

**I-95/395 HOV/HOT Lanes -
Fredericksburg Extension (“Fred Ex”) Project**

Exhibit C -5

Technical Requirements

Attachment 3.4a

Geotechnical Data Report



**GEOTECHNICAL DATA REPORT
FOR
95 EXPRESS LANES FREDERICKSBURG EXTENSION
PRELIMINARY DESIGN**

RFP Conceptual Plans

Stafford County, Virginia

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1.0 INTRODUCTION

The purpose of this document is to present the results of the preliminary geotechnical investigation and to supplement the geotechnical investigation and design requirements contained in Chapter III of the VDOT Materials Division’s Manual of Instructions for the 95 Express Lanes Fredericksburg Extension project. This document also contains information relating to the project specific minimum pavement section.

2.0 PROJECT DESCRIPTION

The project consists of improvements to two areas along the I-95 corridor in Stafford County, Virginia:

- Southern Terminus Extension of the 95 Express Lanes – approximate MP 133.9 to 143.3
- North Stafford Slip Ramp (southbound) / Flyover Ramp HRS (southbound) / Flyover Ramp RHN (northbound) – approximate MP 145.8 to 148.2.

The following improvements are planned to support the project:

- Southern extension of the 95 Express Lanes – the currently proposed extension of the two-lane reversible tolled facility will begin at the southern terminus of the 95 Southern Terminus Extension (STE) I project (approximate MP 143.3) and end to the south at approximate MP 133.9. At its southern terminus, the proposed Express lane extension will tie in to improvements VDOT is proposing at the I-95 / US 17 interchange. The proposed extension is approximately 9.4 miles long and will consist of two travel lanes and two shoulders located in the existing median.
- New entrance and exit points to/from the Express Lanes:
 - Flyover Ramp WGS – exits the 95 Express lanes to I-95 southbound, just north of the US 17 interchange
 - Flyover Ramp HWN – enters the 95 Express lanes from I-95 northbound, just north of Truslow Road
 - On/off ramp at Courthouse Road – provides entrance/exit ramp and traffic circle from east side of Courthouse road
 - North Stafford Slip Ramp (alternative) – enters the 95 Express lanes from I-95 southbound
 - Flyover Ramp HRS (preferred option) – enters the 95 Express lanes from I-95 southbound
 - Flyover Ramp RHN – exits the 95 Express lanes to I-95 northbound, just south of Russell Road.

- Bridges and retaining walls
 - New bridges will be constructed over Potomac Creek and for the four flyover ramps (WGS, HWN, HRS, and RHN)
 - Existing bridges crossing over I-95 will be replaced at Truslow road and American Legion road
 - A total of 12 retaining walls will be required for approach ramps to the flyover bridges, as well as at abutments for the replacement bridges. A retaining wall is also planned north of Courthouse road, separating the Express lanes from the new on/off ramp.
- I-95 Southbound lane realignment – the I-95 southbound lanes will be realigned to the west between approximate MP 138.2 and 139.0 to allow for construction of the 95 Express lanes in this area.
- Sound barrier walls – currently there are three proposed sound barrier walls, summarized below:
 - Approximate Station 113+50 to 134+00 (East of I-95 NB lanes)
 - Approximate Station 129+50 to 137+50 (West of I-95 SB lanes)
 - Approximate Station 339+00 to 357+00 (East of I-95 NB lanes).
- Storm water management ponds and culvert extensions – various locations as required to accommodate the proposed construction.

Figure 1 in Appendix A shows the general site vicinity of the project in addition to mile post locations at several points along the alignment.

3.0 SITE DESCRIPTION

The project site can be generally divided into three areas based on the current state of development:

- Undeveloped median south of 95 STE I – approximate MP 133.9 to 142.8: In general, this area is located between the I-95 northbound and southbound lanes and is heavily vegetated and/or wooded. The distance between the existing lanes varies between less than approximately 50 feet and up to 600 feet, depending on the location. The terrain is undulating and typically not level with the existing northbound and southbound lanes. Embankment side slopes of up to approximately 2H:1V are common. Potomac Creek crosses the alignment at approximate MP 137.0, and wetlands are present at a number of other areas. Most of the project improvements described in Section 2.0 will be constructed within this portion of the site.
- 95 STE I project site currently under construction – approximate MP 142.8 to 144.8: This area is currently in the earthwork phase of construction. Proposed improvements within this portion of the site are limited to the Express Lanes extension to approximate MP 143.3.

- Previously developed for 95 Express Lanes – approximate MP 144.8 to 148.2: This area was previously developed as part of Segment 1 of the 95 Express Lanes project. Proposed improvements within this portion of the site consist of the North Stafford Slip Ramp (approximate MP 145.8 to 146.6), Flyover Ramp HRS (approximate MP 146.2 to 147.1), and Flyover Ramp RHN (approximate MP 146.8 to 148.2).

4.0 OBJECTIVE AND SCOPE

The objective of this preliminary geotechnical investigation is to collect, document, and report geotechnical data sufficient to support the preparation of 30% plans, Technical Requirements, and design-build bidding documents for the 95 Express Lanes Fredericksburg Extension project. To accomplish this objective, HDR completed the following general scope of services:

- Drilled 206 soil test borings to identify subsurface soil, rock, and water conditions in the vicinity of proposed improvements, including embankments, pavements, bridges, retaining walls, culverts, storm water management ponds, and sound barrier walls.
- Obtained 63 pavement cores within the travel lanes and shoulders at proposed tie-in locations with existing roadway.
- Conducted laboratory testing of selected soil and rock samples from the test borings to aid in soil classification and establishment of geotechnical engineering parameters for preliminary design.
- Prepared this Geotechnical Data Report to summarize the subsurface exploration and present the results of the field and laboratory testing programs, as well as considerations for design and construction.

5.0 GEOTECHNICAL EXPLORATIONS

5.1 Existing Geotechnical Data

HDR is aware of the following existing geotechnical data within the general project extents:

- Geotechnical Data Report for I-95 Southbound 4th Lane, Project No. 0095-089-F09, PE101 & 0630-089-202, C501, UPC No. 13558, dated April 13, 2016
- Geotechnical Data Report for I-95 Express Lanes Southern Extension, Project No. 0095-969-991, C501, UPC No. 102711, dated January 26, 2016
- Geotechnical Data Report for Route 630 over I-95 Interchange Reconstruction & Route 630 Widening, Project Nos. 0095-089-F09, PE101 & 0630-089-202, C501, UPC Nos. 13558 & 4632, dated October 21, 2015

- Revised Pavement Report, I-95 from MP 134 to MP 148, NB and SB Lanes, Stafford County, Fredericksburg District, Virginia, GeoConcepts Engineering, Inc., dated August 8, 2014
- Geotechnical Engineering Soil Survey and Minor Structures Report, 95 Express Lanes – Segment 1, Project No. 0095-969-074, HDR Engineering, Inc., dated October 16, 2012.

HDR considered the existing subsurface explorations when developing the preliminary subsurface exploration program and incorporated them, where possible. Approximate locations for selected previous explorations are shown on the boring location plans provided in Appendix A. Previous explorations outside the limits of proposed future improvements may not be shown.

5.2 Preliminary Geotechnical Investigation

HDR planned and executed a preliminary subsurface exploration program to collect geotechnical data in the vicinity of proposed project elements. Traditional soil test borings were used to obtain physical samples for visual/manual classification, laboratory testing, and observation of subsurface water levels. The following sections provide details relative to the preliminary subsurface exploration program.

5.2.1 Soil Test Borings

HDR laid out the proposed exploration program based on the proposed roadway alignment at the time of our exploration. Subsequent shifts or changes to the alignment or structure locations were accommodated in the field when possible. Boring depths were based on preliminary cut and fill depths available to us at the time, or anticipated foundation types for bridges, sound barriers walls, and retaining walls. HDR presented the proposed boring layout to the Fredericksburg VDOT District office prior to commencing field work for their comments and subsequent concurrence.

HDR's field exploration team for the project consisted of GET Solutions, S&ME, and Soil and Land Use Technology (SaLUT). Test borings were completed between late March and mid July 2017. Table 1 provides a brief summary of the exploration team and the amount of drilling each firm completed.



Table 1 – Summary of Exploration Team and Completed Effort

Driller	Office Location	Drilling Equipment / Method	Dates Onsite	Number of Explorations Completed
GET Solutions	Virginia Beach, VA	CME 45/55 track mounted (off-road) CME 45 truck mounted (on pavement) Mud rotary / hollow stem auger	4/3/17 to 7/13/17	101
S&ME	Raleigh, NC	Diedrich D-50 track mounted (off-road) Hollow stem auger / mud rotary / rock core	3/29/17 to 5/3/17	72
Soil and Land Use Technology	Glen Burnie, MD	Acker XLS track mounted (off-road) Mobile B57 truck mounted (on pavement) Hollow stem auger / rock core	3/29/17 to 5/9/17	54
Total Explorations Completed				227

Table 2 summarizes the exploration program, broken down by the relative quantities completed for each of the proposed design elements (bridges, retaining walls, etc.).

Table 2 – Summary of Subsurface Explorations

Exploration Purpose	Exploration Designation	Number of Explorations for Prelim Investigation	Depth Range of Explorations	Total Footage	Approximate Frequency of Explorations
Bridge	17BR-XX	14	46 to 85 feet	979 feet	1-2 per bridge
Retaining Wall	17RW-XX	16	15 to 60 feet	655 feet	1 every 300 feet
Embankment (Cut or Fill) / Pavement Tie-In	17XP-XX	94	7 to 70 feet	2,556 feet	1 every 600 feet
Culvert Extension	17CL-XX	15	15 to 80 feet	584 feet	1 per location
Sound Barrier Wall	17SW-XX	10	29 to 30 feet	299 feet	1 every 600 feet
Pavement Core Only (in travel lane)	17PC-XX	21	Bottom of Subbase	N/A	2 per tie-in location
Storm Water Management	17SWM-XX	23	24 to 25 feet	572 feet	1 per location
Ramps (CHS, HWN, WGS, HPN, HRS, RHN)	17CHS-, 17HWN-, 17WGS-XX, 17HPN-XX, 17RR-XX, 17HRS-XX	22	10 to 60 feet	448 feet	1 every 600 feet
Collector Distributor Rd	17CD-XX	3	15 to 30 feet	74 feet	1 every 600 feet
I-95 SB Lane Realignment	17SBGP-XX	9	10 to 40 feet	166 feet	1 every 600 feet
	Total Explorations	227	Total Footage	6,333 feet	

Notes:

1. Borings completed for North Stafford Slip Ramp have "NSS" in designation.
2. Borings completed for Russell Road Flyover Ramp RHN have "RR" in designation.
3. Borings completed for HRS Flyover Ramp have "HRS" in designation.
4. Approximate frequency of borings shown in table is "proposed" value. Actual spacing of borings in the field may vary depending on length of individual design elements and field conditions encountered at the time of exploration.
5. "XX" indicates two digit numeric identifier.

Test borings were advanced using either mud rotary or hollow stem auger drilling techniques. Standard Penetration Tests (SPT) with split-barrel spoon sampling of soils were conducted in accordance with ASTM D1556 using an automatic hammer. Typically, five 24-inch long SPT

samples were collected in the upper 10 feet of each borehole and at five-foot intervals below a depth of ten feet.

HDR and GETS personnel monitored the drilling in the field, which included overall coordination of drilling activities, visual-manual classification of soil samples, preparation of field exploration logs, monitoring conformance with drilling and sampling criteria, and observation of general site conditions. Groundwater observations were made in open boreholes upon completion of drilling and prior to backfilling.

Pocket penetrometer tests were typically performed on cohesive soil samples at the time of sample collection. The results of the pocket penetrometer tests are shown on the exploration logs provided in Appendix B.

HDR collected bulk soil samples from auger cuttings at 19 of the soil test boring locations. The samples were collected for laboratory testing, including classification, moisture-density relationship, California Bearing Ratio (CBR), and direct shear testing. Bulk sample locations are indicated on the applicable test boring logs in Appendix B and laboratory test results are provided in Appendix C.

Borings advanced through existing pavements were typically backfilled with pea gravel to a depth of approximately two feet below the pavement surface. The remaining two feet were backfilled with grout. Borings not advanced through the existing pavement were backfilled with auger cuttings.

HDR personnel laid out proposed exploration locations in the field using a hand-held, survey-grade Trimble GPS unit. SPT borings and pavement cores were surveyed by Rice Associates for location and surface elevation after drilling was completed.

Station/Offset and Northing/Easting VDOT project coordinates are provided on the exploration logs. Survey data are referenced to North American Datum 1983 (NAD-83) State Plane Virginia (feet). Vertical datum is referenced to North American Vertical Datum 1988 (NAVD-88), also in feet. A summary of the soil test borings is provided in Table A-1 in Appendix A. Test boring logs are provided in Appendix B. As-drilled boring locations are shown on Figure 2 in Appendix A.

5.2.2 Pavement Cores

HDR completed 63 pavement cores in areas where proposed ramps or construction will tie-in to existing pavement sections along the I-95 general purpose or 95 Xpress reversible lanes. The purpose of the pavement cores was to document the existing shoulder and travel lane pavement section thicknesses and composition at the tie-in locations. Table 3 summarizes the proposed tie-in locations and number of pavement cores obtained at each.

Table 3 – Summary of Pavement Core Locations

Pavement Tie-In Location	Lane/Shoulder Location	Approximate MP Location of Explorations	Shoulder Cores	Travel Lane Cores
Ramp HPN	I-95 NB Left lane and shoulder	133.9 to 134.4	5	1
Ramp HWN	I-95 NB Right lane and shoulder	134.3 to 135.0	4	2
Truslow Road	Travel lanes	134.7	--	4
American Legion Road	Travel lanes	138.6	--	2
I-95 SB lane realignment	I-95 SB Right lane and shoulder	138.2 to 139.0	5	1
	I-95 SB Left lane and shoulder		4	1
North Stafford Slip Ramp	95 Xpress lanes West lane and shoulder	145.9 to 146.2	3	2
	I-95 SB Left lane and shoulder	146.2 to 146.6	5	2
HRS Flyover	95 Xpress lanes West lane and shoulder	146.3 to 146.5	3	2
	I-95 SB Right lane and shoulder	146.8 to 147.1	3	2
RHN Flyover	95 Xpress lanes West lane and shoulder	146.8 to 147.1	4	2
	I-95 NB Right lane and shoulder	147.6 to 148.0	4	2
Total Pavement Cores			40	23

The pavement section thickness data is summarized in Table A-4, and logs with photographs of the pavement cores are provided in Appendix B. Pavement core locations are depicted on the boring location plans.

5.3 Design Phase Geotechnical Explorations

Geotechnical explorations were not completed to support preliminary design of toll gantries or sign foundations. A design phase geotechnical investigation shall be performed by the design-builder in accordance with Chapter III of the VDOT Materials Division’s Manual of Instructions to investigate existing subsurface geotechnical conditions in the areas of the proposed improvements. A boring location plan must be approved by the Fredericksburg District Materials Engineer prior to initiation of the design geotechnical investigation. The final geotechnical engineering report must be reviewed and approved by the Fredericksburg District Materials Engineer prior to initiation of construction activities.

6.0 LABORATORY TESTING

GETS, S&ME, SaLUT, and GeoTesting Express conducted laboratory testing on soil and rock samples (jar, bulk, and rock core samples) collected from the subsurface explorations. HDR personnel evaluated the field exploration logs and assigned specific samples for testing. Testing was performed to aid in the classification of soils encountered in the explorations and to support development of geotechnical engineering parameters for preliminary design. Table 4 summarizes the completed laboratory testing.

Table 4 – Summary of Laboratory Testing

Laboratory Test	Specification Referenced			No. of Tests
	VTM	AASHTO	ASTM	
Moisture Content		T 265		1869
No. 200 Wash	25	T 11		352
Grain Size Analysis	25	T 88		144
Atterberg Limits	7	T 89 / 90		222
Standard Proctor	1	T 99		19
California Bearing Ratio	8	T 193		19
Direct Shear		T 236		5
Repeated Direct Shear (fully softened and residual shear strength)	ASTM D3080 and USACE EM-1110-2-1906			3
Total Sulfur Content			D 4239	98
Potential Peroxide Acidity				10

HDR used the following general criteria to assign specific laboratory testing:

- Natural moisture content tests were generally assigned to all jar soil samples, in accordance with the VDOT MOI, Chapter III.
- Standard Proctor and CBR tests were assigned on bulk soil samples collected from proposed cut areas, based on the preliminary profile and cross section drawings available to us.
- Direct shear tests on remolded samples were assigned on five of the bulk samples that classified as granular material (granular soils are more desirable to reuse as embankment fill).
- Fully-softened and residual repeated direct shear tests were assigned on remolded samples of highly-plastic Potomac Formation clay soils observed within cut areas or beneath proposed retaining structures.
- Total Sulfur content tests were assigned in test borings within proposed cut areas where known acid-producing geologic formations intersect the corridor (refer to Section 7.4.2).
- Potential Peroxide Acidity (PPA) testing was conducted on samples where the Total Sulfur content was greater than 0.2%.

A laboratory index table, indicating which testing was performed from each test boring, is provided in Table A-5 in Appendix A. Index testing (natural moisture content, Atterberg Limits, and fines content) results are shown on the test boring logs in Appendix B. A summary of laboratory test results (except for moisture content only samples) is provided in Table A-6 in Appendix A. The laboratory test results are provided in Appendix C.

7.0 GEOLOGIC CONDITIONS

The following sections provide a description of the regional geologic setting, overburden soils, and anticipated geologic hazards within the project site.

7.1 Regional Geologic Setting

The I-95 Express Lanes Fredericksburg Extension project parallels the northeast and southwestern trending Fall Line of Virginia and is located in both the Coastal Plain and Piedmont Physiographic Provinces. The project is located within Coastal Plain Province from approximately 0.3 miles north of Centreport Parkway interchange to approximately 0.8 miles south of the Garrisonville Road interchange. The remainder of the project to the north and south of those limits is located within the Piedmont Province.

The Coastal Plain Province is located between the Fall Line and the Chesapeake Bay. It consists of an eastward-thickening wedge of unconsolidated river/deltaic and marine sediments. The interbedding of fine- and coarse-grained sediments is complex due to irregular deltaic and alluvial deposition, as well as the cyclic marine deposition associated with transgressions and regressions of the sea. Strata unconformities (gaps in the geologic record) due to periods of erosion and regional faulting are common within the western Coastal Plain. As a result, strata composition and thicknesses can vary greatly over short horizontal or vertical distances.

The Piedmont Province is the largest province in Virginia and is located between the Fall Line to the east and the mountains of the Blue Ridge province to the west. The Piedmont has gently rolling hills, deeply weathered bedrock of metamorphic origin, and very little solid rock at the surface. The province is characterized by gently rolling topography that becomes slightly more rugged as it nears the Blue Ridge Province to the West.

7.2 Project Site Overburden Soils and Bedrock

The following overburden soil and rock formations are described from oldest to youngest based on published geologic sources including primarily the VDMME 1993 Geologic Map of VA, 2005 Geologic Map of Stafford Quadrangle, and 2000 Geologic Map of the Fredericksburg Quadrangle. The mapped locations of soil and rock formations specified below relative to project site features (intersecting roadways, streams, etc.). A geologic map of the project is provided in Figure A-1 (VDMME, 1993).

7.2.1 Porphyroblastic Biotite Gneiss (Ymp)

This metamorphic suite is located north and south of Fulk Run. It consists of primarily biotite gneiss and schists, which are characterized as a light and dark colored layered and foliated rock. Micaceous materials make up the darker layers while quartz and feldspar make up the lighter layers. Garnetiferous mica schist is found locally and has foliation consistent with the adjacent gneisses.

7.2.2 Potomac Formation (Kp)

Most of the corridor is underlain by the Cretaceous-aged Potomac Formation. The Potomac Formation can be found along side slopes, lowland areas, and under the older or buried floodplains of the Coastal Plain. Locally, in the upland areas of the project, the Potomac formation can be found below the Tertiary deposits between approximate elevations 205 and 220 feet according to published sources. The formation was deposited in a fluvial-deltaic environment within the western Coastal Plain as a result of sediment transport and erosion from the west. The thickness ranges from few feet in the west to more than 3,500 feet in the eastern Coastal Plain near the continental shelf.

Locally, the Potomac Formation consists of three (3) main sediment types as designated by Mixon's geologic mapping of the Stafford Quadrangle (2005):

- Type I sediment generally consists of light gray to pink to green gray fine- to coarse-grained quartzo-felspathic sand. It commonly is pebbly of metamorphic origin, thick bedded, and poorly sorted. The sediment can also be interbedded with clay-silt matrix of up to 40 percent. The Type I sediments are typically channel bar or point bar deposits.
- Type II sediment generally consists of green to gray, and mottled red to red brown sandy clay and silt, and clayey sand. Clay minerals are mainly illite and smectite. Type II sediments are believed to be the result of localized buried stream channels during flood events.
- Type III sediments generally consist of dark yellowish brown to olive gray lignitic sandy silt, silt, and fine silty sand. Type III soils are typically deposited in swales of point bars or swamps. Locally, the thickness of the formation can be minimal to up to 400 feet.

7.2.3 Lower Tertiary Deposits (TI) - Aquia Formation

In localized areas of higher elevations in the vicinity of the Courthouse Road interchange (Exit 140), the Potomac Formation is overlain by the Aquia Formation of the Tertiary-aged Pamunkey Group. The formation was deposited in a marine environment within the western Coastal Plain and has undergone great erosional unconformity. This formation typically consists of glauconitic (green) fine to medium sand with variable amounts of silt and clay. The sand is thick to massively bedded and is sparsely to abundantly shelly. The green or olive sand weathers to yellowish gray, grayish yellow, and reddish brown color. Unconformable contact between the Aquia and Potomac Formations is commonly delineated by a fine to coarse pebble bed at the base of the Aquia Formation. The thickness of the Aquia formation ranges from a few feet in the western Coastal Plain to more than 100 feet at the Brooke Fault Zone approximately 2.7 miles east of the I-95 corridor.

7.2.4 Chesapeake Group (Tc) – Calvert and Chowan River Formations

The Chesapeake Group of upper Pliocene to lower Miocene aged sediments can also be found at higher elevations above the Potomac Formation in the vicinity of the Roman Church Road cross-over. The Chesapeake Group consists of fine- to course-grained, quartzose sand, silt, and clay and can be variably shelly and diatomaceous. Upper Pliocene includes the Chowan River Formation which is made up of gray to dusky-blue-green clayey and silty fine- to medium-grained sand, which is commonly very shelly and grades laterally into laminated silty clay and upward into cross-bedded, bio fragmental sand, clayey silt, and silty clay. The thickness ranges from 0 to 50 feet. Lower Miocene contains the Calvert Formation, commonly consisting of 2 to 7 fining-upward sequences. These sequences include light- to dark-olive-gray basal, very fine to fine, clayey and silty sand, which is very sparsely to abundantly shelly and grades upward to sandy, diatomaceous clay-silt and diatomite. The thickness ranges from 0 to 600 feet.

7.2.5 Pliocene Sand and Gravel (Tpsg)

The Pliocene Sands and Gravels are also found in the upland areas locally between Enon Road and Truslow Road cross-overs, and at the Route 17 interchange. These sediments consist of interbedded yellowish-orange to reddish-brown gravelly sand, sandy gravel, and fine to course sand, which are typically poorly to well sorted, cross bedded in part and includes lesser amounts of clay and silt in thin to medium beds. Interbedded units are as much as 35 feet thick. This unit is located within southern portion of the project that caps the relatively undissected uplands between Accokeek and Potomac Creeks.

7.2.6 Alluvial Deposits (Qal)

Alluvial deposits exist along the stream channels and floodplain environments associated with Austin Runs (North and South) Accokeek Creek, Potomac Creek, and Fulk Run, as well as other local tributary streams. Alluvial deposits generally consist of gravelly sand, sandy gravel, silt, and clay, as well as organic matter.

7.2.7 Artificial Fill (af)

Artificial fill soils, most likely associated with original construction of the I-95 general purpose lanes, to support roadway grades in lowland areas or where grade separations exist. Embankment fills mainly consist largely of native soils of variable gradation which were removed and recompacted as fill in lowland areas.

7.3 Geologic Hazards

Geologic hazards exist within the project corridor that can have varying impacts on planning, design and construction of a large scale project. The geologic hazards that can impact the design elements of the express lanes are described below based on readily available published sources.

7.3.1 Potomac Formation

The Potomac Formation underlies a majority of the project corridor outside the uplands areas (typically above elevation 200 ft.) based on review of geologic and soil survey maps. The soils of the Potomac Formation occur on side slopes and within the older or buried floodplains of the Coastal Plain. Low to highly plastic silts and clays (ML-MH, CL-CH) of variable thickness underlie surface silts, sands, and gravels. The clay deposits consist of highly fractured and broken clays and silty clays, which have a high shrink-swell potential and can exhibit low shear strengths along existing fissures.

Refer to Section 10.3 of this report for additional discussion.

7.3.2 Corrosion Potential

Overburden soils within the project limits can have varying degrees of corrosion potential and long-term performance impacts on construction materials. Corrosion potential can exist in sands, clays/silts, and weathered rock. The existing acidity levels can negatively impact buried drainage structures and reduce the structural capacity of steel piles. Acidic soils are common in the certain deposits overlying the residual soils and weathered rock of formations including Lower Tertiary Deposits (Tl), Pliocene Sands and Gravels (Tpsg), some alluvial deposits (Qal), Chesapeake Group (Tc), and Potomac Formation (Kp) according to USDA Soil Survey and mapped geologic units (Mixon, 1989).

Refer to Section 10.4 of this report for a discussion of Acid Sulfate Soils.

7.3.3 Fault Conditions / Seismic Potential

Northeastern and southwestern trending faults are mapped and parallel the project alignment, which include of the Fall Hill Fault and Dumfries Fault Zone of the Stafford Fault System. The Stafford Fault system is of the Tertiary period (>2 million years old). Faults of the Dumfries Fault Zone parallel a majority of the project approximately 1 mile west. The project alignment shifts to the west on the northern end in which the faults are approximately 0.3 miles to the west. The Dumfries Fault Zone pinches out 1.8 miles west of the Potomac Creek crossing within the project. Fall Hill Fault parallels the project corridor to the east approximately 0.6 miles or greater. Overturned thrust faults are mapped approximate 0.35 of a mile west of the I-95 and Route 17 interchange and parallels the project alignment to the south.

These faults are high angle or near vertical reverse faults with movement in the up and down directions. Typically the downthrown side of these northeast trending faults is to the east. The vertical displacement of these faults affects the distribution and thickness of the Coastal Plain formations. The downthrown side of the faults (southeast) preserves thicker and more stratigraphic sections. On the northwest side of the faults, the stratigraphy is thinner or absent

because of partial or complete truncation by younger units. Therefore subsurface conditions can vary significantly over a short horizontal distance as well as vertically in the vicinity of a fault zone.

8.0 SUBSURFACE CONDITIONS

The following sections summarize the results of the subsurface explorations completed at the project site. Specific observations, remarks, and comments are reflected on the exploration logs provided in Appendix B.

8.1 Subsurface Soil

HDR drilled 206 test borings as part of its preliminary subsurface exploration program for the 95 Express Lanes Fredericksburg Extension project. Depths of the test borings ranged from approximately 7 feet to 85 feet below existing ground surface, with an average of approximately 30 feet. Subsurface conditions vary along the length of the alignment and consist of sands, silts, clays, highly-weathered rock, and rock. Table A-2 in Appendix A summarizes selected subsurface conditions, including the presence of topsoil, suspected fill, highly-plastic fine-grained soils, very soft to soft fine-grained soils, very loose coarse-grained soils, soils with refusal blow counts, and borings where auger refusal/rock was encountered.

- Topsoil – topsoil thickness was measured in 132 of the test borings and ranges from approximately 1 inch to 12 inches in thickness. The average measured topsoil thickness was approximately 4 inches. Most of the borings were completed in wooded areas within the median and outside the I-95 NB and SB lanes where clearing of small trees, brush, and forest litter may have been required prior to drilling.
- Suspected Fill – suspected fill materials were observed in 47 of the test borings with typical thicknesses ranging from approximately two feet to 16 feet, with a maximum of approximately 21 feet in one test boring. Suspected Fill soils were identified based on observations of soil and site conditions, including: the presence of foreign material such as fragments of asphalt, concrete, wood, brick, angular/sub-angular gravel, or other debris within the otherwise Coastal Plain geology; apparent layering formed by compaction operations; and the presence of fill slopes based on observations of surrounding topography.
- Highly-Plastic Fine-Grained Soils – Highly-plastic fine grained soils (silt or clay with USCS symbol of MH or CH) were observed in 111 of the test borings.
- Very Soft to Soft Fine-Grained Soils / Very Loose Coarse-Grained Soils – Very soft to soft fine-grained soils (silt or clay) have SPT N-values ranging from 0 to 4 blows per foot (bpf), and were observed in 57 of the test borings. Very loose coarse-grained soils have SPT N-values ranging from 0 to 3 blows per foot (bpf), and were observed in 46 of the test borings.

- Soils with Refusal Blow Counts – Refusal blow count soils have SPT N-values greater than 50 blows over a 6-inch interval. Refusal blow counts indicate relative densities of “very dense” for coarse-grained soils, and consistencies of “very hard” for fine-grained soils. Soils with refusal blow counts were observed in 69 of the test borings.
- Auger Refusal / Rock – auger refusal was encountered in 12 of the test borings within the depth explored. The depth to auger refusal ranged from the ground surface (in one case) to approximately 71 feet below existing ground surface. Rock was cored in four of the test borings where auger refusal was encountered. In one boring (17XP-26), auger refusal was encountered and rock was cored from a depth of 7.7 feet to 10 feet (the rock core is described as Conglomerate, which can be encountered in Type I Potomac Formation sediments). Below this depth, soil was encountered to a depth of 25 feet, where the boring was terminated. In the remaining three borings, between 5 feet and 15 feet of rock was cored.

8.2 Subsurface Water

Subsurface water was observed in 94 of the test boring explorations completed for this study at the time of drilling (in open boreholes prior to backfilling) at depths ranging from approximately 0 feet to 59 feet below ground surface. The average depth to subsurface water, where encountered, was approximately 16 feet below ground surface. Refer to Table A-2 in Appendix A for a summary of water level measurements made in the test borings at the time of drilling, after completion of drilling, and at least 24 hours after drilling (prior to backfilling).

In 28 boreholes located in the vicinity of potential storm water management ponds, 1.25-inch diameter slotted PVC piezometers were installed to observe post-exploration water levels. The piezometers were generally installed to a depth of 25 feet and backfilled with auger cuttings. Table A-3 in Appendix A summarizes subsurface water level measurements in the piezometers. Refer to Table 4 and the exploration logs in Appendix B for specific observations of subsurface water at the exploration locations.

Note that water was introduced into the borehole as part of the drilling process in some test borings and may have influenced water level measurements made in those explorations (drilling methods are noted on the test boring logs). Subsurface water levels tend to fluctuate due to precipitation, season, temperature, site grading, and other factors that may be different from those prevailing at the time HDR completed its subsurface explorations.

9.0 PAVEMENTS

9.1 Existing Pavement Thickness

Pavement thickness information was collected at 63 locations by coring. As shown in Table 3, 40 cores were taken in the shoulders and 23 cores were taken in the travel lanes at different tie-in locations. The pavement section thickness data is summarized in Table A-4 in Appendix A. Specific observational comments related to the recovered core are contained on the pavement core photographic logs provided in Appendix B. Table 5 summarizes the existing pavement thickness data obtained at the different tie-in locations.

Table 5 – Summary of Existing Pavement Thickness from Core Results

Pavement Tie-In Location	Lane/Shoulder Location	Approximate MP Location of Explorations	Pavement Section Thickness Shoulder	Pavement Section Thickness Travel Lane
Ramp HPN	I-95 NB Left lane and shoulder	133.9 to 134.4	5.3 to 6.0 inches AC <u>10 to 14 inches Aggregate</u> 16 to 19 inches total	6.0 inches AC 9.3 inches PCC <u>2 inches Aggregate</u> 17 inches total
Ramp HWN	I-95 NB Right lane and shoulder	134.3 to 135.0	6.5 to 10.5 inches AC <u>2 to 16 inches Aggregate</u> 12 to 22 inches total	2.5 to 7.5 inches AC 9.5 inches PCC <u>6 to 7 inches Aggregate</u> 18 to 24 inches total
Truslow Road	Travel lanes	134.7	No shoulder cores taken	5.0 to 7.0 inches AC <u>0 to 11 inches Aggregate</u> 5 to 18 inches total
American Legion Road	Travel lanes	138.6	No shoulder cores taken	7.0 to 8.0 inches AC <u>5 to 7 inches Aggregate</u> 12 to 15 inches total
I-95 SB lane realignment	I-95 SB Right lane and shoulder	138.2 to 139.0	5.3 to 7.3 inches AC <u>12 to 18 inches Aggregate</u> 18 to 23 inches total	11.0 inches AC 9.0 inches PCC <u>6 inches Aggregate</u> 26 inches total
	I-95 SB Left lane and shoulder		5.8 to 7.3 inches AC <u>15 to 18 inches Aggregate</u> 22 to 24 inches total	10.0 inches AC 9.0 inches PCC <u>7 inches Aggregate</u> 26 inches total
North Stafford Slip Ramp	95 Xpress lanes West lane and shoulder	145.9 to 146.2	4.5 to 5.0 inches AC <u>11 to 25 inches Aggregate</u> 16 to 30 inches total	15.0 to 16.3 inches AC <u>8 to 9 inches Aggregate</u> 24 inches total
	I-95 SB Left lane and shoulder	146.2 to 146.6	3.0 to 12.5 inches AC <u>0 to 11 inches Aggregate</u> 6 to 17 inches total	7.5 to 8.8 inches AC 9.5 inches PCC <u>5 to 7 inches Aggregate</u> 23 to 24 inches total
HRS Flyover	95 Xpress lanes West lane and shoulder	146.3 to 146.5	3.8 to 5.0 inches AC <u>15 to 18 inches Aggregate</u> 19 to 23 inches total	12.5 to 15.5 inches AC <u>11 to 18 inches Aggregate</u> 27 to 31 inches total
	I-95 SB Right lane and shoulder	146.8 to 147.1	11.3 to 11.8 inches AC <u>1 to 2 inches Aggregate</u> 12 to 13 inches total	8.0 to 8.3 inches AC <u>9.0 to 10.0 inches PCC</u> 18 to 19 inches total
RHN Flyover	95 Xpress lanes West lane and shoulder	146.8 to 147.1	4.3 to 7.8 inches AC <u>11 to 18 inches Aggregate</u> 19 to 23 inches total	15.5 to 15.8 inches AC <u>9 to 10 inches Aggregate</u> 24 to 26 inches total
	I-95 NB Right lane and shoulder	147.6 to 148.0	10.5 to 15.3 inches AC <u>1 to 4 inches Aggregate</u> 13 to 18 inches total	8.0 to 8.8 inches AC 9.0 to 9.3 inches PCC <u>3 to 6 inches Aggregate</u> 21 to 24 inches total
Notes: AC = Asphalt Concrete Pavement PCC = Portland Cement Concrete Pavement A thickness of "0" indicates the layer was not observed in at least one of the pavement cores within the tie-in location. Refer to Table A-4 in Appendix A for specific, individual core measurements.				

9.2 Minimum Pavement Section Requirements

Minimum pavement sections provided herein are for proposal preparation purposes only. The design-builder will be required to validate the adequacy of the minimum pavement sections and notify the Concessionaire of its findings during the Scope Validation Period. If the selected design-builder confirms that the minimum pavement sections are inadequate for actual design conditions, the design-builder shall notify the Concessionaire during the Scope Validation Period of the necessary changes, if any. Acceptable changes are limited to increasing the thickness of the base or subbase layers specified below. Any changes to the pavement sections specified below must be approved by the Concessionaire. The design-builder will be responsible for the final design and construction of the pavements for this project in accordance with the Technical Requirements.

Table 6 summarizes the preliminary traffic design parameters used to establish the minimum pavement sections for the 95 Express Lanes Fredericksburg Extension project.

Table 6 – Summary of Preliminary Design Parameters for Pavement Design

Parameter	95 Xpress Travel Lanes and Ramps	Truslow Road	American Legion Road
Design life	30 years	20 years	20 years
ADT – First Year	18,500 VPD 2020	2,616 VPD 2020	3,309 VPD 2020
ADT – Design Year	22,324 VPD 2049	7,569 VPD 2039	13,077 VPD 2039
Growth rate	0.65% per year	5.75% per year	7.5% per year
%Passenger Vehicles	97%	97%	97%
%2-Axle, Single Unit	3%	3%	3%
%3-Axle, Tractor Trailer	0%	0%	0%
ESAL Factors (Flexible)	0.0002 / 0.46 / 1.05	0.0002 / 0.46 / 1.05	0.0002 / 0.46 / 1.05
Lane Distribution	90%	100%	100%
Directional Distribution	100%	50%	50%
Design ESALs (Flexible)	2,807,066	239,286	365,995
Resilient Modulus, M _r	7,500 psi	7,500 psi	7,500 psi
Required Structural Number	5.05	2.95	3.00

The minimum pavement designs are based upon the following criteria: (a) a minimum design CBR value of 5 to a depth of approximately two feet below subgrade elevation, (b) all subgrade is compacted in accordance with the applicable sections of the Road and Bridge specifications and applicable special provisions and, (c) that all unsuitable materials at, or below, subgrade have been removed or modified in accordance with applicable sections of RFP documents.

Tables 7 through 9 provide the minimum pavement sections for the 95 Xpress travel lanes, shoulders, and ramps, as well as minimum pavement sections for reconstructed portions of Truslow and American Legion roads.

Table 7 – Minimum Pavement Section, 95 Express Lanes Travel Lane and Ramps

Layer	Material	Layer Coefficient	Thickness	Layer Structural Number
1-Surface	Asphalt Concrete, Type SM-12.5E	0.44	2 in.	0.9
2-Intermediate	Asphalt Concrete, Type IM-19.0A	0.44	2 in.	0.9
3-Base	Asphalt Concrete, Type BM-25.0A	0.44	11 in.	4.8
4-Drainage	Aggregate Base Material, Type I, Size 21B	0.12	4 in.	0.5
5-Cement Treated Aggregate	Aggregate Base Material, Type I, Size 21A stabilized with 4% hydraulic cement by weight	0.20	6 in.	1.2
Totals			25 in.	S _N = 8.3

Table 8 – Minimum Pavement Section, 95 Express Lanes Shoulder

Layer	Material	Layer Coefficient	Thickness	Layer Structural Number
1-Surface	Asphalt Concrete, Type SM-12.5E	0.44	2 in.	0.9
2-Intermediate	Asphalt Concrete, Type IM-19.0A	0.44	2 in.	0.9
3-Aggregate Base	Aggregate Base Material, Type I, Size 21B	0.12	21 in.	2.5
Totals			25 in.	S _N = 4.3

Table 9 – Minimum Pavement Section, American Legion and Truslow Rd

Layer	Material	Layer Coefficient	Thickness	Layer Structural Number
1-Surface	Asphalt Concrete, Type SM-9.5A	0.44	1.5 in.	0.7
2-Base	Asphalt Concrete, Type BM-25.0A	0.44	4.0 in.	1.8
3-Aggregate Subbase	Aggregate Base Material, Type I, Size 21B	0.12	6.0 in.	0.7
Totals			11.5 in.	S _N = 3.1

10.0 GEOTECHNICAL CONSIDERATIONS FOR DESIGN AND CONSTRUCTION

10.1 Earthwork

Substantial amounts of earthwork construction will be required to grade the mostly undeveloped, wooded portions of the project site. Earthwork challenges that should be considered during design may include, but are not limited to, clearing and grubbing, topsoil stripping, excavation, subgrade preparation, subdrainage, compacted fill placement, retaining wall construction, embankment construction, removal and treatment of unsuitable materials, allowable cut and fill slope angles, evaluation of stability and settlement in both design and construction for retained fills and non-retained fills. It will be the Design-BUILDER's responsibility to ensure that the stability and settlements of the embankments have been designed to the tolerances specified in the RFP for this project.

Table A-2 in Appendix A summarizes selected observed subsurface conditions, including the presence of topsoil, suspected fill, highly-plastic fine-grained soils, very soft to soft fine-grained soils, very loose coarse-grained soils, soils with refusal blow counts, and borings where auger refusal/rock was encountered.

For subgrades, it will be important to address appropriate methods for evaluation of subgrade suitability, and procedures for mitigating unsuitable subgrade materials. With respect to subdrainage, the design-builder shall identify areas where subdrainage is needed beyond that required by the standard VDOT specifications/special provisions and design the appropriate types of subdrainage. The design-builder shall evaluate the suitability of on-site soils for use as fill or backfill with respect to soil types, CBR values, and moisture contents.

Nineteen bulk samples of soils within proposed cut areas were collected from the test borings and tested in the laboratory for natural moisture content, classification, Standard Proctor, and CBR. Natural moisture content for the samples ranged between approximately 7% dry to 9% wet of the optimum moisture content. CBR values ranged between 1.4 and 10.7, with an average of approximately 6 (one sample had a CBR value of 26.2, which was not included in the range or average). Swell percentage of the samples ranged between approximately 0.0% and 3.7%, with an average of approximately 1.3%. Drained direct shear testing was conducted on five remolded samples that classified as granular materials. The test results are presented in Appendix C.

Moisture conditioning of the on-site soils should be anticipated and considered in design and construction of the project. The clay and silt soils will likely be difficult to compact if wet of optimum moisture content and/or during periods of wet weather due to their propensity to absorb and retain water. Fines content of the bulk samples ranged between approximately 27% and 95%, with an average of approximately 53%. It will be important that the design-builder address the potential impact that these soils could have on earthwork operations and how they should be treated during construction. As an alternative to aeration and/or mechanical drying, the design-builder may elect to use pelletized quick lime to dry soils that are excessively wet.

10.2 Unsuitable Materials

Unsuitable materials with respect to embankment fill, bedding for structures, and cut area subgrades directly beneath pavements are defined as any soils with one or more of the following properties:

- Greater than 50% passing the No. 200 sieve with a Liquid Limit greater than 50,
- Greater than 50% passing the No. 200 sieve with a Plasticity Index greater than 25,
- Classifies as CH, MH, OH and OL in accordance with the Unified Soil Classification System (USCS),
- Contains more than 5% by weight organic matter,

- A design California Bearing Ratio (CBR) value less than 5 and/or a swell greater than 5% as determined from CBR testing in accordance with VTM-8.
- Untreated, chemically aggressive soils (refer to Section 10.4)

Soils that are otherwise suitable, but are in a condition that is +/- 3% of optimum moisture content (i.e. saturated or very dry and/or very loose or very soft coarse/fine grained soils that exhibit excessive pumping, weaving or rutting under the weight of construction equipment) are also considered unsuitable unless they can be moisture conditioned to an acceptable moisture content range that allows adequate compaction to meet project specifications.

Based upon the available geologic/soils mapping and local experience, unsuitable soils consisting of highly plastic clays and elastic silts, chemically aggressive soils and soils with design CBR values less than 5 should be expected to be encountered on this project. Refer to Table A-2 in Appendix A for topsoil thickness measurements, subsurface water depth measurements, and observations of soft and loose soils, and highly-plastic fine-grained soils at test boring locations.

Where unsuitable soils are encountered in situ within 2 vertical feet of subgrade for pavements or minor structures, the following mitigation measures may be considered:

- Complete removal to a minimum of 2 feet horizontally beyond the outside edge of shoulder pavement or bedding limits and backfill with VDOT Select Material Type I with minimum design CBR of 5; or
- Partial removal to a minimum of 2 feet vertically below final subgrade elevation, place a woven geotextile subgrade stabilization fabric, and backfill above the fabric with VDOT Select Material Type I with minimum design CBR of 5; or
- Chemical stabilization of the unsuitable soils to a minimum depth of 12 inches below final subgrade.

Acceptable field evaluation methods to determine the extent (both lateral and vertical) of undercut typically include, but are not limited to: visual/manual classification of soils, test pit, hand auger, or SPT boring explorations, probe rods (including dynamic cone penetrometers), proof-rolling of subgrade with appropriately sized equipment, field CBR tests, or field moisture content determinations.

The final determination of unsuitable soil limits and quantities is the responsibility of the Design-Builder once the final detailed design subsurface investigation is completed. The Design-Builder should consider this when preparing their bid. Excessively soft/loose or saturated soils not located beneath and/or impacting the pavement subgrade may also be unsuitable based on the Design-Builder's investigation and analysis and must be removed to provide adequate support for embankments, structures or drainage items.

The Design-Builder's qualified geotechnical engineer must identify unsuitable materials and provide justification for the selected treatment method, or methods, to verify that there will be no adverse effect on the performance of embankments, structures or drainage items. Topsoil or other organic soils are also considered unsuitable for use in embankment fills other than as a cover for slopes for the purpose of establishing vegetative cover. When used as cover for slopes, the thickness of topsoil shall not exceed 12 inches.

10.3 Potomac Formation Soils

The Potomac Formation underlies a majority of the project corridor outside the uplands areas (typically above elevation 200 ft.) based on review of geologic and soil survey maps. The soils of the Potomac Formation occur on side slopes and within the older or buried floodplains of the Coastal Plain. Low to highly plastic silts and clays (ML-MH, CL-CH) of variable thickness underlie surface silts, sands, and gravels. The clay deposits consist of highly fractured and broken clays and silty clays, which have a high shrink-swell potential and can exhibit low shear strengths along existing fissures.

Potomac formation clays can present stability issues over extended periods of time due to the potential for fully-softened shear strengths to develop along fissures in the clay. Exposure of the clay to disturbance and water from construction activities can cause additional softening and further weakening along the fissures. The Potomac clays can also exhibit slickensides (previously sheared surfaces) having a lower bound (residual) shear strength along the fissures that impact overall stability. Cut slope and embankment instability, and poor foundation support are common within the Potomac Formation. Potomac Formation clays/silts have been regionally identified as "problem" soils that require special treatment during design and construction.

Identification of the location, quantities, and treatments of high-plasticity Potomac Formation clay and silt soils will be important to consider during D-B proposal preparation. VDOT has successfully used these materials by compacting them in confined embankment fills and capping them with suitable subgrade fill material. This method of treatment of highly plastic soils will be acceptable on this project provided it is adequately engineered and constructed.

HDR assigned three composite samples of highly-plastic Potomac Formation clay and silt soils for repeated direct shear testing. The purpose of the testing is to aid in establishing fully-softened and residual shear strength parameters for the Potomac formation soils. In accordance with Chapter III of the VDOT MOI (July 2016), the tests were run at four normal stresses ranging from 3 psi to 30 psi. After thoroughly mixing, the laboratory processed the composite samples through the No. 40 sieve and moisture conditioned them to the approximate average Liquid Limit. The samples were allowed to hydrate for two days and were consolidated before shearing. A summary of the composite samples is provided in Table 10.

Table 10 – Composite Samples for Fully-Softened and Residual Direct Shear Testing

Composite Sample No.	Location	Boring	Depth Range (ft)	Liquid Limit	Plasticity Index	% Silt/Clay	USCS Symbol
1	Ramp WGS Flyover, south approach	17RW-09	4 to 25	80	49	100	CH
		17BR-10	13 to 25	71	44	93	CH
2	Ramp RHN Flyover	17RR-BR-10	28 to 50	63	47	97	CH
		17RR-BR-11	33 to 65	65	50	96	CH
		17RR-RW-12	33 to 55	76	56	95	CH
3	Cut area, north of Courthouse Rd	17XP-21A	6 to 24	56 to 65	19 to 32	89 to 90	MH
		17XP-24	6 to 40	53 to 70	20 to 31	99	MH

Fully-softened and residual direct shear testing results are provided in Appendix C.

10.4 Acid Sulfate Soils

Acid sulfate soils form when sulfide-bearing materials are excavated from beneath the ground surface and exposed to the atmosphere. Certain formations of the Coastal Plain and Piedmont Province contain such sulfide rich sediments. The sulfides, which are generally in the form of pyrite, oxidize to produce sulfuric acid, iron oxides and hydroxides, and sulfate precipitates. This process typically results in highly acidic soil (pH less than 3.5) and acidic, metal-laden surface runoff. The formation of sulfuric acid can cause degradation of construction materials, weathering of fill soils, depletion of vegetation leading to erosion, and produce acid drainage that can threaten local surface water quality. The sulfide occurrence is a function of geologic setting or formation. The geologic formations known for containing sulfide and producing acidic conditions within the project limits are the Lower Tertiary Deposits (Tl) and, Chesapeake Group (Tc). If highly sulfidic materials are encountered, these materials must be properly managed and may require adequate development of remediation procedures (Orndorff and Daniels, 2003).

10.4.1 Identification of Acid Sulfate Soils

Two analytical tests are commonly used to evaluate the potential acidity of soils and rock. In general, samples are first tested for their total sulfur content. According to the Virginia Transportation Research Council (VTRC) report, samples that contain less than approximately 0.2% sulfur have little acid-producing potential. Samples shown to contain greater than 0.2% sulfur can then be tested for Potential Peroxide Acidity (PPA). The results of the PPA test are in terms of a calcium carbonate equivalent, or how much lime must be added to neutralize the acidity.

HDR tested 98 soil samples at discrete depths for Total Sulfur content. Samples were selected from borings within proposed cut areas (based on the roadway profile shown in the RFP Conceptual Plans) that were intersected by, or in close proximity to, mapped geologic formations known to contain acid producing soils (specifically, lower tertiary marine sediments and the



Chesapeake group). The full results of the tests are provided in Appendix C and summarized in Table A-8. A summary of the Total Sulfur Content testing is provided in Table 11.

Table 11 – Summary of Total Sulfur Content Testing

Boring	Station	Depth Range Tested	No. of Samples at Discrete Depth Intervals Tested for Total Sulfur Content	Samples with Total Sulfur Content > 0.2%
17XP-48	291+94	0 to 10 feet	1	None
17XP-47	296+06	4 to 28 feet	4	None
17XP-46	300+94	4 to 20 feet	4	None
17XP-45	303+95	0 to 35 feet	5	1 Sample 23 to 25 feet
17XP-44	305+91	13 to 55 feet	9	4 Samples 28 to 45 feet
17XP-43	307+99	0 to 25 feet	4	1 Sample 18 to 20 feet
17SWM-13	322+62	2 to 20 feet	4	None
17XP-40	329+94	2 to 15 feet	6	None
17XP-39	335+92	2.3 to 12.3 feet	6	None
17SPGP-04	337+70	2 to 35 feet	5	None
17XP-38	343+89	2 to 15 feet	6	None
17XP-37	348+91	2 to 15 feet	6	None
17SWM-12	353+19	2 to 25 feet	4	1 Sample 23 to 25 feet
17SWM-11	357+14	4 to 20 feet	4	None
17XP-30	394+35	0 to 13 feet	1	None
17SWM-08	400+27	0 to 25 feet	6	None
17XP-29	406+58	0 to 10 feet	1	None
17XP-28	415+90	0 to 25 feet	4	2 Samples 18 to 25 feet
17XP-26	428+15	0 to 8 feet	2	None
17XP-24	440+06	0 to 25 feet	3	None
17XP-23	442+23	0 to 60 feet	7	1 Samples 38 to 40 feet
17XP-22	445+24	0 to 35 feet	6	None

Ten samples had a total sulfur content greater than 0.2% and were tested for PPA. A summary of the PPA test results is provided in Table 12.

Table 12 – Summary of Potential Peroxide Acidity (PPA) Testing

Boring	Station	Average Depth (feet)	Average Elevation (feet)	Sample Color	USCS Symbol	Total Sulfur Content (%)	PPA Result ¹
17XP-45	303+95	24	187	Blue-Gray	ML	1.3	34.5
17XP-44	305+91	29	198	Blue-Gray	CH	2.1	59.0
		34	193	Blue-Gray	CH	0.3	0.8
		39	188	Blue-Gray	CH	0.3	0.5
		44	183	Blue-Gray	CH	1.1	24.7
17XP-43	307+99	19	198	Gray	CL	0.8	19.5
17SWM-12	353+19	24	180	Gray	SP-SC	0.2	7.1
17XP-28	415+90	19	199	Blue-Gray	MH	5.6	170.1
		24	194	Blue-Gray and Brown	MH	0.9	21.7
17XP-23	442+23	39	184	Blue-Gray	MH	4.6	136.2

¹ PPA result expressed in units of tons of lime per 1,000 tons of material required to reach a pH of 7

Figure 4 in Appendix A summarizes acid sulfate soil sampling and testing locations within the project corridor. Based on the results shown in Table 12, the following is noted:

- Nine of the 10 samples are fine-grained with a USCS symbol of ML, CL, MH, or CH. The 10 samples are colored gray to blue-gray.
- The 10 samples were collected from depths greater than approximately 19 feet below existing ground surface. The sample depths correspond to elevations ranging from approximately El. 180 feet to 199 feet.
- Two of the 10 samples have PPA results ranging from approximately 136 to 170 tons of lime per 1,000 tons of material. This is approximately equivalent to 380 to 480 pounds of lime per cubic yard of soil requiring treatment. These areas qualify as “extremely difficult” to mitigate according to the VTRC report.

10.4.2 Mitigation of Acid Sulfate Soils

The soils at the site are known to be potentially acidic due to the presence of acid sulfate soils. All structures in contact with on-site soils shall be designed to resist corrosion and to be functional for the design life indicated in the Contract Documents, unless specific testing determines that the soils are not currently or potentially acidic.

The acidic nature of the soils is also problematic for establishing vegetative growth; as such, all cut and fill surfaces shall be treated appropriately such that a high quality vegetative cover can be established and maintained.

The Design-Builder shall conduct a design-level investigation for the presence of acid sulfate soils along the alignment of the proposed construction, assess the potential impacts, and implement appropriate avoidance and/or mitigation measures, if encountered. Prior to final seeding, the Design-Builder shall perform Acid-Base Accounting Tests per EPA Publication 600/2-78-054 at a minimum rate of 20 tests per acre. The samples will be collected from the top six (6) inches of any area designated to receive seeding. Upon completion of the testing, the Design-Builder shall submit a written report containing the test results and plan for the application of lime.

Lime shall be applied at 1.25 times the net neutralizer deficiency noted in the test results. As an example, if the net neutralizer deficiency is found to be 12.77 tons (calcium carbonate equivalent in tons per acre/1000 tons of material), lime shall be applied at 15.96 tons per acre. In no case shall lime be applied at a rate of less than four (4) tons per acre, despite the results of the Acid-Base Accounting. In areas where the amount of lime needed is greater than four (4) tons per acre, the Design-Builder shall blend the lime into the upper six (6) inches of soil by disking or similar blending method to fully incorporate the lime in the soil.

Mitigation measures (singularly or in combination) that may be considered by the Design-Builder include, but are not limited to:

- Avoidance:
 - Covering unexcavated, undisturbed acid sulfate soils with non-aggressive fill soils.
- Minimization of Disturbance:
 - Adjust alignment and cut/fill areas to avoid acid sulfate soils.
 - Design drainage structures and piping not to penetrate acid sulfate soil layers.
 - Avoid activities resulting in fluctuations (lowering) of the groundwater table as they may lead to the exposure of potential acid sulfate soils to oxygen.
- Neutralization:
 - Commonly used mitigation technique where acid sulfate soils are mixed with alkaline materials.
 - Alkaline materials may include fine agricultural lime, dolomite, magnesite, hydrated lime, and sodium bicarbonate.
 - Neutralization must be supported by an appropriate level of field and laboratory testing.
- Strategic Reburial:
 - Suitable for chemically aggressive soils that have been neutralized and effectively covered with non-aggressive fill.
 - Suitable for acid sulfate soils provided they are placed in a condition that will remain submerged by standing or surface waters.

10.5 Slope Design

Cut and fill slopes shall be no steeper than 2H:1V unless supported by engineering analyses based on site specific field investigation and site specific laboratory strength testing. Slopes steeper than 2H:1V must be approved by the Concessionaire and VDOT. All cut and fill slopes shall be analyzed and designed in accordance with the most recent version of Chapter III of the VDOT Materials Division’s Manual of Instructions. All cut and fill slopes shall be designed to be stable for the interim construction stages, for the end-of-construction condition, and for design-life conditions.

10.6 Bridge Design

New or replacement bridges will be required at seven locations as part of the project. Typically deep foundations are required for support in the area in order to limit differential settlement of the structure. Deep foundations usually consist of either driven piles or drilled shafts. Issues to be considered during the design and construction phases of the project for deep foundations typically include, but are not limited to, axial capacity, lateral capacity, negative shaft resistance, scour, settlement, pile group effects, drive-ability, load testing programs, and use of appropriate resistance factors in design. HDR completed test borings in the vicinity of most of the proposed bridge abutments, which are summarized in Table 13.

Table 13 – Summary of Bridge Borings

Ramp / Road	Potential Wall Location	Borings Completed	Boring Depth	Comments on Subsurface Conditions
Ramp WGS Flyover	South Abutment	17BR-10	75 feet	Dense and hard to very hard soil below 43 feet
	North Abutment	17BR-09	50 feet	Dense to hard soil below 28 feet
Truslow Road Bridge	West Abutment	17BR-07	80 feet	Dense to hard soil below 58 feet
	East Abutment	17BR-08	85 feet	Dense soil at 83 feet
Ramp HWN Flyover	South Abutment	17BR-06	75 feet	Dense soil below 68 feet
	North Abutment	17BR-05	75 feet	Dense to Very dense soil below 63 feet
Potomac Creek Bridge	South Abutment	17BR-04	46 feet	Refusal blow counts below 13 feet Auger refusal at 29 feet Rock cored from 29 feet to 46 feet
American Legion Rd Bridge	West Abutment	17BR-02	80 feet	Very hard to dense soil below 73 feet
	East Abutment	17BR-03	75 feet	Dense soil below 68 feet
HRS Flyover	South Abutment	17HRS-BR-09	59 feet	Dense to Very Dense below 28 feet
	North Abutment	17HRS-BR-08	57 feet	Dense to Very Dense and Very Hard below 33 feet
Ramp RHN - Russell Rd Flyover	South Abutment	17RR-BR-11	83 feet	Very Dense to Very Hard below 68 feet
	North Abutment	17RR-BR-10	68 feet	Dense to Very Hard below 53 feet

10.7 Retaining Wall Design

Twelve retaining walls will be required to support grade changes throughout the project alignment. Wall heights on the project may vary from approximately five feet up to a maximum of approximately 54 feet. Issues to be considered during the design and construction phases of the project for retaining walls typically include, but are not limited to, evaluation of external stability (bearing capacity, sliding, overturning), total and differential settlement, confirmation of bearing requirements in the field, and settlement monitoring. Typical mitigation measures for settlement and stability concerns include the use of slip joints, lighter-weight fill materials, increasing the reinforcement strap lengths, or the use of ground improvement beneath the bearing surface of the walls. Additionally, design of retaining walls must account for the presence of Potomac Formation clay and silt soils, where present, modeled with appropriate shear strength parameters (discussed in Section 10.3).

HDR completed test borings in the vicinity of the proposed retaining walls, which are summarized in Table 14. The retaining wall numbers (1 through 12) correspond to the RFP Conceptual Wall Plans. Bridge borings (with designation “BR”) also serve as retaining wall borings at the bridge abutments.

Table 14 – Summary of Retaining Wall Borings

Ramp / Road	Retaining Wall No.	Wall Location	Approx. Max. Wall Height (feet)	Borings Completed	Range of Depths Drilled
Ramp WGS Flyover	1	South Approach	52	17RW-09, 17BR-10	40 to 75 feet
	2	North Approach	32	17BR-09, 17RW-08, 17RW-07	30 to 50 feet
Truslow Road Bridge	3	East Abutment	16	17BR-08	85 feet
	4	West Abutment	18	17BR-07	80 feet
Ramp HWN Flyover	5	South Approach	54	17BR-06	75 feet
	6	North Approach	46	17BR-05, 17RW-06, 17RW-05, 17RW-04	15 to 75 feet
American Legion Rd Bridge	7	West Abutment	26	17BR-02	80 feet
Courthouse Rd	8	b/w 95 XP and Ramp CHS	12	17XP-24, 17XP-24A	30 to 40 feet
Ramp HRS Flyover	9	South Approach	36	17HRS-BR-09, 17HRS-RW-10, 17HRS-RW-11	40 to 60 feet
	10	North Approach	38	17HRS-BR-08, 17HRS-RW-07	55 to 60 feet
Ramp RHN Flyover	11	South Approach	42	17RR-RW-14, 17RR-RW-13, 17RR-RW-12, 17RR-BR-11	25 to 85 feet
	12	North Approach	54	17RR-BR-10, 17RR-RW-09, 17RR-RW-08	40 to 70 feet

11.0 LIMITATIONS

The information contained in this document has been prepared to facilitate preparation of the proposal for this project and should not be solely relied upon for the final design and construction of this project. A design level geotechnical investigation must be performed by the Design-Builder

to verify and supplement the information included in this document. Design-Builders shall refer to the Contract for further information regarding the required investigations and identification, resolution, and responsibility for differing site conditions.

The data included in this report depict the subsurface soil, ground water, and existing pavement conditions at the specific locations where the borings were performed. These conditions may vary at other locations beyond, or between, these specific locations. Accordingly, the Concessionaire does not warrant or guarantee that the information provided on the logs, or in this report, can be projected as indicative of conditions beyond the limits of the borings, and any such projection is purely interpretive. In addition, the ground water levels recorded on the boring logs indicate the ground water conditions that existed at the time of the investigation. Ground water levels may vary considerably, with time, according to prevailing climate, rainfall, surface run-off, evaporation, construction and other factors.

The data are made available to bidders in order that they may have access to subsurface data identical to that which is possessed by the Concessionaire, and are not intended as a substitute for personal investigation, interpretation and judgment by others. Also, the information contained herein represents borings that were performed by the Concessionaire and may not represent all of the borings performed on the project, particularly if consultant designers performed work under self-contained geotechnical/design contracts.

The minimum pavement sections and discussion of geotechnical considerations as presented in this report are based on the information revealed by the preliminary exploration. The Concessionaire has attempted to provide for normal contingencies, but the possibility remains that unexpected conditions may be encountered during subsequent site explorations and construction. The design-builder must perform additional test borings and laboratory testing to develop the design for this project and to meet the minimum requirements outlined in Chapter III of the current VDOT Material Division's Manual of Instructions and the current AASHTO LRFD Bridge Design Specifications, 2014 and VDOT Modifications.

The Concessionaire has endeavored to complete the services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions as this project.



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APPENDIX A

FIGURES AND TABLES

Figure 1: Site Vicinity Map

Figure 2: As-Drilled Boring Location Plan

Figure 3: Geology Map

Figure 4: Acid Sulfate Soil Sampling and Testing Locations

Table A-1: Summary of Subsurface Explorations

Table A-2: Summary of Subsurface Conditions

Table A-3: Piezometer Water Depth Observations

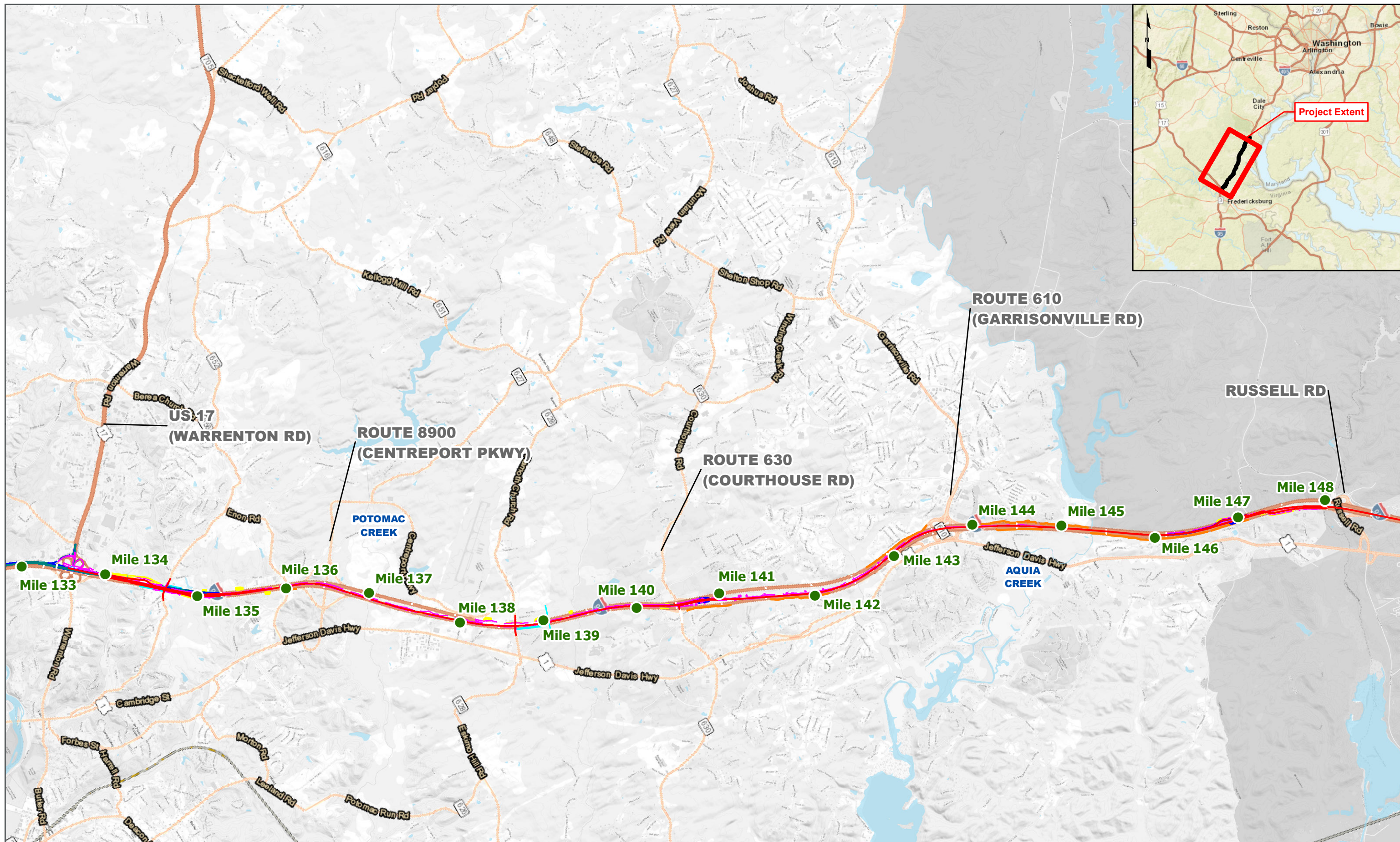
Table A-4: Summary of Pavement Cores

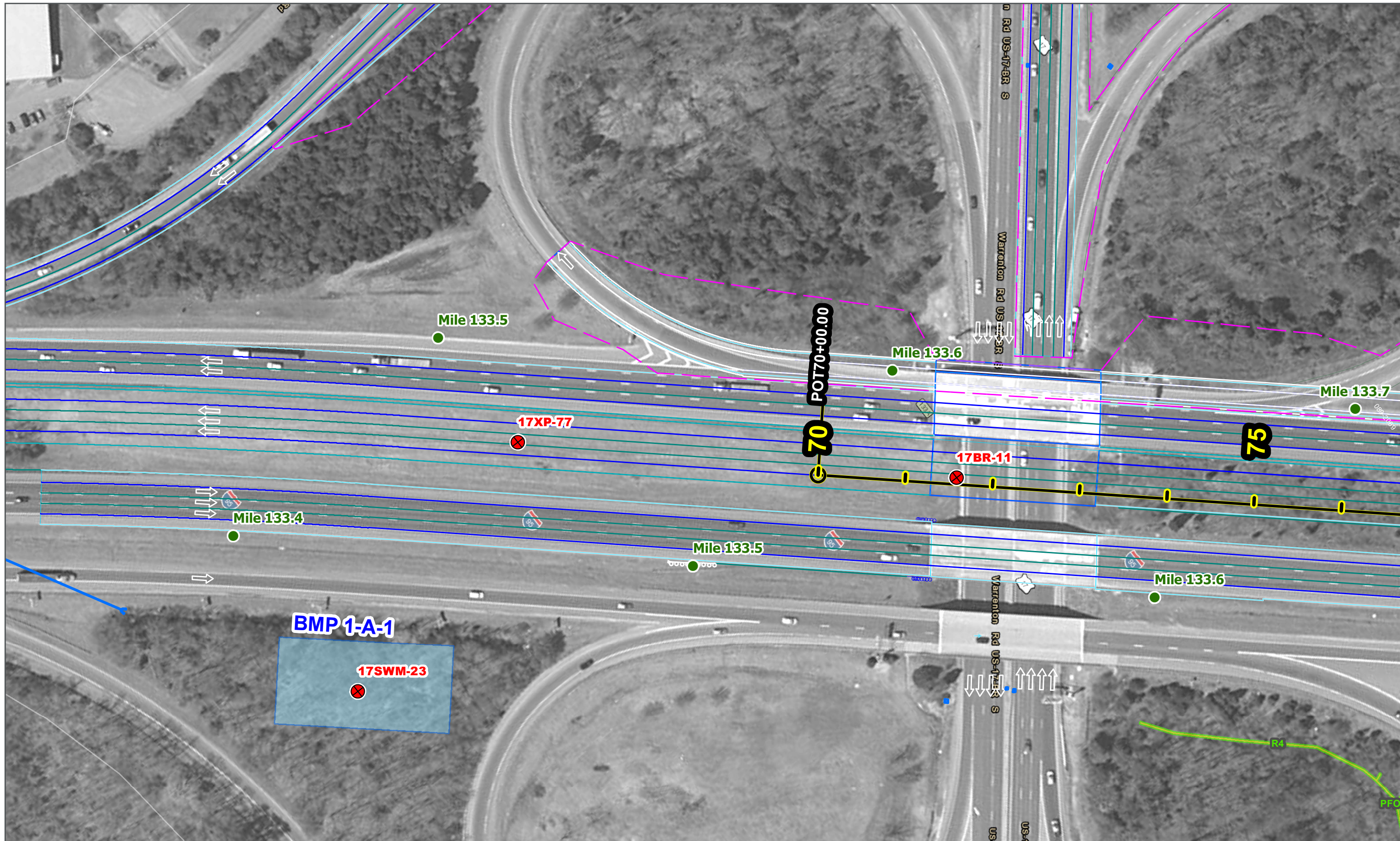
Table A-5: Index of Laboratory Testing to Subsurface Explorations

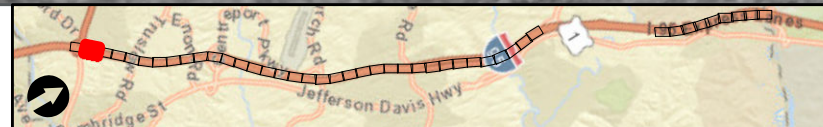
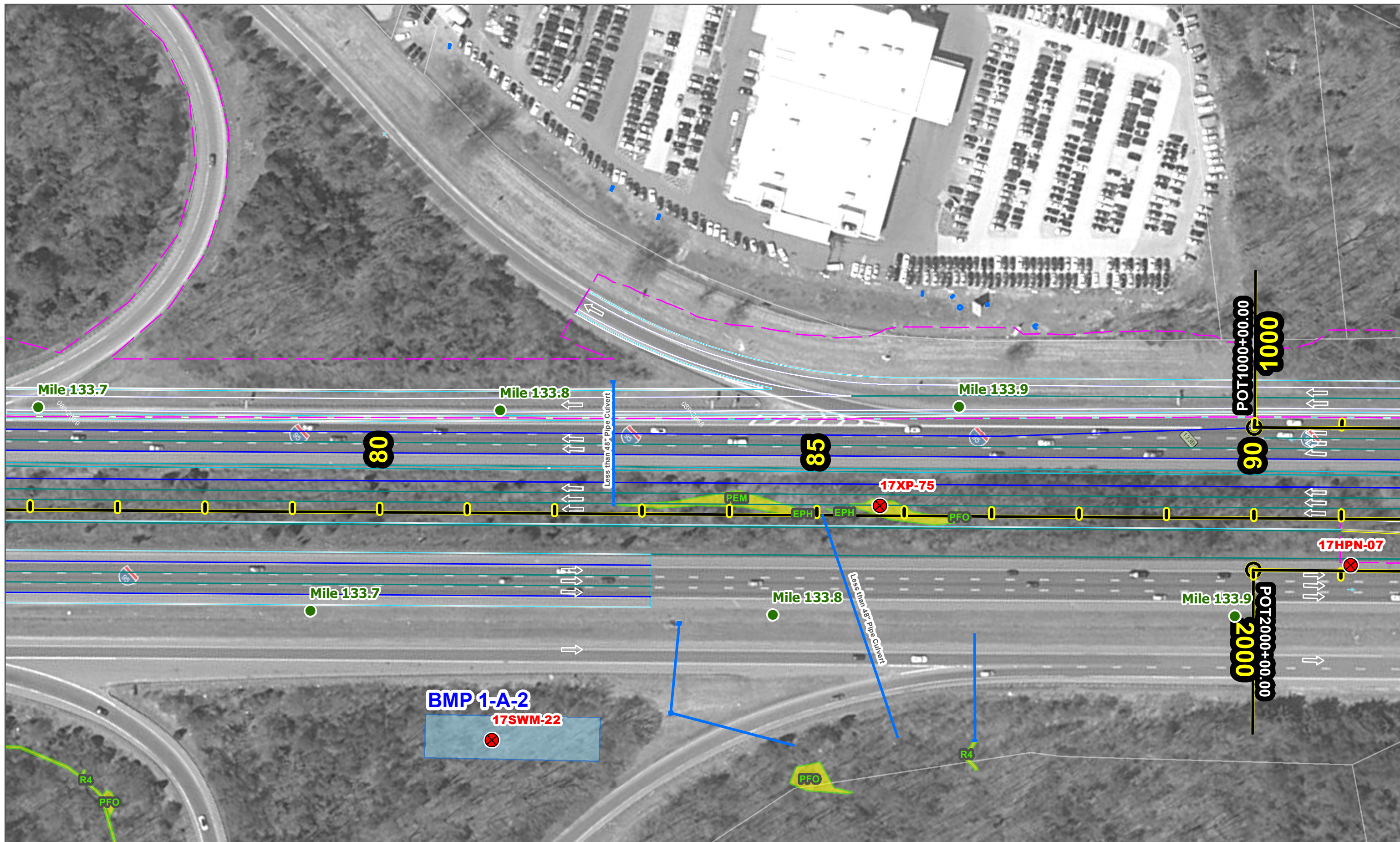
Table A-6: Summary of Laboratory Testing Results

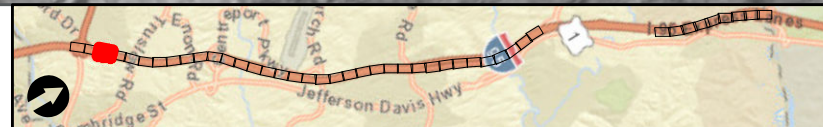
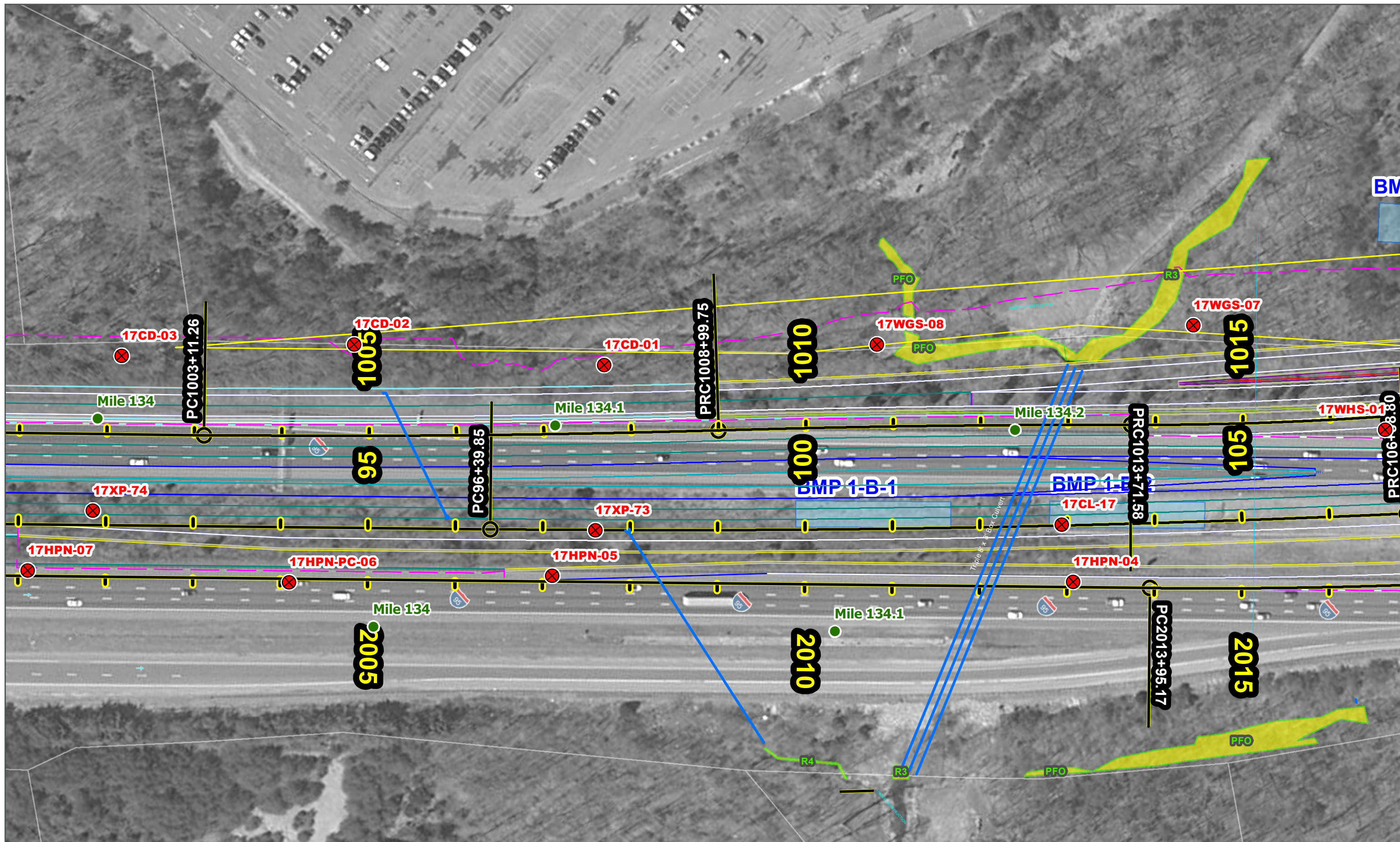
Table A-7: Summary of Bulk Sample Tests

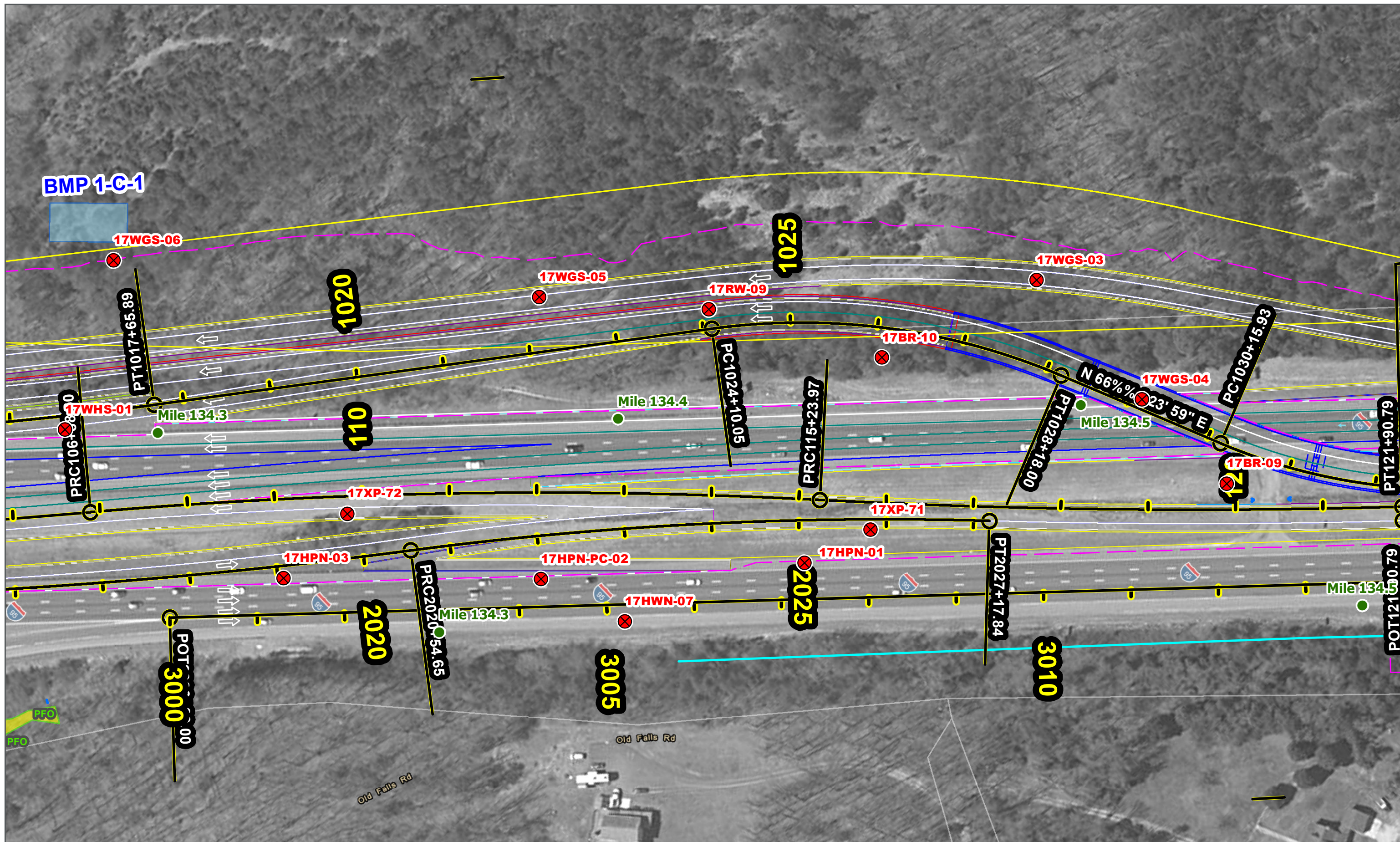
Table A-8: Summary of Acid Sulfate Samples











BMP 1-C-1



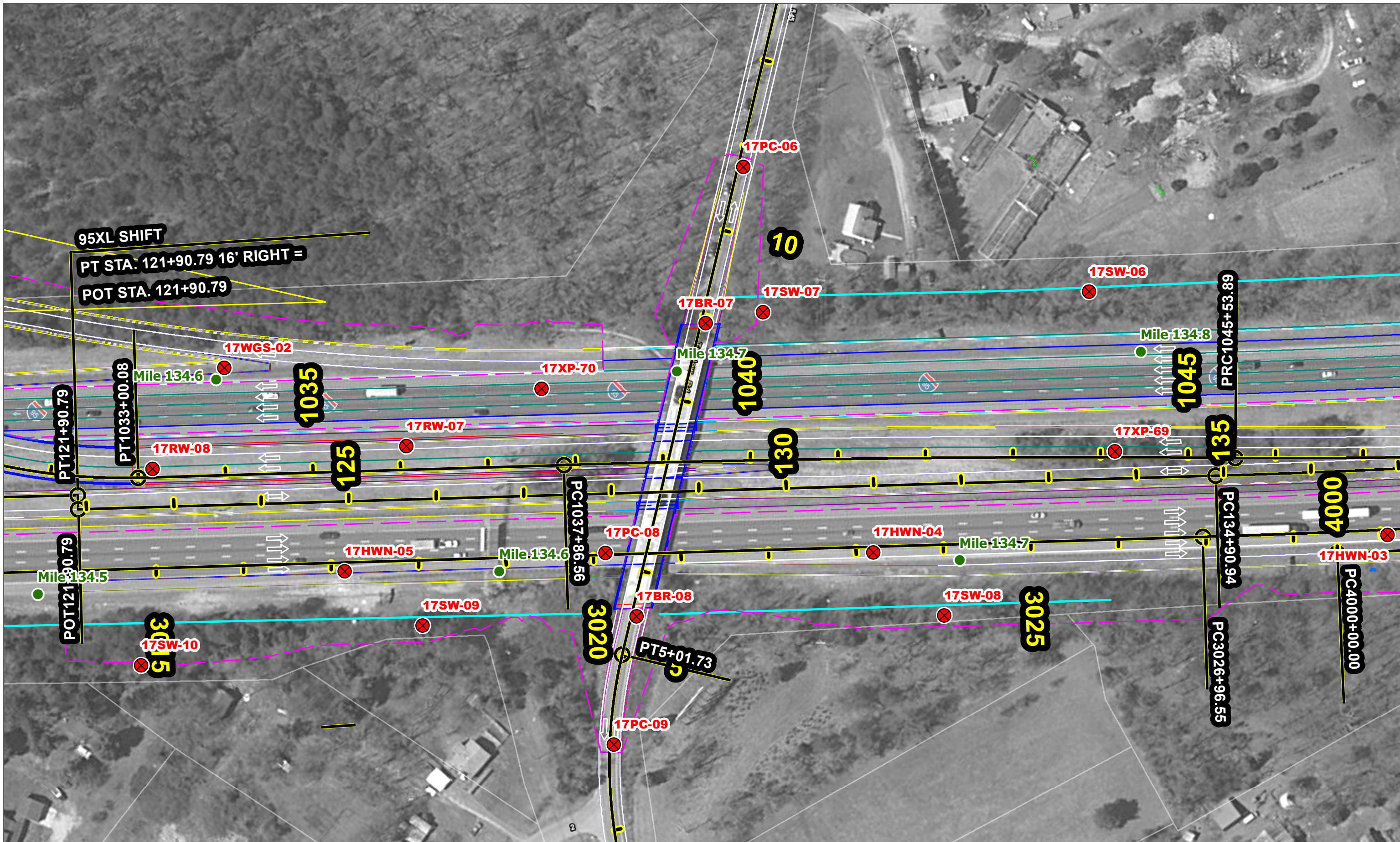
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- ⊕ As-Drilled Test Boring Locations (current study)

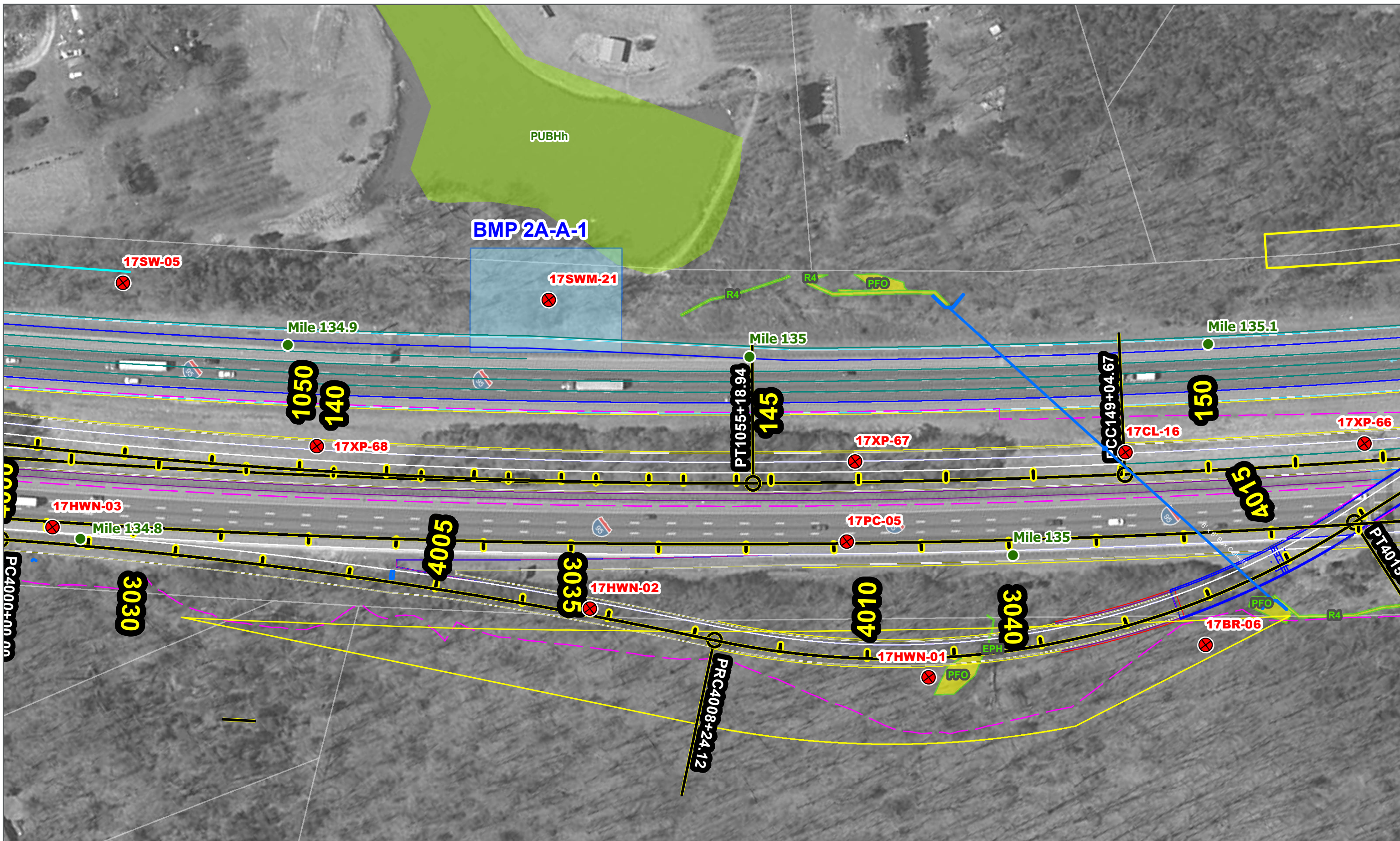
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- SWMP
- Parcels
- Culverts
- Alignment
- NWI Wetlands
- VDOT Wetlands

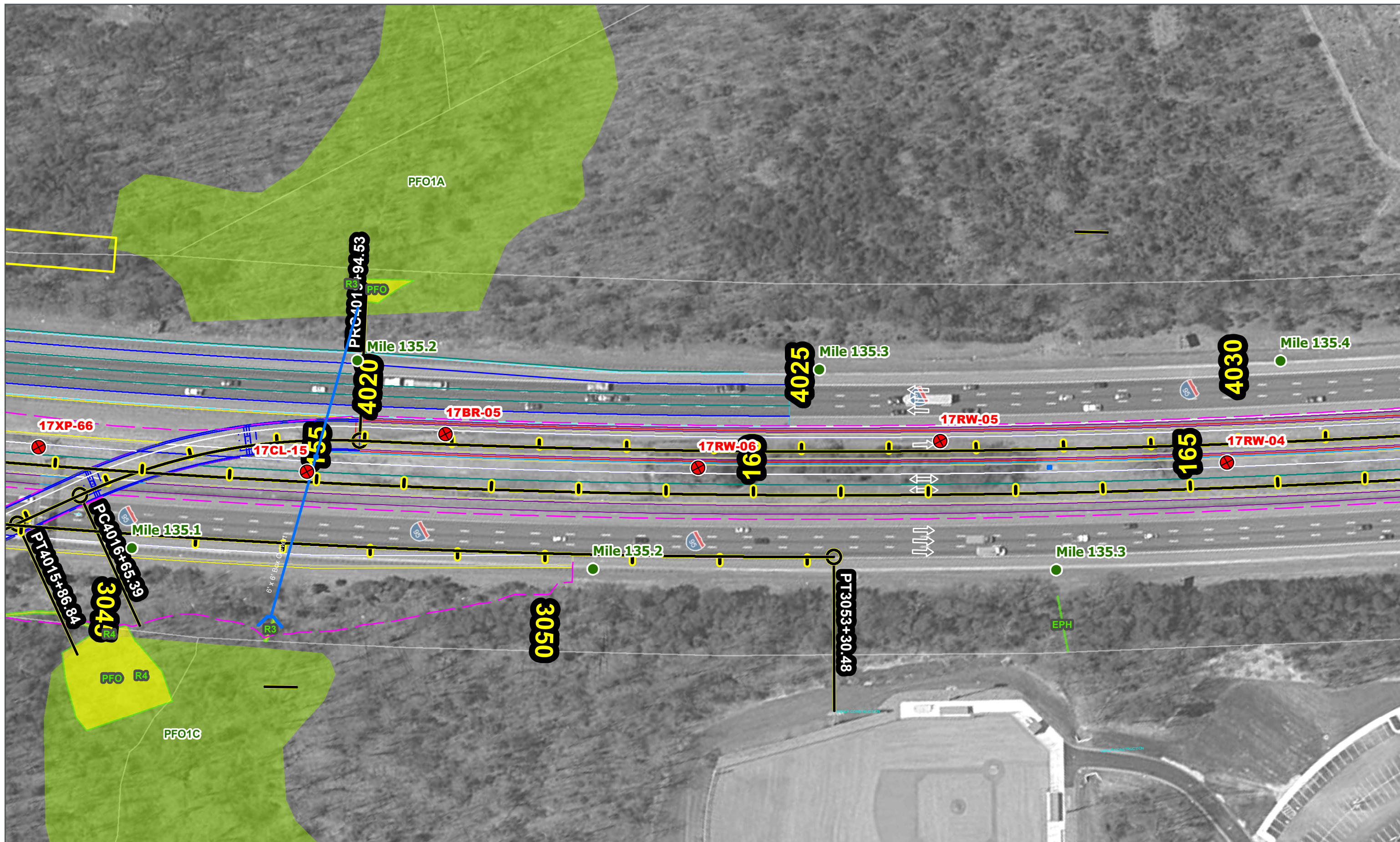
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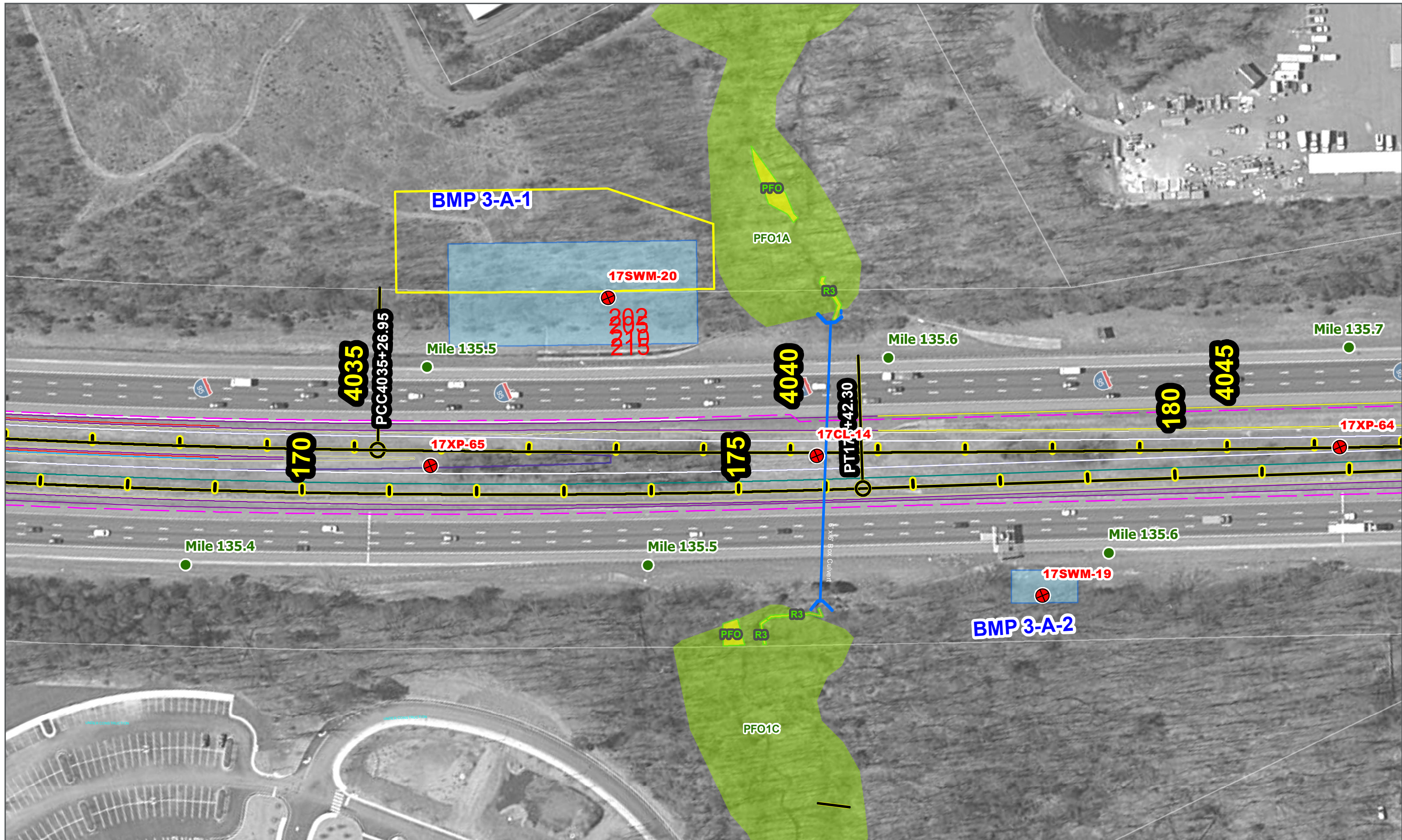


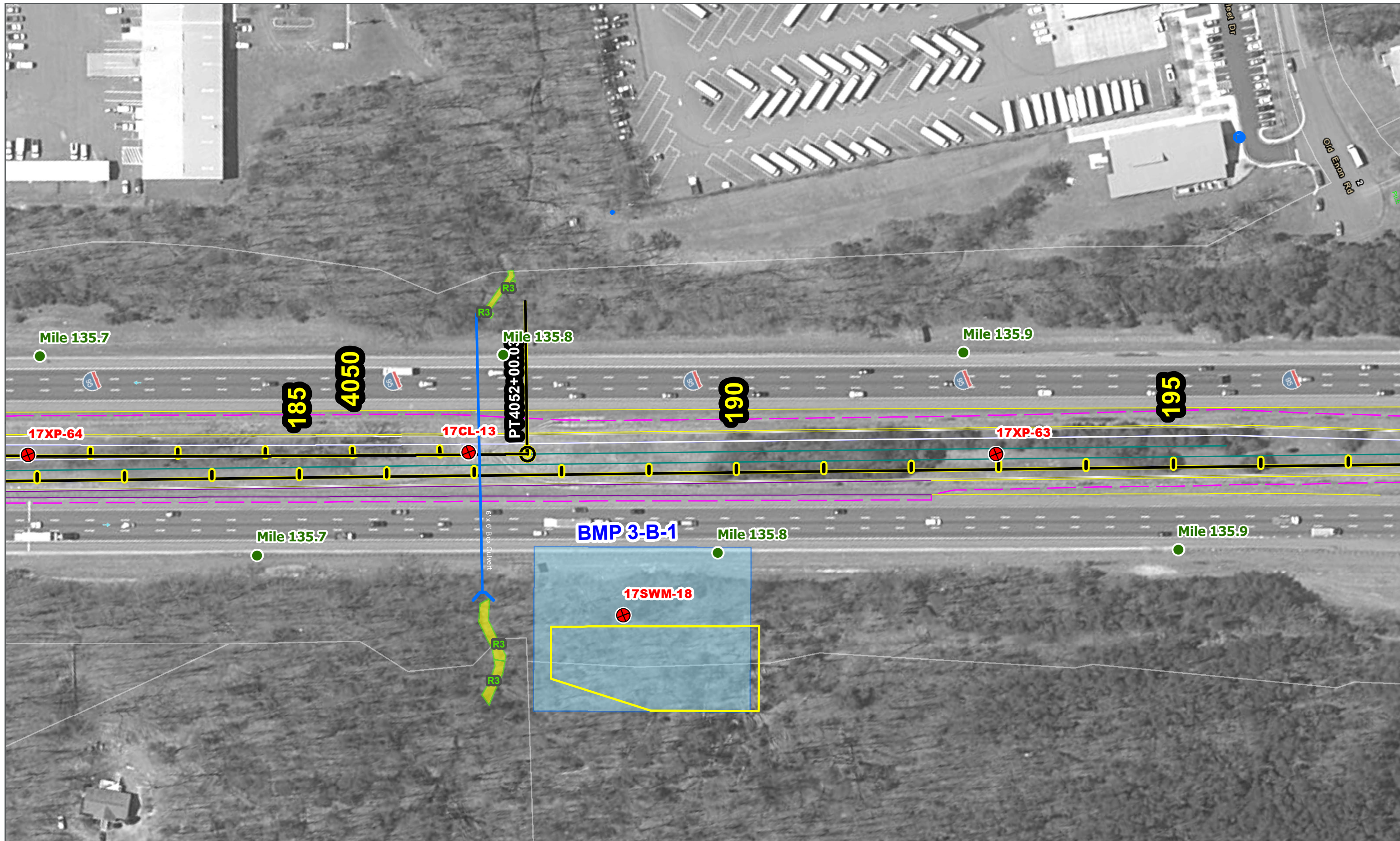
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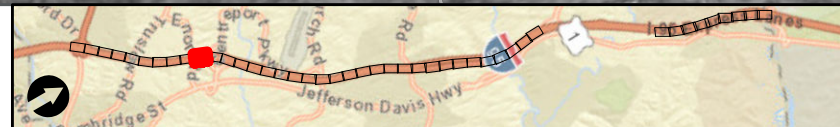
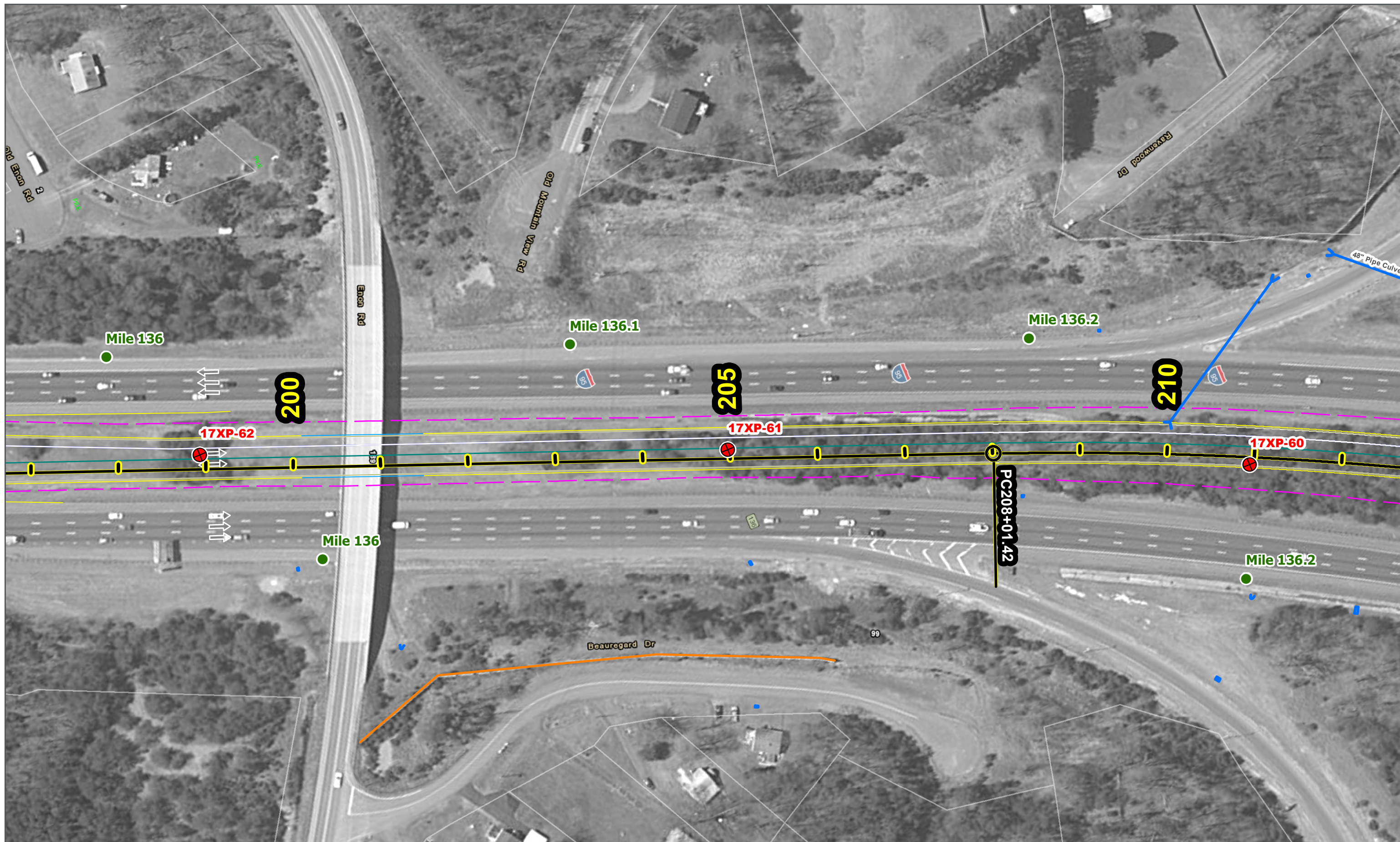


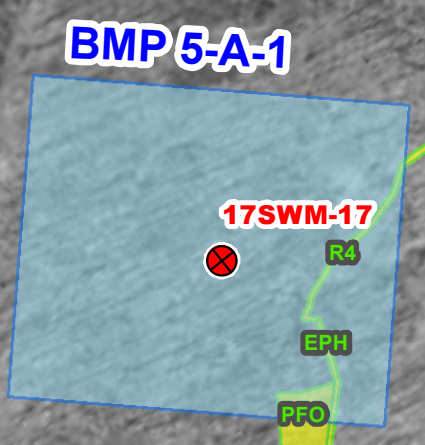
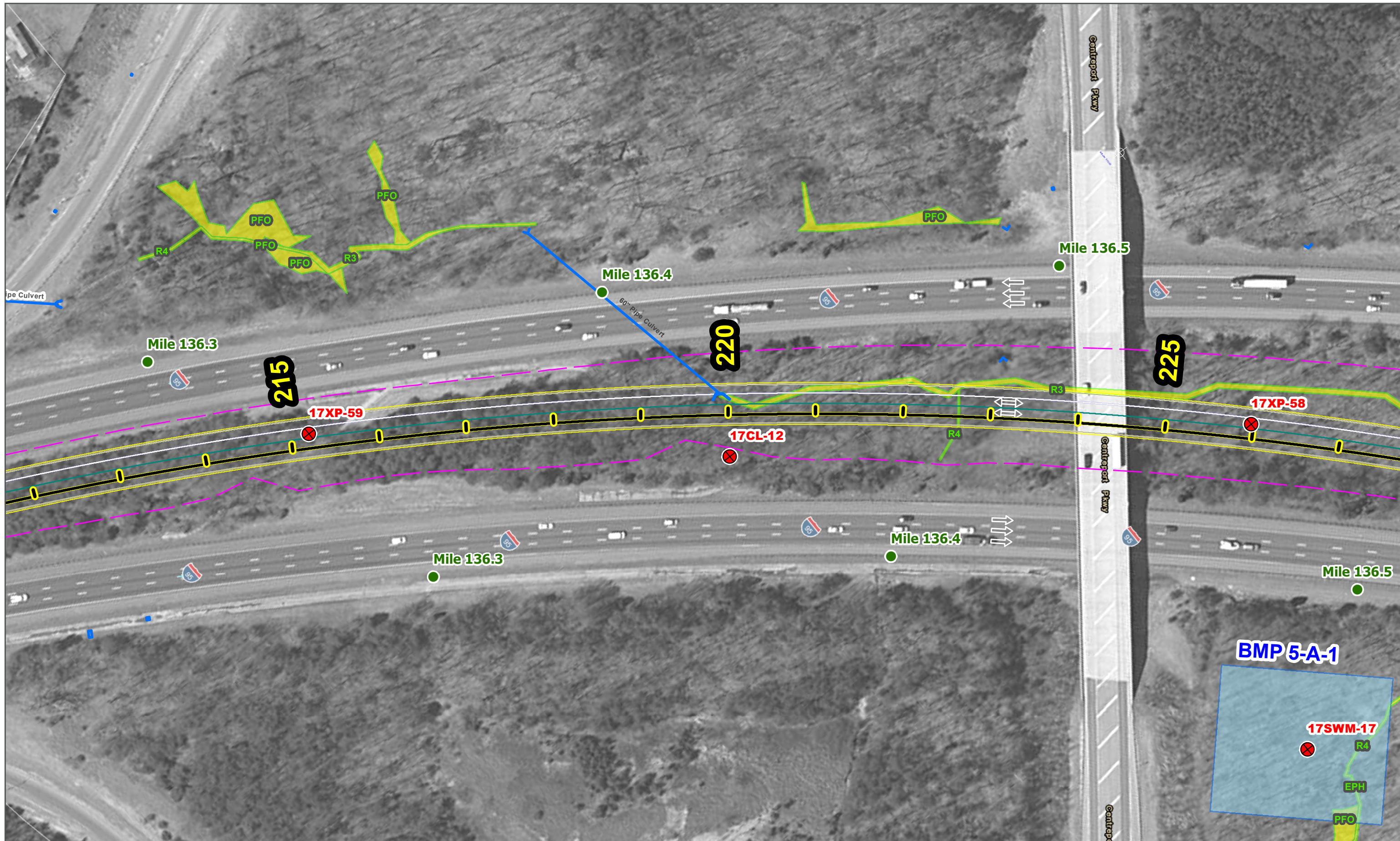












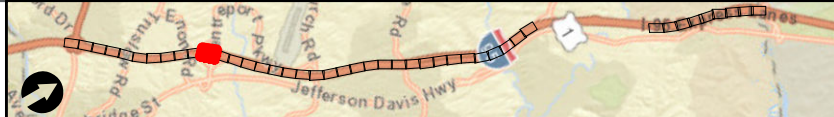
- ⊕ Previous Test Boring Locations (by others)
- ⊕ As-Drilled Test Boring Locations (current study)

- Mile Marker
- SWMP
- Parcels
- Culverts
- Alignment
- NWI Wetlands
- VDOT Wetlands

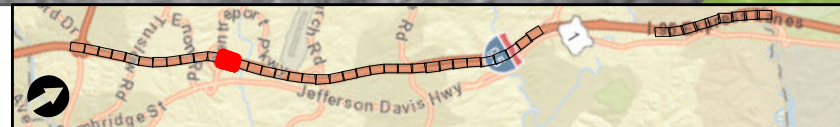
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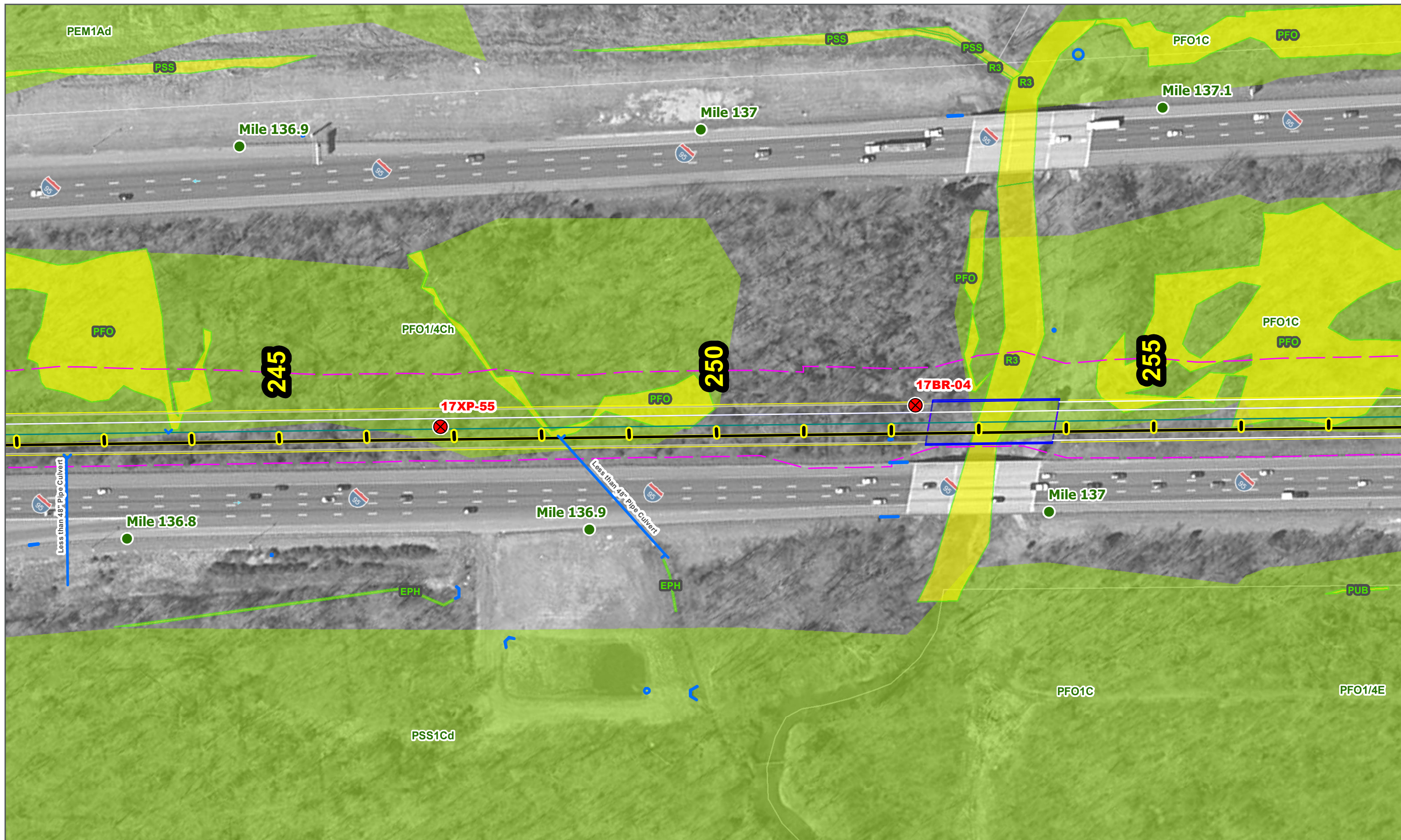
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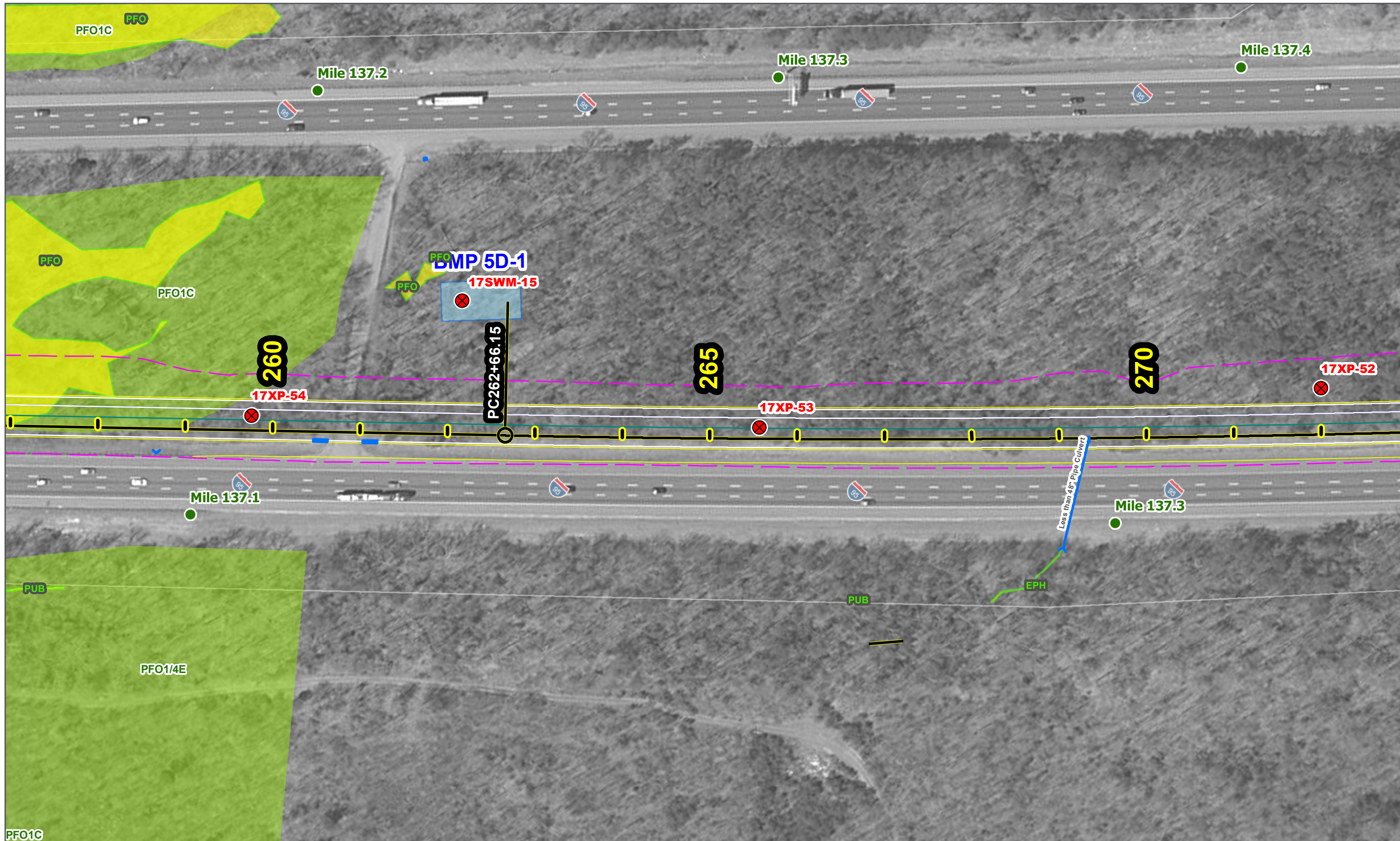
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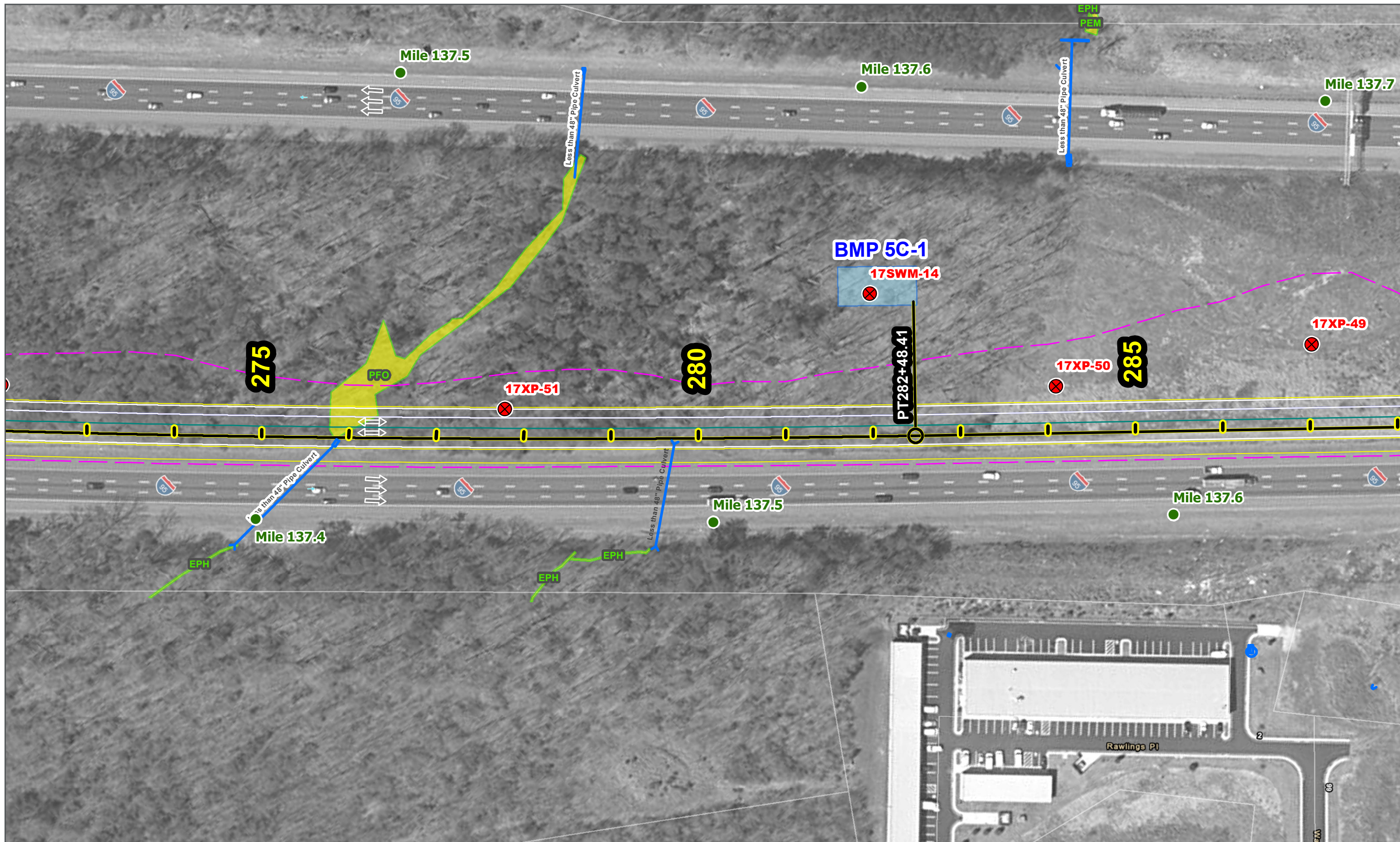
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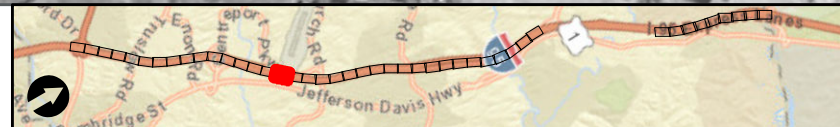
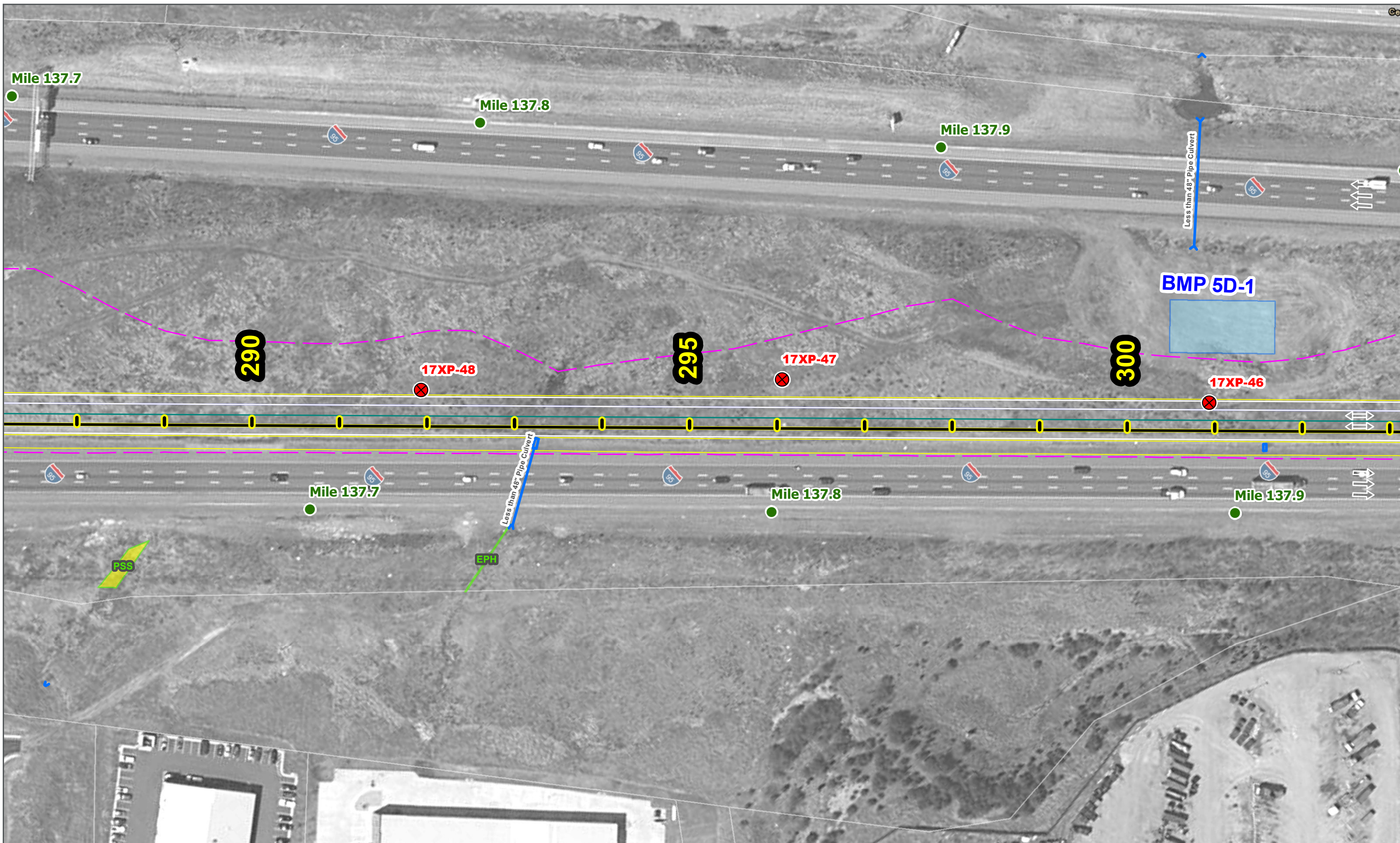


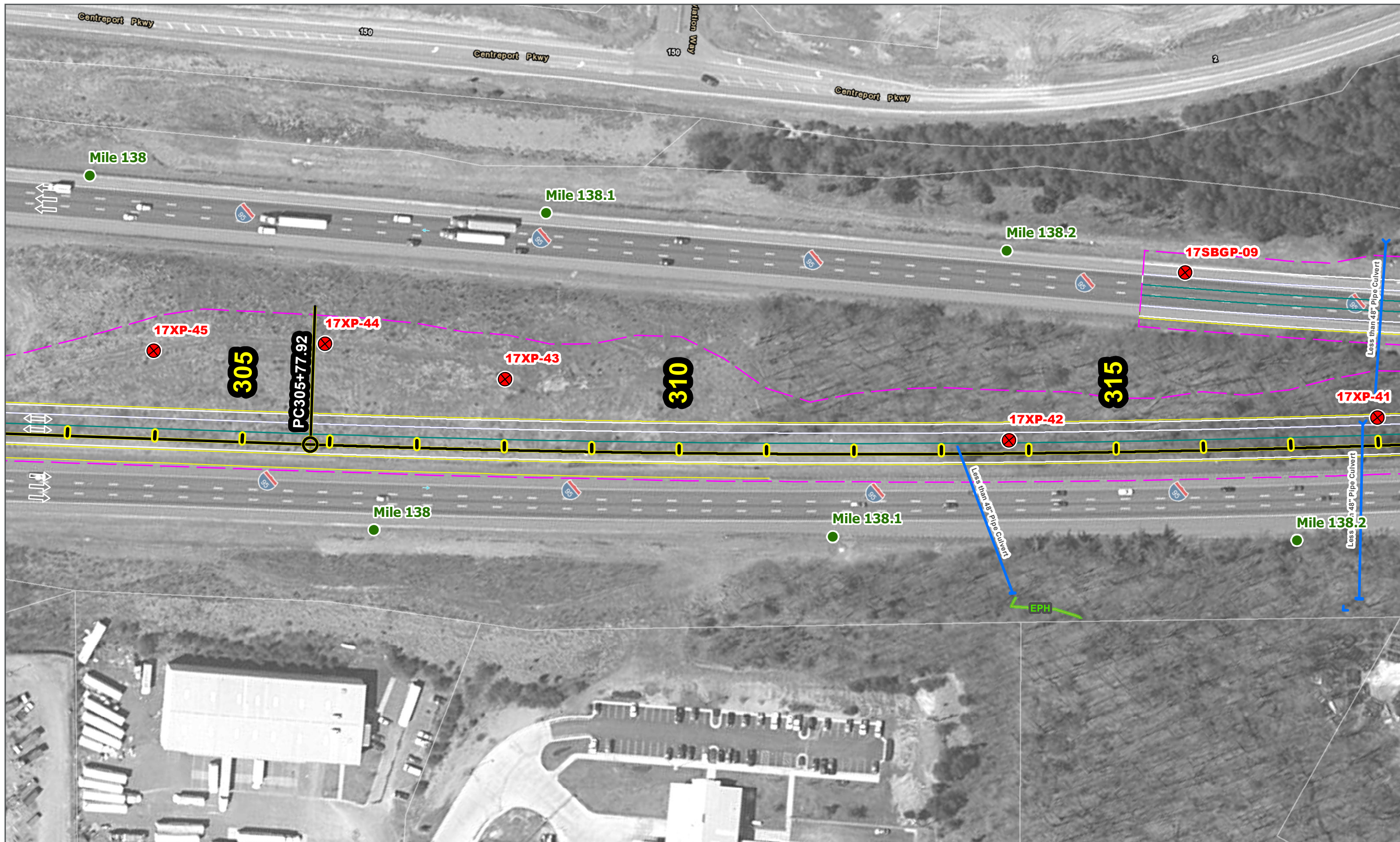




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	As-Drilled Test Boring Locations (current study)	SWMP	Alignment				
	Parcels	VDOT Wetlands					







- ⊕ Previous Test Boring Locations (by others)
- ⊕ As-Drilled Test Boring Locations (current study)

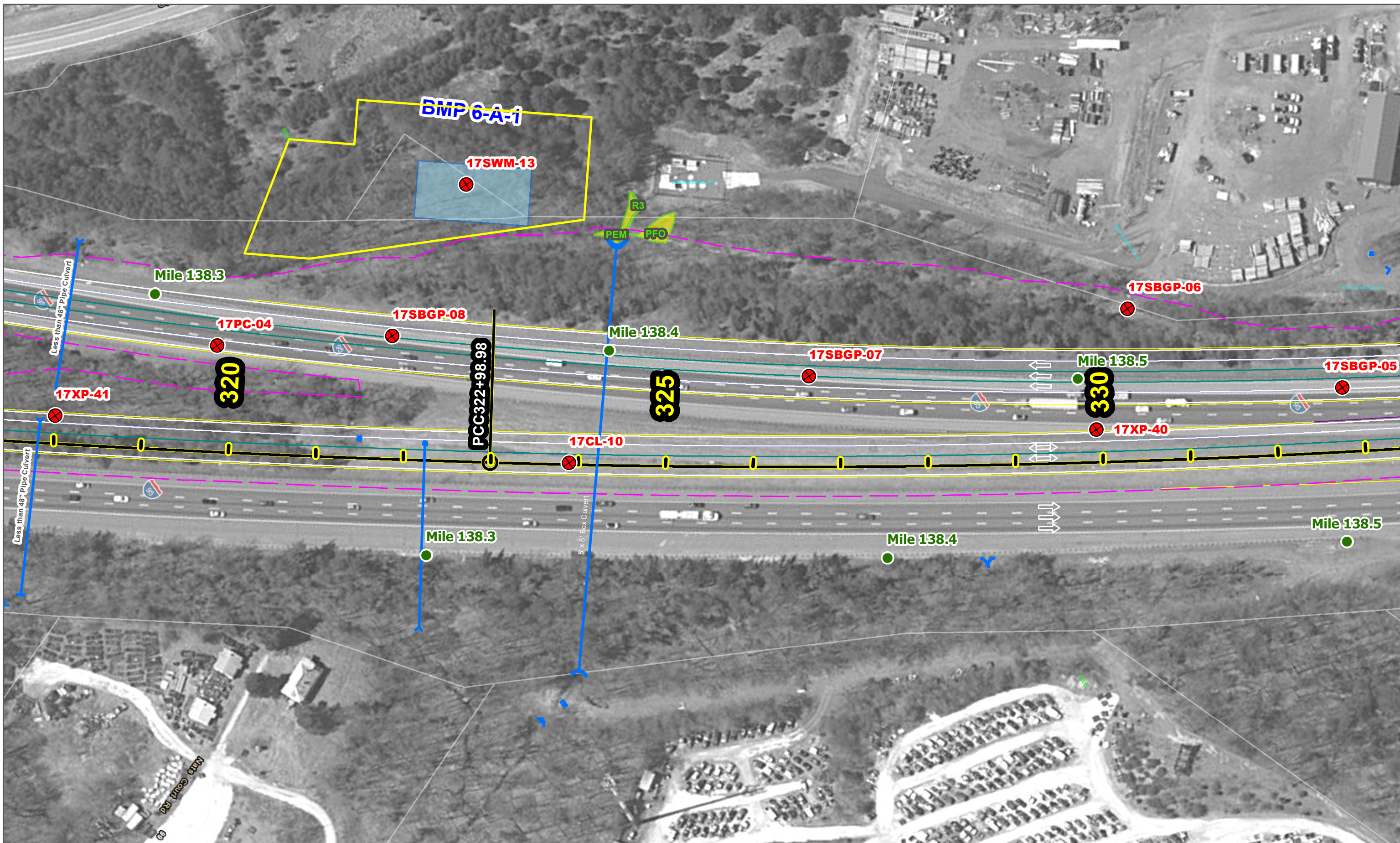
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- Parcels
- Culverts
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- VDOT Wetlands

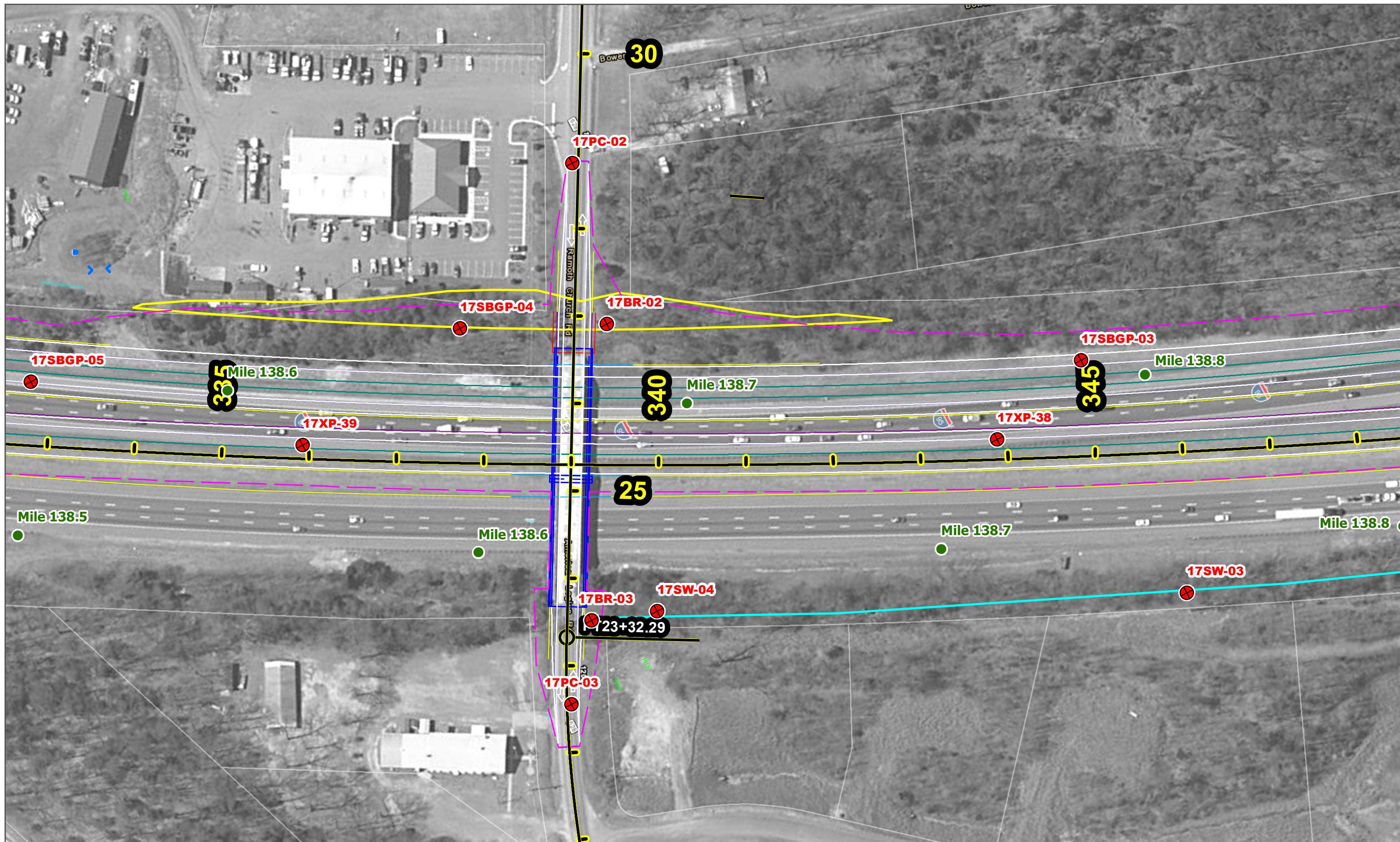


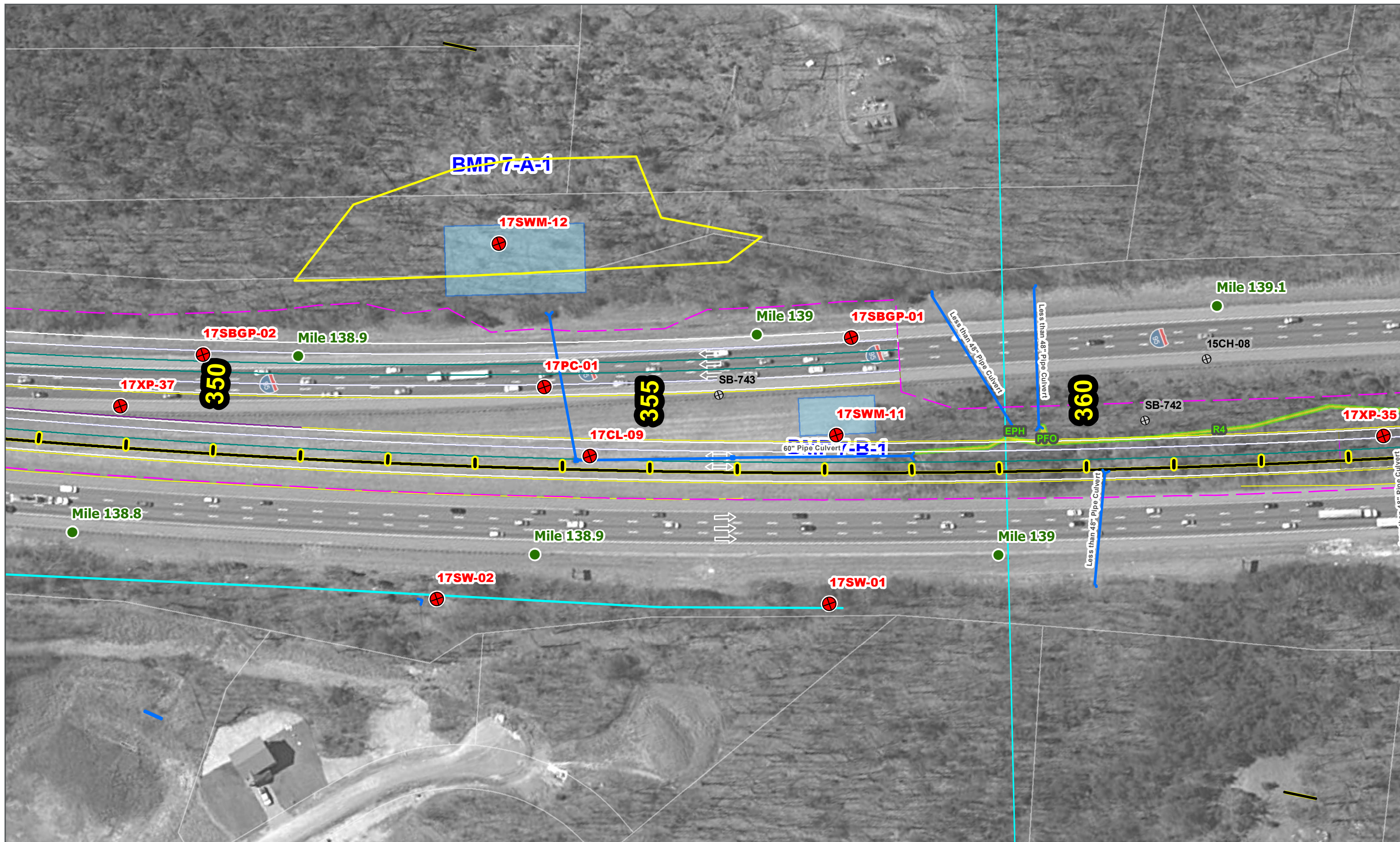
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 DATA SOURCE: ESRI World Imagery



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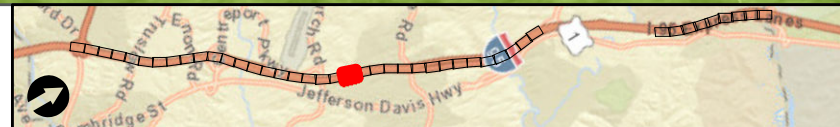
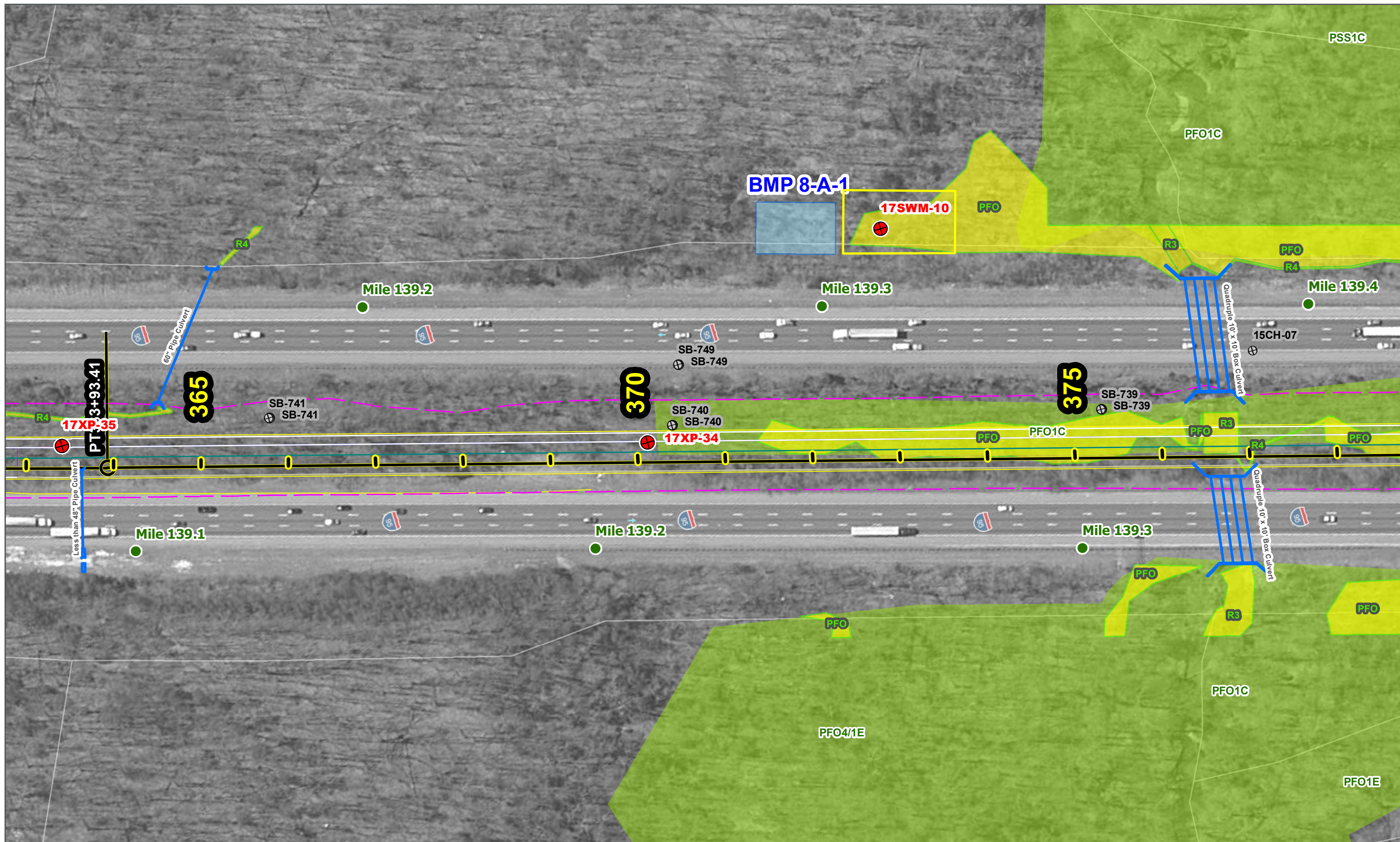
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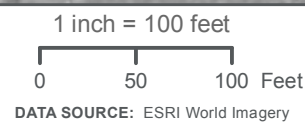
**I-95 EXPRESS LANES
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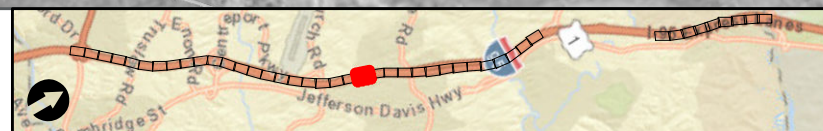


- ⊕ Previous Test Boring Locations (by others)
- ⊕ As-Drilled Test Boring Locations (current study)

- Mile Marker
- SWMP
- Parcels
- Culverts
- Alignment
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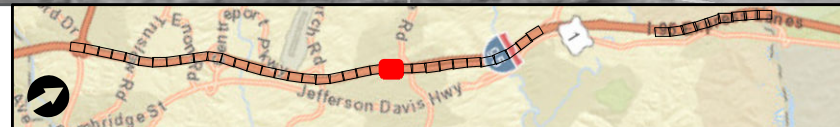


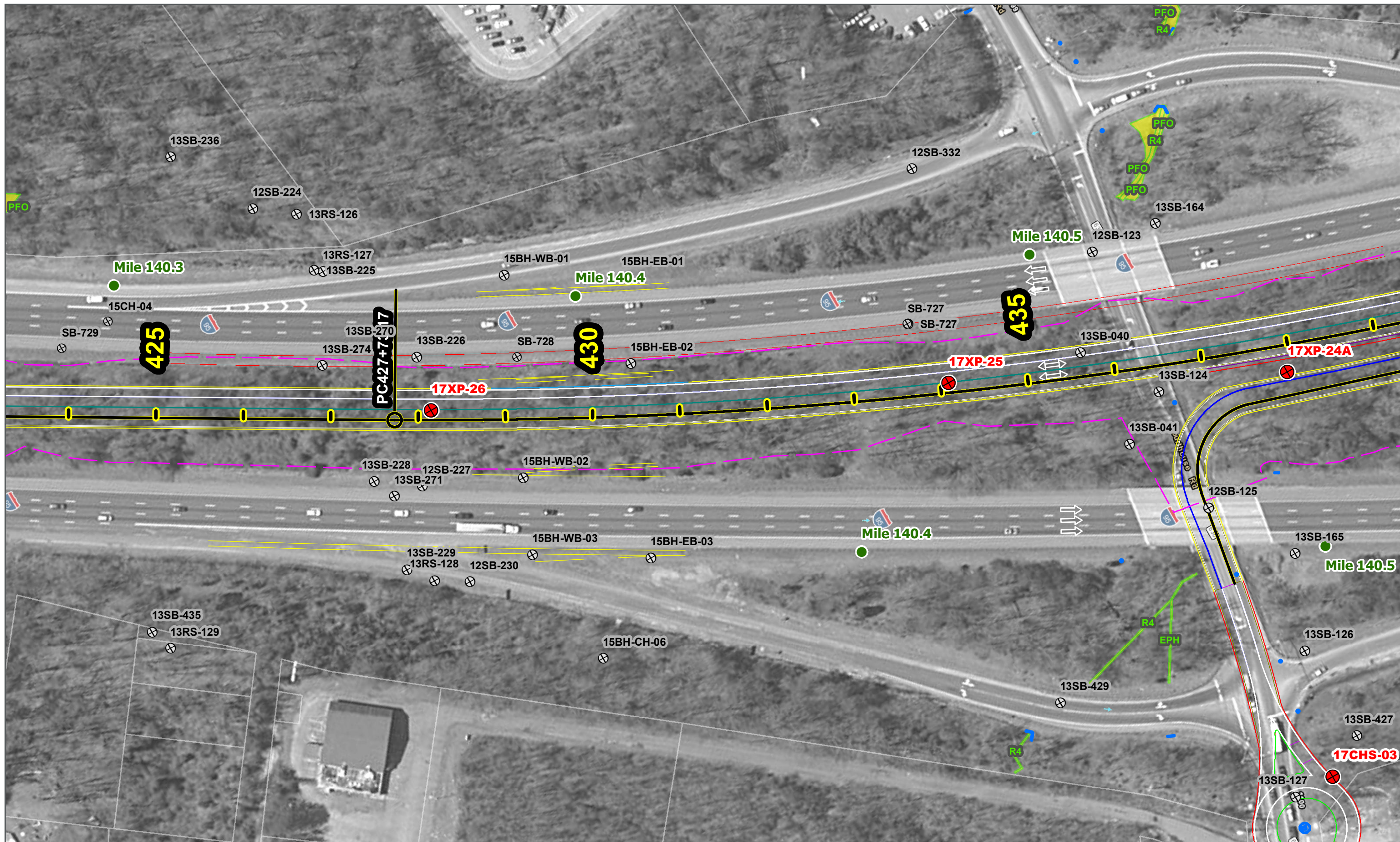
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- Mile Marker
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- Alignment
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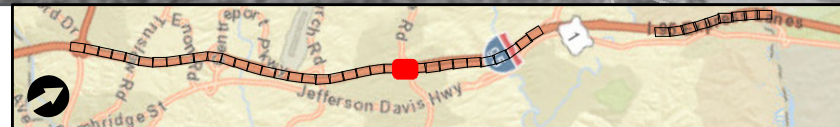


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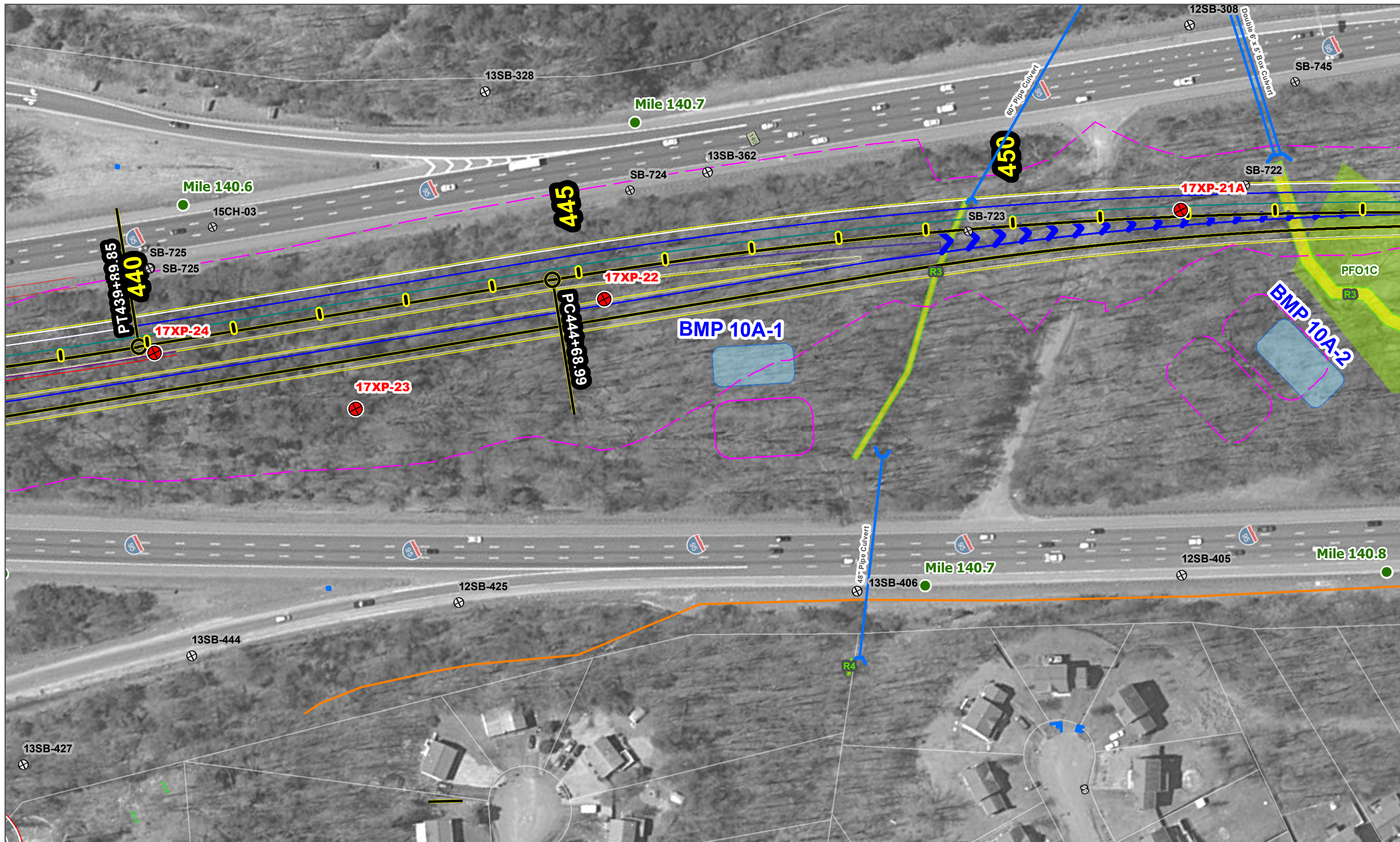
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1 inch = 100 feet
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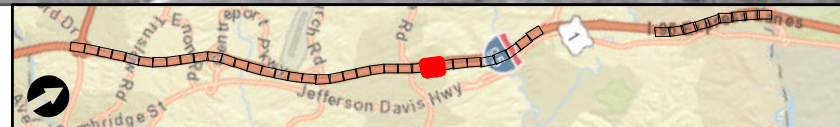


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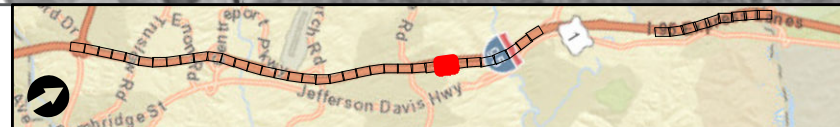
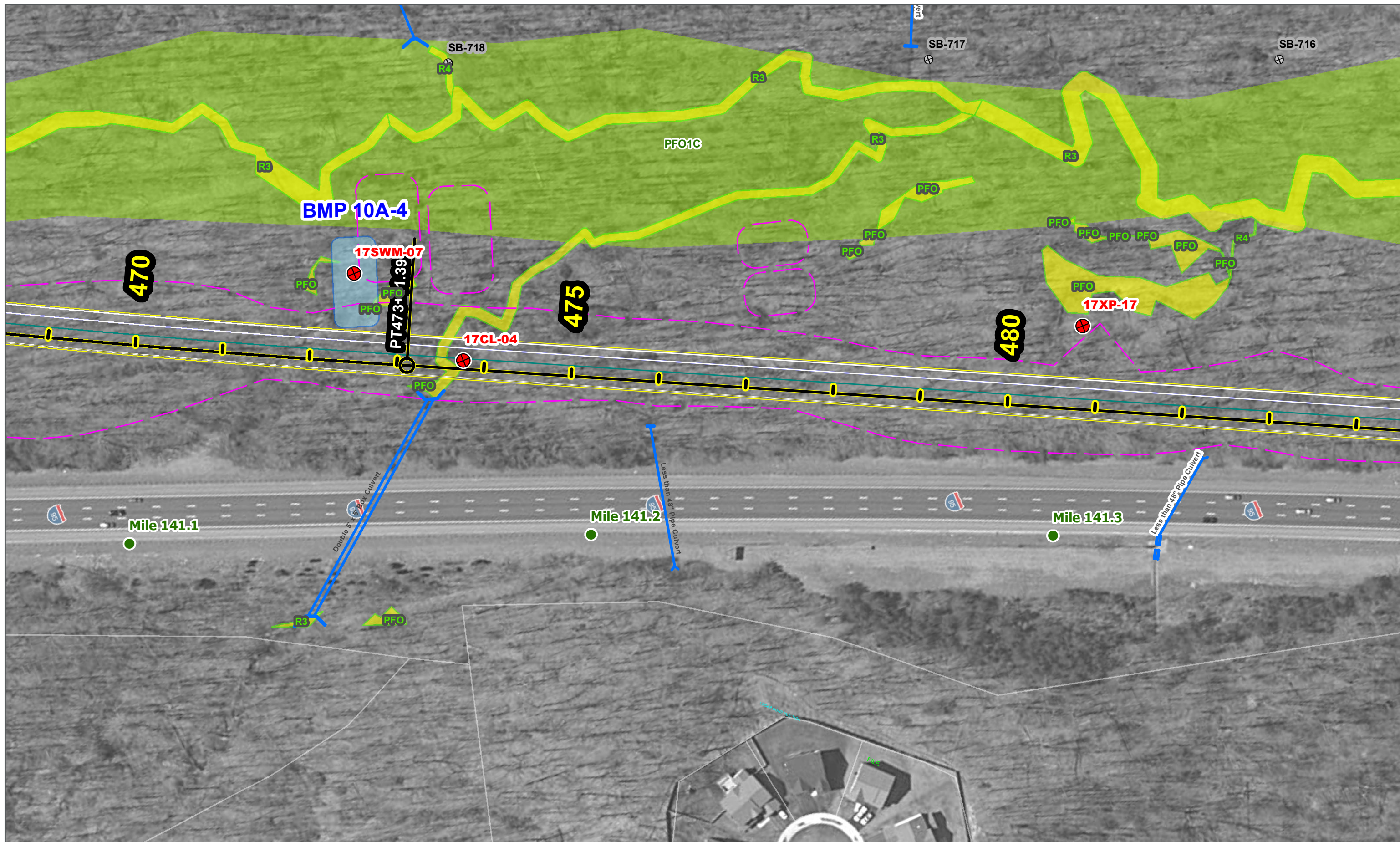
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- Parcels
- Culverts
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- NWI Wetlands
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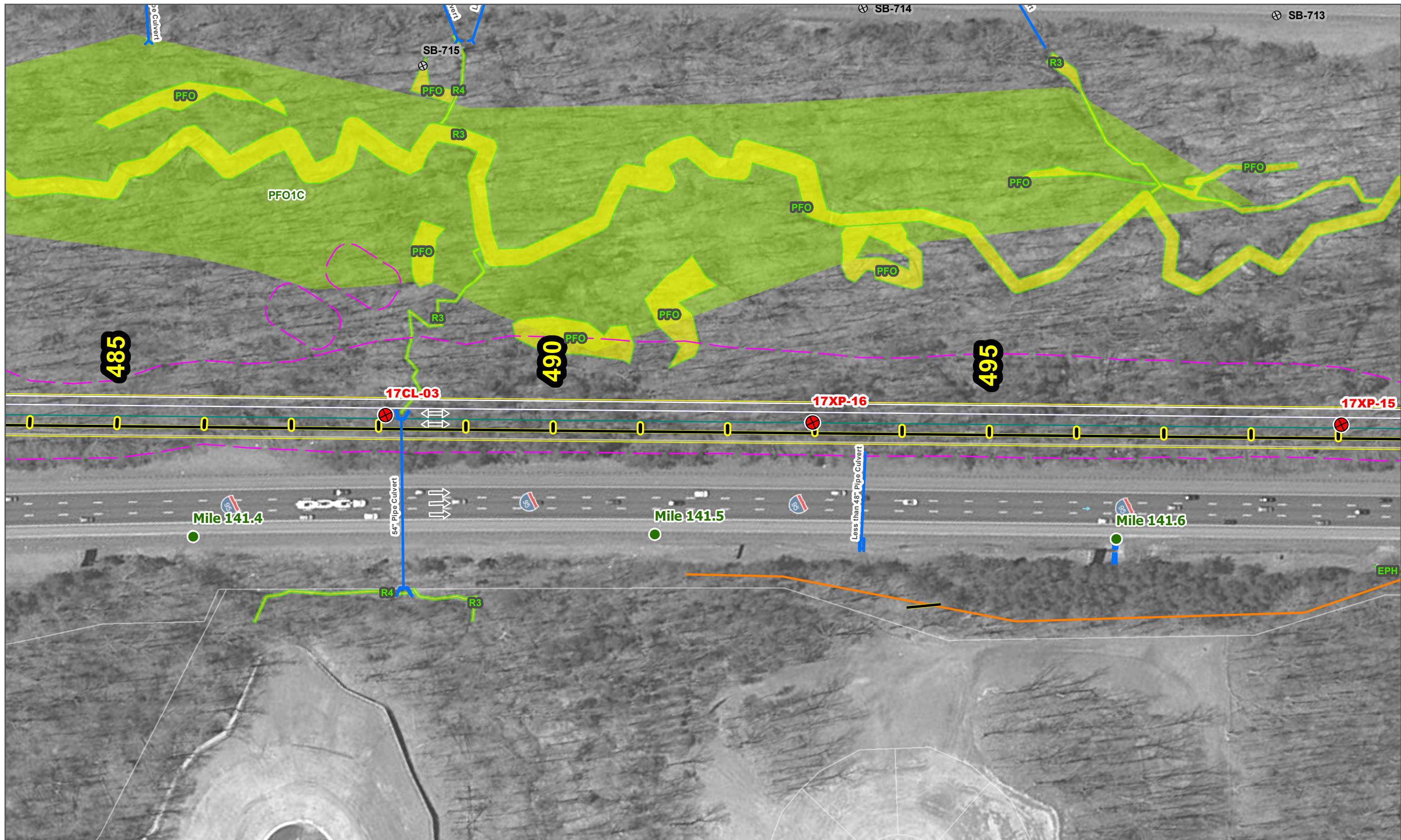


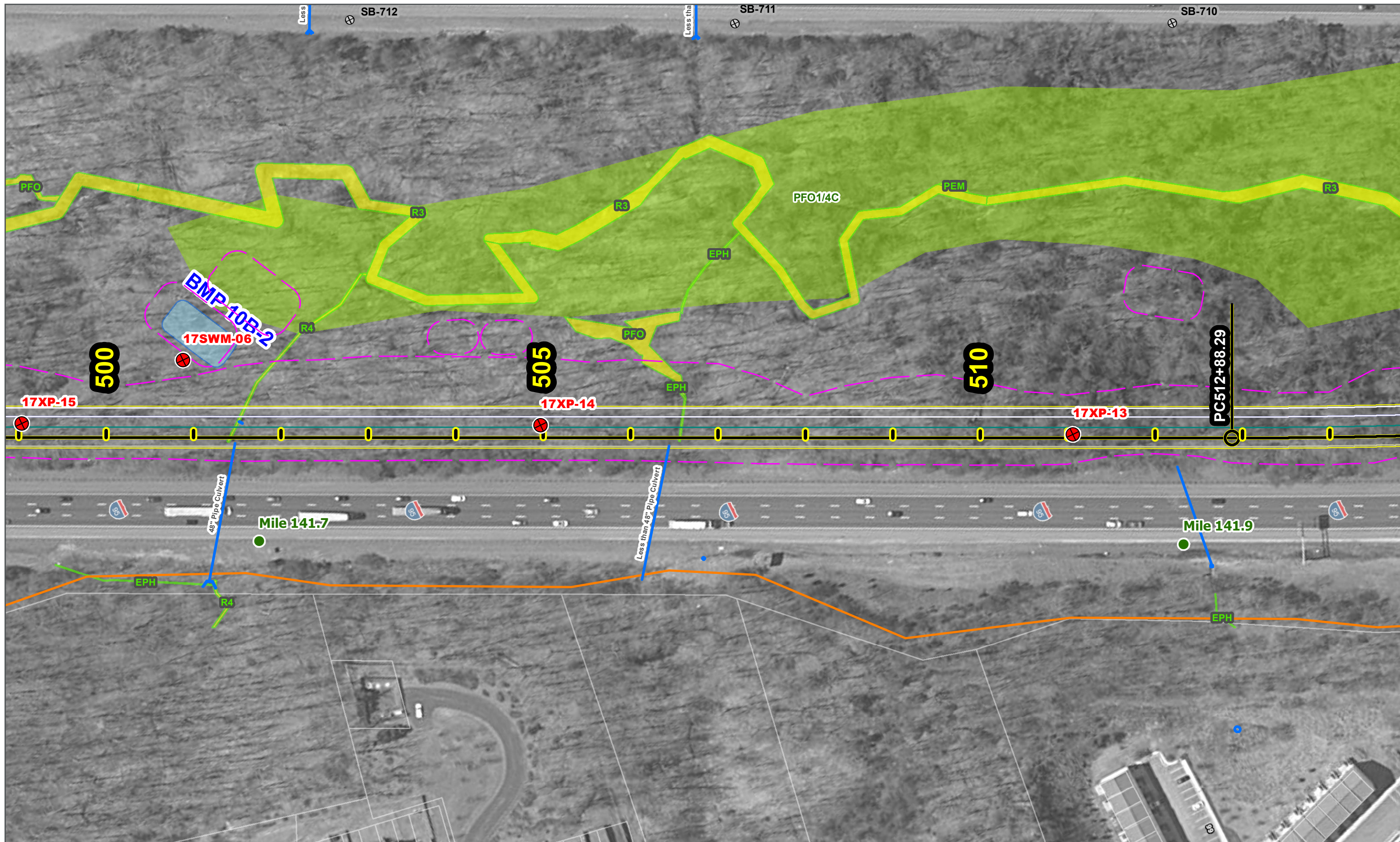
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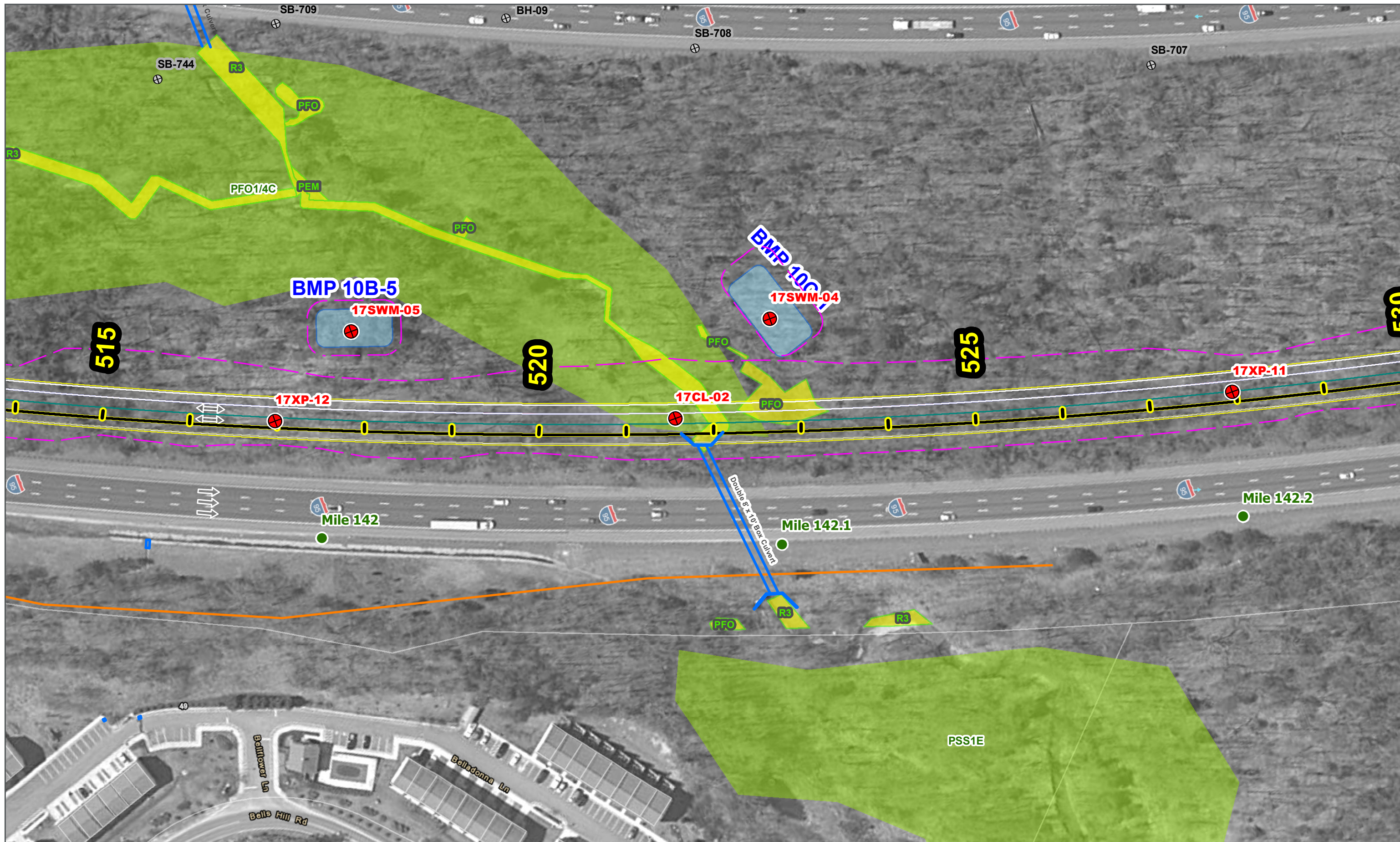
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- ⊕ As-Drilled Test Boring Locations (current study)
- Mile Marker
- SWMP
- Parcels

- Culverts
- Alignment
- NWI Wetlands
- VDOT Wetlands



1 inch = 100 feet
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 DATA SOURCE: ESRI World Imagery

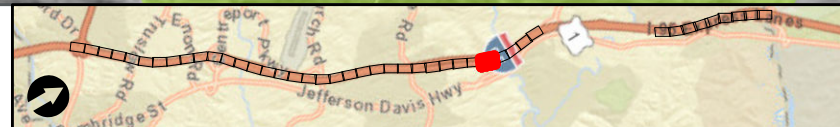
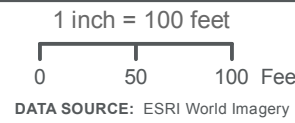




- ⊕ Previous Test Boring Locations (by others)
- ⊕ As-Drilled Test Boring Locations (current study)

- Mile Marker
- SWMP
- Parcels

- Culverts
- Alignment
- NWI Wetlands
- VDOT Wetlands



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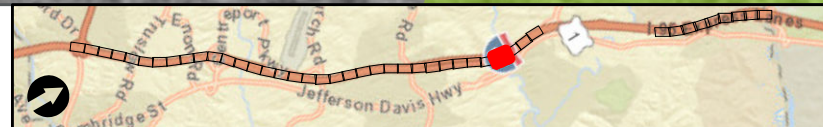


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- ⊕ As-Drilled Test Boring Locations (current study)

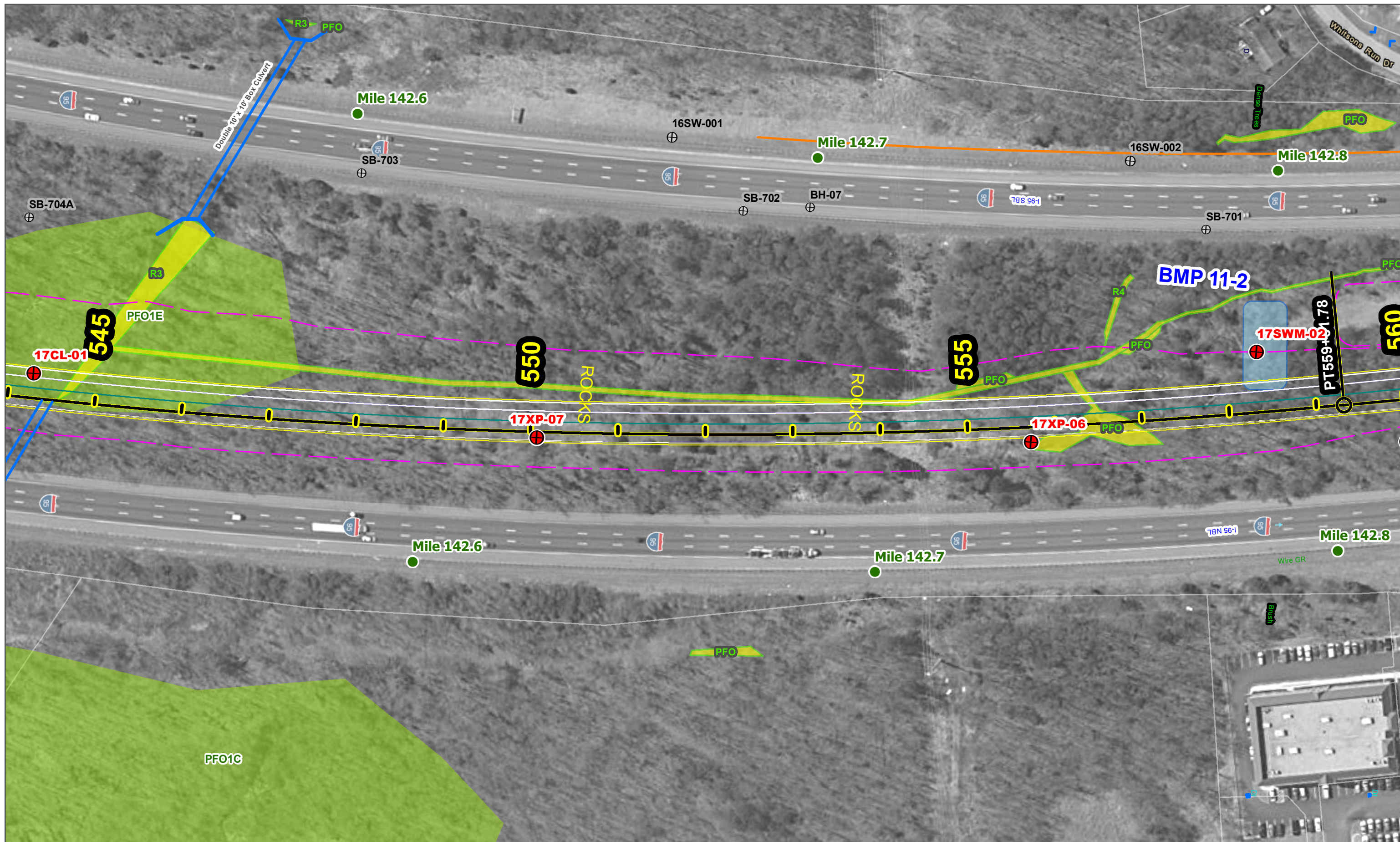
- Mile Marker
- SWMP
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- Culverts
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 DATA SOURCE: ESRI World Imagery



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 FIGURE 2: SHEET 32 OF 44**



- ⊕ Previous Test Boring Locations (by others)
- ⊕ As-Drilled Test Boring Locations (current study)

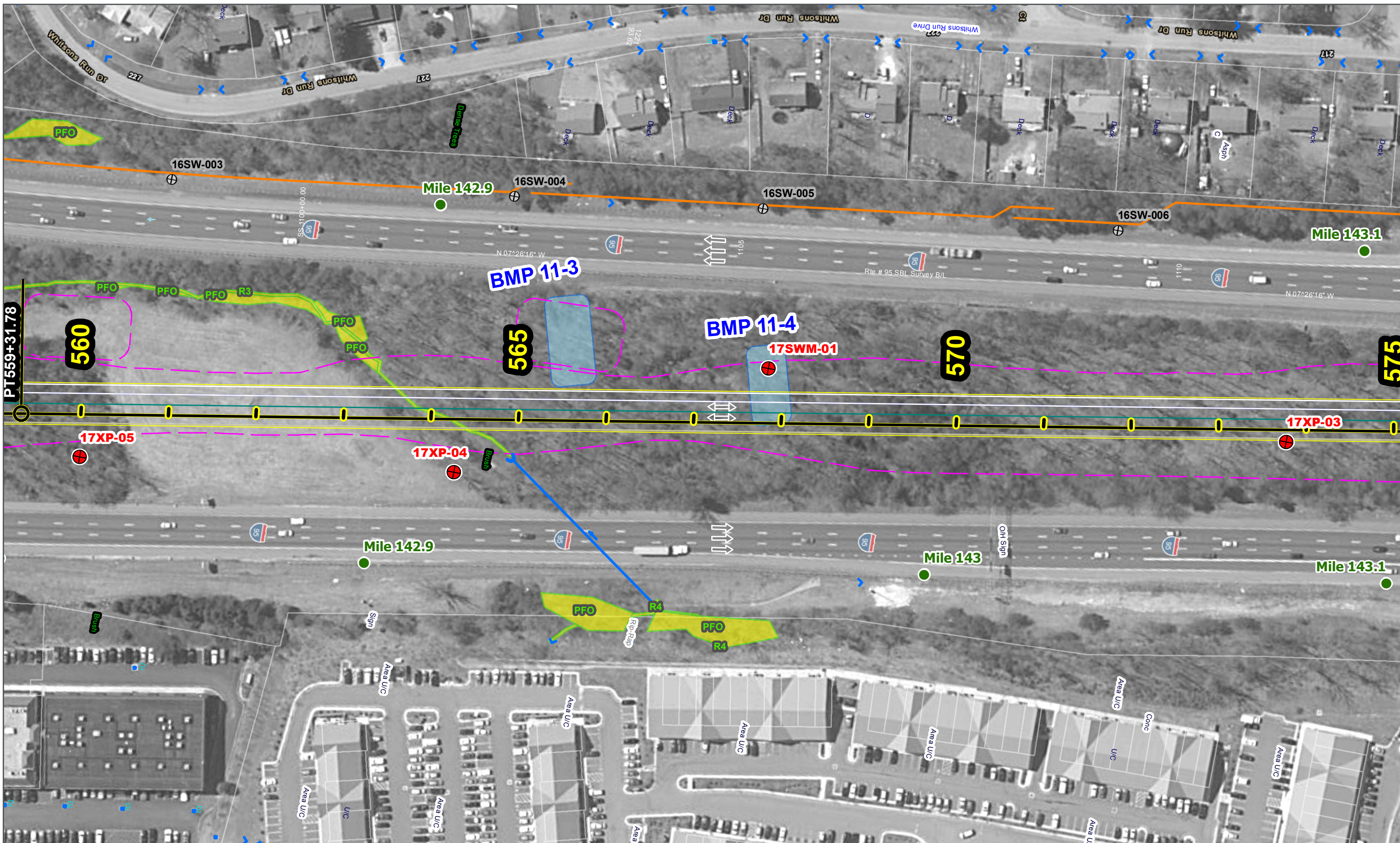
- Mile Marker
- SWMP
- Parcels
- Culverts
- Alignment
- NWI Wetlands
- VDOT Wetlands



1 inch = 100 feet
 0 50 100 Feet
 DATA SOURCE: ESRI World Imagery



**I-95 EXPRESS LANES
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 FIGURE 2: SHEET 33 OF 44**



- ⊕ Previous Test Boring Locations (by others)
- ⊕ As-Drilled Test Boring Locations (current study)

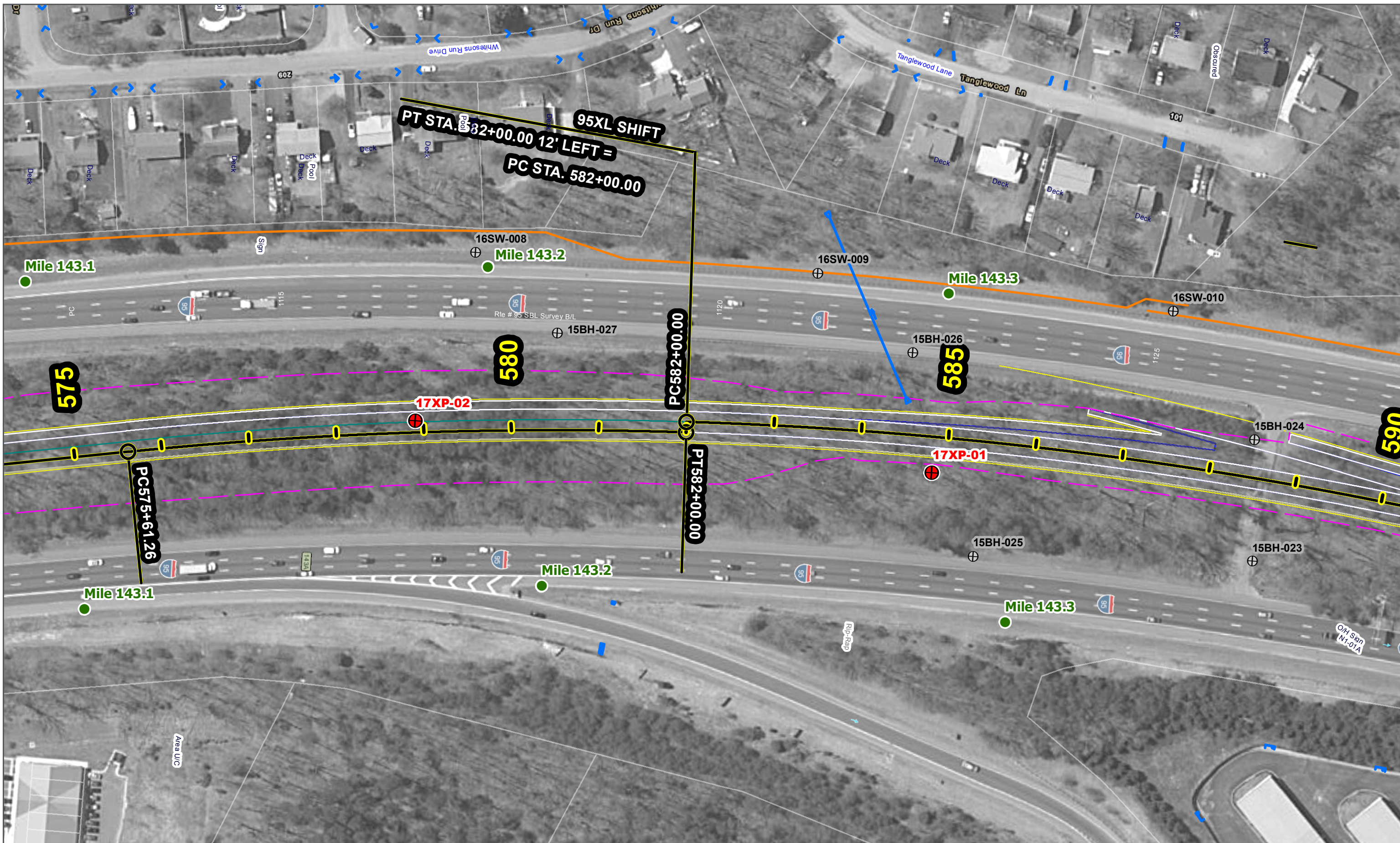
- Mile Marker
- SWMP
- Parcels
- Culverts
- Alignment
- NWI Wetlands
- VDOT Wetlands



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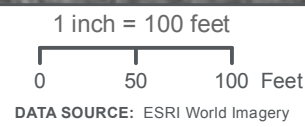


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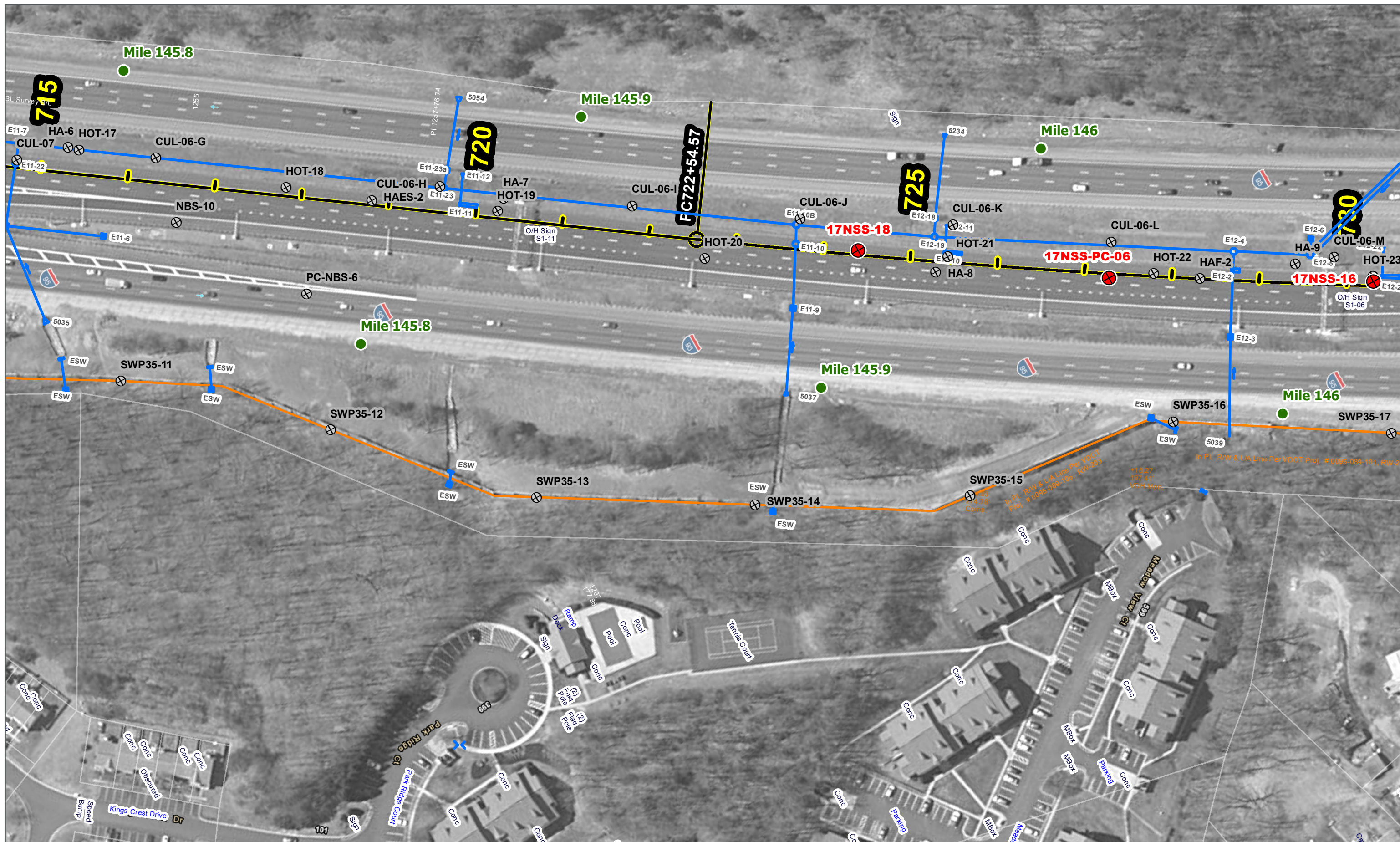


- ⊕ Previous Test Boring Locations (by others)
- ⊕ As-Drilled Test Boring Locations (current study)

- Mile Marker
- SWMP
- Parcels
- Culverts
- Alignment
- NWI Wetlands
- VDOT Wetlands

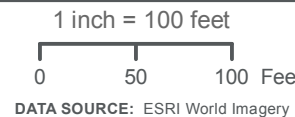


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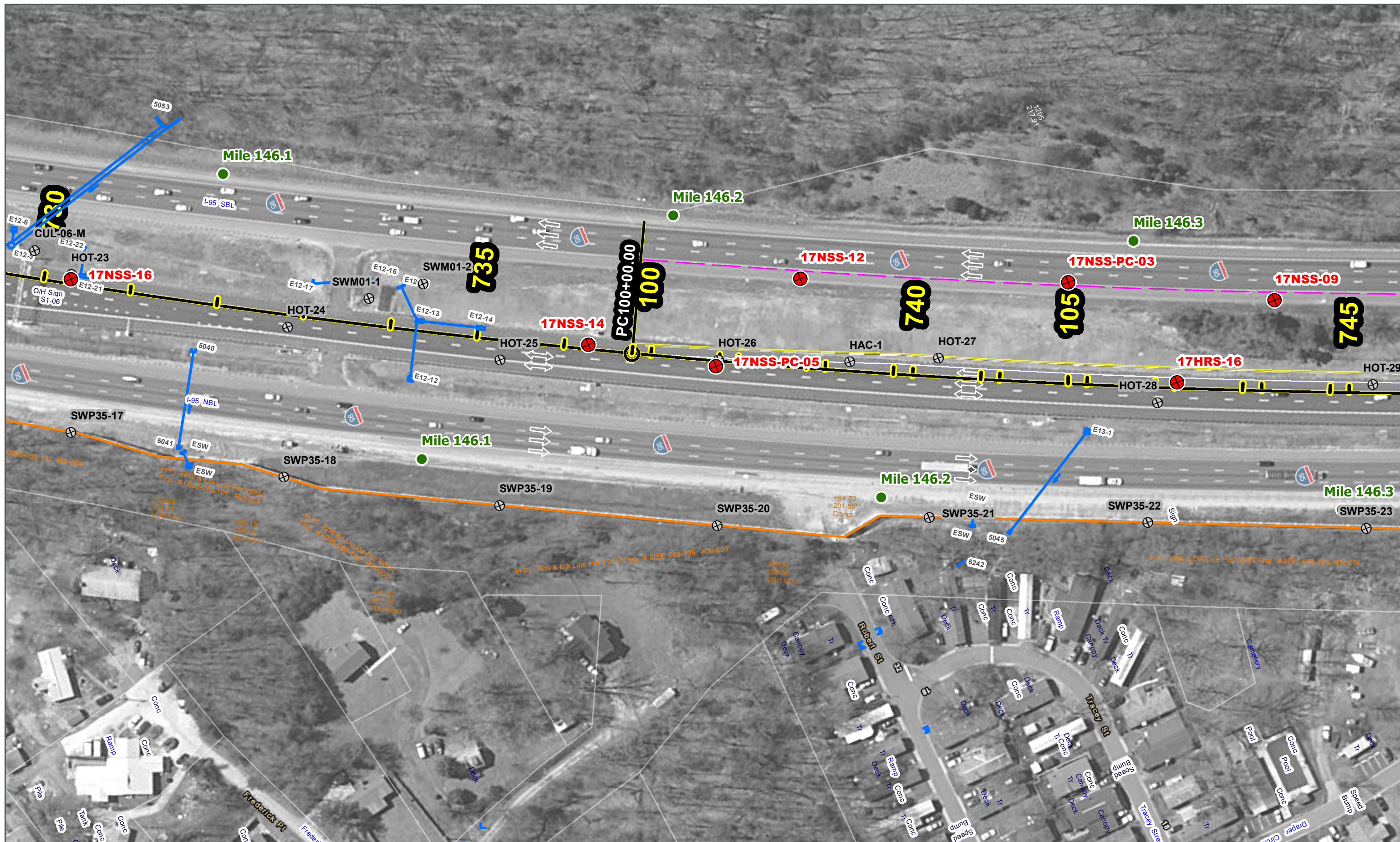


- ⊕ Previous Test Boring Locations (by others)
- ⊕ As-Drilled Test Boring Locations (current study)
- Mile Marker
- SWMP
- Parcels

- Culverts
- Alignment
- NWI Wetlands
- VDOT Wetlands

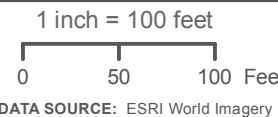


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EXTENSION MAPBOOK
FIGURE 2: SHEET 36 OF 44**

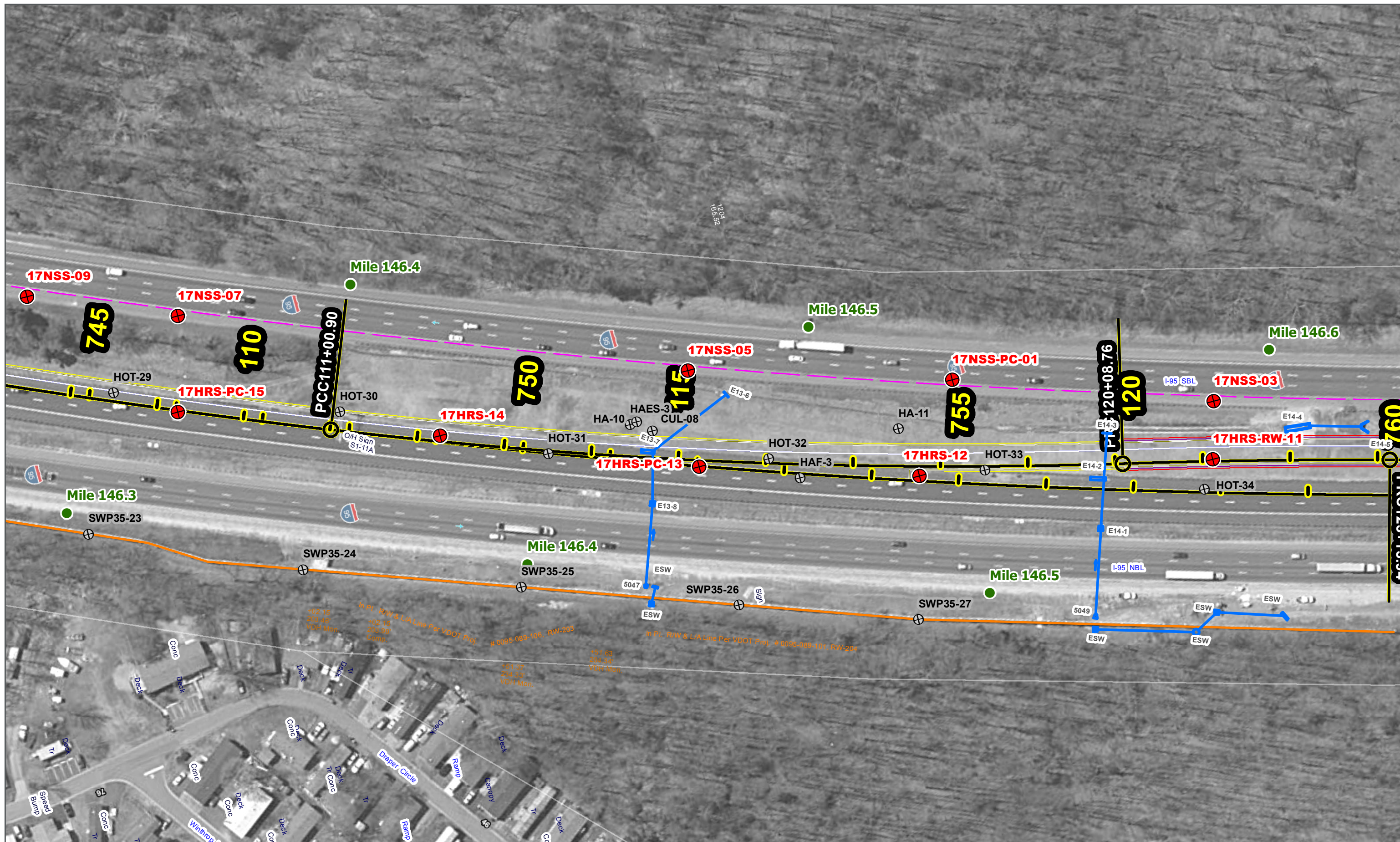


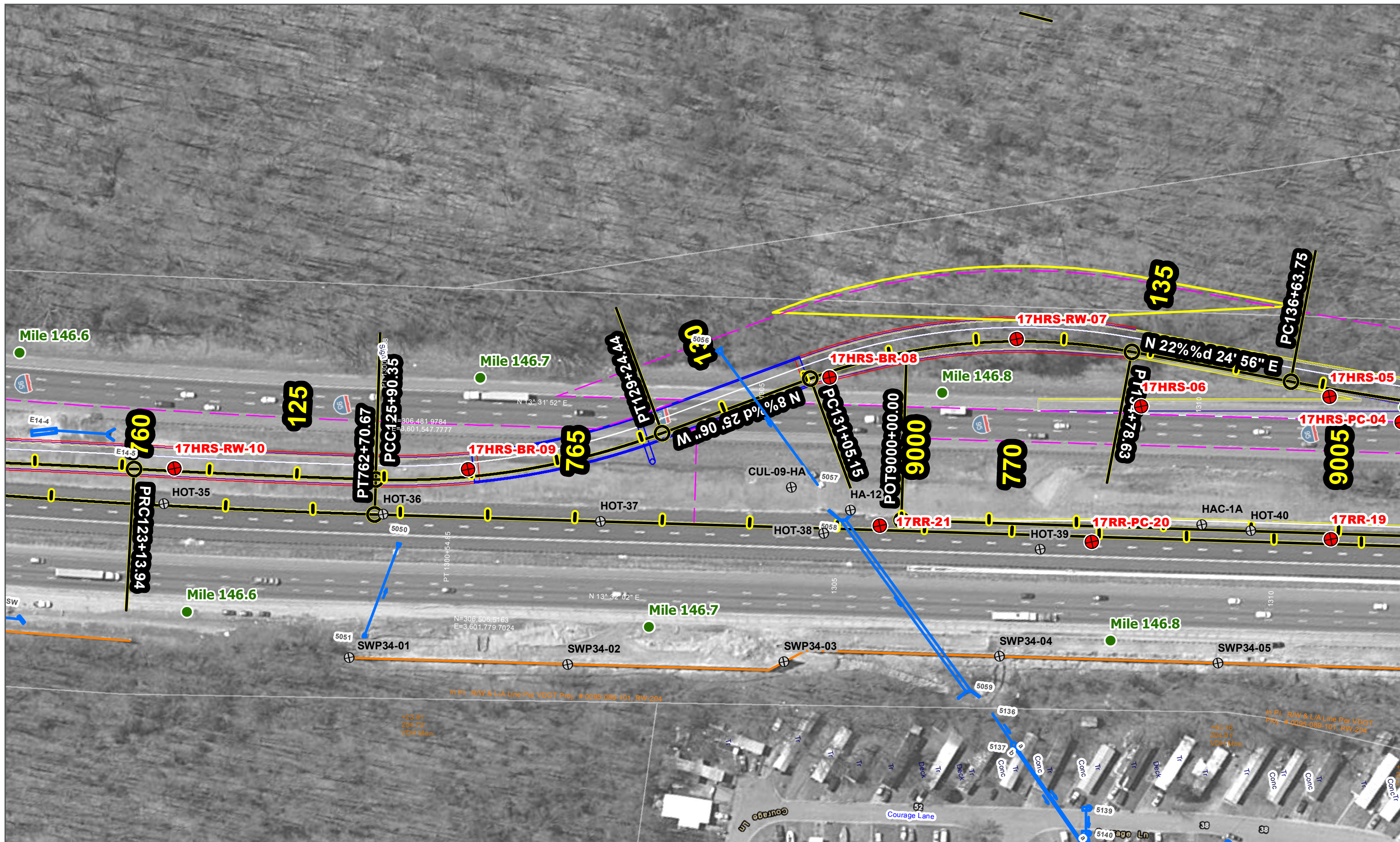
- ⊕ Previous Test Boring Locations (by others)
- ⊕ As-Drilled Test Boring Locations (current study)
- Mile Marker
- SWMP
- Parcels

- Culverts
- Alignment
- NWI Wetlands
- VDOT Wetlands



**I-95 EXPRESS LANES
FREDERICKSBURG
EXTENSION MAPBOOK
FIGURE 2: SHEET 37 OF 44**





- ⊕ Previous Test Boring Locations (by others)
- ⊕ As-Drilled Test Boring Locations (current study)

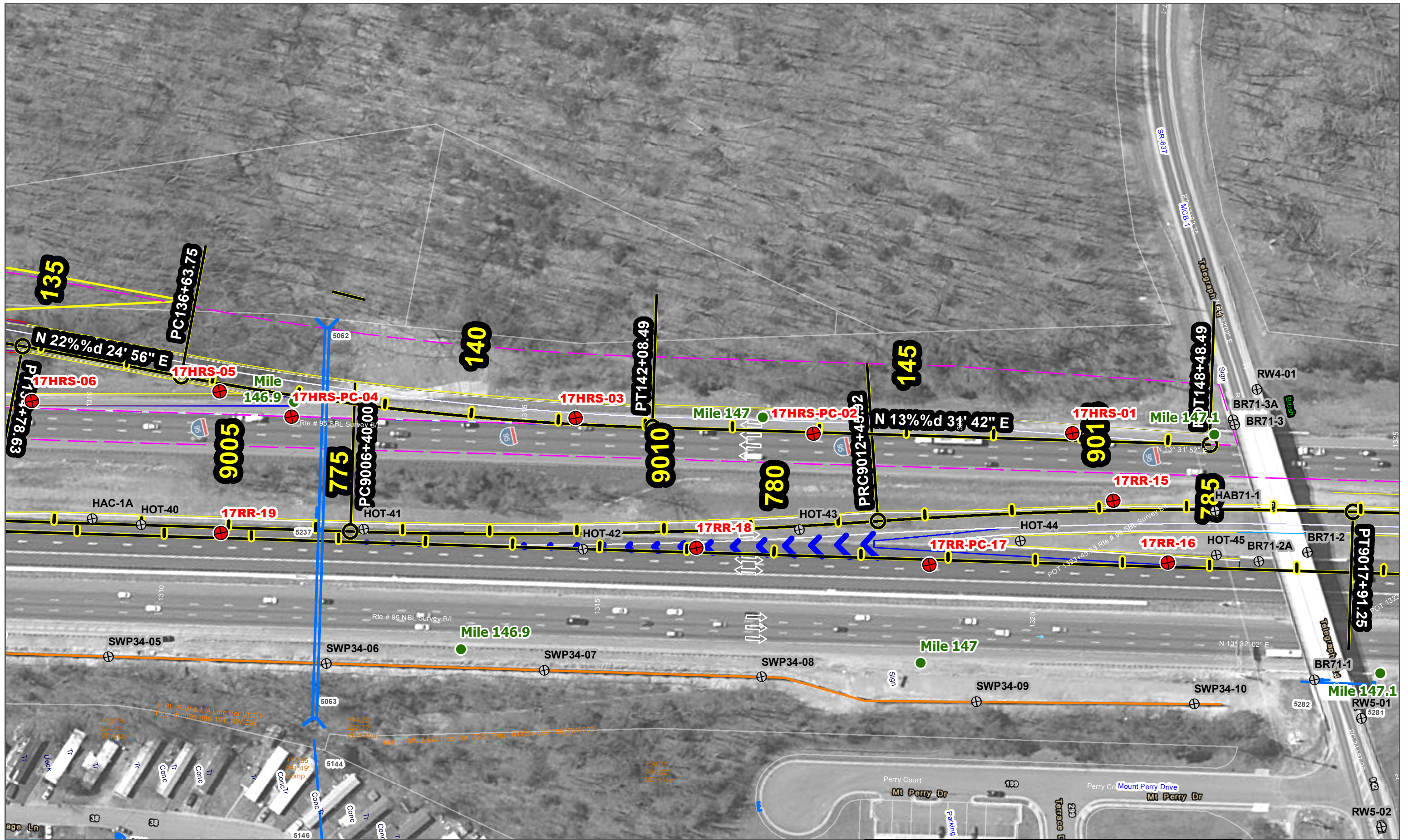
- Mile Marker
- SWMP
- Parcels
- Culverts
- Alignment
- NWI Wetlands
- VDOT Wetlands



1 inch = 100 feet
 0 50 100 Feet
 DATA SOURCE: ESRI World Imagery



**I-95 EXPRESS LANES
 FREDERICKSBURG
 EXTENSION MAPBOOK
 FIGURE 2: SHEET 39 OF 44**



- ⊕ Previous Test Boring Locations (by others)
- ⊕ As-Drilled Test Boring Locations (current study)

- Mile Marker
- SWMP
- Parcels
- Culverts
- Alignment
- NWI Wetlands
- VDOT Wetlands

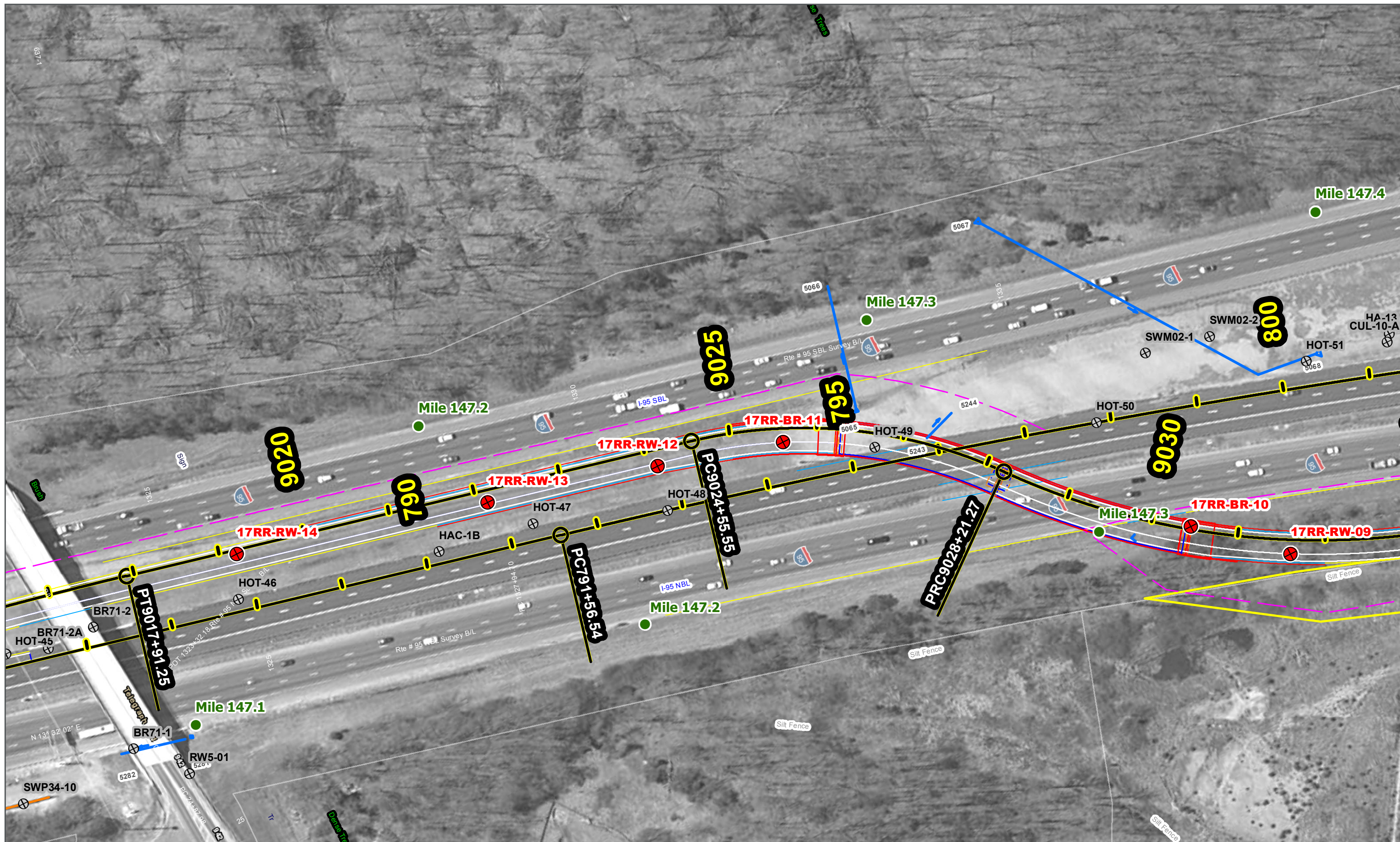
1 inch = 100 feet

0 50 100 Feet

DATA SOURCE: ESRI World Imagery



**I-95 EXPRESS LANES
FREDERICKSBURG
EXTENSION MAPBOOK
FIGURE 2: SHEET 40 OF 44**



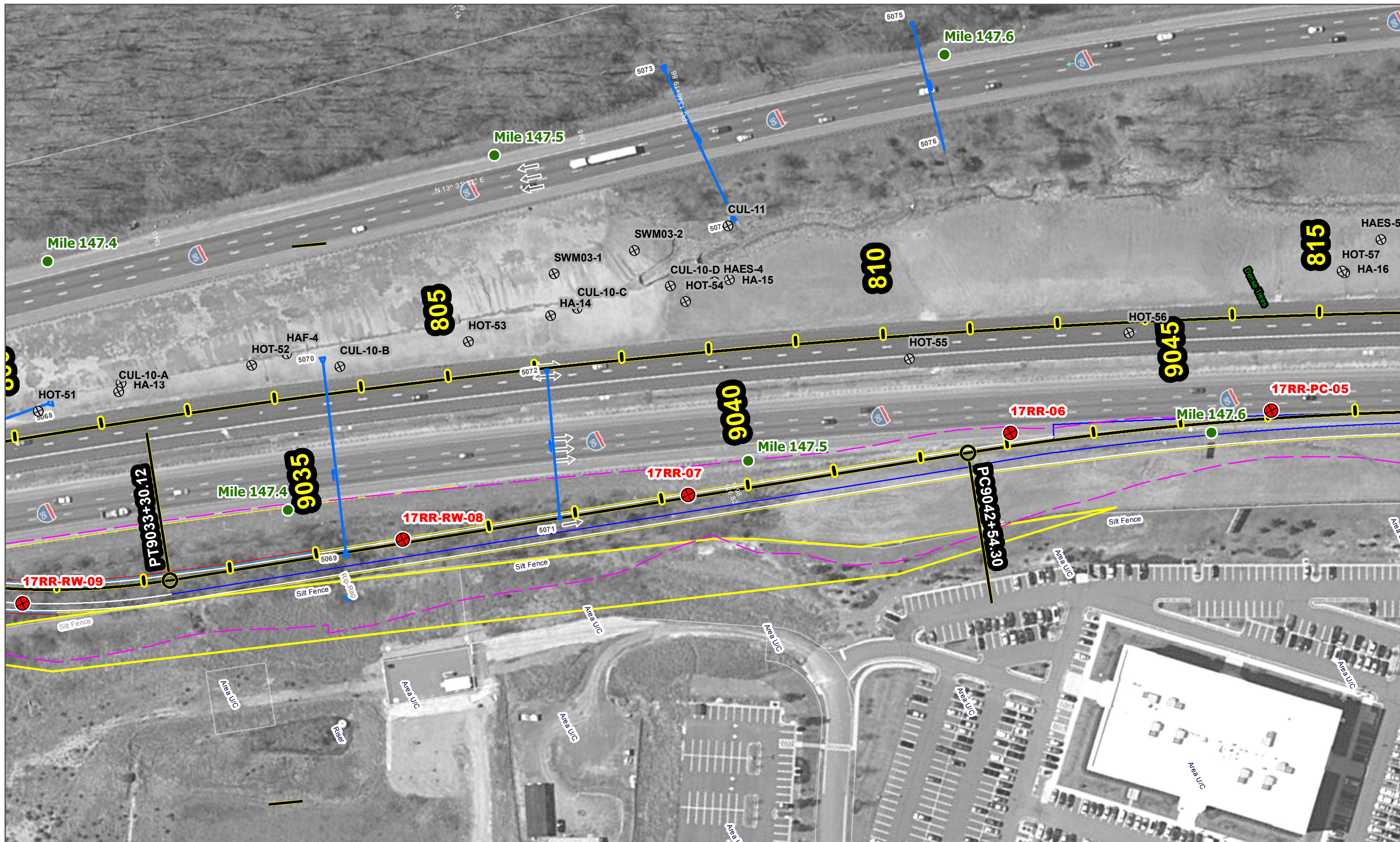
- ⊕ Previous Test Boring Locations (by others)
- ⊕ As-Drilled Test Boring Locations (current study)

- Mile Marker
- SWMP
- Parcels
- Culverts
- Alignment
- NWI Wetlands
- VDOT Wetlands

1 inch = 100 feet
 0 50 100 Feet
 DATA SOURCE: ESRI World Imagery



**I-95 EXPRESS LANES
 FREDERICKSBURG
 EXTENSION MAPBOOK
 FIGURE 2: SHEET 41 OF 44**



- ⊕ Previous Test Boring Locations (by others)
- ⊕ As-Drilled Test Boring Locations (current study)

- Mile Marker
- SWMP
- Parcels
- Culverts
- Alignment
- NWI Wetlands
- VDOT Wetlands

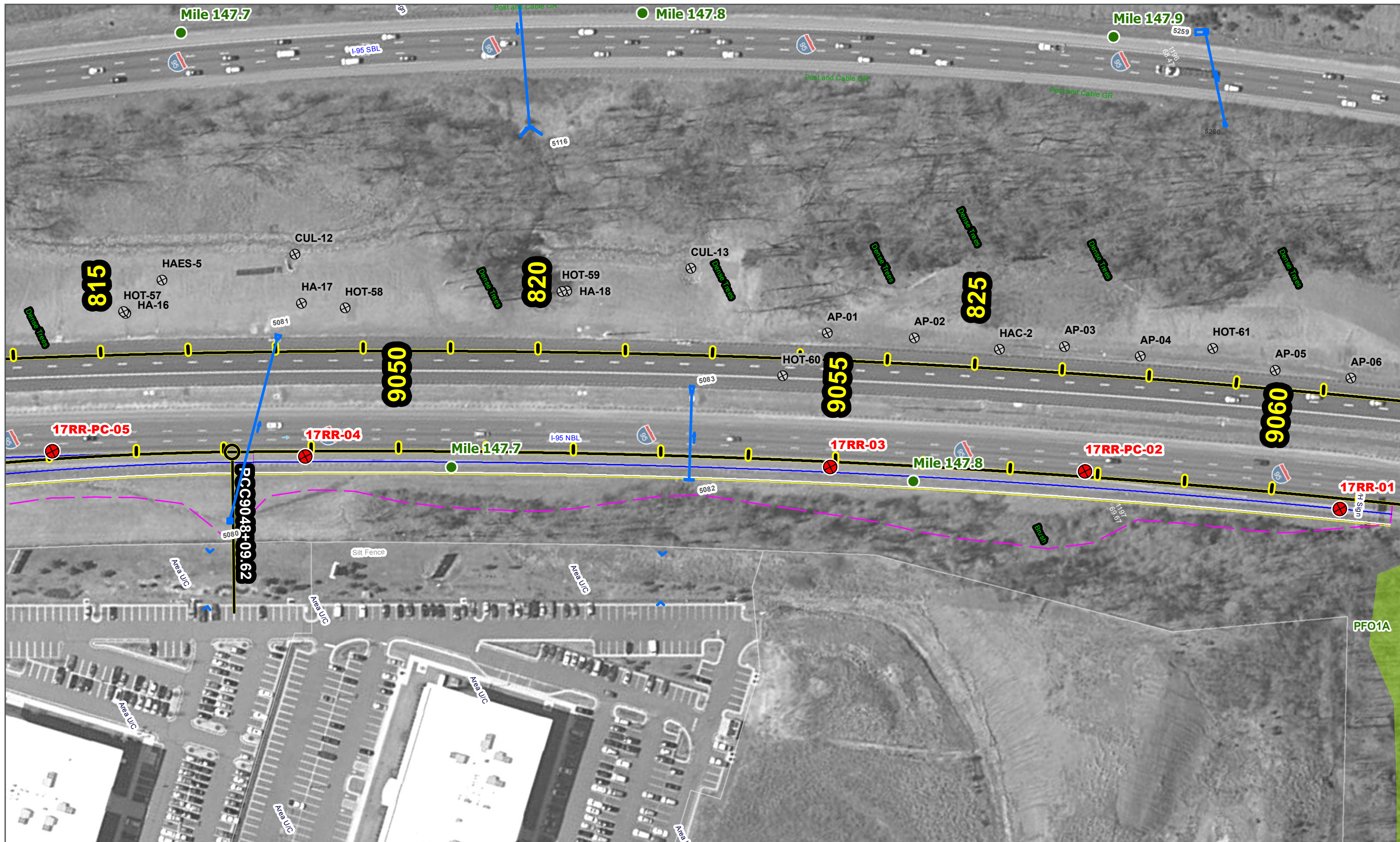
1 inch = 100 feet

0 50 100 Feet

DATA SOURCE: ESRI World Imagery



**I-95 EXPRESS LANES
FREDERICKSBURG
EXTENSION MAPBOOK
FIGURE 2: SHEET 42 OF 44**

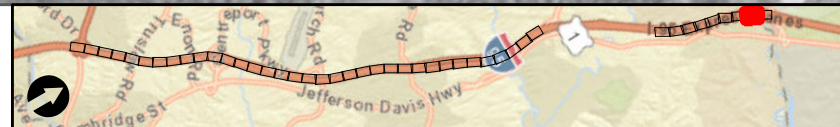


- ⊕ Previous Test Boring Locations (by others)
- ⊕ As-Drilled Test Boring Locations (current study)

- Mile Marker
- SWMP
- Parcels
- Culverts
- Alignment
- NWI Wetlands
- VDOT Wetlands



1 inch = 100 feet
 0 50 100 Feet
 DATA SOURCE: ESRI World Imagery



**I-95 EXPRESS LANES
 FREDERICKSBURG
 EXTENSION MAPBOOK
 FIGURE 2: SHEET 43 OF 44**



- ⊕ Previous Test Boring Locations (by others)
- ⊗ As-Drilled Test Boring Locations (current study)

- Mile Marker
- SWMP
- Parcels
- Culverts
- Alignment
- NWI Wetlands
- VDOT Wetlands

1 inch = 100 feet

0 50 100 Feet

DATA SOURCE: ESRI World Imagery

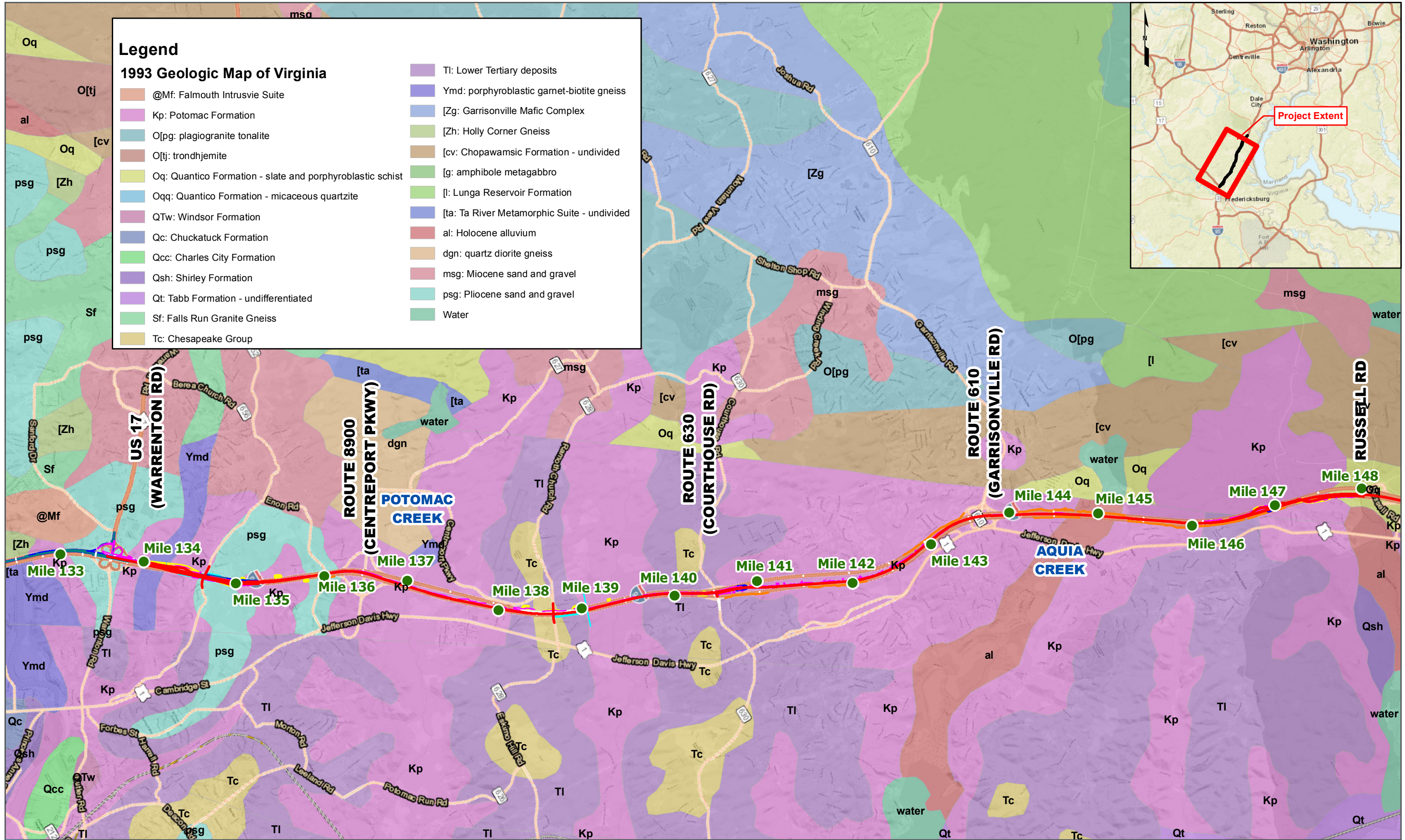
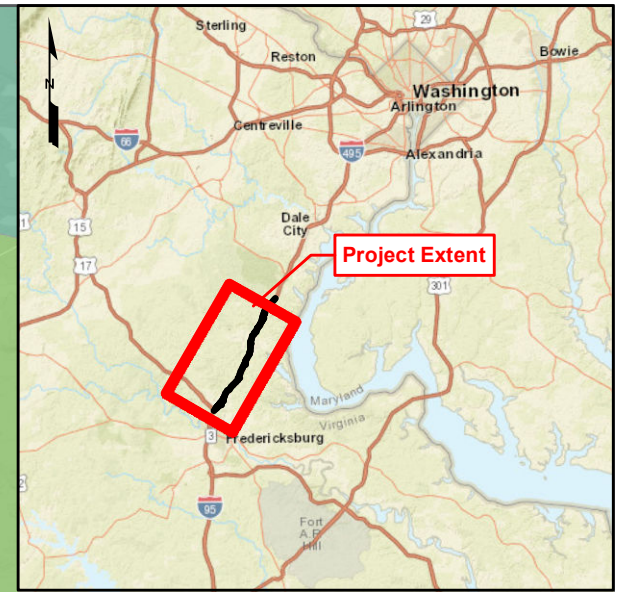


**I-95 EXPRESS LANES
FREDERICKSBURG
EXTENSION MAPBOOK
FIGURE 2: SHEET 44 OF 44**

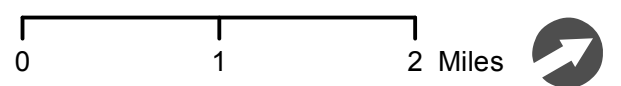
Legend

1993 Geologic Map of Virginia

- @Mf: Falmouth Intrusive Suite
- Kp: Potomac Formation
- O[pg]: plagiogranite tonalite
- O[tj]: trondhjemite
- Oq: Quantico Formation - slate and porphyroblastic schist
- Oqq: Quantico Formation - micaceous quartzite
- QTw: Windsor Formation
- Qc: Chuckatuck Formation
- Qcc: Charles City Formation
- Qsh: Shirley Formation
- Qt: Tabb Formation - undifferentiated
- Sf: Falls Run Granite Gneiss
- Tc: Chesapeake Group
- TI: Lower Tertiary deposits
- Ymd: porphyroblastic garnet-biotite gneiss
- [Zg]: Garrisonville Mafic Complex
- [Zh]: Holly Corner Gneiss
- [cv]: Chopawamsic Formation - undivided
- [g]: amphibole metagabbro
- [l]: Lunga Reservoir Formation
- [ta]: Ta River Metamorphic Suite - undivided
- al: Holocene alluvium
- dgn: quartz diorite gneiss
- msg: Miocene sand and gravel
- psg: Pliocene sand and gravel
- Water



— Proposed Project Alignment
 ● Mile Markers



I-95 FREDERICKSBURG EXPRESS LANES

GEOLOGY MAP

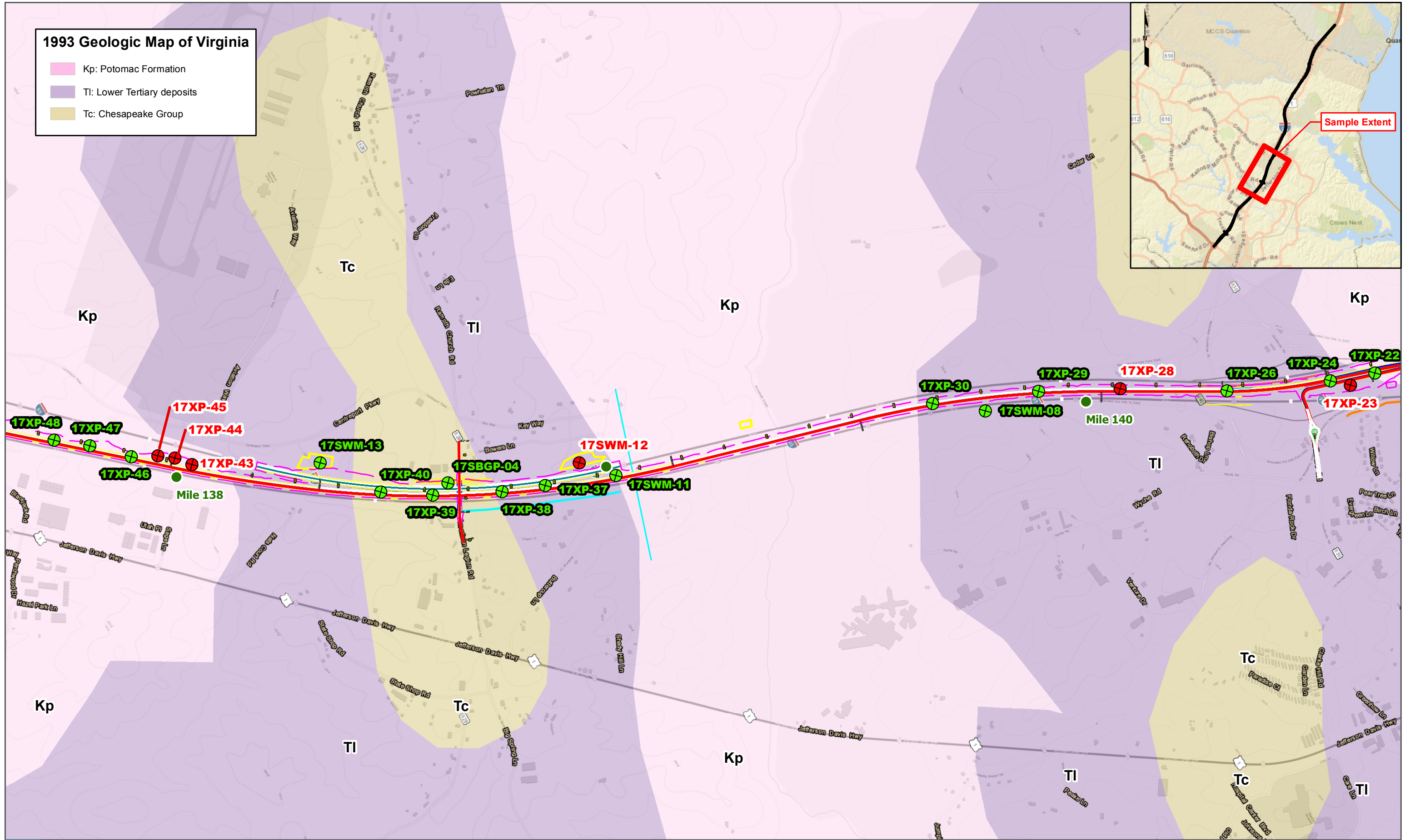
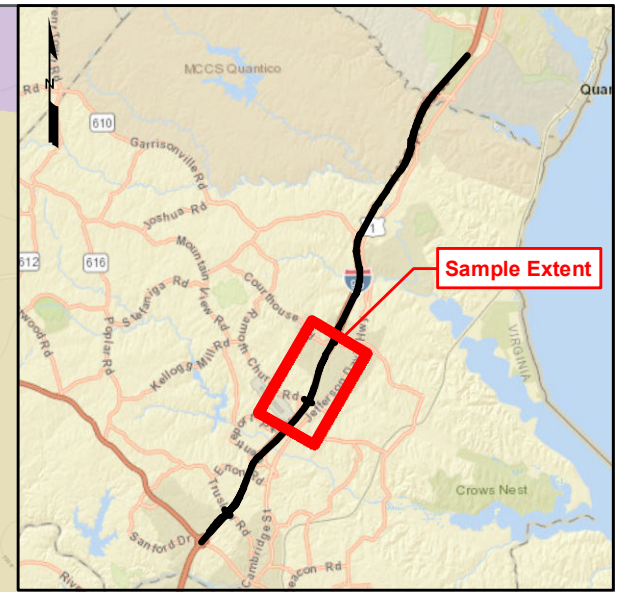
FIGURE 3

DATA SOURCE: ESRI World Street Map, Commonwealth of Virginia Department of Mines, Minerals and Energy

PATH: \\CLTSM\MAIN\GIS_DATA\GIS\PROJECTS\9784_TRANSURBAN\HOLDINGS\LIMITED\10052825_95FREDEX72_WORK_IN_PROGRESS\MAP_DOCS\IMXD\REPORT_20170609\FIG_3_GEOLOGY_95TU.MXD - USER: BRWARD - DATE: 8/7/2017

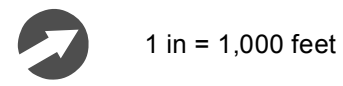
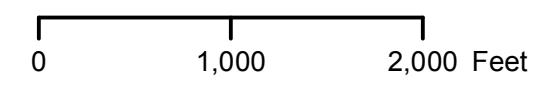
1993 Geologic Map of Virginia

- Kp: Potomac Formation
- Tl: Lower Tertiary deposits
- Tc: Chesapeake Group



- Proposed Project Alignment
- Mile Markers

- Acid Sulfate Samples**
- Total Sulfur Content > 0.2%, Tested for Potential Peroxide Activity
 - Total Sulfur Content < 0.2%



**I-95 FREDERICKSBURG EXPRESS LANES
ACID SULFATE SOIL SAMPLING AND TESTING LOCATIONS**

DATA SOURCE: ESRI World Street Map, Commonwealth of Virginia Department of Mines, Minerals and Energy

FIGURE 4

TABLE A-1: SUMMARY OF SUBSURFACE EXPLORATIONS

Exploration Designation	Primary Design Element Purpose	General Location of Exploration	Travel Lane	Station	Offset	Elevation (ft)	VDOT Project Northing	VDOT Project Easting	Depth Drilled (ft)	Date Completed	Driller	Bulk Sample Collected ¹	Undisturbed Tube Collected	Piezometer Installed	Pavement Core Collected
17BR-02	Bridge	West of 95 GP	--	339+40	161 ft LT	250.0	268067.36	3586024.75	80	4/19/17	S&ME				
17BR-03	Bridge	East of 95 GP	--	339+25	178 ft RT	247.4	267894.37	3586316.85	75	5/1/17	S&ME				
17BR-04	Bridge	Median of 95 GP	--	252+28	32 ft LT	59.0	261404.76	3580518.20	46	4/14/17	SaLUT				
17BR-05	Bridge	Median of 95 GP	--	156+46	62 ft LT	220.7	253405.21	3575554.96	75	4/18/17	SaLUT				
17BR-06	Bridge	East of 95 GP	--	149+87	199 ft RT	210.5	252706.38	3575420.37	75	5/2/17	S&ME				
17BR-07	Bridge	Truslow Road	North Travel Lane	129+14	192 ft LT	248.7	251332.50	3573812.08	80	5/9/17	SaLUT				X
17BR-08	Bridge	Truslow Road	South Travel Lane	128+25	141 ft RT	251.2	251044.90	3574001.20	85	5/8/17	SaLUT				X
17BR-09	Bridge	Median of 95 GP	--	119+91	33 ft LT	209.2	250548.37	3573304.91	50	3/29/17	SaLUT				
17BR-10	Bridge	West of 95 GP	--	115+98	187 ft LT	211.1	250360.57	3572929.37	75	4/26/17	S&ME				
17BR-11	Bridge	Median of 95 GP	--	71+59	8 ft LT	227.4	246930.43	3570104.94	71	4/27/17	SaLUT				
17CD-01	Collector Distributor	West of 95 GP	--	97+69	189 ft LT	169.9	248999.83	3571705.18	29	4/26/17	S&ME				
17CD-02	Collector Distributor	West of 95 GP	--	94+83	210 ft LT	192.8	248799.86	3571499.35	15	4/26/17	S&ME	X			
17CD-03	Collector Distributor	West of 95 GP	--	92+17	194 ft LT	205.9	248590.73	3571334.57	30	4/25/17	S&ME				
17CHS-03	Ramp CHS	East of 95 GP	--	437+67	496 ft RT	198.9	276865.51	3590377.26	30	5/3/17	S&ME				
17CL-01	Culvert	Median of 95 GP	--	544+28	29 ft LT	32.3	286849.10	3593839.00	55	4/19/17	GETS				
17CL-02	Culvert	Median of 95 GP	--	521+57	18 ft LT	39.0	284629.94	3593436.08	50	4/11/17	GETS				
17CL-03	Culvert	Median of 95 GP	--	488+08	16 ft LT	80.4	281597.97	3592022.96	60	4/3/17	GETS				
17CL-04	Culvert	Median of 95 GP	--	473+76	10 ft LT	89.7	280307.28	3591403.03	30	4/17/17	GETS				
17CL-06	Culvert	Median of 95 GP	--	410+27	15 ft LT	166.4	274628.72	3588606.64	50	4/10/17	S&ME				
17CL-07	Culvert	Median of 95 GP	--	398+64	9 ft LT	139.1	273575.54	3588110.28	35	4/10/17	S&ME				
17CL-09	Culvert	Median of 95 GP	--	354+32	16 ft LT	169.4	269354.29	3586768.24	15	4/5/17	S&ME				
17CL-10	Culvert	Median of 95 GP	--	323+90	2 ft LT	196.6	266676.37	3585348.14	30	4/5/17	S&ME				
17CL-11	Culvert	Median of 95 GP	--	229+02	30 ft LT	92.3	259831.55	3578807.76	44	4/12/17	SaLUT				
17CL-12	Culvert	Median of 95 GP	--	220+01	47 ft RT	148.7	259125.33	3578247.51	80	4/10/17	SaLUT				
17CL-13	Culvert	Median of 95 GP	--	186+94	27 ft LT	212.5	256155.99	3576838.38	20	4/4/17	SaLUT				
17CL-14	Culvert	Median of 95 GP	--	175+91	39 ft LT	204.4	255132.60	3576427.16	20	4/4/17	SaLUT				
17CL-15	Culvert	Median of 95 GP	--	154+89	12 ft LT	218.9	253245.27	3575516.77	20	4/18/17	SaLUT				
17CL-16	Culvert	Median of 95 GP	--	149+07	25 ft LT	213.1	252765.24	3575189.52	40	4/19/17	SaLUT				
17CL-17	Culvert	Median of 95 GP	--	102+94	5 ft RT	156.9	249274.65	3572186.47	35	4/20/17	SaLUT			X	
17HPN-01	Ramp HPN	95 NB GP	Left Shoulder	115+07	66 ft RT	202.2	250134.93	3573038.87	12	6/28/17	GETS				X
17HPN-03	Ramp HPN	95 NB GP	Left Shoulder	109+07	60 ft RT	188.1	249689.82	3572642.66	12	6/28/17	GETS				X
17HPN-04	Ramp HPN	95 NB GP	Left Shoulder	103+09	56 ft RT	175.8	249241.74	3572244.21	12	6/28/17	GETS				X
17HPN-05	Ramp HPN	95 NB GP	Left Shoulder	97+13	56 ft RT	181.2	248796.63	3571847.77	12	6/28/17	GETS				X
17HPN-07	Ramp HPN	95 NB GP	Left Shoulder	91+13	57 ft RT	201.7	248347.94	3571449.21	12	6/27/17	GETS				X
17HPN-PC-06	Pavement Core Only	95 NB GP	Left Travel Lane	94+12	67 ft RT	191.7	248564.67	3571655.84	N/A ¹	6/27/17	GETS				X
17HRS-01	Pavement / Tie-in	95 SB GP	Right Shoulder	783+38	150 ft LT	163.2	308491.95	3602010.69	12	6/28/17	GETS				X
17HRS-03	Pavement / Tie-in	95 SB GP	Right Shoulder	777+68	150 ft LT	151.3	307937.75	3601877.55	12	6/28/17	GETS				X
17HRS-05	Ramp	West of 95 GP	--	773+59	168 ft LT	135.5	307543.92	3601764.16	40	7/13/17	GETS				
17HRS-06	Pavement / Tie-in	95 SB GP	Right Shoulder	771+44	150 ft LT	130.2	307330.93	3601731.04	12	6/29/17	GETS				X
17HRS-12	Pavement / Tie-in	I-95 Express Reversible	West Shoulder	754+55	6 ft LT	152.7	305663.22	3601446.44	12	6/29/17	GETS				X
17HRS-14	Pavement / Tie-in	I-95 Express Reversible	West Shoulder	749+04	7 ft LT	164.6	305144.42	3601262.87	7	6/29/17	GETS				X
17HRS-16	Pavement / Tie-in	I-95 Express Reversible	West Shoulder	743+03	7 ft LT	166.2	304589.28	3601033.95	12	6/30/17	GETS				X
17HRS-BR-08/08A	Bridge	West of 95 GP	--	767+87	172 ft LT	116.1	306988.50	3601625.95	57	7/12/17	GETS				
17HRS-BR-09	Bridge	Median of 95 GP	--	763+77	55 ft LT	113.0	306562.33	3601644.03	59	7/10/17	GETS				
17HRS-PC-02	Pavement Core Only	95 SB GP	Right Travel Lane	780+42	141 ft LT	158.6	308201.51	3601950.47	N/A ¹	6/28/17	GETS				X
17HRS-PC-04	Pavement Core Only	95 SB GP	Right Travel Lane	774+42	141 ft LT	140.9	307618.58	3601809.34	N/A ¹	6/29/17	GETS				X
17HRS-PC-13	Pavement Core Only	I-95 Express Reversible	West Travel Lane	752+03	1 ft RT	159.4	305421.99	3601372.45	N/A ¹	6/29/17	GETS				X
17HRS-PC-15	Pavement Core Only	I-95 Express Reversible	West Travel Lane	746+03	2 ft RT	167.5	304861.28	3601160.31	N/A ¹	6/30/17	GETS				X
17HRS-RW-07	Retaining Wall	West of 95 GP	--	769+99	223 ft LT	136.7	307207.07	3601626.48	55	7/13/17	GETS				
17HRS-RW-10	Retaining Wall	Median of 95 GP	--	760+40	43 ft LT	125.5	306233.65	3601574.69	60	7/11/17	GETS				
17HRS-RW-11	Retaining Wall	Median of 95 GP	--	757+90	38 ft LT	137.1	305992.61	3601513.62	40	7/11/17	GETS				
17HWN-01	Ramp HWN	East of 95 GP	--	146+76	224 ft RT	213.3	252431.01	3575260.53	60	5/2/17	S&ME				
17HWN-02	Ramp HWN	East of 95 GP	--	142+95	144 ft RT	241.1	252168.05	3574965.90	20	5/1/17	S&ME	X			
17HWN-03	Ramp HWN	I-95 North Bound	Right Shoulder	136+84	75 ft RT	236.9	251732.22	3574523.21	11	5/16/17	GETS				X
17HWN-04	Ramp HWN	I-95 North Bound	Right Shoulder	130+97	76 ft RT	233.5	251291.79	3574133.81	11	5/15/17	GETS	X			
17HWN-05	Ramp HWN	I-95 North Bound	Right Shoulder	124+93	80 ft RT	225.3	250838.07	3573734.81	12	5/15/17	GETS				X
17HWN-07	Ramp HWN	I-95 North Bound	Right Shoulder	113+04	116 ft RT	197.5	249939.66	3572946.64	12	5/15/17	GETS				X
17NSS-03	Pavement / Tie-in	I-95 South Bound	Left Shoulder	757+90	104 ft LT	133.4	306010.52	3601449.54	10	5/8/17	SaLUT				X
17NSS-05	Pavement / Tie-in	I-95 South Bound	Left Shoulder	751+81	108 ft LT	151.0	305437.15	3601262.70	11	5/8/17	GETS				X
17NSS-07	Pavement / Tie-in	I-95 South Bound	Left Shoulder	745+88	107 ft LT	160.5	304889.04	3601054.02	10	5/8/17	SaLUT				X



TABLE A-1: SUMMARY OF SUBSURFACE EXPLORATIONS

Exploration Designation	Primary Design Element Purpose	General Location of Exploration	Travel Lane	Station	Offset	Elevation (ft)	VDOT Project Northing	VDOT Project Easting	Depth Drilled (ft)	Date Completed	Driller	Bulk Sample Collected ¹	Undisturbed Tube Collected	Piezometer Installed	Pavement Core Collected
17NSS-09	Pavement / Tie-in	I-95 South Bound	Left Shoulder	744+13	104 ft LT	161.0	304728.07	3600988.85	10	5/8/17	GETS	X			X
17NSS-12	Pavement / Tie-in	I-95 South Bound	Left Shoulder	738+64	101 ft LT	155.2	304234.63	3600762.23	10	5/8/17	SaLUT				X
17NSS-14	Pavement / Tie-in	I-95 Express Reversible	West Shoulder	736+28	5 ft LT	152.8	303981.21	3600741.38	12	5/9/17	GETS	X			X
17NSS-16	Pavement / Tie-in	I-95 Express Reversible	West Shoulder	730+31	5 ft LT	134.8	303460.54	3600449.50	13	5/9/17	GETS				X
17NSS-18	Pavement / Tie-in	I-95 Express Reversible	West Shoulder	724+40	5 ft LT	118.3	302961.88	3600133.22	12	5/9/17	GETS	X			X
17NSS-PC-01	Pavement Core Only	I-95 South Bound	Left Travel Lane	754+87	117 ft LT	142.5	305727.56	3601350.02	N/A ¹	5/8/17	GETS				X
17NSS-PC-03	Pavement Core Only	I-95 South Bound	Left Travel Lane	741+74	116 ft LT	160.0	304517.05	3600881.19	N/A ¹	5/8/17	GETS				X
17NSS-PC-05	Pavement Core Only	I-95 Express Reversible	West Travel Lane	737+76	6 ft RT	157.4	304107.23	3600818.92	N/A ¹	5/9/17	GETS				X
17NSS-PC-06	Pavement Core Only	I-95 Express Reversible	West Travel Lane	727+29	5 ft RT	126.5	303197.91	3600299.65	N/A ¹	5/9/17	GETS				X
17PC-01	Pavement Core Only	I-95 South Bound	Left Travel Lane	353+77	94 ft LT	186.4	269331.02	3586676.33	N/A ¹	5/18/17	GETS				X
17PC-02	Pavement Core Only	American Legion Road	North Travel Lane	338+99	345 ft LT	243.4	268118.45	3585843.51	N/A ¹	5/4/17	SaLUT				X
17PC-03	Pavement Core Only	American Legion Road	North Travel Lane	339+03	274 ft RT	244.8	267829.31	3586390.86	N/A ¹	5/4/17	SaLUT				X
17PC-04	Pavement Core Only	I-95 South Bound	Right Travel Lane	319+82	122 ft LT	207.4	266420.61	3585010.61	N/A ¹	5/18/17	GETS				X
17PC-05	Pavement Core Only	I-95 North Bound	Right Travel Lane	145+86	68 ft RT	232.4	252449.08	3575080.55	N/A ¹	5/16/17	GETS				X
17PC-06	Pavement Core Only	Truslow Road	South Travel Lane	129+62	369 ft LT	244.5	251486.49	3573711.72	N/A ¹	5/9/17	SaLUT				X
17PC-08	Pavement Core Only	I-95 North Bound	Right Travel Lane	127+92	67 ft RT	229.9	251069.18	3573924.07	N/A ¹	5/16/17	GETS				X
17PC-09	Pavement Core Only	Truslow Road	North Travel Lane	127+94	286 ft RT	249.7	250925.30	3574089.64	N/A ¹	5/8/17	SaLUT				X
17RR-01	Pavement / Tie-in	I-95 North Bound	Right Shoulder	829+31	130 ft RT	61.1	312642.68	3603923.91	12	5/18/17	GETS				X
17RR-03	Pavement / Tie-in	I-95 North Bound	Right Shoulder	823+40	122 ft RT	81.2	312145.01	3603616.63	11	5/17/17	GETS				X
17RR-04	Pavement / Tie-in	I-95 North Bound	Right Shoulder	817+33	120 ft RT	102.2	311615.08	3603333.83	11	5/17/17	GETS				X
17RR-06	Pavement / Tie-in	I-95 North Bound	Right Shoulder	811+39	118 ft RT	120.5	311082.66	3603084.40	11	5/17/17	GETS				X
17RR-07	Ramp	East of 95 GP	--	807+61	161 ft RT	124.9	310721.72	3602980.57	23	5/26/17	GETS				
17RR-15	Ramp	Median of 95 GP	--	783+88	74 ft LT	163.0	308522.33	3602096.08	15	5/24/17	GETS				
17RR-16	Pavement / Tie-in	I-95 Express Reversible	West Shoulder	784+52	5 ft LT	159.8	308568.79	3602178.34	12	5/16/17	GETS				X
17RR-18	Pavement / Tie-in	I-95 Express Reversible	West Shoulder	779+11	5 ft LT	146.0	308042.72	3602051.32	12	5/16/17	GETS				X
17RR-19	Pavement / Tie-in	I-95 Express Reversible	West Shoulder	773+66	5 ft LT	129.5	307512.50	3601923.63	12	5/16/17	GETS				X
17RR-21	Pavement / Tie-in	I-95 Express Reversible	West Shoulder	768+49	5 ft LT	123.1	307010.12	3601803.21	12	5/17/17	GETS				X
17RR-BR-10	Bridge	East of 95 GP	--	798+69	136 ft RT	147.4	309899.20	3602666.10	68	5/25/17	GETS				
17RR-BR-11	Bridge	Median of 95 GP	--	794+28	48 ft LT	160.1	309527.50	3602368.72	83	5/23/17	GETS				
17RR-PC-02	Pavement Core Only	I-95 North Bound	Right Travel Lane	826+34	111 ft RT	71.6	312402.43	3603753.61	N/A ¹	5/17/17	GETS				X
17RR-PC-05	Pavement Core Only	I-95 North Bound	Right Travel Lane	814+41	108 ft RT	112.4	311360.18	3603197.28	N/A ¹	5/17/17	GETS				X
17RR-PC-17	Pavement Core Only	I-95 Express Reversible	West Travel Lane	781+79	6 ft RT	153.9	308300.76	3602125.02	N/A ¹	5/16/17	GETS				X
17RR-PC-20	Pavement Core Only	I-95 Express Reversible	West Travel Lane	770+92	6 ft RT	124.5	307243.94	3601870.95	N/A ¹	5/16/17	GETS				X
17RR-RW-08	Retaining Wall	East of 95 GP	--	804+26	175 ft RT	118.2	310407.94	3602877.85	40	5/30/17	GETS		X		
17RR-RW-09	Retaining Wall	East of 95 GP	--	799+78	186 ft RT	135.9	309986.98	3602745.72	53	6/5/17	GETS				
17RR-RW-12	Retaining Wall	Median of 95 GP	--	792+82	52 ft LT	162.6	309387.08	3602328.08	60	5/23/17	GETS				
17RR-RW-13	Retaining Wall	Median of 95 GP	--	790+84	56 ft LT	165.9	309195.11	3602276.76	40	5/24/17	GETS				
17RR-RW-14	Retaining Wall	Median of 95 GP	--	787+91	66 ft LT	167.0	308912.43	3602198.84	25	5/24/17	GETS				
17RW-04	Retaining Wall	Median of 95 GP	--	165+43	29 ft LT	227.6	254174.13	3576012.08	15	4/3/17	SaLUT				
17RW-05	Retaining Wall	Median of 95 GP	--	162+15	61 ft LT	217.7	253898.18	3575833.18	29	4/17/17	SaLUT				
17RW-06	Retaining Wall	Median of 95 GP	--	159+37	30 ft LT	227.5	253640.16	3575727.30	48	4/3/17	SaLUT		X		
17RW-07	Retaining Wall	Median of 95 GP	--	125+68	61 ft LT	222.2	250987.37	3573679.18	30	3/30/17	SaLUT				
17RW-08	Retaining Wall	Median of 95 GP	--	122+77	44 ft LT	215.1	250758.90	3573498.94	50	3/30/17	SaLUT				
17RW-09	Retaining Wall	West of 95 GP	--	113+94	242 ft LT	202.9	250254.47	3572753.17	40	4/27/17	S&ME				
17SBGP-01	I-95 SB GP Realignment	I-95 South Bound	Right Shoulder	357+31	155 ft LT	175.1	269680.97	3586739.59	12	5/10/17	GETS	X			X
17SBGP-02	I-95 SB GP Realignment	West of 95 GP	--	349+82	1113 ft LT	196.0	268975.30	3586512.06	10	4/18/17	S&ME				
17SBGP-03	I-95 SB GP Realignment	West of 95 GP	--	344+89	110 ft LT	207.3	268528.56	3586314.15	15	4/18/17	S&ME				
17SBGP-04	I-95 SB GP Realignment	West of 95 GP	--	337+70	154 ft LT	247.5	267916.44	3585950.96	40	4/19/17	S&ME				
17SBGP-05	I-95 SB GP Realignment	I-95 South Bound	Right Shoulder	332+77	74 ft LT	223.1	267453.90	3585776.29	20	5/10/17	GETS				X
17SBGP-06	I-95 SB GP Realignment	West of 95 GP	--	330+34	174 ft LT	186.4	267302.56	3585563.62	30	5/3/17	SaLUT		X		
17SBGP-07	I-95 SB GP Realignment	I-95 South Bound	Right Shoulder	326+64	104 ft LT	214.7	266958.64	3585421.06	15	5/11/17	GETS				X
17SBGP-08	I-95 SB GP Realignment	I-95 South Bound	Right Shoulder	321+82	141 ft LT	208.2	266591.64	3585114.28	12	5/11/17	GETS				X
17SBGP-09	I-95 SB GP Realignment	I-95 South Bound	Right Shoulder	315+83	204 ft LT	201.2	266158.33	3584703.98	12	5/11/17	GETS	X			X
17SW-01	Sound Wall	East of 95 GP	--	357+06	150 ft RT	177.8	269556.54	3587018.82	29	4/21/17	S&ME				
17SW-02	Sound Wall	East of 95 GP	--	352+62	153 ft RT	162.6	269134.55	3586864.40	30	4/20/17	S&ME				
17SW-03	Sound Wall	East of 95 GP	--	345+97	161 ft RT	207.8	268511.68	3586605.91	30	4/20/17	S&ME				
17SW-04	Sound Wall	East of 95 GP	--	339+99	167 ft RT	241.0	267965.34	3586342.16	30	4/20/17	S&ME				
17SW-05	Sound Wall	West of 95 GP	--	137+47	209 ft LT	221.8	251964.07	3574348.12	30	4/25/17	S&ME				



TABLE A-1: SUMMARY OF SUBSURFACE EXPLORATIONS

Exploration Designation	Primary Design Element Purpose	General Location of Exploration	Travel Lane	Station	Offset	Elevation (ft)	VDOT Project Northing	VDOT Project Easting	Depth Drilled (ft)	Date Completed	Driller	Bulk Sample Collected ¹	Undisturbed Tube Collected	Piezometer Installed	Pavement Core Collected
17SW-06	Sound Wall	West of 95 GP	--	133+53	215 ft LT	230.0	251675.72	3574087.04	30	4/25/17	S&ME				
17SW-07	Sound Wall	West of 95 GP	--	129+79	202 ft LT	230.1	251388.81	3573847.75	30	4/25/17	S&ME				
17SW-08	Sound Wall	East of 95 GP	--	131+76	150 ft RT	245.2	251301.03	3574242.08	30	5/2/17	SaLUT				
17SW-09	Sound Wall	East of 95 GP	--	125+80	144 ft RT	232.0	250860.00	3573840.95	30	5/1/17	SaLUT				
17SW-10	Sound Wall	East of 95 GP	--	122+58	180 ft RT	221.0	3573444.38	250426.49	30	5/2/17	SaLUT				
17SWM-01	Storm Water Pond	Median of 95 GP	--	567+85	63 ft LT	129.5	289177.18	3593561.02	25	4/24/17	GETS	X		X	
17SWM-02	Storm Water Pond	Median of 95 GP	--	558+38	70 ft LT	71.3	288242.48	3593712.44	25	4/27/17	GETS			X	
17SWM-03	Storm Water Pond	Median of 95 GP	--	542+91	161 ft RT	207.4	268511.79	3586605.97	25	4/19/17	GETS			X	
17SWM-04	Storm Water Pond	Median of 95 GP	--	522+68	130 ft LT	40.9	284770.48	3593366.27	25	4/18/17	GETS	X		X	
17SWM-05	Storm Water Pond	Median of 95 GP	--	517+81	114 ft LT	48.6	284315.62	3593215.08	24	4/11/17	GETS			X	
17SWM-06	Storm Water Pond	Median of 95 GP	--	500+88	88 ft LT	75.5	282781.44	3592516.61	25	4/4/17	GETS			X	
17SWM-07	Storm Water Pond	Median of 95 GP	--	472+45	101 ft LT	90.4	280229.36	3591263.55	25	4/13/17	GETS			X	
17SWM-08	Storm Water Pond	East of 95 GP	--	400+27	149 ft RT	155.9	273663.92	3588318.70	25	4/24/17	S&ME			X	
17SWM-09	Storm Water Pond	East of 95 GP	--	386+98	142 ft RT	124.3	272434.11	3587861.86	25	4/21/17	S&ME			X	
17SWM-10	Storm Water Pond	West of 95 GP	--	372+80	265 ft LT	105.9	271186.34	3587078.63	25	5/1/17	GETS			X	
17SWM-11	Storm Water Pond	Median of 95 GP	--	357+14	44 ft LT	164.3	269628.12	3586839.05	25	4/5/17	S&ME			X	
17SWM-12	Storm Water Pond	West of 95 GP	--	353+19	256 ft LT	204.3	269336.68	3586504.60	25	4/18/17	S&ME			X	
17SWM-13	Storm Water Pond	West of 95 GP	--	322+62	317 ft LT	162.2	266759.35	3585019.20	25	4/19/17	S&ME	X		X	
17SWM-14	Storm Water Pond	Median of 95 GP	--	281+99	164 ft LT	143.3	263590.17	3582517.45	25	4/3/17	S&ME			X	
17SWM-15	Storm Water Pond	Median of 95 GP	--	262+15	153 ft LT	84.6	262170.56	3581151.42	25	4/3/17	S&ME	X		X	
17SWM-16	Storm Water Pond	Median of 95 GP	--	237+91	157 ft LT	73.0	260510.71	3579388.81	25	4/13/17	SaLUT			X	
17SWM-17	Storm Water Pond	East of 95 GP	--	227+13	343 ft RT	109.9	259432.72	3578921.57	24	5/2/17	S&ME	X		X	
17SWM-18	Storm Water Pond	East of 95 GP	--	188+69	162 ft RT	216.4	256251.07	3577077.47	24	5/2/17	S&ME			X	
17SWM-19	Storm Water Pond	East of 95 GP	--	178+44	129 ft RT	216.3	255307.70	3576675.71	25	5/1/17	S&ME	X		X	
17SWM-20	Storm Water Pond	West of 95 GP	--	173+53	225 ft LT	224.9	254984.27	3576166.58	25	4/24/17	S&ME			X	
17SWM-21	Storm Water Pond	West of 95 GP	--	142+43	208 ft LT	223.5	252341.67	3574655.53	25	4/24/17	S&ME	X		X	
17SWM-22	Storm Water Pond	East of 95 GP	--	81+30	260 ft RT	224.0	247477.63	3570950.90	25	5/1/17	SaLUT			X	
17SWM-23	Storm Water Pond	East of 95 GP	--	64+91	282 ft RT	231.9	246239.35	3569877.99	25	5/1/17	SaLUT	X		X	
17WGS-02	Ramp WGS	West of 95 GP	--	123+62	157 ft LT	220.0	3573474.72	250902.63	10	4/26/17	S&ME				
17WGS-03	Ramp WGS	West of 95 GP	--	117+80	272 ft LT	210.6	250550.07	3572986.44	15	4/26/17	S&ME	X			
17WGS-04	Ramp WGS	West of 95 GP	--	118+97	132 ft LT	210.7	250544.16	3573168.40	10	4/26/17	S&ME				
17WGS-05	Ramp WGS	West of 95 GP	--	111+93	251 ft LT	176.3	250122.89	3572609.67	50	4/28/17	S&ME		X		
17WGS-06	Ramp WGS	West of 95 GP	--	107+23	287 ft LT	145.6	249798.10	3572244.73	20	4/27/17	S&ME			X	
17WGS-07	Ramp WGS	West of 95 GP	--	104+52	217 ft LT	138.7	249538.03	3572113.44	25	4/27/17	S&ME				
17WGS-08	Ramp WGS	West of 95 GP	--	100+89	210 ft LT	144.2	249250.37	3571892.27	24	4/27/17	S&ME				
17XP-01	Express Lanes	Median of 95 GP	--	584+85	41 ft RT	144.0	290871.23	3593455.30	30	4/21/17	GETS				
17XP-02	Express Lanes	Median of 95 GP	--	578+91	16 ft LT	233.3	257270.73	3577282.29	45	4/24/17	GETS				
17XP-03	Express Lanes	Median of 95 GP	--	573+77	14 ft RT	146.1	289773.78	3593537.17	23	4/24/17	GETS	X			
17XP-04	Express Lanes	Median of 95 GP	--	564+27	61 ft RT	99.2	288844.64	3593742.75	44	4/25/17	GETS			X	
17XP-05	Express Lanes	Median of 95 GP	--	560+00	48 ft RT	80.4	288420.84	3593802.42	34	4/25/17	GETS		X		
17XP-06	Express Lanes	Median of 95 GP	--	555+72	17 ft RT	58.6	287992.69	3593834.01	60	4/26/17	GETS				
17XP-07	Express Lanes	Median of 95 GP	--	550+08	6 ft RT	45.8	287428.54	3593870.19	60	4/26/17	GETS				
17XP-08	Express Lanes	Median of 95 GP	--	539+90	49 ft LT	122.6	286415.53	3593791.69	60	4/20/17	GETS				
17XP-10	Express Lanes	Median of 95 GP	--	533+93	24 ft RT	73.5	285815.40	3593786.57	10	4/18/17	GETS	X			
17XP-11	Express Lanes	Median of 95 GP	--	527+96	11 ft LT	53.1	285238.57	3593626.80	40	4/18/17	GETS				
17XP-12	Express Lanes	Median of 95 GP	--	516+98	8 ft LT	56.8	284198.87	3593281.43	35	4/10/17	GETS				
17XP-13	Express Lanes	Median of 95 GP	--	511+06	4 ft LT	76.0	283660.46	3593037.14	15	4/5/17	GETS				
17XP-14	Express Lanes	Median of 95 GP	--	504+97	14 ft LT	62.5	283116.83	3592762.05	50	4/5/17	GETS				
17XP-15	Express Lanes	Median of 95 GP	--	499+03	16 ft LT	78.3	282583.83	3592501.23	40	4/4/17	GETS				
17XP-16	Express Lanes	Median of 95 GP	--	492+97	12 ft LT	84.4	282036.74	3592239.79	40	4/3/17	GETS				
17XP-17	Express Lanes	Median of 95 GP	--	480+80	95 ft LT	81.7	280978.30	3591633.70	40	4/14/17	GETS				
17XP-18	Express Lanes	Median of 95 GP	--	468+39	73 ft RT	145.7	279788.80	3591235.82	10	4/13/17	GETS	X			
17XP-18A	Express Lanes	Median of 95 GP	--	468+39	73 ft RT	145.7	279788.80	3591235.82	60	4/28/17	GETS				
17XP-19	Express Lanes	Median of 95 GP	--	461+27	78 ft LT	127.6	279238.51	3590760.35	55	4/12/17	GETS				
17XP-20	Express Lanes	Median of 95 GP	--	456+10	107 ft LT	152.1	278802.15	3590476.31	15	4/12/17	GETS	X			
17XP-20A	Express Lanes	Median of 95 GP	--	456+10	107 ft LT	152.1	278802.15	3590476.31	40	4/27/17	GETS		X		
17XP-21A	Express Lanes	Median of 95 GP	--	451+92	8 ft LT	136.4	278380.22	3590377.63	60	4/13/17	GETS				
17XP-22	Express Lanes	Median of 95 GP	--	445+24	31 ft RT	175.4	277745.04	3590172.50	39	4/13/17	S&ME	X		X	
17XP-23	Express Lanes	Median of 95 GP	--	442+23	109 ft RT	222.5	277434.73	3590156.46	70	4/13/17	S&ME	X			



TABLE A-1: SUMMARY OF SUBSURFACE EXPLORATIONS

Exploration Designation	Primary Design Element Purpose	General Location of Exploration	Travel Lane	Station	Offset	Elevation (ft)	VDOT Project Northing	VDOT Project Easting	Depth Drilled (ft)	Date Completed	Driller	Bulk Sample Collected ¹	Undisturbed Tube Collected	Piezometer Installed	Pavement Core Collected
17XP-24	Retaining Wall	Median of 95 GP	--	440+06	10 ft RT	190.3	277257.89	3589996.29	30	4/12/17	S&ME				
17XP-24A	Retaining Wall	Median of 95 GP	--	437+94	31 ft RT	186.0	277049.49	3589948.99	30	4/12/17	S&ME				
17XP-25	Express Lanes	Median of 95 GP	--	434+10	11 ft LT	178.3	276706.30	3589768.51	15	4/11/17	S&ME		X		
17XP-26	Express Lanes	Median of 95 GP	--	428+15	11 ft LT	210.5	276176.24	3589503.24	25	4/12/17	S&ME				
17XP-27	Express Lanes	Median of 95 GP	--	422+00	3 ft LT	192.9	275639.66	3589201.70	30	4/11/17	S&ME				
17XP-28	Express Lanes	Median of 95 GP	--	415+90	33 ft LT	218.2	275127.19	3588869.34	30	4/11/17	S&ME				
17XP-29	Express Lanes	Median of 95 GP	--	406+58	23 ft LT	193.9	274305.06	3588428.50	25	4/10/17	S&ME	X			
17XP-30	Express Lanes	Median of 95 GP	--	394+35	20 ft LT	155.2	273180.15	3587942.05	25	4/10/17	S&ME				
17XP-31	Express Lanes	Median of 95 GP	--	387+78	14 ft LT	135.0	272555.72	3587736.21	15	4/7/17	S&ME	X			
17XP-32	Express Lanes	Median of 95 GP	--	381+98	10 ft RT	108.3	271991.70	3587597.13	20	4/7/17	S&ME				
17XP-34	Express Lanes	Median of 95 GP	--	370+11	23 ft LT	110.2	270861.03	3587236.39	35	4/5/17	S&ME				
17XP-35	Express Lanes	Median of 95 GP	--	363+41	26 ft LT	139.9	270218.12	3587048.04	35	4/5/17	S&ME				
17XP-37	Express Lanes	I-95 South Bound	Left Shoulder	348+91	48 ft LT	200.7	268866.69	3586536.13	15	5/18/17	GETS				X
17XP-38	Express Lanes	I-95 South Bound	Left Shoulder	343+89	23 ft LT	215.0	268401.23	3586349.55	15	5/18/17	GETS				X
17XP-39	Express Lanes	I-95 South Bound	Left Shoulder	335+92	16 ft LT	225.7	267695.06	3585985.12	12	5/18/17	GETS	X			X
17XP-40	Express Lanes	I-95 South Bound	Left Shoulder	329+94	37 ft LT	220.4	267195.15	3585657.39	15	5/18/17	GETS	X			X
17XP-41	Express Lanes	Median of 95 GP	--	318+00	32 ft LT	174.0	266222.66	3584972.03	50	4/4/17	S&ME				
17XP-42	Express Lanes	Median of 95 GP	--	313+78	15 ft LT	175.1	265880.98	3584723.76	35	4/4/17	S&ME				
17XP-43	Express Lanes	Median of 95 GP	--	307+99	81 ft LT	216.5	265481.09	3584302.44	45	3/29/17	S&ME				
17XP-44	Express Lanes	Median of 95 GP	--	305+91	116 ft LT	226.6	265348.03	3584140.34	55	4/17/17	S&ME				
17XP-45	Express Lanes	Median of 95 GP	--	303+95	101 ft LT	210.5	265191.52	3584021.49	50	3/29/17	S&ME				
17XP-46	Express Lanes	Median of 95 GP	--	300+94	32 ft LT	182.3	264920.99	3583873.00	30	3/29/17	S&ME	X		X	
17XP-47	Express Lanes	Median of 95 GP	--	296+06	56 ft LT	185.5	264571.28	3583531.24	45	3/30/17	S&ME				
17XP-48	Express Lanes	Median of 95 GP	--	291+94	41 ft LT	174.0	264253.17	3583268.83	30	3/30/17	S&ME				
17XP-49	Express Lanes	Median of 95 GP	--	287+04	97 ft LT	189.7	263923.39	3582902.11	50	3/30/17	S&ME				
17XP-50	Express Lanes	Median of 95 GP	--	284+10	54 ft LT	161.6	263675.64	3582739.52	25	4/3/17	S&ME				
17XP-51	Express Lanes	Median of 95 GP	--	277+79	34 ft LT	128.3	263193.70	3582332.28	15	4/3/17	S&ME	X			
17XP-52	Express Lanes	Median of 95 GP	--	272+01	53 ft LT	119.7	262788.04	3581921.88	20	4/3/17	S&ME				
17XP-53	Express Lanes	Median of 95 GP	--	265+57	13 ft LT	91.1	262305.64	3581495.39	10	4/3/17	S&ME				
17XP-54	Express Lanes	Median of 95 GP	--	259+76	17 ft LT	79.8	261907.99	3581071.65	30	4/3/17	S&ME				
17XP-55	Express Lanes	Median of 95 GP	--	246+85	15 ft LT	57.9	261018.69	3580135.53	18	4/13/17	SaLUT				
17XP-56	Express Lanes	Median of 95 GP	--	240+83	19 ft LT	65.7	260608.04	3579695.10	22	4/13/17	SaLUT				
17XP-57	Express Lanes	Median of 95 GP	--	234+89	18 ft LT	80.9	260206.50	3579258.44	44	4/12/17	SaLUT				
17XP-58	Express Lanes	Median of 95 GP	--	225+98	17 ft LT	99.6	259614.58	3578590.91	49	4/11/17	SaLUT				
17XP-59	Express Lanes	Median of 95 GP	--	215+21	17 ft LT	177.3	258765.00	3577926.96	15	4/5/17	SaLUT				
17XP-60	Express Lanes	Median of 95 GP	--	210+95	9 ft RT	206.9	258377.28	3577749.83	33	4/7/17	SaLUT				
17XP-61	Express Lanes	Median of 95 GP	--	204+98	10 ft LT	219.0	257831.45	3577506.80	14	4/5/17	SaLUT	X			
17XP-62	Express Lanes	Median of 95 GP	--	198+94	16 ft LT	233.3	257270.73	3577282.29	15	4/4/17	SaLUT				
17XP-63	Express Lanes	Median of 95 GP	--	192+98	18 ft LT	234.4	256715.42	3577065.26	15	4/4/17	SaLUT				
17XP-64	Express Lanes	Median of 95 GP	--	181+90	29 ft LT	223.6	255687.41	3576653.28	15	4/4/17	SaLUT	X			
17XP-65	Express Lanes	Median of 95 GP	--	171+47	33 ft LT	220.2	254721.35	3576263.51	15	4/3/17	SaLUT				
17XP-66	Express Lanes	Median of 95 GP	--	151+80	20 ft LT	220.5	252989.69	3575344.82	20	4/19/17	SaLUT				
17XP-67	Express Lanes	Median of 95 GP	--	145+97	24 ft LT	225.2	252511.40	3575012.98	25	4/19/17	SaLUT				
17XP-68	Express Lanes	Median of 95 GP	--	139+80	34 ft LT	233.5	252029.55	3574630.27	10	4/3/17	SaLUT	X			
17XP-69	Express Lanes	Median of 95 GP	--	133+77	32 ft LT	237.5	251571.71	3574239.64	15	3/30/17	SaLUT				
17XP-70	Express Lanes	Median of 95 GP	--	127+24	123 ft LT	235.8	251144.79	3573737.43	25	3/30/17	SaLUT				
17XP-71	Express Lanes	Median of 95 GP	--	115+82	10 ft RT	200.2	250215.89	3573063.50	10	3/29/17	SaLUT				
17XP-72	Express Lanes	Median of 95 GP	--	109+83	4 ft RT	179.2	249793.19	3572639.13	30	3/29/17	SaLUT				
17XP-73	Express Lanes	Median of 95 GP	--	97+61	0 ft LT	163.8	248868.23	3571840.96	31	4/20/17	SaLUT				
17XP-74	Express Lanes	Median of 95 GP	--	91+86	17 ft RT	183.0	3571446.33	248449.34	40	4/21/17	SaLUT		X		
17XP-75	Express Lanes	Median of 95 GP	--	85+73	11 ft LT	204.7	247988.14	3571042.64	50	4/26/17	SaLUT				
17XP-77	Express Lanes	Median of 95 GP	--	66+55	14 ft LT	233.2	246558.43	3569765.21	20	4/28/17	SaLUT				

¹ A total of 32 bulk samples were collected, however only 19 were tested in the laboratory.



TABLE A-2: SUMMARY OF SUBSURFACE CONDITIONS

Exploration Designation	Depth Drilled (ft)	Topsoil Thickness (in)	Depth to Subsurface Water (ft)			Suspected Fill Material		Highly Plastic Fine Grained Material (USCS Symbol CH or MH)		Very Soft to Soft Fine Grained Soil (SPT N-Value 0 to 4 bsf)		Very Loose Course Grained Soils (SPT N-Value 0 to 3 bsf)		Refusal Blow Count (SPT N-Value >50 blows over 6" Interval)		Auger Refusal		Rock Cored	
			At Time of Drilling	End of Drilling	After Drilling	Present	Depth Range	Present	Depth Range(s)	Present	Depth Range(s)	Present	Depth Range(s)	Present	Depth Range(s)	Present	Depth	Present	Depth Range(s)
17BR-02	80	2	NE	46.9	57.1			X	16.5-21.5, 58.3-66.5					X	71.5-78				
17BR-03	75	2	49.3	59.0	N/A			X	49.3-51.5			X	0.20-2.0	X	6-7.8				
17BR-04	46	2	6.0	5.8	3.5							X	4.0-8.0	X	13-29.0	X	29.0	X	29.0-42.0
17BR-05	75		30.0	24.5	25.0	X	0-8	X	41.5-56.5	X	8.0-16.5, 21.5-26.5			X	51.5-56.5, 61.5-71.5				
17BR-06	75	3	4.5	0.0	9.0														
17BR-07	80		38.0	37.8	N/A	X	0.6-21.5							X	61.6-71.5				
17BR-08	85		49.0	29.5	N/A	X	0.4-13			X	31.5-39.0	X	0.3-2.0						
17BR-09	50	6	8.0	23.0	8.0			X	16.5-41.5					X	36.5-41.5				
17BR-10	75	2	53.5	4.0	N/A			X	11.5-26.5, 46.5-53.5, 61.5-75					X	8.2-11.5, 71.5-75.0				
17BR-11	71	5	15.0	16.5	14.5	X	0.4-4	X	36.5-51.5					X	21.5-26.5, 61.5-71.1	X	71.0		
17CD-01	29	3	NE	NE	NE									X	26.5-28.8				
17CD-02	15	3	NE	NE	NE					X	0.3-2.0			X	13.8-15.0				
17CD-03	30		NE	15.5	3.5					X	4.3-7.0								
17CHS-03	30		NE	NE	NE			X	11.5-30.0	X	0.0-2.0								
17CL-01	55	4	4.0	2.5	2.8			X	39.0-43.5, 49.0-55.0	X	2.0-4.0			X	39.0-46.5				
17CL-02	50	1	2.4	3.0	0.0			X	11.5-16.5, 19.0-21.5, 49.2-50.0			X	0.1-4.4						
17CL-03	60	4	NE	NE	3.0			X	6.0-16.5					X	58.0-59.8				
17CL-04	30	2	6.0	10.3	4.0			X	16.5-30.0			X	0.2-2.0						
17CL-06	50	1	36.5	39.4	32.0			X	8.6-13.9			X	0.4-2.9	X	41.5-46.5				
17CL-07	35	5	19.0	16.5	6.9			X	6.3-9.0	X	2.5-4.0	X	0.3-2.5	X	26.5-31.5				
17CL-09	15	4	NE	NE	NE					X	11.5-15.0	X	8.0-11.5						
17CL-10	30	3	NE	22.1	7.0	X	0.3-5.7			X	8.5-14.0								
17CL-11	44	5	3.5	3.5	3.0							X	0.4-3.0	X	19.0-21.5, 31.5-43.6				
17CL-12	80	2	19.5	23.5	28.0	X	0.2-3.5	X	3.5-14.5, 19.5-79.9					X	46.5-79.9				
17CL-13	20	6	19.0	16.8	10.9			X	4.0-6.0, 8.0-16.5	X	4.0-6.0, 8.0-11.5	X	2.0-4.0						
17CL-14	20	1	19.0	15.8	10.4			X	2.0-3.0	X	0.1-3.0	X	6.0-11.5						
17CL-15	20		NE	NE	NE	X	0-8					X	8.0-20.0						
17CL-16	40		14.0	15.2	15.0	X	0-5.5	X	23.5-34.0			X	4.0-5.5, 11.5-16.5	X	18.5-21.5, 31.5-39.8				
17CL-17	35		8.0	9.0	8.0							X	6.0-11.5	X	26.5-35.2	X	35.0		
17HPN-01	12		NE	NE	N/A	X	1.3-4.0	X	4.0-12.0										
17HPN-03	12		NE	NE	N/A	X	1.4-6.0	X	8.0-12.0	X	6.0-8.0								
17HPN-04	12		NE	NE	N/A	X	1.6-4.0	X	1.6-7.5, 9.0-10.0										
17HPN-05	12		NE	NE	N/A	X	1.6-6.0	X	2.8-4.0, 6.0-9.0										
17HPN-07	12		NE	NE	N/A	X	1.5-7.5	X	1.5-4.0, 7.5-10.0										
17HRS-01	12		8.0	6.8	N/A	x	1.1-4.0												



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			At Time of Drilling	End of Drilling	After Drilling	Present	Depth Range	Present	Depth Range(s)	Present	Depth Range(s)	Present	Depth Range(s)	Present	Depth Range(s)	Present	Depth	Present	Depth Range(s)
17HRS-03	12		NE	NE	N/A	X	1.0-3.7	X	3.7-4.0										
17HRS-05	40	6	NE	N/A	NE			X	11.5-31.5										
17HRS-06	12		NE	NE	N/A	X	1.1-4.0	X	4.0-12.0										
17HRS-12	12		NE	NE	N/A			X	8.0-10.0					X	4.0-4.8				
17HRS-14	7		NE	NE	N/A														
17HRS-16	12		NE	NE	N/A														
17HRS-BR-08/08A	57	6	6.0	N/A	NE	X	0-16.5	X	1.0-2.0, 7.6-11.5, 16.5-24.8			X	6.0-7.6	X	33.0-34.9, 53.0-53.3	X	57.0		
17HRS-BR-09	59		48.0	N/A	3.5			X	0.0-11.5	X	0.0-2.0			X	38.0-39.9, 48.0-50.0, 58.0-58.9				
17HRS-RW-07	55	6	NE	N/A	NE			X	16.5-21.5					X	43-45, 53-54.5				
17HRS-RW-10	60		NE	NE	NE			X	0.0-41.5	X	0.0-2.0								
17HRS-RW-11	40		13.0	N/A	10.3			X	0.0-1.5, 16.5-39.0	X	0.0-1.5								
17HWN-01	60	2	4.5	0.0	3.0									X	51.5-56.5				
17HWN-02	20	3	NE	NE	NE					X	0.3-2.5								
17HWN-03	11		10.0	NE	N/A	X	1-3	X	7.0-11.0	X	9.0-11.0								
17HWN-04	11		NE	NE	N/A	X	1-2	X	5.0-11.0										
17HWN-05	12		6.0	6.0	N/A	X	1.5-5.5					X	8.0-12.0						
17HWN-07	12		NE	NE	N/A	X	1.8-4	X	1.8-4.0										
17NSS-03	10		NE	NE	N/A	X	1.4-4	X	5.0-6.0										
17NSS-05	11		NE	NE	N/A	X	0.7-4.5	X	8.5-8.7										
17NSS-07	10		NE	NE	N/A														
17NSS-09	10		NE	NE	N/A	X	0.5-6.0												
17NSS-12	10		NE	NE	N/A														
17NSS-14	12		NE	NE	N/A														
17NSS-16	12		NE	NE	N/A	X	2.5-3.5	X	8.5-12.0										
17NSS-18	12		NE	NE	N/A	X	1.7-8.5												
17RR-01	12		7.8	5.5	N/A	X	1.5-2.8							X	3.8-7.8, 9.8-11.8				
17RR-03	11		NE	NE	N/A														
17RR-04	11		NE	NE	N/A	X	1.3-5.3	X	4.8-11.3										
17RR-06	11		NE	NE	N/A	X	1.1-3.7	X	3.7-5.3										
17RR-07	23	1	NE	NE	N/A			X	4.0-11.5					X	11.5-23.4				
17RR-15	12		NE	NE	NE			X	8.0-11.5										
17RR-16	12		NE	NE	N/A														
17RR-18	12		NE	NE	N/A			X	6.0-12.0										
17RR-19	12		NE	NE	N/A	X	1.6-2.4												
17RR-21	12		10.0	NE	N/A	X	1.7-12												

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			At Time of Drilling	End of Drilling	After Drilling	Present	Depth Range	Present	Depth Range(s)	Present	Depth Range(s)	Present	Depth Range(s)	Present	Depth Range(s)	Present	Depth	Present	Depth Range(s)
17RR-BR-10	68	2	NE	NE	NE			X	26.5-51.5			X	0.2-2.0	X	56.5-68.3				
17RR-BR-11	83	4	NE	NE	NE			X	2.0-8.0, 29.5-66.5	X	2.0-8.0	X	11.5-16.5	X	71.5-83.3				
17RR-RW-08	40	4	NE	2.5	N/A			X	2.0-26.5	X	4.0-6.0	X	0.3-2.0	X	31.5-40.0	X	40.0		
17RR-RW-09	54	4	6.0	6.0	N/A									X	41.5-53.3				
17RR-RW-12	60	3	NE	28.0	NE			X	29.5-60.0										
17RR-RW-13	40	4	NE	NE	NE			X	4.0-6.0, 31.5-40										
17RR-RW-14	25		NE	NE	NE														
17RW-04	15	6	NE	NE	NE			X	2.0-4.0										
17RW-05	29		13.0	17.2	12.5			X	0.0-7.5			X	11.5-16.5	X	26.5-29.1				
17RW-06	48	6	42.5	25.3	20.3			X	0.5-6.0, 21.5-26.5, 36.5-41.5	X	0.5-2.0			X	31.5-36.5, 41.5-48.4				
17RW-07	30		9.0	16.5	11.0			X	5.0-6.0, 11.5-14.0, 24.5-30.0	X	0.0-1.5, 5.0-11.5	X	1.5-5.0						
17RW-08	50	3	17.5	13.0	3.0			X	21.5-31.5, 36.5-50.0			X	4.0-6.0						
17RW-09	40	2	NE	0.0	5.0			X	2.5-26.5										
17SBGP-01	12		NE	NE	N/A	X	1.9-4.5	X	1.9-4.5										
17SBGP-02	10		NE	NE	N/A	X	0.0-2.0												
17SBGP-03	15		NE	NE	N/A	X	0.0-3.5												
17SBGP-04	40	4	NE	NE	NE							X	0.3-6.0						
17SBGP-05	20		NE	NE	N/A	X	1.5-4.0												
17SBGP-06	30		18.0	18.0	N/A														
17SBGP-07	15		NE	NE	N/A	X	1.5-4.0	X	12.5-15.0										
17SBGP-08	12		NE	NE	N/A	X	1.6-6.0	X	8.0-10.0										
17SBGP-09	12		NE	NE	N/A	X	1.5-6.0	X	6.0-12.0										
17SW-01	29	2	NE	NE	NE			X	11.5-16.5					X	26.5-29.3				
17SW-02	30	2	28.0	21.2	19.8														
17SW-03	30	2	28.0	26.4	21.2			X	21.5-30.0	X	0.2-2.0								
17SW-04	30	2	NE	NE	NE														
17SW-05	30	5	9.5	7.0	1.0							X	0.4-4	X	26.5-29.8				
17SW-06	30	4	27.5	15.0	15.4							X	0.3-2.5						
17SW-07	30	5	18.0	15.3	14.2														
17SW-08	30	2	29.0	26.0	N/A														
17SW-09	30	3	10.5	15.5	24.5					X	0.3-2.0	X	16.5-21.5						
17SW-10	30	2	29.0	28.0	N/A														
17SWM-01	25		NE	20.8	22.1	X	0-11.5			X	6.0-11.5								
17SWM-02	25	1	13.0	10.8	16.8									X	21.5-24.5				
17SWM-03	25	10	8.0	N/A	NE			X	11.5-14.8	X	0.8-2.0, 6.0-8.0								

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			At Time of Drilling	End of Drilling	After Drilling	Present	Depth Range	Present	Depth Range(s)	Present	Depth Range(s)	Present	Depth Range(s)	Present	Depth Range(s)	Present	Depth	Present	Depth Range(s)
17SWM-04	25	4	4.0	3.3	3.0			X	9.0-11.5			X	0.3-4						
17SWM-05	24	3	13.0	13.5	15.0			X	23.5-24.2	X	0.3-2.0			X	21.5-24.2				
17SWM-06	25	4	NE	NE	15.0			X	4.0-5.7	X	0.3-2.0			X	11.5-16.5				
17SWM-07	25	3	NE	22.0	3.9			X	0.3-25.0	X	0.3-2.0								
17SWM-08	25	1	NE	NE	24.0					X	1.8-4.0			X	6-11.5, 21.5-24.9				
17SWM-09	25	3	NE	NE	8.5			X	4.0-6.0, 8.0-16.5					X	11.5-16.5				
17SWM-10	25	8	5.5	1.5	1.5			X	4.0-6.0, 8.0-16.5	X	2.0-6.0	X	0.7-2.0						
17SWM-11	25	6	NE	NE	12.0	X	0.5-3.5	X	11.5-25.0										
17SWM-12	25	4	NE	NE	NE			X	8.0-11.5										
17SWM-13	25	4	13.0	10.0	6.8							X	0.3-2.0						
17SWM-14	25	2	12.0	18.9	7.6							X	0.2-2.0, 8.0-11.5						
17SWM-15	25	6	16.5	17.5	4.3			X	24.0-25.0			X	0.5-2.0						
17SWM-16	25	5	4.5	2.5	2.2														
17SWM-17	24	12	23.0	15.2	7.7			X	4.0-6.0	X	4.0-6.0			X	16.5-24.0				
17SWM-18	24	12	NE	NE	20.6			X	2.0-4.0					X	16.5-23.8				
17SWM-19	25	3	24.0	29.0	22.2							X	0.3-2.0						
17SWM-20	25	4	NE	NE	19.5							X	0.3-2.0						
17SWM-21	25		13.0	11.1	9.0					X	0.0-2.0								
17SWM-22	25	5	24.0	NE	NE					X	0.4-2.0								
17SWM-23	25	3	13.0	24.0	18.2														
17WGS-02	10	4	8.0	NE	N/A	X	0.3-3.5			X	3.5-5.5	X	5.5-10.0						
17WGS-03	15	2	NE	NE	N/A			X	8.0-15.0										
17WGS-04	10	4	NE	NE	N/A	X	0.3-7.5					X	6-7.5						
17WGS-05	50	3	NE	NE	15.1					X	0.3-2.0								
17WGS-06	20	3	7.0	5.5	4.2					X	0.3-3.0			X	16.5-19.5	X	19.5		
17WGS-07	25	2	7.0	0.0	3.0					X	0.2-4.0			X	21.5-25.0				
17WGS-08	24	2	2.0	N/A	N/A			X	4.0-11.5	X	4.0-6.0			X	11.5-23.8				
17XP-01	30		28.0	NE	NE	X	0-4.0	X	4.0-19.7,										
17XP-02	45		NE	NE	NE	X	0.0-11.5	X	26.5-45.0										
17XP-03	23		NE	NE	NE	X	0-4.0	X	4.0-16.5					X	11.5-16.5, 21.5-23.4				
17XP-04	44		13.0	NE	14.1	X	0.0-11.5			X	21.5-26.5			X	31.5-43.8				
17XP-05	34	5	28.0	9.0	6.0			X	16.5-21.5			X	0.4-2.0	X	21.5-33.7				
17XP-06	60	3	4.0	N/A	2.0			X	48.5-60.0			X	0.2-3.0, 4.0-6.0, 8.0-9.7	X	41.5-46.5				
17XP-07	60		13.0	N/A	5.0			X	33.5-51.5										
17XP-08	60	4	53.0	NE	NE									X	16.5-21.5				

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			At Time of Drilling	End of Drilling	After Drilling	Present	Depth Range	Present	Depth Range(s)	Present	Depth Range(s)	Present	Depth Range(s)	Present	Depth Range(s)	Present	Depth	Present	Depth Range(s)
17XP-10	10	4	NE	NE	NE			X	0.3-6.0										
17XP-11	40	2	17.8	17.8	11.8					X	11.5-16.5								
17XP-12	35	4	23.0	22.0	14.0														
17XP-13	15	3	NE	NE	NE			X	2.0-3.5, 4.0-6.0										
17XP-14	50	4	8.0	8.0	5.3			X	16.5-21.5					X	46.5-49.7				
17XP-15	40	5	13.0	13.0	12.0									X	6-21.5				
17XP-16	40	4	NE	NE	12.5			X	0.3-8.0	X	0.3-2.0								
17XP-17	40	4	2.4	8.0	2.5			X	26.5-31.5	X	0.3-4.0								
17XP-18/18A	60	4	48.0	NE	NE			X	0.3-6.0, 13.0-16.5, 21.5-31.5, 51.5-60.00	X	0.3-4.0			X	16.5-21.5, 31.5-36.5				
17XP-19	55	4	23.0	23.0	21.0			X	0.3-14.2, 41.5-55.0	X	0.3-2.0			X	11.5-21.5				
17XP-20/20A	40	3	NE	NE	N/A			X	0.3-15.0, 18.0-26.5, 31.5-36.5					X					
17XP-21A	60	3	28.0	29.0	27.3			X	21.5-25.0	X	0.3-2.0			X	21.5-31.5, 46.5-51.5				
17XP-22	39	5	NE	NE	25.5									X	31.5-38.8				
17XP-23	70	4	NE	NE	24.9			X	36.5-41.5, 68.2-70.0	X	0.3-2.0								
17XP-24	40	6	NE	NE	36.6			X	5.0-19.0, 31.5-40.0	X	0.5-2.5								
17XP-24A	30	4	NE	NE	NE														
17XP-25	15		NE	NE	13.4			X	6.8-11.5										
17XP-26	25	4	NE	NE	NE									X	6-7.7	X	7.7	X	7.7-10.0
17XP-27	30	5	1.0	0.5	0.1							X	0.4-4.0						
17XP-28	30	2	NE	NE	NE			X	16.5-30.0	X	0.2-2.0								
17XP-29	25	3	NE	NE	NE														
17XP-30	25	5	NE	NE	NE			X	6.0-23.3										
17XP-31	15	5	13.0	13.5	N/A														
17XP-32	20	5	8.0	13.0	9.0			X	7.5-11.5	X	4.0-6.5	X	0.4-4.0						
17XP-34	35	3	7.0	3.3	0.8			X	11.5-21.5										
17XP-35	35	4	30.0	21.8	11.0														
17XP-37	15		NE	NE	N/A			X	12.5-15.0										
17XP-38	15		NE	NE	N/A			X	10.0-15.0										
17XP-39	12		NE	NE	N/A														
17XP-40	15		NE	NE	N/A			X	1.8-4.0, 10.0-15.0										
17XP-41	50		3.9	20.0	17.5							X	4.0-6.0	X	46.5-49.8				
17XP-42	35	3	28.0	23.5	16.7			X	2.0-8.5, 18.5-23.5										
17XP-43	45	3	NE	NE	40.1			X	29.0-31.5										
17XP-44	55	4	NE	NE	NE			X	29.0-48.5					X	51.5-54.7				
17XP-45	50	6	NE	NE	NE														

TABLE A-2: SUMMARY OF SUBSURFACE CONDITIONS

Exploration Designation	Depth Drilled (ft)	Topsoil Thickness (in)	Depth to Subsurface Water (ft)			Suspected Fill Material		Highly Plastic Fine Grained Material (USCS Symbol CH or MH)		Very Soft to Soft Fine Grained Soil (SPT N-Value 0 to 4 bsf)		Very Loose Course Grained Soils (SPT N-Value 0 to 3 bsf)		Refusal Blow Count (SPT N-Value >50 blows over 6" Interval)		Auger Refusal		Rock Cored	
			At Time of Drilling	End of Drilling	After Drilling	Present	Depth Range	Present	Depth Range(s)	Present	Depth Range(s)	Present	Depth Range(s)	Present	Depth Range(s)	Present	Depth	Present	Depth Range(s)
17XP-46	30	3	NE	NE	21.1														
17XP-47	45	3	27.0	32.4	25.6			X	36.5-41.5										
17XP-48	30	5	24.0	23.8	18.0			X	26.5-30.0					X	8-16.5				
17XP-49	50	1	NE	NE	44.3									X	8.0-21.5, 26.5-36.5				
17XP-50	25	3	20.5	20.8	21.0														
17XP-51	15	2	12.0	NE	NE			X	2.0-4.5			X	0.2-2.0						
17XP-52	20		NE	NE	NE														
17XP-53	10	2	NE	NE	NE					X	0.2-2.0								
17XP-54	30	3	NE	NE	26.5					X	0.3-2.0								
17XP-55	18	5	3.0	3.5	2.0					X	0.4-3.0			X	16.5-17.6				
17XP-56	22	4	4.0	4.0	2.5									X	16.5-22.1	X	22.1		
17XP-57	44	4	4.0	3.0	3.0					X	0.3-4.0	X	0.3-4.0, 11.5-21.5	X	36.5-44.1				
17XP-58	49	6	2.5	4.5	2.2			X	13.5-36.5			X	0.5-2.0	X	21.5-26.5, 31.5-49.2				
17XP-59	15		NE	NE	NE											X	0.0	X	0-15
17XP-60	33	6	24.0	12.0	22.3					X	0.5-2.0			X	26.5-28.1	X	28.1	X	28.1-33.1
17XP-61	14		NE	NE	N/A									X	6-14.3				
17XP-62	15	6	NE	NE	N/A														
17XP-63	15	1	NE	NE	N/A														
17XP-64	15	3	NE	NE	N/A														
17XP-65	15	6	NE	NE	N/A														
17XP-66	20		NE	NE	NE	X	0-9					X	6.0-8.0						
17XP-67	25	3	14.0	16.5	13.0					X	0.3-2.5								
17XP-68	10		NE	NE	N/A														
17XP-69	15		NE	NE	N/A			X	11.5-15.0										
17XP-70	25	1	NE	NE	N/A			X	6.0-11.5			X	21.5-26.5						
17XP-71	10	5	NE	NE	4.0			X	2.0-10.0										
17XP-72	30	5	NE	NE	N/A			X	11.5-21.5	X	6-11.5								
17XP-73	31		8.0	14.0	3.5							X	0.0-2.0	X	21.5-31.2	X	31.0		
17XP-74	40	3	NE	NE	0.5			X	0.3-11.5	X	2.0-4.0			X	21.5-26.5				
17XP-75	50	3	4.0	1.5	1.5			X	18.5-50.0					X	16.5-26.5, 41.5-50.4	X	50.0		
17XP-77	20	5	NE	17.3	17.3														

¹ Boring advanced by hand auger to bottom of aggregate subbase.



TABLE A-3: PIEZOMETER WATER DEPTH OBSERVATIONS

Exploration Designation	Station	Offset	Surface Elevation (ft)	Depth Drilled (ft)	Screened Depth of Piezometer (ft)	Piezometer Installation Date	At Time of Drilling Water Depth ¹ (ft)	Reading Date	Water Depth ¹ (ft)	Reading Date	Water Depth ¹ (ft)
17SWM-23	64+91	282 ft RT	231.9	25	15.0 to 25.0	5/1/2017	13.0	5/12/2017	9.3	6/20/2017	10.4
17SWM-22	81+30	260 ft RT	224.0	25	15.0 to 25.0	5/1/2017	24.0	5/12/2017	18.9	6/20/2017	18.1
17CL-17	102+94	5 ft RT	156.9	35	25.2 to 35.2	4/20/2017	8.0	5/12/2017	8.6	6/21/2017	7.7
17WGS-06	107+23	287 ft LT	145.6	20	14.5 to 19.5	4/27/2017	7.0	5/10/2017	2.5	6/21/2017	N/A
17SWM-21	142+43	208 ft LT	223.5	25	20.0 to 25.0	4/24/2017	13.0	5/10/2017	9.0	6/21/2017	9.2
17SWM-20	173+53	225 ft LT	224.9	25	20.0 to 25.0	4/24/2017	Dry	5/10/2017	19.5	6/21/2017	17.5
17SWM-19	178+44	129 ft RT	216.3	25	15.0 to 25.0	5/1/2017	24.0	5/12/2017	22.2	6/20/2017	21.8
17SWM-18	188+69	162 ft RT	216.4	24	15.0 to 25.0	5/2/2017	Dry	5/12/2017	20.7	6/20/2017	20.2
17SWM-17	227+13	343 ft RT	109.9	24	15.0 to 25.0	5/2/2017	23.0	5/12/2017	7.5	6/20/2017	8.2
17SWM-16	237+91	157 ft LT	73.0	25	13.0 to 23.0	4/13/2017	4.5	5/10/2017	1.8	6/20/2017	4.4
17SWM-15	262+15	153 ft LT	84.6	25	18.0 to 23.0	4/3/2017	16.5	5/10/2017	4.0	6/20/2017	7.8
17SWM-14	281+99	164 ft LT	143.3	25	16.9 to 21.9	4/3/2017	12.0	5/10/2017	12.1	6/20/2017	12.1
17XP-46	300+94	32 ft LT	182.3	30	25.0 to 30.0	3/29/2017	Dry	5/10/2017	17.7	6/21/2017	17.1
17SWM-13	322+62	317 ft LT	162.2	25	20.0 to 25.0	4/19/2017	13.0	5/10/2017	6.8	6/21/2017	6.6
17SWM-12	353+19	256 ft LT	204.3	25	20.0 to 25.0	4/18/2017	Dry	5/10/2017	19.7	6/21/2017	17.3
17SWM-11	357+14	44 ft LT	164.3	25	20.0 to 25.0	4/5/2017	Dry	5/10/2017	14.8	6/21/2017	15.3
17SWM-10	372+80	265 ft LT	105.9	25	13.0 to 23.0	5/1/2017	5.5	5/10/2017	0.9	6/21/2017	2.6
17SWM-09	386+98	142 ft RT	124.3	25	15.0 to 25.0	4/21/2017	Dry	5/12/2017	8.5	6/20/2017	10.3
17SWM-08	400+27	149 ft RT	155.9	25	14.9 to 24.9	4/24/2017	Dry	5/12/2017	23.0	6/20/2017	23.0
17XP-22	445+24	31 ft RT	175.4	39	33.8 to 38.8	4/13/2017	Dry	5/10/2017	5.5	6/21/2017	25.7
17SWM-07	472+45	101 ft LT	90.4	25	15.0 to 25.0	4/13/2017	Dry	5/10/2017	3.9	6/21/2017	4.8
17SWM-06	500+88	88 ft LT	75.5	25	15.0 to 25.0	4/4/2017	Dry	5/10/2017	14.0	6/21/2017	15.0
17SWM-05	517+81	114 ft LT	48.6	24	14.0 to 24.0	4/11/2017	13.0	5/10/2017	10.4	6/20/2017	15.0
17SWM-04	522+68	130 ft LT	40.9	25	13.0 to 23.0	4/18/2017	4.0	5/10/2017	1.9	6/20/2017	4.7
17SWM-03	542+91	96 ft LT	207.4	25	12.7 to 22.7	4/19/2017	8.0	5/10/2017	21.1	6/21/2017	17.4
17SWM-02	558+38	70 ft LT	71.3	25	13.8 to 23.8	4/27/2017	13.0	5/10/2017	7.1	6/21/2017	9.5
17XP-04	564+27	61 ft RT	99.2	44	13.7 to 23.7	4/25/2017	13.0	5/10/2017	13.5	6/21/2017	14.2
17SWM-01	567+85	63 ft LT	129.5	25	13.2 to 23.2	4/24/2017	Dry	5/10/2017	22.1	6/21/2017	N/A

¹ Water depth measurements are referenced from the ground surface.



TABLE A-4: SUMMARY OF PAVEMENT CORES

Pavement Core Designation	Date Extracted	Roadway	Lane Location	Station	Offset	Thickness (in.)				
						Asphalt Concrete	Portland Cement Concrete	Asphalt Tack	Aggregate Subbase	Total
17HPN-07	6/27/2017	I-95 North Bound	Left Shoulder	91+13	57 ft RT	5.8	--	--	12.2	18.0
17HPN-PC-06	6/27/2017	I-95 North Bound	Left Travel Lane	94+12	67 ft RT	6.0	9.3	--	1.7	17.0
17HPN-05	6/27/2017	I-95 North Bound	Left Shoulder	97+13	56 ft RT	5.3	--	--	13.7	19.0
17HPN-04	6/27/2017	I-95 North Bound	Left Shoulder	103+09	56 ft RT	5.3	--	--	13.7	19.0
17HPN-03	6/27/2017	I-95 North Bound	Left Shoulder	109+07	60 ft RT	5.5	--	--	11.5	17.0
17HWN-07	5/15/2017	I-95 North Bound	Right Shoulder	113+03	146 ft RT	6.5	--	--	15.5	22.0
17HPN-01	6/27/2017	I-95 North Bound	Left Shoulder	115+07	66 ft RT	6.0	--	--	10.0	16.0
17HWN-05	5/15/2017	I-95 North Bound	Right Shoulder	124+93	80 ft RT	6.5	--	--	11.5	18.0
17PC-08	5/16/2017	I-95 North Bound	Right Travel Lane	127+92	67 ft RT	2.5	9.5	--	6.0	18.0
17PC-09	5/8/2017	Truslow Road	North Travel Lane	127+94	286 ft RT	7.0	--	--	11.0	18.0
17BR-08	5/8/2017	Truslow Road	South Travel Lane	128+25	141 ft RT	5.0	--	--	--	5.0
17BR-07	5/9/2017	Truslow Road	North Travel Lane	129+14	192 ft LT	7.0	--	--	--	7.0
17PC-06	5/9/2017	Truslow Road	South Travel Lane	129+62	369 ft LT	5.0	--	--	5.0	10.0
17HWN-04	5/15/2017	I-95 North Bound	Right Shoulder	130+97	76 ft RT	9.0	--	--	3.0	12.0
17HWN-03	5/16/2017	I-95 North Bound	Right Shoulder	136+84	75 ft RT	10.5	--	--	1.5	12.0
17PC-05	5/16/2017	I-95 North Bound	Right Travel Lane	145+86	68 ft RT	7.5	9.5	0.3	6.7	24.0
17SBGP-09	5/11/2017	I-95 South Bound	Right Shoulder	315+83	204 ft LT	6.5	--	--	11.5	18.0
17PC-04	5/18/2017	I-95 South Bound	Right Travel Lane	319+82	122 ft LT	11.0	9.0	0.3	5.7	26.0
17SBGP-08	5/11/2017	I-95 South Bound	Right Shoulder	321+82	141 ft LT	6.8	--	--	12.2	19.0
17SBGP-07	5/11/2017	I-95 South Bound	Right Shoulder	326+64	104 ft LT	6.3	--	--	11.7	18.0
17XP-40	5/18/2017	I-95 South Bound	Left Shoulder	329+94	37 ft LT	7.3	--	--	14.7	22.0
17SBGP-05	5/10/2017	I-95 South Bound	Right Shoulder	332+77	74 ft LT	7.3	--	--	11.7	19.0
17XP-39	5/18/2017	I-95 South Bound	Left Shoulder	335+92	16 ft LT	6.5	--	--	17.5	24.0
17PC-02	5/4/2017	American Legion Road	North Travel Lane	338+99	345 ft LT	7.0	--	--	5.0	12.0
17PC-03	5/4/2017	American Legion Road	North Travel Lane	339+03	274 ft RT	8.0	--	--	7.0	15.0
17XP-38	5/18/2017	I-95 South Bound	Left Shoulder	343+89	23 ft LT	6.3	--	--	16.7	23.0
17XP-37	5/18/2017	I-95 South Bound	Left Shoulder	348+91	48 ft LT	5.8	--	--	16.2	22.0
17PC-01	5/18/2017	I-95 South Bound	Left Travel Lane	353+77	94 ft LT	10.0	9.0	0.5	6.5	26.0
17SBGP-01	5/10/2017	I-95 South Bound	Right Shoulder	357+31	155 ft LT	5.3	--	--	18.0	23.3
17NSS-18	5/10/2017	I-95 Express Reversible	West Shoulder	724+34	5 ft LT	4.5	--	--	15.5	20.0
17NSS-PC-06	5/9/2017	I-95 Express Reversible	West Travel Lane	727+29	5 ft RT	16.3	--	--	7.7	24.0
17NSS-16	5/9/2017	I-95 Express Reversible	West Shoulder	730+31	5 ft LT	4.8	--	--	25.2	30.0



TABLE A-4: SUMMARY OF PAVEMENT CORES

Pavement Core Designation	Date Extracted	Roadway	Lane Location	Station	Offset	Thickness (in.)				
						Asphalt Concrete	Portland Cement Concrete	Asphalt Tack	Aggregate Subbase	Total
17NSS-14	5/9/2017	I-95 Express Reversible	West Shoulder	736+28	5 ft LT	5.0	--	--	11.0	16.0
17NSS-PC-05	5/9/2017	I-95 Express Reversible	West Travel Lane	737+76	6 ft RT	15.0	--	--	9.0	24.0
17NSS-12	5/8/2017	I-95 South Bound	Left Shoulder	738+64	101 ft LT	7.8	9.0	0.5	--	17.3
17NSS-PC-03	5/8/2017	I-95 South Bound	Left Travel Lane	741+74	116 ft LT	8.8	9.5	--	5.0	23.3
17HRS-16	6/29/2017	I-95 Express Reversible	West Shoulder	743+03	7 ft LT	5.0	--	--	18.0	23.0
17NSS-09	5/8/2017	I-95 South Bound	Left Shoulder	744+13	104 ft LT	3.0	--	--	3.0	6.0
17NSS-07	5/8/2017	I-95 South Bound	Left Shoulder	745+88	107 ft LT	12.5	--	--	--	12.5
17HRS-PC-15	6/29/2017	I-95 Express Reversible	West Travel Lane	746+03	2 ft RT	12.5	--	--	18.0	30.5
17HRS-14	6/29/2017	I-95 Express Reversible	West Shoulder	749+04	7 ft LT	3.8	--	--	15.0	18.8
17NSS-05	5/8/2017	I-95 South Bound	Left Shoulder	751+81	108 ft LT	5.0	--	--	3.0	8.0
17HRS-PC-13	6/29/2017	I-95 Express Reversible	West Travel Lane	752+03	1 ft RT	15.5	--	--	11.0	26.5
17HRS-12	6/29/2017	I-95 Express Reversible	West Shoulder	754+55	6 ft LT	5.0	--	--	17.0	22.0
17NSS-PC-01	5/8/2017	I-95 South Bound	Left Travel Lane	754+87	117 ft LT	7.5	9.5	0.5	6.5	24.0
17NSS-03	5/8/2017	I-95 South Bound	Left Shoulder	757+90	104 ft LT	4.5	--	--	11.0	15.5
17RR-21	5/16/2017	I-95 Express Reversible	West Shoulder	768+49	5 ft LT	4.8	--	--	15.2	20.0
17RR-PC-20	5/16/2017	I-95 Express Reversible	West Travel Lane	770+92	6 ft RT	15.5	--	--	8.5	24.0
17HRS-06	6/28/2017	I-95 South Bound	Right Shoulder	771+44	150 ft LT	11.8	--	--	1.2	13.0
17RR-19	5/16/2017	I-95 Express Reversible	West Shoulder	773+66	5 ft LT	4.3	--	--	14.7	19.0
17HRS-PC-04	6/28/2017	I-95 South Bound	Right Travel Lane	774+42	141 ft LT	8.3	10.0	0.5	--	18.8
17HRS-03	6/28/2017	I-95 South Bound	Right Shoulder	777+68	150 ft LT	11.3	--	--	0.7	12.0
17RR-18	5/16/2017	I-95 Express Reversible	West Shoulder	779+11	5 ft LT	4.8	--	--	18.2	23.0
17HRS-PC-02	6/28/2017	I-95 South Bound	Right Travel Lane	780+42	141 ft LT	8.0	9.0	0.5	--	17.5
17RR-PC-17	5/16/2017	I-95 Express Reversible	West Travel Lane	781+79	6 ft RT	15.8	--	--	10.2	26.0
17HRS-01	6/28/2017	I-95 South Bound	Right Shoulder	783+38	150 ft LT	11.3	--	--	1.7	13.0
17RR-16	5/16/2017	I-95 Express Reversible	West Shoulder	784+52	5 ft LT	7.8	--	--	11.2	19.0
17RR-06	5/17/2017	I-95 North Bound	Right Shoulder	811+39	118 ft RT	10.5	--	--	2.5	13.0
17RR-PC-05	5/17/2017	I-95 North Bound	Right Travel Lane	814+41	108 ft RT	8.8	9.0	0.5	5.7	24.0
17RR-04	5/17/2017	I-95 North Bound	Right Shoulder	817+33	120 ft RT	10.8	--	--	4.2	15.0
17RR-03	5/17/2017	I-95 North Bound	Right Shoulder	823+40	122 ft RT	12.8	--	--	1.2	14.0
17RR-PC-02	5/17/2017	I-95 North Bound	Right Travel Lane	826+34	111 ft RT	8.0	9.3	0.5	3.2	21.0
17RR-01	5/17/2017	I-95 North Bound	Right Shoulder	829+31	130 ft RT	15.3	--	--	2.7	18.0

Note: Refer to pavement core photo logs for additional information.



TABLE A-5: INDEX OF LABORATORY TESTING TO SUBSURFACE EXPLORATIONS

Exploration Designation	Station	Offset	Depth Drilled (ft)	Number of Tests Assigned								
				Natural Moisture Content	Atterberg Limits	#200 Wash	Grain Size Analysis	Standard Proctor	CBR	Direct Shear	Total Sulfur Content	Potential Peroxide Acidity
17BR-02	339+40	161 ft LT	80	19	2	4	2					
17BR-03	339+25	178 ft RT	75	18	3	3	1					
17BR-04	252+28	32 ft LT	45.5	10	--	2	2					
17BR-05	156+46	62 ft LT	75	18	2	4	2					
17BR-06	149+87	199 ft RT	75	18	1	2	--					
17BR-07	129+14	192 ft LT	80	--	--	--	--					
17BR-08	128+25	141 ft RT	85	20	2	4	--					
17BR-09	119+91	30 ft LT	50	13	2	3	1					
17BR-10	115+98	187 ft LT	75	18	4	5	1					
17BR-11	71+59	8 ft LT	71.1	18	2	3	2					
17CD-01	97+69	189 ft LT	28.8	9	--	--	--					
17CD-02	94+83	210 ft LT	15	7	--	--	--					
17CD-03	92+17	194 ft LT	30	9	1	1	--					
17CHS-03	437+67	496 ft RT	30	9	1	1	--					
17CL-01	544+28	29 ft LT	55	14	1	2	1					
17CL-02	521+57	18 ft LT	50	13	1	2	1					
17CL-03	488+08	16 ft LT	59.8	15	2	2	1					
17CL-04	473+76	10 ft LT	30	9	2	2	--					
17CL-06	410+27	15 ft LT	50	13	1	2	1					
17CL-07	398+64	9 ft LT	35	10	1	1	1					
17CL-09	354+32	16 ft LT	15	6	1	1	--					
17CL-10	323+90	2 ft LT	30	9	2	2	1					
17CL-11	229+02	30 ft LT	43.6	11	--	2	2					
17CL-12	220+01	47 ft RT	79.9	19	3	3	1					
17CL-13	186+94	27 ft LT	20	7	1	2	1					
17CL-14	175+91	39 ft LT	20	8	--	1	1					
17CL-15	154+89	12 ft LT	20	7	1	1	1					
17CL-16	149+07	25 ft LT	39.8	11	1	2	1					
17CL-17	102+94	5 ft RT	35.2	11	1	2	2					
17HPN-01	115+07	66 ft RT	12	5	2	2	--					
17HPN-03	109+07	60 ft RT	12	5	1	1	--					
17HPN-04	103+09	56 ft RT	12	6	2	--	--					
17HPN-05	97+13	56 ft RT	12	5	1	1	--					
17HPN-07	91+13	57 ft RT	12	5	2	2	--					
17HRS-01	783+38	150 ft LT	12	5	1	2	--					
17HRS-03	777+68	150 ft LT	12	5	--	1	--					
17HRS-05	773+59	168 ft LT	40	11	1	1	--					
17HRS-06	771+44	150 ft LT	12	5	1	1	--					
17HRS-12	754+55	6 ft LT	12	5	1	2	--					
17HRS-14	749+04	7 ft LT	7	3	--	1	--					
17HRS-16	743+03	7 ft LT	12	5	--	1	--					
17HRS-BR-08/08A	767+87	172 ft RT	57	14	1	3	--					
17HRS-BR-09	763+77	55 ft LT	60	15	2	4	--					
17HRS-RW-07	769+99	223 ft LT	54.5	14	2	2	--					
17HRS-RW-10	760+40	43 ft LT	60	15	3	3	--					
17HRS-RW-11	757+90	38 ft LT	40	11	1	1	--					
17HWN-01	146+76	224 ft RT	60	15	1	2	1					
17HWN-02	142+95	144 ft RT	20	7	1	2	--					
17HWN-03	136+84	75 ft RT	11	5	2	2	--					
17HWN-04	130+97	76 ft RT	11	5	1	1	--					
17HWN-05	124+93	80 ft RT	12	5	--	1	--					
17HWN-07	113+04	146 ft RT	12	5	1	1	--					
17NSS-03	757+90	104 ft LT	10	5	--	1	--					
17NSS-05	751+81	108 ft LT	10.7	5	--	1	--					
17NSS-07	745+88	107 ft LT	10	5	1	1	--					
17NSS-09	744+13	104 ft LT	10	5	--	1	--					
17NSS-12	738+64	101 ft LT	10	5	--	1	--					



TABLE A-5: INDEX OF LABORATORY TESTING TO SUBSURFACE EXPLORATIONS

Exploration Designation	Station	Offset	Depth Drilled (ft)	Number of Tests Assigned								
				Natural Moisture Content	Atterberg Limits	#200 Wash	Grain Size Analysis	Standard Proctor	CBR	Direct Shear	Total Sulfur Content	Potential Peroxide Acidity
17NSS-14	736+28	5 ft LT	12	5	--	1	--					
17NSS-16	730+31	5 ft LT	12.5	6	1	1	--					
17NSS-18	724+40	5 ft LT	12	5	1	1	--					
17RR-01	829+31	130 ft RT	11.8	5	1	1	--					
17RR-03	823+40	122 ft RT	11.3	5	1	2	--					
17RR-04	817+33	120 ft RT	11.3	5	1	1	--					
17RR-06	811+39	118 ft RT	11.3	5	1	1	--					
17RR-07	807+61	161 ft RT	23.4	8	2	2	--					
17RR-15	783+88	74 ft LT	15	6	1	1	--					
17RR-16	784+52	5 ft LT	12	5	1	1	--					
17RR-18	779+11	5 ft LT	12.3	5	--	1	--					
17RR-19	773+66	5 ft LT	12	5	1	1	--					
17RR-21	768+49	5 ft LT	12	5	--	1	--					
17RR-BR-10	798+69	136 ft RT	68.3	17	2	3	--					
17RR-BR-11	794+28	48 ft LT	83.3	20	3	3	--					
17RR-RW-08	804+26	175 ft RT	40	11	1	2	--					
17RR-RW-09	799+78	186 ft RT	53.3	14	1	2	--					
17RR-RW-12	792+82	52 ft LT	60	15	1	2	--					
17RR-RW-13	790+84	56 ft LT	40	11	2	3	--					
17RR-RW-14	787+91	66 ft LT	25	8	1	2	--					
17RW-04	165+43	29 ft LT	15	6	--	1	1					
17RW-05	162+15	61 ft LT	29.1	9	1	2	1					
17RW-06	159+37	30 ft LT	48.4	13	1	2	2					
17RW-07	125+68	61 ft LT	30	10	1	2	1					
17RW-08	122+77	44 ft LT	50	13	1	2	1					
17RW-09	113+94	242 ft LT	40	11	2	2	1					
17SBGP-01	357+31	155 ft LT	12	6	1	1	--					
17SBGP-02	349+82	113 ft LT	10	5	--	1	1					
17SBGP-03	344+89	110 ft LT	15	6	--	1	1					
17SBGP-04	337+70	154 ft LT	40	11	--	2	2			5		
17SBGP-05	332+77	74 ft LT	20	7	1	2	--					
17SBGP-06	330+34	174 ft LT	30	9	1	2	--					
17SBGP-07	326+64	104 ft LT	15	6	1	2	--					
17SBGP-08	321+82	141 ft LT	12	5	1	1	--					
17SBGP-09	315+83	204 ft LT	12	5	1	1	--					
17SW-01	357+06	150 ft RT	29.3	9	1	1	--					
17SW-02	352+62	153 ft RT	30	9	1	1	1					
17SW-03	345+97	161 ft RT	30	9	1	2	1					
17SW-04	339+99	167 ft RT	30	9	1	2	1					
17SW-05	137+47	209 ft LT	29.8	9	1	2	1					
17SW-06	133+53	215 ft LT	30	9	1	2	1					
17SW-07	129+79	202 ft LT	30	9	1	1	1					
17SW-08	131+76	150 ft RT	30	6	--	2	1					
17SW-09	125+80	144 ft RT	30	9	--	1	1					
17SW-10	122+58	180 ft RT	30	9	--	1	1					
17SWM-01	567+85	63 ft LT	25	9	2	2	1	1	1			
17SWM-02	558+38	70 ft LT	24.5	8	1	1	1					
17SWM-03	542+91	96 ft LT	25	8	1	1	--					
17SWM-04	522+68	130 ft LT	25	8	0	1	1					
17SWM-05	517+81	114 ft LT	24.2	8	1	1	--					
17SWM-06	500+88	88 ft LT	25	8	--	2	2					
17SWM-07	472+45	202 ft LT	25	8	1	1	--					
17SWM-08	400+27	149 ft RT	24.9	8	--	1	1			6		
17SWM-09	386+98	142 ft RT	25	8	--	1	1					
17SWM-10	372+80	265 ft LT	25	8	1	2	1					
17SWM-11	357+14	44 ft LT	25	8	1	1	--			4		
17SWM-12	353+19	256 ft LT	25	8	1	1	--			4	1	



TABLE A-5: INDEX OF LABORATORY TESTING TO SUBSURFACE EXPLORATIONS

Exploration Designation	Station	Offset	Depth Drilled (ft)	Number of Tests Assigned								
				Natural Moisture Content	Atterberg Limits	#200 Wash	Grain Size Analysis	Standard Proctor	CBR	Direct Shear	Total Sulfur Content	Potential Peroxide Acidity
17SWM-13	322+62	317 ft LT	25	9	2	2	2	1	1		4	
17SWM-14	281+99	164 ft LT	25	8	--	1	1					
17SWM-15	262+15	153 ft LT	25	9	2	3	2	1	1			
17SWM-16	237+91	157 ft LT	25	8	--	2	2					
17SWM-17	227+13	343 ft RT	24	8	--	1	--					
17SWM-18	188+69	162 ft RT	23.8	8	--	1	--					
17SWM-19	178+44	129 ft RT	25	9	2	3	3	1	1			
17SWM-20	173+53	225 ft LT	25	8	--	1	1					
17SWM-21	142+43	208 ft LT	25	9	1	2	2	1	1			
17SWM-22	81+30	260 ft RT	25	8	--	1	1					
17SWM-23	64+91	282 ft RT	25	9	2	3	2	1	1			
17WGS-02	123+62	157 ft LT	10	5	1	1	--					
17WGS-03	117+80	272 ft LT	15	7	3	3	1	1	1			
17WGS-04	118+97	132 ft LT	10	5	1	2	1					
17WGS-05	111+93	251 ft LT	50	14	2	2	1					
17WGS-06	107+23	287 ft LT	19.5	7	--	1	1					
17WGS-07	104+52	217 ft LT	25	8	--	1	1					
17WGS-08	100+89	210 ft LT	23.8	8	1	1	1					
17XP-01	584+85	41 ft RT	30	9	1	2	1					
17XP-02	578+91	14 ft LT	45	11	2	2	1					
17XP-03	573+77	14 ft RT	23.4	9	2	2	1	1	1			
17XP-04	564+27	61 ft RT	43.8	12	1	1	1					
17XP-05	560+00	48 ft RT	33.7	11	2	2	1					
17XP-06	555+72	17 ft RT	60	15	1	3	2					
17XP-07	550+08	6 ft RT	60	15	1	2	1					
17XP-08	539+90	49 ft LT	60	15	2	2	1					
17XP-10	533+93	24 ft RT	10	6	2	2	1	1	1			
17XP-11	527+96	11 ft LT	40	11	1	2	1					
17XP-12	516+98	8 ft LT	35	10	--	1	1					
17XP-13	511+06	4 ft LT	15	6	--	1	1					
17XP-14	504+97	14 ft LT	49.7	13	3	3	1					
17XP-15	499+03	16 ft LT	40	11	--	2	2					
17XP-16	492+97	12 ft LT	40	11	1	1	--					
17XP-17	480+80	95 ft LT	40	11	2	3	1					
17XP-18/18A	468+39	73 ft RT	60	16	4	5	1	1	1			
17XP-19	461+27	78 ft LT	55	14	2	3	1					
17XP-20/20A	456+10	107 ft LT	40	12	4	4	1	1	1			
17XP-21A	451+92	8 ft LT	60	15	3	3	--					
17XP-22	445+24	31 ft RT	38.8	11	1	1	1				6	
17XP-23	442+23	109 ft RT	70	18	4	5	3	1	1	1	7	1
17XP-24	440+06	10 ft RT	40	11	3	3	--				3	
17XP-24A	437+94	31 ft RT	30	9	--	1	1					
17XP-25	434+10	11 ft LT	15	6	1	1	--					
17XP-26	428+15	11 ft LT	25	4	--	--	--				2	
17XP-27	422+00	3 ft LT	30	9	2	2	1					
17XP-28	415+90	33 ft LT	30	9	1	1	--				4	2
17XP-29	406+58	23 ft LT	25	9	2	2	1	1	1		1	
17XP-30	394+35	20 ft LT	25	8	1	1	--				1	
17XP-31	387+78	14 ft LT	15	7	1	2	2	1	1	1		
17XP-32	381+98	10 ft RT	20	7	1	1	--					
17XP-34	370+11	23 ft LT	35	10	3	3	--					
17XP-35	363+41	26 ft LT	35	10	1	2	1					
17XP-37	348+91	48 ft LT	15	6	1	1	--				6	
17XP-38	343+89	23 ft LT	15	6	2	2	--				6	
17XP-39	335+92	16 ft LT	12.3	6	--	1	--				6	
17XP-40	329+94	37 ft LT	15	6	1	1	--				6	
17XP-41	318+00	32 ft LT	49.8	13	--	1	1					



TABLE A-5: INDEX OF LABORATORY TESTING TO SUBSURFACE EXPLORATIONS

Exploration Designation	Station	Offset	Depth Drilled (ft)	Number of Tests Assigned								
				Natural Moisture Content	Atterberg Limits	#200 Wash	Grain Size Analysis	Standard Proctor	CBR	Direct Shear	Total Sulfur Content	Potential Peroxide Acidity
17XP-42	313+78	15 ft LT	35	10	2	2	--					
17XP-43	307+99	81 ft LT	45	12	2	2	1				4	1
17XP-44	305+91	116 ft LT	54.7	14	--	2	2				9	4
17XP-45	303+95	101 ft LT	50	13	--	2	2				5	1
17XP-46	300+94	32 ft LT	30	10	2	3	2	1	1	1	4	
17XP-47	296+06	56 ft LT	45	12	2	3	1				4	
17XP-48	291+94	41 ft LT	30	9	1	2	1				1	
17XP-49	287+04	97 ft LT	50	13	--	1	1					
17XP-50	284+10	54 ft LT	25	8	--	1	1					
17XP-51	277+79	34 ft LT	15	7	1	2	2	1	1			
17XP-52	272+01	53 ft LT	20	7	--	1	1					
17XP-53	265+57	13 ft LT	10	5	--	1	1					
17XP-54	259+76	17 ft LT	30	9	1	2	1					
17XP-55	246+85	15 ft LT	17.6	7	--	1	1					
17XP-56	240+83	19 ft LT	22.1	8	--	1	1					
17XP-57	234+89	18 ft LT	44.1	12	--	2	2					
17XP-58	225+98	17 ft LT	49.2	13	1	2	1					
17XP-59	215+21	17 ft LT	15	--	--	--	--					
17XP-60	210+95	9 ft RT	33.1	9	--	1	1					
17XP-61	204+98	10 ft LT	14.3	7	2	2	1	1	1			
17XP-62	198+94	16 ft LT	15	6	1	2	--					
17XP-63	192+98	18 ft LT	15	6	1	1	--					
17XP-64	181+90	29 ft LT	15	7	1	2	2	1	1	1		
17XP-65	171+47	33 ft LT	15	6	--	1	1					
17XP-66	151+80	20 ft LT	20	7	--	1	1					
17XP-67	145+97	24 ft LT	25	8	--	2	2					
17XP-68	139+80	34 ft LT	10	6	2	2	1	1	1	1		
17XP-69	133+77	32 ft LT	15	6	1	1	--					
17XP-70	127+24	123 ft LT	25	8	2	2	2					
17XP-71	115+82	31 ft RT	10	5	1	1	--					
17XP-72	109+83	20 ft RT	30	9	2	2	--					
17XP-73	97+61	0 ft LT	31.2	10	1	1	1					
17XP-74	91+86	17 ft RT	40	12	1	2	2					
17XP-75	85+73	11 ft LT	50.4	14	2	3	1					
17XP-77	66+55	14 ft LT	20	7	1	1	--					
TOTALS:				1869	222	352	144	19	19	5	98	10



TABLE A-6: SUMMARY OF LABORATORY TESTING RESULTS

Boring ID	Sample Type	Depth, feet			w (%)	Atterberg Limits			Grain Size Analysis			USCS Symbol	Standard Proctor		California Bearing Ratio				Corrosivity		Rock	
						LL (%)	PL (%)	PI (%)	% Gravel ¹	% Sand ²	% Silt/Clay ³		Y _d max (pcf)	W _{opt} (%)	Y _d (pcf)	w (%)	% MDD	CBR	% Swell	Total Sulfur (%)	PPA (tons CaCO ₃ /1000 tons)	UC (psi)
17BR-02	Jar	8.0	to	10.0	4.7				37.8	44.6	17.5											
17BR-02	Jar	18.0	to	20.0	37.8	54	29	25			97.0	CH										
17BR-02	Jar	38.0	to	40.0	27.6				0.0	39.1	60.9											
17BR-02	Jar	63.0	to	65.0	29.5	61	30	31			98.7	CH										
17BR-03	Jar	18.0	to	20.0	22.8	28	18	10			76.4	CL										
17BR-03	Jar	33.0	to	35.0	20.9	33	21	12	0.0	49.0	51.0	CL										
17BR-03	Jar	53.0	to	55.0	23.0	110	21	89			26.6	SC										
17BR-04	Jar	6.0	to	8.0	22.5				7.1	73.4	19.5											
17BR-04	Jar	23.0	to	24.1	10.2				0.0	72.6	27.4											
17BR-05	Jar	18.0	to	20.0	16.9	33	15	18			57.2	CL										
17BR-05	Jar	33.0	to	35.0	17.9				8.1	81.4	10.5											
17BR-05	Jar	43.0	to	45.0	29.1	65	31	34			93.5	CH										
17BR-05	Jar	68.0	to	70.0	13.6				4.8	77.2	18.0											
17BR-06	Jar	38.0	to	40.0	22.6	NP	NP	NP			13.5											
17BR-06	Jar	58.0	to	60.0	24.1						71.7											
17BR-08	Jar	8.0	to	10.0	17.6						45.5											
17BR-08	Jar	33.0	to	35.0	33.6	44	23	21			63.3	CL										
17BR-08	Jar	63.0	to	65.0	28.6	63	17	46			93.6	CH										
17BR-08	Jar	73.0	to	75.0	26.7						38.0											
17BR-09	Jar	4.0	to	6.0	18.1				27.0	58.4	14.6											
17BR-09	Jar	18.0	to	20.0	25.2	65	25	40			60.7	CH										
17BR-09	Jar	43.0	to	45.0	25.2	43	22	21			27.9	SC										
17BR-10	Jar	6.0	to	8.0	6.3				0.7	87.9	11.4											
17BR-10	Jar	18.0	to	20.0	34.8	71	27	44			92.8	CH										
17BR-10	Jar	38.0	to	40.0	27.4	49	26	23			74.0	CL										
17BR-10	Jar	48.0	to	50.0	28.7	62	35	27			92.4	MH										
17BR-10	Jar	68.0	to	70.0	28.0	66	31	35			98.9	CH										
17BR-11	Jar	8.0	to	10.0	16.3	40	21	19	19.7	70.1	10.2	SW-SC										
17BR-11	Jar	43.0	to	45.0	24.3	78	28	50			60.1	CH										
17BR-11	Jar	58.0	to	60.0	26.3				0.0	78.0	22.0											
17CD-03	Jar	18.0	to	20.0	20.1	49	19	30			83.2	CL										
17CHS-03	Jar	18.0	to	20.0	31.9	77	31	46			99.0	CH										
17CL-01	Jar	6.0	to	8.0	22.8				6.9	42.3	50.8											
17CL-01	Jar	38.0	to	39.8	21.8	51	37	14			88.1	MH										
17CL-02	Jar	13.0	to	15.0	24.0	58	25	33			69.3	CH										
17CL-02	Jar	28.0	to	30.0	25.5				0.5	90.1	9.4											
17CL-03	Jar	13.0	to	15.0	25.7	57	22	35			90.9	CH										
17CL-03	Jar	33.0	to	35.0	27.5	39	17	22	0.0	81.8	18.2	SC										
17CL-04	Jar	13.0	to	15.0	28.2	60	36	24			70.7	MH										
17CL-04	Jar	28.0	to	30.0	29.7	65	39	26			99.7	MH										
17CL-06	Jar	8.0	to	10.0	20.8	76	27	49			99.2	CH										
17CL-06	Jar	43.0	to	45.0	19.4				0.0	77.3	22.7											
17CL-07	Jar	6.0	to	8.0	23.7	52	27	25	0.0	44.6	55.4	CH										
17CL-09	Jar	13.0	to	15.0	20.1	31	17	14			52.3	CL										



TABLE A-6: SUMMARY OF LABORATORY TESTING RESULTS

Boring ID	Sample Type	Depth, feet			w (%)	Atterberg Limits			Grain Size Analysis			USCS Symbol	Standard Proctor		California Bearing Ratio				Corrosivity		Rock	
						LL (%)	PL (%)	PI (%)	% Gravel ¹	% Sand ²	% Silt/Clay ³		Y _d max (pcf)	W _{opt} (%)	Y _d (pcf)	w (%)	% MDD	CBR	% Swell	Total Sulfur (%)	PPA (tons CaCO ₃ /1000 tons)	UC (psi)
17CL-10	Jar	6.0	to	8.0	25.7	37	25	12			49.3	SM										
17CL-10	Jar	23.0	to	25.0	17.0	37	23	14	0.4	57.8	41.8	SC										
17CL-11	Jar	6.0	to	8.0	18.6				0.0	23.1	76.9											
17CL-11	Jar	28.0	to	30.0	24.0				0.0	79.1	20.9											
17CL-12	Jar	4.0	to	6.0	29.0	78	30	48			99.7	CH										
17CL-12	Jar	38.0	to	40.0	23.4	68	23	45	0.0	2.3	97.7	CH										
17CL-12	Jar	68.0	to	69.5	24.7	59	25	34			98.1	CH										
17CL-13	Jar	2.0	to	4.0	22.1	38	16	22			33.5	SC										
17CL-13	Jar	13.0	to	15.0	15.1				0.0	40.1	59.9											
17CL-14	Jar	13.0	to	15.0	12.3				9.7	57.2	33.1											
17CL-15	Jar	4.0	to	6.0	13.7	37	18	19	6.2	54.6	39.3	SC										
17CL-16	Jar	13.0	to	15.0	20.3				3.4	57.6	39.0											
17CL-16	Jar	28.0	to	30.0	26.5	75	30	45			99.0	CH										
17CL-17	Jar	4.0	to	6.0	17.6	43	20	23	6.7	58.0	35.4	SC										
17CL-17	Jar	23.0	to	25.0	24.6				1.7	59.4	38.9											
17HPN-01	Jar	4.0	to	6.0	27.4	62	25	37			88.7	CH										
17HPN-01	Jar	10.0	to	12.0	24.8	55	24	31			95.3	CH										
17HPN-03	Jar	6.0	to	8.0	23.9	46	17	29			51.6	CL										
17HPN-04	Jar	4.0	to	6.0	27.2	53	15	38														
17HPN-04	Jar	9.0	to	10.0	21.2	68	22	46														
17HPN-05	Jar	9.0	to	10.0	15.3	20	12	8			54.0	CL										
17HPN-07	Jar	4.0	to	6.0	14.9	30	14	16			31.1	SC										
17HPN-07	Jar	8.0	to	10.0	26.0	59	18	41			52.8	CH										
17HRS-01	Jar	4.0	to	6.0	21.0						22.2											
17HRS-01	Jar	8.5	to	10.0	28.8	52	24	28			44.0	SC										
17HRS-03	Jar	2.0	to	3.7	11.8						16.1											
17HRS-05	Jar	2.0	to	4.0	18.0						19.9											
17HRS-05	Jar	23.0	to	25.0	32.2	64	22	42														
17HRS-06	Jar	2.0	to	4.0	10.4						16.2											
17HRS-06	Jar	8.0	to	10.0	22.5	62	21	41														
17HRS-12	Jar	2.0	to	4.0	18.5						30.4											
17HRS-12	Jar	6.0	to	8.0	21.1	40	15	25			48.2	SC										
17HRS-14	Jar	2.0	to	4.0	13.6						23.7											
17HRS-16	Jar	8.0	to	10.0	9.8						22.7											
17HRS-BR-08	Jar	2.0	to	4.0	20.2						42.9											
17HRS-BR-08	Jar	13.0	to	15.0	20.9	41	20	21			39.3	SC										
17HRS-BR-08	Jar	33.0	to	35.0	24.3						20.5											
17HRS-BR-09	Jar	13.0	to	15.0	15.5	33	15	18			53.0	CL										
17HRS-BR-09	Jar	23.0	to	25.0	24.7						25.3											
17HRS-BR-09	Jar	33.0	to	35.0	23.4						28.0											
17HRS-BR-09	Jar	58.0	to	58.9	24.0	27	11	16			36.1	SC										
17HRS-RW-07	Jar	6.0	to	8.0	22.5	48	22	26			82.5	CL										
17HRS-RW-07	Jar	18.0	to	20.0	27.9	63	27	36														
17HRS-RW-07	Jar	43.0	to	45.0	20.8						20.0											



TABLE A-6: SUMMARY OF LABORATORY TESTING RESULTS

Boring ID	Sample Type	Depth, feet			w (%)	Atterberg Limits			Grain Size Analysis			USCS Symbol	Standard Proctor		California Bearing Ratio				Corrosivity		Rock			
						LL (%)	PL (%)	PI (%)	% Gravel ¹	% Sand ²	% Silt/Clay ³		Y _d max (pcf)	W _{opt} (%)	Y _d (pcf)	w (%)	% MDD	CBR	% Swell	Total Sulfur (%)	PPA (tons CaCo ₃ /1000 tons)	UC (psi)		
17HRS-RW-10	Jar	18.0	to	20.0	30.7	68	19	49			96.7	CH												
17HRS-RW-10	Jar	38.0	to	40.0	22.7	53	24	29			72.6	CH												
17HRS-RW-10	Jar	58.0	to	60.0	24.4	38	15	23			41.8	SC												
17HRS-RW-11	Jar	4.0	to	6.0	21.4						29.0													
17HRS-RW-11	Jar	23.0	to	25.0	28.6	62	26	36																
17HWN-01	Jar	38.0	to	40.0	23.2	55	24	31			80.9	CH												
17HWN-01	Jar	48.0	to	50.0	23.9				0.0	77.9	22.1													
17HWN-02	Jar	4.0	to	6.0	15.9	41	18	23			70.0	CL												
17HWN-02	Jar	18.0	to	20.0	14.1						20.3													
17HWN-03	Jar	3.0	to	5.0	15.5	23	11	12			43.5	SC												
17HWN-03	Jar	9.0	to	11.0	18.1	28	11	17			52.0	CL												
17HWN-04	Jar	3.0	to	5.0	18.7	35	17	18			61.1	CL												
17HWN-05	Jar	8.0	to	10.0	24.5						15.6													
17HWN-07	Jar	8.0	to	10.0	25.8	65	23	42			96.5	CH												
17NSS-03	Jar	2.0	to	4.0	9.3						19.1													
17NSS-05	Jar	0.7	to	2.7	6.0						18.7													
17NSS-07	Jar	6.0	to	8.0	23.5	28	19	9			26.2	SC												
17NSS-09	Jar	8.0	to	10.0	23.2						22.8													
17NSS-12	Jar	4.0	to	6.0	18.7						21.1													
17NSS-14	Jar	8.0	to	10.0	18.2						28.1													
17NSS-16	Jar	8.5	to	10.5	19.7	45	15	30			48.9	SC												
17NSS-18	Jar	10.0	to	12.0	18.7	34	19	15			54.8	CL												
17RR-01	Jar	7.8	to	9.8	12.2	26	13	13			26.9	SC												
17RR-03	Jar	3.3	to	5.3	8.1						23.3													
17RR-03	Jar	9.3	to	11.3	10.1	35	12	23			45.0	SC												
17RR-04	Jar	7.3	to	9.3	18.5	31	17	14			68.8	CL												
17RR-06	Jar	5.3	to	7.3	19.1	28	18	10			60.8	CL												
17RR-07	Jar	8.0	to	10.0	25.3	57	12	45			93.8	CH												
17RR-07	Jar	13.0	to	13.8	23.0	39	14	25			75.7	CL												
17RR-15	Jar	8.0	to	10.0	30.7	80	25	55			83.0	CH												
17RR-16	Jar	4.0	to	6.0	32.4	76	26	50			92.9	CH												
17RR-18	Jar	8.3	to	10.3	16.1						23.5													
17RR-19	Jar	6.0	to	8.0	25.0	54	21	33			91.1	CH												
17RR-21	Jar	8.0	to	10.0	5.6						3.9													
17RR-BR-10	Jar	18.0	to	20.0	25.1						22.1													
17RR-BR-10	Jar	43.0	to	45.0	24.4	63	16	47			97.2	CH												
17RR-BR-10	Jar	63.0	to	63.9	23.2	37	14	23			76.2	CL												
17RR-BR-11	Jar	6.0	to	8.0	35.1	46	13	33			57.8	CL												
17RR-BR-11	Jar	48.0	to	50.0	26.0	65	15	50			96.4	CH												
17RR-BR-11	Jar	73.0	to	74.2	15.0	32	10	22			63.7	CL												
17RR-RW-08	Jar	6.0	to	8.0	28.9	76	18	58			93.7	CH												
17RR-RW-08	Jar	28.0	to	30.0	13.5						72.7													
17RR-RW-09	Jar	4.0	to	6.0	22.3						21.8													
17RR-RW-09	Jar	33.0	to	35.0	21.9	45	12	33			80.6	CL												



TABLE A-6: SUMMARY OF LABORATORY TESTING RESULTS

Boring ID	Sample Type	Depth, feet		w (%)	Atterberg Limits			Grain Size Analysis			USCS Symbol	Standard Proctor		California Bearing Ratio				Corrosivity		Rock	
					LL (%)	PL (%)	PI (%)	% Gravel ¹	% Sand ²	% Silt/Clay ³		Y _d max (pcf)	W _{opt} (%)	Y _d (pcf)	w (%)	% MDD	CBR	% Swell	Total Sulfur (%)	PPA (tons CaCO ₃ /1000 tons)	UC (psi)
17RR-RW-12	Jar	13.0	to	15.0	18.0					25.0											
17RR-RW-12	Jar	38.0	to	40.0	30.7	76	20	56		95.3	CH										
17RR-RW-13	Jar	4.0	to	6.0	53.1	74	22	52		68.5	CH										
17RR-RW-13	Jar	18.0	to	20.0	20.2					21.6											
17RR-RW-13	Jar	38.0	to	40.0	25.3	62	15	47		85.6	CH										
17RR-RW-14	Jar	4.0	to	6.0	28.9	77	25	52		71.8	CH										
17RR-RW-14	Jar	18.0	to	20.0	13.7					27.3											
17RW-04	Jar	8.0	to	10.0	13.0				14.9	77.0	8.1										
17RW-05	Jar	4.0	to	6.0	33.2	67	23	44		91.3	CH										
17RW-05	Jar	23.0	to	25.0	22.0				0.2	85.8	14.0										
17RW-06	Jar	13.0	to	15.0	8.7				0.0	82.5	17.5										
17RW-06	Jar	28.0	to	30.0	27.3	28	23	5	0.0	73.9	26.1	SM									
17RW-07	Jar	18.0	to	20.0	27.7				4.0	88.0	8.1										
17RW-07	Jar	28.0	to	30.0	31.4	68	28	40		60.6	CH										
17RW-08	Jar	8.0	to	10.0	21.9				28.3	51.5	20.2										
17RW-08	Jar	33.0	to	35.0	27.3	45	21	24		24.5	SC										
17RW-09	Jar	13.0	to	15.0	31.9	80	31	49		99.8	CH										
17RW-09	Jar	28.0	to	30.0	24.8	41	18	23	0.0	14.7	85.3	CL									
17SBGP-01	Jar	6.0	to	8.0	25.9	64	24	40		99.1	CH										
17SBGP-02	Jar	8.0	to	10.0	14.2				5.2	71.4	23.4										
17SBGP-03	Jar	8.0	to	10.0	14.5				0.8	75.4	23.8										
17SBGP-04	Jar	2.0	to	4.0																0.001	
17SBGP-04	Jar	6.0	to	8.0																0.001	
17SBGP-04	Jar	8.0	to	10.0	8.4				13.2	76.8	10.0										
17SBGP-04	Jar	13.0	to	15.0																< 0.001	
17SBGP-04	Jar	23.0	to	25.0																< 0.001	
17SBGP-04	Jar	33.0	to	35.0	31.0				0.0	62.0	38.0									< 0.001	
17SBGP-05	Jar	8.0	to	10.0	16.8					35.8											
17SBGP-05	Jar	18.0	to	20.0	13.6	40	13	27		49.4	SC										
17SBGP-06	Jar	6.0	to	8.0	34.5	74	25	49		90.4	CH										
17SBGP-06	Jar	18.0	to	20.0	26.1					27.9											
17SBGP-07	Jar	10.0	to	12.0	20.6					38.9											
17SBGP-07	Jar	13.0	to	15.0	27.2	45	24	21		79.4	CL										
17SBGP-08	Jar	4.0	to	6.0	14.6	30	12	18		33.0	SC										
17SBGP-09	Jar	8.0	to	10.0	28.6	70	27	43		67.2	CH										
17SW-01	Jar	13.0	to	15.0	17.7	60	27	33		59.9	CH										
17SW-02	Jar	18.0	to	20.0	24.9	30	13	17	0.0	57.6	42.4	SC									
17SW-03	Jar	13.0	to	15.0	14.5				0.0	64.9	35.1										
17SW-03	Jar	28.0	to	30.0	32.1	80	32	48		99.9	CH										
17SW-04	Jar	8.0	to	10.0	8.1	20	12	8		38.5	SC										
17SW-04	Jar	23.0	to	25.0	11.6				0.0	26.9	73.1										
17SW-05	Jar	8.0	to	10.0	25.4				4.2	81.9	13.9										
17SW-05	Jar	23.0	to	25.0	30.3	82	30	52		99.1	CH										
17SW-06	Jar	4.0	to	6.0	20.2	41	17	24		60.7	CL										



TABLE A-6: SUMMARY OF LABORATORY TESTING RESULTS

Boring ID	Sample Type	Depth, feet		w (%)	Atterberg Limits			Grain Size Analysis			USCS Symbol	Standard Proctor		California Bearing Ratio				Corrosivity		Rock	
					LL (%)	PL (%)	PI (%)	% Gravel ¹	% Sand ²	% Silt/Clay ³		Y _d max (pcf)	W _{opt} (%)	Y _d (pcf)	w (%)	% MDD	CBR	% Swell	Total Sulfur (%)	PPA (tons CaCO ₃ /1000 tons)	UC (psi)
17SW-06	Jar	23.0	to 25.0	21.9				15.9	67.1	17.0											
17SW-07	Jar	13.0	to 15.0	24.1	37	20	17	2.1	67.8	30.1	SC										
17SW-08	Jar	6.0	to 8.0	10.9				0.0	61.4	38.6											
17SW-08	Jar	28.0	to 30.0	17.2						12.4											
17SW-09	Jar	13.0	to 15.0	13.4				0.3	82.3	17.4											
17SW-10	Jar	23.0	to 25.0	16.0				0.5	79.1	20.4											
17SWM-01	Bulk	0.0	to 8.0	16.9	33	13	20	3.1	44.4	52.5	CL	117.6	12.9	116.4	13.3	103.1	7.4	3.6			
17SWM-01	Jar	13.0	to 15.0	15.2	21	12	9			71.7	CL										
17SWM-02	Jar	18.0	to 20.0	24.4	37	22	15	0.0	78.8	21.2	SC										
17SWM-03	Jar	13.0	to 15.0	27.6	76	31	45			96.4	CH										
17SWM-04	Jar	13.0	to 15.0	22.0				0.0	84.4	15.6											
17SWM-05	Jar	4.0	to 6.0	21.7	29	12	17			46.9	SC										
17SWM-06	Jar	6.0	to 8.0	20.6				0.0	83.2	17.7											
17SWM-06	Jar	18.0	to 20.0	25.5				0.0	79.3	20.7											
17SWM-07	Jar	18.0	to 20.0	26.7	74	26	48			100.0	CH										
17SWM-08	Jar	0.0	to 2.0																		< 0.001
17SWM-08	Jar	2.0	to 4.0																		< 0.001
17SWM-08	Jar	6.0	to 8.0																		< 0.001
17SWM-08	Jar	13.5	to 15.5																		< 0.001
17SWM-08	Jar	18.0	to 20.0	16.2				0.0	74.3	25.7											< 0.001
17SWM-08	Jar	23.0	to 25.0																		< 0.001
17SWM-09	Jar	13.0	to 14.8	19.8				0.0	72.4	27.6											
17SWM-10	Jar	13.0	to 15.0	31.7	77	27	50			99.5	CH										
17SWM-10	Jar	23.0	to 25.0	26.2				0.0	83.4	16.6											
17SWM-11	Jar	4.0	to 6.0																		0.067
17SWM-11	Jar	8.0	to 10.0																		< 0.001
17SWM-11	Jar	13.0	to 15.0																		< 0.001
17SWM-11	Jar	18.0	to 20.0																		< 0.001
17SWM-11	Jar	23.0	to 25.0	31.9	86	32	54			99.7											
17SWM-12	Jar	2.0	to 4.0																		0.001
17SWM-12	Jar	6.0	to 8.0																		< 0.001
17SWM-12	Jar	8.0	to 10.0	22.1	61	30	31			57.2	CH										
17SWM-12	Jar	13.0	to 15.0																		< 0.001
17SWM-12	Jar	23.0	to 25.0																		0.210
17SWM-12	Jar	23.0	to 25.0																		7.1
17SWM-13	Bulk	0.0	to 15.0	21.6	38	22	16	3.4	69.5	27.1	SC	112.5	13.6	114.1	13.4	98.5	26.2	0.2			
17SWM-13	Jar	2.0	to 4.0																		< 0.001
17SWM-13	Jar	6.0	to 8.0																		< 0.001
17SWM-13	Jar	13.0	to 15.0																		< 0.001
17SWM-13	Jar	18.0	to 20.0	26.6	32	21	11	0.0	81.6	18.4	SC										< 0.001
17SWM-14	Jar	8.0	to 10.0	17.8				4.4	77.9	17.7											
17SWM-15	Bulk	0.0	to 15.0	11	30	12	18	2.8	47.5	49.7	SC	117.6	12.6	117.9	12.5	99.2	7.3	1.0			
17SWM-15	Jar	8.0	to 10.0	9.9				38.8	42.5	18.7											
17SWM-15	Jar	23.0	to 25.0	19.7	50	19	31			92.8	CH										
17SWM-16	Jar	8.0	to 10.0	19.3				1.2	62.0	36.8											



TABLE A-6: SUMMARY OF LABORATORY TESTING RESULTS

Boring ID	Sample Type	Depth, feet		w (%)	Atterberg Limits			Grain Size Analysis			USCS Symbol	Standard Proctor		California Bearing Ratio				Corrosivity		Rock	
					LL (%)	PL (%)	PI (%)	% Gravel ¹	% Sand ²	% Silt/Clay ³		Y _{d max} (pcf)	W _{opt} (%)	Y _d (pcf)	w (%)	% MDD	CBR	% Swell	Total Sulfur (%)	PPA (tons CaCO ₃ /1000 tons)	UC (psi)
17XP-12	Jar	23.0	to 25.0	17.6				7.5	85.0	7.5											
17XP-13	Jar	13.0	to 15.0	16.4				0.0	76.6	23.4											
17XP-14	Jar	4.0	to 6.0	15.5	27	12	15			35.8	SC										
17XP-14	Jar	18.0	to 20.0	31.0	50	16	34			54.5	CH										
17XP-14	Jar	33.0	to 35.0	30.2	42	15	27	0.0	84.6	15.4	SC										
17XP-15	Jar	6.0	to 7.3	22.7				0.5	81.6	17.9											
17XP-15	Jar	33.0	to 35.0	28.3				0.0	88.7	11.3											
17XP-16	Jar	4.0	to 6.0	27.4	65	25	40			82.8	CH										
17XP-17	Jar	6.0	to 8.0	27.0				0.0	85.5	14.5											
17XP-17	Jar	18.0	to 20.0	27.3	53	29	24			61.4	CH										
17XP-17	Jar	28.0	to 30.0	22.9	42	33	9			71.7	ML										
17XP-18	Bulk	0.0	to 6.0	17.7	63	17	46	0.4	12.8	86.8	CH	99.9	20.3	99.7	19.9	98.0	1.4	2.7			
17XP-18A	Jar	18.0	to 19.8	21.4	52	23	29			76.3	CH										
17XP-18A	Jar	28.0	to 30.0	21.5	72	21	51			98.7	CH										
17XP-18A	Jar	43.0	to 45.0	19.0						25.8											
17XP-18A	Jar	53.0	to 55.0	23.3	73	16	57			87.5	CH										
17XP-19	Jar	6.0	to 8.0	23.4	52	21	31			97.9	CH										
17XP-19	Jar	33.0	to 35.0	23.6				0.2	90.6	9.2											
17XP-19	Jar	48.0	to 50.0	21.3	49	20	29			98.9	CL										
17XP-20	Bulk	0.0	to 6.0	17	58	16	42	2.8	30.1	67.1	CH	99.5	22.3	100.2	21.5	96.4	7.0	1.2			
17XP-20	Jar	4.0	to 6.0	28.3	80	26	54			95.2	CH										
17XP-20A	Jar	23.0	to 25.0	24.2	47	29	18			86.8	ML										
17XP-20A	Jar	38.0	to 40.0	28.2	54	28	26			54.9	CH										
17XP-21A	Jar	8.0	to 10.0	29.3	65	33	32			88.6	MH										
17XP-21A	Jar	18.0	to 20.0	25.5	56	37	19			89.9	MH										
17XP-21A	Jar	53.0	to 55.0	26.4	72	26	46			99.3	CH										
17XP-22	Grab	0.0	to 10.0																		< 0.001
17XP-22	Jar	8.0	to 10.0	21.0	49	22	27	0.0	27.6	72.4	CL										
17XP-22	Jar	13.0	to 15.0																		0.063
17XP-22	Jar	18.0	to 20.0																		< 0.001
17XP-22	Jar	23.0	to 25.0																		0.001
17XP-22	Jar	28.0	to 30.0																		< 0.001
17XP-22	Jar	33.0	to 35.0																		0.003
17XP-23	Bulk	0.0	to 10.0	8.9	30	25	5	0.0	68.5	31.5	SM	107.7	16.0	108.6	15.7	98.1	8.5	0.0			
17XP-23	Grab	0.0	to 15.0																		< 0.001
17XP-23	Jar	18.0	to 20.0	19.4				0.0	55.6	44.4											
17XP-23	Jar	23.0	to 25.0																		< 0.001
17XP-23	Jar	33.0	to 35.0																		< 0.001
17XP-23	Jar	38.0	to 40.0	33.8	52	41	11			96.5	MH										4.58 136.24
17XP-23	Jar	43.0	to 45.0																		0.001
17XP-23	Jar	48.0	to 50.0																		0.002
17XP-23	Jar	58.0	to 60.0	27.9	47	33	14	0.0	4.7	95.3	ML										
17XP-23	Jar	58.0	to 60.0																		< 0.001
17XP-23	Jar	68.0	to 70.0	28.5	54	36	18			99.3	MH										



TABLE A-6: SUMMARY OF LABORATORY TESTING RESULTS

Boring ID	Sample Type	Depth, feet			w (%)	Atterberg Limits			Grain Size Analysis			USCS Symbol	Standard Proctor		California Bearing Ratio				Corrosivity		Rock		
						LL (%)	PL (%)	PI (%)	% Gravel ¹	% Sand ²	% Silt/Clay ³		Y _d max (pcf)	W _{opt} (%)	Y _d (pcf)	w (%)	% MDD	CBR	% Swell	Total Sulfur (%)	PPA (tons CaCO ₃ /1000 tons)	UC (psi)	
17XP-24	Grab	0.0	to	10.0																0.001			
17XP-24	Jar	8.0	to	10.0	26.9	70	39	31			99.4	MH											
17XP-24	Jar	13.0	to	15.0																	< 0.001		
17XP-24	Jar	23.0	to	25.0																	< 0.001		
17XP-24	Jar	28.0	to	30.0	26.0	49	34	15			95.5	ML											
17XP-24	Jar	33.0	to	35.0	19.4	53	33	20			98.6	MH											
17XP-24A	Jar	23.0	to	25.0	23.0				0.0	54.0	46.0												
17XP-25	Jar	6.0	to	8.0	28.0	60	27	33			96.8	CH											
17XP-26	Grab	0.0	to	6.0																	< 0.001		
17XP-26	Jar	6.0	to	8.0																	< 0.001		
17XP-27	Jar	13.0	to	15.0	28.1	44	35	9			84.5	ML											
17XP-27	Jar	23.0	to	24.0	24.1	30	28	2	0.0	60.8	39.2	SM											
17XP-28	Grab	0.0	to	10.0																	0.002		
17XP-28	Jar	13.0	to	15.0																	< 0.001		
17XP-28	Jar	18.0	to	20.0																	5.64	170.1	
17XP-28	Jar	23.0	to	25.0	30.4	51	37	14			93.3	MH									0.875	21.7	
17XP-29	Bulk	0.0	to	13.0	27.0	25	14	11	0.0	23.6	76.4	CL	99.4	21.8	97.4	21.6	99.1	4.1	2.4				
17XP-29	Grab	0.0	to	10.0																	< 0.001		
17XP-29	Jar	23.0	to	25.0	27.9	50	20	30			32.2	SC											
17XP-30	Grab	0.0	to	13.0																	< 0.001		
17XP-30	Jar	13.0	to	15.0	25.9	75	32	43			99.8	CH											
17XP-31	Bulk	0.0	to	13.0	17.7	42	21	21	1.4	69.4	29.2	SC	110.3	16.3	111.0	16.5	101.2	5.3	0.3				
17XP-31	Jar	6.0	to	8.0	12.5				0.0	82.6	17.4												
17XP-32	Jar	8.0	to	10.0	31.8	77	25	52			94.1	CH											
17XP-34	Jar	13.0	to	15.0	29.5	52	39	13			99.2	MH											
17XP-34	Jar	18.0	to	20.0	29.0	50	38	12			79.8	MH											
17XP-34	Jar	33.0	to	35.0	26.2	34	31	3			73.1	ML											
17XP-35	Jar	8.0	to	10.0	17.5				0.5	73.7	25.8												
17XP-35	Jar	28.0	to	30.0	25.3	37	34	3			49.7	SM											
17XP-37	Jar	8.0	to	10.0	28.3	68	29	39			73.8										< 0.001		
17XP-37	Jar	2.0	to	4.0																	< 0.001		
17XP-37	Jar	4.0	to	6.0																	0.001		
17XP-37	Jar	6.0	to	8.0																	0.001		
17XP-37	Jar	10.0	to	12.0																	0.001		
17XP-37	Jar	13.0	to	15.0																	0.001		
17XP-38	Jar	4.0	to	6.0	10.7	25	17	8			36.3										< 0.001		
17XP-38	Jar	13.0	to	15.0	22.1	46	25	21			46.8										< 0.001		
17XP-38	Jar	2.0	to	4.0																	< 0.001		
17XP-38	Jar	6.0	to	8.0																	< 0.001		
17XP-38	Jar	8.0	to	10.0																	< 0.001		
17XP-38	Jar	10.0	to	12.0																	< 0.001		
17XP-39	Jar	6.3	to	8.3	21.0						35.9										0.008		
17XP-39	Jar	2.3	to	3.3																	< 0.001		
17XP-39	Jar	3.3	to	4.3																	0.002		



TABLE A-6: SUMMARY OF LABORATORY TESTING RESULTS

Boring ID	Sample Type	Depth, feet			w (%)	Atterberg Limits			Grain Size Analysis			USCS Symbol	Standard Proctor		California Bearing Ratio				Corrosivity		Rock		
						LL (%)	PL (%)	PI (%)	% Gravel ¹	% Sand ²	% Silt/Clay ³		Y _d max (pcf)	W _{opt} (%)	Y _d (pcf)	w (%)	% MDD	CBR	% Swell	Total Sulfur (%)	PPA (tons CaCO ₃ /1000 tons)	UC (psi)	
17XP-47	Jar	13.0	to	15.0	15.5				0.0	79.3	20.7									< 0.001			
17XP-47	Jar	18.0	to	20.0																	< 0.001		
17XP-47	Jar	23.0	to	28.0																	< 0.001		
17XP-47	Jar	38.0	to	40.0	23.9	68	26	42			76.7	CH											
17XP-48	Grab	0.0	to	10.0																	< 0.001		
17XP-48	Jar	4.0	to	6.0	20.4	42	27	15			36.9	SM											
17XP-48	Jar	18.0	to	20.0	18.5				0.5	79.9	19.5												
17XP-49	Jar	38.0	to	40.0	17.8				0.2	72.4	27.4												
17XP-50	Jar	4.0	to	6.0	17.2				0.0	73.5	26.5												
17XP-51	Bulk	0.0	to	10.0	12	42	14	28	0.0	47.3	52.7	CL	111.7	14.2	110.3	14.3	100.7	4.0	1.6				
17XP-51	Jar	8.0	to	10.0	13.7				0.5	68.0	31.5												
17XP-52	Jar	6.0	to	8.0	18.7				0.0	41.6	58.4												
17XP-53	Jar	8.0	to	10.0	21.4				0.0	42.2	57.8												
17XP-54	Jar	13.0	to	15.0	14.9	48	16	32			85.0	CL											
17XP-54	Jar	23.0	to	25.0	31.2				0.0	64.3	35.7												
17XP-55	Jar	13.0	to	15.0	20.4				8.7	81.3	10.0												
17XP-56	Jar	6.0	to	8.0	13.1				35.7	47.4	17.0												
17XP-57	Jar	13.0	to	15.0	25.0				0.0	56.3	43.7												
17XP-57	Jar	38.0	to	40.0	25.4				0.0	82.7	17.3												
17XP-58	Jar	8.0	to	10.0	22.1				11.9	79.4	8.7												
17XP-58	Jar	28.0	to	30.0	25.5	61	25	36			90.1	CH											
17XP-59	Rock	0.0	to	15.0																			3,429
17XP-60	Jar	18.0	to	20.0	8.5				4.9	73.8	21.3												
17XP-60	Rock	28.0	to	33.0																			2,692
17XP-61	Bulk	0.0	to	14.3	15.4	34	23	11	6.7	46.4	46.9	SC	103.3	17.8	104.9	17.9	100.6	8.6	0.6				
17XP-61	Jar	13.0	to	14.3	24.6	49	31	18			25.2	SM											
17XP-62	Jar	8.0	to	10.0	10.9	26	26	NP			45.2	SM											
17XP-63	Jar	6.0	to	8.0	18.4						55.4												
17XP-63	Jar	13.0	to	15.0	11.7	31	25	6			46.5	SM											
17XP-64	Bulk	0.0	to	15.0	12.2	38	20	18	2.3	59.9	37.8	SC	116.3	13.8	117.1	13.7	99.3	10.7	0.2				
17XP-64	Jar	2.0	to	4.0	18.2				0.2	36.5	63.3												
17XP-65	Jar	13.0	to	15.0	28.9				0.0	65.5	34.5												
17XP-66	Jar	13.0	to	15.0	15.9				4.0	60.6	35.4												
17XP-67	Jar	4.0	to	6.0	24.2				0.0	53.4	46.6												
17XP-67	Jar	23.0	to	25.0	10.6				50.4	40.6	9.0												
17XP-68	Jar	2.0	to	4.0	14.9	28	18	10			55.6	CL											
17XP-68	Bulk	4.0	to	8.0	9.6	24	13	11	0.3	49.8	49.9	SC	119.3	11.5	119.8	11.5	100.0	8.9	0.1				
17XP-69	Jar	13.0	to	15.0	32.5	74	33	41			85.6	CH											
17XP-70	Jar	13.0	to	15.0	25.5	45	25	20	0.2	59.3	40.5	SC											
17XP-70	Jar	23.0	to	25.0	24.5	33	23	10	1.3	73.8	24.9	SC											
17XP-71	Jar	6.0	to	8.0	25.8	71	28	43			100.0	CH											
17XP-72	Jar	13.0	to	15.0	18.2	50	18	32			89.8	CH											
17XP-72	Jar	28.0	to	30.0	20.0	40	20	20			40.1	SC											
17XP-73	Jar	18.0	to	20.0	17.3	48	37	11	0.0	74.9	25.2	SM											



TABLE A-6: SUMMARY OF LABORATORY TESTING RESULTS

Boring ID	Sample Type	Depth, feet				Atterberg Limits			Grain Size Analysis			USCS Symbol	Standard Proctor		California Bearing Ratio				Corrosivity		Rock	
						LL (%)	PL (%)	PI (%)	% Gravel ¹	% Sand ²	% Silt/Clay ³		Y _{d max} (pcf)	W _{opt} (%)	Y _d (pcf)	w (%)	% MDD	CBR	% Swell	Total Sulfur (%)	PPA (tons CaCO ₃ /1000 tons)	UC (psi)
17XP-74	Tube	4.0	to	6.0	30.3	50	22	28	0.0	18.1	81.9	CH										
17XP-74	Jar	28.0	to	30.0	27.9				0.0	68.4	31.6											
17XP-75	Jar	4.0	to	6.0	18.8	21	11	10			20.3	SC										
17XP-75	Jar	28.0	to	30.0	19.9	56	20	36			95.2	SC										
17XP-75	Jar	43.0	to	45.0	23.6				0.0	28.3	71.7											
17XP-77	Jar	4.0	to	6.0	25.2	66	19	47			64.0	CH										

¹ Particle Diameter > Sieve No. 4.
² Sieve No. 4 >= Particle Diameter <= Sieve No. 200.
³ Particle Diameter < Sieve No. 200.



TABLE A-7: SUMMARY OF BULK SAMPLE TEST RESULTS

Exploration Designation	Station	Offset	Depth (ft)	USCS Symbol	% > 4 (Gravel)	% < 200 (Fines)	Natural Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Uncorrected Maximum Dry Density (pcf)	Uncorrected Optimum Water Content (%)	% Swell	Direct Shear Test Performed
17SWM-23	64+91	282 ft RT	2.0 to 8.0	SC	0	48	19.3	50	17	33	111.2	16.9	0.4	X
17WGS-03	117+80	272 ft LT	0.0 to 13.0	CL	0	65	20.5	45	20	25	111.0	14.5	3.4	
17XP-68	139+80	34 ft LT	4.0 to 8.0	SC	0	50	9.6	24	13	11	119.3	11.5	0.1	X
17SWM-21	142+43	208 ft LT	0.0 to 15.0	SC	3	37	16.1	45	18	27	115.6	14.6	0.1	
17SWM-19	178+44	129 ft RT	0.0 to 10.0	SC	8	42	11.9	37	17	20	118.9	11.7	0.2	
17XP-64	181+90	29 ft LT	0.0 to 15.0	SC	2	38	12.2	38	20	18	116.3	13.8	0.2	X
17XP-18	188+69	162 ft RT	0.0 to 6.0	CH	0	87	17.7	63	17	46	99.9	20.3	2.7	
17XP-61	204+98	10 ft LT	0.0 to 14.3	SC	7	47	15.4	34	23	11	103.3	17.8	0.6	
17SWM-15	262+14	153 ft LT	0.0 to 15.0	SC	3	50	11	30	12	18	117.6	12.6	1.0	
17XP-51	277+79	34 ft LT	0.0 to 10.0	CL	0	53	12	42	14	28	111.7	14.2	1.6	
17XP-46	300+94	32 ft LT	0.0 to 25.0	SC	0	36	22.6	35	22	13	114.3	13.8	0.6	X
17SWM-13	322+62	317 ft LT	0.0 to 15.0	SC	3	27	21.6	38	22	16	112.5	13.6	0.2	
17XP-31	387+78	14 ft LT	0.0 to 13.0	SC	1	29	17.7	42	21	21	110.3	16.3	0.3	X
17XP-29	406+58	23 ft LT	0.0 to 13.0	CL	0	76	27	25	14	11	99.4	21.8	2.4	
17XP-23	442+23	109 ft RT	0.0 to 10.0	SM	0	32	8.9	30	25	5	107.7	16.0	0.0	
17XP-20	456+10	107 ft LT	0.0 to 6.0	CH	3	67	17	58	16	42	99.5	22.3	1.2	
17XP-10	533+93	24 ft RT	2.0 to 6.0	CH	0	83	23.8	63	22	41	100.6	21.2	3.7	
17SWM-01	567+85	63 ft LT	0.0 to 8.0	CL	3	53	16.9	33	13	20	117.6	12.9	3.6	
17XP-03	573+77	14 ft RT	0.0 to 8.0	CH	1	95	25.3	92	24	68	96.0	22.7	2.4	



TABLE A-8: SUMMARY OF ACID SULFATE SAMPLE TEST RESULTS

Exploration Designation	Station	Offset	Surface Elevation (ft)	Depth (ft)	Average Sample Elevation (ft)	Sample Color Description	USCS Symbol	Total Sulfur Content	PPA Test Results (Tons Lime / 1,000 Tons of Material)
17XP-48	291+94	41 ft LT	174	0.0 to 10.0	169	Brown to Tan-Brown to Tan-Gray and Orange	SM	< 0.001	--
17XP-47	296+06	56 ft LT	186	4.0 to 8.0	180	Brown-Gray to Gray-White	SC	< 0.001	--
				13.0 to 15.0	172	Gray-White	SM	< 0.001	--
				18.0 to 20.0	167	White-Gray	SM	< 0.001	--
				23.0 to 28.0	160	White-Gray	SM	< 0.001	--
17XP-46	300+94	32 ft LT	182	4.0 to 6.0	177	Orange-Brown and Light Gray	SC	< 0.001	--
				8.0 to 10.0	173	Orange-Brown and Light Gray	SC	< 0.001	--
				13.0 to 15.0	168	White-Gray	SC	< 0.001	--
				18.0 to 20.0	163	White-Gray	SC	< 0.001	--
17XP-45	303+95	101 ft LT	211	0.0 to 15.0	203	Tan-Orange to Orange-Gray to Gray	SM/ML	0.001	--
				18.0 to 20.0	192	Blue-Gray	SM	0.125	--
				23.0 to 25.0	187	Blue-Gray	ML	1.280	34.50
				28.0 to 30.0	182	Gray to Gray and Brown	CL/SM	< 0.001	--
				33.0 to 35.0	177	Light Gray	SM	< 0.001	--
17XP-44	305+91	116 ft LT	227	13.0 to 15.0	213	Gray and Red-brown	SC	< 0.001	--
				18.0 to 20.0	208	Gray and Red-brown	SC	< 0.001	--
				23.0 to 25.0	203	Red-brown	SC	< 0.001	--
				28.0 to 30.0	198	Blue-Gray	CH	2.130	59.01
				33.0 to 35.0	193	Blue-Gray	CH	0.258	0.81
				38.0 to 40.0	188	Blue-Gray	CH	0.270	0.45
				43.0 to 45.0	183	Blue-Gray	CH	1.060	24.68
				48.0 to 50.0	178	Gray and Brown	SC	0.001	--
				53.0 to 55.0	173	Red-Brown and Gray	SP-SC	< 0.001	--
17XP-43	307+99	81 ft LT	217	0.0 to 13.0	210	Tan to Tan-Orange to Tan-Orange and Gray	CL/SM	< 0.001	--
				13.0 to 15.0	203	Gray	SM	< 0.001	--
				18.0 to 20.0	198	Gray	CL	0.809	19.45
				23.0 to 25.0	193	Gray	SM	0.159	--
17SWM-13	322+62	317 ft LT	162	2.0 to 4.0	159	Orange-Brown and Gray	CL	< 0.001	--
				6.0 to 8.0	155	Gray and Orange-Brown	SC	< 0.001	--
				13.0 to 15.0	148	White-Gray and Brown	SC	< 0.001	--
				18.0 to 20.0	143	White-Gray and Brown	SC	< 0.001	--
17XP-40	329+94	37 ft LT	220	2.0 to 4.0	217	Dark Brown, Red, and Brown	CH	0.001	--
				4.0 to 6.0	215	Brown and Gray	SC	< 0.001	--
				6.0 to 8.0	213	Brown and Gray	SC	0.001	--
				8.0 to 10.0	211	Brown	CL	< 0.001	--
				10.0 to 12.0	209	Brown	CH	< 0.001	--
				13.0 to 15.0	206	Brown and Gray	CH	< 0.001	--
17XP-39	335+92	16 ft LT	226	2.3 to 3.3	223	Brown	CL	< 0.001	--
				3.3 to 4.3	222	Red	SP	0.002	--
				4.3 to 6.3	220	Light Gray and Brown	SC	< 0.001	--
				6.3 to 8.3	218	Light Gray and Brown	SC	0.008	--
				8.3 to 10.3	216	Light Gray and Brown	SC	< 0.001	--
				10.3 to 12.3	214	Light Gray and Brown	SC	< 0.001	--
17SBGP-04	337+70	154 ft LT	248	2.0 to 4.0	245	Red-Brown	SP-SC	0.001	--
				6.0 to 8.0	241	Pink-Brown	SW-SC	0.001	--
				13.0 to 15.0	234	Pink-Brown	SW-SC	< 0.001	--
				23.0 to 25.0	224	Tan-Brown	SC	< 0.001	--
				33.0 to 35.0	214	Tan-Brown and Gray	SC	< 0.001	--



TABLE A-8: SUMMARY OF ACID SULFATE SAMPLE TEST RESULTS

Exploration Designation	Station	Offset	Surface Elevation (ft)	Depth (ft)	Average Sample Elevation (ft)	Sample Color Description	USCS Symbol	Total Sulfur Content	PPA Test Results (Tons Lime / 1,000 Tons of Material)
17XP-38	343+89	23 ft LT	215	2.0 to 4.0	212	Brown	SC	<0.001	--
				4.0 to 6.0	210	Brown	SC	<0.001	--
				6.0 to 8.0	208	Brown to Brown and Light Gray	SC/CL	<0.001	--
				8.0 to 10.0	206	Light Gray and Brown	SP-SC/SC	<0.001	--
				10.0 to 12.0	204	Brown and Red	CH	<0.001	--
				13.0 to 15.0	201	Brown and Red	SC	<0.001	--
17XP-37	348+91	48 ft LT	201	2.0 to 4.0	198	Gray to Brown	CL	<0.001	--
				4.0 to 6.0	196	Brown	SP	0.001	--
				6.0 to 8.0	194	Brown	CH	0.001	--
				8.0 to 10.0	192	Brown	CH	<0.001	--
				10.0 to 12.0	190	Brown	CH	0.001	--
				13.0 to 15.0	187	Brown and Red	CH	0.001	--
17SWM-12	353+19	256 ft LT	204	2.0 to 4.0	201	Brown-Tan	CL	0.001	--
				6.0 to 8.0	197	Brown and Gray to Gray	SC/ML	<0.001	--
				13.0 to 15.0	190	Brown and Gray	SW-SC	<0.001	--
				23.0 to 25.0	180	Gray	SP-SC	0.210	7.10
17SWM-11	357+14	44 ft LT	164	4.0 to 6.0	159	Tan	SC	0.067	--
				8.0 to 10.0	155	Tan	SC	<0.001	--
				13.0 to 15.0	150	Gray-Brown	CH	<0.001	--
				18.0 to 20.0	145	Gray-Brown	CH	<0.001	--
17XP-30	394+35	20 ft LT	155	0.0 to 13.0	149	Brown to Brown and Gray to Red Brown	CL/CH	<0.001	--
17SWM-08	400+27	149 ft RT	156	0.0 to 2.0	155	Gray and Tan	SP-SC	<0.001	--
				2.0 to 4.0	153	Gray and Tan	CL	<0.001	--
				6.0 to 8.0	149	Gray	SM	<0.001	--
				13.5 to 15.5	141	Gray and Tan	SM	<0.001	--
				18.0 to 20.0	137	Gray and Tan	SM	<0.001	--
				23.0 to 25.0	132	Gray and Tan	SM	<0.001	--
17XP-29	406+58	23 ft LT	194	0.0 to 10.0	189	Brown to Gray	CL/SM/ML	<0.001	--
17XP-28	415+90	33 ft LT	218	0.0 to 10.0	213	Red-Brown and Gray	CL/SC	0.002	--
				13.0 to 15.0	204	Brown-Gray	SW-SC	<0.001	--
				18.0 to 20.0	199	Blue-Gray	MH	5.640	170.10
				23.0 to 25.0	194	Blue-Gray and Brown	MH	0.875	21.70
17XP-26	428+15	11 ft LT	211	0.0 to 6.0	208	Brown to Orange-Brown and Gray	CL/SW-SC	<0.001	--
				6.0 to 8.0	204	Red-Brown	SW-SC	<0.001	--
17XP-24	440+06	10 ft RT	190	0.0 to 10.0	185	Gray and Brown to Red-Brown and Gray	SC/MH	0.001	--
				13.0 to 15.0	176	Green-Gray	MH	<0.001	--
				23.0 to 25.0	166	Brown and Gray	ML	<0.001	--
17XP-23	442+23	109 ft RT	223	0.0 to 15.0	215	Tan-Brown to Tan-White	SM	<0.001	--
				23.0 to 25.0	199	Brown and Gray	SC	<0.001	--
				33.0 to 35.0	189	Brown and Gray	SC	<0.001	--
				38.0 to 40.0	184	Blue-Gray	MH	4.580	136.24
				43.0 to 45.0	181	Blue-Gray and Brown	SC	0.001	--
				48.0 to 50.0	174	Blue-Gray and Brown	SC	0.002	--
				58.0 to 60.0	164	Blue-Gray and Brown	ML	<0.001	--
17XP-22	445+24	31 ft RT	175	0.0 to 10.0	170	Brown to Red and Brown	CL	<0.001	--
				13.0 to 15.0	161	Red and Brown	CL	0.063	--
				18.0 to 20.0	156	Dark Red-Brown and Gray	CL	<0.001	--
				23.0 to 25.0	151	Dark Red-Brown and Gray	CL	0.001	--
				28.0 to 30.0	146	Red-Brown and Gray	CL	<0.001	--
				33.0 to 35.0	141	Red-Brown, Gray, and Brown	SC	0.003	--



95 EXPRESS LANES FREDERICKSBURG EXTENSION

APPENDIX B

SUBSURFACE EXPLORATION DATA

Subsurface Exploration Logs
Pavement Core Photographs
Rock Core Photographs
Field Soil Descriptions – VDOT Soil Logging
Field Rock Descriptions – VDOT Rock Logging
VDOT Material and Sample Symbols List



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: AMER. LEG. BRIDGE

17BR-02

PAGE 1 OF 4

STATION: 339+40 **OFFSET:** 161 ft LT
LATITUDE: 38.397883° N **LONGITUDE:** 77.435810° W
SURFACE ELEVATION: 250.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/18/2017 - 04/19/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Ray Norwood/S&ME, Inc.
Logger: Randy Bलिएfnich/GET Solutions, Inc.

LAB DATA

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ↓ STABILIZED AT 57.1 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		3							
		2	2	35					
		248	2	2					
		246	2	65					
		244	2	2					
		242	8	90					
		240	11	100					
		238	14	15					
		236	13	90					
		234	16	16					
		232	4	3					
		230	6	100					
		228	8	11					
		226	5	5					

0.0 / 250.0 2" Topsoil				
0.2 / 249.8 Brown, fine to coarse POORLY GRADED SAND (SP), contains organic matter, loose, moist		10.6		
2.0 / 248.0 Brown and red, fine CLAYEY SAND (SC), contains organic matter, loose, moist		13.3		
Brown and red, fine to coarse CLAYEY SAND (SC), medium dense, moist		10.0		
Tan, fine to coarse CLAYEY SAND (SC), medium dense, moist		4.9		
Tan, fine to coarse CLAYEY SAND WITH GRAVEL (SC), medium dense, dry		4.7	17.5	
16.5 / 233.5 Red and tan, mottled, fine to coarse CLAYEY SAND WITH GRAVEL (SC), medium dense, dry		7.5		
16.5 / 233.5 Red and tan, FAT CLAY (CH), stiff, moist	54	25	37.8	97.0
21.5 / 228.5 Tan, fine to coarse POORLY GRADED SAND WITH CLAY (SP-SC), medium dense, moist		16.1		

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

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17BR-02

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: AMER. LEG. BRIDGE

17BR-02

PAGE 2 OF 4

STATION: 339+40 **OFFSET:** 161 ft LT
LATITUDE: 38.397883° N **LONGITUDE:** 77.435810° W
SURFACE ELEVATION: 250.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/18/2017 - 04/19/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Ray Norwood/S&ME, Inc.
 Logger: Randy Bliefernich/GET Solutions, Inc.

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ▽ STABILIZED AT 57.1 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND											
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °		STRATA	JOINTS									
	26	224																		
	28	222	5																	
	30	220	5 7 11	100																
	32	218																		
	34	216	4 5 6 8	100																
	36	214																		
	38	212	6 10 13 20	100																
	40	210																		
	42	208																		
	44	206	6 9 13 18	100																
	46	204																		
4	48	202	5 7 14 19	100																
	50	200																		

Tan, fine to coarse POORLY GRADED SAND WITH CLAY (SP-SC), medium dense, moist

26.5 / 223.5

Gray and tan, mottled, fine POORLY GRADED SAND (SP), medium dense, moist

26.1

36.5 / 213.5

Gray, SANDY SILT (ML), very stiff, moist

27.6 60.9

46.5 / 203.5

Gray, LEAN CLAY (CL), moist

48.3 / 201.7

Tan, fine to coarse POORLY GRADED SAND (SP), medium dense, moist

25.7

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

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17BR-02



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: AMER. LEG. BRIDGE

17BR-02

PAGE 3 OF 4

STATION: 339+40 **OFFSET:** 161 ft LT
LATITUDE: 38.397883° N **LONGITUDE:** 77.435810° W
SURFACE ELEVATION: 250.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/18/2017 - 04/19/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Ray Norwood/S&ME, Inc.
 Logger: Randy Bliefernich/GET Solutions, Inc.

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ▽ STABILIZED AT 57.1 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND											
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA		JOINTS										
	52	198	11																	
	54	196	13	17	100															
	56	194		20																
4.5	58	192	6																	
	60	190	10	14	100															
	62	188		19																
3.5	64	186	7																	
	66	184	12	18	100															
	68	182	4																	
	70	180	8	11	100															
	72	178		16																
3	74	176	38	50/4"	100															

Tan, fine to coarse POORLY GRADED SAND (SP), medium dense, moist

Gray, fine to coarse POORLY GRADED SAND (SP), moist
 58.3 / 191.7
 Gray, FAT CLAY (CH), very stiff, moist

Gray and brown, mottled, FAT CLAY (CH), very stiff, moist

66.5 / 183.5

Gray and brown, mottled, fine CLAYEY SAND (SC), medium dense, moist

71.5 / 178.5

Gray and brown, mottled, LEAN CLAY WITH SAND (CL), very hard, moist

		18.0	
		17.7	
61	31	29.5	98.7
		24.2	
		14.9	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

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17BR-02

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: AMER. LEG. BRIDGE

17BR-02

PAGE 4 OF 4

STATION: 339+40 **OFFSET:** 161 ft LT
LATITUDE: 38.397883° N **LONGITUDE:** 77.435810° W
SURFACE ELEVATION: 250.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/18/2017 - 04/19/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Ray Norwood/S&ME, Inc.
 Logger: Randy Bliefernich/GET Solutions, Inc.

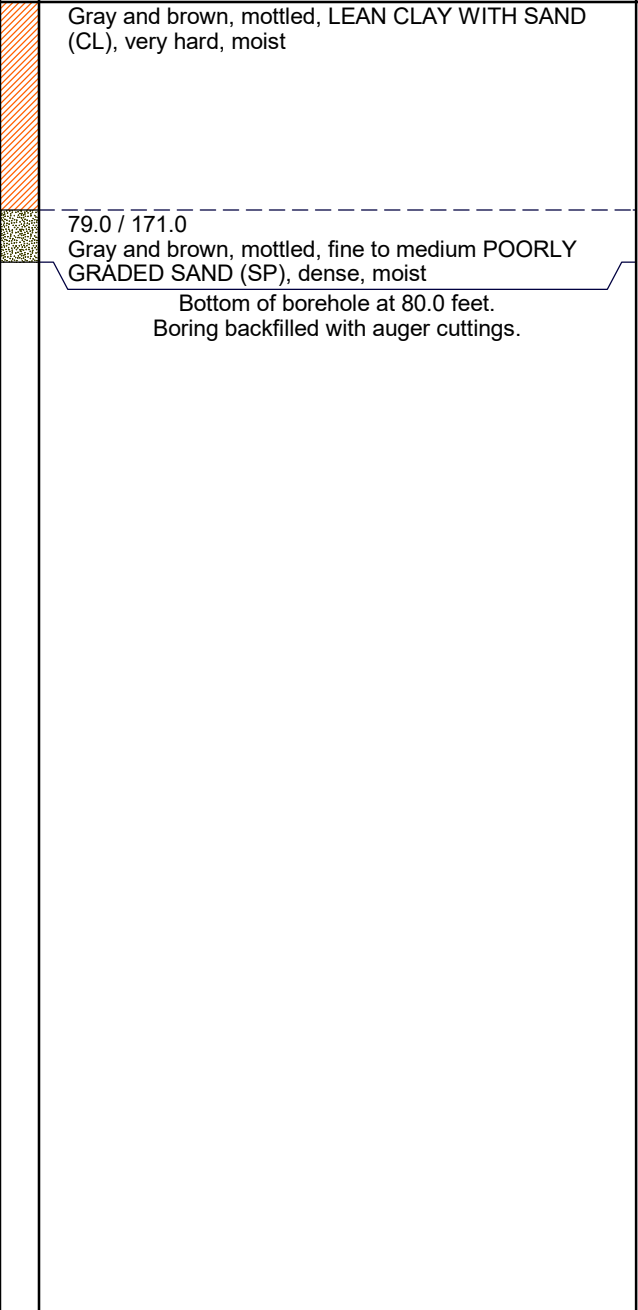
GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ↓ STABILIZED AT 57.1 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)
 FINES CONTENT -#200 (%)

LL PI

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
	76	174							
	78	172	18						
			15						
			21						
	80	170	35	90					



		16.5	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

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17BR-02

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: AMER. LEG. BRIDGE

17BR-03

PAGE 1 OF 4

STATION: 339+25 **OFFSET:** 178 ft RT
LATITUDE: 38.397399° N **LONGITUDE:** 77.434798° W
SURFACE ELEVATION: 247.4 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/27/2017 - 05/01/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Ray Norwood/S&ME, Inc.
Logger: Randy Bliefernich/GET Solutions, Inc.

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 49.3 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		246	1	40					
	2	244	1, 2, 3	85					
	4	242	3, 5, 7	75					
	6	240	12, 15, 16, 50/4"	100					
	8	238	11, 16, 16	90					
	10	236	15						
4.5	12	234	5, 8, 11, 15	85					
	14	232							
	16	230							
4.5	18	228	5, 6, 11, 13	100					
	20	226							
	22	224	7, 10, 11, 12	100					

0.0 / 247.4
 2" Topsoil
 0.2 / 247.2
 Brown, fine CLAYEY SAND (SC), contains organic matter, very loose, moist
 Red-tan, fine to medium CLAYEY SAND (SC), loose, moist
 Red-tan, fine to medium CLAYEY SAND (SC), medium dense, moist
 Red-tan, fine to medium CLAYEY SAND (SC), dense, dry
 11.5 / 235.9
 Red and blue-gray, LEAN CLAY (CL), contains mica, very stiff, moist
 Red-tan, LEAN CLAY WITH SAND (CL), contains mica, very stiff, moist
 Tan and gray, mottled, SANDY LEAN CLAY (CL), very stiff, moist

		15.2	
		9.4	
		6.9	
		7.8	
		5.5	
		23.4	
28	10	22.8	76.4
		7.9	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

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17BR-03

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: AMER. LEG. BRIDGE

17BR-03

PAGE 3 OF 4

STATION: 339+25 **OFFSET:** 178 ft RT
LATITUDE: 38.397399° N **LONGITUDE:** 77.434798° W
SURFACE ELEVATION: 247.4 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/27/2017 - 05/01/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Ray Norwood/S&ME, Inc.
Logger: Randy Bliefernich/GET Solutions, Inc.

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 49.3 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS		DIP °
	50									
	52	196								
	54	194	8							
	56	192	12							
	58	190	17							
	60	188	27	100						
	62	186								
	64	184	6							
	66	182	6							
	68	180	18							
	70	178	34	100						
	72	176								
	74	174	8							
			12							
			18							
			29	100						

Dark gray, FAT CLAY (CH), wet			
51.5 / 195.9			
Green-gray, fine to medium CLAYEY SAND WITH GRAVEL (SC), contains mica, medium dense, wet	110	89	23.0 26.6
Gray and tan, mottled, fine to medium CLAYEY SAND (SC), contains 4-inch layer of lean clay, medium dense, wet			27.6
Gray and tan, mottled, fine to coarse CLAYEY SAND (SC), medium dense, wet			27.5
66.5 / 180.9			
Dark gray, LEAN CLAY (CL), moist			
68.3 / 179.1			
Gray, fine to coarse POORLY GRADED SAND (SP), dense, wet			26.7
71.5 / 175.9			
Gray, fine to medium CLAYEY SAND (SC), dense, wet			27.4

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

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17BR-03

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: AMER. LEG. BRIDGE

17BR-03

PAGE 4 OF 4

STATION: 339+25 **OFFSET:** 178 ft RT
LATITUDE: 38.397399° N **LONGITUDE:** 77.434798° W
SURFACE ELEVATION: 247.4 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
							75								
<p>Date(s) Drilled: 04/27/2017 - 05/01/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Ray Norwood/S&ME, Inc. Logger: Randy Bliefernich/GET Solutions, Inc.</p> <p style="text-align: center;">GROUND WATER</p> <p>▼ FIRST ENCOUNTERED AT 49.3 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN</p> <p style="text-align: center;">FIELD DESCRIPTION OF STRATA</p> <p>Bottom of borehole at 75.0 feet. Boring backfilled with auger cuttings.</p>															

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

PAGE 4 OF 4

17BR-03

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: POTOMAC CK BRIDGE

17BR-04

PAGE 1 OF 2

STATION: 252+28 **OFFSET:** 32 ft LT
LATITUDE: 38.379764° N **LONGITUDE:** 77.455286° W
SURFACE ELEVATION: 59.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/14/2017 - 04/14/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER

▼ **FIRST ENCOUNTERED AT 6.0 ft DEPTH**
 ▼ **STABILIZED AT 3.5 ft**

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	
3	59.0	3	100					
58		3						
2	56	3	100	2				
4	54	5	100	4				
6	52	1	100	6				
8	50	3	100	8				
10	48	5	75	10				
14	46	49	100	13				
18	42	50/4"	100	18				
24	36	38	100	23				
24	34	50	100	24.1				

0.0 / 59.0
 2" Topsoil
 0.2 / 58.8
 Brown, fine SILTY SAND (SM), loose, moist
 Brown, fine SILTY SAND (SM), very loose, moist
 Brown, fine SILTY SAND (SM), very loose, wet
 Brown, fine SILTY SAND (SM), medium dense, wet
 Gray-white and black, fine to coarse SILTY SAND (SM), contains mica, moist
 Gray-white and black, fine to coarse SILTY SAND (SM), contains mica, very dense, moist

		11.8	
		21.4	
		14.3	
		22.5	19.5
		13.0	
		14.0	
		9.2	
		10.2	27.4

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 4.2 feet

PAGE 1 OF 2

17BR-04

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: POTOMAC CK BRIDGE

17BR-04

PAGE 2 OF 2

STATION: 252+28 **OFFSET:** 32 ft LT
LATITUDE: 38.379764° N **LONGITUDE:** 77.455286° W
SURFACE ELEVATION: 59.0 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA			
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LL	PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION						
26	32												
28	30	45 50/6" 50/0"	100	X	28			Gray-white and black, fine to coarse SILTY SAND (SM), contains mica, very dense, dry			10.1		
30	28				29			29.0 / 30.0 Highly to moderately weathered, soft to hard, medium to thick bedded, highly fractured, gray, SANDSTONE					
32	26				57	33		32.0 / 27.0 Moderately to slightly weathered, hard, medium to thick bedded, highly to moderately fractured, gray, SANDSTONE					
34	24				100	68							
36	22				37			37.0 / 22.0 Slightly weathered, hard, medium to thick bedded, highly to moderately fractured, gray, SANDSTONE					
38	20				100	84							
40	18				42			42.0 / 17.0 Moderately to slightly weathered, hard, medium to thick bedded, highly to moderately fractured, gray, SANDSTONE					
42	16				100	94							
44	14				45.5			Bottom of borehole at 45.5 feet. Boring backfilled with auger cuttings.					

Date(s) Drilled: 04/14/2017 - 04/14/2017
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Bill Miller/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 6.0 ft DEPTH
 ▽ STABILIZED AT 3.5 ft

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/17

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 4.2 feet

PAGE 2 OF 2

17BR-04



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: BRIDGE

17BR-05

PAGE 1 OF 4

STATION: 156+46 **OFFSET:** 62 ft LT
LATITUDE: 38.357953° N **LONGITUDE:** 77.472911° W
SURFACE ELEVATION: 220.7 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/18/2017 - 04/18/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 30.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
1.5	220	6	8	75					
1.5	218	9	6	75					
4	216	3	2	100					
6	214	3	3	100					
0.25	212	1	1	100					
10	210								
0.25	208	1	1	100					
14	206	2	2	100					
16	204								
1	202	4	4	100					
20	200								
22	198	1	1	100					
24	196	2	2	100					

0.0 / 220.7
 Fill, Yellow-brown to brown, LEAN CLAY WITH GRAVEL (CL), very stiff, moist

4.0 / 216.7
 Fill, Brown, fine to medium SILTY SAND (SM), loose, moist

8.0 / 212.7
 Brown, SANDY LEAN CLAY (CL), contains lenses of sand, soft, moist

Brown, SANDY LEAN CLAY (CL), contains lenses of sand, stiff, moist

Brown, SANDY LEAN CLAY (CL), contains lenses of sand, soft, moist

		9.8	
		16.5	
		13.9	
		13.9	
		19.0	
		16.4	
33	18	16.9	57.2
		19.5	

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17BR-05

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: BRIDGE

17BR-05

PAGE 2 OF 4

STATION: 156+46 **OFFSET:** 62 ft LT
LATITUDE: 38.357953° N **LONGITUDE:** 77.472911° W
SURFACE ELEVATION: 220.7 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/18/2017 - 04/18/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Bill Miller/HDR

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 30.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS		
	26	194								
	28	192	1	50						
	30	190	7	12						
	32	188		16						
	34	186	WOH 1	100						
	36	184		4						
	38	182	2	100						
	40	180		14						
	42	178		10						
2	44	176	3	100						
	46	174		16						
4	48	172	10	100						
	50			18						

Brown, SANDY LEAN CLAY (CL), contains lenses of sand, moist

29.0 / 191.7
 Orange-brown to brown, fine to coarse WELL GRADED SAND WITH SILT (SW-SM), moist

Orange-brown to brown, fine to coarse WELL GRADED SAND WITH SILT (SW-SM), loose, wet

Orange-brown to brown, fine to coarse WELL GRADED SAND WITH SILT (SW-SM), medium dense, wet

41.5 / 179.2

Gray, FAT CLAY (CH), very stiff, moist

		11.9	
		17.9	10.5
		11.6	
65	34	29.1	93.5
		25.9	

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17BR-05

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: BRIDGE

17BR-05

PAGE 3 OF 4

STATION: 156+46 **OFFSET:** 62 ft LT
LATITUDE: 38.357953° N **LONGITUDE:** 77.472911° W
SURFACE ELEVATION: 220.7 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/18/2017 - 04/18/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 30.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

FIELD DESCRIPTION OF STRATA

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		170							
4.5	52	168	12						
	54	166	24 34 50/6"	100					
	56	164							
4	58	162	7						
	60	160	9						
	62	158	13 20	100					
	64	156	27						
	66	154	37 50/5"	100					
	68	152	12						
	70	150	22 33 50/6"	100					
	72	148							
	74	146	17 19 23 34	100					

50									
53	Gray, FAT CLAY (CH), hard, moist								
55									
56.5 / 164.2									
58	Gray, LEAN CLAY (CL), contains mica, very stiff, moist								
60									
61.5 / 159.2									
63	Light gray, fine to coarse SILTY SAND (SM), very dense, moist								
64.4									
68	Light gray, fine to coarse SILTY SAND (SM), very dense, moist								
70									
73	Light gray, fine to coarse SILTY SAND (SM), dense, moist								

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17BR-05

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: BRIDGE

17BR-06

PAGE 1 OF 4

STATION: 149+87 **OFFSET:** 199 ft RT
LATITUDE: 38.356039° N **LONGITUDE:** 77.473407° W
SURFACE ELEVATION: 210.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 05/02/2017 - 05/02/2017

LAB DATA

Drilling Method(s): Mud Rotary w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Thomas Williams/S&ME, Inc.
 Logger: Russell Kanith/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 4.5 ft DEPTH
 ▽ STABILIZED AT 9.0 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		210	2						
	1		1	90					
	2		2						
	4		4						
	6		6						
	8		8						
	10		10						
	12		12						
	14		14						
	16		16						
	18		18						
	20		20						
	22		22						
	24		24						

0.0 / 210.5	3" Topsoil and Root Mat		
0.3 / 210.2	Tan-brown, fine CLAYEY SAND (SC), very loose, moist	11.7	
2.0 / 208.5	Orange-brown, LEAN CLAY (CL), firm, moist	23.3	
	Brown and tan, mottled, LEAN CLAY (CL), very stiff, wet	23.9	
6.0 / 204.5	Tan-brown, fine to coarse CLAYEY SAND (SC), medium dense, wet	19.7	
		18.1	
11.5 / 199.0	Brown and tan, CLAYEY GRAVEL WITH SAND (GC), dense, wet	19.9	
16.5 / 194.0	Brown and gray, mottled, CLAYEY SAND (SC), loose, wet	19.8	
		12.8	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 35.3 feet

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17BR-06

SPT_LOGABW\VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: BRIDGE

17BR-06

PAGE 2 OF 4

STATION: 149+87 **OFFSET:** 199 ft RT
LATITUDE: 38.356039° N **LONGITUDE:** 77.473407° W
SURFACE ELEVATION: 210.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 05/02/2017 - 05/02/2017
Drilling Method(s): Mud Rotary w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 4.5 ft DEPTH
 ▽ STABILIZED AT 9.0 ft

FIELD DESCRIPTION OF STRATA

LL	PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
----	----	----------------------	-------------------------

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA		JOINTS
	25									
	26	184								
	28	182	13	95						
	30	180	11	9						
	32	178	7							
	34	176	5	100						
1.25	34.4	176	8	7						
	35		10							
	36	174								
	38	172	9	100						
4.5	38		18							
	40	170	26							
	42	168	31							
	44	166	11	100						
	46	164	16							
	48	162	25							
	50		30							
			8	100						
			12							
			19							
			26							

Gray and brown, mottled, CLAYEY SAND (SC), medium dense, wet

34.4 / 176.1
Gray-blue, LEAN CLAY (CL), moist

36.5 / 174.0

Brown and tan, fine SILTY SAND (SM), dense, dry

41.5 / 169.0

Brown and gray, mottled, fine to medium CLAYEY SAND (SC), dense, wet

Gray-white, fine to medium CLAYEY SAND (SC), medium dense, wet

		17.1	
		13.5	
NP	NP	22.6	13.5
		19.3	
		22.4	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 35.3 feet

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17BR-06

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: BRIDGE

17BR-06

PAGE 3 OF 4

STATION: 149+87 **OFFSET:** 199 ft RT
LATITUDE: 38.356039° N **LONGITUDE:** 77.473407° W
SURFACE ELEVATION: 210.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 05/02/2017 - 05/02/2017

LAB DATA

Drilling Method(s): Mud Rotary w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Thomas Williams/S&ME, Inc.
 Logger: Russell Kanith/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 4.5 ft DEPTH
 ▽ STABILIZED AT 9.0 ft

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	
		160			50				
	52	158	11		53				Gray-white, fine to medium CLAYEY SAND (SC), dense, wet
	54	156	15 21 27	100	55				
	56	154			56.5 / 154.0				Gray-white, LEAN CLAY WITH SAND (CL), very stiff, wet
	58	152	8 10 14 20	100	58				
	60	150			60				Gray-white, fine to medium CLAYEY SAND (SC), medium dense, wet
	62	148	10 11	100	63				
	64	146	13 14	100	65				Gray-white, fine to medium CLAYEY SAND (SC), dense, wet
	66	144			66				
	68	142	10 14 23 30	100	68				Gray-white, fine to medium CLAYEY SAND (SC), dense, wet
	70	140			70				
	72	138			72				26.8
	74	136	13 20 30 35	100	73				

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 35.3 feet

PAGE 3 OF 4

17BR-06



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: BRIDGE

17BR-06

PAGE 4 OF 4

STATION: 149+87 **OFFSET:** 199 ft RT
LATITUDE: 38.356039° N **LONGITUDE:** 77.473407° W
SURFACE ELEVATION: 210.5 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						75									
<p>GROUND WATER</p> <p>▼ FIRST ENCOUNTERED AT 4.5 ft DEPTH</p> <p>▼ STABILIZED AT 9.0 ft</p>															
<p>FIELD DESCRIPTION OF STRATA</p> <p>Bottom of borehole at 75.0 feet. Boring backfilled with auger cuttings and hole plug.</p>											LL	PI			

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 35.3 feet

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17BR-06

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: TRUSLOW BRIDGE

17BR-07

PAGE 1 OF 4

STATION: 129+14 **OFFSET:** 192 ft LT
LATITUDE: 38.352316° N **LONGITUDE:** 77.479068° W
SURFACE ELEVATION: 248.7 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 05/09/2017 - 05/09/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Bill Miller/HDR

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER

▼ FIRST ENCOUNTERED AT 38.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL PI

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA		JOINTS
		248.7			0.6					
		248.1	4	57						
0.25	2	246.1	2	50	2					
		244.1	1	75	4					
0.25	4	242.1	2	100	6					
		240.1	4	100	8					
1	6	238.1	2		6					
		236.1	3		10					
1	8	234.1	4		13					
		232.1	3		15					
		230.1	5		18					
0.5	18	228.1	4		20					
		226.1	5		23					
		224.1	10							

0.0 / 248.7
 7" Asphalt

0.6 / 248.1
 Fill, Brown, fine to medium SILTY SAND (SM), loose, moist

3.0 / 245.7
 Yellow-brown, orange and gray, LEAN CLAY WITH SAND (CL), contains sand seams, moist
 Fill, Yellow-brown, orange and gray, LEAN CLAY WITH SAND (CL), contains sand seams, firm, moist

Fill, Yellow-brown, orange and gray, LEAN CLAY WITH SAND (CL), contains sand seams, stiff, moist

21.5 / 227.2
 Brown and gray-brown, fine to medium CLAYEY SAND (SC), contains clay seams, medium dense, moist

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 47 feet

PAGE 1 OF 4

17BR-07

SPT_LOGAM:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: TRUSLOW BRIDGE

17BR-07

PAGE 4 OF 4

STATION: 129+14 **OFFSET:** 192 ft LT
LATITUDE: 38.352316° N **LONGITUDE:** 77.479068° W
SURFACE ELEVATION: 248.7 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 05/09/2017 - 05/09/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Bill Miller/HDR

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER

▼ FIRST ENCOUNTERED AT 38.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL PI

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK						
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	DIP °
	76	172				75					
	78	170	12 26 32 35	100		78					
	80					80					

Gray, fine POORLY GRADED SAND (SP), very dense, moist

Bottom of borehole at 80.0 feet.
 Boring backfilled with bentonite and grout.

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 47 feet

PAGE 4 OF 4

17BR-07

SPT_LOGAW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: TRUSLOW BRIDGE

17BR-08

PAGE 1 OF 4

STATION: 128+25 **OFFSET:** 141 ft RT
LATITUDE: 38.351520° N **LONGITUDE:** 77.478420° W
SURFACE ELEVATION: 251.2 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 05/08/2017 - 05/08/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Bill Miller/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 40.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		250	2	53					
	2	248	4	100					
	4	246	2	75					
	6	244	9	100					
	8	242	3	100					
	10	240							
	12	238	3	100					
	14	236	5	100					
	16	234							
	18	232	2	100					
	20	230	2	100					
	22	228	5	100					
	24		6	100					

0.0 / 251.2
5" Asphalt

0.4 / 250.8
Fill, Brown, fine SILTY SAND WITH GRAVEL (SM), loose, moist

1.5 / 249.7
Fill, Brown and yellow-brown, fine POORLY GRADED SAND (SP), moist
Brown and yellow-brown, fine POORLY GRADED SAND (SP), loose, moist

6.0 / 245.2
Fill, Yellow-brown, fine CLAYEY SAND (SC), medium dense, moist

19.0 / 232.2
Brown to gray, SANDY LEAN CLAY (CL), moist

21.5 / 229.7
Gray-brown, fine to coarse CLAYEY SAND (SC), medium dense, moist

Yellow-brown, fine CLAYEY SAND (SC), contains clay lenses, loose, moist

		13.5	
		15.2	
		11.2	
		16.5	
		17.6	45.5
		15.7	
		29.0	
		20.2	

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 40.2 feet

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17BR-08

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: TRUSLOW BRIDGE

17BR-08

PAGE 2 OF 4

STATION: 128+25 **OFFSET:** 141 ft RT
LATITUDE: 38.351520° N **LONGITUDE:** 77.478420° W
SURFACE ELEVATION: 251.2 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 05/08/2017 - 05/08/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Bill Miller/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 40.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		LL	PI

FIELD DESCRIPTION OF STRATA

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		226							
	26								
		224							
	28		4						
		222	4	100					
	30		7						
		220	7						
	32								
0.25		218	1						
	34		2	100					
		216	2						
	36		2						
		214	3						
	38		1						
0.25		212	2	100					
	40		5						
		210	17						
	42								
		208	1						
	44		4	100					
		206	4						
	46		4						
		204	8						
	48		9						
		202	12	100					
	50		13						
		200	14						

25 - 28	Gray-brown, fine to coarse CLAYEY SAND (SC), medium dense, moist			17.3	
31.5 / 219.7					
33 - 35	Gray, orange and brown, mottled, SANDY LEAN CLAY (CL), soft, moist	44	21	33.6	63.3
39.0 / 212.2					
39 - 40	Orange-brown, medium to coarse SILTY SAND WITH GRAVEL (SM), wet			16.3	
43 - 45	Orange-brown, medium to coarse SILTY SAND WITH GRAVEL (SM), loose, wet			24.7	
48 - 48	Orange-brown, medium to coarse SILTY SAND WITH GRAVEL (SM), medium dense, wet			13.7	

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 40.2 feet

PAGE 2 OF 4

17BR-08

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: TRUSLOW BRIDGE

17BR-08

PAGE 3 OF 4

STATION: 128+25 **OFFSET:** 141 ft RT
LATITUDE: 38.351520° N **LONGITUDE:** 77.478420° W
SURFACE ELEVATION: 251.2 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 05/08/2017 - 05/08/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Bill Miller/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 40.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS		
	50									
	52	200								
	53	198	5							
2.5	54	196	10	100						
	55	196	13							
	56	194	14							
4	58	192	12	100						
	60	190	13							
	62	188	8	100						
4	64	186	11							
	66	184	13							
	68	182	14							
	70	180	10	100						
	72	178	19							
	74	178	15							
	76	178	6	100						
	78	178	11							
	80	178	12							
	82	178	19							

Orange-brown, medium to coarse SILTY SAND WITH GRAVEL (SM), wet
 54.0 / 197.2
 Gray, FAT CLAY (CH), moist

Gray, FAT CLAY (CH), very stiff, moist

66.5 / 184.7

Gray, fine SILTY SAND (SM), medium dense, moist

		19.3	
		22.3	
63	46	28.6	93.6
		25.2	
		26.7	38.0

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 40.2 feet

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17BR-08

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: BRIDGE

17BR-09

PAGE 2 OF 3

STATION: 119+91 **OFFSET:** 33 ft LT
LATITUDE: 38.350178° N **LONGITUDE:** 77.480867° W
SURFACE ELEVATION: 209.2 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 03/29/2017 - 03/29/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Kohltan Heiter, EIT/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 8.0 ft DEPTH
 ▽ STABILIZED AT 8.0 ft

FIELD DESCRIPTION OF STRATA

LL	PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
----	----	----------------------	-------------------------

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND		
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA		JOINTS	
		184									
	26										
		182									
4.5	28	9	15	100							
		180	24								
	30		27								
		178									
	32										
4.25	34	10	14	100							
		176	19								
	34		40								
		174									
	36										
		172									
4.5	38	9	19	100							
		170	29								
	40		50/6"								
		168									
	42										
4.5	44	18	21	100							
		166	29								
	44		29								
		164									
	46										
		162									
4.5	48	16	16	100							
		160	23								
	50		49								

Gray and red, mottled, SANDY FAT CLAY (CH), contains mica, hard, moist

24.2

41.5 / 167.7 (SC)

Gray, fine to coarse CLAYEY SAND (SC), contains mica, dense, moist

43 21 25.2 27.9

Dark gray, fine to coarse CLAYEY SAND (SC), contains mica, dense, moist

29.0

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 39 feet

PAGE 2 OF 3

17BR-09

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: BRIDGE

17BR-09

PAGE 3 OF 3

STATION: 119+91 **OFFSET:** 33 ft LT
LATITUDE: 38.350178° N **LONGITUDE:** 77.480867° W
SURFACE ELEVATION: 209.2 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						50									
<p>GROUND WATER</p> <p>▼ FIRST ENCOUNTERED AT 8.0 ft DEPTH</p> <p>▼ STABILIZED AT 8.0 ft</p>															
<p>FIELD DESCRIPTION OF STRATA</p> <p>Bottom of borehole at 50.0 feet. Boring backfilled with auger cuttings.</p>											LL	PI			

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 39 feet

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17BR-09

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8_30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: BRIDGE

17BR-10

PAGE 1 OF 4

STATION: 115+98 **OFFSET:** 187 ft LT
LATITUDE: 38.349674° N **LONGITUDE:** 77.482184° W
SURFACE ELEVATION: 211.1 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/26/2017 - 04/26/2017

LAB DATA

Drilling Method(s): Mud Rotary w/ SPT
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Thomas Williams/S&ME, Inc.
 Logger: Russell Kanith/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 53.5 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
1		210	2	75					
4.5	2	208	3	80					
4.5	4	206	5	80					
6	6	204	7	80					
4.5	8	202	5	100					
10	10	200							
4.5	14	198	15	100					
2	18	192	24	80					
4	24	188	9	100					

0.0 / 211.1 2" Root Mat				
0.2 / 210.9 Brown and gray, mottled, LEAN CLAY (CL), contains root fragments, firm, moist			29.4	
0.2 / 210.9 Brown and gray, mottled, LEAN CLAY (CL), stiff, moist			22.9	
4.5 / 206.6 Gray-brown, POORLY GRADED SAND WITH SILT (SP-SM), medium dense, moist			6.3	
4.5 / 204.4 Gray-brown, POORLY GRADED SAND WITH SILT (SP-SM), medium dense, moist			6.3	11.4
8.2 / 202.9 Gray, LEAN CLAY (CL), moist			26.5	
8.5 / 202.6 Red-brown, fine to coarse WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), very dense, moist				
11.5 / 199.6 Blue-gray, SANDY FAT CLAY (CH), hard, dry			30.2	
Blue-gray, FAT CLAY (CH), very hard, dry	71	44	34.8	92.8
Blue-gray, FAT CLAY (CH), very stiff, dry			28.9	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 0 feet

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17BR-10

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: BRIDGE

17BR-10

PAGE 2 OF 4

STATION: 115+98 **OFFSET:** 187 ft LT
LATITUDE: 38.349674° N **LONGITUDE:** 77.482184° W
SURFACE ELEVATION: 211.1 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/26/2017 - 04/26/2017
 Drilling Method(s): Mud Rotary w/ SPT
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Thomas Williams/S&ME, Inc.
 Logger: Russell Kanith/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 53.5 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
	25								
	26								
	184								
	28	9							
	182	11							
	30	14		100					
	180	18							
	32								
	178	10							
	34	15							
	176	24		100					
	36	22							
	174								
	38	10							
	172	12							
	40	15		100					
	170	19							
	42								
	168	10							
	44	17							
	166	20		100					
	46	23							
	164								
	48	13							
	162	16							
	50	20		100					
		27							

Blue-gray, FAT CLAY (CH), very stiff, dry

26.5 / 184.6

Gray and dark red-brown, mottled, LEAN CLAY (CL), very stiff, dry

32.2

Gray and dark red-brown, mottled, LEAN CLAY (CL), hard, dry

34.3

Blue-gray, LEAN CLAY WITH SAND (CL), very stiff, dry

49 23 27.4 74.0

Blue-gray, LEAN CLAY WITH SAND (CL), hard, dry

19.4

46.5 / 164.6

Dark gray, ELASTIC SILT (MH), contains organic matter, hard, moist

62 27 28.7 92.4

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 0 feet

PAGE 2 OF 4

17BR-10

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: BRIDGE

17BR-10

PAGE 4 OF 4

STATION: 115+98 **OFFSET:** 187 ft LT
LATITUDE: 38.349674° N **LONGITUDE:** 77.482184° W
SURFACE ELEVATION: 211.1 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						75									
<p>GROUND WATER ▽ FIRST ENCOUNTERED AT 53.5 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN</p>															
<p>FIELD DESCRIPTION OF STRATA</p>											LL	PI			
<p>Bottom of borehole at 75.0 feet. Boring backfilled with onsite soils and hole plug.</p>															

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 0 feet

PAGE 4 OF 4

17BR-10

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8_30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: US 17 BRIDGE

17BR-11

PAGE 1 OF 3

STATION: 71+59 **OFFSET:** 8 ft LT
LATITUDE: 38.340342° N **LONGITUDE:** 77.492163° W
SURFACE ELEVATION: 227.4 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/27/2017 - 04/27/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 15.0 ft DEPTH
 ▽ STABILIZED AT 14.5 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
2		226	5	100					
2	2	224	4	75					
4	4	222	3	50					
6	6	220	11	75					
8	8	218	5	100					
10	10	216	6	100					
12	12	214	6	100					
14	14	212	4	100					
16	16	210	2	100					
18	18	208	2	100					
20	20	206	9	100					
22	22	204	8	100					
24	24	204	5	100					

0.0 / 227.4
 5" Topsoil
 0.4 / 227.0
 Fill, Yellow-brown, LEAN CLAY (CL), firm, moist
 Fill, Yellow-brown, LEAN CLAY (CL), stiff, moist

4.0 / 223.4
 Yellow-brown, CLAYEY SAND (SC), medium dense, moist

6.0 / 221.4
 Yellow-brown, fine to coarse WELL GRADED SAND WITH CLAY AND GRAVEL (SW-SC), dense, moist

Yellow-brown, fine to coarse WELL GRADED SAND WITH CLAY AND GRAVEL (SW-SC), medium dense, moist

Yellow-brown, fine to coarse WELL GRADED SAND WITH CLAY AND GRAVEL (SW-SC), loose, wet

Yellow-brown, fine to coarse WELL GRADED SAND WITH CLAY AND GRAVEL (SW-SC), medium dense, wet

Yellow-brown, fine to coarse WELL GRADED SAND WITH CLAY AND GRAVEL (SW-SC), very dense, wet

		26.4	
		25.0	
		20.3	
40	19	16.3	10.2
		26.7	
		21.2	
		17.8	

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17BR-11

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: US 17 BRIDGE

17BR-11

PAGE 2 OF 3

STATION: 71+59 **OFFSET:** 8 ft LT
LATITUDE: 38.340342° N **LONGITUDE:** 77.492163° W
SURFACE ELEVATION: 227.4 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/27/2017 - 04/27/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 15.0 ft DEPTH
 ▽ STABILIZED AT 14.5 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		202							
	26								
4.5	28	198	9	75					
	30	196	15	23					
	32	194	11	100					
	34	192	22	28					
	36	190	11	100					
4.5	38	188	14	38					
	40	186	22	100					
	42	184	12	100					
	44	182	20	41					
	46	180	33	100					
4.5	48	178	19	38					
	50		20	100					

		Yellow-brown, fine to coarse WELL GRADED SAND WITH CLAY AND GRAVEL (SW-SC), very dense, wet				
	26.5 / 200.9 (CL)	Gray and brown, mottled, LEAN CLAY (CL), very stiff, moist		22.0		
	31.5 / 195.9 (SC)	Gray, CLAYEY SAND (SC), dense, moist		16.3		
	36.5 / 190.9 (CH)	Brown and gray, mottled, SANDY FAT CLAY (CH), contains mica, hard, moist		24.3		
		Brown and gray, mottled, SANDY FAT CLAY (CH), contains mica, hard, moist	78	50	24.3	60.1
					31.9	

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17BR-11

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: US 17 BRIDGE

17BR-11

PAGE 3 OF 3

STATION: 71+59 **OFFSET:** 8 ft LT
LATITUDE: 38.340342° N **LONGITUDE:** 77.492163° W
SURFACE ELEVATION: 227.4 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/27/2017 - 04/27/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Bill Miller/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 15.0 ft DEPTH
 ▽ STABILIZED AT 14.5 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

LL	PI		
		19.2	
		26.3	22.0
		23.7	
		14.0	
		13.2	

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION		DIP °
		176								
	52	174	23	50/5"	100	X	53			
	54	172					53.9			
	56	170								
	58	168	11	17	100	X	58			
	60	166	23	35			60			
	62	164	23	50/5"	100	X	63			
	64	162					63.9			
	66	160								
	68	158	50/2"		100	X	68			
	70	156					68.2			
		154	50/1"		100	X	71			
		152					71.1			

Brown and gray, mottled, SANDY FAT CLAY (CH), contains mica, hard, moist

51.5 / 175.9 (SM)

Gray and black, fine to medium SILTY SAND (SM), contains mica, very dense, moist

Gray and black, fine to medium SILTY SAND (SM), contains mica, dense, moist

Gray and black, fine to medium SILTY SAND (SM), contains mica, very dense, moist

Auger refusal at 71.0 feet.
 Bottom of borehole at 71.1 feet.
 Boring backfilled with auger cuttings.

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17BR-11

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: COLLECTOR DISTRIBUTOR

17CD-01
PAGE 1 OF 2

STATION: 97+69 **OFFSET:** 189 ft LT
LATITUDE: 38.345975° N **LONGITUDE:** 77.486504° W
SURFACE ELEVATION: 169.9 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/26/2017 - 04/26/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Ray Norwood/S&ME, Inc.
 Logger: Randy Bliefernich/GET Solutions, Inc.

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ▽ STABILIZED AT 24.0 ft

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
LL	PI	

FIELD DESCRIPTION OF STRATA

LL	PI

DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
1								
2	168	50	2					
4	166	75	4					
6	164	85	6					
8	162	85	8					
10	160	90	10					
12	158							
14	156	90	13					
16	154							
18	152	100	18					
20	150	100	20					
22	148							
24	146	100	23					

0.0 / 169.9
 3" Topsoil
 0.3 / 169.6
 Tan, fine to medium CLAYEY SAND WITH GRAVEL (SC), loose, moist

Gray, fine to coarse CLAYEY SAND (SC), contains clay nodules, medium dense, moist

Light-gray and dark gray, mottled, fine to coarse CLAYEY SAND (SC), contains clay nodules, dense, moist

Light-gray and dark gray, mottled, fine to coarse CLAYEY SAND (SC), contains clay nodules, very dense, moist

Gray, fine CLAYEY SAND (SC), dense, moist

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

PAGE 1 OF 2
17CD-01

SPT_LOG\VDOT_TRANSURBAN_95_FRED_EX.GPJ:8:30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
 LOCATION: Stafford County, Virginia
 STRUCTURE: COLLECTOR DISTRIBUTOR

17CD-01
PAGE 2 OF 2

STATION: 97+69 OFFSET: 189 ft LT
 LATITUDE: 38.345975° N LONGITUDE: 77.486504° W
 SURFACE ELEVATION: 169.9 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA									
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)							
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA				JOINTS	STRATA LEGEND					
26	144				25														
28	142	45 50/4"	100	X	28 28.8														
<p>GROUND WATER NOT ENCOUNTERED DURING DRILLING ↓ STABILIZED AT 24.0 ft</p>																			
FIELD DESCRIPTION OF STRATA										LL	PI								
<p>Gray, fine CLAYEY SAND (SC), very dense, moist</p> <p>Bottom of borehole at 28.8 feet. Boring backfilled with auger cuttings.</p>												15.6							

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

PAGE 2 OF 2
17CD-01

SPT_LOG:V:\DOT_TRANURBAN\95 FRED EX.GPJ\8.30.004\061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: COLLECTOR DISTRIBUTOR

17CD-02

PAGE 1 OF 1

STATION: 94+83 **OFFSET:** 210 ft LT
LATITUDE: 38.345432° N **LONGITUDE:** 77.487230° W
SURFACE ELEVATION: 192.8 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA									
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		SAMPLE INTERVAL	ROCK			STRATA LEGEND	Date(s) Drilled: 04/26/2017 - 04/26/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Ray Norwood/S&ME, Inc.	Logger: Randy Bliefernich/GET Solutions, Inc.	GROUND WATER NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)		ROCK RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °											
0.25		192	1	65						0.0 / 192.8	3" Topsoil								22.2
0.75	2	190	3	65	2					0.3 / 192.5	Tan, LEAN CLAY (CL), contains organic matter, soft, moist Tan, LEAN CLAY (CL), stiff, moist								15.0
	4	188	5	85	4					3.5 / 189.3	Tan, fine to medium CLAYEY SAND (SC), moist Tan to gray, fine to medium CLAYEY SAND WITH GRAVEL (SC), medium dense, moist								12.7
	6	186	7	90	6						Gray and tan, mottled, fine to medium CLAYEY SAND WITH GRAVEL (SC), medium dense, moist								20.0
	8	184	8	90	8					8.0 / 184.8	Red and tan, mottled, fine to coarse POORLY GRADED SAND (SP), medium dense, moist								18.7
	10	182	13	100	10														14.9
	12	180	18	100	13														18.0
	14	178	36	50	15					13.8 / 179.0	Gray, fine SILTY SAND (SM), very dense, dry								
										Bottom of borehole at 15.0 feet. Bulk sample collected from 0.0 to 15.0 feet bgs. Boring backfilled with auger cuttings.									

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

PAGE 1 OF 1

17CD-02

SPT_LOGAW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: COLLECTOR DISTRIBUTOR

17CD-03

PAGE 1 OF 2

STATION: 92+17 **OFFSET:** 194 ft LT
LATITUDE: 38.344863° N **LONGITUDE:** 77.487812° W
SURFACE ELEVATION: 205.9 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/25/2017 - 04/25/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Ray Norwood/S&ME, Inc.
Logger: Randy Bliefernich/GET Solutions, Inc.

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ▽ STABILIZED AT 3.5 ft

FIELD DESCRIPTION OF STRATA

LL PI

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		1							
		2	2	80					
		204	2	5					
		6	6						
		202	4	50					
		2	2	5					
		202	2	4.3					
		2	2	90					
		200	3	6					
		6	7						
		198	8	7					
		2	2	100					
		196	10	10					
		194	12						
		192	14	3					
		190	8	65					
		188	18	13					
		186	20	17					
		184	22	25					
		182	24	10					
		4.5	5	17					
				22					

0.0 / 205.9
 Tan, fine to coarse POORLY GRADED SAND (SP), contains organic matter, loose, moist

4.3 / 201.6
 Gray and tan, mottled, LEAN CLAY WITH SAND (CL), soft, moist

7.0 / 198.9
 Gray and tan, mottled, fine to medium CLAYEY SAND (SC), medium dense, moist

16.5 / 189.4
 Gray, LEAN CLAY WITH SAND (CL), very stiff, moist

		7.6	
		7.7	
		22.5	
		36.3	
		23.3	
		24.7	
49	30	20.1	83.2
		20.3	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

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17CD-03

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: COLLECTOR DISTRIBUTOR

17CD-03

PAGE 2 OF 2

STATION: 92+17 **OFFSET:** 194 ft LT
LATITUDE: 38.344863° N **LONGITUDE:** 77.487812° W
SURFACE ELEVATION: 205.9 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/25/2017 - 04/25/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Ray Norwood/S&ME, Inc.
 Logger: Randy Bliefernich/GET Solutions, Inc.

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ↓ STABILIZED AT 3.5 ft

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)
 FINES CONTENT -#200 (%)

FIELD DESCRIPTION OF STRATA

LL PI

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °		STRATA
	26	180			25					
4.5	28	178	7		28					
			13							
			20							
	30	176	33	100	30					

Gray, LEAN CLAY WITH SAND (CL), hard, moist

21.1

Bottom of borehole at 30.0 feet.
 Boring backfilled with auger cuttings.

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

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17CD-03

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GP-J.8.30.004:061810:8/8/17



STATION: 437+67 **OFFSET:** 496 ft RT
LATITUDE: 38.421900° N **LONGITUDE:** 77.420264° W
SURFACE ELEVATION: 198.9 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK					STRATA LEGEND	Date(s) Drilled: 05/03/2017 - 05/03/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Ray Norwood/S&ME, Inc.	Logger: Taylor Redmond/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS											
										GROUND WATER				NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN						
										FIELD DESCRIPTION OF STRATA				LL	PI					
3		198	1	75							0.0 / 198.9	Brown and gray, SANDY LEAN CLAY (CL), contains organic matter, soft, moist						25.2		
2.5	2	196	3	75	2							Brown, SANDY LEAN CLAY (CL), contains organic matter, stiff, moist						18.2		
4	3	194	3	75	4						4.0 / 194.9	Brown and gray, fine CLAYEY SAND (SC), contains organic matter, loose, moist						15.4		
6	3	192	3	75	6							Brown and gray, fine CLAYEY SAND (SC), medium dense, moist						7.2		
2.75	8	190	6	75	8						8.0 / 190.9	Brown and gray, SANDY LEAN CLAY (CL), stiff, moist						28.5		
10	6	188	5	75	10							11.5 / 187.4								
12	4	186	6	95	13							Gray, FAT CLAY (CH), very stiff, moist						28.5		
14	7	184	7	95	15							Red and gray, FAT CLAY (CH), very stiff, moist								
16	11	182	11	95	15															
18	7	180	7	100	18															
20	9	178	9	100	20															
22	11	176	11	100	20															
4.5	4	174	4	100	23															
24	7	174	7	100	23															
	9	174	9	100	23															
	13	174	13	100	23															

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 26.8 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: COURTHOUSE ROAD

17CHS-03
PAGE 2 OF 2

STATION: 437+67 **OFFSET:** 496 ft RT
LATITUDE: 38.421900° N **LONGITUDE:** 77.420264° W
SURFACE ELEVATION: 198.9 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA					
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 05/03/2017 - 05/03/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Ray Norwood/S&ME, Inc. Logger: Taylor Redmond/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA						
											NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN				
											FIELD DESCRIPTION OF STRATA	LL	PI		
4.5	26	172	8			25					Red and gray, FAT CLAY (CH), hard, moist			23.6	
	28	170	12			28									
	30		22			30					Bottom of borehole at 30.0 feet. Boring backfilled with auger cuttings.				

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 26.8 feet

PAGE 2 OF 2
17CHS-03

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-01

PAGE 3 OF 3

STATION: 544+28 **OFFSET:** 29 ft LT
LATITUDE: 38.449198° N **LONGITUDE:** 77.407767° W
SURFACE ELEVATION: 32.3 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/19/2017 - 04/19/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Brice Bahhar/GET Solutions, Inc
Logger: Joe Wallen, PE/HDR

LAB DATA

GROUND WATER
 ▾ FIRST ENCOUNTERED AT 4.0 ft DEPTH
 ▾ STABILIZED AT 2.8 ft

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		24.3	

FIELD DESCRIPTION OF STRATA

LL	PI
----	----

contains fine sand partings, dry

Dark gray and gray, stratified, FAT CLAY (CH), contains fine sand partings, hard, dry

Bottom of borehole at 55.0 feet.
 Boring backfilled with hole plug and auger cuttings.

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND		
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °		STRATA	JOINTS
		-18				50						
4.5	52	-20	8			53						
	54	-22	13 21 28	100		55						

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 11.3 feet

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17CL-01

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-02

PAGE 1 OF 3

STATION: 521+57 **OFFSET:** 18 ft LT
LATITUDE: 38.443119° N **LONGITUDE:** 77.409266° W
SURFACE ELEVATION: 39.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/11/2017 - 04/11/2017

LAB DATA

Drilling Method(s): 2.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Brice Bahhar/GET Solutions, Inc
 Logger: Kohltan Heiter, EIT/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 2.4 ft DEPTH
 ▽ STABILIZED AT 0.0 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
0.75		38	WOH/12"	65					
	2	36	1	40					
	4	34	2	11					
	4.5	32	8	15					
	1.5	30	8	23					
	10	28	23	24					
	12	26	9	12					
	14	24	15	19					
	16	22							
	18	20	4	9					
	20	18	9	16					
	22	16							
	2.25	14	11	17					
	24	12	22	27					

0.0 / 39.0	1" Topsoil		
0.1 / 38.9	Dark brown, fine POORLY GRADED GRAVEL WITH SILT (GP-GM), contains mica, contains organic matter, very loose, moist		25.6
2.4 / 36.6	Brown, gray and orange, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, very loose, wet		30.1
4.4 / 34.6	Gray, fine POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, wet		19.7
4.4 / 34.6	Gray, fine to coarse POORLY GRADED GRAVEL WITH CLAY AND SAND (GP-GC), contains mica, wet		20.7
5.0 / 34.0	Light gray, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, moist		19.2
6.0 / 33.0	Blue-gray, fine CLAYEY SAND (SC), contains mica, contains pockets of angular quartz gravel 7.4 to 8.0 feet bgs, dense, dry		
8.0 / 31.0	Blue-gray, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, contains pockets of angular quartz gravel 9.2 to 9.4 feet bgs, dense, moist	58	33
11.5 / 27.5	Blue-gray, SANDY FAT CLAY (CH), contains mica, very stiff, moist		24.0
16.5 / 22.5			
16.5 / 22.5	Blue-gray, fine to medium CLAYEY SAND (SC), contains mica, moist		24.6
19.0 / 20.0	Blue-gray, FAT CLAY (CH), contains mica, moist		
21.5 / 17.5			
21.5 / 17.5	Blue-gray, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, dense, moist		24.0

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 3.8 feet

PAGE 1 OF 3

17CL-02

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-02

PAGE 3 OF 3

STATION: 521+57 **OFFSET:** 18 ft LT
LATITUDE: 38.443119° N **LONGITUDE:** 77.409266° W
SURFACE ELEVATION: 39.0 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						50'									
<p>GROUND WATER</p> <p>▼ FIRST ENCOUNTERED AT 2.4 ft DEPTH</p> <p>▼ STABILIZED AT 0.0 ft</p>															
<p>FIELD DESCRIPTION OF STRATA</p> <p>Dark blue-gray, FAT CLAY (CH), contains mica, dry</p> <p>Bottom of borehole at 50.0 feet.</p> <p>Boring backfilled with auger cuttings.</p>											LL	PI			

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 3.8 feet

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17CL-02

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-03

PAGE 1 OF 3

STATION: 488+08 **OFFSET:** 16 ft LT
LATITUDE: 38.434840° N **LONGITUDE:** 77.414325° W
SURFACE ELEVATION: 80.4 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/03/2017 - 04/03/2017
Drilling Method(s): Mud Rotary w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Will Riddick/GET Solutions, Inc
Logger: Kohltan Heiter, EIT/HDR

LAB DATA

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ↓ STABILIZED AT 3.0 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
	1.5	80	2						
			2	90					
			3						
	1.25	78	2	2					
			3	90					
			2						
	1	76	6	3					
			10	50					
			8						
	6	74	2	2					
			4	20					
			8						
	4.5	72	10	9					
			19	100					
			27						
	10	70		27					
	12	68							
	4.5		8						
			14	100					
			21						
	14	66		22					
	16	64							
			18	8					
	3	62		11					
			16	100					
			20						
	20	60		20					
	22	58							
			8						
	24	56		11					
			15	100					
			16						

0.0 / 80.4 4" Topsoil				
0.3 / 80.1 Red and brown, fine to medium CLAYEY SAND (SC), contains organic matter, loose, moist Red and gray, fine to medium CLAYEY SAND (SC), loose, moist			26.1	
Red and gray, fine to medium CLAYEY SAND (SC), contains organic matter, medium dense, moist			17.5	
Red and gray, fine to medium CLAYEY SAND (SC), contains organic matter, medium dense, moist			14.4	
6.0 / 74.4 Gray and red, mottled, FAT CLAY (CH), contains mica, stiff, moist			24.4	
Gray and red, mottled, FAT CLAY (CH), contains mica, hard, dry			25.9	
Gray and red, mottled, FAT CLAY (CH), contains mica, hard, moist	57	35	25.7	90.9
16.5 / 63.9 Gray and brown, fine to coarse CLAYEY SAND (SC), contains mica, medium dense, moist			23.3	
Blue-gray, fine CLAYEY SAND (SC), contains mica, medium dense, moist			24.5	

REMARKS: Rig Type: CME 45C ATV Track Rig.

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17CL-03

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-03

PAGE 2 OF 3

STATION: 488+08 **OFFSET:** 16 ft LT
LATITUDE: 38.434840° N **LONGITUDE:** 77.414325° W
SURFACE ELEVATION: 80.4 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/03/2017 - 04/03/2017

LAB DATA

Drilling Method(s): Mud Rotary w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Will Riddick/GET Solutions, Inc
 Logger: Kohltan Heiter, EIT/HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ▽ STABILIZED AT 3.0 ft

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

FIELD DESCRIPTION OF STRATA

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND											
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA		JOINTS	DIP °									
2.5	28	52	5	100																
			7																	
			11																	
			11																	
2.5	34	46	6	100																
			8																	
			13																	
			15																	
2.5	40	40	6	100																
			10																	
			15																	
			19																	
			9																	
			14																	
			17																	
			24																	
			10																	
			18																	
			22																	
			35																	

Blue-gray, fine CLAYEY SAND (SC), contains mica, medium dense, moist
29.1

Blue-gray, fine CLAYEY SAND (SC), contains mica, medium dense, moist
39 22 27.5 18.2

Blue-gray, fine to medium CLAYEY SAND (SC), contains mica, medium dense, moist
26.4

41.5 / 38.9

Blue-gray, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), dense, moist
21.8

Blue-gray, fine to coarse POORLY GRADED SAND WITH CLAY (SP-SC), dense, moist
20.7

REMARKS: Rig Type: CME 45C ATV Track Rig.

PAGE 2 OF 3

17CL-03

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-04

PAGE 1 OF 2

STATION: 473+76 **OFFSET:** 10 ft LT
LATITUDE: 38.431316° N **LONGITUDE:** 77.416542° W
SURFACE ELEVATION: 89.7 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/17/2017 - 04/17/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Brice Bahhar/GET Solutions, Inc
Logger: Joe Wallen, PE/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 6.0 ft DEPTH
 ▽ STABILIZED AT 4.0 ft

FIELD DESCRIPTION OF STRATA

LL	PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		13.7	
		32.2	
		27.9	
		26.9	
		30.1	
60	24	28.2	70.7
		29.2	
		27.6	

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
			1						
			1	75					
			2						
2.75	2	88	2	2					
			2	60					
			4						
1.5	4	86	3	5					
			3	70					
			4						
			5	5					
			2	10					
			10	19					
1.75	8	82	15	50					
			2	15					
			3	65					
			5						
			9	9					
			10						
			12	78					
			4	13					
3	14	76	6	80					
			8						
			10	15					
			16	74					
			8	18					
4.5	18	72	12	100					
			16						
			19	20					
			20	70					
			22	68					
			10	23					
4.5	24	66	15	100					
			19						
			26						

0.0 / 89.7
 2.5" Topsoil
 0.2 / 89.5
 Brown, fine to medium SILTY SAND (SM), very loose, moist
 2.0 / 87.7
 Brown, LEAN CLAY (CL), contains root fragments, firm, moist
 Brown and gray, mottled, SANDY LEAN CLAY (CL), firm, moist
 6.0 / 83.7
 Gray and brown, fine to coarse CLAYEY GRAVEL WITH SAND (GC), medium dense, wet
 8.0 / 81.7
 Brown and gray, mottled, ELASTIC SILT WITH SAND (MH), contains mica, firm, moist
 Gray, ELASTIC SILT WITH SAND (MH), stiff, moist
 Red, ELASTIC SILT (MH), very stiff, dry
 Red, ELASTIC SILT (MH), hard, dry

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 20.2 feet

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17CL-04

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-04

PAGE 2 OF 2

STATION: 473+76 **OFFSET:** 10 ft LT
LATITUDE: 38.431316° N **LONGITUDE:** 77.416542° W
SURFACE ELEVATION: 89.7 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/17/2017 - 04/17/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Brice Bahhar/GET Solutions, Inc
Logger: Joe Wallen, PE/HDR

LAB DATA

GROUND WATER
 ▾ FIRST ENCOUNTERED AT 6.0 ft DEPTH
 ▾ STABILIZED AT 4.0 ft

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

65	26	29.7	99.7
----	----	------	------

Red, ELASTIC SILT (MH), contains slickensides, very stiff, dry

Bottom of borehole at 30.0 feet.
 Boring backfilled with auger cuttings and bentonite.

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND		
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °		STRATA	JOINTS
	26	64				25						
4.5	28	62	5			28						
	30	60	11 12 17	100		30						

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 20.2 feet

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17CL-04

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-06

PAGE 1 OF 3

STATION: 410+27 **OFFSET:** 15 ft LT
LATITUDE: 38.415815° N **LONGITUDE:** 77.426534° W
SURFACE ELEVATION: 166.4 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/10/2017 - 04/10/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Thomas Williams/S&ME, Inc.
 Logger: Russell Kanith/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 36.5 ft DEPTH
 ▽ STABILIZED AT 32.0 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		166	1						
		164	1	25					
1.25	2	164	1						
1.75	4	162	2	70					
6	6	160	2	60					
1.25	8	158	5	85					
3.25	10	156	8	100					
	12	154	9						
	14	152	21	100					
	16	150	22						
	18	148	26	100					
	20	146	45						
	22	144	46						
	24	142	25	100					

0.0 / 166.4				
5" Topsoil and Root Mat				
0.4 / 166.0				
Brown, CLAYEY SAND (SC), very loose, moist			26.3	
2.9 / 163.5				
Brown and gray, mottled, LEAN CLAY (CL), contains organic matter, moist				
2.9 / 163.5				
Brown and gray, mottled, LEAN CLAY (CL), contains organic matter, soft, moist			23.4	
6.0 / 160.4				
Brown and gray, mottled, CLAYEY SAND (SC), wet				
7.0 / 159.4				
Gray and brown, mottled, LEAN CLAY (CL), moist			23.1	
8.6 / 157.8				
Brown and gray, mottled, FAT CLAY (CH), moist	76	49	20.8	99.2
13.9 / 152.5				
Gray, fine CLAYEY SAND (SC), dry			20.1	
16.5 / 149.9				
Gray, fine POORLY GRADED SAND WITH CLAY (SP-SC), very dense, moist			15.1	
Gray, fine POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, very dense, moist			11.5	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 48.8 feet

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17CL-06

SPT_LOGABW\VDOT_TRANSURBAN_95_FRED_EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-06

PAGE 3 OF 3

STATION: 410+27 **OFFSET:** 15 ft LT
LATITUDE: 38.415815° N **LONGITUDE:** 77.426534° W
SURFACE ELEVATION: 166.4 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						50									
<p>Date(s) Drilled: 04/10/2017 - 04/10/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Thomas Williams/S&ME, Inc. Logger: Russell Kanith/HDR</p> <p style="text-align: center;">GROUND WATER</p> <p>▼ FIRST ENCOUNTERED AT 36.5 ft DEPTH ▼ STABILIZED AT 32.0 ft</p> <p style="text-align: center;">FIELD DESCRIPTION OF STRATA</p> <p>Bottom of borehole at 50.0 feet. Boring backfilled with auger cuttings.</p>															

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 48.8 feet

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17CL-06

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-09

PAGE 1 OF 1

STATION: 354+32 **OFFSET:** 16 ft LT
LATITUDE: 38.401393° N **LONGITUDE:** 77.433164° W
SURFACE ELEVATION: 169.4 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA									
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		SAMPLE INTERVAL	ROCK			STRATA LEGEND	Date(s) Drilled: 04/05/2017 - 04/05/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Thomas Williams/S&ME, Inc.	Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)		CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
										NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HOURS									
										FIELD DESCRIPTION OF STRATA				LL	PI				
		2	2	65						0.0 / 169.4									
		168	3	3	2					3" Topsoil								15.0	
	2	166	4	65	4					0.3 / 169.1								20.6	
	4	164	5	70	4					5.0 / 164.4								24.5	
2.5	6	162	2	70	2					Fill, Brown, dark gray and gray, LEAN CLAY (CL), contains wood fragments, moist								16.6	
	8	160	3	10	3					Fill, Brown, dark gray and gray, LEAN CLAY (CL), contains organic matter, firm, moist								16.0	
	10	158	1	2	2					8.0 / 161.4									
	12	156	2	30	2					Fill, Gray and brown, CLAYEY SAND (SC), very loose, moist									
	14		1							11.5 / 157.9									
			2							Fill, Gray and brown, SANDY LEAN CLAY (CL), contains wood fragments, soft, moist					31	14	20.1	52.3	
										Bottom of borehole at 15.0 feet. Boring backfilled with auger cuttings.									

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 12.6 feet

PAGE 1 OF 1

17CL-09

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-10

PAGE 1 OF 2

STATION: 323+90 **OFFSET:** 2 ft LT
LATITUDE: 38.394085° N **LONGITUDE:** 77.438227° W
SURFACE ELEVATION: 196.6 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/05/2017 - 04/05/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ↓ STABILIZED AT 7.0 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		196	2						
		196	2	50					
		194	4						
		194	4	60					
		192	4						
		192	4	60					
		190	2						
		190	2	80					
		188	1						
		188	1	60					
		186							
		184	2						
		184	2	65					
		182	4						
		182	4	65					
		180							
		180							
		178	3						
		178	3	70					
		176							
		174	5						
		174	5	80					
		172	7						
		172	7	80					

0.0 / 196.6
 3" Topsoil
 0.3 / 196.3
 Fill, Brown, CLAYEY SAND (SC), loose, wet
 Fill, Brown, CLAYEY SAND (SC), loose, moist

5.7 / 190.9
 Brown and gray, mottled, LEAN CLAY (CL), moist

7.0 / 189.6
 Blue-gray, fine CLAYEY SAND (SC), moist

8.5 / 188.1
 Gray and brown, LEAN CLAY WITH SAND (CL), soft, moist

14.0 / 182.6
 Blue-gray, SILT (ML), dry

16.5 / 180.1
 Brown and gray, fine to medium CLAYEY SAND (SC), contains mica, loose, moist

Brown and gray, fine to medium CLAYEY SAND (SC), contains mica, medium dense, moist

		14.8		
		8.5		
		14.9		
37	12	25.7	49.3	
		22.0		
		27.3		
		17.6		
37	14	17.0	41.8	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 15.3 feet

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17CL-10

SPT_LOGABW\VDOT_TRANSURBAN_95_FRED_EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-10

PAGE 2 OF 2

STATION: 323+90 **OFFSET:** 2 ft LT
LATITUDE: 38.394085° N **LONGITUDE:** 77.438227° W
SURFACE ELEVATION: 196.6 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/05/2017 - 04/05/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ↓ STABILIZED AT 7.0 ft

FIELD DESCRIPTION OF STRATA

LL	PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
----	----	----------------------	-------------------------

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND		
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION		DIP °	STRATA
	25										
	26	170									
	28	168	6								
			13								
			13								
			17	80							
	30										

Brown and orange-gray, fine to medium CLAYEY SAND WITH GRAVEL (SC), medium dense, moist

Bottom of borehole at 30.0 feet.
 Boring backfilled with auger cuttings.

10.5

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 15.3 feet

PAGE 2 OF 2

17CL-10

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-11

PAGE 1 OF 2

STATION: 229+02 **OFFSET:** 30 ft LT
LATITUDE: 38.375497° N **LONGITUDE:** 77.461315° W
SURFACE ELEVATION: 92.3 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/12/2017 - 04/12/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
LL	PI		

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 3.5 ft DEPTH
 ▽ STABILIZED AT 3.0 ft

FIELD DESCRIPTION OF STRATA

LL	PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
		16.6	
		23.2	
		21.5	
		18.6	76.9
		19.9	
		14.7	
		20.6	
		21.6	

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
	0.25	92	1						
			2	75					
			1						
	0.25	90	2	50					
			2						
			11						
	4	88	5	75					
			3						
			5						
	6	86	14	100					
			17						
			15						
	8	84	4	100					
			7						
			17						
	10	82		30					
	12	80							
			9						
	14	78	19	100					
			23						
			40						
	16	76							
	18	74	18	100					
			27						
			34						
			50/4"						
	20	72							
	22	70							
			19						
	24	68	19	100					
			28						
			31						

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Switched to Mud Rotary at 19.8 ft bgs.

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17CL-11

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-12

PAGE 1 OF 4

STATION: 220+01 **OFFSET:** 47 ft RT
LATITUDE: 38.373576° N **LONGITUDE:** 77.463296° W
SURFACE ELEVATION: 148.7 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/10/2017 - 04/10/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 19.5 ft DEPTH
 ▽ STABILIZED AT 28.0 ft

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
0.25		148	3	45					
4.5	2	146	2	3					
4.5	4	144	12	17					
4.5	6	142	13	24					
4.5	8	140	9	27					
4.5	10	138	17	22					
4.5	12	136	6	6					
4.5	14	134	6	13					
4.5	16	132	13	22					
4.5	18	130	12	18					
4.5	20	128	12	20					
4.5	22	126	11	14					
4.5	24	124	15	27					

0.0 / 148.7 2" Topsoil			
0.2 / 148.5 Fill, Brown and gray-brown, LEAN CLAY (CL), firm, moist			39.8
0.2 / 148.5 Fill, Brown and gray-brown, LEAN CLAY (CL), stiff, moist			26.2
3.5 / 145.2 Brown and red-brown, FAT CLAY (CH), hard, moist	78	48	29.0
			99.7
			24.4
Brown and red-brown, FAT CLAY (CH), very stiff, moist			25.9
			16.6
14.5 / 134.2 Gray, CLAYEY SAND (SC), moist			21.6
Gray, CLAYEY SAND (SC), dense, moist			
19.5 / 129.2 Gray, orange and red-brown, FAT CLAY (CH), moist			
Gray, orange and red-brown, FAT CLAY (CH), very stiff, moist			19.2

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17CL-12

SPT_LOGABW\VDOT_TRANSURBAN_95_FRED_EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-12

PAGE 2 OF 4

STATION: 220+01 **OFFSET:** 47 ft RT
LATITUDE: 38.373576° N **LONGITUDE:** 77.463296° W
SURFACE ELEVATION: 148.7 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/10/2017 - 04/10/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 19.5 ft DEPTH
 ▽ STABILIZED AT 28.0 ft

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA		JOINTS
	25									
	26	122								
	28									
	28	120	21	100	28					
	30		27	100	30					
	30		36	100						
	30	118	50/6"							
	32									
	32	116	12	100	33					
	34		31	100						
	34	114	45	100	35					
	36		50/6"							
	36	112								
	38		12	100	38					
	38	110	12	100						
	40		31	100	40					
	40	108	38	100						
	42									
	42	106	14	100	43					
	44		27	100						
	44	104	50	100	45					
	46		50/6"							
	46	102								
	48		27	100	48					
	48	100	50/4"	100	48.8					
	50									

Gray, orange and red-brown, FAT CLAY (CH), very hard, moist

Gray, orange and red-brown, FAT CLAY (CH), hard, moist

Gray, orange and red-brown, FAT CLAY (CH), very hard, moist

		15.3	
		18.1	
68	45	23.4	97.7
		24.0	
		21.6	

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17CL-12

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-12

PAGE 3 OF 4

STATION: 220+01 **OFFSET:** 47 ft RT
LATITUDE: 38.373576° N **LONGITUDE:** 77.463296° W
SURFACE ELEVATION: 148.7 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/10/2017 - 04/10/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 19.5 ft DEPTH
 ▽ STABILIZED AT 28.0 ft

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	
	98								
	52	96	12						
	54	94	21 50/6"	100	53				
	56								
	58	92							
	60	90	42 50/6"	100	58				
	62								
	64	86	24 50/5"	100	63				
	66								
	68	82							
	70	80	20 50/6"	100	68				
	72								
	74	76	27 50/5"	100	73				
	74								

Gray, orange and red-brown, FAT CLAY (CH), very hard, wet

Gray and dark-gray, FAT CLAY (CH), contains mica, very hard, moist

Gray and dark-gray, FAT CLAY (CH), contains mica, very hard, moist

		21.1	
		17.1	
		18.2	
59	34	24.7	98.1
		15.1	

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17CL-12

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-13

PAGE 1 OF 1

STATION: 186+94 **OFFSET:** 27 ft LT
LATITUDE: 38.365467° N **LONGITUDE:** 77.468328° W
SURFACE ELEVATION: 212.5 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/04/2017 - 04/04/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Josh Freeman/SaLUT, Inc.	Logger: Taylor Redmond/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
										GROUND WATER										
										▼ FIRST ENCOUNTERED AT 19.0 ft DEPTH ▼ STABILIZED AT 10.9 ft										
										FIELD DESCRIPTION OF STRATA										
1.25		212	WOH 3								0.0 / 212.5									
			2	90							6" Topsoil								15.7	
1	2	210	2	4		2					0.5 / 212.0									
			2								2.0 / 210.5									
1	4	208	WOH/12"	2	100		4				Brown, fine CLAYEY SAND (SC), contains organic matter, very loose, moist	38	22	22.1	33.5					
			2	40							4.0 / 208.5									
	6	206	2	1		6					Brown, FAT CLAY WITH SAND (CH), soft, moist									22.3
			2								6.0 / 206.5									
2	8	204	WOH/12"	2	90		8				Brown and gray, fine CLAYEY SAND (SC), loose, moist									22.1
			2								8.0 / 204.5									
	10	202	3			10					Brown to gray, SANDY FAT CLAY (CH), soft, moist									21.2
	12	200	4			13					Gray, SANDY FAT CLAY (CH), stiff, moist									
			5																	
	14	198	10	100		15														15.1
			14																	
	16	196																		
											16.5 / 196.0									
	18	194	5			18					White to yellow, fine to coarse CLAYEY SAND (SC), medium dense, wet									22.0
			4	100																
	20		6			20														
			9																	
										Bottom of borehole at 20.0 feet. Boring backfilled with auger cuttings.										

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 17 feet

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17CL-13

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-14

PAGE 1 OF 1

STATION: 175+91 **OFFSET:** 39 ft LT
LATITUDE: 38.362669° N **LONGITUDE:** 77.469802° W
SURFACE ELEVATION: 204.4 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/04/2017 - 04/04/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Taylor Redmond/HDR

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)
 FINES CONTENT -#200 (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 19.0 ft DEPTH
 ▽ STABILIZED AT 10.4 ft

FIELD DESCRIPTION OF STRATA

LL PI

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		204	2						
			1						
0.25	2	202	1						
1.5	5		5						
4	6	200	6						
6	1	198	1						
8	2	196	2						
10	4	194	4						
12	6	192	6						
14	10	190	10						
16	20	188	20						
18	7	186	7						
20	9		9						

0.0 / 204.4
 1" Topsoil

0.1 / 204.3
 Dark brown, ORGANIC CLAY, very soft, moist

2.0 / 202.4
 Brown, FAT CLAY WITH SAND (CH), contains organic material, moist

3.0 / 201.4
 Dark gray, LEAN CLAY (CL), contains organic material, moist

4.0 / 200.4
 Dark gray and brown, fine to coarse CLAYEY SAND (SC), loose, moist
 Brown, fine to medium CLAYEY SAND (SC), very loose, moist

Dark gray, fine to coarse CLAYEY SAND (SC), dense, moist

Brown, medium CLAYEY SAND (SC), medium dense, moist

Bottom of borehole at 20.0 feet.
 Boring backfilled with auger cuttings.

MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
27.7	
23.7	
18.6	
20.2	
22.1	
23.5	
12.3	33.1
12.5	

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 16.8 feet

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17CL-14

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-15

PAGE 1 OF 1

STATION: 154+89
LATITUDE: 38.357515° N
SURFACE ELEVATION: 218.9 ft

OFFSET: 12 ft LT
LONGITUDE: 77.473050° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/18/2017 - 04/18/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY 24 HRS AFTER DRILLING

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	
3	218	2	50					
2	216	4	75					
4	214	3	75					
6	212	4	75					
8	210	1	100					
10	208							
12	206	2						
14	204	1	100					
16	202							
18	200	1	100					
20		1						

0.0 / 218.9
Fill, Brown, fine to coarse CLAYEY SAND (SC), loose, moist

2
Fill, Brown, fine to coarse CLAYEY SAND (SC), medium dense, moist

4
Fill, Brown, fine to coarse CLAYEY SAND (SC), loose, moist

8.0 / 210.9
 Brown, fine to medium CLAYEY SAND (SC), very loose, moist

Bottom of borehole at 20.0 feet.
 Boring backfilled with auger cuttings.

		12.2	
		17.0	
37	19	13.7	39.3
		15.0	
		23.7	
		17.1	
		19.0	

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17CL-15

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-16

PAGE 1 OF 2

STATION: 149+07 **OFFSET:** 25 ft LT
LATITUDE: 38.356208° N **LONGITUDE:** 77.474210° W
SURFACE ELEVATION: 213.1 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/19/2017 - 04/19/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Bill Miller/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 14.0 ft DEPTH
 ▽ STABILIZED AT 15.0 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		212	8	75					
2		210	3	50					
0.25	4	208	2	100					
0.25	6	206	3	100					
1	8	204	2	100					
	10	202							
	12	200							
	14	198							
	16	196							
	18	194							
	20	192							
2	24	190							

0.0 / 213.1 Fill, Brown, SILTY SAND (SM), medium dense, moist			
Fill, Brown, SILTY SAND (SM), loose, moist		7.9	
Fill, Brown, SILTY SAND (SM), contains organic matter, very loose, moist		13.3	
5.5 / 207.6 Brown, LEAN CLAY WITH SAND (CL), firm, moist		24.9	
		16.2	
		17.9	
11.5 / 201.6 Brown, fine to coarse SILTY SAND (SM), very loose, wet		20.3	39.0
		17.4	
23.5 / 189.6 Gray, FAT CLAY (CH), stiff, moist			36.5

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

PAGE 1 OF 2

17CL-16

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-17

PAGE 1 OF 2

STATION: 102+94
LATITUDE: 38.346715° N
SURFACE ELEVATION: 156.9 ft

OFFSET: 5 ft RT
LONGITUDE: 77.484816° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/20/2017 - 04/20/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

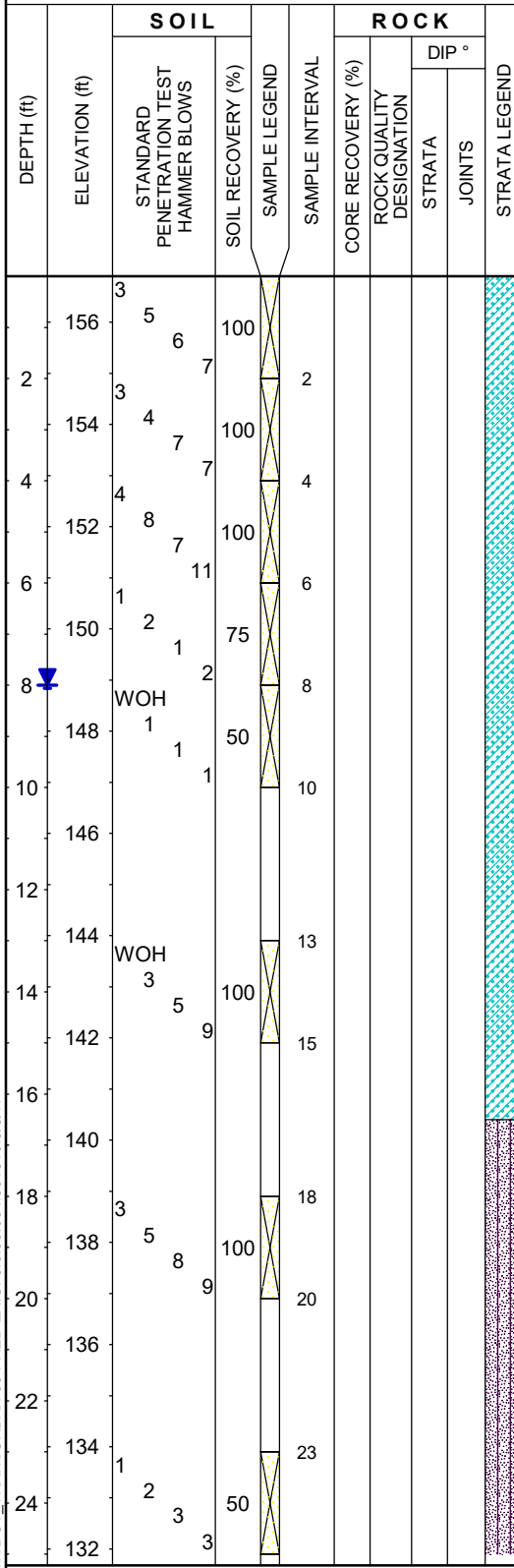
LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
LL	PI		

GROUND WATER

▼ **FIRST ENCOUNTERED AT 8.0 ft DEPTH**
 ▼ **STABILIZED AT 8.0 ft**

FIELD DESCRIPTION OF STRATA

LL	PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)



0.0 / 156.9
 Yellow-brown and gray, fine to coarse CLAYEY SAND (SC), medium dense, moist

		33.4	
--	--	------	--

Yellow-brown and gray, fine to coarse CLAYEY SAND (SC), very loose, moist

		14.9	
--	--	------	--

Yellow-brown and gray, fine to coarse CLAYEY SAND (SC), very loose, wet

43	23	17.6	35.4
----	----	------	------

Yellow-brown and gray, fine to coarse CLAYEY SAND (SC), loose, wet

		21.1	
--	--	------	--

Yellow-brown and gray, fine to coarse CLAYEY SAND (SC), loose, wet

		26.3	
--	--	------	--

16.5 / 140.4

Brown and gray, fine to coarse SILTY SAND (SM), medium dense, wet

		15.5	
--	--	------	--

Brown and gray, fine to coarse SILTY SAND (SM), loose, wet

		24.6	38.9
--	--	------	------

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

PAGE 1 OF 2

17CL-17

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: CULVERT

17CL-17

PAGE 2 OF 2

STATION: 102+94
LATITUDE: 38.346715° N
SURFACE ELEVATION: 156.9 ft

OFFSET: 5 ft RT
LONGITUDE: 77.484816° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/20/2017 - 04/20/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER

▼ FIRST ENCOUNTERED AT 8.0 ft DEPTH
 ▼ STABILIZED AT 8.0 ft

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA
26	130				25				
28	128	18 37 50/5"	100	X	28 29.4				
30	126								
32	124	50/5"	100	X	33 33.4				
34	122	50/2"	100	X	35 35.2				

Brown and gray, fine to coarse SILTY SAND (SM), wet
 28.5 / 128.4

White and gray, fine to coarse WELL GRADED SAND WITH GRAVEL (SW), very dense, dry

35.0 / 121.9
 White and gray, fine to coarse POORLY GRADED GRAVEL (GP), very dense, dry

Auger refusal at 35.0 feet.
 Bottom of borehole at 35.2 feet.
 Boring backfilled with auger cuttings.

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

PAGE 2 OF 2

17CL-17

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: HPN RAMP

17HPN-01
PAGE 1 OF 1

STATION: 115+07 **OFFSET:** 66 ft RT
LATITUDE: 38.349051° N **LONGITUDE:** 77.481811° W
SURFACE ELEVATION: 202.2 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 06/28/2017 - 06/28/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Kohltan Heiter, EIT/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
		202									GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN									
											FIELD DESCRIPTION OF STRATA				LL	PI				
											0.0 / 202.2									
											6" Asphalt									
	2	200.4	4		2						0.5 / 201.7									
			4		15						10" Aggregate Subbase									
	4	198.3	4		4						1.3 / 200.9							8.5		
			7		3						Fill, Brown and gray, fine to coarse CLAYEY SAND (SC), contain asphalt rubble, contains mica, loose, dry									
	4	196.2	7		4						4.0 / 198.2									
			8		100						Light blue-gray, FAT CLAY (CH), contains mica, stiff, dry	62	37	27.4	88.7					
	2.5	196.2	8		13						Light blue-gray to gray and brown, FAT CLAY (CH), friable, contains mica, stiff, dry									
	4.5	194.4	9		7						Gray and brown, FAT CLAY (CH), contains mica, stiff, dry							23.3		
	4.5	194.4	7		8						Gray and brown, FAT CLAY (CH), contains mica, stiff, dry							26.6		
			8		100						Gray and brown, FAT CLAY (CH), contains slickensides, contains mica, very stiff, dry									
	4.5	192.6	8		10							55	31	24.8	95.3					
			12		100															
	12		13		12						Bottom of borehole at 12.0 feet. Boring backfilled with pea gravel and concrete.									

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 6.5 feet

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17HPN-01

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: HPN RAMP

17HPN-03
PAGE 1 OF 1

STATION: 109+07 **OFFSET:** 60 ft RT
LATITUDE: 38.347841° N **LONGITUDE:** 77.483209° W
SURFACE ELEVATION: 188.2 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA					
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA						JOINTS
										GROUND WATER					
										NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN					
										FIELD DESCRIPTION OF STRATA		LL	PI		
		188								0.0 / 188.2					
										5.5" Asphalt					
										0.5 / 187.7					
										11.5" Aggregate Subbase					
3.5	2	186	3		2					1.4 / 186.8					
			7							Fill, Brown and gray, fine to medium CLAYEY SAND (SC), contains mica, medium dense, dry			8.8		
			10												
2.5	4	184	4		4					1.4 / 186.8					
			5							Fill, Gray to dark gray, fine to medium CLAYEY SAND (SC), contains a pocket of quartz gravel from 4.5 to 4.7 ft bgs, contains mica, loose, dry			10.3		
			4												
0.5	6	182	WOH		6					6.0 / 182.2					
			1							Dark gray and brown, SANDY LEAN CLAY (CL), contains mica, soft, moist	46	29	23.9	51.6	
			1												
0.75	8	180	WOH		8					8.0 / 180.2					
			2							Dark gray and brown, FAT CLAY (CH), contains mica, firm, moist			20.0		
			3												
			4												
1	10	178	1		10										
			3												
			5										23.0		
			5												
	12				12										
										Bottom of borehole at 12.0 feet. Boring backfilled with pea gravel and concrete.					

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 3 feet

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17HPN-03

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17HPN-04**
LOCATION: Stafford County, Virginia
STRUCTURE: HPN RAMP **PAGE 1 OF 1**

STATION: 103+09 **OFFSET:** 56 ft RT
LATITUDE: 38.346623° N **LONGITUDE:** 77.484616° W
SURFACE ELEVATION: 175.8 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA		
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA				
<p>Date(s) Drilled: 06/28/2017 - 06/28/2017 Drilling Method(s): 2.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Will Riddick/GET Solutions, Inc Logger: Kohltan Heiter, EIT/HDR</p>													
<p align="center">GROUND WATER</p> <p align="center">NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p>													
<p align="center">FIELD DESCRIPTION OF STRATA</p>											LL	PI	
2.5	2	174	3			2							
			4										
1.5	4	172	5	85		4							
			4										
			6	50		6					53	38	27.2
1.25	6	170	6			6							
			8										
			11	65		7.5							
1.75	8	168	5			8							8.8
			2										11.3
2.5	7	166	7	100		9							11.3
			7										11.3
2	10	166	6			10					68	46	21.2
			2										21.2
			4	75									13.4
			8										13.4
			8			12							
		164	8										

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 6.5 feet

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17HPN-04

SPT_LOGAW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: HPN RAMP

17HPN-05
PAGE 1 OF 1

STATION: 97+13 **OFFSET:** 56 ft RT
LATITUDE: 38.345413° N **LONGITUDE:** 77.486015° W
SURFACE ELEVATION: 181.2 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA			
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA					
<p>Date(s) Drilled: 06/28/2017 - 06/28/2017 Drilling Method(s): 2.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Will Riddick/GET Solutions, Inc Logger: Kohltan Heiter, EIT/HDR</p> <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p> <p>FIELD DESCRIPTION OF STRATA</p>														
											LL	PI		
		180												
2	5	180	2											
3.5	4	178	5	75									13.8	
3.5	3	176	7	75									12.5	
2.5	6	174	3	65									17.0	
1.5	8	172	2	75									20	8
2.5	10	170	2	75									15.3	54.0
	4	170	13	85									15.0	
12	13	170	13	85										

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 8 feet

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17HPN-05

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



STATION: 91+13 **OFFSET:** 57 ft RT
LATITUDE: 38.344193° N **LONGITUDE:** 77.487422° W
SURFACE ELEVATION: 201.7 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 06/27/2017 - 06/27/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Kohltan Heiter, EIT/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN									
											FIELD DESCRIPTION OF STRATA				LL	PI				
3.5	2	200	3			2					0.0 / 201.7	5.8" Asphalt								
			5								0.5 / 201.2	12.3" Aggregate Subbase								
2.5	4	198	6	85		4					1.5 / 200.2	Fill Brown to gray, SANDY FAT CLAY (CH), contains mica, stiff, moist						13.2		
			2								4.0 / 197.7	Fill, Dark gray and brown, CLAYEY SAND (SC), contains pocket of asphalt rubble from 5.7 to 6.0 ft bgs, contains mica, stiff, moist	30	16	14.9	31.1				
6	6	196	6	75		6					6.0 / 195.7	Fill, Dark gray, fine to medium CLAYEY SAND (SC), contains mica, loose, dry								
1.75	8	194	5	40		7.5					7.5 / 194.2	Light gray and brown, SANDY FAT CLAY (CH), contains mica, stiff, moist	59	41	26.0	52.8				
1.25	10	192	9	20		8					10.0 / 191.7	Dark brown and brown, fine to medium CLAYEY SAND (SC), contains mica, medium dense, moist								
			3			10					Bottom of borehole at 12.0 feet. Boring backfilled with pea gravel and concrete.									
	12	190	4	40		12														

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: HRS FLYOVER

17HRS-05

PAGE 1 OF 2

STATION: 773+59 **OFFSET:** 168 ft LT
LATITUDE: 38.505755° N **LONGITUDE:** 77.379216° W
SURFACE ELEVATION: 135.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 07/13/2017 - 07/13/2017

LAB DATA

Drilling Method(s): Mud Rotary w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Will Riddick/GET Solutions, Inc
 Logger: Taylor Redmond/HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 24 HRS

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		134	4	35					
2	2	132	3	95					
4	4	130	4	7					
6	6	128	3	40					
8	8	126	2	50					
10	10	124	2	9					
12	12	122	1	80					
14	14	120	3	11					
16	16	118	5	100					
18	18	116	3	7					
20	20	114	5	9					
22	22	112	3	100					
24	24		7	13					

0.0 / 135.5
 6" Topsoil
 0.5 / 135.0
 Light brown to dark brown, fine to coarse CLAYEY SAND (SC), loose, moist
 Gray, fine to medium CLAYEY SAND (SC), contains organic matter, loose, moist
 Dark brown, fine to coarse CLAYEY SAND (SC), medium dense, moist
 Gray, fine to medium CLAYEY SAND (SC), loose, moist
 11.5 / 124.0
 Red and gray, mottled, FAT CLAY (CH), stiff, moist
 Red and gray, mottled, FAT CLAY (CH), very stiff, moist

		14.4	
		18.0	19.9
		16.7	
		20.3	
		20.1	
		30.3	
		30.9	
64	42	32.2	

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 22.5 feet

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17HRS-05

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: HRS FLYOVER

17HRS-05

PAGE 2 OF 2

STATION: 773+59 **OFFSET:** 168 ft LT
LATITUDE: 38.505755° N **LONGITUDE:** 77.379216° W
SURFACE ELEVATION: 135.5 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA					
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				FIELD DESCRIPTION OF STRATA	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA						JOINTS
3	26	110													
	28	108	6		X	28									
	30	106	10 12 16		X	30									
	32	104													
	34	102	10 22 26 34		X	33 35									
	36	100													
	38	98	8		X	38									
	40	96	23 30 31		X	40									
										GROUND WATER					
										NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS					
										FIELD DESCRIPTION OF STRATA		LL		PI	
										31.5 / 104.0					
										Light yellow-brown, fine CLAYEY SAND (SC), contains graphitic inclusions, dense, moist				21.2	
										Gray, fine CLAYEY SAND (SC), very dense, moist				25.2	
										Bottom of borehole at 40.0 feet. Boring backfilled with hole plug and bentonite.					

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 22.5 feet

PAGE 2 OF 2

17HRS-05

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: HRS FLYOVER

17HRS-06

PAGE 1 OF 1

STATION: 771+44 **OFFSET:** 150 ft LT
LATITUDE: 38.505172° N **LONGITUDE:** 77.379340° W
SURFACE ELEVATION: 130.2 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 06/29/2017 - 06/29/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Kohltan Heiter, EIT/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
		130									GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN									
											FIELD DESCRIPTION OF STRATA				LL	PI				
											0.0 / 130.2 11.8" Asphalt									
	2	128.7	14	80		2					1.0 / 129.2 1.3" Aggregate Subbase									
	2.5	126.2	14	85		4					1.1 / 129.1 Fill, Brown, fine to medium CLAYEY SAND (SC), contains mica, medium dense, moist							10.4	16.2	
	4.5	124.2	2	5		6					4.0 / 126.2 Gray, FAT CLAY (CH), contains mica, firm, moist							23.9		
	4	122.3	4	100		8					Gray, FAT CLAY (CH), contains mica, stiff, dry							19.0		
	4.5	120.4	8	100		10										62	41	22.5		
	12	120.4	4	85		12												19.6		
											Bottom of borehole at 12.0 feet. Boring backfilled with pea gravel and concrete.									

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 7 feet

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17HRS-06

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: HRS FLYOVER

17HRS-12

PAGE 1 OF 1

STATION: 754+55 **OFFSET:** 6 ft LT
LATITUDE: 38.500602° N **LONGITUDE:** 77.380406° W
SURFACE ELEVATION: 152.7 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK					STRATA LEGEND	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA					
										GROUND WATER				
										NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN				
										FIELD DESCRIPTION OF STRATA				
											LL	PI		
		152												
	2	150	9											
	4	148	8	100									18.5	30.4
	6	146	8	9									11.2	
	8	144	2	75									40	25
	10	142	4	75									21.1	48.2
	12		4	75									15.3	
			4	75									15.3	
			6	8										
										Bottom of borehole at 12.0 feet. Boring backfilled with pea gravel and concrete.				

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 6.5 feet

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17HRS-12

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: HRS FLYOVER

17HRS-14

PAGE 1 OF 1

STATION: 749+04
LATITUDE: 38.499184° N
SURFACE ELEVATION: 164.6 ft

OFFSET: 7 ft LT
LONGITUDE: 77.381069° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/29/2017 - 06/29/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Will Riddick/GET Solutions, Inc
Logger: Taylor Redmond/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND			
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °		STRATA	JOINTS	
0	164											
2	162	8	75		2							
4	160	17 50/4"	100		4							
6	158	32 12 22	50		5							
7					7							

0.0 / 164.6
 3.8" Asphalt
 0.3 / 164.3
 15" Aggregate Subbase
 1.6 / 163.0
 Dark gray and brown, fine to coarse CLAYEY SAND (SC), medium dense, moist
 Light gray to white, medium to coarse CLAYEY SAND WITH GRAVEL (SC), very dense, moist
 5.0 / 159.6
 Gray, coarse POORLY GRADED GRAVEL WITH SAND (GP), dense, moist
 Bottom of borehole at 7.0 feet.
 Boring backfilled with pea gravel and concrete.

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 6 feet

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17HRS-14

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: HRS FLYOVER

17HRS-16

PAGE 1 OF 1

STATION: 743+03
LATITUDE: 38.497668° N
SURFACE ELEVATION: 166.2 ft

OFFSET: 7 ft LT
LONGITUDE: 77.381893° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/29/2017 - 06/29/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Will Riddick/GET Solutions, Inc
Logger: Taylor Redmond/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND			
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °		STRATA	JOINTS	
0	166											
2	164.8	12	95		2							
4	162.2	7	90		4							
6	160.3	6	100		6							
8	158.4	7	95		8							
10	156.8	10	95		10							
12	156	9	95		12							

0.0 / 166.2
 5" Asphalt
 0.4 / 165.8
 18" Aggregate Subbase
 1.9 / 164.3
 Light brown and gray, fine to coarse CLAYEY SAND (SC), medium dense, moist
 Light brown and gray, fine to coarse CLAYEY SAND (SC), loose, moist
 Light brown and gray, fine to coarse CLAYEY SAND (SC), medium dense, moist
 Light brown, fine to coarse CLAYEY SAND WITH GRAVEL (SC), medium dense, moist

Bottom of borehole at 12.0 feet.
 Boring backfilled with pea gravel and concrete.

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 7.1 feet

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17HRS-16

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/17



STATION: 767+87 OFFSET: 172 ft LT
 LATITUDE: 38.504235° N LONGITUDE: 77.379722° W
 SURFACE ELEVATION: 116.1 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA												
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 07/12/2017 - 07/12/2017	Drilling Method(s): Mud Rotary w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Kohltan Heiter, EIT/HDR	GROUND WATER FIRST ENCOUNTERED AT 6.0 ft DEPTH	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA													JOINTS
	25																					
	26	90																				
1	28	88	4																			
			8																			
			14																			
	30	86																				
			23																			
1.5	32	84																				
			17																			
	34	82																				
			21																			
			36																			
			50/5"																			
	36	80																				
2	38	78																				
			13																			
			21																			
	40	76																				
			32																			
			28																			
	42	74																				
2	44	72																				
			11																			
			18																			
			28																			
			35																			
	45																					
Bottom of borehole at 45.0 feet. Boring backfilled with hole plug and bentonite.																						

REMARKS: Rig Type: CME 55 ATV Track Rig.

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 767+87 OFFSET: 172 ft LT
 LATITUDE: 38.504235° N LONGITUDE: 77.379722° W
 SURFACE ELEVATION: 116.1 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 07/12/2017 - 07/12/2017	Drilling Method(s): Mud Rotary w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Kohltan Heiter, EIT/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											JOINTS
										GROUND WATER										
										NOT ENCOUNTERED DURING DRILLING										
										FIELD DESCRIPTION OF STRATA							LL	PI		
	2	114									0.0 / 116.1 Boring advanced to a depth of 48.0 feet using mud rotary techniques									
	4	112																		
	6	110																		
	8	108																		
	10	106																		
	12	104																		
	14	102																		
	16	100																		
	18	98																		
	20	96																		
	22	94																		
	24	92																		

REMARKS: Rig Type: CME 55 ATV Track Rig.

SPT_LOGAW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/17



STATION: 767+87 OFFSET: 172 ft LT
 LATITUDE: 38.504235° N LONGITUDE: 77.379722° W
 SURFACE ELEVATION: 116.1 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 07/12/2017 - 07/12/2017
 Drilling Method(s): Mud Rotary w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Will Riddick/GET Solutions, Inc
 Logger: Kohltan Heiter, EIT/HDR

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING

FIELD DESCRIPTION OF STRATA

LL PI

Boring advanced to a depth of 48.0 feet using mud rotary techniques

48.0 / 68.1
 Blue-gray, fine to coarse CLAYEY SAND (SC), contains mica, very dense, moist

18.5

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK						
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	DIP °
1.5	48	68	12	100		48					
	26	90	22								
	28	88	29								
	30	86	29								
	32	84									
	34	82									
	36	80									
	38	78									
	40	76									
	42	74									
	44	72									
	46	70									
	48	68									
	50										

REMARKS: Rig Type: CME 55 ATV Track Rig.

SPT_LOGAW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/8/17



STATION: 767+87 OFFSET: 172 ft LT
 LATITUDE: 38.504235° N LONGITUDE: 77.379722° W
 SURFACE ELEVATION: 116.1 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA			
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				FIELD DESCRIPTION OF STRATA	LL	PI	MOISTURE CONTENT (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA				
	52	64	50/4"	100	X	53							
	54	62				53.3							23.3
	56	60											
<p>GROUND WATER NOT ENCOUNTERED DURING DRILLING</p>													
<p>FIELD DESCRIPTION OF STRATA</p>													
<p>51.5 / 64.6</p> <p>Dark gray, LEAN CLAY (CL), foliated, contains mica, very hard, dry</p>												23.3	
<p>Auger refusal at 57.0 feet. Bottom of borehole at 57.0 feet. Boring backfilled with hole plug and bentonite.</p>													

REMARKS: Rig Type: CME 55 ATV Track Rig.

SPT_LOGAW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/17



STATION: 763+77 **OFFSET:** 55 ft LT
LATITUDE: 38.503064° N **LONGITUDE:** 77.379677° W
SURFACE ELEVATION: 113.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 07/10/2017 - 07/10/2017

LAB DATA

Drilling Method(s): Mud Rotary w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Will Riddick/GET Solutions, Inc
 Logger: Kohltan Heiter, EIT/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 48.0 ft DEPTH
 ▽ STABILIZED AT 3.5 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
			WOH						
	1	112	2	90					
	2.5	110	2	3					
	3	108	4	100					
	3.5	106	7	9					
	4.5	104	3	100					
	10	102	5	100					
	14	98	11	100					
	16	96	32	20					
	18	94	5	100					
	20	92	10	13					
	22	90	18	20					
	24	88	9	9					

0.0 / 113.0	Light gray and orange, mottled, SANDY FAT CLAY (CH), contains organic material, contains mica, soft, moist			
	Light gray and brown, mottled, SANDY FAT CLAY (CH), contains mica, stiff, moist		35.9	
	Gray and orange, mottled, FAT CLAY WITH SAND (CH), contains mica, stiff, dry		30.3	
	Red-brown and gray, mottled, FAT CLAY WITH SAND (CH), contains mica, stiff, dry		29.3	
	Blue-gray, SANDY FAT CLAY (CH), contains mica, very stiff, dry		26.8	
			24.5	
11.5 / 101.5	Blue-gray, SANDY LEAN CLAY (CL), contains mica, hard, dry	33	18	15.5 53.0
	Blue-gray, SANDY LEAN CLAY (CL), contains mica, very stiff, dry		26.5	
21.5 / 91.5	Blue-gray, fine CLAYEY SAND (SC), contains mica, medium dense, moist		24.7	25.3

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 11.5 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/9/17



STATION: 769+99 **OFFSET:** 223 ft LT
LATITUDE: 38.504835° N **LONGITUDE:** 77.379711° W
SURFACE ELEVATION: 136.7 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA					
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK					FIELD DESCRIPTION OF STRATA	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °						STRATA
										GROUND WATER					
										NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS					
										FIELD DESCRIPTION OF STRATA					
1.5		136	2	95						0.0 / 136.7 6" Topsoil					
	2	134	3	50						0.5 / 136.2 Gray and brown, SANDY LEAN CLAY (CL), contains organic material, firm, moist			28.6		
	3.5	132	4	75						2.0 / 134.7 Brown and gray, mottled, fine CLAYEY SAND (SC), contains organic material, medium dense, moist			24.5		
	4.5	130	6	100						4.0 / 132.7 Gray and red, LEAN CLAY (CL), very stiff, moist			18.0		
	8	128	8	100						Gray and red-brown, LEAN CLAY WITH SAND (CL), very stiff, moist	48	26	22.5	82.5	
	10	126	10	100						8.0 / 128.7 Gray and red-brown, fine CLAYEY SAND (SC), medium dense, moist			20.9		
	14	122	14	100						Gray, brown and light red, fine CLAYEY SAND (SC), medium dense, moist			20.9		
	16	120	16	100						16.5 / 120.2					
	18	118	18	100						Gray and red, FAT CLAY (CH), very stiff, moist	63	36	27.9		
	22	114	22	100						21.5 / 115.2					
	24	112	24	100						Brown, fine CLAYEY SAND (SC), medium dense, moist			17.5		

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 15.5 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 769+99 OFFSET: 223 ft LT
 LATITUDE: 38.504835° N LONGITUDE: 77.379711° W
 SURFACE ELEVATION: 136.7 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				FIELD DESCRIPTION OF STRATA	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA					
	26	110												
	28	108	10	14	16	29	100							27.7
	30	106												
	32	104	13	31	22	40	100							21.0
	34	102												
	36	100												
	38	98	18	26	29	45	100							21.6
	40	96												
	42	94	9	23	32	50/6"	100							20.8
	44	92												20.0
	46	90												
	48	88	13	22	32	49	100							23.6
	50													

Date(s) Drilled: 07/13/2017 - 07/13/2017
 Drilling Method(s): Mud Rotary w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Will Riddick/GET Solutions, Inc
 Logger: Taylor Redmond/HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 24 HRS

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 15.5 feet



STATION: 769+99 OFFSET: 223 ft LT
 LATITUDE: 38.504835° N LONGITUDE: 77.379711° W
 SURFACE ELEVATION: 136.7 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA						
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 07/13/2017 - 07/13/2017 Drilling Method(s): Mud Rotary w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Will Riddick/GET Solutions, Inc Logger: Taylor Redmond/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °							STRATA
GROUND WATER											LL	PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)		
NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS																
FIELD DESCRIPTION OF STRATA											LL	PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)		
	86				50											
	52	84	14													
	54		31 50/6"	100	53 54.5									21.1		
Bottom of borehole at 54.5 feet. Boring backfilled with hole plug and bentonite.																

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 15.5 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 760+40 OFFSET: 43 ft LT
 LATITUDE: 38.502164° N LONGITUDE: 77.379934° W
 SURFACE ELEVATION: 125.5 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 07/10/2017 - 07/11/2017
 Drilling Method(s): Mud Rotary w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Will Riddick/GET Solutions, Inc
 Logger: Kohltan Heiter, EIT/HDR

LAB DATA

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 24 HRS

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
			WOH/18"						
1.5		124	3	55					
2.5	2	122	5	100					
2.5	4	120	3	90					
2.5	6	118	2	100					
2	8	116	5	100					
	10	114	7	100					
2.75	12	112	3	100					
	14	110	5	100					
	16	108	8	100					
2.75	18	106	3	100					
	20	104	5	100					
	22	102	8	100					
3.75	24	100	7	100					

0.0 / 125.5
 Light gray and orange, mottled, FAT CLAY (CH), contains organic material, very soft, moist

Gray and orange, mottled, FAT CLAY (CH), stiff, moist

Light gray and red, mottled, FAT CLAY (CH), stiff, dry

Light gray and red, mottled, FAT CLAY (CH), firm, dry

Gray, FAT CLAY (CH), stiff, dry

Red and gray, mottled, FAT CLAY (CH), stiff, dry

Gray, FAT CLAY (CH), contains mica, very stiff, moist

		36.2	
		31.2	
		31.1	
		34.9	
		29.2	
		26.4	
68	49	30.7	96.7
		22.9	

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 7.5 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 760+40 OFFSET: 43 ft LT
 LATITUDE: 38.502164° N LONGITUDE: 77.379934° W
 SURFACE ELEVATION: 125.5 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				FIELD DESCRIPTION OF STRATA	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA					
4	28	98	7	100										
	30	96	11	100										
4	34	92	9	100										
	40	86	15	100										
4	38	88	6	100										
	42	84	11	100										
1.5	44	82	8	100										
	48	78	13	100										
2	48	78	11	100										
	50	76	16	100										

Date(s) Drilled: 07/10/2017 - 07/11/2017
 Drilling Method(s): Mud Rotary w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Will Riddick/GET Solutions, Inc
 Logger: Kohltan Heiter, EIT/HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 24 HRS

FIELD DESCRIPTION OF STRATA

Blue-gray, FAT CLAY (CH), contains mica, very stiff, dry

Light blue-gray, FAT CLAY WITH SAND (CH), contains mica, very stiff, dry

Light blue-gray, FAT CLAY WITH SAND (CH), contains mica, very stiff, dry

41.5 / 84.0

Light blue-gray, fine to medium CLAYEY SAND (SC), contains mica, dense, moist

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		21.5	
		22.6	
53	29	22.7	72.6
		26.6	
		25.4	

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 7.5 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 757+90 OFFSET: 38 ft LT
 LATITUDE: 38.501505° N LONGITUDE: 77.380157° W
 SURFACE ELEVATION: 137.1 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		SAMPLE INTERVAL	ROCK			STRATA LEGEND	LAB DATA				
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)		CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA		JOINTS	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
<p>Date(s) Drilled: 07/11/2017 - 07/11/2017 Drilling Method(s): Mud Rotary w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Will Riddick/GET Solutions, Inc Logger: Kohltan Heiter, EIT/HDR</p>										<p>GROUND WATER ▽ FIRST ENCOUNTERED AT 13.0 ft DEPTH ▽ STABILIZED AT 10.3 ft</p>				
FIELD DESCRIPTION OF STRATA										LL	PI			
1.5		2								0.0 / 137.1				
		136	2	75	1.5					Brown and gray orange, mottled, FAT CLAY WITH SAND (CH), contains organics, soft, moist			28.9	
2		2	2		2					1.5 / 135.6				
		134	2	65						Light gray and orange, stratified, fine to medium CLAYEY SAND (SC), loose, dry			13.7	
4		4	3		4					Light gray and orange, stratified, fine to medium CLAYEY SAND (SC), medium dense, dry			21.4	29.0
		132	4	85	6					Light gray and orange, stratified, fine to medium CLAYEY SAND (SC), contains a pocket of clay from 6.5 to 6.8 ft bgs, medium dense, dry			25.1	
6		6	4		7					Light gray and orange, stratified, fine to coarse CLAYEY SAND (SC), medium dense, moist			21.0	
		128	6	85	7									
10		10	7		8									
		126	9		9									
12		12	6		11									
		124	7		11									
14		14	6		13					Light gray and orange, stratified, fine to medium CLAYEY SAND (SC), medium dense, wet			23.5	
		122	7		13									
16		16	8		15									
		120	8		15					16.5 / 120.6				
4		18	4		18					Gray and red-brown, mottled, FAT CLAY (CH), very stiff, dry			30.5	
		118	6		18									
20		20	10		20									
		116	12		20									
22		22	5		23									
		114	7		23									
4.5		4.5	13		23									
		112	17		23									
24		24	17		23									
		110			23									
		108			23									
		106			23									
		104			23									
		102			23									
		100			23									
		98			23									
		96			23									
		94			23									
		92			23									
		90			23									
		88			23									
		86			23									
		84			23									
		82			23									
		80			23									
		78			23									
		76			23									
		74			23									
		72			23									
		70			23									
		68			23									
		66			23									
		64			23									
		62			23									
		60			23									
		58			23									
		56			23									
		54			23									
		52			23									
		50			23									
		48			23									
		46			23									
		44			23									
		42			23									
		40			23									
		38			23									
		36			23									
		34			23									
		32			23									
		30			23									
		28			23									
		26			23									
		24			23									
		22			23									
		20			23									
		18			23									
		16			23									
		14			23									
		12			23									
		10			23									
		8			23									
		6			23									
		4			23									
		2			23									

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 16 feet



STATION: 146+76 **OFFSET:** 224 ft RT
LATITUDE: 38.355288° N **LONGITUDE:** 77.473975° W
SURFACE ELEVATION: 213.3 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 05/02/2017 - 05/02/2017	Drilling Method(s): Mud Rotary w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Thomas Williams/S&ME, Inc.	Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											FIELD DESCRIPTION OF STRATA				LL	PI				
											0.0 / 213.3	2" Topsoil and Root Mat								
											0.2 / 213.1	Brown-tan, SILT (ML), contains root fragments, soft, moist						14.0		
											2.6 / 210.7	Brown-gray, fine CLAYEY SAND (SC), dry						15.2		
												Brown and gray, mottled, fine to medium CLAYEY SAND (SC), loose, wet						11.6		
												Brown and gray, mottled, medium to coarse CLAYEY SAND (SC), medium dense, wet						21.8		
																		23.2		
												Gray-white, fine to medium CLAYEY SAND (SC), medium dense, wet						20.1		
												Brown-tan, medium to coarse CLAYEY SAND (SC), medium dense, wet						22.0		
												21.5 / 191.8								
												Blue-gray, SANDY LEAN CLAY (CL), stiff, moist						22.6		

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 20.7 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17HWN-01**
LOCATION: Stafford County, Virginia
STRUCTURE: RAMP HWN **PAGE 3 OF 3**

STATION: 146+76 **OFFSET:** 224 ft RT
LATITUDE: 38.355288° N **LONGITUDE:** 77.473975° W
SURFACE ELEVATION: 213.3 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA									
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 05/02/2017 - 05/02/2017	Drilling Method(s): Mud Rotary w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Thomas Williams/S&ME, Inc.	Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
	52	162	12			50														
	54	160	20	48	67	53	54.8												22.3	
	56	158																		
	58	156	10	17		58														
	60	154	18	49	100	60													22.7	
											FIELD DESCRIPTION OF STRATA				LL	PI				
											Blue-gray, fine to coarse CLAYEY SAND (SC), very dense, wet									
											Blue-gray, fine to coarse CLAYEY SAND (SC), dense, wet									
											Bottom of borehole at 60.0 feet. Boring backfilled with auger cuttings and hole plug.									

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 20.7 feet **PAGE 3 OF 3**
17HWN-01

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17HWN-02**
LOCATION: Stafford County, Virginia
STRUCTURE: RAMP HWN **PAGE 1 OF 1**

STATION: 142+95 **OFFSET:** 144 ft RT
LATITUDE: 38.354575° N **LONGITUDE:** 77.475013° W
SURFACE ELEVATION: 241.1 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK					STRATA LEGEND	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS					
<p>Date(s) Drilled: 05/01/2017 - 05/01/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Thomas Williams/S&ME, Inc. Logger: Russell Kanith/HDR</p>										<p>GROUND WATER NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS</p>				
<p>FIELD DESCRIPTION OF STRATA</p>										LL	PI			
1		240	1	85						0.0 / 241.1				
			2							3" Topsoil and Root Mat			14.3	
1	2		3		2					0.3 / 240.8				
			4							Brown, LEAN CLAY (CL), soft, moist				
		238	6	100						2.5 / 238.6			17.7	
4	4		10		4					Red-brown and orange, CLAYEY SAND (SC), medium dense, moist				
			11							5.0 / 236.1				
4	4	236	11	100	5					Red-brown, brown and gray, mottled, SANDY LEAN CLAY (CL), very stiff, moist			23.3	
3.75	6		11		6						41	23	15.9	70.0
		234	14	100										
3.5	8		12		8									
			13										22.5	
		232	12	100										
10			13		10									
		230												
			14							11.5 / 229.6				
12			14							Gray, brown and red, mottled, CLAYEY SAND (SC), medium dense, dry			13.5	
		228	14	100	13									
14			14											
		226	14		15									
16														
		224												
18			18											
			18											
		222	7	100	18								14.1	20.3
			6											
20			7		20									
										Bottom of borehole at 20.0 feet. Bulk sample collected from 0.0 to 13.0 feet bgs. Boring backfilled with auger cuttings.				

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GFJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17HWN-04**
LOCATION: Stafford County, Virginia
STRUCTURE: RAMP HWN **PAGE 1 OF 1**

STATION: 130+97 **OFFSET:** 76 ft RT
LATITUDE: 38.352194° N **LONGITUDE:** 77.477948° W
SURFACE ELEVATION: 233.5 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA			
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA					
<p>GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p> <p>FIELD DESCRIPTION OF STRATA</p> <p>0.0 / 233.5 9" Asphalt</p> <p>0.8 / 232.7 3" Aggregate Subbase</p> <p>1.0 / 232.5 Fill, Brown, fine to coarse POORLY GRADED SAND (SP), contains mica, moist</p> <p>2.2 / 231.3 Light gray and orange, fine to medium CLAYEY SAND (SC), moist</p> <p>3.0 / 230.5 Light gray and orange, mottled, SANDY LEAN CLAY (CL), contains mica, very stiff, moist</p> <p>5.0 / 228.5 Brown and light-gray, mottled, FAT CLAY WITH SAND (CH), contains mica, stiff, moist</p> <p>Bottom of borehole at 11.0 feet. Bulk sample collected from 1.0 to 7.0 feet bgs. Boring backfilled with pea gravel and concrete.</p>											LL	PI		
3.5	2	232	10	80	1									
2.5	2	230	10	5	2.2									
4	4	230	6	12	3									
2.75	4	228	9	7	5									
6	6	228	4	6	100									
3.25	6	226	2	6	7									
8	8	226	5	6	85									
3.75	8	224	3	8	9									
10	10	224	5	6	90									
			6	8	11									

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 4.5 feet

PAGE 1 OF 1
17HWN-04

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8_30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RAMP HWN

17HWN-05

PAGE 1 OF 1

STATION: 124+93
LATITUDE: 38.350961° N
SURFACE ELEVATION: 225.3 ft

OFFSET: 80 ft RT
LONGITUDE: 77.479357° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/15/2017 - 05/15/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Will Riddick/GET Solutions, Inc
Logger: Kohlтан Heiter, EIT/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 6.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
2	224	10	80		2				
4	222	16	17		4				
6	220	9	5		5.5				
8	218	2	2		8				
10	216	1	2		10				
12	214	2	1		12				

0.0 / 225.3
 6.5" Asphalt
 0.5 / 224.8
 11.5" Aggregate Subbase
 1.5 / 223.8
Fill, Brown, fine to coarse POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, dense, dry
Fill, Brown, fine to coarse POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, medium dense, dry
 5.5 / 219.8
 Orange-brown, fine to coarse CLAYEY SAND (SC), contains mica, moist
 Orange and light gray, fine to coarse CLAYEY SAND (SC), contains mica, loose, wet
 Orange and light gray, fine to coarse CLAYEY SAND (SC), contains mica, very loose, wet
 Orange and light gray, fine to coarse CLAYEY SAND (SC), contains lens of fat clay 11.5 to 11.7 feet bgs, contains mica, very loose, wet
 Bottom of borehole at 12.0 feet.
 Boring backfilled with pea gravel and concrete.

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 8 feet

PAGE 1 OF 1

17HWN-05

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: NSS RAMP

17NSS-03
PAGE 1 OF 1

STATION: 757+90 **OFFSET:** 104 ft LT
LATITUDE: 38.501556° N **LONGITUDE:** 77.380380° W
SURFACE ELEVATION: 133.4 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		SAMPLE INTERVAL	ROCK			STRATA LEGEND	Date(s) Drilled: 05/08/2017 - 05/08/2017 Drilling Method(s): 2.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: James T./SaLUT, Inc. Logger: Taylor Redmond/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)		ROCK RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °						
										GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN				
										FIELD DESCRIPTION OF STRATA	LL	PI		
		12	16	67	0.5					0.0 / 133.4				
	2	132	18	7	2					4.5" Asphalt			8.9	
		130	8	12						0.4 / 133.0				
	4	130	12	4	4					11" Aggregate Subbase				
		128	5	5	5					0.5 / 132.9			9.3	19.1
1.5	6	128	5	7	6					Fill, Brown to gray, fine CLAYEY SAND (SC), moist			24.9	
		126	3	3	6					Fill, Gray, fine to medium CLAYEY SAND (SC), contains asphalt fragments, medium dense, moist			21.9	
	8	126	5	6	8					4.0 / 129.4				
		124	2	3	10					White to brown, fine to medium CLAYEY SAND (SC), moist			19.1	
	10	124	3	4	10					5.0 / 128.4				
										Gray, SANDY FAT CLAY WITH GRAVEL (CH), moist			17.3	
										6.0 / 127.4				
										Dark gray, fine CLAYEY SAND (SC), loose, moist				
										Light gray, fine CLAYEY SAND (SC), loose, moist				
										Bottom of borehole at 10.0 feet. Boring backfilled with concrete.				

REMARKS: Rig Type: Mobile Drill B57 Truck Rig. Cave-in Depth at 2 feet

PAGE 1 OF 1
17NSS-03

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: NSS RAMP

17NSS-05
PAGE 1 OF 1

STATION: 751+81 **OFFSET:** 108 ft LT
LATITUDE: 38.499988° N **LONGITUDE:** 77.381058° W
SURFACE ELEVATION: 151.0 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA			
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA					
<p>GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p> <p>FIELD DESCRIPTION OF STRATA</p>											LL	PI		
		150	WOH 9		0.7					0.0 / 151.0 5" Asphalt				
2		148	10	40	2.7					0.4 / 150.6 3" Aggregate Subbase			6.0	18.7
		146	16	65	4.5					0.7 / 150.3 Fill, Gray to brown, fine to coarse CLAYEY SAND (SC), contains mica, medium dense, moist			15.5	
2		144	7	65	4.7					4.5 / 146.5 Light gray, fine to medium CLAYEY SAND (SC), moist			17.4	
2.5		142	6	75	6.7					Orange and gray, fine CLAYEY SAND (SC), contains mica, medium dense, moist			22.0	
		140	9	60	7.6					6.7 / 144.3 Light gray, fine to medium POORLY GRADED SAND WITH SILT (SP-SM), medium dense, moist			22.4	
		138	7		8.7					8.5 / 142.5 Gray and red, mottled, FAT CLAY (CH), moist				
		136	6		10.7					8.7 / 142.3 Light gray and orange, fine to medium POORLY GRADED SAND (SP), contains mica, medium dense, moist				
										Bottom of borehole at 10.7 feet. Boring backfilled with pea gravel and concrete.				

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 5 feet

PAGE 1 OF 1
17NSS-05

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: NSS RAMP

17NSS-07
PAGE 1 OF 1

STATION: 745+88 **OFFSET:** 107 ft LT
LATITUDE: 38.498490° N **LONGITUDE:** 77.381810° W
SURFACE ELEVATION: 160.5 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA								
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	Date(s) Drilled: 05/08/2017 - 05/08/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: James T./SaLUT, Inc.	Logger: Taylor Redmond/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION											
										GROUND WATER								
										NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN								
										FIELD DESCRIPTION OF STRATA								
0.0	160.5																	
	158.1	11	100	1														
2	158.8	12	85	2												11.4		
4	156.5	5	100	4												8.6		
6	154.2	3	100	6												20.3		
8	152.0	5	100	8										28	9	23.5	26.2	
10	152.0	8	100	10												22.1		
										Bottom of borehole at 10.0 feet. Boring backfilled with concrete.								

REMARKS: Rig Type: Mobile Drill B57 Truck Rig. Cave-in Depth at 5.3 feet

PAGE 1 OF 1
17NSS-07

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: NSS RAMP

17NSS-09

PAGE 1 OF 1

STATION: 744+13 **OFFSET:** 104 ft LT
LATITUDE: 38.498050° N **LONGITUDE:** 77.382045° W
SURFACE ELEVATION: 161.0 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA				
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
<p>Date(s) Drilled: 05/08/2017 - 05/08/2017 Drilling Method(s): 2.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Will Riddick/GET Solutions, Inc Logger: Kohlman Heiter, EIT/HDR</p> <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p> <p>FIELD DESCRIPTION OF STRATA</p>														
0.0	161.0													
2	160.7	8	70	1										
4	159.0	19	100	2										
6	156.0	19	100	4										
8	154.0	6	65	6										
10	152.0	14	100	8										
		3	100	10										
		6	100											
		5	100											
		8	100											
		11	100											
		15	100											
<p>Bottom of borehole at 10.0 feet. Bulk sample collected from 1.0 to 5.0 feet bgs. Boring backfilled with pea gravel and concrete.</p>														

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 5 feet

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17NSS-09

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: NSS RAMP

17NSS-12
PAGE 1 OF 1

STATION: 738+64 **OFFSET:** 101 ft LT
LATITUDE: 38.496703° N **LONGITUDE:** 77.382857° W
SURFACE ELEVATION: 155.2 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA			
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION						
<p>GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p>													
<p>FIELD DESCRIPTION OF STRATA</p>													
0.0	155.2								0.0 / 155.2				
7.8									7.8" Asphalt				
0.6	154.6								0.6 / 154.6				
9"									9" Aggregate Subbase, 0.5" tar			15.0	
1.4	153.8								1.4 / 153.8				
									Brown, fine to medium CLAYEY SAND WITH GRAVEL (SC), moist			17.3	
									White, fine to medium CLAYEY SAND (SC), medium dense, moist				
									White with brown, fine to medium CLAYEY SAND (SC), medium dense, moist			18.7	21.1
												16.8	
												19.5	
<p>Bottom of borehole at 10.0 feet. Boring backfilled with concrete.</p>													

REMARKS: Rig Type: Mobile Drill B57 Truck Rig. Cave-in Depth at 5.8 feet

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17NSS-12

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: NSS RAMP

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PAGE 1 OF 1

STATION: 736+28 **OFFSET:** 5 ft LT
LATITUDE: 38.496008° N **LONGITUDE:** 77.382941° W
SURFACE ELEVATION: 152.8 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 05/09/2017 - 05/09/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Will Riddick/GET Solutions, Inc
Logger: Kohlтан Heiter, EIT/HDR

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
152									
2	150	6	25	80	2				
4	148	4	20	23	4				
6	146	6	11	12	6				
8	144	5	14	18	8				
10	142	3	11	16	10				
12			11	11	12				

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

0.0 / 152.8
 5" Asphalt

0.4 / 152.4
 11" Aggregate Subbase

1.3 / 151.5
 Light gray and orange, fine to medium POORLY GRADED SAND (SP), contains mica, dense, dry

4.0 / 148.8
 Light gray and orange, fine to medium SILTY SAND (SM), contains mica, medium dense, dry

Light gray and orange, fine to coarse SILTY SAND (SM), contains mica, dense, dry

Light gray and orange, fine to medium SILTY SAND (SM), contains mica, medium dense, dry

Light gray, fine to medium SILTY SAND (SM), contains mica, medium dense, dry

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		20.3	
		14.2	
		15.8	
		18.2	28.1
		21.7	

Bottom of borehole at 12.0 feet.
 Bulk sample collected from 2.0 to 8.0 feet bgs. Boring backfilled with pea gravel and concrete.

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 6 feet

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SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: NSS RAMP

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STATION: 730+31 **OFFSET:** 5 ft LT
LATITUDE: 38.494588° N **LONGITUDE:** 77.383983° W
SURFACE ELEVATION: 134.8 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 05/09/2017 - 05/09/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Kohltan Heiter, EIT/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN									
											FIELD DESCRIPTION OF STRATA				LL	PI				
		134									0.0 / 134.8									
	2										4.8" Asphalt									
		132									0.4 / 134.4									
	4										25.2" Aggregate Subbase									
		130									2.5 / 132.3							12.9		
	4										Fill, Gray, fine to coarse CLAYEY SAND (SC), medium dense, moist							12.0		
		128									3.5 / 131.3									
	6										Light gray and orange, fine to coarse POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, medium dense, moist							16.3		
		126									4.5 / 130.3									
	8										Light gray and orange, fine to medium POORLY GRADED SAND WITH SILT (SP-SM), contains mica, medium dense, dry							15.3		
		124									8.5 / 126.3									
	10										Light gray, red and white, fine to coarse CLAYEY SAND (SC), contains mica, medium dense, moist						45	30	19.7	48.9
		122									12.0 / 122.8									
	12										Dark gray and red, mottled, SANDY LEAN CLAY (CL), moist								15.2	
											Bottom of borehole at 12.5 feet. Boring backfilled with pea gravel and concrete.									

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 6 feet

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17NSS-16

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: NSS RAMP

17NSS-18
PAGE 1 OF 1

STATION: 724+40 **OFFSET:** 5 ft LT
LATITUDE: 38.493230° N **LONGITUDE:** 77.385109° W
SURFACE ELEVATION: 118.3 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA					
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK					STRATA LEGEND	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS						DIP °
		118													
	2	116.3	14	75	2										
	4	114.5	7	85	4										
	6	112.2	6	100	6										
2.5	8	110.3	8	100	8										
	10	108.3	6	100	10										
	12		6	100	12										
GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN															
FIELD DESCRIPTION OF STRATA											LL	PI			
0.0 / 118.3 4.5" Asphalt 0.4 / 117.9 15.5" Aggregate Subbase 1.7 / 116.6 <i>Fill</i> , Gray and orange, fine to coarse POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, medium dense, dry 7.0 / 114.5 <i>Fill</i> , Gray and tan, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, medium dense, dry 6.0 / 112.3 <i>Fill</i> , Light gray, fine to medium CLAYEY SAND (SC), contains mica, contains asphalt fragments, medium dense, dry 8.5 / 109.8 Orange and gray, SANDY LEAN CLAY (CL), contains mica, very stiff, dry Dark gray, SANDY LEAN CLAY (CL), contains mica, stiff, dry											34	15	18.7	54.8	
Bottom of borehole at 12.0 feet. Bulk sample collected from 2.0 to 6.0 feet bgs. Boring backfilled with pea gravel and concrete.															

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 7.5 feet

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17NSS-18

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RAMP RHN

17RR-01

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STATION: 829+31
LATITUDE: 38.519682° N
SURFACE ELEVATION: 61.1 ft

OFFSET: 130 ft RT
LONGITUDE: 77.371450° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/18/2017 - 05/18/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Will Riddick/GET Solutions, Inc
Logger: Kohlтан Heiter, EIT/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 7.8 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °		JOINTS
0	60									
2	58	12	100	X	1.8					
4	56	9	100	X	2.8					
6	54	6	100	X	3.8					
8	52	8	100	X	5.5					
10	50	45	100	X	5.8					
		50/2"	100	X	6.2					
		50/5"	100	X	7.8					
		50/4"	100	X	9.8					
		50/4"	100	X	10.6					

0.0 / 61.1
15.3" Asphalt

1.3 / 59.8
2.7" Aggregate Subbase

1.5 / 59.6
Fill, Brown, fine to medium CLAYEY SAND WITH GRAVEL (SC), contains mica, moist

2.8 / 58.3
Dark gray, fine CLAYEY SAND (SC), contains mica, hard, dry

Dark gray, fine CLAYEY SAND (SC), contains mica, very hard, dry

Dark gray, fine CLAYEY SAND (SC), contains mica, very stiff, wet

Dark gray, fine CLAYEY SAND (SC), contains mica, very hard, wet

Bottom of borehole at 10.6 feet.
Boring backfilled with pea gravel and concrete.

		7.0	
		9.5	
		7.1	
26	13	12.2	26.9
		12.0	

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 7 feet

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17RR-01

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RAMP RHN

17RR-03

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STATION: 823+40 **OFFSET:** 122 ft RT
LATITUDE: 38.518326° N **LONGITUDE:** 77.372546° W
SURFACE ELEVATION: 81.2 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA				
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	GROUND WATER	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION							
									NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN					
									FIELD DESCRIPTION OF STRATA	LL	PI			
	80	10			1.3				0.0 / 81.2 12.8" Asphalt					
2	78	11			3.3				1.1 / 80.1 1.2" Aggregate Subbase			6.6		
4	76	9			5.3				1.3 / 79.9 Fill, Brown, fine to medium CLAYEY SAND (SC), contains mica, medium dense, moist Fill, Brown to gray, fine to medium CLAYEY SAND (SC), contains mica, medium dense, moist			8.1	23.3	
6	74	8			7.3				5.3 / 75.9 Dark gray, fine CLAYEY SAND (SC), contains mica, dense, dry			13.1		
8	72	5			9.3				Dark gray, fine CLAYEY SAND (SC), contains layer of sand 8.4 to 8.6 feet bgs, contains mica, medium dense, dry			12.4		
10	70	11			11.3				Dark gray, fissured, fine CLAYEY SAND (SC), contains mica, very dense, dry	35	23	10.1	45.0	
									Bottom of borehole at 11.3 feet. Boring backfilled with pea gravel and concrete.					

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 6 feet

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17RR-03

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RAMP RHN

17RR-07

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STATION: 807+61 **OFFSET:** 161 ft RT
LATITUDE: 38.514439° N **LONGITUDE:** 77.374829° W
SURFACE ELEVATION: 124.9 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 05/26/2017 - 05/26/2017

LAB DATA

Drilling Method(s): Mud Rotary w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Will Riddick/GET Solutions, Inc
 Logger: Taylor Redmond/HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		124	2	50					
	2	122	3	65					
	3	120	2	50					
2.25	6	118	3	95					
4	8	116	5	95					
	10	114	10						
	12	112	28	100					
	14	110	50/4"						
	16	108							
	18	106	16	88					
	20	104							
	22	102	50/5"	100					

0.0 / 124.9 1" Topsoil				
0.1 / 124.8 Light brown, fine to medium CLAYEY SAND (SC), loose, moist			16.0	
			17.0	
4.0 / 120.9 Gray and brown, mottled, FAT CLAY (CH), firm, moist			30.5	
			30.0	
Dark brown and gray, mottled, FAT CLAY (CH), stiff, moist				
Dark brown and gray, mottled, FAT CLAY (CH), very stiff, moist	57	45	25.3	93.8
11.5 / 113.4 Dark gray, LEAN CLAY WITH SAND (CL), contains pyritic banding, very hard, dry	39	25	23.0	75.7
Dark gray, LEAN CLAY WITH SAND (CL), very hard, dry			16.4	
			22.2	
Bottom of borehole at 23.4 feet. Boring backfilled with hole plug and auger cuttings.				

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 19 feet

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17RR-07

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GFJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RAMP RHN

17RR-15

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STATION: 783+88 **OFFSET:** 74 ft LT
LATITUDE: 38.508431° N **LONGITUDE:** 77.378014° W
SURFACE ELEVATION: 163.0 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA											
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK					STRATA LEGEND	Date(s) Drilled: 05/24/2017 - 05/24/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Taylor Redmond/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS												GROUND WATER
											GROUND WATER NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS										
											FIELD DESCRIPTION OF STRATA						LL	PI			
		162	2	50							0.0 / 163.0	Light brown, fine to coarse POORLY GRADED SAND WITH CLAY (SP-SC), contains organic matter, loose, moist								13.1	
	2	160	3	60	2						2.0 / 161.0	Light brown to white, fine to medium CLAYEY SAND (SC), loose, moist								18.6	
	4	158	5	8	4							Light brown to dark brown, fine to medium CLAYEY SAND (SC), medium dense, moist								19.6	
	3	156	2	80	6						6.0 / 157.0	Light gray, SANDY LEAN CLAY (CL), firm, moist								31.3	
	4.25	154	6	10	8						8.0 / 155.0	Dark gray, FAT CLAY WITH SAND (CH), very stiff, moist						80	55	30.7	83.0
	10	152	11	15	10						11.5 / 151.5										
	14	150	5	13								Light gray, fine CLAYEY SAND (SC), medium dense, moist								27.9	
	14	148	9	17							Bottom of borehole at 15.0 feet. Boring backfilled with auger cuttings.										
	14		17	20	15																

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 12 feet

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17RR-15

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RAMP RHN

17RR-16

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STATION: 784+52 **OFFSET:** 5 ft LT
LATITUDE: 38.50855° N **LONGITUDE:** 77.377725° W
SURFACE ELEVATION: 159.8 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 05/16/2017 - 05/16/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Will Riddick/GET Solutions, Inc
Logger: Kohltan Heiter, EIT/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
3.5	2	158	5	100					
			10						
			13						
4	4	156	4	100					
			11						
			15						
4	6	154	4	100					
			8						
			12						
2	8	152	5	100					
			9						
			11						
4	10	150	8	100					
			14						
			18						
			19						
	12	148							

0.0 / 159.8
 7.3" Asphalt
 0.6 / 159.2
 11.2" Aggregate Subbase
 1.6 / 158.2
 Dark brown, FAT CLAY (CH), contains mica, very stiff, moist
 Dark brown, FAT CLAY (CH), contains mica, very stiff, dry
 Dark brown-gray, FAT CLAY (CH), contains mica, very stiff, dry
 Dark brown-gray, FAT CLAY WITH SAND (CH), contains mica, very stiff, dry
 Dark brown-gray, FAT CLAY WITH SAND (CH), contains mica, hard, dry

Bottom of borehole at 12.0 feet.
 Boring backfilled with pea gravel and concrete.

		30.4	
76	50	32.4	92.9
		29.4	
		30.4	
		24.9	

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 7 feet

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17RR-16

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RAMP RHN

17RR-18

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STATION: 779+11 **OFFSET:** 5 ft LT
LATITUDE: 38.507115° N **LONGITUDE:** 77.378191° W
SURFACE ELEVATION: 146.0 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 05/16/2017 - 05/16/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Kohltan Heiter, EIT/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN									
											FIELD DESCRIPTION OF STRATA				LL	PI				
											0.0 / 146.0	4.8" Asphalt								
											0.4 / 145.6	18.2" Aggregate Subbase								
1.5	2	144	2			2.3					1.9 / 144.1	Light gray and light orange, fine to medium CLAYEY SAND (SC), contains mica, contains organic matter, medium dense, dry						19.2		
3	4	142	6	100		4.3						Light gray and orange, fine CLAYEY SAND (SC), contains mica, medium dense, dry						25.8		
	6	140	12	100		6.3					6.3 / 139.7	Light gray and orange, stratified, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, medium dense, moist						19.6		
1	8	138	14	85		8.3					8.3 / 137.7	Light gray and orange, fine to medium CLAYEY SAND (SC), contains mica, dense, moist						16.1	23.5	
	10	136	9	20		10.3						Light gray and orange, mottled, fine to medium CLAYEY SAND (SC), contains mica, medium dense, moist						17.6		
	12	134	16	35		12.3						Bottom of borehole at 12.3 feet. Boring backfilled with pea gravel and concrete.								

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 4.5 feet

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17RR-18

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RAMP RHN

17RR-19

PAGE 1 OF 1

STATION: 773+66 **OFFSET:** 5 ft LT
LATITUDE: 38.505664° N **LONGITUDE:** 77.378660° W
SURFACE ELEVATION: 129.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 05/16/2017 - 05/16/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Will Riddick/GET Solutions, Inc
Logger: Kohltan Heiter, EIT/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL	PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		15.3	
		16.4	
54	33	25.0	91.1
		18.7	
		20.9	

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
3	2	128	4	2					
			17	2.4					
1.5	4	126	11	4					
			8						
3	6	124	9	6					
			3						
4.5	8	122	6	8					
			3						
4.5	10	120	5	10					
			5						
			4						
			7						
			9						
			11						
	12	118		12					

0.0 / 129.5
 4.3" Asphalt
 0.4 / 129.1
 14.7" Aggregate Subbase
 1.6 / 127.9
 Fill, Dark gray, fine to coarse CLAYEY SAND (SC), dry
 2.4 / 127.1
 Tan and dark gray, fine to coarse POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, dense, dry
 Light gray and orange, fine to coarse POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, medium dense, dry
 6.0 / 123.5
 Light gray and orange, mottled, FAT CLAY (CH), contains root fragments, stiff, moist
 Light gray and orange, mottled, FAT CLAY (CH), stiff, moist
 Light gray and orange, mottled, FAT CLAY WITH SAND (CH), very stiff, moist

Bottom of borehole at 12.0 feet.
 Boring backfilled with pea gravel and concrete.

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 5 feet

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SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RAMP RHN

17RR-21

PAGE 1 OF 1

STATION: 768+49 **OFFSET:** 5 ft LT
LATITUDE: 38.504289° N **LONGITUDE:** 77.379102° W
SURFACE ELEVATION: 123.1 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA									
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 05/17/2017 - 05/17/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Kohltan Heiter, EIT/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											FIELD DESCRIPTION OF STRATA				LL	PI				
		122									0.0 / 123.1	4.8" Asphalt								
	2		3			2					0.4 / 122.7	15.2" Aggregate Subbase								
	4	120	18	85		4					1.7 / 121.4	Fill, Tan, fine to medium POORLY GRADED SAND (SP), contains mica, dense, dry					19.6			
2	6	118	9	6		4.8					4.8 / 118.3	Fill, Dark gray and orange, mottled, fine to medium CLAYEY SAND (SC), contains mica, moist					15.1			
	8	116	8	75		6					6.0 / 117.1	Fill, Light gray and orange, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, moist					16.8			
	10	114	7	80		7					7.0 / 116.1	Fill, Black, fine to coarse POORLY GRADED SAND WITH GRAVEL (SP), medium dense, moist					5.6	3.9		
	12	112	8	75		8					10.0 / 113.1	Fill, Black, fine to coarse POORLY GRADED SAND WITH CLAY AND GRAVEL (SP-SC), medium dense, wet					7.8			
											Bottom of borehole at 12.0 feet. Boring backfilled with pea gravel and concrete.									

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 6.5 feet

PAGE 1 OF 1

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SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 798+69 **OFFSET:** 136 ft RT
LATITUDE: 38.512192° N **LONGITUDE:** 77.375963° W
SURFACE ELEVATION: 147.4 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 05/25/2017 - 05/25/2017	Drilling Method(s): Mud Rotary w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Taylor Redmond/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
			WOH								GROUND WATER NOT ENCOUNTERED DURING DRILLING ↓ STABILIZED AT 20.0 ft									
											FIELD DESCRIPTION OF STRATA				LL	PI				
											0.0 / 147.4									
											2" Topsoil								21.7	
											0.2 / 147.2									
											Light brown, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), very loose, moist									
											2.0 / 145.4									
											Dark gray, fine CLAYEY SAND (SC), loose, moist									22.2
											Dark gray, fine CLAYEY SAND WITH GRAVEL (SC), loose, moist									
											Dark gray, fine to coarse CLAYEY SAND WITH GRAVEL (SC), medium dense, moist									
											Light brown, fine to coarse CLAYEY SAND WITH GRAVEL (SC), medium dense, moist									
											White, fine to medium CLAYEY SAND (SC), medium dense, moist									
											White, fine to medium CLAYEY SAND (SC), medium dense, moist									
											White, fine to medium CLAYEY SAND (SC), medium dense, moist									
											Brown, fine to medium CLAYEY SAND (SC), medium dense, moist									

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 798+69 OFFSET: 136 ft RT
 LATITUDE: 38.512192° N LONGITUDE: 77.375963° W
 SURFACE ELEVATION: 147.4 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 05/25/2017 - 05/25/2017	Drilling Method(s): Mud Rotary w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Taylor Redmond/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER NOT ENCOUNTERED DURING DRILLING ↓ STABILIZED AT 20.0 ft									
											FIELD DESCRIPTION OF STRATA				LL	PI				
	26	122									Brown, fine to medium CLAYEY SAND (SC), medium dense, moist									
	4.5	120									26.5 / 120.9									
	28	118	8	10	15	18	100				Gray and red, mottled, FAT CLAY (CH), very stiff, moist						28.8			
	30	116																		
	4.5	114	4	8	10	14	100				Gray and red, mottled, FAT CLAY (CH), contains slickensides, very stiff, moist						28.9			
	34	112																		
	36	110																		
	38	108	9	11	15	17	50				Gray and red, mottled, FAT CLAY (CH), very stiff, moist						32.6			
	40	106																		
	4	104	5	8	13	17	100				Gray and red, mottled, FAT CLAY (CH), very stiff, moist				63	47	24.4	97.2		
	44	102																		
	46	100																		
	4	98	7	12	18	23	100				Red and gray, mottled, FAT CLAY (CH), very stiff, moist						18.8			
	48	96																		
	50	94																		

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 21 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 798+69 **OFFSET:** 136 ft RT
LATITUDE: 38.512192° N **LONGITUDE:** 77.375963° W
SURFACE ELEVATION: 147.4 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 05/25/2017 - 05/25/2017	Drilling Method(s): Mud Rotary w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Taylor Redmond/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											NOT ENCOUNTERED DURING DRILLING									
											STABILIZED AT 20.0 ft									
											FIELD DESCRIPTION OF STRATA				LL	PI				
	50										Red and gray, mottled, FAT CLAY (CH), very stiff, moist									
	52	96									51.5 / 95.9									
	54	94	9								Gray and red, mottled, fine to medium CLAYEY SAND (SC), dense, moist						18.7			
	56	92	15	25	39	100					56.5 / 90.9									
	58	90	30	50/5"		100					Dark gray, LEAN CLAY WITH SAND (CL), very hard, moist						21.1			
	60	88																		
	62	86																		
	64	84	32	50/5"		78					Dark gray, LEAN CLAY WITH SAND (CL), very hard, dry				37	23	23.2	76.2		
	66	82																		
	68	80		50/4"		100					Bottom of borehole at 68.3 feet. Boring backfilled with hole plug and auger cuttings.						23.4			

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 21 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 794+28 OFFSET: 48 ft LT
 LATITUDE: 38.511181° N LONGITUDE: 77.377019° W
 SURFACE ELEVATION: 160.1 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				FIELD DESCRIPTION OF STRATA	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA					
3.5	52	108	8											
	54	106	10 14 16	100									25.3	
	56	104												
0.5	58	102	WOH 4											
	60	100	3 8	100									37.8	
	62	98												
3.5	64	96	5 9											
	66	94	13 16	100									24.4	
	68	92	10 23											
	70	90	35 35	100									12.6	
	72	88												
2.75	74	86	16 45 50/2"	100									32	22
													15.0	63.7

Date(s) Drilled: 05/22/2017 - 05/23/2017
 Drilling Method(s): Mud Rotary w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Will Riddick/GET Solutions, Inc
 Logger: Taylor Redmond/HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 24 HRS

FIELD DESCRIPTION OF STRATA

Red and gray, mottled, FAT CLAY (CH), very stiff, moist

Red and gray, mottled, FAT CLAY (CH), firm, moist

Red and gray, mottled, FAT CLAY (CH), very stiff, moist

Red and gray, mottled, fine CLAYEY SAND (SC), very dense, moist

Dark gray, SANDY LEAN CLAY (CL), very hard, moist

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 5 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 794+28 OFFSET: 48 ft LT
 LATITUDE: 38.511181° N LONGITUDE: 77.377019° W
 SURFACE ELEVATION: 160.1 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA									
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				Date(s) Drilled: 05/22/2017 - 05/23/2017	Drilling Method(s): Mud Rotary w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Taylor Redmond/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA										
1	76-82	84-82	50/2"	100	X	78 78.2													
	80-82	80-78	50/4"	67	X	83 83.3													
<p>GROUND WATER NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS</p>										<p>FIELD DESCRIPTION OF STRATA</p>									
<p>Dark gray, SANDY LEAN CLAY (CL), very hard, moist</p>										<p>12.2</p>									
<p>Bottom of borehole at 83.3 feet. Boring backfilled with auger cuttings.</p>										<p>21.2</p>									

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 5 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



STATION: 804+26 OFFSET: 175 ft RT
 LATITUDE: 38.513581° N LONGITUDE: 77.375202° W
 SURFACE ELEVATION: 118.2 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 05/30/2017 - 05/30/2017	Drilling Method(s): Mud Rotary w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Taylor Redmond/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
		118	WOH/12"																	
	1		1	25								0.0 / 118.2								
	2		1									3.5" Topsoil							15.3	
	2	116	1									0.3 / 117.9								
	2		2									Brown, medium CLAYEY SAND (SC), very loose, moist								
	3		3	50								2.0 / 116.2							40.1	
	3		3									Light brown and gray, FAT CLAY WITH SAND (CH), contains organic matter, firm, moist								
	4	114	WOH									Light brown and gray, SANDY FAT CLAY (CH), soft, moist							38.9	
	4		1	90																
	4		1																	
	6	112	2																	
	6		3									Light red and gray, FAT CLAY (CH), firm, moist								
	6		3	80															76	58
	8		5																	
	8	110	3																	
	8		4									Light gray, FAT CLAY (CH), firm, moist								
	8		4	75																28.2
	10		3																	
	10	108	5																	
	10		5																	
	12																			
	12	106																		
	12																			
	13																			
	13																			
	14																			
	14	104	8																	
	14		11	80																24.2
	14		12																	
	15																			
	15																			
	16																			
	16	102																		
	16																			
	18																			
	18	100	3																	
	18		6																	
	18		6	95																29.5
	20		10																	
	20	98	13																	
	20		13																	
	22																			
	22	96																		
	22																			
	23																			
	23																			
	23																			
	24																			
	24	94	4																	
	24		7																	
	24		12	100																25.2
	24		10																	

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 3.5 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 804+26 OFFSET: 175 ft RT
 LATITUDE: 38.513581° N LONGITUDE: 77.375202° W
 SURFACE ELEVATION: 118.2 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				FIELD DESCRIPTION OF STRATA	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA					
	26	92												
	28	90	5											
	30	88	11 17 27	100									13.5	72.7
	32	86												
	34	84	9 50/5"	78									14.5	
	36	82												
	38	80	50/2"	100									18.7	
	40													

Date(s) Drilled: 05/30/2017 - 05/30/2017
 Drilling Method(s): Mud Rotary w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Will Riddick/GET Solutions, Inc
 Logger: Taylor Redmond/HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

Gray and red-yellow, mottled, FAT CLAY WITH SAND (CH), very stiff, moist

31.5 / 86.7

Gray, fine CLAYEY SAND (SC), very dense, moist

Gray, fine to medium CLAYEY SAND (SC), very dense, moist

Tricone refusal at 40.0 feet.
 Bottom of borehole at 40.0 feet.
 Shelby tube collected from an offset boring between depths of 4.0 to 6.0 feet bgs. Boring backfilled with auger cuttings.

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 3.5 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GFJ:8.30.004:061810:8/8/17



STATION: 799+78 **OFFSET:** 186 ft RT
LATITUDE: 38.512430° N **LONGITUDE:** 77.375681° W
SURFACE ELEVATION: 135.9 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 06/05/2017 - 06/05/2017	Drilling Method(s): Mud Rotary w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Randy Bliefernich/GET Solutions, Inc.	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER									
											FIELD DESCRIPTION OF STRATA 0.0 / 135.9 4" Topsoil 0.3 / 135.6 Gray, CLAYEY SAND (SC), contains organic matter, loose, moist Yellow, fine to medium CLAYEY SAND (SC), loose, moist Yellow, fine to coarse CLAYEY SAND (SC), medium dense, moist Yellow, fine to coarse CLAYEY SAND (SC), loose, wet Yellow, fine to coarse CLAYEY SAND (SC), medium dense, wet 12.5 / 123.4 Gray and brown, LEAN CLAY (CL), stiff, moist Gray and brown, LEAN CLAY (CL), very stiff, moist									

GROUND WATER
 FIRST ENCOUNTERED AT 6.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 9 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 799+78 **OFFSET:** 186 ft RT
LATITUDE: 38.512430° N **LONGITUDE:** 77.375681° W
SURFACE ELEVATION: 135.9 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 06/05/2017 - 06/05/2017	Drilling Method(s): Mud Rotary w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Randy Bliefernich/GET Solutions, Inc.	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER ▽ FIRST ENCOUNTERED AT 6.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN									
											FIELD DESCRIPTION OF STRATA									
	25																			
	26	110																		
2.5	28	108	5																	
			10																	
			13																	
	30	106		100																
			13																	
	32	104																		
3.5	34	102	8																	
			15																	
			19																	
			24																	
	36	100																		
	38	98	7																	
			13																	
			17																	
	40	96		100																
			19																	
	42	94																		
			50/4"																	
				100																
	44	92																		
	46	90																		
	48	88	50/4"																	
				100																
	50	86																		

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 9 feet



PROJECT #: 95 Express Fredericksburg Ext. 17RR-RW-09
LOCATION: Stafford County, Virginia
STRUCTURE: RETAINING WALL

PAGE 3 OF 3

STATION: 799+78 **OFFSET:** 186 ft RT
LATITUDE: 38.512430° N **LONGITUDE:** 77.375681° W
SURFACE ELEVATION: 135.9 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 06/05/2017 - 06/05/2017

LAB DATA

Drilling Method(s): Mud Rotary w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Will Riddick/GET Solutions, Inc
 Logger: Randy Bliefernich/GET Solutions, Inc.

GROUND WATER
 FIRST ENCOUNTERED AT 6.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

FIELD DESCRIPTION OF STRATA

LL	PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND											
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA		JOINTS										
	52	84	50/4"	100																	

Gray and brown, mottled, LEAN CLAY WITH SAND (CL), contains mica, very hard, moist
 Bottom of borehole at 53.3 feet.
 Boring backfilled with auger cuttings.

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 9 feet

PAGE 3 OF 3

17RR-RW-09

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



STATION: 792+82 **OFFSET:** 52 ft LT
LATITUDE: 38.510797° N **LONGITUDE:** 77.377167° W
SURFACE ELEVATION: 162.6 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 05/23/2017 - 05/23/2017	Drilling Method(s): Mud Rotary w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Taylor Redmond/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS									
											FIELD DESCRIPTION OF STRATA				LL	PI				
		162	2									0.0 / 162.6								
			2									3" Topsoil								
			3																	
			4									0.3 / 162.3								
	2	160	2				2					Gray, fine CLAYEY SAND (SC), contains organic matter, loose, moist								
			3									Gray and orange, mottled, fine CLAYEY SAND (SC), contains organic matter, loose, moist								17.0
			4																	
	4	158	3				4					Gray and orange, mottled, fine CLAYEY SAND (SC), medium dense, moist								25.4
			8																	
			9																	
	6	156	7				6					Gray, fine CLAYEY SAND (SC), medium dense, moist								24.4
			12																	
			13																	
	8	154	11				8					Gray, fine to medium SANDY LEAN CLAY WITH GRAVEL (CL), very dense, moist								27.7
			17																	
	10	152	17				10													
			34																	
			35																	
	12	150					13													
			12																	
	14	148	23				15					Gray, orange and black, mottled, fine to medium SANDY LEAN CLAY WITH GRAVEL (CL), dense, moist								34.4
			24																	
			27																	
	16	146																		
			11																	
	18	144	13				18					Gray and orange, mottled, fine to medium SANDY LEAN CLAY WITH GRAVEL (CL), medium dense, moist								18.0
			14																	
			15																	
	20	142																		
			11																	
	22	140	13				20													
			14																	
			15																	
	24	138	9				23					Gray and orange, mottled, fine to medium CLAYEY SAND WITH GRAVEL (SC), dense, moist								18.1
			16																	
			20																	
			20																	

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GFJ:8.30.004:061810:8/8/17



STATION: 792+82 **OFFSET:** 52 ft LT
LATITUDE: 38.510797° N **LONGITUDE:** 77.377167° W
SURFACE ELEVATION: 162.6 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 05/23/2017 - 05/23/2017	Drilling Method(s): Mud Rotary w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Taylor Redmond/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS									
											FIELD DESCRIPTION OF STRATA				LL	PI				
	25										Gray and orange, mottled, fine to medium CLAYEY SAND WITH GRAVEL (SC), dense, moist									
	26	136									26.5 / 136.1									
	28	134	50/4"	100	28	28.3					Dark brown, coarse POORLY GRADED GRAVEL WITH SAND (GP), very dense, moist							19.9		
	30	132																		
	32	130									31.5 / 131.1									
4.25	34	128	4	8	100	33					Dark red and gray, mottled, FAT CLAY (CH), very stiff, moist							29.4		
	36	126	12	12		35														
4.5	38	124	6	10	100	38					Dark gray, FAT CLAY (CH), contains slickensides, very stiff, moist					76	56	30.7	95.3	
	40	122	14	16		40														
	42	120																		
4.5	44	118	7	10	100	43					Dark red and gray, mottled, FAT CLAY (CH), very stiff, moist									
	46	116	13	16		45														
	48	114	1	6	100	48														
4.25	50	112	12	14																26.4

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 28 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. 17RR-RW-12
 LOCATION: Stafford County, Virginia
 STRUCTURE: RETAINING WALL

PAGE 3 OF 3

STATION: 792+82 OFFSET: 52 ft LT
 LATITUDE: 38.510797° N LONGITUDE: 77.377167° W
 SURFACE ELEVATION: 162.6 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA					
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				FIELD DESCRIPTION OF STRATA	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA						JOINTS
		112				50									
4.5	52	110	5			53									
	54	108	9 12 16	100		55				Dark red and gray, mottled, FAT CLAY (CH), very stiff, moist			25.7		
	56	106													
4	58	104	10 19 19 30	100		58				Gray, SANDY FAT CLAY (CH), hard, moist			16.4		
	60					60				Bottom of borehole at 60.0 feet. Boring backfilled with hole plug and auger cuttings.					

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 24 HRS

Date(s) Drilled: 05/23/2017 - 05/23/2017
 Drilling Method(s): Mud Rotary w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Will Riddick/GET Solutions, Inc
 Logger: Taylor Redmond/HDR

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 28 feet

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17RR-RW-12



STATION: 790+84 **OFFSET:** 56 ft LT
LATITUDE: 38.510272° N **LONGITUDE:** 77.377354° W
SURFACE ELEVATION: 165.9 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA					
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	GROUND WATER	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA						
Date(s) Drilled: 05/24/2017 - 05/24/2017 Drilling Method(s): Mud Rotary w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Will Riddick/GET Solutions, Inc Logger: Taylor Redmond/HDR											FIELD DESCRIPTION OF STRATA				
		3									0.0 / 165.9				
		3									4" Topsoil			20.5	
2.5	2	164	2	35							0.3 / 165.6				
		3	4								Dark brown to light brown, fine to coarse POORLY GRADED SAND WITH CLAY (SP-SC), contains root fragments, contains organic matter, loose, moist			31.8	
0.5	4	162	7	95							2.0 / 163.9				
		7	5								Dark gray, SANDY LEAN CLAY (CL), firm, moist				
		6	6	50							4.0 / 161.9	74	52	53.1	68.5
		6	7								Dark gray, SANDY FAT CLAY (CH), stiff, moist				
		6	2								6.0 / 159.9			20.3	
		8	3	100							Dark gray and light gray, fine CLAYEY SAND (SC), loose, moist				
		8	6	23							Light gray and light brown, fine CLAYEY SAND (SC), dense, moist			22.2	
		10	8								11.5 / 154.4				
		12	16	100							Light orange and white, coarse CLAYEY GRAVEL WITH SAND (GC), very dense, moist			11.1	
		14	20	80							16.5 / 149.4				
		16	18								Light gray and orange, fine to medium CLAYEY SAND WITH GRAVEL (SC), very dense, moist			20.2	21.6
		18	14	90							21.5 / 144.4				
		20	30								Light orange and white, fine to coarse CLAYEY GRAVEL WITH SAND (GC), dense, moist			16.5	
		22	30	90											
		24	42												
		22	15	50											
		24	13												
		24	19												
		24	24												

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 15 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 787+91 **OFFSET:** 66 ft LT
LATITUDE: 38.509498° N **LONGITUDE:** 77.377638° W
SURFACE ELEVATION: 167.0 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 05/24/2017 - 05/24/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Taylor Redmond/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS									
											FIELD DESCRIPTION OF STRATA				LL	PI				
		166	2	50							0.0 / 167.0	Brown, fine to medium CLAYEY SAND (SC), contains organic matter, loose, moist						12.3		
3.5	2	164	2	80							2.0 / 165.0	Dark gray, FAT CLAY WITH SAND (CH), firm, moist						28.4		
4.5	4	162	4	100								Dark gray, FAT CLAY WITH SAND (CH), very stiff, moist				77	52	28.9	71.8	
4.5	6	160	3	100														30.3		
	8	158	6	100							8.0 / 159.0	Dark gray, fine CLAYEY SAND (SC), medium dense, moist						20.2		
	10	156																		
	12	154	3	90								Light brown-gray, fine to medium CLAYEY SAND (SC), medium dense, moist						18.6		
	14	152	7	14																
	16	150																		
	18	148	5	70								Brown and white, fine to coarse CLAYEY SAND WITH GRAVEL (SC), dense, moist						13.7	27.3	
	20	146	16	43																
	22	144																		
	24	142	13	20								Brown and white, fine to coarse CLAYEY SAND WITH GRAVEL (SC), very dense, moist						12.1		

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 12.3 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GFJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. 17RR-RW-14
 LOCATION: Stafford County, Virginia
 STRUCTURE: RETAINING WALL

PAGE 2 OF 2

STATION: 787+91 OFFSET: 66 ft LT
 LATITUDE: 38.509498° N LONGITUDE: 77.377638° W
 SURFACE ELEVATION: 167.0 ft COORD. DATUM: NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						25									
<p>Date(s) Drilled: 05/24/2017 - 05/24/2017 Drilling Method(s): 2.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Will Riddick/GET Solutions, Inc Logger: Taylor Redmond/HDR</p> <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS</p> <p>FIELD DESCRIPTION OF STRATA Bottom of borehole at 25.0 feet. Boring backfilled with hole plug and auger cuttings.</p>															

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 12.3 feet

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17RR-RW-14

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RETAINING WALL

17RW-05

PAGE 1 OF 2

STATION: 162+15 **OFFSET:** 61 ft LT
LATITUDE: 38.359298° N **LONGITUDE:** 77.471921° W
SURFACE ELEVATION: 217.7 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/17/2017 - 04/17/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Bill Miller/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 13.0 ft DEPTH
 ▽ STABILIZED AT 12.5 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		SAMPLE INTERVAL	ROCK			STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)		CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
2		3	3	75					
2.5	2	216	5	6	2				
2.5	4	214	10	10	4				
2	6	212	3	7	6				
8	8	210	14	14	8				
10	10	208	11	13	10				
12	12	206	11	13	10				
14	14	204	1	100	13				
16	16	202	1	100	15				
18	18	200	4	100	18				
20	20	198	4	100	20				
22	22	196	4	100	20				
24	24	194	8	100	23				

0.0 / 217.7
 Orange-brown and gray, FAT CLAY (CH), firm, moist

Orange-brown and gray, FAT CLAY (CH), very stiff, moist

Orange-brown and gray, FAT CLAY (CH), firm, moist

Orange-brown and gray, FAT CLAY (CH), very stiff, moist

7.5 / 210.2
 Orange-brown and gray, fine to medium CLAYEY SAND (SC), medium dense, moist

Orange-brown and gray, fine to medium CLAYEY SAND (SC), very loose, wet

Orange-brown and gray, fine to medium CLAYEY SAND (SC), loose, wet

Orange-brown and gray, fine to medium CLAYEY SAND (SC), medium dense, wet

		36.1	
		22.5	
67	44	33.2	91.3
		11.2	
		13.4	
		25.9	
		30.0	
		22.0	14.0

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17RW-05

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RETAINING WALL

17RW-05

PAGE 2 OF 2

STATION: 162+15 **OFFSET:** 61 ft LT
LATITUDE: 38.359298° N **LONGITUDE:** 77.471921° W
SURFACE ELEVATION: 217.7 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/17/2017 - 04/17/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Bill Miller/HDR

GROUND WATER

▼ FIRST ENCOUNTERED AT 13.0 ft DEPTH
 ▼ STABILIZED AT 12.5 ft

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)
 FINES CONTENT -#200 (%)

FIELD DESCRIPTION OF STRATA

LL PI

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK					STRATA LEGEND		
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °		STRATA	JOINTS
	26	192				25						
	28	190	8			28						
			25 50/1"	100		29.1						

Orange-brown and gray, fine to medium CLAYEY SAND (SC), very dense, wet

Bottom of borehole at 29.1 feet.
 Boring backfilled with auger cuttings.

26.8

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17RW-05

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RETAINING WALL

17RW-06

PAGE 1 OF 3

STATION: 159+37 **OFFSET:** 30 ft LT
LATITUDE: 38.358593° N **LONGITUDE:** 77.472300° W
SURFACE ELEVATION: 227.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/03/2017 - 04/03/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Taylor Redmond/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 42.5 ft DEPTH
 ▽ STABILIZED AT 20.3 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
	1	227.5	1	90					
3.5	2	226	1	90					
	3	224	5	95					
3	4	224	10	13					
	5	222	4	90					
6	6	222	6	14					
	7	220	9	100					
8	8	220	10	100					
	9	218	7	100					
10	10	218	8	12					
	11	216							
12	12	216							
	13	214	4	100					
14	14	214	6	100					
	15	212	6	100					
16	16	212	8						
	17	210							
18	18	210	2	90					
	19	208	3	90					
20	20	208	4	12					
	21	206							
22	22	206							
	23	204	1.75	100					
24	24	204	2	100					
	25		3	100					
	26		5	100					

0.0 / 227.5
 6" Topsoil

0.5 / 227.0
 Brown, FAT CLAY WITH SAND (CH), contains organic material, soft, moist
 Brown and gray, SANDY FAT CLAY (CH), contains organic material, stiff, moist

Brown, gray and red, mottled, SANDY FAT CLAY (CH), stiff, moist

6.0 / 221.5
 Brown and gray, fine CLAYEY SAND (SC), medium dense, moist

Brown and red, fine to medium CLAYEY SAND (SC), medium dense, moist

21.5 / 206.0
 Gray, SANDY FAT CLAY (CH), firm, moist

		17.0	
		17.9	
		24.4	
		13.6	
		12.8	
		8.7	17.5
		20.5	
		25.1	

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 29.3 feet

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17RW-06

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GFJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RETAINING WALL

17RW-06

PAGE 2 OF 3

STATION: 159+37 **OFFSET:** 30 ft LT
LATITUDE: 38.358593° N **LONGITUDE:** 77.472300° W
SURFACE ELEVATION: 227.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/03/2017 - 04/03/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Taylor Redmond/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 42.5 ft DEPTH
 ▽ STABILIZED AT 20.3 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		202							
	26								
	28	200	2						
	30	198	3	100					
	32	196							
	34	194	50/2"	100					
	36	192							
1.5	38	190	13						
	40	188	14	100					
	42	186	17						
	44	184	31	100					
	46	182							
	48	180	50/5"	100					

Gray, SANDY FAT CLAY (CH), firm, moist

26.5 / 201.0

Gray to yellow-brown, mottled, fine to coarse SILTY SAND (SM), loose, moist

Gray, fine SILTY SAND (SM), very dense, dry

36.5 / 191.0

Gray, SANDY FAT CLAY (CH), hard, moist

41.5 / 186.0

Gray and white, medium to coarse CLAYEY SAND (SC), very dense, wet

Gray to white, medium to coarse CLAYEY SAND (SC), very dense, wet

Bottom of borehole at 48.4 feet.

Shelby tube collected from an offset boring between

28	5	27.3	26.1
		20.7	
			26.2
			27.7
			26.7

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 29.3 feet

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17RW-06

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RETAINING WALL

17RW-06

PAGE 3 OF 3

STATION: 159+37 **OFFSET:** 30 ft LT
LATITUDE: 38.358593° N **LONGITUDE:** 77.472300° W
SURFACE ELEVATION: 227.5 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS					STRATA LEGEND
<p>Date(s) Drilled: 04/03/2017 - 04/03/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Josh Freeman/SaLUT, Inc. Logger: Taylor Redmond/HDR</p> <p style="text-align: center;">GROUND WATER</p> <p>▼ FIRST ENCOUNTERED AT 42.5 ft DEPTH ▼ STABILIZED AT 20.3 ft</p> <p style="text-align: center;">FIELD DESCRIPTION OF STRATA</p> <p>depths of 23.0 to 25.0 feet bgs. Boring backfilled with auger cuttings.</p>															

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 29.3 feet

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17RW-06

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8_30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RETAINING WALL

17RW-07

PAGE 1 OF 2

STATION: 125+68 **OFFSET:** 61 ft LT
LATITUDE: 38.351372° N **LONGITUDE:** 77.479545° W
SURFACE ELEVATION: 222.2 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 03/29/2017 - 03/30/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Kohltan Heiter, EIT/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 9.0 ft DEPTH
 ▽ STABILIZED AT 11.0 ft

FIELD DESCRIPTION OF STRATA

LL	PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		14.5	
		14.3	
		30.1	
		27.6	
		26.9	
		34.5	
		27.7	8.1
		24.5	
		24.6	

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
2.25	1	222	1	90					
	2	220	1	75					
	4	218	1	3					
1.5	6	216	2	100					
0.5	8	214	2	100					
1.25	10	212	1	100					
	12	210	7						
	14	208	5	100					
	16	206							
	18	204	4	100					
	20	202	4	22					
	22	200	5						
	24	198	8	100					
2.5	24.5	197.7	9	14					

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 20.5 feet

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17RW-07

SPT_LOGABW\VDOT_TRANSURBAN_95_FRED_EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RETAINING WALL

17RW-08

PAGE 1 OF 3

STATION: 122+77 **OFFSET:** 44 ft LT
LATITUDE: 38.350751° N **LONGITUDE:** 77.480182° W
SURFACE ELEVATION: 215.1 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 03/30/2017 - 03/30/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Taylor Redmond/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 17.5 ft DEPTH
 ▽ STABILIZED AT 3.0 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		SAMPLE INTERVAL	ROCK			STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)		CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
		214	3	90					
	2	212	2	100	2				
	4	210	1	100	4				
	6	208	13	65	6				
	8	206	8	100	8				
	10	204	10	100	10				
	12	202	11	100	13				
	14	200	14	100	15				
	16	198	3	100	18				
	18	196	5	100	20				
	20	194	6	100	23				
	22	192	7	100					
	24		14	100					

0.0 / 215.1
 3" Topsoil
 0.3 / 214.8
 Brown, medium to coarse CLAYEY SAND (SC), loose, moist
 Brown, fine to medium CLAYEY SAND (SC), loose, moist
 Brown, fine to medium CLAYEY SAND (SC), very loose, moist
 Brown, fine to medium CLAYEY SAND (SC), contains lenses of clay from 7.4 to 8.0 feet, dense, moist
 Brown, fine to coarse CLAYEY SAND WITH GRAVEL (SC), contains mica, medium dense, moist
 Brown, fine to coarse CLAYEY SAND (SC), medium dense, moist
 Brown to white, fine to medium CLAYEY SAND (SC), medium dense, wet
 21.5 / 193.6
 Gray, FAT CLAY (CH), very stiff, moist

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17RW-08

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GFJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RETAINING WALL

17RW-08

PAGE 2 OF 3

STATION: 122+77 **OFFSET:** 44 ft LT
LATITUDE: 38.350751° N **LONGITUDE:** 77.480182° W
SURFACE ELEVATION: 215.1 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 03/30/2017 - 03/30/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Taylor Redmond/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 17.5 ft DEPTH
 ▽ STABILIZED AT 3.0 ft

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

FIELD DESCRIPTION OF STRATA

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
	25								
	26	188							
4.5	28	186	12	100					
	30	184	19	100					
	32	182	24	100					
3	34	180	30	100					
	36	178	7	100					
	38	176	10	100					
	40	174	19	100					
	42	172	32	100					
4.5	44	170	9	100					
	46	168	17	100					
	48	166	26	100					
4.5	50	166	42	100					

25

Gray and brown, mottled, FAT CLAY (CH), hard, moist

31.5 / 183.6

Gray, CLAYEY SAND (SC), medium dense, moist

36.5 / 178.6

Gray, FAT CLAY (CH), hard, moist

Gray and red, mottled, FAT CLAY (CH), hard, dry

Gray, FAT CLAY (CH), hard, dry

		23.9	
45	24	27.3	24.5
		27.2	
		29.5	
		29.9	

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RETAINING WALL

17RW-08

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STATION: 122+77 **OFFSET:** 44 ft LT
LATITUDE: 38.350751° N **LONGITUDE:** 77.480182° W
SURFACE ELEVATION: 215.1 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						50									
<p>Date(s) Drilled: 03/30/2017 - 03/30/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Josh Freeman/SaLUT, Inc. Logger: Taylor Redmond/HDR</p> <p style="text-align: center;">GROUND WATER</p> <p>▼ FIRST ENCOUNTERED AT 17.5 ft DEPTH ▼ STABILIZED AT 3.0 ft</p> <p style="text-align: center;">FIELD DESCRIPTION OF STRATA</p> <p>Bottom of borehole at 50.0 feet. Boring backfilled with auger cuttings.</p>															

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RETAINING WALL

17RW-09

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STATION: 113+94 **OFFSET:** 242 ft LT
LATITUDE: 38.349388° N **LONGITUDE:** 77.482802° W
SURFACE ELEVATION: 202.9 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/27/2017 - 04/27/2017

LAB DATA

Drilling Method(s): Mud Rotary w/ SPT
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Thomas Williams/S&ME, Inc.
 Logger: Russell Kanith/HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ▽ STABILIZED AT 5.0 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		202	2	80					
		200	5	80					
		198	8	100					
		196	7	100					
		194	8	100					
		192							
		190	9	100					
		188	15	100					
		186							
		184	10	100					
		182							
		180	8	100					
		178	14	100					

0.0 / 202.9
 2" Root Mat
 0.2 / 202.7
 Orange-brown, CLAYEY SAND (SC), contains clay lenses, loose, moist
 2.5 / 200.4
 Gray and brown, mottled, FAT CLAY WITH SAND (CH), stiff, dry
 Gray and brown, mottled, FAT CLAY WITH SAND (CH), very stiff, dry
 Blue-gray, FAT CLAY (CH), dry
 Blue-gray, FAT CLAY (CH), very stiff, dry
 Brown, FAT CLAY (CH), very stiff, dry
 Dark red-brown and gray, mottled, FAT CLAY (CH), very stiff, dry
 Brown and gray, mottled, FAT CLAY (CH), hard, dry

		24.2	
		22.8	
		29.9	
		27.0	
		26.2	
80	49	31.9	99.8
		29.7	
		23.4	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 31.9 feet

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17RW-09

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RETAINING WALL

17RW-09

PAGE 2 OF 2

STATION: 113+94 **OFFSET:** 242 ft LT
LATITUDE: 38.349388° N **LONGITUDE:** 77.482802° W
SURFACE ELEVATION: 202.9 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/27/2017 - 04/27/2017	Drilling Method(s): Mud Rotary w/ SPT	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Thomas Williams/S&ME, Inc.	Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER NOT ENCOUNTERED DURING DRILLING ↓ STABILIZED AT 5.0 ft									
											FIELD DESCRIPTION OF STRATA				LL	PI				
	26	176																		
	28	174	11	14	16	19	100										41	23	24.8	85.3
	30	172																		
	32	170	15	20	27	35	100												31.6	
	34	168																		
	36	166																		
	38	164	12	15	21	28	100												20.8	
	40																			
											Bottom of borehole at 40.0 feet. Boring backfilled with onsite soils and hole plug.									

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 31.9 feet

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17RW-09

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



STATION: 357+31 **OFFSET:** 155 ft LT
LATITUDE: 38.402291° N **LONGITUDE:** 77.433251° W
SURFACE ELEVATION: 175.1 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 05/10/2017 - 05/10/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Kohltan Heiter, EIT/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN									
											FIELD DESCRIPTION OF STRATA				LL	PI				
		174									0.0 / 175.1	5.3" Asphalt								
2	3	172	6	75							0.4 / 174.7	18" Aggregate Subbase								
1.5	4	170	3	7							1.9 / 173.2	Fill, Dark brown and gray, mottled, SANDY FAT CLAY (CH), stiff, moist						22.7		
4.5	6	168	9	100							4.5 / 170.6	Light gray and tan, mottled, fine SILTY SAND (SM), medium dense, moist						22.0		
4.5	8	166	22	100							6.0 / 169.1	Gray and brown, mottled, FAT CLAY (CH), hard, dry	64	40	25.9	99.1				
4.5	10	164	15	100								Gray and brown, mottled, FAT CLAY (CH), very stiff, dry					25.4			
12	12		9	75														27.7		
											Bottom of borehole at 12.0 feet. Bulk sample collected from 2.0 to 8.0 feet bgs. Boring backfilled with pea gravel and concrete.									

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 6 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
 LOCATION: Stafford County, Virginia
 STRUCTURE: SBGP REALIGNMENT

17SBGP-02

PAGE 1 OF 1

STATION: 349+82
 LATITUDE: 38.400360° N
 SURFACE ELEVATION: 196.0 ft

OFFSET: 113 ft LT
 LONGITUDE: 77.434073° W
 COORD. DATUM: NAD 83

FIELD DATA										LAB DATA			
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION						
									GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN				
									FIELD DESCRIPTION OF STRATA	LL	PI		
5		7	85					0.0 / 196.0 Fill, Brown and gray, CLAYEY SAND (SC), contains cinder block fragments, medium dense, dry			11.8		
2	194	5	11	2				2.0 / 194.0 Orange-brown, fine CLAYEY SAND (SC), contains mica, medium dense, dry			16.3		
4	192	4	10	4							18.2		
6	190	6	8	6				Orange-brown, fine to coarse CLAYEY SAND (SC), medium dense, moist			15.4		
8	188	3	7	8				Orange-brown, fine to coarse CLAYEY SAND (SC), contains layers of clay, medium dense, moist			14.2	23.4	
10	186	8	100	10				Bottom of borehole at 10.0 feet. Boring backfilled with auger cuttings.					

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 8.3 feet

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17SBGP-02

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/17



STATION: 344+89 OFFSET: 110 ft LT
 LATITUDE: 38.399140° N LONGITUDE: 77.434782° W
 SURFACE ELEVATION: 207.3 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/18/2017 - 04/18/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Thomas Williams/S&ME, Inc.	Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER									
											NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN									
											FIELD DESCRIPTION OF STRATA				LL	PI				
		3									0.0 / 207.3	Fill, Brown and gray, CLAYEY SAND (SC), contains mica, loose, moist						15.1		
	2	206	3	85								Fill, Brown and gray, CLAYEY SAND (SC), contains mica, medium dense, moist						9.4		
	2	204	3	100							3.5 / 203.8	Gray, LEAN CLAY (CL), moist Brown-orange, LEAN CLAY WITH SAND (CL), stiff, moist						23.1		
	4	202	6	95							6.3 / 201.0	Orange-brown and gray, mottled, fine to coarse CLAYEY SAND (SC), medium dense, moist Orange-brown and gray, mottled, to gray, fine to coarse CLAYEY SAND (SC), medium dense, moist						21.3	23.8	
	4	200	7	100								Orange-brown and gray, mottled, fine to coarse CLAYEY SAND (SC), medium dense, moist						18.3		
	8	198	6	95								Bottom of borehole at 15.0 feet. Boring backfilled with auger cuttings.								
	10	196	9	100																
	10	194	7	100																
	14		8																	
			9																	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 14 feet **PAGE 1 OF 1**

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 337+70 **OFFSET:** 154 ft LT
LATITUDE: 38.397471° N **LONGITUDE:** 77.436074° W
SURFACE ELEVATION: 247.5 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK					STRATA LEGEND	Date(s) Drilled: 04/19/2017 - 04/19/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Thomas Williams/S&ME, Inc.	Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS											
											GROUND WATER NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS									
											FIELD DESCRIPTION OF STRATA				LL	PI				
											0.0 / 247.5	4" Topsoil and Root Mat						7.0		
	2	246	1	85	2						0.3 / 247.2	Red-brown, POORLY GRADED SAND WITH CLAY (SP-SC), very loose, dry						6.0		
	4	244	1	70	4													7.2		
	6	242	2	45	6													5.5		
	8	240	3	30	8						6.0 / 241.5	Pink-brown, fine to coarse WELL GRADED SAND WITH CLAY (SW-SC), loose, dry						8.4	10.0	
	10	238	2	40	10							Pink-brown, fine to coarse WELL GRADED SAND WITH CLAY (SW-SC), loose, dry								
	12	236																		
	14	234	8	80	13							Pink-brown, fine to coarse WELL GRADED SAND WITH CLAY (SW-SC), dense, dry						7.1		
	16	232	15	5	14.5						14.5 / 233.0	Brown and gray, mottled, LEAN CLAY (CL), moist								
	18	230	3	5	18						16.5 / 231.0	Tan-brown, CLAYEY SAND (SC), loose, dry						17.4		
	20	228	2	2	20															
	22	226																		
	24	224	3	100	23							Tan-brown, fine CLAYEY SAND (SC), loose, moist						22.8		

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 38.2 feet



STATION: 337+70 OFFSET: 154 ft LT
 LATITUDE: 38.397471° N LONGITUDE: 77.436074° W
 SURFACE ELEVATION: 247.5 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				FIELD DESCRIPTION OF STRATA	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA					
	26	222												
	28	220	5											
	30	218	7	100								27.9		
	34	214	8	100								31.0	38.0	
	38	210	6	100								32.7		
	40	208	9	100										
Bottom of borehole at 40.0 feet. Boring backfilled with auger cuttings.														

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 38.2 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004-061810:8/8/17



STATION: 332+77 OFFSET: 74 ft LT
 LATITUDE: 38.396207° N LONGITUDE: 77.436702° W
 SURFACE ELEVATION: 223.1 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK					STRATA LEGEND	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA					
										GROUND WATER				
										NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN				
										FIELD DESCRIPTION OF STRATA				
										0.0 / 223.1				
		222								7.3" Asphalt				
										0.6 / 222.5				
	2		30							10.7" Aggregate Subbase				
										1.5 / 221.6				
		220	8	7	15					Fill, Dark gray, fine to coarse POORLY GRADED GRAVEL WITH SAND (GP), medium dense, moist			16.2	
	3.5	4	4	7										
										4.0 / 219.1				
		218	5	8	75					Brown, SANDY LEAN CLAY (CL), stiff, moist			15.1	
	2	6	4	9										
										6.0 / 217.1				
		216	5	6	100					Light gray and brown, fine to medium CLAYEY SAND (SC), contains mica, medium dense, dry			13.8	
	1.5	8	3	8										
										Brown and gray, fine CLAYEY SAND (SC), contains mica, medium dense, dry			16.8	35.8
		214	6	7	85									
	1.5	10	3	8										
										Brown, fine CLAYEY SAND (SC), contains mica, medium dense, dry			20.2	
		212	5	8	75									
	2	12												
										Brown, fine CLAYEY SAND (SC), contains mica, medium dense, moist				
		210	4	10	100								16.6	
	14		8											
		208	8											
	16													
		206												
	4.5	18	3							Brown and gray, mottled, fine to medium CLAYEY SAND (SC), medium dense, moist			13.6	49.4
		204	9	15	100							40	27	
		20	14											
										Bottom of borehole at 20.0 feet. Boring backfilled with pea gravel and concrete.				

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GFJ:8.30.004:061810:8/8/17

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 12 feet



STATION: 330+34 **OFFSET:** 174 ft LT
LATITUDE: 38.395798° N **LONGITUDE:** 77.437450° W
SURFACE ELEVATION: 186.4 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	GROUND WATER			
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA		JOINTS	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
Date(s) Drilled: 05/03/2017 - 05/03/2017										Date(s) Drilled: 05/03/2017 - 05/03/2017				
Drilling Method(s): 3.25" HSA w/ SPTs										Drilling Method(s): 3.25" HSA w/ SPTs				
SPT Method: Automatic Hammer										SPT Method: Automatic Hammer				
Other Test(s): Not Applicable										Other Test(s): Not Applicable				
Driller: Josh Freeman/SaLUT, Inc.										Driller: Josh Freeman/SaLUT, Inc.				
Logger: Bill Miller/HDR										Logger: Bill Miller/HDR				
GROUND WATER										GROUND WATER				
FIRST ENCOUNTERED AT 18.0 ft DEPTH										FIRST ENCOUNTERED AT 18.0 ft DEPTH				
NO LONG TERM MEASUREMENTS TAKEN										NO LONG TERM MEASUREMENTS TAKEN				
FIELD DESCRIPTION OF STRATA										FIELD DESCRIPTION OF STRATA				
		186.6	6	50						0.0 / 186.4				
	2	184.1	2	75						Yellow-brown and brown, fine to medium CLAYEY SAND (SC), medium dense, moist			16.1	
	4	182.2	3	75						Yellow-brown and brown, fine to medium CLAYEY SAND (SC), loose, moist			32.7	
	6	180.4	4	75						6.0 / 180.4			20.2	
	8	178.2	7	100						Yellow-brown and gray, mottled, FAT CLAY (CH), stiff, moist	74	49	34.5	90.4
	10	176.6	8	100									33.7	
	12	174.4	13	100						11.5 / 174.9			15.5	
	14	172.2	15	100						White and orange-brown, fine to medium SILTY SAND (SM), medium dense, moist			26.1	27.9
	16	170.0	18	50						White and orange-brown, fine to medium SILTY SAND (SM), medium dense, wet			19.3	
	18	168.0	12	50										
	20	166.0	15	100										
	22	164.0	23	100										
	24	162.0	14	100										

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 21 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GFJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SBGP-06**
 LOCATION: Stafford County, Virginia
 STRUCTURE: SBGP REALIGNMENT **PAGE 2 OF 2**

STATION: 330+34 OFFSET: 174 ft LT
 LATITUDE: 38.395798° N LONGITUDE: 77.437450° W
 SURFACE ELEVATION: 186.4 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA									
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				Date(s) Drilled: 05/03/2017 - 05/03/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Josh Freeman/SaLUT, Inc.	Logger: Bill Miller/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA										
										GROUND WATER FIRST ENCOUNTERED AT 18.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN									
										FIELD DESCRIPTION OF STRATA				LL	PI				
	26	160				25				White and orange-brown, fine to medium SILTY SAND (SM), medium dense, wet Bottom of borehole at 30.0 feet. Shelby tube collected from an offset boring between depths of 6.0 to 8.0 feet bgs. Boring backfilled with auger cuttings.									
	28	158	7			28													
	30		7	10	100	30													

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 21 feet

PAGE 2 OF 2

17SBGP-06

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 326+64 **OFFSET:** 104 ft LT
LATITUDE: 38.394858° N **LONGITUDE:** 77.437961° W
SURFACE ELEVATION: 214.7 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK					STRATA LEGEND	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS					
<p>Date(s) Drilled: 05/11/2017 - 05/11/2017 Drilling Method(s): 2.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Will Riddick/GET Solutions, Inc Logger: Kohltan Heiter, EIT/HDR</p>											<p>GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p>			
<p>FIELD DESCRIPTION OF STRATA</p>											LL	PI		
		214												
	2	212	4	75	2									
	2	210	4	100	4									
	1	208	2	100	6									
	3	206	3	100	8									
	1.5	204	2	100	10									
		202	2	100	12									
	3	200	2	100	13									
			5		15									
<p>Bottom of borehole at 15.0 feet. Boring backfilled with pea gravel and concrete.</p>														

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 7.5 feet



STATION: 321+82 OFFSET: 141 ft LT
 LATITUDE: 38.393860° N LONGITUDE: 77.439046° W
 SURFACE ELEVATION: 208.2 ft COORD. DATUM: NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK					STRATA LEGEND	Date(s) Drilled: 05/11/2017 - 05/11/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Kohltan Heiter, EIT/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
		208																		
1.5	2	206.2	2		2															
	3			50																
	4			3																
2	4	204.1	1		4															
	3			55																
	4			4																
2.5	6	202.3	3		6															
	6			100																
	8			8																
2	8	200.2	2		8															
	7			100																
	6			7																
1.5	10	198.2	2		10															
	4			85																
	5			6																
	6																			
	12																			
											FIELD DESCRIPTION OF STRATA 0.0 / 208.2 6.8" Asphalt 0.6 / 207.6 12.2" Aggregate Subbase 1.6 / 206.6 <i>Fill</i> , Brown and gray, fine CLAYEY SAND (SC), contains mica, contains asphalt fragments, loose, moist 6.0 / 202.2 Brown, SANDY LEAN CLAY (CL), contains mica, contains organic matter, stiff, moist 8.0 / 200.2 Brown, FAT CLAY WITH SAND (CH), contains mica, stiff, moist 10.0 / 198.2 Brown, fine CLAYEY SAND (SC), contains mica, loose, moist Bottom of borehole at 12.0 feet. Boring backfilled with pea gravel and concrete.				LL	PI				
													10.5							
											30	18	14.6	33.0						
													11.2							
													18.7							
													13.9							

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: SOUND WALL

17SW-01

PAGE 1 OF 2

STATION: 357+06
LATITUDE: 38.401940° N
SURFACE ELEVATION: 177.8 ft

OFFSET: 150 ft RT
LONGITUDE: 77.432281° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/21/2017 - 04/21/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Ray Norwood/S&ME, Inc.
 Logger: Randy Bliefernich/GET Solutions, Inc.

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 24 HRS

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
LL	PI		

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK						
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA	JOINTS	STRATA LEGEND
2	176	3	50								
4	174	6	90								
6	172	7	90								
8	170	11	90								
10	168	14	65								
12	166										
14	164	11	100								
16	162										
18	160	6	65								
20	158	17									
22	156										
24	154	14	100								

0.0 / 177.8
 2" Topsoil
 0.2 / 177.6
 Red-tan, fine to coarse CLAYEY SAND (SC), loose, moist
 Red-tan, fine to coarse CLAYEY SAND (SC), medium dense, moist
 Red-tan, fine to coarse CLAYEY SAND (SC), medium dense, dry
 Red-tan, fine CLAYEY SAND (SC), medium dense, dry
 11.5 / 166.3
 Red-tan, SANDY FAT CLAY (CH), very stiff, dry
 16.5 / 161.3
 Gray, fine SILTY SAND (SM), medium dense, moist

		11.9	
		15.0	
		10.0	
		8.6	
		19.3	
60	33	17.7	59.9
		38.3	
		23.8	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

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17SW-01

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: SOUND WALL

17SW-01

PAGE 2 OF 2

STATION: 357+06
LATITUDE: 38.401940° N
SURFACE ELEVATION: 177.8 ft

OFFSET: 150 ft RT
LONGITUDE: 77.432281° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/21/2017 - 04/21/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Ray Norwood/S&ME, Inc.
Logger: Randy Bliefernich/GET Solutions, Inc.

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 24 HRS

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK							
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA	JOINTS	STRATA LEGEND
26	152				25						
28	150	5	77		28						
		17 50/4"			29.3						

Gray, fine SILTY SAND (SM), very dense, moist

Bottom of borehole at 29.3 feet.
 Boring backfilled with auger cuttings.

16.9

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

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17SW-01

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: SOUND WALL

17SW-02

PAGE 1 OF 2

STATION: 352+62
LATITUDE: 38.400786° N
SURFACE ELEVATION: 162.6 ft

OFFSET: 153 ft RT
LONGITUDE: 77.432837° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/20/2017 - 04/20/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Ray Norwood/S&ME, Inc.
 Logger: Randy Bliefernich/GET Solutions, Inc.

GROUND WATER

▼ FIRST ENCOUNTERED AT 28.0 ft DEPTH
 ▼ STABILIZED AT 19.8 ft

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

FIELD DESCRIPTION OF STRATA

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °		STRATA
162	162	3	90							
2	160	2	75							
4	158	3	6							
6	156	5	8							
8	154	4	10							
10	152	6	11							
12	150	3	13							
14	148	5	15							
16	146	6	18							
18	144	3	18							
20	142	4	20							
22	140	6	23							
24	138	10	21							

DEPTH (ft)	ELEVATION (ft)	FIELD DESCRIPTION OF STRATA	LL	PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
0.0	162.6	2" Topsoil			14.1	
0.2	162.4	Red and tan, fine to coarse CLAYEY SAND (SC), contains organic matter, loose, moist			12.9	
4.0	158.6	Gray, fine POORLY GRADED SAND (SP), loose, moist			30.9	
6.0	156.6	Gray and tan, mottled, fine to medium CLAYEY SAND (SC), medium dense, moist			7.0	
		Gray, fine to medium CLAYEY SAND (SC), medium dense, moist			24.5	
		Gray, fine to medium CLAYEY SAND (SC), medium dense, moist	30	17	24.9	42.4
					17.6	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

PAGE 1 OF 2

17SW-02

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: SOUND WALL

17SW-02

PAGE 2 OF 2

STATION: 352+62 **OFFSET:** 153 ft RT
LATITUDE: 38.400786° N **LONGITUDE:** 77.432837° W
SURFACE ELEVATION: 162.6 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA									
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	GROUND WATER									
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °		STRATA	JOINTS	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)				
26	136				25														
28	134	2			28														
30		4	12	100	30														
		16																	
										FIELD DESCRIPTION OF STRATA				LL	PI				
										Gray, fine to medium CLAYEY SAND (SC), medium dense, moist 26.5 / 136.1									
										Gray, fine to coarse POORLY GRADED SAND (SP), medium dense, wet 20.0									
										Bottom of borehole at 30.0 feet. Boring backfilled with auger cuttings.									

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

PAGE 2 OF 2

17SW-02

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: SOUND WALL

17SW-03

PAGE 1 OF 2

STATION: 345+97 **OFFSET:** 161 ft RT
LATITUDE: 38.399084° N **LONGITUDE:** 77.433764° W
SURFACE ELEVATION: 207.8 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/20/2017 - 04/20/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Ray Norwood/S&ME, Inc.
 Logger: Randy Bलिएfnich/GET Solutions, Inc.

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 28.0 ft DEPTH
 ▽ STABILIZED AT 21.2 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
2		1	1	60					
		206	2	2					
		204	6	65					
		202	8	85					
4.5	8	200	8	75					
		198	12	75					
		196	5	85					
		194	7	85					
		192	8	100					
		190	5	100					
		188	7	100					
		186	11	100					
		184	4	100					

0.0 / 207.8 2" Topsoil			
0.2 / 207.6 Brown, LEAN CLAY WITH SAND (CL), contains organic matter, soft, moist		16.4	
2.0 / 205.8 Brown, fine to medium CLAYEY SAND (SC), loose, moist		9.7	
4.0 / 203.8 Tan, fine to coarse POORLY GRADED SAND (SP), medium dense, moist		7.2	
6.0 / 201.8 Tan, fine to medium CLAYEY SAND (SC), contains organic matter, loose, moist		16.7	
8.2 / 199.6 Red-brown, LEAN CLAY WITH SAND (CL), very stiff, moist		14.2	
11.5 / 196.3 Tan, fine to medium CLAYEY SAND (SC), medium dense, moist		14.5	35.1
21.5 / 186.3 Red and tan, mottled, fine to medium CLAYEY SAND (SC), medium dense, moist		34.1	
3.25 / 184 Gray and brown, mottled, FAT CLAY (CH), stiff, moist		31.5	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

PAGE 1 OF 2

17SW-03

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GFJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: SOUND WALL

17SW-03

PAGE 2 OF 2

STATION: 345+97 **OFFSET:** 161 ft RT
LATITUDE: 38.399084° N **LONGITUDE:** 77.433764° W
SURFACE ELEVATION: 207.8 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/20/2017 - 04/20/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Ray Norwood/S&ME, Inc.
 Logger: Randy Bliefernich/GET Solutions, Inc.

GROUND WATER

- ▼ FIRST ENCOUNTERED AT 28.0 ft DEPTH
- ▼ STABILIZED AT 21.2 ft

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK					STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	DIP °		
		182									
	26	182									
4.5	28	180	6								
			12								
			19								
			25	100							
	30	178									

Gray and brown, mottled, FAT CLAY (CH), hard, wet

80 48 32.1 99.9

Bottom of borehole at 30.0 feet.
 Boring backfilled with auger cuttings.

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

PAGE 2 OF 2

17SW-03

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: SOUND WALL

17SW-04

PAGE 1 OF 2

STATION: 339+99 **OFFSET:** 167 ft RT
LATITUDE: 38.397593° N **LONGITUDE:** 77.434707° W
SURFACE ELEVATION: 241.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/20/2017 - 04/20/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Ray Norwood/S&ME, Inc.
 Logger: Randy Bलिएfnich/GET Solutions, Inc.

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 24 HRS

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		240	2	60					
	2	238	2	75					
	4	236	5	65					
	6	234	3	75					
3.5	8	232	6	65					
	10	230	16	22					
	12	228	3	85					
4.5	14	226	6	15					
	16	224							
	18	222	5	90					
	20	220	5	8					
	22	218	6						
	24	216	6	100					

0.0 / 241.0 2" Topsoil				
0.2 / 240.8 Red-brown, fine to coarse POORLY GRADED SAND (SP), loose, moist			12.3	
Red-brown, fine to coarse POORLY GRADED SAND (SP), medium dense, moist			9.7	
4.0 / 237.0 Red-brown, fine CLAYEY SAND (SC), loose, moist			17.0	
Red and tan, mottled, fine CLAYEY SAND (SC), medium dense, moist			15.6	
Red and tan, mottled, fine to coarse CLAYEY SAND (SC), dense, dry	20	8	8.1	38.5
Tan, fine to coarse CLAYEY SAND (SC), medium dense, dry			20.8	
Tan and gray, fine CLAYEY SAND (SC), medium dense, moist			10.6	
21.5 / 219.5				
Tan and gray, LEAN CLAY WITH SAND (CL), stiff, moist			11.6	73.1

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

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17SW-04

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: SOUND WALL

17SW-04

PAGE 2 OF 2

STATION: 339+99 **OFFSET:** 167 ft RT
LATITUDE: 38.397593° N **LONGITUDE:** 77.434707° W
SURFACE ELEVATION: 241.0 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA									
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				Date(s) Drilled: 04/20/2017 - 04/20/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Ray Norwood/S&ME, Inc.	Logger: Randy Bliefernich/GET Solutions, Inc.	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °										
	26	214				25													
	28	212	5			28													
	30		6	7	100	30												22.5	
										GROUND WATER									
										NOT ENCOUNTERED DURING DRILLING									
										DRY AFTER 24 HRS									
										FIELD DESCRIPTION OF STRATA				LL	PI				
										Tan and gray, LEAN CLAY WITH SAND (CL), stiff, moist									
										Bottom of borehole at 30.0 feet. Boring backfilled with auger cuttings.									

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

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17SW-04

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: SOUND WALL

17SW-05

PAGE 1 OF 2

STATION: 137+47 **OFFSET:** 209 ft LT
LATITUDE: 38.354034° N **LONGITUDE:** 77.477175° W
SURFACE ELEVATION: 221.8 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/25/2017 - 04/25/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Thomas Williams/S&ME, Inc.
 Logger: Russell Kanith/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 9.5 ft DEPTH
 ▽ STABILIZED AT 1.0 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		
		15.7	
		15.5	
		13.4	
		17.7	
		25.4	13.9
		29.6	
		21.3	
82	52	30.3	99.1

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
			1						
			1	90					
			2						
	2	220	1	85					
			3						
	4	218	3						
			4						
	6	216	4						
			4						
	8	214	5						
			5						
	10	212	3	100					
			3						
	12	210							
			3						
	14	208	1	100					
			3						
	16	206							
			2						
	18	204	3						
			5						
	20	202	11	80					
			9						
	22	200							
4.5	24	198	6	85					
			9						
			13						

0.0 / 221.8
 5" Topsoil and Root Mat
 0.4 / 221.4
 Brown, CLAYEY SAND (SC), contains root fragments, very loose, moist
 Brown to orange-brown, CLAYEY SAND (SC), contains root fragments, very loose, moist
 Orange-brown, CLAYEY SAND (SC), loose, moist
 Red and gray, mottled, fine to coarse CLAYEY SAND (SC), loose, wet
 Red and gray, mottled, to blue-gray and dark brown, fine to coarse CLAYEY SAND (SC), loose, wet
 Red-brown, CLAYEY SAND (SC), medium dense, wet
 21.5 / 200.3
 Blue-gray and brown, mottled, FAT CLAY (CH), stiff, dry

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 17.6 feet

PAGE 1 OF 2

17SW-05

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: SOUND WALL

17SW-06

PAGE 1 OF 2

STATION: 133+53 **OFFSET:** 215 ft LT
LATITUDE: 38.353250° N **LONGITUDE:** 77.478096° W
SURFACE ELEVATION: 230.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/25/2017 - 04/25/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 27.5 ft DEPTH
 ▽ STABILIZED AT 15.4 ft

FIELD DESCRIPTION OF STRATA

LL	PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		18.2	
		34.3	
41	24	20.2	60.7
		19.8	
		25.5	
		16.6	
		19.0	
		21.9	17.0

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
			1						
			2	85					
			1						
			2	85					
1.25	2	228	2	80	2				
			2		2.5				
			3						
			4						
1.5	4	226	2	80	4				
			4						
			7						
			11						
6	6	224	4	90	6				
			6						
			10						
			10						
8	8	222	3	100	8				
			5						
			6						
			9						
10	10	220	6	100	10				
			9						
			13						
12	12	218	5	85	13				
			7						
			9						
			8						
14	14	216	7	85	15				
			9						
			8						
16	16	214	8	85	15				
			8						
			18						
18	18	212	4	90	18				
			7						
			6						
			7						
20	20	210	7	90	20				
			7						
			23						
22	22	208	2	90	23				
			2						
			1						
			4						
24	24	206	1	90	23				
			4						
			5						

0.0 / 230.0
 4" Topsoil and Root Mat
 0.3 / 229.7
 Tan-brown, fine CLAYEY SAND (SC), very loose, moist
 2.5 / 227.5
 Brown, SANDY LEAN CLAY (CL), firm, moist
 Brown, SANDY LEAN CLAY (CL), stiff, moist
 6.4 / 223.6
 Tan-brown, CLAYEY SAND (SC), contains mica, medium dense, moist
 Tan-brown, CLAYEY SAND (SC), contains layers of clay, contains mica, medium dense, moist
 Gray, fine to coarse CLAYEY SAND (SC), loose, moist

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 22 feet

PAGE 1 OF 2

17SW-06

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: SOUND WALL

17SW-06

PAGE 2 OF 2

STATION: 133+53 **OFFSET:** 215 ft LT
LATITUDE: 38.353250° N **LONGITUDE:** 77.478096° W
SURFACE ELEVATION: 230.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/25/2017 - 04/25/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 27.5 ft DEPTH
 ▽ STABILIZED AT 15.4 ft

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		26.3	

FIELD DESCRIPTION OF STRATA

LL	PI
----	----

Brown and gray, mottled, fine CLAYEY SAND WITH GRAVEL (SC), contains clay layer from 29.8 to 30.0 feet bgs, loose, wet

Bottom of borehole at 30.0 feet.
 Boring backfilled with auger cuttings.

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °		STRATA
	25										
	26	204									
	27	203	4								
	28	202	3								
	29	201	5								
	30	200	6	100							

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 22 feet

PAGE 2 OF 2

17SW-06

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: SOUND WALL

17SW-08

PAGE 1 OF 2

STATION: 131+76 **OFFSET:** 150 ft RT
LATITUDE: 38.352216° N **LONGITUDE:** 77.477570° W
SURFACE ELEVATION: 245.2 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 05/02/2017 - 05/02/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Bill Miller/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 29.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		5							
		6							
		244	7	100					
		7							
		242	8	100					
		9							
		242	12	100					
		9							
		240	19	100					
		5							
		240	22	100					
		8							
		238	12	100					
		8							
		236	10	100					
		14							
		234	14	100					
		12							
		232	6	100					
		14							
		230	9	100					
		12							
		228	12	100					
		18							
		226	10	100					
		20							
		224	12	100					
		22							
		222	7	100					
		24							
		222	6	100					
		24							
		222	7	100					
		24							

0.0 / 245.2
 2" Topsoil

0.2 / 245.0
 Orange-brown, LEAN CLAY WITH SAND (CL), stiff, moist

3.0 / 242.2
 Orange-brown, fine to medium CLAYEY SAND (SC), dense, moist

Orange-brown and gray, mottled, fine to medium CLAYEY SAND (SC), medium dense, moist

Orange-brown, mottled, fine to medium CLAYEY SAND (SC), medium dense, moist

Orange-brown and gray, mottled, fine to medium CLAYEY SAND (SC), medium dense, moist

19.0 / 226.2
 Orange-brown and gray, mottled, LEAN CLAY WITH SAND (CL), moist

24.0 / 221.2
 Yellow-brown, fine to medium SILTY SAND (SM),

		22.3	
		12.2	
		11.1	
		10.9	38.6
		13.2	
		20.7	
		26.9	
		11.3	

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17SW-08

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GFJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: SOUND WALL

17SW-08

PAGE 2 OF 2

STATION: 131+76 **OFFSET:** 150 ft RT
LATITUDE: 38.352216° N **LONGITUDE:** 77.477570° W
SURFACE ELEVATION: 245.2 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 05/02/2017 - 05/02/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 29.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK															
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	DIP °									
		220																		
	26																			
		218																		
	28		5																	
		216	4	6	100															
	30		6																	

moist

Yellow-brown, fine to medium SILTY SAND (SM), medium dense, wet

Bottom of borehole at 30.0 feet.
 Boring backfilled with auger cuttings.

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17SW-08

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: SOUND WALL

17SW-09

PAGE 1 OF 2

STATION: 125+80 **OFFSET:** 144 ft RT
LATITUDE: 38.351018° N **LONGITUDE:** 77.478986° W
SURFACE ELEVATION: 232.0 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 05/01/2017 - 05/01/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Josh Freeman/SaLUT, Inc.	Logger: Bill Miller/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER									
											▼ FIRST ENCOUNTERED AT 10.5 ft DEPTH ▼ STABILIZED AT 24.5 ft									
											FIELD DESCRIPTION OF STRATA				LL	PI				
0.25			1								0.0 / 232.0									
			1								3" Topsoil									
			1								0.3 / 231.7									
3	2	230	3								Yellow-brown and gray-brown, SANDY LEAN CLAY (CL), soft, moist								15.9	
			4								Yellow-brown and gray-brown, SANDY LEAN CLAY (CL), stiff, moist								18.7	
3.5	4	228	6								Yellow-brown and gray-brown, SANDY LEAN CLAY (CL), very stiff, moist								22.6	
			7																	
			10																	
6	226		5																	
			7																	
			9																	
8	224		3								7.0 / 225.0									
			3								Gray-brown and white, medium to coarse CLAYEY SAND (SC), loose, moist									
			6																	
10	222		4																	
			4																	
12	220																			
			2								11.5 / 220.5									
			2								White and yellow-brown, fine to coarse SILTY SAND (SM), loose, wet									
14	218		4																	
			4																	
16	216																			
			2																	
18	214		1								White and yellow-brown, fine to coarse SILTY SAND (SM), very loose, wet									
			1																	
20	212		2																	
			2																	
22	210																			
			5																	
24	208		4								White and yellow-brown, fine to coarse SILTY SAND (SM), loose, wet									
			4																	
			4																	

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

PAGE 1 OF 2

17SW-09

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
 LOCATION: Stafford County, Virginia
 STRUCTURE: SOUND WALL

17SW-10

PAGE 2 OF 2

STATION: 122+58 OFFSET: 180 ft RT
 LATITUDE: 38.350297° N LONGITUDE: 77.479651° W
 SURFACE ELEVATION: 214.6 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/02/2017 - 05/02/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Bill Miller/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 29.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		18.1	

FIELD DESCRIPTION OF STRATA

Orange-brown, fine to coarse CLAYEY SAND (SC), medium dense, wet

Bottom of borehole at 30.0 feet.
 Boring backfilled with auger cuttings.

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
	25								
	26	188							
	28	186	4	100					
	30		4	6					

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

PAGE 2 OF 2

17SW-10

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 567+85 **OFFSET:** 63 ft LT
LATITUDE: 38.455599° N **LONGITUDE:** 77.408641° W
SURFACE ELEVATION: 129.5 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/24/2017 - 04/24/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Brice Bahhar/GET Solutions, Inc	Logger: Joe Wallen, PE/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											NOT ENCOUNTERED DURING DRILLING									
											STABILIZED AT 22.1 ft									
											FIELD DESCRIPTION OF STRATA				LL	PI				
3		3	4	50							0.0 / 129.5									
	2.25	128	4	4	2						Fill, Brown and gray, LEAN CLAY WITH GRAVEL (CL), firm, moist							23.2		
	4	126	3	50	4													16.4		
	6	124	2	55	6						4.0 / 125.5	33	20					16.9	52.5	
	8	122	2	60	8						6.0 / 123.5							19.0		
	10	120	2	40	10						Fill, Brown, fine to medium CLAYEY SAND (SC), loose, moist							16.6		
	12	118	2	60	12						6.0 / 123.5							16.6		
	14	116	2	40	14						Fill, Gray and brown, LEAN CLAY WITH GRAVEL (CL), contains root fragments, soft, moist							22.9		
	16	114	2	40	16															
	18	112	2	40	18						11.5 / 118.0									
	20	110	2	40	20						Light brown, LEAN CLAY WITH SAND (CL), very stiff, moist							15.2	71.7	
	22	108	2	40	22															
	24	106	2	40	24						16.5 / 113.0							25.6		
																		16.9		

REMARKS: Rig Type: CME 55 ATV Track Rig.

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-01**
 LOCATION: Stafford County, Virginia
 STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 567+85 OFFSET: 63 ft LT
 LATITUDE: 38.455599° N LONGITUDE: 77.408641° W
 SURFACE ELEVATION: 129.5 ft COORD. DATUM: NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						25									
<p>Date(s) Drilled: 04/24/2017 - 04/24/2017 Drilling Method(s): 2.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Brice Bahhar/GET Solutions, Inc Logger: Joe Wallen, PE/HDR</p> <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING ↓ STABILIZED AT 22.1 ft</p> <p>FIELD DESCRIPTION OF STRATA Bottom of borehole at 25.0 feet. Bulk sample collected from 0.0-8.0 feet bgs. Piezometer installed to a depth of 23.2 feet bgs (screened 13.2 to 23.2 feet bgs).</p>															

REMARKS: Rig Type: CME 55 ATV Track Rig. **PAGE 2 OF 2**
17SWM-01

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



STATION: 558+38 **OFFSET:** 70 ft LT
LATITUDE: 38.453028° N **LONGITUDE:** 77.408151° W
SURFACE ELEVATION: 71.3 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA												
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK					STRATA LEGEND	Date(s) Drilled: 04/27/2017 - 04/27/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Brice Bahhar/GET Solutions, Inc	Logger: Joe Wallen, PE/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)		
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA												JOINTS	GROUND WATER
3.75		2	10	75							0.0 / 71.3	1" Topsoil										
2	2	70	8	7	2						0.1 / 71.2	Brown, SANDY SILT (ML), very stiff, moist							10.0			
	4	68	9	7	4						3.0 / 68.3	Brown, fine to medium CLAYEY SAND WITH GRAVEL (SC), moist							14.6			
	6	66	5	7	6						0.1 / 71.2	Brown, fine to medium CLAYEY SAND (SC), loose, moist							18.0			
	8	64	2	4	8						6.5 / 64.8	Brown, SANDY LEAN CLAY (CL), firm, moist							23.6			
	10	62	3	5	10						7.7 / 63.6	Yellow-brown, fine to medium CLAYEY SAND (SC), moist							23.0			
	12	60	4	3	13							Brown and gray, mottled, fine to medium CLAYEY SAND (SC), loose, moist										
	14	58	7	4	15							Yellow-brown, fine to coarse CLAYEY SAND (SC), medium dense, wet							19.3			
	16	56	4	6	18																	
	18	54	5	9	20							Brown and gray, stratified, fine to medium CLAYEY SAND (SC), medium dense, wet							37	15	24.4	21.2
	20	52	14	16	23																	
	22	50																				
	24	48	17	28	24.5							Brown and gray, stratified, fine to medium CLAYEY SAND (SC), very dense, moist							29.0			
			50/6"	100								Bottom of borehole at 24.5 feet.										

REMARKS: Rig Type: CME 55 ATV Track Rig. **PAGE 1 OF 2**

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-02**
LOCATION: Stafford County, Virginia
STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 558+38 **OFFSET:** 70 ft LT
LATITUDE: 38.453028° N **LONGITUDE:** 77.408151° W
SURFACE ELEVATION: 71.3 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS					DIP °
<p>Date(s) Drilled: 04/27/2017 - 04/27/2017 Drilling Method(s): 2.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Brice Bahhar/GET Solutions, Inc Logger: Joe Wallen, PE/HDR</p> <p style="text-align: center;">GROUND WATER</p> <p>▼ FIRST ENCOUNTERED AT 13.0 ft DEPTH ▼ STABILIZED AT 16.8 ft</p> <p style="text-align: center;">FIELD DESCRIPTION OF STRATA</p> <p>Piezometer installed to a depth of 23.8 feet bgs (screened 13.8 to 23.8 feet bgs).</p>															

REMARKS: Rig Type: CME 55 ATV Track Rig. **PAGE 2 OF 2**
17SWM-02

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



STATION: 542+91 **OFFSET:** 161 ft RT
LATITUDE: 38.448834° N **LONGITUDE:** 77.408028° W
SURFACE ELEVATION: 207.4 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/19/2017 - 04/19/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Brice Bahhar/GET Solutions, Inc	Logger: Joe Wallen, PE/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER									
											FIELD DESCRIPTION OF STRATA 0.0 / 207.4 10" Topsoil 0.8 / 206.6 Brown, SANDY LEAN CLAY (CL), soft, moist Brown, SANDY LEAN CLAY (CL), firm, moist 2.0 / 204.4 Brown, SANDY LEAN CLAY (CL), contains root fragments, firm, moist 4.0 / 202.2 Brown, SANDY LEAN CLAY (CL), soft, moist 6.0 / 200.0 Tan, fine to coarse SILTY SAND WITH GRAVEL (SM), loose, wet 8.0 / 199.4 11.5 / 195.9 Gray, FAT CLAY (CH), contains slickensides, hard, dry 14.8 / 192.6 Yellow-brown, fine to medium CLAYEY SAND (SC), moist 18.0 / 188.0 Tan to gray, fine CLAYEY SAND (SC), medium dense, moist 21.5 / 185.9 Gray, fine to coarse POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), dense, wet									
											LL	PI								

REMARKS: Rig Type: CME 55 ATV Track Rig.

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-03**
 LOCATION: Stafford County, Virginia
 STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 542+91 OFFSET: 161 ft RT
 LATITUDE: 38.448834° N LONGITUDE: 77.408028° W
 SURFACE ELEVATION: 207.4 ft COORD. DATUM: NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						25									
<p>Date(s) Drilled: 04/19/2017 - 04/19/2017 Drilling Method(s): 2.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Brice Bahhar/GET Solutions, Inc Logger: Joe Wallen, PE/HDR</p> <p>GROUND WATER FIRST ENCOUNTERED AT 8.0 ft DEPTH DRY AFTER 24 HRS</p> <p>FIELD DESCRIPTION OF STRATA Bottom of borehole at 25.0 feet. Piezometer installed to a depth of 22.7 feet bgs (screened 12.7 to 22.7 feet bgs).</p>															

REMARKS: Rig Type: CME 55 ATV Track Rig. **PAGE 2 OF 2**
17SWM-03

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 522+68 **OFFSET:** 130 ft LT
LATITUDE: 38.443507° N **LONGITUDE:** 77.409504° W
SURFACE ELEVATION: 40.9 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/18/2017 - 04/18/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Brice Bahhar/GET Solutions, Inc	Logger: Joe Wallen, PE/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
			WOH																	
	40		1	80							0.0 / 40.9									
	2		1								3.5" Topsoil							24.1		
	38		1	80							0.3 / 40.6							18.3		
	4		5								Yellow-brown, fine to medium SILTY SAND (SM), very loose, moist									
	36		13	90							Yellow-brown, fine to coarse SILTY SAND WITH GRAVEL (SM), dense, wet							12.0		
	6		20								Yellow-brown, fine to coarse SILTY SAND (SM), dense, wet							19.1		
	34		24	60																
	8		18																	
	32		2	19																
4.5			5	95							9.0 / 31.9							28.2		
	10		9								Gray, FAT CLAY (CH), moist									
	30		10																	
	12										11.5 / 29.4									
	28		8								Yellow-brown to gray, fine to medium SILTY SAND (SM), dense, wet							22.0	15.6	
	14		15	100																
	26		21																	
	22		22																	
	16																			
	24		7								Gray, fine to medium SILTY SAND (SM), dense, wet									
	18		15	100																
	22		17																	
	20		21																	
	20																			
	22																			
	18		10																	
	24		17	85																
	16		19																	
			25																	

REMARKS: Rig Type: CME 55 ATV Track Rig. **PAGE 1 OF 2**

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-04**
 LOCATION: Stafford County, Virginia
 STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 522+68 OFFSET: 130 ft LT
 LATITUDE: 38.443507° N LONGITUDE: 77.409504° W
 SURFACE ELEVATION: 40.9 ft COORD. DATUM: NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						25									
<p>Date(s) Drilled: 04/18/2017 - 04/18/2017 Drilling Method(s): 2.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Brice Bahhar/GET Solutions, Inc Logger: Joe Wallen, PE/HDR</p> <p>GROUND WATER ▾ FIRST ENCOUNTERED AT 4.0 ft DEPTH ▾ STABILIZED AT 3.0 ft</p> <p>FIELD DESCRIPTION OF STRATA</p> <p>Bottom of borehole at 25.0 feet. Bulk sample collected from 0.3 to 9.0 feet bgs. Piezometer installed to a depth of 23 feet bgs (screened 13.0 to 23.0 feet bgs).</p>															

REMARKS: Rig Type: CME 55 ATV Track Rig. **PAGE 2 OF 2**
17SWM-04

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-05**
 LOCATION: Stafford County, Virginia
 STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 517+81 OFFSET: 114 ft LT
 LATITUDE: 38.442263° N LONGITUDE: 77.410051° W
 SURFACE ELEVATION: 48.6 ft COORD. DATUM: NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
<p>Date(s) Drilled: 04/11/2017 - 04/11/2017 Drilling Method(s): 2.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Brice Bahhar/GET Solutions, Inc Logger: Kohltan Heiter, EIT/HDR</p> <p style="text-align: center;">GROUND WATER</p> <p>▼ FIRST ENCOUNTERED AT 13.0 ft DEPTH ▼ STABILIZED AT 15.0 ft</p> <p style="text-align: center;">FIELD DESCRIPTION OF STRATA</p> <p>dry</p> <p>Bottom of borehole at 24.2 feet. Piezometer installed to a depth of 24.2 feet bgs (screened 14.2 to 24.2 feet bgs).</p>															

REMARKS: Rig Type: CME 55 ATV Track Rig.

PAGE 2 OF 2

17SWM-05

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



STATION: 500+88 **OFFSET:** 88 ft LT
LATITUDE: 38.438073° N **LONGITUDE:** 77.412553° W
SURFACE ELEVATION: 75.5 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA					
<p>GROUND WATER NOT ENCOUNTERED DURING DRILLING ↓ STABILIZED AT 15.0 ft</p>										<p>FIELD DESCRIPTION OF STRATA</p>				
1.5		2	1	75						0.0 / 75.5				
		74	2							4" Topsoil			15.9	
2			3	20	2					0.3 / 75.2			17.0	
		72	4							Brown, LEAN CLAY WITH SAND (CL), contains root fragments, soft, moist				
2.5			5							Brown, LEAN CLAY WITH SAND (CL), contains root fragments, stiff, moist				
		70	6	100	4					4.0 / 71.5			19.0	
		68	8							Dark brown, SANDY FAT CLAY (CH), contains mica, stiff, moist				
		66	10	80	6					5.7 / 69.8			20.6	17.7
		64	11							Orange and brown, stratified, fine to medium CLAYEY SAND (SC), moist				
1.75		62	13	50/4"	13					Orange, gray and red, stratified, fine to medium CLAYEY SAND (SC), contains mica, medium dense, moist			21.0	
		60	14		13.8					8.0 / 67.5			22.3	
		58	18							Orange and gray, stratified, fine to coarse POORLY GRADED SAND (SP), contains mica, medium dense, moist				
1.5		56	7	100	18					11.5 / 64.0			25.5	20.7
		54	9							Orange, gray and red, fine to medium CLAYEY SAND (SC), contains mica, very dense, moist				
		52	13							Orange and gray, stratified, fine to medium CLAYEY SAND (SC), contains mica, medium dense, moist				
2		50	17		20					Orange and gray, mottled, fine to medium CLAYEY SAND (SC), contains mica, moist			24.7	
		48	17		23					Blue-gray, fine to coarse CLAYEY SAND (SC),				

REMARKS: Rig Type: CME 45C ATV Track Rig.

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-06**
LOCATION: Stafford County, Virginia
STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 500+88 **OFFSET:** 88 ft LT
LATITUDE: 38.438073° N **LONGITUDE:** 77.412553° W
SURFACE ELEVATION: 75.5 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						25									
<p>Date(s) Drilled: 04/04/2017 - 04/04/2017 Drilling Method(s): Mud Rotary w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Will Riddick/GET Solutions, Inc Logger: Kohltan Heiter, EIT/HDR</p> <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING ↓ STABILIZED AT 15.0 ft</p> <p>FIELD DESCRIPTION OF STRATA contains mica, moist Bottom of borehole at 25.0 feet. Piezometer installed to a depth of 25.0 feet bgs (screened 15.0 to 25.0 feet bgs).</p>															

REMARKS: Rig Type: CME 45C ATV Track Rig. **PAGE 2 OF 2**
17SWM-06

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



STATION: 472+45 **OFFSET:** 101 ft LT
LATITUDE: 38.431107° N **LONGITUDE:** 77.417032° W
SURFACE ELEVATION: 90.4 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/13/2017 - 04/13/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Brice Bahhar/GET Solutions, Inc
Logger: Kohltan Heiter, EIT/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ▽ STABILIZED AT 3.9 ft

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		90	WOH						
			2	90					
			2						
		88	1	4	2				
			3						
			4	100					
		86	3	6	4				
			5						
			5	100					
		84	4	8	6				
			6						
			10	100					
		82	7	11	8				
			11						
			14	100					
			17						
		80			10				
		78							
			6		13				
			11						
		76	15	100					
			20		15				
		74							
		72	9		18				
			14						
			16	100					
			22		20				
		70							
		68							
			7		23				
			10						
		66	15	100	24				
			19						

0.0 / 90.4
 3" Topsoil
 0.3 / 90.1
 Brown and gray, mottled, FAT CLAY WITH SAND (CH), contains mica, contains organic matter, soft, moist
 Brown and gray, mottled, FAT CLAY WITH SAND (CH), contains mica, contains organic matter, firm, moist
 Red and gray, mottled, FAT CLAY WITH SAND (CH), contains mica, stiff, moist
 Dark red and gray, mottled, FAT CLAY WITH SAND (CH), contains mica, very stiff, dry
 Dark red and gray, mottled, FAT CLAY (CH), contains mica, very stiff, dry
 Dark red, FAT CLAY (CH), contains mica, very stiff, dry
 Gray and dark red, mottled, FAT CLAY (CH), contains mica, very stiff, dry

		19.9	
		19.0	
		33.9	
		27.2	
		25.9	
		23.2	
74	48	26.7	100.0
		31.6	

REMARKS: Rig Type: CME 55 ATV Track Rig.

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-07**
LOCATION: Stafford County, Virginia
STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 472+45 **OFFSET:** 101 ft LT
LATITUDE: 38.431107° N **LONGITUDE:** 77.417032° W
SURFACE ELEVATION: 90.4 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						25									
<p>Date(s) Drilled: 04/13/2017 - 04/13/2017 Drilling Method(s): 2.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Brice Bahhar/GET Solutions, Inc Logger: Kohltan Heiter, EIT/HDR</p> <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING ↓ STABILIZED AT 3.9 ft</p> <p>FIELD DESCRIPTION OF STRATA Bottom of borehole at 25.0 feet. Piezometer installed to a depth of 24.9 feet bgs (screened 14.9 to 24.9 feet bgs).</p>															

REMARKS: Rig Type: CME 55 ATV Track Rig.

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-08**
 LOCATION: Stafford County, Virginia
 STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 400+27 OFFSET: 149 ft RT
 LATITUDE: 38.413176° N LONGITUDE: 77.427579° W
 SURFACE ELEVATION: 155.9 ft COORD. DATUM: NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						24.9									
<p>GROUND WATER NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS</p> <p>FIELD DESCRIPTION OF STRATA Bottom of borehole at 24.9 feet. Piezometer installed to a depth of 24.9 feet bgs (screened 14.9 to 24.9 feet bgs).</p>															

Date(s) Drilled: 04/24/2017 - 04/24/2017
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Ray Norwood/S&ME, Inc.
 Logger: Randy Bliefernich/GET Solutions, Inc.

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 386+98 **OFFSET:** 142 ft RT
LATITUDE: 38.409814° N **LONGITUDE:** 77.429223° W
SURFACE ELEVATION: 124.3 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/21/2017 - 04/21/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Ray Norwood/S&ME, Inc.	Logger: Randy Bliefernich/GET Solutions, Inc.	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
										NOT ENCOUNTERED DURING DRILLING										
										STABILIZED AT 8.5 ft										
										FIELD DESCRIPTION OF STRATA						LL	PI			
2		124	1								0.0 / 124.3									
			2								3" Topsoil								17.9	
			4	65							0.3 / 124.0									
	2	122	3								Red and brown, LEAN CLAY (CL), contains organic matter, firm, moist									
			2								2.0 / 122.3									
			3	75							Gray and tan, mottled, fine to medium CLAYEY SAND (SC), loose, moist									
	4	120	3																	
			4	65																
			4																	
	6	118	4																	
			7																	
			9	90																
	8	116	3																	
			6																	
			9	100																
			9																	
	10	114		19																
	12	112																		
			5																	
			13																	
	14	110		26																
				50/5"																
	16	108																		
	18	106	4																	
			7																	
			10	100																
			10																	
	20	104		14																
	22	102																		
			5																	
	24	100		12																
				8																
				18																

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-09**
LOCATION: Stafford County, Virginia
STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 386+98 **OFFSET:** 142 ft RT
LATITUDE: 38.409814° N **LONGITUDE:** 77.429223° W
SURFACE ELEVATION: 124.3 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						25									
<p>Date(s) Drilled: 04/21/2017 - 04/21/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Ray Norwood/S&ME, Inc. Logger: Randy Bliefernich/GET Solutions, Inc.</p> <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING ↓ STABILIZED AT 8.5 ft</p> <p>FIELD DESCRIPTION OF STRATA Bottom of borehole at 25.0 feet. Piezometer installed to a depth of 25.0 feet bgs (screened 15.0 to 25.0 feet bgs).</p>															

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. **PAGE 2 OF 2**
17SWM-09

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 372+80 **OFFSET:** 265 ft LT
LATITUDE: 38.406413° N **LONGITUDE:** 77.432007° W
SURFACE ELEVATION: 105.9 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA											
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 05/01/2017 - 05/01/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Brice Bahhar/GET Solutions, Inc	Logger: Taylor Redmond/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA												JOINTS
			WOH/12"																		
	0.5	104	1	75							0.0 / 105.9	8" Topsoil						21.0			
	1.5	102	1	90							0.7 / 105.2	Gray and brown, fine to medium CLAYEY SAND (SC), very loose, moist						24.1			
	6	100	1	90							2.0 / 103.9	Gray and brown, SANDY LEAN CLAY (CL), soft, moist						32.3			
	8	98	2	75							4.0 / 101.9	Gray and brown, FAT CLAY WITH SAND (CH), soft, wet						17.5			
	10	96	4	15							6.0 / 99.9	Brown, fine to coarse POORLY GRADED SAND (SP), medium dense, wet						42.5			
	14	92	8	100							8.0 / 97.9	Red and brown, FAT CLAY (CH), very stiff, wet						77	50	31.7	99.5
	18	88	10	100							16.5 / 89.4	Red and gray, FAT CLAY (CH), very stiff, wet						25.1			
	22	84	14	100								Gray, fine to medium CLAYEY SAND (SC), medium dense, wet						26.2	16.6		
	24	82	16	100								Gray, fine to medium CLAYEY SAND (SC), medium dense, wet									

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-10**
 LOCATION: Stafford County, Virginia
 STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 372+80 OFFSET: 265 ft LT
 LATITUDE: 38.406413° N LONGITUDE: 77.432007° W
 SURFACE ELEVATION: 105.9 ft COORD. DATUM: NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						25									
<p>Date(s) Drilled: 05/01/2017 - 05/01/2017 Drilling Method(s): 2.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Brice Bahhar/GET Solutions, Inc Logger: Taylor Redmond/HDR</p> <p>GROUND WATER ▾ FIRST ENCOUNTERED AT 5.5 ft DEPTH ▾ STABILIZED AT 1.5 ft</p> <p>FIELD DESCRIPTION OF STRATA</p> <p>Bottom of borehole at 25.0 feet. Piezometer installed to a depth of 23.0 feet bgs (screened 13.0 to 23.0 feet bgs).</p>															

REMARKS: Rig Type: CME 55 ATV Track Rig.

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-11**
LOCATION: Stafford County, Virginia
STRUCTURE: STORM WATER POND **PAGE 1 OF 2**

STATION: 357+14 **OFFSET:** 44 ft LT
LATITUDE: 38.402142° N **LONGITUDE:** 77.432906° W
SURFACE ELEVATION: 164.3 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/05/2017 - 04/05/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Thomas Williams/S&ME, Inc.	Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
		164.3	3																	
		162.4	4	70							0.0 / 164.3									
		160.3	5	75							6" Topsoil and Root Mat									
		158.3	6	80							0.5 / 163.8									
		156.2	8	60							Fill, Brown tan, CLAYEY SAND (SC), loose, moist									
		154.3	10								Fill, Brown tan, CLAYEY SAND (SC), contains wood fragments, medium dense, moist									
		152.3	12								3.5 / 160.8									
		150.3	14								Tan, fine CLAYEY SAND (SC), contains mica, loose, moist									
		148.3	16								Tan, fine to medium CLAYEY SAND (SC), contains mica, loose, moist									
		146.3	18								Tan, fine to medium CLAYEY SAND (SC), contains clay lenses, contains mica, loose, moist									
		144.3	20								11.5 / 152.8									
		142.3	22								Gray brown, mottled, FAT CLAY (CH), contains mica, very stiff, dry									
		140.3	24																	

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-11**
LOCATION: Stafford County, Virginia
STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 357+14 **OFFSET:** 44 ft LT
LATITUDE: 38.402142° N **LONGITUDE:** 77.432906° W
SURFACE ELEVATION: 164.3 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						25									
<p>Date(s) Drilled: 04/05/2017 - 04/05/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Thomas Williams/S&ME, Inc. Logger: Russell Kanith/HDR</p> <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING ↓ STABILIZED AT 12.0 ft</p> <p>FIELD DESCRIPTION OF STRATA Bottom of borehole at 25.0 feet. Piezometer installed to a depth of 25.0 feet bgs (screened 20.0 to 25.0 feet bgs).</p>															

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. **PAGE 2 OF 2**
17SWM-11

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 353+19 **OFFSET:** 256 ft LT
LATITUDE: 38.401353° N **LONGITUDE:** 77.434084° W
SURFACE ELEVATION: 204.3 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA									
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		SAMPLE INTERVAL	ROCK			STRATA LEGEND	Date(s) Drilled: 04/18/2017 - 04/18/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Thomas Williams/S&ME, Inc.	Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)		CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
										NOT ENCOUNTERED DURING DRILLING				DRY AFTER 48 HRS					
										FIELD DESCRIPTION OF STRATA				LL	PI				
1		204	2	65						0.0 / 204.3									
			3							4" Topsoil and Root Mat							32.2		
2	2	202	3	70	2					0.3 / 204.0									
			3		2.5					Brown-tan, LEAN CLAY (CL), firm, moist									
			4							Brown-tan, LEAN CLAY (CL), contains mica, firm, moist							21.8		
3.25	4	200	3	85	4					5.0 / 199.3									
			5							Brown and gray, mottled, CLAYEY SAND (SC), contains clay layers, moist							20.8		
	6	198	5	100	6					7.2 / 197.1									
			6							Gray, SILT (ML), dry									
4	8	196	4	35	8					8.0 / 196.3									
			5							Brown and gray, mottled, SANDY FAT CLAY (CH), stiff, moist					61	31	22.1	57.2	
			5																
	10	194	9		10					11.5 / 192.8									
			9							Brown and gray, mottled, WELL GRADED SAND WITH CLAY (SW-SC), medium dense, moist									
	12	192	4	100	13														
			5																
	14	190	5	100	15														
			5																
	16	188	8		18					16.5 / 187.8									
			8							Brown and gray, mottled, fine POORLY GRADED SAND WITH CLAY (SP-SC), medium dense, moist									
	18	186	4	100	20														
			7																
	20	184	9		23														
			9																
	22	182	3																
			3																
	24	180	5	100															
			7							Gray, fine POORLY GRADED SAND WITH CLAY (SP-SC), medium dense, moist									
			9																

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. **PAGE 1 OF 2**

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-12**
 LOCATION: Stafford County, Virginia
 STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 353+19 OFFSET: 256 ft LT
 LATITUDE: 38.401353° N LONGITUDE: 77.434084° W
 SURFACE ELEVATION: 204.3 ft COORD. DATUM: NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						25									
<p>Date(s) Drilled: 04/18/2017 - 04/18/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Thomas Williams/S&ME, Inc. Logger: Russell Kanith/HDR</p> <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING DRY AFTER 48 HRS</p> <p>FIELD DESCRIPTION OF STRATA Bottom of borehole at 25.0 feet. Piezometer installed to a depth of 25.0 feet bgs (screened 20.0 to 25.0 feet bgs).</p>															

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. **PAGE 2 OF 2**
17SWM-12

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 322+62 **OFFSET:** 317 ft LT
LATITUDE: 38.394324° N **LONGITUDE:** 77.439371° W
SURFACE ELEVATION: 162.2 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/19/2017 - 04/19/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Thomas Williams/S&ME, Inc.	Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER ▽ FIRST ENCOUNTERED AT 13.0 ft DEPTH ▽ STABILIZED AT 6.8 ft									
FIELD DESCRIPTION OF STRATA											LL	PI								
		162	1								0.0 / 162.2									
			1	75							4" Root Mat							19.7		
	2	160	2								0.3 / 161.9									
			3	65							Brown-gray, CLAYEY SAND (SC), contains clay layer 1.7 to 1.8 feet bgs, very loose, moist									
	2.25	158	4								2.0 / 160.2									
			5	85							Orange-brown and gray, mottled, LEAN CLAY (CL), firm, moist									
			3								Orange-brown and gray, mottled, LEAN CLAY WITH SAND (CL), firm, moist									
	2	156	5																	
			3	100							6.5 / 155.7									
			5								Gray and orange-brown, fine to coarse CLAYEY SAND (SC), loose, moist									
	8	154	4								Gray and orange-brown, fine to coarse CLAYEY SAND (SC), medium dense, moist									
			5	100																
			5																	
	10	152	6																	
	12	150																		
			4																	
			5	100							White-gray and brown, mottled, fine to coarse CLAYEY SAND (SC), medium dense, wet									
	14	148	7																	
			7																	
	16	146																		
	18	144	4																	
			8																	
			7	100							White-gray and brown, mottled, fine to coarse CLAYEY SAND (SC), medium dense, wet									
	20	142	7																	
	22	140																		
			5																	
	24	138	5																	
			6	100																
			8																	

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-13**
LOCATION: Stafford County, Virginia
STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 322+62 **OFFSET:** 317 ft LT
LATITUDE: 38.394324° N **LONGITUDE:** 77.439371° W
SURFACE ELEVATION: 162.2 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						25									
<p>Date(s) Drilled: 04/19/2017 - 04/19/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Thomas Williams/S&ME, Inc. Logger: Russell Kanith/HDR</p> <p>GROUND WATER ▾ FIRST ENCOUNTERED AT 13.0 ft DEPTH ▾ STABILIZED AT 6.8 ft</p> <p>FIELD DESCRIPTION OF STRATA</p> <p>Bottom of borehole at 25.0 feet. Bulk sample collected from 0.0 to 15.0 feet bgs. Piezometer installed to a depth of 25.0 feet bgs (screened 20.0 to 25.0 feet bgs).</p>															

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. **PAGE 2 OF 2**
17SWM-13

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: STORM WATER POND

17SWM-14

PAGE 1 OF 2

STATION: 281+99 **OFFSET:** 164 ft LT
LATITUDE: 38.385701° N **LONGITUDE:** 77.448226° W
SURFACE ELEVATION: 143.3 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/03/2017 - 04/03/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

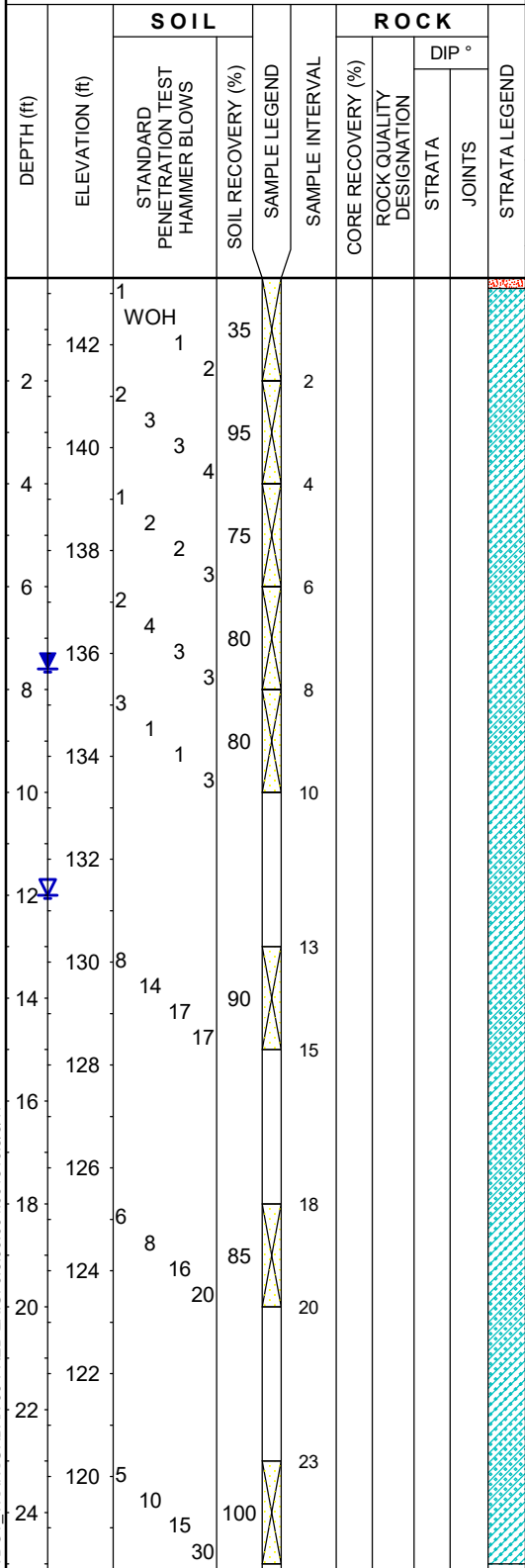
LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		17.3	
		16.8	
		15.6	
		12.1	
		17.8	17.7
		19.7	
		27.2	
		23.8	

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 12.0 ft DEPTH
 ▽ STABILIZED AT 7.6 ft

FIELD DESCRIPTION OF STRATA

LL PI



0.0 / 143.3
 2" Topsoil
 0.2 / 143.1
 Brown, fine to coarse CLAYEY SAND (SC), very loose, moist
 Brown-gray, fine to coarse CLAYEY SAND (SC), loose, moist
 Brown, fine to coarse CLAYEY SAND (SC), loose, moist
 Brown to brown-gray, fine to coarse CLAYEY SAND (SC), very loose, moist
 Gray and brown, mottled, fine to medium CLAYEY SAND (SC), contains layer of fat clay 13.8 to 14.1 feet bgs, dense, wet
 Gray and brown, mottled, fine to medium CLAYEY SAND (SC), contains layer of fat clay 18.8 to 19.1 feet bgs, medium dense, wet
 Gray and brown, mottled, fine to medium CLAYEY SAND (SC), contains lenses of fat clay, medium dense, wet

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

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17SWM-14

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-15**
LOCATION: Stafford County, Virginia
STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 262+15 **OFFSET:** 153 ft LT
LATITUDE: 38.381846° N **LONGITUDE:** 77.453047° W
SURFACE ELEVATION: 84.6 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						25									
<p>Date(s) Drilled: 04/03/2017 - 04/03/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Thomas Williams/S&ME, Inc. Logger: Russell Kanith/HDR</p> <p>GROUND WATER ▾ FIRST ENCOUNTERED AT 16.5 ft DEPTH ▾ STABILIZED AT 4.3 ft</p> <p>FIELD DESCRIPTION OF STRATA angle of 30 degrees, hard, dry Bottom of borehole at 25.0 feet. Bulk sample collected from 0.0 to 15.0 feet bgs. Piezometer installed to a depth of 23.0 feet bgs (screened 18.0 to 23.0 feet bgs).</p>															

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. **PAGE 2 OF 2**
17SWM-15

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: STORM WATER POND

17SWM-16
PAGE 1 OF 2

STATION: 237+91 **OFFSET:** 157 ft LT
LATITUDE: 38.377344° N **LONGITUDE:** 77.459261° W
SURFACE ELEVATION: 73.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/13/2017 - 04/13/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		15.1	
		6.5	
		30.3	
		20.7	
		19.3	36.8
		29.5	
		24.0	18.5
		37.5	

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 4.5 ft DEPTH
 ▽ STABILIZED AT 2.2 ft

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
3	72	1	50					
6	70	3	50	2				
7	68	7	50	4				
8	66	8	50	6				
9	64	9	50	8				
10	62	4	50	6				
11	60	5	50	8				
12	58	6	50	10				
13	56	11	50	13				
14	54	11	50	15				
15	52	12	50	18				
16	50	17	50	20				
17	48	28	50	23				
18		27	50					
19		20	50					
20		22	50					
21		32	50					

0.0 / 73.0
 5" Topsoil
 0.4 / 72.6
 Orange-brown and brown, fine to medium CLAYEY SAND (SC), loose, moist
 Orange-brown and brown, fine to medium CLAYEY SAND (SC), medium dense, moist
 Orange-brown and brown, fine to medium CLAYEY SAND (SC), loose, wet
 Orange-brown and brown, fine to medium CLAYEY SAND (SC), contains clay layer 7.5 to 8.0 feet bgs, loose, wet
 8.0 / 65.0
 Brown, fine to coarse SILTY SAND (SM), medium dense, wet
 Gray and black, fine to coarse SILTY SAND (SM), contains mica, dense, moist

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

PAGE 1 OF 2
17SWM-16

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
 LOCATION: Stafford County, Virginia
 STRUCTURE: STORM WATER POND

17SWM-16

PAGE 2 OF 2

STATION: 237+91
 LATITUDE: 38.377344° N
 SURFACE ELEVATION: 73.0 ft

OFFSET: 157 ft LT
 LONGITUDE: 77.459261° W
 COORD. DATUM: NAD 83

FIELD DATA

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
					25				

Date(s) Drilled: 04/13/2017 - 04/13/2017
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Bill Miller/HDR

GROUND WATER

- ▼ FIRST ENCOUNTERED AT 4.5 ft DEPTH
- ▼ STABILIZED AT 2.2 ft

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

FIELD DESCRIPTION OF STRATA

Bottom of borehole at 25.0 feet.
 Piezometer installed to a depth of 23.0 feet bgs (screened 13.0 to 23.0 feet bgs).

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

PAGE 2 OF 2

17SWM-16

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-17**
 LOCATION: Stafford County, Virginia
 STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 227+13 OFFSET: 343 ft RT
 LATITUDE: 38.374399° N LONGITUDE: 77.460933° W
 SURFACE ELEVATION: 109.9 ft COORD. DATUM: NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS					STRATA LEGEND
<p>Date(s) Drilled: 05/02/2017 - 05/02/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Ray Norwood/S&ME, Inc. Logger: Taylor Redmond/HDR</p> <p style="text-align: center;">GROUND WATER</p> <p>▼ FIRST ENCOUNTERED AT 23.0 ft DEPTH ▼ STABILIZED AT 7.7 ft</p> <p style="text-align: center;">FIELD DESCRIPTION OF STRATA</p> <p>Piezometer installed to a depth of 24.0 feet bgs (screened 14.0 to 24.0 feet bgs).</p>															

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. **PAGE 2 OF 2**
17SWM-17

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 188+69 **OFFSET:** 162 ft RT
LATITUDE: 38.365720° N **LONGITUDE:** 77.467490° W
SURFACE ELEVATION: 216.4 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA											
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK					STRATA LEGEND	Date(s) Drilled: 05/02/2017 - 05/02/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Ray Norwood/S&ME, Inc.	Logger: Taylor Redmond/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS												GROUND WATER
											NOT ENCOUNTERED DURING DRILLING										
											STABILIZED AT 20.6 ft										
											FIELD DESCRIPTION OF STRATA						LL	PI			
2.75	216	2	2	80							0.0 / 216.4	12" Topsoil									
3.9	214	2	3	90	2						1.0 / 215.4	Brown, LEAN CLAY WITH SAND (CL), moist								22.3	
4	212	3	7	90	4						2.0 / 214.4	Gray and brown-red, SANDY FAT CLAY (CH), stiff, moist								18.9	
2.5	210	5	9	90	6						4.0 / 212.4	Brown, fine to coarse CLAYEY SAND WITH GRAVEL (SC), medium dense, moist								8.4	
8	208	4	10	90	8						6.0 / 210.4	Brown and gray, LEAN CLAY WITH SAND (CL), contains iron staining, stiff, moist								29.2	
10	206	10	14	90	10						8.0 / 208.4	Gray and brown, fine to medium CLAYEY SAND (SC), medium dense, moist								18.1	34.2
12	204	14	16	100	13							Gray, fine to medium CLAYEY SAND (SC), dense, moist								19.8	
14	202	16	19	100	15							Gray, fine CLAYEY SAND (SC), very dense, moist								19.5	
16	200	18	20	56	18																
18	198	14	33	50/4"	19.8																
20	196	20	20	100	20																
22	194	20	50/4"	100	23															15.7	
					23.8						Bottom of borehole at 23.8 feet. Piezometer installed to a depth of 23.0 feet bgs										

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GFJ:8.30.004:061810:8/8/17

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. **PAGE 1 OF 2**



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-18**
 LOCATION: Stafford County, Virginia
 STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 188+69 OFFSET: 162 ft RT
 LATITUDE: 38.365720° N LONGITUDE: 77.467490° W
 SURFACE ELEVATION: 216.4 ft COORD. DATUM: NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
<p>Date(s) Drilled: 05/02/2017 - 05/02/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Ray Norwood/S&ME, Inc. Logger: Taylor Redmond/HDR</p> <p style="text-align: center;">GROUND WATER NOT ENCOUNTERED DURING DRILLING ↓ STABILIZED AT 20.6 ft</p> <p style="text-align: center;">FIELD DESCRIPTION OF STRATA (screened 13.0 to 23.0 feet bgs).</p>															

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. **PAGE 2 OF 2**
17SWM-18

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-19**
LOCATION: Stafford County, Virginia
STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 178+44 **OFFSET:** 129 ft RT
LATITUDE: 38.363143° N **LONGITUDE:** 77.468928° W
SURFACE ELEVATION: 216.3 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						25									
<p>Date(s) Drilled: 05/01/2017 - 05/01/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Ray Norwood/S&ME, Inc. Logger: Randy Bliefernich/GET Solutions, Inc.</p> <p>GROUND WATER ▾ FIRST ENCOUNTERED AT 24.0 ft DEPTH ▾ STABILIZED AT 22.2 ft</p> <p>FIELD DESCRIPTION OF STRATA</p> <p>Gray and tan, fine to coarse CLAYEY SAND (SC), wet</p> <p>Bottom of borehole at 25.0 feet. Bulk sample collected from 0.0 to 10.0 feet bgs. Piezometer installed to a depth of 25.0 feet bgs (screened 15.0 to 25.0 feet bgs).</p>															

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. **PAGE 2 OF 2**
17SWM-19

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GF-J.8.30.004:061810:8/8/17



STATION: 173+53 **OFFSET:** 225 ft LT
LATITUDE: 38.362270° N **LONGITUDE:** 77.470716° W
SURFACE ELEVATION: 224.9 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/24/2017 - 04/24/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Thomas Williams/S&ME, Inc.	Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °											
											GROUND WATER NOT ENCOUNTERED DURING DRILLING ↓ STABILIZED AT 19.5 ft									
											FIELD DESCRIPTION OF STRATA				LL	PI				
		224	1	70							0.0 / 224.9	4" Topsoil and Root Mat							13.6	
4	2	222	3	80	2						0.3 / 224.6	Brown, fine CLAYEY SAND (SC), contains root fragments, very loose, moist							25.3	
3.5	4	220	5	85	4						2.0 / 222.9	Red-brown, SANDY LEAN CLAY (CL), stiff, dry							15.8	
	6	218	7	90	6						5.0 / 219.9	Red-brown, fine to coarse CLAYEY SAND (SC), dry Red-brown, fine to coarse CLAYEY SAND (SC), contains shell fragments, medium dense, dry							9.6	
	8	216	8	100	8							Red-brown, fine to coarse CLAYEY SAND (SC), contains shell fragments, medium dense, moist							12.2	22.1
	10	214																		
	12	212	5	90	13															12.6
	14	210	7		15															
	16	208																		
	18	206	12	90	18							Red-brown to brown and gray, mottled, fine to coarse CLAYEY SAND (SC), medium dense, moist								19.4
	20	204	10		20															
	22	202	5		23															
	24	200	6	100								Gray-white, fine to medium CLAYEY SAND (SC), medium dense, moist								24.0

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-20**
 LOCATION: Stafford County, Virginia
 STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 173+53 OFFSET: 225 ft LT
 LATITUDE: 38.362270° N LONGITUDE: 77.470716° W
 SURFACE ELEVATION: 224.9 ft COORD. DATUM: NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						25									
<p>Date(s) Drilled: 04/24/2017 - 04/24/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Thomas Williams/S&ME, Inc. Logger: Russell Kanith/HDR</p> <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING ↓ STABILIZED AT 19.5 ft</p> <p>FIELD DESCRIPTION OF STRATA</p> <p>Bottom of borehole at 25.0 feet. Piezometer installed to a depth of 25.0 feet bgs (screened 20.0 to 25.0 feet bgs).</p>															

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. **PAGE 2 OF 2**
17SWM-20

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GF-J.8.30.004:061810:8/8/17



STATION: 142+43 **OFFSET:** 208 ft LT
LATITUDE: 38.355061° N **LONGITUDE:** 77.476088° W
SURFACE ELEVATION: 223.5 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK					STRATA LEGEND	Date(s) Drilled: 04/24/2017 - 04/24/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Thomas Williams/S&ME, Inc.	Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	DIP °											
3		222	1	85							0.0 / 223.5									
	2		3	5	2						Tan-brown, LEAN CLAY (CL), contains root fragments, soft, moist								19.5	
	3	220	5	85	3						1.5 / 222.0									
3.25	4		7	8	4						Brown-gray, fine CLAYEY SAND (SC), contains root fragments, moist								18.8	
	6	218	4	100	6						3.0 / 220.5									
	8	216	3	100	8						Brown and gray, mottled, SANDY LEAN CLAY (CL), moist									
	10	214	5	90	10						4.5 / 219.0									
	12	212	7	100	12						Brown and gray, mottled, fine CLAYEY SAND (SC), medium dense, moist									
	14	210	4	95	13						Brown and gray, mottled, fine CLAYEY SAND (SC), contains clay layers, medium dense, moist	45	27	21.6	16.1	36.8				
	16	208	5	100	15						Brown and gray, mottled, to orange-brown, fine to course CLAYEY SAND (SC), medium dense, moist								17.0	14.7
	18	206	7	100	18						Orange-brown, fine to coarse CLAYEY SAND (SC), medium dense, wet									
	20	204	10	100	20															
	22	202	7	100	23															
	24	200	12	100	24.5						Brown and gray, fine to coarse CLAYEY SAND (SC), medium dense, wet									28.5
2			14	12							24.5 / 199.0									

SPT_LOGABW\VDOT_TRANSURBAN_95_FRED_EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-21**
LOCATION: Stafford County, Virginia
STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 142+43 **OFFSET:** 208 ft LT
LATITUDE: 38.355061° N **LONGITUDE:** 77.476088° W
SURFACE ELEVATION: 223.5 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						25									
<p>Date(s) Drilled: 04/24/2017 - 04/24/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Thomas Williams/S&ME, Inc. Logger: Russell Kanith/HDR</p> <p>GROUND WATER ▾ FIRST ENCOUNTERED AT 13.0 ft DEPTH ▾ STABILIZED AT 9.0 ft</p> <p>FIELD DESCRIPTION OF STRATA Blue-gray, LEAN CLAY (CL), wet Bottom of borehole at 25.0 feet. Bulk sample collected from 0.0 to 15.0 feet bgs. Piezometer installed to a depth of 25.0 feet bgs (screened 20.0 to 25.0 feet bgs).</p>															

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. **PAGE 2 OF 2**
17SWM-21

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8_30.004:061810:8/8/17



STATION: 81+30 **OFFSET:** 260 ft RT
LATITUDE: 38.341819° N **LONGITUDE:** 77.489192° W
SURFACE ELEVATION: 224.0 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 05/01/2017 - 05/01/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Josh Freeman/SaLUT, Inc.	Logger: Bill Miller/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
0.25			1																	
			2																	
	2	222	1	75																
			2																	
	4	220	3	100																
			4																	
	6	218	6	100																
			6																	
	8	216	9	100																
			8																	
	10	214	11	100																
			9																	
	12	212	12																	
			6																	
	14	210	8	100																
			8																	
	16	208	8																	
			8																	
	18	206	12	100																
			12																	
	20	204	30																	
			8																	
	22	202	22	100																
			12																	
	24	200	17	100																
			18																	

GROUND WATER
 FIRST ENCOUNTERED AT 24.0 ft DEPTH
 DRY AFTER 24 HRS

FIELD DESCRIPTION OF STRATA

0.0 / 224.0
 5" Topsoil
 0.4 / 223.6
 Yellow-brown, LEAN CLAY (CL), soft, moist
 2.0 / 222.0
 Yellow-brown, fine to coarse SILTY SAND WITH GRAVEL (SM), loose, moist
 Yellow-brown, fine to coarse SILTY SAND (SM), medium dense, moist
 18.5 / 205.5
 Yellow-brown, fine CLAYEY SAND (SC), dense, moist
 Yellow-brown, fine CLAYEY SAND (SC), medium dense, wet

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-22**
 LOCATION: Stafford County, Virginia
 STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 81+30 OFFSET: 260 ft RT
 LATITUDE: 38.341819° N LONGITUDE: 77.489192° W
 SURFACE ELEVATION: 224.0 ft COORD. DATUM: NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						25									
<p>Date(s) Drilled: 05/01/2017 - 05/01/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Josh Freeman/SaLUT, Inc. Logger: Bill Miller/HDR</p> <p>GROUND WATER FIRST ENCOUNTERED AT 24.0 ft DEPTH DRY AFTER 24 HRS</p> <p>FIELD DESCRIPTION OF STRATA Bottom of borehole at 25.0 feet. Piezometer installed to a depth of 25.0 feet bgs (screened 15.0 to 25.0 feet bgs).</p>															

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. **PAGE 2 OF 2**
17SWM-22

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17SWM-23**
 LOCATION: Stafford County, Virginia
 STRUCTURE: STORM WATER POND **PAGE 2 OF 2**

STATION: 64+91 OFFSET: 282 ft RT
 LATITUDE: 38.338451° N LONGITUDE: 77.492980° W
 SURFACE ELEVATION: 231.9 ft COORD. DATUM: NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						25									
<p>Date(s) Drilled: 05/01/2017 - 05/01/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Josh Freeman/SaLUT, Inc. Logger: Bill Miller/HDR</p> <p>GROUND WATER ▾ FIRST ENCOUNTERED AT 13.0 ft DEPTH ▾ STABILIZED AT 18.2 ft</p> <p>FIELD DESCRIPTION OF STRATA</p> <p>Bottom of borehole at 25.0 feet. Bulk sample collected from 2.0 to 6.0 feet bgs. Piezometer installed to a depth of 25.0 feet bgs (screened 15.0 to 25.0 feet bgs).</p>															

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. **PAGE 2 OF 2**
17SWM-23

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17WGS-02**
LOCATION: Stafford County, Virginia
STRUCTURE: RAMP WGS **PAGE 1 OF 1**

STATION: 123+62 **OFFSET:** 157 ft LT
LATITUDE: 38.351133° N **LONGITUDE:** 77.480274° W
SURFACE ELEVATION: 219.2 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA									
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		SAMPLE INTERVAL	ROCK			STRATA LEGEND	Date(s) Drilled: 04/26/2017 - 04/26/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Thomas Williams/S&ME, Inc.	Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)		CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °											
										GROUND WATER									
										▽ FIRST ENCOUNTERED AT 8.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN									
										FIELD DESCRIPTION OF STRATA									
										LL	PI								
		218	2	75						0.0 / 219.2									
			2							4" Root Mat							18.1		
		216	2	100						0.3 / 218.9							29.8		
			2							Fill, Orange-brown, CLAYEY SAND (SC), loose, wet									
0.5	0.75	214	2	100	3.5					3.5 / 215.7									
			2		4					Orange-brown, SANDY LEAN CLAY (CL), soft, moist						43	21	24.9	56.6
		212	1	95	6					5.5 / 213.7									
			1							Orange-brown, medium to coarse CLAYEY SAND (SC), very loose, wet							20.7		
		210	2	90	8														
			2							Gray and brown, mottled, CLAYEY SAND (SC), very loose, wet							26.5		
		10	4		10														
										Bottom of borehole at 10.0 feet. Boring backfilled with auger cuttings.									

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 9 feet

PAGE 1 OF 1

17WGS-02

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8_30.004:061810:8/8/17



STATION: 118+97 **OFFSET:** 132 ft LT
LATITUDE: 38.350171° N **LONGITUDE:** 77.481343° W
SURFACE ELEVATION: 210.7 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/26/2017 - 04/26/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Thomas Williams/S&ME, Inc.	Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
										GROUND WATER				NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN						
										FIELD DESCRIPTION OF STRATA				LL	PI					
		210	2	50							0.0 / 210.7									
			2	5							4" Topsoil and Root Mat								15.6	
	2	208	7	4		2					0.3 / 210.4									
			6	90							Fill, Brown, fine to coarse CLAYEY SAND (SC), loose, moist									
	4	206	3	4		4					Fill, Brown, fine to coarse CLAYEY SAND (SC), medium dense, moist									23.2
			3	60							Fill, Brown, fine to coarse CLAYEY SAND (SC), loose, moist									13.7
	6	204	2	2		6					Fill, Brown, fine to coarse CLAYEY SAND (SC), very loose, moist									
			1	90																
2	8	202	2	2		7.5					7.5 / 203.2									
			5	100		8					Brown and gray, mottled, SANDY LEAN CLAY (CL), moist									
			7								8.5 / 202.2									
	10		9			10					Brown and gray, mottled, fine SILTY SAND (SM), medium stiff, moist									25.3
										Bottom of borehole at 10.0 feet. Boring backfilled with auger cuttings.										

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 7.2 feet

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



STATION: 111+93 **OFFSET:** 251 ft LT
LATITUDE: 38.349031° N **LONGITUDE:** 77.483308° W
SURFACE ELEVATION: 176.3 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/28/2017 - 04/28/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Thomas Williams/S&ME, Inc.	Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °											
											GROUND WATER NOT ENCOUNTERED DURING DRILLING ↓ STABILIZED AT 15.1 ft									
											FIELD DESCRIPTION OF STRATA				LL	PI				
	26	150									26.5 / 149.8									
	28	148	11 21 28	90	X						Green and blue-gray, fine SILTY SAND (SM), contains mica, dense, dry						20.7			
	30	146		33	X															
	32	144																		
	34	142	8 13 17 24	100	X						Green and blue-gray, fine SILTY SAND (SM), contains mica, dense, dry				52	8	26.2	25.8		
	36	140																		
	38	138	22 20 25 30	100	X												22.2			
	40	136																		
	42	134																		
	44	132	11 19 22 23	100	X												20.5			
	46	130																		
	48	128	14 24 27 30	100	X						Green and blue-gray, fine SILTY SAND (SM), contains mica, very dense, dry						25.9			
	50																			

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 47.6 feet

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17WGS-05**
 LOCATION: Stafford County, Virginia
 STRUCTURE: RAMP WGS **PAGE 3 OF 3**

STATION: 111+93 OFFSET: 251 ft LT
 LATITUDE: 38.349031° N LONGITUDE: 77.483308° W
 SURFACE ELEVATION: 176.3 ft COORD. DATUM: NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						50									
<p>Date(s) Drilled: 04/28/2017 - 04/28/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Thomas Williams/S&ME, Inc. Logger: Russell Kanith/HDR</p> <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING ↓ STABILIZED AT 15.1 ft</p> <p>FIELD DESCRIPTION OF STRATA Bottom of borehole at 50.0 feet. Shelby tube collected from an offset boring between depths of 13.0 to 15.0 feet bgs. Boring backfilled with auger cuttings.</p>															

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 47.6 feet **PAGE 3 OF 3**
17WGS-05

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



STATION: 107+23 **OFFSET:** 287 ft LT
LATITUDE: 38.348151° N **LONGITUDE:** 77.484592° W
SURFACE ELEVATION: 145.6 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/27/2017 - 04/27/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Thomas Williams/S&ME, Inc.	Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											FIELD DESCRIPTION OF STRATA				LL	PI				
	0.5	144	1	40							0.0 / 145.6									
	0.5	142	3	80							3" Root Mat							39.8		
	4	142	3	80							0.3 / 145.3							12.5		
	0.5	140	2	85							3.0 / 142.6							35.0		
	6	140	3	85							Orange-brown, CLAYEY SAND (SC), moist							9.2		
	8	138	10	80							5.0 / 140.6							37.0	13.8	
	8	138	18	80							Tan-brown to dark gray, LEAN CLAY (CL), moist							23.0		
	10	136	10	80							6.0 / 139.6							28.1		
	10	136	5	80							Brown-gray, fine to coarse CLAYEY SAND WITH GRAVEL (SC), medium dense, wet									
	12	134									Brown-gray to orange-gray, fine to coarse CLAYEY SAND WITH GRAVEL (SC), contains mica, medium dense, moist									
	14	132	8	85							Green and gray, fine to coarse CLAYEY SAND (SC), contains mica, medium dense, moist									
	14	132	11	85																
	16	130																		
	18	128	50/5"	100							Green and gray, fine to coarse CLAYEY SAND (SC), contains mica, very dense, moist									
	18	128	50/0"								Auger refusal at 19.5 feet. Bottom of borehole at 19.5 feet. Piezometer installed to a depth of 19.5 feet bgs (screened 14.5 to 19.5 feet bgs).									

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GFJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext. **17WGS-07**
 LOCATION: Stafford County, Virginia
 STRUCTURE: RAMP WGS **PAGE 2 OF 2**

STATION: 104+52 OFFSET: 217 ft LT
 LATITUDE: 38.347441° N LONGITUDE: 77.485060° W
 SURFACE ELEVATION: 138.7 ft COORD. DATUM: NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
			50/0"			25									
<p>Date(s) Drilled: 04/27/2017 - 04/27/2017 Drilling Method(s): Mud Rotary w/ SPT SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Thomas Williams/S&ME, Inc. Logger: Russell Kanith/HDR</p> <p>GROUND WATER ▾ FIRST ENCOUNTERED AT 7.0 ft DEPTH ▾ STABILIZED AT 3.0 ft</p> <p>FIELD DESCRIPTION OF STRATA</p> <p>Spoon refusal at 25.0 feet. Bottom of borehole at 25.0 feet. Boring backfilled with onsite soils and hole plug.</p>															

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. **PAGE 2 OF 2**
17WGS-07

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: RAMP WGS

17WGS-08

PAGE 1 OF 1

STATION: 100+89 **OFFSET:** 210 ft LT
LATITUDE: 38.346658° N **LONGITUDE:** 77.485842° W
SURFACE ELEVATION: 144.2 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/27/2017 - 04/27/2017

LAB DATA

Drilling Method(s): Mud Rotary w/ SPT
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Ray Norwood/S&ME, Inc.
 Logger: Randy Bliefernich/GET Solutions, Inc.

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 2.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

FIELD DESCRIPTION OF STRATA

		20.0	
		25.9	
		24.9	
		19.9	
56	33	29.7	58.1
		12.4	
		11.9	
		8.6	

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	
2	144.2	2	65					
3	142.3	3	50					
4	140.2	2	75					
6	138.3	2	100					
8	136.5	7	65					
10	134.1	10						
12	132.1	13						
14	130.5	10	50					
16	128.8							
18	126.6	26	56					
20	124.4							
22	122.2	13	63					

0.0 / 144.2
 2" Topsoil
 0.2 / 144.0
 Brown, fine to medium CLAYEY SAND (SC), contains organic matter, loose, moist
 Brown, fine to medium CLAYEY SAND (SC), loose, wet
 4.0 / 140.2
 Gray, brown and black, mottled, SANDY FAT CLAY (CH), soft, wet
 Gray, brown and black, mottled, SANDY FAT CLAY (CH), firm, wet
 11.5 / 132.7
 Gray and tan, fine to coarse POORLY GRADED SAND (SP), contains lenses of cemented sand, very dense, moist

Bottom of borehole at 23.8 feet.
 Boring backfilled with onsite soils.

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig.

PAGE 1 OF 1

17WGS-08

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-01

PAGE 1 OF 2

STATION: 584+85 **OFFSET:** 41 ft RT
LATITUDE: 38.460254° N **LONGITUDE:** 77.408940° W
SURFACE ELEVATION: 144.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/21/2017 - 04/21/2017

LAB DATA

Drilling Method(s): 2.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Brice Bahhar/GET Solutions, Inc
 Logger: Joe Wallen, PE/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 28.0 ft DEPTH
 DRY AFTER 72 HRS

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
1	2	142	2	60					
1	2	142	2	60					
4	4	140	5	55					
4.5	6	138	4	65					
4.5	8	136	4	50					
10	10	134	7	80					
12	12	132	11	80					
4	14	130	9	50					
16	16	128	12	50					
4.5	18	126	8	65					
20	20	124	10	65					
22	22	122	16	65					
24	24	120	6	100					

0.0 / 144.0 Fill, Brown and gray, SANDY LEAN CLAY (CL), firm, moist				
Fill, Brown and gray, SANDY LEAN CLAY (CL), contains wood fragments, firm, moist			20.5	
4.0 / 140.0 Brown, FAT CLAY (CH), very stiff, moist	96	68	27.2	95.7
Brown, FAT CLAY (CH), stiff, moist			22.8	
Brown, FAT CLAY (CH), very stiff, moist			18.7	
Brown, FAT CLAY (CH), very stiff, dry			15.6	
19.7 / 124.3 Yellow-brown, fine to medium CLAYEY SAND (SC), moist			14.2	
21.5 / 122.5 Yellow-brown to gray, fine to medium SILTY SAND (SM), medium dense, moist			17.1	25.8

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 16.5 feet

PAGE 1 OF 2

17XP-01

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-01

PAGE 2 OF 2

STATION: 584+85 **OFFSET:** 41 ft RT
LATITUDE: 38.460254° N **LONGITUDE:** 77.408940° W
SURFACE ELEVATION: 144.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/21/2017 - 04/21/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Brice Bahhar/GET Solutions, Inc
Logger: Joe Wallen, PE/HDR

LAB DATA

GROUND WATER
 ▽ **FIRST ENCOUNTERED AT 28.0 ft DEPTH**
 DRY AFTER 72 HRS

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		20.8	

FIELD DESCRIPTION OF STRATA

LL	PI
----	----

Yellow-brown to gray, fine to medium SILTY SAND (SM), medium dense, wet

Bottom of borehole at 30.0 feet.
 Boring backfilled with auger cuttings and hole plug.

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK						
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA	JOINTS	STRATA LEGEND
	26	118				25						
	28	116	2			28						
	30	114	8 10 14	100		30						

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 16.5 feet

PAGE 2 OF 2

17XP-01

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-02

PAGE 1 OF 2

STATION: 578+91 **OFFSET:** 16 ft LT
LATITUDE: 38.458626° N **LONGITUDE:** 77.409034° W
SURFACE ELEVATION: 172.91 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		SAMPLE INTERVAL	ROCK			STRATA LEGEND	LAB DATA				
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)		CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA		DIP °	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
<p>Date(s) Drilled: 04/24/2017 - 04/24/2017 Drilling Method(s): 2.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Brice Bahhar/GET Solutions, Inc Logger: Joe Wallen, PE/HDR</p>										<p>GROUND WATER NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS</p>				
FIELD DESCRIPTION OF STRATA										LL	PI			
2.75		172	4	50						0.0 / 172.91				
			7							<i>Fill, Brown, LEAN CLAY WITH GRAVEL (CL), stiff, moist</i>			15.3	
4.5	2	170	7	60	2					<i>Fill, Brown, GRAVELLY LEAN CLAY (CL), very stiff, moist</i>			14.3	
			13							<i>Fill, No Recovery</i>				
	4	168	11	0	4					<i>Fill, No Recovery</i>				
			12							<i>Fill, Brown, SANDY LEAN CLAY (CL), very stiff, moist</i>				
	6	166	8	5	6					<i>Fill, Brown, SANDY LEAN CLAY (CL), very stiff, moist</i>			14.7	
			12							<i>Fill, Gray and yellow-brown, fine CLAYEY SAND (SC), medium dense, moist</i>				
	8	164	7	80	8					<i>Fill, Gray and yellow-brown, fine CLAYEY SAND (SC), medium dense, moist</i>			12.3	
			8							<i>Fill, Gray and yellow-brown, fine CLAYEY SAND (SC), medium dense, moist</i>				
	10	162	11		10					<i>Fill, Gray and yellow-brown, fine CLAYEY SAND (SC), medium dense, moist</i>				
			13							<i>Gray, fine CLAYEY SAND (SC), medium dense, moist</i>				
	12	160	5		13					<i>Gray, fine CLAYEY SAND (SC), medium dense, moist</i>				
			8							<i>Gray, fine CLAYEY SAND (SC), medium dense, moist</i>				
	14	158	10	85	15					<i>Gray, fine CLAYEY SAND (SC), medium dense, moist</i>			15.1	
			13							<i>Gray, fine CLAYEY SAND (SC), medium dense, moist</i>				
	16	156								<i>Gray, fine CLAYEY SAND (SC), medium dense, moist</i>				
			7		18					<i>Gray, fine CLAYEY SAND (SC), medium dense, moist</i>				
	18	154	7	85	20					<i>Gray, fine CLAYEY SAND (SC), medium dense, moist</i>	29	8	15.7	27.6
			10							<i>Gray, fine CLAYEY SAND (SC), medium dense, moist</i>				
	20	152	12		20					<i>Gray, fine CLAYEY SAND (SC), medium dense, moist</i>				
										<i>Gray, fine CLAYEY SAND (SC), medium dense, moist</i>				
	22	150			23					<i>Gray, fine CLAYEY SAND (SC), medium dense, moist</i>				
			7							<i>Yellow-brown and gray, fine to medium CLAYEY SAND (SC), medium dense, moist</i>				
	24	148	11	100						<i>Yellow-brown and gray, fine to medium CLAYEY SAND (SC), medium dense, moist</i>			16.3	
			18							<i>Yellow-brown and gray, fine to medium CLAYEY SAND (SC), medium dense, moist</i>				
			30							<i>Yellow-brown and gray, fine to medium CLAYEY SAND (SC), medium dense, moist</i>				

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 18.8 feet

PAGE 1 OF 2

17XP-02

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-02

PAGE 2 OF 2

STATION: 578+91 **OFFSET:** 16 ft LT
LATITUDE: 38.458626° N **LONGITUDE:** 77.409034° W
SURFACE ELEVATION: 172.91 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/24/2017 - 04/24/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Brice Bahhar/GET Solutions, Inc
Logger: Joe Wallen, PE/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 24 HRS

FIELD DESCRIPTION OF STRATA

LL	PI		
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PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS		
	25									
	26	146								
4	28	144	5	100						
	30	142	10	100						
4.5	34	140	14	100						
	36	138	17	100						
4.5	38	136	7	100						
	40	134	12	100						
4	44	130	7	100						
	45	128	15	100						

Yellow-brown and gray, fine to medium CLAYEY SAND (SC), medium dense, moist

26.5 / 146.41

Red, ELASTIC SILT (MH), contains slickensides, very stiff, dry

Red, ELASTIC SILT (MH), hard, dry

Red and gray, mottled, ELASTIC SILT (MH), hard, dry

Bottom of borehole at 45.0 feet.
 Boring backfilled with hole plug and auger cuttings.

		29.1	
		27.0	
58	23	27.7	99.7
		25.6	

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 18.8 feet

PAGE 2 OF 2

17XP-02

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-03

PAGE 1 OF 1

STATION: 573+77 **OFFSET:** 14 ft RT
LATITUDE: 38.457238° N **LONGITUDE:** 77.408700° W
SURFACE ELEVATION: 146.1 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/24/2017 - 04/24/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Brice Bahhar/GET Solutions, Inc
Logger: Joe Wallen, PE/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 24 HRS

FIELD DESCRIPTION OF STRATA

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK			STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
3.75		3						
	4	144	4	100				
4	2	144	7	10				
	4	142	7	50				
4.5	4	142	9	50				
	4	142	11	40				
4.5	6	140	10	40				
	4	140	10	90				
4.5	6	140	7	90				
	4	138	10	90				
4.5	8	138	14	65				
	3	136	6	10				
	10	136	12	10				
	12	134						
	14	132	24	100				
	14	132	50/2"	13.7				
	16	130						
	18	128	5	100				
	18	128	10	100				
	20	126	17	100				
	20	126	20	20				
	22	124						
	22	124	50/5"	23.4				

0.0 / 146.1
 Fill, Brown, LEAN CLAY (CL), contains root fragments, stiff, moist

4.0 / 142.1
 Gray and brown, mottled, FAT CLAY (CH), very stiff, dry

16.5 / 129.6
 Gray, fine SILTY SAND (SM), medium dense, dry

Gray, fine SILTY SAND (SM), very dense, dry

Bottom of borehole at 23.4 feet.
 Bulk sample collected from 0.0 to 8.0 feet bgs. Boring backfilled with auger cuttings.

		33.6	
		32.2	
92	68	25.3	95.2
		26.4	
		23.2	
85	64	24.5	99.9
		16.2	
		7.2	
		11.7	

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 13.8 feet

PAGE 1 OF 1

17XP-03

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-04

PAGE 1 OF 2

STATION: 564+27
LATITUDE: 38.454680° N
SURFACE ELEVATION: 99.2 ft

OFFSET: 61 ft RT
LONGITUDE: 77.408021° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/25/2017 - 04/25/2017
 Drilling Method(s): 2.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Brice Bahhar/GET Solutions, Inc
 Logger: Joe Wallen, PE/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 13.0 ft DEPTH
 ▽ STABILIZED AT 14.1 ft

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	DIP °	
1	99.2	3	65					
2	98	4	3	2				
3	96	2	75	6				
4	94	5	3	4				
5	92	12	45	75				
6	90	6	18	6				
7	88	4	75	8				
8	86	8	11	8				
9	84	13	5	5				
10	82	5	7	10				
11	80	8	1	15				
12	78	5	60	13				
13	76	6	1	15				
14	74	6	1	15				
15	72	1	75	18				
16	70	2	3	20				
17	68	3	2	20				
18	66	2	3	20				
19	64	3	90	23				
20	62	1	2					

0.0 / 99.2
 Fill, Brown, fine to medium CLAYEY SAND WITH GRAVEL (SC), loose, moist

5.0 / 94.2
 Fill, Black and brown, fine to coarse POORLY GRADED GRAVEL WITH CLAY AND SAND (GP-GC), moist

6.0 / 93.2
 Fill, Gray, fine to coarse POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), medium dense, moist

8.0 / 91.2
 Fill, Brown, fine to coarse CLAYEY SAND WITH GRAVEL (SC), medium dense, moist

11.5 / 87.7
 Gray, fine to coarse POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), medium dense, wet

16.5 / 82.7
 Gray, fine to coarse CLAYEY SAND (SC), loose, wet

21.5 / 77.7
 Gray, SANDY LEAN CLAY (CL), very soft, wet

		10.2	
		14.9	
		9.1	
		9.3	
		8.0	
		17.5	
		11.3	
38	23	34.2	54.1

REMARKS: Rig Type: CME 55 ATV Track Rig.

PAGE 1 OF 2

17XP-04

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-04
PAGE 2 OF 2

STATION: 564+27 **OFFSET:** 61 ft RT
LATITUDE: 38.454680° N **LONGITUDE:** 77.408021° W
SURFACE ELEVATION: 99.2 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA			
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION						
74									Gray, SANDY LEAN CLAY (CL), very soft, wet				
26									26.5 / 72.7				
72									Gray, fine SILTY SAND (SM), medium dense, moist			23.7	
28	4	6	11	90									
70													
30		15											
68													
32													
66	7	19	39	94					Brown, fine to medium SILTY SAND (SM), very dense, moist			25.5	
34		50/2"											
64													
36													
62									36.5 / 62.7				
38	10	50/5"		100					Gray, fine to medium POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), very dense, moist			26.1	
60													
40													
58													
42													
56	21	50/4"		100								19.8	
									Bottom of borehole at 43.8 feet. Piezometer installed to a depth of 23.8 feet bgs (screened from 13.8 to 23.8 feet bgs). Boring backfilled with hole plug and auger cuttings.				

REMARKS: Rig Type: CME 55 ATV Track Rig.

PAGE 2 OF 2
17XP-04

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-05

PAGE 1 OF 2

STATION: 560+00 **OFFSET:** 48 ft RT
LATITUDE: 38.453515° N **LONGITUDE:** 77.407830° W
SURFACE ELEVATION: 80.4 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/25/2017 - 04/25/2017
 Drilling Method(s): 2.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Brice Bahhar/GET Solutions, Inc
 Logger: Joe Wallen, PE/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 28.0 ft DEPTH
 ▽ STABILIZED AT 6.0 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		80	WOH/12"						
	1.25	78	1						
	2.5	76	2						
	2	74	4						
	1.25	72	2						
	2.25	68	2						
	1	62	2						
	2	60	6						
	2	58	4						
	24	56	17						

0.0 / 80.4	5" Topsoil		
0.4 / 80.0	Light brown, fine to medium CLAYEY SAND (SC), very loose, moist		14.0
2.0 / 78.4	Light brown, SANDY LEAN CLAY (CL), firm, moist		17.6
	Light brown and gray, mottled, SANDY LEAN CLAY (CL), firm, moist		19.7
	Gray and light brown, SANDY LEAN CLAY (CL), firm, moist		19.1
8.0 / 72.4	Gray, fine to medium CLAYEY SAND (SC), loose, moist		13.8
	Brown and gray, mottled, fine to coarse CLAYEY SAND (SC), loose, moist	22	43.8
		13	19.3
16.5 / 63.9	Light brown, SANDY FAT CLAY (CH), stiff, moist	61	77.9
		41	30.2
21.5 / 58.9	Yellow-brown, fine to medium POORLY GRADED SAND WITH SILT (SP-SM), very dense, moist		17.3

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 24.5 feet

PAGE 1 OF 2

17XP-05

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-05

PAGE 2 OF 2

STATION: 560+00 **OFFSET:** 48 ft RT
LATITUDE: 38.453515° N **LONGITUDE:** 77.407830° W
SURFACE ELEVATION: 80.4 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/25/2017 - 04/25/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Brice Bahhar/GET Solutions, Inc
Logger: Joe Wallen, PE/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 28.0 ft DEPTH
 ▽ STABILIZED AT 6.0 ft

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		LL	

FIELD DESCRIPTION OF STRATA

LL	PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
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PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
	24.9								
	26	54							
	28	52	50/5"	50	28 28.4				
	30	50							
	32	48	20 50/2"	100	33 33.7				

Yellow-brown, fine to medium POORLY GRADED SAND WITH SILT (SP-SM), very dense, moist

26.5 / 53.9

Gray, fine to coarse POORLY GRADED GRAVEL (GP), very dense, wet

23.1

31.5 / 48.9

Gray, fine to coarse POORLY GRADED SAND WITH SILT (SP-SM), very dense, wet

19.7

Bottom of borehole at 33.7 feet.
 Shelby tube collected from an offset boring between depths of 13.0 to 15.0 feet bgs. Boring backfilled with hole plug, bentonite, and auger cuttings.

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 24.5 feet

PAGE 2 OF 2

17XP-05

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-06

PAGE 1 OF 3

STATION: 555+72 **OFFSET:** 17 ft RT
LATITUDE: 38.452338° N **LONGITUDE:** 77.407737° W
SURFACE ELEVATION: 58.6 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/26/2017 - 04/26/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Brice Bahhar/GET Solutions, Inc
Logger: Joe Wallen, PE/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 4.0 ft DEPTH
 ▽ STABILIZED AT 2.0 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		58	1						
		56	1	40					
	2	56	1	2					
		54	1	60					
	4	54	1	100					
		52	1	95					
		50	2	85					
1		48	3	9.7					
		46	1	13					
		44	3	65					
		42	4	15					
		40	8	18					
		38	11	100					
		36	13	20					
		34	19	23					
		32	6	21					
		30	26	90					
		28	34	34					

0.0 / 58.6 2.5" Topsoil			
0.2 / 58.4 Brown, fine to coarse CLAYEY SAND (SC), very loose, moist	17.2		
3.0 / 55.6 Gray, fine to medium SILTY SAND (SM), moist	19.3		
4.0 / 54.6 Gray, fine to coarse CLAYEY SAND (SC), very loose, wet	23.5		
Gray, fine to coarse CLAYEY SAND (SC), loose, wet	18.3	42.5	
Gray, fine to coarse CLAYEY SAND (SC), very loose, wet	19.3		
9.7 / 48.9 Gray, LEAN CLAY WITH SAND (CL), moist			
11.5 / 47.1 Gray, fine to coarse SILTY SAND WITH GRAVEL (SM), loose, moist	18.9		
Gray, fine to coarse SILTY SAND (SM), medium dense, moist	21.6		
21.5 / 37.1 Gray, fine to coarse CLAYEY SAND WITH GRAVEL (SC), dense, moist	14.9		

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 8 feet

PAGE 1 OF 3

17XP-06

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-06

PAGE 3 OF 3

STATION: 555+72 **OFFSET:** 17 ft RT
LATITUDE: 38.452338° N **LONGITUDE:** 77.407737° W
SURFACE ELEVATION: 58.6 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/26/2017 - 04/26/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Brice Bahhar/GET Solutions, Inc
Logger: Joe Wallen, PE/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 4.0 ft DEPTH
 ▽ STABILIZED AT 2.0 ft

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

FIELD DESCRIPTION OF STRATA

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK															
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	DIP °									
		8																		
	52	6																		
4.5	6	6	12																	
	54	4	17	100																
	4	4	21																	
	56	2																		
4.5	58	0	4																	
	0	4	12																	
	60	0	18	100																
		60	23																	

Red, ELASTIC SILT (MH), very stiff, dry

31.7

Red, ELASTIC SILT (MH), very stiff, dry

51 14 30.8 90.5

Bottom of borehole at 60.0 feet.
 Boring backfilled with auger cuttings and hole plug.

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 8 feet

PAGE 3 OF 3

17XP-06

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-07

PAGE 1 OF 3

STATION: 550+08 **OFFSET:** 6 ft RT
LATITUDE: 38.450788° N **LONGITUDE:** 77.407634° W
SURFACE ELEVATION: 45.8 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/26/2017 - 04/26/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Brice Bahhar/GET Solutions, Inc
Logger: Joe Wallen, PE/HDR

LAB DATA

LIQUID LIMIT
PLASTICITY INDEX
MOISTURE CONTENT (%)
FINES CONTENT -#200 (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 13.0 ft DEPTH
 ▽ STABILIZED AT 5.0 ft

FIELD DESCRIPTION OF STRATA

LL **PI**

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS		DIP °
		2								
		3								
		6		45						
		9								
	2	44	2							
		5								
		6		55						
		4								
	4	42	4							
		3		3						
		4		10						
		4								
		4		10						
		6		5						
		2								
		3		50						
		4								
		4		4						
2.75	8	38	1							
		4		80						
		5								
		6		6						
	10	36								
		12								
		34								
		4								
		32		90						
		3								
		3								
		4		2						
		15								
	16	30								
		18								
		28								
		1								
		2								
		3		100						
		5								
		26								
		2								
		24								
		7								
		23								
		24								
		13								
		19								
		24		80						
		24								

0.0 / 45.8
Brown, fine to coarse CLAYEY GRAVEL WITH SAND (GC), loose, moist

Brown, fine to coarse CLAYEY GRAVEL WITH SAND (GC), medium dense, moist

4.0 / 41.8
Gray and brown, fine to medium CLAYEY SAND (SC), loose, moist

6.0 / 39.8
Brown, LEAN CLAY (CL), firm, moist

Brown and gray, mottled, LEAN CLAY WITH SAND (CL), stiff, moist

11.5 / 34.3
Gray, fine to medium SILTY SAND (SM), loose, wet

16.5 / 29.3
Gray, fine to medium CLAYEY SAND (SC), loose, wet

21.5 / 24.3
Gray, fine to medium SILTY SAND (SM), dense, wet

11.2

10.7

19.6

23.7

34.9

29.8

25.0

22.4

17.3

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 20 feet

PAGE 1 OF 3

17XP-07

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-08

PAGE 1 OF 3

STATION: 539+90 **OFFSET:** 49 ft LT
LATITUDE: 38.448009° N **LONGITUDE:** 77.407951° W
SURFACE ELEVATION: 122.6 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/20/2017 - 04/20/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Brice Bahhar/GET Solutions, Inc
Logger: Joe Wallen, PE/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 53.0 ft DEPTH
 DRY AFTER 24 HRS

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		122	1						
			2	75					
2.5	2	120	2	2					
			3						
			4	65					
1.25	4	118	2	4					
			3						
			4	70					
2.75	6	116	2	5					
			3						
			5	100					
4.5	8	114	2	8					
			5						
			9	100					
			12						
			10						
			11						
4.5	10	112							
			5						
			15	100					
			24						
			30						
			15						
			14						
			15						
3.5	18	108	4	100					
			36						
			50/4"						
			19						
			19.3						
			16						
			16						
			104						
			18						
			18						
			19.3						
			20						
			102						
			22						
			100						
4.5	24	100	12						
			22						
			29						
			100						
			23						
			29						
			35						
			98						

0.0 / 122.6
 4" Topsoil
 0.3 / 122.3
 Tan, fine to medium SILTY SAND (SM), loose, moist
 2.0 / 120.6
 Brown and gray, mottled, SILT (ML), contains root fragments, firm, moist
 Brown, SILT (ML), contains root fragments, firm, moist
 Brown and gray, mottled, SILT (ML), firm, moist
 8.0 / 114.6
 Gray, FAT CLAY (CH), stiff, dry
 Gray and brown, mottled, FAT CLAY (CH), hard, dry
 Gray and brown, mottled, SANDY FAT CLAY (CH), very hard, dry
 Gray, SANDY FAT CLAY (CH), hard, dry

		17.2	
		30.1	
		33.8	
		26.6	
61	36	24.1	96.1
		21.8	
		16.3	
		19.7	

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 19.5 feet

PAGE 1 OF 3

17XP-08

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-08

PAGE 2 OF 3

STATION: 539+90 **OFFSET:** 49 ft LT
LATITUDE: 38.448009° N **LONGITUDE:** 77.407951° W
SURFACE ELEVATION: 122.6 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/20/2017 - 04/20/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Brice Bahhar/GET Solutions, Inc
Logger: Joe Wallen, PE/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 53.0 ft DEPTH
 DRY AFTER 24 HRS

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS		
	25									
	26	96								
	28	94	7							
	30	92	14	16	100					
	32	90		22						
	34	88	9	16	100					
	36	86		31						
	38	84	6	32	100					
	40	82	8	10						
	42	80		11						
	44	78	7	8	100					
	46	76		11						
	48	74	8	11	100					
	50			13						
				14						

Gray, SANDY FAT CLAY (CH), hard, dry

26.5 / 96.1

Gray and brown, fine to medium SILTY SAND (SM), dense, dry

21.0

Yellow-brown, gray and black, fine to medium SILTY SAND (SM), dense, dry

35 10 16.1 34.1

Gray and brown, fine to medium SILTY SAND (SM), medium dense, dry

14.5

41.5 / 81.1

Gray and brown, fine to medium POORLY GRADED SAND WITH SILT (SP-SM), medium dense, dry

12.8

46.5 / 76.1

Gray and brown, fine to medium SILTY SAND (SM), medium dense, dry

15.1

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 19.5 feet

PAGE 2 OF 3

17XP-08

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-08

PAGE 3 OF 3

STATION: 539+90 **OFFSET:** 49 ft LT
LATITUDE: 38.448009° N **LONGITUDE:** 77.407951° W
SURFACE ELEVATION: 122.6 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/20/2017 - 04/20/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Brice Bahhar/GET Solutions, Inc
Logger: Joe Wallen, PE/HDR

LAB DATA

GROUND WATER
 ▽ **FIRST ENCOUNTERED AT 53.0 ft DEPTH**
 DRY AFTER 24 HRS

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS		
		72								
		70	6							
		54	8							
		68	9	100						
		56	11							
		66								
		58	5							
		64	8							
		60	10	100						
			11							

Gray and brown, fine to medium SILTY SAND (SM), medium dense, dry
 51.5 / 71.1
 Yellow-brown and gray, fine to medium CLAYEY SAND (SC), medium dense, wet
 27.6
 56.5 / 66.1
 Gray and brown, fine SILTY SAND (SM), medium dense, moist
 23.8
 Bottom of borehole at 60.0 feet.
 Boring backfilled with auger cuttings and hole plug.

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 19.5 feet

PAGE 3 OF 3

17XP-08

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-10

PAGE 1 OF 1

STATION: 533+93 **OFFSET:** 24 ft RT
LATITUDE: 38.446362° N **LONGITUDE:** 77.407993° W
SURFACE ELEVATION: 73.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/18/2017 - 04/18/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Brice Bahhar/GET Solutions, Inc
Logger: Joe Wallen, PE/HDR

LAB DATA

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 24 HRS

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
			1						
			4						
		72	3	65					
2.75	2		2	5	2				
		70	3	60					
2.5	4		4	6	4				
		68	5	55					
	6		7						
		66	10	35	6				
	8		16						
		64	18	35					
			9	14	8				
			9	25					
	10		8						
			10		10				

0.0 / 73.5
 3.5" Topsoil
 0.3 / 73.2
 Yellow-brown, FAT CLAY (CH), contains root fragments, firm, moist
 Yellow-brown and gray, mottled, FAT CLAY WITH SAND (CH), contains root fragments, firm, moist
 Yellow-brown and gray, mottled, FAT CLAY WITH SAND (CH), contains root fragments, stiff, moist
 6.0 / 67.5
 Gray, fine to coarse POORLY GRADED GRAVEL WITH SAND (GP), dense, dry
 8.0 / 65.5
 Yellow-brown and gray, mottled, SANDY LEAN CLAY (CL), very stiff, moist

Bottom of borehole at 10.0 feet.
 Bulk sample collected from 2.0 to 6.0 feet bgs. Boring backfilled with auger cuttings.

		30.6	
		35.9	
63	41	23.8	82.7
		17.2	
		5.0	
34	20	14.4	62.2

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 4 feet

PAGE 1 OF 1

17XP-10

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-12

PAGE 1 OF 2

STATION: 516+98 **OFFSET:** 8 ft LT
LATITUDE: 38.441940° N **LONGITUDE:** 77.409824° W
SURFACE ELEVATION: 56.8 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/10/2017 - 04/10/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Brice Bahhar/GET Solutions, Inc
Logger: Kohltan Heiter, EIT/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 23.0 ft DEPTH
 ▽ STABILIZED AT 14.0 ft

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

FIELD DESCRIPTION OF STRATA

		19.1	
		15.5	
		16.6	
		14.0	
		14.7	
		21.2	
		18.7	
		17.6	7.5

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
1.5		56	2	70					
	2	54	3	9	2				
	4	52	7	17	4				
	6	50	10	27	6				
	8	48	11	26	8				
	10	46	14	28	10				
1.25	14	44	8	13	13				
	16	42	17	13.5	13.5				
	18	40	20	15	15				
1	20	38	16	18	18				
	22	36	20	20	20				
1.5	24	34	17	23	23				
	26	32	21	25	25				
	28	30	25	32	32				

0.0 / 56.8
 4" Topsoil

0.3 / 56.5
 Orange and red, fine to medium CLAYEY SAND (SC), contains organic matter and mica, loose, moist

2.0 / 54.8
 Brown and orange, fine to medium POORLY GRADED SAND (SP), contains mica, medium dense, moist
 Brown, orange and red, fine to medium POORLY GRADED SAND (SP), contains mica, dense, moist

Orange, brown and light gray, fine to coarse POORLY GRADED SAND (SP), contains mica, dense, moist

Orange, brown and light gray, fine to coarse POORLY GRADED SAND (SP), contains mica, contains pockets of course quartz gravel 9.5 to 9.7 feet bgs, dense, moist

Orange, brown and light gray, fine to coarse POORLY GRADED SAND (SP), contains mica, moist

13.5 / 43.3
 Light brown and blue-gray, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, dense, moist

Blue-gray, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, dense, moist

Blue-gray, fine to coarse POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, dense, wet

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 16.5 feet

PAGE 1 OF 2

17XP-12

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-14

PAGE 1 OF 3

STATION: 504+97 **OFFSET:** 14 ft LT
LATITUDE: 38.438986° N **LONGITUDE:** 77.411682° W
SURFACE ELEVATION: 62.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/05/2017 - 04/05/2017
Drilling Method(s): Mud Rotary w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Will Riddick/GET Solutions, Inc
Logger: Kohltan Heiter, EIT/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
LL	PI		

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 8.0 ft DEPTH
 ▽ STABILIZED AT 5.3 ft

FIELD DESCRIPTION OF STRATA

LL	PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
		16.5	
		15.2	
27	15	15.5	36.0
		22.8	
		8.9	
		22.6	
50	34	31.0	55.0
		30.8	

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
1.75	62	2	1	65					
			3						
2.5	2	60	3	90					
			4						
2.5	4	58	4	100					
			7						
			6						
2.75	6	56	3	75					
			4						
			7						
8	8	54	6	50					
			10						
			12						
			13						
			10						
			12						
			6						
			9						
1.5	14	48	11	85					
			15						
			14.5						
			15						
			16						
			16						
0.75	18	44	3	25					
			8						
			12						
			11						
			20						
			42						
			22						
			40						
2.5	24	38	4	100					
			7						
			9						
			11						

REMARKS: Rig Type: CME 45C ATV Track Rig.

PAGE 1 OF 3

17XP-14

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-14

PAGE 2 OF 3

STATION: 504+97 **OFFSET:** 14 ft LT
LATITUDE: 38.438986° N **LONGITUDE:** 77.411682° W
SURFACE ELEVATION: 62.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/05/2017 - 04/05/2017

LAB DATA

Drilling Method(s): Mud Rotary w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Will Riddick/GET Solutions, Inc
 Logger: Kohltan Heiter, EIT/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 8.0 ft DEPTH
 ▽ STABILIZED AT 5.3 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS		
	25									
	26	36								
	28	34	10							
	30	32	11	25						
	32		15							
	34	28	14							
2	30	30	8							
	34	28	11	75						
	36	26	10							
	38	24	11							
2.5	40	22	13	75						
	42	20	11							
	44	18	9	75						
3	46	16	7							
	48	14	15	100						
	49.7		23	50/2"						

Blue-gray, fine CLAYEY SAND (SC), contains mica, medium dense, moist

26.5 / 36.0

Blue-gray, SANDY LEAN CLAY (CL), very stiff, wet

31.5 / 31.0

Blue-gray, fine to medium CLAYEY SAND (SC), contains mica, medium dense, moist

41.5 / 21.0

Blue-gray, SANDY LEAN CLAY (CL), contains mica, very stiff, moist

46.5 / 16.0

Blue-gray, fine POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, very dense, moist

		44.2	
42	27	30.2	15.4
		26.1	
		28.2	
		29.8	

REMARKS: Rig Type: CME 45C ATV Track Rig.

PAGE 2 OF 3

17XP-14

SPT_LOGABW\VDOT_TRANSURBAN_95_FRED_EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-15

PAGE 1 OF 2

STATION: 499+03 **OFFSET:** 16 ft LT
LATITUDE: 38.437531° N **LONGITUDE:** 77.412614° W
SURFACE ELEVATION: 78.3 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/04/2017 - 04/04/2017

LAB DATA

Drilling Method(s): Mud Rotary w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Will Riddick/GET Solutions, Inc
 Logger: Kohltan Heiter, EIT/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 13.0 ft DEPTH
 ▽ STABILIZED AT 12.0 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK			STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
	1	78	5	100				
	2	76	15	100				
	4.5	74	26	100				
	6	72	43	100				
	8	70	40	100				
	10	68						
	12	66						
	14	64						
	16	62						
	18	60	37	100				
	20	58						
	22	56						
1.5	24	54	12	100				

0.0 / 78.3
 5" Topsoil
 0.4 / 77.9
 Gray and orange, fine to medium POORLY GRADED SAND (SP), contains mica, medium dense, moist
 2.0 / 76.3
 Blue-gray and orange, stratified, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), dense, moist
 4.0 / 74.3
 Blue-gray and orange, fine to medium CLAYEY SAND (SC), dense, moist
 Gray and orange, fine to medium CLAYEY SAND (SC), contains mica, very dense, moist
 16.5 / 61.8
 Orange and brown, fine to coarse POORLY GRADED SAND WITH CLAY (SP-SC), very dense, wet
 Blue-gray, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, dense, moist

		18.9	
		20.2	
		16.3	
		22.7	17.9
		17.6	
		20.9	
		19.7	
		24.0	

REMARKS: Rig Type: CME 45C ATV Track Rig.

PAGE 1 OF 2

17XP-15

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-15

PAGE 2 OF 2

STATION: 499+03 **OFFSET:** 16 ft LT
LATITUDE: 38.437531° N **LONGITUDE:** 77.412614° W
SURFACE ELEVATION: 78.3 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/04/2017 - 04/04/2017
Drilling Method(s): Mud Rotary w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Will Riddick/GET Solutions, Inc
Logger: Kohltan Heiter, EIT/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 13.0 ft DEPTH
 ▽ STABILIZED AT 12.0 ft

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND											
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA		JOINTS										
	26	52																		
2.5	28	50	15																	
			17																	
			24																	
	30	48																		
			32																	
	32	46																		
1.75	34	44	10																	
			13																	
			17																	
			21																	
	36	42																		
2.5	38	40	12																	
			29																	
			40																	
			48																	
	40																			

Blue-gray, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, dense, moist

Blue-gray, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, dense, moist

Blue-gray, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, very dense, moist

Bottom of borehole at 40.0 feet.
 Boring backfilled with auger cuttings and hole plug.

REMARKS: Rig Type: CME 45C ATV Track Rig.

PAGE 2 OF 2

17XP-15

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-17

PAGE 1 OF 2

STATION: 480+80 **OFFSET:** 95 ft LT
LATITUDE: 38.433151° N **LONGITUDE:** 77.415709° W
SURFACE ELEVATION: 81.7 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/14/2017 - 04/14/2017

LAB DATA

Drilling Method(s): 2.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Brice Bahhar/GET Solutions, Inc
 Logger: Kohltan Heiter, EIT/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 2.4 ft DEPTH
 ▽ STABILIZED AT 2.5 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
1.25	2	80	2	40					
1.25	2	78	1	90					
4	4	76	1	90					
1.25	6	74	4	100					
3	8	72	9	100					
2	10	70	12	100					
2	14	68	16	100					
2	18	66	19	100					
2	20	64	24	100					
2	22	62	24	100					
2	24	60	16	100					

0.0 / 81.7	4" Topsoil		
0.3 / 81.4	Brown, LEAN CLAY WITH SAND (CL), contains organic matter, contains mica, soft, moist Gray and orange, mottled, SANDY LEAN CLAY (CL), contains mica, soft, wet	33.2	
4.0 / 77.7	Dark gray, fine to coarse CLAYEY SAND (SC), contains mica, wet	24.2	
5.3 / 76.4	Blue-gray and orange, stratified, fine SILTY SAND (SM), contains mica, moist	26.9	
6.0 / 75.7	Blue-gray, fine to medium POORLY GRADED SAND WITH SILT (SP-SM), medium dense, moist	27.0	14.5
9.0 / 72.7	Blue-gray, fine to medium POORLY GRADED SAND WITH SILT (SP-SM), wet	26.6	
11.5 / 70.2	Blue-gray and brown, stratified, SANDY LEAN CLAY (CL), contains mica, moist		
16.5 / 65.2	Brown and blue-gray, stratified, fine SILTY SAND (SM), contains mica, medium dense, moist	28.4	
21.5 / 60.2	Brown and blue-gray, mottled, SANDY FAT CLAY (CH), contains mica, very stiff, moist	53	24
	Blue-gray, fine CLAYEY SAND (SC), contains mica, medium dense, moist		31.5

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 20 feet

PAGE 1 OF 2

17XP-17

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-17

PAGE 2 OF 2

STATION: 480+80 **OFFSET:** 95 ft LT
LATITUDE: 38.433151° N **LONGITUDE:** 77.415709° W
SURFACE ELEVATION: 81.7 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/14/2017 - 04/14/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Brice Bahhar/GET Solutions, Inc	Logger: Kohltan Heiter, EIT/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER									
											▼ FIRST ENCOUNTERED AT 2.4 ft DEPTH ▼ STABILIZED AT 2.5 ft									
											FIELD DESCRIPTION OF STRATA				LL	PI				
	26	56									Blue-gray, fine CLAYEY SAND (SC), contains mica, medium dense, moist									
	28	54	13								26.5 / 55.2									
4.5	30	52	18	20	100						Blue-gray and brown, mottled, SILT WITH SAND (ML), contains mica, hard, dry	42	9	22.9	71.7					
	32	50	20								31.5 / 50.2									
2.5	34	48	9	11	100						Blue-gray, fine CLAYEY SAND (SC), contains mica, medium dense, moist			29.6						
	36	46	15	18							36.5 / 45.2									
	38	44	9	12	100						Blue-gray, POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, medium dense, moist			26.7						
	40	42	18	23							Bottom of borehole at 40.0 feet. Boring backfilled with auger cuttings, bentonite, and hole plug.									

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 20 feet

PAGE 2 OF 2

17XP-17

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-18

PAGE 1 OF 1

STATION: 468+39 **OFFSET:** 73 ft RT
LATITUDE: 38.429898° N **LONGITUDE:** 77.417147° W
SURFACE ELEVATION: 145.7 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/13/2017 - 04/13/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Brice Bahhar/GET Solutions, Inc	Logger: Kohltan Heiter, EIT/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS									
											FIELD DESCRIPTION OF STRATA				LL	PI				
1.5		144	1	20							0.0 / 145.7 4" Topsoil									
2	2	142	2	10							0.3 / 145.4 Brown, FAT CLAY WITH SAND (CH), contains organic matter, contains mica, soft, moist Gray and dark gray, mottled, FAT CLAY WITH SAND (CH), contains organic matter, contains mica, firm, moist	63	46	17.7	29.8	22.0	86.8			
2.5	4	140	4	50							Brown, red and gray, mottled, FAT CLAY WITH SAND (CH), firm, moist			34.6						
3	6	138	6	75							6.0 / 139.7 Light gray and orange, mottled, SILT (ML), very stiff, dry			35.0						
4	8	136	8	100							Light gray and orange, mottled, SILT (ML), hard, dry			29.7						
10	10		10								Bottom of borehole at 10.0 feet. Bulk sample collected from 0.0 to 6.0 feet bgs. Boring backfilled with auger cuttings.									

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 3.9 feet

PAGE 1 OF 1

17XP-18

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-18A

PAGE 1 OF 3

STATION: 468+39 **OFFSET:** 73 ft RT
LATITUDE: 38.429898° N **LONGITUDE:** 77.417147° W
SURFACE ELEVATION: 145.7 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/28/2017 - 04/28/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Brice Bahhar/GET Solutions, Inc
Logger: Joe Wallen, PE/HDR

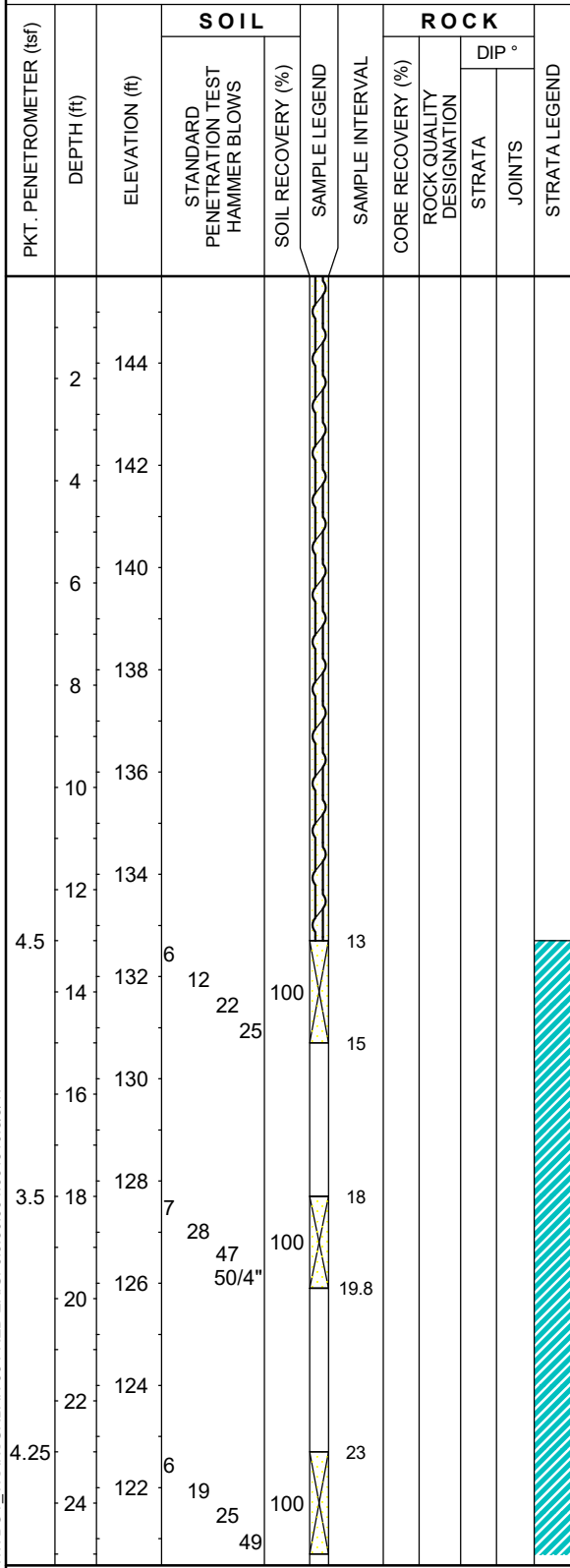
LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 48.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--



0.0 / 145.7
 Boring advanced to a depth of 13.0 feet using hollow stem auger techniques

13.0 / 132.7
 Light brown, FAT CLAY (CH), hard, dry

Gray, FAT CLAY WITH SAND (CH), very hard, dry

Red and gray, mottled, FAT CLAY (CH), hard, dry

		27.0	
52	29	21.4	76.3
		22.7	

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 46 feet

PAGE 1 OF 3

17XP-18A

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J:8:30:004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-18A
PAGE 2 OF 3

STATION: 468+39 **OFFSET:** 73 ft RT
LATITUDE: 38.429898° N **LONGITUDE:** 77.417147° W
SURFACE ELEVATION: 145.7 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/28/2017 - 04/28/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Brice Bahhar/GET Solutions, Inc	Logger: Joe Wallen, PE/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											FIELD DESCRIPTION OF STRATA				LL	PI				
4.5	26	120																		
	28	118	10 22 26 33	100	X	25-28											72	51	21.5	98.7
	30	116																		
	32	114																		
	34	112	50/6"	100	X	33-33.5													12.2	
	36	110																		
	38	108	14 27 29 30	90	X	38-40													12.3	
	40	106																		
	42	104																		
	44	102	7 14 14 17	90	X	43-45													19.0	25.8
	46	100																		
	48	98	13 18 19 22	100	X	48-50													20.7	
	50	96																		

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 46 feet

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17XP-18A

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-18A
PAGE 3 OF 3

STATION: 468+39 **OFFSET:** 73 ft RT
LATITUDE: 38.429898° N **LONGITUDE:** 77.417147° W
SURFACE ELEVATION: 145.7 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/28/2017 - 04/28/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Brice Bahhar/GET Solutions, Inc	Logger: Joe Wallen, PE/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER ▽ FIRST ENCOUNTERED AT 48.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN									
											FIELD DESCRIPTION OF STRATA				LL	PI				
											Gray and yellow-brown, fine to coarse SILTY SAND (SM), dense, wet 51.5 / 94.2									
4.5	52	94	13								Red, FAT CLAY (CH), hard, dry				73	57	23.3	87.5		
	54	92	24	29	100															
	56	90	42																	
4.5	58	88	7								Bottom of borehole at 60.0 feet. Boring backfilled with auger cuttings and hole plug.									
	60	86	23	33	100												22.0			
			42																	

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 46 feet

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17XP-18A

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-19

PAGE 2 OF 3

STATION: 461+27 **OFFSET:** 78 ft LT
LATITUDE: 38.428403° N **LONGITUDE:** 77.418829° W
SURFACE ELEVATION: 127.6 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/12/2017 - 04/12/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Brice Bahhar/GET Solutions, Inc
Logger: Kohltan Heiter, EIT/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 23.0 ft DEPTH
 ▽ STABILIZED AT 21.0 ft

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS		
		102								
	26									
		100	6							
	28		14							
		98	19	100						
1.25	30		21							
		96								
	32									
		94	4							
	34		12	100						
		92	17							
	36		22							
		90								
	38		8							
		88	11	100						
	40		12							
		86	17							
	42									
4.5		84	12							
	44		18	100						
		82	36							
	46		44							
		80								
4.5	48		17							
		78	23	100						
	50		30							
			42							

Orange and gray, stratified, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, medium dense, wet
 26.5 / 101.1

Gray and brown, fine to medium POORLY GRADED SAND (SP), contains mica, dense, wet
 29.5 / 98.1

Blue-gray, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, wet

Blue-gray, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, medium dense, wet

Blue-gray, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, medium dense, wet

Gray and dark red, mottled, FAT CLAY (CH), contains mica, hard, dry

		21.5	
			23.6
			9.2
		23.4	
			22.8
49	29	21.3	98.9

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 26 feet

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17XP-19

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-20

PAGE 1 OF 1

STATION: 456+10 **OFFSET:** 107 ft LT
LATITUDE: 38.427214° N **LONGITUDE:** 77.419838° W
SURFACE ELEVATION: 152.1 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/12/2017 - 04/12/2017

LAB DATA

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	Date(s) Drilled: 04/12/2017 - 04/12/2017 Drilling Method(s): 2.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Brice Bahhar/GET Solutions, Inc Logger: Kohltan Heiter, EIT/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION						
										GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN				
										FIELD DESCRIPTION OF STRATA	LL	PI		
1.5			1							0.0 / 152.1 3" Topsoil			20.2	
2.75	2	150	3	40	2					0.3 / 151.8 Red-brown, FAT CLAY WITH SAND (CH), contains organic matter and mica, firm, moist Red and gray, mottled, SANDY FAT CLAY (CH), contains organic matter and mica, firm, moist	58	42	17.0 21.4	67.1
2.25	4	148	2	7	4					Orange and light gray, mottled, FAT CLAY (CH), contains mica, stiff, dry	80	54	28.3	95.2
4.5	6	146	6	14	6					Orange, dark red and light gray, mottled, FAT CLAY (CH), hard, dry			19.8	
4.5	8	144	3	20	8					Orange, dark red and light gray, mottled, FAT CLAY (CH), very stiff, dry			21.5	
	10	142		19	10									
	12	140												
4.5	14	138	10	50	13					Orange, dark red and light gray, mottled, FAT CLAY WITH SAND (CH), hard, dry			15.3	
				25 33	15					Bottom of borehole at 15.0 feet. Bulk sample collected from 0.0 to 6.0 feet bgs. Boring backfilled with auger cuttings.				

REMARKS: Rig Type: CME 55 ATV Track Rig.

PAGE 1 OF 1

17XP-20

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



STATION: 456+10 **OFFSET:** 107 ft LT
LATITUDE: 38.427214° N **LONGITUDE:** 77.419838° W
SURFACE ELEVATION: 152.1 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK					STRATA LEGEND	Date(s) Drilled: 04/27/2017 - 04/27/2017	Drilling Method(s): Mud Rotary w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Will Riddick/GET Solutions, Inc	Logger: Joe Wallen, PE/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN									
											FIELD DESCRIPTION OF STRATA				LL	PI				
	2	150									0.0 / 152.1	Boring advanced to a depth of 4.0 feet using mud rotary techniques								
	4	148				4					4.0 / 148.1									
	6	146		100		6					6.0 / 146.1	Boring advanced to a depth of 18.0 feet using mud rotary techniques								
	8	144																		
	10	142																		
	12	140																		
	14	138																		
	16	136																		
	18	134	10			18					18.0 / 134.1	Gray, SILT (ML), hard, dry						24.0		
	20	132	19			20														
	22	130	28																	
	24	128	33			23						Red and gray, mottled, SILT (ML), hard, dry				47	18	24.2	86.8	
	4.5	134	10			18														
	4.5	130	19			23														
	4.5	128	26			23														
	4.5	128	38			23														

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 456+10 **OFFSET:** 107 ft LT
LATITUDE: 38.427214° N **LONGITUDE:** 77.419838° W
SURFACE ELEVATION: 152.1 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				FIELD DESCRIPTION OF STRATA	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA					
	26	126												
	28	124	11											
	30	122	13	20	100							24.3		
	32	120	24											
4.5	34	118	42	50/1"	100							22.0		
	36	116												
3	38	114	9											
	40		13	16	100							54	26	28.2
			21											54.9
<p>GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p>														
<p>FIELD DESCRIPTION OF STRATA</p>														
<p>26.5 / 125.6</p> <p>Gray, fine SILTY SAND (SM), dense, dry</p>														
<p>31.5 / 120.6</p> <p>Gray, FAT CLAY (CH), very hard, dry</p>														
<p>Gray, SANDY FAT CLAY (CH), very stiff, dry</p>														
<p>Bottom of borehole at 40.0 feet. Shelby tube collected from an offset boring between depths of 4.0 to 6.0 feet bgs. Boring backfilled with bentonite and hole plug.</p>														

REMARKS: Rig Type: CME 45C ATV Drill Track Rig.

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GFJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-21A
PAGE 1 OF 3

STATION: 451+92 **OFFSET:** 8 ft LT
LATITUDE: 38.426059° N **LONGITUDE:** 77.420200° W
SURFACE ELEVATION: 136.4 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/13/2017 - 04/13/2017	Drilling Method(s): 2.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Brice Bahhar/GET Solutions, Inc	Logger: Kohltan Heiter, EIT/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											FIELD DESCRIPTION OF STRATA				LL	PI				
1.25	136	1	1	60							0.0 / 136.4	3" Topsoil								
2.25	134	2	WOH	2							0.3 / 136.1	Red-brown, LEAN CLAY WITH SAND (CL), contains organic matter, contains mica, very soft, moist						20.3		
		3		90								Brown, LEAN CLAY WITH SAND (CL), contains organic matter, contains mica, firm, moist						20.2		
		4		6								Brown and gray, mottled, SANDY LEAN CLAY (CL), contains mica, firm, moist						22.1		
		5		80																
1.75	130	6		6																
		3		90							6.0 / 130.4	Gray and brown, mottled, ELASTIC SILT (MH), contains mica, firm, moist						22.0		
		5		90																
2.25	128	8		5								Red, brown and gray, mottled, ELASTIC SILT (MH), contains mica, stiff, dry	65	32			29.3	88.6		
		5		90																
		8		90																
		11		10																
		12		124																
4.5	124	14		13								Gray, brown and red, mottled, ELASTIC SILT (MH), contains mica, hard, dry						21.3		
		16		100																
		14		122																
		19		24																
		24		15																
		16		120																
		18		118								Blue-gray and dark red, mottled, ELASTIC SILT (MH), contains mica, hard, dry	56	19			25.5	89.9		
		11		100																
		19		100																
		28		100																
		39		20																
		116		20																
		22		114																
		23		100								Blue-gray and dark red, mottled, ELASTIC SILT (MH), contains mica, very hard, dry						20.5		
		45		100																
		50/4"		24.3																

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 36.2 feet

PAGE 1 OF 3
17XP-21A

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-21A

PAGE 2 OF 3

STATION: 451+92 **OFFSET:** 8 ft LT
LATITUDE: 38.426059° N **LONGITUDE:** 77.420200° W
SURFACE ELEVATION: 136.4 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/13/2017 - 04/13/2017

LAB DATA

Drilling Method(s): 2.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Brice Bahhar/GET Solutions, Inc
 Logger: Kohltan Heiter, EIT/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 28.0 ft DEPTH
 ▽ STABILIZED AT 27.3 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION		DIP °
	26	110								
	28	108	35	100	28					
	30	106	40	100	29.4					
1.5	32	104	7	100	33					
	34	102	12	100	35					
	36	100	15	100	35					
	38	98	9	100	38					
	40	96	14	100	40					
	42	94	16	100	40					
4.5	44	92	9	100	43					
	46	90	15	100	45					
	48	88	19	100	48					
	50		26	100						

Blue-gray and dark red, mottled, ELASTIC SILT (MH), contains mica, very hard, dry			
26.5 / 109.9			
Light blue-gray and orange, fine to coarse POORLY GRADED SAND (SP), contains mica, very dense, wet		26.1	
31.5 / 104.9			
Gray and orange, stratified, fine to medium CLAYEY SAND (SC), contains mica, medium dense, wet		25.5	
36.5 / 99.9			
Gray and orange, stratified, to blue-gray, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, medium dense, wet		22.8	
41.5 / 94.9			
Blue-gray and brown, mottled, FAT CLAY (CH), contains mica, hard, moist		24.1	
46.5 / 89.9			
Blue-gray, fine POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, dense, moist		21.5	

REMARKS: Rig Type: CME 55 ATV Track Rig. Cave-in Depth at 36.2 feet

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17XP-21A

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-22

PAGE 1 OF 2

STATION: 445+24 **OFFSET:** 31 ft RT
LATITUDE: 38.424321° N **LONGITUDE:** 77.420942° W
SURFACE ELEVATION: 175.4 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/13/2017 - 04/13/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Thomas Williams/S&ME, Inc.
 Logger: Russell Kanith/HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ↓ STABILIZED AT 25.5 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		
		25.8	
		27.2	
		23.1	
49	27	21.0	72.4
		25.4	
		25.2	

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
1		174	1	55					
2.25	2	172	2	65					
1.5	4	170	3	85					
1.75		168	3	90					
2	6	166	4	90					
	8	164	4	95					
	10	162	7	100					
	12	160	8						
	14	158	14						
2.25	18	156	4						
	20	154	7						
	22	152	12						
4.5	24		5						

0.0 / 175.4
 5" Topsoil
 0.4 / 175.0
 Brown, LEAN CLAY (CL), moist
 1.0 / 174.4
 Brown, CLAYEY SAND (SC), moist
 2.0 / 173.4
 Brown, LEAN CLAY (CL), firm, moist
 Brown and gray, mottled, LEAN CLAY (CL), firm, moist
 Red and brown, mottled, LEAN CLAY (CL), stiff, moist
 Red and brown, mottled, LEAN CLAY WITH SAND (CL), very stiff, moist
 Red and brown, mottled, LEAN CLAY WITH SAND (CL), stiff, moist
 Dark red-brown and gray, mottled, LEAN CLAY (CL), contains mica, very stiff, dry
 Dark red-brown and gray, mottled, LEAN CLAY (CL), contains lens of sand from 24.2 to 24.3 feet bgs, contains mica, very stiff, dry

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 26 feet

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17XP-22

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GFJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-22

PAGE 2 OF 2

STATION: 445+24 **OFFSET:** 31 ft RT
LATITUDE: 38.424321° N **LONGITUDE:** 77.420942° W
SURFACE ELEVATION: 175.4 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/13/2017 - 04/13/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ▽ STABILIZED AT 25.5 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	
	26	150							
4.5	28	148	9	100					
	30	146	18	40					
	32	144							
	34	142	13	100					
	36	140	32	50/6"					
	38	138	29	100					

Red-brown and gray, mottled, LEAN CLAY WITH SAND (CL), contains slickensides with 35 degree dip angles, hard, dry

31.5 / 143.9

Red-brown, gray and brown, CLAYEY SAND (SC), very dense, dry

36.5 / 138.9

Gray, SILTY SAND (SM), very dense, dry

Bottom of borehole at 38.8 feet.
 Bulk sample collected from 0.0 to 10.0 feet bgs.
 Piezometer installed to a depth of 38.8 feet bgs (screened 28.8 to 38.8 feet bgs).

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 26 feet

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17XP-22

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-23

PAGE 2 OF 3

STATION: 442+23 **OFFSET:** 109 ft RT
LATITUDE: 38.423470° N **LONGITUDE:** 77.421011° W
SURFACE ELEVATION: 222.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/13/2017 - 04/13/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ↓ STABILIZED AT 24.9 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		LL	

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA		JOINTS
	26	196								
	28	194	7							
			8							
			9	75						
	30	192								
			9							
	32	190								
			10							
	34	188	15							
			17	80						
			19							
	36	186								
2.5	38	184	6							
			9							
	40	182								
			11	100						
			13							
	42	180								
			8							
	44	178								
			9							
			13	100						
			15							
	46	176								
	48	174	8							
			9							
			11	100						
			14							

Brown and gray, mottled, medium CLAYEY SAND (SC), contains mica, medium dense, moist

36.5 / 186.0

Blue-gray, ELASTIC SILT (MH), very stiff, dry

41.5 / 181.0

Blue-gray and brown, mottled, fine CLAYEY SAND (SC), medium dense, dry

		20.9	
		17.3	
52	11	33.8	96.5
		31.9	
		35.9	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Switched to Mud Rotary at 15 ft bgs. Cave-in Depth at 26 feet

PAGE 2 OF 3

17XP-23

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-23

PAGE 3 OF 3

STATION: 442+23 **OFFSET:** 109 ft RT
LATITUDE: 38.423470° N **LONGITUDE:** 77.421011° W
SURFACE ELEVATION: 222.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/13/2017 - 04/13/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ▽ STABILIZED AT 24.9 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	
		172			50				
	52	170	9		53				
	54	168	17	100	55				
	56	166	20						
	58	164	8		58				
	60	162	10	100	60				
	62	160	11						
	64	158	12	100	63				
	66	156	16						
	68	154	17	100	65				
4.5			10		68				
	70		14		68.2				
			17		70				
			20						

Blue-gray and brown, mottled, fine CLAYEY SAND (SC), medium dense, dry
 56.5 / 166.0
 Blue-gray and brown, mottled, SILT (ML), contains clay layers, very stiff, dry
 63.5 / 159.0
 Blue-gray, fine CLAYEY SAND (SC), medium dense, dry
 68.2 / 154.3
 Dark red-brown, ELASTIC SILT (MH), contains shell fragments, hard, dry
 Bottom of borehole at 70.0 feet.
 Bulk sample collected from 0.0 to 10.0 feet bgs.
 Boring backfilled with auger cuttings.

		30.6	
47	14	27.9	95.3
		26.4	
54	18	28.5	99.3

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Switched to Mud Rotary at 15 ft bgs. Cave-in Depth at 26 feet

PAGE 3 OF 3

17XP-23

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GFJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-24

PAGE 1 OF 2

STATION: 440+06 **OFFSET:** 10 ft RT
LATITUDE: 38.422989° N **LONGITUDE:** 77.421577° W
SURFACE ELEVATION: 190.3 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/12/2017 - 04/12/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ↓ STABILIZED AT 36.6 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
1.25	1	190	1	75					
2	2	188	2	85					
4	4	186	3	65					
2.5	5	184	5	75					
4.25	6	184	8	75					
4.25	8	182	8	75					
10	10	180	12	100					
12	12	178	15	100					
4.5	14	176	17	100					
16	16	174	18	100					
4.25	18	172	5	100					
4.5	20	170	12	100					
22	22	168	13	100					
4	24	166	10	100					

0.0 / 190.3 6" Topsoil and Root Mat				
0.5 / 189.8 Tan, LEAN CLAY (CL), soft, moist			20.1	
2.5 / 187.8 Gray and brown, mottled, fine CLAYEY SAND (SC), loose, moist			18.9	
5.0 / 185.3 Gray and brown, mottled, ELASTIC SILT WITH SAND (MH), moist			28.8	
Brown and red-brown gray, mottled, ELASTIC SILT (MH), very stiff, moist			24.3	
Red-brown and gray, mottled, ELASTIC SILT (MH), very stiff, moist	70	31	26.9	99.4
Green-gray, ELASTIC SILT (MH), slickensides present at an angle of 33 degrees, very stiff, moist			27.7	
19.0 / 171.3 Blue-gray, SILT (ML), dry			30.9	
Brown and gray, mottled, SILT WITH SAND (ML), very stiff, dry			30.5	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 38.3 feet

PAGE 1 OF 2

17XP-24

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



STATION: 437+94 **OFFSET:** 31 ft RT
LATITUDE: 38.422419° N **LONGITUDE:** 77.421751° W
SURFACE ELEVATION: 186.0 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/12/2017 - 04/12/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Thomas Williams/S&ME, Inc.	Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
										GROUND WATER				NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS						
										FIELD DESCRIPTION OF STRATA				LL	PI					
1			1								0.0 / 186.0	4" Topsoil and Root Mat								
1.75	2	184	3	45	1						0.3 / 185.7	Brown-yellow, CLAYEY SAND (SC), moist						14.0		
			3		2						1.0 / 185.0	Brown, orange and gray, mottled, LEAN CLAY (CL), moist						27.8		
			4	70	4							Brown, orange and gray, mottled, LEAN CLAY (CL), stiff, moist						17.9		
3.5	4	182	4		4.5							Gray and brown, mottled, LEAN CLAY (CL), stiff, moist								
			3	65	6															
2.5	6	180	4		6															
			7	85	8						6.3 / 179.7	Brown and gray, CLAYEY SAND WITH GRAVEL (SC), medium dense, moist						7.6		
			11		8															
			13	80	10															
			23		10						8.0 / 178.0	Gray and brown, fine to coarse WELL GRADED SAND (SW), dense, dry						2.2		
			23		13															
			17		15															
4.25	12	174	5		13						11.5 / 174.5	Brown and gray, mottled, LEAN CLAY (CL), very stiff, moist						22.1		
			9	85	15															
			11		18															
			12		15															
			16		18															
			6	100	18															
			7		18															
			10		20															
			11		20															
			20		20															
			11		23															
			6		23															
			7	100	23															
			13		23															
			15		23															
			6		23															
			7	100	23															
			13		23															
			15		23															
			6		23															
			7	100	23															
			13		23															
			15		23															
			6		23															
			7	100	23															
			13		23															
			15		23															
			6		23															
			7	100	23															
			13		23															
			15		23															

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-24A

PAGE 2 OF 2

STATION: 437+94 **OFFSET:** 31 ft RT
LATITUDE: 38.422419° N **LONGITUDE:** 77.421751° W
SURFACE ELEVATION: 186.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/12/2017 - 04/12/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		25.0	

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 24 HRS

FIELD DESCRIPTION OF STRATA

LL	PI
----	----

Blue-gray, fine to medium SILTY SAND (SM), medium dense, moist

26.5 / 159.5

Dark red-brown, LEAN CLAY (CL), hard, dry

Bottom of borehole at 30.0 feet.
 Boring backfilled with auger cuttings.

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS		
	26	160								
4.5	28	158.9	11	100						
	30	156	24	40						

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 28 feet

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17XP-24A

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-26

PAGE 1 OF 2

STATION: 428+15 **OFFSET:** 11 ft LT
LATITUDE: 38.420035° N **LONGITUDE:** 77.423342° W
SURFACE ELEVATION: 210.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

LAB DATA

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	Date(s) Drilled: 04/11/2017 - 04/12/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Thomas Williams/S&ME, Inc. Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS					
2		210	1							GROUND WATER NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS			
										FIELD DESCRIPTION OF STRATA	LL	PI	
			3	80						0.0 / 210.5 4" Topsoil and Root Mat			14.4
1.75	2	208	4	95						0.3 / 210.2 Brown, LEAN CLAY (CL), firm, moist			
	4	206	7	95						2.8 / 207.7 Orange-brown and gray, fine to coarse WELL GRADED SAND WITH CLAY (SW-SC), medium dense, moist			8.6
	6	204	8	100						Red-brown, WELL GRADED SAND WITH CLAY (SW-SC), dense, moist			10.7
	8	202	11	100	35	35				7.7 / 202.8 Moderately weathered, moderately hard, no apparent bedding, red-gray, CONGLOMERATE			12.0
	10	200	8	100						8.5 / 202.0 No core recovery 8.5 to 10.0 feet Dark-gray, fine POORLY GRADED SAND WITH CLAY (SP-SC), medium dense, moist			
	12	198	12										
	14	196	11	75									
	16	194	13										
	18	192	16	85						Gray, fine to coarse POORLY GRADED SAND WITH CLAY (SP-SC), dense, moist			
	20	190	17										
	22	188	6							21.5 / 189.0			
3.75	24	186	7	100						Blue-gray, LEAN CLAY (CL), very stiff, moist			

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 17.1 feet

PAGE 1 OF 2

17XP-26

SPT_LOGAW:VDOT_TRANURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
 LOCATION: Stafford County, Virginia
 STRUCTURE: EMBANKMENT

17XP-26

PAGE 2 OF 2

STATION: 428+15 OFFSET: 11 ft LT
 LATITUDE: 38.420035° N LONGITUDE: 77.423342° W
 SURFACE ELEVATION: 210.5 ft COORD. DATUM: NAD 83

FIELD DATA											LAB DATA			
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA				JOINTS
						25								
<p>Date(s) Drilled: 04/11/2017 - 04/12/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Thomas Williams/S&ME, Inc. Logger: Russell Kanith/HDR</p> <p style="text-align: center;">GROUND WATER</p> <p>NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS</p> <p style="text-align: center;">FIELD DESCRIPTION OF STRATA</p> <p>Auger refusal at 7.7 feet. Bottom of borehole at 25.0 feet. Boring backfilled with auger cuttings.</p>														

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 17.1 feet

PAGE 2 OF 2

17XP-26

SPT_LOGAW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-27

PAGE 1 OF 2

STATION: 422+00 **OFFSET:** 3 ft LT
LATITUDE: 38.418572° N **LONGITUDE:** 77.424416° W
SURFACE ELEVATION: 192.9 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/11/2017 - 04/11/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 1.0 ft DEPTH
 ▽ STABILIZED AT 0.1 ft

FIELD DESCRIPTION OF STRATA

LL	PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		41.8	
		38.5	
		31.8	
		29.3	
		29.8	
44	9	28.1	84.5
		28.6	
30	2	24.1	39.2

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		192	1	25					
	2	190	1	50					
	4	188	2	70					
	6	186	3	50					
	8	184	3	80					
	10	182	5	80					
4.5	12	180	7	100					
	14	178	8	100					
	16	176	9	100					
3.5	18	174	5	85					
	20	172	10	22					
	22	170	7	100					
	24	168	7	100					

0.0 / 192.9
 5" Topsoil and Root Mat
 0.4 / 192.5
 Dark gray, CLAYEY SAND (SC), very loose, wet
 Orange-brown and gray, mottled, CLAYEY SAND (SC), contains layer of clay 2.3 to 2.5 feet bgs, very loose, wet
 Orange-brown and gray, mottled, fine CLAYEY SAND (SC), loose, wet
 Orange-brown and gray, mottled, fine CLAYEY SAND (SC), medium dense, wet
 11.5 / 181.4
 Blue-gray and brown, mottled, SILT WITH SAND (ML), contains slickensides, very stiff, dry
 19.0 / 173.9
 Blue-gray and brown, mottled, fine to medium SILTY SAND (SM), dry
 Blue-gray, fine to medium SILTY SAND (SM), medium dense, dry

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 23.2 feet

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17XP-27

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-27

PAGE 2 OF 2

STATION: 422+00 **OFFSET:** 3 ft LT
LATITUDE: 38.418572° N **LONGITUDE:** 77.424416° W
SURFACE ELEVATION: 192.9 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA									
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				Date(s) Drilled: 04/11/2017 - 04/11/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Thomas Williams/S&ME, Inc.	Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °										
	26	166				25													
	28	164	5			28													
	30		13	24	43	100												22.7	
										GROUND WATER									
										▼ FIRST ENCOUNTERED AT 1.0 ft DEPTH ▼ STABILIZED AT 0.1 ft									
										FIELD DESCRIPTION OF STRATA				LL	PI				
										Blue-gray to blue-gray and brown, mottled, fine to medium SILTY SAND (SM), dense, dry									
										Bottom of borehole at 30.0 feet. Boring backfilled with auger cuttings.									

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 23.2 feet

PAGE 2 OF 2

17XP-27

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-28

PAGE 1 OF 2

STATION: 415+90 **OFFSET:** 33 ft LT
LATITUDE: 38.417176° N **LONGITUDE:** 77.425597° W
SURFACE ELEVATION: 218.2 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/11/2017 - 04/11/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Thomas Williams/S&ME, Inc.
 Logger: Russell Kanith/HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 48 HRS

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
1.25	2	218	2						
			1	80					
			3						
3.25	2	216	4						
			6	90					
			8						
4.25	4	214	3						
			6	95					
			9						
			12						
	6	212	6						
			8	90					
			11						
	8	210	8						
			8	100					
			9						
			11						
	10	208							
	12	206							
			7						
			8	95					
	14	204	7						
			7						
			7						
	16	202							
3.5	18	200	4						
			7	100					
			8						
			9						
	20	198							
	22	196							
2	24	194	7						
			8	100					
			9						
			11						

0.0 / 218.2
 2" Topsoil and Root Mat
 0.2 / 218.0
 Red-brown and gray, LEAN CLAY (CL), soft, moist
 Red-brown and brown, LEAN CLAY (CL), stiff, moist

5.5 / 212.7
 Red-brown and gray, mottled, fine CLAYEY SAND (SC), medium dense, dry

Red-brown and gray, mottled, fine CLAYEY SAND (SC), contains mica, medium dense, dry

11.5 / 206.7
 Brown-gray, fine to coarse WELL GRADED SAND WITH CLAY (SW-SC), medium dense, moist

16.5 / 201.7
 Blue-gray, ELASTIC SILT WITH SAND (MH), stiff, dry

Blue-gray and brown, mottled, ELASTIC SILT (MH), very stiff, moist

		17.9	
		26.7	
		24.1	
		17.6	
		12.6	
		12.8	
		36.0	
51	14	30.4	93.3

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 28.7 feet

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17XP-28

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-29

PAGE 1 OF 2

STATION: 406+58 **OFFSET:** 23 ft LT
LATITUDE: 38.414932° N **LONGITUDE:** 77.427169° W
SURFACE ELEVATION: 193.9 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		SAMPLE INTERVAL	ROCK			STRATA LEGEND	Date(s) Drilled: 04/10/2017 - 04/10/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Thomas Williams/S&ME, Inc. Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)		CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA						
										NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS				
FIELD DESCRIPTION OF STRATA										LL	PI			
1		193.9	3	40					0.0 / 193.9 3" Topsoil and Root Mat					
1	2	192	3	45	2				0.3 / 193.6 Brown, LEAN CLAY (CL), firm, moist Red-brown and gray, mottled, LEAN CLAY (CL), firm, moist			30.2		
1	4	190	3	60	4							32.4		
	6	188	5	80	6				5.4 / 188.5 Gray, fine SILTY SAND (SM), medium dense, moist			27.0		
4.5	8	186	6	85	7.5						25	11	27.0	76.4
4.5	10	184	8	100	8				7.5 / 186.4 Gray and brown, mottled, SILT (ML), dry			26.2		
	12	182	10	110	10				8.7 / 185.2 Gray, fine SILTY SAND (SM), dry			24.0		
	14	180	11	120	13				Gray, fine SILTY SAND (SM), contains silt and clay lenses, contains mica, medium dense, dry			28.6		
	16	178	12	130	15									
	18	176	13	140	18									
	20	174	14	150	20				18.5 / 175.4 Brown and gray, fine CLAYEY SAND (SC), medium dense, moist			22.6		
	22	172	15	160	23									
	24	170	16	170	23				Brown and gray, fine CLAYEY SAND (SC), medium dense, moist			27.9	32.2	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 23.9 feet

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17XP-29

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GFJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-29

PAGE 2 OF 2

STATION: 406+58 **OFFSET:** 23 ft LT
LATITUDE: 38.414932° N **LONGITUDE:** 77.427169° W
SURFACE ELEVATION: 193.9 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						25									
<p>GROUND WATER NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS</p>															
<p>FIELD DESCRIPTION OF STRATA</p>											LL	PI			
<p>Bottom of borehole at 25.0 feet. Bulk sample collected from 0.0 to 13.0 feet bgs. Boring backfilled with auger cuttings.</p>															

Date(s) Drilled: 04/10/2017 - 04/10/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 23.9 feet

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17XP-29

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-30

PAGE 2 OF 2

STATION: 394+35 **OFFSET:** 20 ft LT
LATITUDE: 38.411860° N **LONGITUDE:** 77.428913° W
SURFACE ELEVATION: 155.2 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						25									
<p>Date(s) Drilled: 04/10/2017 - 04/10/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Thomas Williams/S&ME, Inc. Logger: Russell Kanith/HDR</p> <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HRS</p> <p>FIELD DESCRIPTION OF STRATA Bottom of borehole at 25.0 feet. Boring backfilled with auger cuttings.</p>															

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 14 feet

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17XP-30

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-31

PAGE 1 OF 1

STATION: 387+78 **OFFSET:** 14 ft LT
LATITUDE: 38.410152° N **LONGITUDE:** 77.429656° W
SURFACE ELEVATION: 135.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/07/2017 - 04/07/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Thomas Williams/S&ME, Inc.
 Logger: Russell Kanith/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 13.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		SAMPLE INTERVAL	ROCK			STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)		CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
1		134	3	70					
1.25	2	132	5	85	2				
	4	130	9	95	4				
	6	128	13	100	6				
	8	126	7	100	8				
	10	124	9	100	10				
	12	122	5	100	13				
	14	120	5	100	15				

0.0 / 135.0
 5" Topsoil and Root Mat
 0.4 / 134.6
 Orange-brown, LEAN CLAY WITH SAND (CL), firm, moist

3.0 / 132.0
 Gray-brown, fine to coarse CLAYEY SAND (SC), dry
 Orange-brown and gray, fine to coarse CLAYEY SAND (SC), dense, dry

Tan, fine to coarse CLAYEY SAND (SC), medium dense, dry

Orange-brown and tan, fine to coarse CLAYEY SAND (SC), medium dense, wet

		22.6	
		53.9	
		11.6	
42	21	17.7	29.2
		12.5	17.4
		16.0	
		21.3	

Bottom of borehole at 15.0 feet.
 Bulk sample collected from 0.0 to 13.0 feet bgs.
 Boring backfilled with auger cuttings.

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 14.1 feet

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17XP-31

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-32

PAGE 1 OF 1

STATION: 381+98 **OFFSET:** 10 ft RT
LATITUDE: 38.408608° N **LONGITUDE:** 77.430165° W
SURFACE ELEVATION: 108.3 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/07/2017 - 04/07/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 8.0 ft DEPTH
 ▽ STABILIZED AT 9.0 ft

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		108	WOH/12"						
			3	55					
	2	106	1	3					
			1	65					
	0.5	104	WOH	1					
			1	45					
	0.5	102	2	2					
			3	65					
	0.75	100	1	3					
	1.25	98	2	3					
			3	75					
	10	96	6	6					
			11	75					
	12	94	4	100					
			6	11					
	14	92	11	13					
			13	100					
	16	90	4	6					
			7	11					
	18	88	11	16					
			16	21					
	20		21	100					

0.0 / 108.3
 5" Root Mat
 0.4 / 107.9
 Brown and gray, mottled, fine CLAYEY SAND (SC), very loose, moist

4.0 / 104.3
 Brown and gray, mottled, LEAN CLAY WITH SAND (CL), soft, wet

6.5 / 101.8
 Brown and gray, mottled, CLAYEY SAND (SC), wet

7.5 / 100.8
 Blue-gray, FAT CLAY (CH), moist
 Blue-gray and brown, mottled, FAT CLAY (CH), firm, moist

11.5 / 96.8
 Blue-gray, fine to medium CLAYEY SAND (SC), medium dense, wet

Blue-gray, fine to coarse CLAYEY SAND (SC), medium dense, wet

Bottom of borehole at 20.0 feet.
 Boring backfilled with auger cuttings.

		17.2	
		26.4	
		27.6	
		26.9	
77	52	31.8	94.1
		24.0	
		25.2	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 19 feet

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17XP-32

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-34

PAGE 1 OF 2

STATION: 370+11 **OFFSET:** 23 ft LT
LATITUDE: 38.405515° N **LONGITUDE:** 77.431469° W
SURFACE ELEVATION: 110.2 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/05/2017 - 04/05/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Thomas Williams/S&ME, Inc.
 Logger: Russell Kanith/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 7.0 ft DEPTH
 ▽ STABILIZED AT 0.8 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		110.2	2	75					
	2	108	2	75					
1.25	2	108	2	90					
1.25	4	106	1	75					
	6	104	1	80					
	8	102	2	75					
	10	100	3	75					
4.5	12	98	5	95					
	14	96	11	95					
	16	94	15	95					
4.5	18	92	6	100					
	20	90	8	100					
	22	88	11	100					
	24	86	13	95					

0.0 / 110.2				
3" Root Mat				
0.3 / 109.9				15.9
Brown-gray, SILTY SAND (SM), loose, moist				
3.0 / 107.2				24.9
Orange-tan, LEAN CLAY (CL), moist				
4.5 / 105.7				17.4
Orange and gray, mottled, medium CLAYEY SAND (SC), loose, moist				
Orange and gray, mottled, fine CLAYEY SAND (SC), loose, wet				30.7
Orange and gray, mottled, to orange-brown and gray, fine CLAYEY SAND WITH GRAVEL (SC), loose, wet				18.8
11.5 / 98.7				
Dark red-brown, ELASTIC SILT (MH), very stiff, dry	52	13	29.5	99.2
Blue-gray, ELASTIC SILT WITH SAND (MH), very stiff, moist	50	12	29.0	79.8
21.5 / 88.7				
Blue-gray, CLAYEY SAND (SC), medium dense, wet				25.1

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Switched to Mud Rotary at 10 ft bgs. Cave-in Depth at 23 feet

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17XP-34

SPT_LOGABW\VDOT_TRANSURBAN_95_FRED_EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-34

PAGE 2 OF 2

STATION: 370+11 **OFFSET:** 23 ft LT
LATITUDE: 38.405515° N **LONGITUDE:** 77.431469° W
SURFACE ELEVATION: 110.2 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/05/2017 - 04/05/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Thomas Williams/S&ME, Inc.	Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER ▼ FIRST ENCOUNTERED AT 7.0 ft DEPTH ▼ STABILIZED AT 0.8 ft									
											FIELD DESCRIPTION OF STRATA				LL	PI				
	25										Blue-gray, CLAYEY SAND (SC), medium dense, wet									
	26	84									26.5 / 83.7									
4.5	28	82	11								Blue-gray, SILT (ML), fractures present at an angle of 35 degrees, hard, moist						28.2			
			16																	
			23																	
	30	80																		
			26																	
	32	78																		
4.5	34	76	9								Blue-gray, SILT WITH SAND (ML), very stiff, moist									
			13																	
			15																	
			16																	
	35										Bottom of borehole at 35.0 feet. Boring backfilled with auger cuttings.									

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Switched to Mud Rotary at 10 ft bgs.
 Cave-in Depth at 23 feet

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17XP-34

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-35

PAGE 1 OF 2

STATION: 363+41 **OFFSET:** 26 ft LT
LATITUDE: 38.403755° N **LONGITUDE:** 77.432153° W
SURFACE ELEVATION: 139.9 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/05/2017 - 04/05/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Thomas Williams/S&ME, Inc.
 Logger: Russell Kanith/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 30.0 ft DEPTH
 ▽ STABILIZED AT 11.0 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		SAMPLE INTERVAL	ROCK			STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)		CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
		139.9	3	50					
		138.5	4	3	2				
		138.0	2	85					
		137.5	2	4	4				
		137.0	2	70					
		136.5	4	3	6				
		136.0	2	8					
		135.5	4	95	8				
		135.0	3	7					
		134.5	8	100	8				
		134.0	5	10					
		133.5	7	8					
		133.0	8	9	10				
		132.5	9	5					
		132.0	5	13					
		131.5	7	100	13				
		131.0	9	7					
		130.5	9	15					
		130.0	10	18					
		129.5	10	5					
		129.0	5	18					
		128.5	7	100	18				
		128.0	9	7					
		127.5	9	20					
		127.0	10	5					
		126.5	10	18					
		126.0	11	7					
		125.5	11	20					
		125.0	11	4					
		124.5	4	23					
		124.0	14	100	23				
		123.5	25	5					
		123.0	11	65					
		122.5	11	24.4					

0.0 / 139.9
 4" Topsoil and Root Mat
 0.4 / 139.5
 Brown and gray, SILTY SAND (SM), loose, moist
 2.5 / 137.4
 Orange, brown and gray, mottled, fine CLAYEY SAND (SC), loose, moist
 Orange, brown and gray, mottled, fine CLAYEY SAND (SC), medium dense, moist
 Orange, brown and gray, mottled, fine to medium CLAYEY SAND (SC), medium dense, moist
 Orange-gray, fine to coarse CLAYEY SAND (SC), medium dense, moist
 24.4 / 115.5

		9.8	
		16.1	
		18.7	
		17.6	
		17.5	25.8
		22.5	
		21.7	
		18.0	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 31.8 feet

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17XP-35

SPT_LOGABW\VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-35

PAGE 2 OF 2

STATION: 363+41 **OFFSET:** 26 ft LT
LATITUDE: 38.403755° N **LONGITUDE:** 77.432153° W
SURFACE ELEVATION: 139.9 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/05/2017 - 04/05/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 30.0 ft DEPTH
 ▽ STABILIZED AT 11.0 ft

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

FIELD DESCRIPTION OF STRATA

37	3	25.3	49.7
		22.2	21.0

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
	25								
	26	114							
4.5	28	112	6						
			11						
			13	100					
			16						
	30	110							
	32	108							
			6						
	34	106	9	100					
			13						
			15						
	35								

Blue-gray, fine SILTY SAND (SM), moist

Blue-gray, fine SILTY SAND (SM), medium dense, moist

31.5 / 108.4

Blue-gray, fine to medium CLAYEY SAND (SC), medium dense, wet

Bottom of borehole at 35.0 feet.
 Boring backfilled with auger cuttings.

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 31.8 feet

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17XP-35

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-37

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STATION: 348+91 **OFFSET:** 48 ft LT
LATITUDE: 38.400061° N **LONGITUDE:** 77.433993° W
SURFACE ELEVATION: 200.7 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 05/18/2017 - 05/18/2017
Drilling Method(s): 2.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Will Riddick/GET Solutions, Inc
Logger: Kohltan Heiter, EIT/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		200							
3	2	198	7	2					
	4	196	10	4					
3.5	6	194	11	6					
	8	192	9	8					
1.75	10	190	4	10					
	12	188	3	12					
2	14	186	6	14					

0.0 / 200.7
 5.8" Asphalt
 0.5 / 200.2
 16.2" Aggregate Subbase
 1.8 / 198.9
 Gray to brown, SANDY LEAN CLAY (CL), contains mica, very stiff, moist
 4.0 / 196.7
 Brown, fine to coarse POORLY GRADED SAND (SP), contains mica, medium dense, moist
 5.5 / 195.2
 Brown, fine to medium FAT CLAY WITH SAND (CH), contains mica, loose, moist
 Brown, fine to medium FAT CLAY WITH SAND (CH), contains mica, medium dense, moist
 Brown, fine to medium FAT CLAY WITH SAND (CH), contains mica, loose, moist
 Brown and red, mottled, FAT CLAY WITH SAND (CH), contains mica, stiff, moist

Bottom of borehole at 15.0 feet.
 Boring backfilled with pea gravel and concrete.

		10.1	
		9.4	
		17.5	
68	39	28.3	73.8
		24.4	
		21.3	

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 7.8 feet

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SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

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STATION: 343+89 **OFFSET:** 23 ft LT
LATITUDE: 38.398789° N **LONGITUDE:** 77.434663° W
SURFACE ELEVATION: 215.0 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA			
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		SAMPLE INTERVAL	ROCK			STRATA LEGEND	LAB DATA			
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)		CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA		DIP °	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
<p>Date(s) Drilled: 05/18/2017 - 05/18/2017 Drilling Method(s): 2.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Will Riddick/GET Solutions, Inc Logger: Kohltan Heiter, EIT/HDR</p> <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p> <p>FIELD DESCRIPTION OF STRATA</p>													
										LL	PI		
		214											
2	2	212	4	100	2				0.0 / 215.0 6.3" Asphalt				
									0.5 / 214.5 16.7" Aggregate Subbase				
3	4	210	3	100	4				1.9 / 213.1 Brown, fine CLAYEY SAND (SC), contains layer of gravel 3.3 to 3.5 feet bgs, contains mica, medium dense, moist			19.0	
									7.0 / 208.0 Brown and light gray, mottled, LEAN CLAY WITH SAND (CL), contains mica, moist	25	8	10.7	36.3
1.75	8	208	7	85	7				8.0 / 207.0 Light gray and brown, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), contains mica, moist			12.0	
									8.6 / 206.4 Brown and light gray, fine to medium CLAYEY SAND (SC), contains mica, moist			23.2	
3.5	10	206	3	100	10				10.0 / 205.0 Brown and red, mottled, FAT CLAY (CH), contains mica, very stiff, moist				
									12.5 / 202.5 Brown and red, mottled, fine CLAYEY SAND (SC), contains layer of gravel 14.7 to 15.0 feet bgs, medium dense, moist	46	21	22.1	46.8
2.5	14	202	3	75	13				Bottom of borehole at 15.0 feet. Boring backfilled with pea gravel and concrete.				
		200	17	14	15								

REMARKS: Rig Type: CME 45 Truck Rig. Cave-in Depth at 9.2 feet

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SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-41

PAGE 1 OF 3

STATION: 318+00 **OFFSET:** 32 ft LT
LATITUDE: 38.392852° N **LONGITUDE:** 77.439557° W
SURFACE ELEVATION: 174.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/04/2017 - 04/04/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Thomas Williams/S&ME, Inc.
 Logger: Russell Kanith/HDR

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER

▼ FIRST ENCOUNTERED AT 3.9 ft DEPTH
 ▼ STABILIZED AT 17.5 ft

FIELD DESCRIPTION OF STRATA

LL PI

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LL	PI	MOISTURE CONTENT (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA					
			WOH							0.0 / 174.0			
			1	55						Brown, fine SILTY SAND (SM), loose, moist			16.8
			3										
			5										
	2	172	7	80	2					2.0 / 172.0			6.9
			7										
			3										
	4	170	1	90	4					Brown, fine CLAYEY SAND (SC), very loose, wet			16.4
			1										
			1										
	6	168	3	75	6					6.5 / 167.5			11.6
2.75			5		6.5								
			7										
	8	166	4	12	8					Orange-brown and gray, mottled, SILT (ML), contains mica, stiff, moist			
			7										
			12										
	10	164	15	70	10					9.0 / 165.0			17.7
	12	162											
			5		13								
	14	160	9	90	15					13.5 / 160.5			10.5
			10										
			15										
	16	158											
	18	156	3	100	18					18.5 / 155.5			29.9
1.75			5		18.5								
			9										
	20	154	11		20					Gray, LEAN CLAY (CL), stiff, moist			
	22	152								21.5 / 152.5			
	24	150	12	90	23					Brown and gray, mottled, CLAYEY SAND (SC), dense, wet			24.0
			16										
			21										
			16		24.8								
4.25													

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 30.5 feet

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17XP-41

SPT_LOGAW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-41

PAGE 2 OF 3

STATION: 318+00 **OFFSET:** 32 ft LT
LATITUDE: 38.392852° N **LONGITUDE:** 77.439557° W
SURFACE ELEVATION: 174.0 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/04/2017 - 04/04/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Thomas Williams/S&ME, Inc.	Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											JOINTS
											GROUND WATER ▼ FIRST ENCOUNTERED AT 3.9 ft DEPTH ▼ STABILIZED AT 17.5 ft									
											FIELD DESCRIPTION OF STRATA						LL	PI		
	26	148									24.8 / 149.2	Gray, LEAN CLAY (CL), moist								
	28	146	8								26.5 / 147.5	Gray and brown, CLAYEY SAND (SC), wet								22.6
4.5	30	144	14	21	100						29.4 / 144.6	Gray and dark gray, LEAN CLAY (CL), dry								
	32	142									31.5 / 142.5	Gray, white and brown, mottled, fine to coarse WELL GRADED SAND WITH CLAY (SW-SC), very dense, wet								22.9
	34	140	5	21	90							Gray, white and brown, mottled, fine to coarse WELL GRADED SAND WITH CLAY (SW-SC), dense, wet								24.0
	36	138																		
	38	136	11	15	85															
	40	134	21	29																
	42	132																		
4	44	130	7	10	100						43.7 / 130.3	Gray, SILT (ML), dry								22.9
	46	128																		
	48	126	7	21	83						46.5 / 127.5	Gray and brown, mottled, fine to coarse CLAYEY SAND (SC), very dense, moist								16.2

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 30.5 feet

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17XP-41

SPT_LOGAW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-41

PAGE 3 OF 3

STATION: 318+00 **OFFSET:** 32 ft LT
LATITUDE: 38.392852° N **LONGITUDE:** 77.439557° W
SURFACE ELEVATION: 174.0 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA			
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS				STRATA LEGEND
<p>Date(s) Drilled: 04/04/2017 - 04/04/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Thomas Williams/S&ME, Inc. Logger: Russell Kanith/HDR</p>														
<p style="text-align: center;">GROUND WATER</p> <p>▼ FIRST ENCOUNTERED AT 3.9 ft DEPTH ▼ STABILIZED AT 17.5 ft</p>														
<p style="text-align: center;">FIELD DESCRIPTION OF STRATA</p> <p>Bottom of borehole at 49.8 feet. Boring backfilled with auger cuttings.</p>											LL	PI		

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 30.5 feet

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17XP-41

SPT_LOGAW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-42

PAGE 1 OF 2

STATION: 313+78 **OFFSET:** 15 ft LT
LATITUDE: 38.391921° N **LONGITUDE:** 77.440437° W
SURFACE ELEVATION: 175.1 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/04/2017 - 04/04/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Thomas Williams/S&ME, Inc.
 Logger: Russell Kanith/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 28.0 ft DEPTH
 ▽ STABILIZED AT 16.7 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
			WOH						
		174	2	65					
1	2		3						
		172	2	90					
1.5	4		3						
		170	5	80					
2.5	6		5						
		168	6	95					
3	8		4						
		166	8	85					
10			10						
		164							
12									
		162	7						
14			6	85					
1.75	14		4						
		160	6						
16									
		158							
18			5						
3	18		6	100					
		156	9						
20			17						
		154							
22									
3	22		9						
		152							
24			17	95					
		150	15						
		148	20						

0.0 / 175.1
 3" Root mat
 0.3 / 174.8
 Brown, LEAN CLAY (CL), wet
 1.0 / 174.1
 Tan-brown, fine to coarse CLAYEY SAND (SC), wet
 2.0 / 173.1
 Orange-brown and gray, mottled, FAT CLAY (CH), firm, moist
 Orange-brown and gray, mottled, FAT CLAY WITH SAND (CH), stiff, moist
 Orange-brown and gray, mottled, FAT CLAY WITH SAND (CH), stiff, moist
 8.5 / 166.6
 Orange-brown and gray, mottled, fine to coarse CLAYEY SAND (SC), medium dense, moist
 13.3 / 161.8
 Brown-gray, fine to coarse WELL GRADED SAND (SW), moist
 14.5 / 160.6
 White-gray, LEAN CLAY (CL), moist
 18.5 / 156.6
 Gray and brown, mottled, FAT CLAY WITH SAND (CH), stiff, moist
 23.5 / 151.6
 Gray-white, WELL GRADED SAND WITH CLAY (SW-SC), dense, moist

		15.5	
		18.5	
		19.6	
63	36	27.4	73.2
		14.6	
		31.1	
58	39	23.9	76.9
		17.4	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 25.5 feet

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17XP-42

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-43

PAGE 1 OF 2

STATION: 307+99 **OFFSET:** 81 ft LT
LATITUDE: 38.390837° N **LONGITUDE:** 77.441923° W
SURFACE ELEVATION: 216.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 03/29/2017 - 03/29/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Thomas Williams/S&ME, Inc.
 Logger: Russell Kanith/HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ↓ STABILIZED AT 40.1 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		
		23.0	
		22.1	
		21.2	
		17.5	
		15.0	
		13.8	
		31.9	
		23.9	

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
2.25		216	3						
			3	65					
			3						
			4						
2		214	2						
			3	100					
			4						
			5						
4		212	2						
			2	100					
			3						
			3						
6		210	3						
			3	100					
			4						
			4						
8		208	3						
			3	95					
			4						
			5						
10		206							
12		204	6						
			6	100					
			7						
14		202	7						
			8						
16		200							
3.25		198	4						
			6	95					
			10						
			13						
20		196							
22		194	6						
			10						
			17	100					
			21						
3.5		192							

0.0 / 216.5
 3" Root Mat
 0.3 / 216.2
 Tan-orange, SANDY LEAN CLAY (CL), contains root fragments, firm, dry
 2.0 / 214.5
 Tan, fine SILTY SAND (SM), contains mica, loose, moist
 Tan-orange, fine SILTY SAND (SM), contains mica, loose, moist
 Tan-orange and gray, mottled, fine SILTY SAND (SM), contains mica, loose, moist
 16.5 / 200.0
 Gray, LEAN CLAY (CL), very stiff, dry
 23.7 / 192.8
 Gray, fine SILTY SAND (SM), moist

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 42.8 feet

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17XP-43

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-44

PAGE 1 OF 3

STATION: 305+91
LATITUDE: 38.390476° N
SURFACE ELEVATION: 226.6 ft

OFFSET: 116 ft LT
LONGITUDE: 77.442494° W
COORD. DATUM: NAD 83

FIELD DATA

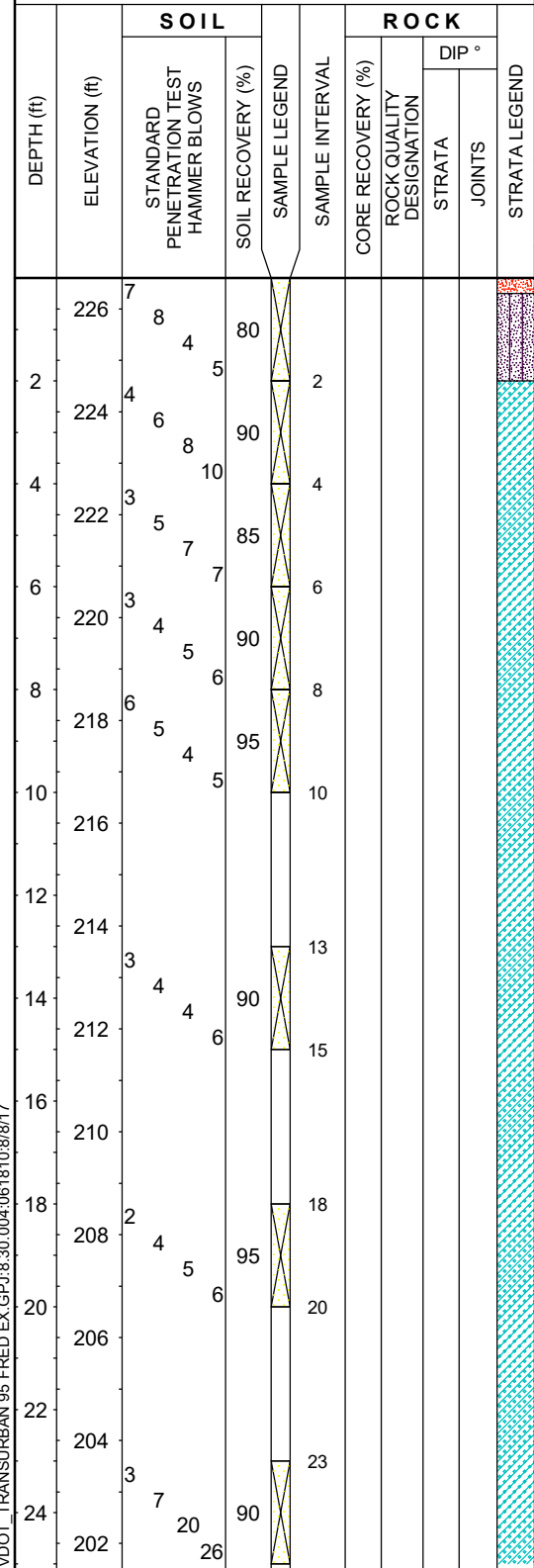
Date(s) Drilled: 04/17/2017 - 04/17/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 72 HRS

FIELD DESCRIPTION OF STRATA



REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 52.4 feet

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17XP-44

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-44

PAGE 2 OF 3

STATION: 305+91
LATITUDE: 38.390476° N
SURFACE ELEVATION: 226.6 ft

OFFSET: 116 ft LT
LONGITUDE: 77.442494° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/17/2017 - 04/17/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

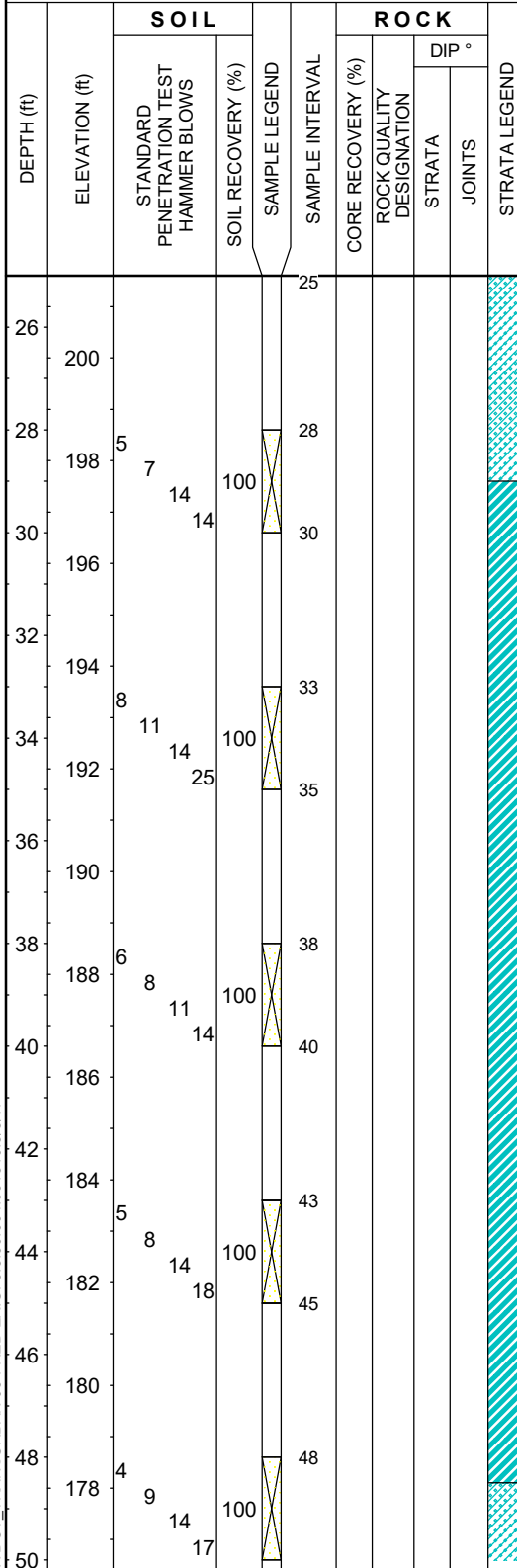
LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 72 HRS

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--



Blue-gray, fine CLAYEY SAND (SC), moist

29.0 / 197.6
 Blue-gray, FAT CLAY WITH SAND (CH), dry

Blue-gray, FAT CLAY WITH SAND (CH), very stiff, dry

Blue-gray, FAT CLAY WITH SAND (CH), very stiff, dry

48.5 / 178.1
 Gray and brown, mottled, CLAYEY SAND (SC), medium dense, moist

28.0

29.6

29.1

29.8 80.1

22.4

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 52.4 feet

PAGE 2 OF 3

17XP-44

SPT_LOGBW:VDOT_TRANURBAN 95 FRED EX.GPJ:8:30:004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
 LOCATION: Stafford County, Virginia
 STRUCTURE: EMBANKMENT

17XP-44

PAGE 3 OF 3

STATION: 305+91
 LATITUDE: 38.390476° N
 SURFACE ELEVATION: 226.6 ft

OFFSET: 116 ft LT
 LONGITUDE: 77.442494° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/17/2017 - 04/17/2017
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Thomas Williams/S&ME, Inc.
 Logger: Russell Kanith/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		16.5	

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 72 HRS

FIELD DESCRIPTION OF STRATA

LL	PI
----	----

DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK					STRATA LEGEND	
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °		STRATA
176					50					
52	174	11			53					
54	172	12 41 50/2"	100		54.7					

Gray and brown, mottled, CLAYEY SAND (SC), medium dense, moist

53.6 / 173.0
 Red-brown and gray, mottled, POORLY GRADED SAND WITH CLAY (SP-SC), contains clay layer from 53.6 to 53.8 feet bgs, very dense, dry

Bottom of borehole at 54.7 feet.
 Boring backfilled with auger cuttings.

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 52.4 feet

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17XP-44

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-45

PAGE 1 OF 3

STATION: 303+95 **OFFSET:** 101 ft LT
LATITUDE: 38.390051° N **LONGITUDE:** 77.442915° W
SURFACE ELEVATION: 210.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 03/29/2017 - 03/29/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 24 HOURS

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		210	3						
			4	95					
			4						
			6						
2		208	3						
			5	90					
			4						
			6						
4		206	2						
			2	70					
			5						
			6						
6		204	3						
			5	80					
			7						
			8						
8		202	5						
			6	90					
			7						
			9						
10		200							
12		198							
			5						
3.5			6	95					
			10						
		196	12						
16		194							
18		192	6						
			6	90					
			10						
			16						
20		190							
22		188							
			5						
			10	100					
			13						
			21						
24		186							

0.0 / 210.5
 6" Topsoil
 0.5 / 210.0
 Tan-orange, fine SILTY SAND (SM), contains mica, loose, moist

Orange-gray, fine SILTY SAND (SM), medium dense, moist

Orange-gray to light gray, fine SILTY SAND (SM), medium dense, moist

11.5 / 199.0
 Gray, SANDY SILT (ML), dry

14.0 / 196.5
 Light gray, fine SILTY SAND (SM), moist

21.5 / 189.0
 Blue-gray, SANDY SILT (ML), very stiff, dry

		21.8	
		21.7	
		24.2	
		14.5	22.9
		22.2	
		22.0	
		31.4	
		27.6	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 47.7 feet

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17XP-45

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-45

PAGE 2 OF 3

STATION: 303+95 **OFFSET:** 101 ft LT
LATITUDE: 38.390051° N **LONGITUDE:** 77.442915° W
SURFACE ELEVATION: 210.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 03/29/2017 - 03/29/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 24 HOURS

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

FIELD DESCRIPTION OF STRATA

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		SAMPLE INTERVAL	ROCK			STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)		CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
	25								
2	26	184							
1.5	28	182	3	95	28				
	30	180	7	14	28.5				
	32	178							
	34	176	29	100	30				
	36	174	45	31	33				
	38	172	33	95	35				
	40	170	11	12					
	42	168	9	13					
	44	166	8	95	38				
	46	164	9	11					
	48	162	8	100	40				
	50		8	12	43				

Blue-gray, SANDY SILT (ML), dry
 28.5 / 182.0

Gray, SANDY LEAN CLAY (CL), moist
 29.0 / 181.5

Gray and brown, fine SILTY SAND (SM), moist

Light gray, fine to coarse SILTY SAND (SM), very dense, moist

Light gray, fine to coarse SILTY SAND (SM), medium dense, moist

Light gray and brown, mottled, fine to coarse SILTY SAND (SM), medium dense, moist

		30.2	
		13.3	
		12.7	
		14.9	22.3
		16.9	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 47.7 feet

PAGE 2 OF 3

17XP-45

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-45

PAGE 3 OF 3

STATION: 303+95 **OFFSET:** 101 ft LT
LATITUDE: 38.390051° N **LONGITUDE:** 77.442915° W
SURFACE ELEVATION: 210.5 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						50									
<p>Date(s) Drilled: 03/29/2017 - 03/29/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Thomas Williams/S&ME, Inc. Logger: Russell Kanith/HDR</p> <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING DRY AFTER 24 HOURS</p> <p>FIELD DESCRIPTION OF STRATA Bottom of borehole at 50.0 feet. Boring backfilled with auger cuttings.</p>															

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 47.7 feet

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17XP-45

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-46

PAGE 1 OF 2

STATION: 300+94 **OFFSET:** 32 ft LT
LATITUDE: 38.389312° N **LONGITUDE:** 77.443444° W
SURFACE ELEVATION: 182.3 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 03/29/2017 - 03/29/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ▽ STABILIZED AT 21.1 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
1.75	3	182	3	100					
	4		4						
2.5	5	180	5	85	2				
	7		7						
	8	178	8		4				
	9		9	95					
	10	176	10		6				
	11		11	90					
	12	174	12		8				
	13		13	95					
	14	172	14		10				
	15		15	90					
	16	170	16		13				
	17		17	90					
	18	168	18		15				
	19		19	95					
	20	166	20		18				
	21		21	100					
	22	164	22		20				
	23		23	95					
	24	162	24		23				
	25	160	25		23				
	26		26	95					
	27	158	27		23				

0.0 / 182.3
 3" Topsoil
 0.3 / 182.0
 Orange-brown, fine to medium CLAYEY SAND (SC), loose, moist
 Orange-brown, fine to medium CLAYEY SAND (SC), medium dense, moist
 Orange-brown and light gray, fine to medium CLAYEY SAND (SC), medium dense, moist
 White-gray, fine to medium CLAYEY SAND (SC), medium dense, moist

		20.0	
41	16	18.4	47.9
		17.4	
		16.4	
		13.2	
35	13	22.6	36.0
		19.2	
		21.7	
		25.0	32.5

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 25.6 feet

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17XP-46

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-46

PAGE 2 OF 2

STATION: 300+94 **OFFSET:** 32 ft LT
LATITUDE: 38.389312° N **LONGITUDE:** 77.443444° W
SURFACE ELEVATION: 182.3 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 03/29/2017 - 03/29/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		25.2	

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ▽ STABILIZED AT 21.1 ft

FIELD DESCRIPTION OF STRATA

White-gray, fine to medium CLAYEY SAND (SC), medium dense, moist

26.5 / 155.8

Light gray to gray, fine to coarse SILTY SAND (SM), medium dense, moist

Bottom of borehole at 30.0 feet.
 Bulk sample collected from 0.0 to 25.0 feet bgs.
 Boring backfilled with auger cuttings. Piezometer installed to a depth of 30.0 feet bgs (screened 20.0 to 30.0 feet bgs).

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA		JOINTS
	26	156				25					
	28	154	4			28					
	30		5 9 14	95		30					

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 25.6 feet

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17XP-46

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-47

PAGE 1 OF 2

STATION: 296+06 **OFFSET:** 56 ft LT
LATITUDE: 38.388363° N **LONGITUDE:** 77.444650° W
SURFACE ELEVATION: 185.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 03/30/2017 - 03/30/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 27.0 ft DEPTH
 ▽ STABILIZED AT 25.6 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS		DIP °
1.5		3								
		184	3	65						
2.5	2		3	4	2					
		182	3	70						
2.5	4		4	5	4					
		180	2	80						
	6		4	5	6					
	8	178	4	95						
	10	176	4	100						
	12	174	5		13					
	14	172	6	100						
	16	170	7		15					
	18	168	5	95						
	20	166	5	10	20					
	22	164	7							
	24	162	10	90	23					

0.0 / 185.5
 3" Topsoil

0.3 / 185.2
 Orange-brown, LEAN CLAY (CL), firm, moist
 Orange-brown and gray, LEAN CLAY (CL), firm, dry

4.6 / 180.9
 Brown-gray, fine to medium CLAYEY SAND (SC), contains mica, moist
 Brown-gray to gray-white, fine CLAYEY SAND (SC), loose, moist

11.5 / 174.0
 Gray-white, fine to coarse SILTY SAND (SM), medium dense, moist

White-gray, fine to coarse SILTY SAND (SM), medium dense, moist

White-gray, fine to coarse SILTY SAND (SM), dense, moist

		22.9	
		27.9	
40	17	21.4	45.5
		21.2	
		15.5	20.7
		23.7	
		20.6	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 39.4 feet

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17XP-47

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-47

PAGE 2 OF 2

STATION: 296+06 **OFFSET:** 56 ft LT
LATITUDE: 38.388363° N **LONGITUDE:** 77.444650° W
SURFACE ELEVATION: 185.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 03/30/2017 - 03/30/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Thomas Williams/S&ME, Inc.
 Logger: Russell Kanith/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 27.0 ft DEPTH
 ▽ STABILIZED AT 25.6 ft

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
	26	160							
	28	158	8						
	30	156	11	90					
	32	154	11						
	34	152	13						
	36	150							
	38	148	9						
	40	146	14	95					
	42	144	16						
	44	142	22						
4.5	44.5	141.0	18	75					
4	45		23						

White-gray, fine to coarse SILTY SAND (SM), medium dense, wet

23.3

White-gray and brown, fine to coarse SILTY SAND (SM), dense, wet

21.3

36.5 / 149.0

Brown-gray, FAT CLAY WITH SAND (CH), very stiff, moist

68 42 23.9 76.7

41.5 / 144.0

Brown-gray, fine to coarse CLAYEY SAND (SC), dense, wet

28.6

44.5 / 141.0

Blue-gray, LEAN CLAY (CL), moist

Bottom of borehole at 45.0 feet.
 Boring backfilled with auger cuttings.

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 39.4 feet

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17XP-47

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-48

PAGE 1 OF 2

STATION: 291+94 **OFFSET:** 41 ft LT
LATITUDE: 38.387498° N **LONGITUDE:** 77.445578° W
SURFACE ELEVATION: 174.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 03/30/2017 - 03/30/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Thomas Williams/S&ME, Inc.
 Logger: Russell Kanith/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 24.0 ft DEPTH
 ▽ STABILIZED AT 18.0 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		3							
		4		45					
		5							
	2	172	4	4	2				
		4		65					
		5							
	4	170	3	7	4				
		3		80					
		5							
	6	168	3	5	6				
		2		85					
		5							
	8	166	4	7	8				
		7		100					
		32							
	10	164		50/1"	9.6				
	12	162		50/4"	13				
				100	13.3				
	14	160							
	16	158							
	18	156	13		18				
			14						
			16		100				
			19						
	20	154			20				
	22	152							
			50		23				
			11						
3.25	24	150		100	24				
			13						
			16						

0.0 / 174.0
 5" Topsoil
 0.4 / 173.6
 Brown, fine SILTY SAND (SM), loose, moist
 Tan-brown, fine SILTY SAND (SM), contains mica, loose, moist
 Tan-brown, fine SILTY SAND (SM), contains mica, contains root fragments, loose, moist
 Tan-gray and orange, mottled, fine SILTY SAND (SM), loose, moist
 Tan-gray and orange, mottled, to gray-white, fine SILTY SAND (SM), dense, moist
 11.5 / 162.5
 White, fine POORLY GRADED SAND (SP), very dense, dry
 16.5 / 157.5
 Gray-white, fine to coarse SILTY SAND (SM), dense, moist
 21.5 / 152.5
 Gray-brown, fine to coarse WELL GRADED SAND (SW), moist
 24.0 / 150.0
 Blue-gray, SANDY LEAN CLAY (CL), moist

		14.6	
		23.6	
42	15	20.4	36.9
		19.2	
		20.0	
		14.4	
		18.5	19.5
		27.8	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 24.8 feet

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17XP-48

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-48

PAGE 2 OF 2

STATION: 291+94 **OFFSET:** 41 ft LT
LATITUDE: 38.387498° N **LONGITUDE:** 77.445578° W
SURFACE ELEVATION: 174.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 03/30/2017 - 03/30/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 24.0 ft DEPTH
 ▽ STABILIZED AT 18.0 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)
 FINES CONTENT -#200 (%)

LL PI

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS		
	26	148								
4.5	28	146	13							
			16							
			23							
			24	100						
	30	144								

25	Blue-gray, SANDY LEAN CLAY (CL), moist		
26.5 / 147.5			
28	Blue-gray and brown, FAT CLAY (CH), hard, moist		21.1
30	Bottom of borehole at 30.0 feet. Boring backfilled with auger cuttings.		

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 24.8 feet

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17XP-48

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-49

PAGE 1 OF 3

STATION: 287+04
LATITUDE: 38.386604° N
SURFACE ELEVATION: 189.7 ft

OFFSET: 97 ft LT
LONGITUDE: 77.446870° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 03/30/2017 - 03/30/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ▽ STABILIZED AT 44.3 ft

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	
5	189.7	7	60					
2	188	4	9	2				
4	186	5	8	4				
6	184	3	7	6				
8	182	3	6	8				
10	180	50/4"	100	8				
12	178			8.3				
14	176	50/2"	100	13				
16	174			13.2				
18	172	50/6"	100	18				
20	170			18.5				
22	168							
24	166	15	100	23				
		17						
		14						
		17						

0.0 / 189.7
 1" Topsoil

0.1 / 189.6
 Tan-brown, CLAYEY SAND (SC), medium dense, moist
 Brown-orange, CLAYEY SAND (SC), medium dense, moist

Brown-orange to gray-brown, fine CLAYEY SAND (SC), loose, moist

Gray-brown, fine CLAYEY SAND (SC), loose, moist

8.0 / 181.7
 White-gray, fine SILTY SAND (SM), very dense, dry

Gray and brown, mottled, fine to medium SILTY SAND (SM), dense, moist

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 47.6 feet

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17XP-49

SPT_LOGBW:VDOT_TRANURBAN 95 FRED EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-49

PAGE 2 OF 3

STATION: 287+04
LATITUDE: 38.386604° N
SURFACE ELEVATION: 189.7 ft

OFFSET: 97 ft LT
LONGITUDE: 77.446870° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 03/30/2017 - 03/30/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ▽ STABILIZED AT 44.3 ft

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK						
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA	JOINTS	STRATA LEGEND
26	164				25						
28	162	23 38 50/4"	92	28	28						
30	160				29.3						
32	158										
34	156	18 36 35 50/6"	90	33	35						
36	154										
38	152	14 17 19	100	38	40						
40	150	31									
42	148										
44	146	14 16 20 24	100	43	45						
46	144										
48	142	16 16 20	100	48							
50	140	24									

Gray, fine SILTY SAND (SM), very dense, moist

13.0

Gray, fine to medium SILTY SAND (SM), dense, moist

14.1

17.8 27.4

16.8

18.7

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 47.6 feet

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17XP-49

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-50

PAGE 1 OF 2

STATION: 284+10
LATITUDE: 38.385929° N
SURFACE ELEVATION: 161.6 ft

OFFSET: 54 ft LT
LONGITUDE: 77.447448° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/03/2017 - 04/03/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

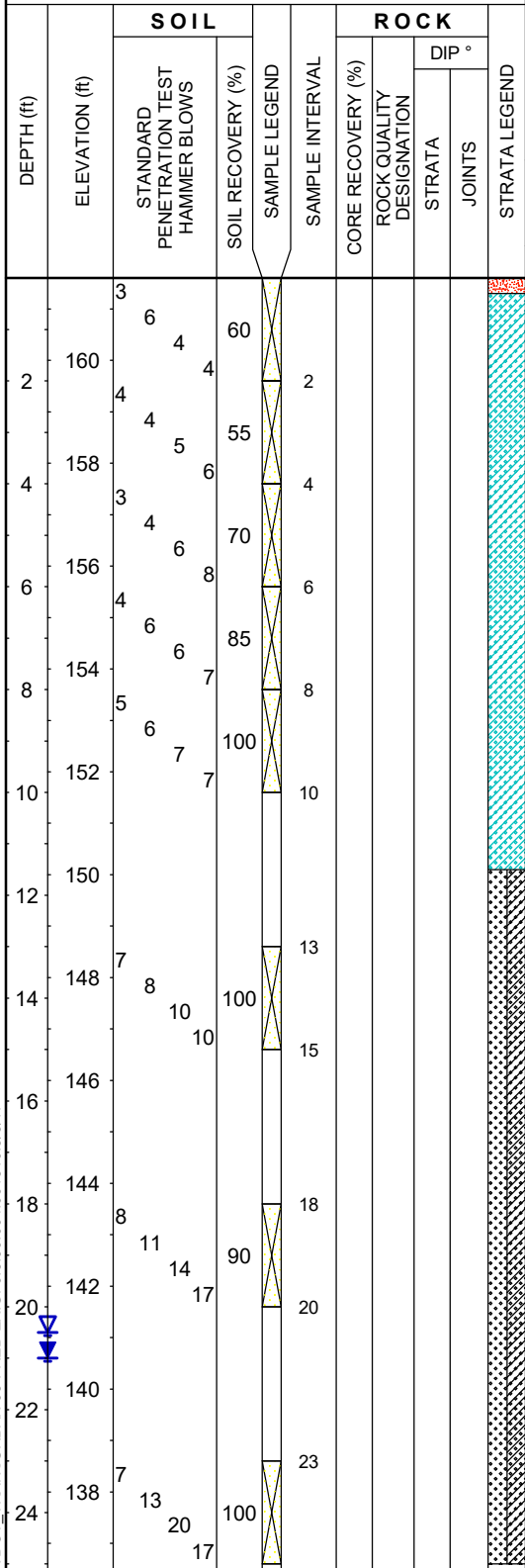
LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 20.5 ft DEPTH
 ▽ STABILIZED AT 21.0 ft

FIELD DESCRIPTION OF STRATA

LL	PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		13.6	
		20.1	
		17.2	26.5
		16.4	
		17.5	
		17.0	
		18.0	
		22.5	



0.0 / 161.6
 3" Topsoil

0.3 / 161.3
 Brown, fine CLAYEY SAND (SC), contains root fragments, medium dense, moist
 Tan, fine CLAYEY SAND (SC), loose, moist

White-gray and brown, fine to medium CLAYEY SAND (SC), medium dense, moist

11.5 / 150.1
 White-gray and brown, mottled, fine to coarse WELL GRADED SAND WITH CLAY (SW-SC), medium dense, moist

White-gray and brown, mottled, fine to coarse WELL GRADED SAND WITH CLAY (SW-SC), dense, wet

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/17

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 23.3 feet

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17XP-50



PROJECT #: 95 Express Fredericksburg Ext.
 LOCATION: Stafford County, Virginia
 STRUCTURE: EMBANKMENT

17XP-50

PAGE 2 OF 2

STATION: 284+10
 LATITUDE: 38.385929° N
 SURFACE ELEVATION: 161.6 ft

OFFSET: 54 ft LT
 LONGITUDE: 77.447448° W
 COORD. DATUM: NAD 83

FIELD DATA

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °		JOINTS
										25

Date(s) Drilled: 04/03/2017 - 04/03/2017
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Thomas Williams/S&ME, Inc.
 Logger: Russell Kanith/HDR

GROUND WATER

- ▼ FIRST ENCOUNTERED AT 20.5 ft DEPTH
- ▼ STABILIZED AT 21.0 ft

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

FIELD DESCRIPTION OF STRATA

Bottom of borehole at 25.0 feet.
 Boring backfilled with auger cuttings.

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 23.3 feet

PAGE 2 OF 2

17XP-50

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-51

PAGE 1 OF 1

STATION: 277+79 **OFFSET:** 34 ft LT
LATITUDE: 38.384618° N **LONGITUDE:** 77.448887° W
SURFACE ELEVATION: 128.3 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/03/2017 - 04/03/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

GROUND WATER
 ▽ **FIRST ENCOUNTERED AT 12.0 ft DEPTH**
 DRY AFTER 24 HOURS

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

FIELD DESCRIPTION OF STRATA

		14.9	
		23.6	
42	28	12.0 16.8	52.7
		22.1	
		13.7	31.5
		15.6	

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		128	WOH/18"						
				55					
2.5	2	126	3	3	2				
			3	80					
2.5	4	124	4	5	4				
			6	80					
			9	11	6				
6	6	122	2	4	6				
			4	6	7				
8	8	120	2	7	8				
			5	6	8				
10	10	118	8	8	10				
12	12	116	4		13				
			3						
14	14	114	3	100	15				
			3						

0.0 / 128.3
 2" Topsoil
 0.2 / 128.1
 Brown, CLAYEY SAND (SC), very loose, moist
 2.0 / 126.3
 Tan-brown, FAT CLAY (CH), firm, moist
 4.5 / 123.8
 Brown-gray and orange, mottled, fine to coarse
 CLAYEY SAND (SC), contains mica, medium dense,
 moist
 Tan-orange, fine CLAYEY SAND (SC), loose, moist

Bottom of borehole at 15.0 feet.
 Bulk sample collected from 0.0 to 10.0 feet bgs.
 Boring backfilled with auger cuttings.

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 13.1 feet

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17XP-51

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-52

PAGE 1 OF 1

STATION: 272+01
LATITUDE: 38.383518° N
SURFACE ELEVATION: 119.7 ft

OFFSET: 53 ft LT
LONGITUDE: 77.450335° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/03/2017 - 04/03/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 24 HOURS

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND		
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °		STRATA	JOINTS
1	119.7	WOH/12"	70							
2	118	1	95							
3	116	3	70							
4	114	4	95							
5	112	5	90							
6	110	4	85							
7	108	4	95							
8	106	7	95							
9	104	11	95							
10	102	13	95							
11	100	13	95							
12										
13										
14										
15										
16										
17										
18										
19										
20										

0.0 / 119.7
 Brown, fine CLAYEY SAND (SC), loose, wet

Brown-tan, fine CLAYEY SAND (SC), loose, moist

4.0 / 115.7
 Tan-gray and orange, mottled, SANDY LEAN CLAY (CL), contains mica, stiff, moist

Tan-gray and orange, mottled, SANDY LEAN CLAY (CL), contains mica, stiff, moist

Tan-gray and orange, mottled, SANDY LEAN CLAY (CL), contains mica, very stiff, moist

11.5 / 108.2
 Gray, fine CLAYEY SAND (SC), medium dense, moist

Bottom of borehole at 20.0 feet.
 Boring backfilled with auger cuttings.

		16.2	
		18.2	
		17.8	
		18.7	58.4
		18.0	
		21.5	
		16.6	

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 16.9 feet

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17XP-52

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-53

PAGE 1 OF 1

STATION: 265+57 **OFFSET:** 13 ft LT
LATITUDE: 38.382206° N **LONGITUDE:** 77.451842° W
SURFACE ELEVATION: 91.1 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/03/2017 - 04/03/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Thomas Williams/S&ME, Inc.	Logger: Russell Kanith/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
											GROUND WATER									
											NOT ENCOUNTERED DURING DRILLING									
											DRY AFTER 24 HOURS									
											FIELD DESCRIPTION OF STRATA				LL	PI				
2.5		90	1	70							0.0 / 91.1									
			WOH								2" Topsoil									
2.5	2		2	3	2						0.2 / 90.9							17.0		
			3								Tan-brown, SANDY LEAN CLAY (CL), soft, moist									
		88	3	95							Orange-brown and gray, mottled, SANDY LEAN CLAY (CL), firm, moist							25.9		
2.5	4		4	6	4															
			4																	
		86	3	95							4.5 / 86.6									
			6								Gray, fine CLAYEY SAND (SC), loose, moist								18.5	
			6	7	6															
		84	WOH																	
			4	70															23.1	
			4																	
	8		2	5	8															
			3																	
		82	3	75							8.0 / 83.1									
			4								Gray and orange, mottled, SANDY LEAN CLAY (CL), firm, moist								21.4	
			4																	
	10		5		10															
			5																	
											Bottom of borehole at 10.0 feet. Boring backfilled with auger cuttings.									

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 7.2 feet

PAGE 1 OF 1

17XP-53

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-54

PAGE 1 OF 2

STATION: 259+76 **OFFSET:** 17 ft LT
LATITUDE: 38.381128° N **LONGITUDE:** 77.453336° W
SURFACE ELEVATION: 79.8 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/03/2017 - 04/03/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ↓ STABILIZED AT 26.5 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
			1						
	1.75	78	2	55					
			3						
	4	76	4	85					
			5						
	6	74	6	100					
			7						
	8	72	8	70					
			9						
	10	70	10	90					
			11						
	12	68	12						
			13						
	14	66	14	100					
			15						
	16	64	16						
			17						
	18	62	18						
			19						
	20	60	20	100					
			21						
	22	58	22						
			23						
	24	56	24	100					

0.0 / 79.8			
3" Topsoil			
0.3 / 79.5		16.8	
Tan and brown, SANDY LEAN CLAY (CL), soft, moist			
Gray, SANDY LEAN CLAY (CL), firm, moist		19.3	
4.5 / 75.3		17.2	
Gray, fine to medium CLAYEY SAND (SC), medium dense, moist		10.9	
8.0 / 71.8		23.1	
Gray and brown, mottled, LEAN CLAY (CL), stiff, moist			
16.5 / 63.3			
Blue-gray, fine to medium SILTY SAND (SM), contains mica, medium dense, dry	48	32	14.9 85.0
Blue-gray, fine to medium SILTY SAND (SM), contains mica, dense, dry			31.2 35.7

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 28.7 feet

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17XP-54

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-54

PAGE 2 OF 2

STATION: 259+76 **OFFSET:** 17 ft LT
LATITUDE: 38.381128° N **LONGITUDE:** 77.453336° W
SURFACE ELEVATION: 79.8 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/03/2017 - 04/03/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Thomas Williams/S&ME, Inc.
Logger: Russell Kanith/HDR

LAB DATA

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ▾ STABILIZED AT 26.5 ft

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		25.0	

FIELD DESCRIPTION OF STRATA

LL	PI
----	----

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK							
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS			
	26	54											
	28	52	12		X	28							
	30	50	17	21	100	30							
			27										

Blue-gray, fine to medium SILTY SAND (SM), contains mica, dense, dry

Bottom of borehole at 30.0 feet.
 Boring backfilled with auger cuttings.

REMARKS: Rig Type: Diedrich D-50 ATV Track Rig. Cave-in Depth at 28.7 feet

PAGE 2 OF 2

17XP-54

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-55

PAGE 1 OF 1

STATION: 246+85 **OFFSET:** 15 ft LT
LATITUDE: 38.378716° N **LONGITUDE:** 77.456636° W
SURFACE ELEVATION: 57.9 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/13/2017 - 04/13/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Josh Freeman/SaLUT, Inc.	Logger: Bill Miller/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
			WOH/12"																	
	0.25			75							0.0 / 57.9	5" Topsoil							27.3	
	2	56	3	2							0.4 / 57.5	Gray-brown, SILT WITH SAND (ML), soft, moist							29.5	
	4	54	4	100							3.0 / 54.9	Brown, fine to coarse WELL GRADED SAND WITH SILT (SW-SM), wet							7.4	
	6	52	3	100								Brown, fine to coarse WELL GRADED SAND WITH SILT (SW-SM), dense, wet							27.7	
	8	50	8	75							7.0 / 50.9	Gray, fine POORLY GRADED SAND (SP), moist							24.3	
	10	48	4	50							9.0 / 48.9	Gray and black, fine to coarse WELL GRADED SAND WITH SILT (SW-SM), contains mica, moist							20.4	10.0
	12	46	9	13								Gray and black, fine to coarse WELL GRADED SAND WITH SILT (SW-SM), contains mica, medium dense, moist							14.6	
	14	44	12	16								Gray and black, fine to coarse WELL GRADED SAND WITH SILT (SW-SM), contains mica, very dense, moist								
	16	42	13	50								Bottom of borehole at 17.6 feet. Boring backfilled with auger cuttings.								
	17.5		50/1"	100																
	17.6																			

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17XP-55

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-56

PAGE 1 OF 1

STATION: 240+83
LATITUDE: 38.377602° N
SURFACE ELEVATION: 65.7 ft

OFFSET: 19 ft LT
LONGITUDE: 77.458189° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/13/2017 - 04/13/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

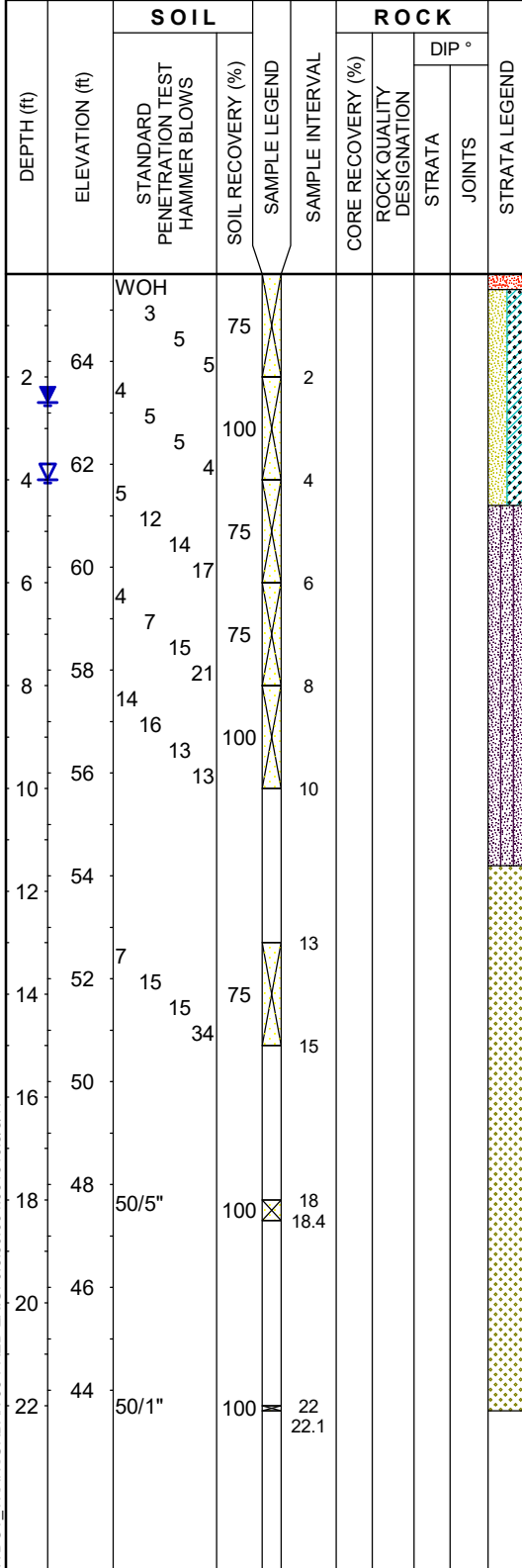
LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
LL	PI		

GROUND WATER

▼ FIRST ENCOUNTERED AT 4.0 ft DEPTH
 ▼ STABILIZED AT 2.5 ft

FIELD DESCRIPTION OF STRATA

LL	PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
		15.9	
		15.5	
		4.7	
		13.1	17.0
		7.1	
		14.2	
		6.2	
		4.9	



0.0 / 65.7
4" Topsoil

0.3 / 65.4
Yellow-brown to brown, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), loose, moist
Yellow-brown to brown, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), medium dense, moist
Yellow-brown to brown, fine to medium POORLY GRADED SAND WITH CLAY (SP-SC), wet

4.5 / 61.2
Brown, fine to coarse SILTY SAND (SM), medium dense, wet
Brown, fine to coarse SILTY SAND (SM), medium dense, wet

11.5 / 54.2
Gray, white and black, fine to coarse WELL GRADED SAND (SW), contains mica, medium dense, moist

Gray, white and black, fine to coarse WELL GRADED SAND (SW), contains mica, very dense, moist

Auger refusal at 22.1 feet.
Bottom of borehole at 22.1 feet.
Boring backfilled with auger cuttings.

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17XP-56

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-57

PAGE 1 OF 2

STATION: 234+89 **OFFSET:** 18 ft LT
LATITUDE: 38.376513° N **LONGITUDE:** 77.459728° W
SURFACE ELEVATION: 80.9 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/12/2017 - 04/12/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Bill Miller/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 4.0 ft DEPTH
 ▽ STABILIZED AT 3.0 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
			WOH/24"						
	80			75					
0.25	2	78	WOH/12"						
				75					
0.5	4	76							
				75					
	6	74							
				100					
	8	72							
				100					
	10	70							
	12	68	WOH						
			1	100					
	14	66							
				100					
	16	64							
	18	62	WOH/18"						
				20					
	20	60							
				100					
	22	58							
				100					
	24	56							
				100					

0.0 / 80.9
 4" Topsoil

0.3 / 80.6
 Yellow-brown and brown, fine to medium CLAYEY SAND (SC), very loose, moist

Yellow-brown and brown, fine to medium CLAYEY SAND (SC), wet

5.0 / 75.9
 Brown and gray, mottled, LEAN CLAY WITH SAND (CL), moist

6.5 / 74.4
 Brown and gray-brown, fine to medium SILTY SAND (SM), loose, wet

Gray, fine to medium SILTY SAND (SM), very loose, wet

Gray, fine to medium SILTY SAND (SM), medium dense, wet

		21.8	
		19.5	
		12.4	
		25.7	
		26.0	
		25.0	43.7
		22.1	
		12.7	

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17XP-57

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-58

PAGE 1 OF 3

STATION: 225+97 **OFFSET:** 17 ft LT
LATITUDE: 38.374908° N **LONGITUDE:** 77.462079° W
SURFACE ELEVATION: 99.6 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/11/2017 - 04/11/2017
Drilling Method(s): Mud Rotary w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 2.5 ft DEPTH
 ▽ STABILIZED AT 2.2 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
			WOH						
	2	98	1	100					
	4	96	5	75					
	6	94	10	65					
	8	92	15	65					
	10	90	20	100					
	12	88	22	100					
	14	86	29	100					
	16	84							
	18	82	13	100					
	20	80	23	100					
	22	78	33	100					
	24	76	39	100					

0.0 / 99.6			
6" Topsoil			
0.5 / 99.1		11.8	
Gray, fine to coarse POORLY GRADED SAND WITH SILT (SP-SM), very loose, moist			
Gray, fine to coarse POORLY GRADED SAND WITH SILT (SP-SM), loose, wet		24.1	
Gray, fine to coarse POORLY GRADED SAND WITH SILT (SP-SM), medium dense, wet		21.3	
		18.7	
		22.1	8.7
13.5 / 86.1		18.6	
Gray and red-brown, FAT CLAY (CH), hard, moist			
		21.1	
		19.3	

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17XP-58

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GFJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-58

PAGE 2 OF 3

STATION: 225+97 **OFFSET:** 17 ft LT
LATITUDE: 38.374908° N **LONGITUDE:** 77.462079° W
SURFACE ELEVATION: 99.6 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/11/2017 - 04/11/2017
Drilling Method(s): Mud Rotary w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 2.5 ft DEPTH
 ▽ STABILIZED AT 2.2 ft

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		61	36

FIELD DESCRIPTION OF STRATA

LL	PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
----	----	----------------------	-------------------------

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS		
		74								24.9
	26									
4.5	28	72	12 17	100						28
	30	70	15 23							30
	32	68								
4.5	34	66	15 22	100						33
	36	64	32 50/6"							35
	38	62	12 17	100						38
	40	60	23 50/6"							40
	42	58								
	44	56	33 50/5"	100						43
	46	54								43.9
	48	52	17 33 50/2"	100						48
										49.2

Gray and red-brown, FAT CLAY (CH), hard, moist

36.5 / 63.1

Gray, fine to medium POORLY GRADED SAND WITH SILT (SP-SM), contains mica, dense, moist

Gray, fine to medium POORLY GRADED SAND WITH SILT (SP-SM), contains mica, very dense, moist

Bottom of borehole at 49.2 feet.

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17XP-58

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-58

PAGE 3 OF 3

STATION: 225+97 **OFFSET:** 17 ft LT
LATITUDE: 38.374908° N **LONGITUDE:** 77.462079° W
SURFACE ELEVATION: 99.6 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS					STRATA LEGEND
<p>Date(s) Drilled: 04/11/2017 - 04/11/2017 Drilling Method(s): Mud Rotary w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Josh Freeman/SaLUT, Inc. Logger: Bill Miller/HDR</p> <p style="text-align: center;">GROUND WATER</p> <p>▼ FIRST ENCOUNTERED AT 2.5 ft DEPTH ▼ STABILIZED AT 2.2 ft</p> <p style="text-align: center;">FIELD DESCRIPTION OF STRATA</p> <p>Boring backfilled with auger cuttings.</p>															

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17XP-58

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-59

PAGE 1 OF 1

STATION: 215+21
LATITUDE: 38.372596° N
SURFACE ELEVATION: 177.3 ft

OFFSET: 17 ft LT
LONGITUDE: 77.464429° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/05/2017 - 04/05/2017
Drilling Method(s): NQ2
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Taylor Redmond/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 24 HOURS

FIELD DESCRIPTION OF STRATA

LL	PI
----	----

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °		JOINTS
2	176					86	76			
4	174									
6	172				5					
8	170					100	100			
10	168				10					
12	166					24	14			
14	164									
					15					

0.0 / 177.3
 Moderately weathered, moderately hard to hard, thin to medium bedded, highly to moderately fractured, gray and white, SANDSTONE, bedding present with a dip of 10 to 15 degrees, contains rounded quartz gravel inclusions, contains iron staining

5.0 / 172.3
 Moderately weathered, moderately hard to hard, thin to medium bedded, moderately fractured, gray and white, SANDSTONE, bedding present with a dip of 10 to 15 degrees, contains rounded quartz gravel inclusions, contains iron staining

10.0 / 167.3
 Moderately weathered, moderately hard to hard, thin to medium bedded, highly fractured, gray and white, SANDSTONE, bedding present with a dip of 10 to 15 degrees, contains rounded quartz gravel inclusions, contains iron staining, no recovery from 12.0 to 14.0 feet bgs

Bottom of borehole at 15.0 feet.
 Boring backfilled with auger cuttings.

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17XP-59

SPT_LOG\W:\VDOT_TRANSURBAN_95\FRED EX.GPJ\8.30.004\061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-60

PAGE 1 OF 2

STATION: 210+95 **OFFSET:** 9 ft RT
LATITUDE: 38.371537° N **LONGITUDE:** 77.465062° W
SURFACE ELEVATION: 206.9 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/07/2017 - 04/07/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Taylor Redmond/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 24.0 ft DEPTH
 ▽ STABILIZED AT 22.3 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
			WOH						
	1	206	1	75					
	2	204	2	100					
	4	202	5	100					
	6	200	8	100					
	8	198	10	100					
	10	196	12	100					
	12	194	14	100					
	14	192	10	100					
	16	190	12	100					
	18	188	7	100					
	20	186	9	100					
	22	184	9	100					
	24	182	12	100					

0.0 / 206.9
 6" Topsoil

0.5 / 206.4
 Brown, LEAN CLAY WITH SAND (CL), soft, moist

2.0 / 204.9
 Light brown, fine to coarse POORLY GRADED SAND WITH CLAY (SP-SC), medium dense, moist

4.0 / 202.9
 Light brown, fine to medium CLAYEY SAND (SC), medium dense, moist

Light brown and white, mottled, fine to medium CLAYEY SAND (SC), medium dense, moist

Brown and white, mottled, fine to medium CLAYEY SAND (SC), medium dense, moist

Brown and white, mottled, fine to coarse CLAYEY SAND (SC), medium dense, wet

		18.8	
		12.4	
		5.8	
		7.5	
		7.4	
		5.8	
		8.5	21.3
		15.4	

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 24.3 feet

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17XP-60

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-60

PAGE 2 OF 2

STATION: 210+95 **OFFSET:** 9 ft RT
LATITUDE: 38.371537° N **LONGITUDE:** 77.465062° W
SURFACE ELEVATION: 206.9 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/07/2017 - 04/07/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Taylor Redmond/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 24.0 ft DEPTH
 ▽ STABILIZED AT 22.3 ft

Liquid Limit: _____
 Plasticity Index: _____
 Moisture Content (%): _____
 Fines Content -#200 (%): _____

FIELD DESCRIPTION OF STRATA

LL: _____ PI: _____

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	
					25				
	26	180							
	28	178	50/1"	100	28 28.1				
	30	176			100	84			
	32	174			33.1				

Gray, fine CLAYEY SAND (SC), very dense, dry
 28.1 / 178.8
 Moderately weathered, hard, thin to medium bedded, moderately fractured, gray and white, SANDSTONE, bedding present with a dip of 10 to 20 degrees

32.2 / 174.7
 Decomposed, very soft, thin to medium bedded, moderately fractured, gray and white, SANDSTONE, bedding present with a dip of 10 to 20 degrees

Auger refusal at 28.1 feet.
 Bottom of borehole at 33.1 feet.
 Boring backfilled with auger cuttings.

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 24.3 feet

PAGE 2 OF 2

17XP-60

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-61
PAGE 1 OF 1

STATION: 204+98 **OFFSET:** 10 ft LT
LATITUDE: 38.370046° N **LONGITUDE:** 77.465931° W
SURFACE ELEVATION: 219.0 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA			
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION						
1	218	4	100					0.0 / 219.0	Yellow to gray, CLAYEY SAND (SC), loose, dry			6.8	
2	216	4	100						Yellow to gray, CLAYEY SAND (SC), medium dense, dry			5.2	
4	214	3	100									2.3	
6	212	33 50/2"	100						Gray, fine to coarse CLAYEY SAND (SC), very dense, dry	34	11	15.4	46.9
8	210	11 50/5"	100									15.9	
12	208							11.5 / 207.5					
14	206	28 40 50/4"	100						Gray, SILTY SAND (SM), very dense, dry	49	18	24.6	25.2
									Bottom of borehole at 14.3 feet. Bulk sample collected from 0.0 to 14.3 feet bgs. Boring backfilled with auger cuttings.				

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 10.5 feet

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17XP-61

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-62

PAGE 1 OF 1

STATION: 198+94
LATITUDE: 38.368514° N
SURFACE ELEVATION: 233.3 ft

OFFSET: 16 ft LT
LONGITUDE: 77.466736° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/04/2017 - 04/04/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Taylor Redmond/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL	PI		
		7.5	
		7.3	
		24.7	
		19.6	
26	NP	10.9	45.2
		26.3	

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK						
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA	JOINTS	STRATA LEGEND
3	232	9	100								
2	230	10	100								
4	228	7	100								
6	226	4	100								
8	224	6	100								
10	222	8	100								
12	220	4	100								
14		4	100								
		6	100								
		5	100								

0.0 / 233.3
 6" Topsoil
 0.5 / 232.8
 Brown, fine to coarse CLAYEY SAND WITH GRAVEL (SC), medium dense, dry
 Brown and red, fine to coarse CLAYEY SAND WITH GRAVEL (SC), medium dense, dry
 Gray, fine to coarse CLAYEY SAND WITH GRAVEL (SC), loose, moist
 6.0 / 227.3
 Red, fine SILTY SAND (SM), medium dense, dry
 Brown, fine SILTY SAND (SM), medium dense, dry

Bottom of borehole at 15.0 feet.
 Boring backfilled with auger cuttings.

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 10.8 feet

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17XP-62

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-63

PAGE 1 OF 1

STATION: 192+98 **OFFSET:** 18 ft LT
LATITUDE: 38.366996° N **LONGITUDE:** 77.467514° W
SURFACE ELEVATION: 234.4 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA								
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	GROUND WATER							
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA		JOINTS	NOT ENCOUNTERED DURING DRILLING	NO LONG TERM MEASUREMENTS TAKEN	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)	
										FIELD DESCRIPTION OF STRATA				LL	PI			
		234	1								0.0 / 234.4							
			5	75							1" Topsoil							
			5								0.1 / 234.3							
2.5	2	232	4	100		2					Brown, white and red, fine CLAYEY SAND (SC), medium dense, moist						11.4	
			4								2.0 / 232.4							
			8								Brown, LEAN CLAY (CL), stiff, moist							19.2
	4	230	2	100		4					Brown, fine SANDY LEAN CLAY (CL), stiff, moist							21.0
			4															
		228	4	100		6					Brown, gray and red, fine SANDY LEAN CLAY (CL), stiff, moist							18.4
			7															
			8															
	8	226	3	100		8												19.1
			5															
			8															
	10	224	10			10												
	12	222	5			13					11.5 / 222.9							
											Brown, SILTY SAND (SM), medium dense, dry							
	14	220	5			13												
			6															
			9			15												
										Bottom of borehole at 15.0 feet. Boring backfilled with auger cuttings.								

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 11 feet

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17XP-63

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-64

PAGE 1 OF 1

STATION: 181+90
LATITUDE: 38.364186° N
SURFACE ELEVATION: 223.6 ft

OFFSET: 29 ft LT
LONGITUDE: 77.468991° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/04/2017 - 04/04/2017
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Taylor Redmond/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL	PI		
		11.6	
		18.2	63.3
		21.4	
38	18	19.3	37.8
		16.1	
		14.0	

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA
5	223.6	8	100						
2	222	6	9						
4	220	7	11						
6	218	6	10						
8	216	8	11						
10	214	9	11						
12	212								
14	210	8	50						

0.0 / 223.6
 3" Topsoil

0.3 / 223.3
 Brown, fine CLAYEY SAND (SC), medium dense, moist

2.0 / 221.6
 Brown, SANDY LEAN CLAY (CL), stiff, moist

4.0 / 219.6
 Brown, fine to medium CLAYEY SAND (SC), medium dense, moist

Brown, medium to coarse CLAYEY SAND WITH GRAVEL (SC), medium dense, moist

Bottom of borehole at 15.0 feet.
 Bulk sample collected from 0.0 to 15.0 feet bgs. Boring backfilled with auger cuttings.

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 12.3 feet

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17XP-64

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-65

PAGE 1 OF 1

STATION: 171+47 **OFFSET:** 33 ft LT
LATITUDE: 38.361545° N **LONGITUDE:** 77.470388° W
SURFACE ELEVATION: 220.2 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 04/03/2017 - 04/03/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Josh Freeman/SaLUT, Inc.	Logger: Taylor Redmond/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
										GROUND WATER				NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN						
										FIELD DESCRIPTION OF STRATA				LL	PI					
1.5		220	1								0.0 / 220.2									
			2								6" Topsoil								16.4	
	2	218	3				2				0.5 / 219.7									
			3								Brown, LEAN CLAY (CL), firm, moist									
			4								2.0 / 218.2									
	4	216	4				4				Brown, fine to medium CLAYEY SAND (SC), loose, moist								16.6	
			5																	
			6																	
	6	214	5				6													
			7																	
			8																	
	8	212	3				8													
			4																	
			5																	
			6																	
	10	210	12				10													
			7																	
			8																	
	12	208																		
			7				13													
			8																	
	14	206	6																	
			7																	
			8				15													
										Brown and gray, fine to medium CLAYEY SAND (SC), medium dense, moist								28.9	34.5	
										Bottom of borehole at 15.0 feet. Boring backfilled with auger cuttings.										

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 12 feet

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17XP-65

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-66

PAGE 1 OF 1

STATION: 151+80
LATITUDE: 38.356819° N
SURFACE ELEVATION: 220.5 ft

OFFSET: 20 ft LT
LONGITUDE: 77.473660° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/19/2017 - 04/19/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 DRY AFTER 24 HRS

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
220	2	4	50					
218	2	4	100					
216	4	3	75					
214	6	1	50					
212	8	3	100					
210	10	5	100					
208	12	5	100					
206	14	6	100					
204	16	8	100					
202	18	5	100					
200	20	7	100					

0.0 / 220.5
Fill, Yellow-brown to brown, fine to medium CLAYEY SAND (SC), medium dense, moist

9.0 / 211.5
Yellow-brown, fine to coarse SILTY SAND (SM), moist

Yellow-brown, fine to coarse SILTY SAND (SM), medium dense, moist

		9.8	
		11.1	
		17.6	
		13.6	
		9.3	
		15.9	35.4
		12.8	

Bottom of borehole at 20.0 feet.
 Boring backfilled with auger cuttings.

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17XP-66

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-67

PAGE 1 OF 2

STATION: 145+97 **OFFSET:** 24 ft LT
LATITUDE: 38.355516° N **LONGITUDE:** 77.474835° W
SURFACE ELEVATION: 225.2 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/19/2017 - 04/19/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Bill Miller/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 14.0 ft DEPTH
 ▽ STABILIZED AT 13.0 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
0.25		1							
		224	1	100					
1	2		5	2					
		222	6	100					
	4		3	8					
		220	5	100					
	6		5	9					
		218	9	75					
	8		9	16					
		216	10	75					
	10		13	14					
		214							
	12								
		212	3						
	14		4	100					
		210	6	7					
	16								
		208							
	18		8						
		206	7	75					
	20		8	13					
		204							
	22								
		202	10						
	24		13	100					
			18	20					

0.0 / 225.2
 3" Topsoil
 0.3 / 224.9
 Yellow-brown, LEAN CLAY (CL), soft, moist

2.5 / 222.7
 Brown to orange-brown, fine to medium CLAYEY SAND (SC), medium dense, moist

21.5 / 203.7
 Brown to orange-brown, fine to medium CLAYEY SAND (SC), medium dense, wet

21.5 / 203.7
 Brown to orange-brown, fine POORLY GRADED GRAVEL WITH CLAY AND SAND (GP-GC), dense, wet

		18.9	
		14.8	
		24.2	46.6
		15.6	
		12.9	
		18.1	
		21.3	
		10.6	9.0

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17XP-67

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-67

PAGE 2 OF 2

STATION: 145+97 **OFFSET:** 24 ft LT
LATITUDE: 38.355516° N **LONGITUDE:** 77.474835° W
SURFACE ELEVATION: 225.2 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA				
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)	
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS
						25									
<p>Date(s) Drilled: 04/19/2017 - 04/19/2017 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: Josh Freeman/SaLUT, Inc. Logger: Bill Miller/HDR</p> <p style="text-align: center;">GROUND WATER</p> <p>▼ FIRST ENCOUNTERED AT 14.0 ft DEPTH ▼ STABILIZED AT 13.0 ft</p> <p style="text-align: center;">FIELD DESCRIPTION OF STRATA</p> <p>Bottom of borehole at 25.0 feet. Boring backfilled with auger cuttings.</p>															

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17XP-67

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-68

PAGE 1 OF 1

STATION: 139+80 **OFFSET:** 34 ft LT
LATITUDE: 38.354205° N **LONGITUDE:** 77.476188° W
SURFACE ELEVATION: 233.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/03/2017 - 04/03/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Taylor Redmond/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL	PI		
		13.8	
28	10	14.9	55.6
		11.1	
24	11	9.6	49.9
		11.2	
		14.8	

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		3	5	95					
		232	6	7					
4	2	230	3	6					
		230	6	7					
	4	228	2	4					
		228	4	6					
	6	226	9	11					
		226	2	16					
	8	224	5	7					
		224	3	3					
	10								

0.0 / 233.5
 Brown and gray, fine CLAYEY SAND (SC), medium dense, moist

2.0 / 231.5
 Brown and gray, SANDY LEAN CLAY (CL), stiff, moist

4.0 / 229.5
 Dark brown, fine to coarse CLAYEY SAND (SC), contains organic matter, medium dense, moist

Dark gray, fine to coarse CLAYEY SAND (SC), contains organic matter, medium dense, wet

Bottom of borehole at 10.0 feet.
 Bulk sample collected from 4.0 to 8.0 feet bgs. Boring backfilled with auger cuttings.

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 5.8 feet

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17XP-68

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-69

PAGE 1 OF 1

STATION: 133+77 **OFFSET:** 32 ft LT
LATITUDE: 38.352960° N **LONGITUDE:** 77.477568° W
SURFACE ELEVATION: 237.5 ft **COORD. DATUM:** NAD 83

FIELD DATA										LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 03/30/2017 - 03/30/2017	Drilling Method(s): 3.25" HSA w/ SPTs	SPT Method: Automatic Hammer	Other Test(s): Not Applicable	Driller: Josh Freeman/SaLUT, Inc.	Logger: Kohltan Heiter, EIT/HDR	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA											
										GROUND WATER				NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN						
										FIELD DESCRIPTION OF STRATA				LL	PI					
1.5		236	2	65							0.0 / 237.5	Dark brown, fine CLAYEY SAND (SC), contains organic matter, medium dense, moist						10.7		
2	2	234	4	75							4.0 / 233.5	Brown and gray, SANDY LEAN CLAY (CL), very stiff, dry						15.8		
4.5	4	232	3	100							6.0 / 231.5	Brown and gray, mottled, fine CLAYEY SAND (SC), dense, dry						7.8		
3.75	6	230	15	100							8.0 / 229.5	Gray and brown, mottled, SANDY LEAN CLAY (CL), medium dense, dry						15.2		
4.5	8	228	9	100							11.5 / 226.0	Red, gray and brown, mottled, FAT CLAY (CH), stiff, moist				74	41	32.5	85.6	
10		226									Bottom of borehole at 15.0 feet. Boring backfilled with auger cuttings.									
12		224	4	100																
3.5	14		7																	
	14		7																	
			12																	

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 9 feet

PAGE 1 OF 1

17XP-69

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX_GF-J.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-70

PAGE 1 OF 2

STATION: 127+24
LATITUDE: 38.351803° N
SURFACE ELEVATION: 235.8 ft

OFFSET: 123 ft LT
LONGITUDE: 77.479336° W
COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 03/30/2017 - 03/30/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Taylor Redmond/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

DEPTH (ft)	ELEVATION (ft)	STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA	JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LL	PI	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
2	234	2	25	2							0.0 / 235.8 1" Topsoil			15.2	
2	232	2	40	2							0.1 / 235.7 Brown, fine CLAYEY SAND (SC), contains root fragments, loose, dry			18.0	
4	230	5	50	4							2.0 / 233.8 Brown, LEAN CLAY WITH SAND (CL), firm, moist			21.8	
6	228	7	90	6							Brown and white, SANDY LEAN CLAY (CL), firm, moist			16.4	
8	226	11	100	8							6.0 / 229.8 Gray and red, FAT CLAY WITH SAND (CH), very stiff, moist			16.8	
10	224	15		10							11.5 / 224.3				
12	222	2	85	13							Gray, fine to coarse CLAYEY SAND (SC), loose, moist	45	20	25.5	40.5
14	220	3	6	15											
16	218	3	65	18							Brown, medium to coarse CLAYEY SAND (SC), loose, moist			16.2	
18	216	3		20											
20	214	4		23											
22	212	1	65								Gray, fine to coarse CLAYEY SAND (SC), very loose, moist	33	10	24.5	24.9

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30:004:06:18:10:8/17

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 16.5 feet

PAGE 1 OF 2

17XP-70



PROJECT #: 95 Express Fredericksburg Ext.
 LOCATION: Stafford County, Virginia
 STRUCTURE: EMBANKMENT

17XP-70

PAGE 2 OF 2

STATION: 127+24
 LATITUDE: 38.351803° N
 SURFACE ELEVATION: 235.8 ft

OFFSET: 123 ft LT
 LONGITUDE: 77.479336° W
 COORD. DATUM: NAD 83

FIELD DATA

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
					25				

Date(s) Drilled: 03/30/2017 - 03/30/2017
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Taylor Redmond/HDR

GROUND WATER

NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

FIELD DESCRIPTION OF STRATA

Bottom of borehole at 25.0 feet.
 Boring backfilled with auger cuttings.

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 16.5 feet

PAGE 2 OF 2

17XP-70

SPT_LOGBW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8:30.004:06:18:10:8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-72

PAGE 2 OF 2

STATION: 109+83 **OFFSET:** 4 ft RT
LATITUDE: 38.348125° N **LONGITUDE:** 77.483218° W
SURFACE ELEVATION: 179.2 ft **COORD. DATUM:** NAD 83

FIELD DATA											LAB DATA										
PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)							
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA					JOINTS	STRATA LEGEND					
3.5	26	154	8			25															
	28	152	11			28															
	30	150	12	100		30															
			24																		
<p>GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p>																					
FIELD DESCRIPTION OF STRATA											LL	PI									
Blue-gray, fine CLAYEY SAND (SC), medium dense, dry											40	20	20.0	40.1							
Bottom of borehole at 30.0 feet. Boring backfilled with auger cuttings.																					

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig. Cave-in Depth at 20 feet

PAGE 2 OF 2

17XP-72

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-73

PAGE 1 OF 2

STATION: 97+61 **OFFSET:** 0 ft
LATITUDE: 38.345610° N **LONGITUDE:** 77.486036° W
SURFACE ELEVATION: 163.8 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/20/2017 - 04/20/2017

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Josh Freeman/SaLUT, Inc.
 Logger: Bill Miller/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 8.0 ft DEPTH
 ▽ STABILIZED AT 3.5 ft

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
LL	PI		

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		3							
		2	1	50					
		162	3						
		1	2	50					
		160	4						
2.5	4	160	4	100					
		158	6	8					
2.5	6	158	6	50					
		156	8	10					
		156	9	100					
		154	9	12					
		152							
		150	13	50					
		148	15						
		146	15	100					
		144	25	26					
		142							
		140	50/4"	100	23				
					23.3				

0.0 / 163.8
 Orange-brown, fine to medium CLAYEY SAND (SC), very loose, moist

Orange-brown, fine to medium CLAYEY SAND (SC), loose, moist

4.5 / 159.3
 Gray-brown, LEAN CLAY (CL), stiff, moist

8.0 / 155.8
 Brown gray-brown, fine to coarse SILTY SAND (SM), medium dense, wet

Brown gray-brown, fine to coarse SILTY SAND (SM), dense, moist

Brown gray-brown, fine to coarse SILTY SAND (SM), dense, moist

21.5 / 142.3
 Gray, fine POORLY GRADED SAND (SP), contains mica, very dense, dry

		25.0	
		23.3	
		25.2	
		23.6	
		34.6	
		23.8	
48	11	17.3	25.2
		7.4	

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

PAGE 1 OF 2

17XP-73

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-73

PAGE 2 OF 2

STATION: 97+61 **OFFSET:** 0 ft
LATITUDE: 38.345610° N **LONGITUDE:** 77.486036° W
SURFACE ELEVATION: 163.8 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/20/2017 - 04/20/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 8.0 ft DEPTH
 ▽ STABILIZED AT 3.5 ft

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND		
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °		STRATA	JOINTS
	26	138										
	28	136	50/2"	100	28 28.2							
	30	134	50/2"	100	31 31.2							

Gray, fine POORLY GRADED SAND (SP), contains mica, very dense, dry

9.1

Auger refusal at 31.0 feet.
 Bottom of borehole at 31.2 feet.
 Boring backfilled with auger cuttings.

12.3

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17XP-73

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-74

PAGE 2 OF 2

STATION: 91+86 **OFFSET:** 17 ft RT
LATITUDE: 38.344472° N **LONGITUDE:** 77.487428° W
SURFACE ELEVATION: 183.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/21/2017 - 04/21/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		27.9	31.6
		24.7	
		27.6	

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ▽ STABILIZED AT 0.5 ft

FIELD DESCRIPTION OF STRATA

LL	PI
----	----

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	
	26	156							
	28	154	12	100	X	28			Brown-gray, fine SILTY SAND (SM), contains mica, very dense, dry
	30	152	20	48	X	30			
	32	150							Brown-gray, fine SILTY SAND (SM), contains mica, dense, dry
	34	148	26	100	X	33			
	36	146	24	40	X	35			
	38	144	27	100	X	38			Bottom of borehole at 40.0 feet. Shelby tube collected from an offset boring between depths of 4.0 to 6.0 feet bgs. Boring backfilled with auger cuttings.
	40	142	30	43	X	40			

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17XP-74

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ.8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-75

PAGE 1 OF 3

STATION: 85+73 **OFFSET:** 11 ft LT
LATITUDE: 38.343218° N **LONGITUDE:** 77.488853° W
SURFACE ELEVATION: 204.7 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/26/2017 - 04/26/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 4.0 ft DEPTH
 ▽ STABILIZED AT 1.5 ft

FIELD DESCRIPTION OF STRATA

LL	PI		
----	----	--	--

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	
		204	3	50					
	2	202	2	75					
	4	200	4	75					
	6	198	3	100					
	8	196	2	100					
	10	194							
	12	192	23	100					
	14	190							
	16	188							
	18	186	36	100					
	20	184							
	22	182	13	75					
	24	180	24	75					

0.0 / 204.7
 3" Topsoil

0.3 / 204.4
 Brown to yellow-brown, fine to coarse CLAYEY SAND (SC), loose, moist

Brown to yellow-brown, fine to coarse CLAYEY SAND (SC), medium dense, wet

Brown to yellow-brown, fine to coarse CLAYEY SAND (SC), loose, wet

Brown to yellow-brown, fine to coarse CLAYEY SAND (SC), very dense, wet

18.5 / 186.2
 Gray, FAT CLAY (CH), very hard, dry

Gray, FAT CLAY (CH), hard, dry

		14.0	
		11.1	
21	10	18.8	20.3
		23.5	
		23.0	
		16.3	
		16.8	
		20.7	

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17XP-75

SPT_LOGABW:VDOT_TRANSURBAN_95_FRED_EX.GPJ:8.30.004:061810:8/8/17



PROJECT #: 95 Express Fredericksburg Ext.
LOCATION: Stafford County, Virginia
STRUCTURE: EMBANKMENT

17XP-77

PAGE 1 OF 1

STATION: 66+55 **OFFSET:** 14 ft LT
LATITUDE: 38.339331° N **LONGITUDE:** 77.493361° W
SURFACE ELEVATION: 233.2 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/28/2017 - 04/28/2017
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: Josh Freeman/SaLUT, Inc.
Logger: Bill Miller/HDR

LAB DATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
66	47	25.2	64.0
		23.5	

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ▽ STABILIZED AT 17.3 ft

FIELD DESCRIPTION OF STRATA

LL PI

PKT. PENETROMETER (tsf)	DEPTH (ft)	ELEVATION (ft)	SOIL		SAMPLE INTERVAL	ROCK			STRATA LEGEND
			STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)		CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
			WOH						
	0.25	232	1	100					
	0.5	230	4	100	2				
	2	228	9	100	4				
	2	226	4	20	6				
	8	224	3	100	8				
	10	222	3	100	10				
	12	220	5	100	13				
	14	218	6	100	15				
	16	216	5	100	18				
	18	214	8	100	20				
	20		8	100					

0.0 / 233.2
 5" Topsoil
 0.4 / 232.8
 Yellow-brown and gray, mottled, SANDY FAT CLAY (CH), firm, moist
 Yellow-brown and gray, mottled, SANDY FAT CLAY (CH), stiff, moist
 Yellow-brown and gray, mottled, SANDY FAT CLAY (CH), firm, moist
 No recovery
 11.5 / 221.7
 Yellow-brown and white, fine SILTY SAND (SM), medium dense, moist
 Bottom of borehole at 20.0 feet.
 Boring backfilled with auger cuttings.

REMARKS: Rig Type: Acker Soil XLS ATV Track Rig.

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17XP-77

SPT_LOGABW:VDOT_TRANSURBAN 95 FRED EX.GPJ:8.30.004:061810:8/8/17



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CORE NUMBER 17BR-07

PAGE 1 OF 1

CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/9/17 **ROADWAY** Truslow Road **LANE LOCATION** North Travel Lane
CORE DIAMETER 6 inches **ELEVATION** 248.7 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17BR-07 bore log
NORTH 251332.5 **EAST** 3573812.08 **STATION** 129+14 **OFFSET** 192 LT

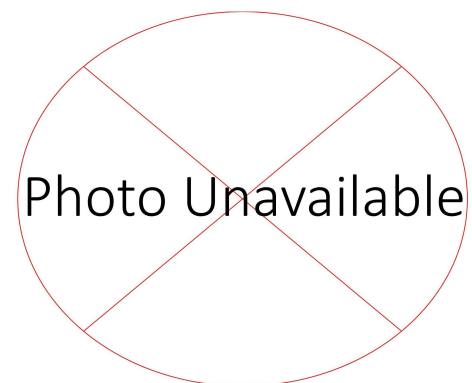
DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
			0.0/248.7 7" Asphalt; 2 Apparent layers

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



Bottom of Pavement Core 0.6' below ground surface.

SURFACE CLOSURE



BACK FILL: Hole plug and bentonite

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE.GDT - 8/8/17 09:45 - J:\100XXXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ



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CORE NUMBER 17BR-08

PAGE 1 OF 1

CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/8/17 **ROADWAY** Truslow Road **LANE LOCATION** South Travel Lane
CORE DIAMETER 6 inches **ELEVATION** 251.2 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17BR-08 bore log
NORTH 251044.9 **EAST** 3574001.2 **STATION** 128+25 **OFFSET** 141 RT

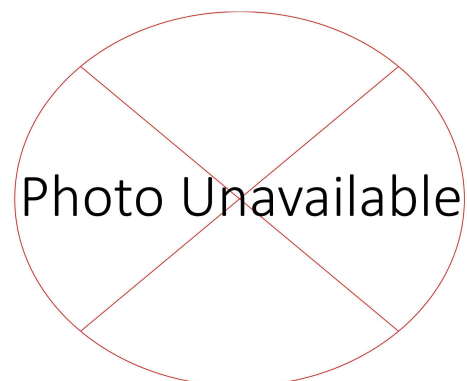
DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	251		0.0/251.2 5" Asphalt; 2 Apparent layers

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



Bottom of Pavement Core 0.4' below ground surface.

SURFACE CLOSURE



BACK FILL: Hole plug and bentonite

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE.GDT - 8/8/17 09:45 - J:\100XXXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ



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CORE NUMBER 17HPN-01

PAGE 1 OF 1

CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 6/28/17 **ROADWAY** I-95 North Bound **LANE LOCATION** Left Shoulder
CORE DIAMETER 4 inches **ELEVATION** 202.2 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17HPN-01 bore log
NORTH 250134.93 **EAST** 3573038.87 **STATION** 115+07 **OFFSET** 66 RT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	202		0.0/202.2 6" Asphalt; 2 Apparent layers, no noted defects
			0.5/201.7 10" Aggregate Subbase
-1			
	201		

Bottom of Pavement Core 1.3' below ground surface.

PAVEMENT CORE THICKNESS VIEW (Not to scale with graphic log)



SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE.GDT - 8/8/17 09:45 - J:\100XXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ



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CORE NUMBER 17HPN-03

PAGE 1 OF 1

CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 6/28/17 **ROADWAY** I-95 North Bound **LANE LOCATION** Left Shoulder
CORE DIAMETER 4 inches **ELEVATION** 188.2 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17HPN-03 bore log
NORTH 249689.82 **EAST** 3572642.66 **STATION** 109+07 **OFFSET** 60 RT

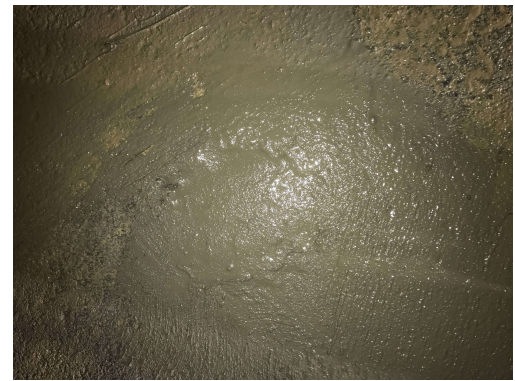
DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	188		0.0/188.2 5.5" Asphalt; 2 Apparent layers, no noted defects
			0.5/187.7 11.5" Aggregate Subbase
-1			
	187		

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



Bottom of Pavement Core 1.4' below ground surface.

SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE_GDT - 8/8/17 09:45 - J:\100XXXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ



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CORE NUMBER 17HPN-04

PAGE 1 OF 1

CLIENT Transurban	PROJECT NAME 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825	PROJECT LOCATION Stafford County
DATE CORED 6/28/17	ROADWAY I-95 North Bound
LANE LOCATION Left Shoulder	SOIL BORING COMPLETED Yes; Refer to 17HPN-04 bore log
CORE DIAMETER 4 inches	ELEVATION 175.8 ft NAVD 88
NORTH 249241.74	EAST 3572244.21
STATION 103+09	OFFSET 56 RT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	0.0/175.8		5.3" Asphalt; 2 Apparent layers, minor deterioration in lower layer
	0.4/175.4		13.7" Aggregate Subbase

PAVMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE_GDT - 8/8/17 09:45 - J:\100XXXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ

Bottom of Pavement Core 1.6' below ground surface.

PAVEMENT CORE THICKNESS VIEW (Not to scale with graphic log)



SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete



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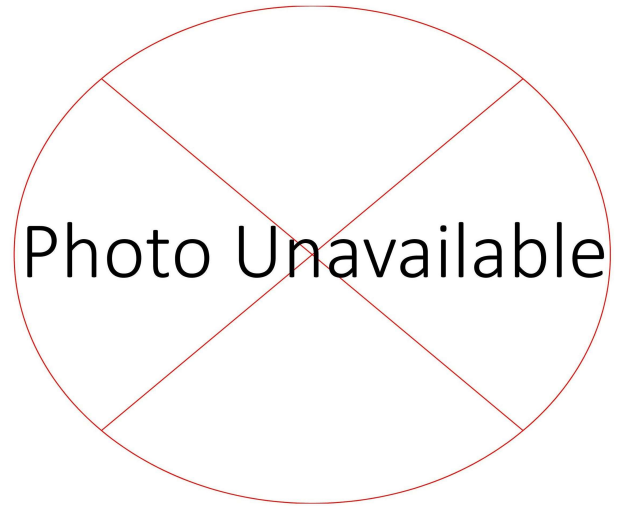
CORE NUMBER 17HPN-05

PAGE 1 OF 1

CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 6/28/17 **ROADWAY** I-95 North Bound **LANE LOCATION** Left Shoulder
CORE DIAMETER 4 inches **ELEVATION** 181.2 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17HPN-05 bore log
NORTH 248796.63 **EAST** 3571847.77 **STATION** 97+13 **OFFSET** 56 RT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	181		0.0/181.2 5.3" Asphalt; 2 Apparent layers, minor deterioration in lower layer 0.2/181.0 Apparent delamination at 1.8" bgs with washout
			0.4/180.8 13" Aggregate Subbase
-1			
	180		

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



Bottom of Pavement Core 1.6' below ground surface.

SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE_GDT - 8/8/17 09:45 - J:\100XXXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ



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CORE NUMBER 17HPN-07

PAGE 1 OF 1

CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 6/27/17 **ROADWAY** I-95 North Bound **LANE LOCATION** Left Shoulder
CORE DIAMETER 6 inches **ELEVATION** 201.7 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17HPN-07 bore log
NORTH 248347.94 **EAST** 3571449.21 **STATION** 91+13 **OFFSET** 57 RT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	0.0/201.7		5.8" Asphalt; 2 Apparent layers, no noted defects
	0.5/201.2		12.2" Aggregate Subbase
-1			

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



Bottom of Pavement Core 1.5' below ground surface.

SURFACE CLOSURE



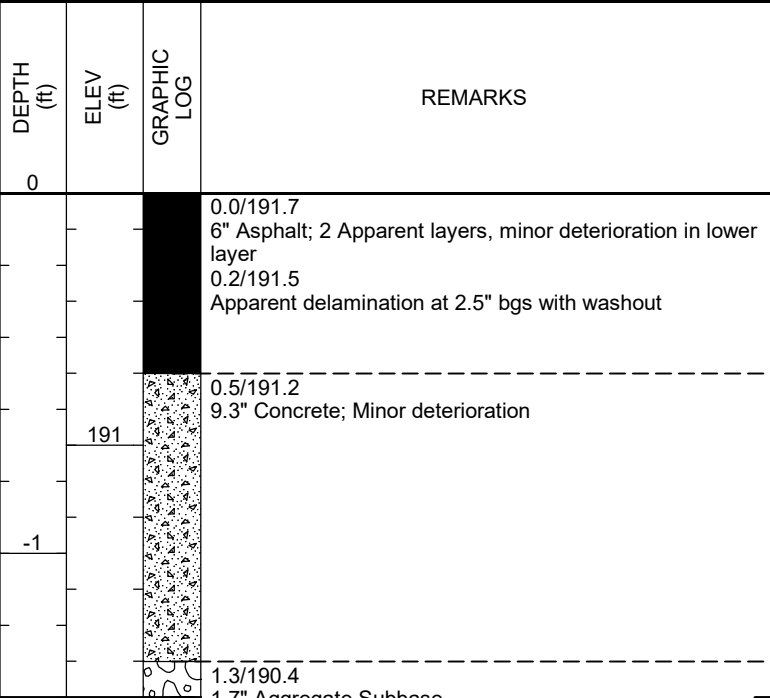
BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE.GDT - 8/8/17 09:45 - J:\100XXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ



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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 6/27/17 **ROADWAY** I-95 North Bound **LANE LOCATION** Left Travel Lane
CORE DIAMETER 4 inches **ELEVATION** 191.7 ft NAVD 88 **SOIL BORING COMPLETED** No; Hand auger advanced to base of gravel
NORTH 248564.67 **EAST** 3571655.84 **STATION** 94+12 **OFFSET** 67 RT



Bottom of Pavement Core 1.4' below ground surface.

**PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)**



SURFACE CLOSURE



BACK FILL: High early strength concrete

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE_GDT - 8/8/17 09:45 - J:\100XXXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ



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CORE NUMBER 17HRS-01

PAGE 1 OF 1

CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 6/28/17 **ROADWAY** I-95 South Bound **LANE LOCATION** Right Shoulder
CORE DIAMETER 4 inches **ELEVATION** 163.2 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17HRS-01 bore log
NORTH 308491.95 **EAST** 3602010.69 **STATION** 783+38 **OFFSET** 150 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	163		0.0/163.2 11.3" Asphalt; 3 Apparent layers, no noted defects
			0.9/162.3 1.7" Aggregate Subbase

Bottom of Pavement Core 1.1' below ground surface.

PAVEMENT CORE THICKNESS VIEW (Not to scale with graphic log)



SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE_GDT - 8/8/17 09:45 - J:\100XXXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ



CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 6/28/17 **ROADWAY** I-95 South Bound **LANE LOCATION** Right Shoulder
CORE DIAMETER 4 inches **ELEVATION** 151.3 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17HRS-03 bore log
NORTH 307937.75 **EAST** 3601877.55 **STATION** 777+68 **OFFSET** 150 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	151		0.0/151.3 11.3" Asphalt; 3 Apparent layers, minor deterioration in lower layer
			0.6/150.7 Apparent delamination at 7.5" bgs
-1			0.9/150.4 0.8" Aggregate Subbase Bottom of Pavement Core 1' below ground surface.

**PAVEMENT CORE THICKNESS VIEW
(Not to scale with graphic log)**



SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete



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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 6/29/17 **ROADWAY** I-95 South Bound **LANE LOCATION** Right Shoulder
CORE DIAMETER 4 inches **ELEVATION** 130.2 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17HRS-06 bore log
NORTH 307330.93 **EAST** 3601731.04 **STATION** 771+44 **OFFSET** 150 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	130		0.0/130.2 11.8" Asphalt; 3 Apparent layers, minor deterioration in lower layer
			0.3/129.9 Apparent delamination at 4.5" bgs with washout
-1			1.0/129.2 1.2" Aggregate Subbase

Bottom of Pavement Core 1.1' below ground surface.

**PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)**



SURFACE CLOSURE



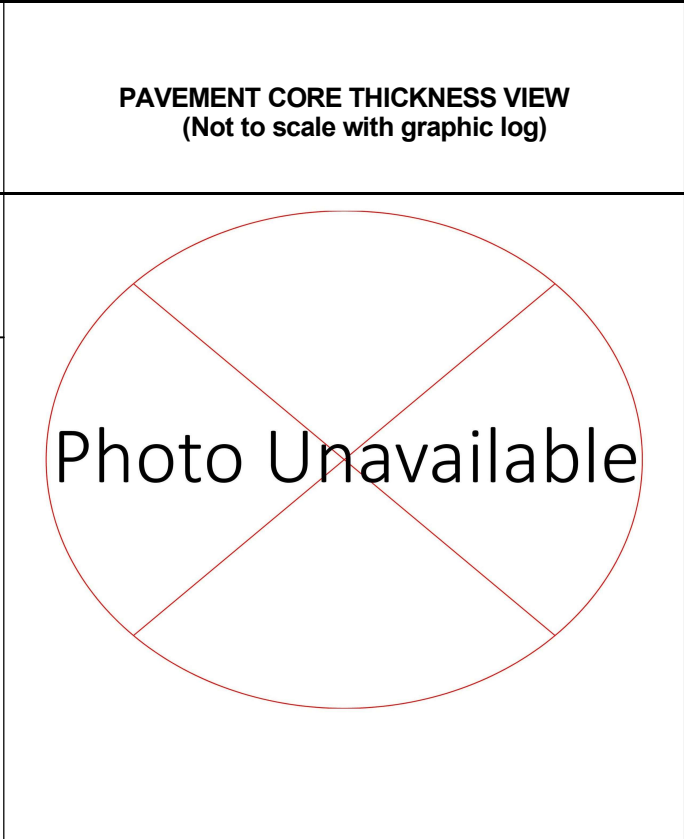
BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE.GDT - 8/8/17 09:46 - J:\100XXXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ



CLIENT Transurban PROJECT NAME 95 Express Lanes Fredericksburg Extension
 HDR PROJECT NUMBER 10052825 PROJECT LOCATION Stafford County
 DATE CORED 6/29/17 ROADWAY I-95 Express Reversible LANE LOCATION West Shoulder
 CORE DIAMETER 4 inches ELEVATION 152.7 ft NAVD 88 SOIL BORING COMPLETED Yes; Refer to 17HRS-12 bore log
 NORTH 305663.22 EAST 3601446.44 STATION 754+55 OFFSET 6 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	0.0/152.7		5" Asphalt; no noted defects
	0.4/152.3		17" Aggregate Subbase
152			
-1			
151			



Bottom of Pavement Core 1.8' below ground surface.

SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE.GDT - 8/8/17 09:46 - J:\100XXXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ



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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 6/29/17 **ROADWAY** I-95 Express Reversible **LANE LOCATION** West Shoulder
CORE DIAMETER 6 inches **ELEVATION** 164.6 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17HRS-14 bore log
NORTH 305144.42 **EAST** 3601262.87 **STATION** 749+04 **OFFSET** 7 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	0.0/164.6		3.8" Asphalt; No noted defects
	0.3/164.3		15" Aggregate Subbase
	163		

PAYMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE_GDT - 8/8/17 09:46 - J:\100XXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ

Bottom of Pavement Core 1.6' below ground surface.

**PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)**



SURFACE CLOSURE

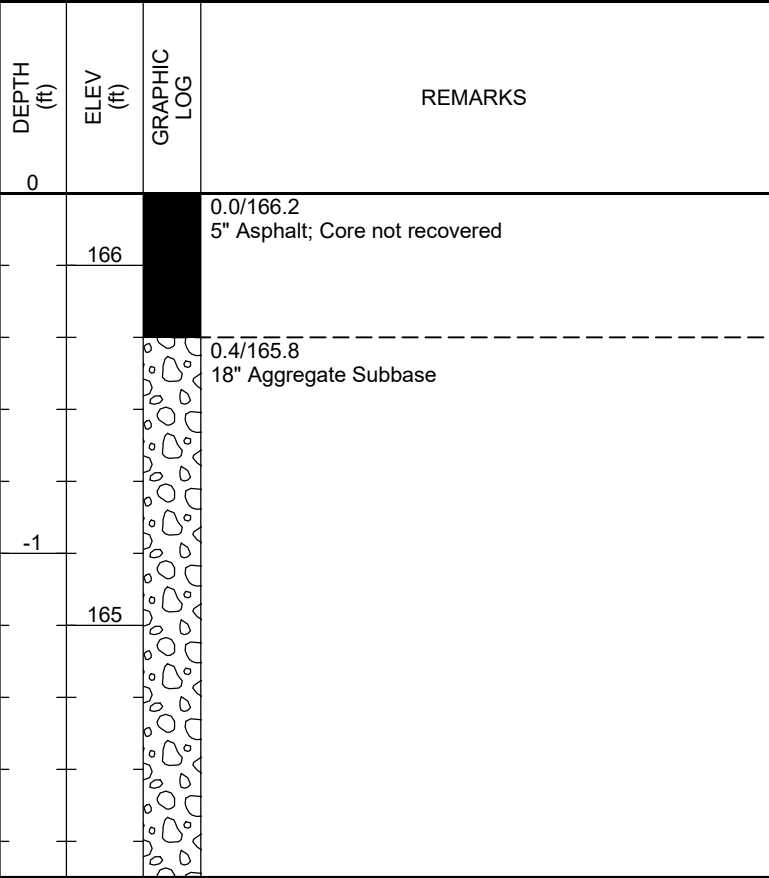


BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

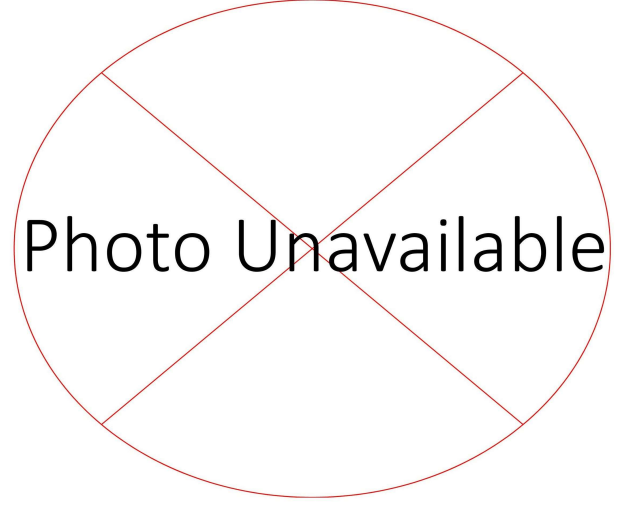


CLIENT <u>Transurban</u>	PROJECT NAME <u>95 Express Lanes Fredericksburg Extension</u>
HDR PROJECT NUMBER <u>10052825</u>	PROJECT LOCATION <u>Stafford County</u>
DATE CORED <u>6/30/17</u>	ROADWAY <u>I-95 Express Reversible</u>
LANE LOCATION <u>West Shoulder</u>	SOIL BORING COMPLETED <u>Yes; Refer to 17HRS-16 bore log</u>
CORE DIAMETER <u>6 inches</u>	ELEVATION <u>166.2 ft NAVD 88</u>
NORTH <u>304589.28</u>	EAST <u>3601033.95</u>
STATION <u>743+03</u>	OFFSET <u>7 LT</u>

PAYMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE_GDT - 8/8/17 09:46 - J:\100XXXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ



PAVEMENT CORE THICKNESS VIEW
(Not to scale with graphic log)



Bottom of Pavement Core 1.9' below ground surface.

SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

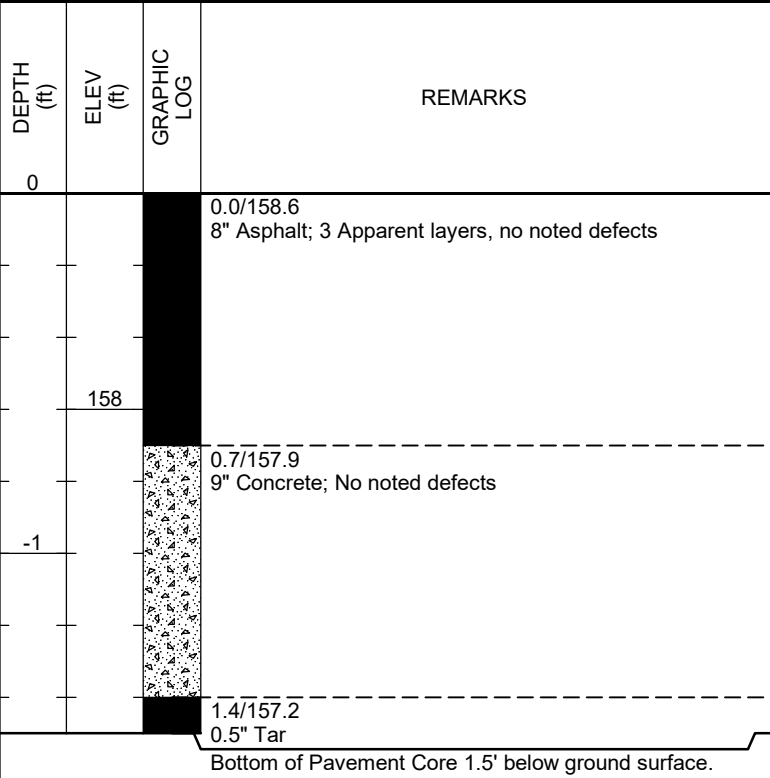


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CORE NUMBER 17HRS-PC-02

PAGE 1 OF 1

CLIENT Transurban	PROJECT NAME 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825	PROJECT LOCATION Stafford County
DATE CORED 6/28/17	ROADWAY I-95 South Bound
LANE LOCATION Right Travel Lane	SOIL BORING COMPLETED No; Hand auger advanced to base of gravel
CORE DIAMETER 4 inches	ELEVATION 158.6 ft NAVD 88
NORTH 308201.51	EAST 3601950.47
STATION 780+42	OFFSET 141 LT



PAVEMENT CORE THICKNESS VIEW
(Not to scale with graphic log)



SURFACE CLOSURE



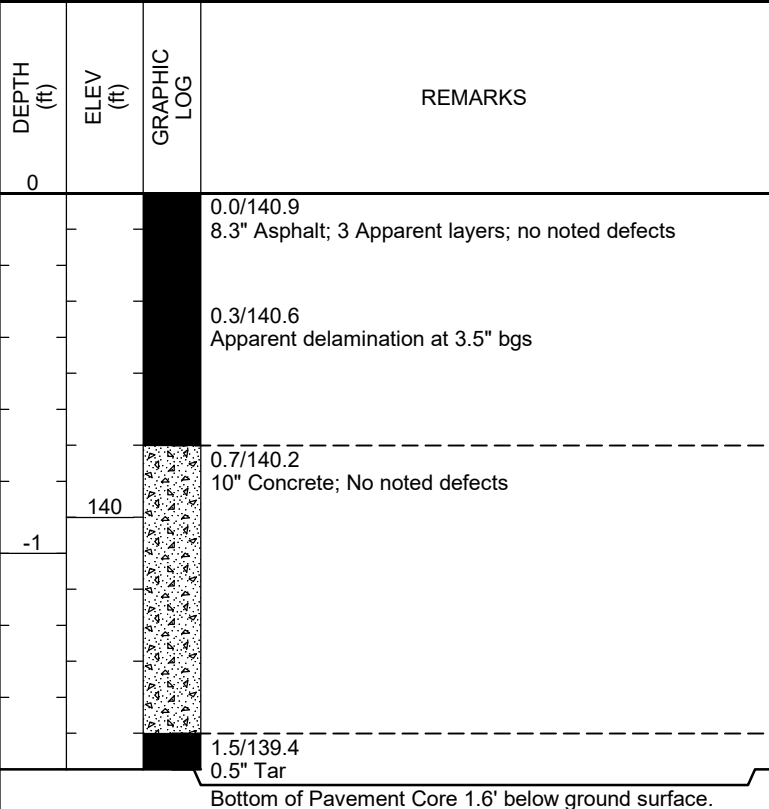
BACK FILL: High early strength concrete

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE.GDT - 8/8/17 09:46 - J:\100XXXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ

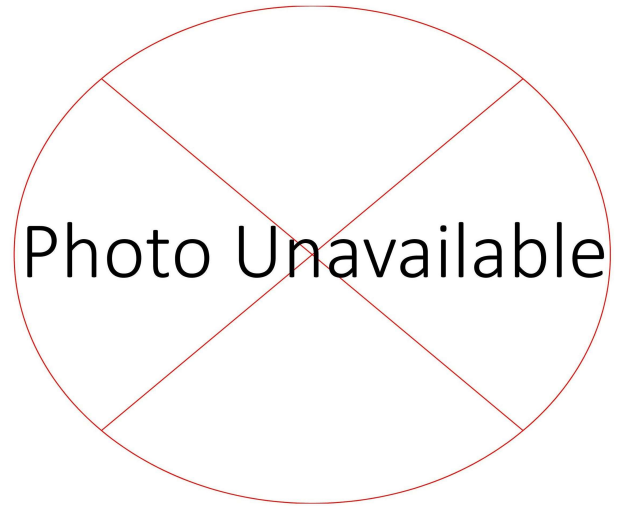


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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 6/29/17 **ROADWAY** I-95 South Bound **LANE LOCATION** Right Travel Lane
CORE DIAMETER 4 inches **ELEVATION** 140.9 ft NAVD 88 **SOIL BORING COMPLETED** No; Hand auger advanced to base of gravel
NORTH 307618.58 **EAST** 3601809.34 **STATION** 774+42 **OFFSET** 141 LT



PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



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BACK FILL: High early strength concrete

SURFACE CLOSURE






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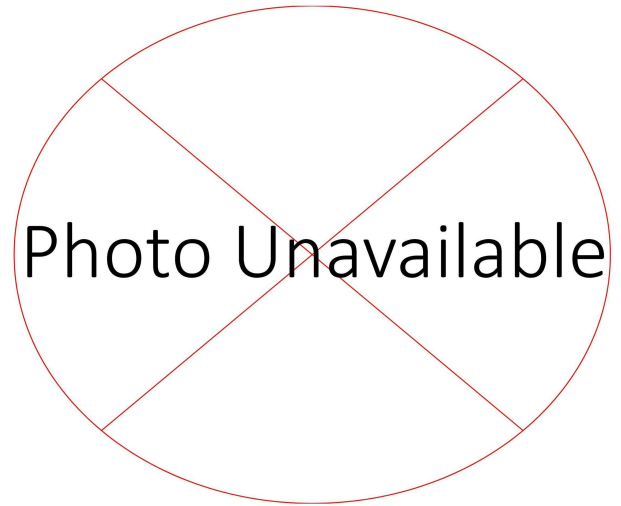
CORE NUMBER 17HRS-PC-13

PAGE 1 OF 1

CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 6/29/17 **ROADWAY** I-95 Express Reversible **LANE LOCATION** West Travel Lane
CORE DIAMETER 6 inches **ELEVATION** 159.4 ft NAVD 88 **SOIL BORING COMPLETED** No; Hand auger advanced to base of gravel
NORTH 305421.99 **EAST** 3601372.45 **STATION** 752+03 **OFFSET** 1 RT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	0.0/159.4		15.5" Asphalt; No noted defects
159			
-1			
	1.3/158.1		11" Aggregate Subbase
158			
-2			

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



Bottom of Pavement Core 2.2' below ground surface.

SURFACE CLOSURE



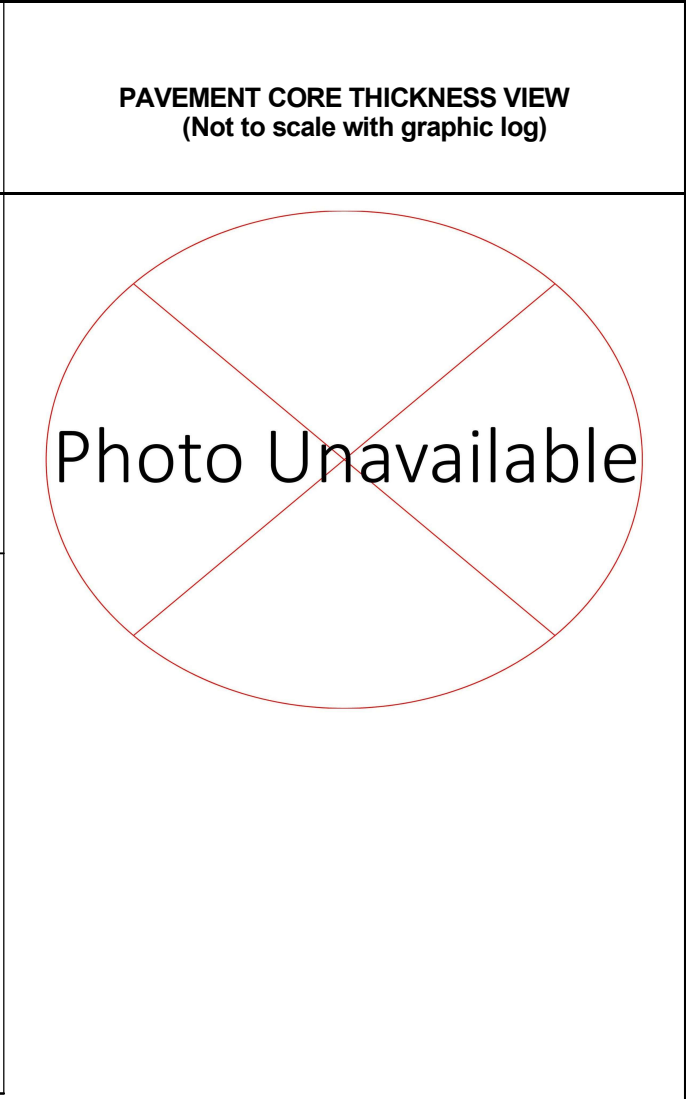
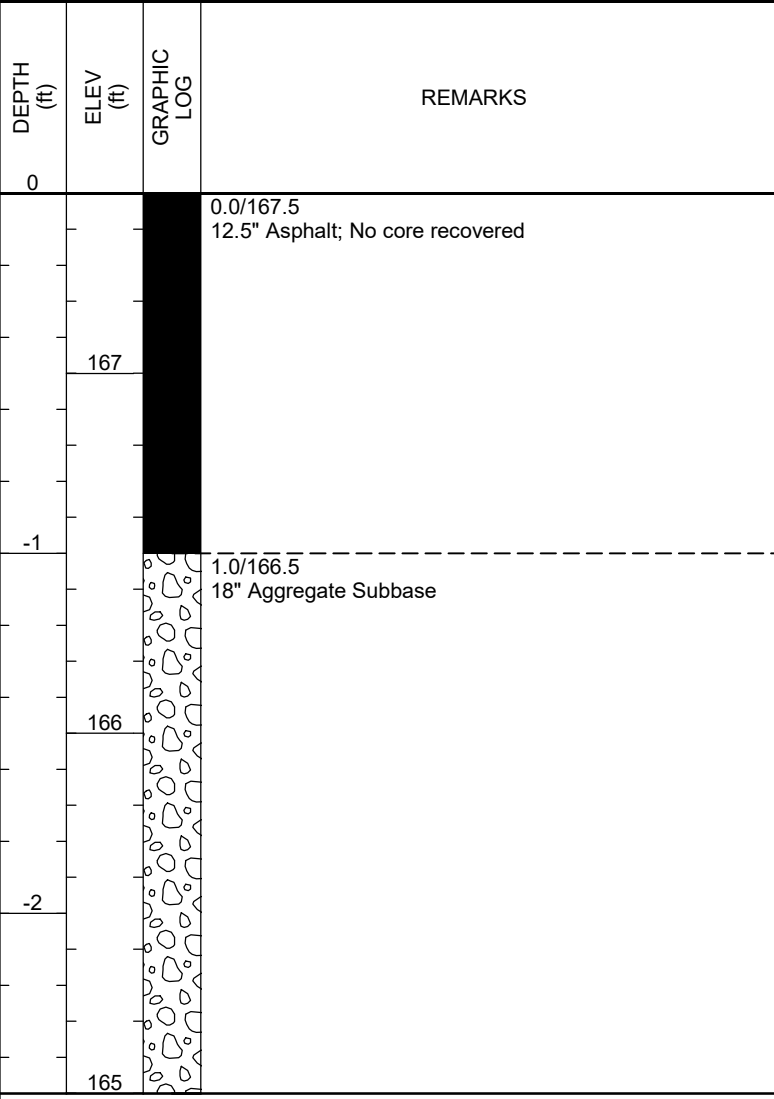
BACK FILL: High early strength concrete

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE.GDT - 8/8/17 09:46 - J:\100XXXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ



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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 6/30/17 **ROADWAY** I-95 Express Reversible **LANE LOCATION** West Travel Lane
CORE DIAMETER 6 inches **ELEVATION** 167.5 ft NAVD 88 **SOIL BORING COMPLETED** No; Hand auger advanced to base of gravel
NORTH 304861.28 **EAST** 3601160.31 **STATION** 746+03 **OFFSET** 2 RT



Bottom of Pavement Core 2.5' below ground surface.

SURFACE CLOSURE



BACK FILL: High early strength concrete

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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/16/17 **ROADWAY** I-95 North Bound **LANE LOCATION** Right Shoulder
CORE DIAMETER 6 inches **ELEVATION** 236.9 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17HWN-03 bore log
NORTH 251732.22 **EAST** 3574523.21 **STATION** 136+84 **OFFSET** 75 RT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
			0.0/236.9 10.5" Asphalt; 3 Apparent layers, some deterioration lower two layers
	236		
-1			0.9/236.0 1.5" Aggregate Subbase Bottom of Pavement Core 1' below ground surface.

PAVEMENT CORE THICKNESS VIEW
(Not to scale with graphic log)



SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE_GDT - 8/8/17 09:46 - J:\100XXXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ



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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/15/17 **ROADWAY** I-95 North Bound **LANE LOCATION** Right Shoulder
CORE DIAMETER 6 inches **ELEVATION** 233.5 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17HWN-04 bore log
NORTH 251291.79 **EAST** 3574133.81 **STATION** 130+97 **OFFSET** 76 RT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	233		0.0/233.5 9" Asphalt; 3 Apparent layers, middle layer slightly deteriorated
			0.8/232.7 3" Aggregate Subbase
-1			Bottom of Pavement Core 1' below ground surface.

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE_GDT - 8/8/17 09:46 - J:\100XXXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ

**PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)**



SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete



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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/15/17 **ROADWAY** I-95 North Bound **LANE LOCATION** Right Shoulder
CORE DIAMETER 6 inches **ELEVATION** 225.3 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17HWN-05 bore log
NORTH 250838.07 **EAST** 3573734.81 **STATION** 124+93 **OFFSET** 80 RT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	225		0.0/225.3 6.5" Asphalt; 2 Apparent layers, minor deterioration near layer change
			0.5/224.8 11.5" Aggregate Subbase
-1			
	224		

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



Bottom of Pavement Core 1.5' below ground surface.

SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

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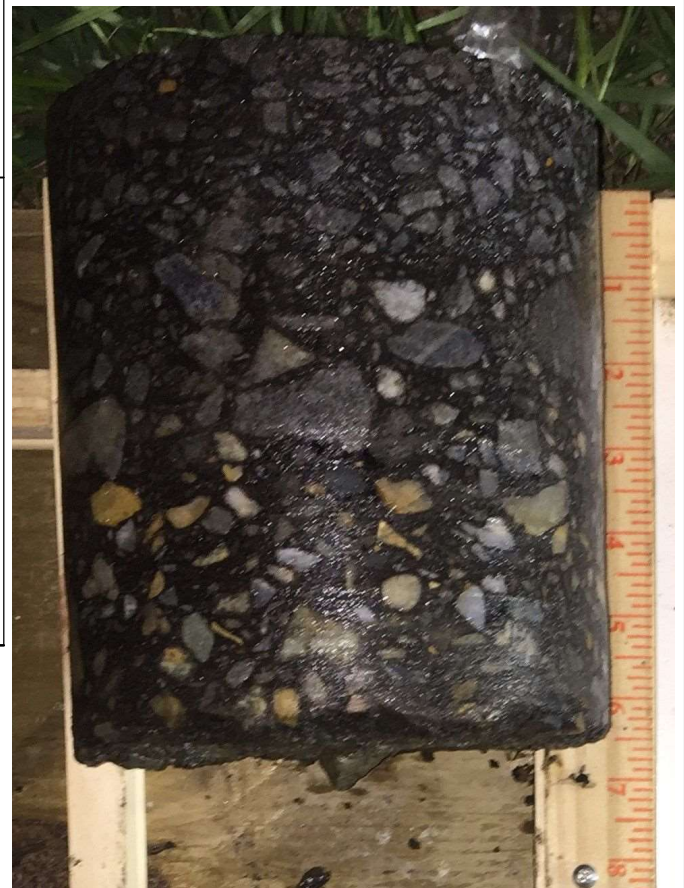
CORE NUMBER 17HWN-07

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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/15/17 **ROADWAY** I-95 North Bound **LANE LOCATION** Right Shoulder
CORE DIAMETER 6 inches **ELEVATION** 197.5 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17HWN-07 bore log
NORTH 249939.66 **EAST** 3572946.64 **STATION** 113+04 **OFFSET** 116 RT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
			0.0/197.5 6.5" Asphalt; 2 Apparent layers, minor deterioration
197			
			0.5/197.0 15.5" Aggregate Subbase
-1			
196			

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



Bottom of Pavement Core 1.8' below ground surface.

SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

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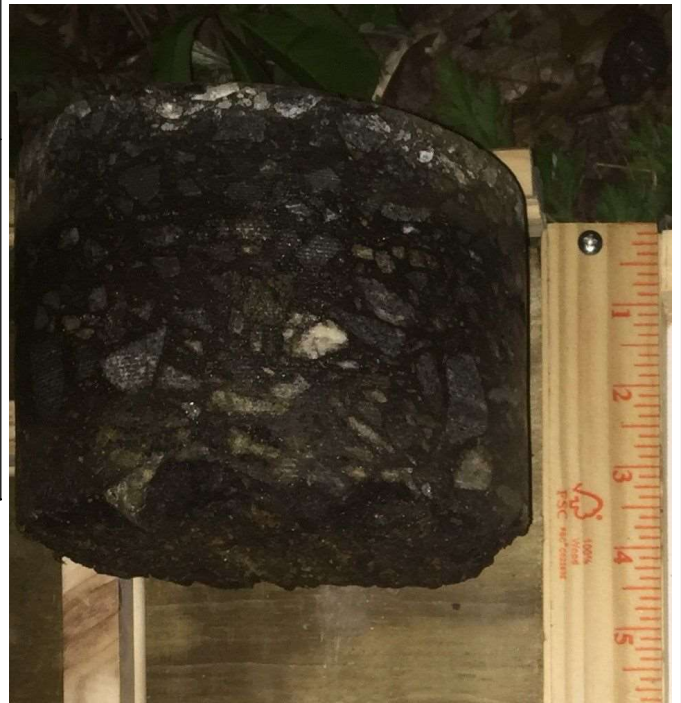
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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/8/17 **ROADWAY** I-95 South Bound **LANE LOCATION** Left Shoulder
CORE DIAMETER 6 inches **ELEVATION** 133.4 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17NSS-03 bore log
NORTH 306010.52 **EAST** 3601449.54 **STATION** 757+90 **OFFSET** 104 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
			0.0/133.4 4.5" Asphalt; No noted defects
133			
			0.4/133.0 11" Aggregate Subbase
-1			
132			

Bottom of Pavement Core 1.4' below ground surface.

**PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)**



SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE_GDT - 8/8/17 09:46 - J:\100XXXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ



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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/8/17 **ROADWAY** I-95 South Bound **LANE LOCATION** Left Shoulder
CORE DIAMETER 6 inches **ELEVATION** 151 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17NSS-05 bore log
NORTH 305437.15 **EAST** 3601262.7 **STATION** 751+81 **OFFSET** 108 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0	151		
			0.0/151.0 5" Asphalt; 2 Apparent layers, minor deterioration in lower layer
			0.4/150.6 3" Aggregate Subbase

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



Bottom of Pavement Core 0.7' below ground surface.

SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/8/17 **ROADWAY** I-95 South Bound **LANE LOCATION** Left Shoulder
CORE DIAMETER 6 inches **ELEVATION** 160.5 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17NSS-07 bore log
NORTH 304889.04 **EAST** 3601054.02 **STATION** 745+88 **OFFSET** 107 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
			0.0/160.5 12.5" Asphalt; 2 Apparent layers
	160		0.3/160.2 Apparent delamination at 3" bgs
-1			

Bottom of Pavement Core 1.1' below ground surface.

**PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)**



SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete



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CORE NUMBER 17NSS-09

CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/8/17 **ROADWAY** I-95 South Bound **LANE LOCATION** Left Shoulder
CORE DIAMETER 6 inches **ELEVATION** 161 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17NSS-09 bore log
NORTH 304728.07 **EAST** 3600988.85 **STATION** 744+13 **OFFSET** 104 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0	161		
			0.0/161.0 3" Asphalt; No noted defects
			0.3/160.7 3" Aggregate Subbase

Bottom of Pavement Core 0.5' below ground surface.

**PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)**



SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

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CORE NUMBER 17NSS-12

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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/8/17 **ROADWAY** I-95 South Bound **LANE LOCATION** Left Shoulder
CORE DIAMETER 6 inches **ELEVATION** 155.2 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17NSS-12 bore log
NORTH 304234.63 **EAST** 3600762.23 **STATION** 738+64 **OFFSET** 101 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
155			0.0/155.2 7.8" Asphalt; Minor deterioration
			0.6/154.6 9" Concrete; No noted defects, contains 1/4" rebar
-1			
154			1.3/153.9 0.5" Asphalt Tack

Bottom of Pavement Core 1.4' below ground surface.

PAVEMENT CORE THICKNESS VIEW (Not to scale with graphic log)



SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE_GDT - 8/8/17 09:46 - J:\100XXXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ



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CORE NUMBER 17NSS-14

PAGE 1 OF 1

CLIENT Transurban PROJECT NAME 95 Express Lanes Fredericksburg Extension
 HDR PROJECT NUMBER 10052825 PROJECT LOCATION Stafford County
 DATE CORED 5/9/17 ROADWAY I-95 Express Reversible LANE LOCATION West Shoulder
 CORE DIAMETER 6 inches ELEVATION 152.8 ft NAVD 88 SOIL BORING COMPLETED Yes; Refer to 17NSS-14 bore log
 NORTH 303981.21 EAST 3600741.38 STATION 736+28 OFFSET 5 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	0.0/152.8		5" Asphalt; Minor deterioration
	0.4/152.4		11" Aggregate Subbase
152			
-1			

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



Bottom of Pavement Core 1.3' below ground surface.

SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

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CORE NUMBER 17NSS-16

PAGE 1 OF 1

CLIENT Transurban PROJECT NAME 95 Express Lanes Fredericksburg Extension
 HDR PROJECT NUMBER 10052825 PROJECT LOCATION Stafford County
 DATE CORED 5/9/17 ROADWAY I-95 Express Reversible LANE LOCATION West Shoulder
 CORE DIAMETER 6 inches ELEVATION 134.8 ft NAVD 88 SOIL BORING COMPLETED Yes; Refer to 17NSS-16 bore log
 NORTH 303460.54 EAST 3600449.5 STATION 730+31 OFFSET 5 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	0.0/134.8		4.8" Asphalt; Some deterioration
	0.4/134.4		25.2" Aggregate Subbase
134			
-1			
133			
-2			

PAVEMENT CORE THICKNESS VIEW
(Not to scale with graphic log)



Bottom of Pavement Core 2.5' below ground surface.

SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

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CORE NUMBER 17NSS-18

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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/10/17 **ROADWAY** I-95 Express Reversible **LANE LOCATION** West Shoulder
CORE DIAMETER 6 inches **ELEVATION** 118.3 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17NSS-18 bore log
NORTH 302961.88 **EAST** 3600133.22 **STATION** 724+40 **OFFSET** 5 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	118		0.0/118.3 4.5" Asphalt; Minor deterioration
	117		0.4/117.9 15.5" Aggregate Subbase

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



Bottom of Pavement Core 1.7' below ground surface.

SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE_GDT - 8/8/17 09:47 - J:\100XXXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ

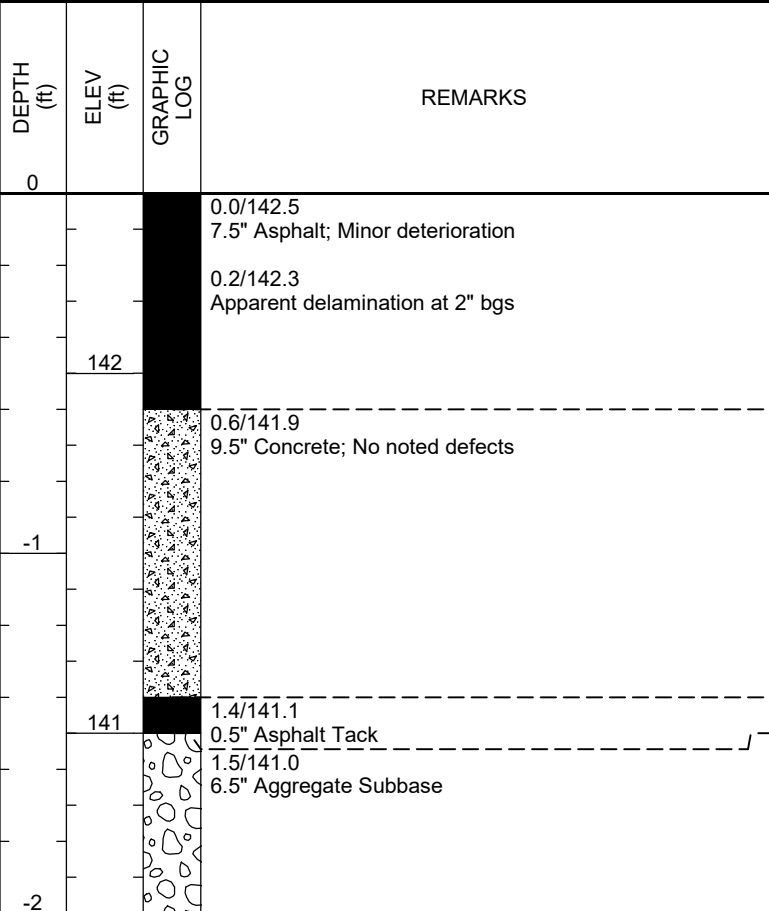


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CORE NUMBER 17NSS-PC-01

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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/8/17 **ROADWAY** I-95 South Bound **LANE LOCATION** Left Travel Lane
CORE DIAMETER 6 inches **ELEVATION** 142.5 ft NAVD 88 **SOIL BORING COMPLETED** No; Hand auger advanced to base of gravel
NORTH 305727.56 **EAST** 3601350.02 **STATION** 754+87 **OFFSET** 117 LT

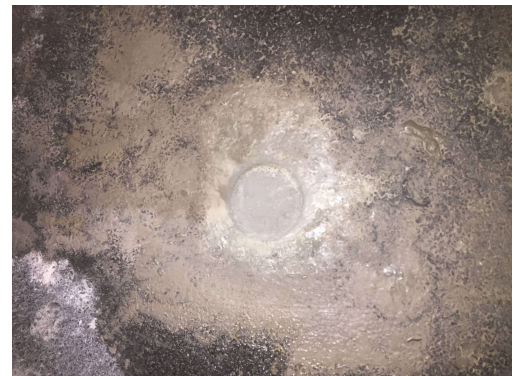


Bottom of Pavement Core 2' below ground surface.

PAVEMENT CORE THICKNESS VIEW (Not to scale with graphic log)



SURFACE CLOSURE



BACK FILL: High early strength concrete

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE_GDT - 8/8/17 09:47 - J:\100XXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ

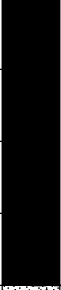
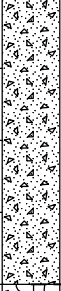



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CORE NUMBER 17NSS-PC-03

PAGE 1 OF 1

CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/8/17 **ROADWAY** I-95 South Bound **LANE LOCATION** Left Travel Lane
CORE DIAMETER 6 inches **ELEVATION** 160 ft NAVD 88 **SOIL BORING COMPLETED** No; Hand auger advanced to base of gravel
NORTH 304517.05 **EAST** 3600881.19 **STATION** 741+74 **OFFSET** 116 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0	160		
			0.0/160.0 8.8" Asphalt; No noted defects
-1	159		0.8/159.2 9.5" Concrete; No noted defects
-2	158		1.6/158.4 5" Aggregate Subbase

Bottom of Pavement Core 2' below ground surface.

**PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)**



SURFACE CLOSURE



BACK FILL: High early strength concrete

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE_GDT - 8/8/17 09:47 - J:\100XXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ



CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/9/17 **ROADWAY** I-95 Express Reversible **LANE LOCATION** West Travel Lane
CORE DIAMETER 6 inches **ELEVATION** 157.4 ft NAVD 88 **SOIL BORING COMPLETED** No; Hand auger advanced to base of gravel
NORTH 304107.23 **EAST** 3600818.92 **STATION** 737+76 **OFFSET** 6 RT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	157		0.0/157.4 15" Asphalt; Minor deterioration
			0.6/156.8 Apparent delamination at 7" bgs
	156		1.3/156.1 9" Aggregate Subbase
			Bottom of Pavement Core 2' below ground surface.

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE.GDT - 8/8/17 09:47 - J:\100XXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ

**PAVEMENT CORE THICKNESS VIEW
(Not to scale with graphic log)**



SURFACE CLOSURE

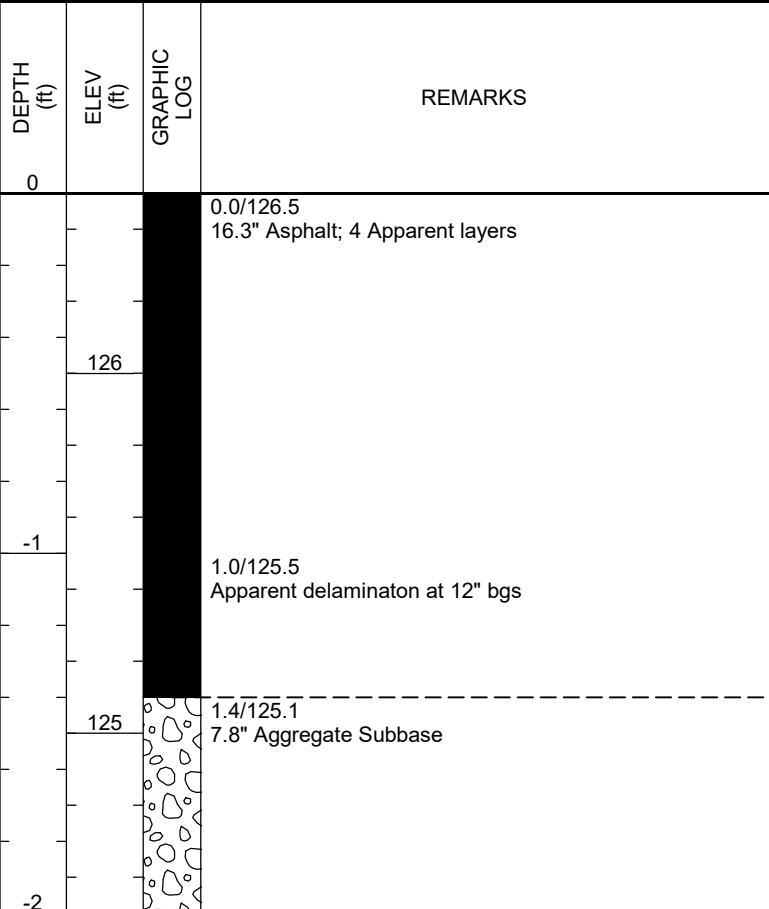


BACK FILL: High early strength concrete



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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/9/17 **ROADWAY** I-95 Express Reversible **LANE LOCATION** West Travel Lane
CORE DIAMETER 6 inches **ELEVATION** 126.5 ft NAVD 88 **SOIL BORING COMPLETED** No; Hand auger advanced to base of gravel
NORTH 303197.91 **EAST** 3600299.65 **STATION** 727+29 **OFFSET** 5 RT



Bottom of Pavement Core 2' below ground surface.

**PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)**



SURFACE CLOSURE



BACK FILL: High early strength concrete

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE.GDT - 8/8/17 09:47 - J:\100XXXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ



CLIENT Transurban	PROJECT NAME 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825	PROJECT LOCATION Stafford County
DATE CORED 5/18/17	ROADWAY I-95 South Bound
LANE LOCATION Left Travel Lane	SOIL BORING COMPLETED No; Hand auger advanced to base of gravel
CORE DIAMETER 6 inches	ELEVATION 186.4 ft NAVD 88
NORTH 269331.02	EAST 3586676.33
STATION 353+77	OFFSET 94 LT

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DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	186		0.0/186.4 10" Asphalt; Minor deterioration, significant deterioration around bottom of core
-1			0.8/185.6 9" Concrete; Minor deterioration, with asphalt tack intermixed throughout
	185		
			1.6/184.8 0.5" Asphalt Tack
			1.7/184.7 6.5" Aggregate Subbase
-2			

Bottom of Pavement Core 2.2' below ground surface.

**PAVEMENT CORE THICKNESS VIEW
(Not to scale with graphic log)**



SURFACE CLOSURE



BACK FILL: High early strength concrete



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CORE NUMBER 17PC-02

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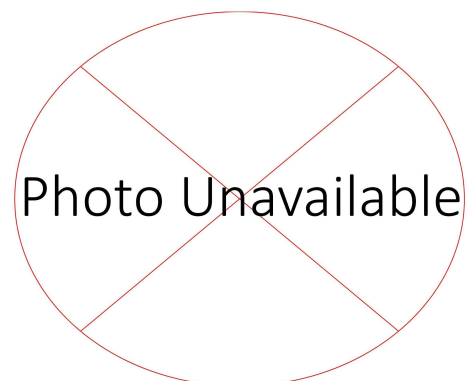
CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/4/17 **ROADWAY** American Legion Road **LANE LOCATION** North Travel Lane
CORE DIAMETER 6 inches **ELEVATION** 243.4 ft NAVD 88 **SOIL BORING COMPLETED** No; Hand auger advanced to base of gravel
NORTH 268118.45 **EAST** 3585843.51 **STATION** 338+99 **OFFSET** 345 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	243		0.0/243.4 7" Asphalt; 3 Apparent layers, no noted defects
			0.6/242.8 5" Aggregate Subbase
-1			Bottom of Pavement Core 1' below ground surface.

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



SURFACE CLOSURE



BACK FILL: High early strength concrete

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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/4/17 **ROADWAY** American Legion Road **LANE LOCATION** North Travel Lane
CORE DIAMETER 6 inches **ELEVATION** 244.8 ft NAVD 88 **SOIL BORING COMPLETED** No; Hand auger advanced to base of gravel
NORTH 267829.31 **EAST** 3586390.86 **STATION** 339+03 **OFFSET** 274 RT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
			0.0/244.8 8" Asphalt; 3 Apparent layers
	244		0.7/244.1 7" Aggregate Subbase
-1			

Bottom of Pavement Core 1.3' below ground surface.

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



SURFACE CLOSURE



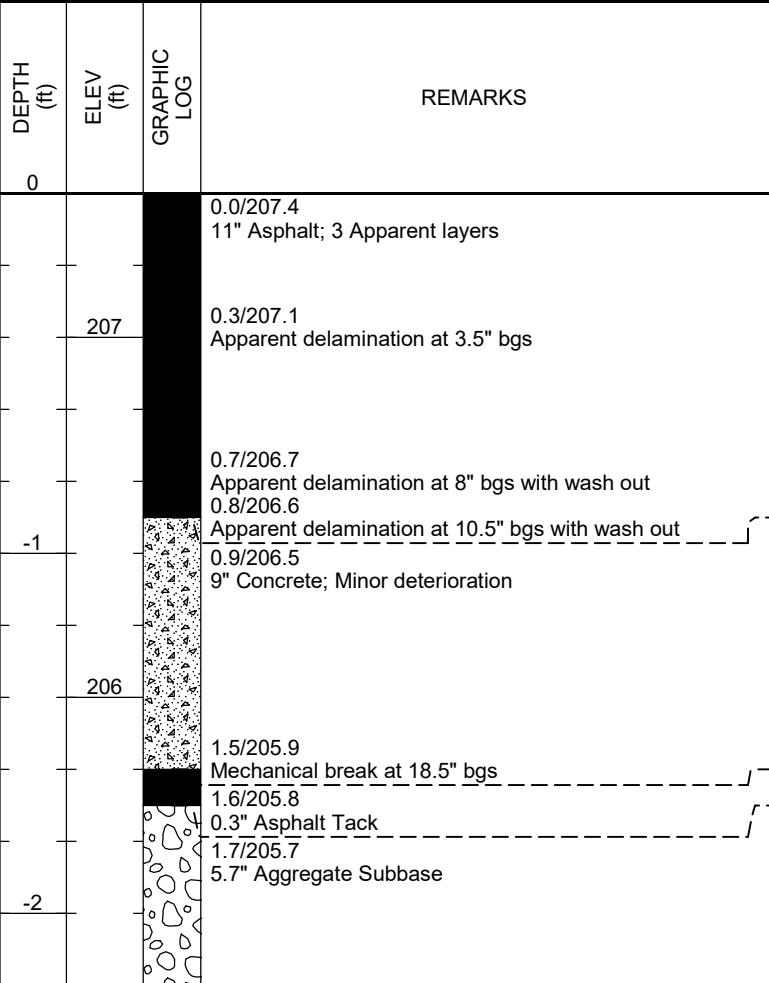
BACK FILL: High early strength concrete

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CLIENT Transurban	PROJECT NAME 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825	PROJECT LOCATION Stafford County
DATE CORED 5/18/17	ROADWAY I-95 South Bound
LANE LOCATION Right Travel Lane	SOIL BORING COMPLETED No; Hand auger advanced to base of gravel
CORE DIAMETER 6 inches	ELEVATION 207.4 ft NAVD 88
NORTH 266420.61	EAST 3585010.61
STATION 319+82	OFFSET 122 LT

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE.GDT - 8/18/17 09:52 - J:\100XXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ



Bottom of Pavement Core 2.2' below ground surface.

**PAVEMENT CORE THICKNESS VIEW
(Not to scale with graphic log)**



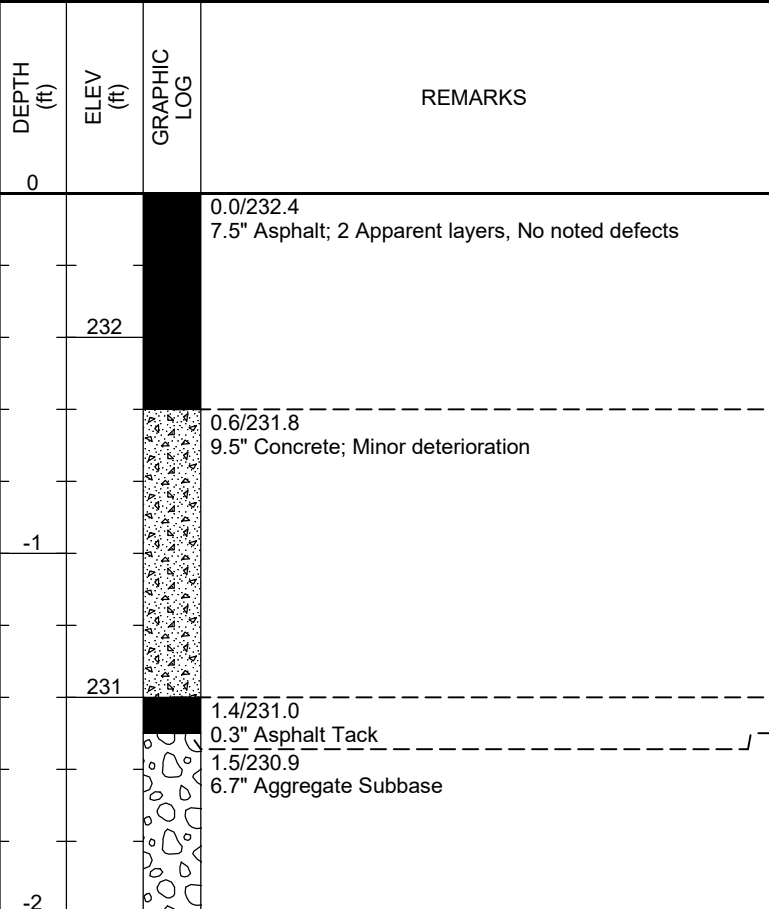
SURFACE CLOSURE



BACK FILL: High early strength concrete



CLIENT Transurban	PROJECT NAME 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825	PROJECT LOCATION Stafford County
DATE CORED 5/16/17	ROADWAY I-95 North Bound
LANE LOCATION Right Travel Lane	SOIL BORING COMPLETED No; Hand auger advanced to base of gravel
CORE DIAMETER 6 inches	ELEVATION 232.4 ft NAVD 88
NORTH 252449.08	EAST 3575080.55
STATION 145+86	OFFSET 68 RT



Bottom of Pavement Core 2' below ground surface.

**PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)**



SURFACE CLOSURE



BACK FILL: High early strength concrete

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CORE NUMBER 17PC-06

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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/9/17 **ROADWAY** Truslow Road **LANE LOCATION** South Travel Lane
CORE DIAMETER 6 inches **ELEVATION** 244.5 ft NAVD 88 **SOIL BORING COMPLETED** No; Hand auger advanced to base of gravel
NORTH 251486.49 **EAST** 3573711.72 **STATION** 129+62 **OFFSET** 369 LT

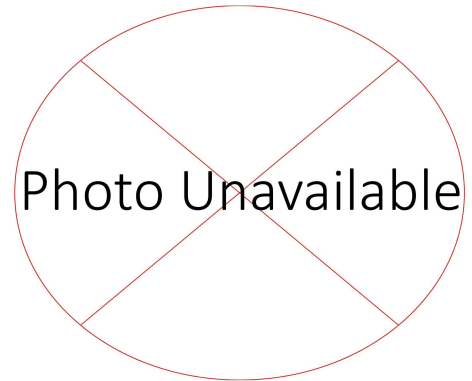
DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
			0.0/244.5 5" Asphalt; 2 Apparent layers, some deterioration
	244		0.4/244.1 5" Aggregate Subbase

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



Bottom of Pavement Core 0.8' below ground surface.

SURFACE CLOSURE






BACK FILL: High early strength concrete

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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/16/17 **ROADWAY** I-95 North Bound **LANE LOCATION** Right Travel Lane
CORE DIAMETER 6 inches **ELEVATION** 229.9 ft NAVD 88 **SOIL BORING COMPLETED** No; Hand auger advanced to base of gravel
NORTH 251069.18 **EAST** 3573924.07 **STATION** 127+92 **OFFSET** 67 RT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	0.0/229.9		2.5" Asphalt; No noted defects
	0.2/229.7		9.5" Concrete; No noted defects
	1.0/228.9		6" Aggregate Subbase

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



SURFACE CLOSURE



Bottom of Pavement Core 1.5' below ground surface.

BACK FILL: High early strength concrete

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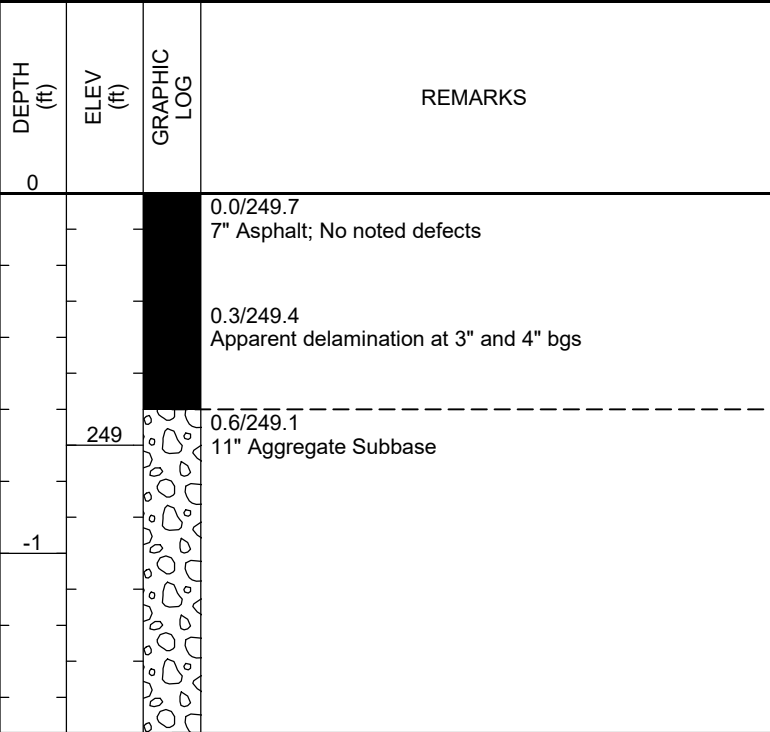


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CORE NUMBER 17PC-09

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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/8/17 **ROADWAY** Truslow Road **LANE LOCATION** North Travel Lane
CORE DIAMETER 6 inches **ELEVATION** 249.7 ft NAVD 88 **SOIL BORING COMPLETED** No; Hand auger advanced to base of gravel
NORTH 250925.3 **EAST** 3574089.64 **STATION** 127+94 **OFFSET** 286 RT

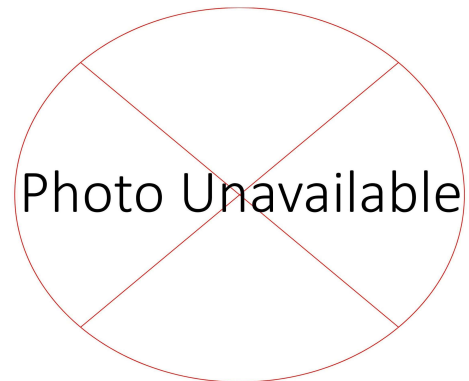


Bottom of Pavement Core 1.5' below ground surface.

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



SURFACE CLOSURE



BACK FILL: High early strength concrete

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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/17/17 **ROADWAY** I-95 North Bound **LANE LOCATION** Right Shoulder
CORE DIAMETER 6 inches **ELEVATION** 61.1 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17RR-01 bore log
NORTH 312642.68 **EAST** 3603923.91 **STATION** 829+31 **OFFSET** 130 RT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	61		0.0/61.1 15.3" Asphalt; 3 Apparent layers, minor deterioration in lower two layers
			0.6/60.5 Apparent delamination at 7.5" bgs
-1	60		
			1.3/59.8 2.7" Aggregate Subbase

Bottom of Pavement Core 1.5' below ground surface.

**PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)**



SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE_GDT - 8/8/17 09:52 - J:\100XXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ



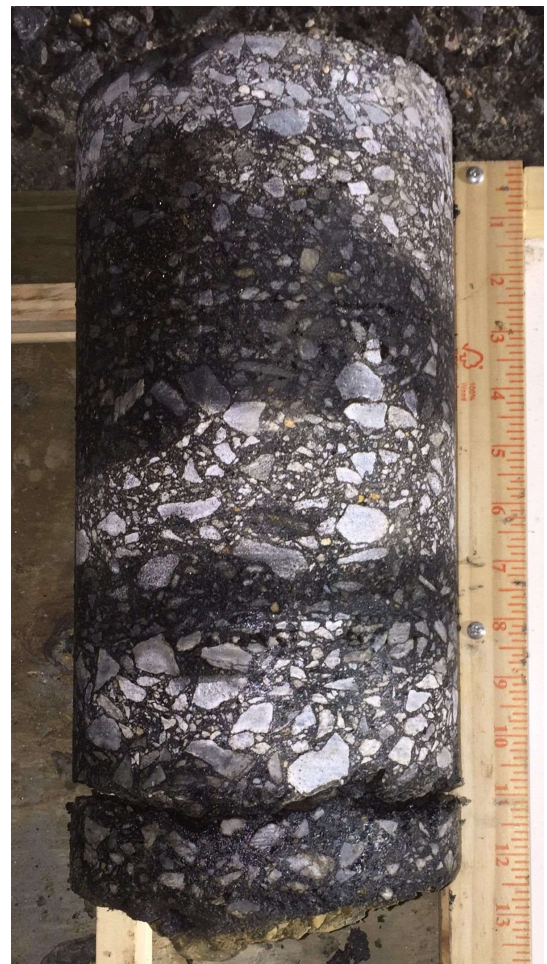
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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/17/17 **ROADWAY** I-95 North Bound **LANE LOCATION** Right Shoulder
CORE DIAMETER 6 inches **ELEVATION** 81.2 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17RR-03 bore log
NORTH 312145.01 **EAST** 3603616.63 **STATION** 823+40 **OFFSET** 122 RT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	81		0.0/81.2 12.8" Asphalt; 3 Apparent layers, Minor deterioration near layer changes
			0.9/80.3 Apparent delamination at 10.5" bgs
-1			1.1/80.1 1.2" Aggregate Subbase
	80		

Bottom of Pavement Core 1.2' below ground surface.

**PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)**



SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/17/17 **ROADWAY** I-95 North Bound **LANE LOCATION** Right Shoulder
CORE DIAMETER 6 inches **ELEVATION** 102.2 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17RR-04 bore log
NORTH 311615.08 **EAST** 3603333.83 **STATION** 817+33 **OFFSET** 120 RT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	102		0.0/102.2 10.8" Asphalt; 3 Apparent layers, bottom layer slightly deteriorated
			0.3/101.9 Apparent delamination at 2.8" bgs
-1			0.9/101.3 4.2" Aggregate Subbase
	101		

Bottom of Pavement Core 1.3' below ground surface.

**PAVEMENT CORE THICKNESS VIEW
(Not to scale with graphic log)**



SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/17/17 **ROADWAY** I-95 North Bound **LANE LOCATION** Right Shoulder
CORE DIAMETER 6 inches **ELEVATION** 120.5 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17RR-06 bore log
NORTH 311082.66 **EAST** 3603084.4 **STATION** 811+39 **OFFSET** 118 RT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
			0.0/120.5 10.5" Asphalt; 3 Apparent layers, some deterioration in bottom layer
	120		0.3/120.2 Apparent delamination at 3" bgs
-1			0.9/119.6 2.5" Aggregate Subbase

Bottom of Pavement Core 1.1' below ground surface.

**PAVEMENT CORE THICKNESS VIEW
(Not to scale with graphic log)**



SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/16/17 **ROADWAY** I-95 Express Reversible **LANE LOCATION** West Shoulder
CORE DIAMETER 6 inches **ELEVATION** 159.8 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17RR-16 bore log
NORTH 308568.79 **EAST** 3602178.34 **STATION** 784+52 **OFFSET** 5 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
			0.0/159.8 7.8" Asphalt; No noted defects
	159		0.7/159.1 11.2" Aggregate Subbase
-1			

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



Bottom of Pavement Core 1.6' below ground surface.

SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/16/17 **ROADWAY** I-95 Express Reversible **LANE LOCATION** West Shoulder
CORE DIAMETER 6 inches **ELEVATION** 146 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17RR-18 bore log
NORTH 308042.72 **EAST** 3602051.32 **STATION** 779+11 **OFFSET** 5 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0	146		
			0.0/146.0 4.8" Asphalt; Minor deterioration
			0.4/145.6 18.2" Aggregate Subbase
-1	145		

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



Bottom of Pavement Core 1.9' below ground surface.

SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

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CLIENT Transurban	PROJECT NAME 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825	PROJECT LOCATION Stafford County
DATE CORED 5/16/17	ROADWAY I-95 Express Reversible
LANE LOCATION West Shoulder	SOIL BORING COMPLETED Yes; Refer to 17RR-19 bore log
CORE DIAMETER 6 inches	ELEVATION 129.5 ft NAVD 88
NORTH 307512.5	EAST 3601923.63
STATION 773+66	OFFSET 5 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	0.0/129.5		4.3" Asphalt; 2 Apparent layers, some deterioration in lower layer
	0.4/129.1		14.7" Aggregate Subbase
			Bottom of Pavement Core 1.6' below ground surface.

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**PAVEMENT CORE THICKNESS VIEW
(Not to scale with graphic log)**



SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

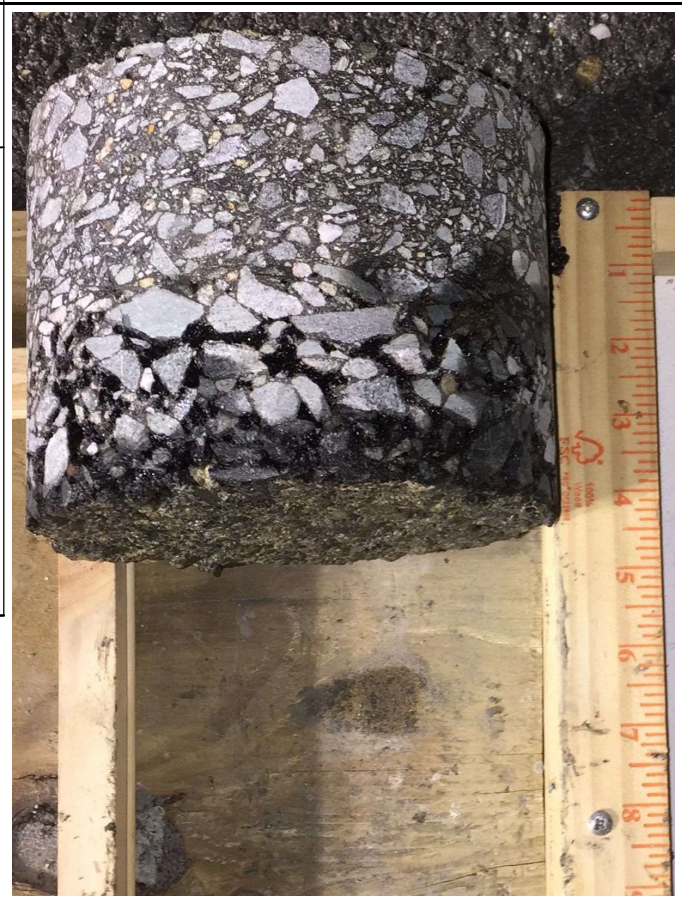


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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/16/17 **ROADWAY** I-95 Express Reversible **LANE LOCATION** West Shoulder
CORE DIAMETER 6 inches **ELEVATION** 123.1 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17RR-21 bore log
NORTH 307010.12 **EAST** 3601803.21 **STATION** 768+49 **OFFSET** 5 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	123		0.0/123.1 4.8" Asphalt; 2 Apparent layers, some deterioration in lower layer
			0.4/122.7 15.2" Aggregate Subbase
-1	122		

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



Bottom of Pavement Core 1.7' below ground surface.

SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

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CLIENT Transurban	PROJECT NAME 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825	PROJECT LOCATION Stafford County
DATE CORED 5/17/17	ROADWAY I-95 North Bound
LANE LOCATION Right Travel Lane	SOIL BORING COMPLETED No; Hand auger advanced to base of gravel
CORE DIAMETER 6 inches	ELEVATION 71.6 ft NAVD 88
NORTH 312402.43	EAST 3603753.61
STATION 826+34	OFFSET 111 RT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	71		0.0/71.6 8" Asphalt; 2 Apparent layers, no noted defects
	-1		0.7/70.9 9.3" Concrete; No noted defects
	70		1.5/70.1 0.5" Asphalt Tack
			1.6/70.0 3.2" Aggregate Subbase

Bottom of Pavement Core 1.8' below ground surface.

**PAVEMENT CORE THICKNESS VIEW
(Not to scale with graphic log)**



SURFACE CLOSURE

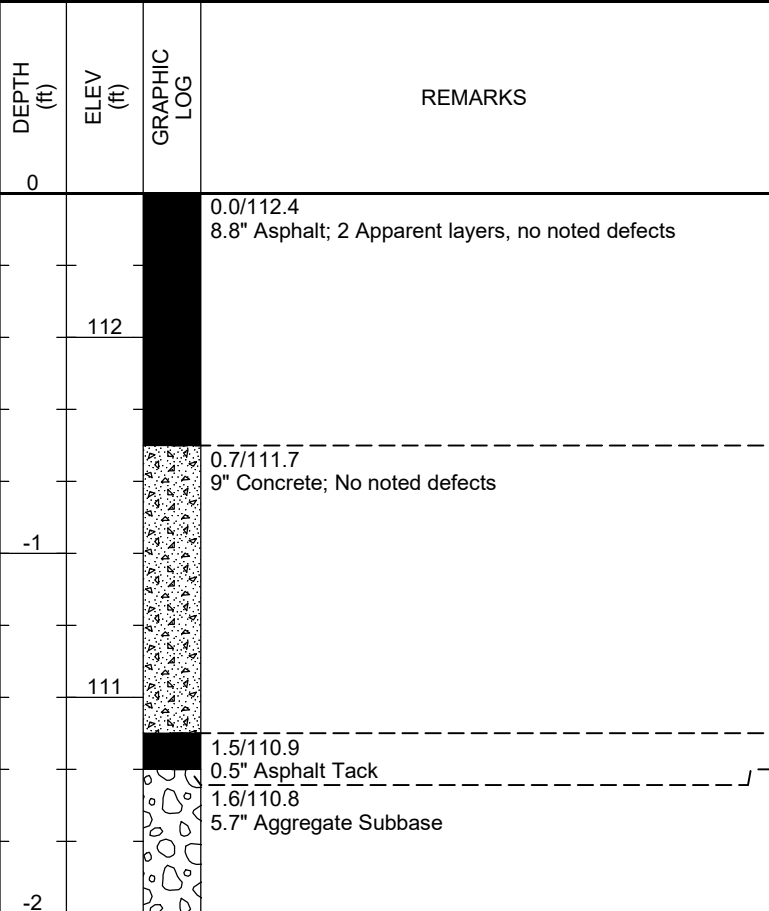


BACK FILL: High early strength concrete

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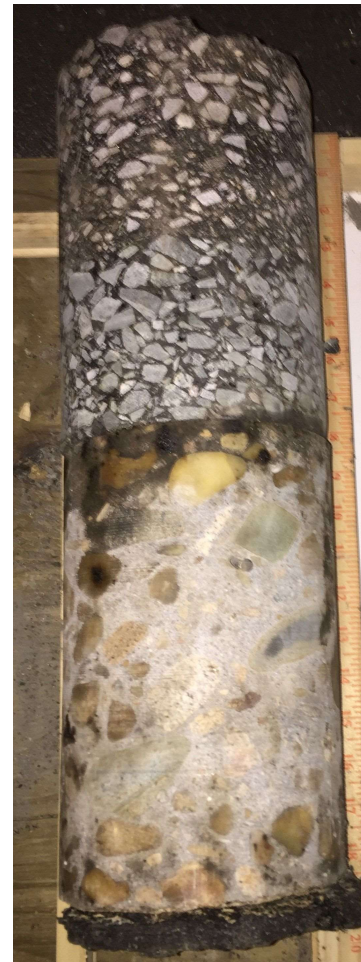


CLIENT Transurban	PROJECT NAME 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825	PROJECT LOCATION Stafford County
DATE CORED 5/17/17	ROADWAY I-95 North Bound
LANE LOCATION Right Travel Lane	SOIL BORING COMPLETED No; Hand auger advanced to base of gravel
CORE DIAMETER 6 inches	ELEVATION 112.4 ft NAVD 88
NORTH 311360.18	EAST 3603197.28
STATION 814+41	OFFSET 108 RT

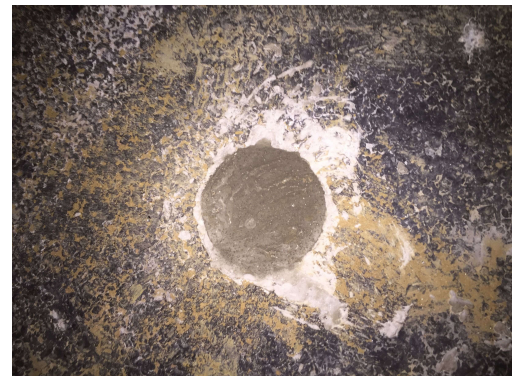


Bottom of Pavement Core 2' below ground surface.

**PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)**



SURFACE CLOSURE



BACK FILL: High early strength concrete

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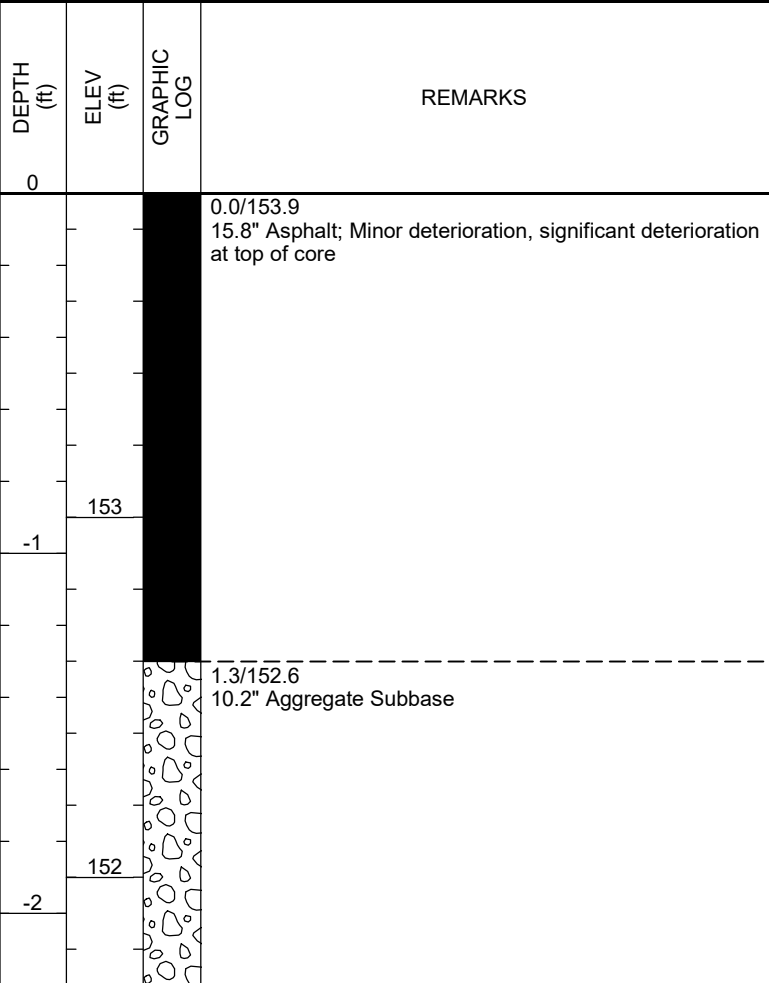


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CORE NUMBER 17RR-PC-17

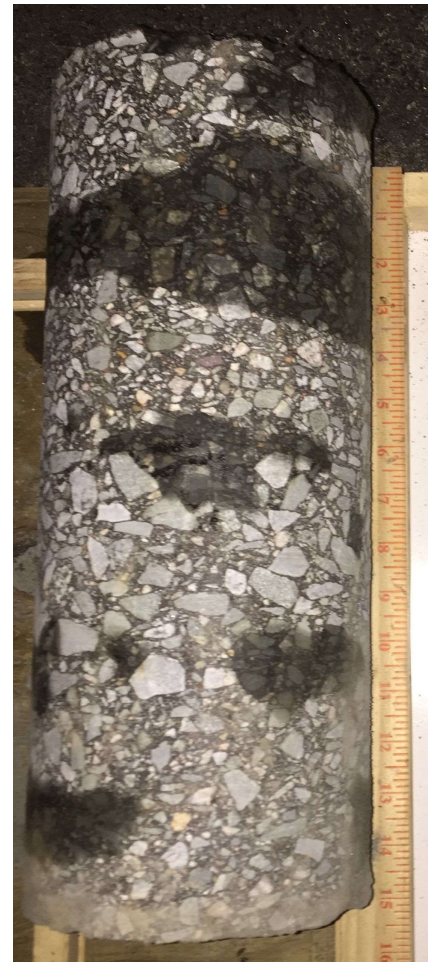
PAGE 1 OF 1

CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/16/17 **ROADWAY** I-95 Express Reversible **LANE LOCATION** West Travel Lane
CORE DIAMETER 6 inches **ELEVATION** 153.9 ft NAVD 88 **SOIL BORING COMPLETED** No; Hand auger advanced to base of gravel
NORTH 308300.76 **EAST** 3602125.02 **STATION** 781+79 **OFFSET** 6 RT

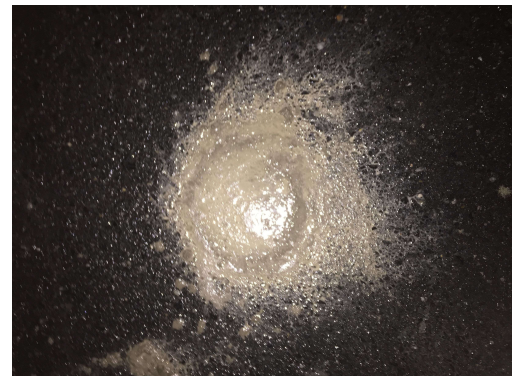


Bottom of Pavement Core 2.2' below ground surface.

PAVEMENT CORE THICKNESS VIEW (Not to scale with graphic log)



SURFACE CLOSURE



BACK FILL: High early strength concrete

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CORE NUMBER 17RR-PC-20

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CLIENT Transurban	PROJECT NAME 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825	PROJECT LOCATION Stafford County
DATE CORED 5/16/17	ROADWAY I-95 Express Reversible
LANE LOCATION West Travel Lane	SOIL BORING COMPLETED No; Hand auger advanced to base of gravel
CORE DIAMETER 6 inches	ELEVATION 124.5 ft NAVD 88
NORTH 307243.94	EAST 3601870.95
STATION 770+92	OFFSET 6 RT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
124	0.0/124.5		15.5" Asphalt; 4 Apparent layers, Minor deterioration
123	1.3/123.2		8.5" Aggregate Subbase
-2			Bottom of Pavement Core 2' below ground surface.

PAVEMENT CORE THICKNESS VIEW (Not to scale with graphic log)



SURFACE CLOSURE



BACK FILL: High early strength concrete

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CORE NUMBER 17SBGP-01

PAGE 1 OF 1

CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/10/17 **ROADWAY** I-95 South Bound **LANE LOCATION** Right Shoulder
CORE DIAMETER 6 inches **ELEVATION** 175.1 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17SBGP-01 bore log
NORTH 269680.97 **EAST** 3586739.59 **STATION** 357+31 **OFFSET** 155 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	175		0.0/175.1 5.3" Asphalt; 2 Apparent layers, minor deterioration in lower layer
			0.4/174.7 18" Aggregate Subbase
	174		

PAVEMENT CORE THICKNESS VIEW (Not to scale with graphic log)



Bottom of Pavement Core 1.9' below ground surface.

SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

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CLIENT Transurban	PROJECT NAME 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825	PROJECT LOCATION Stafford County
DATE CORED 5/10/17	ROADWAY I-95 South Bound
LANE LOCATION Right Shoulder	SOIL BORING COMPLETED Yes; Refer to 17SBGP-05 bore log
CORE DIAMETER 6 inches	ELEVATION 223.1 ft NAVD 88
NORTH 267453.9	EAST 3585776.29
STATION 332+77	OFFSET 74 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	223		0.0/223.1 7.3" Asphalt; 2 Apparent layers, minor deterioration
	222		0.6/222.5 11.7" Aggregate Subbase

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



Bottom of Pavement Core 1.5' below ground surface.

SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

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CLIENT Transurban	PROJECT NAME 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825	PROJECT LOCATION Stafford County
DATE CORED 5/11/17	ROADWAY I-95 South Bound
LANE LOCATION Right Shoulder	SOIL BORING COMPLETED Yes; Refer to 17SBGP-07 bore log
CORE DIAMETER 6 inches	ELEVATION 214.7 ft NAVD 88
NORTH 266958.64	EAST 3585421.06
STATION 326+64	OFFSET 104 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
			0.0/214.7 6.3" Asphalt, 2 Apparent layers, minor deterioration at layer change
	214		0.5/214.2 11.7" Aggregate Subbase
-1			

PAVEMENT CORE THICKNESS VIEW
(Not to scale with graphic log)



Bottom of Pavement Core 1.5' below ground surface.

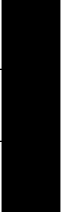

SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete



CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/11/17 **ROADWAY** I-95 South Bound **LANE LOCATION** Right Shoulder
CORE DIAMETER 6 inches **ELEVATION** 208.2 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17SBGP-08 bore log
NORTH 266591.64 **EAST** 3585114.28 **STATION** 321+82 **OFFSET** 141 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	208		0.0/208.2 6.8" Asphalt, 2 Apparent layers, minor deterioration, with some deterioration at layer change
			0.6/207.6 12.2" Aggregate Subbase
-1			
	207		

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



Bottom of Pavement Core 1.6' below ground surface.

SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/11/17 **ROADWAY** I-95 South Bound **LANE LOCATION** Right Shoulder
CORE DIAMETER 6 inches **ELEVATION** 201.2 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17SBGP-09 bore log
NORTH 266158.33 **EAST** 3584703.98 **STATION** 315+83 **OFFSET** 204 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	201		0.0/201.2 6.5" Asphalt; 2 Apparent layers, minor deterioration
			0.5/200.7 11.5" Aggregate Subbase
-1			
	200		

Bottom of Pavement Core 1.5' below ground surface.

**PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)**



SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

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CORE NUMBER 17XP-37

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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/18/17 **ROADWAY** I-95 South Bound **LANE LOCATION** Left Shoulder
CORE DIAMETER 6 inches **ELEVATION** 200.7 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17XP-37 bore log
NORTH 268866.69 **EAST** 3586536.13 **STATION** 348+91 **OFFSET** 48 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	200.7		5.8" Asphalt; Minor deterioration
	200.4		Apparent delamination at 3" bgs
	200.2		16.2" Aggregate Subbase
			Bottom of Pavement Core 1.8' below ground surface.

PAVEMENT CORE THICKNESS VIEW (Not to scale with graphic log)



SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

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CLIENT Transurban **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825 **PROJECT LOCATION** Stafford County
DATE CORED 5/18/17 **ROADWAY** I-95 South Bound **LANE LOCATION** Left Shoulder
CORE DIAMETER 6 inches **ELEVATION** 215 ft NAVD 88 **SOIL BORING COMPLETED** Yes; Refer to 17XP-38 bore log
NORTH 268401.23 **EAST** 3586349.55 **STATION** 343+89 **OFFSET** 23 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0	215		
			0.0/215.0 6.3" Asphalt; 2 Apparent layers
			0.3/214.7 Apparent delamination and wash out from 3-4" bgs
			0.5/214.5 16.7" Aggregate Subbase
-1	214		

Bottom of Pavement Core 1.8' below ground surface.

**PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)**



SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

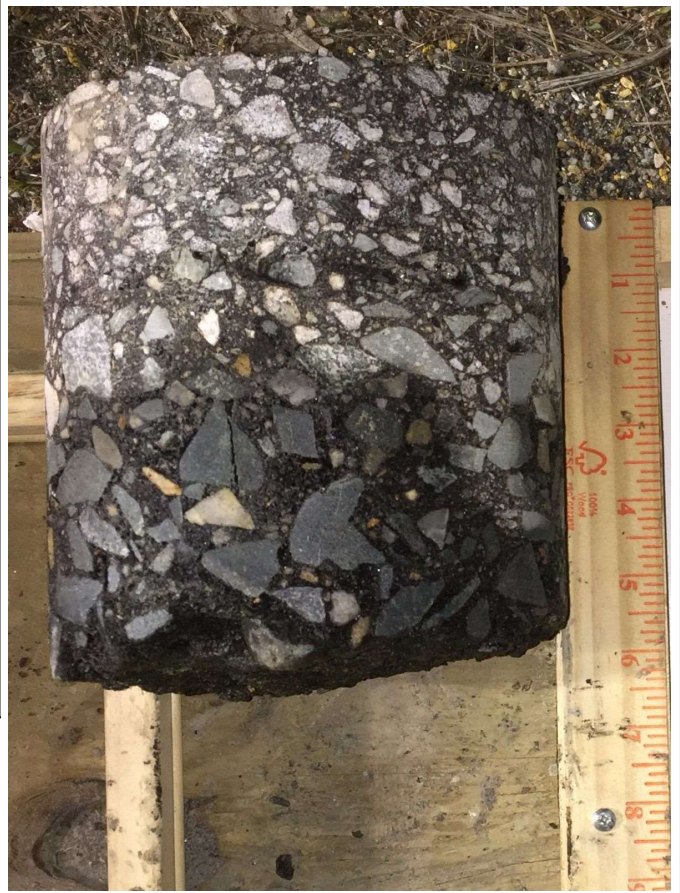
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CLIENT Transurban	PROJECT NAME 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825	PROJECT LOCATION Stafford County
DATE CORED 5/18/17	ROADWAY I-95 South Bound
LANE LOCATION Left Shoulder	SOIL BORING COMPLETED Yes; Refer to 17XP-39 bore log
CORE DIAMETER 6 inches	ELEVATION 225.7 ft NAVD 88
NORTH 267695.06	EAST 3585985.12
STATION 335+92	OFFSET 16 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
	0.0/225.7		6.5" Asphalt; 2 Apparent layers, some deterioration in lower layer
	0.5/225.2		17.5" Aggregate Subbase
225			
-1			
224			
-2			

PAVEMENT CORE THICKNESS VIEW
 (Not to scale with graphic log)



Bottom of Pavement Core 2' below ground surface.

SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

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CLIENT Transurban	PROJECT NAME 95 Express Lanes Fredericksburg Extension
HDR PROJECT NUMBER 10052825	PROJECT LOCATION Stafford County
DATE CORED 5/18/17	ROADWAY I-95 South Bound
LANE LOCATION Left Shoulder	SOIL BORING COMPLETED Yes; Refer to 17XP-40 bore log
CORE DIAMETER 6 inches	ELEVATION 220.4 ft NAVD 88
NORTH 267195.15	EAST 3585657.39
STATION 329+94	OFFSET 37 LT

DEPTH (ft)	ELEV (ft)	GRAPHIC LOG	REMARKS
0			
			0.0/220.4 7.3" Asphalt; 2 Apparent layers, minor deterioration in lower layer
220			0.3/220.1 Apparent delamination at 4" bgs
			0.6/219.8 14.7" Aggregate Subbase
-1			
219			

**PAVEMENT CORE THICKNESS VIEW
(Not to scale with graphic log)**



Bottom of Pavement Core 1.8' below ground surface.

SURFACE CLOSURE



BACK FILL: Gravel capped with a minimum 2.0 feet of high early strength concrete

PAVEMENT CORE REPORT-2PHOTO - GINT STD US LAB - HDR 20160912_PRACTICE_GDT - 8/8/17 09:53 - J:\100XXXXX - TRANSURBAN 95 FRED EXIGINT\PAVEMENT\PAVEMENT.GPJ



Rock Core Photographs



Boring 17BR-04 – 29.0 to 45.5 feet
Box 1 of 1

BORING	RUN	LENGTH	RECOVERY	RQD
17BR-04	1	29.0 – 32.0' = 3.0'	1.7' = 57%	1.0' = 33%
17BR-04	2	32.0 – 37.0' = 5.0'	5.0' = 100%	3.4' = 68%
17BR-04	3	37.0 – 42.0' = 5.0'	5.0' = 100%	4.2' = 84%
17BR-04	4	42.0 – 45.5' = 3.5'	3.5' = 100%	3.3' = 94%



Boring 17XP-26 – 7.7 to 10.0 feet
 Box 1 of 1

BORING	RUN	LENGTH	RECOVERY	RQD
17XP-26	1	7.7 – 10.0' = 2.3'	0.8' = 35%	0.8' = 35%



Boring 17XP-59 – 0.0 to 15.0 feet
 Box 1 of 1

BORING	RUN	LENGTH	RECOVERY	RQD
17XP-59	1	0.0 – 5.0' = 5.0'	4.3' = 86%	3.8' = 76%
17XP-59	2	5.0 – 10.0' = 5.0'	5.0' = 100%	5.0' = 100%
17XP-59	3	10.0 – 15.0' = 5.0'	1.2' = 24%	0.7' =



Boring 17XP-60 – 28.1 to 33.1 feet
 Box 1 of 1

BORING	RUN	LENGTH	RECOVERY	RQD
17XP-60	1	28.1 – 33.1' = 5.0'	5.0' = 100%	4.2' = 84%



**SOIL BORING
KEY TO FIELD LOGGING**

ORDER OF SOIL DESCRIPTION

- | | |
|--------------------------------------|---|
| 1. Geologic Origin – | See Table 1 on page 2 |
| 2. Color – | Comprises more than 50% of the sample, to be written in ALL CAPS |
| 3. Primary/Major Grain Size – | “ and ”: 30% to 50% of the minor grain size |
| 4. Modifying Term – | “ some ”: 15% to 30% of the minor grain size
“ little ”: 5% to 15% of the minor grain size
“ trace ”: 5% or less of the minor grain size |
| 5. Secondary Component(s) – | Can have up to two, but total must not exceed 100% |
| 6. Contains – | See Table 2 on page 2 |
| 7. Soil Density/Consistency – | “ dry ”: Absence of moisture, dusty, dry to the touch |
| 8. Moisture Content – | “ moist ”: Damp but no visible water
“ wet ”: Visible free water, usually soil is below water table |

EXAMPLES OF SOIL DESCRIPTION:

- Residual, Yellow-brown, fine, SANDY ELASTIC SILT, trace gravel, slightly micaceous medium stiff, moist (MH)
- Fill, Brown and gray, fine to coarse, SILTY SAND RUBBLE FILL, trace gravel, contains glass, brick and rock fragments, contains pockets of fat clay, loose, moist (SM)

OTHER INFORMATION TO BE PROVIDED ON FIELD LOG:

- Include logger’s and driller’s first and last name and company
- Provide type of drill rig, size of augers, type of hammer (automatic or manual)
- Indicate field offset direction and distance from staked location, if applicable
- Identify type of ground cover (leaf litter, asphalt, topsoil), and provide depth in inches (i.e., Topsoil 4”)
- Pavement – record thickness of pavement and aggregate subbase in inches (i.e., Asphalt 5”, Aggregate subbase 12”)
- Indicate if material is **Fill or Potential Fill**
- Record depth to water and cave in at time of boring (TOB) (and after 24-hours, if applicable)
- Auger; refusal depth, spoon, or roller cone bit; if applicable (i.e., AR at 14.6 ft)
- Boring termination depth (i.e., BOH 20.0 ft)
- Note backfill methods
- Include comments regarding location, if applicable (i.e., located in shoulder, adjacent to stream, bridge approach, etc.)
- Use shovel for determining thickness of topsoil

“CONTAINS”:

Under “Comments”, note the presence of shell fragments, wood fragments, type/condition of organics (roots/root fragments, branches, leaves, grass/decomposed, fresh, etc.), unusual odors, contamination by other man-made materials (construction material, concrete, asphalt pavement debris, wire, brick, glass, etc.). If the portion of the foreign matter represents more than 30% (by weight) of the soil component, then include statements such as “contains heavy concentrations of _____”.

When noting **mica content**, eliminate the word “contains” and use one of the following expressions: *slightly micaceous* (few shiny flakes), *micaceous* (common throughout soil), or *highly micaceous* (soil is almost all mica).

“Contains” should also be used to identify lenses, layers, or pockets of distinctly different material than the parent soil of the sample. See descriptions below:

<u>Description</u>	<u>Criteria</u>
Frequent	More than one per foot of thickness
Interbedded	Alternating soil layers of different composition
Layer	Material lying essentially parallel to the surfaces against which it was formed (generally 1 to 6 inches)
Lens	A lenticular deposit, larger than a pocket (generally less than 1 inch thick)
Occasional	One or less per foot of thickness
Parting	A very thin granular layer
Pocket	Small erratic deposits that are isolated within the total soil matrix
Seam	A thin layer separating two distinctive layers of different composition or greater magnitude
Stratified	Alternating layers of varying material or color
Stratum	A stratigraphic unit

SAMPLE TYPES S: Split Spoon: ST: Shelby Tube (Examples: S-1, S-2, ST-1, S-3, etc.)

COMPONENT **DISTINGUISHED FEATURES**

Boulders Larger than 12” (300 mm)



**SOIL BORING
KEY TO FIELD LOGGING**

Cobbles

3" to 12" (75 mm to 12 mm)

Gravel

Larger than No. 4 sieve and smaller than a 3" sieve
 Described with any of the following terms (or any combination):
 Fine 3/8" to No. 4 use fine, coarse, or fine to coarse (9.5 mm to 4.75 mm) sieve
 Coarse 3" to 3/4" (75 mm to 19 mm) sieve
Use fine, coarse, or fine to coarse; do not use medium
Provide angular or rounded

Sand

The finest sand grains are just visible to the naked eye; while the largest would pass a No. 4 (4.75mm) sieve (pinhead size). Described with any of the following terms (or any combination):
 Fine No. 40 to No. 200 (0.42 mm to 0.075 mm) sieve
 Medium No. 10 to No. 40 (2.0 mm to 0.42 mm) sieve
 Coarse No. 4 to No. 10 (4.75 mm to 2.0 mm) sieve
Use fine to coarse, fine to medium, medium to coarse, etc.

Silt

Lumps are easily crumbled when are dried
 Feels gritty between the teeth
 A moist pat when shaken in the palm of the hand will appear shiny wet
 When squeezed it will appear dry and dull
Identify whether SILT (ML) or elastic SILT (MH)

Clay

Lumps are comparatively hard when air- dried
 Threads (1/8" diameter) of considerable length will support their own weight when held by one end
 A moist pat will appear the same whether shaken in the palm of the hand or squeezed.
Identify whether lean CLAY (CL) or fat CLAY (CH)

TABLE 1: GEOLOGIC ORIGIN

Residual	Unconsolidated or partly weathered parent material, developed in place by weathering
Palustrine	Material grown or deposited in a marsh or marsh-like environment
Alluvial	Material deposited by a stream or running water
Fill	Distinguish between trash fill and rubble fill
Intermediate Geomaterials (IGM)	Describes material as it transactions between soil and rock, and vice-versa. See below*
*Residual material (has rock structure) w/ SPT N-Values > 50 blows per 6"	
*Strength is greater than soil and less than the weathered rock	

TABLE 2: COLOR (not limited to...)

Brown	Gray	Black	Orange	Yellow	Blue	Green
Red-brown	Gray-brown	Green-gray	Orange-brown	Yellow-brown	Blue-gray	Red
Use "Light" and "Dark" as modifiers						
"Mottled" – irregularly marked with spots or patches of different colors; i.e. brown with gray mottles						

TABLE 3: RELATIVE DENSITY / CONSISTENCY TABLE

Sands		Silts and Clays			
N60	Relative Density	N60	Field Test*	Unconfined Compressive Strength (tsf –e.g., from Pocket Penetrometer)*	Consistency
0-3	Very Loose	0-1	Extruded between fingers when squeezed	<0.25	Very Soft
4-9	Loose	2-4	Molded by light finger pressure	0.25-0.5	Soft
10-29	Medium Dense	5-8	Molded by strong finger pressure	0.5-1.0	Firm
30-50	Dense	9-15	Readily indented by thumb but penetrated with great effort	1.0-2.0	Stiff
Over 50	Very Dense	16-30	Readily indented by thumbnail	2.0-4.0	Very Stiff
		31-60	Indented with difficulty by thumbnail	Over 4.0	Hard
		Over 60	-	-	Very Hard



**ROCK CORING
KEY TO FIELD LOGGING**

ORDER FOR ROCK DESCRIPTIONS
Degree of Weathering; Hardness; Thickness of Bedding; Color; ROCK TYPE (all caps); Degree of Fracturing/Jointing Inclusions, Minor Rock Types, and Minerals; Other Features; Stratum RQD (SRQD) Provide Relative Bedding Dip and Relative Discontinuity Dip in "Comments" column on log.

DEGREE OF WEATHERING (can be range of weathering)	
Unweathered	No evidence of any chemical or mechanical alteration
Slightly Weathered	Slight discoloration on surface, slight alteration along discontinuities, less than 10% of the rock volume altered
Moderately Weathered	Discoloring evident, surface pitted and altered, with alteration penetrating well below rock surfaces, weathering "halos" evident; 10 to 50 % of the rock altered
Highly Weathered	Entire mass discolored, alteration pervading nearly all of the rock, with some pockets of slightly weathered rock noticeable, some minerals leached away
Decomposed	Rock reduced to a soil with relict rock structure (i.e., Saprolite), generally molded and crumbled by hand
Friability should be noted – rock may not be decomposed, but could be susceptible to piping in cut sections	

HARDNESS (can be range of hardness)	
Very Soft	Can be deformed by hand
Soft	Can be scratched with a fingernail
Moderately Hard	Can be scratched easily with a knife
Hard	Can be scratched with difficulty with a knife
Very Hard	Cannot be scratched with a knife

THICKNESS OF BEDDING (can be range of thickness)	
Thin Bedded	Beds 0.3 foot (0.1 meter) thick, or less
Medium Bedded	Beds more than 0.3 ft to 1 ft (0.1m to 0.3 meter) thick
Thick Bedded	Beds more than 1 ft to 3 ft (0.3m to 1 meter) thick
Massive	Beds more than 3 ft (1 meter) thick
No Apparent Bedding	N/A

COLOR (not limited to...) May use "Light" and "Dark" as modifiers	White Black	Gray Brown	Need color dry and wet; hyphenated for compound colors
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ROCK TYPE Example: sandstone, coal, silty shale, clayshale, etc.	Inclusions, minor rock types, & minerals	Other Features
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DEGREE OF FRACTURING and/or JOINTING (can be range of fracturing/jointing)	
Very Widely Fractured / Jointed	At spacing greater than 10 feet.
Slightly Fractured / Jointed	At spacing of 3 to 10 feet.
Moderately Fractured / Jointed	At spacing of 1 to 3 feet.
Highly Fractured / Jointed	At spacing of 2 inches to 1 foot.
Intensely Fractured / Jointed	At spacing of less than 2 inches.

Description	Criteria
Banded	Approximately parallel bands of varying color
Streaked	Randomly oriented streaks of color
Stained	Local color variations associated with other features (i.e., bedding, fractures)



**ROCK CORING
KEY TO FIELD LOGGING**

<p>RECOVERY (REC) – 0% to 100% Length of rock pieces (tenths of feet) divided by Length of run (tenths of feet) Example: 2.0 feet / 5.0 feet = 40%</p>
<p>ROCK QUALITY DESIGNATION (RQD) – 0% to 100% Length of rock pieces of 4 inches or greater (tenths of feet) divided by Length of run (tenths of feet) Example: 0.5 feet + 0.7 feet + 0.5 feet / 4.0 feet = 1.7 feet / 4.0 feet = 42%</p>
<p>STRATUM ROCK QUALITY DESIGNATION (SRQD) – 0% to 100% Length of rock pieces of 4 inches or greater in stratum (tenths of feet) divided by Thickness of stratum (tenths of feet) Example: 1.0 feet + 2.0 feet + 6.0 feet / 15.0 feet = 60%</p>
<p>RELATIVE (BEDDING) DIP (RD) – 0 to 90°</p>
<p>RELATIVE DISCONTINUITY DIP (RDD) – 0 to 90°</p>

- OTHER INFORMATION TO BE PROVIDED ON FIELD LOG:**
- Note casing/auger size and depth, if applicable
 - Note core bit type and diameter
 - Note coring method (i.e., NQ2 wireline)
 - Note solid or split-inner barrel
 - Document Recovery and RQD in both feet and percentage
 - Document water loss, if applicable
 - Identify and mark on core if the breaks are mechanical, note on log probable, or possible mechanical breaks (i.e., caused by drilling or extracting out of core barrel)
 - Provide grain size – fine to coarse
 - Note clay seams, voids, etc. (put cardboard spacer in box denoting void)
 - Provide penetration rate per foot

ROCK MASS RATING (RMR) – Rock Discontinuity Condition Parameters (Note: English conversions are approximate.)
 Determined in the field on discontinuities; Value for each parameter can be a range (i.e., 4 - 5)

PARAMETER	RATING VALUE				
Length – l Note: Typically use a default value of 4	< 3 feet	3 – 10 feet	10 – 30 feet	30 – 60 feet	> 60 feet
	6	4	2	1	0
Separation – s	None	< 0.1 mm (1/250")	0.1-1 mm (1/64-1/32")	1 – 5 mm (1/32-3/16")	> 5 mm (3/16")
		6	5	4	1
Roughness – r	Very Rough	Rough	Slightly Rough	Smooth	Slickensided
	6	5	3	1	0
Infilling – i	None	Hard Infilling		Soft Infilling	
		< 5 mm (3/16")	> 5 mm (3/16")	< 5 mm (3/16")	> 5 mm (3/16")
		6	4	2	2
Weathering – w	Unweathered	Slightly Weathered	Moderately Weathered	Severely Weathered	Decomposed
	6	5	3	1	0

Moderately weathered, hard, thick bedded, yellow-brown, coarse SANDSTONE; gray, soft shale from 23.2' to 25.1'.
 Slightly weathered, moderately hard, moderately jointed, light-gray, vuggy DOLOSTONE; occasional pyrite crystals on very rough joints with typical joint separation of 1/32 in and dip of 14 degrees.

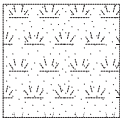
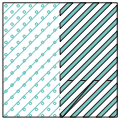
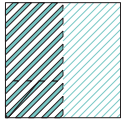
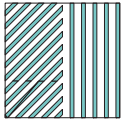
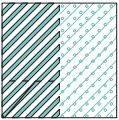
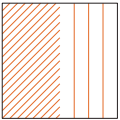
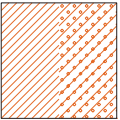
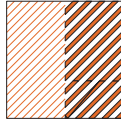
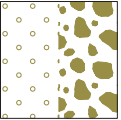

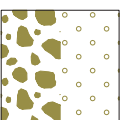
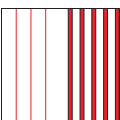
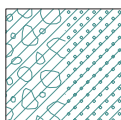
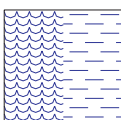
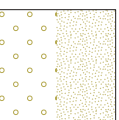
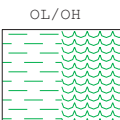
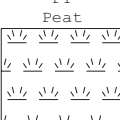
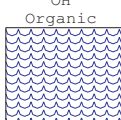
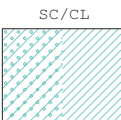


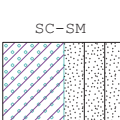
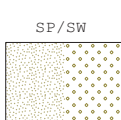
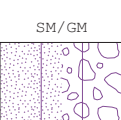
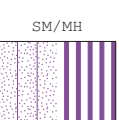
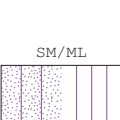
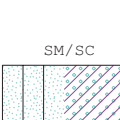


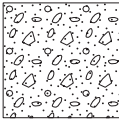
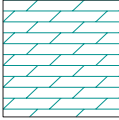
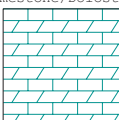
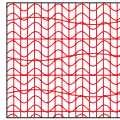
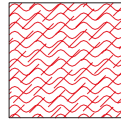
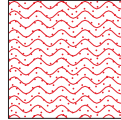
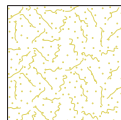

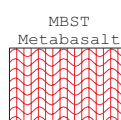
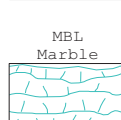


MATERIAL AND SAMPLE SYMBOLS LIST

Pavement/Soils				Sedimentary Rocks		Igneous Rocks	Metamorphic Rocks	Sampling
<p>ASPH - ASPHALT PVT</p>	<p>GP - Poorly-graded Gravel</p>	<p>MH - Elastic Silt</p>	<p>SC - Clayey Sand</p>	<p>CGL - Conglomerate</p>	<p>SE - Shell Bed</p>	<p>AND - Andesite</p>	<p>GGE - Gouge</p>	<p>SPT</p>
<p>CH - Fat Clay</p>	<p>GP-GC</p>	<p>MH/CH</p>	<p>SM - Silty Sand</p>	<p>CLST - Cherty Limestone</p>	<p>SHL - Shale</p>	<p>BST - Basalt</p>	<p>GNS - Gneiss</p>	<p>Core</p>
<p>CL - Lean Clay</p>	<p>GP-GM</p>	<p>MH/ML</p>	<p>SP - Poorly-Graded Sand</p>	<p>COL - Coal</p>	<p>SLS - Siltstone</p>	<p>DBS - Diabase</p>	<p>MYL - Mylonite</p>	<p>Auger</p>
<p>CL-ML</p>	<p>GW - Well-Graded Gravel</p>	<p>MH/SM</p>	<p>SP-SC</p>	<p>MST - Mudstone</p>	<p>SST - Sandstone</p>	<p>DRT - Diorite</p>	<p>PHY - Phyllite</p>	<p>Vane</p>
<p>CONC- CONCRETE PVT</p>	<p>GW-GC</p>	<p>ML - Silt</p>	<p>SP-SM</p>	<p>GWK - Graywacke</p>	<p>SST-SHL - Interbedded Sandstone/Shale</p>	<p>GBR - Gabbro</p>	<p>SCH - Schist</p>	<p>Undisturbed</p>
<p>FL - Fill</p>	<p>GW-GM</p>	<p>ML/CL</p>	<p>SW - Well-Graded Sand</p>	<p>LST - Limestone</p>	<p>SST-SLS - Interbedded Sandstone/Siltstone</p>	<p>GRD - Granodiorite</p>	<p>SLT - Slate</p>	<p>Grab</p>
<p>GC - Clayey Gravel</p>	<p>GM/GP</p>	<p>ML/GM</p>	<p>SW-SC</p>	<p>UCY - Underclay</p>	<p>SHLS-Shaly Limestone</p>	<p>GRN Granite</p>	<p>Misc.</p>	<p>No Recovery</p>
<p>GC-GM</p>	<p>GM/ML</p>	<p>ML/SM</p>	<p>SHDS Shaly Dolostone</p>	<p>MSH Silty Shale</p>	<p>POR - Porphyry</p>	<p>CAV - Cavity</p>	<p>HWR Highly Weathered Rock</p>	<p>Other</p>
<p>GM - Silty Gravel</p>	<p>GM/SM</p>	<p>SW-SM</p>	<p>CHK Chalk</p>	<p>SSHL Sandy Shale</p>	<p>RHY - Rhyolite</p>	<p>BRC - Breccia</p>		



MATERIAL AND SAMPLE SYMBOLS LIST

Pavement/Soils	Sedimentary Rocks	Igneous Rocks	Metamorphic Rocks	Sampling
<p>TOPS-TOPSOIL</p>  <p>SC/CH</p>  <p>CH/CL</p>  <p>CH/MH</p>  <p>CH/SC</p>  <p>CL/ML</p>  <p>CL/SC</p>  <p>CL/CH</p>  <p>GP/GW</p>  <p>CRA Crushed Aggregate</p>  <p>GW/GP</p>  <p>ML/MH</p>  <p>GC/SC</p>  <p>OH/OL</p>  <p>GP/SP</p>  <p>OL/OH</p>  <p>PT Peat</p>  <p>OH Organic</p>  <p>SC/CL</p>  <p>OL Organic</p>  <p>SC/GC</p>  <p>SC-SM</p>  <p>SP/SW</p>  <p>SM/GM</p>  <p>SM/MH</p>  <p>SM/ML</p>  <p>SM/SC</p>  <p>SP/GP</p>  <p>SW/SP</p> 	<p>BLD-Boulder Bed</p>  <p>DLS Dolostone</p>  <p>LST-DLS-Interbedded Limestone/Dolostone</p> 	<p>CHT Charnockite</p> 	<p>MSLS Metasiltstone</p>  <p>MSST Metasandstone</p>  <p>QZT - Quartzite</p>  <p>SPS Soapstone</p>  <p>MBST Metabasalt</p>  <p>MBL Marble</p> 	



95 EXPRESS LANES FREDERICKSBURG EXTENSION

APPENDIX C

LABORATORY TESTING DATA

Laboratory Summary Tables
Moisture Content Reports
Atterberg Limits Test Results
Grain Size Analysis Results
Standard Proctor Moisture Density Results
CBR Test Reports
Phase Separation Science (PSS) Total Sulfur Results
Potential Peroxide Acidity (PPA) Results
Direct Shear Test Reports
Repeated Direct Shear Test Reports
Unconfined Compression (UC) Test on Intact Rock Core Specimens
Tube Extraction Logs



GET Solutions, Inc.

SUMMARY OF LABORATORY RESULTS

CLIENT HDR Engineering **PROJECT NAME** 95 Express Lanes Fredericksburg Extension
PROJECT NUMBER 10052825 **PROJECT LOCATION** Fredericksburg, Virginia

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Saturation (%)	Void Ratio
17CL-02	1.0							25.6			
17CL-02	3.0							30.1			
17CL-02	5.0							19.7			
17CL-02	7.0							20.7			
17CL-02	9.0							19.2			
17CL-02	14.0	58	25	33	0.075	69	CH	24.0			
17CL-02	19.0							24.6			
17CL-02	24.0							24.0			
17CL-02	29.0				9.5	9		25.5			
17CL-02	34.0							18.6			
17CL-02	39.0							17.9			
17CL-02	44.0							22.1			
17CL-02	49.0							19.5			
17CL-03	1.0							26.1			
17CL-03	3.0							17.5			
17CL-03	5.0							14.4			
17CL-03	7.0							24.4			
17CL-03	9.0							25.9			
17CL-03	14.0	57	22	35	0.075	91	CH	25.7			
17CL-03	19.0							23.3			
17CL-03	24.0							24.5			
17CL-03	29.0							29.1			
17CL-03	34.0	39	17	22	4.75	18	SC	27.5			
17CL-03	39.0							26.4			
17CL-03	44.0							21.8			
17CL-03	49.0							20.7			
17CL-03	54.0							22.6			
17CL-03	59.0							20.4			
17CL-11	1.0							16.6			
17CL-11	3.0							23.2			
17CL-11	5.0							21.5			
17CL-11	7.0				4.75	77		18.6			
17CL-11	9.0							19.9			
17CL-11	14.0							14.7			
17CL-11	19.0							20.6			
17CL-11	24.0							21.6			
17CL-11	29.0				4.75	21		24.0			
17CL-11	34.0							22.8			
17CL-11	38.2							15.4			
17CL-11	43.3							19.5			
17CL-12	1.0							39.8			
17CL-12	3.0							26.2			
17CL-12	5.0	78	30	48	0.075	100	CH	29.0			

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GET Solutions, Inc.

SUMMARY OF LABORATORY RESULTS

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Saturation (%)	Void Ratio
17CL-12	7.0							24.4			
17CL-12	9.0							25.9			
17CL-12	11.5							16.6			
17CL-12	19.0							21.6			
17CL-12	24.0							19.2			
17CL-12	29.0							15.3			
17CL-12	34.0							18.1			
17CL-12	39.0	68	23	45	2	98	CH	23.4			
17CL-12	44.0							24.0			
17CL-12	48.4							21.6			
17CL-12	53.8							21.1			
17CL-12	58.8							17.1			
17CL-12	63.7							18.2			
17CL-12	68.8	59	25	34	0.075	98	CH	24.7			
17CL-12	73.5							15.1			
17CL-12	78.9							22.8			
17SWM-05	1.0							24.7			
17SWM-05	3.0							20.1			
17SWM-05	5.0	29	12	17	0.075	47	SC	21.7			
17SWM-05	7.0							10.6			
17SWM-05	9.0							29.8			
17SWM-05	14.0							19.1			
17SWM-05	19.0							14.7			
17SWM-05	23.6							23.2			
17SWM-06	1.0							15.9			
17SWM-06	3.0							17.0			
17SWM-06	5.0							19.0			
17SWM-06	7.0				4.75	18		20.6			
17SWM-06	9.0							21.0			
17SWM-06	13.4							22.3			
17SWM-06	19.0				4.75	21		25.5			
17SWM-06	24.0							24.7			
17SWM-15	1.0							17.7			
17SWM-15	3.0							18.7			
17SWM-15	5.0							14.7			
17SWM-15	7.0							18.3			
17SWM-15	9.0				25	19		9.9			
17SWM-15	14.0							21.8			
17SWM-15	19.0							24.0			
17SWM-15	24.0	50	19	31	0.075	93	CH	19.7			
17XP-12	1.0							19.1			
17XP-12	3.0							15.5			
17XP-12	5.0							16.6			

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GET Solutions, Inc.

SUMMARY OF LABORATORY RESULTS

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Saturation (%)	Void Ratio
17XP-12	7.0							14.0			
17XP-12	9.0							14.7			
17XP-12	14.0							21.2			
17XP-12	19.0							18.7			
17XP-12	24.0				9.5	7		17.6			
17XP-12	29.0							14.3			
17XP-12	34.0							15.7			
17XP-13	1.0							17.8			
17XP-13	3.0							11.1			
17XP-13	5.0							11.5			
17XP-13	7.0							17.4			
17XP-13	9.0							12.6			
17XP-13	14.0				4.75	23		16.4			
17XP-14	1.0							16.5			
17XP-14	3.0							15.2			
17XP-14	5.0	27	12	15	0.075	36	SC	15.5			
17XP-14	7.0							22.8			
17XP-14	9.0							8.9			
17XP-14	14.0							22.6			
17XP-14	19.0	50	16	34	0.075	55	CH	31.0			
17XP-14	24.0							30.8			
17XP-14	29.0							44.2			
17XP-14	34.0	42	15	27	4.75	15	SC	30.2			
17XP-14	39.0							26.1			
17XP-14	44.0							28.2			
17XP-14	48.8							29.8			
17XP-15	1.0							18.9			
17XP-15	3.0							20.2			
17XP-15	5.0							16.3			
17XP-15	6.6				9.5	18		22.7			
17XP-15	8.4							17.6			
17XP-15	13.2							20.9			
17XP-15	18.7							19.7			
17XP-15	24.0							24.0			
17XP-15	29.0							20.0			
17XP-15	34.0				4.75	11		28.3			
17XP-15	39.0							20.8			
17XP-16	1.0							24.9			
17XP-16	3.0							24.4			
17XP-16	5.0	65	25	40	0.075	83	CH	27.4			
17XP-16	7.0							22.8			
17XP-16	9.0							12.9			
17XP-16	14.0							19.8			

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GET Solutions, Inc.

SUMMARY OF LABORATORY RESULTS

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Saturation (%)	Void Ratio
17XP-16	19.0							22.2			
17XP-16	24.0							19.1			
17XP-16	29.0							27.8			
17XP-16	34.0							26.4			
17XP-16	39.0							19.5			
17XP-19	1.0							59.0			
17XP-19	3.0							25.7			
17XP-19	5.0							25.3			
17XP-19	7.0	52	21	31	0.075	98	CH	23.4			
17XP-19	9.0							22.0			
17XP-19	14.0							19.5			
17XP-19	19.0							18.8			
17XP-19	24.0							22.9			
17XP-19	29.0							21.5			
17XP-19	34.0				9.5	9		23.6			
17XP-19	39.0							23.4			
17XP-19	44.0							22.8			
17XP-19	49.0	49	20	29	0.075	99	CL	21.3			
17XP-19	54.0							23.5			
17XP-20	1.0							20.2			
17XP-20	3.0							21.4			
17XP-20	5.0	80	26	54	0.075	95	CH	28.3			
17XP-20	7.0							19.8			
17XP-20	9.0							21.5			
17XP-20	14.0							15.3			
17XP-51	1.0							14.9			
17XP-51	3.0							23.6			
17XP-51	5.0							16.8			
17XP-51	7.0							22.1			
17XP-51	9.0				9.5	31		13.7			
17XP-51	14.0							15.6			
17XP-57	1.0							21.8			
17XP-57	3.0							19.5			
17XP-57	5.0							12.4			
17XP-57	7.0							25.7			
17XP-57	9.0							26.0			
17XP-57	14.0				4.75	44		25.0			
17XP-57	19.0							22.1			
17XP-57	24.0							12.7			
17XP-57	29.0							22.0			
17XP-57	34.0							17.7			
17XP-57	39.0				4.75	17		25.4			
17XP-57	43.5							18.9			

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GET Solutions, Inc.

SUMMARY OF LABORATORY RESULTS

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Saturation (%)	Void Ratio
17XP-58	1.0							11.8			
17XP-58	3.0							24.1			
17XP-58	5.0							21.3			
17XP-58	7.0							18.7			
17XP-58	9.0				19	9		22.1			
17XP-58	14.0							18.6			
17XP-58	19.0							21.1			
17XP-58	24.0							19.3			
17XP-58	29.0	61	25	36	0.075	90	CH	25.5			
17XP-58	34.0							22.3			
17XP-58	39.0							17.2			
17XP-58	43.5							17.5			
17XP-58	48.6							17.7			

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PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER: 10052825

Assignment 2

PROJECT LOCATION: Fredericksburg, Virginia

1 of 9

Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17BR-02	1							10.6				
17BR-02	3							13.3				
17BR-02	5							10				
17BR-02	7							4.9				
17BR-02	9				19	18		4.7				
17BR-02	14							7.5				
17BR-02	19	54	29	25	0.075	97	CH	37.8				
17BR-02	24							16.1				
17BR-02	29							26.1				
17BR-02	34							31.7				
17BR-02	39				4.75	61		27.6				
17BR-02	44							27.3				
17BR-02	49							25.7				
17BR-02	54							18				
17BR-02	59							17.7				
17BR-02	64	61	30	31	0.075	99	CH	29.5				
17BR-02	69							24.2				
17BR-02	73.4							14.9				
17BR-02	79							16.5				
17BR-03	1							15.2				
17BR-03	3							9.4				
17BR-03	5							6.9				
17BR-03	7							7.8				
17BR-03	9							5.5				
17BR-03	14							23.4				
17BR-03	19	28	18	10	0.075	76	CL	22.8				
17BR-03	24							7.9				
17BR-03	29							14.1				
17BR-03	34	33	21	12	4.75	51	CL	20.9				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER: 10052825

Assignment 2

PROJECT LOCATION: Fredericksburg, Virginia

2 of 9

Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17BR-03	39							22.7				
17BR-03	44							12.6				
17BR-03	49							38.9				
17BR-03	54	110	21	89	0.075	27	SC	23				
17BR-03	59							27.6				
17BR-03	64							27.5				
17BR-03	69							26.7				
17BR-03	74							27.4				
17BR-04	1							11.8				
17BR-04	3							21.4				
17BR-04	5							14.3				
17BR-04	7				19	20		22.5				
17BR-04	9							13				
17BR-04	13.4							14				
17BR-04	18.2							9.2				
17BR-04	23.6				2	27		10.2				
17BR-04	28.5							10.1				
17BR-04	37.3							0.9				
17RW-09	1							24.2				
17RW-09	3							22.8				
17RW-09	5							29.9				
17RW-09	7							27				
17RW-09	9							26.2				
17RW-09	14	80	31	49	0.075	100	CH	31.9				
17RW-09	19							29.7				
17RW-09	24							23.4				
17RW-09	29	41	18	23	4.75	85	CL	24.8				
17RW-09	34							31.6				
17RW-09	39							20.8				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER: 10052825

Assignment 2

PROJECT LOCATION: Fredericksburg, Virginia

3 of 9

Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17SBGP-02	1							11.8				
17SBGP-02	3							16.3				
17SBGP-02	5							18.2				
17SBGP-02	7							15.4				
17SBGP-02	9				19	23		14.2				
17SW-02	1							14.1				
17SW-02	3							12.9				
17SW-02	5							30.9				
17SW-02	7							7				
17SW-02	9							20				
17SW-02	14							24.5				
17SW-02	19	30	13	17	4.75	42	SC	24.9				
17SW-02	24							17.6				
17SW-02	29							20				
17SW-03	1							16.4				
17SW-03	3							9.7				
17SW-03	5							7.2				
17SW-03	7							16.7				
17SW-03	9							14.2				
17SW-03	14				4.75	35		14.5				
17SW-03	19							34.1				
17SW-03	24							31.5				
17SW-03	29	80	32	48	0.075	100	CH	32.1				
17SW-04	1							12.3				
17SW-04	3							9.7				
17SW-04	5							17				
17SW-04	7							15.6				
17SW-04	9	20	12	8	0.075	39	SC	8.1				
17SW-04	14							20.8				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER: 10052825

Assignment 2

PROJECT LOCATION: Fredericksburg, Virginia

4 of 9

Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17SW-04	19							10.6				
17SW-04	24				4.75	73		11.6				
17SW-04	29							22.5				
17SWM-01	1							23.2				
17SWM-01	3							16.4				
17SWM-01	4	33	13	20	19	53	CL	16.9	117.6	12.9	7.4	3.6
17SWM-01	5							19				
17SWM-01	7							16.6				
17SWM-01	9							22.9				
17SWM-01	14	21	12	9	0.075	72	CL	15.2				
17SWM-01	19							25.6				
17SWM-01	24							16.9				
17SWM-04	1							24.1				
17SWM-04	3							18.3				
17SWM-04	5							12				
17SWM-04	7							19.1				
17SWM-04	9							28.2				
17SWM-04	14				4.75	16		22				
17SWM-04	19							21				
17SWM-04	24							22				
17SWM-07	1							19.9				
17SWM-07	3							19				
17SWM-07	5							33.9				
17SWM-07	7							27.2				
17SWM-07	9							25.9				
17SWM-07	14							23.2				
17SWM-07	19	74	26	48	0.075	100	CH	26.7				
17SWM-07	24							31.6				
17SWM-16	1							15.1				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER: 10052825

Assignment 2

PROJECT LOCATION: Fredericksburg, Virginia

5 of 9

Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17SWM-16	3							6.5				
17SWM-16	5							30.3				
17SWM-16	7							20.7				
17SWM-16	9				9.5	37		19.3				
17SWM-16	14							29.5				
17SWM-16	19				4.75	19		24				
17SWM-16	24							37.5				
17WGS-06	1							39.8				
17WGS-06	3							12.5				
17WGS-06	5							35				
17WGS-06	7				25	14		9.2				
17WGS-06	9							37				
17WGS-06	14							23				
17WGS-06	18.2							28.1				
17WGS-07	1							47.9				
17WGS-07	3							28				
17WGS-07	5							24.1				
17WGS-07	7							8.8				
17WGS-07	9							25.9				
17WGS-07	14				9.5	23		35.1				
17WGS-07	19	No Recovery										
17WGS-07	23.2							13.9				
17WGS-08	1							20				
17WGS-08	3							25.9				
17WGS-08	5							24.9				
17WGS-08	7							19.9				
17WGS-08	9	56	23	33	4.75	58	CH	29.7				
17WGS-08	13.7							12.4				
17WGS-08	18.5							11.9				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER: 10052825

Assignment 2

PROJECT LOCATION: Fredericksburg, Virginia

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Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17WGS-08	23.2							8.6				
17XP-01	1							20.5				
17XP-01	3							18.1				
17XP-01	5	96	28	68	0.075	96	CH	27.2				
17XP-01	7							22.8				
17XP-01	9							18.7				
17XP-01	14							15.6				
17XP-01	19							14.2				
17XP-01	24				19	26		17.1				
17XP-01	29							20.8				
17XP-03	1							33.6				
17XP-03	3							32.2				
17XP-03	4	92	24	68	9.5	95	CH	25.3	96	22.7	2.9	2.4
17XP-03	5							26.4				
17XP-03	7							23.2				
17XP-03	9	85	21	64	0.075	100	CH	24.5				
17XP-03	13.4							16.2				
17XP-03	19							7.2				
17XP-03	23.2							11.7				
17XP-04	1							10.2				
17XP-04	3							14.9				
17XP-04	5							9.1				
17XP-04	7							9.3				
17XP-04	9							8				
17XP-04	14							17.5				
17XP-04	19							11.3				
17XP-04	24	38	15	23	2	54	CL	34.2				
17XP-04	29							23.7				
17XP-04	33.9							25.5				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER: 10052825

Assignment 2

PROJECT LOCATION: Fredericksburg, Virginia

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Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17XP-04	38.5							26.1				
17XP-04	43.4							19.8				
17XP-05	1							14				
17XP-05	3							17.6				
17XP-05	5							19.7				
17XP-05	7							19.1				
17XP-05	9							13.8				
17XP-05	14							30.6				
17XP-05	14.5	22	9	13	19	44	SC	19.3				
17XP-05	19	61	20	41	0.075	78	CH	30.2				
17XP-05	24							17.3				
17XP-05	28.2							23.1				
17XP-05	33.4							19.7				
17XP-10	1							30.6				
17XP-10	3							35.9				
17XP-10	4	63	22	41	9.5	83	CH	23.8	100.6	21.2	3.5	3.7
17XP-10	5							17.2				
17XP-10	7							5				
17XP-10	9	34	14	20	0.075	62	CL	14.4				
17XP-18	1							22				
17XP-18	3							29.8				
17XP-18	3.5	63	17	46	9.5	87	CH	17.7	99.9	20.3	1.4	2.7
17XP-18	5							34.6				
17XP-18	7							35				
17XP-18	9							29.7				
17XP-21	49							21.5				
17XP-21	54	72	26	46	0.075	99	CH	26.4				
17XP-21	59							26.6				
17XP-55	1							27.3				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER: 10052825

Assignment 2

PROJECT LOCATION: Fredericksburg, Virginia

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Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17XP-55	3							29.5				
17XP-55	5							7.4				
17XP-55	7							27.7				
17XP-55	9							24.3				
17XP-55	14				9.5	10		20.4				
17XP-55	17.6							14.6				
17XP-56	1							15.9				
17XP-56	3							15.5				
17XP-56	5							4.7				
17XP-56	7				19	17		13.1				
17XP-56	9							7.1				
17XP-56	14							14.2				
17XP-56	18.2							6.2				
17XP-56	22.1							4.9				
17XP-74	1							18.2				
17XP-74	3							29.5				
17XP-74	5							20.1				
17XP-74	5.5	50	22	28	4.75	82	CH	30.3				
17XP-74	7							24.7				
17XP-74	9							25.1				
17XP-74	14							25.8				
17XP-74	19							26.3				
17XP-74	24							21				
17XP-74	29				4.75	32		27.9				
17XP-74	34							24.7				
17XP-74	39							27.6				
17XP-75	1							14				
17XP-75	3							11.1				
17XP-75	5	21	11	10	0.075	20	SC	18.8				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER: 10052825

Assignment 3

PROJECT LOCATION: Fredericksburg, Virginia

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Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17BR-08	1.2							13.5				
17BR-08	3							15.2				
17BR-08	5							11.2				
17BR-08	7							16.5				
17BR-08	9				0.075	45		17.6				
17BR-08	14							15.7				
17BR-08	19							29				
17BR-08	24							20.2				
17BR-08	29							17.3				
17BR-08	34	44	23	21	0.075	63	CL	33.6				
17BR-08	39							16.3				
17BR-08	44							24.7				
17BR-08	49							13.7				
17BR-08	54							19.3				
17BR-08	59							22.3				
17BR-08	64	63	17	46	0.075	94	CH	28.6				
17BR-08	69							25.2				
17BR-08	74				0.075	38		26.7				
17BR-08	79							25.6				
17BR-08	84							25.9				
17CHS-03	1							25.2				
17CHS-03	3							18.2				
17CHS-03	5							15.4				
17CHS-03	7							7.2				
17CHS-03	9							28.5				
17CHS-03	14							28.5				
17CHS-03	19	77	31	46	0.075	99	CH	31.9				
17CHS-03	24							34.2				
17CHS-03	29							23.6				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER: 10052825

Assignment 3

PROJECT LOCATION: Fredericksburg, Virginia

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Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17HWN-03	2							11				
17HWN-03	4	23	11	12	0.075	43	SC	15.5				
17HWN-03	6							17.5				
17HWN-03	8							17.2				
17HWN-03	10	28	11	17	0.075	52	CL	18.1				
17HWN-04	2.5							13.2				
17HWN-04	4	35	17	18	0.075	61	CL	18.7				
17HWN-04	6							20.5				
17HWN-04	8							19.8				
17HWN-04	10							19.4				
17HWN-05	3							7.7				
17HWN-05	5.8							14.1				
17HWN-05	7							21				
17HWN-05	9				0.075	16		24.5				
17HWN-05	11							23.9				
17HWN-07	3							19.2				
17HWN-07	5.5							28.4				
17HWN-07	7							29.8				
17HWN-07	9	65	23	42	0.075	97	CH	25.8				
17HWN-07	11							28.8				
17NSS-03	1.3							8.9				
17NSS-03	3				0.075	19		9.3				
17NSS-03	4.5							24.9				
17NSS-03	5.5							21.9				
17NSS-03	7							19.1				
17NSS-03	9							17.3				
17NSS-05	1.7				0.075	19		6				
17NSS-05	4.6							15.5				
17NSS-05	5.7							17.4				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

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Assignment 3

PROJECT LOCATION: Fredericksburg, Virginia

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Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17NSS-05	7.6							22				
17NSS-05	9.7							22.4				
17NSS-07	1.6							11.4				
17NSS-07	3							8.6				
17NSS-07	5							20.3				
17NSS-07	7	28	19	9	0.075	26	SC	23.5				
17NSS-07	9							22.1				
17NSS-09	1.5							9.9				
17NSS-09	3							11.2				
17NSS-09	5							9.5				
17NSS-09	7							23.4				
17NSS-09	9				0.075	23		23.2				
17NSS-12	1.8							15				
17NSS-12	3							17.3				
17NSS-12	5				0.075	21		18.7				
17NSS-12	7							16.8				
17NSS-12	9							19.5				
17NSS-14	3							20.3				
17NSS-14	5							14.2				
17NSS-14	7							15.8				
17NSS-14	9				0.075	28		18.2				
17NSS-14	11							21.7				
17NSS-16	3							12.9				
17NSS-16	4							12				
17NSS-16	5.5							16.3				
17NSS-16	7.5							15.3				
17NSS-16	9.5	45	15	30	0.075	49	SC	19.7				
17NSS-16	12.3							15.2				
17NSS-18	3							15.2				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

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Assignment 3

PROJECT LOCATION: Fredericksburg, Virginia

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Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17NSS-18	5							11.2				
17NSS-18	7							22.3				
17NSS-18	9							18.7				
17NSS-18	11	34	19	15	0.075	55	CL	18.7				
17RR-01	2.3							7				
17RR-01	4.7							9.5				
17RR-01	6							7.1				
17RR-01	8.8	26	13	13	0.075	27	SC	12.2				
17RR-01	10.2							12				
17RR-03	2.3							6.6				
17RR-03	4.3				0.075	23		8.1				
17RR-03	6.3							13.1				
17RR-03	8.3							12.4				
17RR-03	10.3	35	12	23	0.075	45	SC	10.1				
17RR-04	2.3							9.9				
17RR-04	5.1							23.3				
17RR-04	6.3							17.1				
17RR-04	8.3	31	17	14	0.075	69	CL	18.5				
17RR-04	10.3							19.3				
17RR-06	2.3							8.8				
17RR-06	4.5							23.4				
17RR-06	6.3	28	18	10	0.075	61	CL	19.1				
17RR-06	8.3							17				
17RR-06	10.3							16.8				
17RR-16	3							30.4				
17RR-16	5	76	26	50	0.075	93	CH	32.4				
17RR-16	7							29.4				
17RR-16	9							30.4				
17RR-16	11							24.9				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

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Assignment 3

PROJECT LOCATION: Fredericksburg, Virginia

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Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17RR-18	3.3							19.2				
17RR-18	5.3							25.8				
17RR-18	7.3							19.6				
17RR-18	9.3				0.075	23		16.1				
17RR-18	11.3							17.6				
17RR-19	3.2							15.3				
17RR-19	5							16.4				
17RR-19	7	54	21	33	0.075	91	CH	25				
17RR-19	9							18.7				
17RR-19	11							20.9				
17RR-21	3							19.6				
17RR-21	5.4							15.1				
17RR-21	6.5							16.8				
17RR-21	9				0.075	4		5.6				
17RR-21	11							7.8				
17SBGP-01	3							22.7				
17SBGP-01	5							22				
17SBGP-01	7	64	24	40	0.075	99	CH	25.9				
17SBGP-01	9							25.4				
17SBGP-01	11							27.7				
17SBGP-05	3							16.2				
17SBGP-05	5							15.1				
17SBGP-05	7							13.8				
17SBGP-05	9				0.075	36		16.8				
17SBGP-05	11							20.2				
17SBGP-05	14							16.6				
17SBGP-05	19	40	13	27	0.075	49	SC	13.6				
17SBGP-06	1							16.1				
17SBGP-06	3							32.7				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER: 10052825

Assignment 3

PROJECT LOCATION: Fredericksburg, Virginia

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Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17SBGP-06	5							20.2				
17SBGP-06	7	74	25	49	0.075	90	CH	34.5				
17SBGP-06	9							33.7				
17SBGP-06	14							15.5				
17SBGP-06	19				0.075	28		26.1				
17SBGP-06	24							19.3				
17SBGP-06	29							20.1				
17SBGP-07	3							10.7				
17SBGP-07	5							15.7				
17SBGP-07	7							20.1				
17SBGP-07	9							17.9				
17SBGP-07	11				0.075	39		20.6				
17SBGP-07	14	45	24	21	0.075	79	CL	27.2				
17SBGP-08	3							10.5				
17SBGP-08	5	30	12	18	0.075	33	SC	14.6				
17SBGP-08	7							11.2				
17SBGP-08	9							18.7				
17SBGP-08	11							13.9				
17SBGP-09	3							10.1				
17SBGP-09	5							12.5				
17SBGP-09	7							29.5				
17SBGP-09	9	70	27	43	0.075	67	CH	28.6				
17SBGP-09	11							28.5				
17SWM-17	1							19.3				
17SWM-17	3							29.2				
17SWM-17	5							22.4				
17SWM-17	7							22.1				
17SWM-17	9							23.7				
17SWM-17	14				0.075	19		21.5				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

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Assignment 4

PROJECT LOCATION: Fredericksburg, Virginia

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Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17BR-06	1							11.7				
17BR-06	3							23.3				
17BR-06	5							23.9				
17BR-06	7							19.7				
17BR-06	9							18.1				
17BR-06	14							19.9				
17BR-06	19							19.8				
17BR-06	24							12.8				
17BR-06	29							17.1				
17BR-06	34.7							13.5				
17BR-06	39	NP	NP	NP	0.075	14	SM	22.6				
17BR-06	44							19.3				
17BR-06	49							22.4				
17BR-06	54							28.4				
17BR-06	59				0.075	72		24.1				
17BR-06	64							29.3				
17BR-06	69							26.8				
17BR-06	74							26.3				
17BR-06	79							23.9				
17RR-07	1							16				
17RR-07	3							17				
17RR-07	5							30.5				
17RR-07	7							30				
17RR-07	9	57	12	45	0.075	94	CH	25.3				
17RR-07	13.4	39	14	25	0.075	76	CL	23				
17RR-07	18.4							16.4				
17RR-07	23.2							22.2				
17RR-15	1							13.1				
17RR-15	3							18.6				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER: 10052825

Assignment 4

PROJECT LOCATION: Fredericksburg, Virginia

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Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17RR-15	5							19.6				
17RR-15	7							31.3				
17RR-15	9	80	25	55	0.075	83	CH	30.7				
17RR-15	14							27.9				
17RR-BR-10	1							21.7				
17RR-BR-10	3							22.2				
17RR-BR-10	5							27.4				
17RR-BR-10	7							29.1				
17RR-BR-10	9							16.8				
17RR-BR-10	14							25.6				
17RR-BR-10	19				0.075	22		25.1				
17RR-BR-10	24							18.9				
17RR-BR-10	29							28.8				
17RR-BR-10	34							28.9				
17RR-BR-10	39							32.6				
17RR-BR-10	44	63	16	47	0.075	97	CH	24.4				
17RR-BR-10	49							18.8				
17RR-BR-10	54							18.7				
17RR-BR-10	58.4							21.1				
17RR-BR-10	63.4	37	14	23	0.075	76	CL	23.2				
17RR-BR-10	68.2							23.4				
17RR-BR-11	1							15.3				
17RR-BR-11	3							14.5				
17RR-BR-11	5							31.3				
17RR-BR-11	7	46	13	33	0.075	58	CL	35.1				
17RR-BR-11	9							22.8				
17RR-BR-11	14							30.4				
17RR-BR-11	19							24.5				
17RR-BR-11	24							57.2				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER: 10052825

Assignment 4

PROJECT LOCATION: Fredericksburg, Virginia

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Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17RR-BR-11	29							20.2				
17RR-BR-11	34							27.2				
17RR-BR-11	39							29.4				
17RR-BR-11	44							32.1				
17RR-BR-11	49	65	15	50	0.075	96	CH	26				
17RR-BR-11	54							25.3				
17RR-BR-11	59							37.8				
17RR-BR-11	64							24.4				
17RR-BR-11	69							12.6				
17RR-BR-11	73.6	32	10	22	0.075	64	CL	15				
17RR-BR-11	78.1							12.2				
17RR-BR-11	83.2							21.2				
17RR-RW-08	1							15.3				
17RR-RW-08	3							40.1				
17RR-RW-08	5							38.9				
17RR-RW-08	7	76	18	58	0.075	94	CH	28.9				
17RR-RW-08	9							28.2				
17RR-RW-08	14							24.2				
17RR-RW-08	19							29.5				
17RR-RW-08	24							25.2				
17RR-RW-08	29				0.075	73		13.5				
17RR-RW-08	33.2							14.5				
17RR-RW-08	38.1							18.7				
17RR-RW-09	1							14.7				
17RR-RW-09	3							21.5				
17RR-RW-09	5				0.075	22		22.3				
17RR-RW-09	7							24.2				
17RR-RW-09	9							20.8				
17RR-RW-09	14							26.5				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

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Assignment 4

PROJECT LOCATION: Fredericksburg, Virginia

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Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17RR-RW-09	19							27.8				
17RR-RW-09	24							25.6				
17RR-RW-09	29							26				
17RR-RW-09	34	45	12	33	0.075	81	CL	21.9				
17RR-RW-09	39							18.5				
17RR-RW-09	43.2							17.7				
17RR-RW-09	48.2							20.4				
17RR-RW-09	53.2							18.6				
17RR-RW-12	1							17				
17RR-RW-12	3							25.4				
17RR-RW-12	5							24.4				
17RR-RW-12	7							27.7				
17RR-RW-12	9							34.4				
17RR-RW-12	14				0.075	25		18				
17RR-RW-12	19							18.1				
17RR-RW-12	24							18.3				
17RR-RW-12	28.2							19.9				
17RR-RW-12	34							29.4				
17RR-RW-12	39	76	20	56	0.075	95	CH	30.7				
17RR-RW-12	44							26.2				
17RR-RW-12	49							26.4				
17RR-RW-12	54							25.7				
17RR-RW-12	59							16.4				
17RR-RW-13	1							20.5				
17RR-RW-13	3							31.8				
17RR-RW-13	5	74	22	52	0.075	69	CH	53.1				
17RR-RW-13	7							20.3				
17RR-RW-13	9							22.2				
17RR-RW-13	14							11.1				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER: 10052825

Assignment 4

PROJECT LOCATION: Fredericksburg, Virginia

5 of 5

Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17RR-RW-13	19				0.075	22		20.2				
17RR-RW-13	24							16.5				
17RR-RW-13	28.2							22.8				
17RR-RW-13	34							25.7				
17RR-RW-13	39	62	15	47	0.075	86	CH	25.3				
17RR-RW-14	1							12.3				
17RR-RW-14	3							28.4				
17RR-RW-14	5	77	25	52	0.075	72	CH	28.9				
17RR-RW-14	7							30.3				
17RR-RW-14	9							20.2				
17RR-RW-14	14							18.6				
17RR-RW-14	19				0.075	27		13.7				
17RR-RW-14	24							12.1				
17SW-08	19							26.9				
17SW-08	24							11.3				
17SW-08	29				0.075	12		17.2				
17XP-18A	14							27				
17XP-18A	18.9	52	23	29	0.075	76	CH	21.4				
17XP-18A	24							22.7				
17XP-18A	29	72	21	51	0.075	99	CH	21.5				
17XP-18A	33.3							12.2				
17XP-18A	39							12.3				
17XP-18A	44				0.075	26		19				
17XP-18A	49							20.7				
17XP-18A	54	73	16	57	0.075	87	CH	23.3				
17XP-18A	59							22				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER: 10052825

Assignment 5

PROJECT LOCATION: Fredericksburg, Virginia

1 of 2

Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17HPN-01	3							8.5				
17HPN-01	5	62	25	37	0.075	89	CH	27.4				
17HPN-01	7.5							23.3				
17HPN-01	9							26.6				
17HPN-01	11	55	24	31	0.075	95	CH	24.8				
17HPN-03	3							8.8				
17HPN-03	5							10.3				
17HPN-03	7	46	17	29	0.075	52	CL	23.9				
17HPN-03	9							20				
17HPN-03	11							23				
17HPN-04	3							11.7				
17HPN-04	5	53	15	38				27.2				
17HPN-04	7.8							8.8				
17HPN-04	8.5							11.3				
17HPN-04	9.5	68	22	46				21.2				
17HPN-04	11							13.4				
17HPN-05	3.4							13.8				
17HPN-05	5							12.5				
17HPN-05	7							17				
17HPN-05	9.5	20	12	8	0.075	54	CL	15.3				
17HPN-05	11.4							15				
17HPN-07	3							13.2				
17HPN-07	5	30	14	16	0.075	31	SC	14.9				
17HPN-07	7.8							18.5				
17HPN-07	9	59	18	41	0.075	53	CH	26				
17HPN-07	11							19.4				
17HRS-01	3							8.5				
17HRS-01	5				0.075	22		21				
17HRS-01	7							26.8				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER: 10052825

Assignment 5

PROJECT LOCATION: Fredericksburg, Virginia

2 of 2

Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17HRS-01	9.3	52	24	28	0.075	44	SC	28.8				
17HRS-01	11.3							24.7				
17HRS-03	2.9				0.075	16		11.8				
17HRS-03	5							9.2				
17HRS-03	7							12.8				
17HRS-03	9							15.5				
17HRS-03	11							15.8				
17HRS-06	3				0.075	16		10.4				
17HRS-06	5							23.9				
17HRS-06	7							19				
17HRS-06	9	62	21	41				22.5				
17HRS-06	11							19.6				
17HRS-12	3				0.075	30		18.5				
17HRS-12	5							11.2				
17HRS-12	7	40	15	25	0.075	48	SC	21.1				
17HRS-12	9							15.3				
17HRS-12	11							15.3				
17HRS-14	3				0.075	24		13.6				
17HRS-14	4.4							12.1				
17HRS-14	6							13.2				
17HRS-16	3							15.1				
17HRS-16	5							15.5				
17HRS-16	7							19.5				
17HRS-16	9				0.075	23		9.8				
17HRS-16	11							13.4				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER: 10052825

Assignment 5A

PROJECT LOCATION: Fredericksburg, Virginia

1 of 3

Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17HRS-05	1							14.4				
17HRS-05	3				0.075	20		18				
17HRS-05	5							16.7				
17HRS-05	7							20.3				
17HRS-05	9							20.1				
17HRS-05	14							30.3				
17HRS-05	19							30.9				
17HRS-05	24	64	22	42				32.2				
17HRS-05	29							35.2				
17HRS-05	34							21.2				
17HRS-05	39							25.2				
17HRS-BR-08	1.5							13.3				
17HRS-BR-08	3				0.075	43		20.2				
17HRS-BR-08	5							26				
17HRS-BR-08	7.8							27				
17HRS-BR-08	9							24.5				
17HRS-BR-08	14	41	20	21	0.075	39	SC	20.9				
17HRS-BR-08	19							39.6				
17HRS-BR-08	23.9							27.4				
17HRS-BR-08	29							23.8				
17HRS-BR-08	34				0.075	21		24.3				
17HRS-BR-08	39							19.9				
17HRS-BR-08	44							21.2				
17HRS-BR-08	49							18.5				
17HRS-BR-08	53.2							23.3				
17HRS-BR-09	1							35.9				
17HRS-BR-09	3							30.3				
17HRS-BR-09	5							29.3				
17HRS-BR-09	7							26.8				

PROJECT NAME: 95 Express Lanes Fredericksburg Extension

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER: 10052825

Assignment 5A

PROJECT LOCATION: Fredericksburg, Virginia

2 of 3

Borehole	Depth	Liquid Limit	Plastic Limit	PI	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17HRS-BR-09	9							24.5				
17HRS-BR-09	14	33	15	18	0.075	53	CL	15.5				
17HRS-BR-09	19							26.5				
17HRS-BR-09	24				0.075	25		24.7				
17HRS-BR-09	29							23.1				
17HRS-BR-09	34				0.075	28		23.4				
17HRS-BR-09	39							18.9				
17HRS-BR-09	44							21.8				
17HRS-BR-09	49							19.7				
17HRS-BR-09	54							22.5				
17HRS-BR-09	58.5	27	11	16	0.075	36	SC	24				
17HRS-RW-07	1							28.6				
17HRS-RW-07	3							24.5				
17HRS-RW-07	5							18				
17HRS-RW-07	7	48	22	26	0.075	83	CL	22.5				
17HRS-RW-07	9							20.9				
17HRS-RW-07	14							20.9				
17HRS-RW-07	19	63	27	36				27.9				
17HRS-RW-07	24							17.5				
17HRS-RW-07	29							27.7				
17HRS-RW-07	34							21				
17HRS-RW-07	39							21.6				
17HRS-RW-07	44				0.075	20		20.8				
17HRS-RW-07	49							23.6				
17HRS-RW-07	53.8							21.1				
17HRS-RW-10	1							36.2				
17HRS-RW-10	3							31.2				
17HRS-RW-10	5							31.1				
17HRS-RW-10	7							34.9				

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17XP-29	0.0-13.0	25	14	11	100	76	CL	27.0	99.4	21.8	4.1	2.4
17XP-31	0.0-13.0	42	21	21	99	29	SC	17.7	110.3	16.3	5.3	0.3
17XP-46	0.0-25.0	35	22	13	100	36	SC	22.6	114.3	13.8	6.1	0.6
17XP-61	0.0-14.3	34	23	11	93	47	SC	15.4	103.3	17.8	8.6	0.6
17XP-64	0.0-15.0	38	20	18	98	38	SC	12.2	116.3	13.8	10.7	0.2
17XP-68	4.0-8.0	24	13	11	100	50	SC	9.6	119.3	11.5	8.9	0.1

TLB LAB SUMMARY PROC CBR LAB.GPJ PROJECT.GDT 5/8/17



Summary of Laboratory Results (Bulk)
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 17-0013 (HDR Project# 10052825)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)
17BR-09	1.0-2.0							25.7
17BR-09	2.0-4.0							18.3
17BR-09	4.0-6.0				73	15		18.1
17BR-09	6.0-8.0							16.6
17BR-09	8.0-10.0							22.8
17BR-09	13.0-15.0							27.7
17BR-09	18.0-20.0	65	25	40		61	CH	25.2
17BR-09	23.0-25.0							27.5
17BR-09	28.0-30.0							24.2
17BR-09	33.0-35.0							24.0
17BR-09	38.0-40.0							21.0
17BR-09	43.0-45.0	43	22	21		28	SC	25.2
17BR-09	48.0-50.0							29.0
17CL-13	0.0-2.0							15.7
17CL-13	2.0-4.0	38	16	22		34	SC	22.1
17CL-13	4.0-6.0							22.3
17CL-13	6.0-8.0							22.1
17CL-13	8.0-10.0							21.2
17CL-13	13.0-15.0				100	60		15.1
17CL-13	18.0-20.0							22.0
17CL-14	0.0-2.0							27.7
17CL-14	2.0-3.0							23.7
17CL-14	3.0-4.0							18.6
17CL-14	4.0-6.0							20.2
17CL-14	6.0-8.0							22.1
17CL-14	8.0-10.0							23.5
17CL-14	13.0-15.0				90	33		12.3

TLB LAB SUMMARY-BASIC LAB GRU PROJECT GDT 5/6/17



Summary of Laboratory Results (Jar)
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 13-0013 (HDR Project# 170419)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)
17CL-14	18.0-20.0							12.5
17RW-04	0.0-2.0							24.6
17RW-04	2.0-4.0							27.9
17RW-04	4.0-6.0							24.6
17RW-04	6.0-8.0							14.6
17RW-04	8.0-10.0				85	8		13.0
17RW-04	13.0-15.0							16.1
17RW-06	0.0-2.0							17.0
17RW-06	2.0-4.0							17.9
17RW-06	4.0-6.0							24.4
17RW-06	6.0-8.0							13.6
17RW-06	8.0-10.0							12.8
17RW-06	13.0-15.0				100	18		8.7
17RW-06	18.0-20.0							20.5
17RW-06	23.0-25.0							25.1
17RW-06	28.0-30.0	28	23	5	100	26	SM	27.3
17RW-06	33.0-35.0							20.7
17RW-06	38.0-40.0							26.2
17RW-06	43.0-45.5							27.7
17RW-06	48.0-48.4							26.7
17RW-07	0.0-2.0							14.5
17RW-07	2.0-4.0							14.3
17RW-07	4.0-6.0							30.1
17RW-07	6.0-8.0							27.6
17RW-07	8.0-10.0							26.9
17RW-07	13.0-14.0							34.5
17RW-07	18.0-20.0				96	8		27.7

TLB LAB SUMMARY-BASIC LAB GRU PROJECT GDT 5/6/17



Summary of Laboratory Results (Jar)
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 13-0013 (HDR Project# 170419)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)
17RW-07	23.0-24.5							24.5
17RW-07	24.0-25.0							24.6
17RW-07	28.0-30.0	68	28	40		61	CH	31.4
17RW-08	0.0-2.0							19.4
17RW-08	2.0-4.0							28.1
17RW-08	4.0-6.0							26.4
17RW-08	6.0-8.0							22.2
17RW-08	8.0-10.0				72	20		21.9
17RW-08	13.0-15.0							18.3
17RW-08	18.0-20.0							24.9
17RW-08	23.0-25.0							25.6
17RW-08	28.0-30.0							23.9
17RW-08	33.0-35.0	45	21	24		25	SC	27.3
17RW-08	38.0-40.0							27.2
17RW-08	43.0-45.0							29.5
17RW-08	48.0-50.0							29.9
17SWM-11	0.0-2.0							20.1
17SWM-11	2.0-4.0							11.1
17SWM-11	4.0-6.0							18.9
17SWM-11	6.0-8.0							18.6
17SWM-11	8.0-10.0							12.0
17SWM-11	13.0-15.0							25.6
17SWM-11	18.0-20.0							27.5
17SWM-11	23.0-25.0	86	32	54		100	CH	31.9
17XP-21	0.0-2.0							16.9
17XP-21	2.0-4.0							15.8
17XP-21	4.0-6.0				98	29		18.2

TLB LAB SUMMARY-BASIC LAB GRU PROJECT GDT 08/17



Summary of Laboratory Results (Jar)
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 13-0013 (HDR Project# 170419)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)
17XP-21	6.0-8.0							22.1
17XP-21	8.0-10.0							24.3
17XP-21	13.0-15.0							16.6
17XP-21	18.0-20.0							20.2
17XP-21	23.0-25.0							34.5
17XP-24	0.0-2.0							20.1
17XP-24	2.0-4.0							18.9
17XP-24	4.0-6.0							28.8
17XP-24	6.0-8.0							24.3
17XP-24	8.0-10.0	70	39	31		99	MH	26.9
17XP-24	13.0-15.0							27.7
17XP-24	18.0-20.0							30.9
17XP-24	23.0-25.0							30.5
17XP-24	28.0-30.0	49	34	15		96	ML	26.0
17XP-24	33.0-35.0	53	33	20		99	MH	19.4
17XP-24	38.0-40.0							23.4
17XP-26	0.0-2.0							14.4
17XP-26	2.0-4.0							8.6
17XP-26	4.0-6.0							10.7
17XP-26	6.0-7.7							12.0
17XP-28	0.0-2.0							17.9
17XP-28	2.0-4.0							26.7
17XP-28	4.0-6.0							24.1
17XP-28	6.0-8.0							17.6
17XP-28	8.0-10.0							12.6
17XP-28	13.0-15.0							12.8
17XP-28	18.0-20.0							36.0

TLB LAB SUMMARY-BASIC LAB GRU PROJECT GDT 5/6/17



Summary of Laboratory Results (Jar)
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 13-0013 (HDR Project# 170419)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)
17XP-28	23.0-25.0	51	37	14		93	MH	30.4
17XP-28	28.0-23.0							26.0
17XP-29	0.0-2.0							30.2
17XP-29	2.0-4.0							32.4
17XP-29	4.0-6.0							27.0
17XP-29	6.0-8.0							26.2
17XP-29	8.0-10.0							24.0
17XP-29	13.0-15.0							28.6
17XP-29	18.0-20.0							22.6
17XP-29	23.0-25.0	50	20	30		32	SC	27.9
17XP-30	0.0-2.0							20.2
17XP-30	2.0-4.0							25.4
17XP-30	4.0-6.0							29.2
17XP-30	6.0-8.0							21.0
17XP-30	8.0-10.0							24.1
17XP-30	13.0-15.0	75	32	43		100	CH	25.9
17XP-30	18.0-20.0							23.1
17XP-30	23.0-25.0							22.4
17XP-31	0.0-2.0							22.6
17XP-31	2.0-4.0							53.9
17XP-31	4.0-6.0							11.6
17XP-31	6.0-8.0				100	17		12.5
17XP-31	8.0-10.0							16.0
17XP-31	13.0-15.0							21.3
17XP-43	0.0-2.0							23.0
17XP-43	2.0-4.0							22.1
17XP-43	4.0-6.0							21.2

TLB LAB SUMMARY-BASIC LAB GRU PROJECT GDT 5/6/17



Summary of Laboratory Results (Jar)
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 13-0013 (HDR Project# 170419)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)
17XP-43	6.0-8.0							17.5
17XP-43	8.0-10.0							15.0
17XP-43	13.0-15.0							13.8
17XP-43	18.0-20.0							31.9
17XP-43	23.0-25.0							23.9
17XP-43	28.0-30.0	50	34	16		66	MH	27.0
17XP-43	33.0-35.0							29.6
17XP-43	38.0-40.0	38	31	7	100	42	SM	25.4
17XP-43	43.0-45.0							17.2
17XP-45	0.0-2.0							21.8
17XP-45	2.0-4.0							21.7
17XP-45	4.0-6.0							24.2
17XP-45	6.0-8.0				99	23		14.5
17XP-45	8.0-10.0							22.2
17XP-45	13.0-15.0							22.0
17XP-45	18.0-20.0							31.4
17XP-45	23.0-25.0							27.6
17XP-45	28.0-30.0							30.2
17XP-45	33.0-35.0							13.3
17XP-45	38.0-40.0							12.7
17XP-45	43.0-45.0				100	22		14.9
17XP-45	48.0-50.0							16.9
17XP-46	0.0-2.0							20.0
17XP-46	2.0-4.0	41	25	16		48	SC	18.4
17XP-46	4.0-6.0							17.4
17XP-46	6.0-8.0							16.4
17XP-46	8.0-10.0							13.2

TLB LAB SUMMARY-BASIC LAB GRU PROJECT GDT 5/6/17



Summary of Laboratory Results (Jar)
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 13-0013 (HDR Project# 170419)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)
17XP-46	13.0-15.0							19.2
17XP-46	18.0-20.0							21.7
17XP-46	23.0-25.0				100	32		25.0
17XP-46	28.0-30.0							25.2
17XP-47	0.0-2.0							22.9
17XP-47	2.0-4.0							27.9
17XP-47	4.0-6.0							18.6
17XP-47	6.0-8.0	40	23	17		45	SC	21.4
17XP-47	8.0-10.0							21.2
17XP-47	13.0-15.0				100	21		15.5
17XP-47	18.0-20.0							23.7
17XP-47	23.0-25.0							20.6
17XP-47	28.0-30.0							23.3
17XP-47	33.0-35.0							21.3
17XP-47	38.0-40.0	68	26	42		77	CH	23.9
17XP-47	43.0-45.0							28.6
17XP-48	0.0-2.0							14.6
17XP-48	2.0-4.0							23.6
17XP-48	4.0-6.0	42	27	15		37	SM	20.4
17XP-48	6.0-8.0							19.2
17XP-48	8.0-9.6							20.0
17XP-48	13.0-13.3							14.4
17XP-48	18.0-20.0				99	20		18.5
17XP-48	23.0-25.0							27.8
17XP-48	28.0-30.0							21.1
17XP-60	0.0-2.0							18.8
17XP-60	2.0-4.0							12.4

TLB LAB SUMMARY BASIC LAB GRU PROJECT GDT 5/6/17



Summary of Laboratory Results (Jar)
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 13-0013 (HDR Project# 170419)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)
17XP-60	4.0-6.0							5.8
17XP-60	6.0-8.0							7.5
17XP-60	8.0-10.0							7.4
17XP-60	13.0-15.0							5.8
17XP-60	18.0-20.0				95	21		8.5
17XP-60	23.0-25.0							15.4
17XP-60	28.0-30.0							12.7
17XP-61	0.0-2.0							6.8
17XP-61	2.0-4.0							5.2
17XP-61	4.0-6.0							2.3
17XP-61	6.0-6.7							13.3
17XP-61	8.0-8.9							15.9
17XP-61	13.0-14.3	49	31	18		25	SM	24.6
17XP-62	0.0-2.0							7.5
17XP-62	2.0-4.0							7.3
17XP-62	4.0-6.0							24.7
17XP-62	6.0-8.0							19.6
17XP-62	8.0-10.0	26	26	NP		45	SM	10.9
17XP-62	13.0-15.0							26.3
17XP-64	0.0-2.0							11.6
17XP-64	2.0-4.0				100	63		18.2
17XP-64	4.0-6.0							21.4
17XP-64	6.0-8.0							19.3
17XP-64	8.0-10.0							16.1
17XP-64	13.0-15.0							14.0
17XP-65	0.0-2.0							16.4
17XP-65	2.0-4.0							16.6

TLB LAB SUMMARY-BASIC LAB GRU PROJECT GDT 5/6/17



Summary of Laboratory Results (Jar)
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 13-0013 (HDR Project# 170419)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)
17XP-65	4.0-6.0							14.3
17XP-65	6.0-8.0							11.8
17XP-65	8.0-10.0							15.2
17XP-65	13.0-15.0				100	34		28.9
17XP-68	0.0-2.0							13.8
17XP-68	2.0-4.0	28	18	10		56	CL	14.9
17XP-68	4.0-6.0							11.1
17XP-68	6.0-8.0							11.2
17XP-68	8.0-10.0							14.8
17XP-69	0.0-2.0							10.7
17XP-69	2.0-4.0							10.9
17XP-69	4.0-6.0							15.8
17XP-69	6.0-8.0							7.8
17XP-69	8.0-10.0							15.2
17XP-69	13.0-15.0	74	33	41		86	CH	32.5
17XP-70	0.0-2.0							15.2
17XP-70	2.0-4.0							18.0
17XP-70	4.0-6.0							21.8
17XP-70	6.0-8.0							16.4
17XP-70	8.0-10.0							16.8
17XP-70	13.0-15.0	45	25	20	100	40	SC	25.5
17XP-70	18.0-20.0							16.2
17XP-70	23.0-25.0	33	23	10	99	25	SC	24.5
17XP-71	0.0-2.0							27.0
17XP-71	2.0-4.0							27.6
17XP-71	4.0-6.0							27.3
17XP-71	6.0-8.0	71	28	43		100	CH	25.8

TLB LAB SUMMARY-BASIC LAB GRU PROJECT GDT 5/6/17



Summary of Laboratory Results (Jar)
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 13-0013 (HDR Project# 170419)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)
17XP-71	8.0-10.0							24.1
17XP-72	0.0-2.0							17.9
17XP-72	2.0-4.0							23.0
17XP-72	4.0-6.0							19.8
17XP-72	6.0-8.0							30.9
17XP-72	8.0-10.0							26.2
17XP-72	13.0-15.0	50	18	32		90	CH	18.2
17XP-72	18.0-20.0							24.7
17XP-72	23.0-25.0							23.5
17XP-72	28.0-30.0	40	20	20		40	SC	20.0

TB LAB SUMMARY BASIC LAB GRU PROJECT GDT 5/6/17



Summary of Laboratory Results (Jar)
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 13-0013 (HDR Project# 170419)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Optimum Water Content (%)	Soaked CBR @ 0.1 in (%)	Swelling (%)
17SWM-13	0.0-15.0	38	22	16	97	27	SC	21.6	112.5	13.6	26.2	0.2
17WGS-03	0.0-13.0	45	20	25	100	65	CL	20.5	111.0	14.5	3.6	3.4
17XP-23	0.0-10.0	30	25	5	100	32	SM	8.9	107.7	16.0	8.5	0.0

TLB LAB SUMMARY PROC CBR LAB ASSIGNMENT-2.GPJ PROJECT GDT 9/19/17



Summary of Laboratory Results-2 (Bulk)
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 17-0013 (HDR Project# 10052825)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)
17BR-10	0.0-2.0							29.4
17BR-10	2.0-4.0							22.9
17BR-10	4.0-6.0							6.3
17BR-10	6.0-8.0				99	11		6.3
17BR-10	8.0-8.8							26.5
17BR-10	13.0-15.0							30.2
17BR-10	18.0-20.0	71	27	44		93	CH	34.8
17BR-10	23.0-25.0							28.9
17BR-10	28.0-30.0							32.2
17BR-10	33.0-35.0							34.3
17BR-10	38.0-40.0	49	26	23		74	CL	27.4
17BR-10	43.0-45.0							19.4
17BR-10	48.0-50.0	62	35	27		92	MH	28.7
17BR-10	53.0-55.0							25.3
17BR-10	58.0-60.0							21.0
17BR-10	63.0-65.0							21.8
17BR-10	68.0-70.0	66	31	35		99	CH	28.0
17BR-10	73.0-75.0							30.4
17BR-11	0.0-2.0							26.4
17BR-11	2.0-4.0							25.0
17BR-11	4.0-6.0							20.3
17BR-11	6.0-8.0							13.5
17BR-11	8.0-10.0	40	21	19	80	10	SW-SC	16.3
17BR-11	13.0-15.0							26.7
17BR-11	18.0-20.0							21.2
17BR-11	23.0-24.0							17.8
17BR-11	28.0-30.0							22.0

TB LAB SUMMARY-BASIC LAB ASSIGNMENT2.GPJ PROJECT.GDT 5/26/17



Summary of Laboratory Results-2 (Jars)
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 13-0013 (HDR Project# 170419)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)
17BR-11	33.0-35.0							16.3
17BR-11	38.0-40.0							24.3
17BR-11	43.0-45.0	78	28	50		60	CH	24.3
17BR-11	48.0-50.0							31.9
17BR-11	53.0-53.9							19.2
17BR-11	58.0-60.0				100	22		26.3
17BR-11	63.0-63.9							23.7
17BR-11	68.0-68.2							14.0
17BR-11	71.0-71.1							13.2
17CD-03	0.0-2.0							7.6
17CD-03	2.0-4.0							7.7
17CD-03	4.0-6.0							22.5
17CD-03	6.0-8.0							36.3
17CD-03	8.0-10.0							23.3
17CD-03	13.0-15.0							24.7
17CD-03	18.0-20.0	49	19	30		83	CL	20.1
17CD-03	23.0-25.0							20.3
17CD-03	28.0-30.0							21.1
17CL-01	0.0-2.0							28.9
17CL-01	2.0-4.0							30.3
17CL-01	4.0-6.0							10.5
17CL-01	6.0-8.0				93	51		22.8
17CL-01	8.0-10.0							16.8
17CL-01	13.0-15.0							28.2
17CL-01	18.0-20.0							23.2
17CL-01	23.0-25.0							24.0
17CL-01	28.0-30.0							24.9

TB LAB SUMMARY-BASIC LAB ASSIGNMENT2.GPJ PROJECT.GDT 5/25/17



Summary of Laboratory Results-2 (Jars)
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 13-0013 (HDR Project# 170419)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)
17CL-01	33.0-35.0							30.0
17CL-01	38.0-39.8	51	37	14		88	MH	21.8
17CL-01	43.0-44.4							21.9
17CL-01	48.0-50.0							24.0
17CL-01	53.0-55.0							24.3
17SBGP-03	0.0-2.0							15.1
17SBGP-03	2.0-4.0							9.4
17SBGP-03	4.0-6.0							23.1
17SBGP-03	6.0-8.0							21.3
17SBGP-03	8.0-10.0				99	24		14.5
17SBGP-03	13.0-15.0							18.3
17SBGP-04	0.0-2.0							7.0
17SBGP-04	2.0-4.0							6.0
17SBGP-04	4.0-6.0							7.2
17SBGP-04	6.0-8.0							5.5
17SBGP-04	8.0-10.0				87	10		8.4
17SBGP-04	13.0-15.0							7.1
17SBGP-04	18.0-20.0							17.4
17SBGP-04	23.0-25.0							22.8
17SBGP-04	28.0-30.0							27.9
17SBGP-04	33.0-35.0				100	38		31.0
17SBGP-04	38.0-40.0							32.7
17SW-01	0.0-2.0							11.9
17SW-01	2.0-4.0							15.0
17SW-01	4.0-6.0							10.0
17SW-01	6.0-8.0							8.6
17SW-01	8.0-10.0							19.3

TLB LAB SUMMARY-BASIC LAB ASSIGNMENT2.GPJ PROJECT.GDT 5/25/17



Summary of Laboratory Results-2 (Jars)
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 13-0013 (HDR Project# 170419)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)
17SW-01	13.0-15.0	60	27	33		60	CH	17.7
17SW-01	18.0-20.0							38.3
17SW-01	23.0-25.0							23.8
17SW-01	28.0-29.3							16.9
17SWM-02	0.0-2.0							10.0
17SWM-02	2.0-4.0							14.6
17SWM-02	4.0-6.0							18.0
17SWM-02	6.0-8.0							23.6
17SWM-02	8.0-10.0							23.0
17SWM-02	13.0-15.0							19.3
17SWM-02	18.0-20.0	37	22	15	100	21	SC	24.4
17SWM-02	23.0-24.5							29.0
17SWM-03	0.0-2.0							20.8
17SWM-03	2.0-4.0							20.9
17SWM-03	4.0-6.0							22.6
17SWM-03	6.0-8.0							24.4
17SWM-03	8.0-10.0							21.4
17SWM-03	13.0-15.0	76	31	45		96	CH	27.6
17SWM-03	18.0-20.0							27.9
17SWM-03	23.0-25.5							22.9
17SWM-08	0.0-2.0							14.9
17SWM-08	2.0-4.0							21.0
17SWM-08	4.0-6.0							27.1
17SWM-08	6.0-6.9							16.3
17SWM-08	8.0-9.5							14.9
17SWM-08	13.0-15.0							12.1
17SWM-08	18.0-20.0				100	26		16.2

TB LAB SUMMARY-BASIC LAB ASSIGNMENT2.GPJ PROJECT.GDT 5/25/17



Summary of Laboratory Results-2 (Jars)
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 13-0013 (HDR Project# 170419)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)
17SWM-08	23.0-24.8							17.0
17SWM-09	0.0-2.0							17.9
17SWM-09	2.0-4.0							21.0
17SWM-09	4.0-6.0							22.5
17SWM-09	6.0-8.0							22.9
17SWM-09	8.0-10.0							22.4
17SWM-09	13.0-14.8				100	28		19.8
17SWM-09	18.0-20.0							25.1
17SWM-09	23.0-25.0							24.4
17SWM-12	0.0-2.0							32.2
17SWM-12	2.0-4.0							21.8
17SWM-12	4.0-6.0							20.8
17SWM-12	6.0-8.0							26.8
17SWM-12	8.0-10.0	61	30	31		57	CH	22.1
17SWM-12	13.0-15.0							18.8
17SWM-12	18.0-20.0							21.0
17SWM-12	23.0-25.0							25.7
17SWM-13	0.0-2.0							19.7
17SWM-13	2.0-4.0							22.1
17SWM-13	4.0-6.0							23.4
17SWM-13	6.0-8.0							19.5
17SWM-13	8.0-10.0							23.6
17SWM-13	13.0-15.0							21.0
17SWM-13	18.0-20.0	32	21	11	100	18	SC	26.6
17SWM-13	23.0-25.0							24.8
17SWM-20	0.0-2.0							13.6
17SWM-20	2.0-4.0							25.3

TLB LAB SUMMARY-BASIC LAB ASSIGNMENT2.GPJ PROJECT.GDT 5/25/17



Summary of Laboratory Results-2 (Jars)
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 13-0013 (HDR Project# 170419)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)
17SWM-20	4.0-6.0							15.8
17SWM-20	6.0-8.0							9.6
17SWM-20	8.0-10.0				86	22		12.2
17SWM-20	13.0-15.0							12.6
17SWM-20	18.0-20.0							19.4
17SWM-20	23.0-25.0							24.0
17SWM-21	0.0-2.0							19.5
17SWM-21	2.0-4.0							18.8
17SWM-21	4.0-6.0							20.7
17SWM-21	6.0-8.0							21.6
17SWM-21	8.0-10.0				88	15		17.0
17SWM-21	13.0-15.0							22.0
17SWM-21	18.0-20.0							22.0
17SWM-21	23.0-25.0							28.5
17WGS-02	0.0-2.0							18.1
17WGS-02	2.0-4.0							29.8
17WGS-02	4.0-6.0	43	22	21		57	CL	24.9
17WGS-02	6.0-8.0							20.7
17WGS-02	8.0-10.0							26.5
17WGS-03	0.0-2.0							15.6
17WGS-03	2.0-4.0							12.6
17WGS-03	4.0-6.0							10.2
17WGS-03	6.0-8.0							31.2
17WGS-03	8.0-10.0	50	33	17		76	MH	22.5
17WGS-03	13.0-15.0	52	23	29		76	CH	27.3
17WGS-04	0.0-2.0							15.6
17WGS-04	2.0-4.0				89	23		13.2

TB LAB SUMMARY-BASIC LAB ASSIGNMENT2.GPJ PROJECT.GDT 5/25/17



Summary of Laboratory Results-2 (Jars)
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 13-0013 (HDR Project# 170419)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)
17WGS-04	4.0-6.0							13.7
17WGS-04	6.0-8.0	42	23	19		52	CL	27.1
17WGS-04	8.0-10.0							25.3
17XP-22	0.0-2.0							25.8
17XP-22	2.0-4.0							27.2
17XP-22	4.0-6.0							23.1
17XP-22	6.0-8.0							33.3
17XP-22	8.0-10.0	49	22	27	100	72	CL	21.0
17XP-22	13.0-15.0							28.9
17XP-22	18.0-20.0							25.4
17XP-22	23.0-25.0							25.2
17XP-22	28.0-30.0							24.4
17XP-22	33.0-35.0							19.0
17XP-22	38.0-38.8							21.7
17XP-23	0.0-2.0							26.5
17XP-23	2.0-4.0							22.5
17XP-23	4.0-6.0							15.3
17XP-23	6.0-8.0							7.2
17XP-23	8.0-10.0							6.1
17XP-23	13.0-15.0							6.2
17XP-23	18.0-20.0				100	44		19.4
17XP-23	23.0-25.0							19.6
17XP-23	28.0-30.0							20.9
17XP-23	33.0-35.0							17.3
17XP-23	38.0-40.0	52	41	11		97	MH	33.8
17XP-23	43.0-45.0							31.9
17XP-23	48.0-50.0							35.9

TB LAB SUMMARY-BASIC LAB ASSIGNMENT2.GPJ PROJECT.GDT 5/25/17



Summary of Laboratory Results-2 (Jars)
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 13-0013 (HDR Project# 170419)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)
17XP-23	53.0-55.0							30.6
17XP-23	58.0-60.0	47	33	14	100	95	ML	27.9
17XP-23	63.0-65.0							26.4
17XP-23	68.0-70.0	54	36	18		99	MH	28.5
17XP-44	0.0-2.0							23.3
17XP-44	2.0-4.0							23.3
17XP-44	4.0-6.0							20.5
17XP-44	6.0-8.0							14.0
17XP-44	8.0-10.0				100	37		14.4
17XP-44	13.0-15.0							15.9
17XP-44	18.0-20.0							15.2
17XP-44	23.0-25.0							11.6
17XP-44	28.0-30.0							28.0
17XP-44	33.0-35.0							29.6
17XP-44	38.0-40.0							29.1
17XP-44	43.0-45.0				100	80		29.8
17XP-44	48.0-50.0							22.4
17XP-44	53.0-54.7							16.5

TB LAB SUMMARY-BASIC LAB ASSIGNMENT2.GPJ PROJECT.GDT 5/25/17



Summary of Laboratory Results-2 (Jars)
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 13-0013 (HDR Project# 170419)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)
17XP-37	2.0-4.0							10.1
17XP-37	4.0-6.0							9.4
17XP-37	6.0-8.0							17.5
17XP-37	8.0-10.0	68	29	39		74	CH	28.3
17XP-37	10.0-12.0							24.4
17XP-37	13.0-15.0							21.3
17XP-38	2.0-4.0							19.0
17XP-38	4.0-6.0	25	17	8		36	SC	10.7
17XP-38	6.0-8.0							9.6
17XP-38	8.0-10.0							12.0
17XP-38	10.0-12.0							23.2
17XP-38	13.0-15.0	46	25	21		47	SC	22.1
17XP-39	2.3-3.3							16.2
17XP-39	3.3-4.3							8.6
17XP-39	4.3-6.3							21.3
17XP-39	6.3-8.3					36		21.0
17XP-39	8.3-10.3							23.2
17XP-39	10.3-12.3							23.6
17XP-40	2.0-4.0							10.6
17XP-40	4.0-6.0							14.4
17XP-40	6.0-8.0							14.6
17XP-40	8.0-10.0							11.0
17XP-40	10.0-12.0							19.2
17XP-40	13.0-15.0	53	25	28		67	CH	29.9

TLB LAB SUMMARY - BASIC LAB ASSIGNMENT-3.GPJ PROJECT.GDT 05/17



Summary of Laboratory Results
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 17-0013 (HDR Project# 10052528)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	Water Content (%)
17XP-63	0.0-2.0							11.4
17XP-63	2.0-4.0							19.2
17XP-63	4.0-6.0							21.0
17XP-63	6.0-8.0					55		18.4
17XP-63	8.0-10.0							19.1
17XP-63	13.0-15.0	31	25	6		47	SM	11.7

TLB LAB SUMMARY-BASIC LAB ASSIGNMENT-4.GPJ PROJECT.GDT 6/16/17



Summary of Laboratory Results
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 17-0013 (HDR Project# 10052528)

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #: HDR. 10052825 Task: 017 Test Date (s): 4/21 - 5/27/17 Report Date: 6/7/2017

Project Name: Transurban - Fredex - 95XPL

Client Name: HDR, Inc. Client Address: 4480 Cox Suite 103, Glen Allen, VA 23060

Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing											Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8		
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200		#200	LL	PL		PI	MDD (pcf)	Opt (%)	CBR at 0.1"	CBR at 0.2"
17CL-06	SS-1	0-2																		26.3				
17CL-06	SS-2	2-4																		23.4				
17CL-06	SS-3	4-6																		23.1				
17CL-06	SS-4	6-8																		25.0				
17CL-06	SS-5	8-10	CH												99.2	76	27	49	20.8					
17CL-06	SS-6	13-15																		20.1				
17CL-06	SS-7	18-20																		15.1				
17CL-06	SS-8	23-25																		11.5				
17CL-06	SS-9	28-30																		13.8				
17CL-06	SS-10	33-35																		13.0				
17CL-06	SS-11	38-40																		12.9				
17CL-06	SS-12	43-45		100.0	100.0	100.0	100.0	100.0	100.0	98.8	74.8	40.6	28.2	22.7	22.5					19.4				
17CL-06	SS-13	48-50																		23.2				
17CL-07	SS-1	0-2																		37.5				
17CL-07	SS-2	2-4																		30.9				
17CL-07	SS-3	4-6																		22.0				
17CL-07	SS-4	6-8	CH	100.0	100.0	100.0	100.0	100.0	100.0	99.8	95.9	84.9	69.0	55.4	55.1	52	27	25	23.7					
17CL-07	SS-5	8-10																		25.8				
17CL-07	SS-6	13-15																		26.4				
17CL-07	SS-7	18-20																		27.5				
17CL-07	SS-8	23-25																		22.8				
17CL-07	SS-9	28-30																		21.1				

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #: HDR. 10052825 Task: 017 Test Date (s): 4/21 - 5/27/17 Report Date: 6/7/2017

Project Name: Transurban - Fredex - 95XPL

Client Name: HDR, Inc. Client Address: 4480 Cox Suite 103, Glen Allen, VA 23060

Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing											Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8		
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200		#200	LL	PL		PI	MDD (pcf)	Opt (%)	CBR at 0.1"	CBR at 0.2"
17CL-07	SS-10	33-35																		16.9				
17CL-09	SS-1	0-2																		15.0				
17CL-09	SS-2	2-4																		20.6				
17CL-09	SS-3	4-6																		24.5				
17CL-09	SS-4	6-8																		16.6				
17CL-09	SS-5	8-10																		16.0				
17CL-09	SS-6	13-15	CL												52.3	31	17	14	20.1					
17CL-10	SS-1	0-2																		14.8				
17CL-10	SS-2	2-4																		8.5				
17CL-10	SS-3	4-6																		14.9				
17CL-10	SS-4	6-8	SM												49.3	37	25	12	25.7					
17CL-10	SS-5	8-10																		22.0				
17CL-10	SS-6	13-15																		27.3				
17CL-10	SS-7	18-20																		17.6				
17CL-10	SS-8	23-25	SC	100.0	100.0	100.0	100.0	99.6	99.0	97.6	84.7	61.6	48.2	41.8	41.4	37	23	14	17.0					
17CL-10	SS-9	28-30																		10.5				
17SWM-14	SS-1	0-2																		17.3				
17SWM-14	SS-2	2-4																		16.8				
17SWM-14	SS-3	4-6																		15.6				
17SWM-14	SS-4	6-8																		12.1				
17SWM-14	SS-5	8-10		100.0	100.0	100.0	98.7	95.6	89.9	60.6	25.2	21.4	19.3	17.7	17.0				17.8					
17SWM-14	SS-6	13-15																		19.7				

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #: HDR. 10052825 Task: 017 Test Date (s): 4/21 - 5/27/17 Report Date: 6/7/2017

Project Name: Transurban - Fredex - 95XPL

Client Name: HDR, Inc. Client Address: 4480 Cox Suite 103, Glen Allen, VA 23060

Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing											Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8		
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200		#200	LL	PL		PI	MDD (pcf)	Opt (%)	CBR at 0.1"	CBR at 0.2"
17SWM-14	SS-7	18-20																		27.2				
17SWM-14	SS-8	23-25																		23.8				
17XP-24A	SS-1	0-2																		14.0				
17XP-24A	SS-2	2-4																		27.8				
17XP-24A	SS-3	4-6																		17.9				
17XP-24A	SS-4	6-8																		7.6				
17XP-24A	SS-5	8-10																		2.2				
17XP-24A	SS-6	13-15																		22.1				
17XP-24A	SS-7	18-20																		22.7				
17XP-24A	SS-8	23-25		100.0	100.0	100.0	100.0	100.0	99.7	98.2	96.1	86.7	62.9	46.0	45.7					23.0				
17XP-24A	SS-9	28-30																		25.0				
17XP-25	SS-1	0-2																		37.6				
17XP-25	SS-2	2-4																		35.0				
17XP-25	SS-3	4-6																		32.6				
17XP-25	SS-4	6-8	CH												96.8	60	27	33	28.0					
17XP-25	SS-5	8-10																		26.4				
17XP-25	SS-6	13-15																		25.9				
17XP-27	SS-1	0-2																		41.8				
17XP-27	SS-2	2-4																		38.5				
17XP-27	SS-3	4-6																		31.8				
17XP-27	SS-4	6-8																		29.3				
17XP-27	SS-5	8-10																		29.8				

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

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Project Name: Transurban - Fredex - 95XPL

Client Name: HDR, Inc. Client Address: 4480 Cox Suite 103, Glen Allen, VA 23060

Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing											Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8	
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200		#200	LL	PL		PI	MDD (pcf)	Opt (%)	CBR at 0.1"
17XP-27	SS-6	13-15	ML												84.5	44	35	9	28.1				
17XP-27	SS-7	18-20																	28.6				
17XP-27	SS-8	23-25	SM	100.0	100.0	100.0	100.0	100.0	99.8	99.0	96.7	79.3	51.1	39.2	38.9	30	28	2	24.1				
17XP-27	SS-9	28-30																	22.7				
17XP-32	SS-1	0-2																	17.2				
17XP-32	SS-2	2-4																	26.4				
17XP-32	SS-3	4-6																	27.6				
17XP-32	SS-4	6-8																	26.9				
17XP-32	SS-5	8-10	CH												94.1	77	25	52	31.8				
17XP-32	SS-6	13-15																	24.0				
17XP-32	SS-7	18-20																	25.2				
17XP-34	SS-1	0-2																	15.9				
17XP-34	SS-2	2-4																	24.9				
17XP-34	SS-3	4-6																	17.4				
17XP-34	SS-4	6-8																	30.7				
17XP-34	SS-5	8-10																	18.8				
17XP-34	SS-6	13-15	MH												99.2	52	39	13	29.5				
17XP-34	SS-7	18-20	MH												79.8	50	38	12	29.0				
17XP-34	SS-8	23-25																	25.1				
17XP-34	SS-9	28-30																	28.2				
17XP-34	SS-10	33-35	ML												73.1	34	31	3	26.2				
17XP-35	SS-1	0-2																	9.8				

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

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Project Name: Transurban - Fredex - 95XPL

Client Name: HDR, Inc. Client Address: 4480 Cox Suite 103, Glen Allen, VA 23060

Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing												Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8	
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200	#200		LL	PL	PI		MDD (pcf)	Opt (%)	CBR at 0.1"	CBR at 0.2"
17XP-35	SS-2	2-4																		16.1				
17XP-35	SS-3	4-6																		18.7				
17XP-35	SS-4	6-8																		17.6				
17XP-35	SS-5	8-10		100.0	100.0	100.0	100.0	99.5	99.2	94.5	67.1	41.0	30.1	25.8	25.5					17.5				
17XP-35	SS-6	13-15																		22.5				
17XP-35	SS-7	18-20																		21.7				
17XP-35	SS-8	23-25																		18.0				
17XP-35	SS-9	28-30	SM												49.7	37	34	3	25.3					
17XP-35	SS-10	33-35																		22.2				
17XP-41	SS-1	0-2																		16.8				
17XP-41	SS-2	2-4																		6.9				
17XP-41	SS-3	4-6																		16.4				
17XP-41	SS-4	6-8																		11.6				
17XP-41	SS-5	8-10																		17.7				
17XP-41	SS-6	13-15																		10.5				
17XP-41	SS-7	18-20																		29.9				
17XP-41	SS-8	23-25																		24.0				
17XP-41	SS-9	28-30																		22.6				
17XP-41	SS-10	33-35		100.0	100.0	100.0	100.0	100.0	99.9	98.3	63.6	36.3	26.4	21.0	20.9					22.9				
17XP-41	SS-11	38-40																		24.0				
17XP-41	SS-12	43-45																		22.9				
17XP-41	SS-13	48-49.8																		16.2				

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

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Project Name: Transurban - Fredex - 95XPL

Client Name: HDR, Inc. Client Address: 4480 Cox Suite 103, Glen Allen, VA 23060

Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing											Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8		
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200		#200	LL	PL		PI	MDD (pcf)	Opt (%)	CBR at 0.1"	CBR at 0.2"
17XP-42	SS-1	0-2																		15.5				
17XP-42	SS-2	2-4																		18.5				
17XP-42	SS-3	4-6																		19.6				
17XP-42	SS-4	6-8	CH												73.2	63	27	36	27.4					
17XP-42	SS-5	8-10																		14.6				
17XP-42	SS-6	13-15																		31.1				
17XP-42	SS-7	18-20	CH												76.9	58	19	39	23.9					
17XP-42	SS-8	23-25																		17.4				
17XP-42	SS-9	28-30																		19.8				
17XP-42	SS-10	33-35																		20.0				
17XP-49	SS-1	0-2																		11.1				
17XP-49	SS-2	2-4																		16.5				
17XP-49	SS-3	4-6																		23.0				
17XP-49	SS-4	6-8																		22.3				
17XP-49	SS-5	8-10																		11.7				
17XP-49	SS-6	13-13.2																		9.4				
17XP-49	SS-7	18-18.5																		10.8				
17XP-49	SS-8	23-25																		18.5				
17XP-49	SS-9	28-29.3																		13.0				
17XP-49	SS-10	33-35																		14.1				
17XP-49	SS-11	38-40																		17.8				
17XP-49	SS-12	43-45																		16.8				

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



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Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing											Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8		
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200		#200	LL	PL		PI	MDD (pcf)	Opt (%)	CBR at 0.1"	CBR at 0.2"
17XP-49	SS-13	48-50																		18.7				
17XP-50	SS-1	0-2																		13.6				
17XP-50	SS-2	2-4																		20.1				
17XP-50	SS-3	4-6		100.0	100.0	100.0	100.0	100.0	99.5	93.3	60.5	37.7	30.2	26.5	26.2					17.2				
17XP-50	SS-4	6-8																		16.4				
17XP-50	SS-5	8-10																		17.5				
17XP-50	SS-6	13-5																		17.0				
17XP-50	SS-7	18-20																		18.0				
17XP-50	SS-8	23-25																		22.5				
17XP-52	SS-1	0-2																		16.2				
17XP-52	SS-2	2-4																		18.2				
17XP-52	SS-3	4-6																		17.8				
17XP-52	SS-4	6-8																		18.7				
17XP-52	SS-5	8-10																		18.0				
17XP-52	SS-6	13-15																		21.5				
17XP-52	SS-7	18-20																		16.6				
17XP-53	SS-1	0-2																		17.0				
17XP-53	SS-2	2-4																		25.9				
17XP-53	SS-3	4-6																		18.5				
17XP-53	SS-4	6-8																		23.1				
17XP-53	SS-5	8-10																		21.4				
17XP-54	SS-1	0-2																		16.8				

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #: HDR. 10052825 Task: 017 Test Date (s): 4/21 - 5/27/17 Report Date: 6/7/2017

Project Name: Transurban - Fredex - 95XPL

Client Name: HDR, Inc. Client Address: 4480 Cox Suite 103, Glen Allen, VA 23060

Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing											Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8		
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200		#200	LL	PL		PI	MDD (pcf)	Opt (%)	CBR at 0.1"	CBR at 0.2"
17XP-54	SS-2	2-4																		19.3				
17XP-54	SS-3	4-6																		17.2				
17XP-54	SS-4	6-8																		10.9				
17XP-54	SS-5	8-10																		23.1				
17XP-54	SS-6	13-15	CL												85.0	48	16	32	14.9					
17XP-54	SS-7	18-20																	22.3					
17XP-54	SS-8	23-25		100.0	100.0	100.0	100.0	100.0	99.0	88.7	69.8	55.6	44.2	35.7	35.5				31.2					
17XP-54	SS-9	28-30																	25.0					
17BR-05	SS-1	0-2																	9.8					
17BR-05	SS-2	2-4																	16.5					
17BR-05	SS-3	4-6																	13.9					
17BR-05	SS-4	6-8																	13.9					
17BR-05	SS-5	8-10																	19.0					
17BR-05	SS-6	13-15																	16.4					
17BR-05	SS-7	18-20	CL												57.2	33	15	18	16.9					
17BR-05	SS-8	23-25																	19.5					
17BR-05	SS-9	28-30																	11.9					
17BR-05	SS-10	33-35		100.0	100.0	100.0	98.2	91.9	79.1	45.5	20.2	15.3	12.6	10.5	10.3				17.9					
17BR-05	SS-11	38-40																	11.6					
17BR-05	SS-12	43-45	CH												93.5	65	31	34	29.1					
17BR-05	SS-13	48-50																	25.9					
17BR-05	SS-14	53-55																	21.3					

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

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Project Name: Transurban - Fredex - 95XPL

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Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing											Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8		
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200		#200	LL	PL		PI	MDD (pcf)	Opt (%)	CBR at 0.1"	CBR at 0.2"
17BR-05	SS-15	58-60																		25.8				
17BR-05	SS-16	63-64.4																		20.5				
17BR-05	SS-17	68-70		100.0	100.0	100.0	100.0	95.2	90.6	75.5	39.2	27.4	22.2	18.0	17.9				13.6					
17BR-05	SS-18	73-75																	22.2					
17CL-04	SS-1	0-2																	13.7					
17CL-04	SS-2	2-4																	32.2					
17CL-04	SS-3	4-6																	27.9					
17CL-04	SS-4	6-8																	26.9					
17CL-04	SS-5	8-10																	30.1					
17CL-04	SS-6	13-15	MH												70.7	60	36	24	28.2					
17CL-04	SS-7	18-20																	29.2					
17CL-04	SS-8	23-25																	27.6					
17CL-04	SS-9	28-30	MH												99.7	65	39	26	29.7					
17CL-15	SS-1	0-2																	12.2					
17CL-15	SS-2	2-4																	17.0					
17CL-15	SS-3	4-6	SC	100.0	100.0	100.0	97.8	93.8	86.7	76.9	65.7	54.8	44.8	39.3	38.8				13.7					
17CL-15	SS-4	6-8																	15.0					
17CL-15	SS-5	8-10																	23.7					
17CL-15	SS-6	13-15																	17.1					
17CL-15	SS-7	18-20																	19.0					
17CL-16	SS-1	0-2																	7.9					
17CL-16	SS-2	2-4																	13.3					

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



Quality Assurance

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Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing											Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8		
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200		#200	LL	PL		PI	MDD (pcf)	Opt (%)	CBR at 0.1"	CBR at 0.2"
17CL-16	SS-3	4-6																		24.9				
17CL-16	SS-4	6-8																		16.2				
17CL-16	SS-5	8-10																		17.9				
17CL-16	SS-6	13-15		100.0	100.0	100.0	100.0	96.6	90.7	77.7	63.9	55.4	47.5	39.0	38.5					20.3				
17CL-16	SS-7	18-20																		17.4				
17CL-16	SS-8	23-25																		36.5				
17CL-16	SS-9	28-30	CH												99.0	75	30	45	26.5					
17CL-16	SS-10	33-33.9																		24.4				
17CL-16	SS-11	38-39.8																		19.4				
17CL-17	SS-1	0-2																		33.4				
17CL-17	SS-2	2-4																		14.9				
17CL-17	SS-3	4-6	SC	100.0	100.0	100.0	96.5	93.3	90.4	82.4	66.7	54.6	45.7	35.4	34.9	43	20	23	17.6					
17CL-17	SS-4	6-8																		21.1				
17CL-17	SS-5	8-10																		26.3				
17CL-17	SS-6	13-15																		19.4				
17CL-17	SS-7	18-20																		15.5				
17CL-17	SS-8	23-25		100.0	100.0	100.0	100.0	98.3	93.3	82.5	69.0	58.3	49.0	38.9	38.6					24.6				
17CL-17	SS-9	28-29.4																		5.3				
17CL-17	SS-10	33-33.4																		6.7				
17CL-17	SS-11	35-35.2																		7.8				
17RW-05	SS-1	0-2																		36.1				
17RW-05	SS-2	2-4																		22.5				

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #: HDR. 10052825 Task: 017 Test Date (s): 4/21 - 5/27/17 Report Date: 6/7/2017

Project Name: Transurban - Fredex - 95XPL

Client Name: HDR, Inc. Client Address: 4480 Cox Suite 103, Glen Allen, VA 23060

Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing											Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8		
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200		#200	LL	PL		PI	MDD (pcf)	Opt (%)	CBR at 0.1"	CBR at 0.2"
17RW-05	SS-3	4-6	CH												91.3	67	23	44	33.2					
17RW-05	SS-4	6-8																		11.2				
17RW-05	SS-5	8-10																		13.4				
17RW-05	SS-6	13-15																		25.9				
17RW-05	SS-7	18-20																		30.0				
17RW-05	SS-8	23-25		100.0	100.0	100.0	100.0	99.8	99.2	85.2	38.4	20.4	16.3	14.0	13.9					22.0				
17RW-05	SS-9	28-29.1																		26.8				
17SW-05	SS-1	0-2																		15.7				
17SW-05	SS-2	2-4																		15.5				
17SW-05	SS-3	4-6																		13.4				
17SW-05	SS-4	6-8																		17.7				
17SW-05	SS-5	8-10		100.0	100.0	100.0	100.0	95.8	78.7	40.6	23.4	18.3	15.9	13.9	13.8					25.4				
17SW-05	SS-6	13-15																		29.6				
17SW-05	SS-7	18-20																		21.3				
17SW-05	SS-8	23-25	CH												99.1	82	30	52	30.3					
17SW-05	SS-9	28-29.8																		20.9				
17SW-06	SS-1	0-2																		18.2				
17SW-06	SS-2	2-4																		34.3				
17SW-06	SS-3	4-6	CL												60.7	41	17	24	20.2					
17SW-06	SS-4	6-8																		19.8				
17SW-06	SS-5	8-10																		25.5				
17SW-06	SS-6	13-15																		16.6				

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Test Date (s):	4/21 - 5/27/17	Report Date:	6/7/2017
Project Name:	Transurban - Fredex - 95XPL				
Client Name:	HDR, Inc.	Client Address:	4480 Cox Suite 103, Glen Allen, VA 23060		

Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing												Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8	
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200	#200		LL	PL	PI		MDD (pcf)	Opt (%)	CBR at 0.1"	CBR at 0.2"
17SW-06	SS-7	18-20																		19.0				
17SW-06	SS-8	23-25		100.0	100.0	90.9	86.5	84.1	81.7	76.7	56.4	35.3	23.7	17.0	16.9					21.9				
17SW-06	SS-9	28-30																		26.3				
17SW-07	SS-1	0-2																		21.3				
17SW-07	SS-2	2-4																		15.6				
17SW-07	SS-3	4-6																		18.0				
17SW-07	SS-4	6-8																		20.0				
17SW-07	SS-5	8-10																		15.9				
17SW-07	SS-6	13-15	SC	100.0	100.0	100.0	100.0	97.9	96.2	90.7	75.6	60.0	43.1	30.1	29.8	37	20	17	24.1					
17SW-07	SS-7	18-20																		20.5				
17SW-07	SS-8	23-25																		19.7				
17SW-07	SS-9	28-30																		13.6				
17SW-08	SS-1	0-2																		22.3				
17SW-08	SS-2	2-4																		12.2				
17SW-08	SS-3	4-6																		11.1				
17SW-08	SS-4	6-8		100.0	100.0	100.0	100.0	100.0	99.6	96.1	90.4	85.0	75.3	38.6	38.5					10.9				
17SW-08	SS-5	8-10																		13.2				
17SW-08	SS-6	13-15																		20.7				
17SW-09	SS-1	0-2																		15.9				
17SW-09	SS-2	2-4																		18.7				
17SW-09	SS-3	4-6																		22.6				
17SW-09	SS-4	6-8																		21.1				

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #: HDR. 10052825 Task: 017 Test Date (s): 4/21 - 5/27/17 Report Date: 6/7/2017

Project Name: Transurban - Fredex - 95XPL

Client Name: HDR, Inc. Client Address: 4480 Cox Suite 103, Glen Allen, VA 23060

Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing												Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8	
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200	#200		LL	PL	PI		MDD (pcf)	Opt (%)	CBR at 0.1"	CBR at 0.2"
17SW-09	SS-5	8-10																		16.0				
17SW-09	SS-6	13-15		100.0	100.0	100.0	100.0	99.7	93.5	74.9	43.9	24.9	20.1	17.4	17.2					13.4				
17SW-09	SS-7	18-20																		20.1				
17SW-09	SS-8	23-25																		33.1				
17SW-09	SS-9	28-30																		15.9				
17SW-10	SS-1	0-2																		19.1				
17SW-10	SS-2	2-4																		12.6				
17SW-10	SS-3	4-6																		12.7				
17SW-10	SS-4	6-8																		21.2				
17SW-10	SS-5	8-10																		11.0				
17SW-10	SS-6	13-15																		18.4				
17SW-10	SS-7	18-20																		27.4				
17SW-10	SS-8	23-25		100.0	100.0	100.0	100.0	99.5	90.1	59.7	38.9	28.9	23.9	20.4	20.3					16.0				
17SW-10	SS-9	28-30																		18.1				
17SWM-10	SS-1	0-2																		21.0				
17SWM-10	SS-2	2-4																		24.1				
17SWM-10	SS-3	4-6																		32.3				
17SWM-10	SS-4	6-8																		17.5				
17SWM-10	SS-5	8-10																		42.5				
17SWM-10	SS-6	13-15	CH													99.5	77	27	50	31.7				
17SWM-10	SS-7	18-20																		25.1				
17SWM-10	SS-8	23-25		100.0	100.0	100.0	100.0	100.0	100.0	99.3	75.6	34.3	21.9	16.6	16.5					26.2				

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #: HDR. 10052825 Task: 017 Test Date (s): 4/21 - 5/27/17 Report Date: 6/7/2017

Project Name: Transurban - Fredex - 95XPL

Client Name: HDR, Inc. Client Address: 4480 Cox Suite 103, Glen Allen, VA 23060

Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing												Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8	
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200	#200		LL	PL	PI		MDD (pcf)	Opt (%)	CBR at 0.1"	CBR at 0.2"
17SWM-19	Bulk	0-10	SC	100.0	100.0	98.9	96.8	92.0	88.4	81.4	67.1	58.2	50.3	42.0	41.9	37	17	20	11.9	118.9	11.7	5.7	6.8	
17SWM-19	SS-1	0-2																	12.3					
17SWM-19	SS-2	2-4	CL	100.0	100.0	100.0	100.0	100.0	99.8	98.4	92.2	83.6	75.0	57.9	57.5	39	17	22	18.6					
17SWM-19	SS-3	4-6																	13.4					
17SWM-19	SS-4	6-8																	12.8					
17SWM-19	SS-5	8-10																	7.7					
17SWM-19	SS-6	13-15																	12.2					
17SWM-19	SS-7	18-20		100.0	100.0	100.0	100.0	100.0	99.3	75.9	31.9	25.3	22.1	19.6	19.4				16.4					
17SWM-19	SS-8	23-25																	28.7					
17SWM-21	Bulk	0-15	SC	100.0	100.0	100.0	100.0	96.9	90.9	83.7	69.5	54.2	45.3	36.8	36.6	45	18	27	16.1	115.6	14.6	5.5	7.1	
17SWM-22	SS-1	0-2																	14.3					
17SWM-22	SS-2	2-4																	14.6					
17SWM-22	SS-3	4-6																	17.2					
17SWM-22	SS-4	6-8		100.0	100.0	93.4	90.2	83.2	68.6	38.5	28.6	24.0	20.4	17.5	17.5				12.8					
17SWM-22	SS-5	8-10																	8.9					
17SWM-22	SS-6	13-15																	12.2					
17SWM-22	SS-7	18-20																	24.3					
17SWM-22	SS-8	23-25																	23.9					
17SWM-23	Bulk	2-8	SC	100.0	100.0	100.0	100.0	100.0	99.0	96.8	86.3	67.9	56.0	47.5	47.3	50	17	33	19.3	111.2	16.9	7.3	7.1	
17SWM-23	SS-1	0-2																	23.6					
17SWM-23	SS-2	2-4	SC												47.9	57	20	37	25.3					
17SWM-23	SS-3	4-6																	19.0					

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #: HDR. 10052825 Task: 017 Test Date (s): 4/21 - 5/27/17 Report Date: 6/7/2017

Project Name: Transurban - Fredex - 95XPL

Client Name: HDR, Inc. Client Address: 4480 Cox Suite 103, Glen Allen, VA 23060

Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing												Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8	
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200	#200		LL	PL	PI		MDD (pcf)	Opt (%)	CBR at 0.1"	CBR at 0.2"
17SWM-23	SS-4	6-8																		10.8				
17SWM-23	SS-5	8-10																		11.6				
17SWM-23	SS-6	13-15																		23.5				
17SWM-23	SS-7	18-20		100.0	100.0	100.0	100.0	93.4	71.5	35.6	16.3	11.4	9.8	8.5	8.3				25.7					
17SWM-23	SS-8	23-25																	28.0					
17WGS-05	SS-1	0-2																	16.4					
17WGS-05	SS-2	2-4																	14.8					
17WGS-05	SS-3	4-6																	28.0					
17WGS-05	SS-4	6-8																	25.2					
17WGS-05	SS-5	8-10																	19.9					
17WGS-05	SS-6	13-15																	30.8					
17WGS-05	Tube	13-15	CL	100.0	100.0	100.0	100.0	100.0	98.6	96.8	93.7	89.7	82.1	68.5	68.1	47	23	24	27.3					
17WGS-05	SS-7	18-20																	28.5					
17WGS-05	SS-8	23-25																	19.8					
17WGS-05	SS-9	28-30																	20.7					
17WGS-05	SS-10	33-35	SM												25.8	52	44	8	26.2					
17WGS-05	SS-11	38-40																	22.2					
17WGS-05	SS-12	43-45																	20.5					
17WGS-05	SS-13	48-50																	25.9					
17XP-02	SS-1	0-2																	15.3					
17XP-02	SS-2	2-4																	14.3					
17XP-02	SS-4	6-8																	14.7					

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Test Date (s):	4/21 - 5/27/17	Report Date:	6/7/2017
Project Name:	Transurban - Fredex - 95XPL				
Client Name:	HDR, Inc.	Client Address:	4480 Cox Suite 103, Glen Allen, VA 23060		

Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing												Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8	
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200	#200		LL	PL	PI		MDD (pcf)	Opt (%)	CBR at 0.1"	CBR at 0.2"
17XP-02	SS-5	8-10																		12.3				
17XP-02	SS-6	13-15																		15.1				
17XP-02	SS-7	18-20	SC	100.0	100.0	100.0	100.0	100.0	100.0	100.0	98.2	51.0	32.4	27.6	27.5	29	21	8	15.7					
17XP-02	SS-8	23-25																	16.3					
17XP-02	SS-9	28-30																	29.1					
17XP-02	SS-10	33-35																	27.0					
17XP-02	SS-11	38-40	MH												99.7	58	35	23	27.7					
17XP-02	SS-12	43-45																	25.6					
17XP-06	SS-1	0-2																	17.2					
17XP-06	SS-2	2-4																	19.3					
17XP-06	SS-3	4-6																	23.5					
17XP-06	SS-4	6-8		100.0	100.0	100.0	100.0	98.8	96.6	91.4	75.5	64.3	55.2	42.5	41.6				18.3					
17XP-06	SS-5	8-10																	19.3					
17XP-06	SS-6	13-15																	18.9					
17XP-06	SS-7	18-20																	21.6					
17XP-06	SS-8	23-25																	14.9					
17XP-06	SS-9	28-30																	28.2					
17XP-06	SS-10	33-35																	29.5					
17XP-06	SS-11	38-40		100.0	100.0	100.0	100.0	100.0	99.7	95.7	58.6	28.8	20.2	15.7	15.8				27.9					
17XP-06	SS-12	43-44.9																	28.6					
17XP-06	SS-13	48-50																	25.1					
17XP-06	SS-14	53-55																	31.7					

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #: HDR. 10052825 Task: 017 Test Date (s): 4/21 - 5/27/17 Report Date: 6/7/2017

Project Name: Transurban - Fredex - 95XPL

Client Name: HDR, Inc. Client Address: 4480 Cox Suite 103, Glen Allen, VA 23060

Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing											Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8		
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200		#200	LL	PL		PI	MDD (pcf)	Opt (%)	CBR at 0.1"	CBR at 0.2"
17XP-06	SS-15	58-60	MH												90.5	51	37	14	30.8					
17XP-07	SS-1	0-2																		11.2				
17XP-07	SS-2	2-4																		10.7				
17XP-07	SS-3	4-6																		19.6				
17XP-07	SS-4	6-8																		23.7				
17XP-07	SS-5	8-10																		34.9				
17XP-07	SS-6	13-15		100.0	100.0	100.0	100.0	100.0	99.6	96.0	69.3	38.7	23.8	17.3	17.2					29.8				
17XP-07	SS-7	18-20																		25.0				
17XP-07	SS-8	23-25																		22.4				
17XP-07	SS-9	28-30																		22.5				
17XP-07	SS-10	33-35																		21.0				
17XP-07	SS-11	38-40																		29.1				
17XP-07	SS-12	43-45																		25.6				
17XP-07	SS-13	48-50	MH												97.0	68	35	33	28.2					
17XP-07	SS-14	53-55																		26.8				
17XP-07	SS-15	58-60																		29.5				
17XP-08	SS-1	0-2																		17.2				
17XP-08	SS-2	2-4																		30.1				
17XP-08	SS-3	4-6																		33.8				
17XP-08	SS-4	6-8																		26.6				
17XP-08	SS-5	8-10	CH												96.1	61	25	36	24.1					
17XP-08	SS-6	13-15																		21.8				

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #: HDR. 10052825 Task: 017 Test Date (s): 4/21 - 5/27/17 Report Date: 6/7/2017

Project Name: Transurban - Fredex - 95XPL

Client Name: HDR, Inc. Client Address: 4480 Cox Suite 103, Glen Allen, VA 23060

Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing											Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8			
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200		#200	LL	PL		PI	MDD (pcf)	Opt (%)	CBR at 0.1"	CBR at 0.2"	
17XP-08	SS-7	18-19.3																		16.3					
17XP-08	SS-8	23-25																			19.7				
17XP-08	SS-9	28-30																			21.0				
17XP-08	SS-10	33-35	SM	100.0	100.0	100.0	100.0	100.0	100.0	99.9	96.9	74.0	45.2	34.1	33.8	35	25	10	16.1						
17XP-08	SS-11	38-40																			14.5				
17XP-08	SS-12	43-45																			12.8				
17XP-08	SS-13	48-50																			15.1				
17XP-08	SS-14	53-55																			27.6				
17XP-08	SS-15	58-60																			23.8				
17XP-11	SS-1	0-2																			31.6				
17XP-11	SS-2	2-4	CL												51.3	47	19	28	16.7						
17XP-11	SS-3	4-6																			26.2				
17XP-11	SS-4	6-8																			27.5				
17XP-11	SS-5	8-10																			22.7				
17XP-11	SS-6	13-15																			31.0				
17XP-11	SS-7	18-20																			13.9				
17XP-11	SS-8	23-25																			21.2				
17XP-11	SS-9	28-30		100.0	100.0	100.0	100.0	99.6	99.0	85.5	28.9	14.9	11.8	10.3	10.3						23.3				
17XP-11	SS-10	33-35																			20.0				
17XP-11	SS-11	38-40																			23.6				
17XP-17	SS-1	0-2																			33.2				
17XP-17	SS-2	2-4																			24.2				

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Test Date (s):	4/21 - 5/27/17	Report Date:	6/7/2017
Project Name:	Transurban - Fredex - 95XPL				
Client Name:	HDR, Inc.		Client Address: 4480 Cox Suite 103, Glen Allen, VA 23060		

Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing												Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8	
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200	#200		LL	PL	PI		MDD (pcf)	Opt (%)	CBR at 0.1"	CBR at 0.2"
17XP-17	SS-3	4-6																		26.9				
17XP-17	SS-4	6-8		100.0	100.0	100.0	100.0	100.0	99.8	98.2	81.2	58.5	22.5	14.5	14.4					27.0				
17XP-17	SS-5	8-10																		26.6				
17XP-17	SS-6	13-15																		28.4				
17XP-17	SS-7	18-20	CH												61.4	53	29	24	27.3					
17XP-17	SS-8	23-25																		31.5				
17XP-17	SS-9	28-30	ML												71.7	42	33	9	22.9					
17XP-17	SS-10	33-35																		29.6				
17XP-17	SS-11	38-40																		26.7				
17XP-20	SS-7	18-20																		24.0				
17XP-20	SS-8	23-25	ML												86.8	47	29	18	24.2					
17XP-20	SS-9	28-30																		24.3				
17XP-20	SS-10	33-35																		22.0				
17XP-20	SS-11	38-40	CH												54.9	54	28	26	28.2					
17XP-21	SS-1	0-2																		20.3				
17XP-21	SS-2	2-4																		20.2				
17XP-21	SS-3	4-6																		22.1				
17XP-21	SS-4	6-8																		22.0				
17XP-21	SS-5	8-10	MH												86.8	65	33	32	29.3					
17XP-21	SS-6	13-15																		21.3				
17XP-21	SS-7	18-20	MH												89.9	56	37	19	25.5					
17XP-21	SS-8	23-25																		20.5				

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #: HDR. 10052825 Task: 017 Test Date (s): 4/21 - 5/27/17 Report Date: 6/7/2017

Project Name: Transurban - Fredex - 95XPL

Client Name: HDR, Inc. Client Address: 4480 Cox Suite 103, Glen Allen, VA 23060

Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing												Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8		
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200	#200		LL	PL	PI		MDD (pcf)	Opt (%)	CBR at 0.1"	CBR at 0.2"	
17XP-21	SS-9	28-30																		26.1					
17XP-21	SS-10	33-35																			25.5				
17XP-21	SS-11	38-40																			22.8				
17XP-21	SS-12	43-45																			24.1				
17XP-66	SS-1	0-2																			9.8				
17XP-66	SS-2	2-4																			11.1				
17XP-66	SS-3	4-6																			17.6				
17XP-66	SS-4	6-8																			13.6				
17XP-66	SS-5	8-10																			9.3				
17XP-66	SS-6	13-15		100.0	100.0	100.0	97.4	96.0	92.0	83.6	65.2	51.8	43.5	35.4	35.4						15.9				
17XP-66	SS-7	18-20																			12.8				
17XP-67	SS-1	0-2																			18.9				
17XP-67	SS-2	2-4																			14.8				
17XP-67	SS-3	4-6		100.0	100.0	100.0	100.0	100.0	99.9	98.8	92.9	80.5	59.9	46.6	46.5						24.2				
17XP-67	SS-4	6-8																			15.6				
17XP-67	SS-5	8-10																			12.9				
17XP-67	SS-6	13-15																			18.1				
17XP-67	SS-7	18-20																			21.3				
17XP-67	SS-8	23-25		87.5	73.2	63.2	58.6	49.6	40.7	30.0	17.6	13.4	10.9	9.0	8.7						10.6				
17XP-73	SS-1	0-2																			25.0				
17XP-73	SS-2	2-4																			23.3				
17XP-73	SS-3	4-6																			25.2				

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation



Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #: HDR. 10052825 Task: 017 Test Date (s): 6/15 - 6/17/17 Report Date: 6/18/2017

Project Name: Transurban - Fredex - 95XPL

Client Name: HDR, Inc. Client Address: 4480 Cox Suite 103, Glen Allen, VA 23060

Boring No.	Sample No.	Sample Depth (ft)	USCS	Sieve Analysis Total % Passing											Wash (%)	Atterberg Limits			Moist. %	AASHTO VTM 1		AASHTO VTM 8		
				1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200		#200	LL	PL		PI	MDD (pcf)	Opt (%)	CBR at 0.1"	CBR at 0.2"
17HWN-01	SS-1	0-2																		14.0				
17HWN-01	SS-2	2-4																		15.2				
17HWN-01	SS-3	4-6																		11.6				
17HWN-01	SS-4	6-8																		21.8				
17HWN-01	SS-5	8-10																		23.2				
17HWN-01	SS-6	13-15																		20.1				
17HWN-01	SS-7	18-20																		22.0				
17HWN-01	SS-8	23-25																		22.6				
17HWN-01	SS-9	28-30																		26.1				
17HWN-01	SS-10	33-35																		30.2				
17HWN-01	SS-11	38-40	CH												80.9	55	24	31	23.2					
17HWN-01	SS-12	43-45																		25.0				
17HWN-01	SS-13	48-50		100.0	100.0	100.0	100.0	100.0	99.9	97.8	68.5	36.4	26.5	22.1					23.9					
17HWN-01	SS-14	53-54.8																		22.3				
17HWN-01	SS-15	58-60																		22.7				
17HWN-02	SS-1	0-2																		14.3				
17HWN-02	SS-2	2-4																		17.7				
17HWN-02	SS-3	4-6																		23.3				
17HWN-02	SS-4	6-8	CL												70.0	41	18	23	15.9					
17HWN-02	SS-5	8-10																		22.5				

Laboratory Determination of Water Content

ASTM D 2216 AASHTO T 265

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Report Date:	4/28/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Date(s):	Varies
Sampling Method:	Borehole	Drill Rig :	N/A

Method:		A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" type="checkbox"/>	Balance ID.	1024	Calibration Date:	11/4/16	
Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
17CL-06	SS-1	0 - 2		32.99	114.86	97.81	17.05	26.3%
17CL-06	SS-2	2 - 4		45.66	118.58	104.75	13.83	23.4%
17CL-06	SS-3	4 - 6		47.48	130.11	114.59	15.52	23.1%
17CL-06	SS-4	6 - 8		49.83	119.76	105.76	14.00	25.0%
17CL-06	SS-5	8 - 10		121.90	235.94	216.33	19.61	20.8%
17CL-06	SS-6	13 - 15		46.04	120.41	107.94	12.47	20.1%
17CL-06	SS-7	18 - 20		45.69	138.07	125.95	12.12	15.1%
17CL-06	SS-8	23 - 25		46.40	167.41	154.93	12.48	11.5%
17CL-06	SS-9	28 - 30		48.45	142.60	131.16	11.44	13.8%
17CL-06	SS-10	33 - 35		48.40	156.10	143.74	12.36	13.0%
17CL-06	SS-11	38 - 40		45.52	114.21	106.38	7.83	12.9%
17CL-06	SS-12	43 - 45		121.44	320.13	287.83	32.30	19.4%
17CL-06	SS-13	48 - 50		46.76	130.93	115.06	15.87	23.2%
17CL-07	SS-1	0 - 2		48.69	112.09	94.81	17.28	37.5%
17CL-07	SS-2	2 - 4		38.80	127.61	106.64	20.97	30.9%
17CL-07	SS-3	4 - 6		33.03	118.80	103.35	15.45	22.0%
17CL-07	SS-4	6 - 8		130.04	272.53	245.23	27.30	23.7%
17CL-07	SS-5	8 - 10		45.75	141.32	121.70	19.62	25.8%

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Mal Krajan, ET

Technical Responsibility

Signature

Laboratory Manager

Position

5/2/2017

Date

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Laboratory Determination of Water Content

ASTM D 2216 AASHTO T 265

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Report Date:	4/28/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Date(s):	Varies
Sampling Method:	Borehole	Drill Rig :	N/A

Method:		A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" type="checkbox"/>	Balance ID.	1024	Calibration Date:	11/4/16	
Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
17CL-07	SS-6	13 - 15		46.08	132.37	114.33	18.04	26.4%
17CL-07	SS-7	18 - 20		45.86	130.17	111.97	18.20	27.5%
17CL-07	SS-8	23 - 25		47.93	139.18	122.24	16.94	22.8%
17CL-07	SS-9	28 - 30		45.59	147.35	129.59	17.76	21.1%
17CL-07	SS-10	33 - 35		45.71	147.83	133.03	14.80	16.9%
17CIL-09	SS-1	0 - 2		45.73	122.80	112.73	10.07	15.0%
17CIL-09	SS-2	2 - 4		53.07	131.88	118.41	13.47	20.6%
17CIL-09	SS-3	4 - 6		50.60	147.43	128.37	19.06	24.5%
17CIL-09	SS-4	6 - 8		52.79	114.22	105.46	8.76	16.6%
17CIL-09	SS-5	8 - 10		47.15	93.20	86.84	6.36	16.0%
17CIL-09	SS-6	13 - 15		131.57	269.48	246.39	23.09	20.1%
17CL-10	SS-1	0 - 2		48.83	125.57	115.65	9.92	14.8%
17CL-10	SS-2	2 - 4		45.71	148.74	140.63	8.11	8.5%
17CL-10	SS-3	4 - 6		46.00	140.99	128.69	12.30	14.9%
17CL-10	SS-4	6 - 8		120.20	244.97	219.44	25.53	25.7%
17CL-10	SS-5	8 - 10		47.01	155.55	135.96	19.59	22.0%
17CL-10	SS-6	13 - 15		46.01	137.56	117.95	19.61	27.3%
17CL-10	SS-7	18 - 20		49.76	141.29	127.57	13.72	17.6%

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Mal Krajan, ET

Technical Responsibility

Signature

Laboratory Manager

Position

5/2/2017

Date

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Laboratory Determination of Water Content



ASTM D 2216

AASHTO T 265

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Report Date:	4/28/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Date(s):	Varies
Sampling Method:	Borehole	Drill Rig :	N/A

Method: A (1%) B (0.1%) Balance ID: 1024 Calibration Date: 11/4/16

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
17CL-10	SS-8	23 - 25		137.61	270.00	250.74	19.26	17.0%
17CL-10	SS-9	28 - 30		45.37	177.00	164.47	12.53	10.5%
17SWM-14	SS-1	0 - 2		45.01	105.61	96.67	8.94	17.3%
17SWM-14	SS-2	2 - 4		49.30	124.63	113.79	10.84	16.8%
17SWM-14	SS-3	4 - 6		33.93	122.34	110.39	11.95	15.6%
17SWM-14	SS-4	6 - 8		47.03	110.45	103.60	6.85	12.1%
17SWM-14	SS-5	8 - 10		122.88	306.31	278.63	27.68	17.8%
17SWM-14	SS-6	13 - 15		46.29	148.36	131.58	16.78	19.7%
17SWM-14	SS-7	18 - 20		40.16	148.23	125.11	23.12	27.2%
17SWM-14	SS-8	23 - 25		51.07	132.64	116.97	15.67	23.8%
17XP-24A	SS-1	0 - 2		48.23	142.60	130.98	11.62	14.0%
17XP-24A	SS-2	2 - 4		46.62	123.62	106.85	16.77	27.8%
17XP-24A	SS-3	4 - 6		46.11	133.12	119.91	13.21	17.9%
17XP-24A	SS-4	6 - 8		45.28	147.96	140.70	7.26	7.6%
17XP-24A	SS-5	8 - 10		48.08	150.51	148.26	2.25	2.2%
17XP-24A	SS-6	13 - 15		45.80	147.12	128.79	18.33	22.1%
17XP-24A	SS-7	18 - 20		49.03	145.24	127.44	17.80	22.7%
17XP-24A	SS-8	23 - 25		111.36	297.04	262.29	34.75	23.0%

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/2/2017
Date

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Laboratory Determination of Water Content



ASTM D 2216

AASHTO T 265

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Report Date:	4/28/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Date(s):	Varies
Sampling Method:	Borehole	Drill Rig :	N/A

Method: A (1%) B (0.1%) Balance ID: 1024 Calibration Date: 11/4/16

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
17XP-24A	SS-9	28 - 30		45.43	123.52	107.88	15.64	25.0%
17XP-25	SS-1	0 - 2		45.96	109.59	92.20	17.39	37.6%
17XP-25	SS-2	2 - 4		33.65	108.25	88.91	19.34	35.0%
17XP-25	SS-3	4 - 6		45.95	138.36	115.62	22.74	32.6%
17XP-25	SS-4	6 - 8		121.85	255.80	226.46	29.34	28.0%
17XP-25	SS-5	8 - 10		45.82	123.98	107.65	16.33	26.4%
17XP-25	SS-6	13 - 15		48.60	123.64	108.22	15.42	25.9%
17XP-27	SS-1	0 - 2		48.89	90.74	78.41	12.33	41.8%
17XP-27	SS-2	2 - 4		49.61	104.88	89.53	15.35	38.5%
17XP-27	SS-3	4 - 6		49.12	137.97	116.53	21.44	31.8%
17XP-27	SS-4	6 - 8		48.49	123.87	106.79	17.08	29.3%
17XP-27	SS-5	8 - 10		46.91	127.44	108.96	18.48	29.8%
17XP-27	SS-6	13 - 15		127.60	253.18	225.62	27.56	28.1%
17XP-27	SS-7	18 - 20		47.13	123.83	106.77	17.06	28.6%
17XP-27	SS-8	23 - 25		129.11	273.02	245.07	27.95	24.1%
17XP-27	SS-9	28 - 30		45.56	142.72	124.77	17.95	22.7%
17XP-32	SS-1	0 - 2		51.18	123.26	112.67	10.59	17.2%
17XP-32	SS-2	2 - 4		48.08	135.88	117.56	18.32	26.4%

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/2/2017
Date

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Laboratory Determination of Water Content

ASTM D 2216 AASHTO T 265

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Report Date:	4/28/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Date(s):	Varies
Sampling Method:	Borehole	Drill Rig :	N/A

Method:		A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" type="checkbox"/>	Balance ID.	1024	Calibration Date:	11/4/16	
Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
17XP-32	SS-3	4 - 6		51.41	126.82	110.49	16.33	27.6%
17XP-32	SS-4	6 - 8		45.90	147.80	126.23	21.57	26.9%
17XP-32	SS-5	8 - 10		126.62	254.90	223.95	30.95	31.8%
17XP-32	SS-6	13 - 15		46.23	124.90	109.67	15.23	24.0%
17XP-32	SS-7	18 - 20		45.32	124.06	108.21	15.85	25.2%
17XP-34	SS-1	0 - 2		49.16	121.50	111.56	9.94	15.9%
17XP-34	SS-2	2 - 4		46.59	145.64	125.90	19.74	24.9%
17XP-34	SS-3	4 - 6		48.48	138.90	125.49	13.41	17.4%
17XP-34	SS-4	6 - 8		51.03	137.80	117.43	20.37	30.7%
17XP-34	SS-5	8 - 10		46.27	131.62	118.10	13.52	18.8%
17XP-34	SS-6	13 - 15		131.54	257.29	228.67	28.62	29.5%
17XP-34	SS-7	18 - 20		132.54	247.97	222.03	25.94	29.0%
17XP-34	SS-8	23 - 25		45.93	130.90	113.87	17.03	25.1%
17XP-34	SS-9	28 - 30		45.28	135.74	115.86	19.88	28.2%
17XP-34	SS-10	33 - 35		119.81	242.91	217.32	25.59	26.2%
17XP-35	SS-1	0 - 2		51.18	125.43	118.78	6.65	9.8%
17XP-35	SS-2	2 - 4		45.42	144.80	131.05	13.75	16.1%
17XP-35	SS-3	4 - 6		49.30	133.80	120.49	13.31	18.7%

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Mal Krajan, ET

Technical Responsibility

Signature

Laboratory Manager

Position

5/2/2017

Date

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Laboratory Determination of Water Content

ASTM D 2216 AASHTO T 265

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Report Date:	4/28/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Date(s):	Varies
Sampling Method:	Borehole	Drill Rig :	N/A

Method:		A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" type="checkbox"/>	Balance ID.	1024	Calibration Date:	11/4/16	
Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
17XP-35	SS-4	6 - 8		47.11	124.67	113.06	11.61	17.6%
17XP-35	SS-5	8 - 10		129.12	349.88	317.02	32.86	17.5%
17XP-35	SS-6	13 - 15		48.05	116.67	104.06	12.61	22.5%
17XP-35	SS-7	18 - 20		45.35	107.71	96.61	11.10	21.7%
17XP-35	SS-8	23 - 25		33.66	133.62	118.40	15.22	18.0%
17XP-35	SS-9	28 - 30		139.42	274.65	247.33	27.32	25.3%
17XP-35	SS-10	33 - 35		45.54	132.75	116.89	15.86	22.2%
17XP-41	SS-1	0 - 2		45.79	125.31	113.87	11.44	16.8%
17XP-41	SS-2	2 - 4		46.28	148.29	141.70	6.59	6.9%
17XP-41	SS-3	4 - 6		47.08	129.83	118.20	11.63	16.4%
17XP-41	SS-4	6 - 8		48.48	149.53	139.05	10.48	11.6%
17XP-41	SS-5	8 - 10		49.75	145.09	130.75	14.34	17.7%
17XP-41	SS-6	13 - 15		49.07	147.28	137.92	9.36	10.5%
17XP-41	SS-7	18 - 20		45.30	118.85	101.91	16.94	29.9%
17XP-41	SS-8	23 - 25		45.96	128.53	112.53	16.00	24.0%
17XP-41	SS-9	28 - 30		46.02	128.62	113.42	15.20	22.6%
17XP-41	SS-10	33 - 35		124.67	331.04	292.52	38.52	22.9%
17XP-41	SS-11	38 - 40		45.60	129.57	113.33	16.24	24.0%

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Mal Krajan, ET

Technical Responsibility

Signature

Laboratory Manager

Position

5/2/2017

Date

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Laboratory Determination of Water Content

ASTM D 2216 AASHTO T 265

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Report Date:	4/28/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Date(s):	Varies
Sampling Method:	Borehole	Drill Rig :	N/A

Method:		A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" type="checkbox"/>	Balance ID.	1024	Calibration Date:	11/4/16	
Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
17XP-41	SS-12	43 - 45		46.04	139.83	122.38	17.45	22.9%
17XP-41	SS-13	48 - 49.8		45.71	130.11	118.34	11.77	16.2%
17XP-42	SS-1	0 - 2		48.97	125.51	115.21	10.30	15.5%
17XP-42	SS-2	2 - 4		46.07	125.76	113.32	12.44	18.5%
17XP-42	SS-3	4 - 6		47.46	142.85	127.25	15.60	19.6%
17XP-42	SS-4	6 - 8		126.02	257.52	229.27	28.25	27.4%
17XP-42	SS-5	8 - 10		45.65	148.04	135.01	13.03	14.6%
17XP-42	SS-6	13 - 15		45.06	139.50	117.09	22.41	31.1%
17XP-42	SS-7	18 - 20		123.21	248.87	224.67	24.20	23.9%
17XP-42	SS-8	23 - 25		33.05	124.69	111.13	13.56	17.4%
17XP-42	SS-9	28 - 30		46.10	115.70	104.18	11.52	19.8%
17XP-42	SS-10	33 - 35		45.79	119.13	106.93	12.20	20.0%
17XP-49	SS-1	0 - 2		46.39	128.54	120.36	8.18	11.1%
17XP-49	SS-2	2 - 4		48.82	123.83	113.19	10.64	16.5%
17XP-49	SS-3	4 - 6		48.53	142.94	125.30	17.64	23.0%
17XP-49	SS-4	6 - 8		45.52	122.69	108.60	14.09	22.3%
17XP-49	SS-5	8 - 10		49.82	103.92	98.24	5.68	11.7%
17XP-49	SS-6	13 - 13.2		38.74	130.25	122.37	7.88	9.4%

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Mal Krajan, ET

Technical Responsibility

Signature

Laboratory Manager

Position

5/2/2017

Date

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Laboratory Determination of Water Content

ASTM D 2216 AASHTO T 265

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Report Date:	4/28/17
Project Name:	Transurban - Fredex - 95 XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Date(s):	Varies
Sampling Method:	Borehole	Drill Rig :	N/A

Method:		A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" type="checkbox"/>	Balance ID.	1024	Calibration Date:	11/4/16	
Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
17XP-49	SS-7	18 - 18.5		46.83	119.95	112.84	7.11	10.8%
17XP-49	SS-8	23 - 25		32.97	170.19	148.77	21.42	18.5%
17XP-49	SS-9	28 - 29.3		50.60	153.42	141.60	11.82	13.0%
17XP-49	SS-10	33 - 35		48.72	149.26	136.84	12.42	14.1%
17XP-49	SS-11	38 - 40		122.95	326.65	295.86	30.79	17.8%
17XP-49	SS-12	43 - 45		45.74	136.63	123.57	13.06	16.8%
17XP-49	SS-13	48 - 50		45.68	127.57	114.66	12.91	18.7%
17XP-50	SS-1	0 - 2		48.28	134.81	124.43	10.38	13.6%
17XP-50	SS-2	2 - 4		45.65	100.57	91.38	9.19	20.1%
17XP-50	SS-3	4 - 6		124.93	334.05	303.32	30.73	17.2%
17XP-50	SS-4	6 - 8		45.36	136.68	123.78	12.90	16.4%
17XP-50	SS-5	8 - 10		52.80	143.71	130.19	13.52	17.5%
17XP-50	SS-6	13 - 15		48.04	143.59	129.73	13.86	17.0%
17XP-50	SS-7	18 - 20		33.89	129.34	114.75	14.59	18.0%
17XP-50	SS-8	23 - 25		51.39	130.71	116.13	14.58	22.5%
17XP-52	SS-1	0 - 2		48.57	142.10	129.05	13.05	16.2%
17XP-52	SS-2	2 - 4		47.15	123.55	111.78	11.77	18.2%
17XP-52	SS-3	4 - 6		45.84	118.17	107.22	10.95	17.8%

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Mal Krajan, ET

Technical Responsibility

Signature

Laboratory Manager

Position

5/2/2017

Date

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Laboratory Determination of Water Content

ASTM D 2216 AASHTO T 265

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Report Date:	4/28/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Date(s):	Varies
Sampling Method:	Borehole	Drill Rig :	N/A

Method:		A (1%) <input type="checkbox"/>	B (0.1%) <input checked="" type="checkbox"/>	Balance ID.	1024	Calibration Date:	11/4/16	
Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
17XP-52	SS-4	6 - 8		134.87	322.66	293.05	29.61	18.7%
17XP-52	SS-5	8 - 10		47.98	150.46	134.81	15.65	18.0%
17XP-52	SS-6	13 - 15		45.70	133.42	117.89	15.53	21.5%
17XP-52	SS-7	18 - 20		46.05	131.64	119.47	12.17	16.6%
17XP-53	SS-1	0 - 2		45.99	127.48	115.65	11.83	17.0%
17XP-53	SS-2	2 - 4		46.89	125.20	109.08	16.12	25.9%
17XP-53	SS-3	4 - 6		53.05	138.60	125.27	13.33	18.5%
17XP-53	SS-4	6 - 8		40.17	140.94	122.01	18.93	23.1%
17XP-53	SS-5	8 - 10		120.64	323.69	287.91	35.78	21.4%
17XP-54	SS-1	0 - 2		49.64	118.47	108.59	9.88	16.8%
17XP-54	SS-2	2 - 4		45.84	151.31	134.23	17.08	19.3%
17XP-54	SS-3	4 - 6		46.14	123.14	111.85	11.29	17.2%
17XP-54	SS-4	6 - 8		47.05	136.38	127.60	8.78	10.9%
17XP-54	SS-5	8 - 10		49.19	130.32	115.08	15.24	23.1%
17XP-54	SS-6	13 - 15		136.33	242.65	228.86	13.79	14.9%
17XP-54	SS-7	18 - 20		49.25	120.10	107.18	12.92	22.3%
17XP-54	SS-8	23 - 25		119.77	275.51	238.51	37.00	31.2%
17XP-54	SS-9	28 - 30		49.52	138.64	120.84	17.80	25.0%

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Mal Krajan, ET

Technical Responsibility

Signature

Laboratory Manager

Position

5/2/2017

Date

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Laboratory Determination of Water Content



ASTM D 2216

AASHTO T 265

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Report Date:	5/22/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/12 - 5/22/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Date(s):	Varies
Sampling Method:	Borehole	Drill Rig :	N/A

Method: A (1%) B (0.1%) *Balance ID.* 1024 *Calibration Date:* 11/4/16

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
17BR-05	SS-1	0 - 2		49.81	157.90	148.24	9.66	9.8%
17BR-05	SS-2	2 - 4		46.01	157.26	141.47	15.79	16.5%
17BR-05	SS-3	4 - 6		48.07	150.54	138.02	12.52	13.9%
17BR-05	SS-4	6 - 8		33.16	135.98	123.47	12.51	13.9%
17BR-05	SS-5	8 - 10		45.83	154.16	136.84	17.32	19.0%
17BR-05	SS-6	13 - 15		45.51	148.32	133.87	14.45	16.4%
17BR-05	SS-7	18 - 20		120.02	221.80	207.05	14.75	16.9%
17BR-05	SS-8	23 - 25		49.17	173.72	153.37	20.35	19.5%
17BR-05	SS-9	28 - 30		48.44	150.10	139.25	10.85	11.9%
17BR-05	SS-10	33 - 35		121.86	381.37	342.02	39.35	17.9%
17BR-05	SS-11	38 - 40		48.08	148.08	137.67	10.41	11.6%
17BR-05	SS-12	43 - 45		127.60	206.39	188.61	17.78	29.1%
17BR-05	SS-13	48 - 50		45.69	151.45	129.69	21.76	25.9%
17BR-05	SS-14	53 - 55		46.31	147.74	129.90	17.84	21.3%
17BR-05	SS-15	58 - 60		48.57	148.84	128.30	20.54	25.8%
17BR-05	SS-16	63 - 64.4		32.96	145.56	126.44	19.12	20.5%
17BR-05	SS-17	68 - 70		126.65	318.67	295.75	22.92	13.6%
17BR-05	SS-18	73 - 75		50.59	158.86	139.20	19.66	22.2%
17CL-04	SS-1	0 - 2		45.73	155.02	141.89	13.13	13.7%
17CL-04	SS-2	2 - 4		46.17	157.48	130.39	27.09	32.2%
17CL-04	SS-3	4 - 6		45.71	152.95	129.55	23.40	27.9%
17CL-04	SS-4	6 - 8		47.97	186.22	156.89	29.33	26.9%
17CL-04	SS-5	8 - 10		33.93	141.90	116.95	24.95	30.1%
17CL-04	SS-6	13 - 15		131.54	210.92	193.45	17.47	28.2%
17CL-04	SS-7	18 - 20		45.75	147.85	124.78	23.07	29.2%
17CL-04	SS-8	23 - 25		45.29	152.66	129.46	23.20	27.6%
17CL-04	SS-9	28 - 30		139.43	240.82	217.61	23.21	29.7%
17CL-15	SS-1	0 - 2		49.06	154.29	142.86	11.43	12.2%
17CL-15	SS-2	2 - 4		47.14	155.58	139.86	15.72	17.0%
17CL-15	SS-3	4 - 6		125.92	202.16	192.98	9.18	13.7%
17CL-15	SS-4	6 - 8		46.59	164.87	149.47	15.40	15.0%

Laboratory Determination of Water Content



ASTM D 2216

AASHTO T 265

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Report Date:	5/22/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/12 - 5/22/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Date(s):	Varies
Sampling Method:	Borehole	Drill Rig :	N/A

Method: A (1%) B (0.1%) *Balance ID.* 1024 *Calibration Date:* 11/4/16

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
17CL-15	SS-5	8 - 10		45.84	147.99	128.42	19.57	23.7%
17CL-15	SS-6	13 - 15		45.53	155.14	139.16	15.98	17.1%
17CL-15	SS-7	18 - 20		45.36	149.65	132.98	16.67	19.0%
17CL-16	SS-1	0 - 2		45.30	149.18	141.56	7.62	7.9%
17CL-16	SS-2	2 - 4		47.15	148.34	136.49	11.85	13.3%
17CL-16	SS-3	4 - 6		33.66	151.43	127.98	23.45	24.9%
17CL-16	SS-4	6 - 8		46.01	161.60	145.52	16.08	16.2%
17CL-16	SS-5	8 - 10		45.58	146.63	131.29	15.34	17.9%
17CL-16	SS-6	13 - 15		136.33	333.02	299.87	33.15	20.3%
17CL-16	SS-7	18 - 20		46.89	154.16	138.24	15.92	17.4%
17CL-16	SS-8	23 - 25		46.37	147.64	120.54	27.10	36.5%
17CL-16	SS-9	28 - 30		137.63	229.78	210.46	19.32	26.5%
17CL-16	SS-10	33 - 33.9		53.06	161.01	139.83	21.18	24.4%
17CL-16	SS-11	38 - 39.8		46.07	170.65	150.43	20.22	19.4%
17CL-17	SS-1	0 - 2		48.37	161.23	132.96	28.27	33.4%
17CL-17	SS-2	2 - 4		48.46	153.14	139.53	13.61	14.9%
17CL-17	SS-3	4 - 6		111.34	211.42	196.47	14.95	17.6%
17CL-17	SS-4	6 - 8		47.08	147.08	129.69	17.39	21.1%
17CL-17	SS-5	8 - 10		45.93	152.91	130.64	22.27	26.3%
17CL-17	SS-6	13 - 15		48.81	153.23	136.27	16.96	19.4%
17CL-17	SS-7	18 - 20		51.05	152.99	139.34	13.65	15.5%
17CL-17	SS-8	23 - 25		119.58	294.62	260.08	34.54	24.6%
17CL-17	SS-9	28 - 29.4		49.28	152.77	147.55	5.22	5.3%
17CL-17	SS-10	33 - 33.4		51.16	169.62	162.14	7.48	6.7%
17CL-17	SS-11	33 - 35.2		46.11	188.84	178.52	10.32	7.8%
17RW-05	SS-1	0 - 2		45.36	148.03	120.77	27.26	36.1%
17RW-05	SS-2	2 - 4		46.58	152.13	132.76	19.37	22.5%
17RW-05	SS-3	4 - 6		119.97	203.19	182.45	20.74	33.2%
17RW-05	SS-4	6 - 8		45.28	149.56	139.09	10.47	11.2%
17RW-05	SS-5	8 - 10		45.83	146.08	134.22	11.86	13.4%
17RW-05	SS-6	13 - 15		45.74	156.07	133.40	22.67	25.9%

Laboratory Determination of Water Content



ASTM D 2216

AASHTO T 265

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Report Date:	5/22/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/12 - 5/22/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Date(s):	Varies
Sampling Method:	Borehole	Drill Rig :	N/A

Method: A (1%) B (0.1%) *Balance ID.* 1024 *Calibration Date:* 11/4/16

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
17RW-05	SS-7	18 - 20		45.55	160.25	133.76	26.49	30.0%
17RW-05	SS-8	23 - 25		125.87	321.75	286.41	35.34	22.0%
17RW-05	SS-9	28 - 29.1		49.04	153.75	131.62	22.13	26.8%
17SW-05	SS-1	0 - 2		47.12	167.28	150.94	16.34	15.7%
17SW-05	SS-2	2 - 4		45.29	151.42	137.20	14.22	15.5%
17SW-05	SS-3	4 - 6		33.93	134.36	122.51	11.85	13.4%
17SW-05	SS-4	6 - 8		47.99	150.45	135.05	15.40	17.7%
17SW-05	SS-5	8 - 10		126.61	322.63	282.87	39.76	25.4%
17SW-05	SS-6	13 - 15		46.09	155.09	130.22	24.87	29.6%
17SW-05	SS-7	18 - 20		45.72	156.55	137.12	19.43	21.3%
17SW-05	SS-8	23 - 25		111.31	211.54	188.24	23.30	30.3%
17SW-05	SS-9	28 - 29.8		45.71	149.55	131.58	17.97	20.9%
17SW-06	SS-1	0 - 2		50.58	157.03	140.62	16.41	18.2%
17SW-06	SS-2	2 - 4		48.55	154.43	127.37	27.06	34.3%
17SW-06	SS-3	4 - 6		119.55	200.71	187.06	13.65	20.2%
17SW-06	SS-4	6 - 8		32.96	135.09	118.22	16.87	19.8%
17SW-06	SS-5	8 - 10		48.44	151.41	130.52	20.89	25.5%
17SW-06	SS-6	13 - 15		46.31	147.76	133.28	14.48	16.6%
17SW-06	SS-7	18 - 20		33.09	141.42	124.09	17.33	19.0%
17SW-06	SS-8	23 - 25		136.29	335.96	300.09	35.87	21.9%
17SW-06	SS-9	28 - 30		49.16	171.80	146.27	25.53	26.3%
17SW-07	SS-1	0 - 2		48.07	152.13	133.89	18.24	21.3%
17SW-07	SS-2	2 - 4		45.51	152.52	138.07	14.45	15.6%
17SW-07	SS-3	4 - 6		45.69	145.74	130.51	15.23	18.0%
17SW-07	SS-4	6 - 8		48.06	150.73	133.62	17.11	20.0%
17SW-07	SS-5	8 - 10		46.02	154.98	140.03	14.95	15.9%
17SW-07	SS-6	13 - 15		137.59	238.08	218.58	19.50	24.1%
17SW-07	SS-7	18 - 20		45.79	156.19	137.42	18.77	20.5%
17SW-07	SS-8	23 - 25		49.80	163.58	144.88	18.70	19.7%
17SW-07	SS-9	28 - 30		51.05	156.35	143.72	12.63	13.6%
17SW-08	SS-1	0 - 2		47.11	147.84	129.49	18.35	22.3%

Laboratory Determination of Water Content



ASTM D 2216

AASHTO T 265

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Report Date:	5/22/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/12 - 5/22/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Date(s):	Varies
Sampling Method:	Borehole	Drill Rig :	N/A

Method: A (1%) B (0.1%) *Balance ID.* 1024 *Calibration Date:* 11/4/16

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
17SW-08	SS-2	2 - 4		46.18	149.12	137.89	11.23	12.2%
17SW-08	SS-3	4 - 6		48.79	150.34	140.22	10.12	11.1%
17SW-08	SS-4	6 - 8		131.52	336.33	316.16	20.17	10.9%
17SW-08	SS-5	8 - 10		45.93	159.16	145.93	13.23	13.2%
17SW-08	SS-6	13 - 15		46.08	157.45	138.34	19.11	20.7%
17SW-09	SS-1	0 - 2		51.18	184.51	166.25	18.26	15.9%
17SW-09	SS-2	2 - 4		49.27	157.70	140.61	17.09	18.7%
17SW-09	SS-3	4 - 6		48.45	158.82	138.44	20.38	22.6%
17SW-09	SS-4	6 - 8		48.36	162.13	142.34	19.79	21.1%
17SW-09	SS-5	8 - 10		45.58	151.56	136.98	14.58	16.0%
17SW-09	SS-6	13 - 15		121.83	316.33	293.33	23.00	13.4%
17SW-09	SS-7	18 - 20		47.08	147.71	130.86	16.85	20.1%
17SW-09	SS-8	23 - 25		45.65	157.15	129.42	27.73	33.1%
17SW-09	SS-9	28 - 30		33.65	137.54	123.26	14.28	15.9%
17SW-10	SS-1	0 - 2		45.82	148.24	131.78	16.46	19.1%
17SW-10	SS-2	2 - 4		46.49	147.00	135.74	11.26	12.6%
17SW-10	SS-3	4 - 6		53.08	154.54	143.11	11.43	12.7%
17SW-10	SS-4	6 - 8		46.40	151.08	132.80	18.28	21.2%
17SW-10	SS-5	8 - 10		46.04	162.35	150.85	11.50	11.0%
17SW-10	SS-6	13 - 15		46.05	157.57	140.26	17.31	18.4%
17SW-10	SS-7	18 - 20		48.71	152.17	129.92	22.25	27.4%
17SW-10	SS-8	23 - 25		139.40	328.46	302.38	26.08	16.0%
17SW-10	SS-9	28 - 30		45.48	158.14	140.88	17.26	18.1%
17SWM-10	SS-1	0 - 2		48.28	156.25	137.51	18.74	21.0%
17SWM-10	SS-2	2 - 4		46.29	168.81	145.04	23.77	24.1%
17SWM-10	SS-3	4 - 6		47.02	153.53	127.55	25.98	32.3%
17SWM-10	SS-4	6 - 8		45.36	161.19	143.92	17.27	17.5%
17SWM-10	SS-5	8 - 10		45.84	154.05	121.79	32.26	42.5%
17SWM-10	SS-6	13 - 15		124.80	229.43	204.25	25.18	31.7%
17SWM-10	SS-7	18 - 20		45.86	172.12	146.77	25.35	25.1%
17SWM-10	SS-8	23 - 25		121.79	287.42	252.99	34.43	26.2%

Laboratory Determination of Water Content



ASTM D 2216

AASHTO T 265

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Report Date:	5/22/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/12 - 5/22/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Date(s):	Varies
Sampling Method:	Borehole	Drill Rig :	N/A

Method: A (1%) B (0.1%) *Balance ID.* 1024 *Calibration Date:* 11/4/16

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
17SWM-19	Bulk	0 - 10		122.77	415.79	384.56	31.23	11.9%
17SWM-19	SS-1	0 - 2		46.99	177.30	162.99	14.31	12.3%
17SWM-19	SS-2	2 - 4		132.51	218.34	204.87	13.47	18.6%
17SWM-19	SS-3	4 - 6		52.78	183.80	168.34	15.46	13.4%
17SWM-19	SS-4	6 - 8		46.55	150.19	138.40	11.79	12.8%
17SWM-19	SS-5	8 - 10		49.67	155.67	148.12	7.55	7.7%
17SWM-19	SS-6	13 - 15		46.79	154.21	142.52	11.69	12.2%
17SWM-19	SS-7	18 - 20		131.53	313.21	287.61	25.60	16.4%
17SWM-19	SS-8	23 - 25		45.98	170.53	142.76	27.77	28.7%
17SWM-21	Bulk	0 - 15		130.22	397.10	360.00	37.10	16.1%
17SWM-22	SS-1	0 - 2		45.02	162.13	147.51	14.62	14.3%
17SWM-22	SS-2	2 - 4		45.96	148.40	135.32	13.08	14.6%
17SWM-22	SS-3	4 - 6		38.74	144.71	129.17	15.54	17.2%
17SWM-22	SS-4	6 - 8		127.55	340.69	316.55	24.14	12.8%
17SWM-22	SS-5	8 - 10		40.17	169.18	158.65	10.53	8.9%
17SWM-22	SS-6	13 - 15		50.20	159.34	147.44	11.90	12.2%
17SWM-22	SS-7	18 - 20		49.34	160.82	139.06	21.76	24.3%
17SWM-22	SS-8	23 - 25		49.31	158.44	137.36	21.08	23.9%
17SWM-23	Bulk	2 - 8		133.23	408.22	363.80	44.42	19.3%
17SWM-23	SS-1	0 - 2		49.48	172.20	148.78	23.42	23.6%
17SWM-23	SS-2	2 - 4		124.58	207.60	190.85	16.75	25.3%
17SWM-23	SS-3	4 - 6		49.18	154.03	137.27	16.76	19.0%
17SWM-23	SS-4	6 - 8		50.25	162.09	151.16	10.93	10.8%
17SWM-23	SS-5	8 - 10		50.47	150.85	140.44	10.41	11.6%
17SWM-23	SS-6	13 - 15		49.74	154.64	134.69	19.95	23.5%
17SWM-23	SS-7	18 - 20		130.15	327.60	287.24	40.36	25.7%
17SWM-23	SS-8	23 - 25		49.02	97.78	87.12	10.66	28.0%
17WGS-05	SS-1	0 - 2		49.62	163.92	147.84	16.08	16.4%
17WGS-05	SS-2	2 - 4		32.95	133.30	120.38	12.92	14.8%
17WGS-05	SS-3	4 - 6		46.43	144.91	123.38	21.53	28.0%
17WGS-05	SS-4	6 - 8		46.57	133.71	116.16	17.55	25.2%

Laboratory Determination of Water Content



ASTM D 2216

AASHTO T 265

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Report Date:	5/22/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/12 - 5/22/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Date(s):	Varies
Sampling Method:	Borehole	Drill Rig :	N/A

Method: A (1%) B (0.1%) *Balance ID.* 1024 *Calibration Date:* 11/4/16

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
17WGS-05	SS-5	8 - 10		45.84	149.42	132.24	17.18	19.9%
17WGS-05	SS-6	13 - 15		46.09	132.72	112.33	20.39	30.8%
17WGS-05	Tube	13 - 15		111.38	242.33	214.28	28.05	27.3%
17WGS-05	SS-7	18 - 20		45.29	113.87	98.66	15.21	28.5%
17WGS-05	SS-8	23 - 25		40.16	132.96	117.63	15.33	19.8%
17WGS-05	SS-9	28 - 30		38.75	149.75	130.74	19.01	20.7%
17WGS-05	SS-10	33 - 35		129.15	252.24	226.69	25.55	26.2%
17WGS-05	SS-11	38 - 40		47.98	162.32	141.53	20.79	22.2%
17WGS-05	SS-12	43 - 45		45.85	191.42	166.68	24.74	20.5%
17WGS-05	SS-13	48 - 50		49.16	168.15	143.69	24.46	25.9%
17XP-02	SS-1	0 - 2		45.83	156.28	141.63	14.65	15.3%
17XP-02	SS-2	2 - 4		33.93	175.27	157.57	17.70	14.3%
17XP-02	SS-4	6 - 8		45.58	73.19	69.65	3.54	14.7%
17XP-02	SS-5	8 - 10		45.73	102.43	96.20	6.23	12.3%
17XP-02	SS-6	13 - 15		49.82	161.70	147.03	14.67	15.1%
17XP-02	SS-7	18 - 20		141.73	245.82	231.73	14.09	15.7%
17XP-02	SS-8	23 - 25		45.50	144.86	130.91	13.95	16.3%
17XP-02	SS-9	28 - 30		51.07	103.86	91.97	11.89	29.1%
17XP-02	SS-10	33 - 35		46.28	124.78	108.10	16.68	27.0%
17XP-02	SS-11	38 - 40		119.70	223.90	201.30	22.60	27.7%
17XP-02	SS-12	43 - 45		48.05	152.68	131.38	21.30	25.6%
17XP-06	SS-1	0 - 2		46.38	169.29	151.24	18.05	17.2%
17XP-06	SS-2	2 - 4		48.55	187.92	165.42	22.50	19.3%
17XP-06	SS-3	4 - 6		47.09	114.42	101.61	12.81	23.5%
17XP-06	SS-4	6 - 8		122.84	284.77	259.68	25.09	18.3%
17XP-06	SS-5	8 - 10		46.48	185.20	162.73	22.47	19.3%
17XP-06	SS-6	13 - 15		45.42	181.26	159.67	21.59	18.9%
17XP-06	SS-7	18 - 20		45.93	177.43	154.06	23.37	21.6%
17XP-06	SS-8	23 - 25		33.66	159.90	143.57	16.33	14.9%
17XP-06	SS-9	28 - 30		45.58	159.59	134.53	25.06	28.2%
17XP-06	SS-10	33 - 35		46.20	151.81	127.73	24.08	29.5%

Laboratory Determination of Water Content



ASTM D 2216

AASHTO T 265

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Report Date:	5/22/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/12 - 5/22/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Date(s):	Varies
Sampling Method:	Borehole	Drill Rig :	N/A

Method: A (1%) B (0.1%) *Balance ID.* 1024 *Calibration Date:* 11/4/16

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
17XP-06	SS-11	38 - 40		129.99	342.46	296.07	46.39	27.9%
17XP-06	SS-12	43 - 44.9		48.72	150.46	127.84	22.62	28.6%
17XP-06	SS-13	48 - 50		48.41	134.03	116.83	17.20	25.1%
17XP-06	SS-14	53 - 55		48.45	120.54	103.17	17.37	31.7%
17XP-06	SS-15	58 - 60		128.89	274.37	240.11	34.26	30.8%
17XP-07	SS-1	0 - 2		46.11	176.71	163.52	13.19	11.2%
17XP-07	SS-2	2 - 4		48.04	144.65	135.32	9.33	10.7%
17XP-07	SS-3	4 - 6		45.32	112.89	101.81	11.08	19.6%
17XP-07	SS-4	6 - 8		45.35	126.67	111.10	15.57	23.7%
17XP-07	SS-5	8 - 10		48.28	124.92	105.09	19.83	34.9%
17XP-07	SS-6	13 - 15		127.54	369.43	313.90	55.53	29.8%
17XP-07	SS-7	18 - 20		52.78	231.18	195.52	35.66	25.0%
17XP-07	SS-8	23 - 25		46.02	169.57	146.93	22.64	22.4%
17XP-07	SS-9	28 - 30		33.07	185.40	157.42	27.98	22.5%
17XP-07	SS-10	33 - 35		49.26	175.25	153.41	21.84	21.0%
17XP-07	SS-11	38 - 40		46.02	138.44	117.59	20.85	29.1%
17XP-07	SS-12	43 - 45		45.83	124.38	108.39	15.99	25.6%
17XP-07	SS-13	48 - 50		136.28	286.41	253.38	33.03	28.2%
17XP-07	SS-14	53 - 55		45.02	158.32	134.36	23.96	26.8%
17XP-07	SS-15	58 - 60		45.68	160.30	134.22	26.08	29.5%
17XP-08	SS-1	0 - 2		45.73	169.76	151.59	18.17	17.2%
17XP-08	SS-2	2 - 4		48.35	122.41	105.26	17.15	30.1%
17XP-08	SS-3	4 - 6		45.83	111.42	94.86	16.56	33.8%
17XP-08	SS-4	6 - 8		47.07	146.32	125.49	20.83	26.6%
17XP-08	SS-5	8 - 10		130.08	222.44	204.53	17.91	24.1%
17XP-08	SS-6	13 - 15		53.06	138.25	123.03	15.22	21.8%
17XP-08	SS-7	18 - 19.3		47.02	141.08	127.88	13.20	16.3%
17XP-08	SS-8	23 - 25		50.65	157.78	140.18	17.60	19.7%
17XP-08	SS-9	28 - 30		46.57	127.39	113.38	14.01	21.0%
17XP-08	SS-10	33 - 35		121.78	230.48	215.43	15.05	16.1%
17XP-08	SS-11	38 - 40		45.83	171.64	155.70	15.94	14.5%

Laboratory Determination of Water Content



ASTM D 2216

AASHTO T 265

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Report Date:	5/22/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/12 - 5/22/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Date(s):	Varies
Sampling Method:	Borehole	Drill Rig :	N/A

Method: A (1%) B (0.1%) *Balance ID.* 1024 *Calibration Date:* 11/4/16

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
17XP-08	SS-12	43 - 45		46.80	151.62	139.76	11.86	12.8%
17XP-08	SS-13	48 - 50		48.79	158.14	143.76	14.38	15.1%
17XP-08	SS-14	53 - 55		45.96	172.95	145.51	27.44	27.6%
17XP-08	SS-15	58 - 60		49.06	157.77	136.85	20.92	23.8%
17XP-11	SS-1	0 - 2		45.50	130.83	110.33	20.50	31.6%
17XP-11	SS-2	2 - 4		122.74	219.37	205.56	13.81	16.7%
17XP-11	SS-3	4 - 6		47.13	103.10	91.47	11.63	26.2%
17XP-11	SS-4	6 - 8		47.11	112.62	98.50	14.12	27.5%
17XP-11	SS-5	8 - 10		45.80	136.24	119.51	16.73	22.7%
17XP-11	SS-6	13 - 15		51.17	127.49	109.42	18.07	31.0%
17XP-11	SS-7	18 - 20		46.05	348.43	311.42	37.01	13.9%
17XP-11	SS-8	23 - 25		49.74	177.03	154.74	22.29	21.2%
17XP-11	SS-9	28 - 30		126.59	387.92	338.59	49.33	23.3%
17XP-11	SS-10	33 - 35		48.93	156.03	138.18	17.85	20.0%
17XP-11	SS-11	38 - 40		47.23	165.04	142.56	22.48	23.6%
17XP-17	SS-1	0 - 2		46.18	115.27	98.05	17.22	33.2%
17XP-17	SS-2	2 - 4		48.04	177.24	152.04	25.20	24.2%
17XP-17	SS-3	4 - 6		45.57	165.66	140.22	25.44	26.9%
17XP-17	SS-4	6 - 8		133.17	299.66	264.30	35.36	27.0%
17XP-17	SS-5	8 - 10		40.14	142.04	120.63	21.41	26.6%
17XP-17	SS-6	13 - 15		46.27	128.60	110.39	18.21	28.4%
17XP-17	SS-7	18 - 20		136.27	263.90	236.52	27.38	27.3%
17XP-17	SS-8	23 - 25		46.38	133.18	112.40	20.78	31.5%
17XP-17	SS-9	28 - 30		125.88	277.12	248.90	28.22	22.9%
17XP-17	SS-10	33 - 35		48.00	144.49	122.46	22.03	29.6%
17XP-17	SS-11	38 - 40		45.79	134.91	116.12	18.79	26.7%
17XP-20	SS-7	18 - 20		49.60	131.23	115.41	15.82	24.0%
17XP-20	SS-8	23 - 25		137.58	266.76	241.63	25.13	24.2%
17XP-20	SS-9	28 - 30		46.10	145.01	125.65	19.36	24.3%
17XP-20	SS-10	33 - 35		46.58	139.63	122.83	16.80	22.0%
17XP-20	SS-11	38 - 40		122.89	253.46	224.74	28.72	28.2%

Laboratory Determination of Water Content



ASTM D 2216

AASHTO T 265

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Report Date:	5/22/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/12 - 5/22/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Date(s):	Varies
Sampling Method:	Borehole	Drill Rig :	N/A

Method: A (1%) B (0.1%) *Balance ID.* 1024 *Calibration Date:* 11/4/16

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
17XP-21	SS-1	0 - 2		48.45	121.89	109.48	12.41	20.3%
17XP-21	SS-2	2 - 4		48.28	155.06	137.13	17.93	20.2%
17XP-21	SS-3	4 - 6		45.27	137.72	121.01	16.71	22.1%
17XP-21	SS-4	6 - 8		46.00	122.07	108.37	13.70	22.0%
17XP-21	SS-5	8 - 10		106.61	209.95	186.52	23.43	29.3%
17XP-21	SS-6	13 - 15		46.40	125.04	111.23	13.81	21.3%
17XP-21	SS-7	18 - 20		106.22	232.51	206.86	25.65	25.5%
17XP-21	SS-8	23 - 25		45.84	116.09	104.12	11.97	20.5%
17XP-21	SS-9	28 - 30		32.96	136.42	115.02	21.40	26.1%
17XP-21	SS-10	33 - 35		45.83	166.00	141.55	24.45	25.5%
17XP-21	SS-11	38 - 40		33.69	154.65	132.21	22.44	22.8%
17XP-21	SS-12	43 - 45		49.84	119.35	105.85	13.50	24.1%
17XP-66	SS-1	0 - 2		45.58	162.81	152.37	10.44	9.8%
17XP-66	SS-2	2 - 4		47.07	182.43	168.93	13.50	11.1%
17XP-66	SS-3	4 - 6		48.41	163.28	146.13	17.15	17.6%
17XP-66	SS-4	6 - 8		45.78	153.32	140.45	12.87	13.6%
17XP-66	SS-5	8 - 10		49.16	187.15	175.37	11.78	9.3%
17XP-66	SS-6	13 - 15		84.22	247.46	225.09	22.37	15.9%
17XP-66	SS-7	18 - 20		46.08	155.64	143.17	12.47	12.8%
17XP-67	SS-1	0 - 2		47.10	129.49	116.37	13.12	18.9%
17XP-67	SS-2	2 - 4		53.05	160.96	147.05	13.91	14.8%
17XP-67	SS-3	4 - 6		116.83	290.52	256.65	33.87	24.2%
17XP-67	SS-4	6 - 8		48.79	140.06	127.77	12.29	15.6%
17XP-67	SS-5	8 - 10		48.79	155.13	143.01	12.12	12.9%
17XP-67	SS-6	13 - 15		48.35	205.87	181.78	24.09	18.1%
17XP-67	SS-7	18 - 20		45.84	163.58	142.89	20.69	21.3%
17XP-67	SS-8	23 - 25		113.01	354.56	331.43	23.13	10.6%
17XP-73	SS-1	0 - 2		52.95	121.01	107.39	13.62	25.0%
17XP-73	SS-2	2 - 4		45.08	152.00	131.82	20.18	23.3%
17XP-73	SS-3	4 - 6		48.56	128.61	112.49	16.12	25.2%
17XP-73	SS-4	6 - 8		37.74	140.17	120.63	19.54	23.6%

Laboratory Determination of Water Content



ASTM D 2216

AASHTO T 265

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Report Date:	6/1/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/30 - 5/31/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Date(s):	Varies
Sampling Method:	Borehole	Drill Rig :	N/A

Method: A (1%) B (0.1%) Balance ID. 1024 Calibration Date: 11/4/16

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
17CD-01	SS-1	0 - 2		49.06	183.44	169.08	14.36	12.0%
17CD-01	SS-2	2 - 4		45.57	182.38	167.11	15.27	12.6%
17CD-01	SS-3	4 - 6		48.34	188.60	164.58	24.02	20.7%
17CD-01	SS-4	6 - 8		45.62	186.37	158.15	28.22	25.1%
17CD-01	SS-5	8 - 10		45.46	179.26	158.49	20.77	18.4%
17CD-01	SS-6	13 - 15		38.74	171.74	148.96	22.78	20.7%
17CD-01	SS-7	18 - 20		33.93	191.75	160.89	30.86	24.3%
17CD-01	SS-8	23 - 25		46.38	185.63	149.95	35.68	34.5%
17CD-01	SS-9	28 - 28.8		45.76	181.58	163.23	18.35	15.6%
17CD-02	Bulk	0 - 15		45.88	232.65	203.18	29.47	18.7%
17CD-02	SS-1	0 - 2		46.79	172.67	149.78	22.89	22.2%
17CD-02	SS-2	2 - 4		45.74	185.26	167.10	18.16	15.0%
17CD-02	SS-3	4 - 6		49.27	175.03	160.82	14.21	12.7%
17CD-02	SS-4	6 - 8		48.94	196.39	171.78	24.61	20.0%
17CD-02	SS-5	8 - 10		50.61	189.07	171.10	17.97	14.9%
17CD-02	SS-6	13 - 15		49.22	153.96	137.97	15.99	18.0%

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Mal Krajan, ET

Technical Responsibility

Signature

Laboratory Manager

Position

6/1/2017

Date

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Laboratory Determination of Water Content



ASTM D 2216

AASHTO T 265

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR. 10052825 Task: 017	Report Date:	6/16/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	6/15 - 6/16/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Date(s):	Varies
Sampling Method:	Borehole	Drill Rig :	N/A

Method: A (1%) B (0.1%) *Balance ID.* 1024 *Calibration Date:* 11/4/16

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
17HWN-01	SS-1	0 - 2		48.90	173.75	158.39	15.36	14.0%
17HWN-01	SS-2	2 - 4		48.28	155.35	141.25	14.10	15.2%
17HWN-01	SS-3	4 - 6		45.61	171.33	158.22	13.11	11.6%
17HWN-01	SS-4	6 - 8		47.07	188.88	163.48	25.40	21.8%
17HWN-01	SS-5	8 - 10		45.97	176.08	151.60	24.48	23.2%
17HWN-01	SS-6	13 - 15		49.31	192.66	168.68	23.98	20.1%
17HWN-01	SS-7	18 - 20		45.75	159.18	138.76	20.42	22.0%
17HWN-01	SS-8	23 - 25		45.37	178.47	153.95	24.52	22.6%
17HWN-01	SS-9	28 - 30		33.69	149.04	125.13	23.91	26.1%
17HWN-01	SS-10	33 - 35		45.52	146.96	123.44	23.52	30.2%
17HWN-01	SS-11	38 - 40		115.47	239.73	216.31	23.42	23.2%
17HWN-01	SS-12	43 - 45		45.78	148.49	127.98	20.51	25.0%
17HWN-01	SS-13	48 - 50		116.21	287.68	254.57	33.11	23.9%
17HWN-01	SS-14	53 - 54.8		45.47	164.69	142.97	21.72	22.3%
17HWN-01	SS-15	58 - 60		51.31	165.61	144.48	21.13	22.7%
17HWN-02	SS-1	0 - 2		50.60	164.54	150.26	14.28	14.3%
17HWN-02	SS-2	2 - 4		45.74	157.74	140.93	16.81	17.7%
17HWN-02	SS-3	4 - 6		48.42	154.26	134.26	20.00	23.3%
17HWN-02	SS-4	6 - 8		108.48	230.75	213.99	16.76	15.9%
17HWN-02	SS-5	8 - 10		49.07	152.57	133.56	19.01	22.5%
17HWN-02	SS-6	13 - 15		50.45	170.58	156.33	14.25	13.5%
17HWN-02	SS-7	18 - 20		106.63	241.24	224.63	16.61	14.1%

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

6/16/2017
Date

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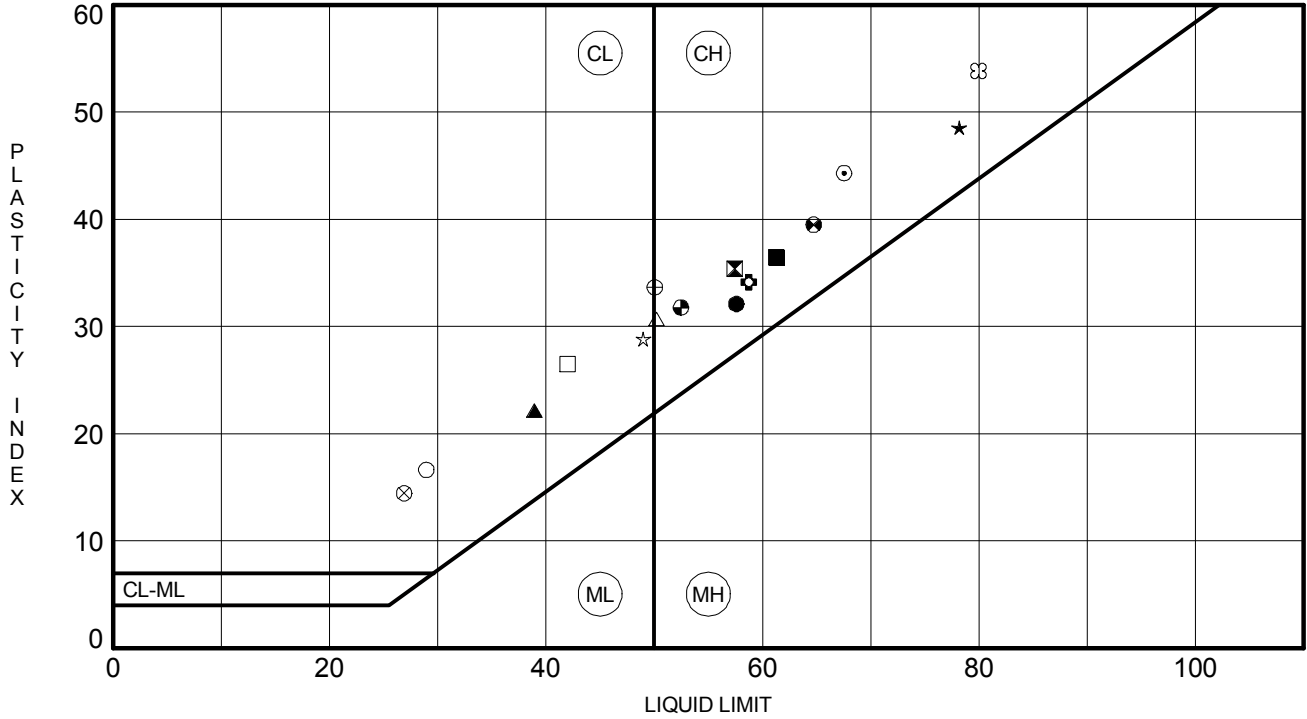
ATTERBERG LIMITS RESULTS

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



(1) GET - ATTERBERG LIMITS REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14).GDT - 5/1/17 13:00 - G:\GINT\PROJECTS\17VB17-151G 95 EXPRESS LANES.GPJ

BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
● 17CL-02	14.0	58	25	33	69	SANDY FAT CLAY(CH)
⊠ 17CL-03	14.0	57	22	35	91	FAT CLAY(CH)
▲ 17CL-03	34.0	39	17	22	18	CLAYEY SAND(SC)
★ 17CL-12	5.0	78	30	48	100	FAT CLAY(CH)
⊙ 17CL-12	39.0	68	23	45	98	FAT CLAY(CH)
⊕ 17CL-12	68.8	59	25	34	98	FAT CLAY(CH)
○ 17SWM-05	5.0	29	12	17	47	CLAYEY SAND(SC)
△ 17SWM-15	24.0	50	19	31	93	FAT CLAY(CH)
⊗ 17XP-14	5.0	27	12	15	36	CLAYEY SAND(SC)
⊕ 17XP-14	19.0	50	16	34	55	SANDY FAT CLAY(CH)
□ 17XP-14	34.0	42	15	27	15	CLAYEY SAND(SC)
⊕ 17XP-16	5.0	65	25	40	83	FAT CLAY with SAND(CH)
⊕ 17XP-19	7.0	52	21	31	98	FAT CLAY(CH)
★ 17XP-19	49.0	49	20	29	99	LEAN CLAY(CL)
⊗ 17XP-20	5.0	80	26	54	95	FAT CLAY(CH)
■ 17XP-58	29.0	61	25	36	90	FAT CLAY(CH)



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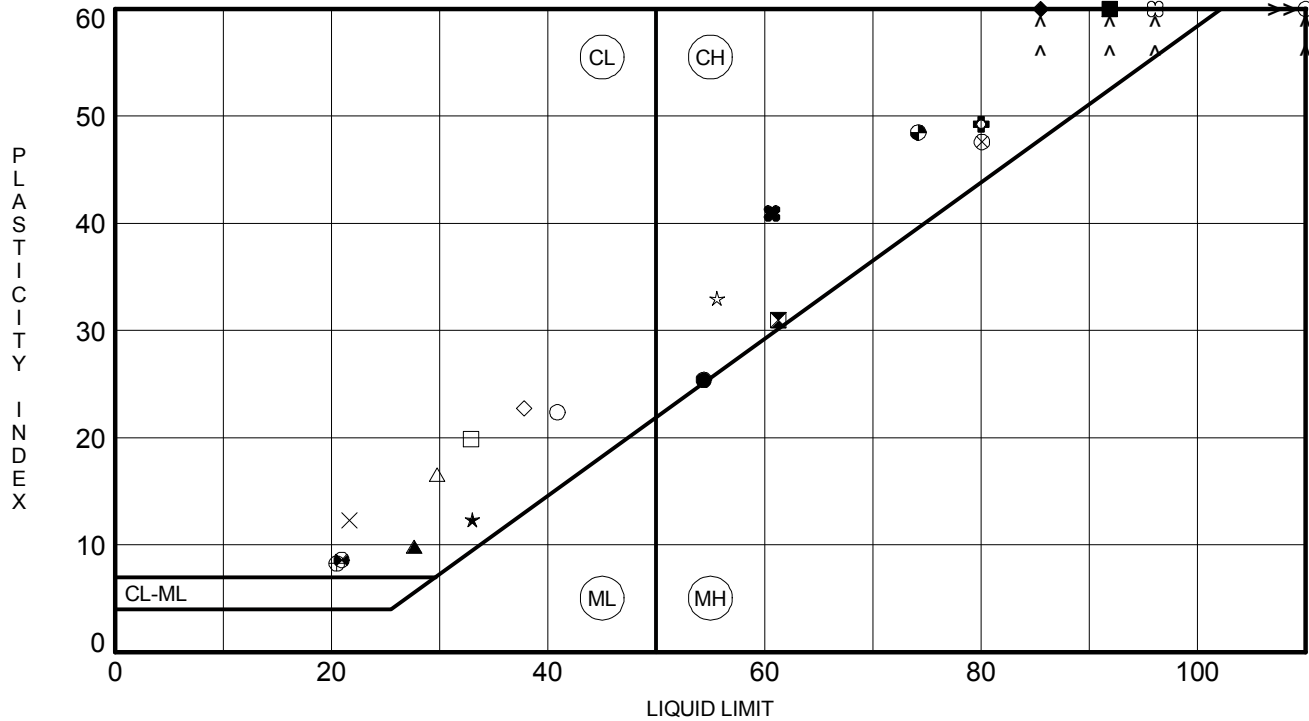
ATTERBERG LIMITS RESULTS

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



(1) GET - ATTERBERG LIMITS REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14).GDT - 5/23/17 11:00 - G:\GIT\PROJECTS\17\17V\17-151G 95 EXPRESS LANES.GPJ

	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	17BR-02	19.0	54	29	25	97	FAT CLAY(CH)
⊠	17BR-02	64.0	61	30	31	99	FAT CLAY(CH)
▲	17BR-03	19.0	28	18	10	76	LEAN CLAY with SAND(CL)
★	17BR-03	34.0	33	21	12	51	SANDY LEAN CLAY(CL)
⊙	17BR-03	54.0	110	21	89	27	CLAYEY SAND(SC)
⊕	17RW-09	14.0	80	31	49	100	FAT CLAY(CH)
○	17RW-09	29.0	41	18	23	85	LEAN CLAY(CL)
△	17SW-02	19.0	30	13	17	42	CLAYEY SAND(SC)
⊗	17SW-03	29.0	80	32	48	100	FAT CLAY(CH)
⊕	17SW-04	9.0	20	12	8	39	CLAYEY SAND(SC)
□	17SWM-01	4.0	33	13	20	53	SANDY LEAN CLAY(CL)
⊕	17SWM-01	14.0	21	12	9	72	LEAN CLAY with SAND(CL)
⊕	17SWM-07	19.0	74	26	48	100	FAT CLAY(CH)
★	17WGS-08	9.0	56	23	33	58	SANDY FAT CLAY(CH)
⊗	17XP-01	5.0	96	28	68	96	FAT CLAY(CH)
■	17XP-03	4.0	92	24	68	95	FAT CLAY(CH)
◆	17XP-03	9.0	85	21	64	100	FAT CLAY(CH)
◇	17XP-04	24.0	38	15	23	54	SANDY LEAN CLAY(CL)
×	17XP-05	14.5	22	9	13	44	CLAYEY SAND(SC)
⊕	17XP-05	19.0	61	20	41	78	FAT CLAY with SAND(CH)



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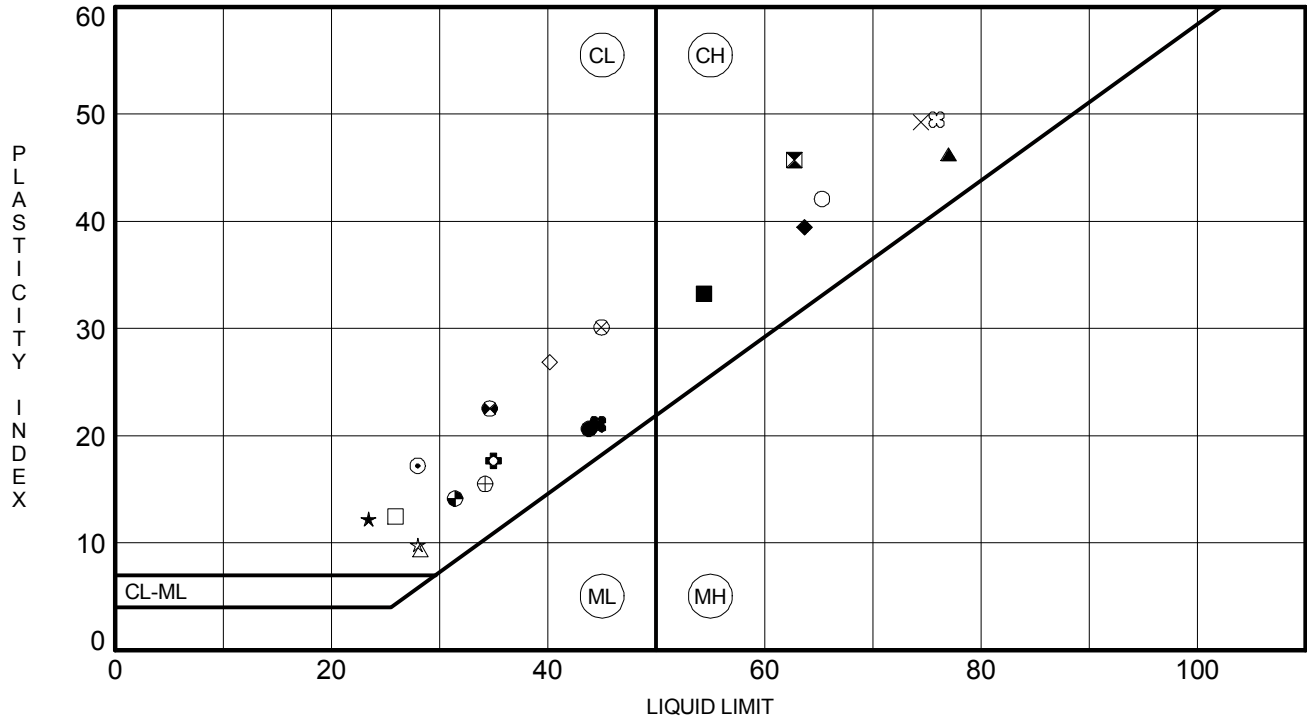
ATTERBERG LIMITS RESULTS

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



(1) GET - ATTERBERG LIMITS REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14).GDT - 6/14/17 10:00 - G:\GINT\PROJECTS\17\17V17-151G 95 EXPRESS LANES.GPJ

	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	17BR-08	34.0	44	23	21	63	SANDY LEAN CLAY(CL)
■	17BR-08	64.0	63	17	46	94	FAT CLAY(CH)
▲	17CHS-03	19.0	77	31	46	99	FAT CLAY(CH)
★	17HWN-03	4.0	23	11	12	43	CLAYEY SAND(SC)
⊕	17HWN-03	10.0	28	11	17	52	SANDY LEAN CLAY(CL)
⊕	17HWN-04	4.0	35	17	18	61	SANDY LEAN CLAY(CL)
○	17HWN-07	9.0	65	23	42	97	FAT CLAY(CH)
△	17NSS-07	7.0	28	19	9	26	CLAYEY SAND(SC)
⊗	17NSS-16	9.5	45	15	30	49	CLAYEY SAND(SC)
⊕	17NSS-18	11.0	34	19	15	55	SANDY LEAN CLAY(CL)
□	17RR-01	8.8	26	13	13	27	CLAYEY SAND(SC)
⊕	17RR-03	10.3	35	12	23	45	CLAYEY SAND(SC)
⊕	17RR-04	8.3	31	17	14	69	SANDY LEAN CLAY(CL)
★	17RR-06	6.3	28	18	10	61	SANDY LEAN CLAY(CL)
⊗	17RR-16	5.0	76	26	50	93	FAT CLAY(CH)
■	17RR-19	7.0	54	21	33	91	FAT CLAY(CH)
◆	17SBGP-01	7.0	64	24	40	99	FAT CLAY(CH)
◇	17SBGP-05	19.0	40	13	27	49	CLAYEY SAND(SC)
×	17SBGP-06	7.0	74	25	49	90	FAT CLAY(CH)
●	17SBGP-07	14.0	45	24	21	79	LEAN CLAY with SAND(CL)



GET Solutions, Inc.

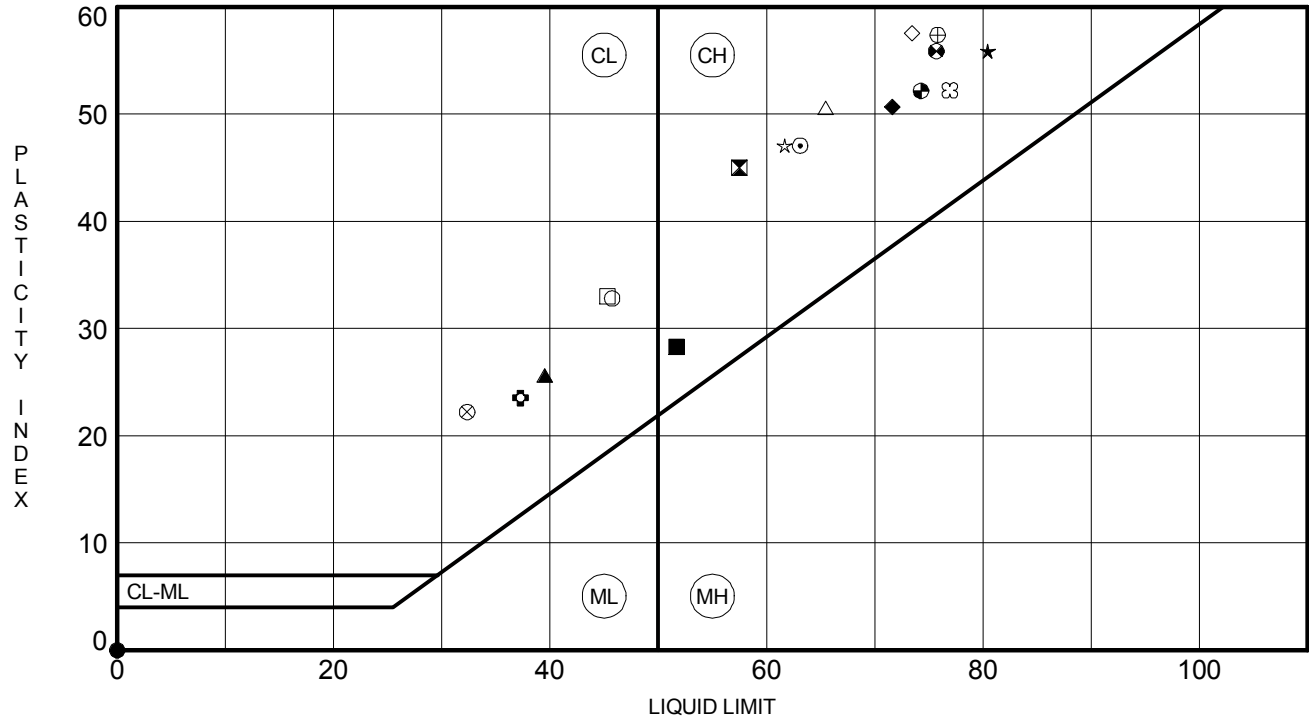
ATTERBERG LIMITS RESULTS

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

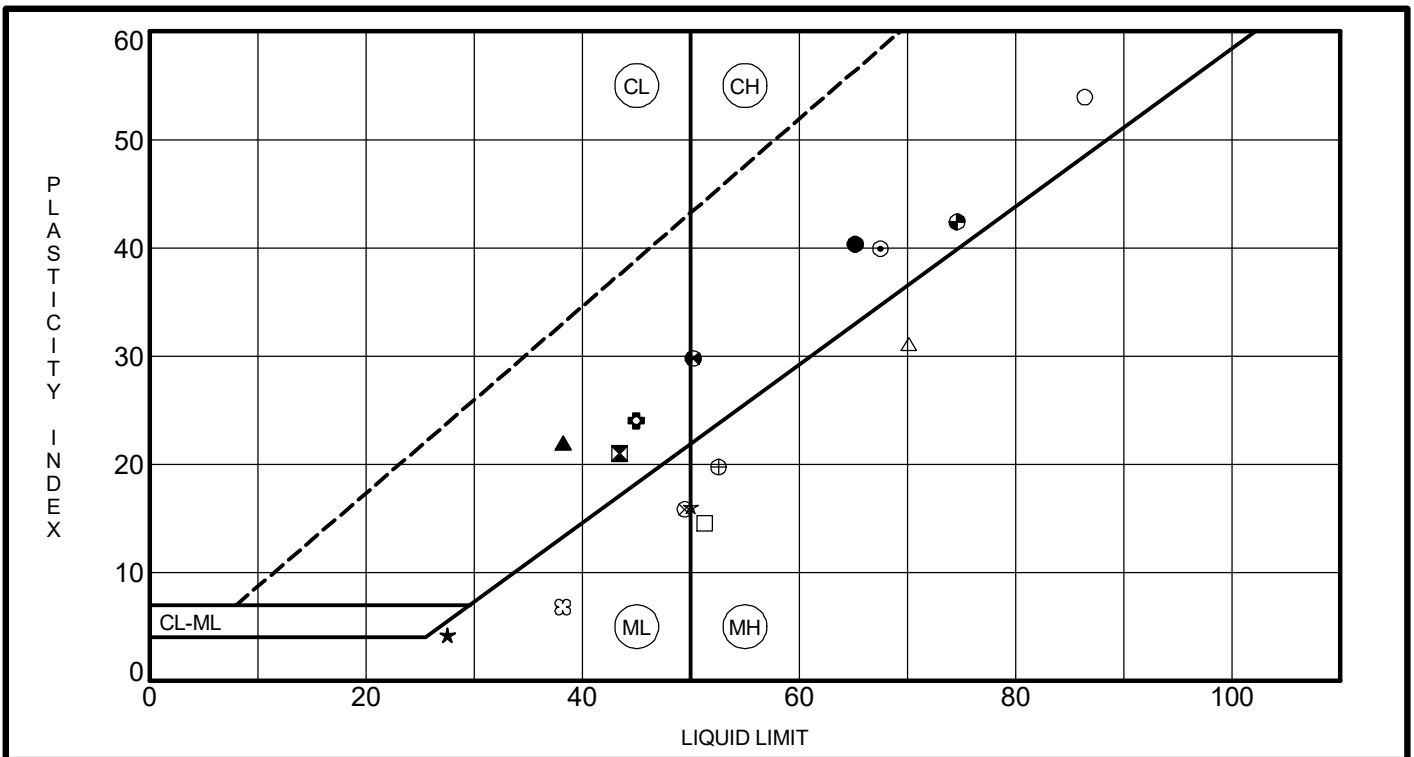
PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



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	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	17BR-06	39.0	NP	NP	NP	14	SILTY SAND(SM)
⊠	17RR-07	9.0	57	12	45	94	FAT CLAY(CH)
▲	17RR-07	13.4	39	14	25	76	LEAN CLAY with SAND(CL)
★	17RR-15	9.0	80	25	55	83	FAT CLAY with SAND(CH)
⊙	17RR-BR-10	44.0	63	16	47	97	FAT CLAY(CH)
⊕	17RR-BR-10	63.4	37	14	23	76	LEAN CLAY with SAND(CL)
○	17RR-BR-11	7.0	46	13	33	58	SANDY LEAN CLAY(CL)
△	17RR-BR-11	49.0	65	15	50	96	FAT CLAY(CH)
⊗	17RR-BR-11	73.6	32	10	22	64	SANDY LEAN CLAY(CL)
⊕	17RR-RW-08	7.0	76	18	58	94	FAT CLAY(CH)
□	17RR-RW-09	34.0	45	12	33	81	LEAN CLAY with SAND(CL)
⊕	17RR-RW-12	39.0	76	20	56	95	FAT CLAY(CH)
⊕	17RR-RW-13	5.0	74	22	52	69	SANDY FAT CLAY(CH)
★	17RR-RW-13	39.0	62	15	47	86	FAT CLAY(CH)
⊗	17RR-RW-14	5.0	77	25	52	72	FAT CLAY with SAND(CH)
■	17XP-18A	18.9	52	23	29	76	FAT CLAY with SAND(CH)
◆	17XP-18A	29.0	72	21	51	99	FAT CLAY(CH)
◇	17XP-18A	54.0	73	16	57	87	FAT CLAY(CH)



Boring	Depth	LL	PL	PI	Fines	Classification
● 17BR-09	18.0-20.0	65	25	40	61	SANDY FAT CLAY(CH)
☒ 17BR-09	43.0-45.0	43	22	21	28	CLAYEY SAND(SC)
▲ 17CL-13	2.0-4.0	38	16	22	34	CLAYEY SAND(SC)
★ 17RW-06	28.0-30.0	28	23	5	26	SILTY SAND(SM)
⊙ 17RW-07	28.0-30.0	68	28	40	61	SANDY FAT CLAY(CH)
⊕ 17RW-08	33.0-35.0	45	21	24	25	CLAYEY SAND(SC)
○ 17SWM-11	23.0-25.0	86	32	54	100	FAT CLAY(CH)
△ 17XP-24	8.0-10.0	70	39	31	99	ELASTIC SILT(MH)
⊗ 17XP-24	28.0-30.0	49	34	15	96	SILT(ML)
⊕ 17XP-24	33.0-35.0	53	33	20	99	ELASTIC SILT(MH)
□ 17XP-28	23.0-25.0	51	37	14	93	ELASTIC SILT(MH)
⊕ 17XP-29	23.0-25.0	50	20	30	32	CLAYEY SAND(SC)
⊕ 17XP-30	13.0-15.0	75	32	43	100	FAT CLAY(CH)
☆ 17XP-43	28.0-30.0	50	34	16	66	SANDY ELASTIC SILT(MH)
⊗ 17XP-43	38.0-40.0	38	31	7	42	SILTY SAND(SM)

Test Method: AASHTO T89/90 Method

Tested By: EM, JW

Date: 5/1/2017

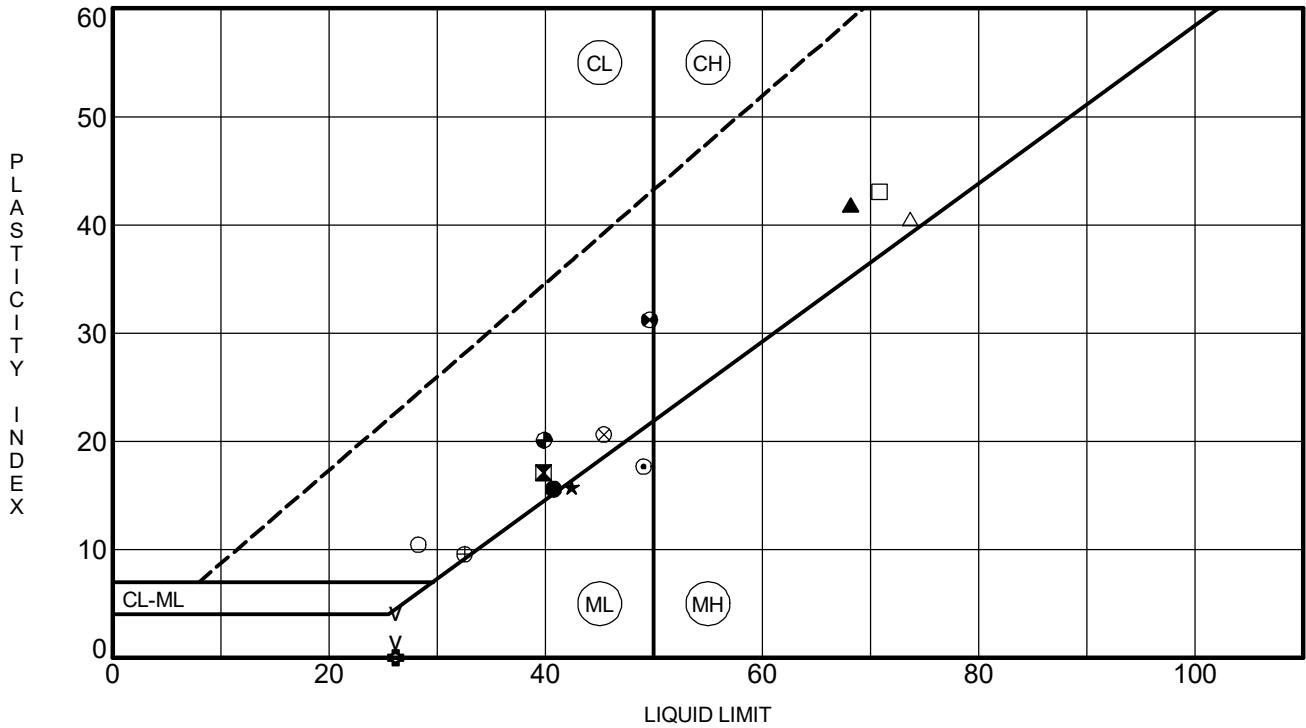


ATTERBERG LIMITS' RESULTS

Project: 95 Express Lanes Fredericksburg Extension

Location: Fredericksburg, Virginia

Project Number: 13-0013 (HDR Project# 170419)



Boring	Depth	LL	PL	PI	Fines	Classification
● 17XP-46	2.0-4.0	41	25	16	48	CLAYEY SAND(SC)
☒ 17XP-47	6.0-8.0	40	23	17	45	CLAYEY SAND(SC)
▲ 17XP-47	38.0-40.0	68	26	42	77	FAT CLAY with SAND(CH)
★ 17XP-48	4.0-6.0	42	27	15	37	SILTY SAND(SM)
⊙ 17XP-61	13.0-14.3	49	31	18	25	SILTY SAND(SM)
⊕ 17XP-62	8.0-10.0	26	26	NP	45	SILTY SAND(SM)
○ 17XP-68	2.0-4.0	28	18	10	56	SANDY LEAN CLAY(CL)
△ 17XP-69	13.0-15.0	74	33	41	86	FAT CLAY(CH)
⊗ 17XP-70	13.0-15.0	45	25	20	40	CLAYEY SAND(SC)
⊕ 17XP-70	23.0-25.0	33	23	10	25	CLAYEY SAND(SC)
□ 17XP-71	6.0-8.0	71	28	43	100	FAT CLAY(CH)
⊕ 17XP-72	13.0-15.0	50	18	32	90	FAT CLAY(CH)
⊕ 17XP-72	28.0-30.0	40	20	20	40	CLAYEY SAND(SC)

Test Method: AASHTO T89/90 Method

Tested By: EM, JW

Date: 5/3/2017

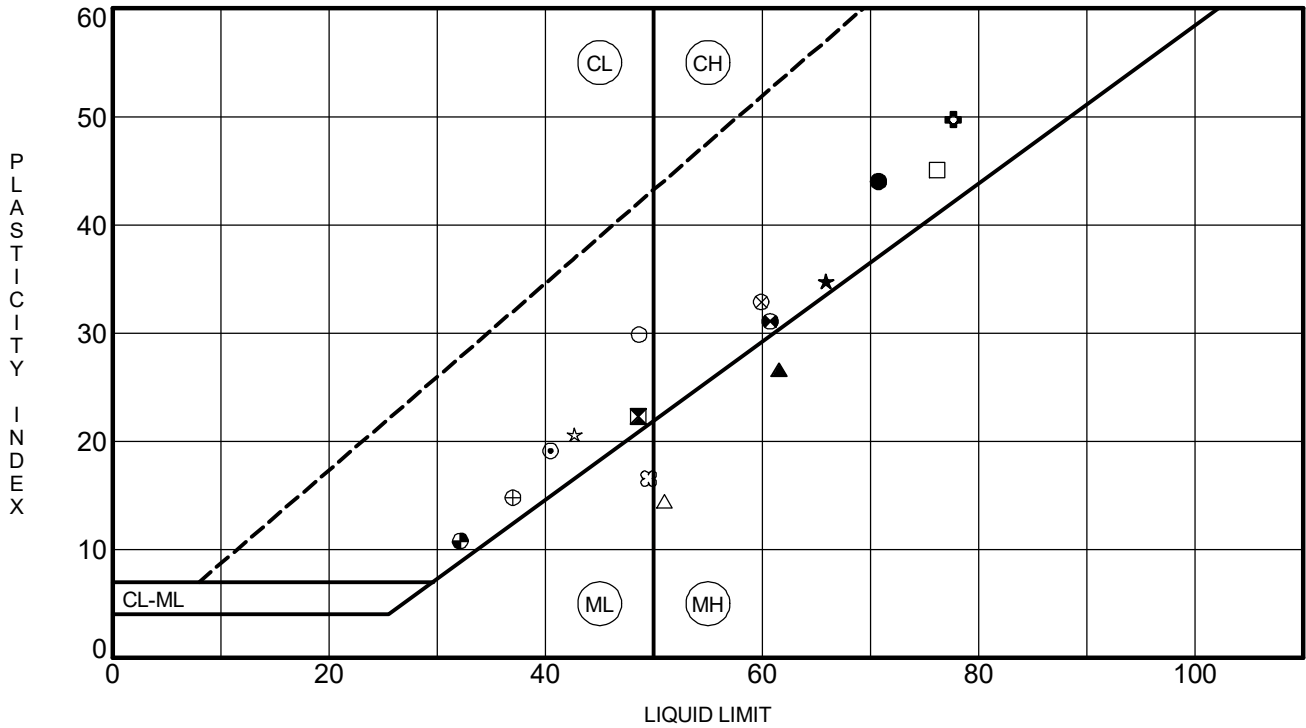


ATTERBERG LIMITS' RESULTS

Project: 95 Express Lanes Fredericksburg Extension

Location: Fredericksburg, Virginia

Project Number: 13-0013 (HDR Project# 170419)



Boring	Depth	LL	PL	PI	Fines	Classification
● 17BR-10	18.0-20.0	71	27	44	93	FAT CLAY(CH)
⊠ 17BR-10	38.0-40.0	49	26	23	74	LEAN CLAY with SAND(CL)
▲ 17BR-10	48.0-50.0	62	35	27	92	ELASTIC SILT(MH)
★ 17BR-10	68.0-70.0	66	31	35	99	FAT CLAY(CH)
⊙ 17BR-11	8.0-10.0	40	21	19	10	WELL-GRADED SAND with CLAY and GRAVEL(SW-SC)
⊕ 17BR-11	43.0-45.0	78	28	50	60	SANDY FAT CLAY(CH)
○ 17CD-03	18.0-20.0	49	19	30	83	LEAN CLAY with SAND(CL)
△ 17CL-01	38.0-39.8	51	37	14	88	ELASTIC SILT(MH)
⊗ 17SW-01	13.0-15.0	60	27	33	60	SANDY FAT CLAY(CH)
⊕ 17SWM-02	18.0-20.0	37	22	15	21	CLAYEY SAND(SC)
□ 17SWM-03	13.0-15.0	76	31	45	96	FAT CLAY(CH)
⊕ 17SWM-12	8.0-10.0	61	30	31	57	SANDY FAT CLAY(CH)
⊕ 17SWM-13	18.0-20.0	32	21	11	18	CLAYEY SAND(SC)
☆ 17WGS-02	4.0-6.0	43	22	21	57	SANDY LEAN CLAY(CL)
⊗ 17WGS-03	8.0-10.0	50	33	17	76	ELASTIC SILT with SAND(MH)

Test Method: AASHTO T89/90

Tested By: EM, JW

Date: 5/17/2017



ATTERBERG LIMITS' RESULTS

Project: 95 Express Lanes Fredericksburg Extension

Location: Fredericksburg, Virginia

Project Number: 13-0013 (HDR Project# 170419)

Liquid Limit, Plastic Limit, and Plastic Index



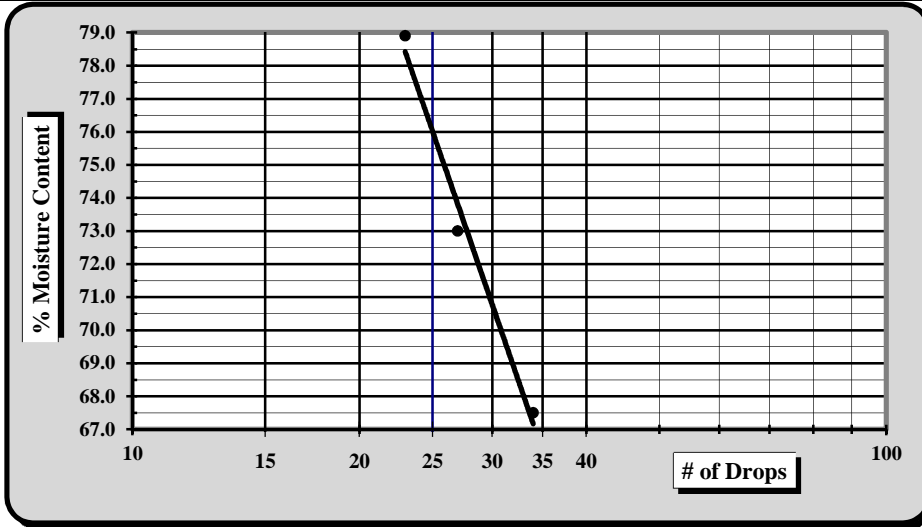
Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring #:	17CL-06	Sample #:	SS-5
		Sample Date:	4/10/17
Location:	Site Borehole	Offset:	N/A
		Depth (ft):	8 - 10 ft.

Sample Description:	Tan-Brown Fat CLAY (CH)				
<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>	<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit				Plastic Limit	
A	Tare Weight	15.30	11.02	15.22		21.14	21.05
B	Wet Soil Weight + A	23.64	19.34	25.72		28.17	29.41
C	Dry Soil Weight + A	20.28	15.83	21.09		26.68	27.60
D	Water Weight (B-C)	3.36	3.51	4.63		1.49	1.81
E	Dry Soil Weight (C-A)	4.98	4.81	5.87		5.54	6.55
F	% Moisture (D/E)*100	67.5%	73.0%	78.9%		26.9%	27.6%
N	# OF DROPS	34	27	23		<i>Moisture Contents determined by ASTM D 2216</i>	
LL	LL = F * FACTOR						
Ave.	Average					27.3%	



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **76**

Plastic Limit **27**

Plastic Index **49**

Group Symbol **CH**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 0%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Mal Krajan, ET</u> Technical Responsibility	 Signature	<u>Laboratory Manager</u> Position	<u>5/3/2017</u> Date
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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods:

ASTM D 4318 AASHTO T 89 AASHTO T 90

Quality Assurance

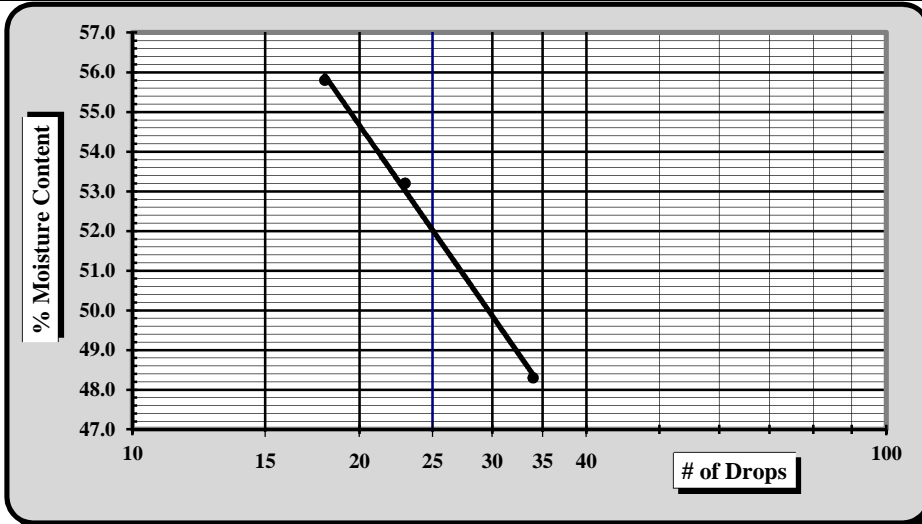
S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring #:	17CL-07	Sample #:	SS-4
		Sample Date:	4/10/17
Location:	Site Borehole	Offset:	N/A
		Depth (ft):	6 - 8 ft.

Sample Description: Tan-Brown Sandy Fat CLAY (CH)

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	21.17	16.69	16.70			13.05	12.98	
B	Wet Soil Weight + A	30.97	25.62	26.03			19.22	19.20	
C	Dry Soil Weight + A	27.78	22.52	22.69			17.92	17.87	
D	Water Weight (B-C)	3.19	3.10	3.34			1.30	1.33	
E	Dry Soil Weight (C-A)	6.61	5.83	5.99			4.87	4.89	
F	% Moisture (D/E)*100	48.3%	53.2%	55.8%			26.7%	27.2%	
N	# OF DROPS	34	23	18			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						27.0%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **52**

Plastic Limit **27**

Plastic Index **25**

Group Symbol **CH**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 4%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

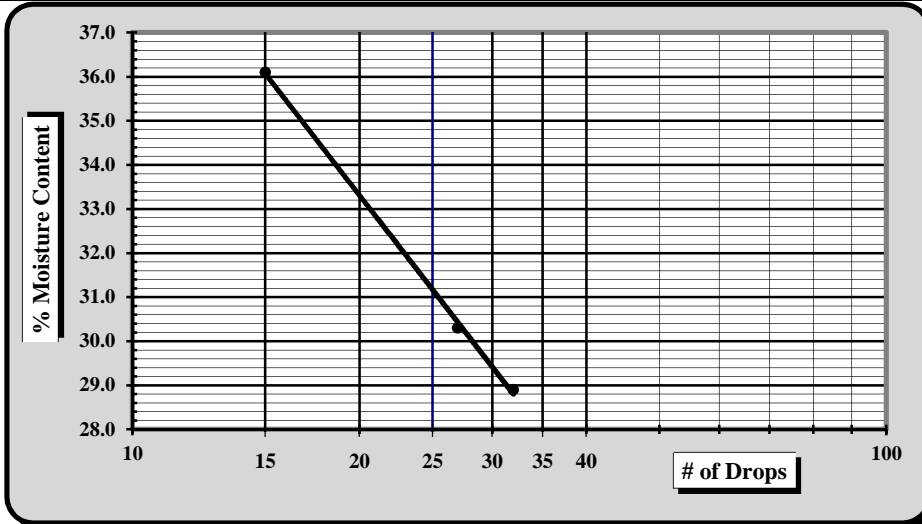
S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring #:	17CL-09	Sample #:	SS-6
		Sample Date:	4/5/17
Location:	Site Borehole	Offset:	N/A
		Depth (ft):	13 - 15 ft.

Sample Description: Brown Sandy Lean CLAY (CL)

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	16.75	13.60	11.09			12.92	13.07	
B	Wet Soil Weight + A	29.60	24.36	23.45			19.00	19.14	
C	Dry Soil Weight + A	26.72	21.86	20.17			18.13	18.25	
D	Water Weight (B-C)	2.88	2.50	3.28			0.87	0.89	
E	Dry Soil Weight (C-A)	9.97	8.26	9.08			5.21	5.18	
F	% Moisture (D/E)*100	28.9%	30.3%	36.1%			16.7%	17.2%	
N	# OF DROPS	32	27	15			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						17.0%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **31**

Plastic Limit **17**

Plastic Index **14**

Group Symbol **CL**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 15%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods:

ASTM D 4318

AASHTO T 89

AASHTO T 90

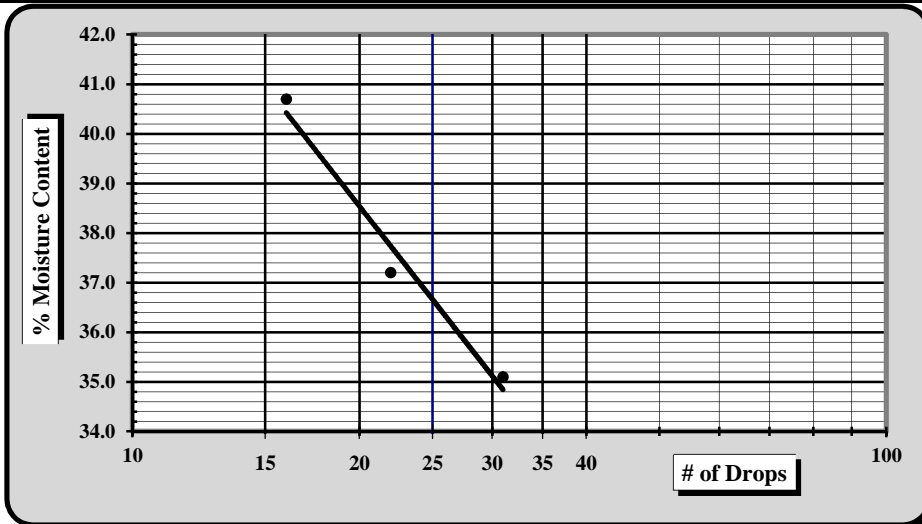
Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring #:	17CL-10	Sample #:	SS-4
		Sample Date:	4/5/17
Location:	Site Borehole	Offset:	N/A
		Depth (ft):	6 - 8 ft.

Sample Description:	Gray Brown Silty SAND (SM)				
<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>	<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	21.16	21.13	21.03			13.09	13.13	
B	Wet Soil Weight + A	35.85	32.23	31.06			19.21	19.23	
C	Dry Soil Weight + A	32.03	29.22	28.16			17.99	18.04	
D	Water Weight (B-C)	3.82	3.01	2.90			1.22	1.19	
E	Dry Soil Weight (C-A)	10.87	8.09	7.13			4.90	4.91	
F	% Moisture (D/E)*100	35.1%	37.2%	40.7%			24.9%	24.2%	
N	# OF DROPS	31	22	16			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						24.6%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **37**

Plastic Limit **25**

Plastic Index **12**

Group Symbol **SM**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 22%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods:

ASTM D 4318

AASHTO T 89

AASHTO T 90

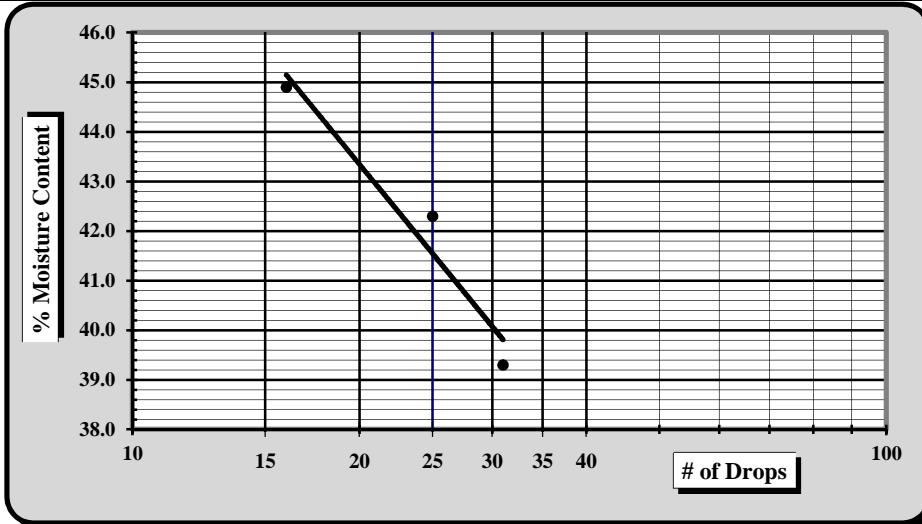
Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring #:	17CL-10	Sample #:	SS-8
Location:	Site Borehole	Offset:	N/A
		Sample Date:	4/5/17
		Depth (ft):	23 - 25 ft.

Sample Description:	Tan-Brown Clayey SAND (SC)				
<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>	<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit	
A	Tare Weight	13.52	20.88	20.92			12.97	12.89
B	Wet Soil Weight + A	24.02	31.00	30.63			20.09	20.03
C	Dry Soil Weight + A	21.06	27.99	27.62			18.77	18.70
D	Water Weight (B-C)	2.96	3.01	3.01			1.32	1.33
E	Dry Soil Weight (C-A)	7.54	7.11	6.70			5.80	5.81
F	% Moisture (D/E)*100	39.3%	42.3%	44.9%			22.8%	22.9%
N	# OF DROPS	31	25	16			<i>Moisture Contents determined by ASTM D 2216</i>	
LL	LL = F * FACTOR							
Ave.	Average						22.9%	



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	37
Plastic Limit	23
Plastic Index	14
Group Symbol	SC

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried

Estimate the % Retained on the #40 Sieve: 22%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET
Technical Responsibility

[Signature]
Signature

Laboratory Manager
Position

5/3/2017
Date

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Liquid Limit, Plastic Limit, and Plastic Index



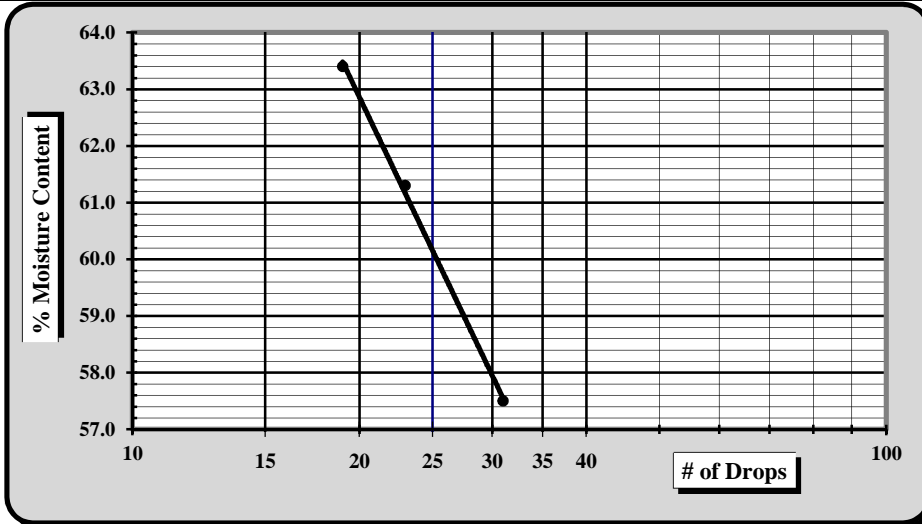
Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	10052825	Task:	017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL			Test Date(s)	4/21 - 4/28/17
Client Name:	HDR Inc.				
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060				
Boring #:	17XP-25	Sample #:	SS-4	Sample Date:	4/11/17
Location:	Site Borehole	Offset:	N/A	Depth (ft):	6 - 8 ft.

Sample Description:	Brown Fat CLAY (CH)				
<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>	<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit	
A	Tare Weight	13.59	21.04	21.16			20.79	21.07
B	Wet Soil Weight + A	22.57	34.20	30.44			28.79	30.68
C	Dry Soil Weight + A	19.29	29.20	26.84			27.08	28.63
D	Water Weight (B-C)	3.28	5.00	3.60			1.71	2.05
E	Dry Soil Weight (C-A)	5.70	8.16	5.68			6.29	7.56
F	% Moisture (D/E)*100	57.5%	61.3%	63.4%			27.2%	27.1%
N	# OF DROPS	31	23	19			<i>Moisture Contents determined by ASTM D 2216</i>	
LL	LL = F * FACTOR							
Ave.	Average						27.2%	



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **60**

Plastic Limit **27**

Plastic Index **33**

Group Symbol **CH**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 0%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET
Technical Responsibility

[Signature]
Signature

Laboratory Manager
Position

5/3/2017
Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods:

ASTM D 4318

AASHTO T 89

AASHTO T 90

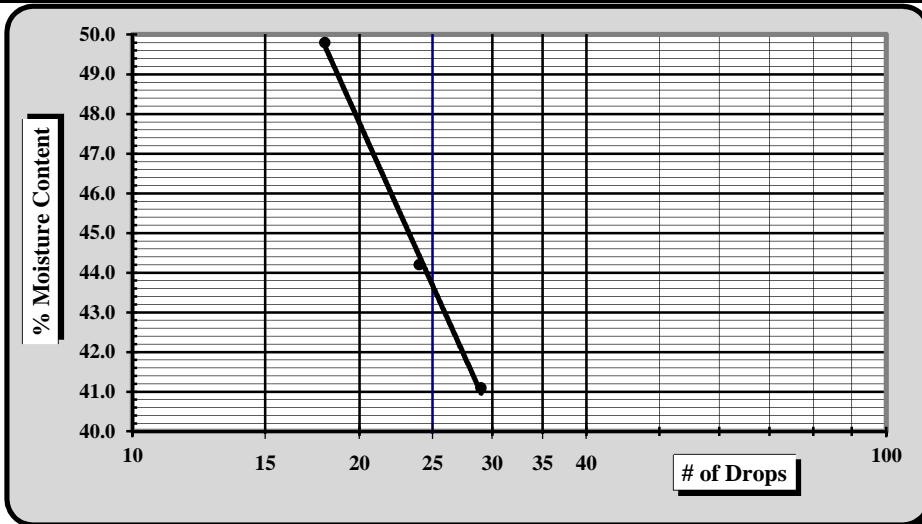
Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring #:	17XP-27	Sample #:	SS-6
		Sample Date:	4/11/17
Location:	Site Borehole	Offset:	N/A
		Depth (ft):	13 - 15 ft.

Sample Description: Brown SILT with Sand (ML)					
<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>	<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	20.62	20.88	20.74			13.09	13.06	
B	Wet Soil Weight + A	31.51	31.16	33.34			21.72	22.28	
C	Dry Soil Weight + A	28.34	28.01	29.15			19.51	19.90	
D	Water Weight (B-C)	3.17	3.15	4.19			2.21	2.38	
E	Dry Soil Weight (C-A)	7.72	7.13	8.41			6.42	6.84	
F	% Moisture (D/E)*100	41.1%	44.2%	49.8%			34.4%	34.8%	
N	# OF DROPS	29	24	18			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						34.6%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **44**

Plastic Limit **35**

Plastic Index **9**

Group Symbol **ML**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 1%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Liquid Limit, Plastic Limit, and Plastic Index



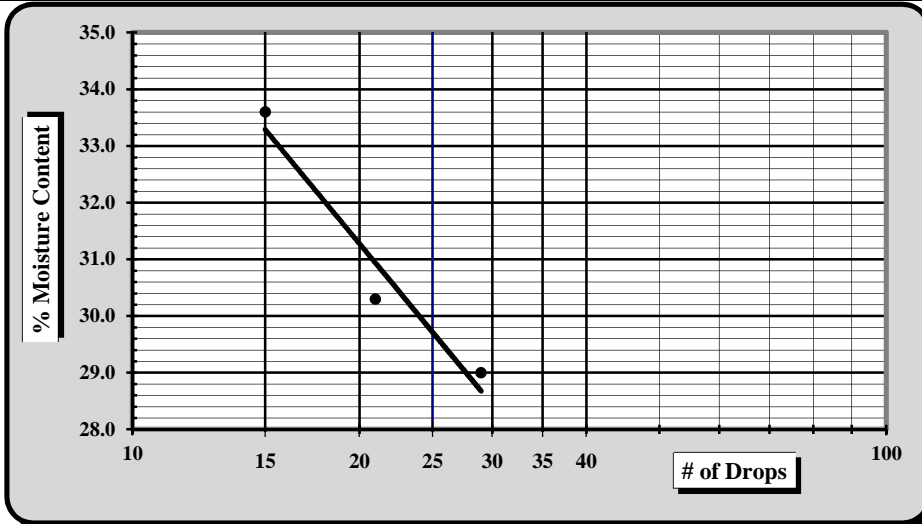
Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring #:	17XP-27	Sample #:	SS-8
		Sample Date:	4/11/17
Location:	Site Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft.

Sample Description:	Olive Gray Silty SAND (SM)				
<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>	<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit				Plastic Limit	
A	Tare Weight	12.88	13.07	13.07		13.09	12.43
B	Wet Soil Weight + A	22.90	27.70	25.15		21.39	20.98
C	Dry Soil Weight + A	20.65	24.30	22.11		19.59	19.14
D	Water Weight (B-C)	2.25	3.40	3.04		1.80	1.84
E	Dry Soil Weight (C-A)	7.77	11.23	9.04		6.50	6.71
F	% Moisture (D/E)*100	29.0%	30.3%	33.6%		27.7%	27.4%
N	# OF DROPS	29	21	15		<i>Moisture Contents determined by ASTM D 2216</i>	
LL	LL = F * FACTOR						
Ave.	Average					27.6%	



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **30**

Plastic Limit **28**

Plastic Index **2**

Group Symbol **SM**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 1%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods:

ASTM D 4318

AASHTO T 89

AASHTO T 90

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring #:	17XP-32	Sample #:	SS-5
Location:	Site Borehole	Offset:	N/A
		Sample Date:	4/7/17
		Depth (ft):	8 - 10 ft.

Sample Description:	Gray Brown Fat CLAY (CH)				
<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>	<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit	
A	Tare Weight	15.28	16.73	10.97			13.70	13.53
B	Wet Soil Weight + A	23.19	25.09	20.35			21.80	21.66
C	Dry Soil Weight + A	19.86	21.48	16.10			20.18	20.00
D	Water Weight (B-C)	3.33	3.61	4.25			1.62	1.66
E	Dry Soil Weight (C-A)	4.58	4.75	5.13			6.48	6.47
F	% Moisture (D/E)*100	72.7%	76.0%	82.8%			25.0%	25.7%
N	# OF DROPS	35	24	17			<i>Moisture Contents determined by ASTM D 2216</i>	
LL	LL = F * FACTOR							
Ave.	Average						25.4%	



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	77
Plastic Limit	25
Plastic Index	52
Group Symbol	CH

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 0%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET
 Technical Responsibility

[Signature]
 Signature

Laboratory Manager
 Position

5/3/2017
 Date

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Liquid Limit, Plastic Limit, and Plastic Index



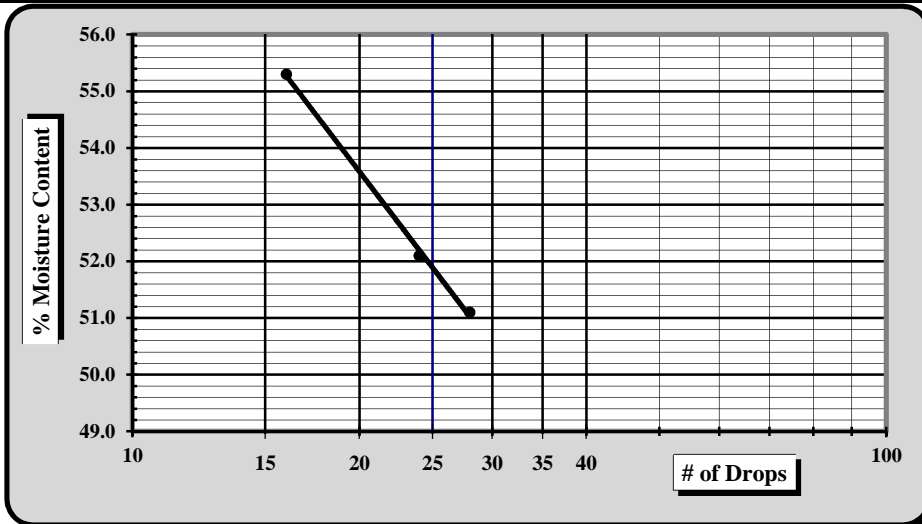
Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring #:	17XP-34	Sample #:	SS-6
		Sample Date:	4/5/17
Location:	Site Borehole	Offset:	N/A
		Depth (ft):	13 - 15 ft.

Sample Description:	Dark Brown Elastic SILT (MH)				
<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>	<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	21.15	21.00	21.23			13.09	20.50	
B	Wet Soil Weight + A	29.61	30.11	30.13			21.19	28.01	
C	Dry Soil Weight + A	26.75	26.99	26.96			18.91	25.89	
D	Water Weight (B-C)	2.86	3.12	3.17			2.28	2.12	
E	Dry Soil Weight (C-A)	5.60	5.99	5.73			5.82	5.39	
F	% Moisture (D/E)*100	51.1%	52.1%	55.3%			39.2%	39.3%	
N	# OF DROPS	28	24	16			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						39.3%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **52**
 Plastic Limit **39**
 Plastic Index **13**
 Group Symbol **MH**

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 0%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Mal Krajan, ET</u> Technical Responsibility	 Signature	<u>Laboratory Manager</u> Position	<u>5/3/2017</u> Date
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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods:

ASTM D 4318 AASHTO T 89 AASHTO T 90

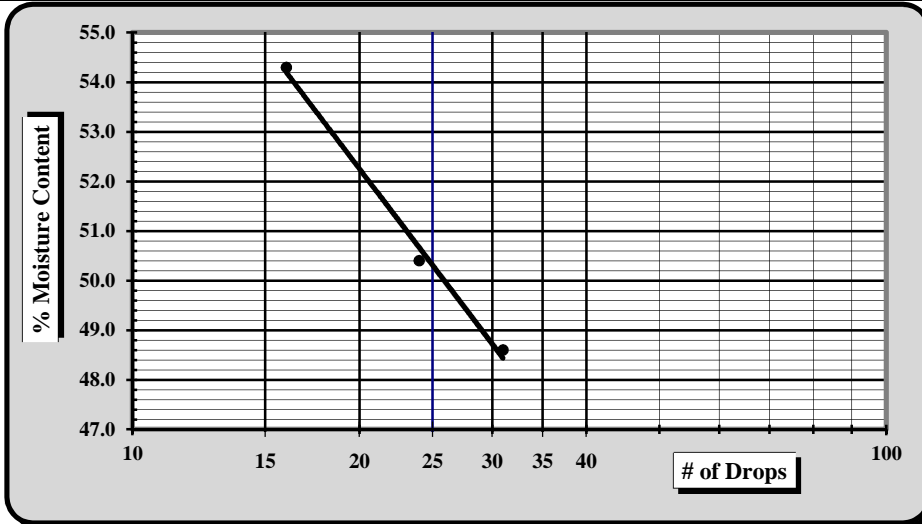
Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring #:	17XP-34	Sample #:	SS-7
Location:	Site Borehole	Offset:	N/A
		Sample Date:	4/5/17
		Depth (ft):	18 - 20 ft.

Sample Description:	Dark Brown Elastic SILT with Sand (MH)				
<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>	<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit	
A	Tare Weight	20.98	13.49	21.16			20.90	21.03
B	Wet Soil Weight + A	31.50	22.03	30.59			27.11	27.53
C	Dry Soil Weight + A	28.06	19.17	27.27			25.39	25.75
D	Water Weight (B-C)	3.44	2.86	3.32			1.72	1.78
E	Dry Soil Weight (C-A)	7.08	5.68	6.11			4.49	4.72
F	% Moisture (D/E)*100	48.6%	50.4%	54.3%			38.3%	37.7%
N	# OF DROPS	31	24	16			<i>Moisture Contents determined by ASTM D 2216</i>	
LL	LL = F * FACTOR							
Ave.	Average						38.0%	



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **50**

Plastic Limit **38**

Plastic Index **12**

Group Symbol **MH**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 2%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET
Technical Responsibility

[Signature]
Signature

Laboratory Manager
Position

5/3/2017
Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods:

ASTM D 4318 AASHTO T 89 AASHTO T 90

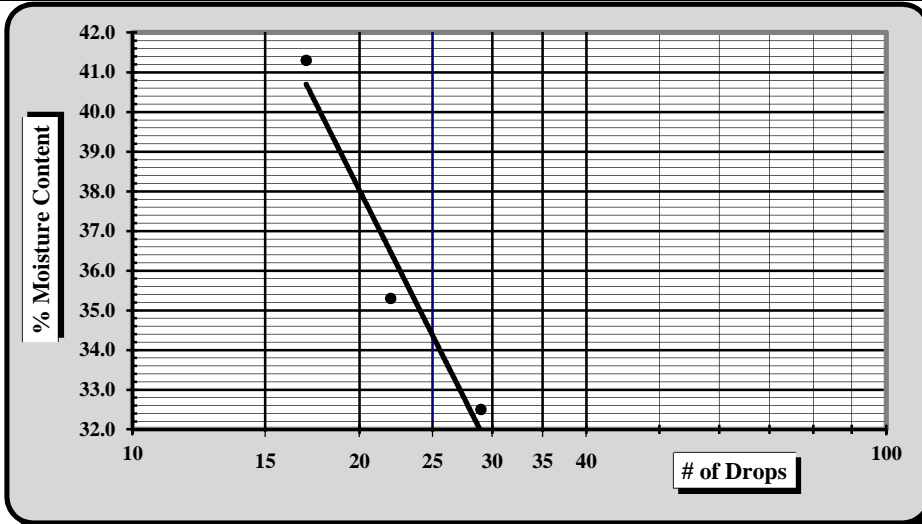
Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring #:	17XP-34	Sample #:	SS-10
Location:	Site Borehole	Offset:	N/A
Sample Description:	Gray SILT with Sand (ML)		
Sample Date:	4/5/17		
Depth (ft):	33 - 35 ft		

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit	
A	Tare Weight	21.02	20.95	20.70			13.01	12.93
B	Wet Soil Weight + A	30.07	31.33	29.77			20.69	20.24
C	Dry Soil Weight + A	27.85	28.62	27.12			18.90	18.52
D	Water Weight (B-C)	2.22	2.71	2.65			1.79	1.72
E	Dry Soil Weight (C-A)	6.83	7.67	6.42			5.89	5.59
F	% Moisture (D/E)*100	32.5%	35.3%	41.3%			30.4%	30.8%
N	# OF DROPS	29	22	17			<i>Moisture Contents determined by ASTM D 2216</i>	
LL	LL = F * FACTOR							
Ave.	Average						30.6%	



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **34**

Plastic Limit **31**

Plastic Index **3**

Group Symbol **ML**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 2%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods:

ASTM D 4318 AASHTO T 89 AASHTO T 90

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring #:	17XP-35	Sample #:	SS-9
		Sample Date:	4/5/17
Location:	Site Borehole	Offset:	N/A
		Depth (ft):	28 - 30 ft

Sample Description: Olive Gray Silty SAND (SM)					
<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>	<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	13.52	21.03	20.78			20.98	20.74	
B	Wet Soil Weight + A	25.11	30.55	31.23			29.37	28.50	
C	Dry Soil Weight + A	22.14	27.80	28.01			27.26	26.53	
D	Water Weight (B-C)	2.97	2.75	3.22			2.11	1.97	
E	Dry Soil Weight (C-A)	8.62	6.77	7.23			6.28	5.79	
F	% Moisture (D/E)*100	34.5%	40.6%	44.5%			33.6%	34.0%	
N	# OF DROPS	27	23	20			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						33.8%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	37
Plastic Limit	34
Plastic Index	3
Group Symbol	SM

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 5%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/3/2017
 Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods:

ASTM D 4318 AASHTO T 89 AASHTO T 90

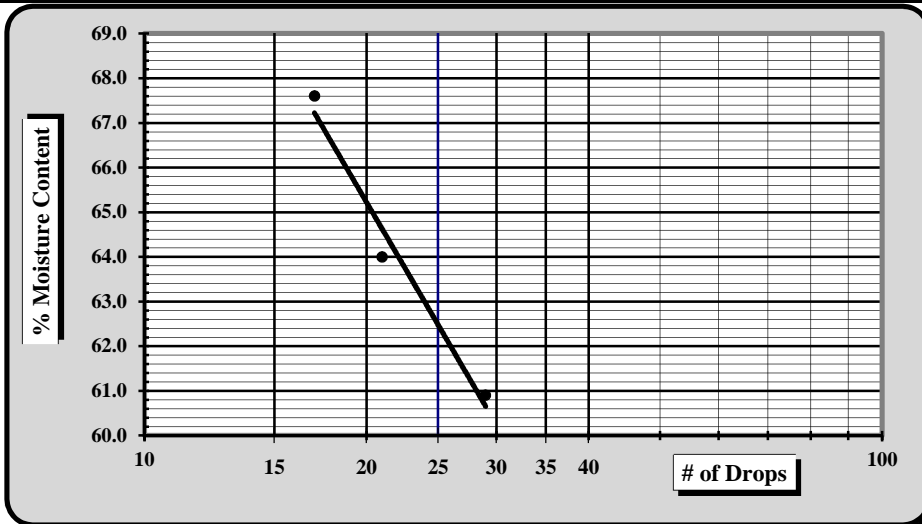
Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring #:	17XP-42	Sample #:	SS-4
		Sample Date:	4/4/17
Location:	Site Borehole	Offset:	N/A
		Depth (ft):	6 - 8 ft

Sample Description: Brown Fat CLAY with Sand (CH)					
<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>	<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	13.53	21.03	13.58			12.51	13.00	
B	Wet Soil Weight + A	21.46	30.54	22.95			18.89	19.81	
C	Dry Soil Weight + A	18.46	26.83	19.17			17.55	18.39	
D	Water Weight (B-C)	3.00	3.71	3.78			1.34	1.42	
E	Dry Soil Weight (C-A)	4.93	5.80	5.59			5.04	5.39	
F	% Moisture (D/E)*100	60.9%	64.0%	67.6%			26.6%	26.3%	
N	# OF DROPS	29	21	17			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						26.5%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **63**

Plastic Limit **27**

Plastic Index **36**

Group Symbol **CH**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 2%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Mal Krajan, ET</u> Technical Responsibility	 Signature	<u>Laboratory Manager</u> Position	<u>5/3/2017</u> Date
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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods:

ASTM D 4318 AASHTO T 89 AASHTO T 90

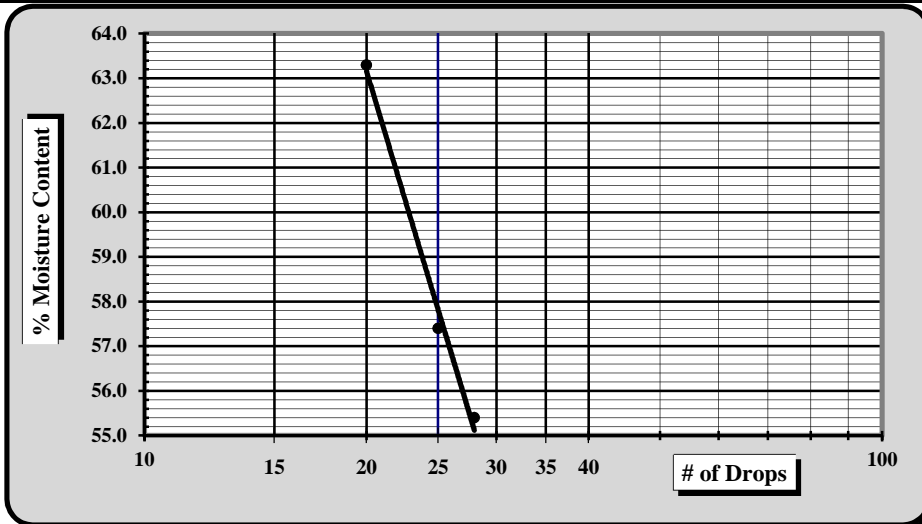
Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring #:	17XP-42	Sample #:	SS-7
Location:	Site Borehole	Offset:	N/A
Sample Description:	Gray Fat CLAY with Sand (CH)		
Sample Date:	4/4/17		
Depth (ft):	18 - 20 ft		

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit	
A	Tare Weight	16.71	11.00	16.73			21.06	13.03
B	Wet Soil Weight + A	26.44	20.05	24.96			29.67	20.61
C	Dry Soil Weight + A	22.97	16.75	21.77			28.29	19.40
D	Water Weight (B-C)	3.47	3.30	3.19			1.38	1.21
E	Dry Soil Weight (C-A)	6.26	5.75	5.04			7.23	6.37
F	% Moisture (D/E)*100	55.4%	57.4%	63.3%			19.1%	19.0%
N	# OF DROPS	28	25	20			<i>Moisture Contents determined by ASTM D 2216</i>	
LL	LL = F * FACTOR							
Ave.	Average						19.1%	



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **58**

Plastic Limit **19**

Plastic Index **39**

Group Symbol **CH**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 0%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Mal Krajan, ET</u> Technical Responsibility	 Signature	<u>Laboratory Manager</u> Position	<u>5/3/2017</u> Date
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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods:

ASTM D 4318

AASHTO T 89

AASHTO T 90

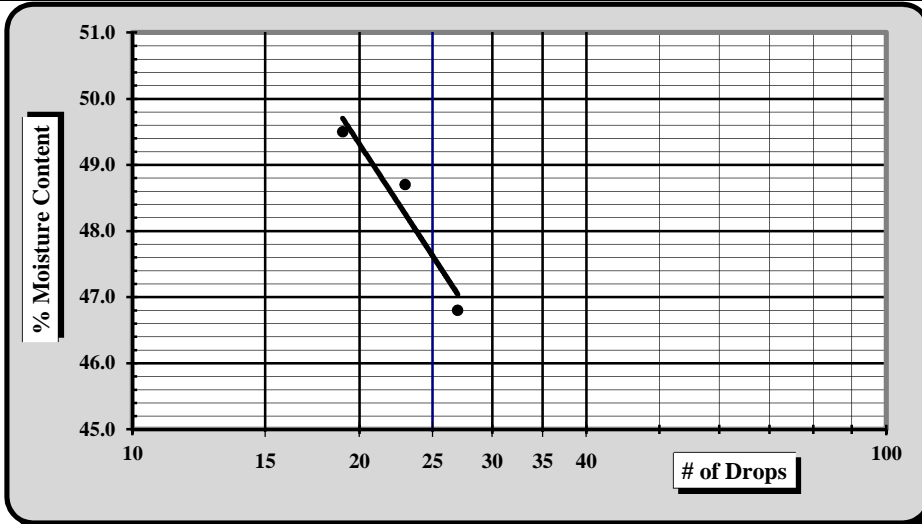
Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring #:	17XP-54	Sample #:	SS-6
		Sample Date:	4/3/17
Location:	Site Borehole	Offset:	N/A
		Depth (ft):	13 - 15 ft

Sample Description: Gray Brown Lean CLAY with Sand (CL)					
<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>	<i>Type and Specification</i>	<i>S&ME ID #</i>	<i>Cal Date:</i>
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit	
A	Tare Weight	21.06	13.69	13.60			12.97	13.04
B	Wet Soil Weight + A	29.34	23.34	21.36			19.12	19.09
C	Dry Soil Weight + A	26.70	20.18	18.79			18.25	18.24
D	Water Weight (B-C)	2.64	3.16	2.57			0.87	0.85
E	Dry Soil Weight (C-A)	5.64	6.49	5.19			5.28	5.20
F	% Moisture (D/E)*100	46.8%	48.7%	49.5%			16.5%	16.3%
N	# OF DROPS	27	23	19			<i>Moisture Contents determined by ASTM D 2216</i>	
LL	LL = F * FACTOR							
Ave.	Average						16.4%	



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	48
Plastic Limit	16
Plastic Index	32
Group Symbol	CL

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 0%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

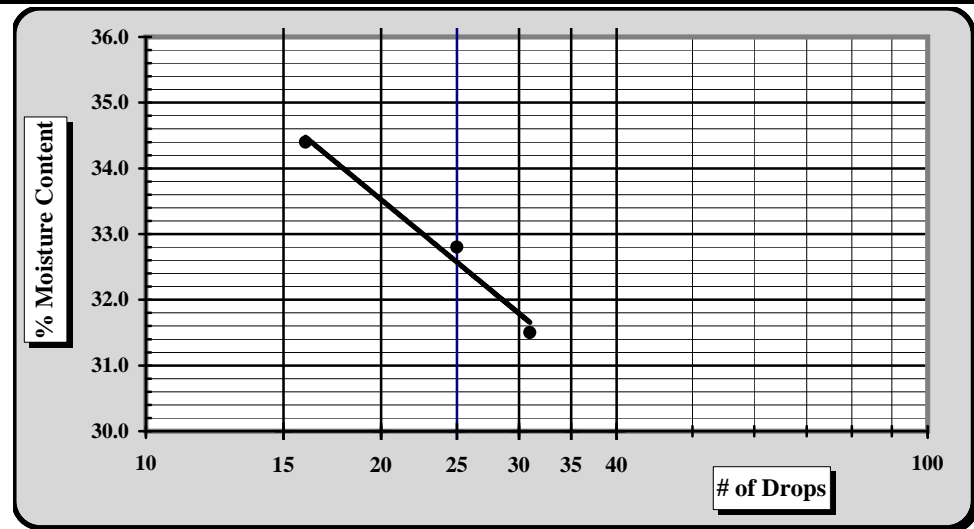
Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	5/16 - 5/21/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		

Boring #:	17BR-05	Sample #:	SS-7	Sample Date:	4/18/17
Location:	Site Borehole	Offset:	N/A	Depth (ft):	18 - 20 ft

Sample Description: Tan-Brown Sandy Lean CLAY (CL)

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	20.61	21.07	20.75			12.53	13.00	
B	Wet Soil Weight + A	30.59	32.64	31.15			18.70	19.07	
C	Dry Soil Weight + A	28.20	29.78	28.49			17.87	18.28	
D	Water Weight (B-C)	2.39	2.86	2.66			0.83	0.79	
E	Dry Soil Weight (C-A)	7.59	8.71	7.74			5.34	5.28	
F	% Moisture (D/E)*100	31.5%	32.8%	34.4%			15.5%	15.0%	
N	# OF DROPS	31	25	16			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						15.3%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **33**

Plastic Limit **15**

Plastic Index **18**

Group Symbol **CL**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 22%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Mal Krajan, ET</u> Technical Responsibility	 Signature	<u>Laboratory Manager</u> Position	<u>5/21/2017</u> Date
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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

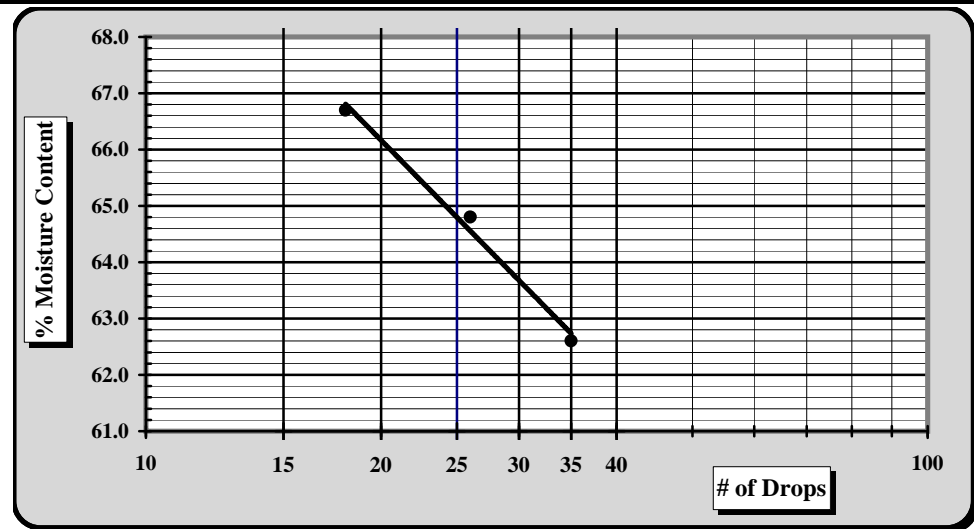
Project #: **HDR No. 10052825 Task: 017** Report Date: **5/21/17**
 Project Name: **Transurban - Fredex - 95XPL** Test Date(s) **5/16 - 5/21/17**
 Client Name: **HDR, Inc.**
 Client Address: **4480 Cox Road, Suite 103, Glen Allen, VA 23060**

Boring #: **17BR-05** Sample #: **SS-12** Sample Date: **4/18/17**
 Location: **Site Borehole** Offset: **N/A** Depth (ft): **43 - 45 ft**

Sample Description: **Gray Fat CLAY (CH)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	21.09	21.12	21.14			12.98	13.00	
B	Wet Soil Weight + A	30.31	32.00	30.89			20.65	19.56	
C	Dry Soil Weight + A	26.76	27.72	26.99			18.85	17.99	
D	Water Weight (B-C)	3.55	4.28	3.90			1.80	1.57	
E	Dry Soil Weight (C-A)	5.67	6.60	5.85			5.87	4.99	
F	% Moisture (D/E)*100	62.6%	64.8%	66.7%			30.7%	31.5%	
N	# OF DROPS	35	26	18			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						31.1%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **65**
 Plastic Limit **31**
 Plastic Index **34**
 Group Symbol **CH**
 Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 0%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET  Laboratory Manager 5/21/2017
 Technical Responsibility Signature Position Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

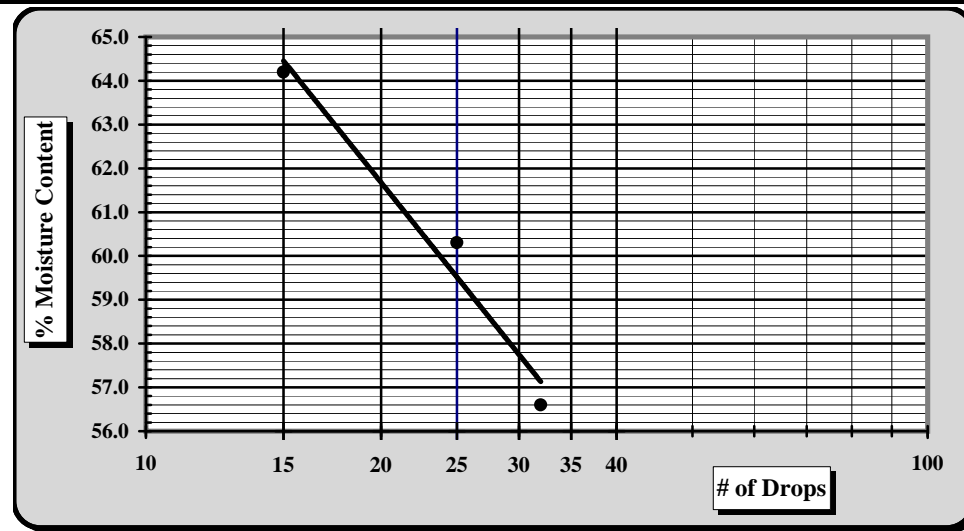
Project #: **HDR No. 10052825 Task: 017** Report Date: **5/21/17**
 Project Name: **Transurban - Fredex - 95XPL** Test Date(s) **5/16 - 5/21/17**
 Client Name: **HDR, Inc.**
 Client Address: **4480 Cox Road, Suite 103, Glen Allen, VA 23060**

Boring #: **17CL-04** Sample #: **SS-6** Sample Date: **4/17/17**
 Location: **Site Borehole** Offset: **N/A** Depth (ft): **13 - 15 ft**

Sample Description: **Olive Gray Elastic SILT with Sand (MH)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit				Plastic Limit	
A	Tare Weight	21.04	21.13	13.07		13.03	12.99
B	Wet Soil Weight + A	30.92	31.47	25.71		19.23	19.30
C	Dry Soil Weight + A	27.35	27.58	20.77		17.60	17.63
D	Water Weight (B-C)	3.57	3.89	4.94		1.63	1.67
E	Dry Soil Weight (C-A)	6.31	6.45	7.70		4.57	4.64
F	% Moisture (D/E)*100	56.6%	60.3%	64.2%		35.7%	36.0%
N	# OF DROPS	32	25	15		<i>Moisture Contents determined by ASTM D 2216</i>	
LL	LL = F * FACTOR						
Ave.	Average					35.9%	



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **60**
 Plastic Limit **36**
 Plastic Index **24**
 Group Symbol **MH**

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve:

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/21/2017
 Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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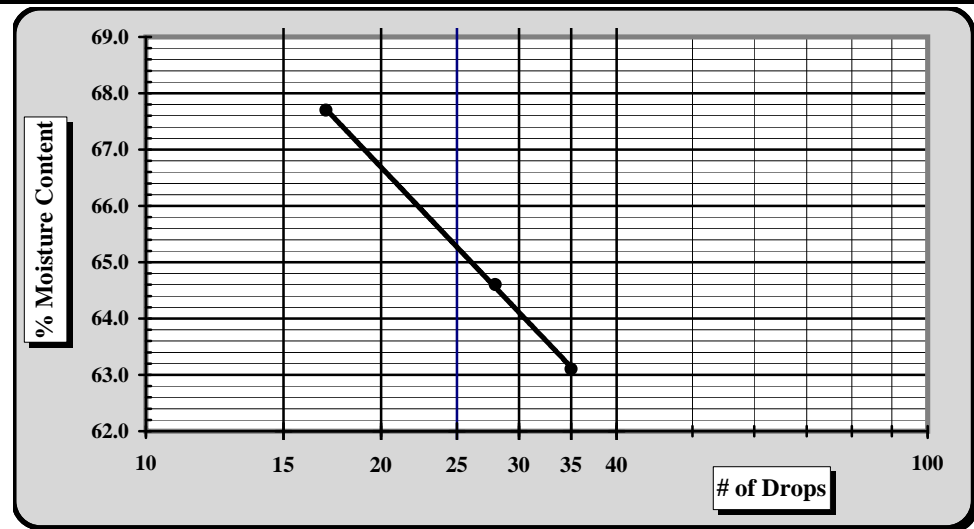
Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	5/16 - 5/21/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		

Boring #: 17CL-04	Sample #: SS-9	Sample Date: 4/17/17
Location: Site Borehole	Offset: N/A	Depth (ft): 28 - 30 ft

Sample Description: **Brown Elastic SILT (MH)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	21.04	20.80	20.76			12.94	12.94	
B	Wet Soil Weight + A	33.47	29.03	29.55			19.79	19.51	
C	Dry Soil Weight + A	28.66	25.80	26.00			17.87	17.66	
D	Water Weight (B-C)	4.81	3.23	3.55			1.92	1.85	
E	Dry Soil Weight (C-A)	7.62	5.00	5.24			4.93	4.72	
F	% Moisture (D/E)*100	63.1%	64.6%	67.7%			38.9%	39.2%	
N	# OF DROPS	35	28	17			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						39.1%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **65**

Plastic Limit **39**

Plastic Index **26**

Group Symbol **MH**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 0%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Mal Krajan, ET</u> Technical Responsibility	 Signature	<u>Laboratory Manager</u> Position	<u>5/21/2017</u> Date
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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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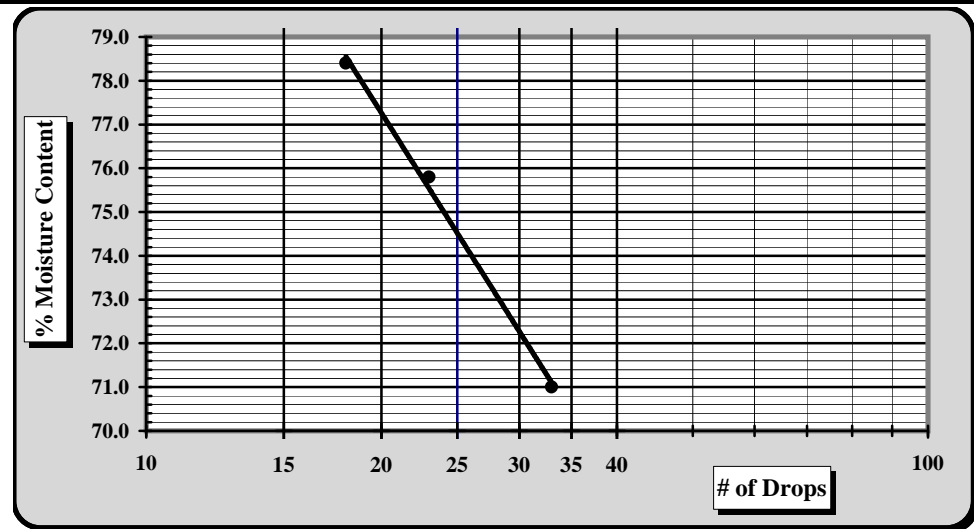
Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	5/16 - 5/21/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		

Boring #:	17CL-16	Sample #:	SS-9	Sample Date:	4/19/17
Location:	Site Borehole	Offset:	N/A	Depth (ft):	28 - 30 ft

Sample Description: **Brown Fat CLAY (CH)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit				Plastic Limit		
		1	2	3	4	1	2	3
A	Tare Weight	13.48	13.65	20.92		13.09	12.94	
B	Wet Soil Weight + A	21.50	21.79	30.36		20.16	20.65	
C	Dry Soil Weight + A	18.17	18.28	26.21		18.53	18.85	
D	Water Weight (B-C)	3.33	3.51	4.15		1.63	1.80	
E	Dry Soil Weight (C-A)	4.69	4.63	5.29		5.44	5.91	
F	% Moisture (D/E)*100	71.0%	75.8%	78.4%		30.0%	30.5%	
N	# OF DROPS	33	23	18		Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR							
Ave.	Average					30.3%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **75**

Plastic Limit **30**

Plastic Index **45**

Group Symbol **CH**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 0%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Mal Krajan, ET</u> Technical Responsibility	 Signature	<u>Laboratory Manager</u> Position	<u>5/21/2017</u> Date
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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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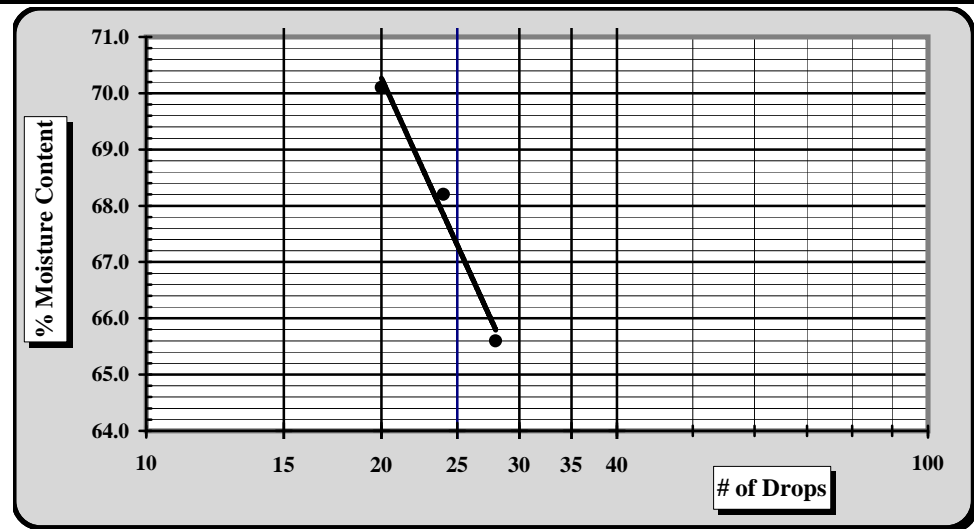
Project #: **HDR No. 10052825 Task: 017** Report Date: **5/24/17**
 Project Name: **Transurban - Fredex - 95XPL** Test Date(s) **5/18 - 5/24/17**
 Client Name: **HDR, Inc.**
 Client Address: **4480 Cox Road, Suite 103, Glen Allen, VA 23060**

Boring #: **17RW-05** Sample #: **SS-3** Sample Date: **4/17/17**
 Location: **Site Borehole** Offset: **N/A** Depth (ft): **4 - 6 ft.**

Sample Description: **Gray Fat CLAY (CH)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	13.40	20.72	20.92			13.10	12.91	
B	Wet Soil Weight + A	22.06	30.76	31.11			21.06	22.41	
C	Dry Soil Weight + A	18.63	26.69	26.91			19.57	20.68	
D	Water Weight (B-C)	3.43	4.07	4.20			1.49	1.73	
E	Dry Soil Weight (C-A)	5.23	5.97	5.99			6.47	7.77	
F	% Moisture (D/E)*100	65.6%	68.2%	70.1%			23.0%	22.3%	
N	# OF DROPS	28	24	20			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						22.7%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **67**
 Plastic Limit **23**
 Plastic Index **44**
 Group Symbol **CH**
 Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 0%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET  Laboratory Manager 5/24/2017
 Technical Responsibility Signature Position Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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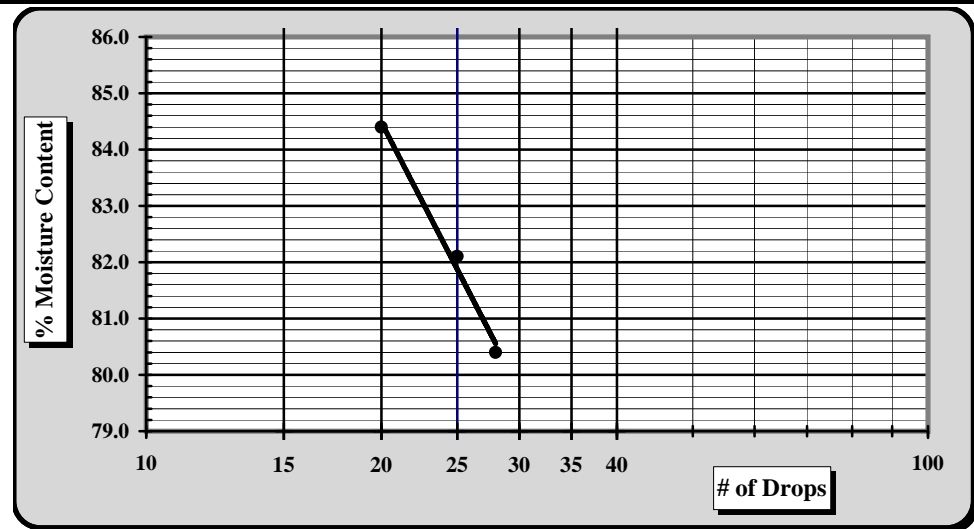
Project #: **HDR No. 10052825 Task: 017** Report Date: **5/24/17**
 Project Name: **Transurban - Fredex - 95XPL** Test Date(s) **5/18 - 5/24/17**
 Client Name: **HDR, Inc.**
 Client Address: **4480 Cox Road, Suite 103, Glen Allen, VA 23060**

Boring #: **17SW-05** Sample #: **SS-8** Sample Date: **4/24/17**
 Location: **Site Borehole** Offset: **N/A** Depth (ft): **23 - 25 ft.**

Sample Description: **Gray & Brown Fat CLAY (CH)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	20.77	13.51	13.55			12.42	12.94	
B	Wet Soil Weight + A	28.98	20.72	22.88			20.56	21.17	
C	Dry Soil Weight + A	25.32	17.47	18.61			18.67	19.31	
D	Water Weight (B-C)	3.66	3.25	4.27			1.89	1.86	
E	Dry Soil Weight (C-A)	4.55	3.96	5.06			6.25	6.37	
F	% Moisture (D/E)*100	80.4%	82.1%	84.4%			30.2%	29.2%	
N	# OF DROPS	28	25	20			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						29.7%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **82**
 Plastic Limit **30**
 Plastic Index **52**
 Group Symbol **CH**
 Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 0%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET  Laboratory Manager 5/24/2017
 Technical Responsibility Signature Position Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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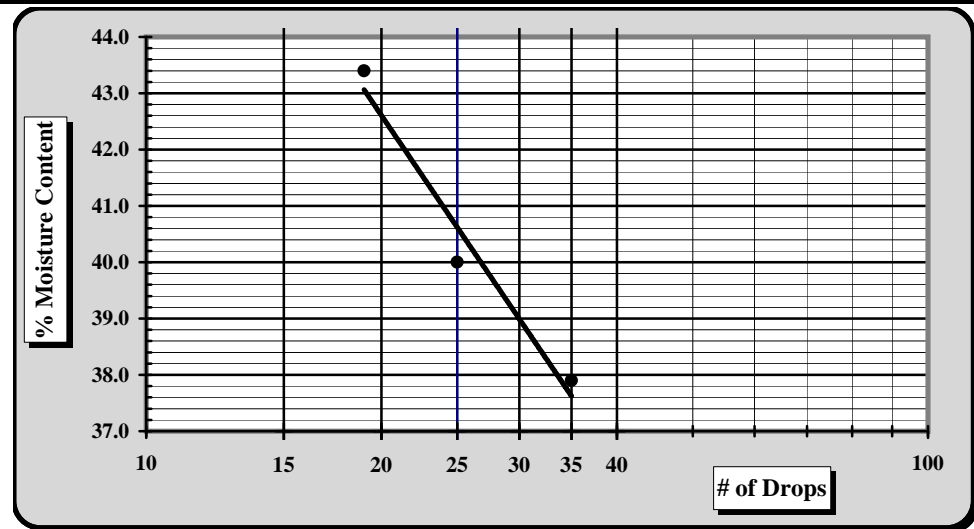
Project #: **HDR No. 10052825 Task: 017** Report Date: **5/24/17**
 Project Name: **Transurban - Fredex - 95XPL** Test Date(s) **5/18 - 5/24/17**
 Client Name: **HDR, Inc.**
 Client Address: **4480 Cox Road, Suite 103, Glen Allen, VA 23060**

Boring #: **17SW-06** Sample #: **SS-3** Sample Date: **4/25/17**
 Location: **Site Borehole** Offset: **N/A** Depth (ft): **4 - 6 ft.**

Sample Description: **Tan-Brown Sandy Lean CLAY (CL)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	20.99	21.07	21.06			15.21	16.63	
B	Wet Soil Weight + A	31.57	31.12	31.70			24.51	25.65	
C	Dry Soil Weight + A	28.66	28.25	28.48			23.18	24.37	
D	Water Weight (B-C)	2.91	2.87	3.22			1.33	1.28	
E	Dry Soil Weight (C-A)	7.67	7.18	7.42			7.97	7.74	
F	% Moisture (D/E)*100	37.9%	40.0%	43.4%			16.7%	16.5%	
N	# OF DROPS	35	25	19			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						16.6%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **41**
 Plastic Limit **17**
 Plastic Index **24**
 Group Symbol **CL**
 Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: **5%**

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET  Laboratory Manager 5/24/2017
 Technical Responsibility Signature Position Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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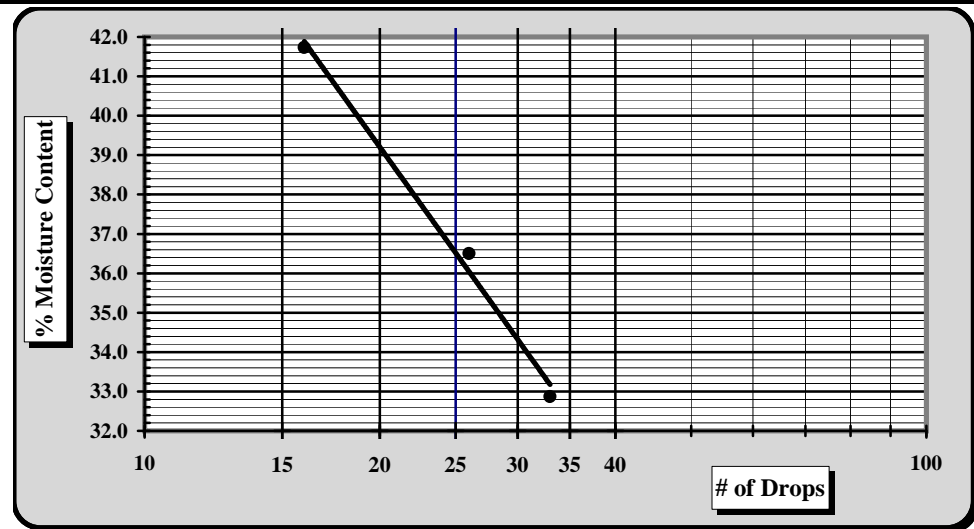
Project #: **HDR No. 10052825 Task: 017** Report Date: **5/24/17**
 Project Name: **Transurban - Fredex - 95XPL** Test Date(s) **5/18 - 5/24/17**
 Client Name: **HDR, Inc.**
 Client Address: **4470 Cox Road, Suite 200, Glen Allen, VA 23060**

Boring #: **17SW-07** Sample #: **SS-6** Sample Date: **4/25/17**
 Location: **Site-Borehole** Offset: **N/A** Depth (ft): **13 - 15 ft**

Sample Description: **Light Gray Clayey SAND (SC)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	1084	8/20/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit				Plastic Limit	
A	Tare Weight	13.57	20.90	20.81		13.06	13.01
B	Wet Soil Weight + A	26.06	30.96	31.44		22.13	22.59
C	Dry Soil Weight + A	22.97	28.27	28.31		20.60	20.98
D	Water Weight (B-C)	3.09	2.69	3.13		1.53	1.61
E	Dry Soil Weight (C-A)	9.40	7.37	7.50		7.54	7.97
F	% Moisture (D/E)*100	32.9%	36.5%	41.7%		20.3%	20.2%
N	# OF DROPS	33	26	16		<i>Moisture Contents determined by ASTM D 2216</i>	
LL	LL = F * FACTOR						
Ave.	Average					20.2%	



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **37**
 Plastic Limit **20**
 Plastic Index **17**
 Group Symbol **SC**
 Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 24.4%

Notes / Deviations / References:

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)
 ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET  Laboratory Manager 5/24/2017
 Technical Responsibility Signature Position Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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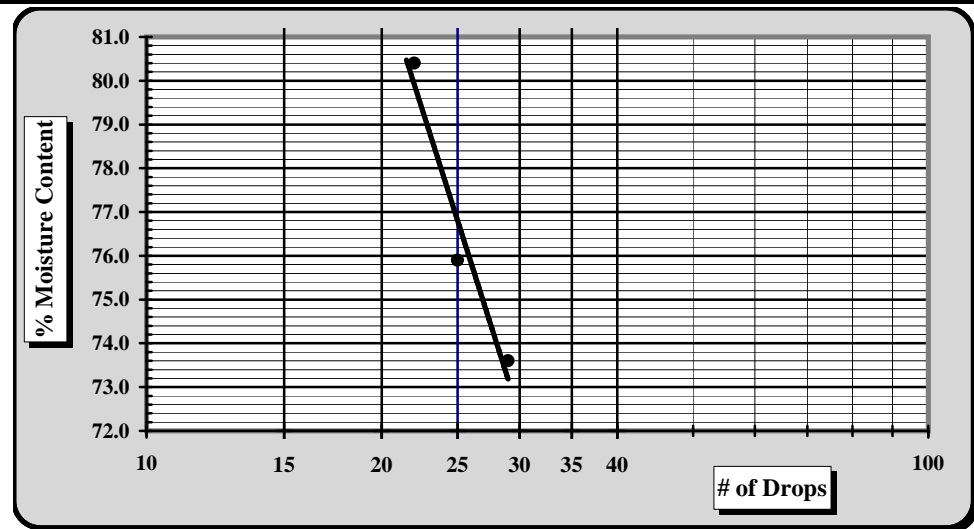
Project #: HDR No. 10052825 Task: 017	Report Date: 5/24/17
Project Name: Transurban - Fredex - 95XPL	Test Date(s) 5/18 - 5/24/17
Client Name: HDR, Inc.	
Client Address: 4480 Cox Road, Suite 103, Glen Allen, VA 23060	

Boring #: 17SWM-10	Sample #: SS-6	Sample Date: 5/1/17
Location: Site Borehole	Offset: N/A	Depth (ft): 13 - 15 ft.

Sample Description: **Brown Fat CLAY (CH)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		1	2	3	4	5	1	2	3
A	Tare Weight	15.29	16.69	16.70			13.01	13.10	
B	Wet Soil Weight + A	25.55	27.14	28.30			21.00	21.17	
C	Dry Soil Weight + A	21.20	22.63	23.13			19.26	19.50	
D	Water Weight (B-C)	4.35	4.51	5.17			1.74	1.67	
E	Dry Soil Weight (C-A)	5.91	5.94	6.43			6.25	6.40	
F	% Moisture (D/E)*100	73.6%	75.9%	80.4%			27.8%	26.1%	
N	# OF DROPS	29	25	22			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						27.0%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **77**

Plastic Limit **27**

Plastic Index **50**

Group Symbol **CH**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 0%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Mal Krajan, ET</u> Technical Responsibility	 Signature	<u>Laboratory Manager</u> Position	<u>5/24/2017</u> Date
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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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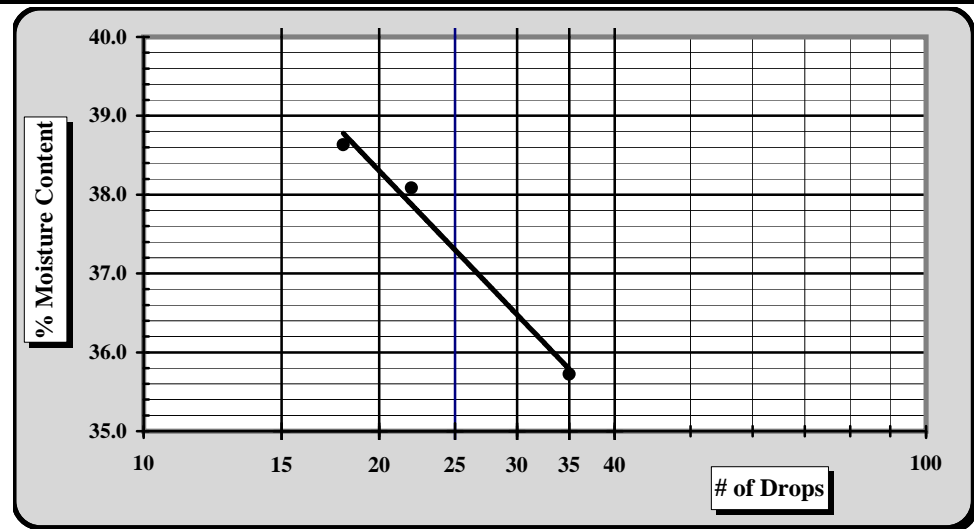
Project #:	HDR No. 10052825 Task: 017	Report Date:	5/14/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	5/10 - 5/14/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		

Boring #:	17SWM-19	Sample #:	Bulk	Sample Date:	5/1/17
Location:	Site-Borehole	Offset:	N/A	Depth (ft):	0 - 10

Sample Description: Tan-Brown Clayey SAND (SC)

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	1084	8/20/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
		1	2	3	4	5	1	2	3
A	Tare Weight	21.14	13.69	20.50			12.98	11.02	
B	Wet Soil Weight + A	32.69	24.06	31.84			21.94	19.31	
C	Dry Soil Weight + A	29.65	21.20	28.68			20.64	18.12	
D	Water Weight (B-C)	3.04	2.86	3.16			1.30	1.19	
E	Dry Soil Weight (C-A)	8.51	7.51	8.18			7.66	7.10	
F	% Moisture (D/E)*100	35.7%	38.1%	38.6%			17.0%	16.8%	
N	# OF DROPS	35	22	18			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						16.9%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	37
Plastic Limit	17
Plastic Index	20
Group Symbol	SC

Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried *Estimate the % Retained on the #40 Sieve: 32.9%*

Notes / Deviations / References:

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)
 ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Mal Krajan, ET</u> Technical Responsibility	 Signature	<u>Laboratory Manager</u> Position	<u>5/21/2017</u> Date
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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

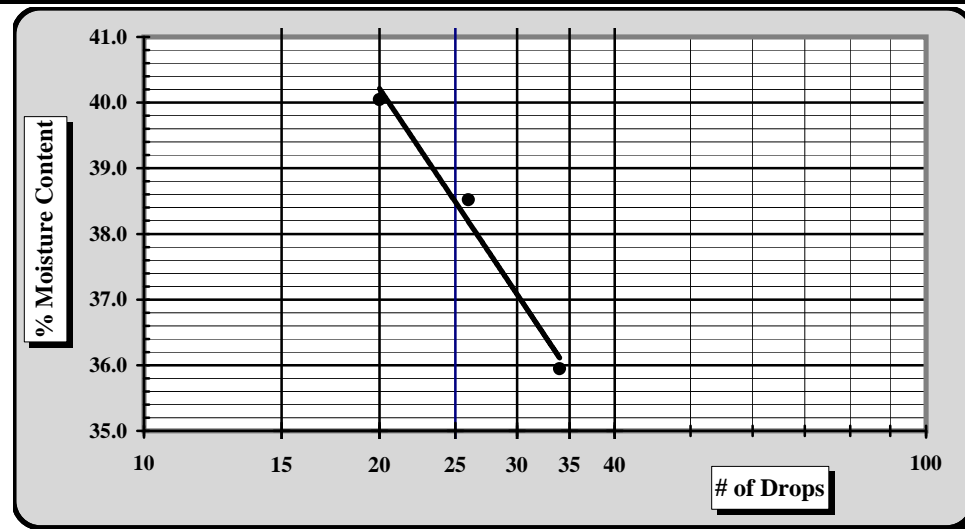
Project #: **HDR No. 10052825 Task: 017** Report Date: **5/24/17**
 Project Name: **Transurban - Fredex - 95XPL** Test Date(s) **5/16 - 5/24/17**
 Client Name: **HDR, Inc.**
 Client Address: **4470 Cox Road, Suite 200, Glen Allen, VA 23060**

Boring #: **17SWM-19** Sample #: **SS-2** Sample Date: **5/1/17**
 Location: **Site-Borehole** Offset: **N/A** Depth (ft): **2 - 4 ft.**

Sample Description: **Tan-Brown Sandy Lean CLAY (CL)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	1084	8/20/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	20.64	21.11	21.16			16.71	16.67	
B	Wet Soil Weight + A	31.91	32.33	33.12			24.39	24.59	
C	Dry Soil Weight + A	28.93	29.21	29.70			23.26	23.46	
D	Water Weight (B-C)	2.98	3.12	3.42			1.13	1.13	
E	Dry Soil Weight (C-A)	8.29	8.10	8.54			6.55	6.79	
F	% Moisture (D/E)*100	35.9%	38.5%	40.0%			17.3%	16.6%	
N	# OF DROPS	34	26	20			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						16.9%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **39**
 Plastic Limit **17**
 Plastic Index **22**
 Group Symbol **CL**

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 7.8%

Notes / Deviations / References:

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)
 ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET
 Technical Responsibility

[Signature]
 Signature

Laboratory Manager
 Position

5/24/2017
 Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

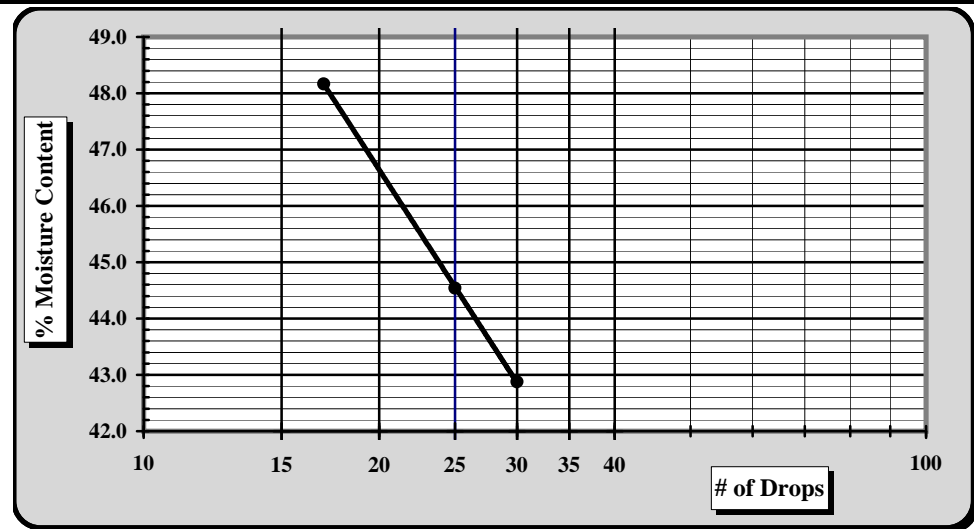
Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	5/10 - 5/16/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		

Boring #:	17SWM-21	Sample #:	Bulk
Location:	Site-Borehole	Offset:	N/A
Sample Date:	4/24/17		
Depth (ft):	0 - 15		

Sample Description: Tan-Brown Clayey SAND (SC)

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	1084	8/20/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	13.01	21.19	21.14			13.06	13.05	
B	Wet Soil Weight + A	23.14	31.38	31.23			20.27	22.11	
C	Dry Soil Weight + A	20.10	28.24	27.95			19.15	20.76	
D	Water Weight (B-C)	3.04	3.14	3.28			1.12	1.35	
E	Dry Soil Weight (C-A)	7.09	7.05	6.81			6.09	7.71	
F	% Moisture (D/E)*100	42.9%	44.5%	48.2%			18.4%	17.5%	
N	# OF DROPS	30	25	17			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						18.0%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **45**

Plastic Limit **18**

Plastic Index **27**

Group Symbol **SC**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 30.5%

Notes / Deviations / References:

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Mal Krajan, ET</u> Technical Responsibility	 Signature	<u>Laboratory Manager</u> Position	<u>5/21/2017</u> Date
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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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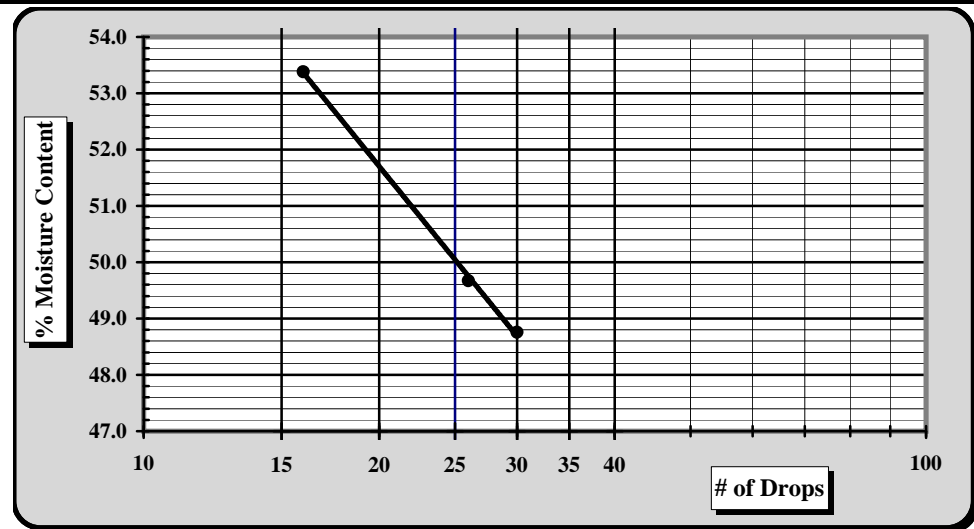
Project #: **HDR No. 10052825 Task: 017** Report Date: **5/21/17**
 Project Name: **Transurban - Fredex - 95XPL** Test Date(s) **5/10 - 5/16/17**
 Client Name: **HDR, Inc.**
 Client Address: **4470 Cox Road, Suite 200, Glen Allen, VA 23060**

Boring #: **17SWM-23** Sample #: **Bulk** Sample Date: **5/1/23**
 Location: **Site-Borehole** Offset: **N/A** Depth (ft): **2 - 8 ft.**

Sample Description: **Brown Clayey SAND (SC)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	1084	8/20/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	21.12	21.04	13.58			13.01	12.97	
B	Wet Soil Weight + A	31.86	30.14	22.20			21.14	21.21	
C	Dry Soil Weight + A	28.34	27.12	19.20			19.97	20.03	
D	Water Weight (B-C)	3.52	3.02	3.00			1.17	1.18	
E	Dry Soil Weight (C-A)	7.22	6.08	5.62			6.96	7.06	
F	% Moisture (D/E)*100	48.8%	49.7%	53.4%			16.8%	16.7%	
N	# OF DROPS	30	26	16			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						16.8%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **50**
 Plastic Limit **17**
 Plastic Index **33**
 Group Symbol **SC**
 Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 13.7%

Notes / Deviations / References:

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)
 ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET  **Laboratory Manager** **5/21/2017**
 Technical Responsibility Signature Position Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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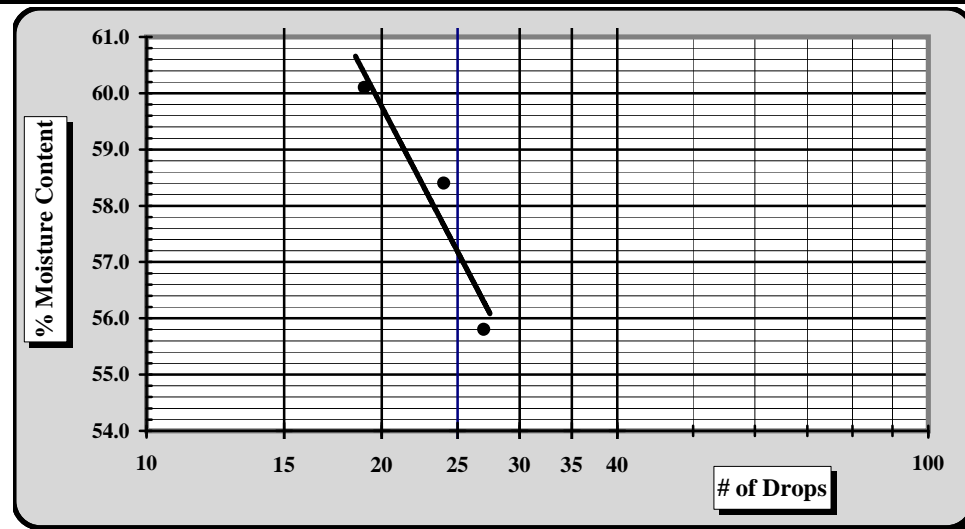
Project #: **HDR No. 10052825 Task: 017** Report Date: **5/24/17**
 Project Name: **Transurban - Fredex - 95XPL** Test Date(s) **5/18 - 5/24/17**
 Client Name: **HDR, Inc.**
 Client Address: **4480 Cox Road, Suite 103, Glen Allen, VA 23060**

Boring #: **17SWM-23** Sample #: **SS-2** Sample Date: **5/1/17**
 Location: **Site Borehole** Offset: **N/A** Depth (ft): **2 - 4 ft.**

Sample Description: **Tan Clayey SAND (SC)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit				Plastic Limit	
A	Tare Weight	13.67	13.53	20.99		13.00	13.10
B	Wet Soil Weight + A	23.97	23.62	30.18		20.68	22.72
C	Dry Soil Weight + A	20.28	19.90	26.73		19.40	21.10
D	Water Weight (B-C)	3.69	3.72	3.45		1.28	1.62
E	Dry Soil Weight (C-A)	6.61	6.37	5.74		6.40	8.00
F	% Moisture (D/E)*100	55.8%	58.4%	60.1%		20.0%	20.3%
N	# OF DROPS	27	24	19		<i>Moisture Contents determined by ASTM D 2216</i>	
LL	LL = F * FACTOR						
Ave.	Average					20.2%	



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **57**
 Plastic Limit **20**
 Plastic Index **37**
 Group Symbol **SC**
 Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 21%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/24/2017
 Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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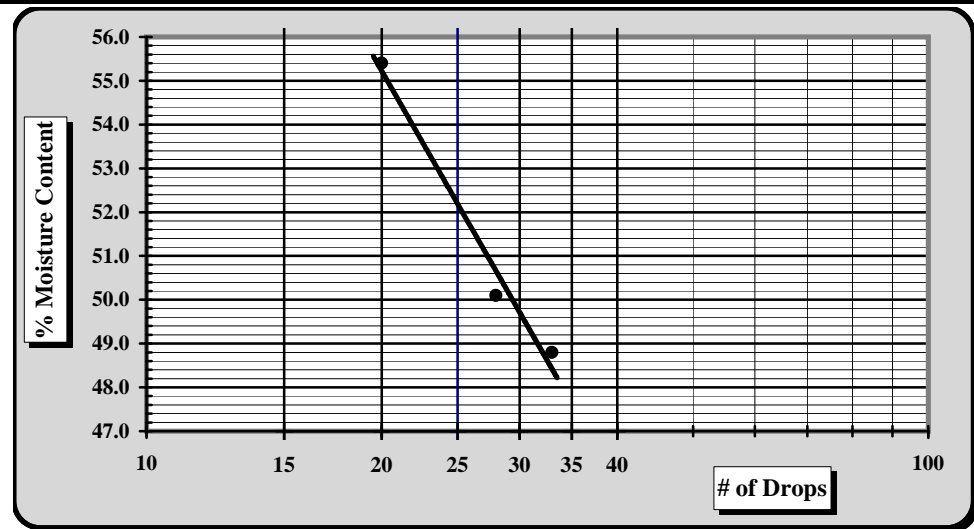
Project #: **HDR No. 10052825 Task: 017** Report Date: **5/24/17**
 Project Name: **Transurban - Fredex - 95XPL** Test Date(s) **5/18 - 5/24/17**
 Client Name: **HDR, Inc.**
 Client Address: **4480 Cox Road, Suite 103, Glen Allen, VA 23060**

Boring #: **17WGS-05** Sample #: **SS-10** Sample Date: **4/27/17**
 Location: **Site Borehole** Offset: **N/A** Depth (ft): **33 - 35 ft.**

Sample Description: **Olive Gray Silty SAND (SM)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	13.06	13.07	13.14			16.57	12.93	
B	Wet Soil Weight + A	23.70	24.66	24.50			26.88	23.11	
C	Dry Soil Weight + A	20.21	20.79	20.45			23.73	19.99	
D	Water Weight (B-C)	3.49	3.87	4.05			3.15	3.12	
E	Dry Soil Weight (C-A)	7.15	7.72	7.31			7.16	7.06	
F	% Moisture (D/E)*100	48.8%	50.1%	55.4%			44.0%	44.2%	
N	# OF DROPS	33	28	20			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						44.1%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **52**
 Plastic Limit **44**
 Plastic Index **8**
 Group Symbol **SM**
 Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 14%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET  Laboratory Manager 5/25/2017
 Technical Responsibility Signature Position Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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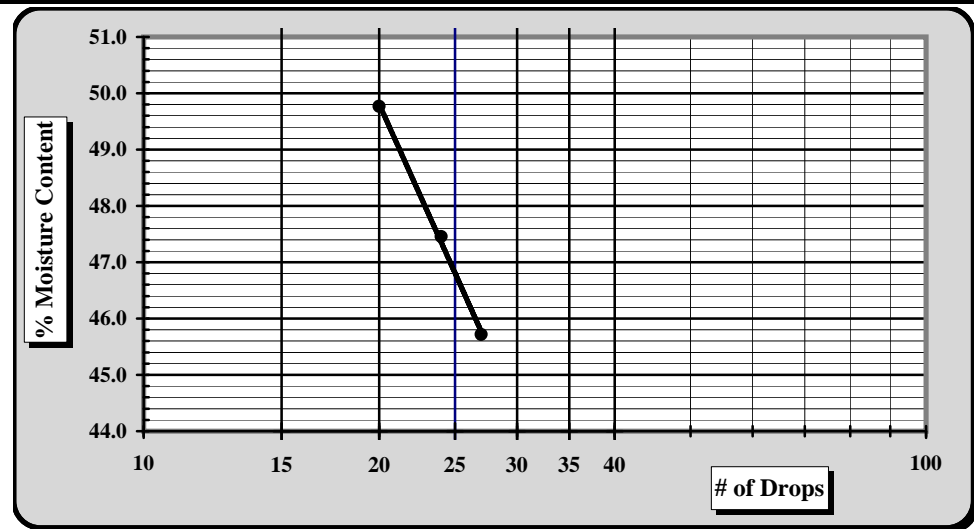
Project #: **HDR No. 10052825 Task: 017** Report Date: **5/25/17**
 Project Name: **Transurban - Fredex - 95XPL** Test Date(s) **5/18 - 5/24/17**
 Client Name: **HDR, Inc.**
 Client Address: **4470 Cox Road, Suite 200, Glen Allen, VA 23060**

Boring #: **17WGS-05** Sample #: **Tube** Sample Date: **4/28/17**
 Location: **Site-Borehole** Offset: **N/A** Depth (ft): **13 - 15 ft.**

Sample Description: **Gray Sandy Lean CLAY (CL)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	1084	8/20/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	20.96	20.94	20.95			13.62	13.70	
B	Wet Soil Weight + A	31.16	31.94	30.70			21.12	22.24	
C	Dry Soil Weight + A	27.96	28.40	27.46			19.70	20.69	
D	Water Weight (B-C)	3.20	3.54	3.24			1.42	1.55	
E	Dry Soil Weight (C-A)	7.00	7.46	6.51			6.08	6.99	
F	% Moisture (D/E)*100	45.7%	47.5%	49.8%			23.4%	22.2%	
N	# OF DROPS	27	24	20			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						22.8%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **47**
 Plastic Limit **23**
 Plastic Index **24**
 Group Symbol **SC**
 Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 6.3%

Notes / Deviations / References:

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)
 ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET  Laboratory Manager 5/25/2017
 Technical Responsibility Signature Position Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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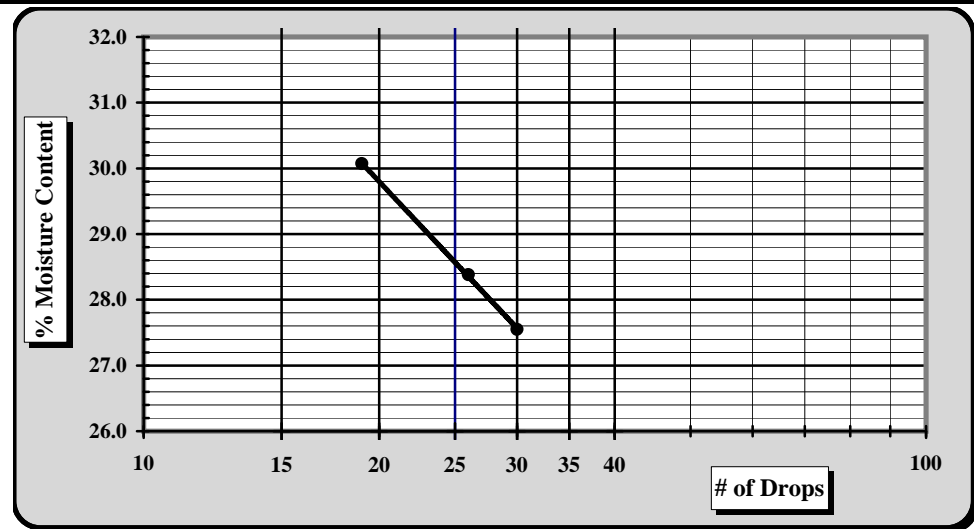
Project #: **HDR No. 10052825 Task: 017** Report Date: **5/25/17**
 Project Name: **Transurban - Fredex - 95XPL** Test Date(s) **5/18 - 5/24/17**
 Client Name: **HDR, Inc.**
 Client Address: **4470 Cox Road, Suite 200, Glen Allen, VA 23060**

Boring #: **17XP-02** Sample #: **SS-7** Sample Date: **4/24/17**
 Location: **Site-Borehole** Offset: **N/A** Depth (ft): **18 - 20 ft.**

Sample Description: **Tan Clayey SAND (SC)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	1084	8/20/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	21.14	21.14	21.04			21.01	21.04	
B	Wet Soil Weight + A	34.15	33.76	35.53			32.57	32.70	
C	Dry Soil Weight + A	31.34	30.97	32.18			30.58	30.61	
D	Water Weight (B-C)	2.81	2.79	3.35			1.99	2.09	
E	Dry Soil Weight (C-A)	10.20	9.83	11.14			9.57	9.57	
F	% Moisture (D/E)*100	27.5%	28.4%	30.1%			20.8%	21.8%	
N	# OF DROPS	30	26	19			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						21.3%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **29**
 Plastic Limit **21**
 Plastic Index **8**
 Group Symbol **SC**

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 1.8%

Notes / Deviations / References:

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)
 ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/25/2017
 Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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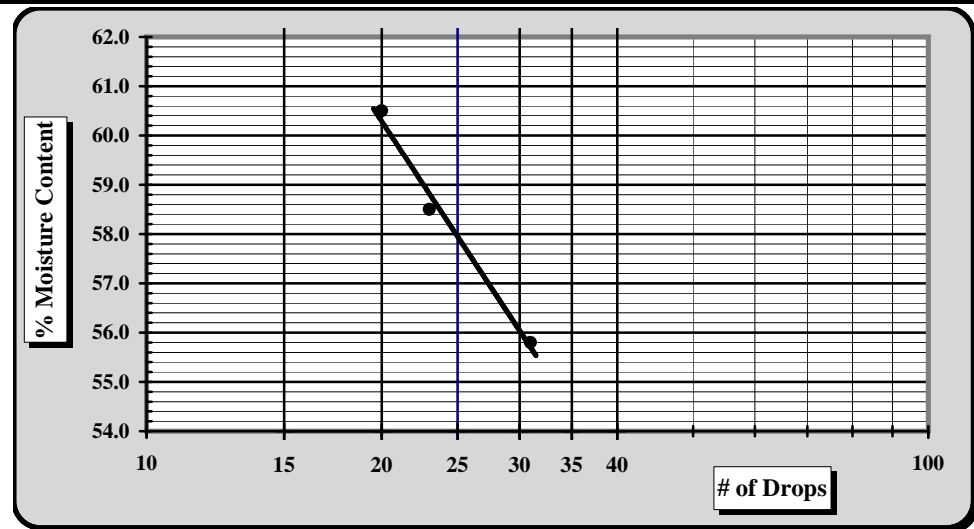
Project #: **HDR No. 10052825 Task: 017** Report Date: **5/24/17**
 Project Name: **Transurban - Fredex - 95XPL** Test Date(s) **5/18 - 5/24/17**
 Client Name: **HDR, Inc.**
 Client Address: **4480 Cox Road, Suite 103, Glen Allen, VA 23060**

Boring #: **17XP-02** Sample #: **SS-11** Sample Date: **4/24/17**
 Location: **Site Borehole** Offset: **N/A** Depth (ft): **38 - 40 ft.**

Sample Description: **Olive Gray Elastic SILT (MH)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit				Plastic Limit		
		1	2	3	4	1	2	3
A	Tare Weight	20.76	13.66	20.74		21.06	13.60	
B	Wet Soil Weight + A	31.87	25.01	30.21		29.13	22.32	
C	Dry Soil Weight + A	27.89	20.82	26.64		27.03	20.07	
D	Water Weight (B-C)	3.98	4.19	3.57		2.10	2.25	
E	Dry Soil Weight (C-A)	7.13	7.16	5.90		5.97	6.47	
F	% Moisture (D/E)*100	55.8%	58.5%	60.5%		35.2%	34.8%	
N	# OF DROPS	31	23	20		<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR							
Ave.	Average					35.0%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **58**
 Plastic Limit **35**
 Plastic Index **23**
 Group Symbol **MH**
 Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 0%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET  **Laboratory Manager** **5/27/2017**
 Technical Responsibility Signature Position Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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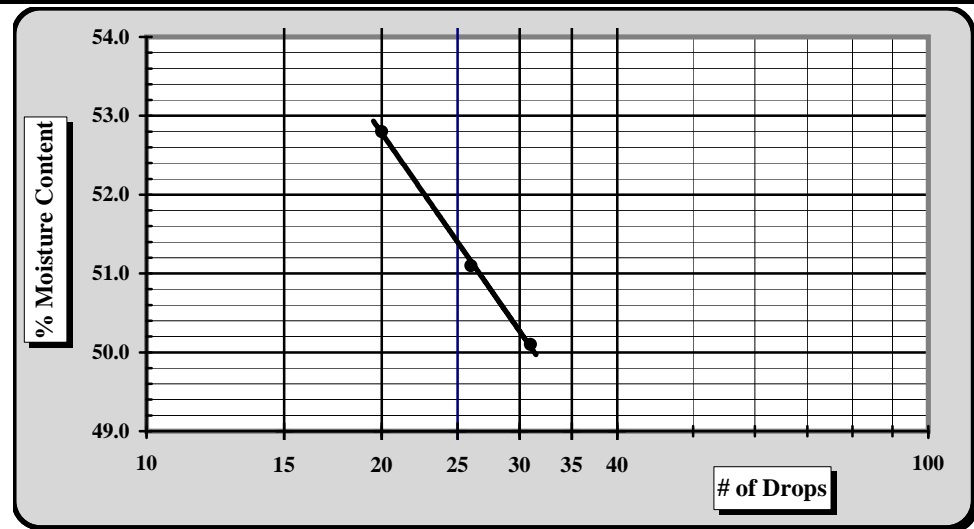
Project #: **HDR No. 10052825 Task: 017** Report Date: **5/24/17**
 Project Name: **Transurban - Fredex - 95XPL** Test Date(s) **5/18 - 5/24/17**
 Client Name: **HDR, Inc.**
 Client Address: **4480 Cox Road, Suite 103, Glen Allen, VA 23060**

Boring #: **17XP-06** Sample #: **SS-15** Sample Date: **4/26/17**
 Location: **Site Borehole** Offset: **N/A** Depth (ft): **58 - 60 ft.**

Sample Description: **Brown Elastic SILT (MH)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	20.78	21.12	21.02			20.87	13.53	
B	Wet Soil Weight + A	31.05	30.58	31.70			30.89	23.54	
C	Dry Soil Weight + A	27.62	27.38	28.01			28.14	20.84	
D	Water Weight (B-C)	3.43	3.20	3.69			2.75	2.70	
E	Dry Soil Weight (C-A)	6.84	6.26	6.99			7.27	7.31	
F	% Moisture (D/E)*100	50.1%	51.1%	52.8%			37.8%	36.9%	
N	# OF DROPS	31	26	20			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						37.4%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **51**
 Plastic Limit **37**
 Plastic Index **14**
 Group Symbol **MH**
 Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 0%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET  Laboratory Manager 5/27/2017
 Technical Responsibility Signature Position Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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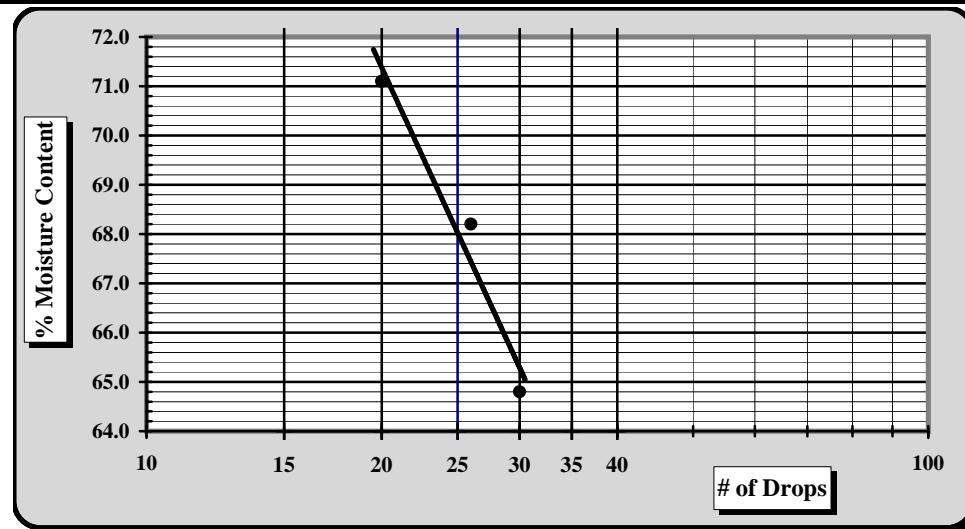
Project #: **HDR No. 10052825 Task: 017** Report Date: **5/24/17**
 Project Name: **Transurban - Fredex - 95XPL** Test Date(s) **5/18 - 5/24/17**
 Client Name: **HDR, Inc.**
 Client Address: **4480 Cox Road, Suite 103, Glen Allen, VA 23060**

Boring #: **17XP-07** Sample #: **SS-13** Sample Date: **4/26/17**
 Location: **Site Borehole** Offset: **N/A** Depth (ft): **48 - 50 ft.**

Sample Description: **Olive Gray Elastic SILT (MH)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	13.59	20.58	21.09			21.04	21.20	
B	Wet Soil Weight + A	23.69	30.72	31.75			29.47	27.63	
C	Dry Soil Weight + A	19.72	26.61	27.32			27.30	25.96	
D	Water Weight (B-C)	3.97	4.11	4.43			2.17	1.67	
E	Dry Soil Weight (C-A)	6.13	6.03	6.23			6.26	4.76	
F	% Moisture (D/E)*100	64.8%	68.2%	71.1%			34.7%	35.1%	
N	# OF DROPS	30	26	20			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						34.9%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **68**
 Plastic Limit **35**
 Plastic Index **33**
 Group Symbol **MH**

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 0%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/27/2017
 Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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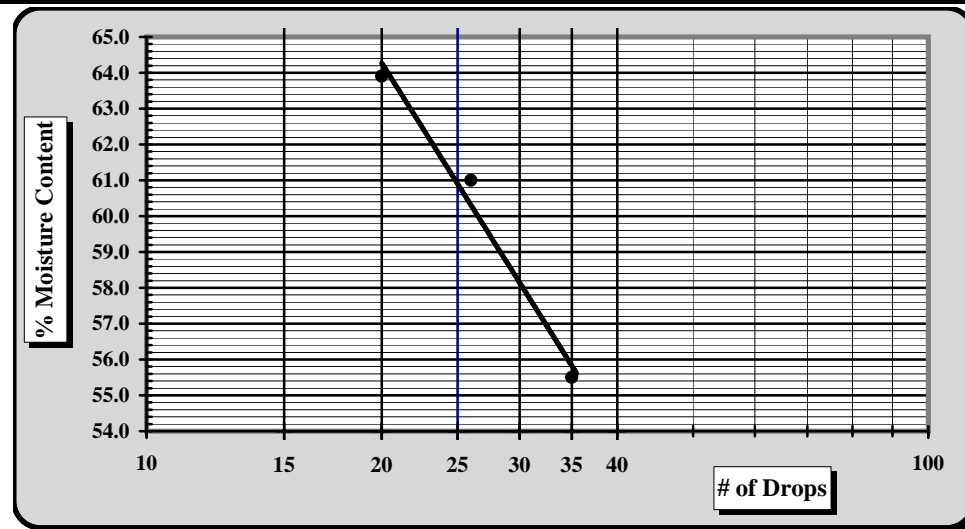
Project #: HDR No. 10052825 Task: 017	Report Date: 5/24/17
Project Name: Transurban - Fredex - 95XPL	Test Date(s) 5/18 - 5/24/17
Client Name: HDR, Inc.	
Client Address: 4480 Cox Road, Suite 103, Glen Allen, VA 23060	

Boring #: 17XP-08	Sample #: SS-5	Sample Date: 4/20/17
Location: Site Borehole	Offset: N/A	Depth (ft): 8 - 10 ft.

Sample Description: Tan Fat CLAY (CH)

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	20.90	21.13	21.15			15.30	13.60	
B	Wet Soil Weight + A	30.09	31.19	31.33			23.14	23.42	
C	Dry Soil Weight + A	26.81	27.38	27.36			21.57	21.45	
D	Water Weight (B-C)	3.28	3.81	3.97			1.57	1.97	
E	Dry Soil Weight (C-A)	5.91	6.25	6.21			6.27	7.85	
F	% Moisture (D/E)*100	55.5%	61.0%	63.9%			25.0%	25.1%	
N	# OF DROPS	35	26	20			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						25.1%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **61**

Plastic Limit **25**

Plastic Index **36**

Group Symbol **CH**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 0%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/27/2017
Date

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Liquid Limit, Plastic Limit, and Plastic Index



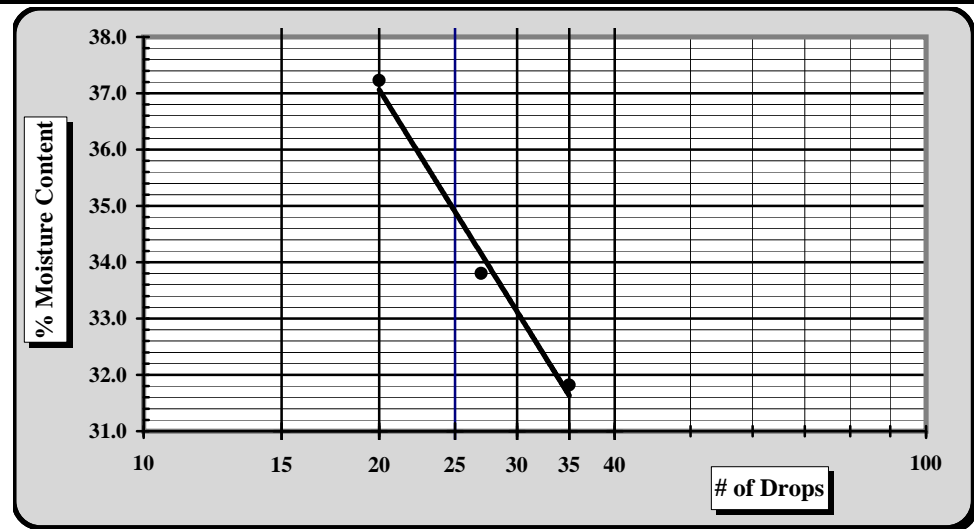
Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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Project #:	HDR No. 10052825 Task: 017	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	5/18 - 5/27/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring #:	17XP-08	Sample #:	SS-10
		Sample Date:	4/20/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	33 - 35 ft.

Sample Description: Tan Silty SAND (SM)					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	1084	8/20/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit				Plastic Limit	
A	Tare Weight	16.74	13.06	12.45		21.02	21.01
B	Wet Soil Weight + A	29.50	23.59	23.73		28.86	31.66
C	Dry Soil Weight + A	26.42	20.93	20.67		27.30	29.54
D	Water Weight (B-C)	3.08	2.66	3.06		1.56	2.12
E	Dry Soil Weight (C-A)	9.68	7.87	8.22		6.28	8.53
F	% Moisture (D/E)*100	31.8%	33.8%	37.2%		24.8%	24.9%
N	# OF DROPS	35	27	20		Moisture Contents determined by ASTM D 2216	
LL	LL = F * FACTOR						
Ave.	Average					24.8%	



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	35
Plastic Limit	25
Plastic Index	10
Group Symbol	SM

Multipoint Method	<input checked="" type="checkbox"/>
One-point Method	<input type="checkbox"/>

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 3.1%

Notes / Deviations / References:

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/27/2017
Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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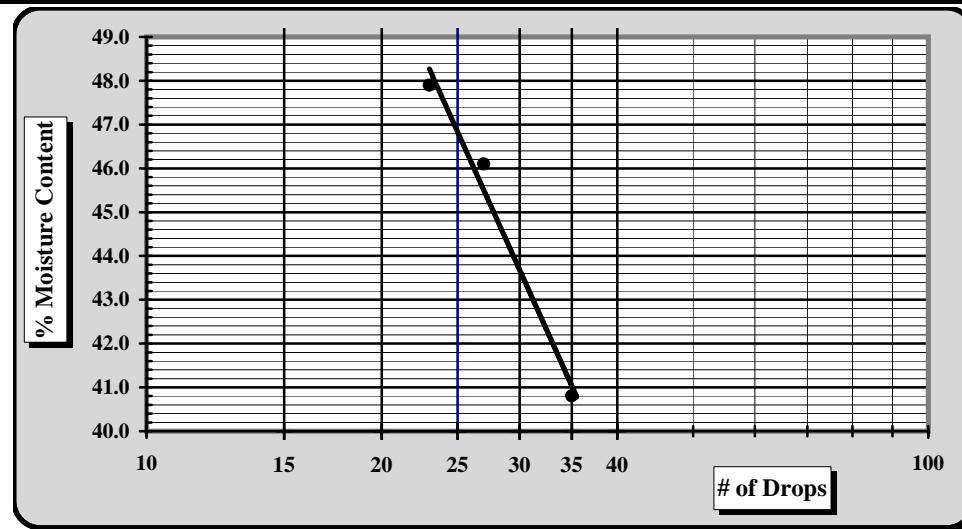
Project #: HDR No. 10052825 Task: 017	Report Date: 5/24/17
Project Name: Transurban - Fredex - 95XPL	Test Date(s) 5/18 - 5/24/17
Client Name: HDR, Inc.	
Client Address: 4480 Cox Road, Suite 103, Glen Allen, VA 23060	

Boring #: 17XP-11	Sample #: SS-2	Sample Date: 4/18/17
Location: Site Borehole	Offset: N/A	Depth (ft): 2 - 4 ft.

Sample Description: **Brown Sandy Lean CLAY (CL)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	13.02	13.26	21.01			13.27	21.09	
B	Wet Soil Weight + A	23.33	23.18	30.92			21.27	30.08	
C	Dry Soil Weight + A	20.34	20.05	27.71			20.00	28.69	
D	Water Weight (B-C)	2.99	3.13	3.21			1.27	1.39	
E	Dry Soil Weight (C-A)	7.32	6.79	6.70			6.73	7.60	
F	% Moisture (D/E)*100	40.8%	46.1%	47.9%			18.9%	18.3%	
N	# OF DROPS	35	27	23			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						18.6%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **47**
 Plastic Limit **19**
 Plastic Index **28**
 Group Symbol **CL**

Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 16%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/27/2017
 Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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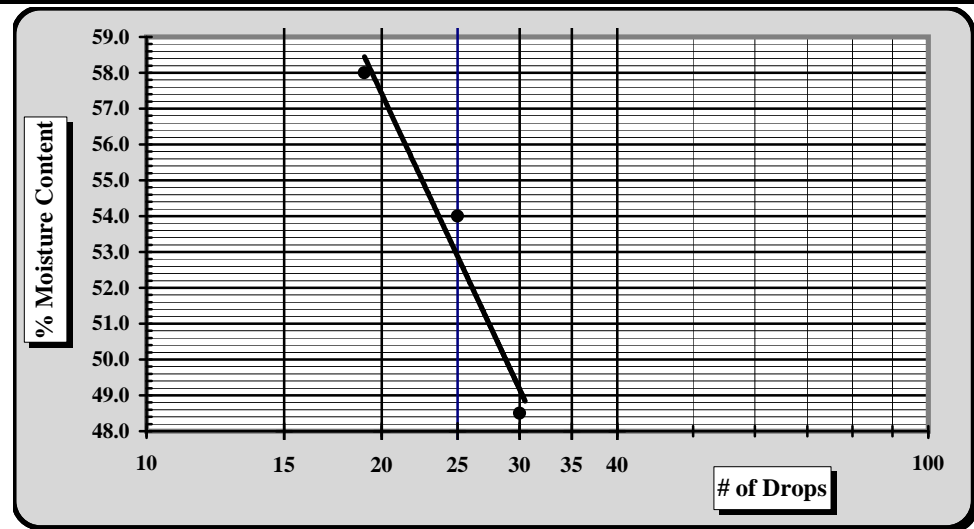
Project #: **HDR No. 10052825 Task: 017** Report Date: **5/27/17**
 Project Name: **Transurban - Fredex - 95XPL** Test Date(s) **5/18 - 5/26/17**
 Client Name: **HDR, Inc.**
 Client Address: **4480 Cox Road, Suite 103, Glen Allen, VA 23060**

Boring #: **17XP-17** Sample #: **SS-7** Sample Date: **4/14/17**
 Location: **Site Borehole** Offset: **N/A** Depth (ft): **18 - 20 ft.**

Sample Description: **Olive Gray Sandy Fat CLAY (CH)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	21.05	20.88	13.66			13.57	13.47	
B	Wet Soil Weight + A	30.88	29.92	23.06			25.08	21.79	
C	Dry Soil Weight + A	27.67	26.75	19.61			22.47	19.90	
D	Water Weight (B-C)	3.21	3.17	3.45			2.61	1.89	
E	Dry Soil Weight (C-A)	6.62	5.87	5.95			8.90	6.43	
F	% Moisture (D/E)*100	48.5%	54.0%	58.0%			29.3%	29.4%	
N	# OF DROPS	30	25	19			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						29.4%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **53**
 Plastic Limit **29**
 Plastic Index **24**
 Group Symbol **CH**
 Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 2%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET  Laboratory Manager 5/27/2017
 Technical Responsibility Signature Position Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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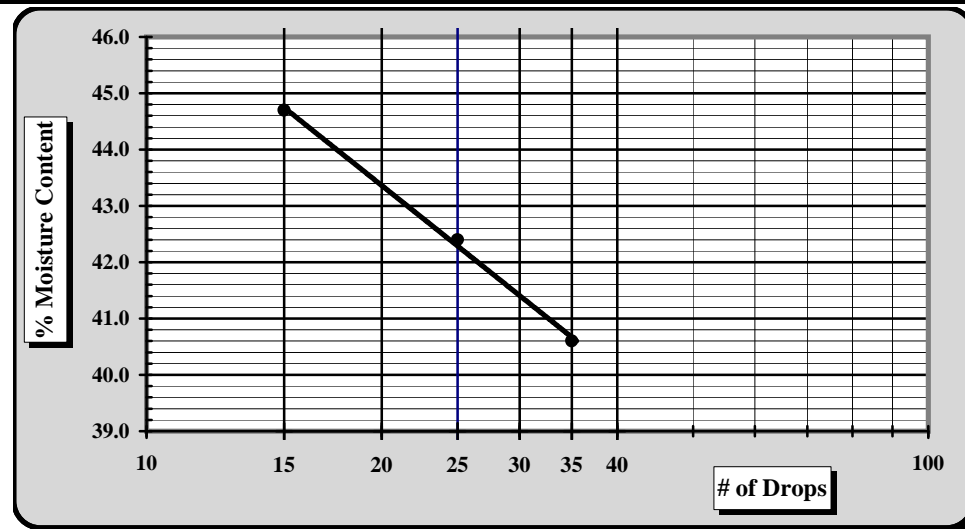
Project #:	HDR No. 10052825 Task: 017	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	5/18 - 5/26/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		

Boring #: 17XP-17	Sample #: SS-9	Sample Date: 4/14/17
Location: Site Borehole	Offset: N/A	Depth (ft): 28 - 30 ft.

Sample Description: Olive Gray SILT with Sand (ML)

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	13.63	12.95	12.52			20.92	21.16	
B	Wet Soil Weight + A	25.20	23.00	24.60			30.52	30.87	
C	Dry Soil Weight + A	21.86	20.01	20.87			28.15	28.48	
D	Water Weight (B-C)	3.34	2.99	3.73			2.37	2.39	
E	Dry Soil Weight (C-A)	8.23	7.06	8.35			7.23	7.32	
F	% Moisture (D/E)*100	40.6%	42.4%	44.7%			32.8%	32.7%	
N	# OF DROPS	35	25	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						32.8%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **42**

Plastic Limit **33**

Plastic Index **9**

Group Symbol **ML**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 4%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Mal Krajan, ET</u> Technical Responsibility	 Signature	<u>Laboratory Manager</u> Position	<u>5/27/2017</u> Date
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Liquid Limit, Plastic Limit, and Plastic Index



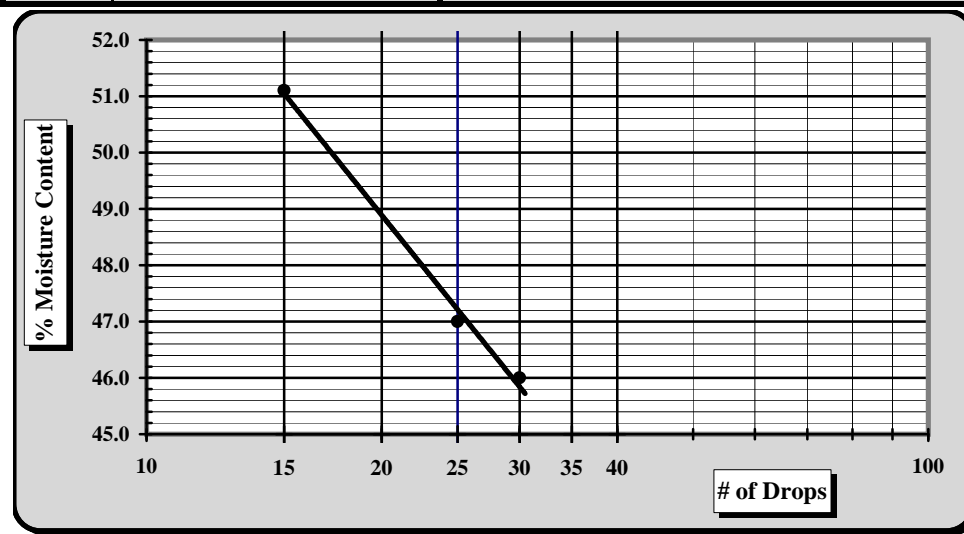
Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	5/18 - 5/26/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring #:	17XP-20	Sample #:	SS-8
		Sample Date:	4/13/17
Location:	Site Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft.

Sample Description: Red-Brown SILT (ML)					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit				Plastic Limit	
A	Tare Weight	13.00	13.05	12.88		21.02	20.74
B	Wet Soil Weight + A	23.60	23.75	24.29		29.64	31.20
C	Dry Soil Weight + A	20.26	20.33	20.43		27.72	28.86
D	Water Weight (B-C)	3.34	3.42	3.86		1.92	2.34
E	Dry Soil Weight (C-A)	7.26	7.28	7.55		6.70	8.12
F	% Moisture (D/E)*100	46.0%	47.0%	51.1%		28.7%	28.8%
N	# OF DROPS	30	25	15		Moisture Contents determined by ASTM D 2216	
LL	LL = F * FACTOR						
Ave.	Average					28.8%	



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **47**

Plastic Limit **29**

Plastic Index **18**

Group Symbol **ML**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 3%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Mal Krajan, ET</u> Technical Responsibility	 Signature	<u>Laboratory Manager</u> Position	<u>5/27/2017</u> Date
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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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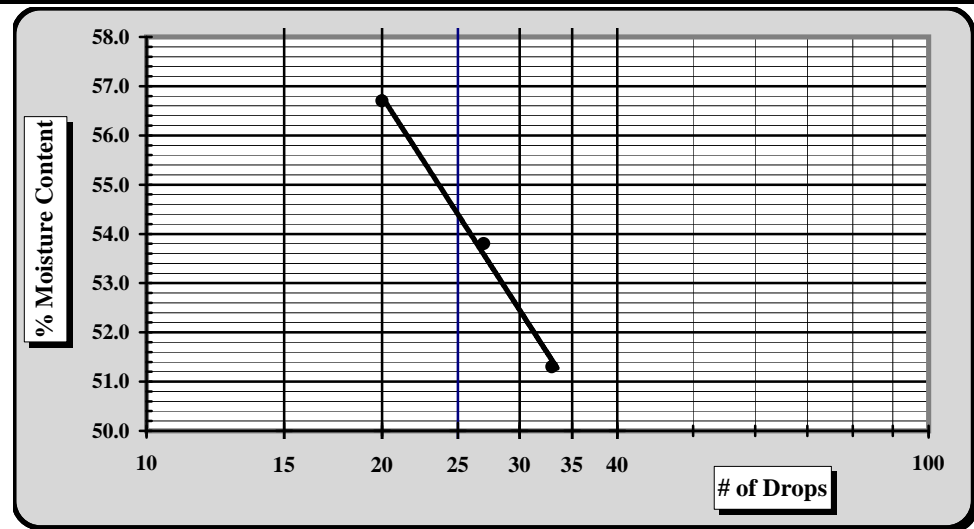
Project #: HDR No. 10052825 Task: 017 Report Date: 5/27/17
 Project Name: Transurban - Fredex - 95XPL Test Date(s) 5/18 - 5/26/17
 Client Name: HDR, Inc.
 Client Address: 4480 Cox Road, Suite 103, Glen Allen, VA 23060

Boring #: 17XP-20 Sample #: SS-11 Sample Date: 4/13/17
 Location: Site Borehole Offset: N/A Depth (ft): 38 - 40 ft.

Sample Description: Olive Gray Sandy Fat CLAY (CH)

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	21.03	13.63	13.49			20.96	20.87	
B	Wet Soil Weight + A	30.32	24.04	23.97			31.20	31.21	
C	Dry Soil Weight + A	27.17	20.40	20.18			28.95	29.00	
D	Water Weight (B-C)	3.15	3.64	3.79			2.25	2.21	
E	Dry Soil Weight (C-A)	6.14	6.77	6.69			7.99	8.13	
F	% Moisture (D/E)*100	51.3%	53.8%	56.7%			28.2%	27.2%	
N	# OF DROPS	33	27	20			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						27.7%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **54**
 Plastic Limit **28**
 Plastic Index **26**
 Group Symbol **CH**
 Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 7%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET Laboratory Manager 5/27/2017
 Technical Responsibility Signature Position Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

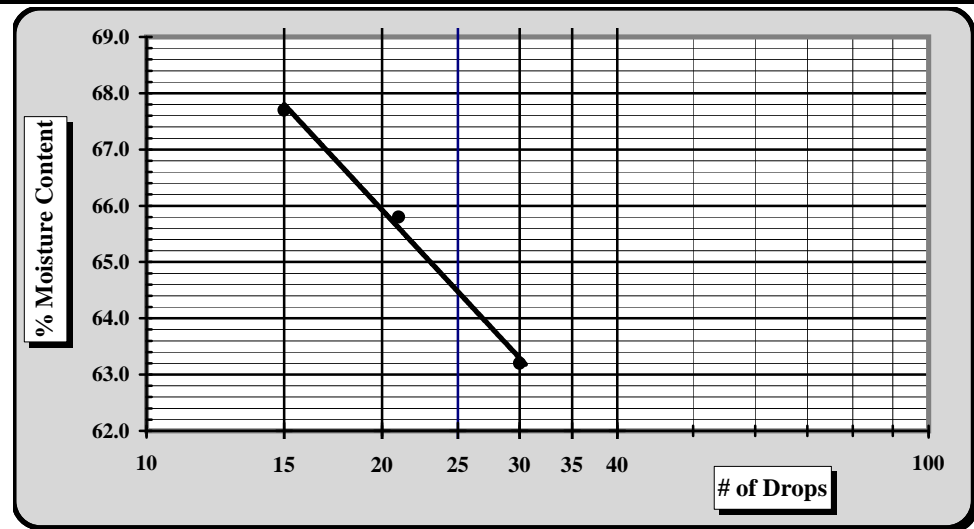
Project #: HDR No. 10052825 Task: 017 Report Date: 5/27/17
 Project Name: Transurban - Fredex - 95XPL Test Date(s) 5/18 - 5/26/17
 Client Name: HDR, Inc.
 Client Address: 4480 Cox Road, Suite 103, Glen Allen, VA 23060

Boring #: 17XP-21 Sample #: SS-5 Sample Date: 4/13/17
 Location: Site Borehole Offset: N/A Depth (ft): 8 - 10 ft.

Sample Description: Brown Elastic SILT (MH)

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit				Plastic Limit	
A	Tare Weight	21.03	11.00	11.00		13.49	13.59
B	Wet Soil Weight + A	30.64	21.58	22.54		21.75	23.13
C	Dry Soil Weight + A	26.92	17.38	17.88		19.70	20.77
D	Water Weight (B-C)	3.72	4.20	4.66		2.05	2.36
E	Dry Soil Weight (C-A)	5.89	6.38	6.88		6.21	7.18
F	% Moisture (D/E)*100	63.2%	65.8%	67.7%		33.0%	32.9%
N	# OF DROPS	30	21	15		<i>Moisture Contents determined by ASTM D 2216</i>	
LL	LL = F * FACTOR						
Ave.	Average					33.0%	



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **65**
 Plastic Limit **33**
 Plastic Index **32**
 Group Symbol **MH**
 Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 1%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET Laboratory Manager 5/27/2017
 Technical Responsibility Signature Position Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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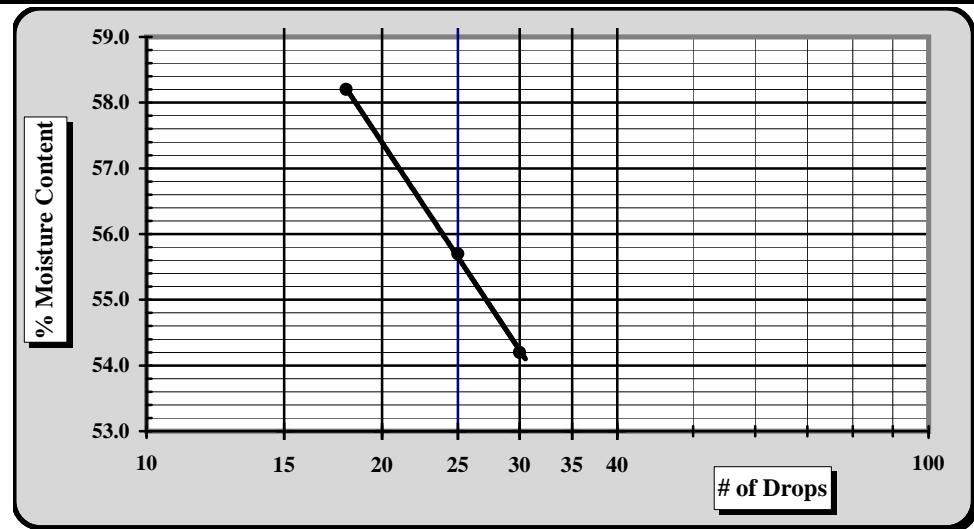
Project #: **HDR No. 10052825 Task: 017** Report Date: **5/27/17**
 Project Name: **Transurban - Fredex - 95XPL** Test Date(s) **5/18 - 5/26/17**
 Client Name: **HDR, Inc.**
 Client Address: **4480 Cox Road, Suite 103, Glen Allen, VA 23060**

Boring #: **17XP-21** Sample #: **SS-7** Sample Date: **4/13/17**
 Location: **Site Borehole** Offset: **N/A** Depth (ft): **18 - 20 ft.**

Sample Description: **Brown Elastic SILT (MH)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	16.71	11.12	10.97			21.12	20.63	
B	Wet Soil Weight + A	26.58	21.18	22.01			30.01	29.04	
C	Dry Soil Weight + A	23.11	17.58	17.95			27.60	26.78	
D	Water Weight (B-C)	3.47	3.60	4.06			2.41	2.26	
E	Dry Soil Weight (C-A)	6.40	6.46	6.98			6.48	6.15	
F	% Moisture (D/E)*100	54.2%	55.7%	58.2%			37.2%	36.7%	
N	# OF DROPS	30	25	18			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						37.0%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **56**
 Plastic Limit **37**
 Plastic Index **19**
 Group Symbol **MH**
 Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 0%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET  Laboratory Manager 5/27/2017
 Technical Responsibility Signature Position Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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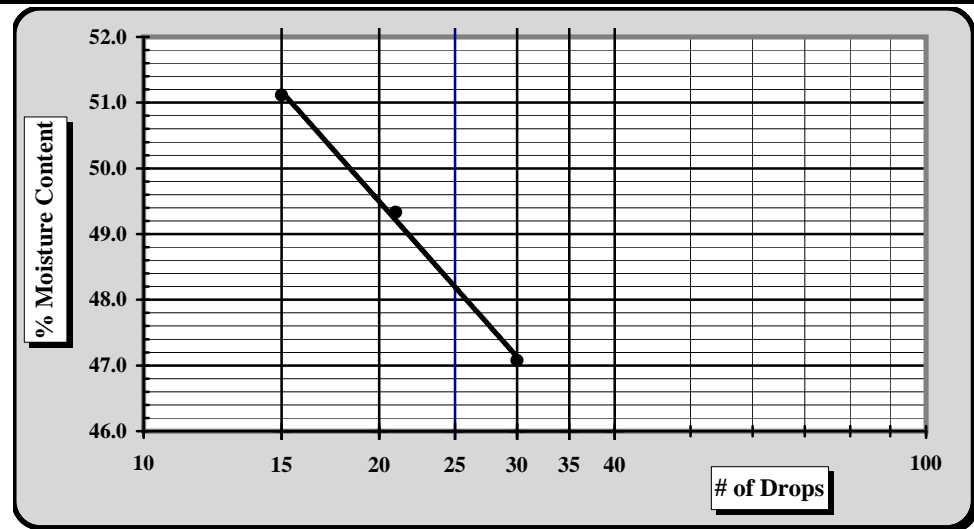
Project #:	HDR No. 10052825 Task: 017	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	5/18 - 5/27/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		

Boring #:	17XP-73	Sample #:	SS-7	Sample Date:	4/20/17
Location:	Site-Borehole	Offset:	N/A	Depth (ft):	18 - 20 ft.

Sample Description: **Brown Silty SAND (SM)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	1084	8/20/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	12.92	12.94	13.00			20.95	20.75	
B	Wet Soil Weight + A	23.73	24.08	23.17			31.51	33.05	
C	Dry Soil Weight + A	20.27	20.40	19.73			28.67	29.78	
D	Water Weight (B-C)	3.46	3.68	3.44			2.84	3.27	
E	Dry Soil Weight (C-A)	7.35	7.46	6.73			7.72	9.03	
F	% Moisture (D/E)*100	47.1%	49.3%	51.1%			36.8%	36.2%	
N	# OF DROPS	30	21	15			Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR								
Ave.	Average						36.5%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **48**

Plastic Limit **37**

Plastic Index **11**

Group Symbol **SM**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 33.4%

Notes / Deviations / References:

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)
 ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Mal Krajan, ET</u> Technical Responsibility	 Signature	<u>Laboratory Manager</u> Position	<u>5/27/2017</u> Date
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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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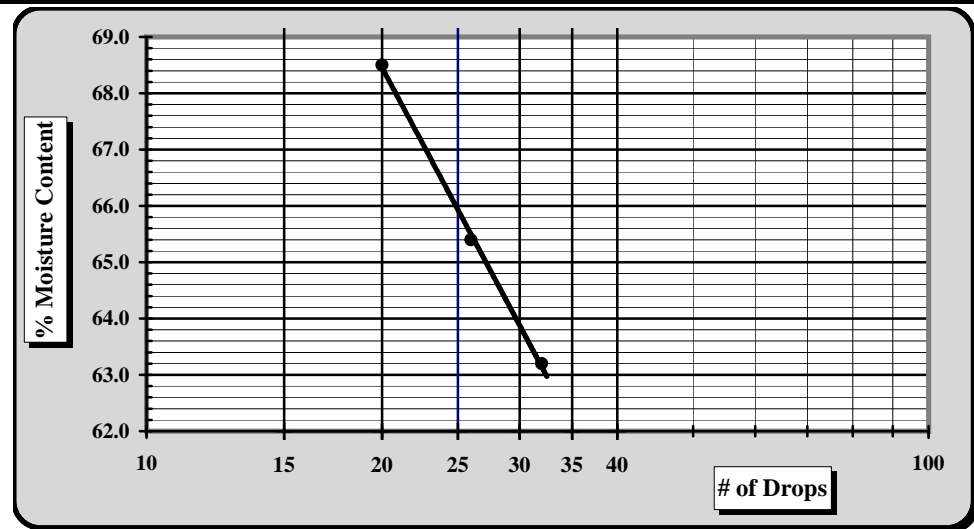
Project #: **HDR No. 10052825 Task: 017** Report Date: **5/27/17**
 Project Name: **Transurban - Fredex - 95XPL** Test Date(s) **5/18 - 5/26/17**
 Client Name: **HDR, Inc.**
 Client Address: **4480 Cox Road, Suite 103, Glen Allen, VA 23060**

Boring #: **17XP-77** Sample #: **SS-3** Sample Date: **4/28/17**
 Location: **Site Borehole** Offset: **N/A** Depth (ft): **4 - 6 ft.**

Sample Description: **Gray and Brown Sandy Fat CLAY (CH)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	13.02	13.60	13.62			21.05	13.56	
B	Wet Soil Weight + A	23.14	23.69	22.72			28.70	20.05	
C	Dry Soil Weight + A	19.22	19.70	19.02			27.50	19.01	
D	Water Weight (B-C)	3.92	3.99	3.70			1.20	1.04	
E	Dry Soil Weight (C-A)	6.20	6.10	5.40			6.45	5.45	
F	% Moisture (D/E)*100	63.2%	65.4%	68.5%			18.6%	19.1%	
N	# OF DROPS	32	26	20			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						18.9%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **66**
 Plastic Limit **19**
 Plastic Index **47**
 Group Symbol **CH**
 Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 8%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET  Laboratory Manager 5/27/2017
 Technical Responsibility Signature Position Date

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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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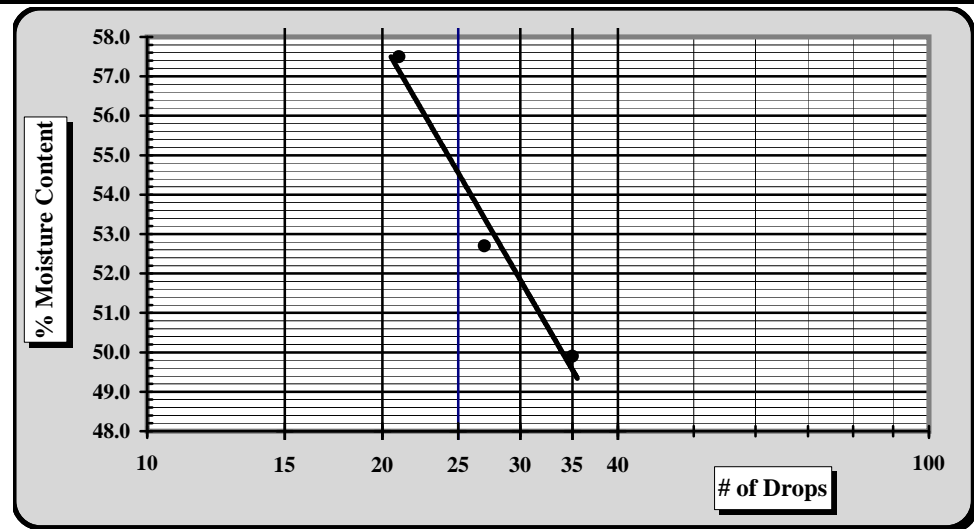
Project #:	HDR No. 10052825 Task: 017	Report Date:	6/17/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	6/15 - 6/17/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		

Boring #:	17HWN-01	Sample #:	SS-11
Location:	Site Borehole	Offset:	N/A
Sample Date:	5/2/17		
Depth (ft):	38 - 40 ft.		

Sample Description: Gray CLAY with Sand (CH)

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit				
		1	2	3	4	5	6	7	8		
A	Tare Weight	16.69	21.20	21.07					13.58	21.00	
B	Wet Soil Weight + A	27.95	32.09	34.68					23.69	31.36	
C	Dry Soil Weight + A	24.20	28.33	29.71					21.76	29.39	
D	Water Weight (B-C)	3.75	3.76	4.97					1.93	1.97	
E	Dry Soil Weight (C-A)	7.51	7.13	8.64					8.18	8.39	
F	% Moisture (D/E)*100	49.9%	52.7%	57.5%					23.6%	23.5%	
N	# OF DROPS	35	27	21					Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR										
Ave.	Average								23.6%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic

Liquid Limit **55**

Plastic Limit **24**

Plastic Index **31**

Group Symbol **CH**

Multipoint Method

One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 0%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

<u>Mal Krajan, ET</u> Technical Responsibility	 Signature	<u>Laboratory Manager</u> Position	<u>6/17/2017</u> Date
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Liquid Limit, Plastic Limit, and Plastic Index



Test Methods: ASTM D 4318 AASHTO T 89 AASHTO T 90 Quality Assurance

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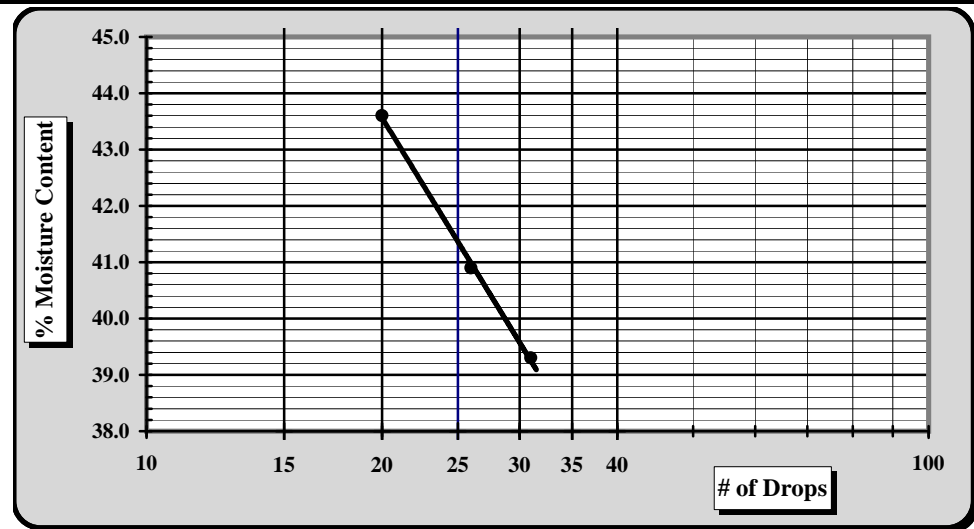
Project #: **HDR No. 10052825 Task: 017** Report Date: **6/17/17**
 Project Name: **Transurban - Fredex - 95XPL** Test Date(s) **6/15 - 6/17/17**
 Client Name: **HDR, Inc.**
 Client Address: **4480 Cox Road, Suite 103, Glen Allen, VA 23060**

Boring #: **17HWN-02** Sample #: **SS-4** Sample Date: **5/1/17**
 Location: **Site Borehole** Offset: **N/A** Depth (ft): **4 - 6 ft.**

Sample Description: **Tan-Brown Sandy CLAY (CL)**

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	1024	11/4/2016	Grooving tool	S-1	5/20/2016
LL Apparatus	13288	8/10/2016			
Oven	1454	10/7/2016			

Pan #	Tare #:	Liquid Limit					Plastic Limit		
A	Tare Weight	13.52	21.17	20.72			20.99	16.70	
B	Wet Soil Weight + A	24.68	32.44	33.17			31.76	25.31	
C	Dry Soil Weight + A	21.53	29.17	29.39			30.14	24.02	
D	Water Weight (B-C)	3.15	3.27	3.78			1.62	1.29	
E	Dry Soil Weight (C-A)	8.01	8.00	8.67			9.15	7.32	
F	% Moisture (D/E)*100	39.3%	40.9%	43.6%			17.7%	17.6%	
N	# OF DROPS	31	26	20			<i>Moisture Contents determined by ASTM D 2216</i>		
LL	LL = F * FACTOR								
Ave.	Average						17.7%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic
 Liquid Limit **41**
 Plastic Limit **18**
 Plastic Index **23**
 Group Symbol **CL**
 Multipoint Method
 One-point Method

Wet Preparation Dry Preparation Air Dried Estimate the % Retained on the #40 Sieve: 5%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET  **Laboratory Manager** **6/17/2017**
 Technical Responsibility Signature Position Date

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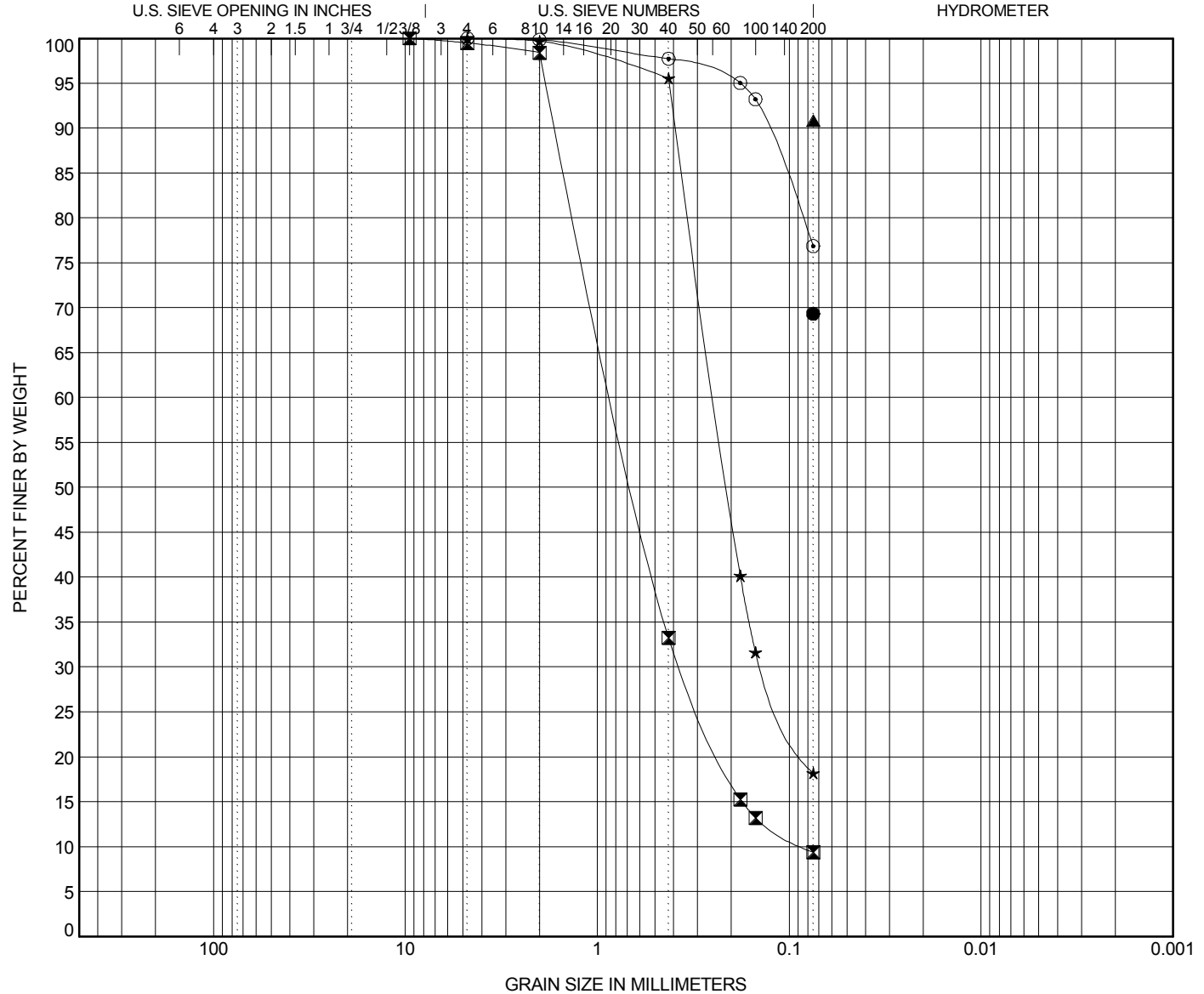
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● 17CL-02	14.0	SANDY FAT CLAY(CH)	58	25	33		
☒ 17CL-02	29.0					1.96	9.55
▲ 17CL-03	14.0	FAT CLAY(CH)	57	22	35		
★ 17CL-03	34.0	CLAYEY SAND(SC)	39	17	22		
◎ 17CL-11	7.0						

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 17CL-02	14.0	0.075							69.3
☒ 17CL-02	29.0	9.5	0.803	0.364	0.084	0.5	90.1		9.4
▲ 17CL-03	14.0	0.075							90.9
★ 17CL-03	34.0	4.75	0.245	0.138		0.0	81.8		18.2
◎ 17CL-11	7.0	4.75				0.0	23.1		76.9

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 5/1/17 13:01 - G:\GINT\PROJECTS\VB17VB17-151G 95 EXPRESS LANES.GPJ



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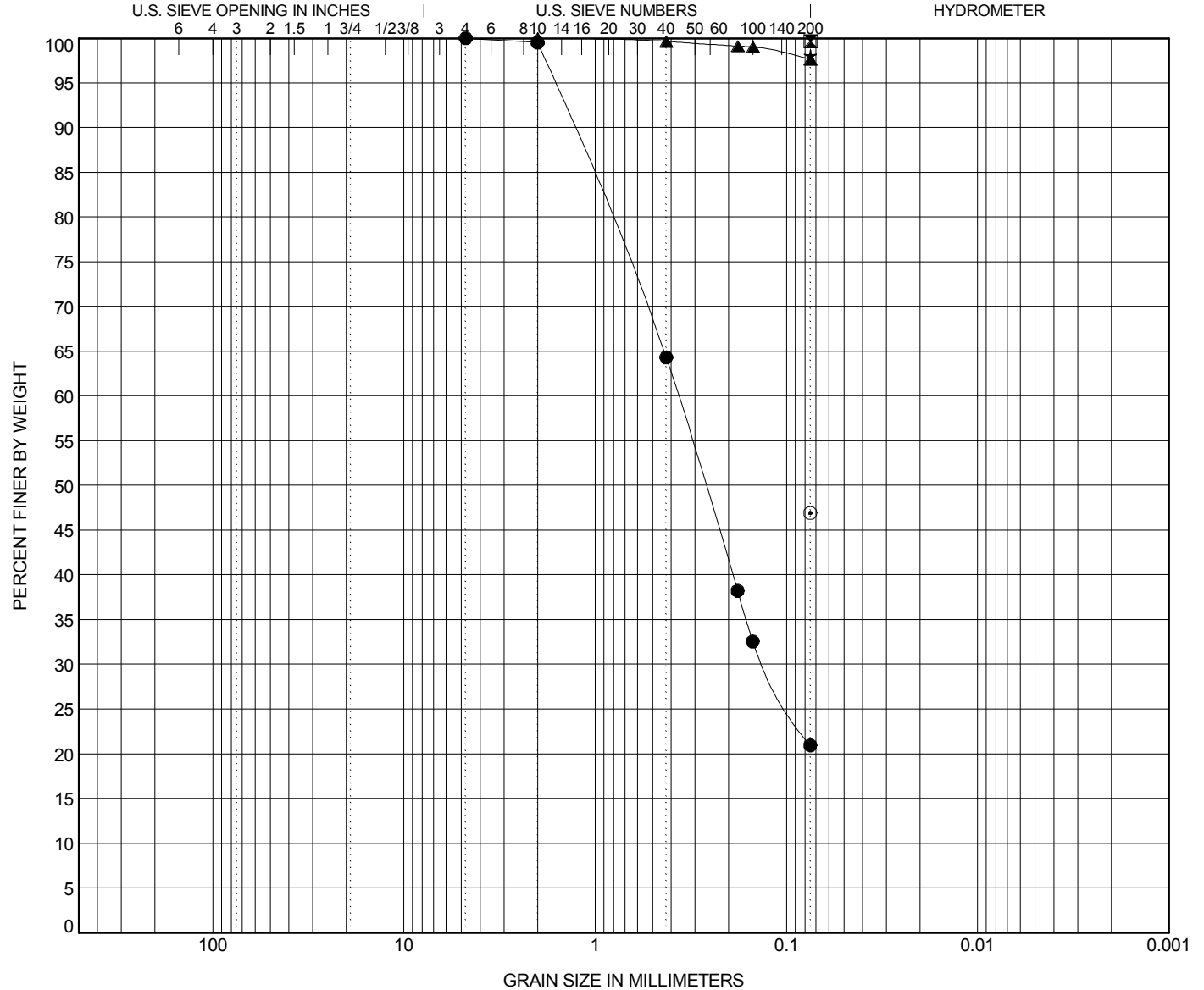
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17CL-11	29.0										
☒ 17CL-12	5.0	FAT CLAY(CH)					78	30	48		
▲ 17CL-12	39.0	FAT CLAY(CH)					68	23	45		
★ 17CL-12	68.8	FAT CLAY(CH)					59	25	34		
◎ 17SWM-05	5.0	CLAYEY SAND(SC)					29	12	17		
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● 17CL-11	29.0	4.75	0.369	0.129		0.0	79.1	20.9			
☒ 17CL-12	5.0	0.075						99.7			
▲ 17CL-12	39.0	2				0.0	2.3	97.7			
★ 17CL-12	68.8	0.075						98.1			
◎ 17SWM-05	5.0	0.075						46.9			

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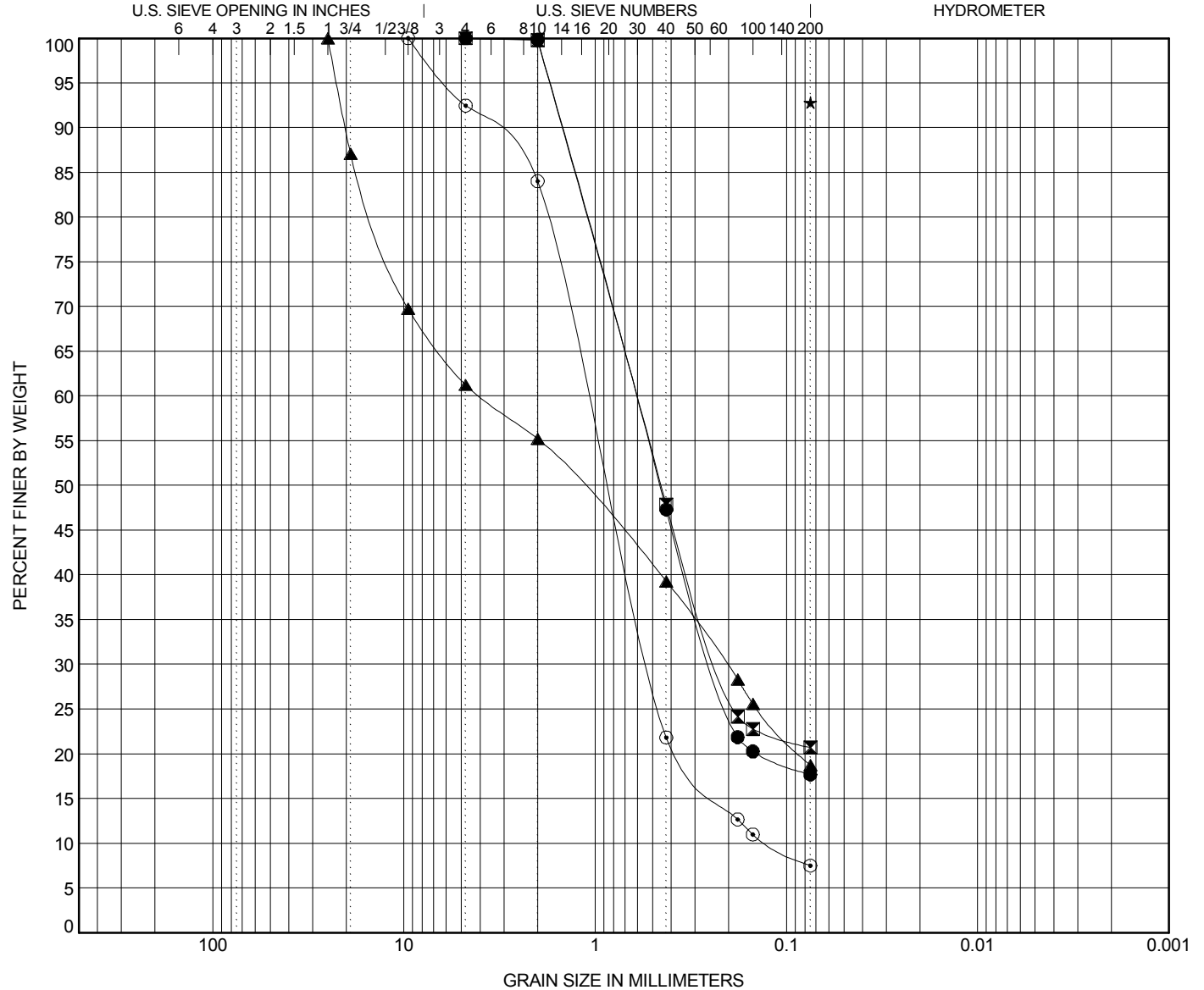
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17SWM-06	7.0										
☒ 17SWM-06	19.0										
▲ 17SWM-15	9.0										
★ 17SWM-15	24.0	FAT CLAY(CH)					50	19	31		
◎ 17XP-12	24.0								1.99	8.88	
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● 17SWM-06	7.0	4.75	0.618	0.237		0.0	82.3	17.7			
☒ 17SWM-06	19.0	4.75	0.611	0.222		0.0	79.3	20.7			
▲ 17SWM-15	9.0	25	3.977	0.205		38.8	42.5	18.7			
★ 17SWM-15	24.0	0.075						92.8			
◎ 17XP-12	24.0	9.5	1.1	0.521	0.124	7.5	85.0	7.5			

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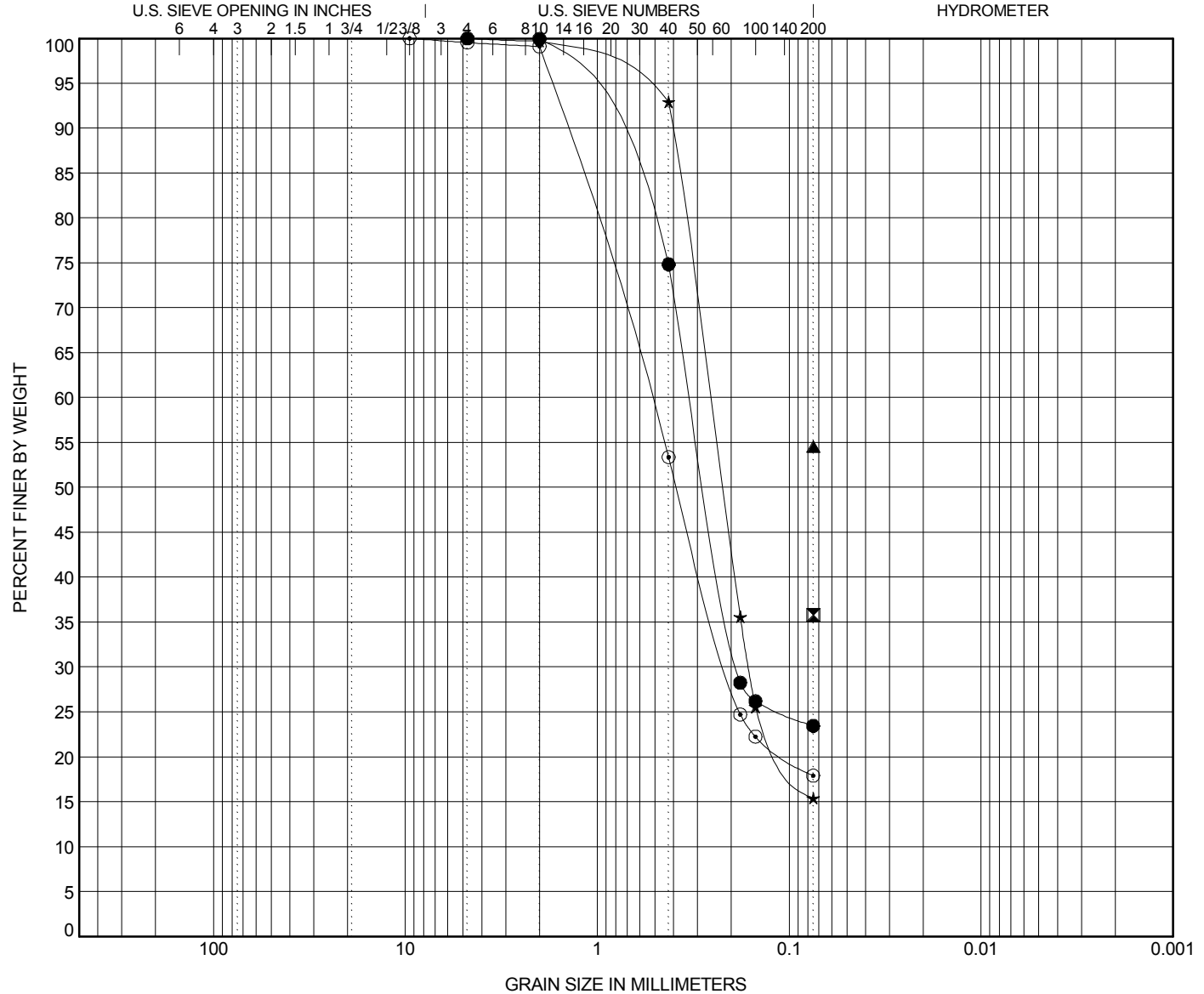
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17XP-13	14.0										
☒ 17XP-14	5.0	CLAYEY SAND(SC)					27	12	15		
▲ 17XP-14	19.0	SANDY FAT CLAY(CH)					50	16	34		
★ 17XP-14	34.0	CLAYEY SAND(SC)					42	15	27		
◎ 17XP-15	6.6										

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 17XP-13	14.0	4.75	0.323	0.186		0.0	76.6		23.4
☒ 17XP-14	5.0	0.075							35.8
▲ 17XP-14	19.0	0.075							54.5
★ 17XP-14	34.0	4.75	0.259	0.163		0.0	84.6		15.4
◎ 17XP-15	6.6	9.5	0.532	0.211		0.5	81.6		17.9

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 5/1/17 13:01 - G:\GINT\PROJECTS\VB17VB17-151G 95 EXPRESS LANES.GPJ



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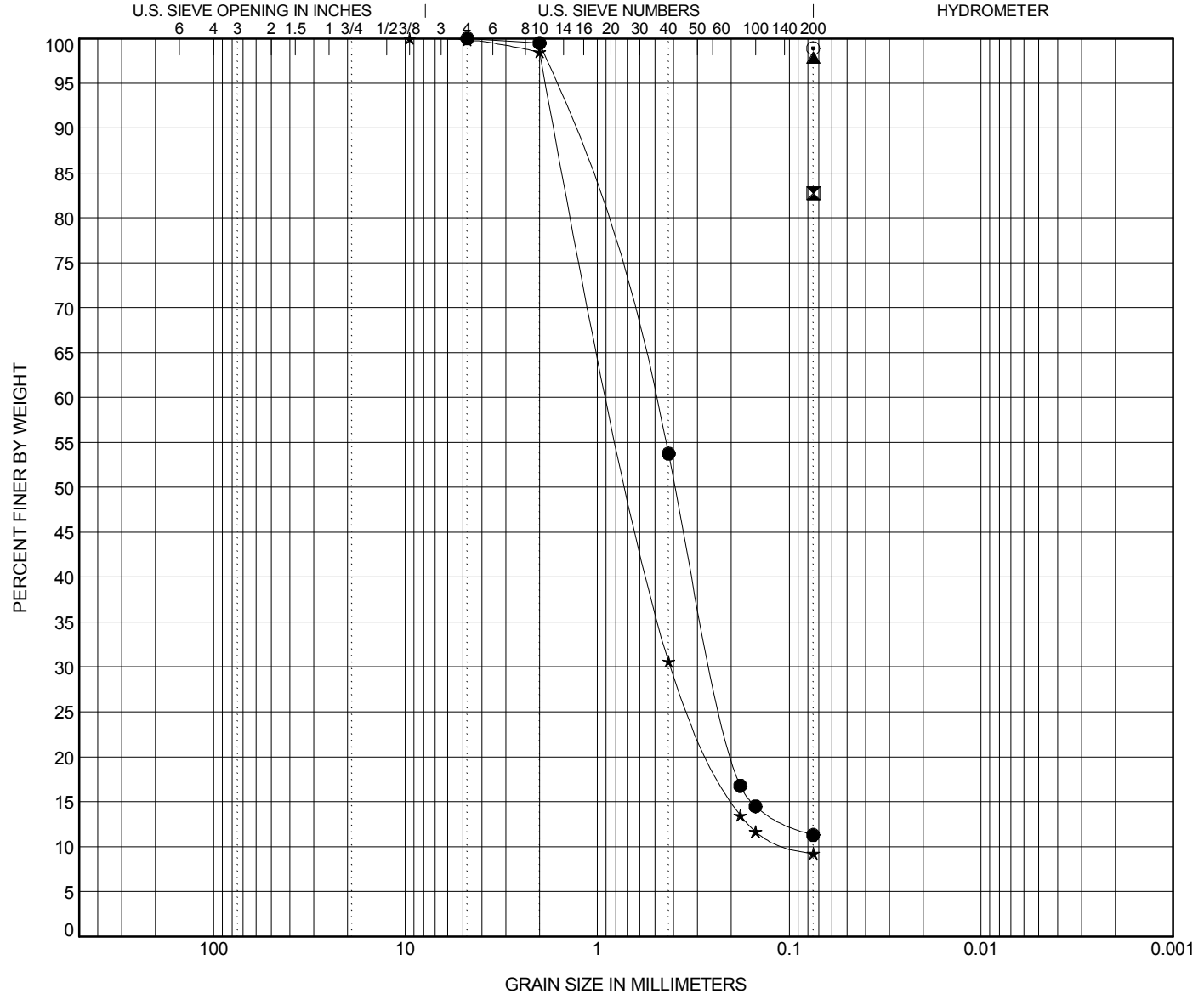
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17XP-15	34.0									2.01	9.27
☒ 17XP-16	5.0	FAT CLAY with SAND(CH)					65	25	40		
▲ 17XP-19	7.0	FAT CLAY(CH)					52	21	31		
★ 17XP-19	34.0									2.19	8.90
◎ 17XP-19	49.0	LEAN CLAY(CL)					49	20	29		
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● 17XP-15	34.0	4.75	0.525	0.245		0.0	88.7	11.3			
☒ 17XP-16	5.0	0.075						82.8			
▲ 17XP-19	7.0	0.075						97.9			
★ 17XP-19	34.0	9.5	0.831	0.412	0.093	0.2	90.6	9.2			
◎ 17XP-19	49.0	0.075						98.9			

(1) GET - GRAIN SIZE REPORT - GET - STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 5/1/17 13:01 - G:\GINT\PROJECTS\17151G 95 EXPRESS LANES.GPJ



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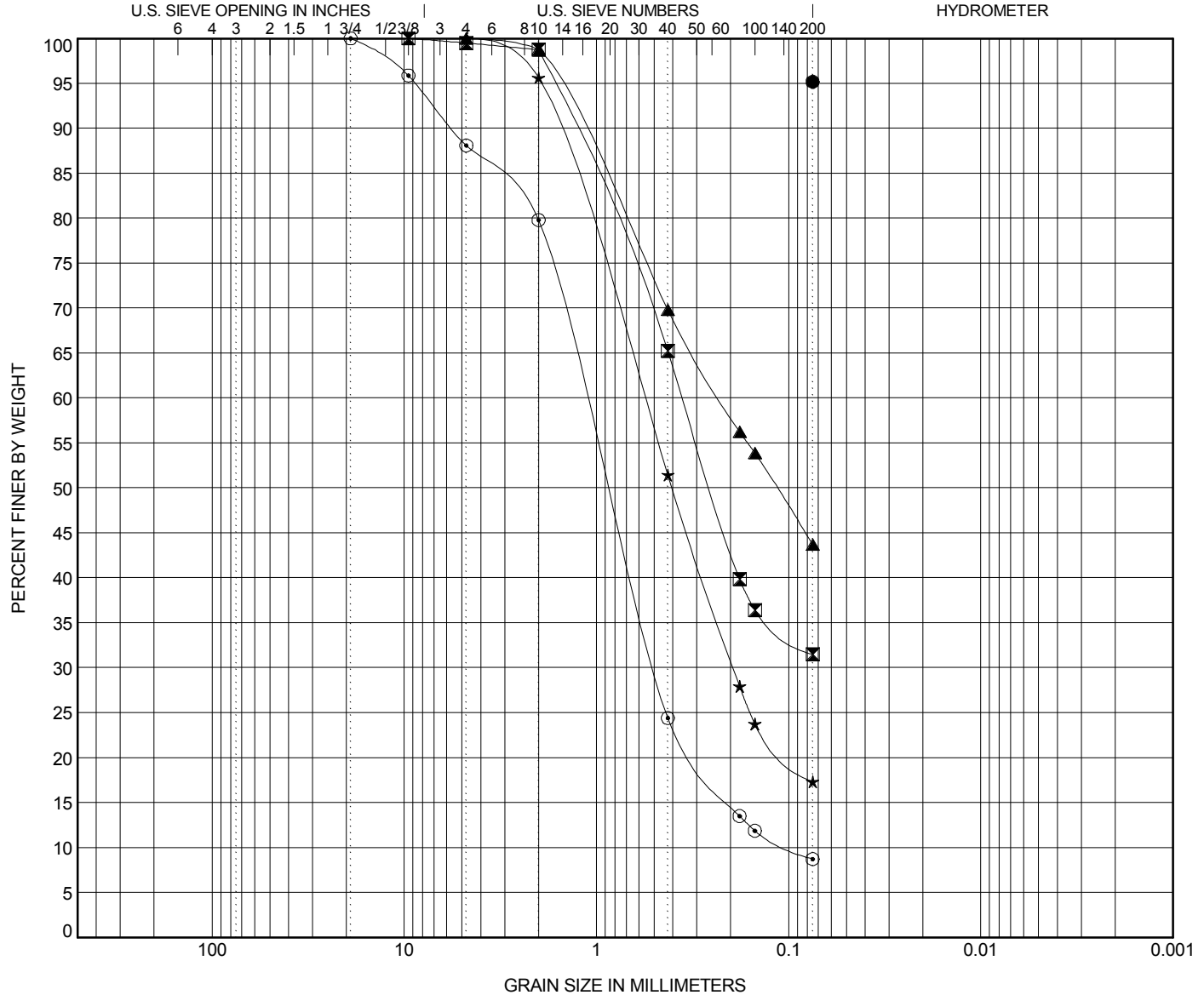
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17XP-20	5.0	FAT CLAY(CH)					80	26	54		
☒ 17XP-51	9.0										
▲ 17XP-57	14.0										
★ 17XP-57	39.0										
◎ 17XP-58	9.0								2.15	11.51	

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 17XP-20	5.0	0.075						95.2	
☒ 17XP-51	9.0	9.5	0.356			0.5	68.0	31.5	
▲ 17XP-57	14.0	4.75	0.228			0.0	56.3	43.7	
★ 17XP-57	39.0	4.75	0.574	0.194		0.0	82.7	17.3	
◎ 17XP-58	9.0	19	1.15	0.497	0.1	11.9	79.4	8.7	

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 5/1/17 13:01 - G:\GINT\PROJECTS\VB17VB17-151G 95 EXPRESS LANES.GPJ



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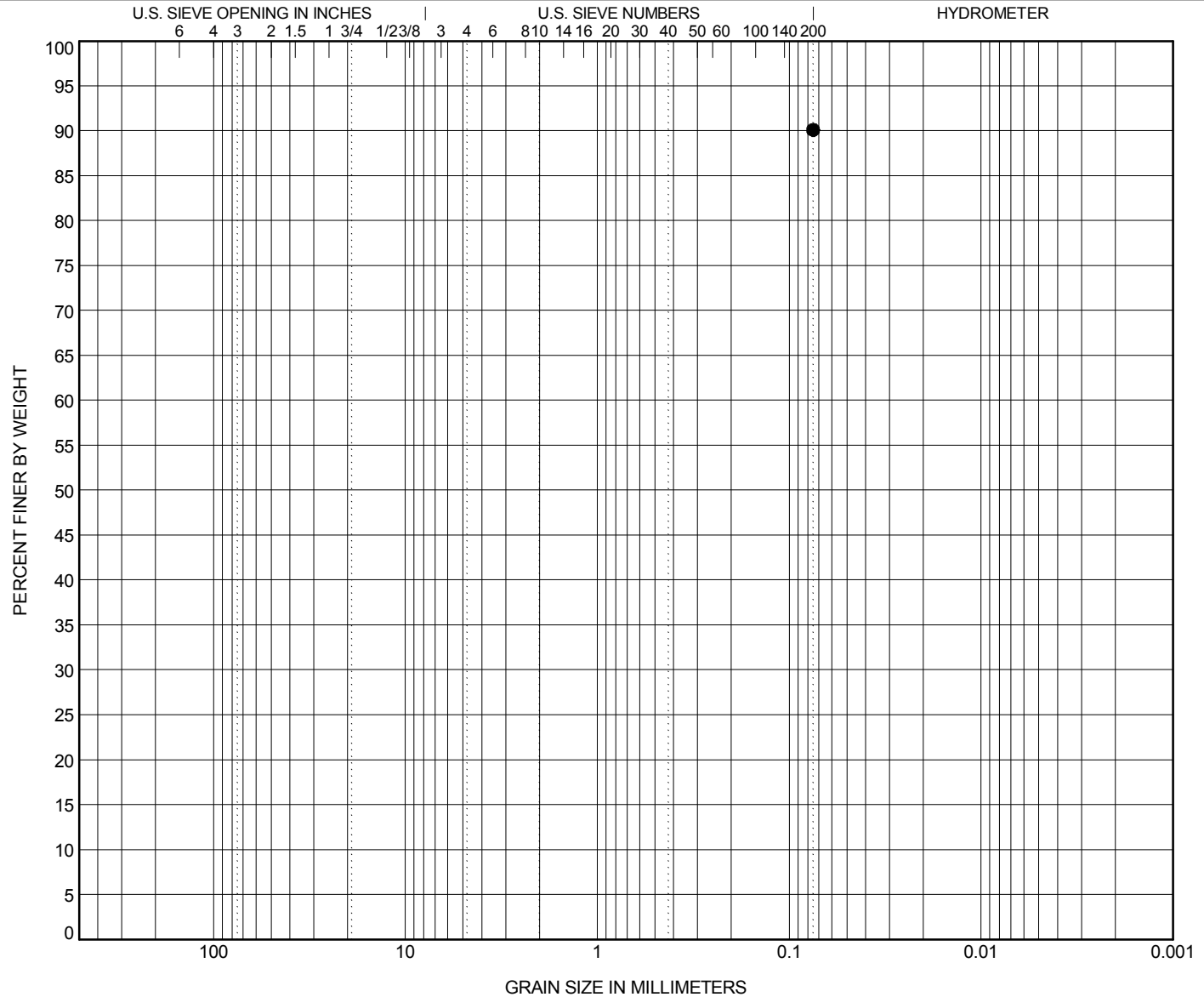
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17XP-58	29.0	FAT CLAY(CH)					61	25	36		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 17XP-58	29.0	0.075							90.1

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 5/1/17 13:01 - G:\GINT\PROJECTS\VB17VB17-151G 95 EXPRESS LANES.GPJ



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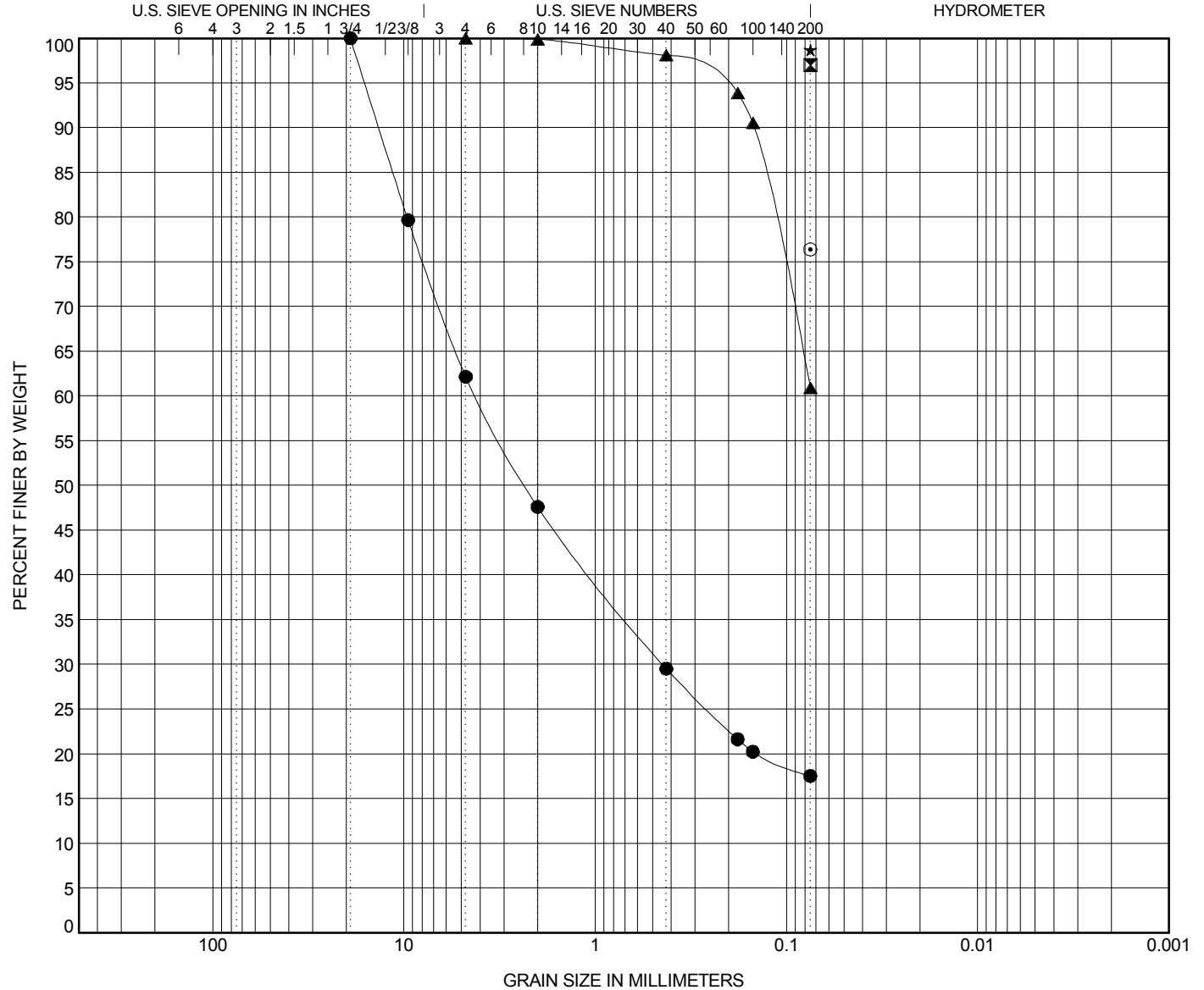
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17BR-02	9.0										
☒ 17BR-02	19.0	FAT CLAY(CH)					54	29	25		
▲ 17BR-02	39.0										
★ 17BR-02	64.0	FAT CLAY(CH)					61	30	31		
◎ 17BR-03	19.0	LEAN CLAY with SAND(CL)					28	18	10		
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● 17BR-02	9.0	19	4.18	0.443		37.8	44.6		17.5		
☒ 17BR-02	19.0	0.075							97.0		
▲ 17BR-02	39.0	4.75				0.0	39.1		60.9		
★ 17BR-02	64.0	0.075							98.7		
◎ 17BR-03	19.0	0.075							76.4		

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 5/23/17 12:02 - G:\GINT\PROJECTS\VB17\VB17-151G 95 EXPRESS LANES.GPJ



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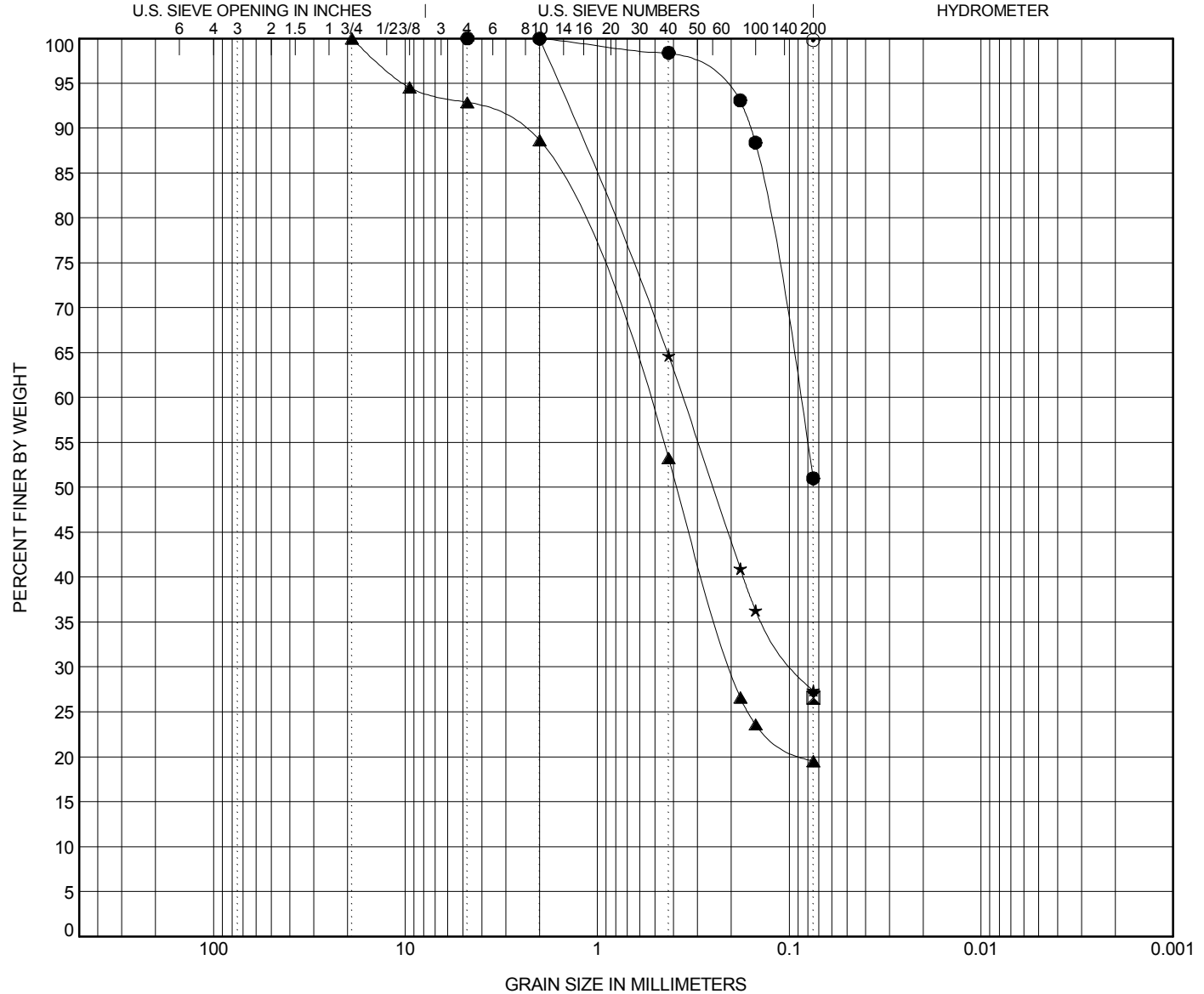
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17BR-03	34.0	SANDY LEAN CLAY(CL)					33	21	12		
☒ 17BR-03	54.0	CLAYEY SAND(SC)					110	21	89		
▲ 17BR-04	7.0										
★ 17BR-04	23.6										
◎ 17RW-09	14.0	FAT CLAY(CH)					80	31	49		
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● 17BR-03	34.0	4.75	0.089			0.0	49.0	51.0			
☒ 17BR-03	54.0	0.075						26.6			
▲ 17BR-04	7.0	19	0.57	0.201		7.1	73.4	19.5			
★ 17BR-04	23.6	2	0.359	0.092		0.0	72.6	27.4			
◎ 17RW-09	14.0	0.075						99.8			

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 5/23/17 12:02 - G:\GINT\PROJECTS\1717\17-151G 95 EXPRESS LANES.GPJ



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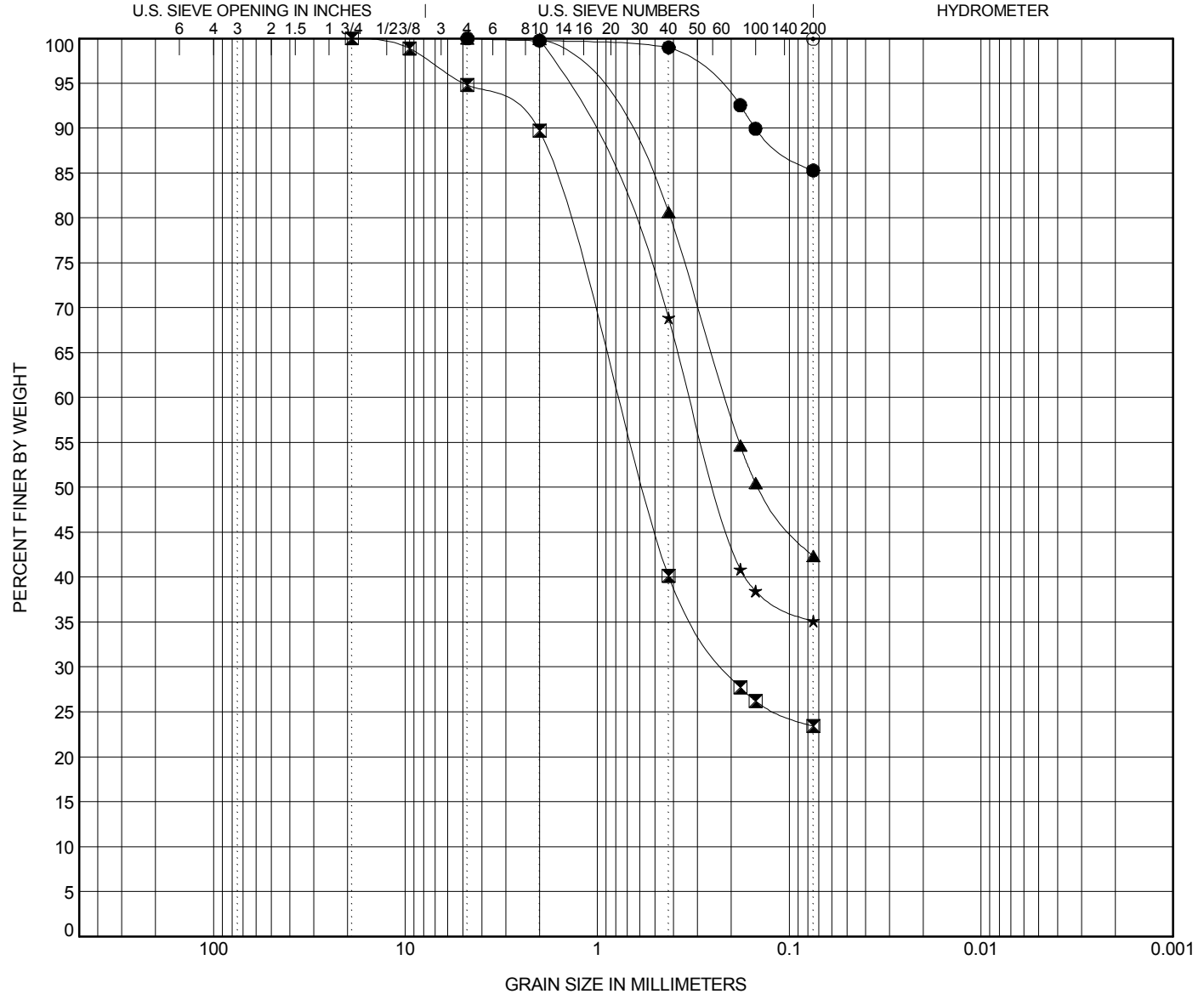
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17RW-09	29.0	LEAN CLAY(CL)					41	18	23		
☒ 17SBGP-02	9.0										
▲ 17SW-02	19.0	CLAYEY SAND(SC)					30	13	17		
★ 17SW-03	14.0										
◎ 17SW-03	29.0	FAT CLAY(CH)					80	32	48		
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● 17RW-09	29.0	4.75				0.0	14.7	85.3			
☒ 17SBGP-02	9.0	19	0.791	0.211		5.2	71.4	23.4			
▲ 17SW-02	19.0	4.75	0.215			0.0	57.6	42.4			
★ 17SW-03	14.0	4.75	0.324			0.0	64.9	35.1			
◎ 17SW-03	29.0	0.075						99.9			

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 5/23/17 12:03 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



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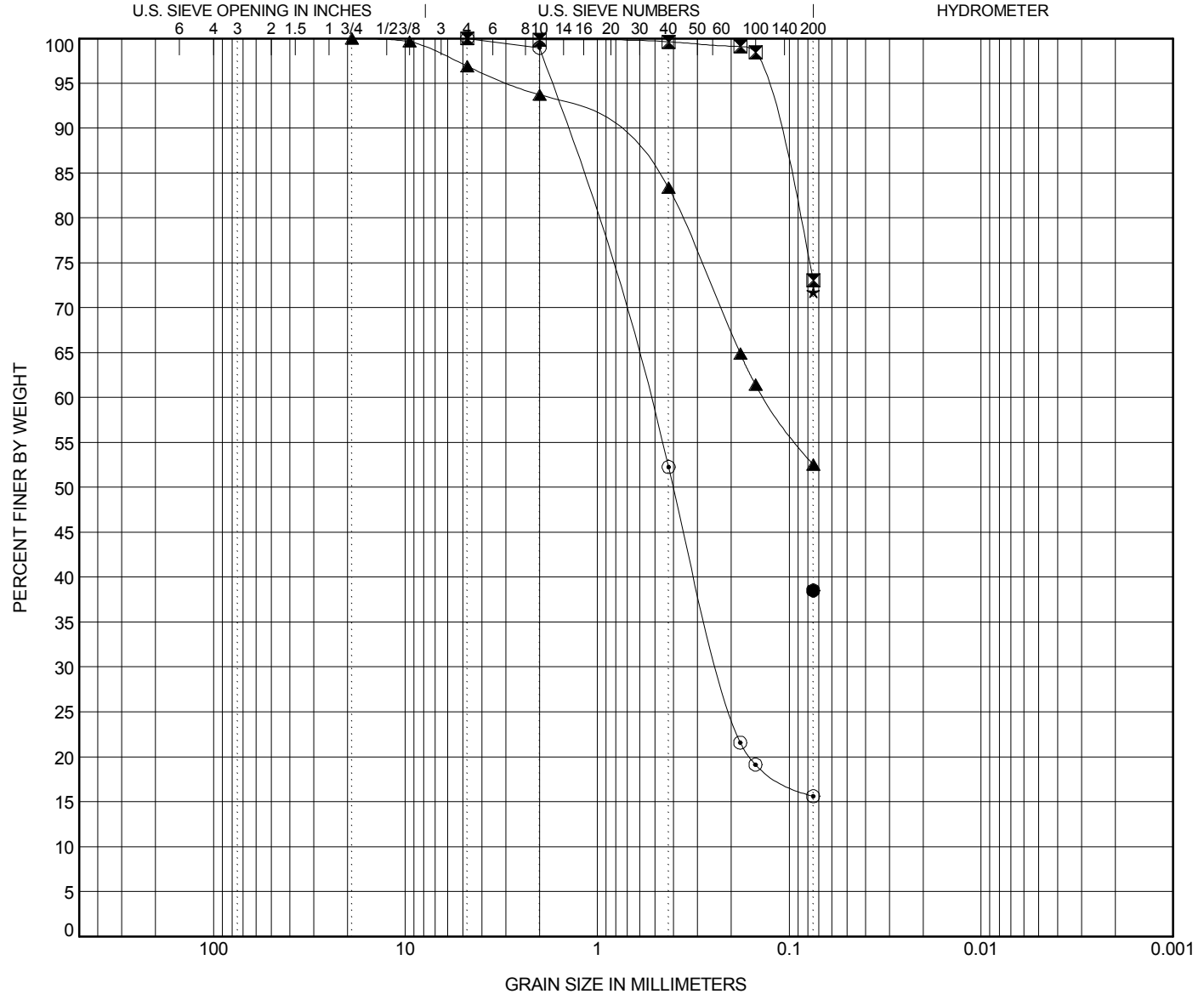
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● 17SW-04	9.0	CLAYEY SAND(SC)	20	12	8		
☒ 17SW-04	24.0						
▲ 17SWM-01	4.0	SANDY LEAN CLAY(CL)	33	13	20		
★ 17SWM-01	14.0	LEAN CLAY with SAND(CL)	21	12	9		
◎ 17SWM-04	14.0						

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 17SW-04	9.0	0.075							38.5
☒ 17SW-04	24.0	4.75				0.0	26.9		73.1
▲ 17SWM-01	4.0	19	0.134			3.1	44.4		52.5
★ 17SWM-01	14.0	0.075							71.7
◎ 17SWM-04	14.0	4.75	0.549	0.228		0.0	84.4		15.6

(1) GET - GRAIN SIZE REPORT - GET - STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 5/23/17 12:03 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



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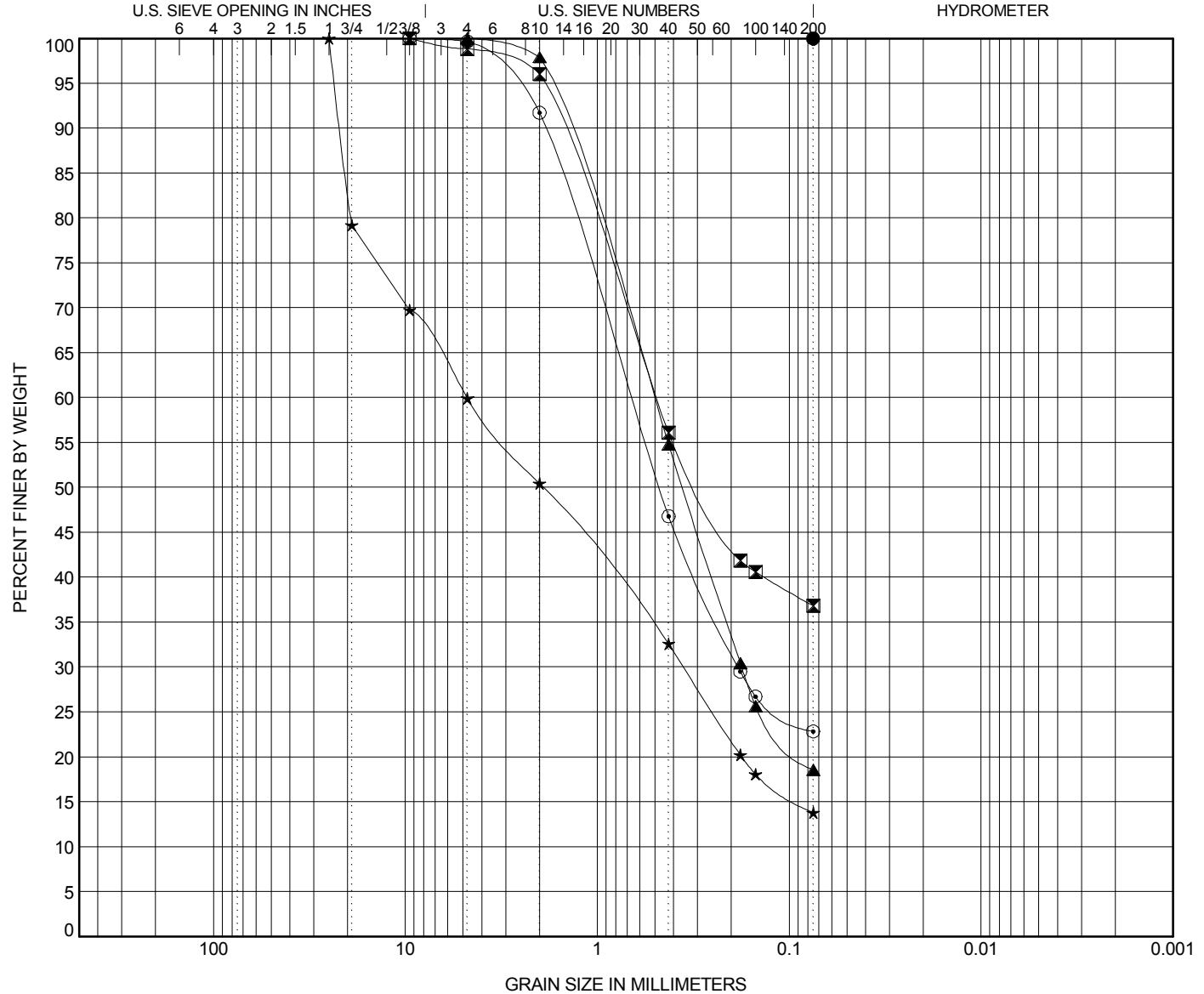
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17SWM-07	19.0	FAT CLAY(CH)					74	26	48		
☒ 17SWM-16	9.0										
▲ 17SWM-16	19.0										
★ 17WGS-06	7.0										
◎ 17WGS-07	14.0										
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● 17SWM-07	19.0	0.075						100.0			
☒ 17SWM-16	9.0	9.5	0.495			1.2	62.0	36.8			
▲ 17SWM-16	19.0	4.75	0.512	0.177		0.0	81.5	18.5			
★ 17WGS-06	7.0	25	4.779	0.355		40.1	46.1	13.8			
◎ 17WGS-07	14.0	9.5	0.67	0.185		0.4	76.8	22.8			

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 5/23/17 12:03 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



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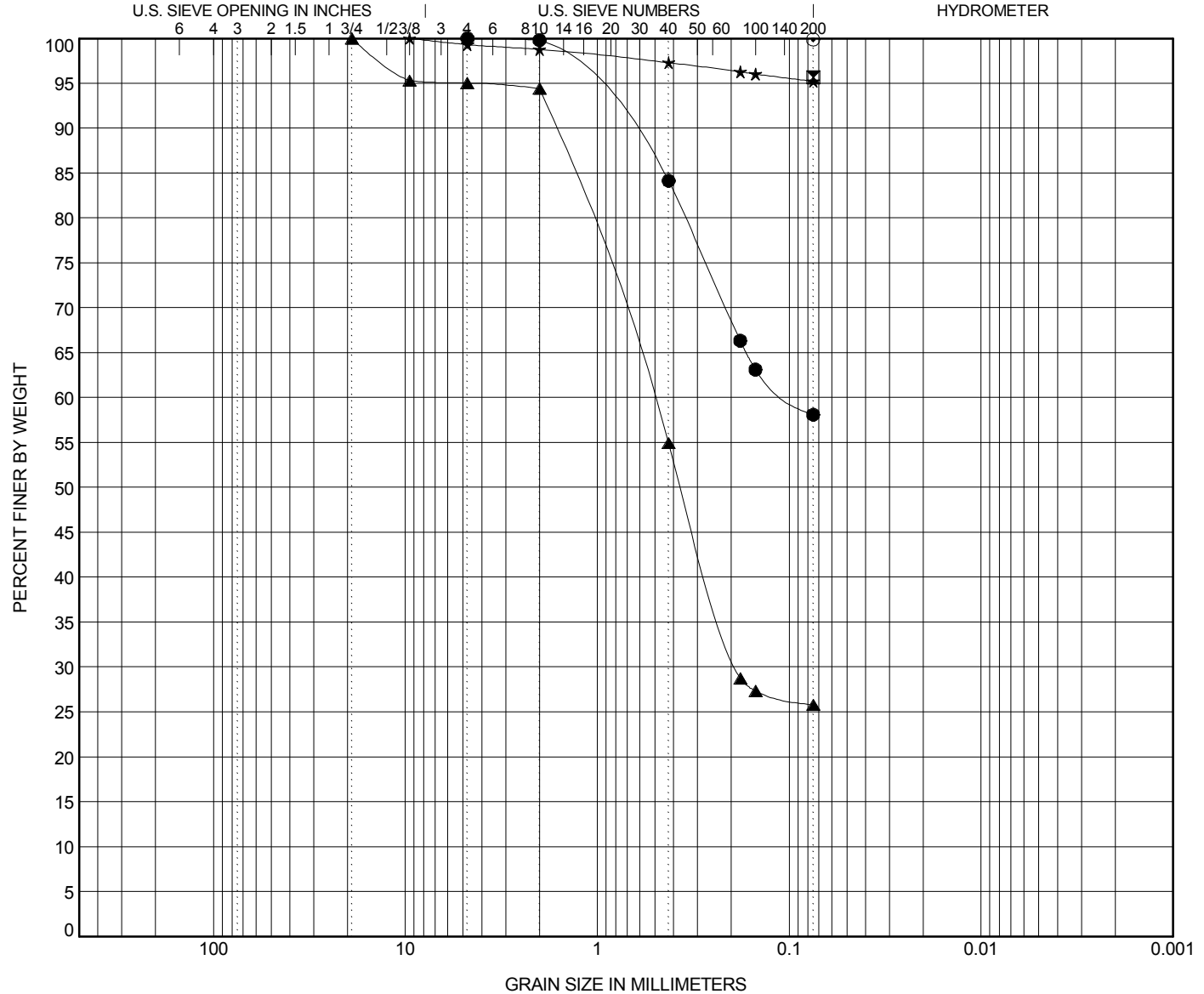
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● 17WGS-08	9.0	SANDY FAT CLAY(CH)	56	23	33		
☒ 17XP-01	5.0	FAT CLAY(CH)	96	28	68		
▲ 17XP-01	24.0						
★ 17XP-03	4.0	FAT CLAY(CH)	92	24	68		
◎ 17XP-03	9.0	FAT CLAY(CH)	85	21	64		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 17WGS-08	9.0	4.75	0.098			0.0	41.9		58.1
☒ 17XP-01	5.0	0.075							95.7
▲ 17XP-01	24.0	19	0.518	0.188		5.0	69.2		25.8
★ 17XP-03	4.0	9.5				0.7	4.1		95.2
◎ 17XP-03	9.0	0.075							99.9

(1) GET - GRAIN SIZE REPORT - GET - STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 5/23/17 12:03 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



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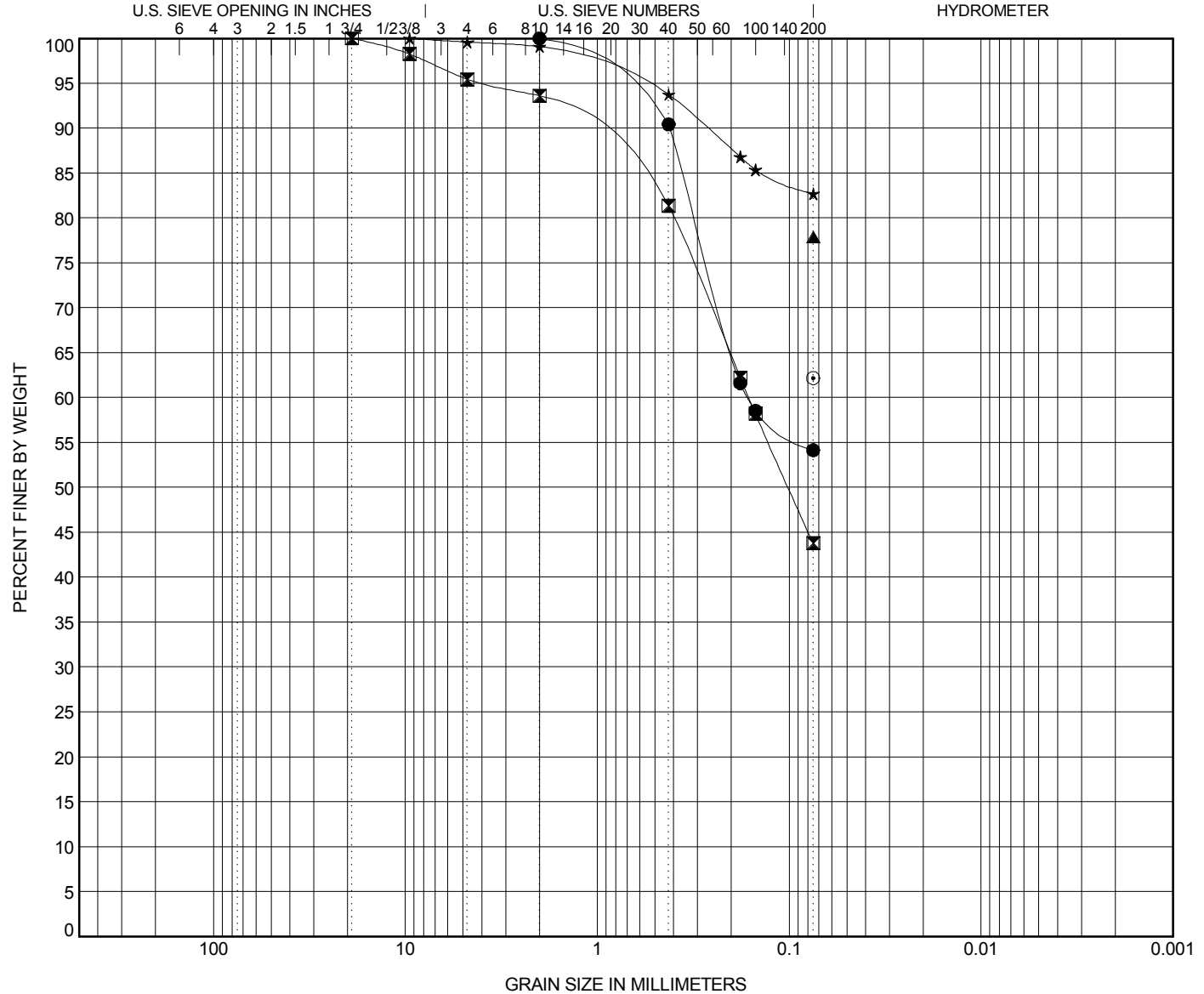
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17XP-04	24.0	SANDY LEAN CLAY(CL)					38	15	23		
☒ 17XP-05	14.5	CLAYEY SAND(SC)					22	9	13		
▲ 17XP-05	19.0	FAT CLAY with SAND(CH)					61	20	41		
★ 17XP-10	4.0	FAT CLAY with SAND(CH)					63	22	41		
⊙ 17XP-10	9.0	SANDY LEAN CLAY(CL)					34	14	20		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 17XP-04	24.0	2	0.164			0.0	45.9	54.1	
☒ 17XP-05	14.5	19	0.163			4.6	51.7	43.8	
▲ 17XP-05	19.0	0.075						77.9	
★ 17XP-10	4.0	9.5				0.4	16.9	82.7	
⊙ 17XP-10	9.0	0.075						62.2	

(1) GET - GRAIN SIZE REPORT - GET - STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 5/23/17 12:03 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



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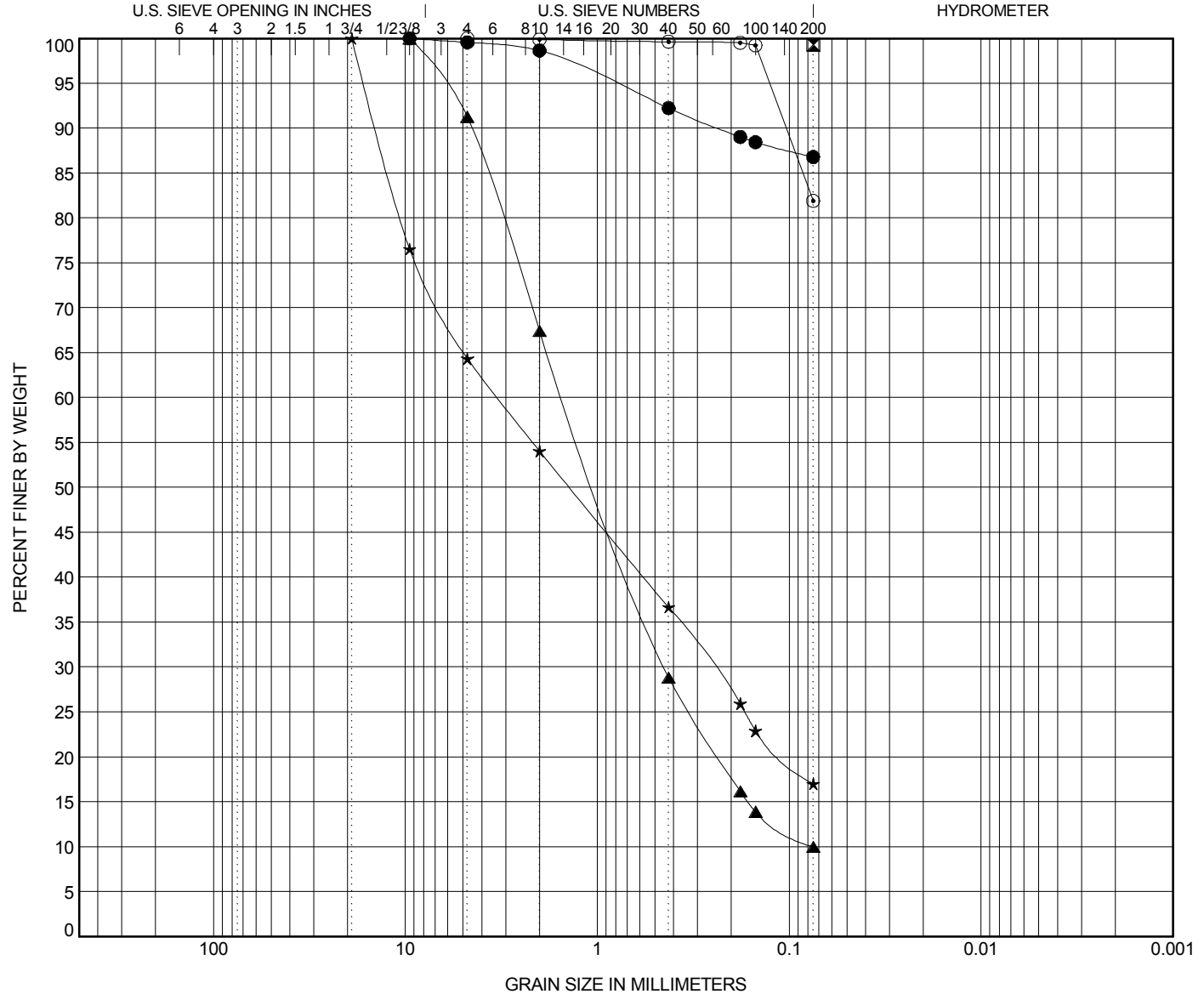
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● 17XP-18	3.5	FAT CLAY(CH)	63	17	46		
☒ 17XP-21	54.0	FAT CLAY(CH)	72	26	46		
▲ 17XP-55	14.0					1.77	19.67
★ 17XP-56	7.0						
◎ 17XP-74	5.5	FAT CLAY with SAND(CH)	50	22	28		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 17XP-18	3.5	9.5				0.4	12.8		86.8
☒ 17XP-21	54.0	0.075							99.3
▲ 17XP-55	14.0	9.5	1.485	0.446	0.075	8.7	81.3		10.0
★ 17XP-56	7.0	19	3.297	0.249		35.7	47.4		17.0
◎ 17XP-74	5.5	4.75				0.0	18.1		81.9

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 5/23/17 12:03 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



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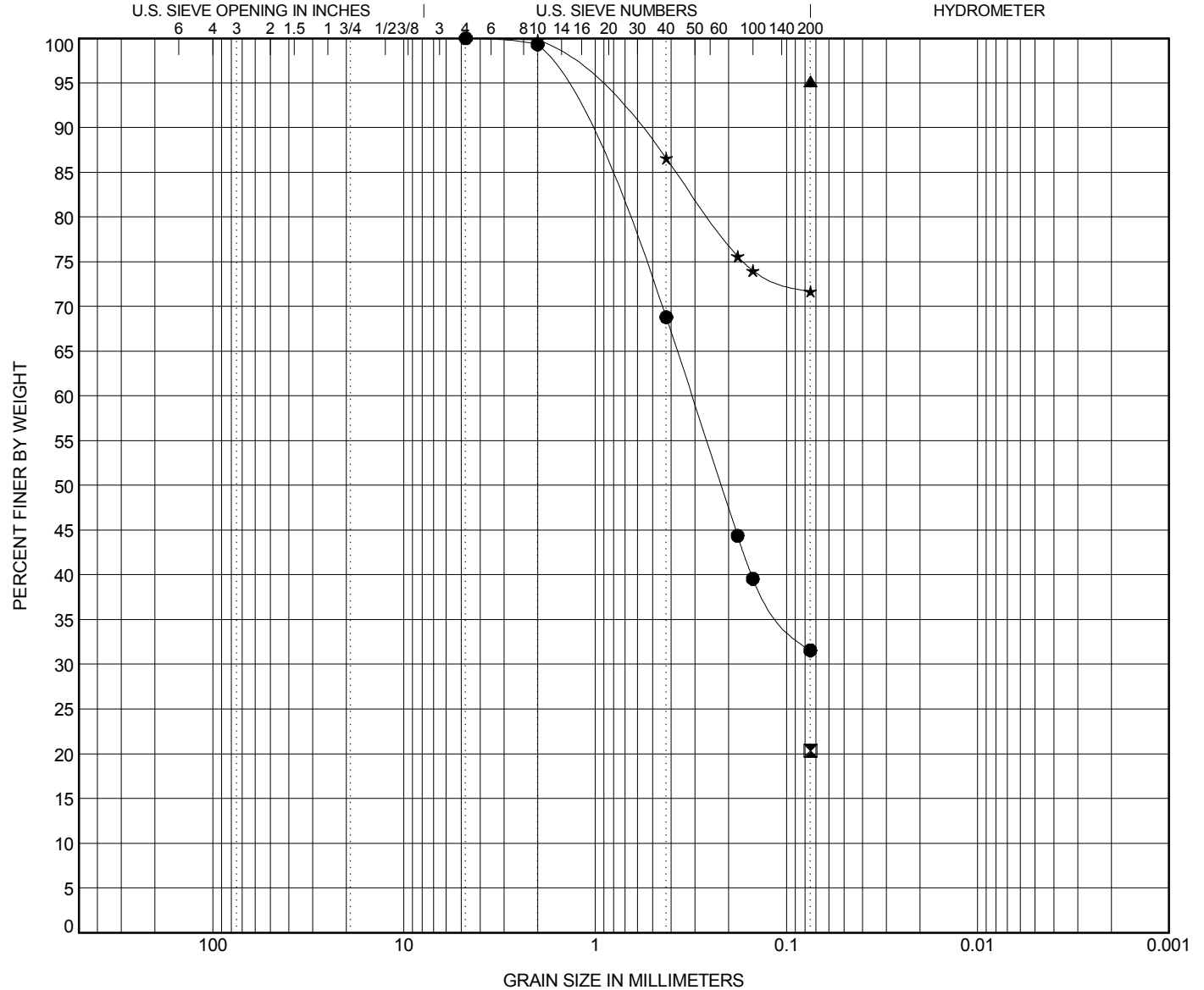
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

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PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17XP-74	29.0										
☒ 17XP-75	5.0	CLAYEY SAND(SC)					21	11	10		
▲ 17XP-75	29.0	FAT CLAY(CH)					56	20	36		
★ 17XP-75	44.0										

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 17XP-74	29.0	4.75	0.312			0.0	68.4		31.6
☒ 17XP-75	5.0	0.075						20.3	
▲ 17XP-75	29.0	0.075						95.2	
★ 17XP-75	44.0	4.75				0.0	28.3		71.7

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 5/23/17 12:03 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



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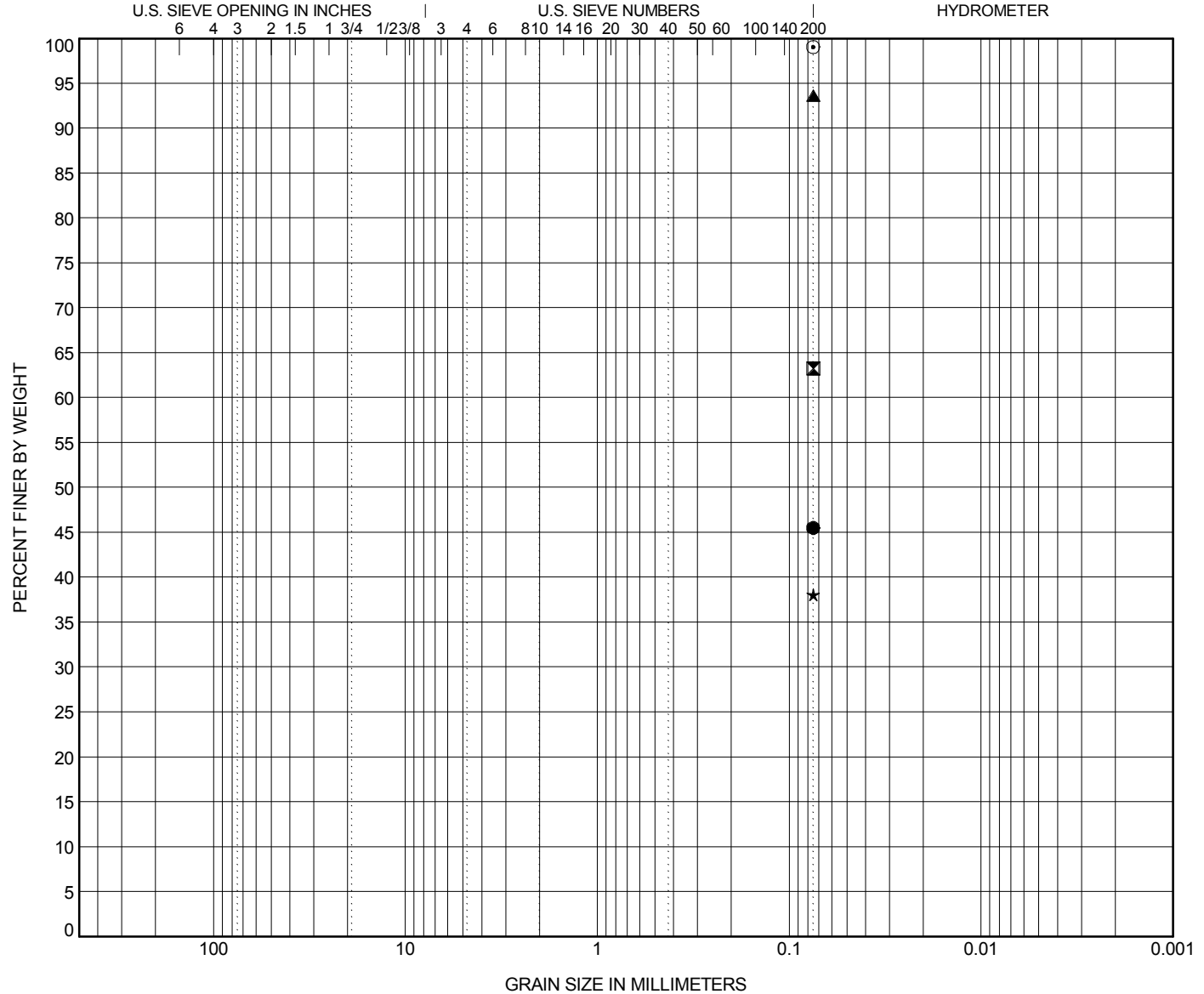
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PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17BR-08	9.0										
⊠ 17BR-08	34.0	SANDY LEAN CLAY(CL)					44	23	21		
▲ 17BR-08	64.0	FAT CLAY(CH)					63	17	46		
★ 17BR-08	74.0										
○ 17CHS-03	19.0	FAT CLAY(CH)					77	31	46		
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● 17BR-08	9.0	0.075							45.5		
⊠ 17BR-08	34.0	0.075							63.3		
▲ 17BR-08	64.0	0.075							93.6		
★ 17BR-08	74.0	0.075							38.0		
○ 17CHS-03	19.0	0.075							99.0		

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 6/14/17 10:03 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



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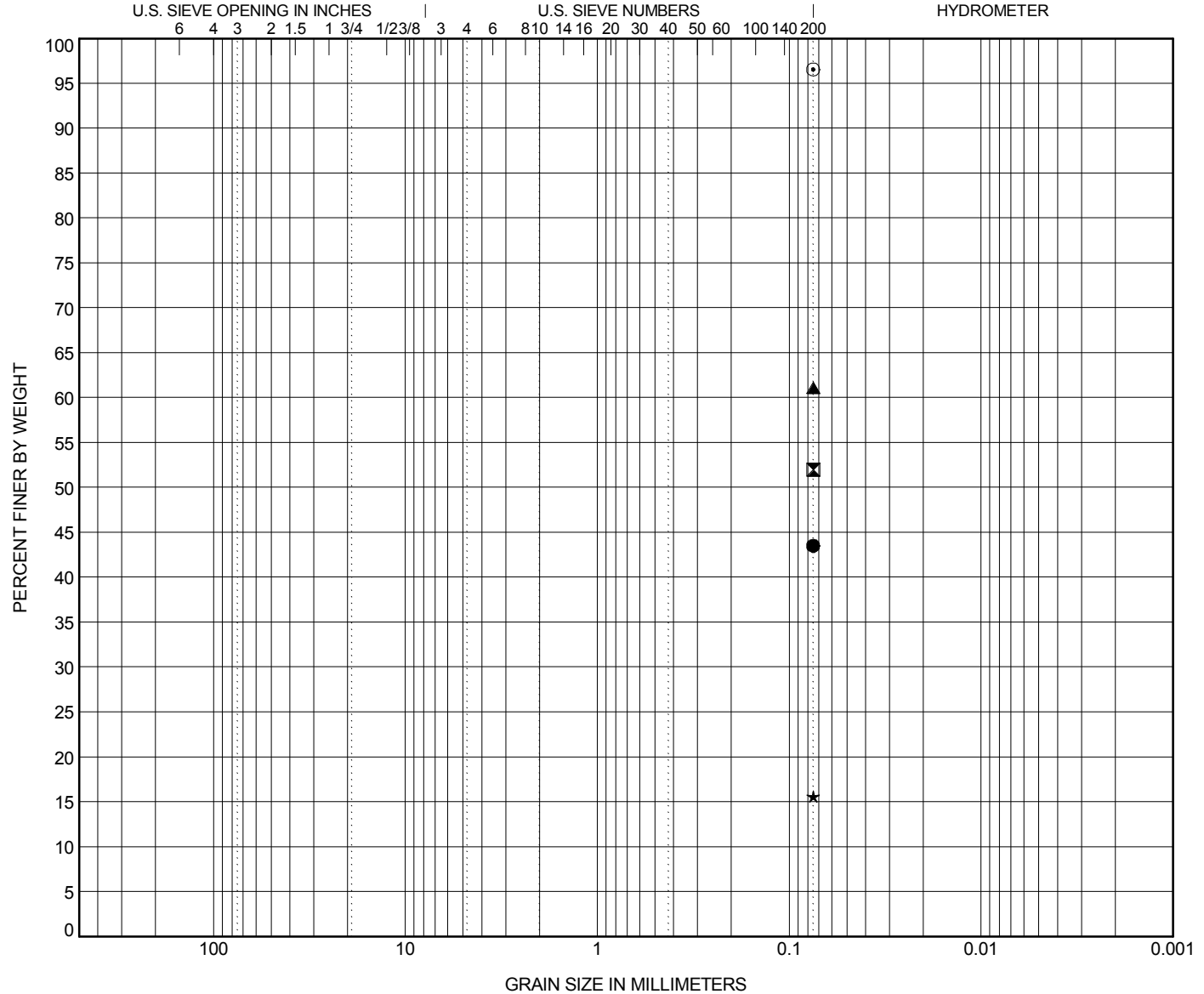
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17HWN-03	4.0	CLAYEY SAND(SC)					23	11	12		
☒ 17HWN-03	10.0	SANDY LEAN CLAY(CL)					28	11	17		
▲ 17HWN-04	4.0	SANDY LEAN CLAY(CL)					35	17	18		
★ 17HWN-05	9.0										
◎ 17HWN-07	9.0	FAT CLAY(CH)					65	23	42		
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● 17HWN-03	4.0	0.075							43.5		
☒ 17HWN-03	10.0	0.075							52.0		
▲ 17HWN-04	4.0	0.075							61.1		
★ 17HWN-05	9.0	0.075							15.6		
◎ 17HWN-07	9.0	0.075							96.5		

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)GDT - 6/14/17 10:03 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



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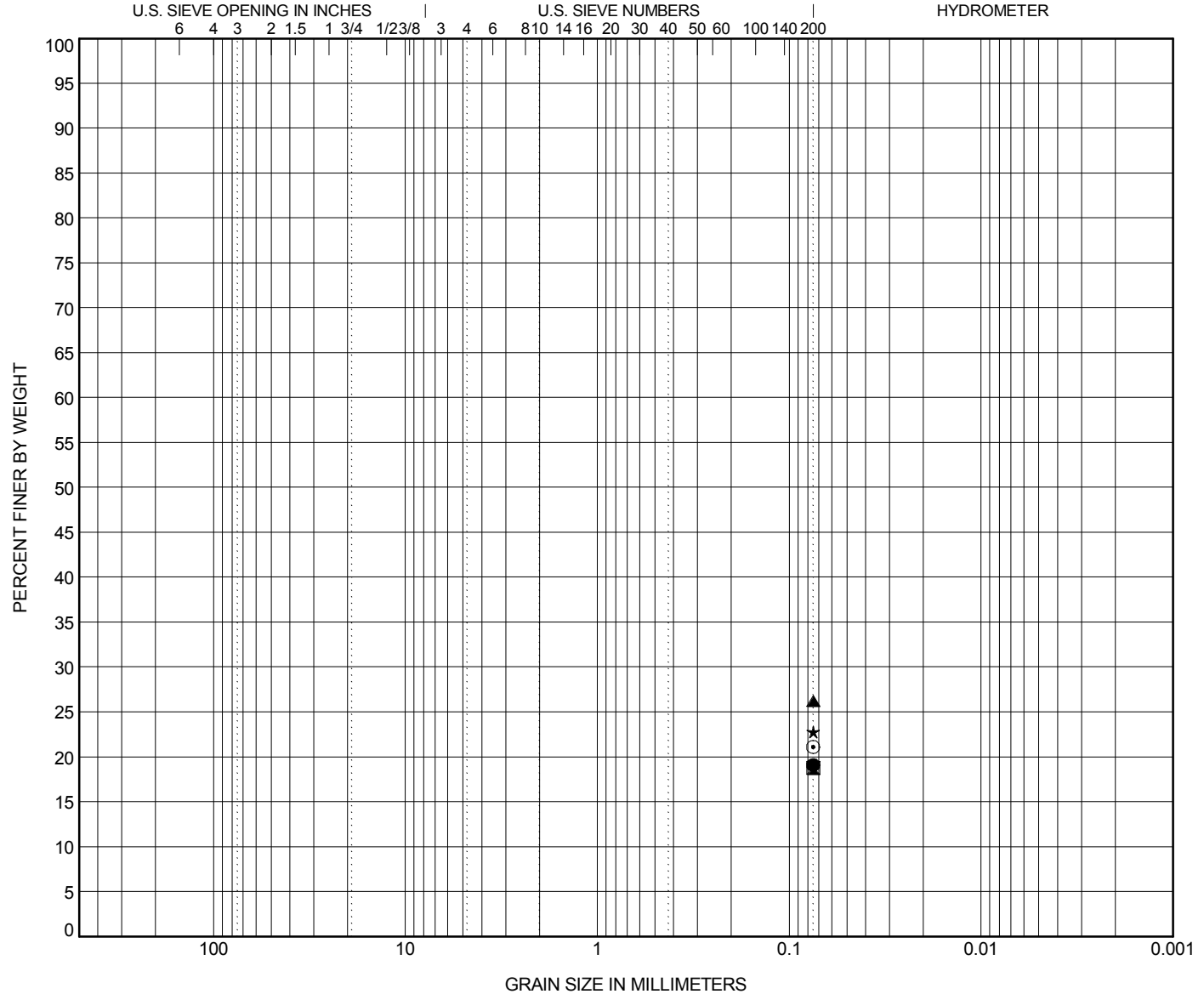
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PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17NSS-03	3.0										
☒ 17NSS-05	1.7										
▲ 17NSS-07	7.0	CLAYEY SAND(SC)					28	19	9		
★ 17NSS-09	9.0										
◎ 17NSS-12	5.0										
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● 17NSS-03	3.0	0.075							19.1		
☒ 17NSS-05	1.7	0.075							18.7		
▲ 17NSS-07	7.0	0.075							26.2		
★ 17NSS-09	9.0	0.075							22.8		
◎ 17NSS-12	5.0	0.075							21.1		

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 6/14/17 10:03 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



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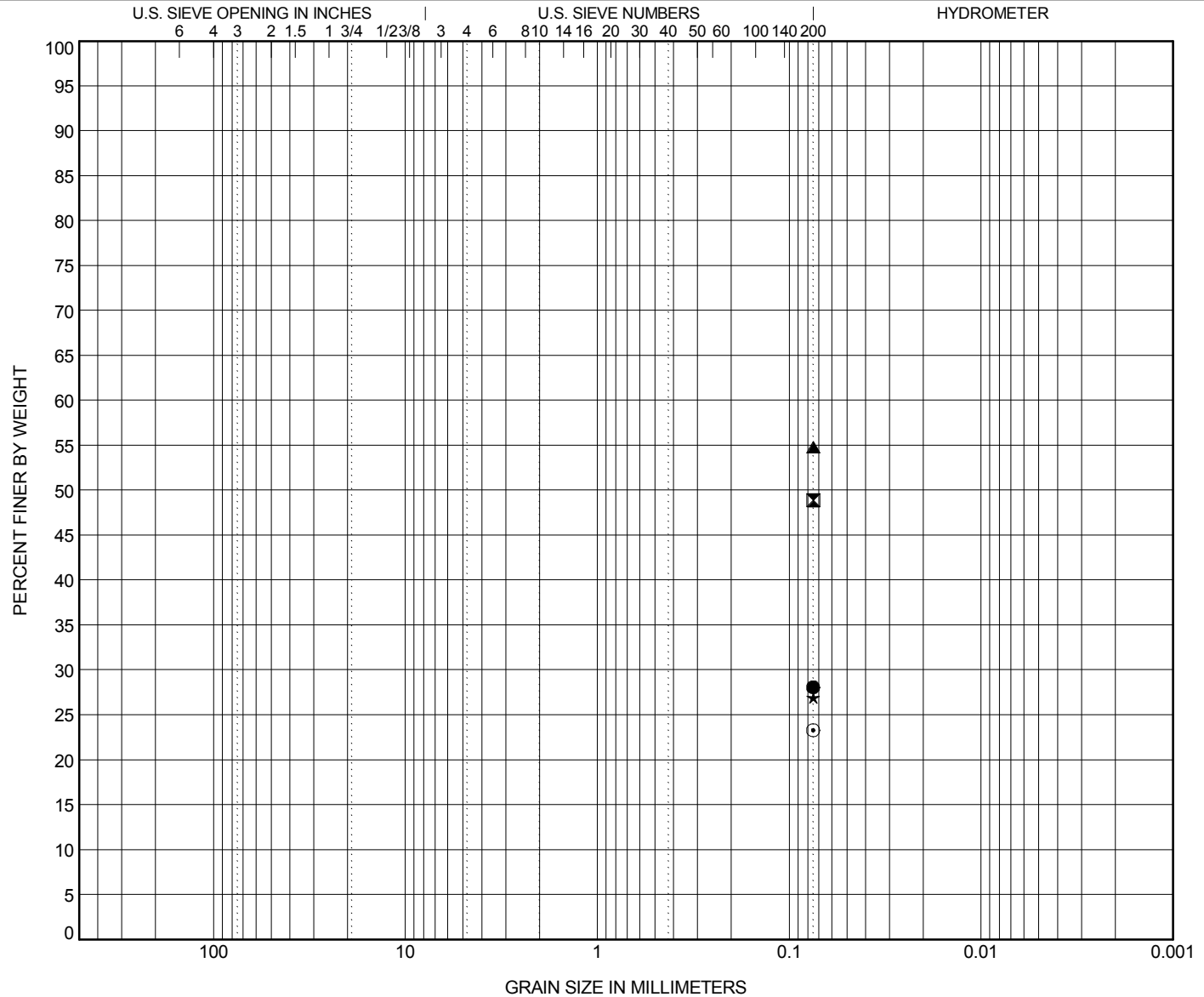
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● 17NSS-14	9.0						
■ 17NSS-16	9.5	CLAYEY SAND(SC)	45	15	30		
▲ 17NSS-18	11.0	SANDY LEAN CLAY(CL)	34	19	15		
★ 17RR-01	8.8	CLAYEY SAND(SC)	26	13	13		
○ 17RR-03	4.3						

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 17NSS-14	9.0	0.075							28.1
■ 17NSS-16	9.5	0.075							48.9
▲ 17NSS-18	11.0	0.075							54.8
★ 17RR-01	8.8	0.075							26.9
○ 17RR-03	4.3	0.075							23.3

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 6/14/17 10:03 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



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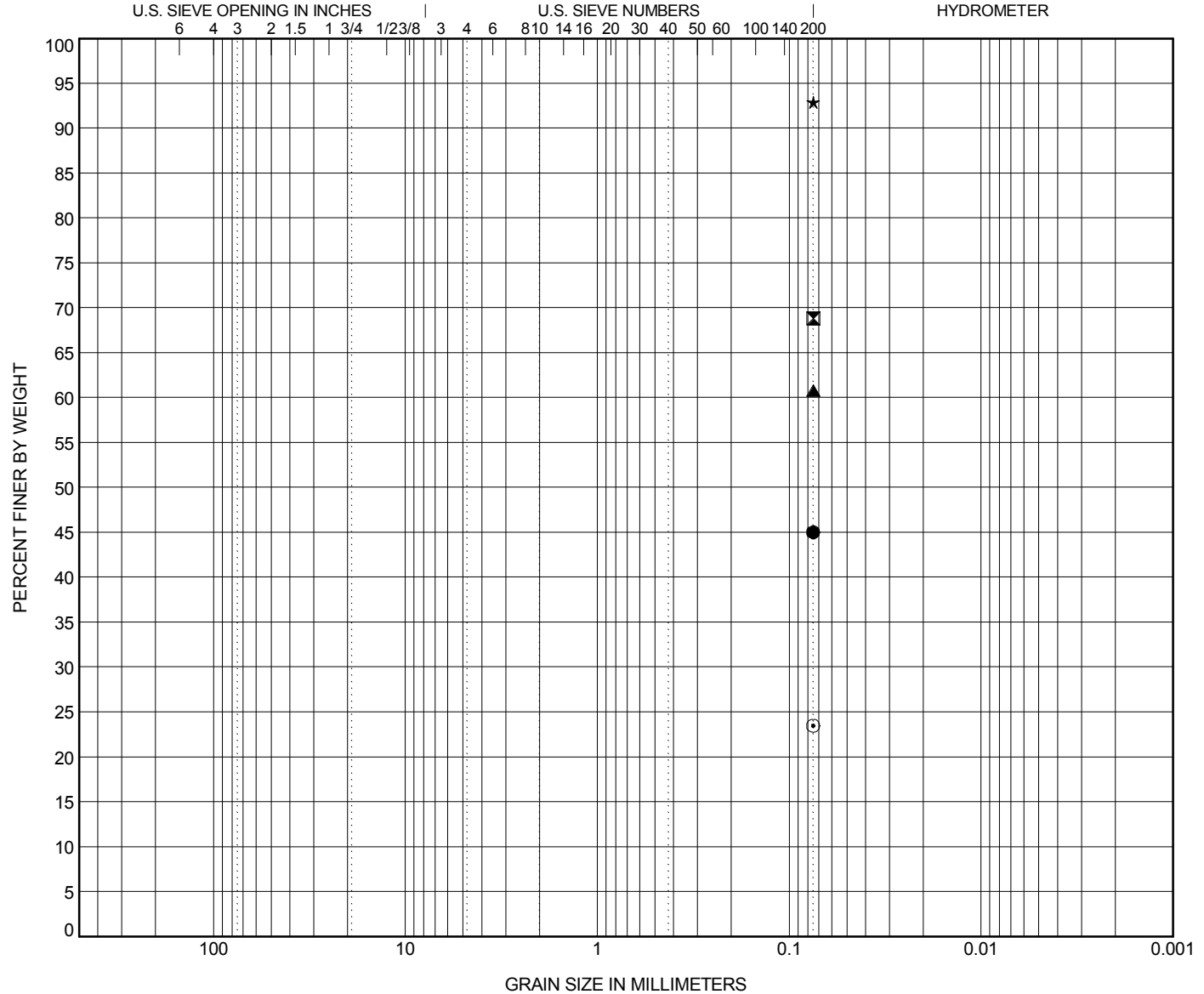
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● 17RR-03	10.3	CLAYEY SAND(SC)	35	12	23		
☒ 17RR-04	8.3	SANDY LEAN CLAY(CL)	31	17	14		
▲ 17RR-06	6.3	SANDY LEAN CLAY(CL)	28	18	10		
★ 17RR-16	5.0	FAT CLAY(CH)	76	26	50		
◎ 17RR-18	9.3						

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 17RR-03	10.3	0.075						45.0	
☒ 17RR-04	8.3	0.075						68.8	
▲ 17RR-06	6.3	0.075						60.8	
★ 17RR-16	5.0	0.075						92.9	
◎ 17RR-18	9.3	0.075						23.5	

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 6/14/17 10:03 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



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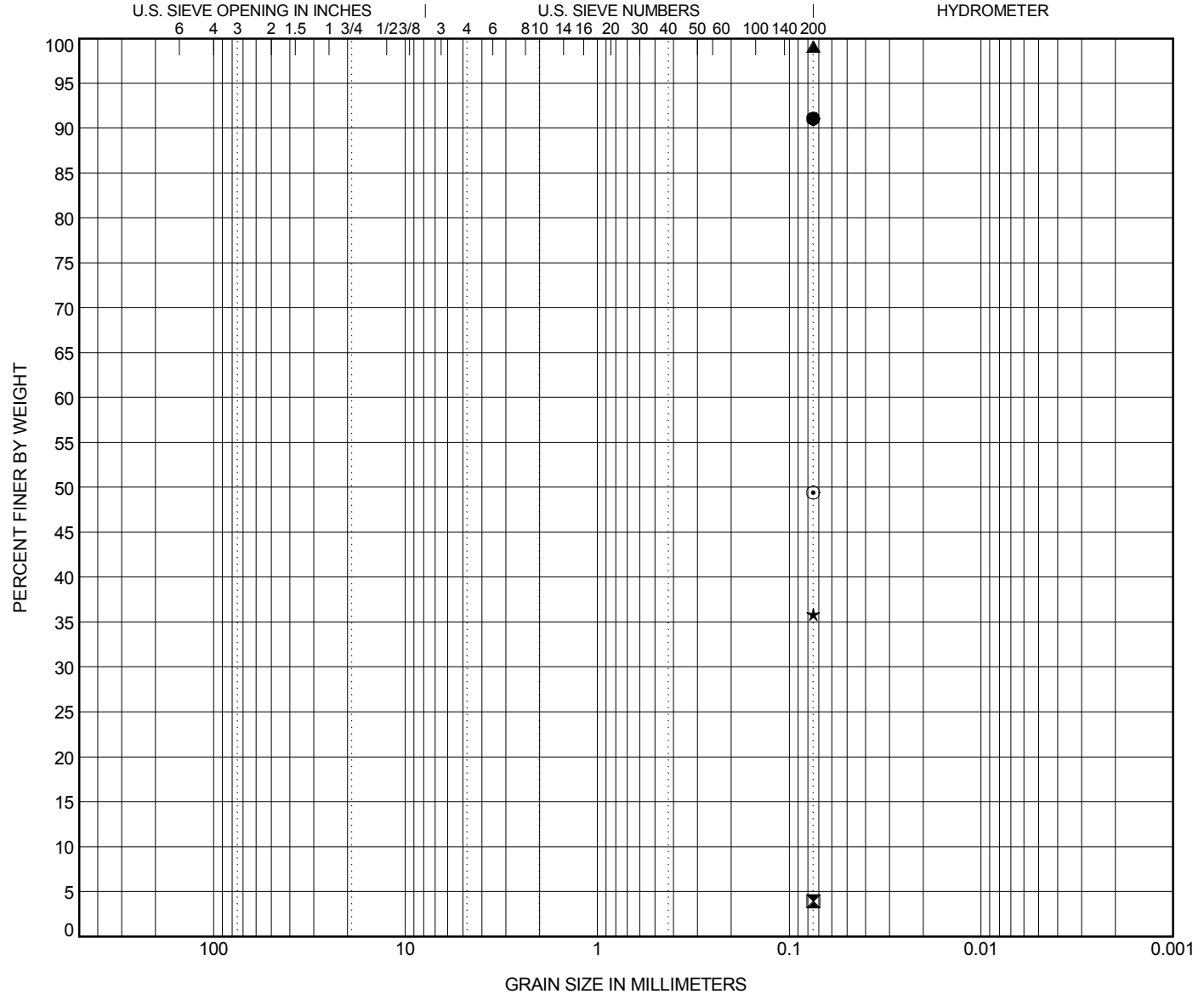
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17RR-19	7.0	FAT CLAY(CH)					54	21	33		
☒ 17RR-21	9.0	FAT CLAY(CH)									
▲ 17SBGP-01	7.0	FAT CLAY(CH)					64	24	40		
★ 17SBGP-05	9.0	FAT CLAY(CH)									
⊗ 17SBGP-05	19.0	CLAYEY SAND(SC)					40	13	27		
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● 17RR-19	7.0	0.075							91.1		
☒ 17RR-21	9.0	0.075							3.9		
▲ 17SBGP-01	7.0	0.075							99.1		
★ 17SBGP-05	9.0	0.075							35.8		
⊗ 17SBGP-05	19.0	0.075							49.4		

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)GDT - 6/14/17 10:03 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



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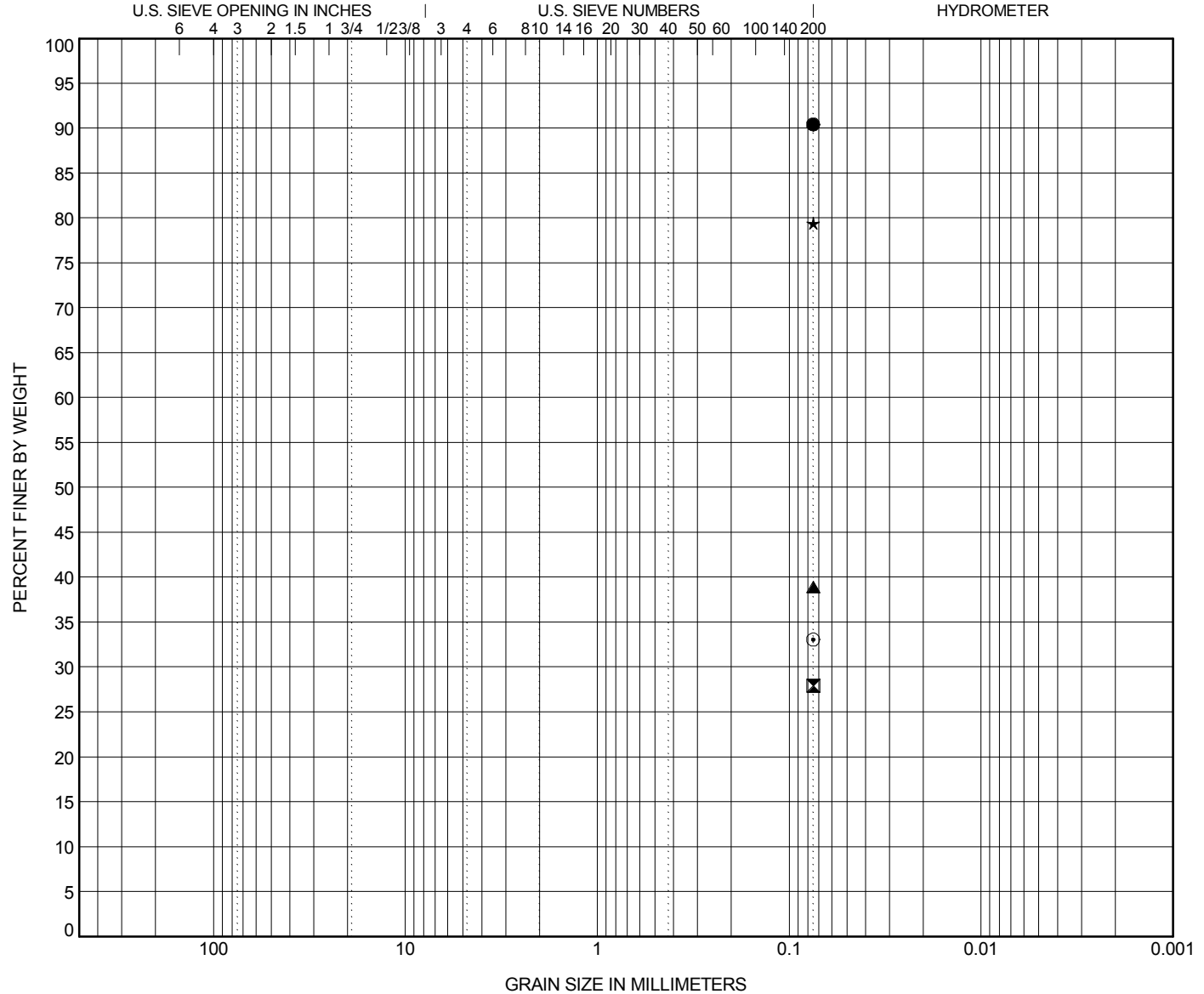
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CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification				LL	PL	PI	Cc	Cu
● 17SBGP-06	7.0	FAT CLAY(CH)				74	25	49		
☒ 17SBGP-06	19.0									
▲ 17SBGP-07	11.0									
★ 17SBGP-07	14.0	LEAN CLAY with SAND(CL)				45	24	21		
◎ 17SBGP-08	5.0	CLAYEY SAND(SC)				30	12	18		
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	
● 17SBGP-06	7.0	0.075							90.4	
☒ 17SBGP-06	19.0	0.075							27.9	
▲ 17SBGP-07	11.0	0.075							38.9	
★ 17SBGP-07	14.0	0.075							79.4	
◎ 17SBGP-08	5.0	0.075							33.0	

(1) GET - GRAIN SIZE REPORT - GET - STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 6/14/17 10:03 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



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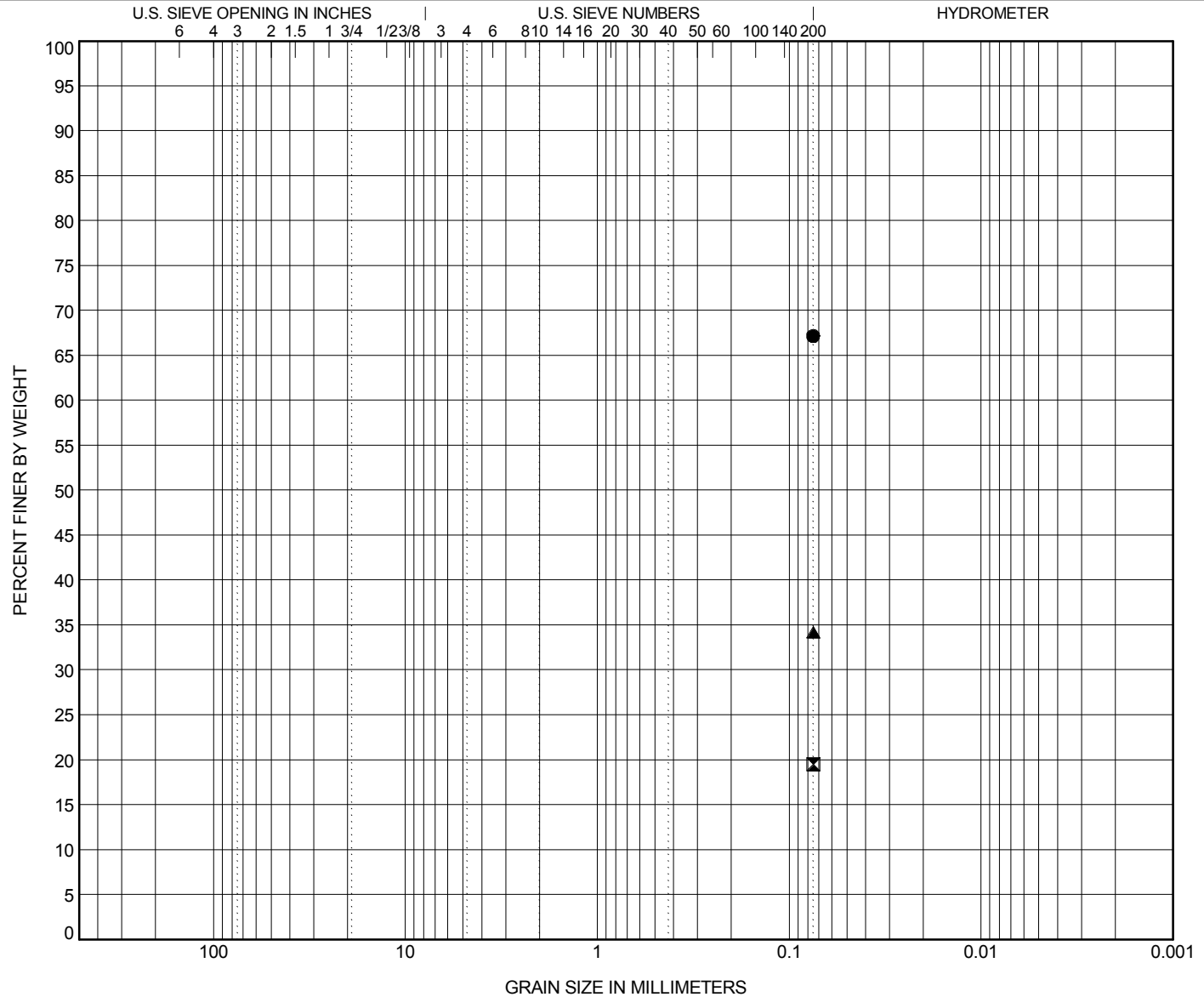
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17SBGP-09	9.0	SANDY FAT CLAY(CH)					70	27	43		
☒ 17SWM-17	14.0										
▲ 17SWM-18	9.0										

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 17SBGP-09	9.0	0.075						67.2	
☒ 17SWM-17	14.0	0.075						19.5	
▲ 17SWM-18	9.0	0.075						34.2	

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 6/14/17 10:03 - G:\GINT\PROJECTS\17\17-151G 95 EXPRESS LANES.GPJ



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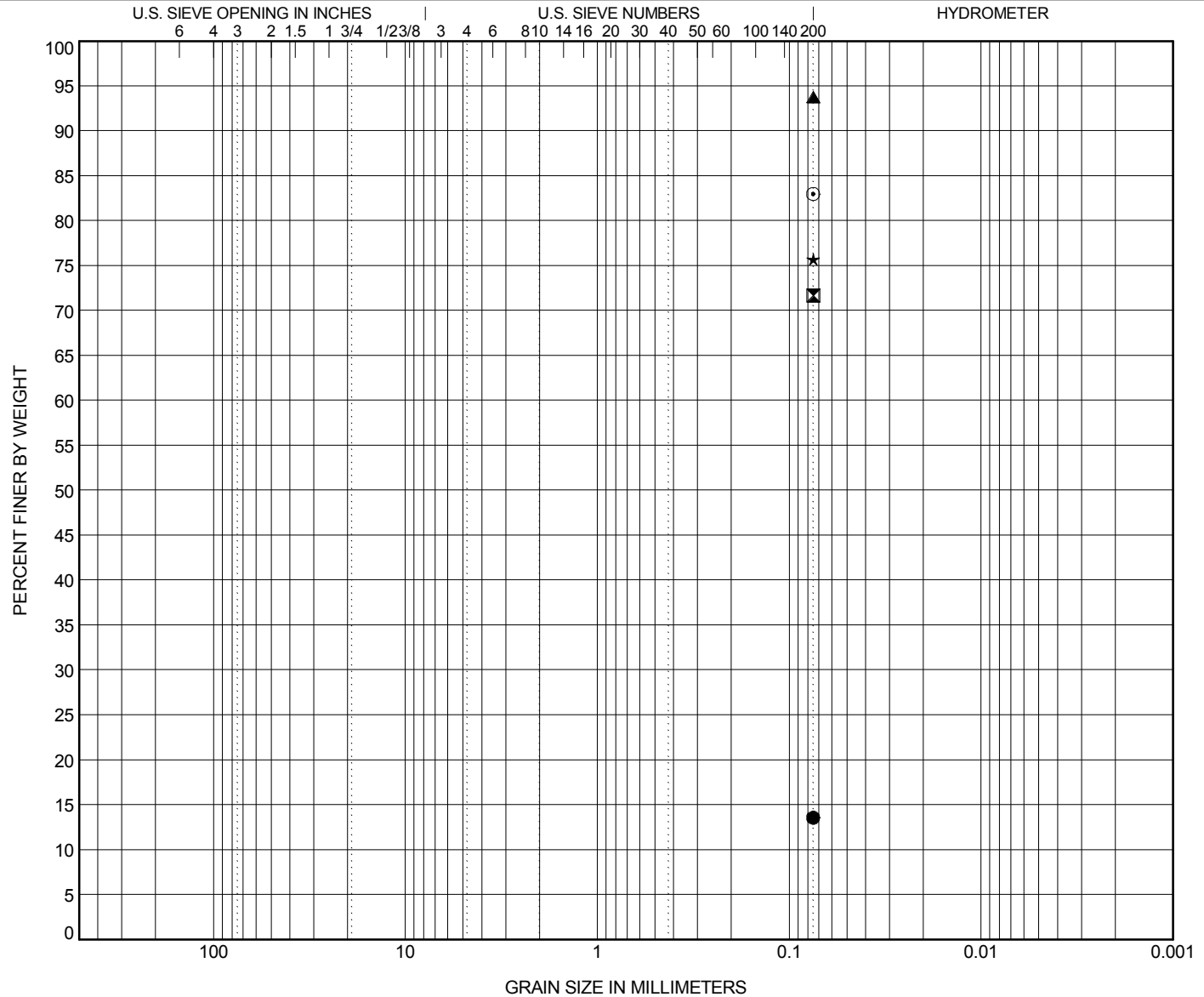
GRAIN SIZE DISTRIBUTION

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PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17BR-06	39.0	SILTY SAND(SM)					NP	NP	NP		
☒ 17BR-06	59.0										
▲ 17RR-07	9.0	FAT CLAY(CH)					57	12	45		
★ 17RR-07	13.4	LEAN CLAY with SAND(CL)					39	14	25		
◎ 17RR-15	9.0	FAT CLAY with SAND(CH)					80	25	55		
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● 17BR-06	39.0	0.075							13.5		
☒ 17BR-06	59.0	0.075							71.7		
▲ 17RR-07	9.0	0.075							93.8		
★ 17RR-07	13.4	0.075							75.7		
◎ 17RR-15	9.0	0.075							83.0		

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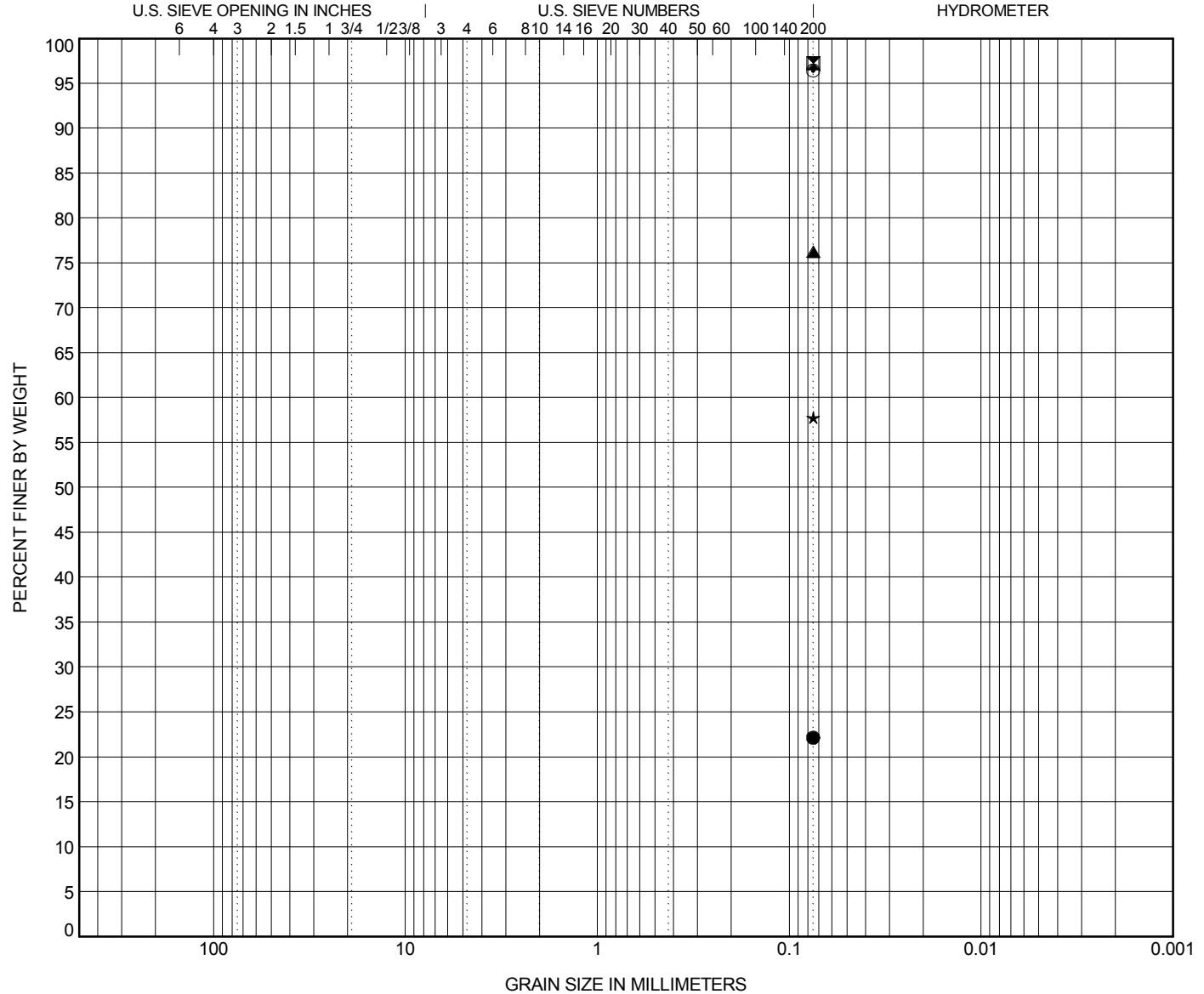
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● 17RR-BR-10	19.0						
☒ 17RR-BR-10	44.0	FAT CLAY(CH)	63	16	47		
▲ 17RR-BR-10	63.4	LEAN CLAY with SAND(CL)	37	14	23		
★ 17RR-BR-11	7.0	SANDY LEAN CLAY(CL)	46	13	33		
◎ 17RR-BR-11	49.0	FAT CLAY(CH)	65	15	50		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 17RR-BR-10	19.0	0.075							22.1
☒ 17RR-BR-10	44.0	0.075							97.2
▲ 17RR-BR-10	63.4	0.075							76.2
★ 17RR-BR-11	7.0	0.075							57.8
◎ 17RR-BR-11	49.0	0.075							96.4

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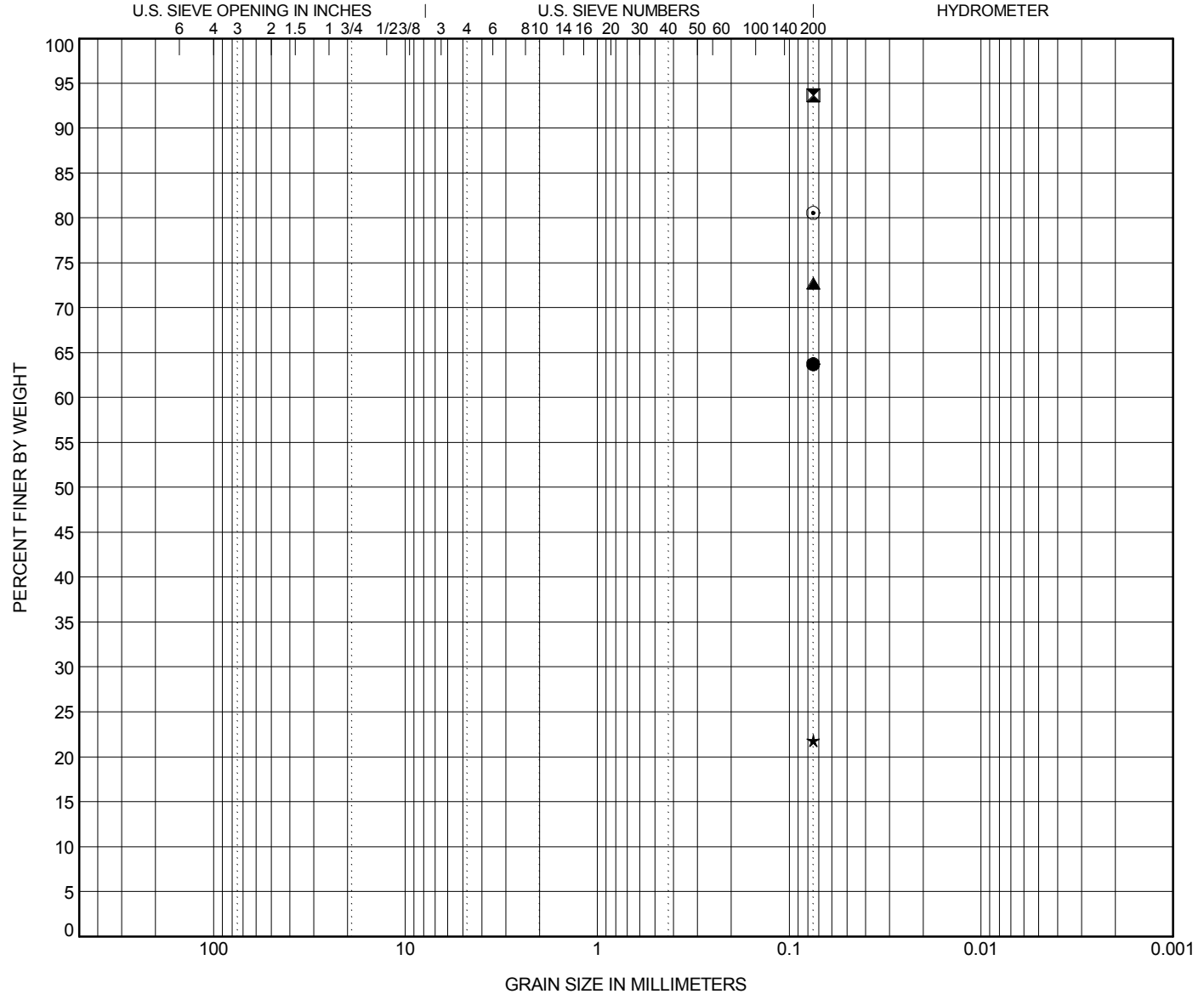
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PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17RR-BR-11	73.6	SANDY LEAN CLAY(CL)					32	10	22		
☒ 17RR-RW-08	7.0	FAT CLAY(CH)					76	18	58		
▲ 17RR-RW-08	29.0										
★ 17RR-RW-09	5.0										
◎ 17RR-RW-09	34.0	LEAN CLAY with SAND(CL)					45	12	33		
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● 17RR-BR-11	73.6	0.075							63.7		
☒ 17RR-RW-08	7.0	0.075							93.7		
▲ 17RR-RW-08	29.0	0.075							72.7		
★ 17RR-RW-09	5.0	0.075							21.8		
◎ 17RR-RW-09	34.0	0.075							80.6		

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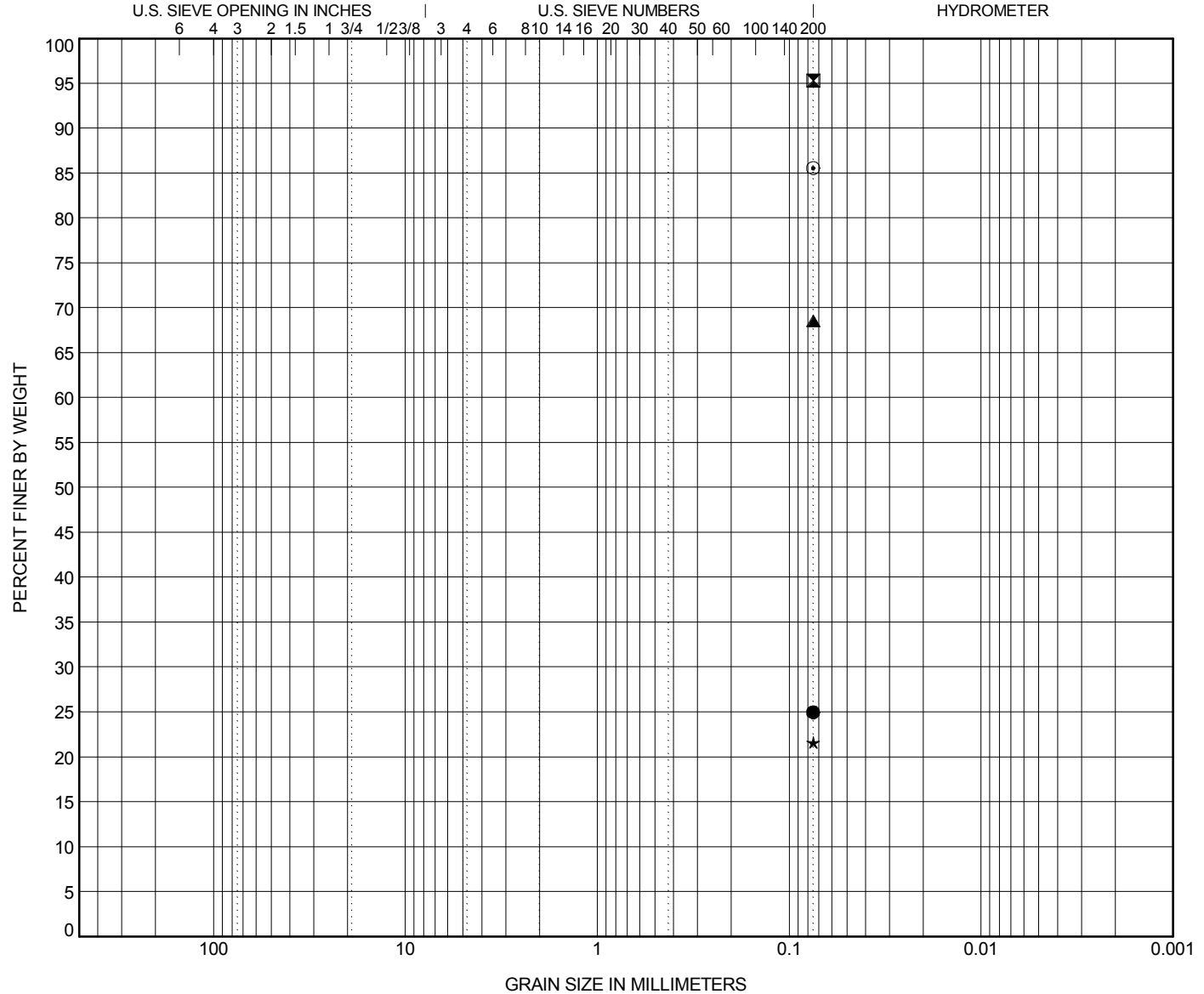
GRAIN SIZE DISTRIBUTION

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PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17RR-RW-12	14.0										
☒ 17RR-RW-12	39.0	FAT CLAY(CH)					76	20	56		
▲ 17RR-RW-13	5.0	SANDY FAT CLAY(CH)					74	22	52		
★ 17RR-RW-13	19.0										
◎ 17RR-RW-13	39.0	FAT CLAY(CH)					62	15	47		
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● 17RR-RW-12	14.0	0.075							25.0		
☒ 17RR-RW-12	39.0	0.075							95.3		
▲ 17RR-RW-13	5.0	0.075							68.5		
★ 17RR-RW-13	19.0	0.075							21.6		
◎ 17RR-RW-13	39.0	0.075							85.6		

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 6/21/17 11:03 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



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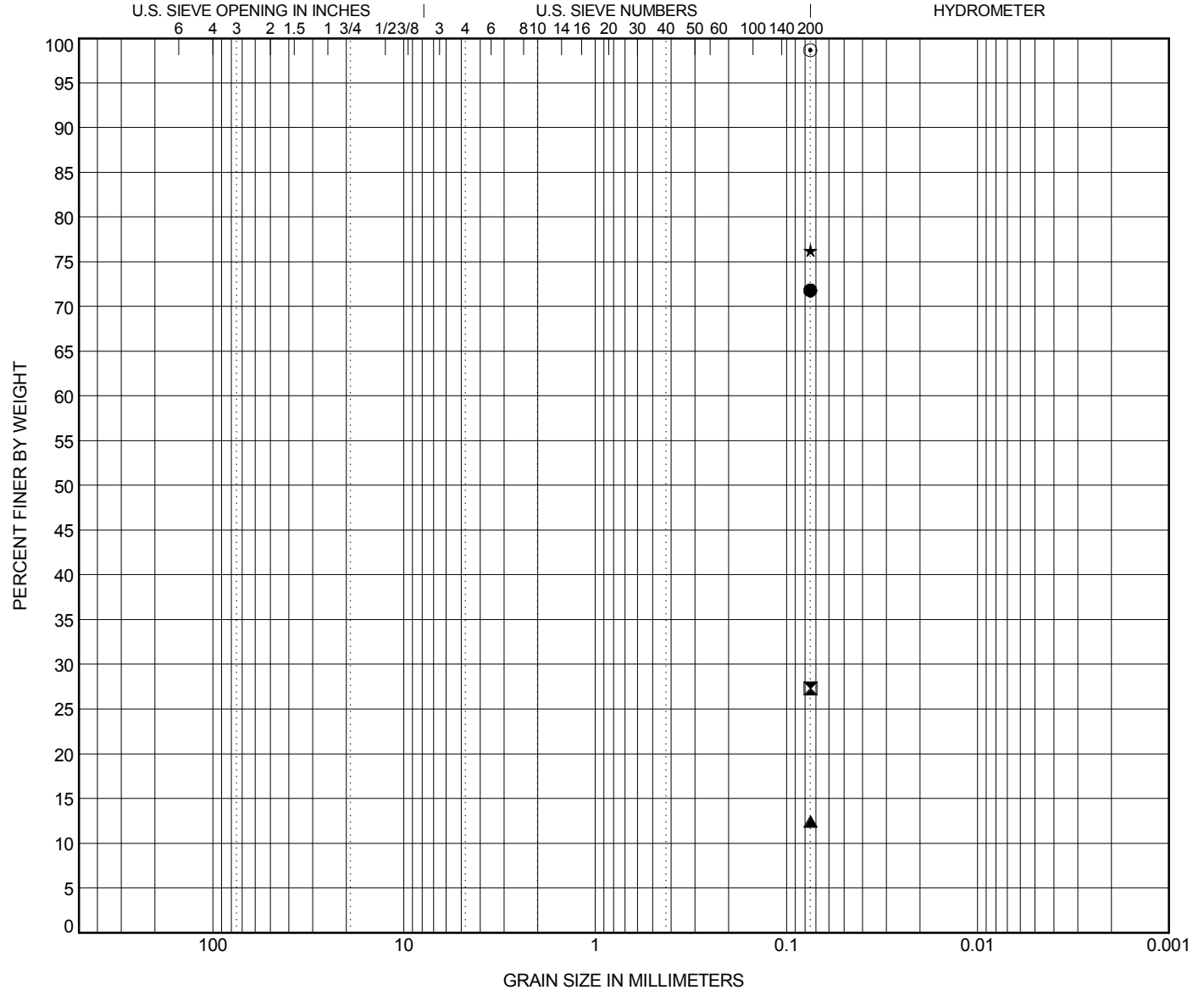
GRAIN SIZE DISTRIBUTION

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PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17RR-RW-14	5.0	FAT CLAY with SAND(CH)					77	25	52		
☒ 17RR-RW-14	19.0										
▲ 17SW-08	29.0										
★ 17XP-18A	18.9	FAT CLAY with SAND(CH)					52	23	29		
◎ 17XP-18A	29.0	FAT CLAY(CH)					72	21	51		
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● 17RR-RW-14	5.0	0.075							71.8		
☒ 17RR-RW-14	19.0	0.075							27.3		
▲ 17SW-08	29.0	0.075							12.4		
★ 17XP-18A	18.9	0.075							76.3		
◎ 17XP-18A	29.0	0.075							98.7		

(1) GET - GRAIN SIZE REPORT - GET - STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 6/21/17 11:03 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



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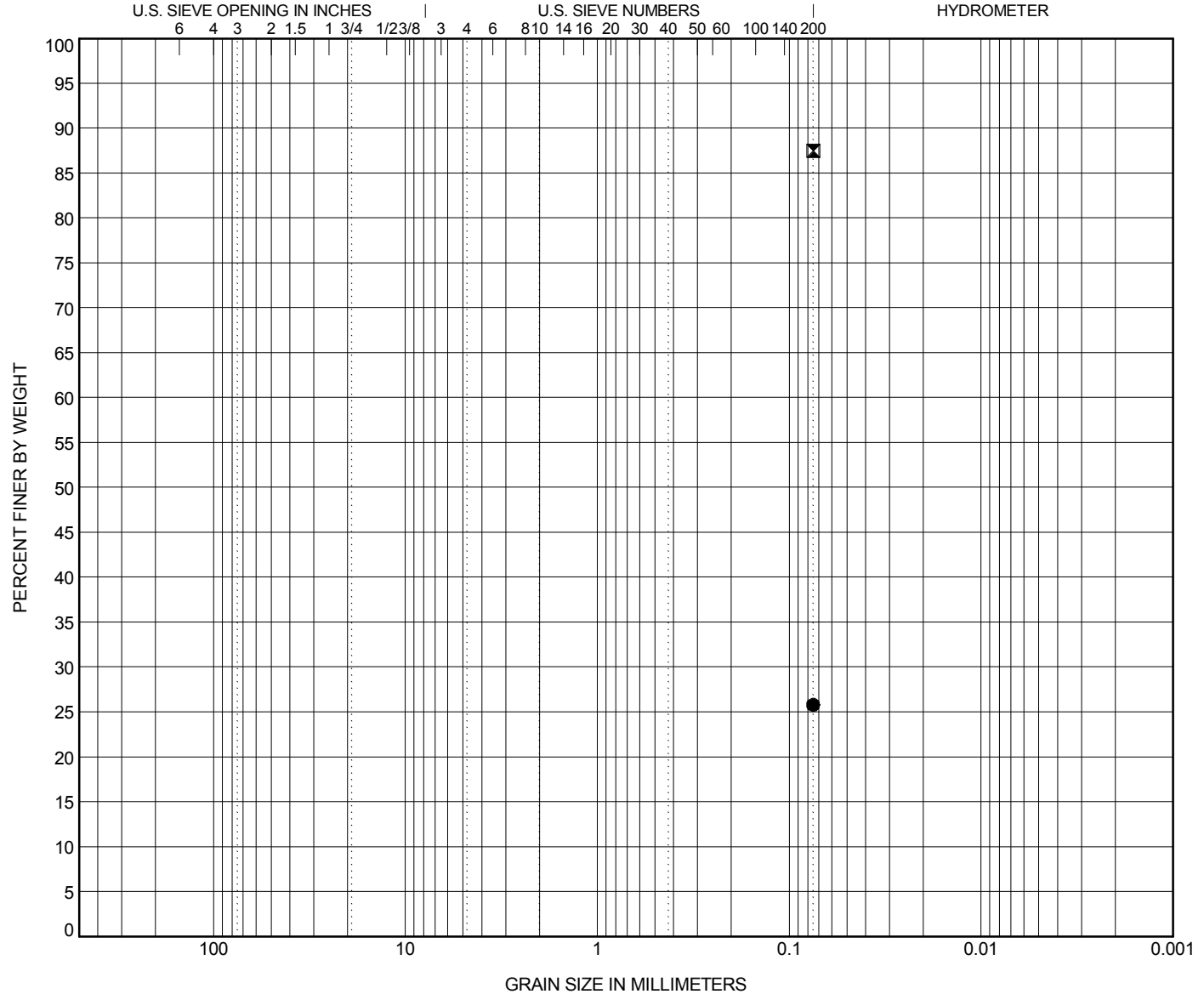
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17XP-18A	44.0										
☒ 17XP-18A	54.0	FAT CLAY(CH)					73	16	57		
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● 17XP-18A	44.0	0.075							25.8		
☒ 17XP-18A	54.0	0.075							87.5		

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 6/21/17 11:03 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



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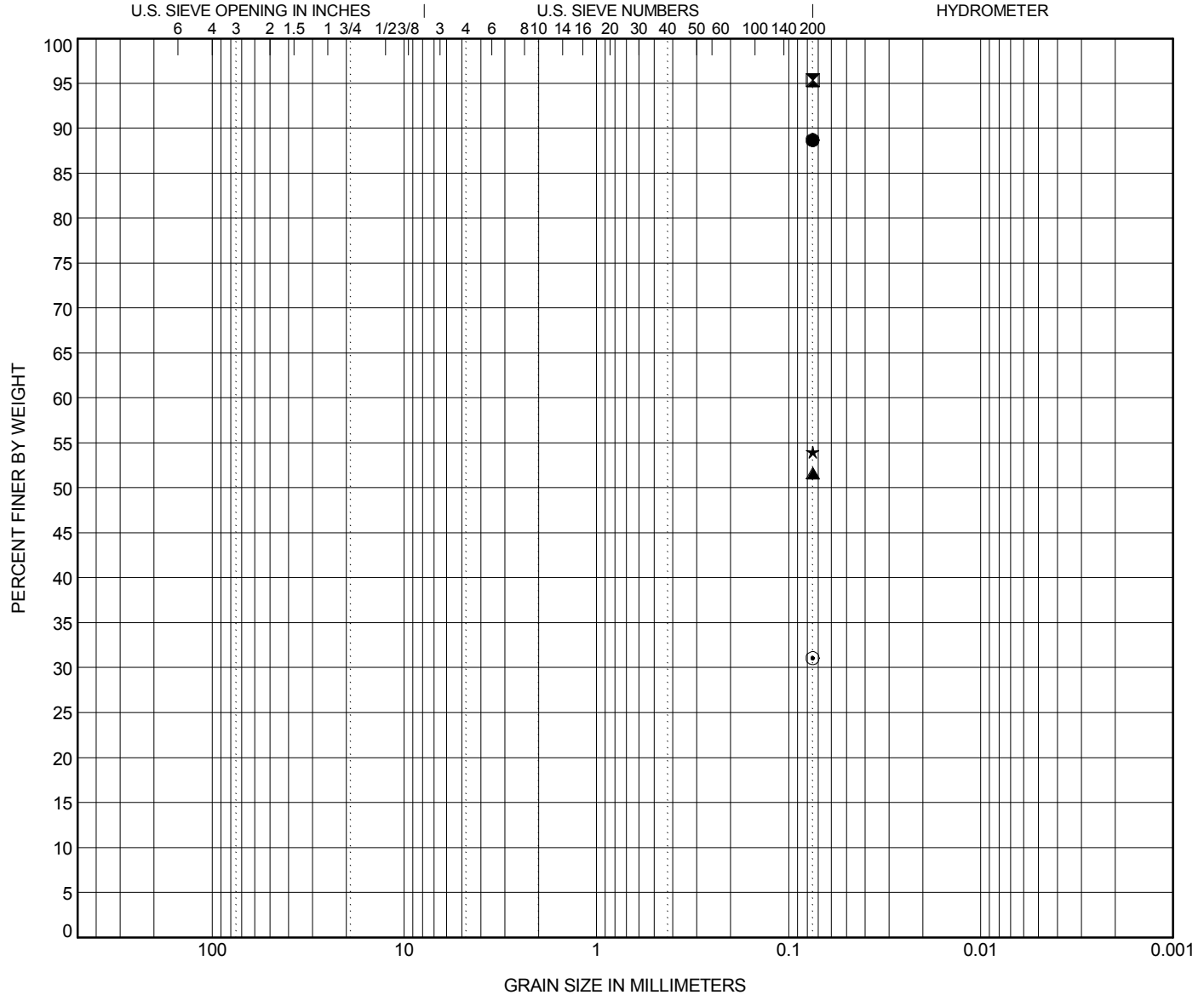
GRAIN SIZE DISTRIBUTION

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PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● 17HPN-01	5.0	FAT CLAY(CH)	62	25	37		
☒ 17HPN-01	11.0	FAT CLAY(CH)	55	24	31		
▲ 17HPN-03	7.0	SANDY LEAN CLAY(CL)	46	17	29		
★ 17HPN-05	9.5	SANDY LEAN CLAY(CL)	20	12	8		
◎ 17HPN-07	5.0	CLAYEY SAND(SC)	30	14	16		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 17HPN-01	5.0	0.075							88.7
☒ 17HPN-01	11.0	0.075							95.3
▲ 17HPN-03	7.0	0.075							51.6
★ 17HPN-05	9.5	0.075							54.0
◎ 17HPN-07	5.0	0.075							31.1

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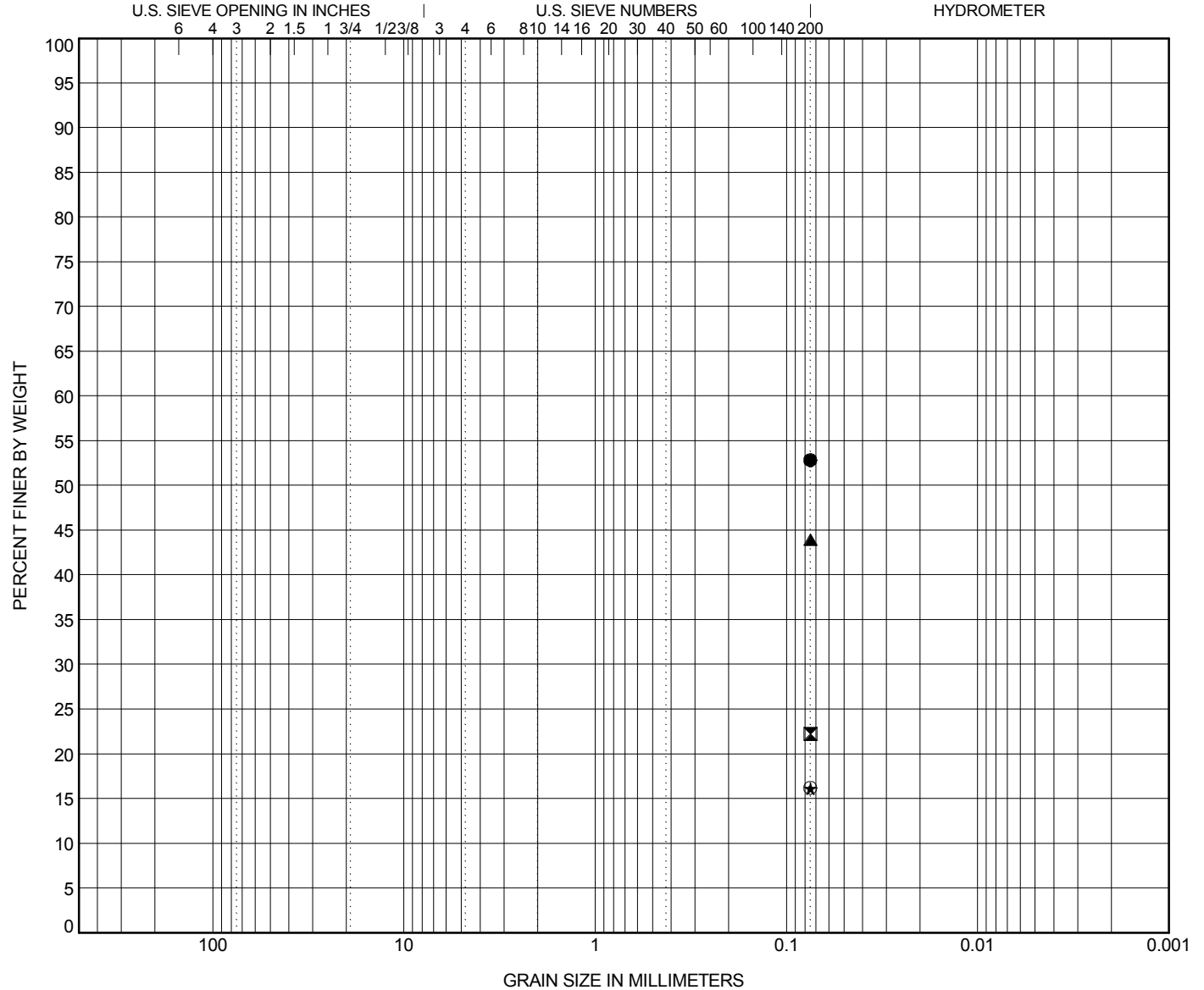
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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17HPN-07	9.0	SANDY FAT CLAY(CH)					59	18	41		
☒ 17HRS-01	5.0										
▲ 17HRS-01	9.3	CLAYEY SAND(SC)					52	24	28		
★ 17HRS-03	2.9										
◎ 17HRS-06	3.0										
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● 17HPN-07	9.0	0.075							52.8		
☒ 17HRS-01	5.0	0.075							22.2		
▲ 17HRS-01	9.3	0.075							44.0		
★ 17HRS-03	2.9	0.075							16.1		
◎ 17HRS-06	3.0	0.075							16.2		

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)GDT - 7/17/17 13:03 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



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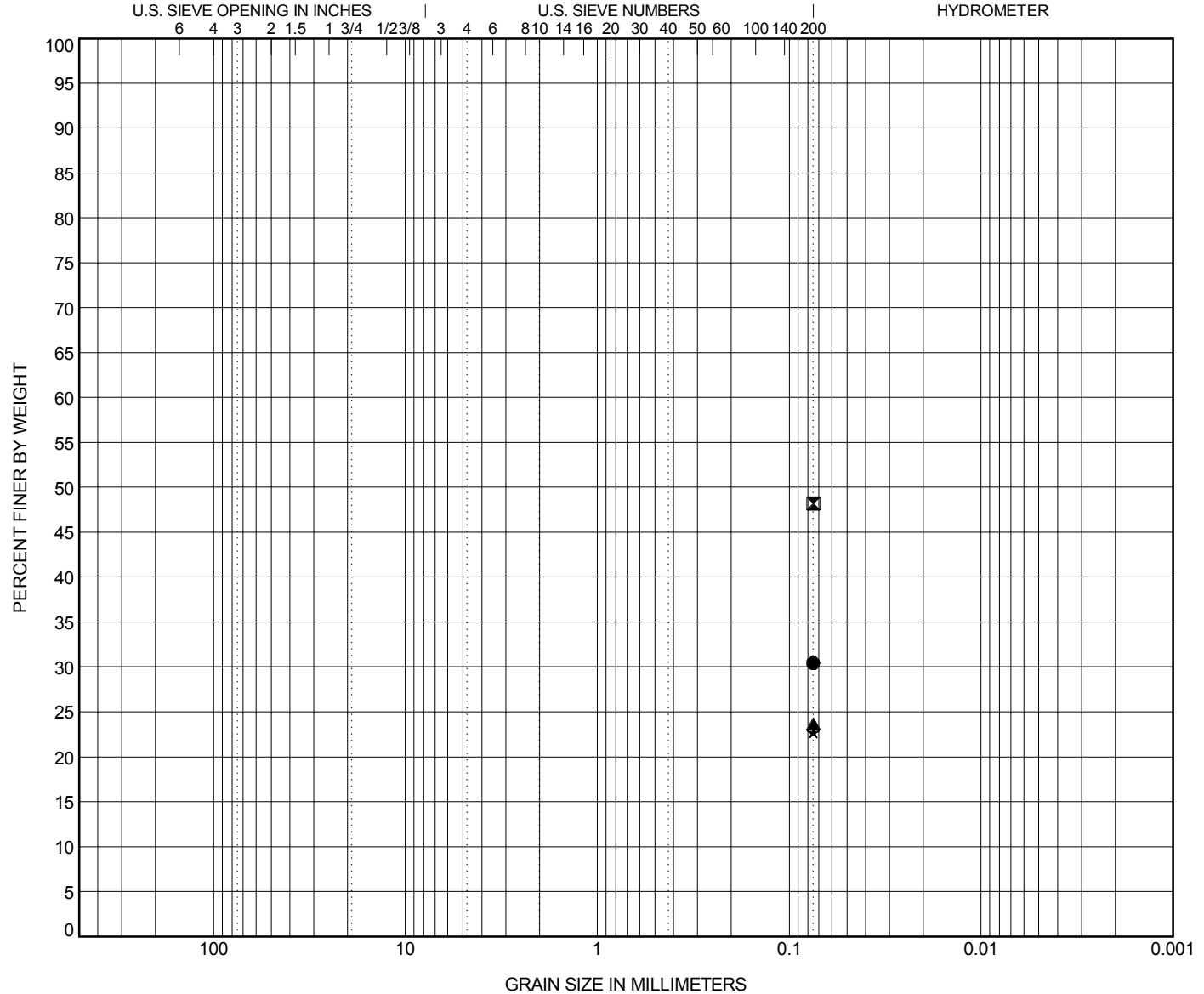
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PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17HRS-12	3.0										
☒ 17HRS-12	7.0	CLAYEY SAND(SC)					40	15	25		
▲ 17HRS-14	3.0										
★ 17HRS-16	9.0										

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 17HRS-12	3.0	0.075							30.4
☒ 17HRS-12	7.0	0.075							48.2
▲ 17HRS-14	3.0	0.075							23.7
★ 17HRS-16	9.0	0.075							22.7

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)GDT - 7/17/17 13:03 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



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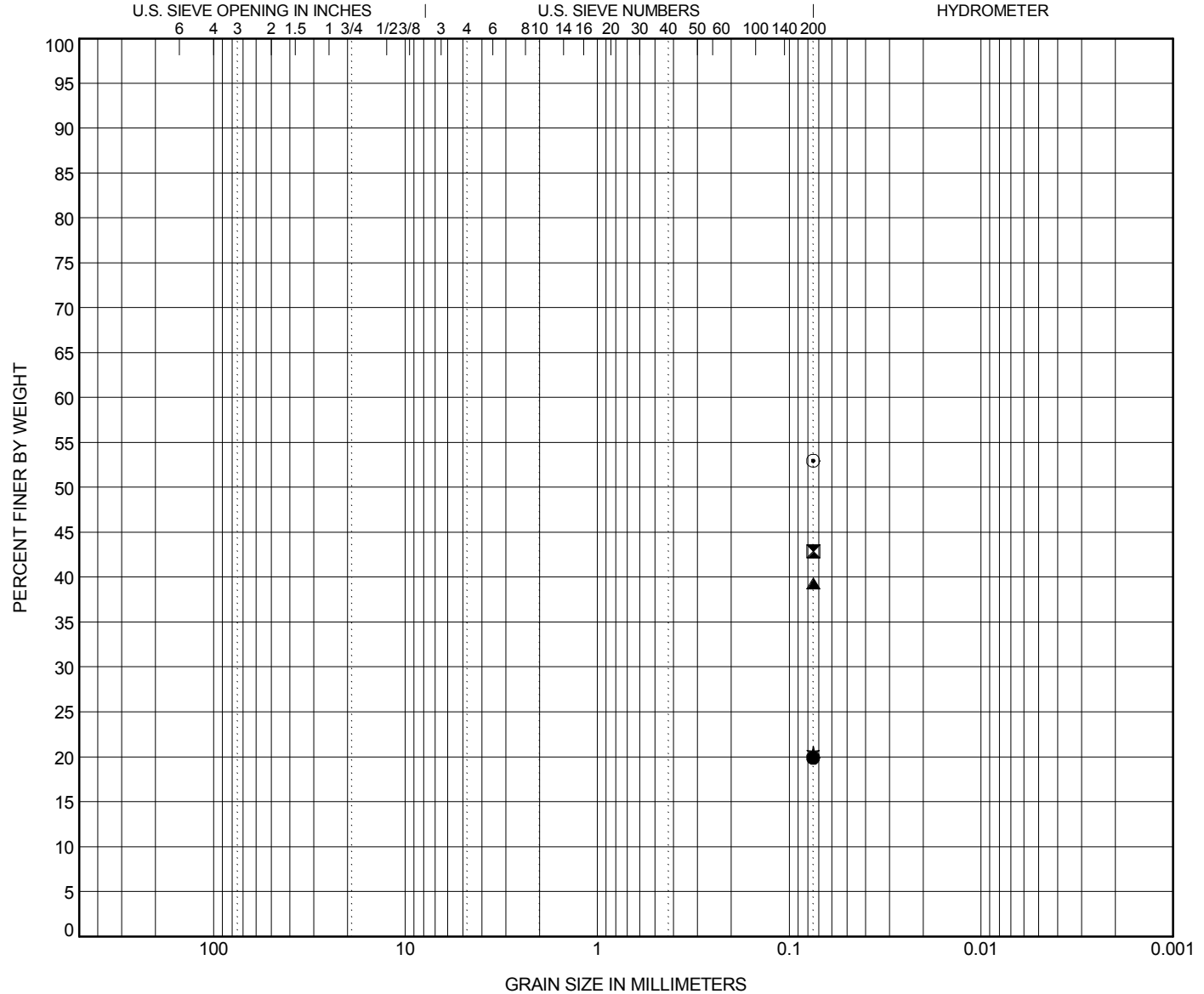
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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 17HRS-05	3.0										
☒ 17HRS-BR-08	3.0										
▲ 17HRS-BR-08	14.0	CLAYEY SAND(SC)					41	20	21		
★ 17HRS-BR-08	34.0										
◎ 17HRS-BR-09	14.0	SANDY LEAN CLAY(CL)					33	15	18		
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● 17HRS-05	3.0	0.075							19.9		
☒ 17HRS-BR-08	3.0	0.075							42.9		
▲ 17HRS-BR-08	14.0	0.075							39.3		
★ 17HRS-BR-08	34.0	0.075							20.5		
◎ 17HRS-BR-09	14.0	0.075							53.0		

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 7/20/17 16:01 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



GET Solutions, Inc.

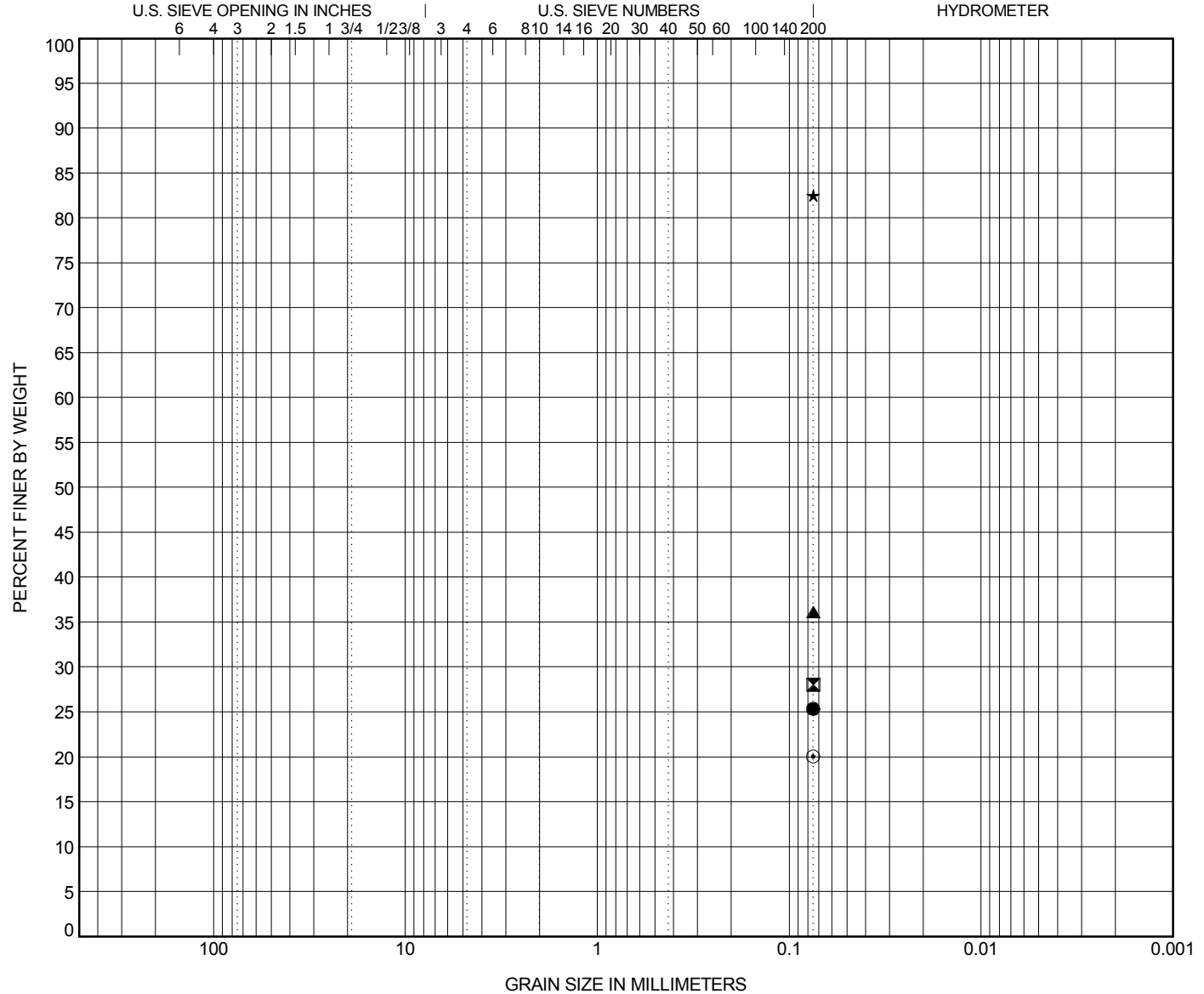
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
●	17HRS-BR-09 24.0										
☒	17HRS-BR-09 34.0										
▲	17HRS-BR-09 58.5	CLAYEY SAND(SC)					27	11	16		
★	17HRS-RW-07 7.0	LEAN CLAY with SAND(CL)					48	22	26		
◎	17HRS-RW-07 44.0										

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	17HRS-BR-09 24.0	0.075							25.3
☒	17HRS-BR-09 34.0	0.075							28.0
▲	17HRS-BR-09 58.5	0.075							36.1
★	17HRS-RW-07 7.0	0.075							82.5
◎	17HRS-RW-07 44.0	0.075							20.0

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 7/20/17 16:01 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ



GET Solutions, Inc.

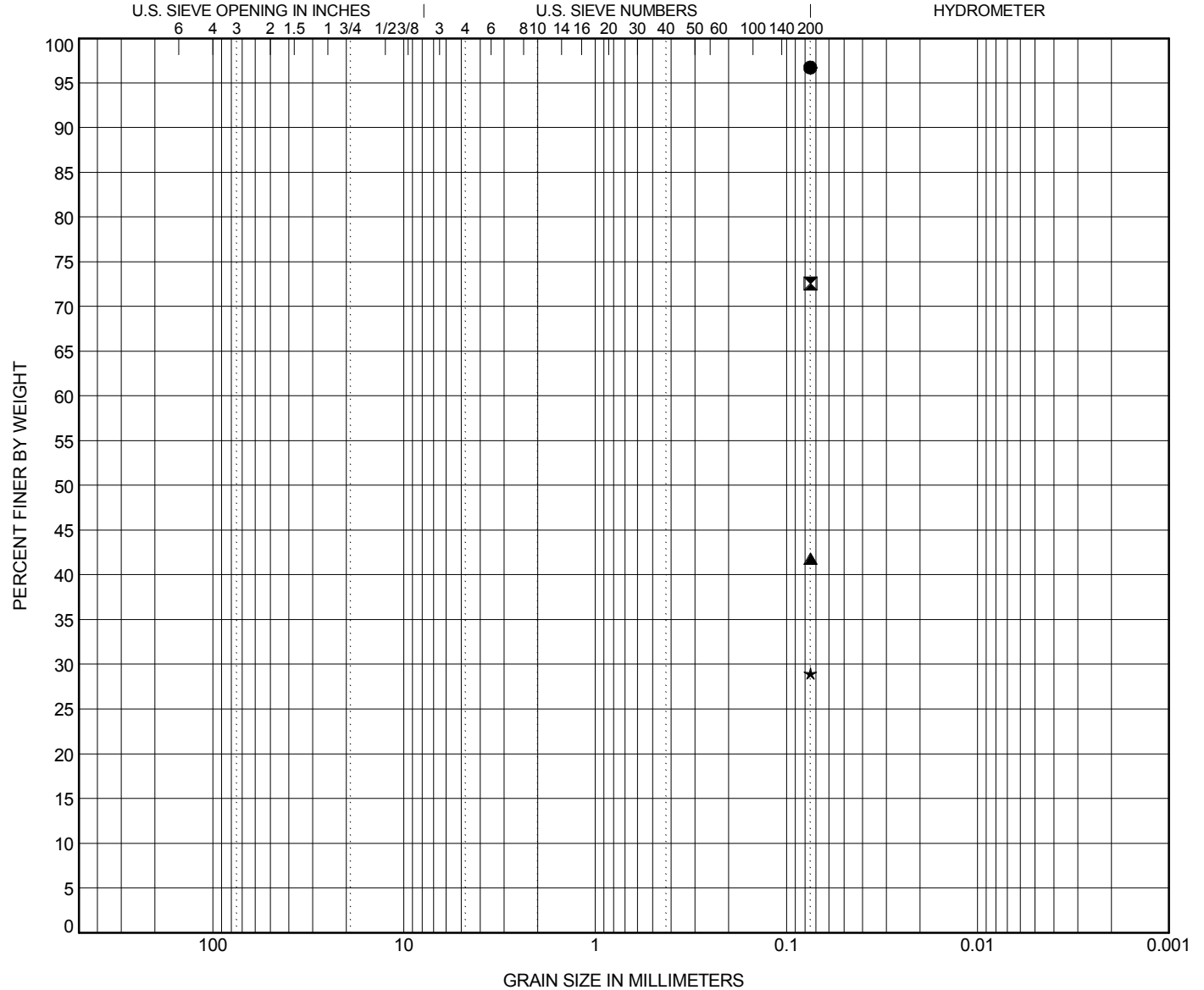
GRAIN SIZE DISTRIBUTION

CLIENT HDR Engineering

PROJECT NAME 95 Express Lanes Fredericksburg Extension

PROJECT NUMBER 10052825

PROJECT LOCATION Fredericksburg, Virginia



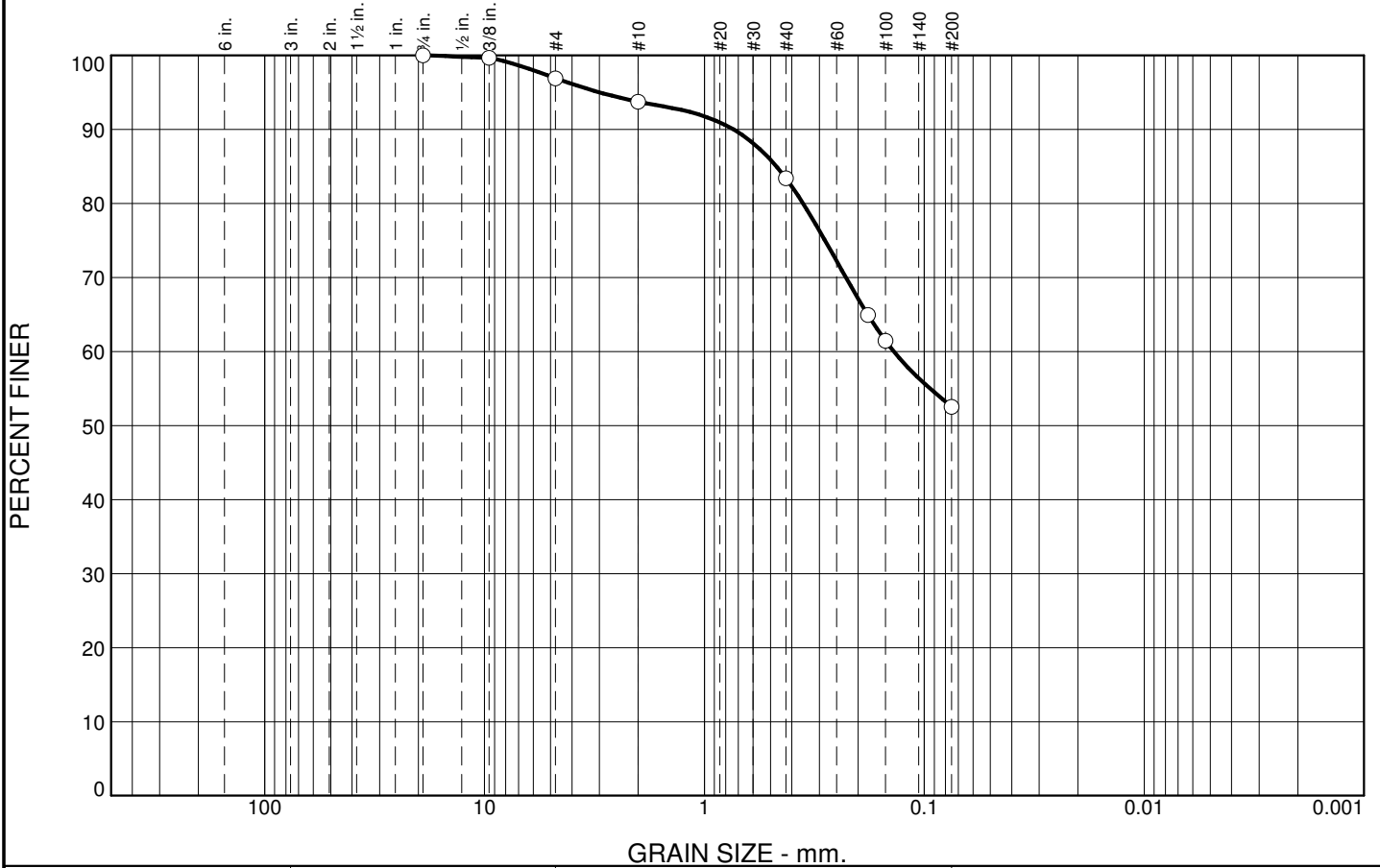
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● 17HRS-RW-10	19.0	FAT CLAY(CH)	68	19	49		
⊠ 17HRS-RW-10	39.0	FAT CLAY with SAND(CH)	53	24	29		
▲ 17HRS-RW-10	59.0	CLAYEY SAND(SC)	38	15	23		
★ 17HRS-RW-11	5.0						

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 17HRS-RW-10	19.0	0.075						96.7	
⊠ 17HRS-RW-10	39.0	0.075						72.6	
▲ 17HRS-RW-10	59.0	0.075						41.8	
★ 17HRS-RW-11	5.0	0.075						29.0	

(1) GET - GRAIN SIZE REPORT - GET_STANDARD_DATA_TEMPLATE(03-17-14)\GDT - 7/20/17 16:01 - G:\GINT\PROJECTS\B17\VB17-151G 95 EXPRESS LANES.GPJ

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.1	3.2	10.3	30.9	52.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.375	99.7		
#4	96.9		
#10	93.7		
#40	83.4		
#80	64.9		
#100	61.4		
#200	52.5		

Material Description

Tan, Sandy Lean CLAY

Atterberg Limits

PL= 13 LL= 33 PI= 20

Coefficients

D₉₀= 0.7384 D₈₅= 0.4700 D₆₀= 0.1376
D₅₀= D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(7)

Remarks

Sample Obtained 4/13/17

* (no specification provided)

Location: 17SWM-01
Sample Number: 17SWM-01

Depth: 0-8 ft.

Date: 4/13/17

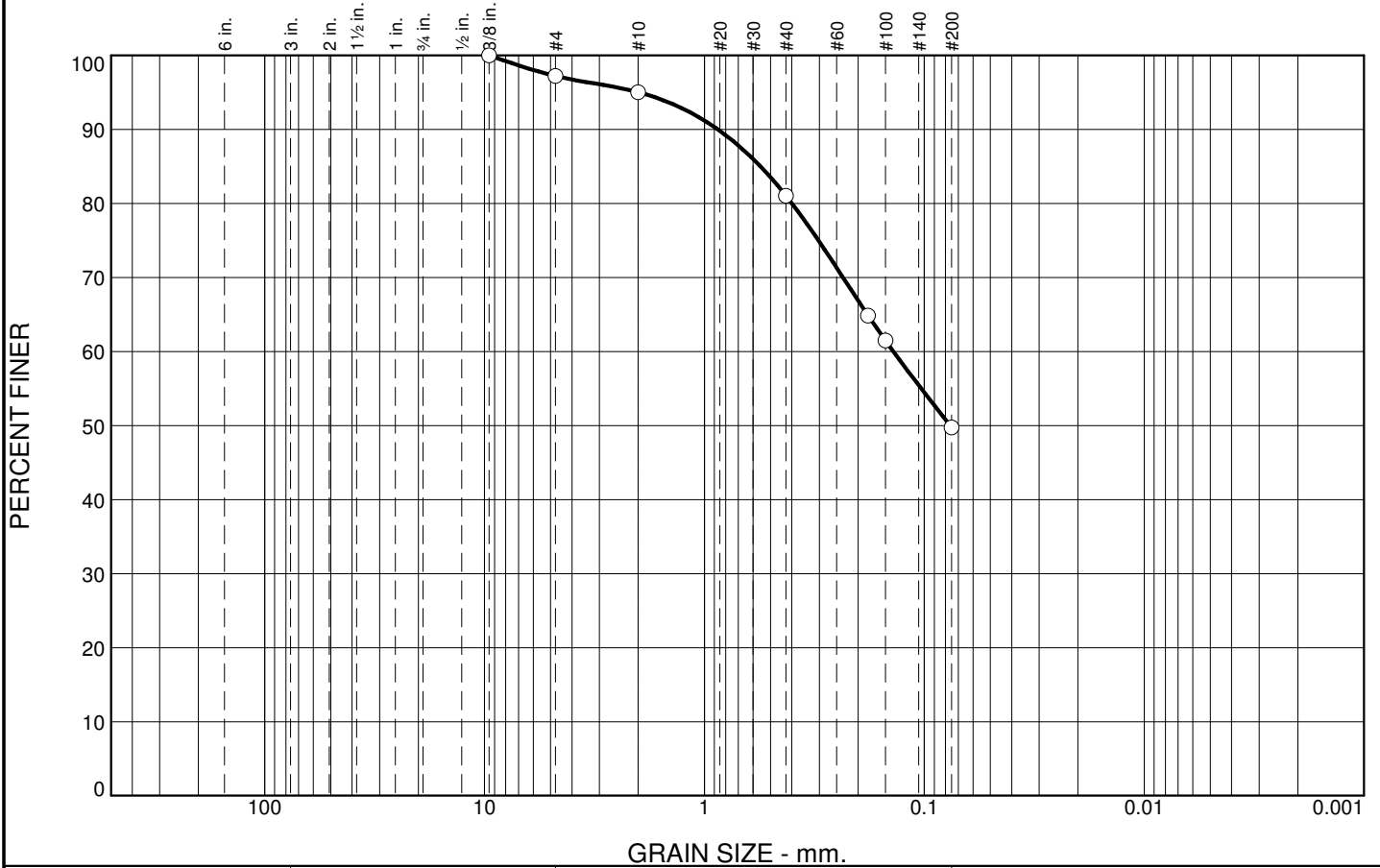
GET
SOLUTIONS, INC.

Client: HDR Engineering
Project: 95 Express Lanes - Fredericksburg Extension

Project No: 10052825

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.8	2.2	14.0	31.3	49.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	97.2		
#10	95.0		
#40	81.0		
#80	64.9		
#100	61.5		
#200	49.7		

Material Description

Orange-Gray, Clayey SAND

Atterberg Limits

PL= 12 LL= 30 PI= 18

Coefficients

D₉₀= 0.8702 D₈₅= 0.5560 D₆₀= 0.1382
D₅₀= 0.0762 D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(5)

Remarks

Sample Obtained 4/20/17

* (no specification provided)

Location: 17SWM-15
Sample Number: 17SWM-15

Depth: 0-15 ft.

Date: 4/20/17

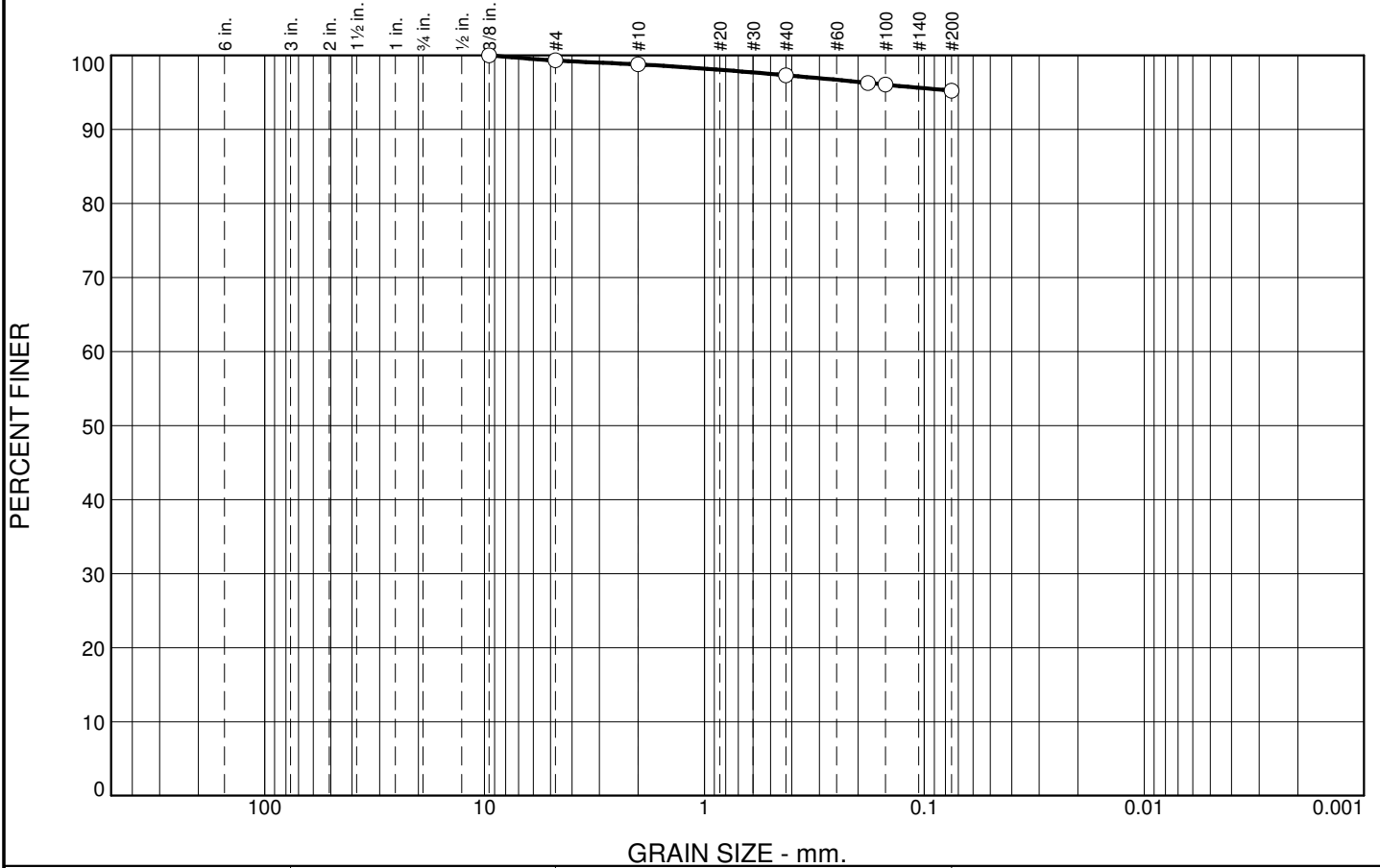
GET
SOLUTIONS, INC.

Client: HDR Engineering
Project: 95 Express Lanes - Fredericksburg Extension

Project No: 10052825

Figure 1A

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.7	0.5	1.5	2.1	95.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.3		
#10	98.8		
#40	97.3		
#80	96.3		
#100	96.0		
#200	95.2		

Material Description

Red-Orange, Fat CLAY

PL= 24 **Atterberg Limits** LL= 92 PI= 68

Coefficients
 D₉₀= D₈₅= D₆₀=
 D₅₀= D₃₀= D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= CH AASHTO= A-7-6(74)

Remarks
 Sample Obtained 4/13/17

* (no specification provided)

Location: 17XP-03
Sample Number: 17XP-03

Depth: 0-8 ft.

Date: 4/13/17

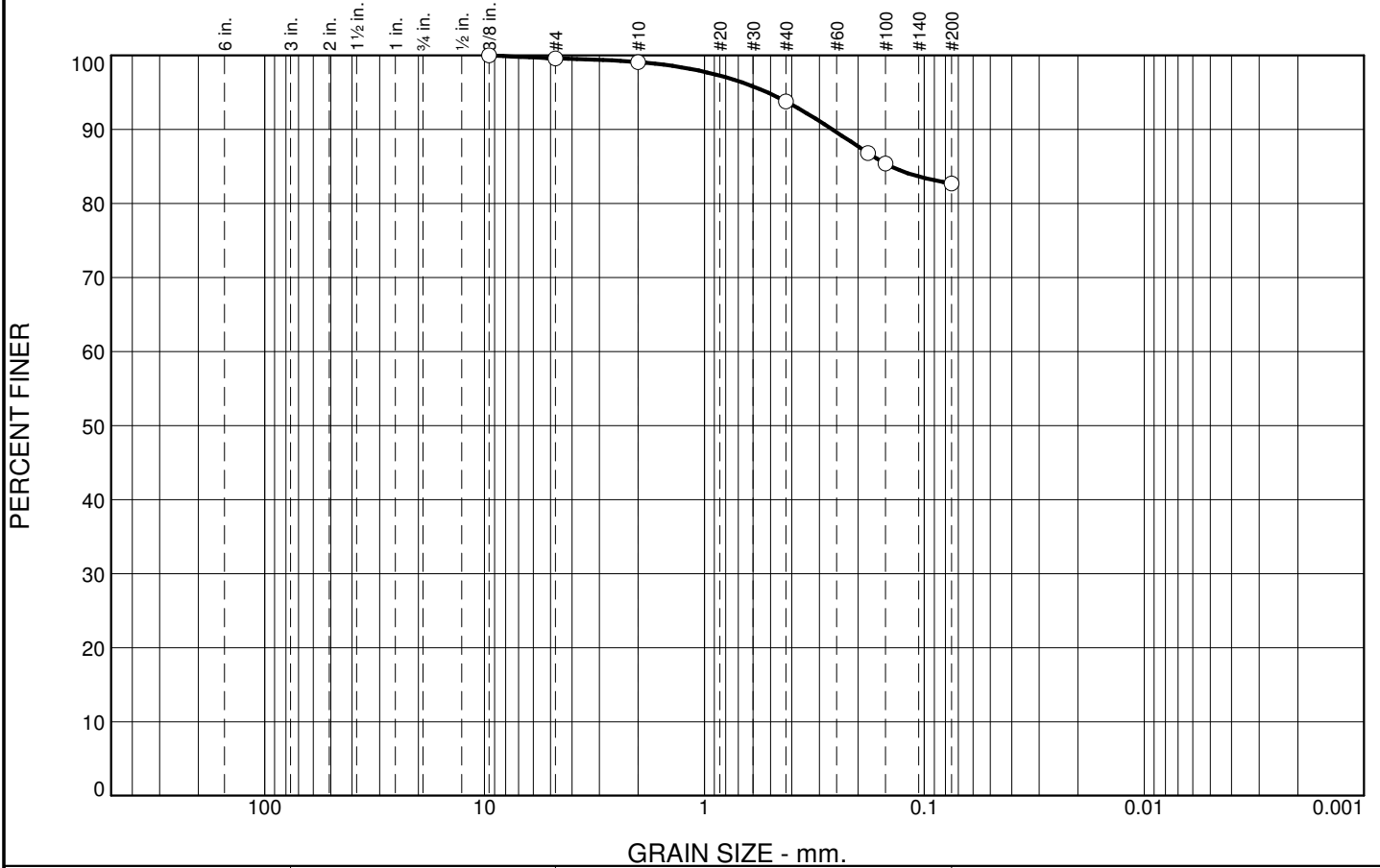
GET
SOLUTIONS, INC.

Client: HDR Engineering
Project: 95 Express Lanes - Fredericksburg Extension

Project No: 10052825

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.5	5.3	11.1	82.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.6		
#10	99.1		
#40	93.8		
#80	86.8		
#100	85.4		
#200	82.7		

Material Description

Tan-Orange, Fat CLAY with Sand

Atterberg Limits

PL= 22 LL= 63 PI= 41

Coefficients

D₉₀= 0.2621 D₈₅= 0.1416 D₆₀=
D₅₀= D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= CH AASHTO= A-7-6(36)

Remarks

Sample Obtained 4/13/17

* (no specification provided)

Location: 17XP-10
Sample Number: 17XP-10

Depth: 2-6 ft.

Date: 4/13/17

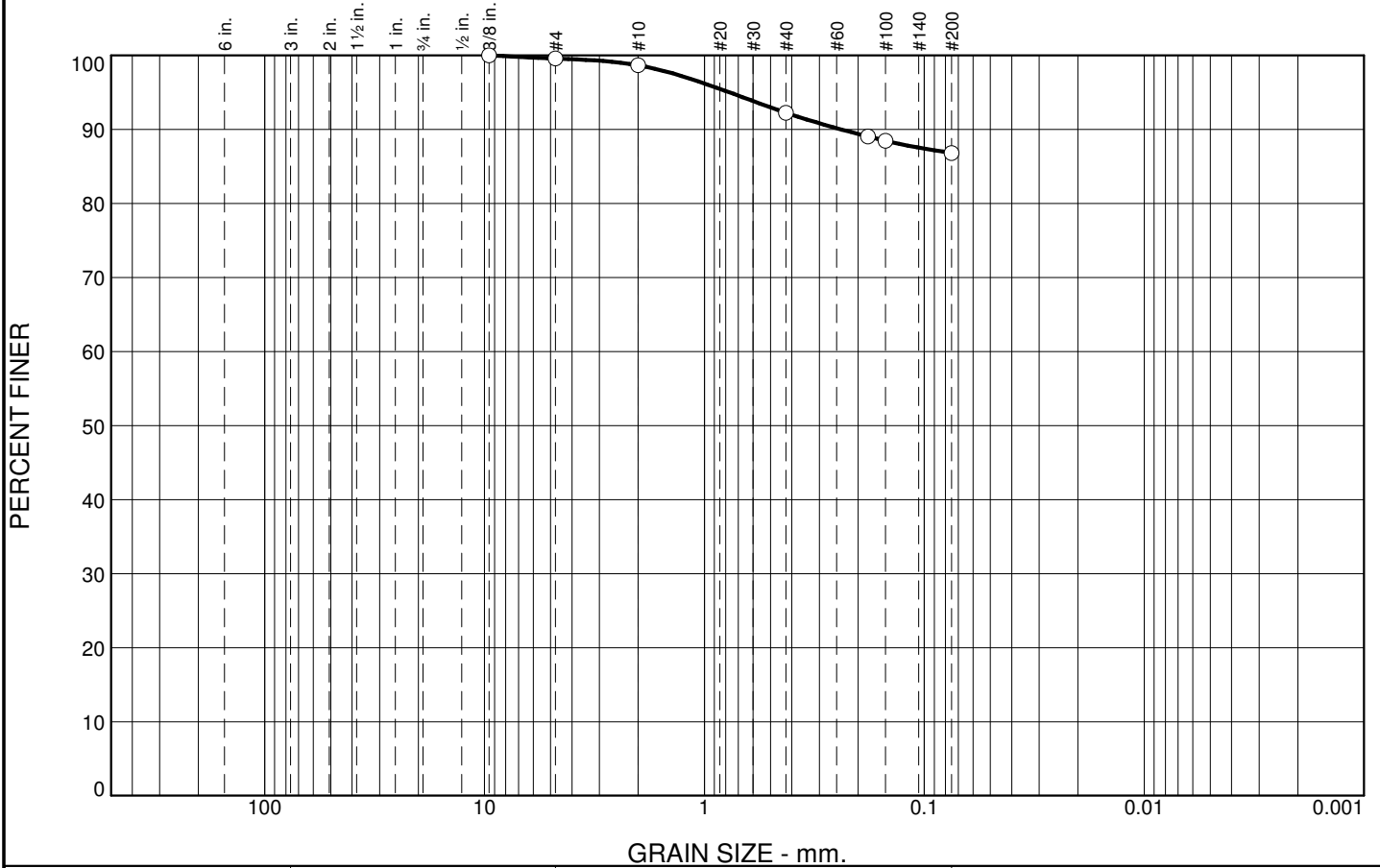
GET
SOLUTIONS, INC.

Client: HDR Engineering
Project: 95 Express Lanes - Fredericksburg Extension

Project No: 10052825

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.9	6.5	5.4	86.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.6		
#10	98.7		
#40	92.2		
#80	89.0		
#100	88.4		
#200	86.8		

Material Description

Tan-Orange, Fat CLAY

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 0.2393 D₈₅= D₆₀=

D₅₀= D₃₀= D₁₅=

D₁₀= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Obtained 4/13/17

* (no specification provided)

Location: 17XP-18
Sample Number: 17XP-18

Depth: 0-6 ft.

Date: 4/13/17

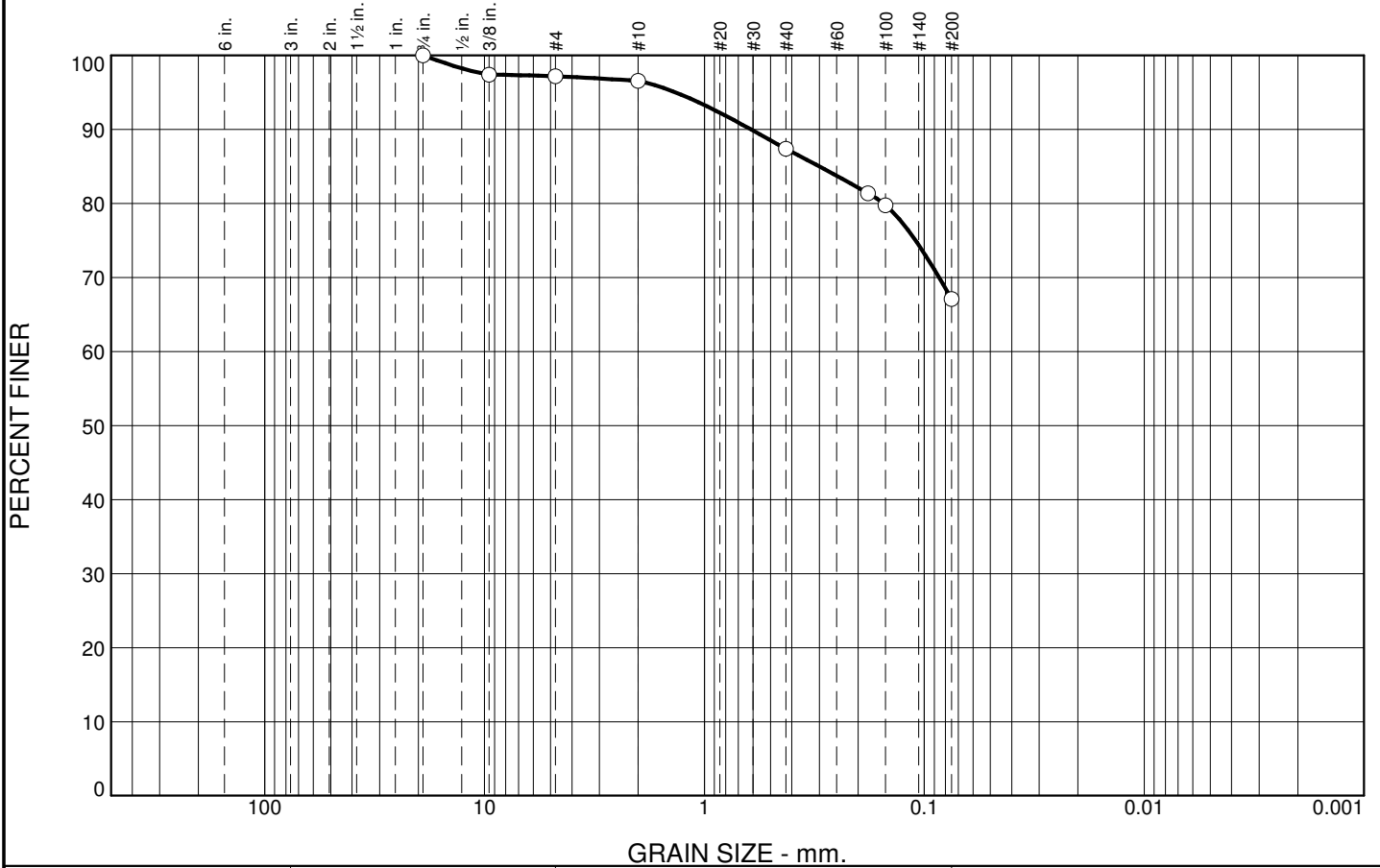
GET
SOLUTIONS, INC.

Client: HDR Engineering
Project: 95 Express Lanes - Fredericksburg Extension

Project No: 10052825

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.8	0.7	9.1	20.3	67.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.375	97.4		
#4	97.2		
#10	96.5		
#40	87.4		
#80	81.4		
#100	79.8		
#200	67.1		

Material Description

Orange, Sandy Fat CLAY

Atterberg Limits

PL= 16 LL= 58 PI= 42

Coefficients

D₉₀= 0.6151 D₈₅= 0.3007 D₆₀=
D₅₀= D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= CH AASHTO= A-7-6(26)

Remarks

Sample Obtained 4/20/17

* (no specification provided)

Location: 17XP-20
Sample Number: 17XP-20

Depth: 0-6 ft.

Date: 4/20/17

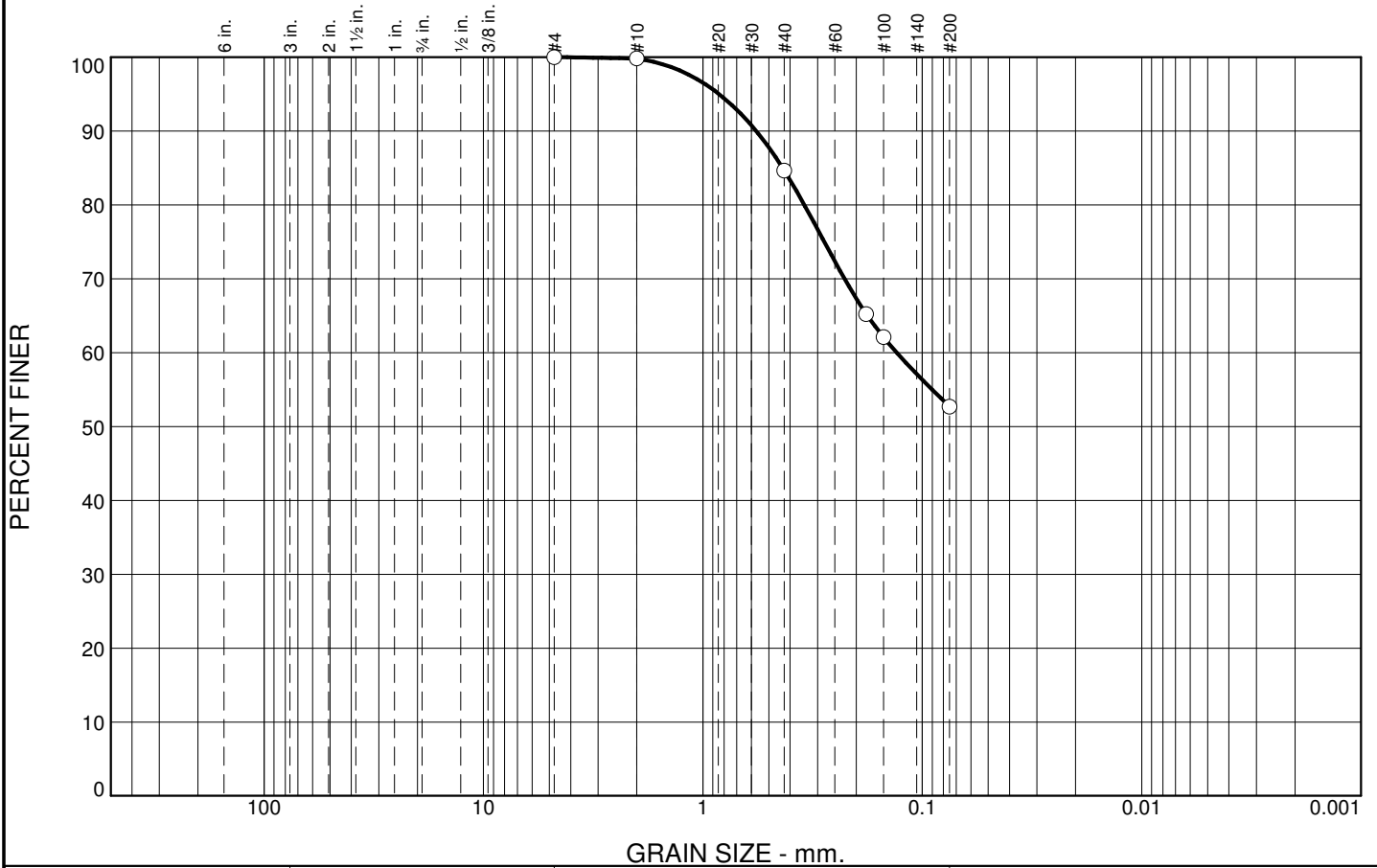
GET
SOLUTIONS, INC.

Client: HDR Engineering
Project: 95 Express Lanes - Fredericksburg Extension

Project No: 10052825

Figure 2A

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	15.2	31.9	52.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.8		
#40	84.6		
#80	65.2		
#100	62.1		
#200	52.7		

Material Description

Tan, Sandy Lean CLAY

Atterberg Limits

PL= 14 LL= 42 PI= 28

Coefficients

D₉₀= 0.5712 D₈₅= 0.4324 D₆₀= 0.1307
D₅₀= D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(11)

Remarks

Sample Obtained 4/20/17

* (no specification provided)

Location: 17XP-51
Sample Number: 17XP-51

Depth: 0-10 ft.

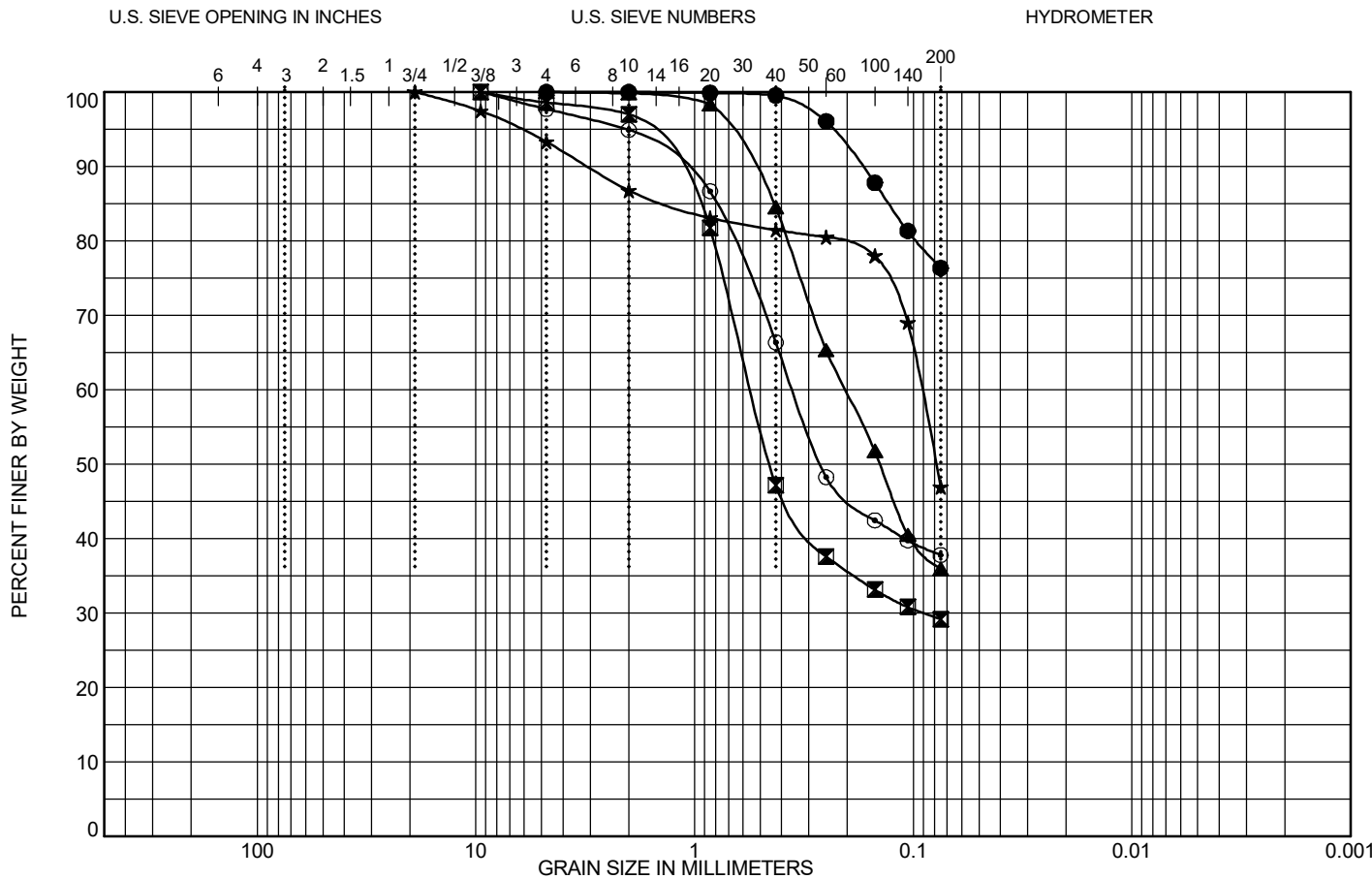
Date: 4/20/17

GET
SOLUTIONS, INC.

Client: HDR Engineering
Project: 95 Express Lanes - Fredericksburg Extension

Project No: 10052825

Figure 3A



	D10	D30	D60	D100
●				4.76
☒		0.089	0.55	9.5
▲			0.204	4.76
★			0.092	19
⊙			0.353	9.5

Test Method: AASHTO T88

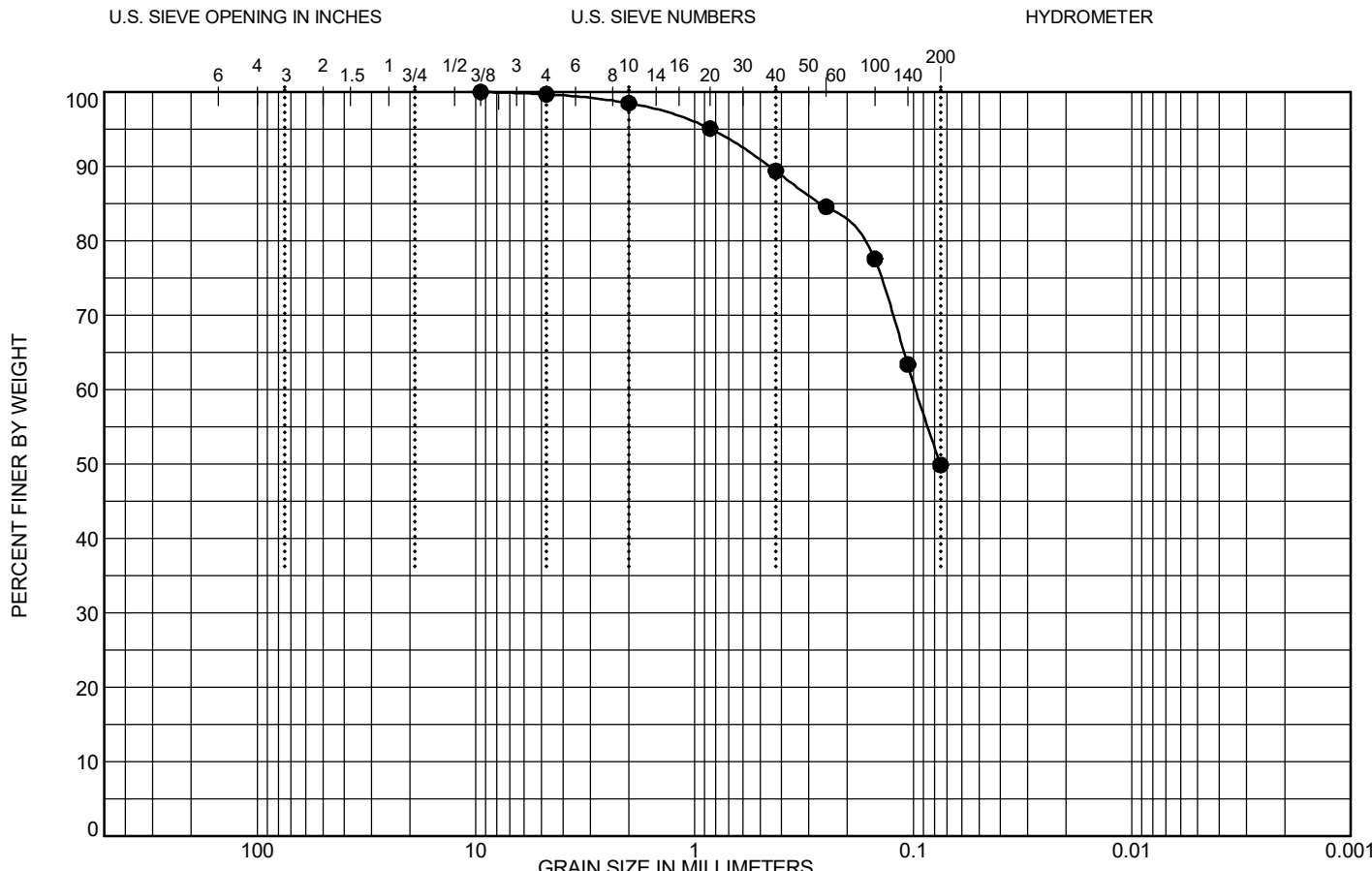
Tested By: EAP Date: 4/26/2017

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
●	17XP-29	Bag	0.0-13.0	0.0	23.6	76.4	25	11	27.0		LEAN CLAY with SAND(CL)
☒	17XP-31	Bag	0.0-13.0	1.4	69.4	29.2	42	21	17.7		CLAYEY SAND(SC)
▲	17XP-46	Bag	0.0-25.0	0.0	64.0	36.0	35	13	22.6		CLAYEY SAND(SC)
★	17XP-61	Bag	0.0-14.3	6.7	46.4	46.9	34	11	15.4		CLAYEY SAND(SC)
⊙	17XP-64	Bag	0.0-15.0	2.3	59.9	37.8	38	18	12.2		CLAYEY SAND(SC)

	GRAIN SIZE DISTRIBUTION 95 Express Lanes Fredericksburg Extension	Fredericksburg, Virginia Project Number: 13-0013 (HDR Project# 170419)	Sheet 1 of 2
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TB GRAIN SIZE LANDSCAPE USGS LAB GPJ SALUT2014.GDT 5/8/17



	D10	D30	D60	D100
●			0.097	9.5

Test Method: AASHTO T88

Tested By: EAP Date: 4/26/2017

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

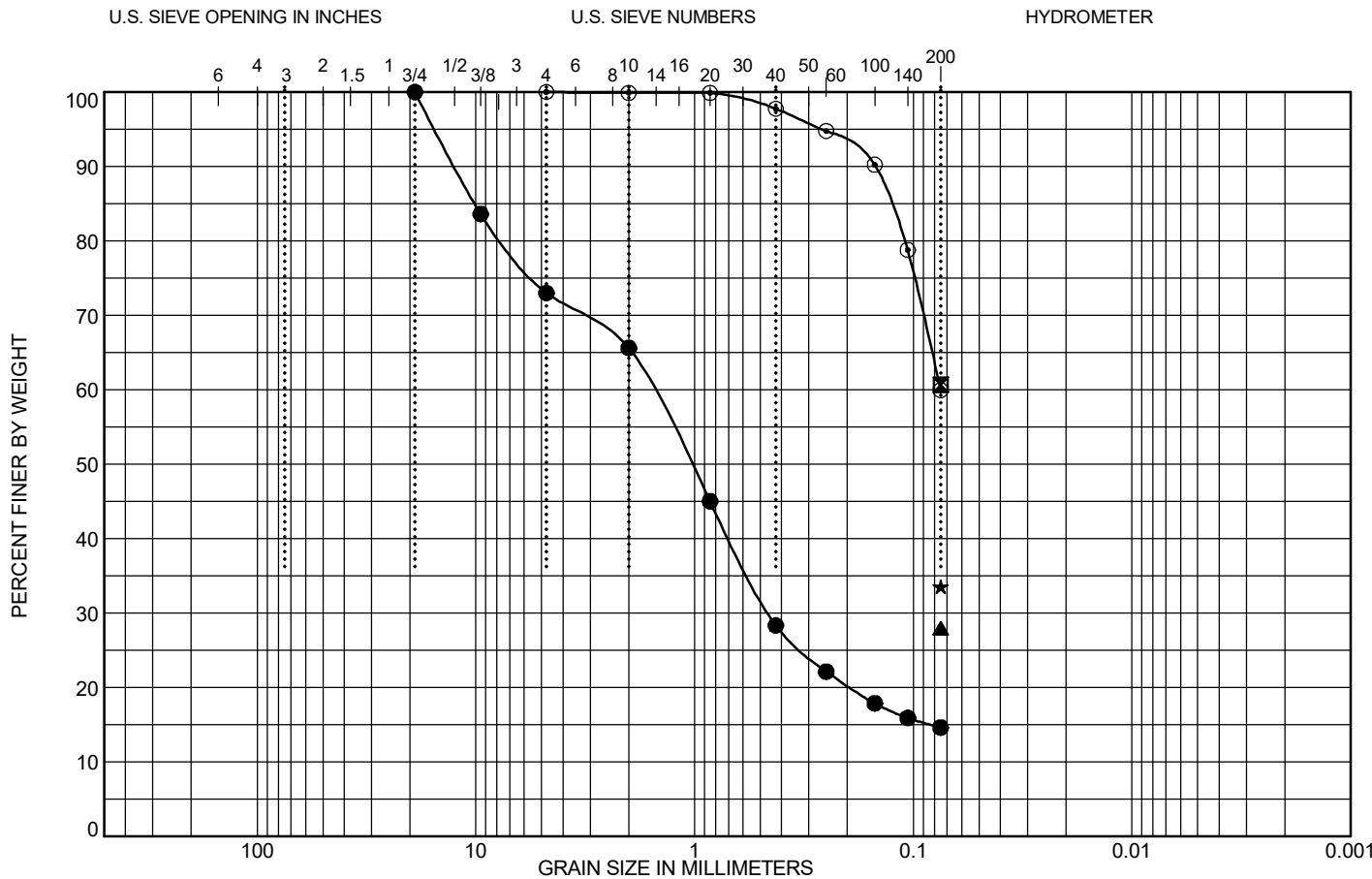
Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
● 17XP-68	Bag	4.0-8.0	0.3	49.8	49.9	24	11	9.6		CLAYEY SAND(SC)



GRAIN SIZE DISTRIBUTION
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 13-0013 (HDR Project# 170419)
 Sheet 2 of 2

TB GRAIN SIZE LANDSCAPE USCS LAB GPJ SALUT2014.GDT 5/8/17



	D10	D30	D60	D100
●		0.456	1.584	19
☒				0.075
▲				0.075
★				0.075
◎			0.075	4.76

Test Method: AASHTO T88

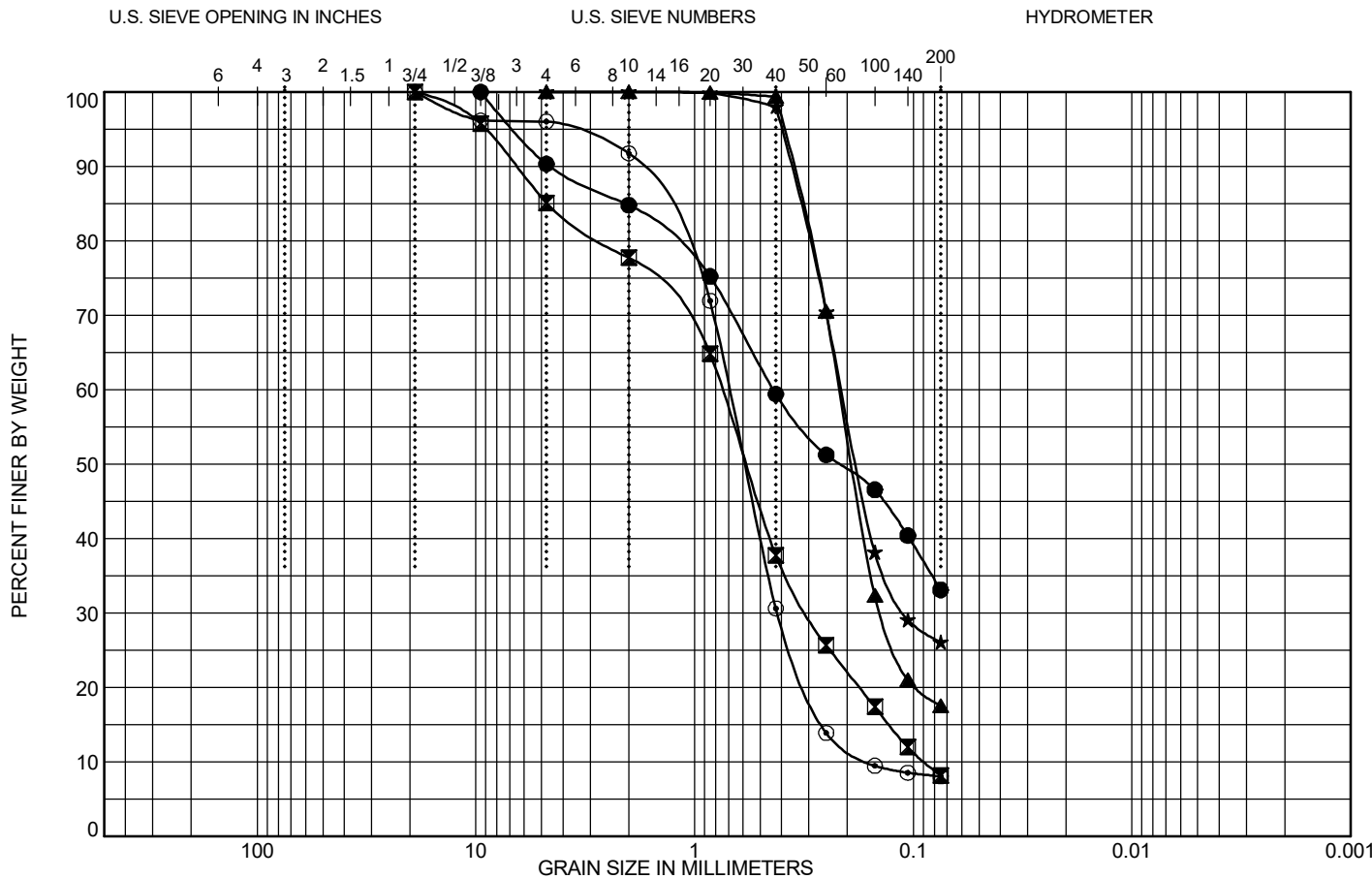
Tested By: EAP Date: 5/2/2017

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
●	17BR-09		4.0-6.0	27.0	58.4	14.6				18.1	
☒	17BR-09		18.0-20.0				60.7	65	40	25.2	SANDY FAT CLAY(CH)
▲	17BR-09		43.0-45.0				27.9	43	21	25.2	CLAYEY SAND(SC)
★	17CL-13		2.0-4.0				33.5	38	22	22.1	CLAYEY SAND(SC)
◎	17CL-13		13.0-15.0	0.0	40.1	59.9				15.1	

	GRAIN SIZE DISTRIBUTION 95 Express Lanes Fredericksburg Extension	Fredericksburg, Virginia Project Number: 13-0013 (HDR Project# 170419)	Sheet 1 of 11
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TB GRAIN SIZE LANDSCAPE USGS LAB G.P.J. SALUT2014.GDT 5/8/17



	D10	D30	D60	D100
●			0.436	9.5
☒	0.089	0.302	0.75	19
▲		0.14	0.217	4.76
★		0.11	0.212	4.76
⊙	0.159	0.417	0.696	19

Test Method: AASHTO T88

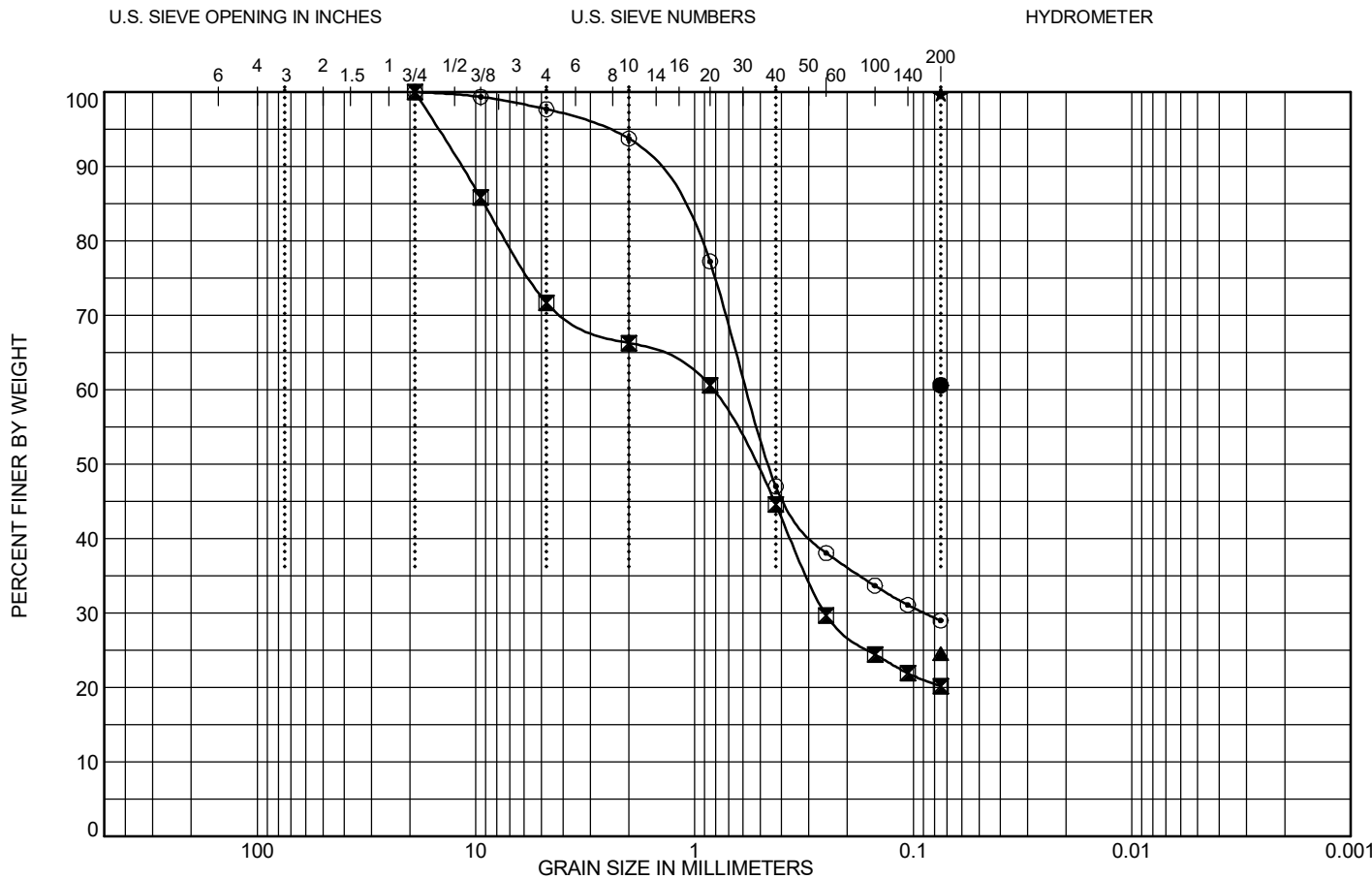
Tested By: EAP Date: 5/2/2017

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
●	17CL-14		13.0-15.0	9.7	57.2	33.1				12.3	
☒	17RW-04		8.0-10.0	14.9	77.0	8.1				13.0	
▲	17RW-06		13.0-15.0	0.0	82.5	17.5				8.7	
★	17RW-06		28.0-30.0	0.0	73.9	26.1	28	5		27.3	SILTY SAND(SM)
⊙	17RW-07		18.0-20.0	4.0	88.0	8.1				27.7	

	GRAIN SIZE DISTRIBUTION 95 Express Lanes Fredericksburg Extension	Fredericksburg, Virginia Project Number: 13-0013 (HDR Project# 170419)	Sheet 2 of 11
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TB GRAIN SIZE LANDSCAPE USGS LAB GPJ SALUT2014.GDT 5/8/17



	D10	D30	D60	D100
●				0.075
■		0.253	0.828	19
▲				0.075
★				0.075
◎		0.089	0.572	19

Test Method: AASHTO T88

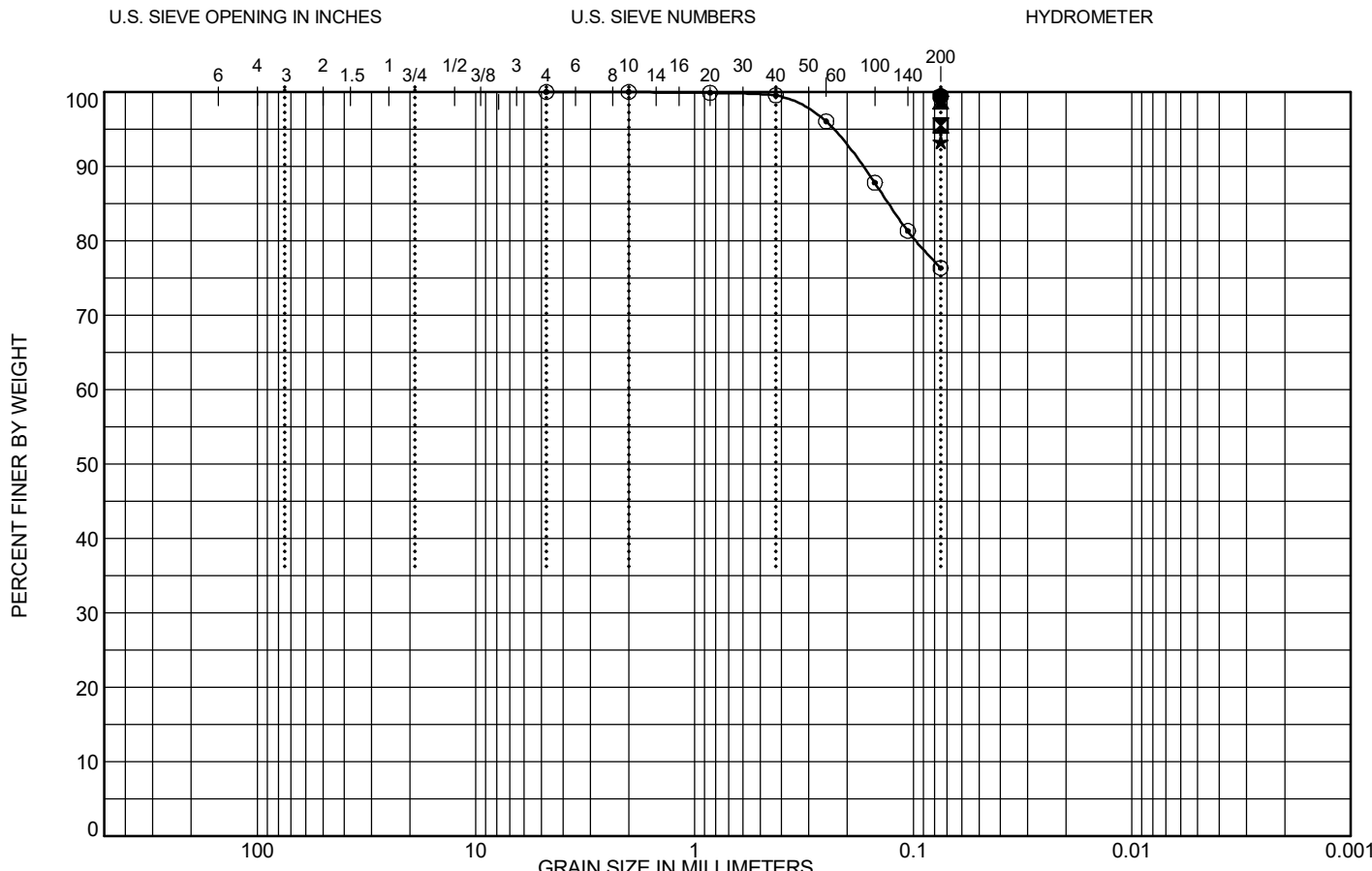
Tested By: EAP Date: 5/2/2017

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
●	17RW-07		28.0-30.0			60.6	68	40	31.4		SANDY FAT CLAY(CH)
■	17RW-08		8.0-10.0	28.3	51.5	20.2			21.9		
▲	17RW-08		33.0-35.0			24.5	45	24	27.3		CLAYEY SAND(SC)
★	17SWM-11		23.0-25.0			99.7	86	54	31.9		FAT CLAY(CH)
◎	17XP-21		4.0-6.0	2.3	68.7	29.0			18.2		

	GRAIN SIZE DISTRIBUTION 95 Express Lanes Fredericksburg Extension	Fredericksburg, Virginia Project Number: 13-0013 (HDR Project# 170419)	Sheet 3 of 11
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TB GRAIN SIZE LANDSCAPE USGS LAB GPJ SALUT2014.GDT 5/8/17



	D10	D30	D60	D100
●				0.075
☒				0.075
▲				0.075
★				0.075
◎				4.76

Test Method: AASHTO T88

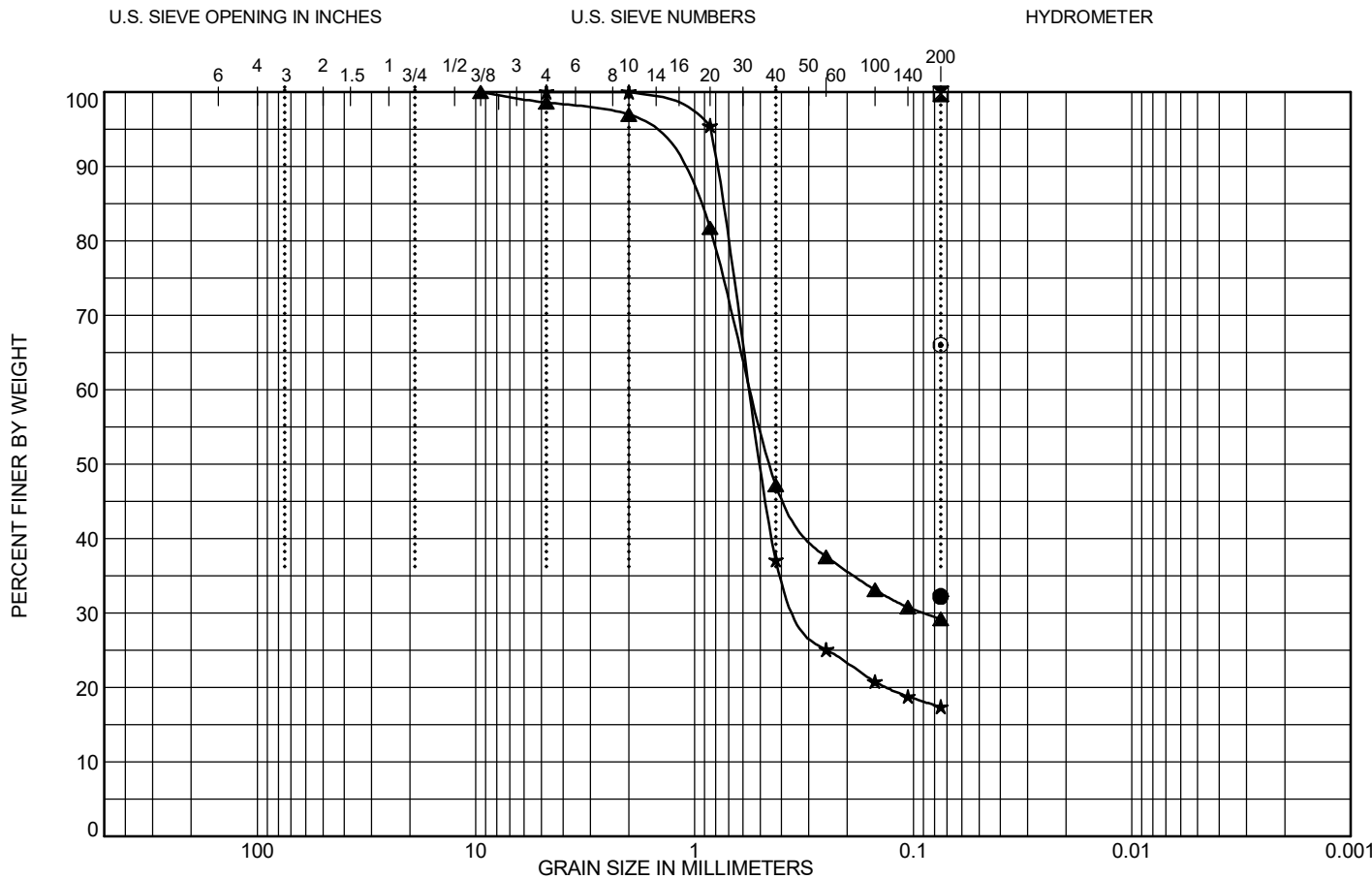
Tested By: EAP Date: 4/26/2017

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
●	17XP-24		8.0-10.0			99.4		70	31	26.9	ELASTIC SILT(MH)
☒	17XP-24		28.0-30.0			95.5		49	15	26.0	SILT(ML)
▲	17XP-24		33.0-35.0			98.6		53	20	19.4	ELASTIC SILT(MH)
★	17XP-28		23.0-25.0			93.3		51	14	30.4	ELASTIC SILT(MH)
◎	17XP-29		0.0-13.0	0.0	23.6	76.4		25	11	27.0	LEAN CLAY with SAND(CL)

	GRAIN SIZE DISTRIBUTION 95 Express Lanes Fredericksburg Extension	Fredericksburg, Virginia Project Number: 13-0013 (HDR Project# 170419)	Sheet 4 of 11
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T&E GRAIN SIZE LANDSCAPE USCS LAB GPJ SALUT2014.GDT 5/8/17



	D10	D30	D60	D100
●				0.075
☒				0.075
▲		0.089	0.55	9.5
★		0.31	0.558	4.76
◎				0.075

Test Method: AASHTO T88

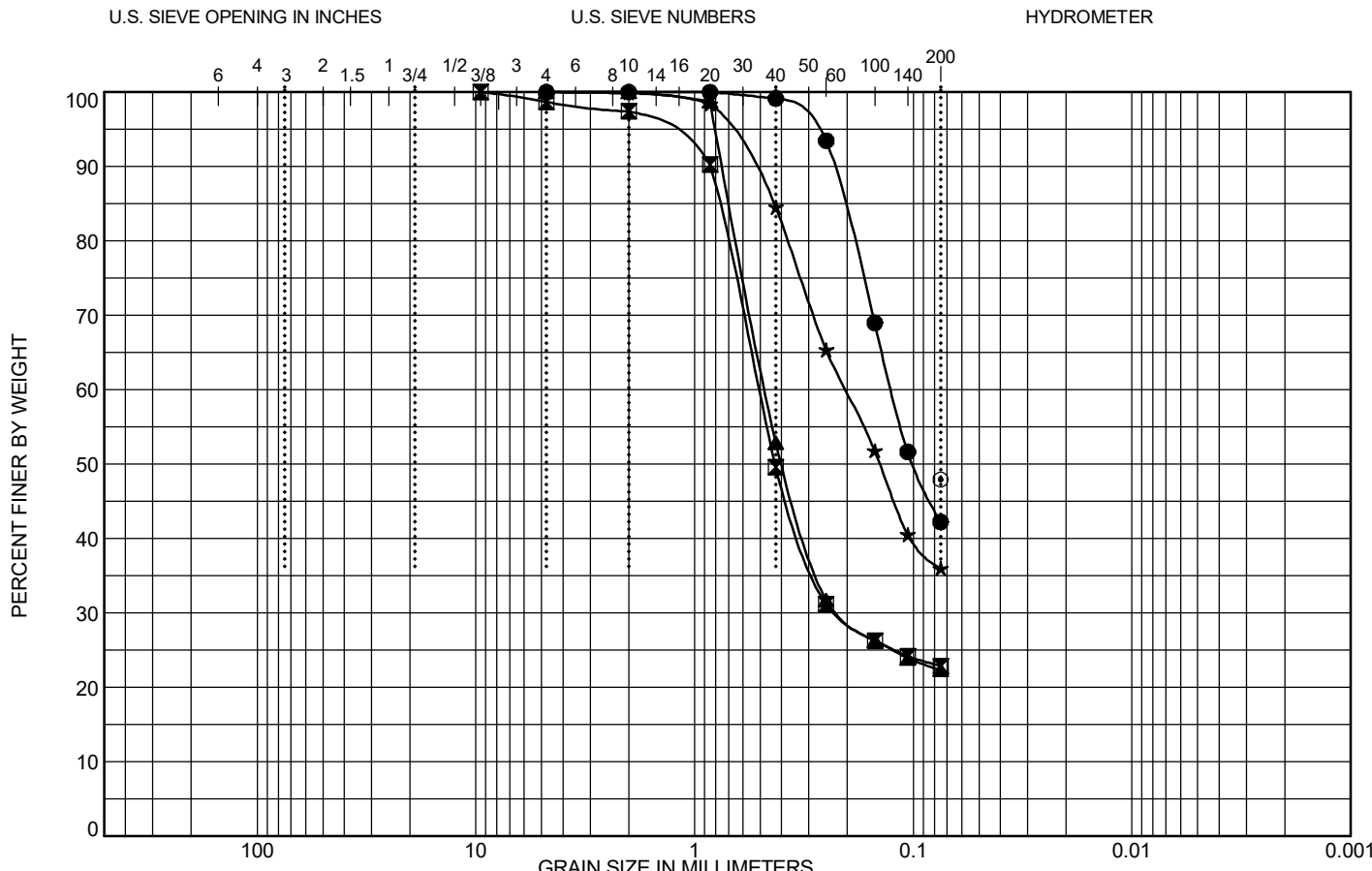
Tested By: EAP Date: 5/2/2017

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Symbol	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
●	17XP-29		23.0-25.0			32.2	50	30	27.9		CLAYEY SAND(SC)
☒	17XP-30		13.0-15.0			99.8	75	43	25.9		FAT CLAY(CH)
▲	17XP-31		0.0-13.0	1.4	69.4	29.2	42	21	17.7		CLAYEY SAND(SC)
★	17XP-31		6.0-8.0	0.0	82.6	17.4			12.5		
◎	17XP-43		28.0-30.0			66.0	50	16	27.0		SANDY ELASTIC SILT(MH)

	GRAIN SIZE DISTRIBUTION 95 Express Lanes Fredericksburg Extension	Fredericksburg, Virginia Project Number: 13-0013 (HDR Project# 170419)	Sheet 5 of 11
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T.B. GRAIN SIZE LANDSCAPE USCS LAB.GPJ SALUT2014.GDT 5/8/17



	D10	D30	D60	D100
●			0.125	4.76
☒		0.221	0.508	9.5
▲		0.213	0.473	4.76
★			0.204	4.76
◎				0.075

Test Method: AASHTO T88

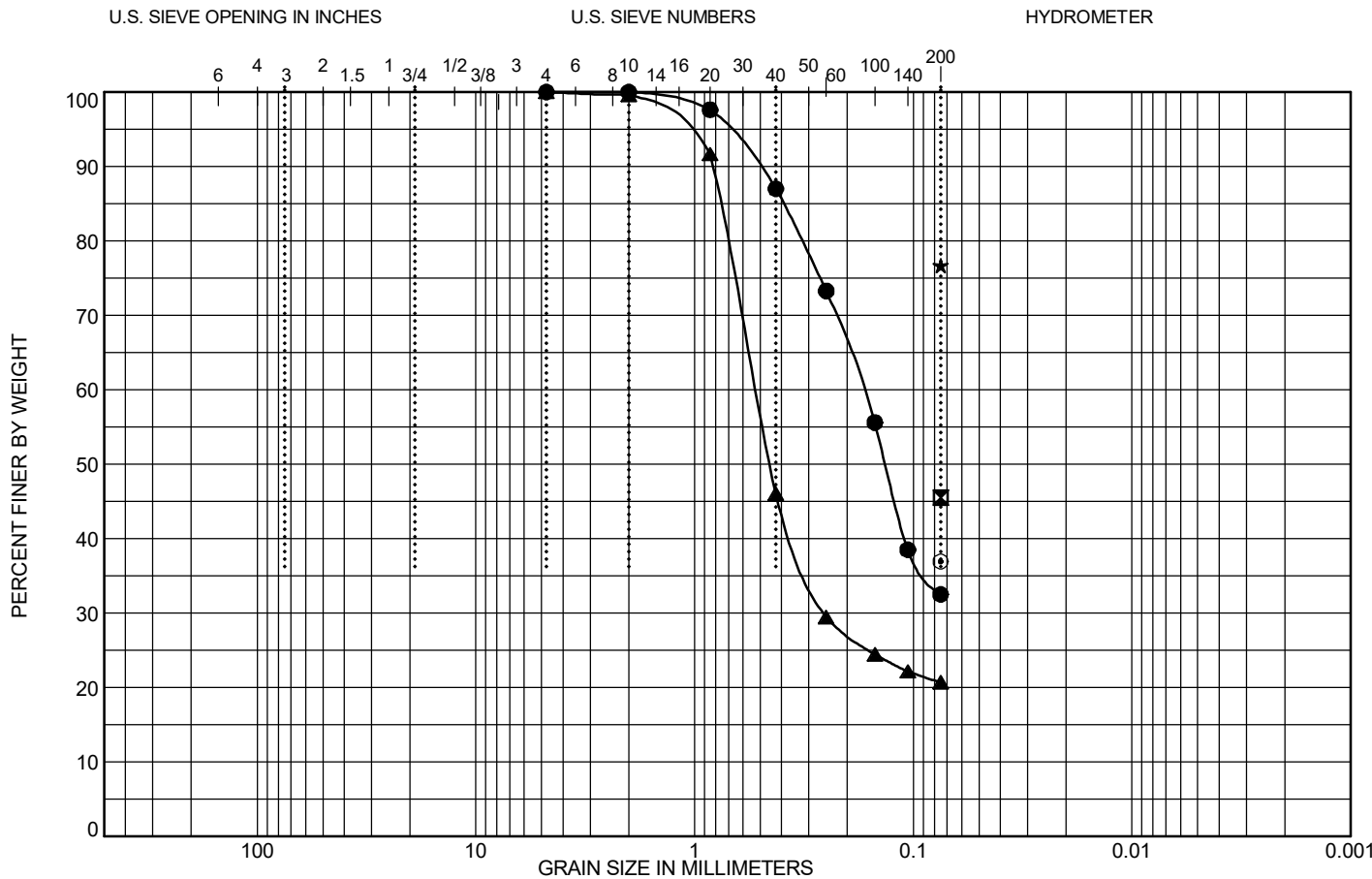
Tested By: EAP Date: 5/2/2017

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
●	17XP-43		38.0-40.0	0.0	57.8	42.2	38	7	25.4		SILTY SAND(SM)
☒	17XP-45		6.0-8.0	1.4	75.8	22.9				14.5	
▲	17XP-45		43.0-45.0	0.0	77.7	22.3				14.9	
★	17XP-46		0.0-25.0	0.0	64.0	36.0	35	13	22.6		CLAYEY SAND(SC)
◎	17XP-46		2.0-4.0			47.9	41	16	18.4		CLAYEY SAND(SC)

	GRAIN SIZE DISTRIBUTION 95 Express Lanes Fredericksburg Extension	Fredericksburg, Virginia Project Number: 13-0013 (HDR Project# 170419)	Sheet 6 of 11
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TB GRAIN SIZE LANDSCAPE USGS LAB GPJ SALUT2014.GDT 5/8/17



	D10	D30	D60	D100
●			0.17	4.76
☒				0.075
▲		0.254	0.526	4.76
★				0.075
◎				0.075

Test Method: AASHTO T88

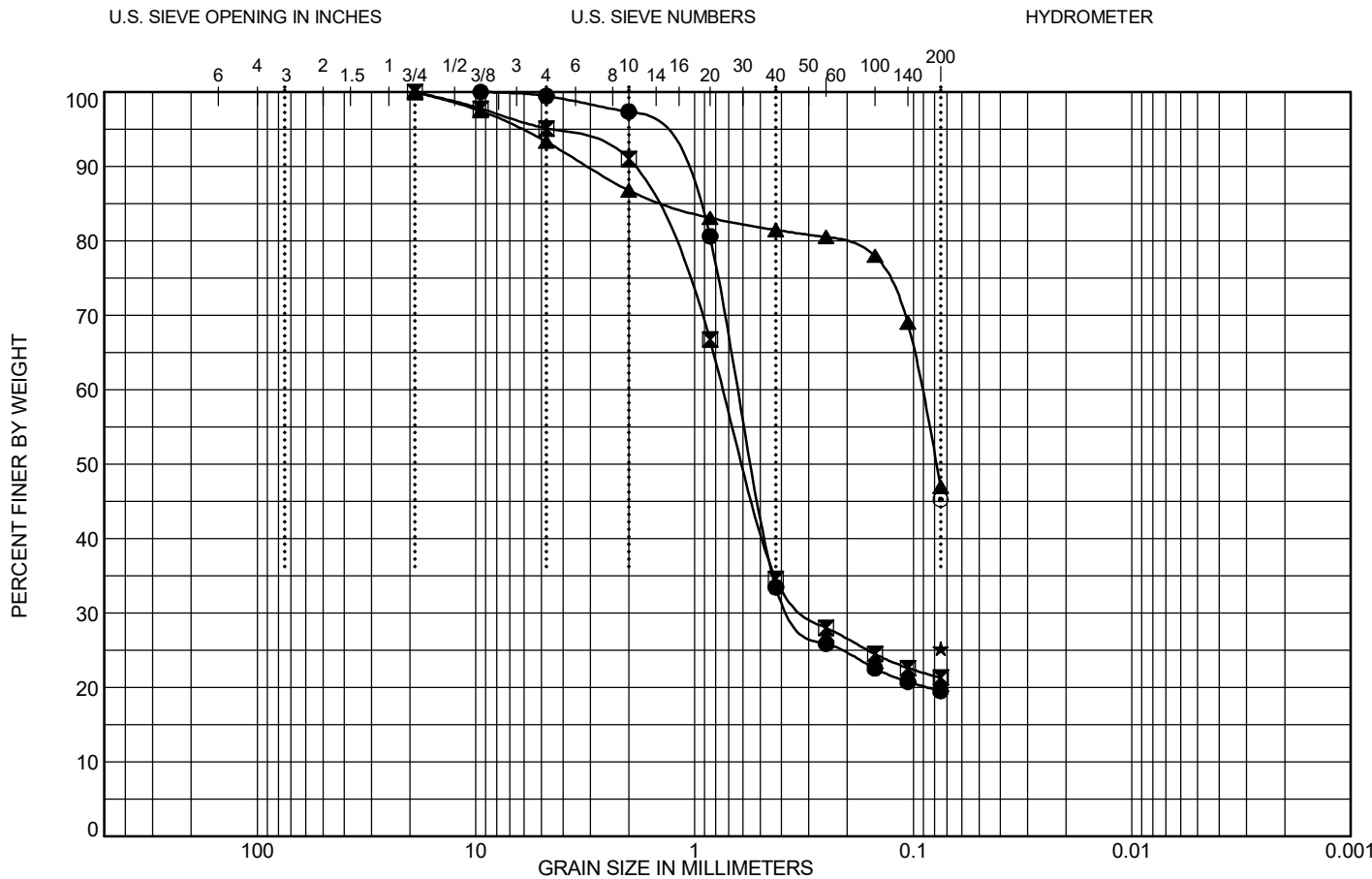
Tested By: EAP Date: 5/2/2017

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
●	17XP-46		23.0-25.0	0.0	67.5	32.5	32	8	25.0		SILTY SAND(SM)
☒	17XP-47		6.0-8.0			45.5	40	17	21.4		CLAYEY SAND(SC)
▲	17XP-47		13.0-15.0	0.0	79.3	20.7			15.5		
★	17XP-47		38.0-40.0			76.7	68	42	23.9		FAT CLAY with SAND(CH)
◎	17XP-48		4.0-6.0			36.9	42	15	20.4		SILTY SAND(SM)

	GRAIN SIZE DISTRIBUTION 95 Express Lanes Fredericksburg Extension	Fredericksburg, Virginia Project Number: 13-0013 (HDR Project# 170419)	Sheet 7 of 11
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T&E GRAIN SIZE LANDSCAPE USCS LAB GPJ SALUT2014.GDT 5/8/17



	D10	D30	D60	D100
●		0.334	0.628	9.5
☒		0.294	0.735	19
▲			0.092	19
★				0.075
◎				0.075

Test Method: AASHTO T88

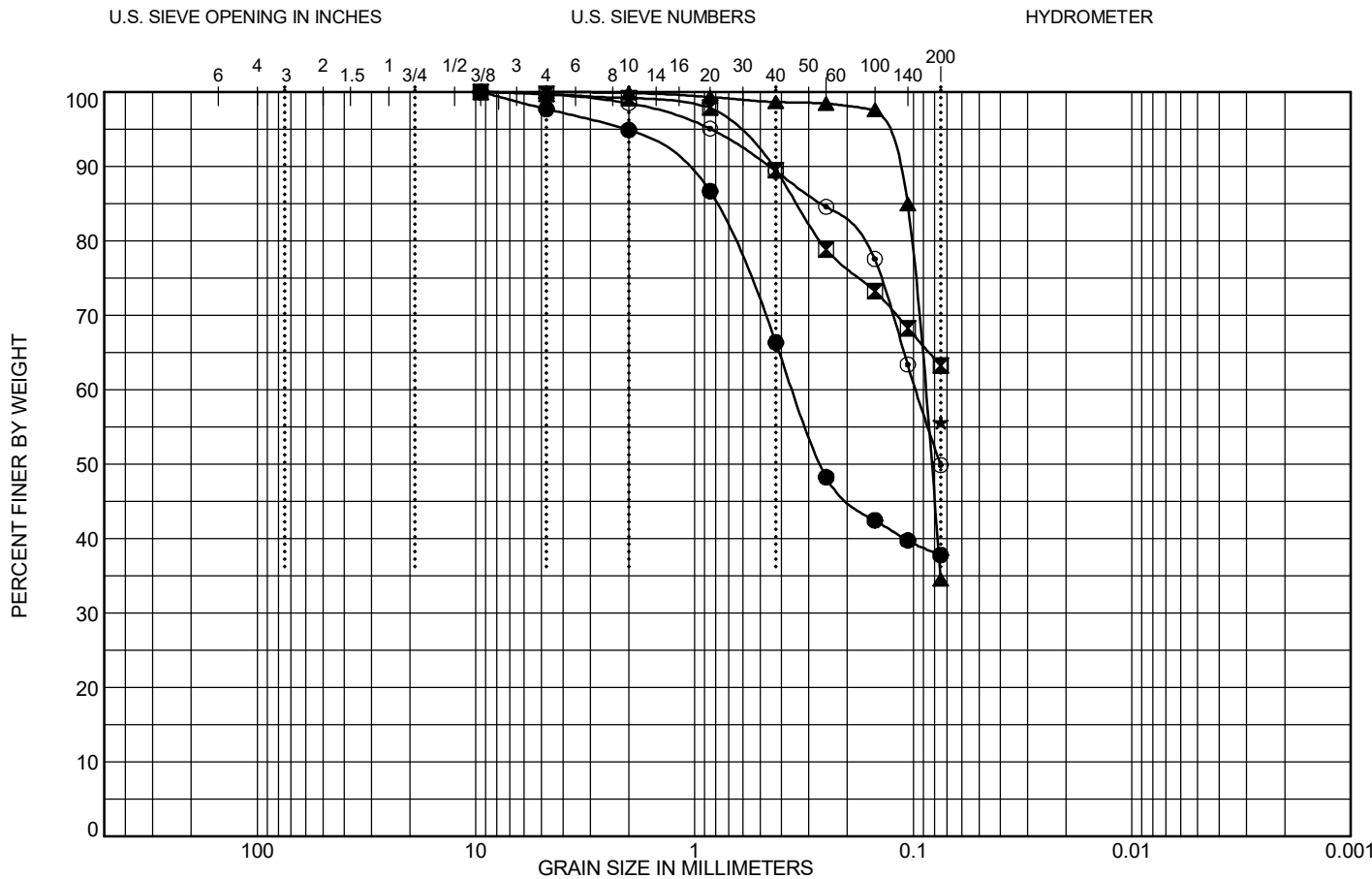
Tested By: EAP Date: 5/2/2017

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
●	17XP-48		18.0-20.0	0.5	79.9	19.5				18.5	
☒	17XP-60		18.0-20.0	4.9	73.8	21.3				8.5	
▲	17XP-61		0.0-14.3	6.7	46.4	46.9	34	11	15.4		CLAYEY SAND(SC)
★	17XP-61		13.0-14.3			25.2	49	18	24.6		SILTY SAND(SM)
◎	17XP-62		8.0-10.0			45.2	26	NP	10.9		SILTY SAND(SM)

	GRAIN SIZE DISTRIBUTION 95 Express Lanes Fredericksburg Extension	Fredericksburg, Virginia Project Number: 13-0013 (HDR Project# 170419)	Sheet 8 of 11
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T.B. GRAIN SIZE LANDSCAPE USGS LAB GPJ SALUT2014.GDT 5/8/17



	D10	D30	D60	D100
●			0.353	9.5
☒				9.5
▲			0.089	4.76
★				0.075
⊙			0.097	9.5

Test Method: AASHTO T88

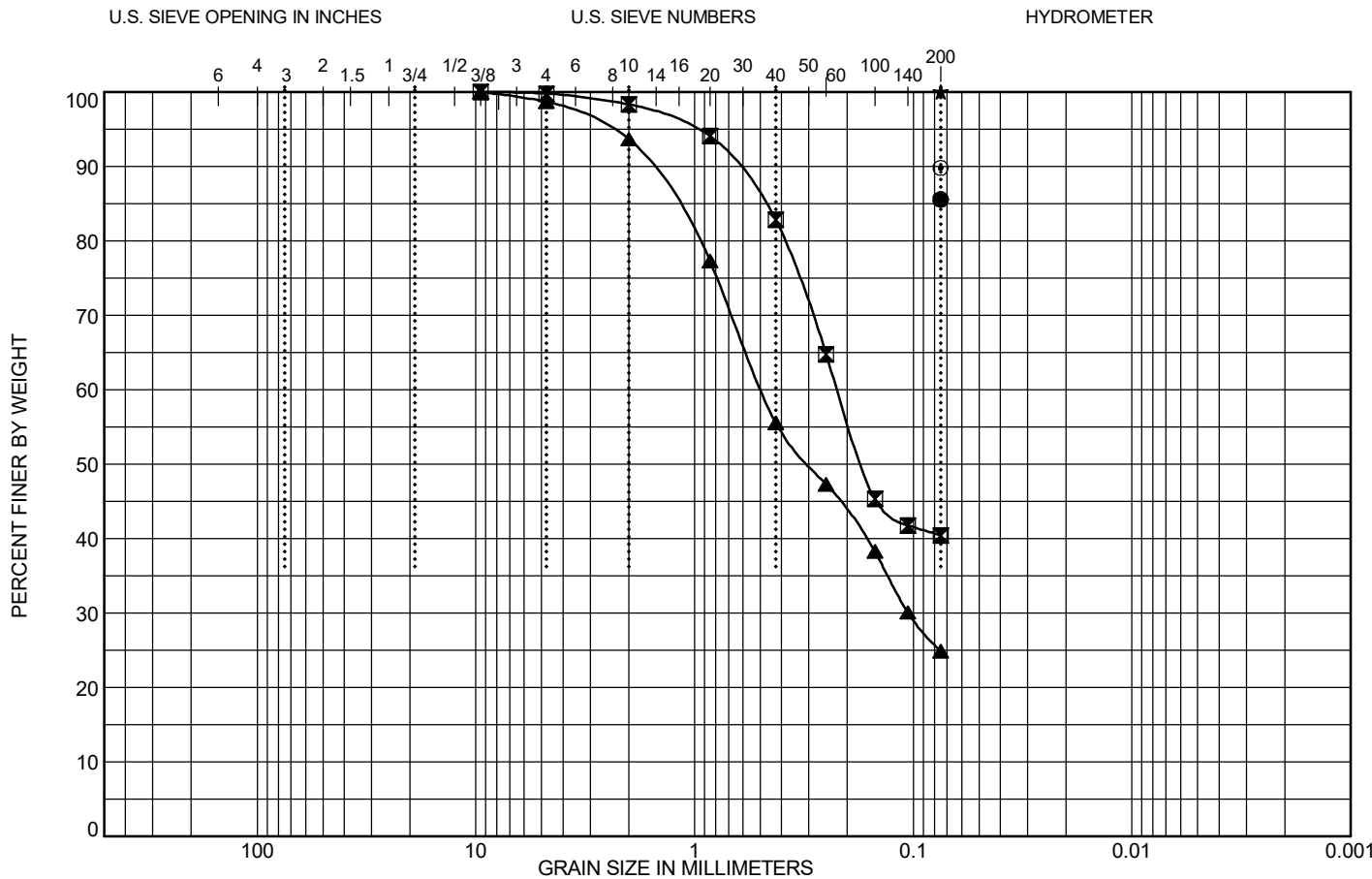
Tested By: EAP Date: 4/26/2017

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
●	17XP-64		0.0-15.0	2.3	59.9	37.8	38	18	12.2		CLAYEY SAND(SC)
☒	17XP-64		2.0-4.0	0.2	36.5	63.3				18.2	
▲	17XP-65		13.0-15.0	0.0	65.5	34.5				28.9	
★	17XP-68		2.0-4.0			55.6	28	10	14.9		SANDY LEAN CLAY(CL)
⊙	17XP-68		4.0-8.0	0.3	49.8	49.9	24	11	9.6		CLAYEY SAND(SC)

	GRAIN SIZE DISTRIBUTION 95 Express Lanes Fredericksburg Extension	Fredericksburg, Virginia Project Number: 13-0013 (HDR Project# 170419)	Sheet 9 of 11
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TB GRAIN SIZE LANDSCAPE USGS LAB GPJ SALUT2014.GDT 5/8/17



	D10	D30	D60	D100
●				0.075
☒			0.22	9.5
▲		0.105	0.49	9.5
★				0.075
◎				0.075

Test Method: AASHTO T88

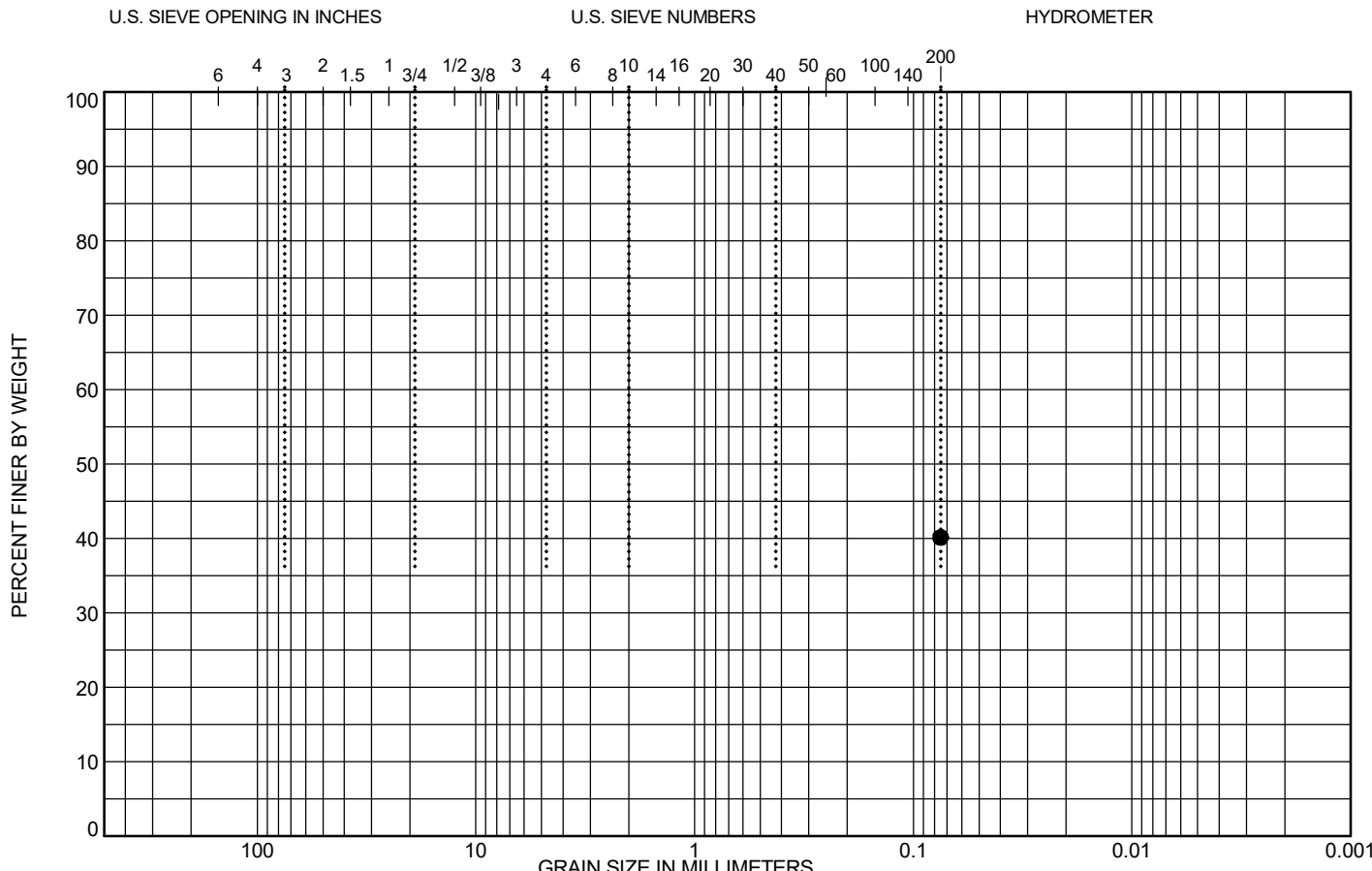
Tested By: EAP Date: 4/28/2017

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
●	17XP-69		13.0-15.0			85.6	74	41	32.5		FAT CLAY(CH)
☒	17XP-70		13.0-15.0	0.2	59.3	40.5	45	20	25.5		CLAYEY SAND(SC)
▲	17XP-70		23.0-25.0	1.3	73.8	24.9	33	10	24.5		CLAYEY SAND(SC)
★	17XP-71		6.0-8.0			100.0	71	43	25.8		FAT CLAY(CH)
◎	17XP-72		13.0-15.0			89.8	50	32	18.2		FAT CLAY(CH)

	GRAIN SIZE DISTRIBUTION 95 Express Lanes Fredericksburg Extension	Fredericksburg, Virginia Project Number: 13-0013 (HDR Project# 170419)	Sheet 10 of 11
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T&E GRAIN SIZE LANDSCAPE USCS LAB GPJ SALUT2014.GDT 5/8/17



	D10	D30	D60	D100
●				0.075

Test Method: AASHTO T88

Tested By: EAP Date: 5/4/2017

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

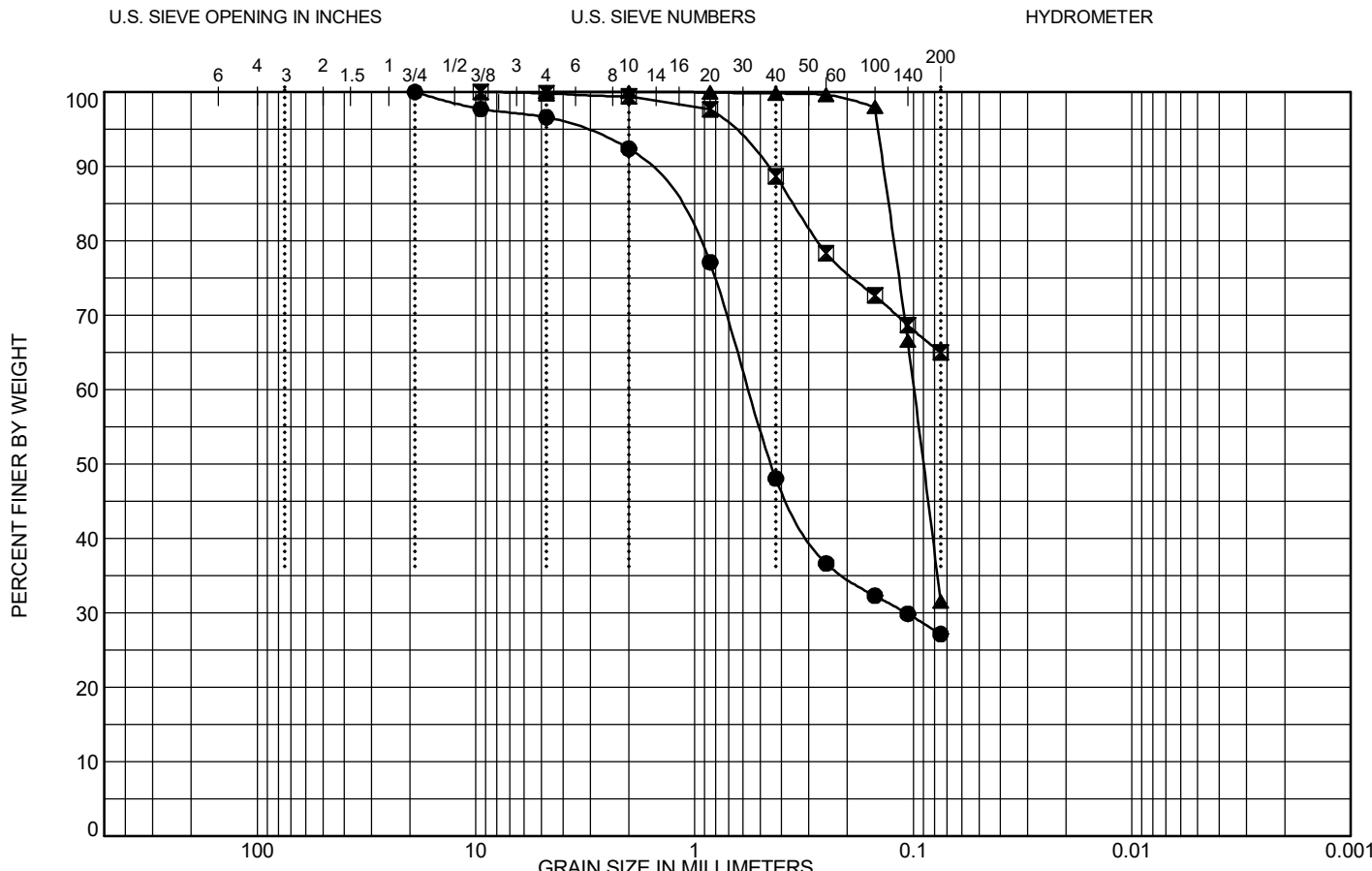
Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
● 17XP-72		28.0-30.0			40.1		40	20	20.0	CLAYEY SAND(SC)

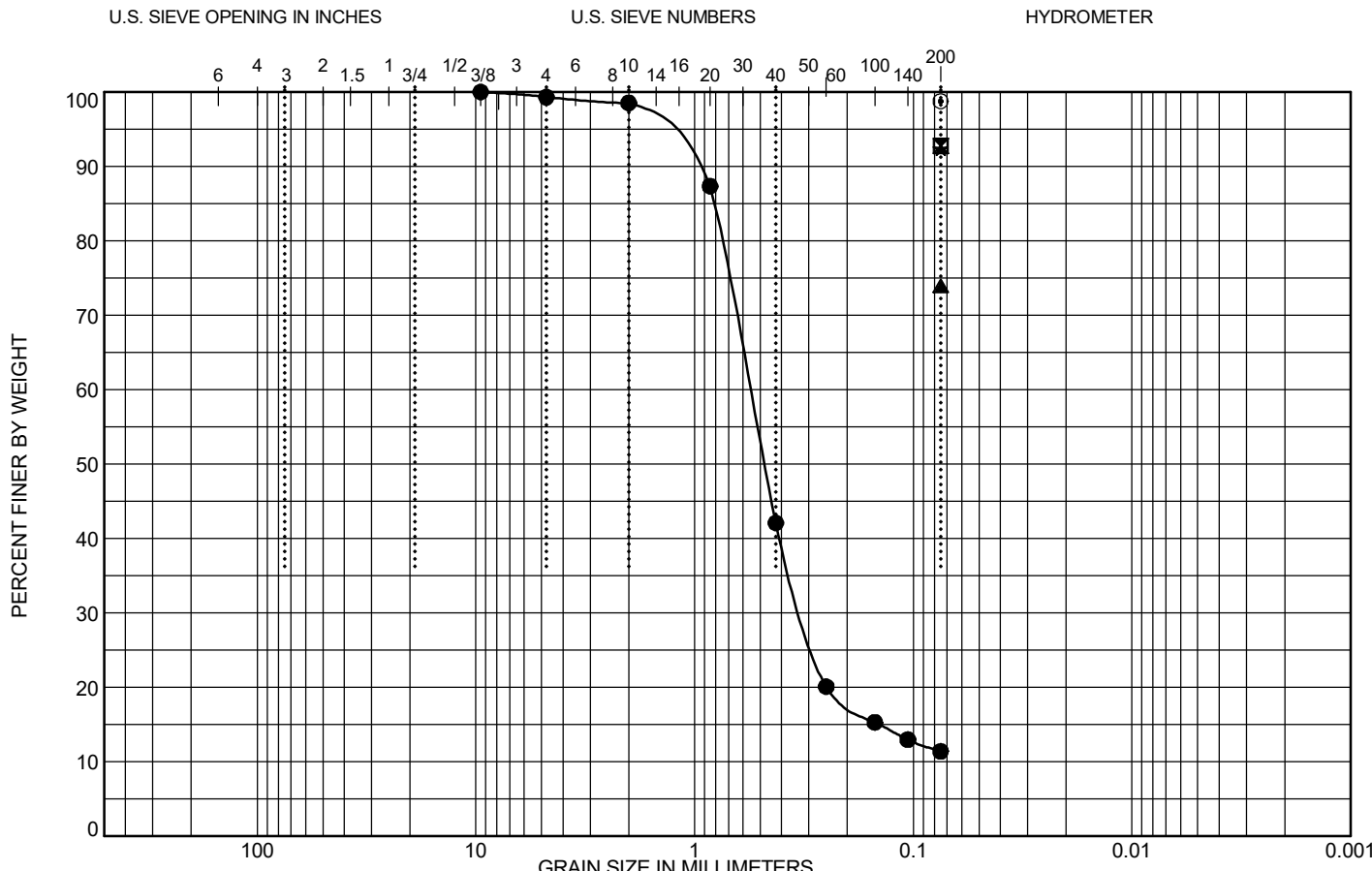


GRAIN SIZE DISTRIBUTION
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 13-0013 (HDR Project# 170419)

TB GRAIN SIZE LANDSCAPE USCS LAB GPJ SALUT2014.GDT 5/8/17





	D10	D30	D60	D100
●		0.318	0.559	9.5
☒				
▲				
★				
◎				

Test Method: AASHTO T88

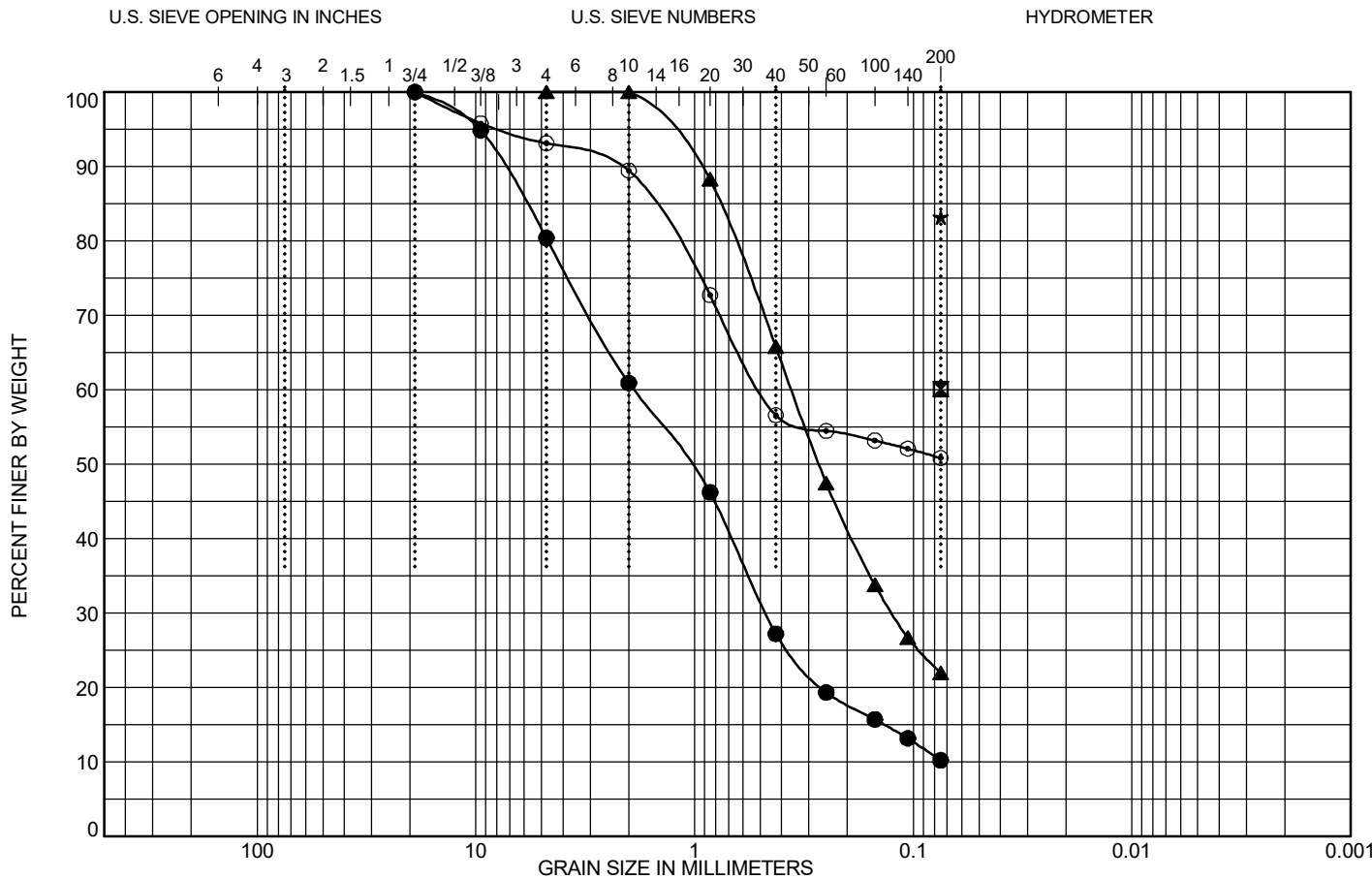
Tested By: EAP Date: 5/16/2017

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	
		0.7	87.9	11.4		

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
●	17BR-10		6.0-8.0	0.7	87.9	11.4				6.3	
☒	17BR-10		18.0-20.0			92.8	71	44	34.8		FAT CLAY(CH)
▲	17BR-10		38.0-40.0			74.0	49	23	27.4		LEAN CLAY with SAND(CL)
★	17BR-10		48.0-50.0			92.4	62	27	28.7		ELASTIC SILT(MH)
◎	17BR-10		68.0-70.0			98.8	66	35	28.0		FAT CLAY(CH)

	GRAIN SIZE DISTRIBUTION 95 Express Lanes Fredericksburg Extension	Fredericksburg, Virginia Project Number: 13-0013 (HDR Project# 170419)	Sheet 1 of 7
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TB GRAIN SIZE LANDSCAPE USGS LAB ASSIGNMENT 2.GPJ SALUT2014.GDT 5/25/17



	D10	D30	D60	D100
●		0.471	1.898	19
☒				
▲		0.124	0.359	4.76
★				
◎			0.492	19

Test Method: AASHTO T88

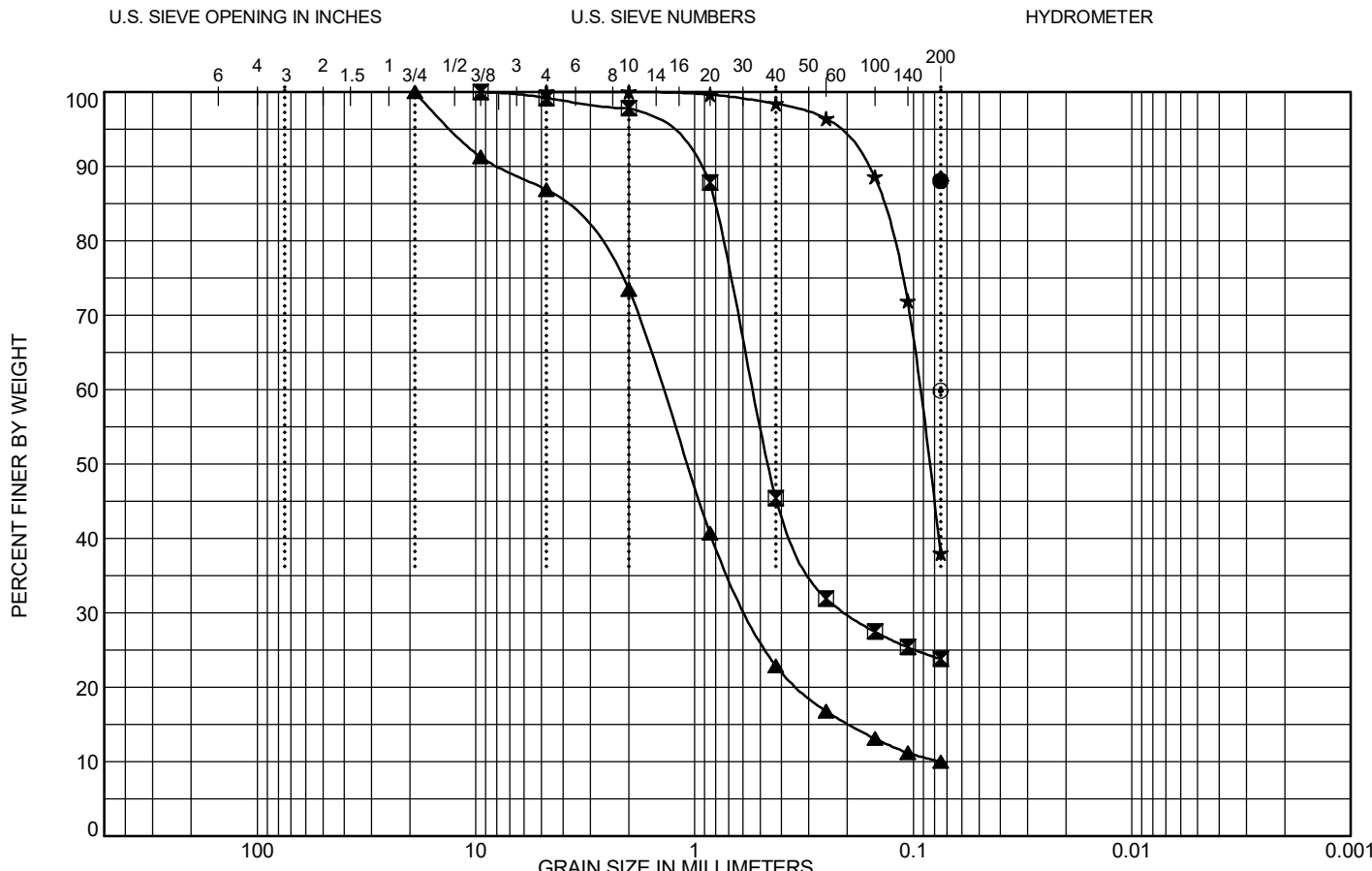
Tested By: EAP Date: _____

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
●	17BR-11		8.0-10.0	19.7	70.1	10.2	40	19	16.3		WELL-GRADED SAND with CLAY and GRAVEL(SW-SC)
☒	17BR-11		43.0-45.0				60.1	78	50	24.3	SANDY FAT CLAY(CH)
▲	17BR-11		58.0-60.0	0.0	78.0	22.0				26.3	
★	17CD-03		18.0-20.0				83.2	49	30	20.1	LEAN CLAY with SAND(CL)
◎	17CL-01		6.0-8.0	6.9	42.3	50.8				22.8	

	GRAIN SIZE DISTRIBUTION 95 Express Lanes Fredericksburg Extension	Fredericksburg, Virginia Project Number: 13-0013 (HDR Project# 170419)	Sheet 2 of 7
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TB GRAIN SIZE LANDSCAPE USGS LAB ASSIGNMENT-2.GPJ SALUT2014.GDT 5/25/17



	D10	D30	D60	D100
●				
☒		0.2	0.539	9.5
▲	0.075	0.56	1.407	19
★			0.094	4.76
◎				

Test Method: AASHTO T88

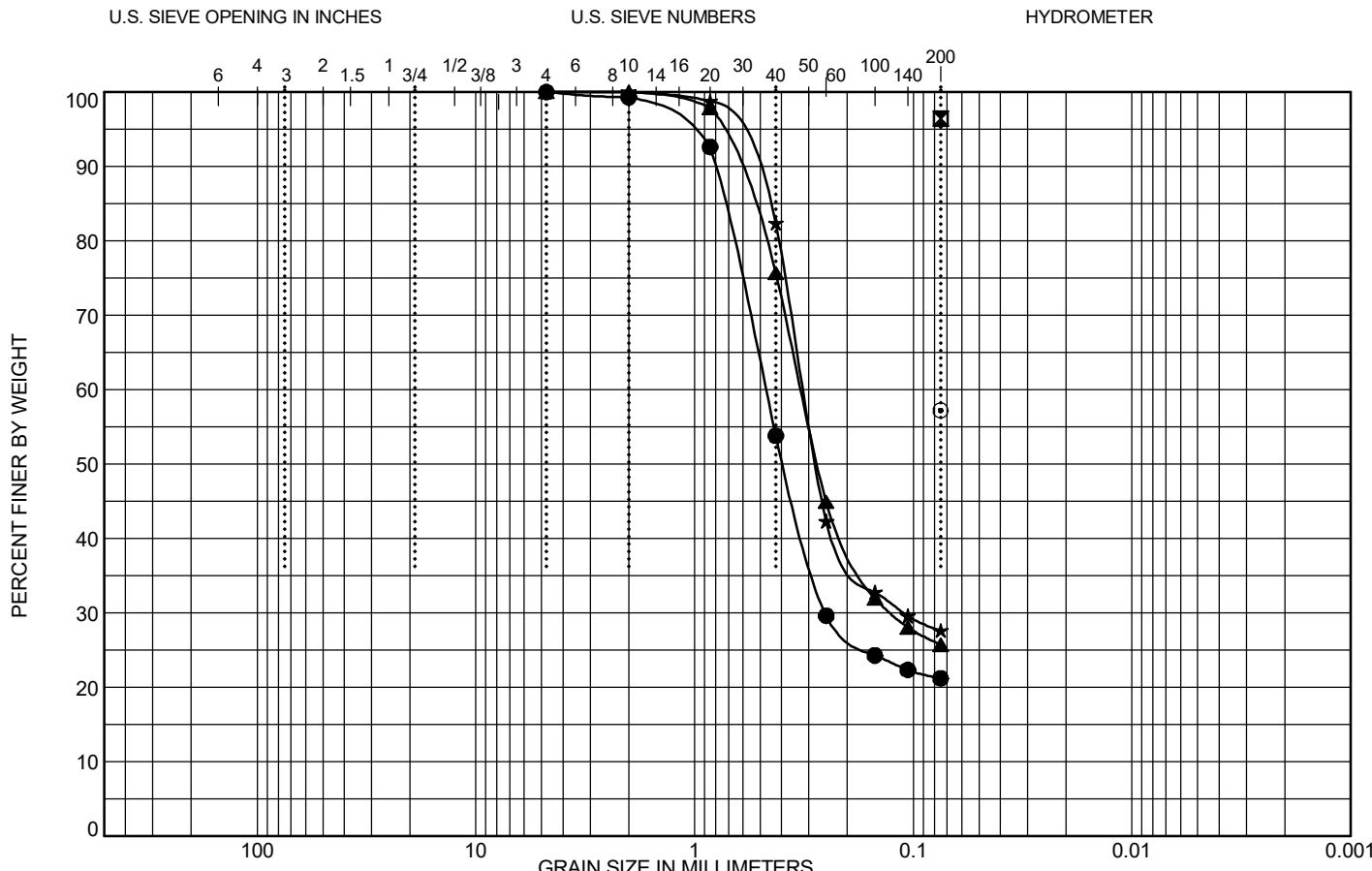
Tested By: EAP Date: 5/16/2017

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
●	17CL-01		38.0-39.8			88.1	51	14	21.8		ELASTIC SILT(MH)
☒	17SBGP-03		8.0-10.0	0.8	75.4	23.8				14.5	
▲	17SBGP-04		8.0-10.0	13.2	76.8	10.0				8.4	
★	17SBGP-04		33.0-35.0	0.0	62.0	38.0				31.0	
◎	17SW-01		13.0-15.0			59.9	60	33	17.7		SANDY FAT CLAY(CH)

	GRAIN SIZE DISTRIBUTION 95 Express Lanes Fredericksburg Extension	Fredericksburg, Virginia Project Number: 13-0013 (HDR Project# 170419)	Sheet 3 of 7
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TB GRAIN SIZE LANDSCAPE USGS LAB ASSIGNMENT 2.GPJ SALUT2014.GDT 5/25/17



	D10	D30	D60	D100
●		0.252	0.475	4.76
☒				
▲		0.126	0.324	4.76
★		0.111	0.316	4.76
⊙				

Test Method: AASHTO T88

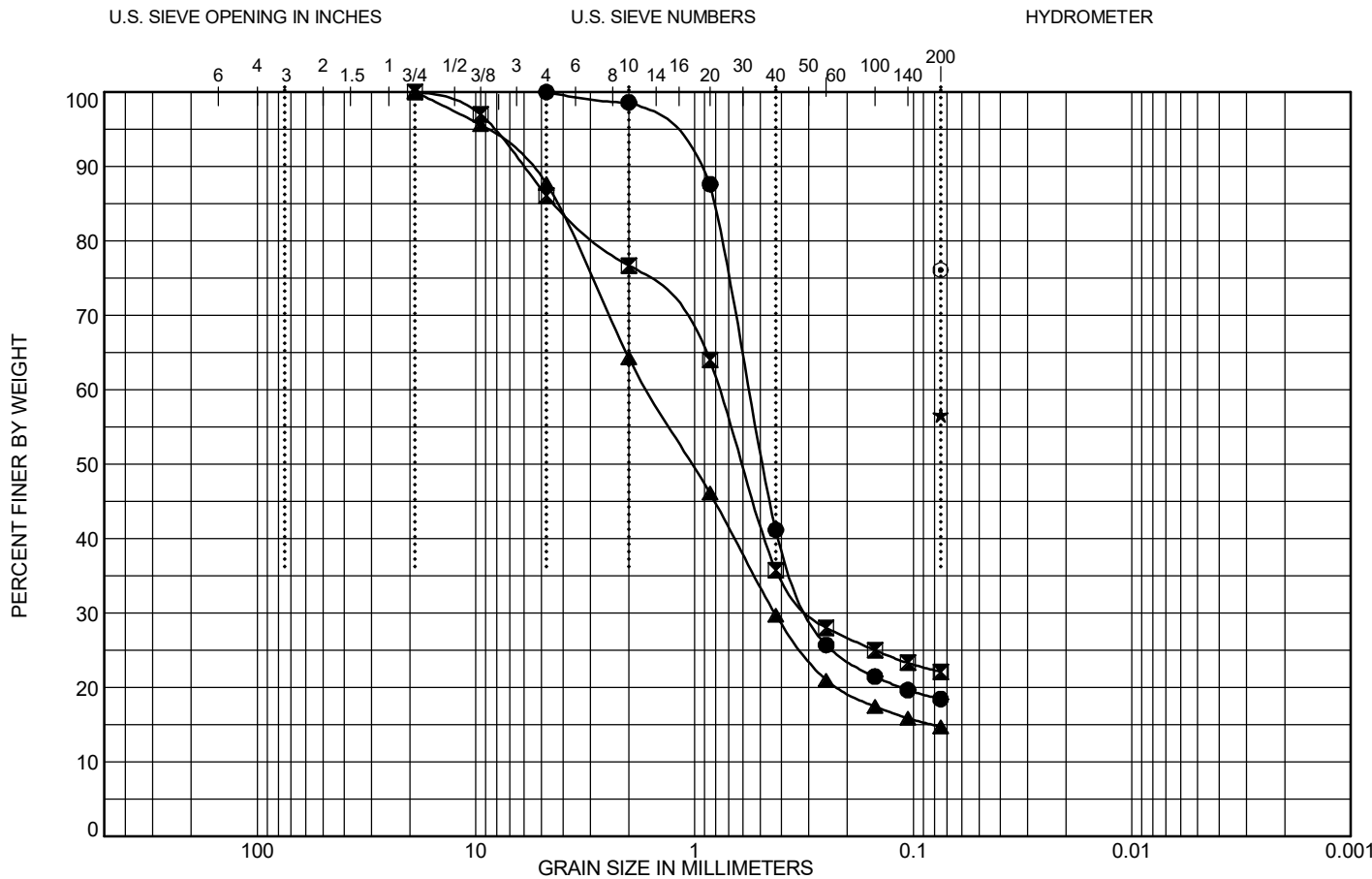
Tested By: EAP Date: 5/16/2017

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
●	17SWM-02		18.0-20.0	0.0	78.8	21.2	37	15	24.4		CLAYEY SAND(SC)
☒	17SWM-03		13.0-15.0			96.4	76	45	27.6		FAT CLAY(CH)
▲	17SWM-08		18.0-20.0	0.0	74.3	25.7			16.2		
★	17SWM-09		13.0-14.8	0.0	72.4	27.6			19.8		
⊙	17SWM-12		8.0-10.0			57.2	61	31	22.1		SANDY FAT CLAY(CH)

	GRAIN SIZE DISTRIBUTION 95 Express Lanes Fredericksburg Extension	Fredericksburg, Virginia Project Number: 13-0013 (HDR Project# 170419)	Sheet 4 of 7
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T&E GRAIN SIZE LANDSCAPE USGS LAB ASSIGNMENT 2.GPJ SALUT2014.GDT 5/25/17



	D10	D30	D60	D100
●		0.29	0.563	4.76
☒		0.286	0.771	19
▲		0.43	1.636	19
★				
◎				

Test Method: AASHTO T88

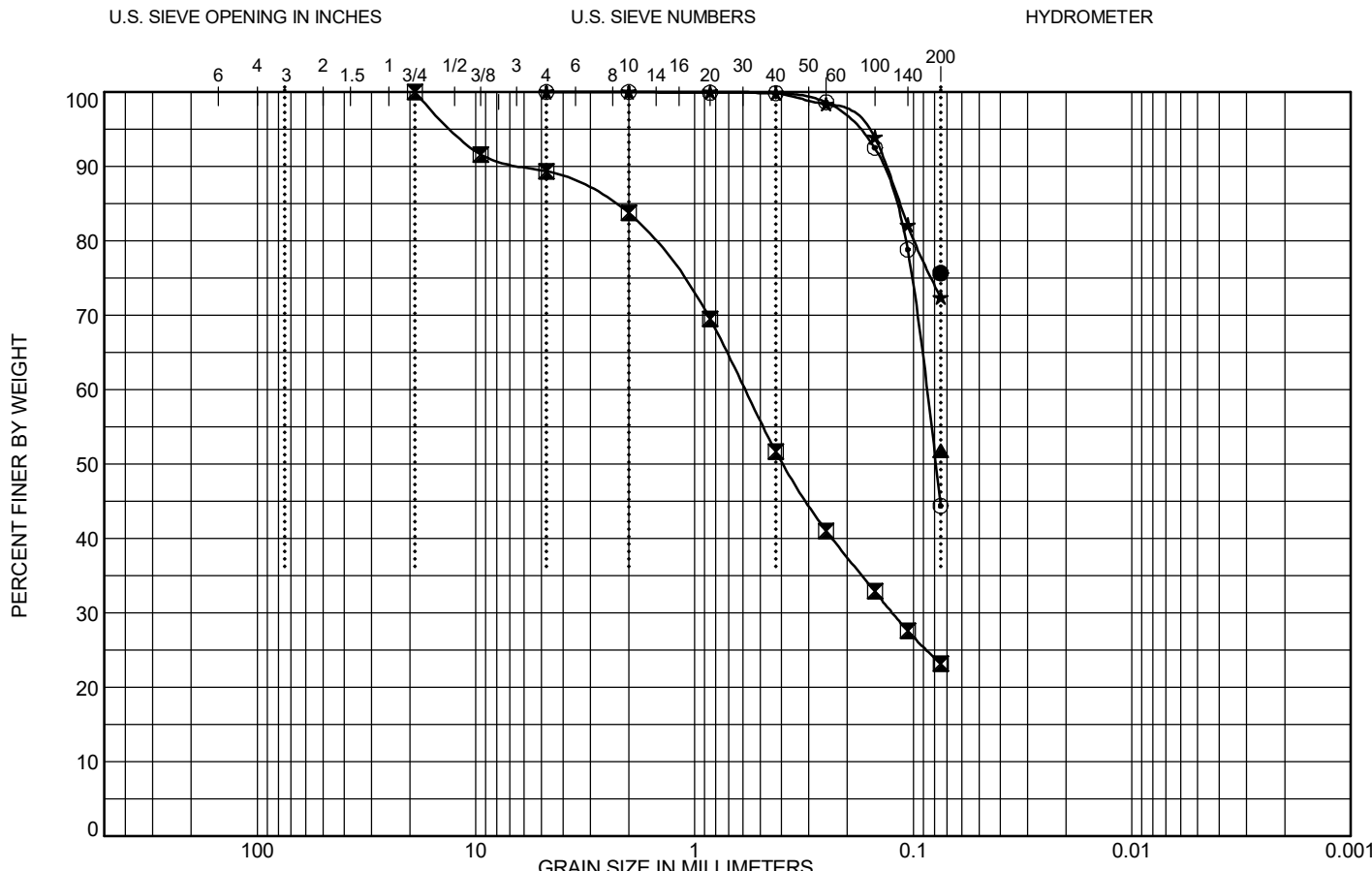
Tested By: EAP Date: 5/16/2017

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
●	17SWM-13		18.0-20.0	0.0	81.6	18.4	32	11	26.6		CLAYEY SAND(SC)
☒	17SWM-20		8.0-10.0	13.9	64.0	22.1			12.2		
▲	17SWM-21		8.0-10.0	12.3	72.9	14.7			17.0		
★	17WGS-02		4.0-6.0			56.6	43	21	24.9		SANDY LEAN CLAY(CL)
◎	17WGS-03		8.0-10.0			76.1	50	17	22.5		ELASTIC SILT with SAND(MH)

	GRAIN SIZE DISTRIBUTION 95 Express Lanes Fredericksburg Extension	Fredericksburg, Virginia Project Number: 13-0013 (HDR Project# 170419)	Sheet 5 of 7
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TB GRAIN SIZE LANDSCAPE USGS LAB ASSIGNMENT 2.GPJ SALUT2014.GDT 5/25/17



	D10	D30	D60	D100
●				
☒		0.124	0.587	19
▲				
★				4.76
◎			0.088	4.76

Test Method: AASHTO T88

Tested By: EAP Date: 5/16/2017

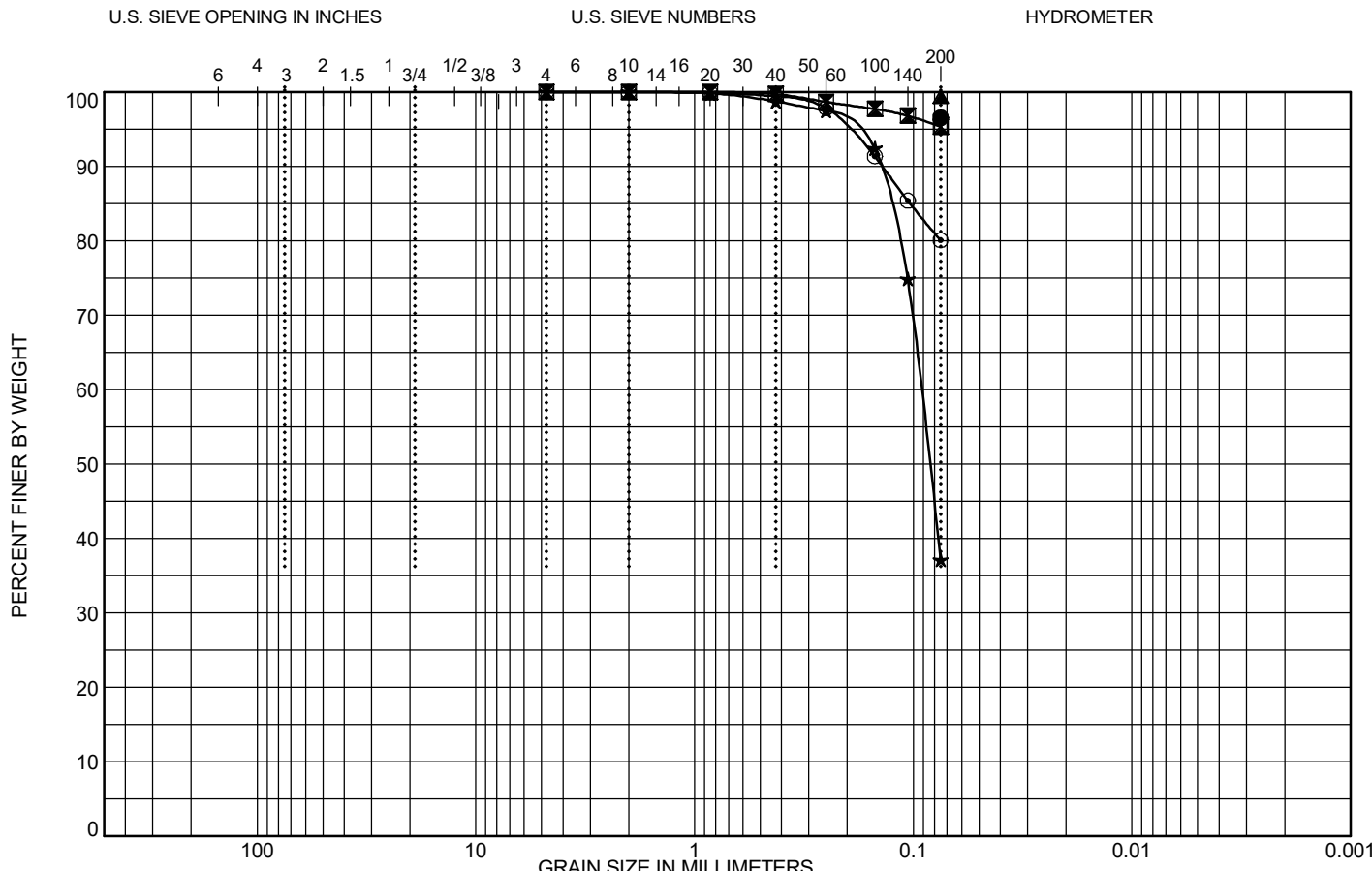
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
●	17WGS-03		13.0-15.0			75.7	52	29	27.3		FAT CLAY with SAND(CH)
☒	17WGS-04		2.0-4.0	10.7	66.2	23.2			13.2		
▲	17WGS-04		6.0-8.0			51.8	42	19	27.1		SANDY LEAN CLAY(CL)
★	17XP-22		8.0-10.0	0.0	27.6	72.4	49	27	21.0		LEAN CLAY with SAND(CL)
◎	17XP-23		18.0-20.0	0.0	55.6	44.4			19.4		

	GRAIN SIZE DISTRIBUTION 95 Express Lanes Fredericksburg Extension	Fredericksburg, Virginia Project Number: 13-0013 (HDR Project# 170419)	Sheet 6 of 7
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T.B. GRAIN SIZE LANDSCAPE USGS LAB ASSIGNMENT 2.GPJ SALUT2014.GDT 5/25/17

T.B. GRAIN SIZE LANDSCAPE USCS LAB ASSIGNMENT 2.GPJ SALUT2014.GDT 5/25/17



	D10	D30	D60	D100
●				
☒				4.76
▲				
★			0.092	4.76
⊙				4.76

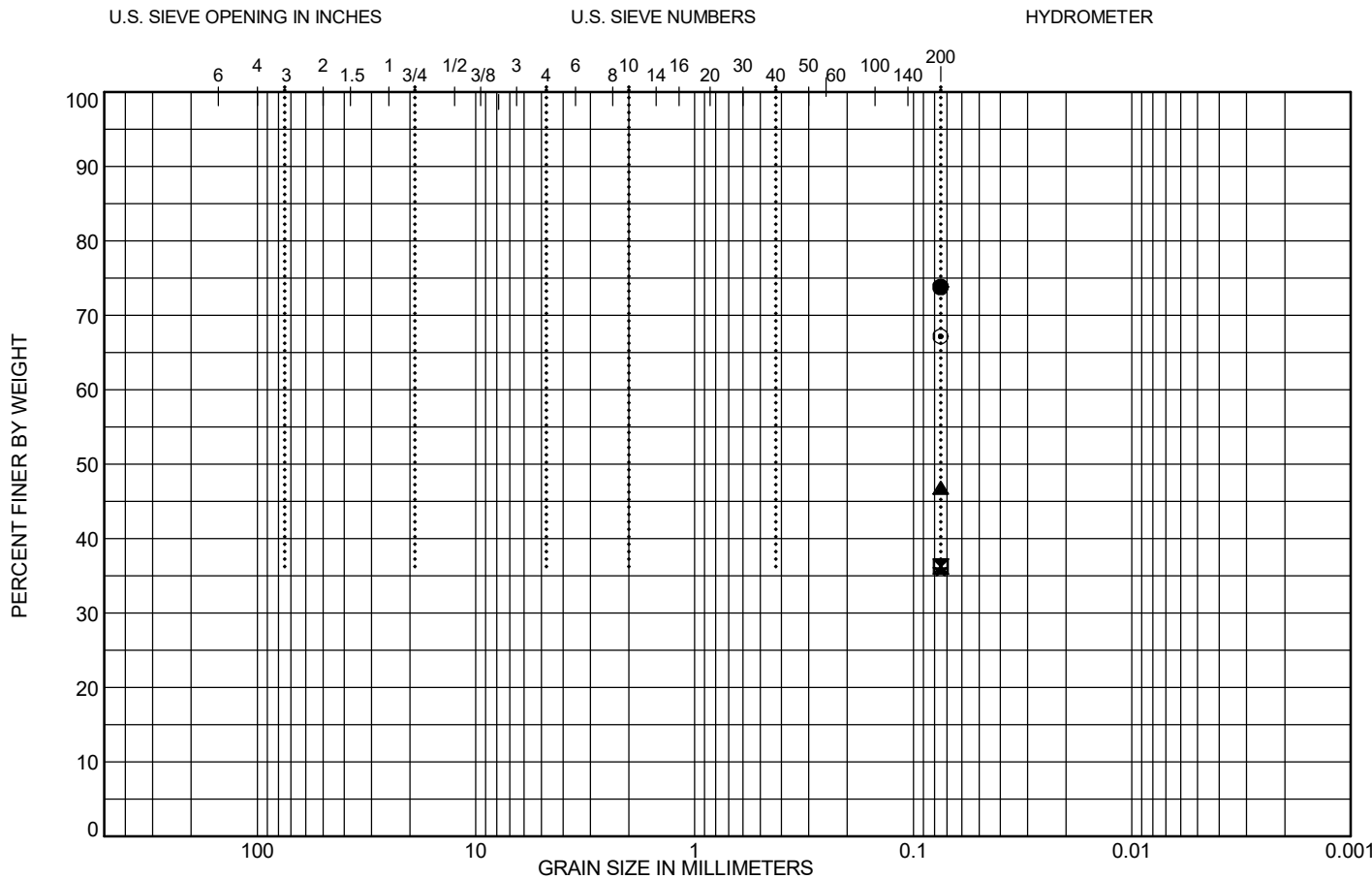
Test Method: AASHTO T88

Tested By: EAP Date: 5/16/2017

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
●	17XP-23		38.0-40.0			96.5		52	11	33.8	ELASTIC SILT(MH)
☒	17XP-23		58.0-60.0	0.0	4.7	95.3		47	14	27.9	SILT(ML)
▲	17XP-23		68.0-70.0			99.3		54	18	28.5	ELASTIC SILT(MH)
★	17XP-44		8.0-10.0	0.0	62.9	37.1				14.4	
⊙	17XP-44		43.0-45.0	0.0	19.9	80.1				29.8	

	GRAIN SIZE DISTRIBUTION 95 Express Lanes Fredericksburg Extension	Fredericksburg, Virginia Project Number: 13-0013 (HDR Project# 170419)	Sheet 7 of 7
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	D10	D30	D60	D100
●				
☒				
▲				
★				
◎				

Test Method: AASHTO T88

Tested By: DE Date: 6/2/2017

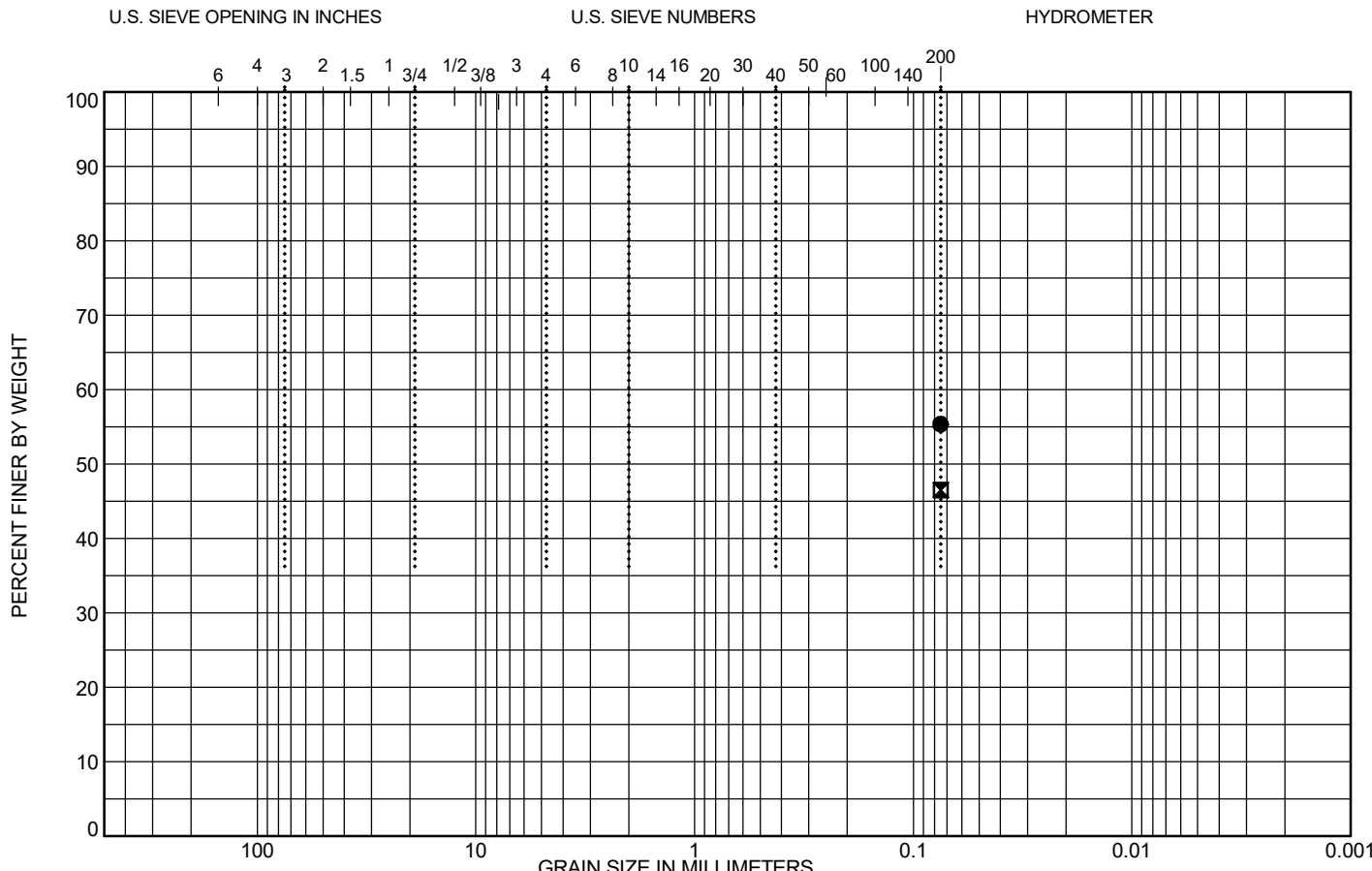
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
●	17XP-37		8.0-10.0			73.8	68	39	28.3		FAT CLAY with SAND(CH)
☒	17XP-38		4.0-6.0			36.3	25	8	10.7		CLAYEY SAND(SC)
▲	17XP-38		13.0-15.0			46.8	46	21	22.1		CLAYEY SAND(SC)
★	17XP-39		6.3-8.3			35.9			21.0		
◎	17XP-40		13.0-15.0			67.2	53	28	29.9		SANDY FAT CLAY(CH)

	GRAIN SIZE DISTRIBUTION 95 Express Lanes Fredericksburg Extension	Fredericksburg, Virginia Project Number: 17-0013 (HDR Project# 10052528)	Sheet 1 of 1
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T&E GRAIN SIZE LANDSCAPE USCS LAB ASSIGNMENT15.GPJ SALUT02014.GDT 8/5/17

T.B. GRAIN SIZE LANDSCAPE USCS LAB ASSIGNMENT-4.GPJ SALUT2014.GDT 6/16/17



	D10	D30	D60	D100
●				
■				

Test Method: ASTM D422

Tested By: EM Date: 6/14/2017

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification
●	17XP-63	6.0-8.0			55.4				18.4	
■	17XP-63	13.0-15.0			46.5		31	6	11.7	SILTY SAND(SM)



GRAIN SIZE DISTRIBUTION
 95 Express Lanes Fredericksburg Extension

Fredericksburg, Virginia
 Project Number: 17-0013 (HDR Project# 10052528)
 Sheet 1 of 1

Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	4/28/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Dates:	4/10/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17CL-06	Sample No.	SS-5
		Sample Depth:	8 - 10 ft.

Sample Description	Tan-Brown Fat CLAY (CH)		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
Tare #:	2k	Soaked <input checked="" type="checkbox"/>	Soak Time 24 hrs.
Tare Wt. (T)	121.90	Original Dry Mass of Sample (B)	94.43
Wet Wt + T	235.94	After 200 Wash + Tare Wt. (C _T)	122.66
Dry Wt + T	216.33	Dry Mass Retained on #200 Sieve (C)	0.76
Moisture Content (MC)	20.8%	% Passing #200 Sieve (A)	99.2%

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
Tare #:		Soaked <input type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
Moisture Content (MC)		% Passing #200 Sieve (A)

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
Tare #:	B5	Soaked <input type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
Moisture Content (MC)		% Passing #200 Sieve (A)

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um)) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

<u>Patrick Hayes</u> Technician Name	 Signature	N/A Certification Type/No.	4/28/2017 Date
<u>Mal Krajan, ET</u> Technical Responsibility	 Signature	Laboratory Manager Position	5/3/2017 Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17CL-06	Sample:	SS-12
		Sample Date:	4/10/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	43 - 45 ft.
Sample Description:	Tan-Brown Silty SAND		

Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.	910	Tare Wt.	121.44	Mass of Sample after Wash + Tare Wt.	250.40
Total Sample Wet Wt. + Tare Wt.			320.13	Mass of Sample after Wash	128.96
Total Sample Dry Wt. + Tare Wt.			287.83	Mass passing #200	37.43
Total Sample Dry Weight			166.39	% Passing #200 (D1140)	22.5%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	0.00	0.0%	0.0%	100.0%	NA
#20	0.850	1.95	1.2%	1.2%	98.8%	NA
#40	0.425	42.00	24.1%	25.2%	74.8%	NA
#60	0.250	98.91	34.2%	59.4%	40.6%	NA
#100	0.150	119.49	12.4%	71.8%	28.2%	NA
#200	0.075	128.69	5.5%	77.3%	22.7%	NA
Pan	<0.075	129.02		% Passing #200 (D6913) = 22.7%		
D2487	Maximum Particle Size		#10	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	25.2%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	52.1%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.0%	% Silt & Clay	< 0.075 mm	22.7%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/3/2017
Date

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Sieve Analysis of Soils

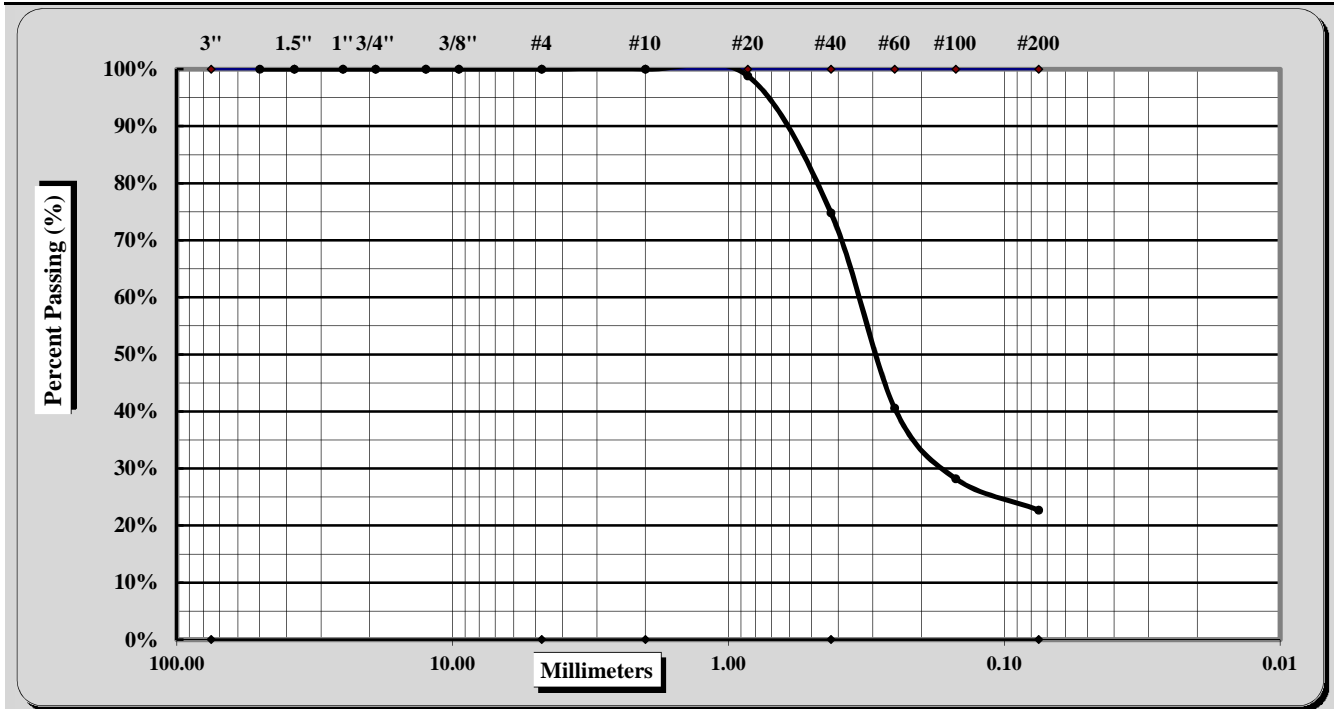


ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616			
Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17CL-06	Sample:	SS-12
		Sample Date:	4/10/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	43 - 45 ft.

Sample Description: Tan-Brown Silty SAND



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#10	Coarse Sand	0.0%	Fine Sand	52.1%
Gravel	0.0%	Medium Sand	25.2%	Silt & Clay	22.7%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	19.4%
Coarse Sand	0.0%	Medium Sand	25.2%	Fine Sand	52.1%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17CL-07	Sample:	SS-4
		Sample Date:	4/10/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	6 - 8 ft.
Sample Description:	Tan-Brown Sandy Fat CLAY (CH)		

Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input type="checkbox"/>
Hard & Durable	<input type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.	1207	Tare Wt.	130.04	Mass of Sample after Wash + Tare Wt.	181.77
Total Sample Wet Wt. + Tare Wt.			272.53	Mass of Sample after Wash	51.73
Total Sample Dry Wt. + Tare Wt.			245.23	Mass passing #200	63.46
Total Sample Dry Weight			115.19	% Passing #200 (D1140)	55.1%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	0.04	0.0%	0.0%	100.0%	NA
#20	0.850	0.19	0.1%	0.2%	99.8%	NA
#40	0.425	4.71	3.9%	4.1%	95.9%	NA
#60	0.250	17.45	11.1%	15.1%	84.9%	NA
#100	0.150	35.72	15.9%	31.0%	69.0%	NA
#200	0.075	51.33	13.6%	44.6%	55.4%	NA
Pan	<0.075	51.87		% Passing #200 (D6913) =		55.4%
D2487	Maximum Particle Size		#4	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	4.1%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	40.5%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.0%	% Silt & Clay	< 0.075 mm	55.4%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/3/2017
Date

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Sieve Analysis of Soils

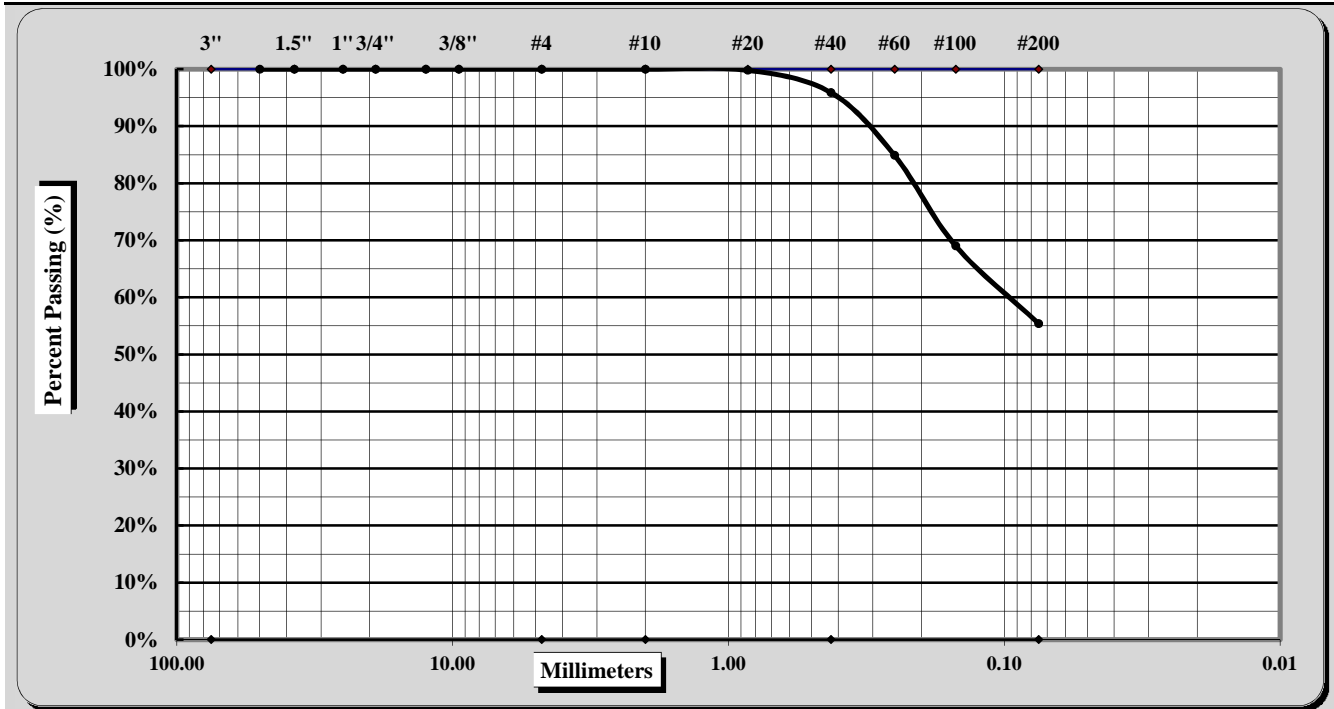


ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616			
Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17CL-07	Sample:	SS-4
		Sample Date:	4/10/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	6 - 8 ft.

Sample Description: Tan-Brown Sandy Fat CLAY (CH)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	0.0%	Fine Sand	40.5%
Gravel	0.0%	Medium Sand	4.1%	Silt & Clay	55.4%
Liquid Limit	52	Plastic Limit	27	Plastic Index	25
Specific Gravity	ND			Moisture Content	23.7%
Coarse Sand	0.0%	Medium Sand	4.1%	Fine Sand	40.5%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input type="checkbox"/>
Hard & Durable	<input type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	4/28/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Dates:	4/5/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17CL-10	Sample No.	SS-4
		Sample Depth:	6 - 8 ft.

Sample Description	Gray Brown Silty SAND (SM)		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A	<input type="checkbox"/> Method B <input checked="" type="checkbox"/>
Tare #:	53	Soaked	<input checked="" type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)	120.20	Original Dry Mass of Sample (B)	99.24
Wet Wt + T	244.97	After 200 Wash + Tare Wt. (C _T)	170.47
Dry Wt + T	219.44	Dry Mass Retained on #200 Sieve (C)	50.27
Moisture Content (MC)	25.7%	% Passing #200 Sieve (A)	49.3%

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
Tare #:		Soaked <input type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
Moisture Content (MC)		% Passing #200 Sieve (A)

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
Tare #:		Soaked <input type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
Moisture Content (MC)		% Passing #200 Sieve (A)

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um)) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No.

4/28/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/3/2017
 Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17CL-10	Sample:	SS-8
		Sample Date:	5/5/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft.
Sample Description:	Tan-Brown Clayey SAND (SC)		

Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.	1201	Tare Wt.	137.61	Mass of Sample after Wash + Tare Wt.	203.89
Total Sample Wet Wt. + Tare Wt.			270.00	Mass of Sample after Wash	66.28
Total Sample Dry Wt. + Tare Wt.			250.74	Mass passing #200	46.85
Total Sample Dry Weight			113.13	% Passing #200 (D1140)	41.4%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.50	0.4%	0.4%	99.6%	NA
#10	2.000	1.11	0.5%	1.0%	99.0%	NA
#20	0.850	2.72	1.4%	2.4%	97.6%	NA
#40	0.425	17.34	12.9%	15.3%	84.7%	NA
#60	0.250	43.47	23.1%	38.4%	61.6%	NA
#100	0.150	58.61	13.4%	51.8%	48.2%	NA
#200	0.075	65.87	6.4%	58.2%	41.8%	NA
Pan	<0.075	66.09		% Passing #200 (D6913) =		41.8%
D2487	Maximum Particle Size		3/8"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	14.3%
Gravel	< 75 mm and > 4.75 mm (#4)		0.4%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	42.9%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.6%	% Silt & Clay	< 0.075 mm	41.8%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/3/2017
Date

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Sieve Analysis of Soils

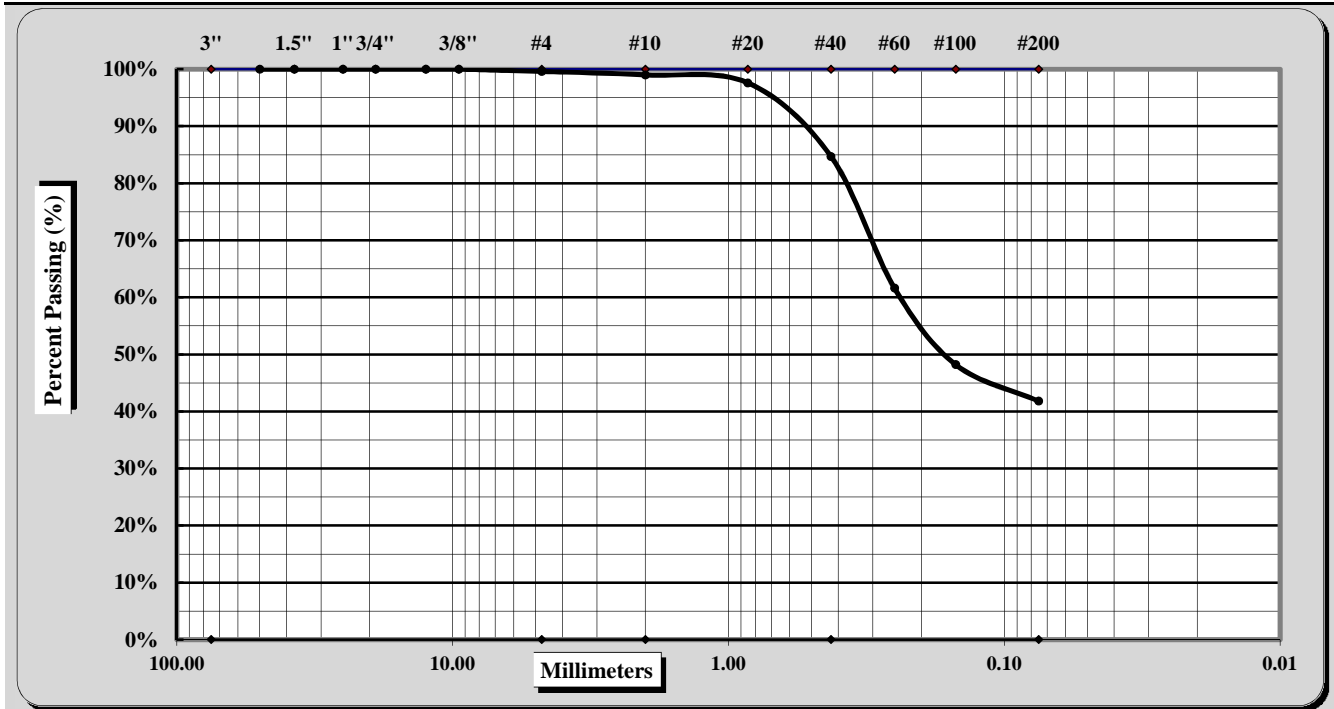


ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616			
Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17CL-10	Sample:	SS-8
		Sample Date:	5/5/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft.

Sample Description: Tan-Brown Clayey SAND (SC)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/8"	Coarse Sand	0.6%	Fine Sand	42.9%
Gravel	0.4%	Medium Sand	14.3%	Silt & Clay	41.8%
Liquid Limit	37	Plastic Limit	23	Plastic Index	14
Specific Gravity	ND			Moisture Content	17.0%
Coarse Sand	0.6%	Medium Sand	14.3%	Fine Sand	42.9%
Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

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Position

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17SWM-14	Sample:	SS-5
		Sample Date:	4/3/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	8 - 10 ft.
Sample Description: Tan Silty Clayey SAND			

Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.	8004	Tare Wt.	122.88	Mass of Sample after Wash + Tare Wt.	252.21
Total Sample Wet Wt. + Tare Wt.			306.31	Mass of Sample after Wash	129.33
Total Sample Dry Wt. + Tare Wt.			278.63	Mass passing #200	26.42
Total Sample Dry Weight			155.75	% Passing #200 (D1140)	17.0%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	2.03	1.3%	1.3%	98.7%	NA
#4	4.75	6.81	3.1%	4.4%	95.6%	NA
#10	2.000	15.80	5.8%	10.1%	89.9%	NA
#20	0.850	61.38	29.3%	39.4%	60.6%	NA
#40	0.425	116.52	35.4%	74.8%	25.2%	NA
#60	0.250	122.36	3.7%	78.6%	21.4%	NA
#100	0.150	125.66	2.1%	80.7%	19.3%	NA
#200	0.075	128.15	1.6%	82.3%	17.7%	NA
Pan	<0.075	128.97		% Passing #200 (D6913) =		17.7%
D2487	Maximum Particle Size		1/2"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	64.7%
Gravel	< 75 mm and > 4.75 mm (#4)		4.4%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	7.5%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		5.7%	% Silt & Clay	< 0.075 mm	17.7%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/3/2017
Date

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Sieve Analysis of Soils

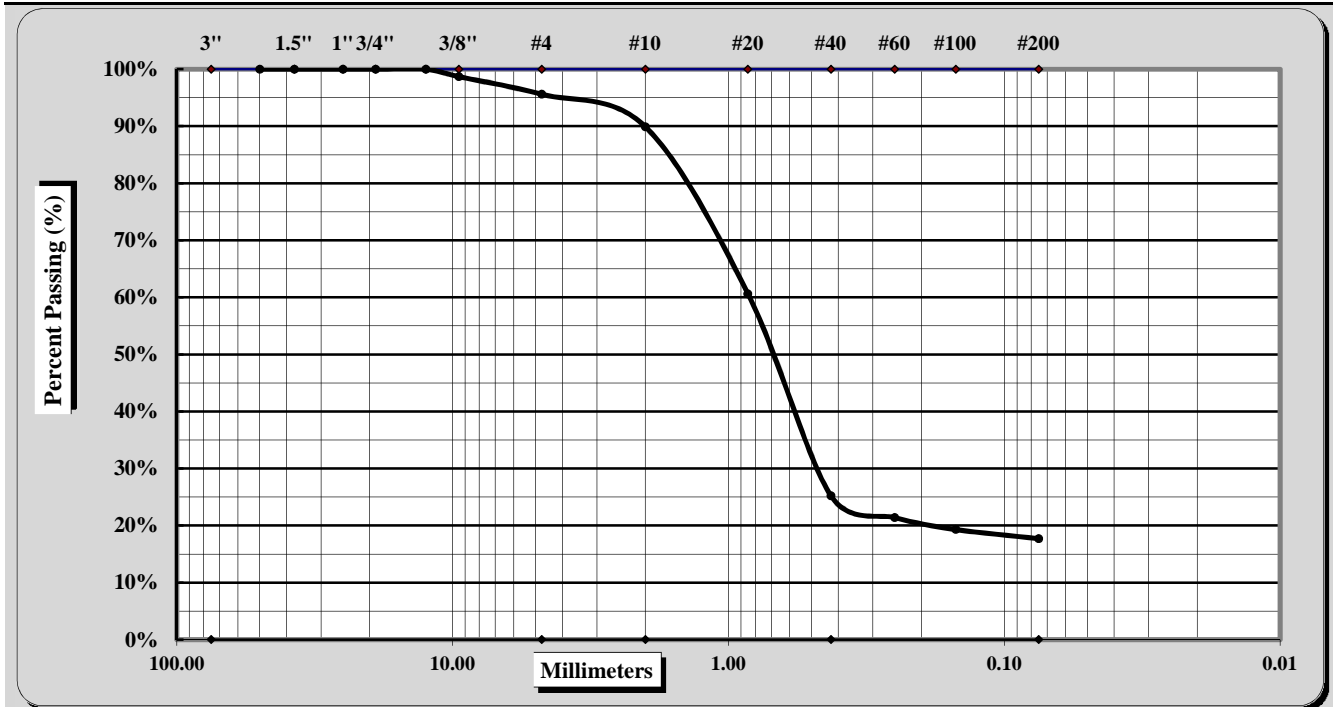


ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616			
Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17SWM-14	Sample:	SS-5
		Sample Date:	4/3/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	8 - 10 ft.

Sample Description: Tan Silty Clayey SAND



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	1/2"	Coarse Sand	5.7%	Fine Sand	7.5%
Gravel	4.4%	Medium Sand	64.7%	Silt & Clay	17.7%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	17.8%
Coarse Sand	5.7%	Medium Sand	64.7%	Fine Sand	7.5%
Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

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Laboratory Manager
Position

5/3/2017
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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-24A	Sample:	SS-8
		Sample Date:	4/12/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft.
Sample Description:	Tan-Brown Silty Clayey SAND		

Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.	908	Tare Wt.	111.36	Mass of Sample after Wash + Tare Wt.	193.36
Total Sample Wet Wt. + Tare Wt.			297.04	Mass of Sample after Wash	82.00
Total Sample Dry Wt. + Tare Wt.			262.29	Mass passing #200	68.93
Total Sample Dry Weight			150.93	% Passing #200 (D1140)	45.7%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	0.41	0.3%	0.3%	99.7%	NA
#20	0.850	2.70	1.5%	1.8%	98.2%	NA
#40	0.425	5.91	2.1%	3.9%	96.1%	NA
#60	0.250	20.06	9.4%	13.3%	86.7%	NA
#100	0.150	55.93	23.8%	37.1%	62.9%	NA
#200	0.075	81.52	17.0%	54.0%	46.0%	NA
Pan	<0.075	81.99		% Passing #200 (D6913) =		46.0%
D2487	Maximum Particle Size		#4	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	3.6%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	50.1%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.3%	% Silt & Clay	< 0.075 mm	46.0%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/3/2017
Date

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Sieve Analysis of Soils

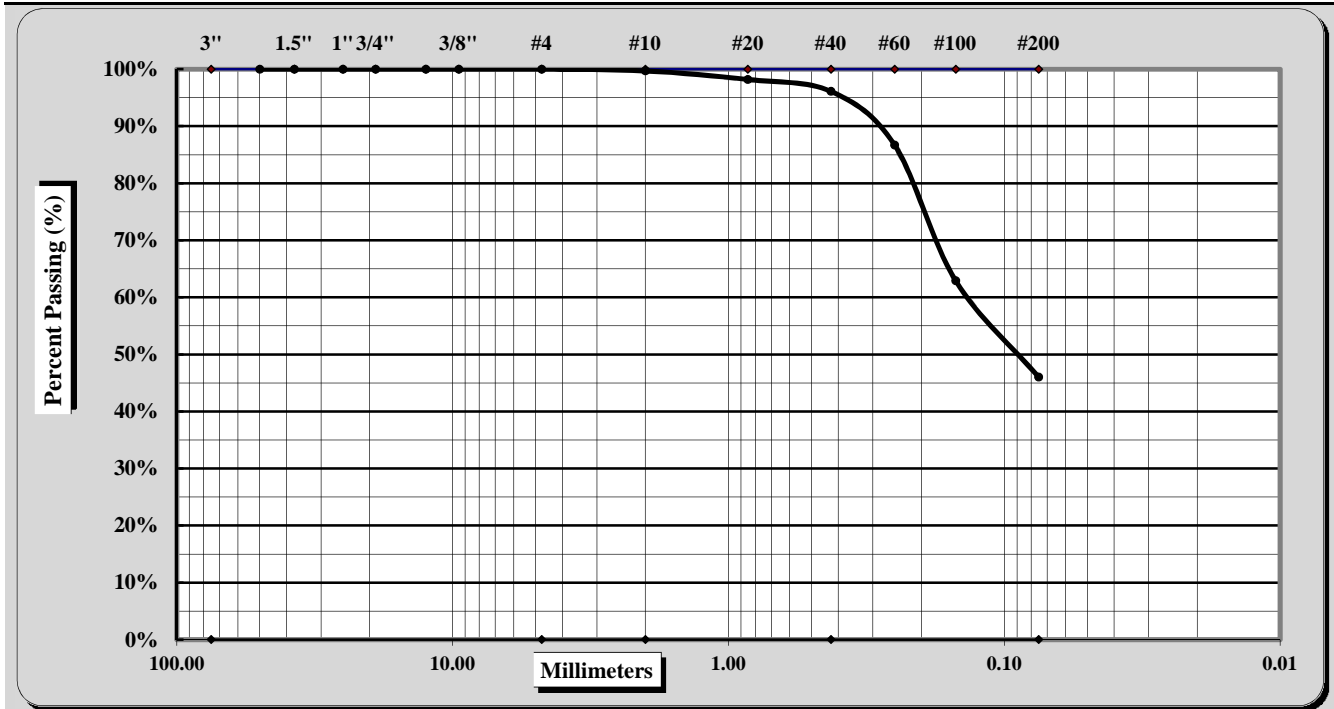


ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616			
Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-24A	Sample:	SS-8
		Sample Date:	4/12/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft.

Sample Description: Tan-Brown Silty Clayey SAND



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	0.3%	Fine Sand	50.1%
Gravel	0.0%	Medium Sand	3.6%	Silt & Clay	46.0%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	23.0%
Coarse Sand	0.3%	Medium Sand	3.6%	Fine Sand	50.1%
Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	4/28/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Dates:	4/11/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-25	Sample No.	SS-4
		Sample Depth:	6 - 8 ft.

Sample Description	Brown Fat CLAY (CH)		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A	<input type="checkbox"/> Method B <input checked="" type="checkbox"/>
Tare #:	2	Soaked	<input checked="" type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)	121.85	Original Dry Mass of Sample (B)	104.61
Wet Wt + T	255.80	After 200 Wash + Tare Wt. (C _T)	125.17
Dry Wt + T	226.46	Dry Mass Retained on #200 Sieve (C)	3.32
Moisture Content (MC)	28.0%	% Passing #200 Sieve (A)	96.8%

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
Tare #:		Soaked <input type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
Moisture Content (MC)		% Passing #200 Sieve (A)

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
Tare #:		Soaked <input type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
Moisture Content (MC)		% Passing #200 Sieve (A)

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um)) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No.

4/28/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/3/2017
 Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	4/28/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Dates:	4/11/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-27	Sample No.	SS-6
		Sample Depth:	13 - 15 ft.
Sample Description	Brown SILT with Sand (ML)		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
	Tare #:	902	Soaked <input checked="" type="checkbox"/> Soak Time 24 hrs.
	Tare Wt. (T)	127.60	Original Dry Mass of Sample (B) 98.02
	Wet Wt + T	253.18	After 200 Wash + Tare Wt. (C _T) 142.75
	Dry Wt + T	225.62	Dry Mass Retained on #200 Sieve (C) 15.15
	Moisture Content (MC)	28.1%	% Passing #200 Sieve (A) 84.5%

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/> Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)
	Moisture Content (MC)	% Passing #200 Sieve (A)

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/> Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)
	Moisture Content (MC)	% Passing #200 Sieve (A)

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um)) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No.

4/28/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/3/2017
 Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-27	Sample:	SS-8
		Sample Date:	4/11/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft.
Sample Description:	Olive Gray Silty SAND (SM)		

Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input checked="" type="checkbox"/>	Weathered & Friable	<input checked="" type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.	1301	Tare Wt.	129.11	Mass of Sample after Wash + Tare Wt.	199.95
Total Sample Wet Wt. + Tare Wt.			273.02	Mass of Sample after Wash	70.84
Total Sample Dry Wt. + Tare Wt.			245.07	Mass passing #200	45.12
Total Sample Dry Weight			115.96	% Passing #200 (D1140)	38.9%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	0.25	0.2%	0.2%	99.8%	NA
#20	0.850	1.20	0.8%	1.0%	99.0%	NA
#40	0.425	3.79	2.2%	3.3%	96.7%	NA
#60	0.250	24.00	17.4%	20.7%	79.3%	NA
#100	0.150	56.69	28.2%	48.9%	51.1%	NA
#200	0.075	70.56	12.0%	60.8%	39.2%	NA
Pan	<0.075	71.21		% Passing #200 (D6913) =		39.2%
D2487	Maximum Particle Size		#4	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	3.1%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	57.5%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.2%	% Silt & Clay	< 0.075 mm	39.2%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/3/2017
Date

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Sieve Analysis of Soils

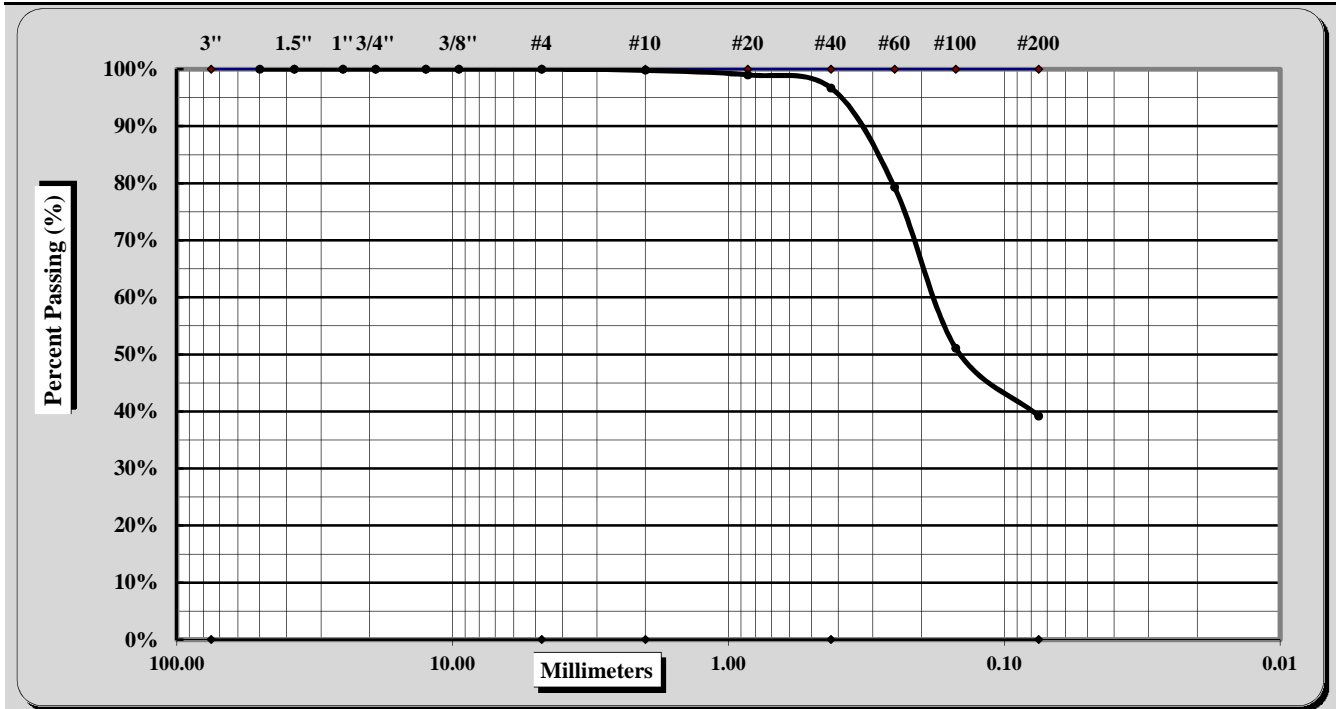


ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616			
Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-27	Sample:	SS-8
		Sample Date:	4/11/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft.

Sample Description: Olive Gray Silty SAND (SM)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	0.2%	Fine Sand	57.5%
Gravel	0.0%	Medium Sand	3.1%	Silt & Clay	39.2%
Liquid Limit	30	Plastic Limit	28	Plastic Index	2
Specific Gravity	ND			Moisture Content	24.1%
Coarse Sand	0.2%	Medium Sand	3.1%	Fine Sand	57.5%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input checked="" type="checkbox"/>	Weathered & Friable	<input checked="" type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	4/28/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Dates:	4/7/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-32	Sample No.	SS-5
		Sample Depth:	8 - 10 ft.

Sample Description	Gray Brown Fat CLAY (CH)		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A	<input type="checkbox"/> Method B <input checked="" type="checkbox"/>
Tare #:	1209	Soaked	<input checked="" type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)	126.62	Original Dry Mass of Sample (B)	97.33
Wet Wt + T	254.90	After 200 Wash + Tare Wt. (C _T)	132.40
Dry Wt + T	223.95	Dry Mass Retained on #200 Sieve (C)	5.78
Moisture Content (MC)	31.8%	% Passing #200 Sieve (A)	94.1%

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
Tare #:		Soaked <input type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
Moisture Content (MC)		% Passing #200 Sieve (A)

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
Tare #:		Soaked <input type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
Moisture Content (MC)		% Passing #200 Sieve (A)

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um)) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No.

4/28/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/3/2017
 Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	4/28/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Dates:	4/7/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-34	Sample No.	SS-6
		Sample Depth:	13 - 15 ft.

Sample Description	Dark Brown Elastic SILT (MH)		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A	<input type="checkbox"/> Method B <input checked="" type="checkbox"/>
Tare #:	1216	Soaked	<input checked="" type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)	131.54	Original Dry Mass of Sample (B)	97.13
Wet Wt + T	257.29	After 200 Wash + Tare Wt. (C _T)	132.29
Dry Wt + T	228.67	Dry Mass Retained on #200 Sieve (C)	0.75
Moisture Content (MC)	29.5%	% Passing #200 Sieve (A)	99.2%

Boring No. Sample No. **Sample Depth:**

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A	<input type="checkbox"/> Method B <input type="checkbox"/>
Tare #:		Soaked	<input type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)	
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)	
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)	
Moisture Content (MC)		% Passing #200 Sieve (A)	

Boring No. Sample No. **Sample Depth:**

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A	<input type="checkbox"/> Method B <input type="checkbox"/>
Tare #:		Soaked	<input type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)	
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)	
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)	
Moisture Content (MC)		% Passing #200 Sieve (A)	

Balance ID. 1024 **Calibration Date:** 11/4/16 **#200 Sieve** 1987 **Calibration Date:** 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um)) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
Technician Name

Signature

N/A
Certification Type/No.

4/28/2017
Date

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	4/28/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Dates:	4/5/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-34	Sample No.	SS-7
		Sample Depth:	18 - 20 ft.

Sample Description	Dark Brown Elastic SILT with Sand (MH)		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A	<input type="checkbox"/> Method B <input checked="" type="checkbox"/>
Tare #:	1205	Soaked	<input checked="" type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)	132.54	Original Dry Mass of Sample (B)	89.49
Wet Wt + T	247.97	After 200 Wash + Tare Wt. (C _T)	150.59
Dry Wt + T	222.03	Dry Mass Retained on #200 Sieve (C)	18.05
Moisture Content (MC)	29.0%	% Passing #200 Sieve (A)	79.8%

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
Tare #:		Soaked <input type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
Moisture Content (MC)		% Passing #200 Sieve (A)

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
Tare #:		Soaked <input type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
Moisture Content (MC)		% Passing #200 Sieve (A)

Balance ID. **1024** Calibration Date: **11/4/16** #200 Sieve **1987** Calibration Date: **3/16/17**

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um)) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
Technician Name

Signature

N/A
Certification Type/No.

4/28/2017
Date

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Dates:	4/5/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-34	Sample No.	SS-10
		Sample Depth:	33 - 35 ft

Sample Description	Gray SILT with Sand (ML)		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A	<input type="checkbox"/> Method B <input checked="" type="checkbox"/>
Tare #:	1211	Soaked	<input checked="" type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)	119.81	Original Dry Mass of Sample (B)	97.51
Wet Wt + T	242.91	After 200 Wash + Tare Wt. (C _T)	146.01
Dry Wt + T	217.32	Dry Mass Retained on #200 Sieve (C)	26.20
Moisture Content (MC)	26.2%	% Passing #200 Sieve (A)	73.1%

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
Tare #:		Soaked <input type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
Moisture Content (MC)		% Passing #200 Sieve (A)

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
Tare #:	B5	Soaked <input type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
Moisture Content (MC)		% Passing #200 Sieve (A)

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um)) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No.

4/28/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/3/2017
 Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-35	Sample:	SS-5
		Sample Date:	4/5/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	8 - 10 ft

Sample Description: Brown Silty SAND

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	129.12	Mass of Sample after Wash + Tare Wt.	269.04
Total Sample Wet Wt. + Tare Wt.			349.88	Mass of Sample after Wash	139.92
Total Sample Dry Wt. + Tare Wt.			317.02	Mass passing #200	47.98
Total Sample Dry Weight			187.90	% Passing #200 (D1140)	25.5%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.94	0.5%	0.5%	99.5%	NA
#10	2.000	1.58	0.3%	0.8%	99.2%	NA
#20	0.850	10.39	4.7%	5.5%	94.5%	NA
#40	0.425	61.86	27.4%	32.9%	67.1%	NA
#60	0.250	110.91	26.1%	59.0%	41.0%	NA
#100	0.150	131.42	10.9%	69.9%	30.1%	NA
#200	0.075	139.49	4.3%	74.2%	25.8%	NA
Pan	<0.075	139.72		% Passing #200 (D6913) =		25.8%
D2487	Maximum Particle Size		3/8"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	32.1%
Gravel	< 75 mm and > 4.75 mm (#4)		0.5%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	41.3%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.3%	% Silt & Clay	< 0.075 mm	25.8%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/3/2017
Date

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Sieve Analysis of Soils

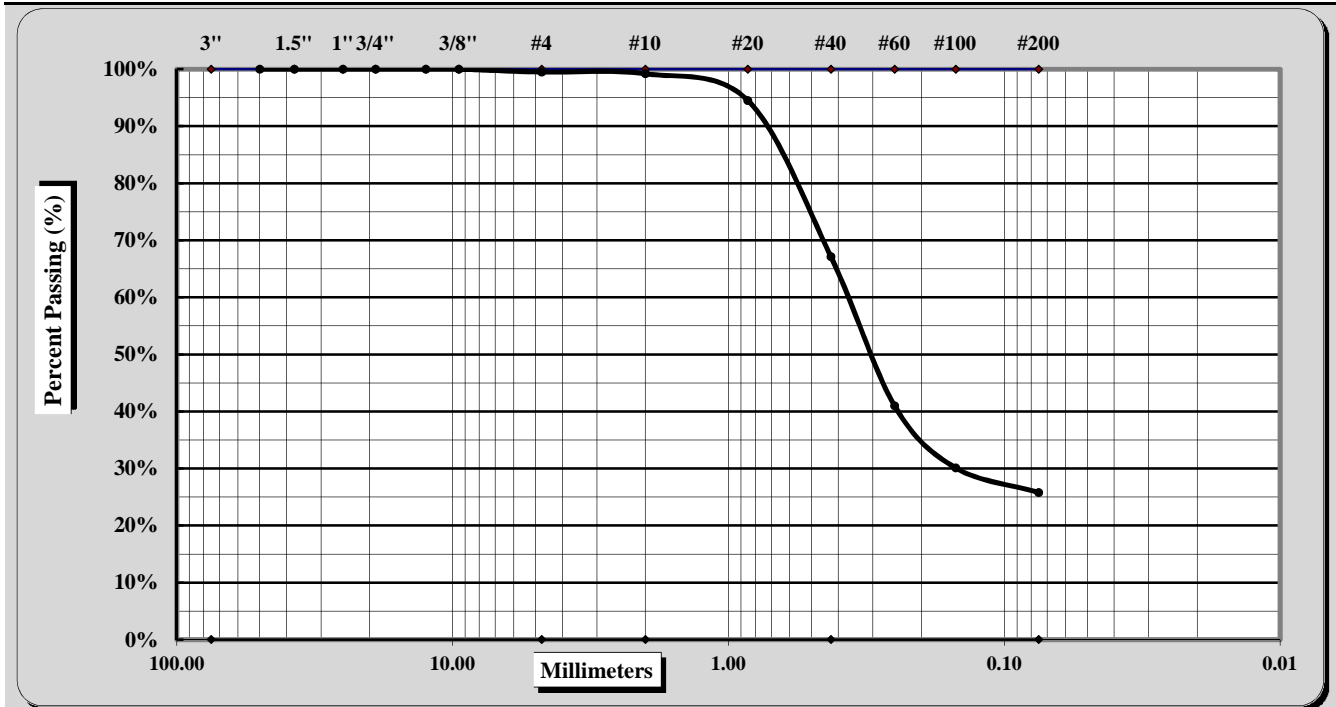


ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616			
Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-35	Sample:	SS-5
		Sample Date:	4/5/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	8 - 10 ft

Sample Description: Brown Silty SAND



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/8"	Coarse Sand	0.3%	Fine Sand	41.3%
Gravel	0.5%	Medium Sand	32.1%	Silt & Clay	25.8%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	17.5%
Coarse Sand	0.3%	Medium Sand	32.1%	Fine Sand	41.3%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Dates:	4/5/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-35	Sample No.	SS-9
		Sample Depth:	28 - 30 ft

Sample Description	Olive Gray Silty SAND (SM)		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A	<input type="checkbox"/> Method B <input checked="" type="checkbox"/>
Tare #:		Soaked	<input checked="" type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)	139.42	Original Dry Mass of Sample (B)	107.91
Wet Wt + T	274.65	After 200 Wash + Tare Wt. (C _T)	193.75
Dry Wt + T	247.33	Dry Mass Retained on #200 Sieve (C)	54.33
Moisture Content (MC)	25.3%	% Passing #200 Sieve (A)	49.7%

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
Tare #:		Soaked <input type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
Moisture Content (MC)		% Passing #200 Sieve (A)

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
Tare #:	B5	Soaked <input type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
Moisture Content (MC)		% Passing #200 Sieve (A)

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um)) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
Technician Name

Signature

N/A
Certification Type/No.

4/28/2017
Date

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-41	Sample:	SS-10
		Sample Date:	4/4/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	33 - 35 ft

Sample Description: Gray Silty SAND

Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	124.67	Mass of Sample after Wash + Tare Wt.	257.44
Total Sample Wet Wt. + Tare Wt.			331.04	Mass of Sample after Wash	132.77
Total Sample Dry Wt. + Tare Wt.			292.52	Mass passing #200	35.08
Total Sample Dry Weight			167.85	% Passing #200 (D1140)	20.9%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	0.18	0.1%	0.1%	99.9%	NA
#20	0.850	2.88	1.6%	1.7%	98.3%	NA
#40	0.425	61.07	34.7%	36.4%	63.6%	NA
#60	0.250	106.91	27.3%	63.7%	36.3%	NA
#100	0.150	123.59	9.9%	73.6%	26.4%	NA
#200	0.075	132.61	5.4%	79.0%	21.0%	NA
Pan	<0.075	132.93		% Passing #200 (D6913) = 21.0%		
D2487	Maximum Particle Size		#4	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	36.3%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	42.6%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.1%	% Silt & Clay	< 0.075 mm	21.0%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/3/2017
Date

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Sieve Analysis of Soils

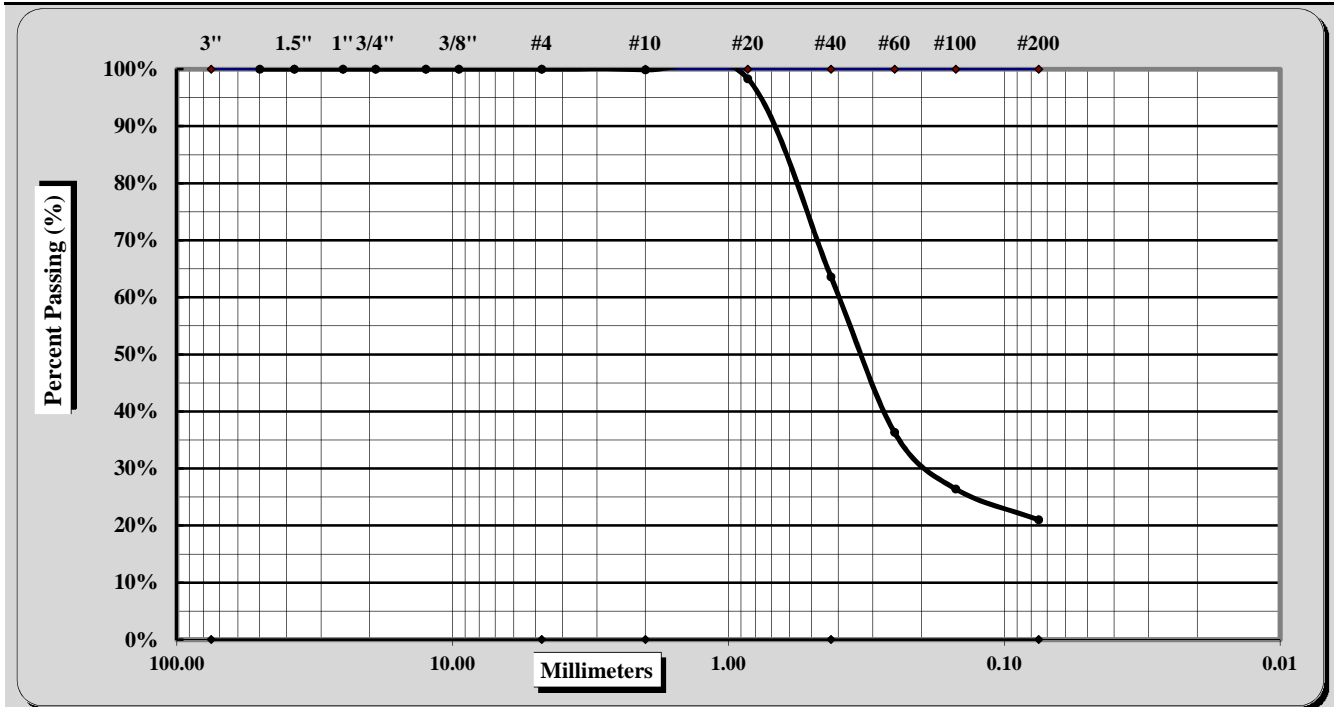


ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616			
Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-41	Sample:	SS-10
		Sample Date:	4/4/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	33 - 35 ft

Sample Description: Gray Silty SAND



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	0.1%	Fine Sand	42.6%
Gravel	0.0%	Medium Sand	36.3%	Silt & Clay	21.0%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	22.9%
Coarse Sand	0.1%	Medium Sand	36.3%	Fine Sand	42.6%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Dates:	4/4/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-42	Sample No.	SS-4
		Sample Depth:	6 - 8 ft

Sample Description	Brown Fat CLAY with Sand (CH)		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A	<input type="checkbox"/> Method B <input checked="" type="checkbox"/>
Tare #:	1218	Soaked	<input checked="" type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)	126.02	Original Dry Mass of Sample (B)	103.25
Wet Wt + T	257.52	After 200 Wash + Tare Wt. (C _T)	153.64
Dry Wt + T	229.27	Dry Mass Retained on #200 Sieve (C)	27.62
Moisture Content (MC)	27.4%	% Passing #200 Sieve (A)	73.2%

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
Tare #:		Soaked <input type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
Moisture Content (MC)		% Passing #200 Sieve (A)

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
Tare #:	B5	Soaked <input type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
Moisture Content (MC)		% Passing #200 Sieve (A)

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um)) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No.

4/28/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/3/2017
 Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-49	Sample:	SS-11
		Sample Date:	3/30/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	38 - 40 ft
Sample Description:	Tan Brown Silty SAND		

Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	122.95	Mass of Sample after Wash + Tare Wt.	248.82
Total Sample Wet Wt. + Tare Wt.			326.65	Mass of Sample after Wash	125.87
Total Sample Dry Wt. + Tare Wt.			295.86	Mass passing #200	47.04
Total Sample Dry Weight			172.91	% Passing #200 (D1140)	27.2%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.43	0.2%	0.2%	99.8%	NA
#10	2.000	0.81	0.2%	0.5%	99.5%	NA
#20	0.850	7.50	3.9%	4.3%	95.7%	NA
#40	0.425	51.72	25.6%	29.9%	70.1%	NA
#60	0.250	93.62	24.2%	54.1%	45.9%	NA
#100	0.150	117.71	13.9%	68.1%	31.9%	NA
#200	0.075	125.59	4.6%	72.6%	27.4%	NA
Pan	<0.075	125.97		% Passing #200 (D6913) =		27.4%
D2487	Maximum Particle Size		3/8"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	29.4%
Gravel	< 75 mm and > 4.75 mm (#4)		0.2%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	42.7%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.3%	% Silt & Clay	< 0.075 mm	27.4%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Sieve Analysis of Soils

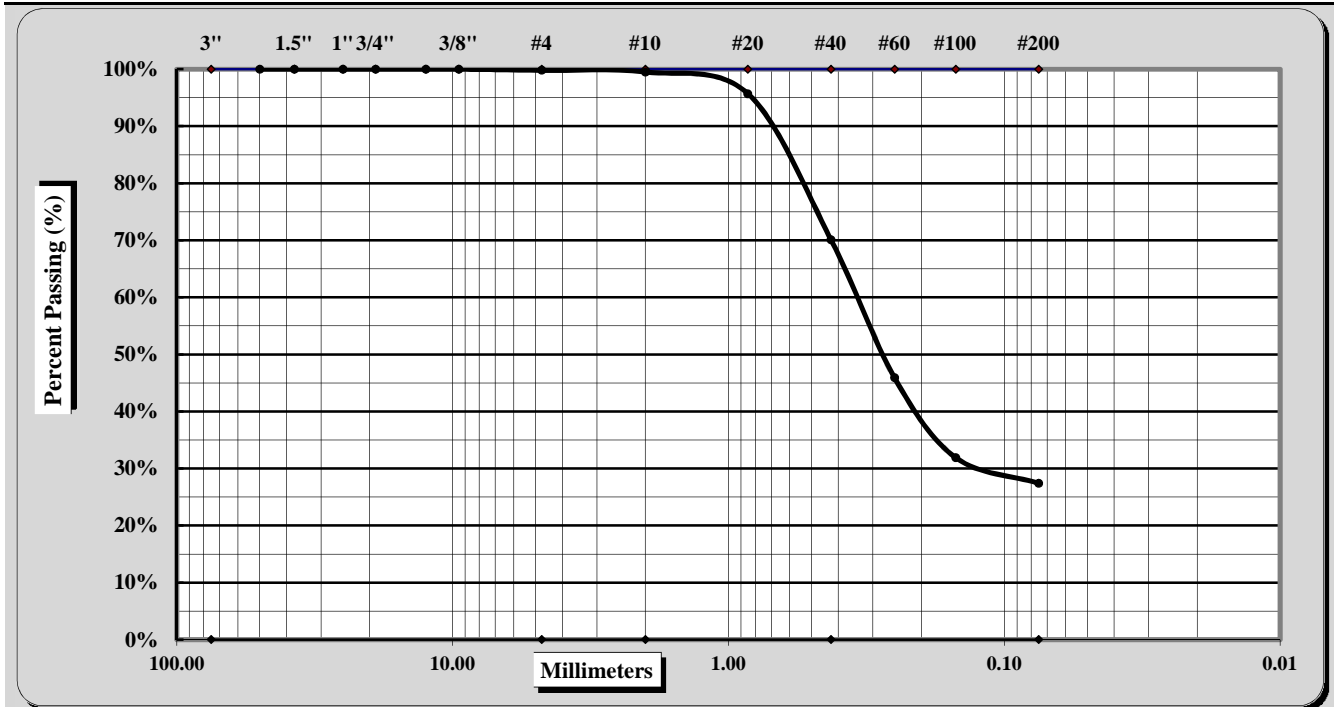


ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616			
Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-49	Sample:	SS-11
		Sample Date:	3/30/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	38 - 40 ft

Sample Description: Tan Brown Silty SAND



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/8"	Coarse Sand	0.3%	Fine Sand	42.7%
Gravel	0.2%	Medium Sand	29.4%	Silt & Clay	27.4%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	17.8%
Coarse Sand	0.3%	Medium Sand	29.4%	Fine Sand	42.7%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-50	Sample:	SS-3
		Sample Date:	4/3/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	4 - 6 ft
Sample Description:	tan-Brown Silty SAND		

Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis			Material Excluded:		
Tare No.	Tare Wt.	124.93	Mass of Sample after Wash + Tare Wt.	256.61	
Total Sample Wet Wt. + Tare Wt.		334.05	Mass of Sample after Wash	131.68	
Total Sample Dry Wt. + Tare Wt.		303.32	Mass passing #200	46.71	
Total Sample Dry Weight		178.39	% Passing #200 (D1140)	26.2%	

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	0.94	0.5%	0.5%	99.5%	NA
#20	0.850	11.99	6.2%	6.7%	93.3%	NA
#40	0.425	70.49	32.8%	39.5%	60.5%	NA
#60	0.250	111.16	22.8%	62.3%	37.7%	NA
#100	0.150	124.46	7.5%	69.8%	30.2%	NA
#200	0.075	131.19	3.8%	73.5%	26.5%	NA
Pan	<0.075	131.74		% Passing #200 (D6913) = 26.5%		
D2487	Maximum Particle Size		#4	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	39.0%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	34.0%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.5%	% Silt & Clay	< 0.075 mm	26.5%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Sieve Analysis of Soils

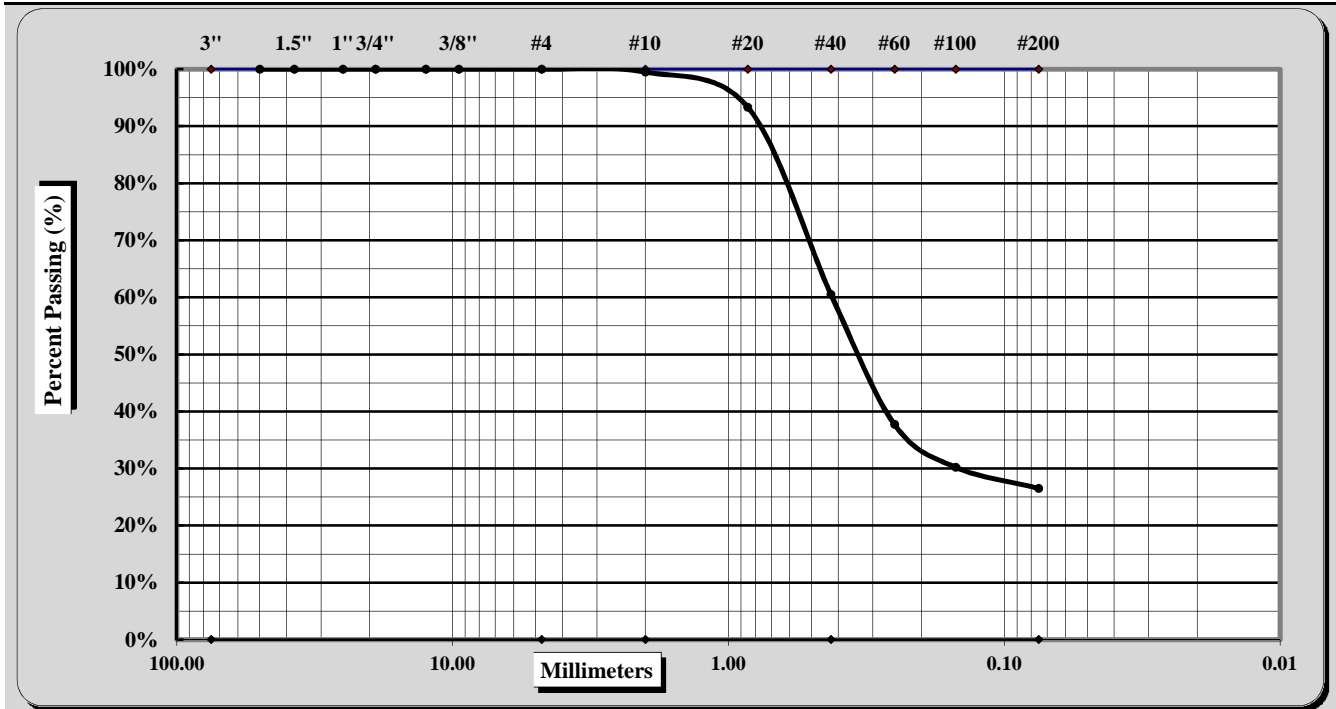


ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616			
Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-50	Sample:	SS-3
		Sample Date:	4/3/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	4 - 6 ft

Sample Description: tan-Brown Silty SAND



Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-52	Sample:	SS-4
		Sample Date:	4/3/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	6 - 8 ft
Sample Description:	Tan-Brown Sandy SILT		

Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input type="checkbox"/>
Hard & Durable	<input type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	134.87	Mass of Sample after Wash + Tare Wt.	202.29
Total Sample Wet Wt. + Tare Wt.			322.66	Mass of Sample after Wash	67.42
Total Sample Dry Wt. + Tare Wt.			293.05	Mass passing #200	90.76
Total Sample Dry Weight			158.18	% Passing #200 (D1140)	57.4%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	0.41	0.3%	0.3%	99.7%	NA
#20	0.850	1.92	1.0%	1.2%	98.8%	NA
#40	0.425	11.04	5.8%	7.0%	93.0%	NA
#60	0.250	22.34	7.1%	14.1%	85.9%	NA
#100	0.150	43.38	13.3%	27.4%	72.6%	NA
#200	0.075	65.78	14.2%	41.6%	58.4%	NA
Pan	<0.075	67.55		% Passing #200 (D6913) = 58.4%		
D2487	Maximum Particle Size		#4	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	6.7%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	34.6%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.3%	% Silt & Clay	< 0.075 mm	58.4%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/3/2017
Date

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Sieve Analysis of Soils

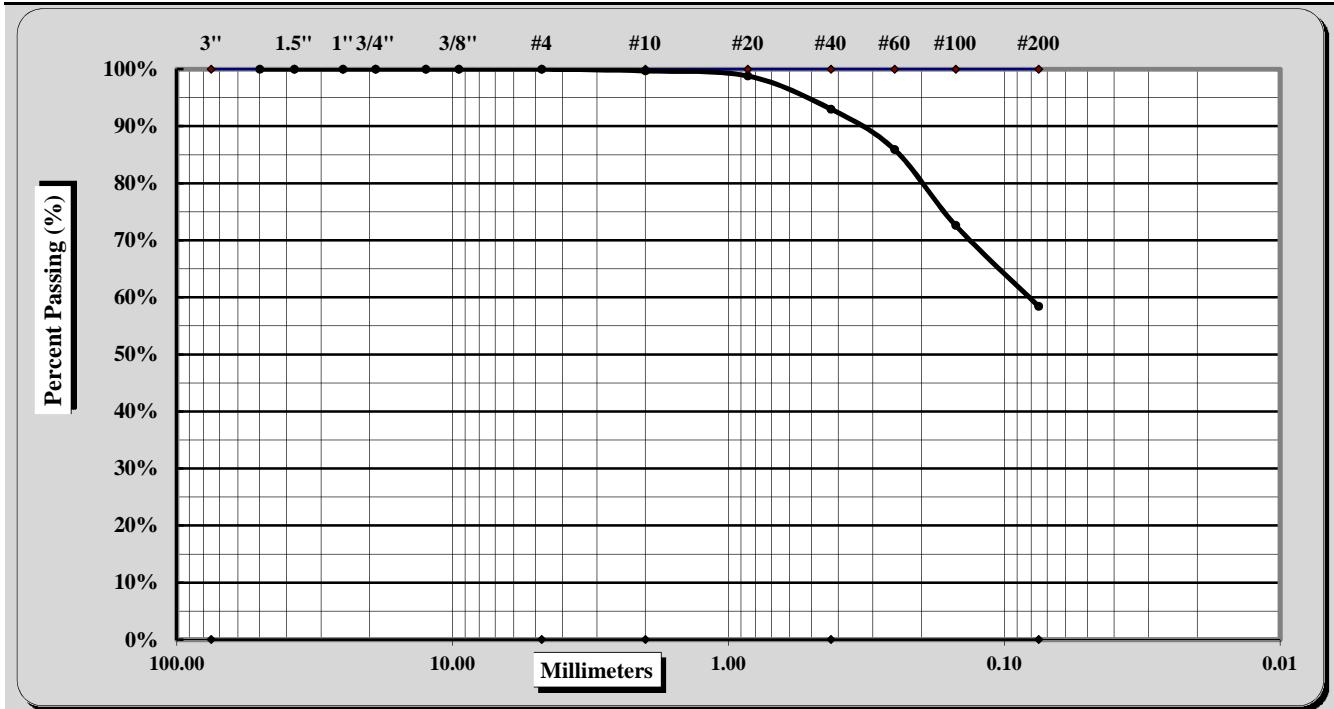


ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616			
Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-52	Sample:	SS-4
		Sample Date:	4/3/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	6 - 8 ft

Sample Description: Tan-Brown Sandy SILT



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	0.3%	Fine Sand	34.6%
Gravel	0.0%	Medium Sand	6.7%	Silt & Clay	58.4%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	18.7%
Coarse Sand	0.3%	Medium Sand	6.7%	Fine Sand	34.6%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input type="checkbox"/>
Hard & Durable	<input type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-53	Sample:	SS-5
		Sample Date:	4/3/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	8 - 10 ft
Sample Description:	Tan-Brown Sandy SILT		

Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input type="checkbox"/>
Hard & Durable	<input type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	120.64	Mass of Sample after Wash + Tare Wt.	191.64
Total Sample Wet Wt. + Tare Wt.			323.69	Mass of Sample after Wash	71.00
Total Sample Dry Wt. + Tare Wt.			287.91	Mass passing #200	96.27
Total Sample Dry Weight			167.27	% Passing #200 (D1140)	57.6%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	0.16	0.1%	0.1%	99.9%	NA
#20	0.850	5.93	3.4%	3.5%	96.5%	NA
#40	0.425	35.22	17.5%	21.1%	78.9%	NA
#60	0.250	54.70	11.6%	32.7%	67.3%	NA
#100	0.150	64.24	5.7%	38.4%	61.6%	NA
#200	0.075	70.62	3.8%	42.2%	57.8%	NA
Pan	<0.075	70.86		% Passing #200 (D6913) = 57.8%		
D2487	Maximum Particle Size		#4	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	21.0%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	21.1%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.1%	% Silt & Clay	< 0.075 mm	57.8%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/3/2017
Date

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Sieve Analysis of Soils

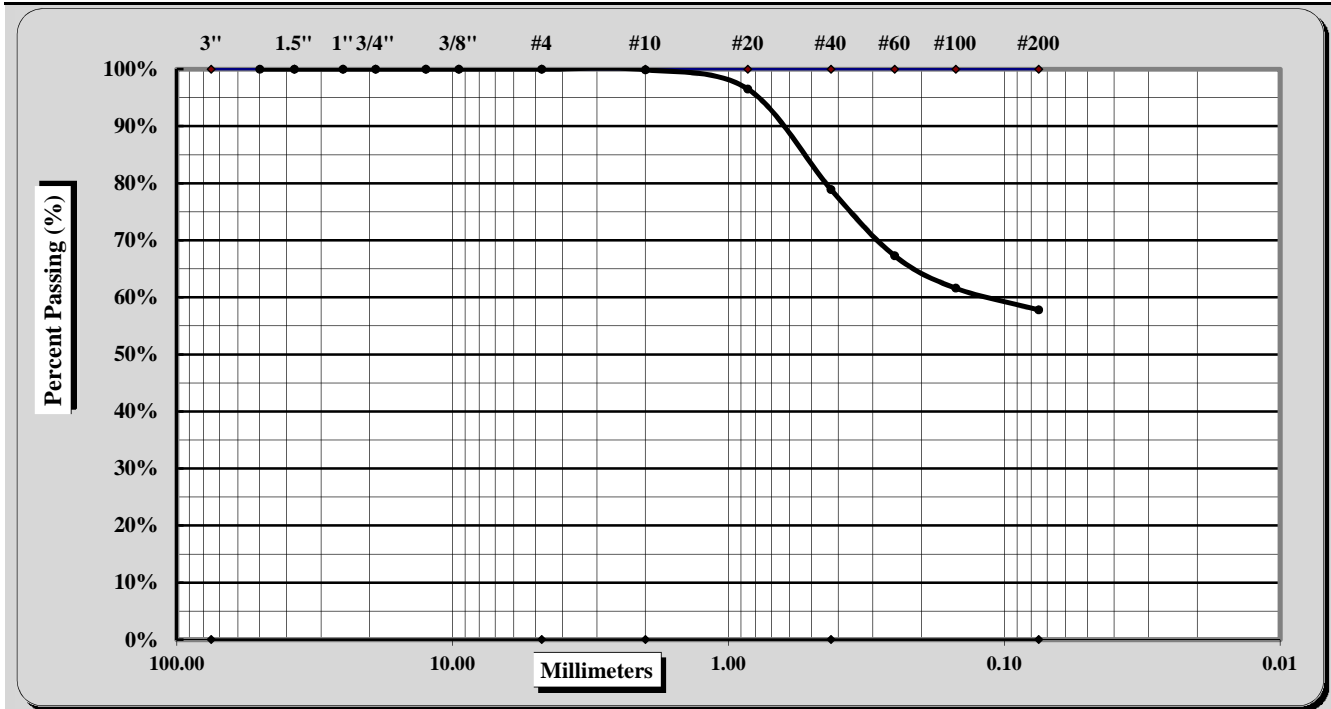


ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616			
Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-53	Sample:	SS-5
		Sample Date:	4/3/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	8 - 10 ft

Sample Description: Tan-Brown Sandy SILT



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	0.1%	Fine Sand	21.1%
Gravel	0.0%	Medium Sand	21.0%	Silt & Clay	57.8%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	21.4%
Coarse Sand	0.1%	Medium Sand	21.0%	Fine Sand	21.1%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input type="checkbox"/>
Hard & Durable	<input type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Dates:	4/3/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-54	Sample No.	SS-6
		Sample Depth:	13 - 15 ft

Sample Description	Gray Brown Lean CLAY with Sand (CL)		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A	<input type="checkbox"/> Method B <input checked="" type="checkbox"/>
Tare #:		Soaked	<input checked="" type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)	136.33	Original Dry Mass of Sample (B)	92.53
Wet Wt + T	242.65	After 200 Wash + Tare Wt. (C _T)	150.22
Dry Wt + T	228.86	Dry Mass Retained on #200 Sieve (C)	13.89
Moisture Content (MC)	14.9%	% Passing #200 Sieve (A)	85.0%

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
Tare #:		Soaked <input type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
Moisture Content (MC)		% Passing #200 Sieve (A)

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
Tare #:	B5	Soaked <input type="checkbox"/> Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
Moisture Content (MC)		% Passing #200 Sieve (A)

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um)) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No.

4/28/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/3/2017
 Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-54	Sample:	SS-8
		Sample Date:	4/3/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft
Sample Description:	Olive Gray Silty SAND		

Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input checked="" type="checkbox"/>	Weathered & Friable	<input checked="" type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	119.77	Mass of Sample after Wash + Tare Wt.	196.37
Total Sample Wet Wt. + Tare Wt.			275.51	Mass of Sample after Wash	76.60
Total Sample Dry Wt. + Tare Wt.			238.51	Mass passing #200	42.14
Total Sample Dry Weight			118.74	% Passing #200 (D1140)	35.5%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	1.20	1.0%	1.0%	99.0%	NA
#20	0.850	13.39	10.3%	11.3%	88.7%	NA
#40	0.425	35.90	19.0%	30.2%	69.8%	NA
#60	0.250	52.69	14.1%	44.4%	55.6%	NA
#100	0.150	66.30	11.5%	55.8%	44.2%	NA
#200	0.075	76.33	8.4%	64.3%	35.7%	NA
Pan	<0.075	77.48		% Passing #200 (D6913) = 35.7%		
D2487	Maximum Particle Size		#4	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	29.2%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	34.1%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		1.0%	% Silt & Clay	< 0.075 mm	35.7%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/3/2017
Date

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Sieve Analysis of Soils

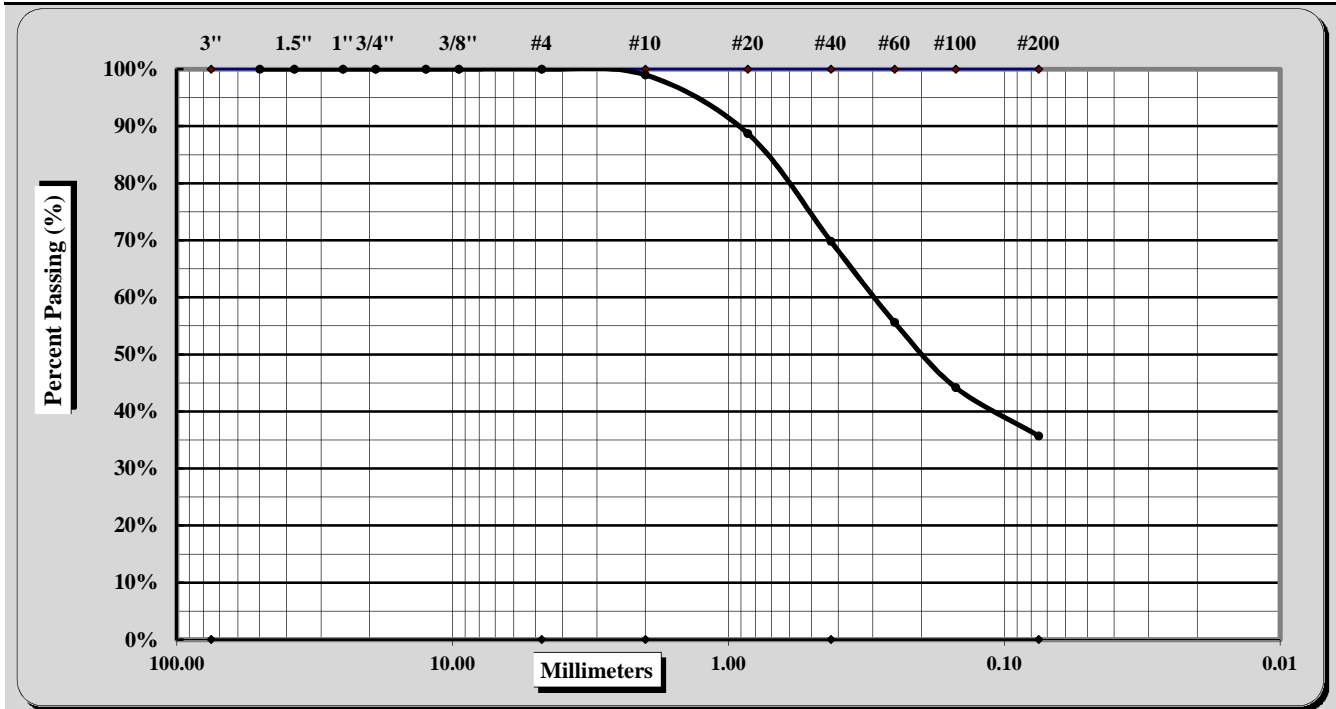


ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616			
Project #:	HDR No. 10052825 Task: 017	Report Date:	5/3/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	4/21 - 4/28/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-54	Sample:	SS-8
		Sample Date:	4/3/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft

Sample Description: Olive Gray Silty SAND



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	1.0%	Fine Sand	34.1%
Gravel	0.0%	Medium Sand	29.2%	Silt & Clay	35.7%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	31.2%
Coarse Sand	1.0%	Medium Sand	29.2%	Fine Sand	34.1%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input checked="" type="checkbox"/>	Weathered & Friable	<input checked="" type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/3/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/16 - 5/21/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Dates:	4/18/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17BR-05	Sample No.	SS-7
		Sample Depth:	18 - 20 ft

Sample Description	Tan-Brown Sandy CLAY (CL)		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
	Tare #:	Soaked <input checked="" type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	87.03
	Wet Wt + T	After 200 Wash + Tare Wt. (C _T)	157.25
	Dry Wt + T	Dry Mass Retained on #200 Sieve (C)	37.23
	Moisture Content (MC)	% Passing #200 Sieve (A)	57.2%

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No. 5/16/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position 5/21/2017
 Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/16 - 5/21/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17BR-05	Sample:	SS-10
		Sample Date:	4/18/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	33 - 35 ft

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	121.86	Mass of Sample after Wash + Tare Wt.	319.43
Total Sample Wet Wt. + Tare Wt.			381.37	Mass of Sample after Wash	197.57
Total Sample Dry Wt. + Tare Wt.			342.02	Mass passing #200	22.59
Total Sample Dry Weight			220.16	% Passing #200 (D1140)	10.3%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	4.02	1.8%	1.8%	98.2%	NA
#4	4.75	17.84	6.3%	8.1%	91.9%	NA
#10	2.000	46.03	12.8%	20.9%	79.1%	NA
#20	0.850	119.93	33.6%	54.5%	45.5%	NA
#40	0.425	175.60	25.3%	79.8%	20.2%	NA
#60	0.250	186.55	5.0%	84.7%	15.3%	NA
#100	0.150	192.49	2.7%	87.4%	12.6%	NA
#200	0.075	197.14	2.1%	89.5%	10.5%	NA
Pan	<0.075	197.40		% Passing #200 (D6913) = 10.5%		
D2487	Maximum Particle Size		1/2"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	58.9%
Gravel	< 75 mm and > 4.75 mm (#4)		8.1%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	9.7%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		12.8%	% Silt & Clay	< 0.075 mm	10.5%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/21/2017
Date

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Sieve Analysis of Soils



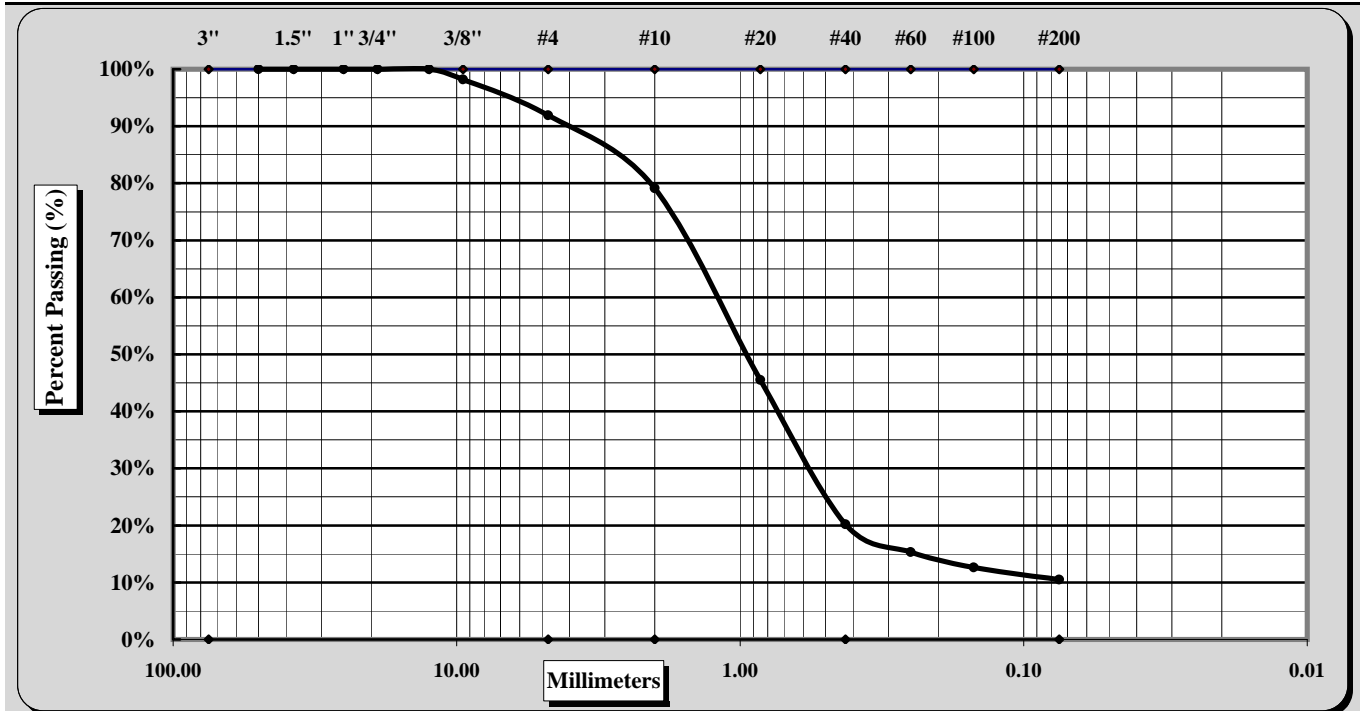
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/16 - 5/21/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17BR-05	Sample:	SS-10
		Sample Date:	4/18/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	33 - 35 ft

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	1/2"	Coarse Sand	12.8%	Fine Sand	9.7%
Gravel	8.1%	Medium Sand	58.9%	Silt & Clay	10.5%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	17.9%

Coarse Sand	12.8%	Medium Sand	58.9%	Fine Sand	9.7%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined. CC=3.713, Cu=16.667

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/21/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/16 - 5/21/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Dates:	4/18/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17BR-05	Sample No.	SS-12
		Sample Depth:	43 - 45 ft

Sample Description		Gray Fat CLAY (CH)	
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
	Tare #:	Soaked <input checked="" type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	61.01
	Wet Wt + T	After 200 Wash + Tare Wt. (C _T)	131.55
	Dry Wt + T	Dry Mass Retained on #200 Sieve (C)	3.95
	Moisture Content (MC)	% Passing #200 Sieve (A)	93.5%

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/> Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)
	Moisture Content (MC)	% Passing #200 Sieve (A)

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/> Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)
	Moisture Content (MC)	% Passing #200 Sieve (A)

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No. 5/16/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position 5/21/2017
 Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/16 - 5/21/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17BR-05	Sample:	SS-17
		Sample Date:	4/18/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	68 - 70 ft

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	126.65	Mass of Sample after Wash + Tare Wt.	265.51
Total Sample Wet Wt. + Tare Wt.			318.67	Mass of Sample after Wash	138.86
Total Sample Dry Wt. + Tare Wt.			295.75	Mass passing #200	30.24
Total Sample Dry Weight			169.10	% Passing #200 (D1140)	17.9%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	8.09	4.8%	4.8%	95.2%	NA
#10	2.000	15.92	4.6%	9.4%	90.6%	NA
#20	0.850	41.46	15.1%	24.5%	75.5%	NA
#40	0.425	102.75	36.2%	60.8%	39.2%	NA
#60	0.250	122.72	11.8%	72.6%	27.4%	NA
#100	0.150	131.59	5.2%	77.8%	22.2%	NA
#200	0.075	138.61	4.2%	82.0%	18.0%	NA
Pan	<0.075	138.85		% Passing #200 (D6913) = 18.0%		
D2487	Maximum Particle Size		3/8"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	51.4%
Gravel	< 75 mm and > 4.75 mm (#4)		4.8%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	21.2%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		4.6%	% Silt & Clay	< 0.075 mm	18.0%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/21/2017
Date

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Sieve Analysis of Soils



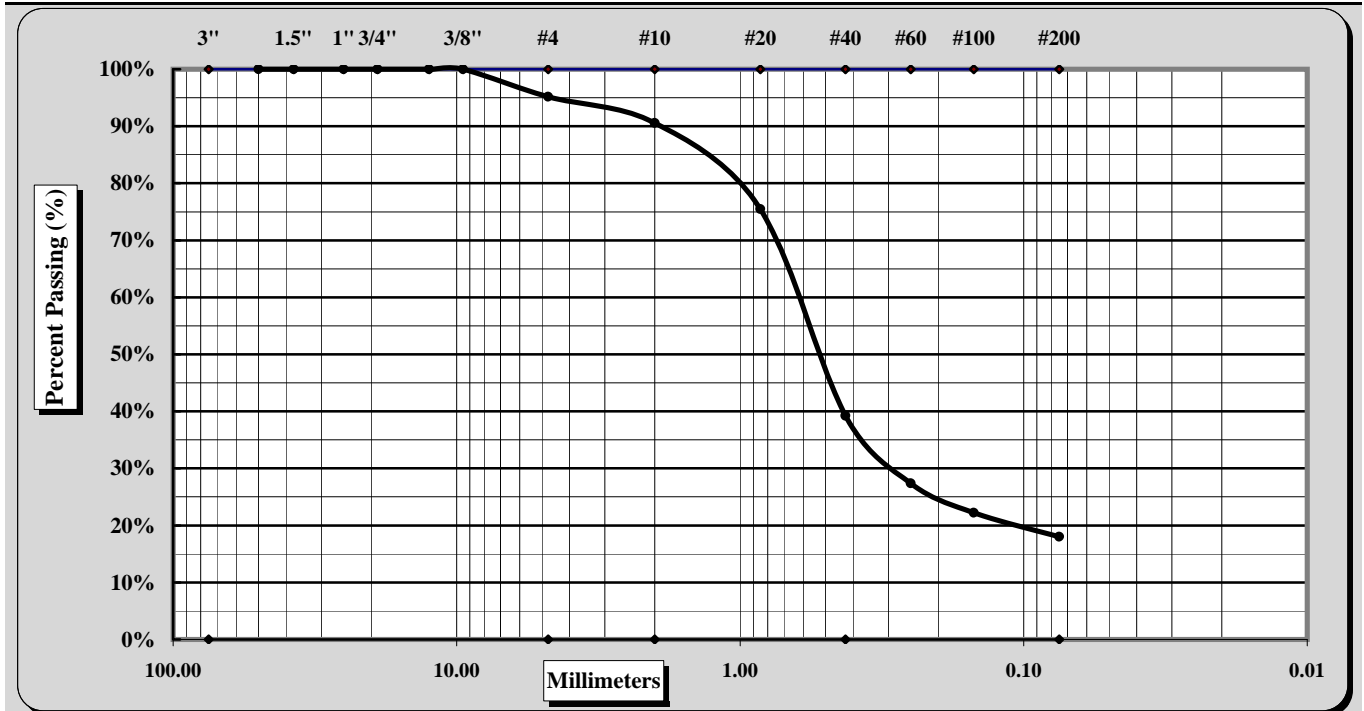
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/16 - 5/21/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17BR-05	Sample:	SS-17
		Sample Date:	4/18/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	68 - 70 ft

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/8"	Coarse Sand	4.6%	Fine Sand	21.2%
Gravel	4.8%	Medium Sand	51.4%	Silt & Clay	18.0%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	13.6%

Coarse Sand	4.6%	Medium Sand	51.4%	Fine Sand	21.2%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/21/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/16 - 5/21/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Dates:	4/17/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17CL-04	Sample No.	SS-6
		Sample Depth:	13 - 15 ft

Sample Description			
Olive Gray Elastic SILT with Sand (MH)			
<input type="checkbox"/>	<i>Auxiliary</i>	<i>#200 Wash</i>	<input type="checkbox"/> Method A <input checked="" type="checkbox"/> Method B <input checked="" type="checkbox"/>
	Tare #:		Soaked <input checked="" type="checkbox"/> Soak Time 24 hrs.
	Tare Wt. (T)	131.54	Original Dry Mass of Sample (B) 61.91
	Wet Wt + T	210.92	After 200 Wash + Tare Wt. (C _T) 149.68
	Dry Wt + T	193.45	Dry Mass Retained on #200 Sieve (C) 18.14
	Moisture Content (MC)	28.2%	% Passing #200 Sieve (A) 70.7%

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/>	<i>Auxiliary</i>	<i>#200 Wash</i>	<input type="checkbox"/> Method A <input type="checkbox"/> Method B <input type="checkbox"/>
	Tare #:		Soaked <input type="checkbox"/> Soak Time 24 hrs.
	Tare Wt. (T)		Original Dry Mass of Sample (B)
	Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
	Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
	Moisture Content (MC)		% Passing #200 Sieve (A)

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/>	<i>Auxiliary</i>	<i>#200 Wash</i>	<input type="checkbox"/> Method A <input type="checkbox"/> Method B <input type="checkbox"/>
	Tare #:		Soaked <input type="checkbox"/> Soak Time 24 hrs.
	Tare Wt. (T)		Original Dry Mass of Sample (B)
	Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
	Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
	Moisture Content (MC)		% Passing #200 Sieve (A)

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

$$\% \text{ Passing } \#200 = A = [(B-C)/B] * 100$$

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No.

5/16/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/21/2017
 Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/16 - 5/21/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Dates:	4/17/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17CL-04	Sample No.	SS-9
		Sample Depth:	28 - 30 ft

Sample Description		Brown Elastic SILT (MH)	
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
	Tare #:	Soaked <input checked="" type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	78.18
	Wet Wt + T	After 200 Wash + Tare Wt. (C _T)	139.64
	Dry Wt + T	Dry Mass Retained on #200 Sieve (C)	0.21
	Moisture Content (MC)	% Passing #200 Sieve (A)	99.7%

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
Technician Name

Signature

N/A
Certification Type/No.

5/16/2017
Date

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/21/2017
Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/16 - 5/21/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17CL-15	Sample:	SS-3
		Sample Date:	3/29/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	4 - 6 ft

Sample Description: Tan-Brown Clayey SAND (SC)

Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	125.92	Mass of Sample after Wash + Tare Wt.	166.93
Total Sample Wet Wt. + Tare Wt.			202.16	Mass of Sample after Wash	41.01
Total Sample Dry Wt. + Tare Wt.			192.98	Mass passing #200	26.05
Total Sample Dry Weight			67.06	% Passing #200 (D1140)	38.8%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	1.46	2.2%	2.2%	97.8%	NA
#4	4.75	4.15	4.0%	6.2%	93.8%	NA
#10	2.000	8.95	7.2%	13.3%	86.7%	NA
#20	0.850	15.56	9.9%	23.2%	76.8%	NA
#40	0.425	22.97	11.0%	34.3%	65.7%	NA
#60	0.250	30.33	11.0%	45.2%	54.8%	NA
#100	0.150	37.04	10.0%	55.2%	44.8%	NA
#200	0.075	40.71	5.5%	60.7%	39.3%	NA
Pan	<0.075	41.10		% Passing #200 (D6913) = 39.3%		
D2487	Maximum Particle Size		1/2"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	20.9%
Gravel	< 75 mm and > 4.75 mm (#4)		6.2%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	26.5%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		7.2%	% Silt & Clay	< 0.075 mm	39.3%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/21/2017
Date

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Sieve Analysis of Soils



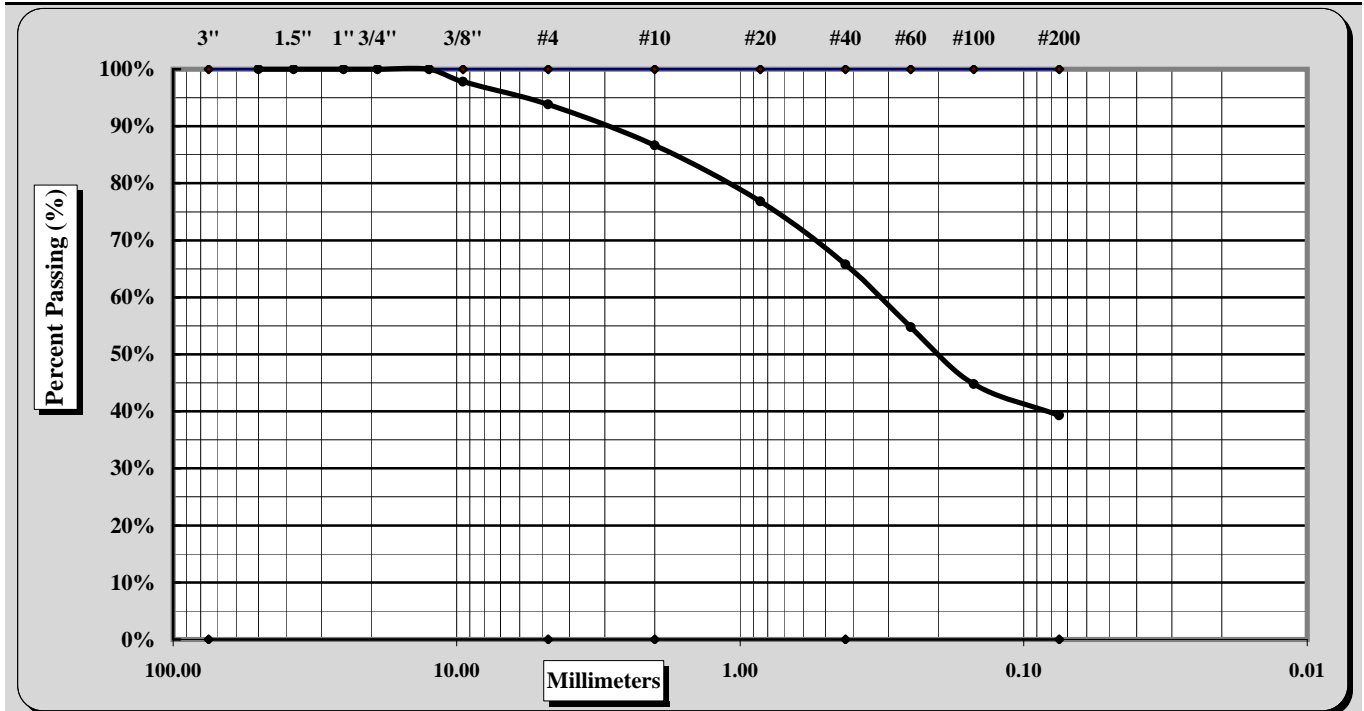
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 0	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/16 - 5/21/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17CL-15	Sample:	SS-3
		Sample Date:	3/29/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	4 - 6 ft

Sample Description: Tan-Brown Clayey SAND (SC)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	1/2"	Coarse Sand	7.2%	Fine Sand	26.5%
Gravel	6.2%	Medium Sand	20.9%	Silt & Clay	39.3%
Liquid Limit	37	Plastic Limit	18	Plastic Index	19
Specific Gravity	ND			Moisture Content	13.7%

Coarse Sand	7.2%	Medium Sand	20.9%	Fine Sand	26.5%
Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/16 - 5/21/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17CL-16	Sample:	SS-6
		Sample Date:	4/19/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	13 - 15 ft

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	136.33	Mass of Sample after Wash + Tare Wt.	236.85
Total Sample Wet Wt. + Tare Wt.			333.02	Mass of Sample after Wash	100.52
Total Sample Dry Wt. + Tare Wt.			299.87	Mass passing #200	63.02
Total Sample Dry Weight			163.54	% Passing #200 (D1140)	38.5%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	5.49	3.4%	3.4%	96.6%	NA
#10	2.000	15.28	6.0%	9.3%	90.7%	NA
#20	0.850	36.39	12.9%	22.3%	77.7%	NA
#40	0.425	59.08	13.9%	36.1%	63.9%	NA
#60	0.250	72.88	8.4%	44.6%	55.4%	NA
#100	0.150	85.79	7.9%	52.5%	47.5%	NA
#200	0.075	99.78	8.6%	61.0%	39.0%	NA
Pan	<0.075	100.43		% Passing #200 (D6913) = 39.0%		
D2487	Maximum Particle Size		3/8"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	26.8%
Gravel	< 75 mm and > 4.75 mm (#4)		3.4%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	24.9%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		5.9%	% Silt & Clay	< 0.075 mm	39.0%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

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Laboratory Manager
Position

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Date

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Sieve Analysis of Soils



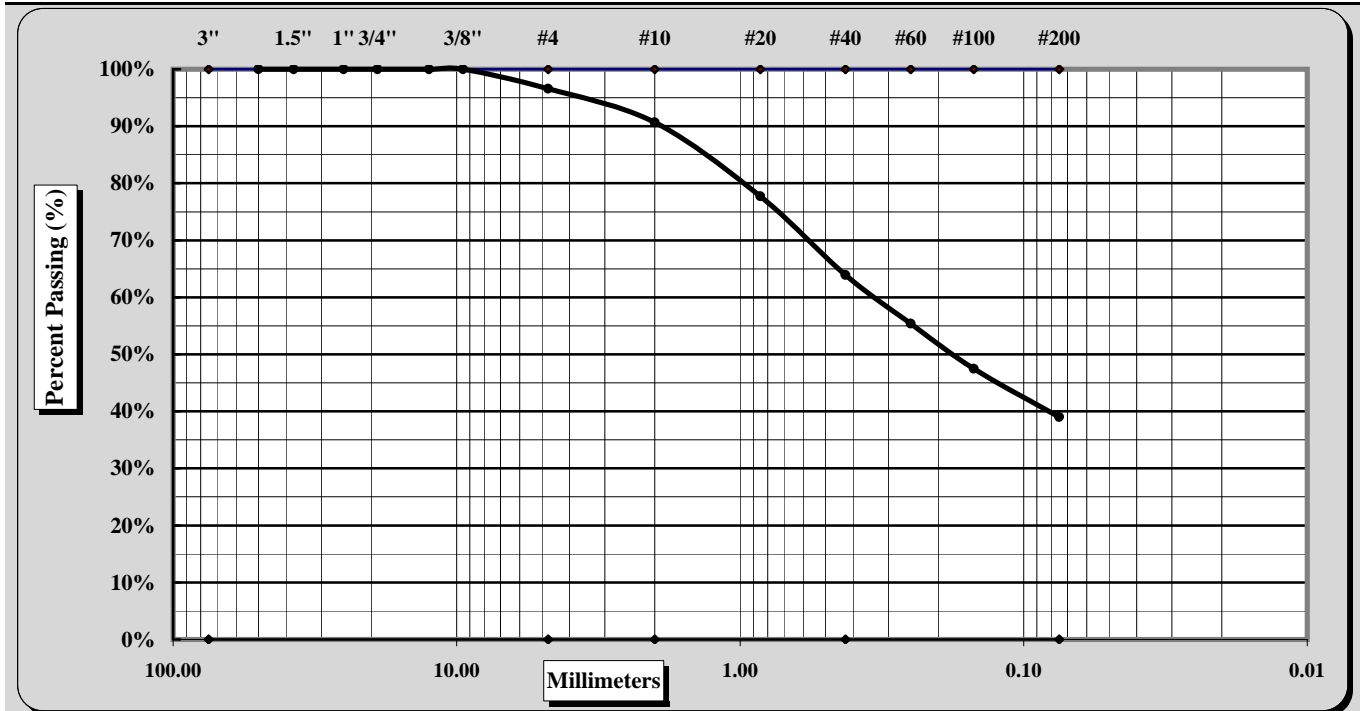
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/16 - 5/21/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17CL-16	Sample:	SS-6
		Sample Date:	4/19/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	13 - 15 ft

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/8"	Coarse Sand	5.9%	Fine Sand	24.9%
Gravel	3.4%	Medium Sand	26.8%	Silt & Clay	39.0%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	20.3%

Coarse Sand	5.9%	Medium Sand	26.8%	Fine Sand	24.9%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/21/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/16 - 5/21/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Dates:	4/19/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17CL-16	Sample No.	SS-9
		Sample Depth:	28 - 30 ft

Sample Description		Brown Fat CLAY (CH)	
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
	Tare #:	Soaked <input checked="" type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	72.83
	Wet Wt + T	After 200 Wash + Tare Wt. (C _T)	138.34
	Dry Wt + T	Dry Mass Retained on #200 Sieve (C)	0.71
	Moisture Content (MC)	% Passing #200 Sieve (A)	99.0%

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
Technician Name

Signature

N/A
Certification Type/No.

5/16/2017
Date

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/21/2017
Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/16 - 5/21/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17CL-17	Sample:	SS-3
		Sample Date:	N/A
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	4 - 6 ft
Sample Description:	Tan-Brown Clayey SAND (SC)		

Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	111.34	Mass of Sample after Wash + Tare Wt.	166.72
Total Sample Wet Wt. + Tare Wt.			211.42	Mass of Sample after Wash	55.38
Total Sample Dry Wt. + Tare Wt.			196.47	Mass passing #200	29.75
Total Sample Dry Weight			85.13	% Passing #200 (D1140)	34.9%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	2.97	3.5%	3.5%	96.5%	NA
#4	4.75	5.67	3.2%	6.7%	93.3%	NA
#10	2.000	8.14	2.9%	9.6%	90.4%	NA
#20	0.850	15.00	8.1%	17.6%	82.4%	NA
#40	0.425	28.32	15.6%	33.3%	66.7%	NA
#60	0.250	38.63	12.1%	45.4%	54.6%	NA
#100	0.150	46.25	9.0%	54.3%	45.7%	NA
#200	0.075	55.03	10.3%	64.6%	35.4%	NA
Pan	<0.075	55.31		% Passing #200 (D6913) = 35.4%		
D2487	Maximum Particle Size		1/2"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	23.7%
Gravel	< 75 mm and > 4.75 mm (#4)		6.7%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	31.4%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		2.9%	% Silt & Clay	< 0.075 mm	35.4%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

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Date

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Sieve Analysis of Soils



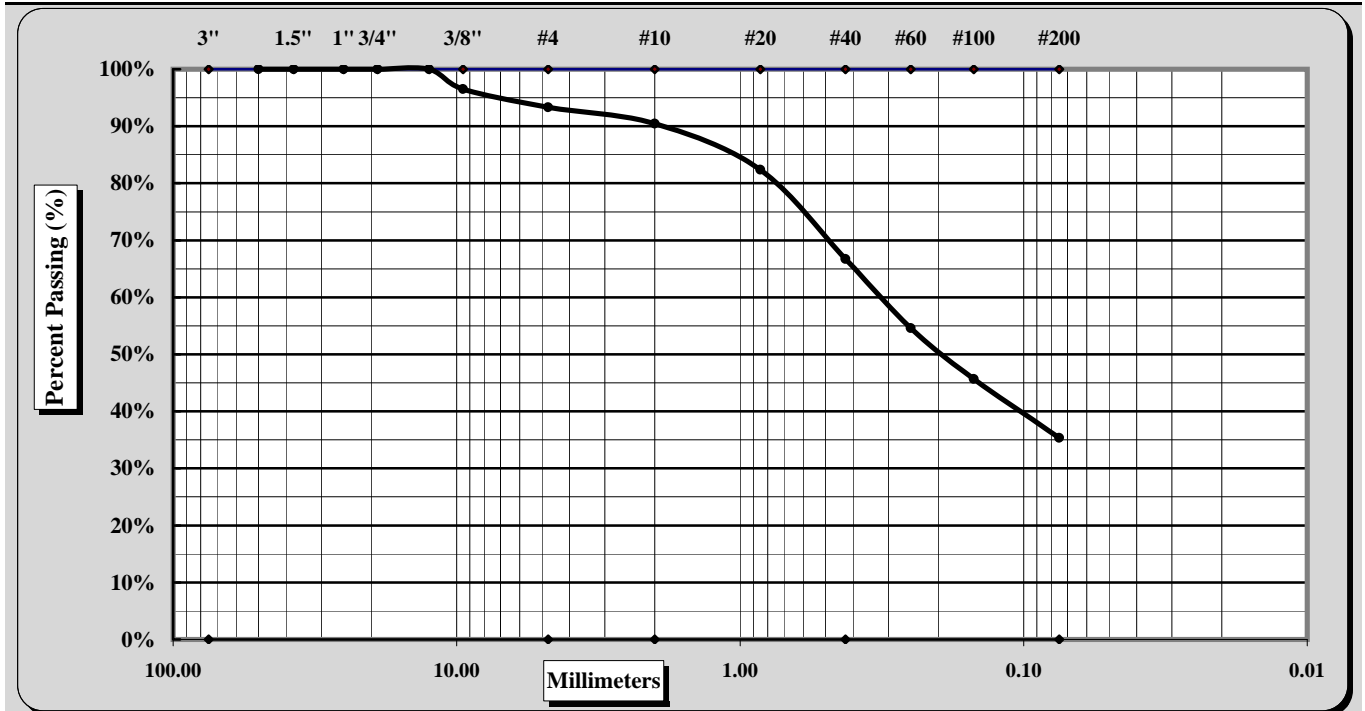
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 0	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/16 - 5/21/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17CL-17	Sample:	SS-3
		Sample Date:	N/A
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	4 - 6 ft

Sample Description: Tan-Brown Clayey SAND (SC)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	1/2"	Coarse Sand	2.9%	Fine Sand	31.4%
Gravel	6.7%	Medium Sand	23.7%	Silt & Clay	35.4%
Liquid Limit	43	Plastic Limit	20	Plastic Index	23
Specific Gravity	ND			Moisture Content	17.6%

Coarse Sand	2.9%	Medium Sand	23.7%	Fine Sand	31.4%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

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Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/16 - 5/21/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17CL-17	Sample:	SS-8
		Sample Date:	4/20/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	119.58	Mass of Sample after Wash + Tare Wt.	205.89
Total Sample Wet Wt. + Tare Wt.			294.62	Mass of Sample after Wash	86.31
Total Sample Dry Wt. + Tare Wt.			260.08	Mass passing #200	54.19
Total Sample Dry Weight			140.50	% Passing #200 (D1140)	38.6%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	2.43	1.7%	1.7%	98.3%	NA
#10	2.000	9.40	5.0%	6.7%	93.3%	NA
#20	0.850	24.54	10.8%	17.5%	82.5%	NA
#40	0.425	43.58	13.6%	31.0%	69.0%	NA
#60	0.250	58.65	10.7%	41.7%	58.3%	NA
#100	0.150	71.62	9.2%	51.0%	49.0%	NA
#200	0.075	85.82	10.1%	61.1%	38.9%	NA
Pan	<0.075	86.27		% Passing #200 (D6913) = 38.9%		
D2487	Maximum Particle Size		3/8"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	24.3%
Gravel	< 75 mm and > 4.75 mm (#4)		1.7%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	30.1%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		5.0%	% Silt & Clay	< 0.075 mm	38.9%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/21/2017
Date

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Sieve Analysis of Soils



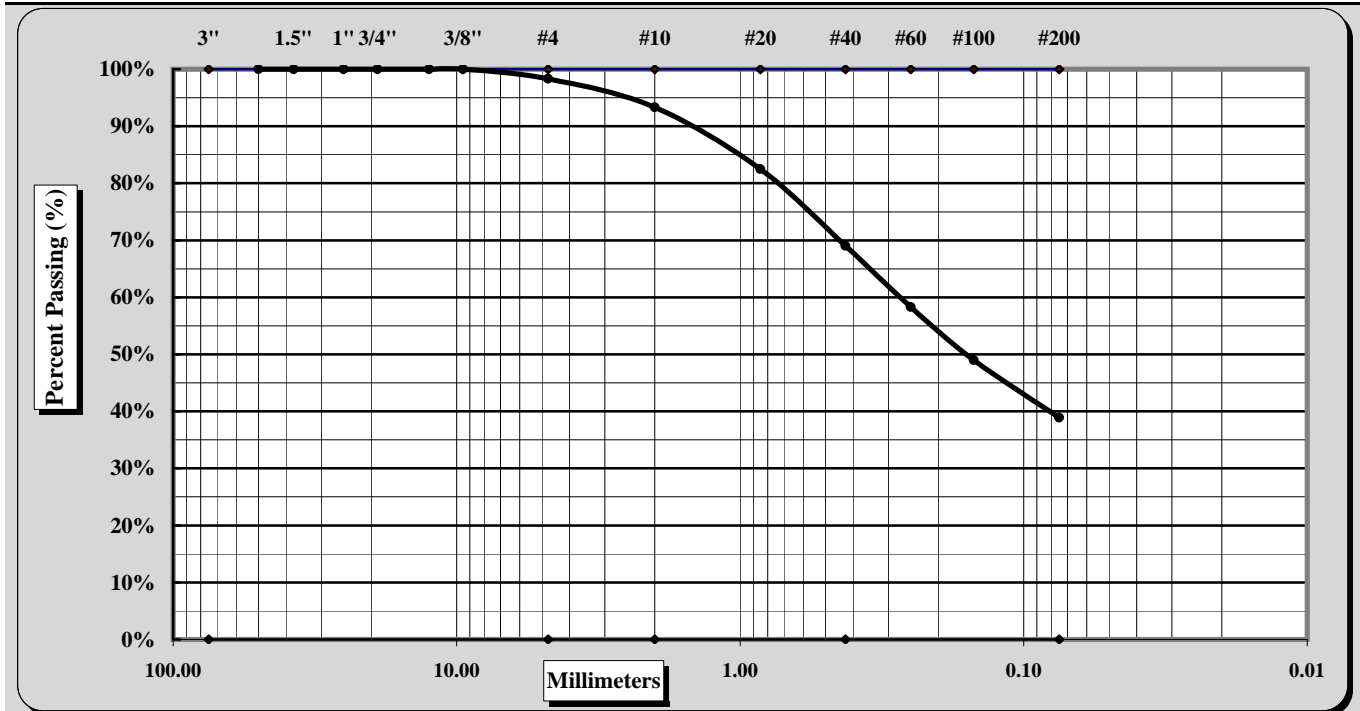
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/16 - 5/21/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17CL-17	Sample:	SS-8
		Sample Date:	4/20/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/8"	Coarse Sand	5.0%	Fine Sand	30.1%
Gravel	1.7%	Medium Sand	24.3%	Silt & Clay	38.9%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	24.6%

Coarse Sand	5.0%	Medium Sand	24.3%	Fine Sand	30.1%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/21/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Dates:	4/17/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17RW-05	Sample No.	SS-3
		Sample Depth:	4 - 6 ft.

Sample Description		Gray Fat CLAY (CH)	
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
	Tare #:	Soaked <input checked="" type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	62.48
	Wet Wt + T	After 200 Wash + Tare Wt. (C _T)	125.39
	Dry Wt + T	Dry Mass Retained on #200 Sieve (C)	5.42
	Moisture Content (MC)	% Passing #200 Sieve (A)	91.3%

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No. 5/18/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position 5/24/2017
 Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17RW-05	Sample:	SS-8
		Sample Date:	4/17/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	125.87	Mass of Sample after Wash + Tare Wt.	264.11
Total Sample Wet Wt. + Tare Wt.			321.75	Mass of Sample after Wash	138.24
Total Sample Dry Wt. + Tare Wt.			286.41	Mass passing #200	22.30
Total Sample Dry Weight			160.54	% Passing #200 (D1140)	13.9%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.34	0.2%	0.2%	99.8%	NA
#10	2.000	1.27	0.6%	0.8%	99.2%	NA
#20	0.850	23.79	14.0%	14.8%	85.2%	NA
#40	0.425	98.89	46.8%	61.6%	38.4%	NA
#60	0.250	127.81	18.0%	79.6%	20.4%	NA
#100	0.150	134.44	4.1%	83.7%	16.3%	NA
#200	0.075	138.01	2.2%	86.0%	14.0%	NA
Pan	<0.075	138.13		% Passing #200 (D6913) = 14.0%		
D2487	Maximum Particle Size		3/8"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	60.8%
Gravel	< 75 mm and > 4.75 mm (#4)		0.2%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	24.4%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.6%	% Silt & Clay	< 0.075 mm	14.0%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/24/2017
Date

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Sieve Analysis of Soils



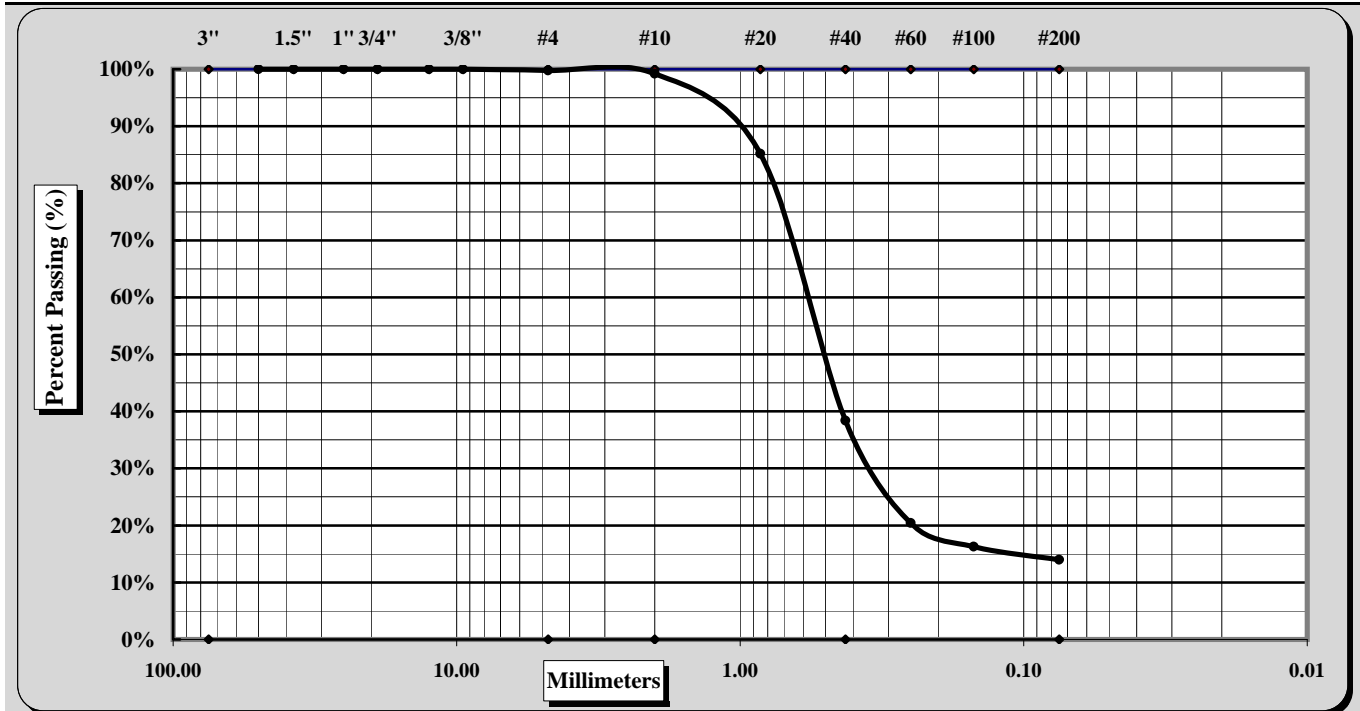
ASTM D 6913

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Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17RW-05	Sample:	SS-8
		Sample Date:	4/17/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/8"	Coarse Sand	0.6%	Fine Sand	24.4%
Gravel	0.2%	Medium Sand	60.8%	Silt & Clay	14.0%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	22.0%

Coarse Sand	0.6%	Medium Sand	60.8%	Fine Sand	24.4%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17SW-05	Sample:	SS-5
		Sample Date:	4/24/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	8 - 10 ft

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	126.61	Mass of Sample after Wash + Tare Wt.	261.38
Total Sample Wet Wt. + Tare Wt.			322.63	Mass of Sample after Wash	134.77
Total Sample Dry Wt. + Tare Wt.			282.87	Mass passing #200	21.49
Total Sample Dry Weight			156.26	% Passing #200 (D1140)	13.8%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	6.53	4.2%	4.2%	95.8%	NA
#10	2.000	33.29	17.1%	21.3%	78.7%	NA
#20	0.850	92.77	38.1%	59.4%	40.6%	NA
#40	0.425	119.77	17.3%	76.6%	23.4%	NA
#60	0.250	127.60	5.0%	81.7%	18.3%	NA
#100	0.150	131.39	2.4%	84.1%	15.9%	NA
#200	0.075	134.60	2.1%	86.1%	13.9%	NA
Pan	<0.075	134.81		% Passing #200 (D6913) = 13.9%		
D2487	Maximum Particle Size		3/8"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	55.3%
Gravel	< 75 mm and > 4.75 mm (#4)		4.2%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	9.5%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		17.1%	% Silt & Clay	< 0.075 mm	13.9%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/24/2017
Date

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Sieve Analysis of Soils



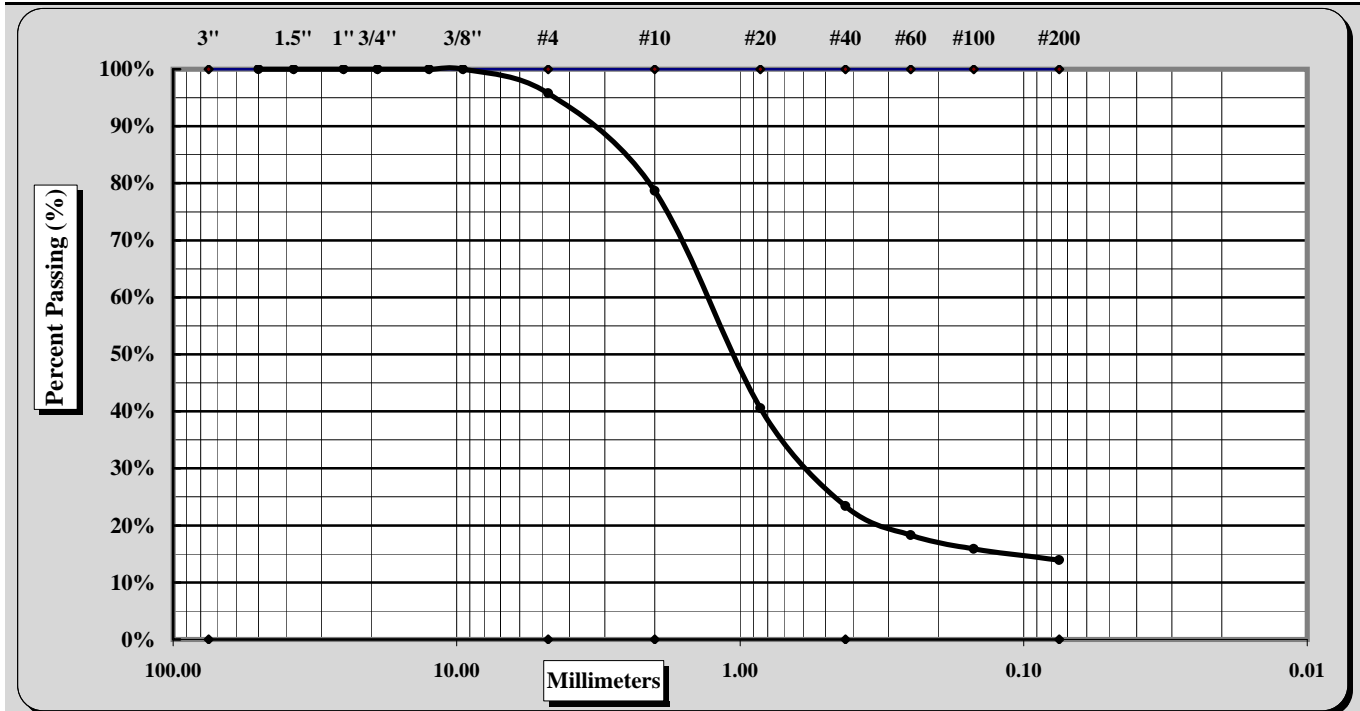
ASTM D 6913

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Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17SW-05	Sample:	SS-5
		Sample Date:	4/24/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	8 - 10 ft

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/8"	Coarse Sand	17.1%	Fine Sand	9.5%
Gravel	4.2%	Medium Sand	55.3%	Silt & Clay	13.9%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	25.4%

Coarse Sand	17.1%	Medium Sand	55.3%	Fine Sand	9.5%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/24/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Dates:	4/24/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17SW-05	Sample No.	SS-8
		Sample Depth:	23 - 25 ft.

Sample Description		Gray & Brown Fat CLAY (CH)	
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
	Tare #:	Soaked <input checked="" type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	76.93
	Wet Wt + T	After 200 Wash + Tare Wt. (C _T)	111.99
	Dry Wt + T	Dry Mass Retained on #200 Sieve (C)	0.68
	Moisture Content (MC)	30.3%	% Passing #200 Sieve (A)
			99.1%

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>
	Tare Wt. (T)	Original Dry Mass of Sample (B)
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)
	Moisture Content (MC)	% Passing #200 Sieve (A)

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>
	Tare Wt. (T)	Original Dry Mass of Sample (B)
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)
	Moisture Content (MC)	% Passing #200 Sieve (A)

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No. 5/18/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position 5/24/2017
 Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME, Inc.	Sample Dates:	4/25/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17SW-06	Sample No.	SS-3
		Sample Depth:	4 - 6 ft.

Sample Description			
Tan-Brown Sandy Lean CLAY (CL)			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
Tare #:		Soaked <input checked="" type="checkbox"/>	Soak Time 24 hrs.
Tare Wt. (T)	119.55	Original Dry Mass of Sample (B)	67.51
Wet Wt + T	200.71	After 200 Wash + Tare Wt. (C _T)	146.10
Dry Wt + T	187.06	Dry Mass Retained on #200 Sieve (C)	26.55
Moisture Content (MC)	20.2%	% Passing #200 Sieve (A)	60.7%

Boring No. Sample No. Sample Depth:

Sample Description			
Tan-Brown Sandy Lean CLAY (CL)			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
Tare #:		Soaked <input type="checkbox"/>	Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)	
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)	
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)	
Moisture Content (MC)		% Passing #200 Sieve (A)	

Boring No. Sample No. Sample Depth:

Sample Description			
Tan-Brown Sandy Lean CLAY (CL)			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
Tare #:		Soaked <input type="checkbox"/>	Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)	
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)	
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)	
Moisture Content (MC)		% Passing #200 Sieve (A)	

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
Technician Name

Signature

N/A
Certification Type/No.

5/18/2017
Date

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/24/2017
Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17SW-06	Sample:	SS-8
		Sample Date:	4/25/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	136.29	Mass of Sample after Wash + Tare Wt.	272.36
Total Sample Wet Wt. + Tare Wt.			335.96	Mass of Sample after Wash	136.07
Total Sample Dry Wt. + Tare Wt.			300.09	Mass passing #200	27.73
Total Sample Dry Weight			163.80	% Passing #200 (D1140)	16.9%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	14.90	9.1%	9.1%	90.9%	NA
3/8"	9.50	22.04	4.4%	13.5%	86.5%	NA
#4	4.75	26.02	2.4%	15.9%	84.1%	NA
#10	2.000	30.01	2.4%	18.3%	81.7%	NA
#20	0.850	38.17	5.0%	23.3%	76.7%	NA
#40	0.425	71.47	20.3%	43.6%	56.4%	NA
#60	0.250	106.04	21.1%	64.7%	35.3%	NA
#100	0.150	125.03	11.6%	76.3%	23.7%	NA
#200	0.075	135.95	6.7%	83.0%	17.0%	NA
Pan	<0.075	136.17		% Passing #200 (D6913) = 17.0%		
D2487	Maximum Particle Size		3/4"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	25.3%
Gravel	< 75 mm and > 4.75 mm (#4)		15.9%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	39.4%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		2.4%	% Silt & Clay	< 0.075 mm	17.0%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


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Laboratory Manager
Position

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Sieve Analysis of Soils



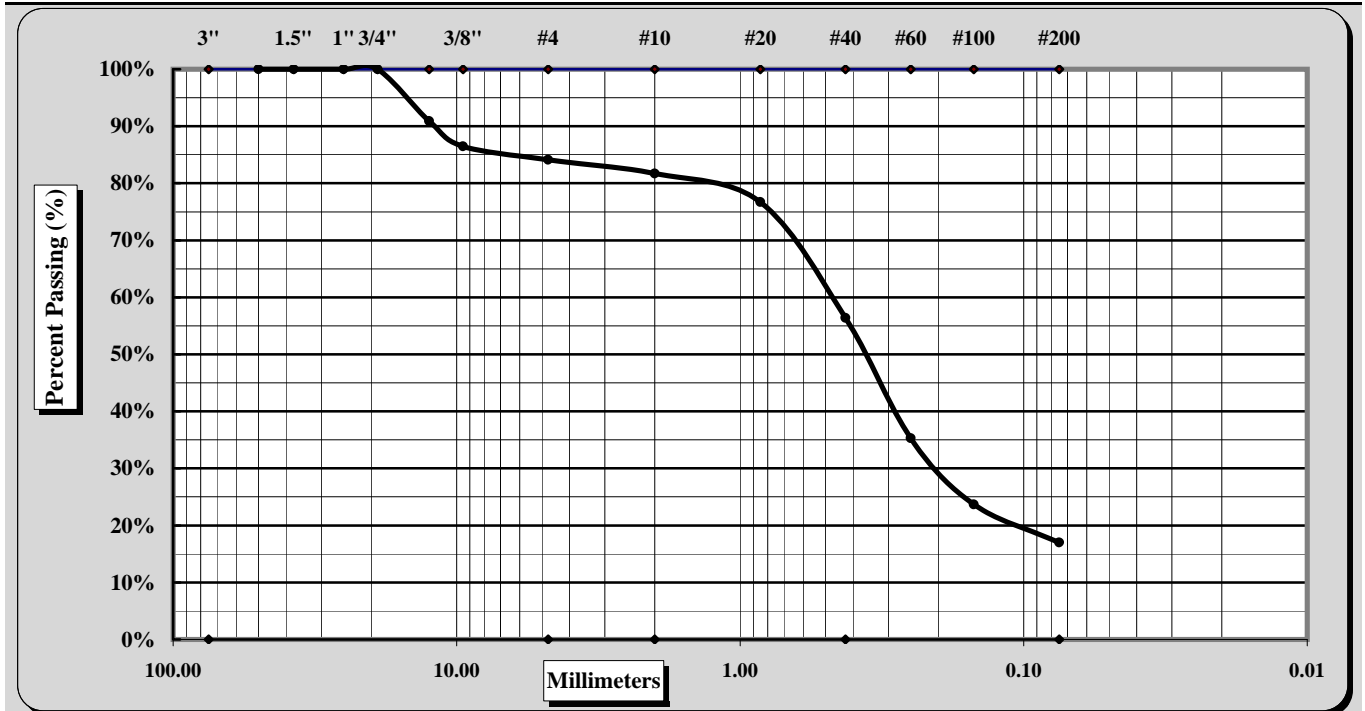
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17SW-06	Sample:	SS-8
		Sample Date:	4/25/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/4"	Coarse Sand	2.4%	Fine Sand	39.4%
Gravel	15.9%	Medium Sand	25.3%	Silt & Clay	17.0%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	21.9%

Coarse Sand	2.4%	Medium Sand	25.3%	Fine Sand	39.4%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

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Sieve Analysis of Soils



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Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17SW-07	Sample:	SS-6
		Sample Date:	4/25/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	13 - 15 ft

Sample Description: Light Gray Clayey SAND (SC)

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	137.59	Mass of Sample after Wash + Tare Wt.	194.42
Total Sample Wet Wt. + Tare Wt.			238.08	Mass of Sample after Wash	56.83
Total Sample Dry Wt. + Tare Wt.			218.58	Mass passing #200	24.16
Total Sample Dry Weight			80.99	% Passing #200 (D1140)	29.8%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	1.73	2.1%	2.1%	97.9%	NA
#10	2.000	3.04	1.6%	3.8%	96.2%	NA
#20	0.850	7.50	5.5%	9.3%	90.7%	NA
#40	0.425	19.78	15.2%	24.4%	75.6%	NA
#60	0.250	32.42	15.6%	40.0%	60.0%	NA
#100	0.150	46.09	16.9%	56.9%	43.1%	NA
#200	0.075	56.62	13.0%	69.9%	30.1%	NA
Pan	<0.075	52.04		% Passing #200 (D6913) = 30.1%		
D2487	Maximum Particle Size		3/8"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	20.7%
Gravel	< 75 mm and > 4.75 mm (#4)		2.1%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	45.5%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		1.6%	% Silt & Clay	< 0.075 mm	30.1%

Notes / Deviations / References:

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Sieve Analysis of Soils



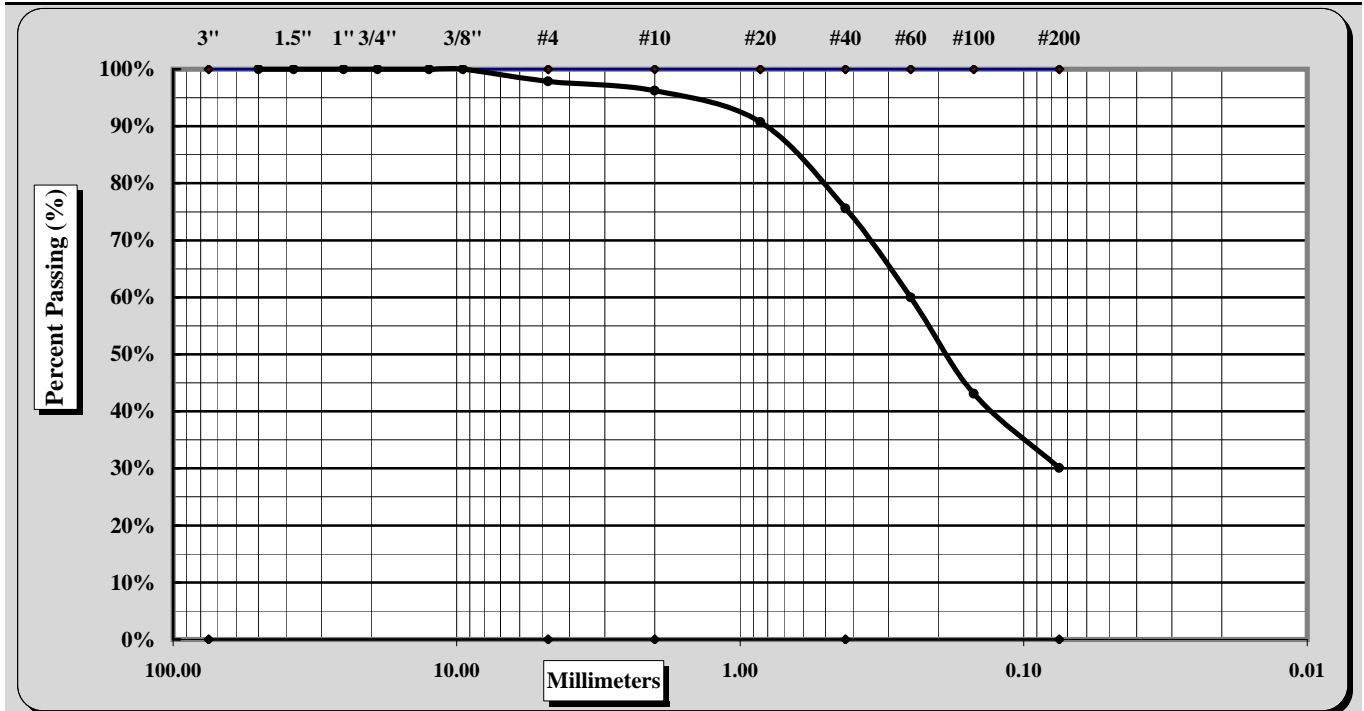
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 0	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17SW-07	Sample:	SS-6
		Sample Date:	4/25/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	13 - 15 ft

Sample Description: Light Gray Clayey SAND (SC)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/8"	Coarse Sand	1.6%	Fine Sand	45.5%
Gravel	2.1%	Medium Sand	20.7%	Silt & Clay	30.1%
Liquid Limit	37	Plastic Limit	20	Plastic Index	17
Specific Gravity	ND			Moisture Content	24.1%

Coarse Sand	1.6%	Medium Sand	20.7%	Fine Sand	45.5%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

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Sieve Analysis of Soils



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Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17SW-08	Sample:	SS-4
		Sample Date:	4/25/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	6 - 8 ft

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>	
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	131.52	Mass of Sample after Wash + Tare Wt.	245.06
Total Sample Wet Wt. + Tare Wt.			336.33	Mass of Sample after Wash	113.54
Total Sample Dry Wt. + Tare Wt.			316.16	Mass passing #200	71.10
Total Sample Dry Weight			184.64	% Passing #200 (D1140)	38.5%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	0.78	0.4%	0.4%	99.6%	NA
#20	0.850	7.11	3.4%	3.9%	96.1%	NA
#40	0.425	17.81	5.8%	9.6%	90.4%	NA
#60	0.250	27.70	5.4%	15.0%	85.0%	NA
#100	0.150	45.52	9.7%	24.7%	75.3%	NA
#200	0.075	113.30	36.7%	61.4%	38.6%	NA
Pan	<0.075	113.56		% Passing #200 (D6913) = 38.6%		
D2487	Maximum Particle Size		#4	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	9.2%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	51.8%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.4%	% Silt & Clay	< 0.075 mm	38.6%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

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Sieve Analysis of Soils



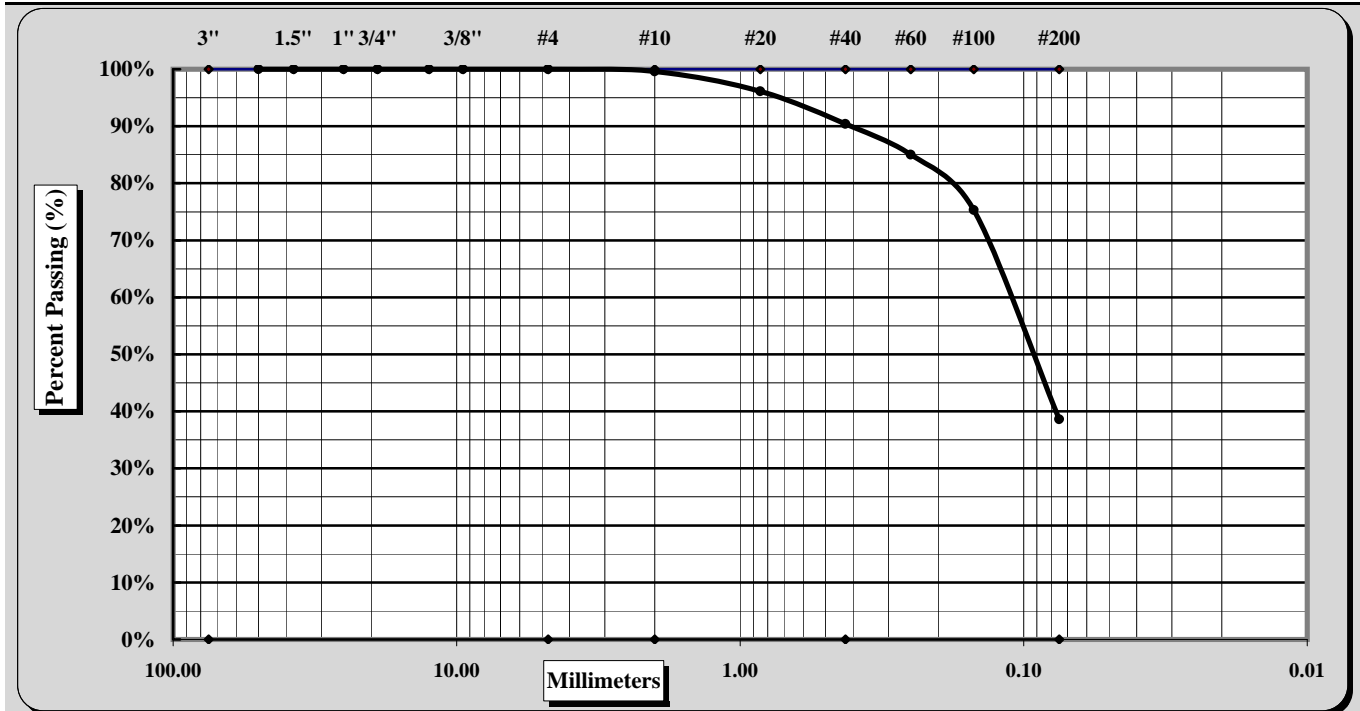
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Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17SW-08	Sample:	SS-4
		Sample Date:	4/25/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	6 - 8 ft

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	0.4%	Fine Sand	51.8%
Gravel	0.0%	Medium Sand	9.2%	Silt & Clay	38.6%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	10.9%

Coarse Sand	0.4%	Medium Sand	9.2%	Fine Sand	51.8%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

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Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17SW-09	Sample:	SS-6
		Sample Date:	5/2/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	13 - 15 ft

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	121.83	Mass of Sample after Wash + Tare Wt.	263.81
Total Sample Wet Wt. + Tare Wt.			316.33	Mass of Sample after Wash	141.98
Total Sample Dry Wt. + Tare Wt.			293.33	Mass passing #200	29.52
Total Sample Dry Weight			171.50	% Passing #200 (D1140)	17.2%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.50	0.3%	0.3%	99.7%	NA
#10	2.000	11.15	6.2%	6.5%	93.5%	NA
#20	0.850	43.04	18.6%	25.1%	74.9%	NA
#40	0.425	96.21	31.0%	56.1%	43.9%	NA
#60	0.250	128.75	19.0%	75.1%	24.9%	NA
#100	0.150	137.07	4.9%	79.9%	20.1%	NA
#200	0.075	141.67	2.7%	82.6%	17.4%	NA
Pan	<0.075	141.94		% Passing #200 (D6913) = 17.4%		
D2487	Maximum Particle Size		3/8"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	49.6%
Gravel	< 75 mm and > 4.75 mm (#4)		0.3%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	26.5%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		6.2%	% Silt & Clay	< 0.075 mm	17.4%

Notes / Deviations / References:

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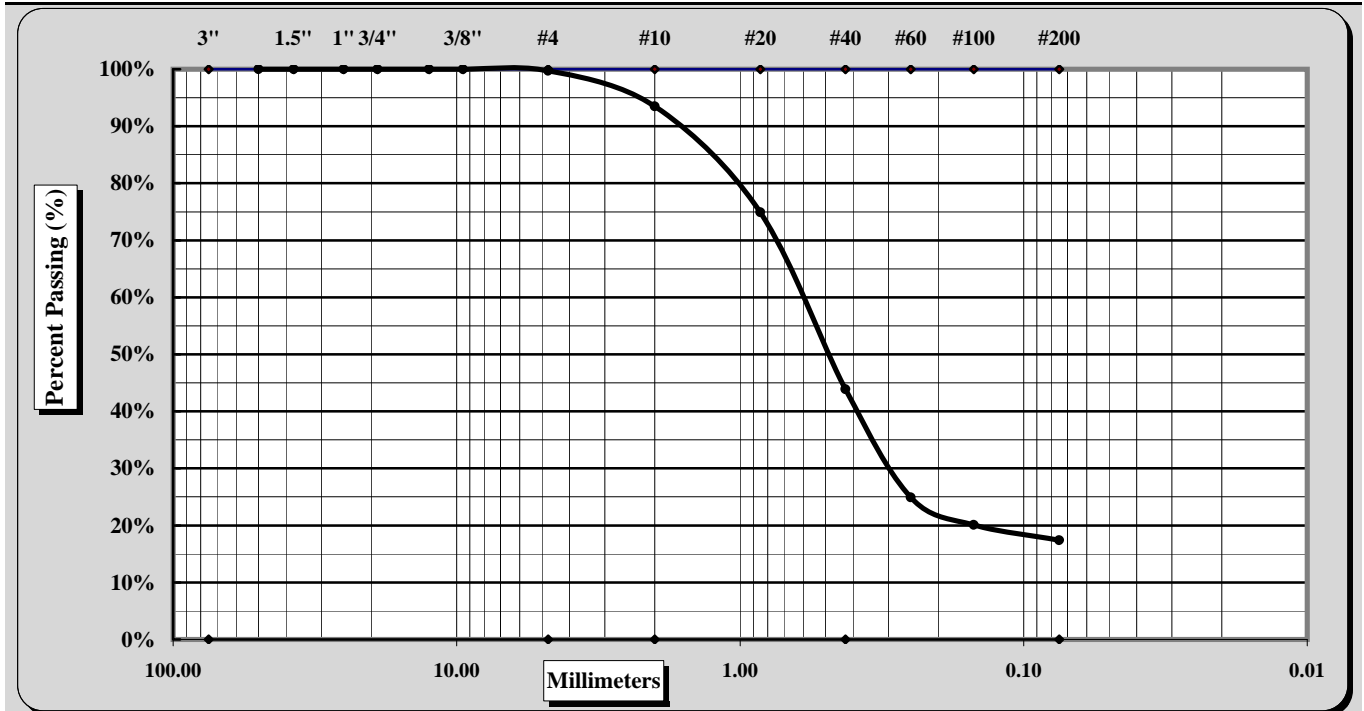
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Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17SW-09	Sample:	SS-6
		Sample Date:	5/2/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	13 - 15 ft

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/8"	Coarse Sand	6.2%	Fine Sand	26.5%
Gravel	0.3%	Medium Sand	49.6%	Silt & Clay	17.4%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	13.4%

Coarse Sand	6.2%	Medium Sand	49.6%	Fine Sand	26.5%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

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Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17SW-10	Sample:	SS-8
		Sample Date:	5/2/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>	
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	139.40	Mass of Sample after Wash + Tare Wt.	269.29
Total Sample Wet Wt. + Tare Wt.			328.46	Mass of Sample after Wash	129.89
Total Sample Dry Wt. + Tare Wt.			302.38	Mass passing #200	33.09
Total Sample Dry Weight			162.98	% Passing #200 (D1140)	20.3%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.83	0.5%	0.5%	99.5%	NA
#10	2.000	16.15	9.4%	9.9%	90.1%	NA
#20	0.850	65.72	30.4%	40.3%	59.7%	NA
#40	0.425	99.59	20.8%	61.1%	38.9%	NA
#60	0.250	115.83	10.0%	71.1%	28.9%	NA
#100	0.150	124.00	5.0%	76.1%	23.9%	NA
#200	0.075	129.70	3.5%	79.6%	20.4%	NA
Pan	<0.075	129.93		% Passing #200 (D6913) = 20.4%		
D2487	Maximum Particle Size		3/8"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	51.2%
Gravel	< 75 mm and > 4.75 mm (#4)		0.5%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	18.5%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		9.4%	% Silt & Clay	< 0.075 mm	20.4%

Notes / Deviations / References:

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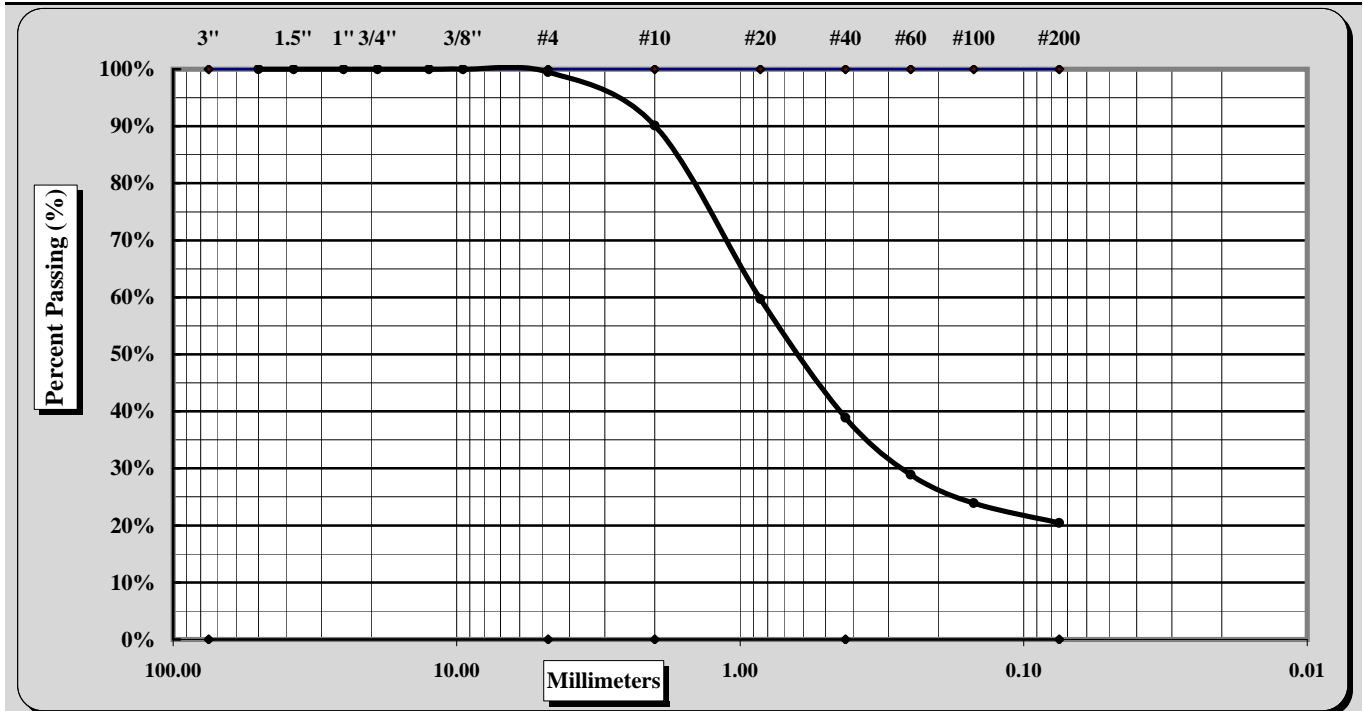
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17SW-10	Sample:	SS-8
		Sample Date:	5/2/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/8"	Coarse Sand	9.4%	Fine Sand	18.5%
Gravel	0.5%	Medium Sand	51.2%	Silt & Clay	20.4%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	16.0%

Coarse Sand	9.4%	Medium Sand	51.2%	Fine Sand	18.5%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/24/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	GET	Sample Dates:	5/1/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17SWM-10	Sample No.	SS-6
		Sample Depth:	13 - 15 ft.

Sample Description		Brown Fat CLAY (CH)	
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
	Tare #:	Soaked <input checked="" type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	79.45
	Wet Wt + T	After 200 Wash + Tare Wt. (C _T)	125.23
	Dry Wt + T	Dry Mass Retained on #200 Sieve (C)	0.43
	Moisture Content (MC)	% Passing #200 Sieve (A)	99.5%

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No. 5/18/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position 5/24/2017
 Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17SWM-10	Sample:	SS-8
		Sample Date:	5/1/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>	
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	121.79	Mass of Sample after Wash + Tare Wt.	231.32
Total Sample Wet Wt. + Tare Wt.			287.42	Mass of Sample after Wash	109.53
Total Sample Dry Wt. + Tare Wt.			252.99	Mass passing #200	21.67
Total Sample Dry Weight			131.20	% Passing #200 (D1140)	16.5%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	0.02	0.0%	0.0%	100.0%	NA
#20	0.850	0.98	0.7%	0.7%	99.3%	NA
#40	0.425	32.06	23.7%	24.4%	75.6%	NA
#60	0.250	86.23	41.3%	65.7%	34.3%	NA
#100	0.150	102.41	12.3%	78.1%	21.9%	NA
#200	0.075	109.45	5.4%	83.4%	16.6%	NA
Pan	<0.075	109.83		% Passing #200 (D6913) = 16.6%		
D2487	Maximum Particle Size	#4	Medium Sand	< 2.00 mm and > 0.425 mm (#40)		24.4%
Gravel	< 75 mm and > 4.75 mm (#4)	0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)		59.0%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	0.0%	% Silt & Clay	< 0.075 mm		16.6%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/24/2017
Date

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Sieve Analysis of Soils



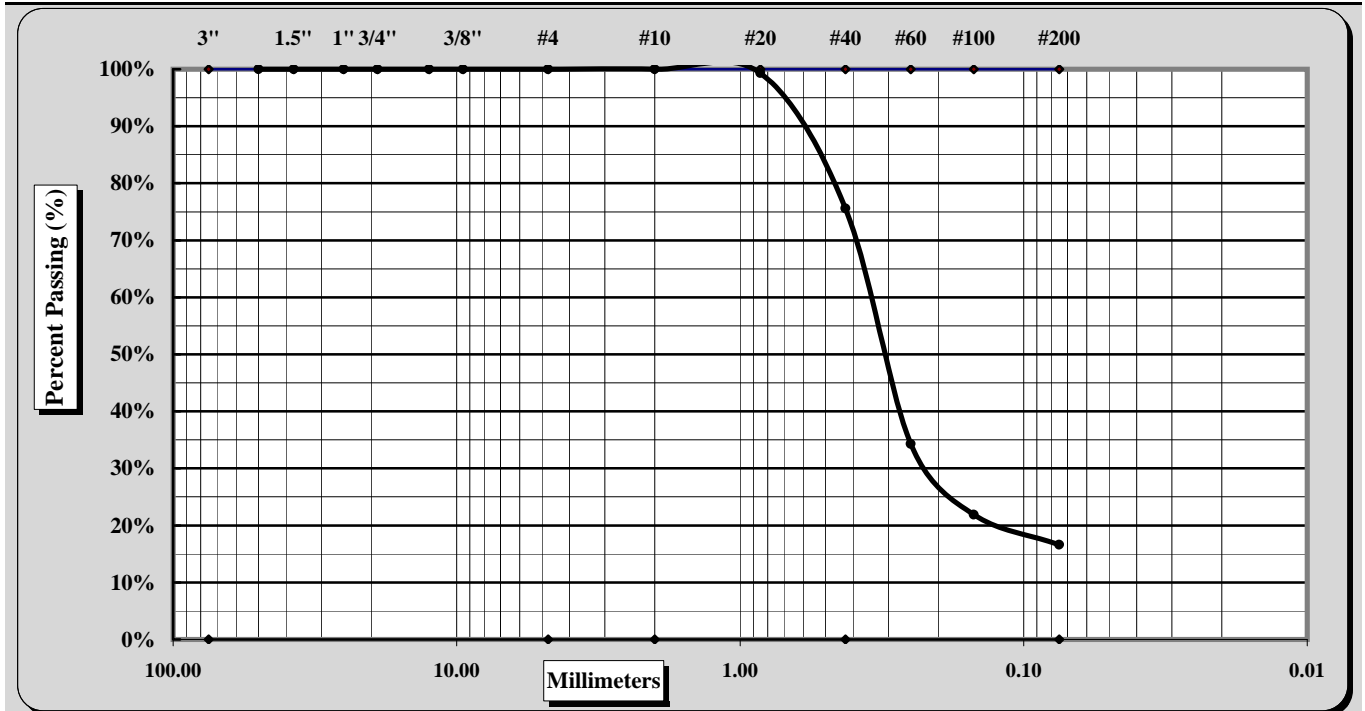
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17SWM-10	Sample:	SS-8
		Sample Date:	5/1/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	0.0%	Fine Sand	59.0%
Gravel	0.0%	Medium Sand	24.4%	Silt & Clay	16.6%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	26.2%

Coarse Sand	0.0%	Medium Sand	24.4%	Fine Sand	59.0%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/14/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/10 - 5/14/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17SWM-19	Sample:	Bulk
		Sample Date:	5/1/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	0 - 10

Sample Description: Tan-Brown Clayey SAND (SC)

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.	306A	Tare Wt.	122.77	Mass of Sample after Wash + Tare Wt.	274.96
Total Sample Wet Wt. + Tare Wt.			415.79	Mass of Sample after Wash	152.19
Total Sample Dry Wt. + Tare Wt.			384.56	Mass passing #200	109.60
Total Sample Dry Weight			261.79	% Passing #200 (D1140)	41.9%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	2.93	1.1%	1.1%	98.9%	NA
3/8"	9.50	8.36	2.1%	3.2%	96.8%	NA
#4	4.75	20.98	4.8%	8.0%	92.0%	NA
#10	2.000	30.35	3.6%	11.6%	88.4%	NA
#20	0.850	48.63	7.0%	18.6%	81.4%	NA
#40	0.425	86.00	14.3%	32.9%	67.1%	NA
#60	0.250	109.43	8.9%	41.8%	58.2%	NA
#100	0.150	129.99	7.9%	49.7%	50.3%	NA
#200	0.075	151.88	8.4%	58.0%	42.0%	NA
Pan	<0.075	152.15		% Passing #200 (D6913) = 42.0%		
D2487	Maximum Particle Size		3/4"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	21.3%
Gravel	< 75 mm and > 4.75 mm (#4)		8.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	25.2%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		3.6%	% Silt & Clay	< 0.075 mm	42.0%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


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Laboratory Manager
Position

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Sieve Analysis of Soils



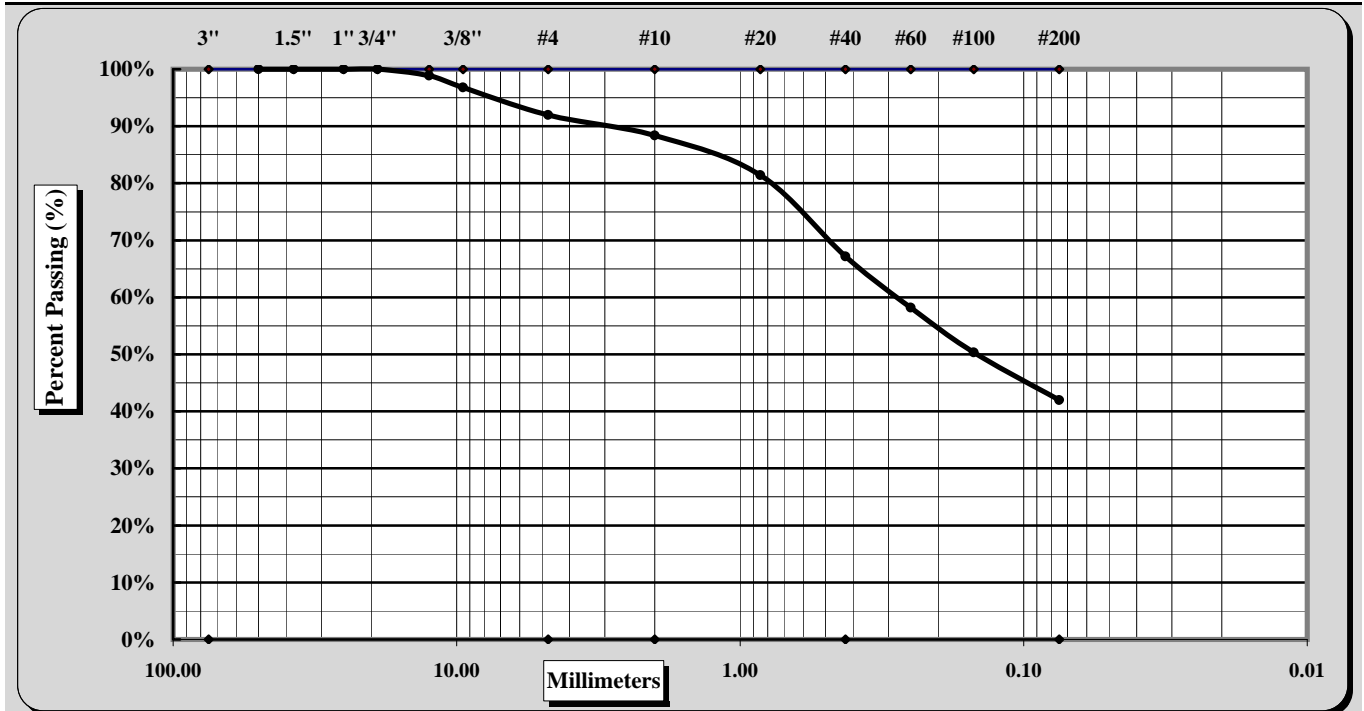
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 0	Report Date:	5/14/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/10 - 5/14/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17SWM-19	Sample:	Bulk
		Sample Date:	5/1/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	0 - 10

Sample Description: Tan-Brown Clayey SAND (SC)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/4"	Coarse Sand	3.6%	Fine Sand	25.2%
Gravel	8.0%	Medium Sand	21.3%	Silt & Clay	42.0%
Liquid Limit	37	Plastic Limit	17	Plastic Index	20
Specific Gravity	ND			Moisture Content	11.9%

Coarse Sand	3.6%	Medium Sand	21.3%	Fine Sand	25.2%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/16 - 5/24/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17SWM-19	Sample:	SS-2
		Sample Date:	5/1/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	2 - 4 ft.

Sample Description: Tan-Brown Sandy Lean CLAY (CL)

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	132.51	Mass of Sample after Wash + Tare Wt.	163.25
Total Sample Wet Wt. + Tare Wt.			218.34	Mass of Sample after Wash	30.74
Total Sample Dry Wt. + Tare Wt.			204.87	Mass passing #200	41.62
Total Sample Dry Weight			72.36	% Passing #200 (D1140)	57.5%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	0.13	0.2%	0.2%	99.8%	NA
#20	0.850	1.13	1.4%	1.6%	98.4%	NA
#40	0.425	5.63	6.2%	7.8%	92.2%	NA
#60	0.250	11.89	8.7%	16.4%	83.6%	NA
#100	0.150	18.08	8.6%	25.0%	75.0%	NA
#200	0.075	30.46	17.1%	42.1%	57.9%	NA
Pan	<0.075	30.83		% Passing #200 (D6913) = 57.9%		
D2487	Maximum Particle Size		#4	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	7.6%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	34.3%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.2%	% Silt & Clay	< 0.075 mm	57.9%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/24/2017
Date

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Sieve Analysis of Soils



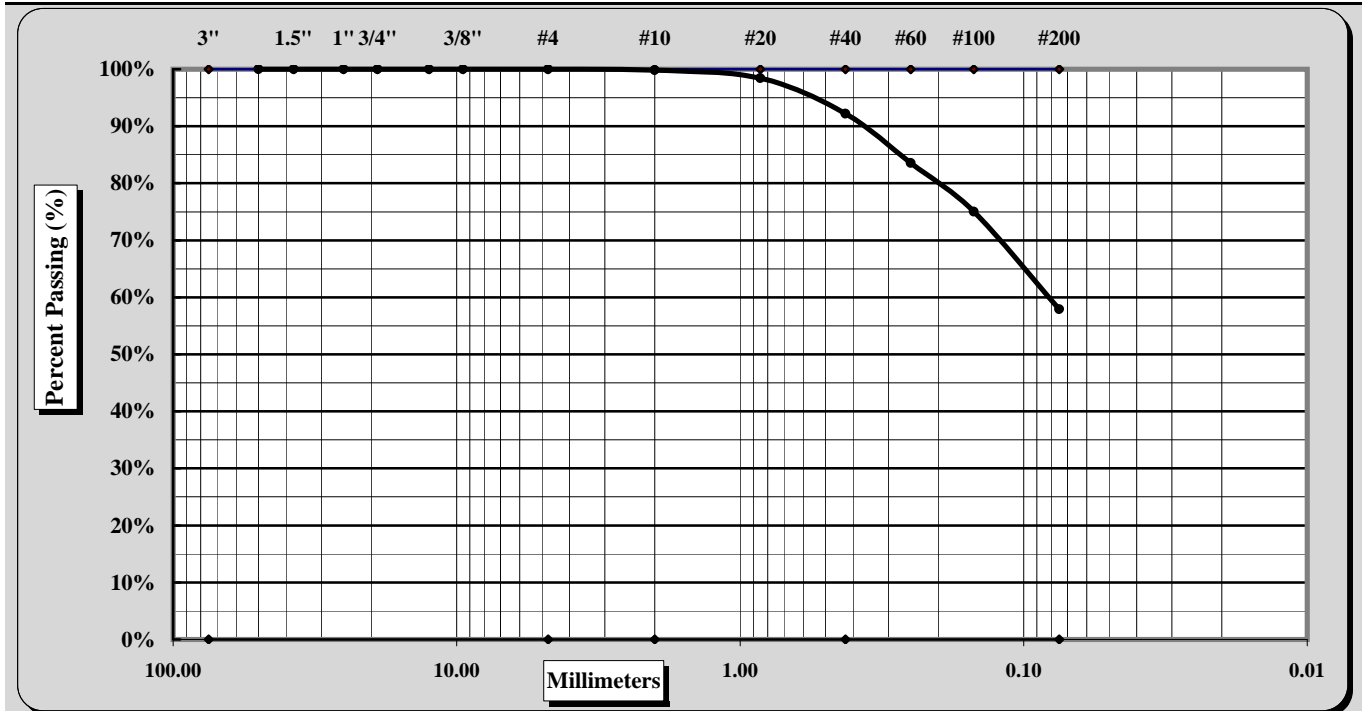
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 0	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/16 - 5/24/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17SWM-19	Sample:	SS-2
		Sample Date:	5/1/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	2 - 4 ft.

Sample Description: Tan-Brown Sandy Lean CLAY (CL)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	0.2%	Fine Sand	34.3%
Gravel	0.0%	Medium Sand	7.6%	Silt & Clay	57.9%
Liquid Limit	39	Plastic Limit	17	Plastic Index	22
Specific Gravity	ND			Moisture Content	18.6%

Coarse Sand	0.2%	Medium Sand	7.6%	Fine Sand	34.3%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17SWM-19	Sample:	SS-7
		Sample Date:	5/1/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	18 - 20 ft

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	131.53	Mass of Sample after Wash + Tare Wt.	257.34
Total Sample Wet Wt. + Tare Wt.			313.21	Mass of Sample after Wash	125.81
Total Sample Dry Wt. + Tare Wt.			287.61	Mass passing #200	30.27
Total Sample Dry Weight			156.08	% Passing #200 (D1140)	19.4%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	1.14	0.7%	0.7%	99.3%	NA
#20	0.850	37.59	23.4%	24.1%	75.9%	NA
#40	0.425	106.22	44.0%	68.1%	31.9%	NA
#60	0.250	116.59	6.6%	74.7%	25.3%	NA
#100	0.150	121.51	3.2%	77.9%	22.1%	NA
#200	0.075	125.51	2.6%	80.4%	19.6%	NA
Pan	<0.075	125.65		% Passing #200 (D6913) = 19.6%		
D2487	Maximum Particle Size		#4	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	67.4%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	12.3%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.7%	% Silt & Clay	< 0.075 mm	19.6%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/24/2017
Date

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Sieve Analysis of Soils



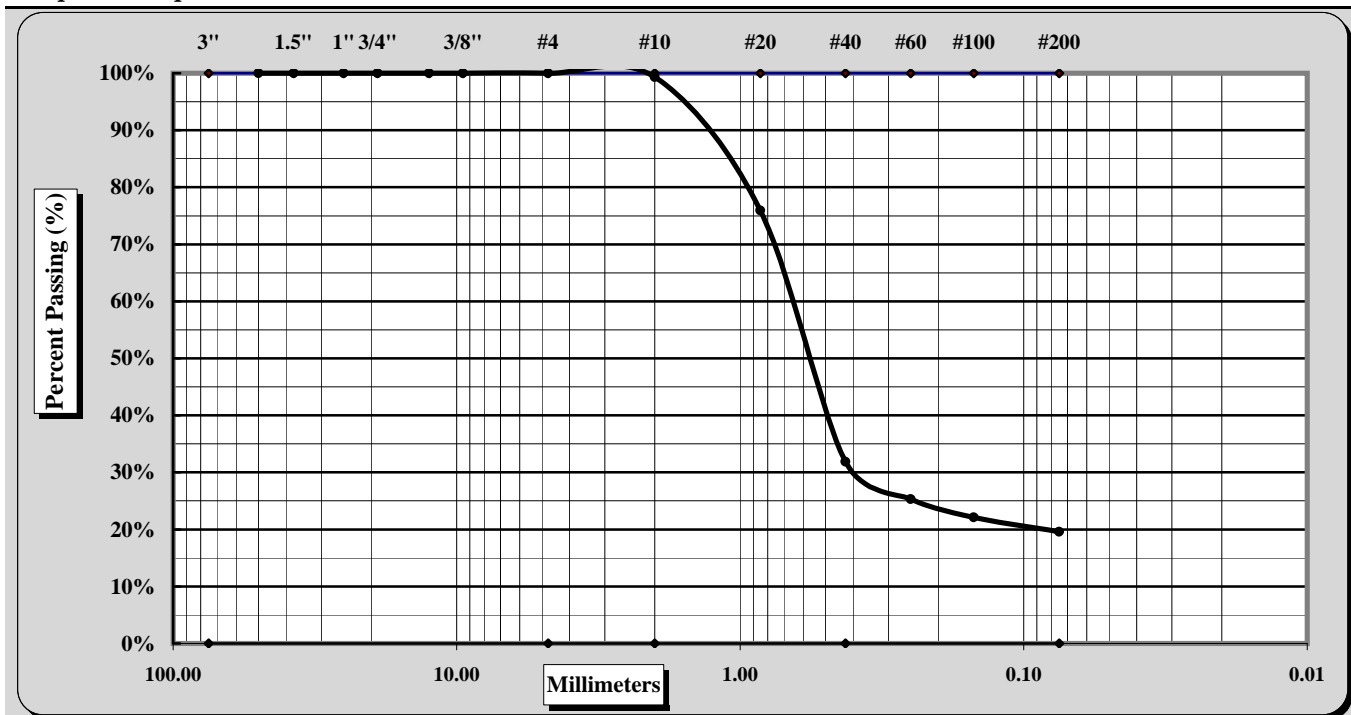
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17SWM-19	Sample:	SS-7
		Sample Date:	5/1/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	18 - 20 ft

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	0.7%	Fine Sand	12.3%
Gravel	0.0%	Medium Sand	67.4%	Silt & Clay	19.6%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	16.4%

Coarse Sand	0.7%	Medium Sand	67.4%	Fine Sand	12.3%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/24/2017
Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/10 - 5/16/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17SWM-21	Sample:	Bulk
		Sample Date:	4/24/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	0 - 15
Sample Description:	Tan-Brown Clayey SAND (SC)		

Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.	1217	Tare Wt.	130.22	Mass of Sample after Wash + Tare Wt.	275.86
Total Sample Wet Wt. + Tare Wt.			397.10	Mass of Sample after Wash	145.64
Total Sample Dry Wt. + Tare Wt.			360.00	Mass passing #200	84.14
Total Sample Dry Weight			229.78	% Passing #200 (D1140)	36.6%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	7.16	3.1%	3.1%	96.9%	NA
#10	2.000	20.99	6.0%	9.1%	90.9%	NA
#20	0.850	37.40	7.1%	16.3%	83.7%	NA
#40	0.425	70.09	14.2%	30.5%	69.5%	NA
#60	0.250	105.32	15.3%	45.8%	54.2%	NA
#100	0.150	125.58	8.8%	54.7%	45.3%	NA
#200	0.075	145.25	8.6%	63.2%	36.8%	NA
Pan	<0.075	145.67		% Passing #200 (D6913) =		36.8%
D2487	Maximum Particle Size		3/8"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	21.4%
Gravel	< 75 mm and > 4.75 mm (#4)		3.1%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	32.7%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		6.0%	% Silt & Clay	< 0.075 mm	36.8%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


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Laboratory Manager
Position

5/21/2017
Date

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Sieve Analysis of Soils



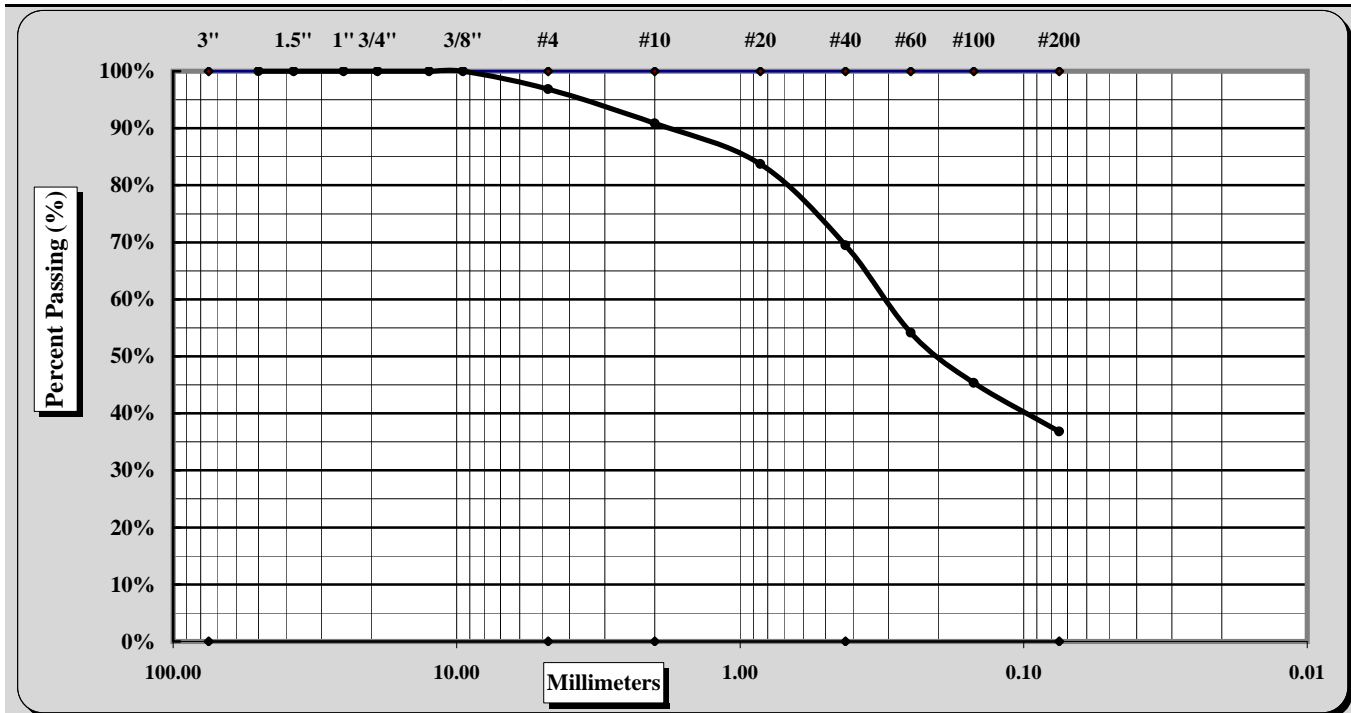
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 0	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/10 - 5/16/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17SWM-21	Sample:	Bulk
		Sample Date:	4/24/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	0 - 15

Sample Description: Tan-Brown Clayey SAND (SC)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/8"	Coarse Sand	6.0%	Fine Sand	32.7%
Gravel	3.1%	Medium Sand	21.4%	Silt & Clay	36.8%
Liquid Limit	45	Plastic Limit	18	Plastic Index	27
Specific Gravity	ND			Moisture Content	16.1%

Coarse Sand	6.0%	Medium Sand	21.4%	Fine Sand	32.7%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17SWM-22	Sample:	SS-4
		Sample Date:	5/1/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	6 - 8 ft

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	127.55	Mass of Sample after Wash + Tare Wt.	283.53
Total Sample Wet Wt. + Tare Wt.			340.69	Mass of Sample after Wash	155.98
Total Sample Dry Wt. + Tare Wt.			316.55	Mass passing #200	33.02
Total Sample Dry Weight			189.00	% Passing #200 (D1140)	17.5%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	12.54	6.6%	6.6%	93.4%	NA
3/8"	9.50	18.46	3.1%	9.8%	90.2%	NA
#4	4.75	31.76	7.0%	16.8%	83.2%	NA
#10	2.000	59.44	14.6%	31.4%	68.6%	NA
#20	0.850	116.30	30.1%	61.5%	38.5%	NA
#40	0.425	134.96	9.9%	71.4%	28.6%	NA
#60	0.250	143.55	4.5%	76.0%	24.0%	NA
#100	0.150	150.43	3.6%	79.6%	20.4%	NA
#200	0.075	155.89	2.9%	82.5%	17.5%	NA
Pan	<0.075	156.17		% Passing #200 (D6913) = 17.5%		
D2487	Maximum Particle Size		3/4"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	40.0%
Gravel	< 75 mm and > 4.75 mm (#4)		16.8%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	11.1%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		14.6%	% Silt & Clay	< 0.075 mm	17.5%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

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Laboratory Manager
Position

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Sieve Analysis of Soils



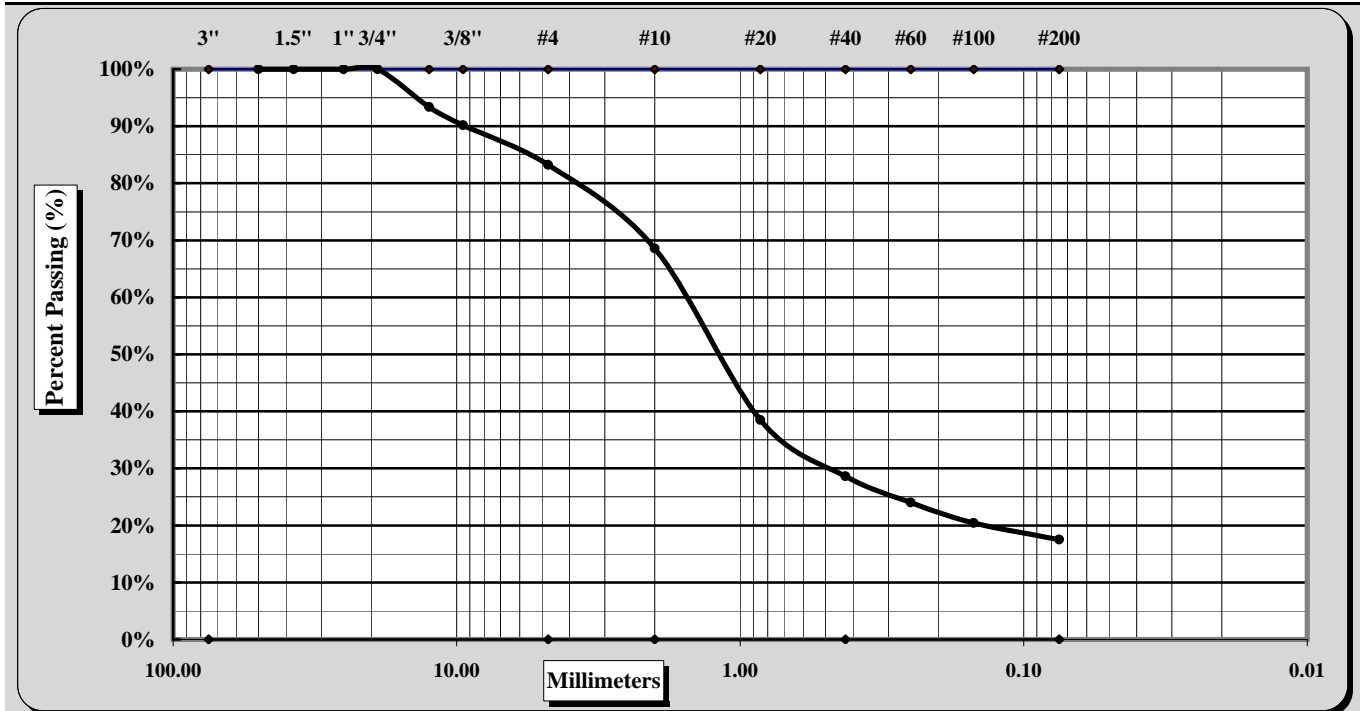
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17SWM-22	Sample:	SS-4
		Sample Date:	5/1/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	6 - 8 ft

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/4"	Coarse Sand	14.6%	Fine Sand	11.1%
Gravel	16.8%	Medium Sand	40.0%	Silt & Clay	17.5%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	12.8%

Coarse Sand	14.6%	Medium Sand	40.0%	Fine Sand	11.1%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

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Sieve Analysis of Soils



ASTM D 6913

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S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/10 - 5/16/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17SWM-23	Sample:	Bulk
		Sample Date:	5/1/23
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	2 - 8 ft.

Sample Description: Brown Clayey SAND (SC)

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.	50	Tare Wt.	133.23	Mass of Sample after Wash + Tare Wt.	254.80
Total Sample Wet Wt. + Tare Wt.			408.22	Mass of Sample after Wash	121.57
Total Sample Dry Wt. + Tare Wt.			363.80	Mass passing #200	109.00
Total Sample Dry Weight			230.57	% Passing #200 (D1140)	47.3%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	2.40	1.0%	1.0%	99.0%	NA
#20	0.850	7.47	2.2%	3.2%	96.8%	NA
#40	0.425	31.65	10.5%	13.7%	86.3%	NA
#60	0.250	74.03	18.4%	32.1%	67.9%	NA
#100	0.150	101.40	11.9%	44.0%	56.0%	NA
#200	0.075	121.15	8.6%	52.5%	47.5%	NA
Pan	<0.075	121.57		% Passing #200 (D6913) =		47.5%
D2487	Maximum Particle Size		#4	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	12.7%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	38.8%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		1.0%	% Silt & Clay	< 0.075 mm	47.5%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


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Sieve Analysis of Soils



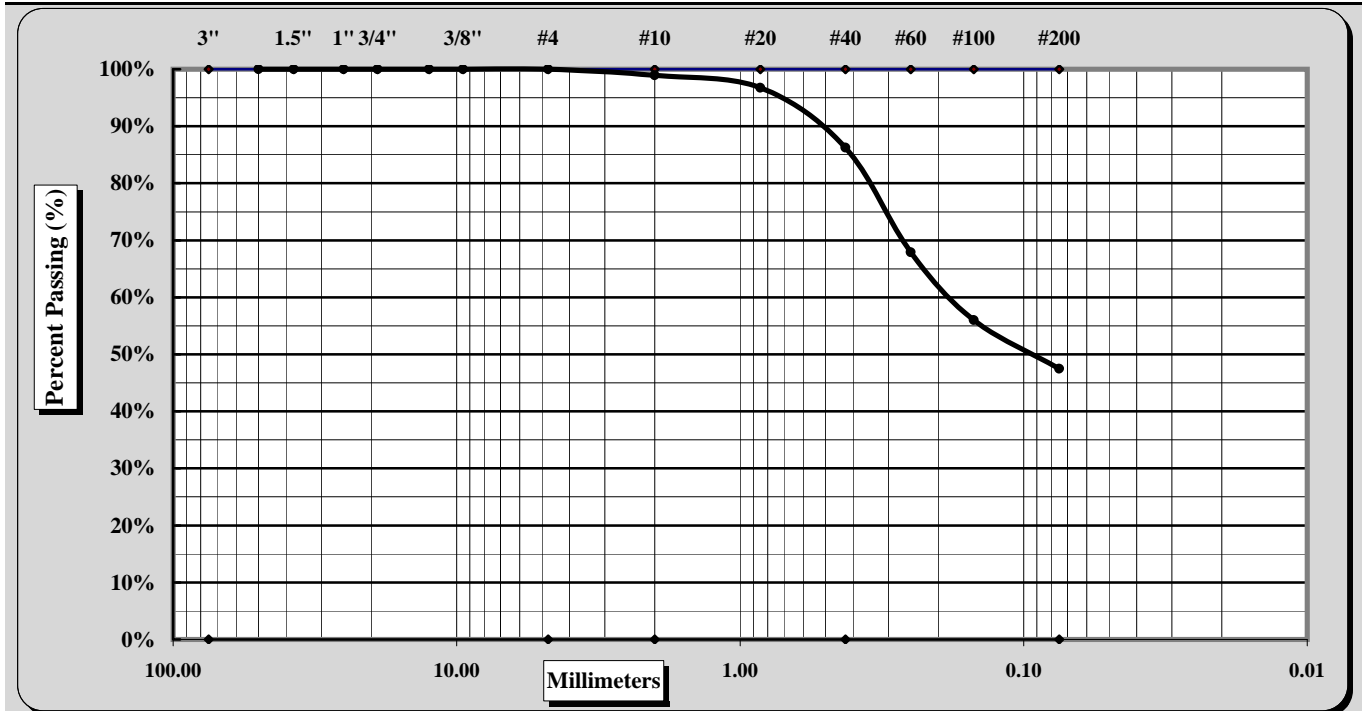
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 0	Report Date:	5/21/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/10 - 5/16/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17SWM-23	Sample:	Bulk
		Sample Date:	5/1/23
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	2 - 8 ft.

Sample Description: Brown Clayey SAND (SC)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	1.0%	Fine Sand	38.8%
Gravel	0.0%	Medium Sand	12.7%	Silt & Clay	47.5%
Liquid Limit	50	Plastic Limit	17	Plastic Index	33
Specific Gravity	ND			Moisture Content	19.3%

Coarse Sand	1.0%	Medium Sand	12.7%	Fine Sand	38.8%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

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5/21/2017
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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME	Sample Dates:	5/1/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17SWM-23	Sample No.	SS-2
		Sample Depth:	2 - 4 ft.

Sample Description		Tan Clayey SAND (SC)	
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
	Tare #:	Soaked <input checked="" type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	66.27
	Wet Wt + T	After 200 Wash + Tare Wt. (C _T)	159.08
	Dry Wt + T	Dry Mass Retained on #200 Sieve (C)	34.50
	Moisture Content (MC)	% Passing #200 Sieve (A)	47.9%

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No. 5/18/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position 5/24/2017
 Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17SWM-23	Sample:	SS-7
		Sample Date:	5/1/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	18 - 20 ft

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	130.15	Mass of Sample after Wash + Tare Wt.	274.13
Total Sample Wet Wt. + Tare Wt.			327.60	Mass of Sample after Wash	143.98
Total Sample Dry Wt. + Tare Wt.			287.24	Mass passing #200	13.11
Total Sample Dry Weight			157.09	% Passing #200 (D1140)	8.3%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	10.31	6.6%	6.6%	93.4%	NA
#10	2.000	44.80	22.0%	28.5%	71.5%	NA
#20	0.850	101.09	35.8%	64.4%	35.6%	NA
#40	0.425	131.54	19.4%	83.7%	16.3%	NA
#60	0.250	139.20	4.9%	88.6%	11.4%	NA
#100	0.150	141.77	1.6%	90.2%	9.8%	NA
#200	0.075	143.73	1.2%	91.5%	8.5%	NA
Pan	<0.075	143.80		% Passing #200 (D6913) = 8.5%		
D2487	Maximum Particle Size		3/8"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	55.2%
Gravel	< 75 mm and > 4.75 mm (#4)		6.6%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	7.8%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		21.9%	% Silt & Clay	< 0.075 mm	8.5%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/24/2017
Date

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Sieve Analysis of Soils



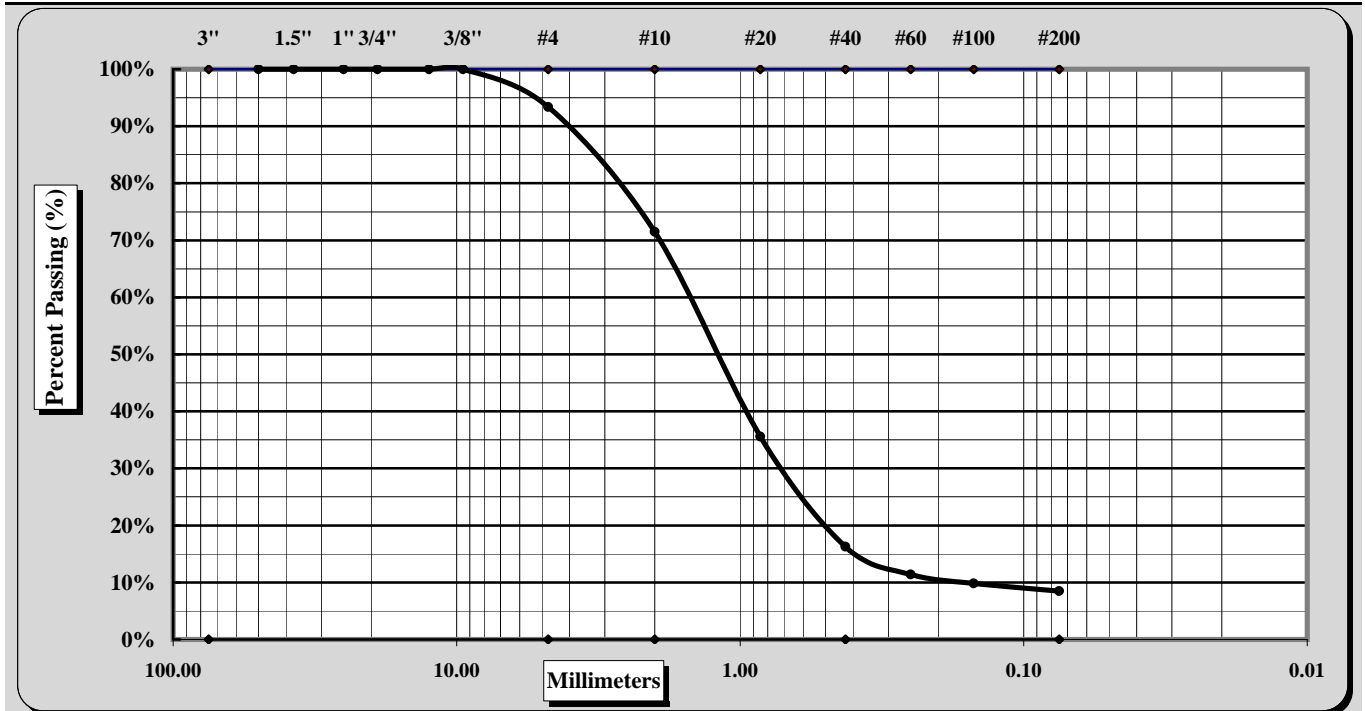
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17SWM-23	Sample:	SS-7
		Sample Date:	5/1/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	18 - 20 ft

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/8"	Coarse Sand	21.9%	Fine Sand	7.8%
Gravel	6.6%	Medium Sand	55.2%	Silt & Clay	8.5%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	25.7%

Coarse Sand	21.9%	Medium Sand	55.2%	Fine Sand	7.8%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined. Cc=2.230, Cu=10.333

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/24/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME	Sample Dates:	4/27/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17WGS-05	Sample No.	SS-10
		Sample Depth:	33 - 35 ft.

Sample Description			
Olive Gray Silty SAND (SM)			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
	Tare #:	Soaked <input checked="" type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	97.54
	Wet Wt + T	After 200 Wash + Tare Wt. (C _T)	201.51
	Dry Wt + T	Dry Mass Retained on #200 Sieve (C)	72.36
	Moisture Content (MC)	% Passing #200 Sieve (A)	25.8%

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>
	Tare Wt. (T)	Original Dry Mass of Sample (B)
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)
	Moisture Content (MC)	% Passing #200 Sieve (A)

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>
	Tare Wt. (T)	Original Dry Mass of Sample (B)
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)
	Moisture Content (MC)	% Passing #200 Sieve (A)

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No.

5/18/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/25/2017
 Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/25/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17WGS-05	Sample:	Tube
		Sample Date:	4/28/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	13 - 15 ft.

Sample Description: Gray Sandy Lean CLAY (CL)

Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	111.38	Mass of Sample after Wash + Tare Wt.	144.25
Total Sample Wet Wt. + Tare Wt.			242.33	Mass of Sample after Wash	32.87
Total Sample Dry Wt. + Tare Wt.			214.28	Mass passing #200	70.03
Total Sample Dry Weight			102.90	% Passing #200 (D1140)	68.1%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	1.45	1.4%	1.4%	98.6%	NA
#20	0.850	3.32	1.8%	3.2%	96.8%	NA
#40	0.425	6.50	3.1%	6.3%	93.7%	NA
#60	0.250	10.60	4.0%	10.3%	89.7%	NA
#100	0.150	18.47	7.6%	17.9%	82.1%	NA
#200	0.075	32.38	13.5%	31.5%	68.5%	NA
Pan	<0.075	32.84		% Passing #200 (D6913) = 68.5%		
D2487	Maximum Particle Size		#4	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	4.9%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	25.2%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		1.4%	% Silt & Clay	< 0.075 mm	68.5%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/25/2017
Date

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Sieve Analysis of Soils



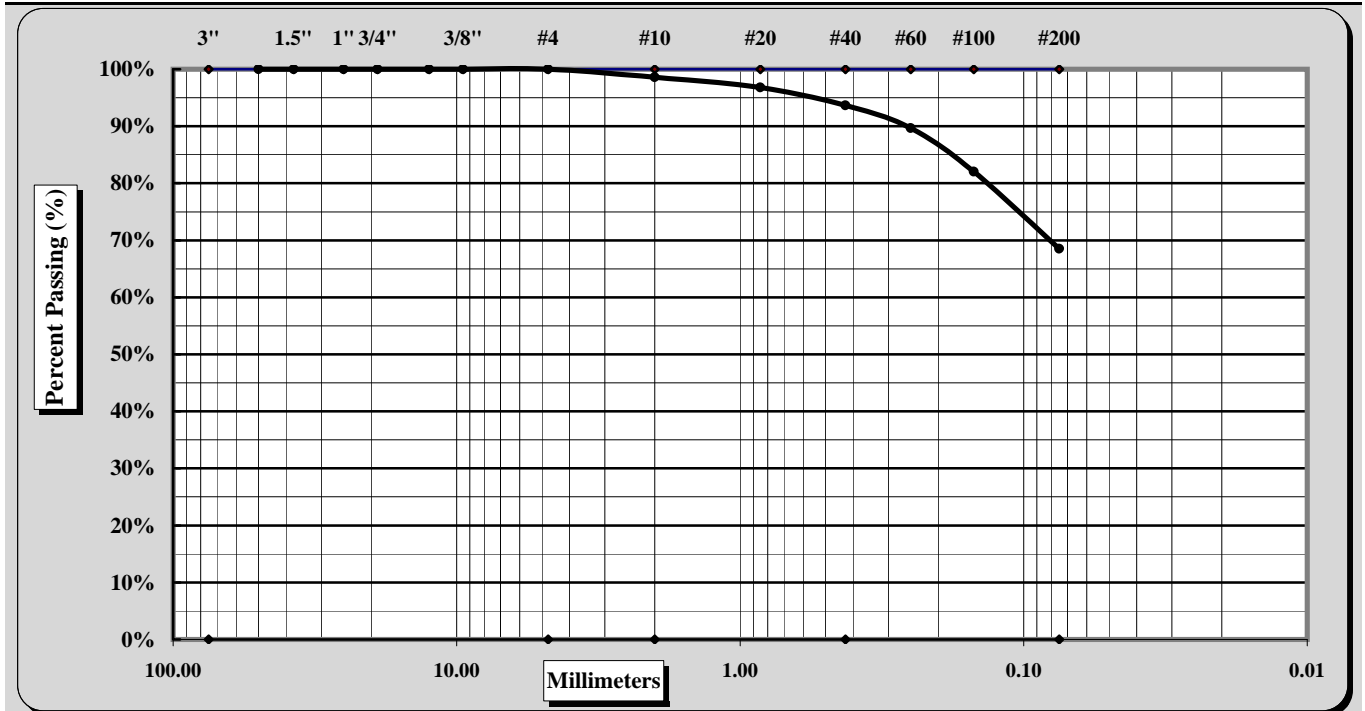
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 0	Report Date:	5/25/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17WGS-05	Sample:	Tube
		Sample Date:	4/28/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	13 - 15 ft.

Sample Description: Gray Sandy Lean CLAY (CL)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	1.4%	Fine Sand	25.2%
Gravel	0.0%	Medium Sand	4.9%	Silt & Clay	68.5%
Liquid Limit	47	Plastic Limit	23	Plastic Index	24
Specific Gravity	ND			Moisture Content	27.3%

Coarse Sand	1.4%	Medium Sand	4.9%	Fine Sand	25.2%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/25/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17XP-02	Sample:	SS-7
		Sample Date:	4/24/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	18 - 20 ft.

Sample Description: Tan Clayey SAND (SC)

Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	141.73	Mass of Sample after Wash + Tare Wt.	206.98
Total Sample Wet Wt. + Tare Wt.			245.82	Mass of Sample after Wash	65.25
Total Sample Dry Wt. + Tare Wt.			231.73	Mass passing #200	24.75
Total Sample Dry Weight			90.00	% Passing #200 (D1140)	27.5%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	0.00	0.0%	0.0%	100.0%	NA
#20	0.850	0.00	0.0%	0.0%	100.0%	NA
#40	0.425	1.59	1.8%	1.8%	98.2%	NA
#60	0.250	44.13	47.3%	49.0%	51.0%	NA
#100	0.150	60.80	18.5%	67.6%	32.4%	NA
#200	0.075	65.20	4.9%	72.4%	27.6%	NA
Pan	<0.075	65.21		% Passing #200 (D6913) = 27.6%		
D2487	Maximum Particle Size		#20	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	1.8%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	70.7%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.0%	% Silt & Clay	< 0.075 mm	27.6%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/25/2017
Date

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Sieve Analysis of Soils



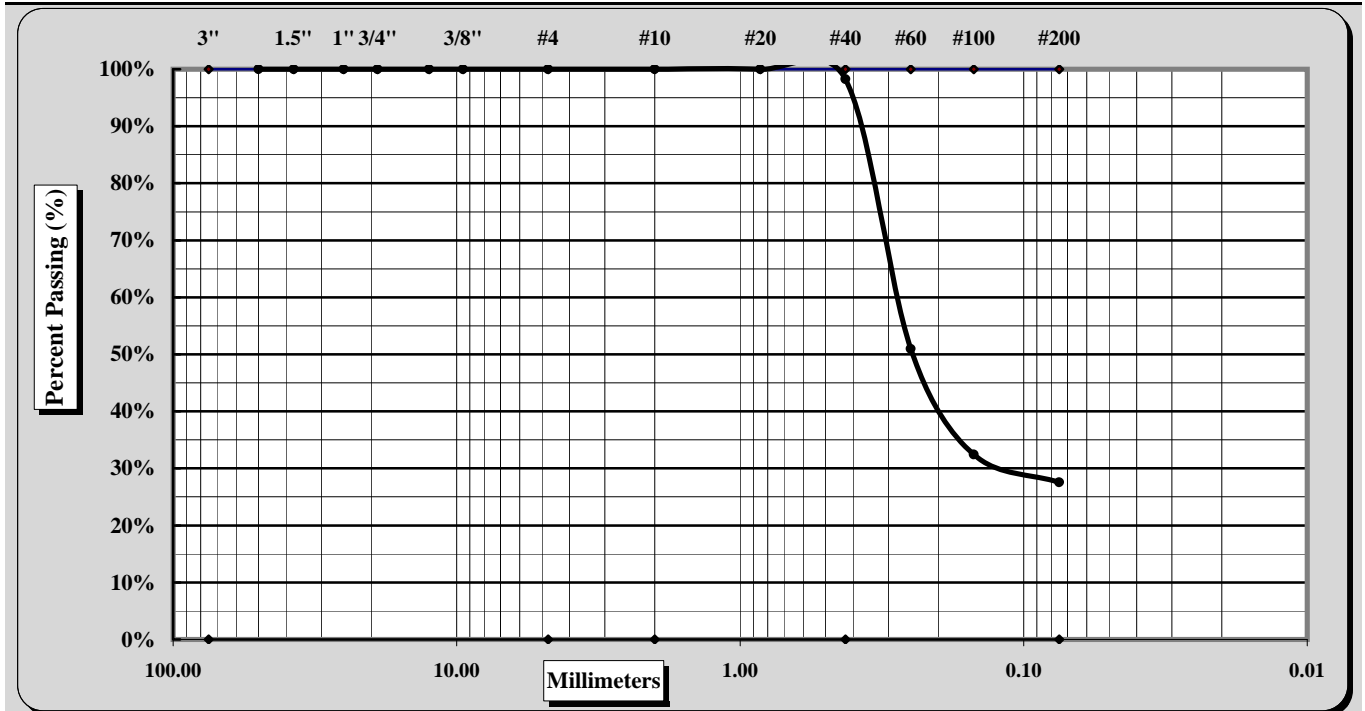
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 0	Report Date:	5/25/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17XP-02	Sample:	SS-7
		Sample Date:	4/24/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	18 - 20 ft.

Sample Description: Tan Clayey SAND (SC)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#20	Coarse Sand	0.0%	Fine Sand	70.7%
Gravel	0.0%	Medium Sand	1.8%	Silt & Clay	27.6%
Liquid Limit	29	Plastic Limit	21	Plastic Index	8
Specific Gravity	ND			Moisture Content	15.7%

Coarse Sand	0.0%	Medium Sand	1.8%	Fine Sand	70.7%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/25/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME	Sample Dates:	4/24/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-02	Sample No.	SS-11
		Sample Depth:	38 - 40 ft.

Sample Description		Olive Gray Elastic SILT (MH)	
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
	Tare #:	Soaked <input checked="" type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	81.60
	Wet Wt + T	After 200 Wash + Tare Wt. (C _T)	119.98
	Dry Wt + T	Dry Mass Retained on #200 Sieve (C)	0.28
	Moisture Content (MC)	% Passing #200 Sieve (A)	99.7%

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No. 5/18/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position 5/27/2017
 Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/26/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/26/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-06	Sample:	SS-4
		Sample Date:	5/1/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	6 - 8 ft.

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>	
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	122.84	Mass of Sample after Wash + Tare Wt.	202.82
Total Sample Wet Wt. + Tare Wt.			284.77	Mass of Sample after Wash	79.98
Total Sample Dry Wt. + Tare Wt.			259.68	Mass passing #200	56.86
Total Sample Dry Weight			136.84	% Passing #200 (D1140)	41.6%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	1.61	1.2%	1.2%	98.8%	NA
#10	2.000	4.62	2.2%	3.4%	96.6%	NA
#20	0.850	11.82	5.3%	8.6%	91.4%	NA
#40	0.425	33.47	15.8%	24.5%	75.5%	NA
#60	0.250	48.87	11.3%	35.7%	64.3%	NA
#100	0.150	61.34	9.1%	44.8%	55.2%	NA
#200	0.075	78.65	12.6%	57.5%	42.5%	NA
Pan	<0.075	79.76		% Passing #200 (D6913) = 42.5%		
D2487	Maximum Particle Size		3/8"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	21.1%
Gravel	< 75 mm and > 4.75 mm (#4)		1.2%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	33.0%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		2.2%	% Silt & Clay	< 0.075 mm	42.5%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/27/2017
Date

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Sieve Analysis of Soils



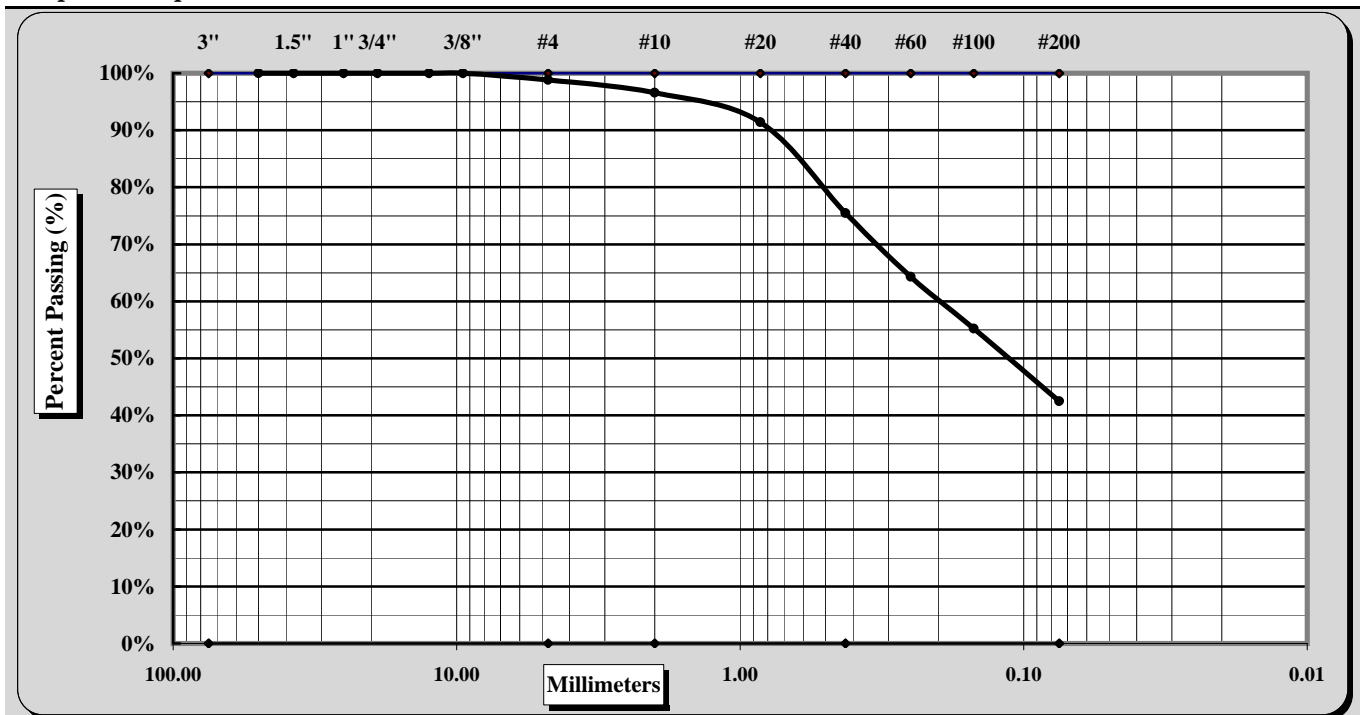
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/26/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/26/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-06	Sample:	SS-4
		Sample Date:	5/1/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	6 - 8 ft.

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/8"	Coarse Sand	2.2%	Fine Sand	33.0%
Gravel	1.2%	Medium Sand	21.1%	Silt & Clay	42.5%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	18.3%

Coarse Sand	2.2%	Medium Sand	21.1%	Fine Sand	33.0%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/27/2017
Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/26/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/26/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-06	Sample:	SS-11
		Sample Date:	4/26/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	38 - 40 ft.

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	129.99	Mass of Sample after Wash + Tare Wt.	269.86
Total Sample Wet Wt. + Tare Wt.			342.46	Mass of Sample after Wash	139.87
Total Sample Dry Wt. + Tare Wt.			296.07	Mass passing #200	26.21
Total Sample Dry Weight			166.08	% Passing #200 (D1140)	15.8%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	0.51	0.3%	0.3%	99.7%	NA
#20	0.850	7.14	4.0%	4.3%	95.7%	NA
#40	0.425	68.75	37.1%	41.4%	58.6%	NA
#60	0.250	118.22	29.8%	71.2%	28.8%	NA
#100	0.150	132.52	8.6%	79.8%	20.2%	NA
#200	0.075	139.99	4.5%	84.3%	15.7%	NA
Pan	<0.075	140.09		% Passing #200 (D6913) = 15.7%		
D2487	Maximum Particle Size		#4	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	41.1%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	42.9%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.3%	% Silt & Clay	< 0.075 mm	15.7%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/27/2017
Date

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Sieve Analysis of Soils



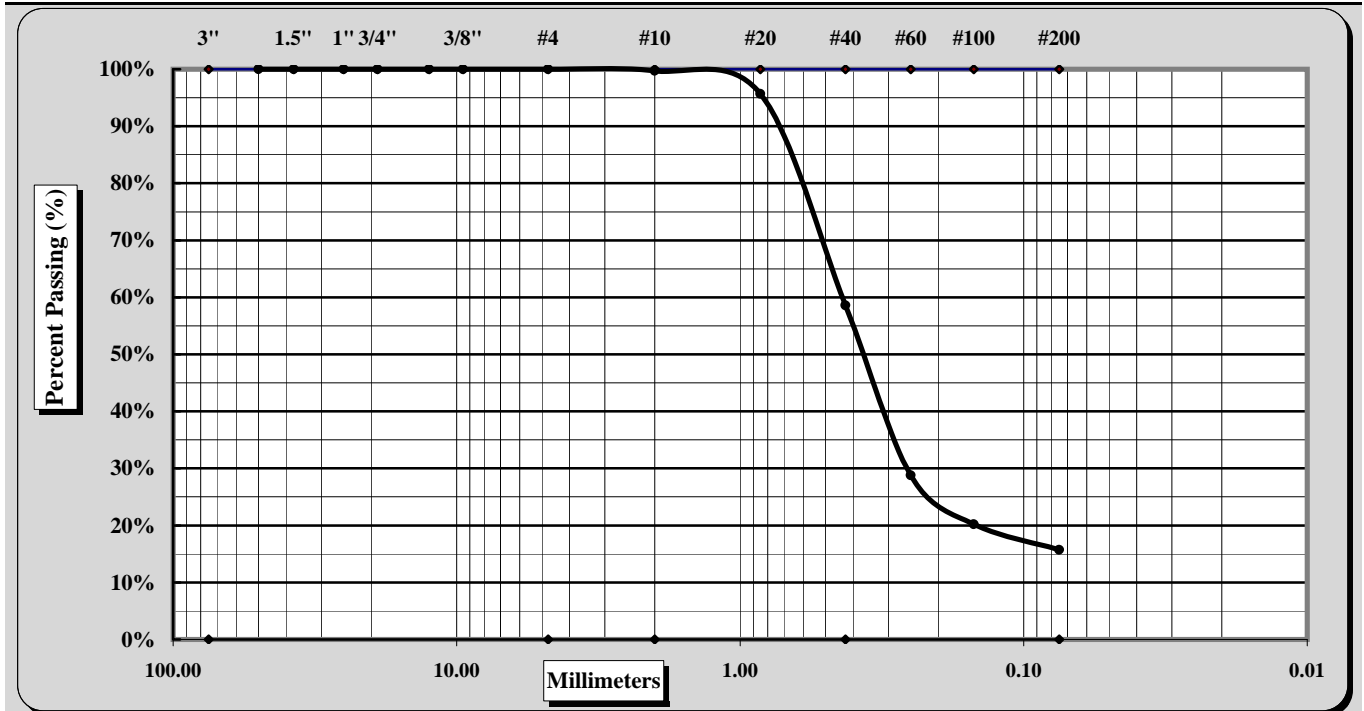
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/26/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/26/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-06	Sample:	SS-11
		Sample Date:	4/26/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	38 - 40 ft.

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	0.3%	Fine Sand	42.9%
Gravel	0.0%	Medium Sand	41.1%	Silt & Clay	15.7%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	27.9%

Coarse Sand	0.3%	Medium Sand	41.1%	Fine Sand	42.9%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/27/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME	Sample Dates:	4/26/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-06	Sample No.	SS-15
		Sample Depth:	58 - 60 ft.

Sample Description		Brown Elastic SILT (MH)	
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
	Tare #:	Soaked <input checked="" type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	111.22
	Wet Wt + T	After 200 Wash + Tare Wt. (C _T)	139.49
	Dry Wt + T	Dry Mass Retained on #200 Sieve (C)	10.60
	Moisture Content (MC)	% Passing #200 Sieve (A)	90.5%

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
Technician Name

Signature

N/A
Certification Type/No.

5/18/2017
Date

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/27/2017
Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/26/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/26/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-07	Sample:	SS-6
		Sample Date:	4/26/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	13 - 15 ft.

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	127.54	Mass of Sample after Wash + Tare Wt.	281.89
Total Sample Wet Wt. + Tare Wt.			369.43	Mass of Sample after Wash	154.35
Total Sample Dry Wt. + Tare Wt.			313.90	Mass passing #200	32.01
Total Sample Dry Weight			186.36	% Passing #200 (D1140)	17.2%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	0.74	0.4%	0.4%	99.6%	NA
#20	0.850	7.38	3.6%	4.0%	96.0%	NA
#40	0.425	57.17	26.7%	30.7%	69.3%	NA
#60	0.250	114.28	30.6%	61.3%	38.7%	NA
#100	0.150	142.05	14.9%	76.2%	23.8%	NA
#200	0.075	154.10	6.5%	82.7%	17.3%	NA
Pan	<0.075	154.59		% Passing #200 (D6913) = 17.3%		
D2487	Maximum Particle Size		#4	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	30.3%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	52.0%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.4%	% Silt & Clay	< 0.075 mm	17.3%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/27/2017
Date

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Sieve Analysis of Soils



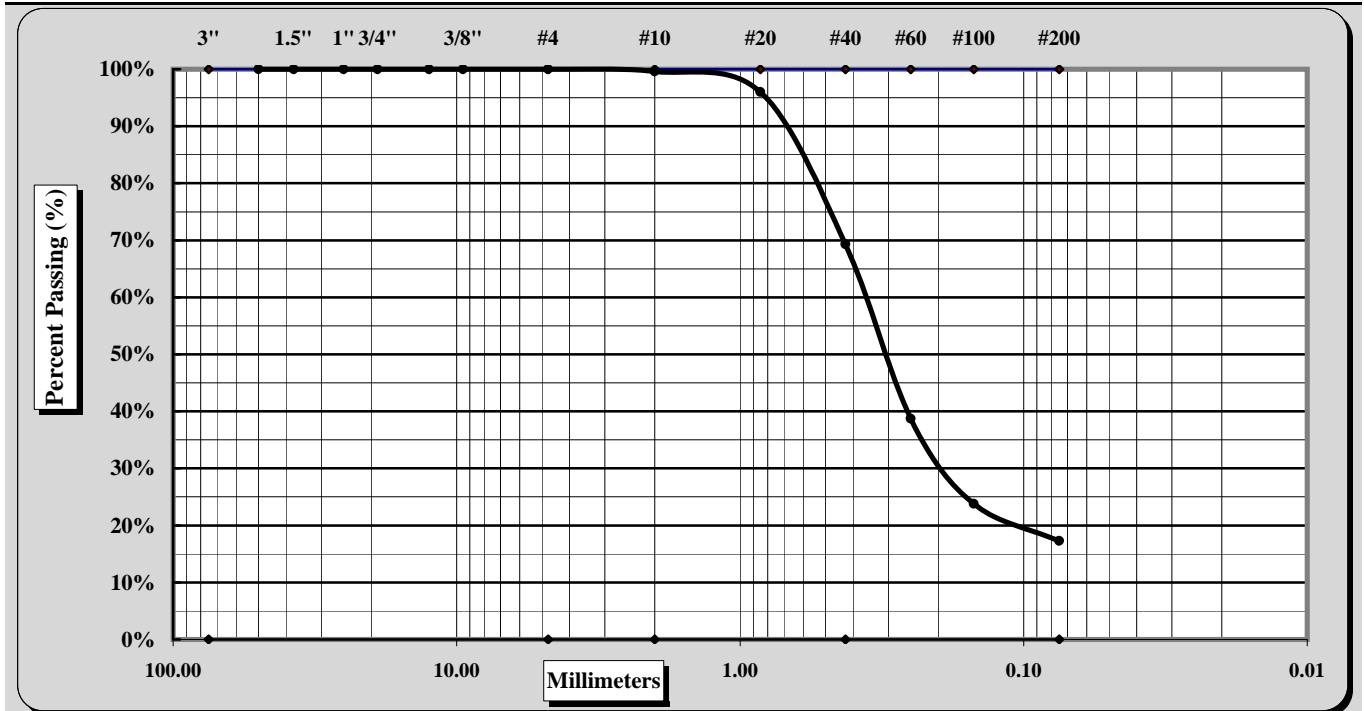
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/26/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/26/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-07	Sample:	SS-6
		Sample Date:	4/26/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	13 - 15 ft.

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	0.4%	Fine Sand	52.0%
Gravel	0.0%	Medium Sand	30.3%	Silt & Clay	17.3%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	29.8%

Coarse Sand	0.4%	Medium Sand	30.3%	Fine Sand	52.0%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/27/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME	Sample Dates:	4/26/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-07	Sample No.	SS-13
		Sample Depth:	48 - 50 ft.

Sample Description		Olive Gray Elastic SILT (MH)	
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
	Tare #:	Soaked <input checked="" type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	117.10
	Wet Wt + T	After 200 Wash + Tare Wt. (C _T)	139.81
	Dry Wt + T	Dry Mass Retained on #200 Sieve (C)	3.53
	Moisture Content (MC)	28.2%	% Passing #200 Sieve (A)
			97.0%

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
Technician Name

Signature

N/A
Certification Type/No.

5/18/2017
Date

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/27/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME	Sample Dates:	4/20/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-08	Sample No.	SS-5
		Sample Depth:	8 - 10 ft.

Sample Description		Tan Fat CLAY (CH)	
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
	Tare #:	Soaked <input checked="" type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	74.45
	Wet Wt + T	After 200 Wash + Tare Wt. (C _T)	133.00
	Dry Wt + T	Dry Mass Retained on #200 Sieve (C)	2.92
	Moisture Content (MC)	% Passing #200 Sieve (A)	96.1%

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No.

5/18/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/27/2017
 Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/27/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17XP-08	Sample:	SS-10
		Sample Date:	4/20/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	33 - 35 ft.

Sample Description: Tan Silty SAND (SM)

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	121.78	Mass of Sample after Wash + Tare Wt.	183.77
Total Sample Wet Wt. + Tare Wt.			230.48	Mass of Sample after Wash	61.99
Total Sample Dry Wt. + Tare Wt.			215.43	Mass passing #200	31.66
Total Sample Dry Weight			93.65	% Passing #200 (D1140)	33.8%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	0.00	0.0%	0.0%	100.0%	NA
#20	0.850	0.08	0.1%	0.1%	99.9%	NA
#40	0.425	2.86	3.0%	3.1%	96.9%	NA
#60	0.250	24.31	22.9%	26.0%	74.0%	NA
#100	0.150	51.32	28.8%	54.8%	45.2%	NA
#200	0.075	61.67	11.1%	65.9%	34.1%	NA
Pan	<0.075	62.01		% Passing #200 (D6913) = 34.1%		
D2487	Maximum Particle Size		#10	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	3.1%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	62.8%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.0%	% Silt & Clay	< 0.075 mm	34.1%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/27/2017
Date

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Sieve Analysis of Soils



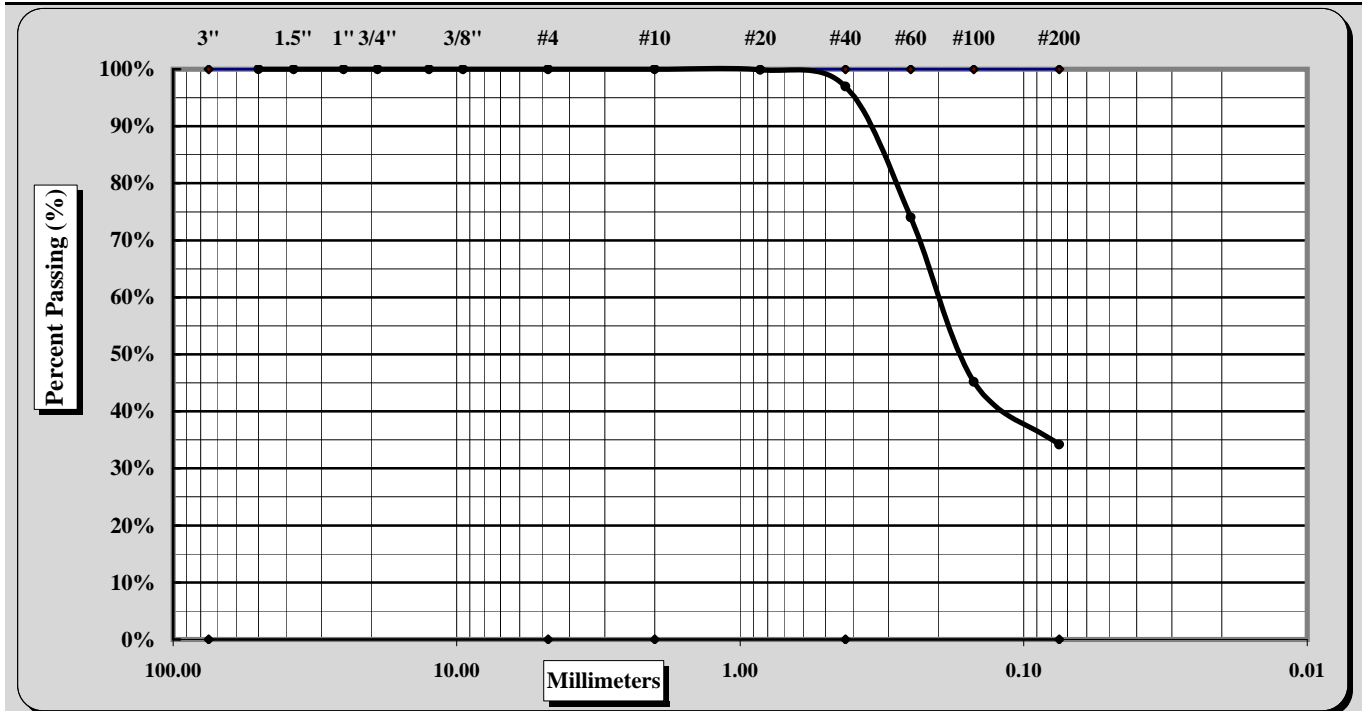
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 0	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/27/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17XP-08	Sample:	SS-10
		Sample Date:	4/20/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	33 - 35 ft.

Sample Description: Tan Silty SAND (SM)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#10	Coarse Sand	0.0%	Fine Sand	62.8%
Gravel	0.0%	Medium Sand	3.1%	Silt & Clay	34.1%
Liquid Limit	35	Plastic Limit	25	Plastic Index	10
Specific Gravity	ND			Moisture Content	16.1%

Coarse Sand	0.0%	Medium Sand	3.1%	Fine Sand	62.8%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

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Position

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/24/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/24/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME	Sample Dates:	4/18/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-11	Sample No.	SS-2
		Sample Depth:	2 - 4 ft.

Sample Description			
Brown Sandy Lean CLAY (CL)			
<input type="checkbox"/>	<i>Auxiliary</i>	<i>#200 Wash</i>	<input type="checkbox"/> Method A <input type="checkbox"/> Method B <input checked="" type="checkbox"/>
	Tare #:		Soaked <input checked="" type="checkbox"/> Soak Time 24 hrs.
	Tare Wt. (T)	122.74	Original Dry Mass of Sample (B) 82.82
	Wet Wt + T	219.37	After 200 Wash + Tare Wt. (C _T) 163.10
	Dry Wt + T	205.56	Dry Mass Retained on #200 Sieve (C) 40.36
	Moisture Content (MC)	16.7%	% Passing #200 Sieve (A) 51.3%

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/>	<i>Auxiliary</i>	<i>#200 Wash</i>	<input type="checkbox"/> Method A <input type="checkbox"/> Method B <input type="checkbox"/>
	Tare #:		Soaked <input type="checkbox"/> Soak Time 24 hrs.
	Tare Wt. (T)		Original Dry Mass of Sample (B)
	Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
	Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
	Moisture Content (MC)		% Passing #200 Sieve (A)

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/>	<i>Auxiliary</i>	<i>#200 Wash</i>	<input type="checkbox"/> Method A <input type="checkbox"/> Method B <input type="checkbox"/>
	Tare #:		Soaked <input type="checkbox"/> Soak Time 24 hrs.
	Tare Wt. (T)		Original Dry Mass of Sample (B)
	Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
	Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
	Moisture Content (MC)		% Passing #200 Sieve (A)

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
Technician Name

Signature

N/A
Certification Type/No.

5/18/2017
Date

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/27/2017
Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/26/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/26/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-11	Sample:	SS-9
		Sample Date:	4/18/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	28 - 30 ft.

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	126.59	Mass of Sample after Wash + Tare Wt.	316.80
Total Sample Wet Wt. + Tare Wt.			387.92	Mass of Sample after Wash	190.21
Total Sample Dry Wt. + Tare Wt.			338.59	Mass passing #200	21.79
Total Sample Dry Weight			212.00	% Passing #200 (D1140)	10.3%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.79	0.4%	0.4%	99.6%	NA
#10	2.000	2.10	0.6%	1.0%	99.0%	NA
#20	0.850	30.65	13.5%	14.5%	85.5%	NA
#40	0.425	150.70	56.6%	71.1%	28.9%	NA
#60	0.250	180.47	14.0%	85.1%	14.9%	NA
#100	0.150	186.99	3.1%	88.2%	11.8%	NA
#200	0.075	190.06	1.4%	89.7%	10.3%	NA
Pan	<0.075	190.10		% Passing #200 (D6913) = 10.3%		
D2487	Maximum Particle Size		3/8"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	70.1%
Gravel	< 75 mm and > 4.75 mm (#4)		0.4%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	18.6%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.6%	% Silt & Clay	< 0.075 mm	10.3%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/27/2017
Date

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Sieve Analysis of Soils



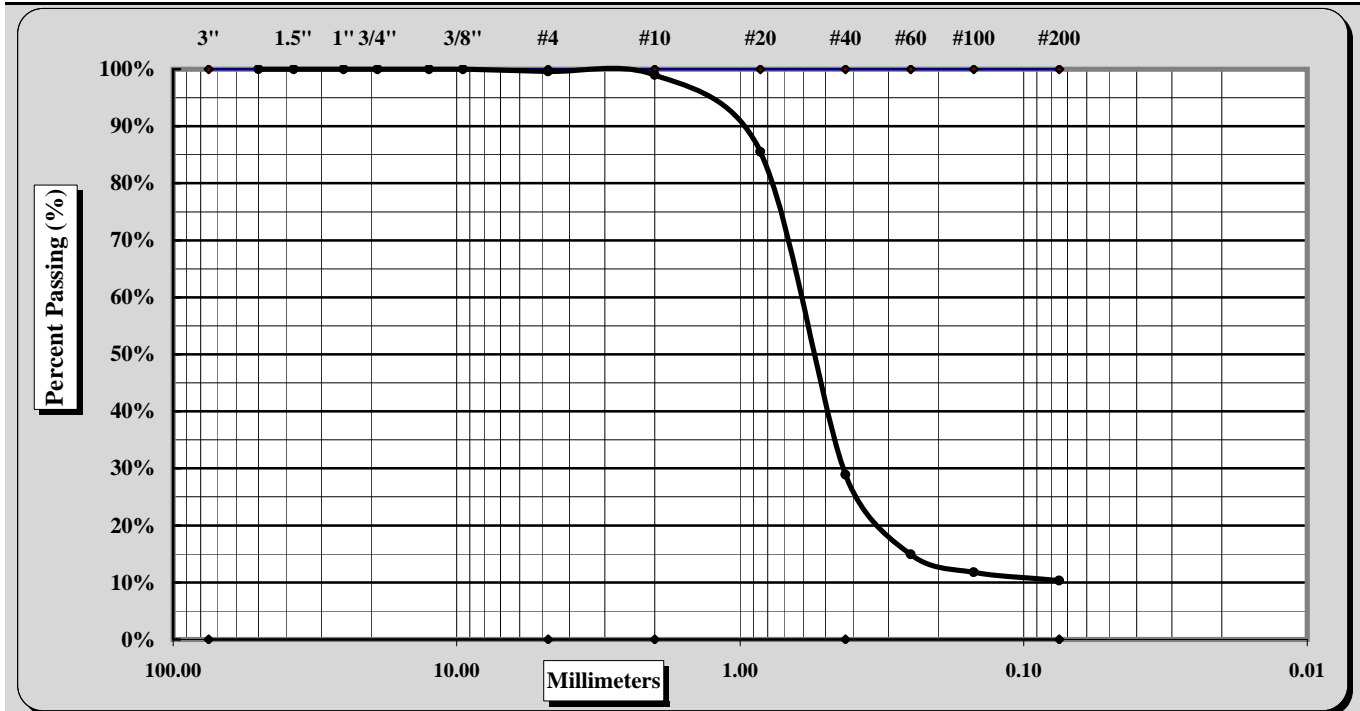
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/26/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/26/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-11	Sample:	SS-9
		Sample Date:	4/18/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	28 - 30 ft.

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/8"	Coarse Sand	0.6%	Fine Sand	18.6%
Gravel	0.4%	Medium Sand	70.1%	Silt & Clay	10.3%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	23.3%

Coarse Sand	0.6%	Medium Sand	70.1%	Fine Sand	18.6%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined. Cc=4.014, Cu=8.000

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/27/2017
Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/26/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/26/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-17	Sample:	SS-4
		Sample Date:	4/14/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	6 - 8 ft.

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	133.17	Mass of Sample after Wash + Tare Wt.	245.36
Total Sample Wet Wt. + Tare Wt.			299.66	Mass of Sample after Wash	112.19
Total Sample Dry Wt. + Tare Wt.			264.30	Mass passing #200	18.94
Total Sample Dry Weight			131.13	% Passing #200 (D1140)	14.4%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	0.21	0.2%	0.2%	99.8%	NA
#20	0.850	2.40	1.7%	1.8%	98.2%	NA
#40	0.425	24.69	17.0%	18.8%	81.2%	NA
#60	0.250	54.38	22.6%	41.5%	58.5%	NA
#100	0.150	101.57	36.0%	77.5%	22.5%	NA
#200	0.075	112.15	8.1%	85.5%	14.5%	NA
Pan	<0.075	112.32		% Passing #200 (D6913) = 14.5%		
D2487	Maximum Particle Size		#4	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	18.6%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	66.7%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.2%	% Silt & Clay	< 0.075 mm	14.5%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/27/2017
Date

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Sieve Analysis of Soils



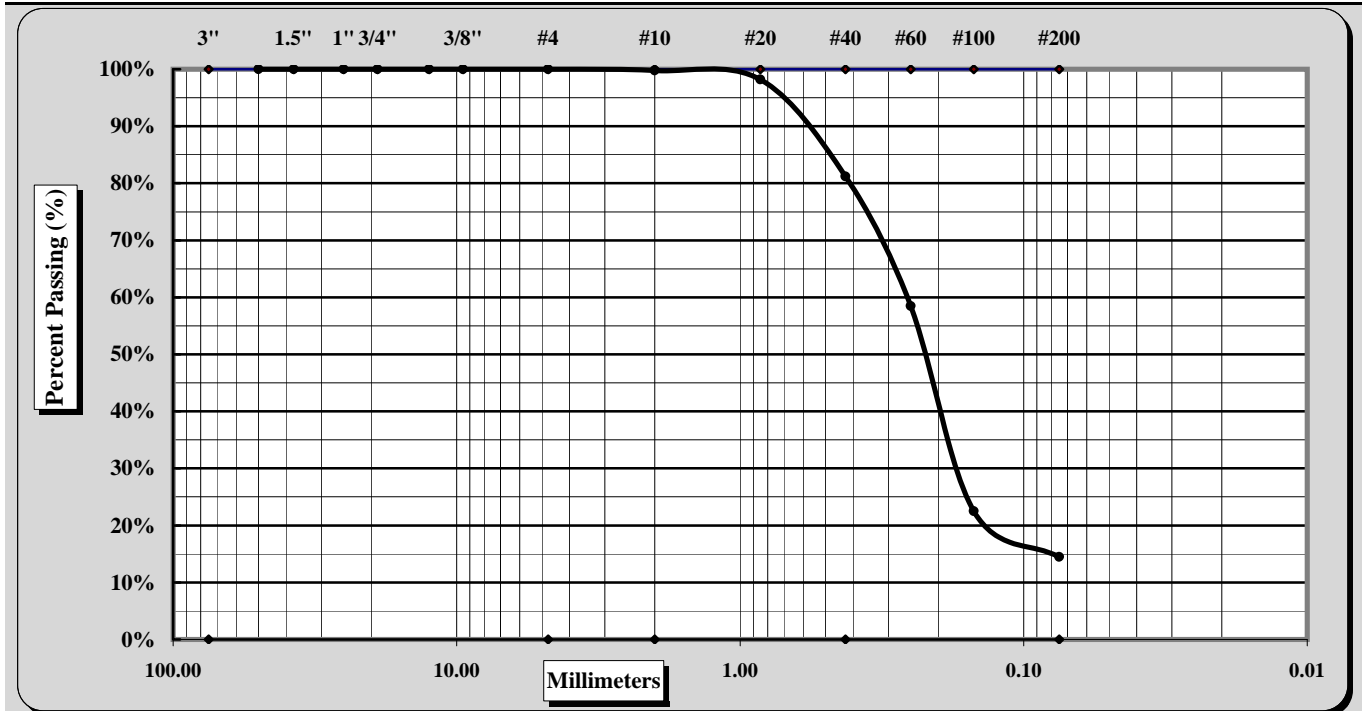
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/26/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/26/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-17	Sample:	SS-4
		Sample Date:	4/14/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	6 - 8 ft.

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	0.2%	Fine Sand	66.7%
Gravel	0.0%	Medium Sand	18.6%	Silt & Clay	14.5%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	27.0%

Coarse Sand	0.2%	Medium Sand	18.6%	Fine Sand	66.7%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/27/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/26/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME	Sample Dates:	4/14/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-17	Sample No.	SS-7
		Sample Depth:	18 - 20 ft.

Sample Description			
Olive Gray Sandy Fat CLAY (CH)			
<input type="checkbox"/>	Auxiliary	#200 Wash	Method A
<input type="checkbox"/>			Method B
<input checked="" type="checkbox"/>			
	Tare #:		Soaked <input checked="" type="checkbox"/> Soak Time 24 hrs.
	Tare Wt. (T)	136.27	Original Dry Mass of Sample (B) 100.25
	Wet Wt + T	263.90	After 200 Wash + Tare Wt. (C _T) 174.94
	Dry Wt + T	236.52	Dry Mass Retained on #200 Sieve (C) 38.67
	Moisture Content (MC)	27.3%	% Passing #200 Sieve (A) 61.4%

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/>	Auxiliary	#200 Wash
<input type="checkbox"/>		
<input type="checkbox"/>		
	Tare #:	Soaked <input type="checkbox"/> Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)
	Moisture Content (MC)	% Passing #200 Sieve (A)

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/>	Auxiliary	#200 Wash
<input type="checkbox"/>		
<input type="checkbox"/>		
	Tare #:	Soaked <input type="checkbox"/> Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)
	Moisture Content (MC)	% Passing #200 Sieve (A)

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No. 5/18/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position 5/27/2017
 Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/26/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME	Sample Dates:	4/14/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-17	Sample No.	SS-9
		Sample Depth:	28 - 30 ft.

Sample Description			
Olive Gray SILT with Sand (ML)			
<input type="checkbox"/>	<i>Auxiliary</i>	<i>#200 Wash</i>	<input type="checkbox"/>
		Method A	<input type="checkbox"/>
		Method B	<input checked="" type="checkbox"/>
	Tare #:	Soaked	<input checked="" type="checkbox"/>
		Soak Time	24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	123.02
	Wet Wt + T	After 200 Wash + Tare Wt. (C _T)	160.72
	Dry Wt + T	Dry Mass Retained on #200 Sieve (C)	34.84
	Moisture Content (MC)	22.9%	% Passing #200 Sieve (A)
			71.7%

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/>	<i>Auxiliary</i>	<i>#200 Wash</i>	<input type="checkbox"/>
		Method A	<input type="checkbox"/>
		Method B	<input type="checkbox"/>
	Tare #:	Soaked	<input type="checkbox"/>
		Soak Time	24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/>	<i>Auxiliary</i>	<i>#200 Wash</i>	<input type="checkbox"/>
		Method A	<input type="checkbox"/>
		Method B	<input type="checkbox"/>
	Tare #:	Soaked	<input type="checkbox"/>
		Soak Time	24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

$$\% \text{ Passing } \#200 = A = [(B-C)/B] * 100$$

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No.

5/18/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/27/2017
 Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/26/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME	Sample Dates:	4/13/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-20	Sample No.	SS-8
		Sample Depth:	23 - 25 ft.

Sample Description	Red-Brown SILT (ML)		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
	Tare #:	Soaked <input checked="" type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	104.05
	Wet Wt + T	After 200 Wash + Tare Wt. (C _T)	151.31
	Dry Wt + T	Dry Mass Retained on #200 Sieve (C)	13.73
	Moisture Content (MC)	% Passing #200 Sieve (A)	86.8%

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
Technician Name

Signature

N/A
Certification Type/No.

5/18/2017
Date

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/27/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/26/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME	Sample Dates:	4/13/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-20	Sample No.	SS-11
		Sample Depth:	38 - 40 ft.

Sample Description			
Olive Gray Sandy Fat CLAY (CH)			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
	Tare #:	Soaked <input checked="" type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	101.85
	Wet Wt + T	After 200 Wash + Tare Wt. (C _T)	168.81
	Dry Wt + T	Dry Mass Retained on #200 Sieve (C)	45.92
	Moisture Content (MC)	% Passing #200 Sieve (A)	54.9%

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/> Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)
	Moisture Content (MC)	% Passing #200 Sieve (A)

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/> Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/> Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)
	Moisture Content (MC)	% Passing #200 Sieve (A)

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No. 5/18/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position 5/27/2017
 Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/26/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME	Sample Dates:	4/13/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-21	Sample No.	SS-5
		Sample Depth:	8 - 10 ft.

Sample Description		Brown Elastic SILT (MH)	
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
	Tare #:	Soaked <input checked="" type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	79.91
	Wet Wt + T	After 200 Wash + Tare Wt. (C _T)	115.72
	Dry Wt + T	Dry Mass Retained on #200 Sieve (C)	9.11
	Moisture Content (MC)	% Passing #200 Sieve (A)	88.6%

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>
	Tare Wt. (T)	Original Dry Mass of Sample (B)
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)
	Moisture Content (MC)	% Passing #200 Sieve (A)

Boring No.	Sample No.	Sample Depth:
Sample Description		
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>
	Tare Wt. (T)	Original Dry Mass of Sample (B)
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)
	Moisture Content (MC)	% Passing #200 Sieve (A)

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No.

5/18/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/27/2017
 Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/26/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME	Sample Dates:	4/13/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-21	Sample No.	SS-7
		Sample Depth:	18 - 20 ft.

Sample Description		Brown Elastic SILT (MH)	
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
	Tare #:	Soaked <input checked="" type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	100.64
	Wet Wt + T	After 200 Wash + Tare Wt. (C _T)	116.42
	Dry Wt + T	Dry Mass Retained on #200 Sieve (C)	10.20
	Moisture Content (MC)	% Passing #200 Sieve (A)	89.9%

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
	Tare #:	Soaked <input type="checkbox"/>	Soak Time 24 hrs.
	Tare Wt. (T)	Original Dry Mass of Sample (B)	
	Wet Wt (W) + T	After 200 Wash + Tare Wt. (C _T)	
	Dry Wt (D) + T	Dry Mass Retained on #200 Sieve (C)	
	Moisture Content (MC)	% Passing #200 Sieve (A)	

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No. 5/18/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position 5/27/2017
 Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/27/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-66	Sample:	SS-6
		Sample Date:	4/19/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	13 - 15 ft.

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>	
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	84.22	Mass of Sample after Wash + Tare Wt.	175.20
Total Sample Wet Wt. + Tare Wt.			247.46	Mass of Sample after Wash	90.98
Total Sample Dry Wt. + Tare Wt.			225.09	Mass passing #200	49.89
Total Sample Dry Weight			140.87	% Passing #200 (D1140)	35.4%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	3.64	2.6%	2.6%	97.4%	NA
#4	4.75	5.68	1.4%	4.0%	96.0%	NA
#10	2.000	11.21	3.9%	8.0%	92.0%	NA
#20	0.850	23.04	8.4%	16.4%	83.6%	NA
#40	0.425	49.05	18.5%	34.8%	65.2%	NA
#60	0.250	67.87	13.4%	48.2%	51.8%	NA
#100	0.150	79.64	8.4%	56.5%	43.5%	NA
#200	0.075	91.00	8.1%	64.6%	35.4%	NA
Pan	<0.075	91.14		% Passing #200 (D6913) = 35.4%		
D2487	Maximum Particle Size		1/2"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	26.8%
Gravel	< 75 mm and > 4.75 mm (#4)		4.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	29.8%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		4.0%	% Silt & Clay	< 0.075 mm	35.4%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/27/2017
Date

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Sieve Analysis of Soils



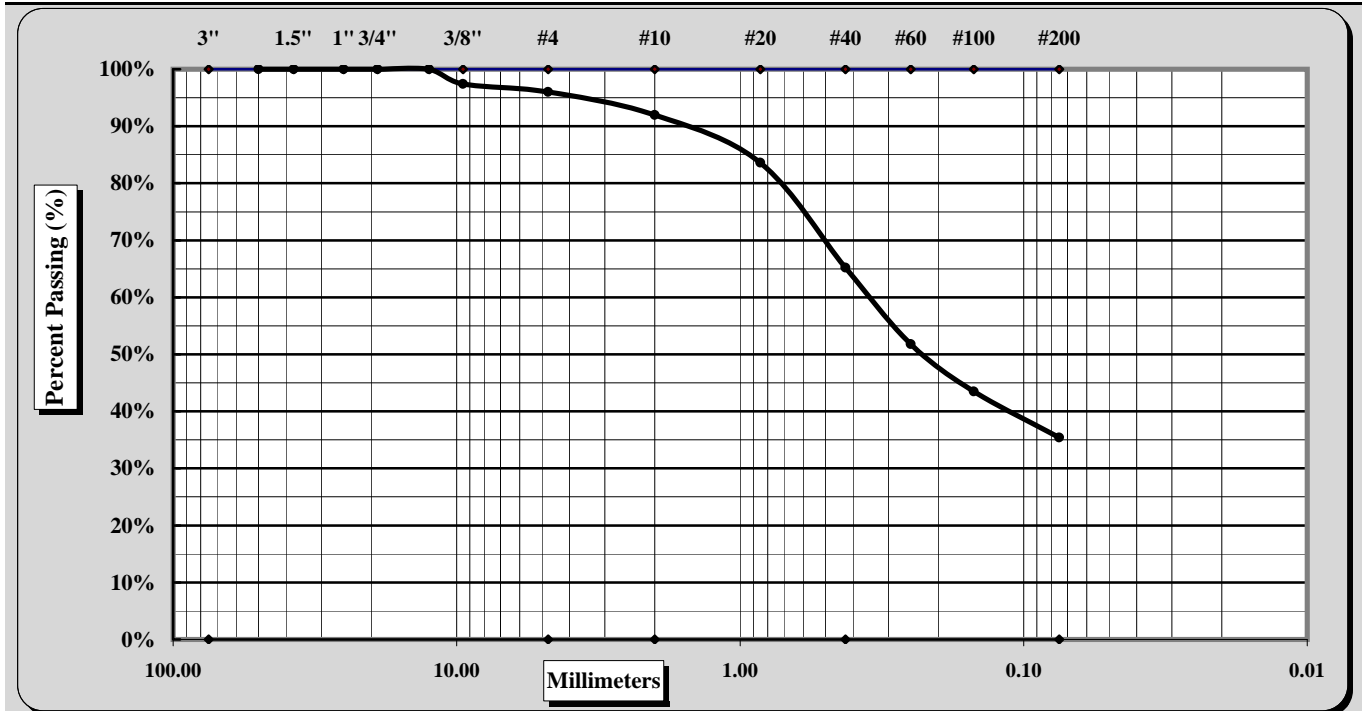
ASTM D 6913

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S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/27/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-66	Sample:	SS-6
		Sample Date:	4/19/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	13 - 15 ft.

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	1/2"	Coarse Sand	4.0%	Fine Sand	29.8%
Gravel	4.0%	Medium Sand	26.8%	Silt & Clay	35.4%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	15.9%

Coarse Sand	4.0%	Medium Sand	26.8%	Fine Sand	29.8%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

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Laboratory Manager
Position

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/27/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-67	Sample:	SS-3
		Sample Date:	4/20/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	4 - 6 ft.

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>	
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	116.83	Mass of Sample after Wash + Tare Wt.	191.65
Total Sample Wet Wt. + Tare Wt.			290.52	Mass of Sample after Wash	74.82
Total Sample Dry Wt. + Tare Wt.			256.65	Mass passing #200	65.00
Total Sample Dry Weight			139.82	% Passing #200 (D1140)	46.5%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	0.18	0.1%	0.1%	99.9%	NA
#20	0.850	1.62	1.0%	1.2%	98.8%	NA
#40	0.425	9.99	6.0%	7.1%	92.9%	NA
#60	0.250	27.24	12.3%	19.5%	80.5%	NA
#100	0.150	56.05	20.6%	40.1%	59.9%	NA
#200	0.075	74.71	13.3%	53.4%	46.6%	NA
Pan	<0.075	74.81		% Passing #200 (D6913) = 46.6%		
D2487	Maximum Particle Size		#4	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	7.0%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	46.3%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		0.1%	% Silt & Clay	< 0.075 mm	46.6%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/27/2017
Date

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Sieve Analysis of Soils



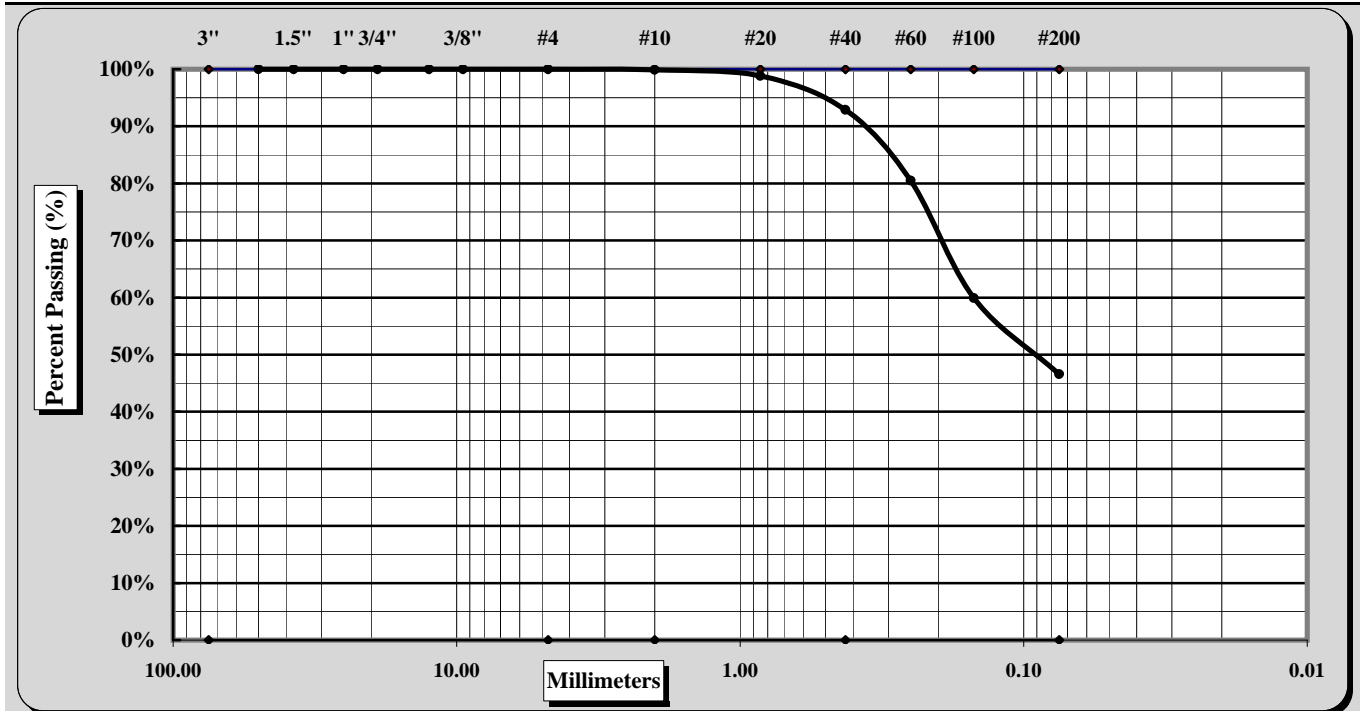
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/27/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-67	Sample:	SS-3
		Sample Date:	4/20/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	4 - 6 ft.

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	0.1%	Fine Sand	46.3%
Gravel	0.0%	Medium Sand	7.0%	Silt & Clay	46.6%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	24.2%

Coarse Sand	0.1%	Medium Sand	7.0%	Fine Sand	46.3%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

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Laboratory Manager
Position

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/27/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-67	Sample:	SS-8
		Sample Date:	4/20/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft.

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>	
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	113.01	Mass of Sample after Wash + Tare Wt.	312.39
Total Sample Wet Wt. + Tare Wt.			354.56	Mass of Sample after Wash	199.38
Total Sample Dry Wt. + Tare Wt.			331.43	Mass passing #200	19.04
Total Sample Dry Weight			218.42	% Passing #200 (D1140)	8.7%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	27.31	12.5%	12.5%	87.5%	NA
3/4"	19.00	58.57	14.3%	26.8%	73.2%	NA
1/2"	12.50	80.27	9.9%	36.8%	63.2%	NA
3/8"	9.50	90.53	4.7%	41.4%	58.6%	NA
#4	4.75	110.01	8.9%	50.4%	49.6%	NA
#10	2.000	129.62	9.0%	59.3%	40.7%	NA
#20	0.850	152.99	10.7%	70.0%	30.0%	NA
#40	0.425	179.99	12.4%	82.4%	17.6%	NA
#60	0.250	189.10	4.2%	86.6%	13.4%	NA
#100	0.150	194.61	2.5%	89.1%	10.9%	NA
#200	0.075	198.86	1.9%	91.0%	9.0%	NA
Pan	<0.075	199.25		% Passing #200 (D6913) = 9.0%		
D2487	Maximum Particle Size		1.5"	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	23.1%
Gravel	< 75 mm and > 4.75 mm (#4)		50.4%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	8.6%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		8.9%	% Silt & Clay	< 0.075 mm	9.0%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/27/2017
Date

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Sieve Analysis of Soils



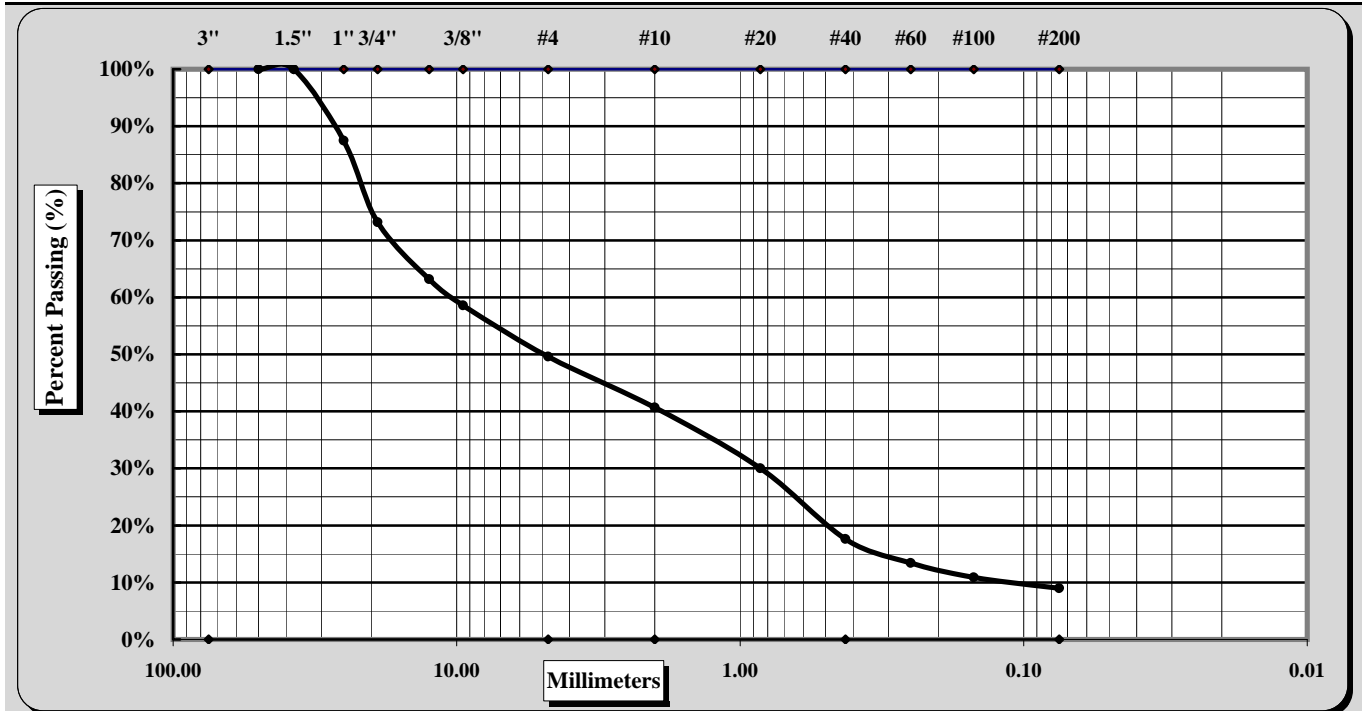
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/27/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17XP-67	Sample:	SS-8
		Sample Date:	4/20/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	23 - 25 ft.

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	1.5"	Coarse Sand	8.9%	Fine Sand	8.6%
Gravel	50.4%	Medium Sand	23.1%	Silt & Clay	9.0%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	10.6%

Coarse Sand	8.9%	Medium Sand	23.1%	Fine Sand	8.6%
Description of Sand & Gravel Particles:		Rounded	<input checked="" type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined. Cc=0.577, Cu=80.080

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/27/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17XP-73	Sample:	SS-7
		Sample Date:	4/20/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	18 - 20 ft.

Sample Description: Brown Silty SAND (SM)

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input checked="" type="checkbox"/>	Weathered & Friable
				<input checked="" type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.		Tare Wt.	114.79	Mass of Sample after Wash + Tare Wt.	184.98
Total Sample Wet Wt. + Tare Wt.			223.58	Mass of Sample after Wash	70.19
Total Sample Dry Wt. + Tare Wt.			207.53	Mass passing #200	22.55
Total Sample Dry Weight			92.74	% Passing #200 (D1140)	24.3%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	1.21	1.3%	1.3%	98.7%	NA
#20	0.850	12.83	12.5%	13.8%	86.2%	NA
#40	0.425	30.94	19.5%	33.4%	66.6%	NA
#60	0.250	45.42	15.6%	49.0%	51.0%	NA
#100	0.150	57.17	12.7%	61.6%	38.4%	NA
#200	0.075	69.40	13.2%	74.8%	25.2%	NA
Pan	<0.075	70.26		% Passing #200 (D6913) =		25.2%
D2487	Maximum Particle Size		#4	Medium Sand	< 2.00 mm and > 0.425 mm (#40)	32.1%
Gravel	< 75 mm and > 4.75 mm (#4)		0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	41.5%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)		1.3%	% Silt & Clay	< 0.075 mm	25.2%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

5/27/2017
Date

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Sieve Analysis of Soils



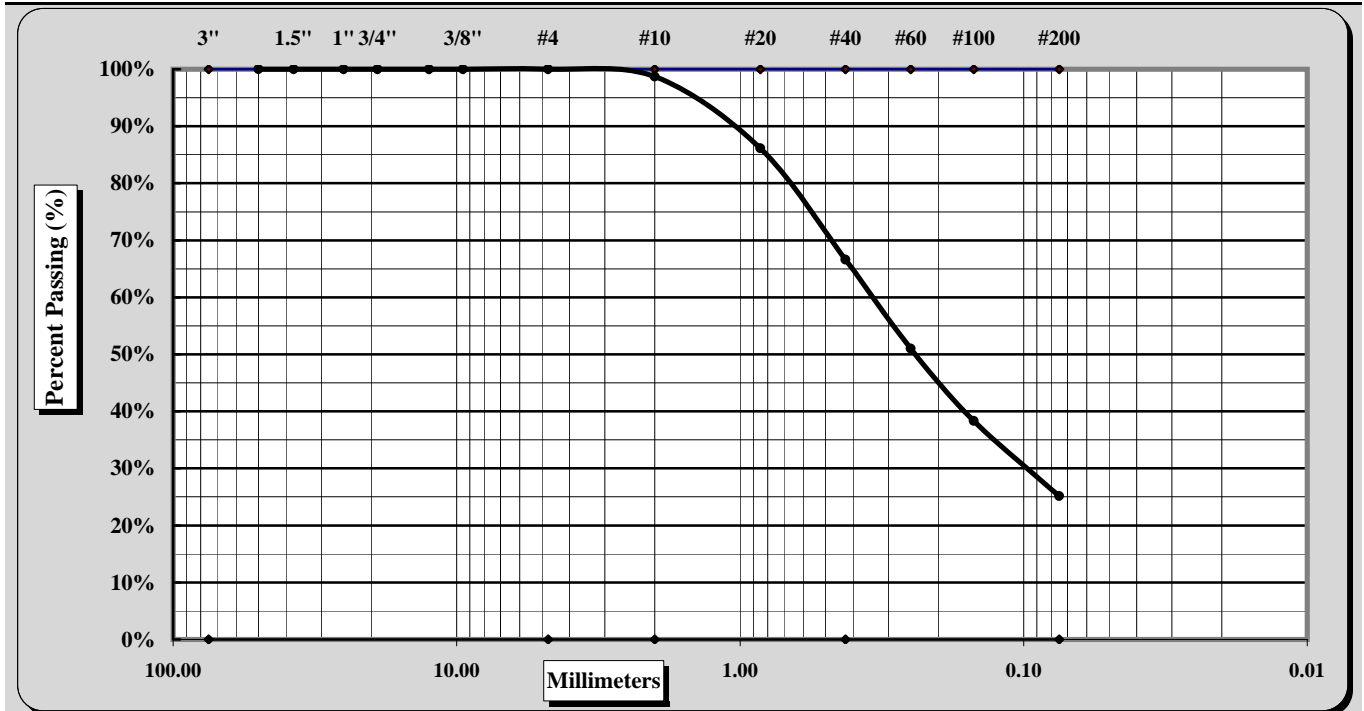
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 0	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/27/17
Client Name:	HDR, Inc.		
Client Address:	4470 Cox Road, Suite 200, Glen Allen, VA 23060		
Boring No.:	17XP-73	Sample:	SS-7
		Sample Date:	4/20/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	18 - 20 ft.

Sample Description: Brown Silty SAND (SM)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	1.3%	Fine Sand	41.5%
Gravel	0.0%	Medium Sand	32.1%	Silt & Clay	25.2%
Liquid Limit	48	Plastic Limit	37	Plastic Index	11
Specific Gravity	ND			Moisture Content	17.3%

Coarse Sand	1.3%	Medium Sand	32.1%	Fine Sand	41.5%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input checked="" type="checkbox"/>	Weathered & Friable	<input checked="" type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/27/2017
Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	5/27/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/18 - 5/26/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME	Sample Dates:	4/28/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17XP-77	Sample No.	SS-3
		Sample Depth:	4 - 6 ft.

Sample Description Gray and Brown Sandy Fat CLAY (CH)			
<input type="checkbox"/>	<i>Auxiliary</i>	<i>#200 Wash</i>	<input type="checkbox"/> Method A <input type="checkbox"/> Method B <input checked="" type="checkbox"/>
	Tare #:		Soaked <input checked="" type="checkbox"/> Soak Time 24 hrs.
	Tare Wt. (T)	115.45	Original Dry Mass of Sample (B) 45.03
	Wet Wt + T	171.81	After 200 Wash + Tare Wt. (C _T) 131.68
	Dry Wt + T	160.48	Dry Mass Retained on #200 Sieve (C) 16.23
	Moisture Content (MC)	25.2%	% Passing #200 Sieve (A) 64.0%

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/>	<i>Auxiliary</i>	<i>#200 Wash</i>	<input type="checkbox"/> Method A <input type="checkbox"/> Method B <input type="checkbox"/>
	Tare #:		Soaked <input type="checkbox"/> Soak Time 24 hrs.
	Tare Wt. (T)		Original Dry Mass of Sample (B)
	Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
	Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
	Moisture Content (MC)		% Passing #200 Sieve (A)

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/>	<i>Auxiliary</i>	<i>#200 Wash</i>	<input type="checkbox"/> Method A <input type="checkbox"/> Method B <input type="checkbox"/>
	Tare #:		Soaked <input type="checkbox"/> Soak Time 24 hrs.
	Tare Wt. (T)		Original Dry Mass of Sample (B)
	Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)
	Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)
	Moisture Content (MC)		% Passing #200 Sieve (A)

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No.

5/18/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/27/2017
 Date

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Material Finer than the #200 Sieve



ASTM D1140

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	6/17/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	6/15 - 6/17/17
Client Name:	HDR, Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Sample by:	S&ME	Sample Dates:	5/2/17
Sampling Method:	Split Spoon	Drill Rig :	N/A
Boring No.	17HWN-01	Sample No.	SS-11
		Sample Depth:	38 - 40 ft.

Sample Description		Gray CLAY with Sand (CH)	
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input checked="" type="checkbox"/>
Tare #:	147	Soaked <input checked="" type="checkbox"/>	Soak Time 24 hrs.
Tare Wt. (T)	115.47	Original Dry Mass of Sample (B)	100.84
Wet Wt + T	239.73	After 200 Wash + Tare Wt. (C _T)	134.77
Dry Wt + T	216.31	Dry Mass Retained on #200 Sieve (C)	19.30
Moisture Content (MC)	23.2%	% Passing #200 Sieve (A)	80.9%

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
Tare #:		Soaked <input type="checkbox"/>	Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)	
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)	
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)	
Moisture Content (MC)		% Passing #200 Sieve (A)	

Boring No. Sample No. Sample Depth:

Sample Description			
<input type="checkbox"/> Auxiliary	#200 Wash	Method A <input type="checkbox"/>	Method B <input type="checkbox"/>
Tare #:		Soaked <input type="checkbox"/>	Soak Time 24 hrs.
Tare Wt. (T)		Original Dry Mass of Sample (B)	
Wet Wt (W) + T		After 200 Wash + Tare Wt. (C _T)	
Dry Wt (D) + T		Dry Mass Retained on #200 Sieve (C)	
Moisture Content (MC)		% Passing #200 Sieve (A)	

Balance ID. 1024 Calibration Date: 11/4/16 #200 Sieve 1987 Calibration Date: 3/16/17

Notes / Deviations / References: ASTM D1140: Amount of Material in Soil Finer Than the No. 200 (75-um) Sieve

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

% Passing #200 = A = [(B-C)/B] * 100

Patrick Hayes
 Technician Name

Signature

N/A
 Certification Type/No.

6/15/2017
 Date

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

6/17/2017
 Date

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Sieve Analysis of Soils



ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	6/17/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	6/15 - 6/17/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17HWN-01	Sample:	SS-13
		Sample Date:	5/2/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	48 - 50

Sample Description:

Description of Sand & Gravel Particles:	Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable
				<input type="checkbox"/>

Particle Size Analysis / Without Hydrometer Analysis				Material Excluded:	
Tare No.	124	Tare Wt.	116.21	Mass of Sample after Wash + Tare Wt.	224.10
Total Sample Wet Wt. + Tare Wt.			287.68	Mass of Sample after Wash	107.89
Total Sample Dry Wt. + Tare Wt.			254.57	Mass passing #200	30.47
Total Sample Dry Weight			138.36	% Passing #200 (D1140)	22.0%

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.00	0.0%	0.0%	100.0%	NA
1.5"	37.50	0.00	0.0%	0.0%	100.0%	NA
1.0"	25.00	0.00	0.0%	0.0%	100.0%	NA
3/4"	19.00	0.00	0.0%	0.0%	100.0%	NA
1/2"	12.50	0.00	0.0%	0.0%	100.0%	NA
3/8"	9.50	0.00	0.0%	0.0%	100.0%	NA
#4	4.75	0.00	0.0%	0.0%	100.0%	NA
#10	2.000	0.07	0.1%	0.1%	99.9%	NA
#20	0.850	3.07	2.2%	2.2%	97.8%	NA
#40	0.425	43.59	29.3%	31.5%	68.5%	NA
#60	0.250	88.06	32.1%	63.6%	36.4%	NA
#100	0.150	101.75	9.9%	73.5%	26.5%	NA
#200	0.075	107.83	4.4%	77.9%	22.1%	NA
Pan	<0.075	107.97		% Passing #200 (D6913) =		22.1%
D2487	Maximum Particle Size	#4	Medium Sand	< 2.00 mm and > 0.425 mm (#40)		31.4%
Gravel	< 75 mm and > 4.75 mm (#4)	0.0%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)		46.4%
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	0.1%	% Silt & Clay	< 0.075 mm		22.1%

Notes / Deviations / References:

D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility


Signature

Laboratory Manager
Position

6/17/2017
Date

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Sieve Analysis of Soils



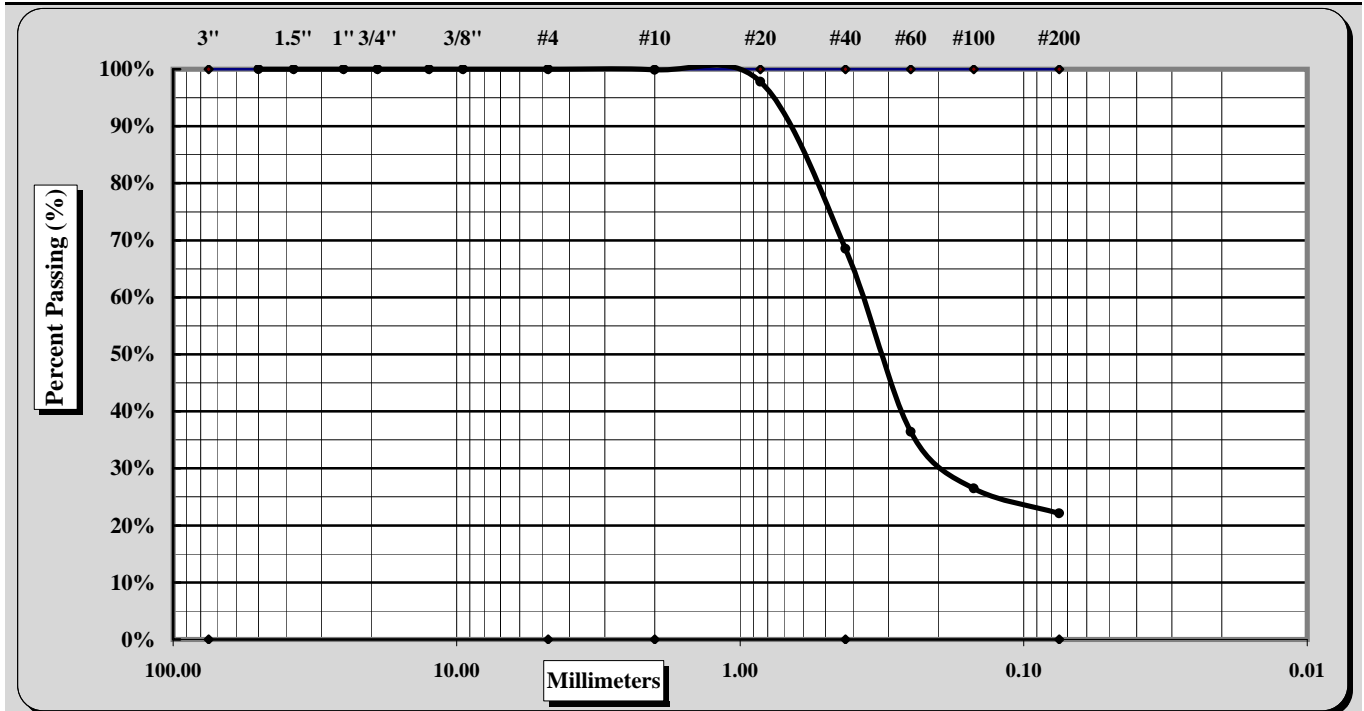
ASTM D 6913

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	HDR No. 10052825 Task: 017	Report Date:	6/17/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	6/15 - 6/17/17
Client Name:	HDR Inc.		
Client Address:	4480 Cox Road, Suite 103, Glen Allen, VA 23060		
Boring No.:	17HWN-01	Sample:	SS-13
		Sample Date:	5/2/17
Location:	Site-Borehole	Offset:	N/A
		Depth (ft):	48 - 50

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	0.1%	Fine Sand	46.4%
Gravel	0.0%	Medium Sand	31.4%	Silt & Clay	22.1%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Specific Gravity	ND			Moisture Content	23.9%

Coarse Sand	0.1%	Medium Sand	31.4%	Fine Sand	46.4%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References: ND=Not Determined.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Mal Krajan, ET
Technical Responsibility

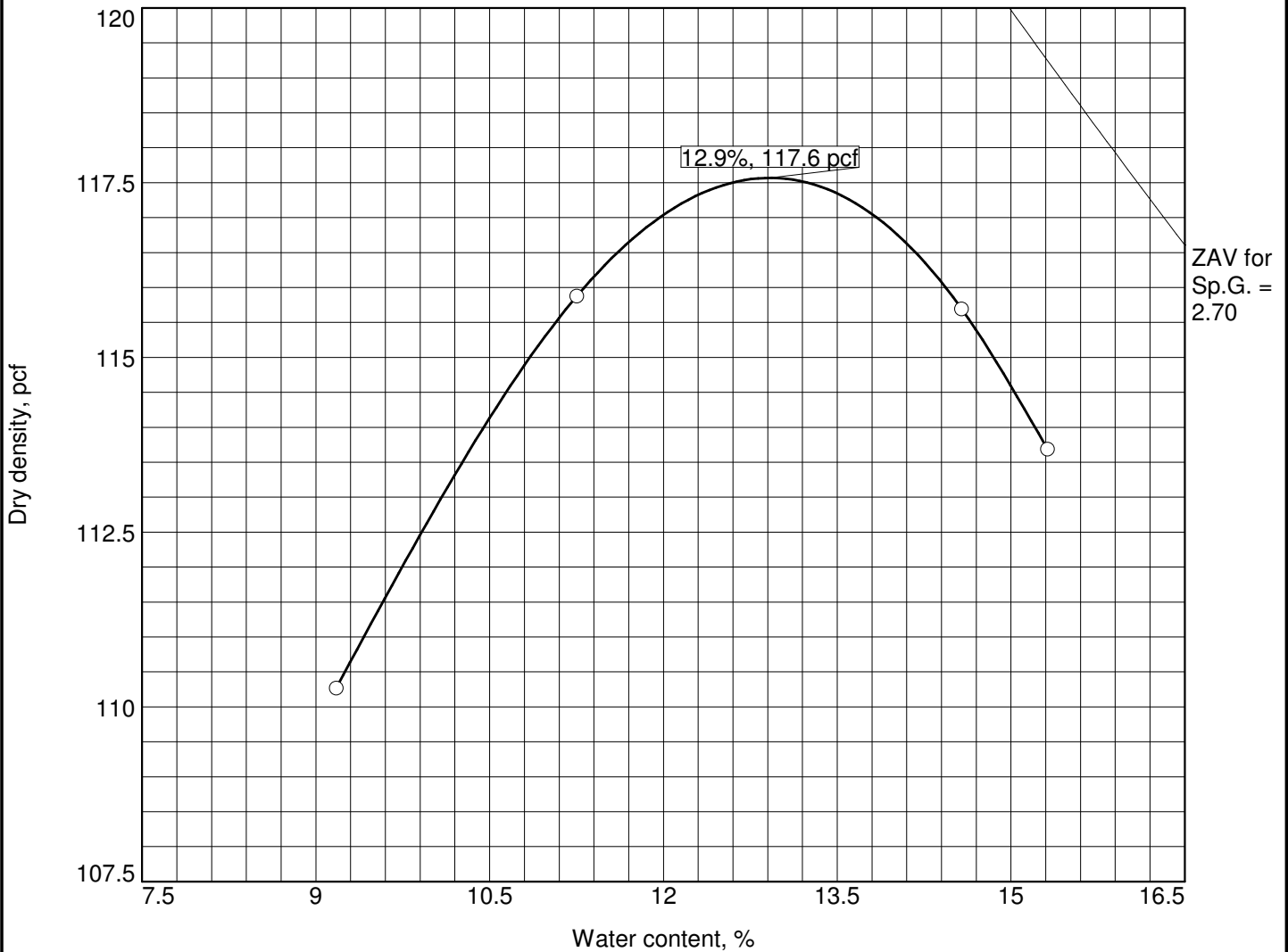
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Position

6/17/2017
Date

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MOISTURE DENSITY RELATIONSHIP (PROCTOR CURVE)



Test specification: VTM-1 Standard

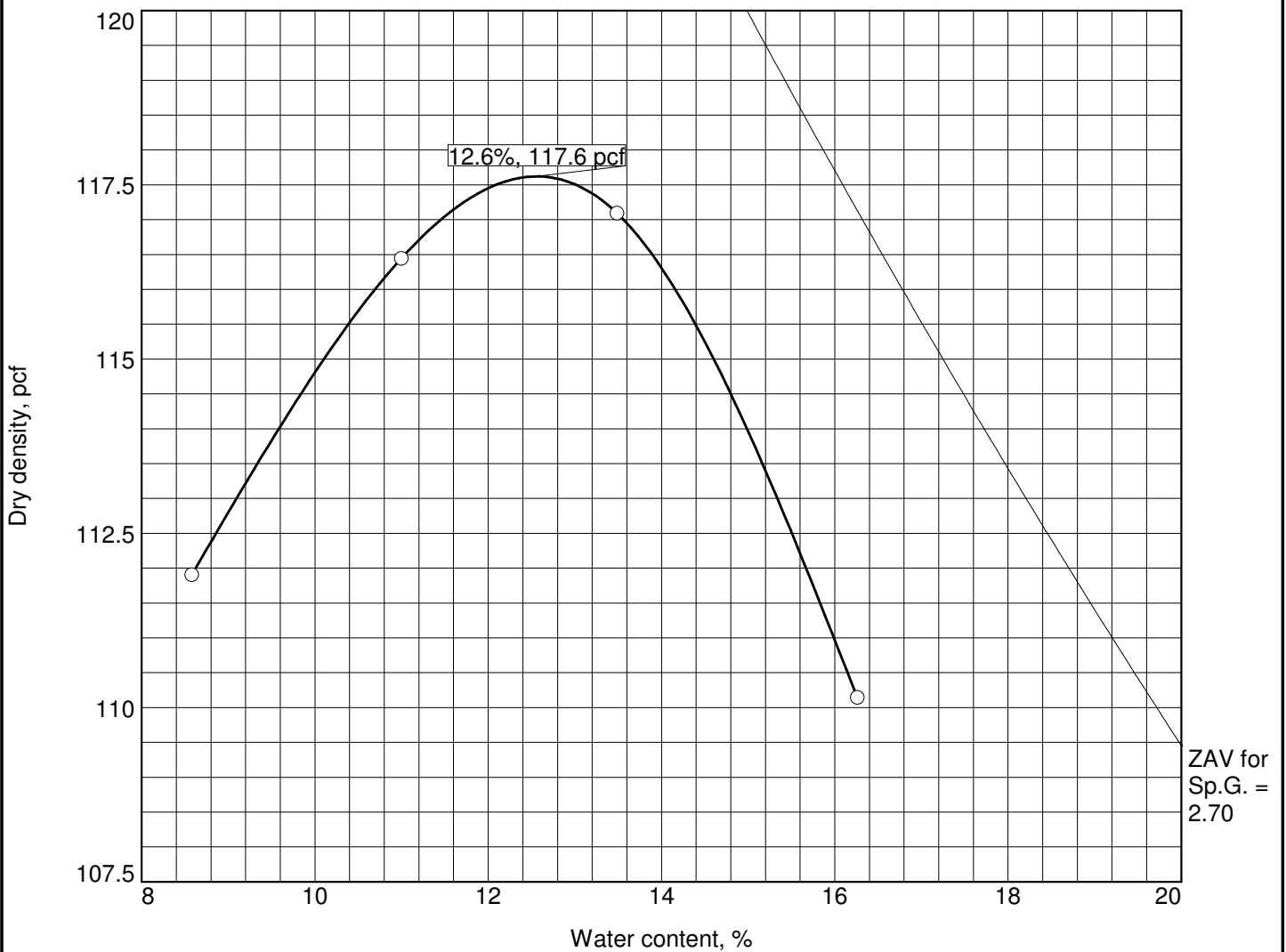
Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
0-8 ft.	CL	A-6(7)	16.9		33	20	3.1	52.5

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 117.6 pcf Optimum moisture = 12.9 %	Tan, Sandy Lean CLAY
Project No. 10052825 Client: HDR Engineering Project: 95 Express Lanes - Fredericksburg Extension ○ Location: 17SWM-01 Sample Number: 17SWM-01	Remarks: Sample Obtained 4/13/17

GET SOLUTIONS, INC.

Figure

MOISTURE DENSITY RELATIONSHIP (PROCTOR CURVE)



Test specification: VTM-1 Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
0-15 ft.	SC	A-6(5)	11		30	18	2.8	49.7

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 117.6 pcf Optimum moisture = 12.6 %	Orange-Gray, Clayey SAND
Project No. 10052825 Client: HDR Engineering Project: 95 Express Lanes - Fredericksburg Extension ○ Location: 17SWM-15 Sample Number: 17SWM-15	Remarks: Sample Obtained 4/20/17

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Moisture - Density Report



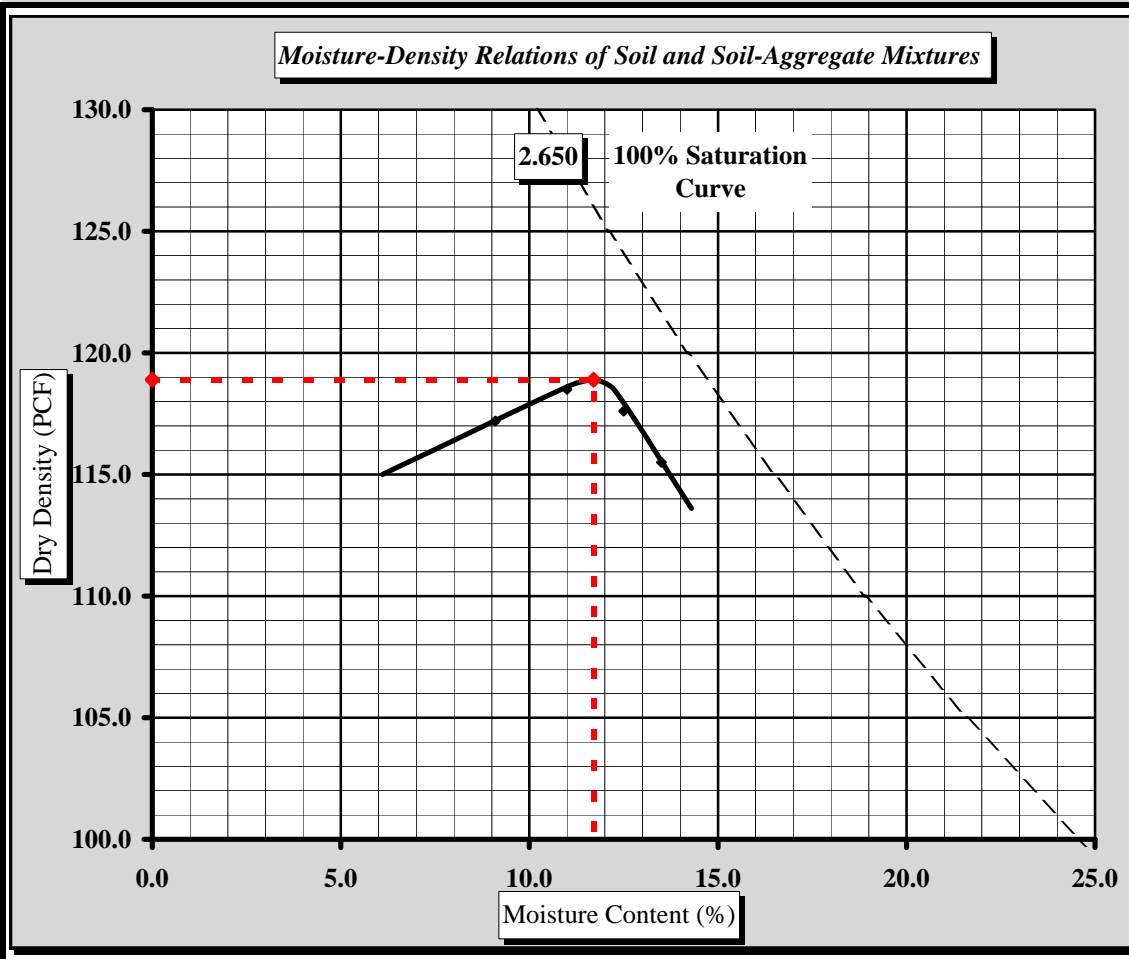
VTM-1

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	10052825	Task:	017	Report Date:	5/12/17
Project Name:	Transurban - Fredex - 95XPL			Test Date(s):	5/10 - 5/12/17
Client Name:	HDR Engineering			Amended Report #1	
Client Address:	4480 Cox Road, Suite 103, Gle Allen, VA 23060			Original Report:	
Boring #:	17SWM-19	Sample #:	Bulk	Sample Date:	5/1/2017
Location:	Site-Borehole	Offset:	NA	Depth:	0 - 10 ft
Sample Description: Tan-Brown Clayey SAND (SC)					

Maximum Dry Density 118.9 PCF. Optimum Moisture Content 11.7%
AASHTO T99 -- Method A



Soil Properties	
Natural Moisture Content	11.9%
Assumed Specific Gravity	2.650
Liquid Limit	37
Plastic Limit	17
Plastic Index	20
% Passing	
3/4"	100.0%
3/8"	96.8%
#4	92.0%
#10	88.4%
#40	67.1%
#60	58.2%
#200	42.0%
Oversize Fraction VTM-1	
Bulk Gravity	
% Moisture	
% Oversize	
MDD	
Opt. MC	

Moisture-Density Curve Displayed: Fine Fraction Corrected for Oversize Fraction (ASTM D 4718)
 Sieve Size used to separate the Oversize Fraction: #4 Sieve 3/8 inch Sieve 3/4 inch Sieve
 Mechanical Rammer Manual Rammer Moist Preparation Dry Preparation

References / Comments / Deviations:

- AASHTO T88: Particle Size Analysis of Soils
- AASHTO T265: Laboratory Determination of Moisture Content of Soils
- AASHTO T 99: Moisture-Density Relations of Soil Using a 5.5 Lb. Rammer and a 12" Drop

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/21/2017
 Date

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Moisture - Density Report



VTM-1

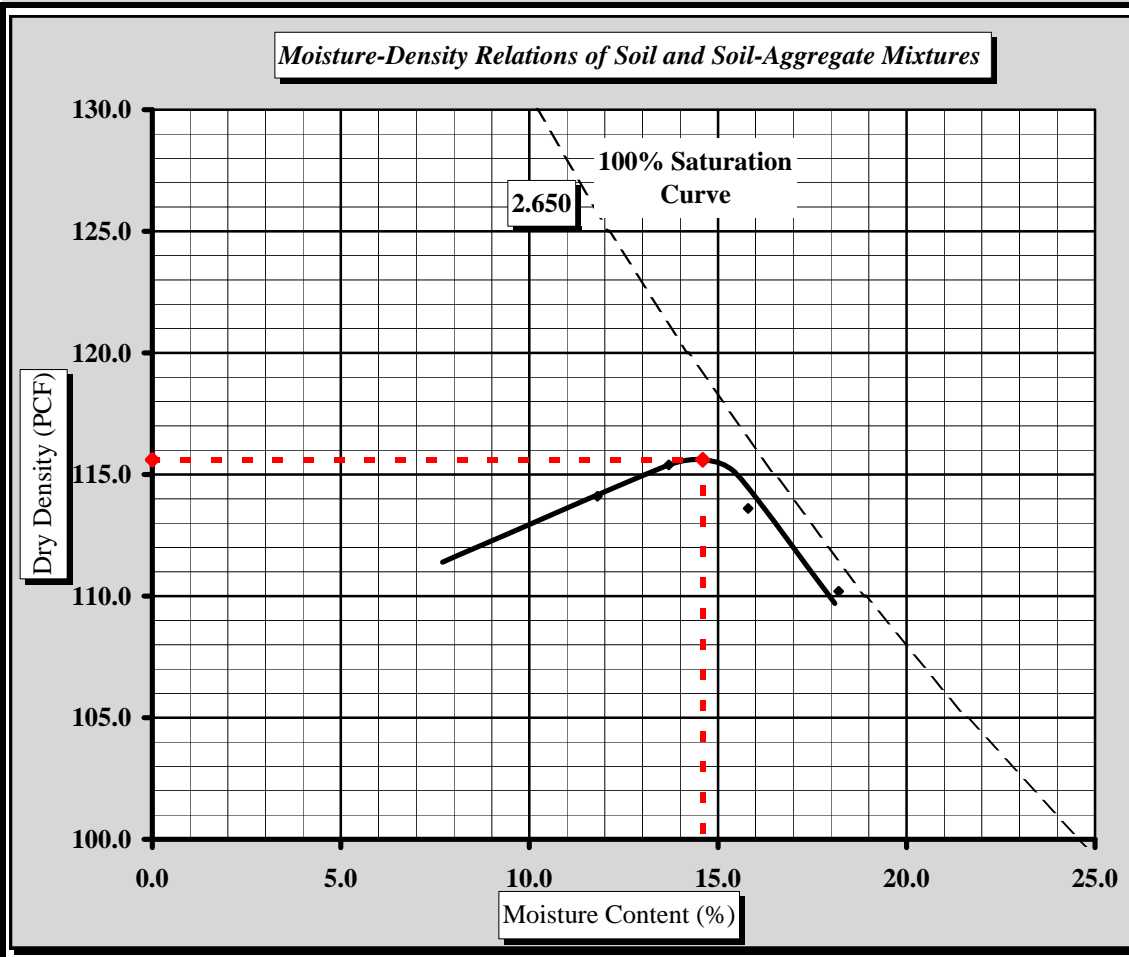
Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	10052825 Task: 017	Report Date:	5/12/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s):	5/10 - 5/12/17
Client Name:	HDR Engineering		
Client Address:	4480 Cox Road, Suite 103, Gle Allen, VA 23060		
Boring #:	17SWM-21	Sample #:	Bulk
Location:	Site-Borehole	Sample Date:	4/24/2017
		Offset:	NA
		Depth:	0 - 15 ft
Sample Description:	Tan-Brown Clayey SAND (SC)		

Maximum Dry Density 115.6 PCF. Optimum Moisture Content 14.6%

AASHTO T99 -- Method A



Soil Properties	
Natural Moisture Content	16.1%
Assumed Specific Gravity	2.650
Liquid Limit	45
Plastic Limit	18
Plastic Index	27
% Passing	
3/4"	100.0%
3/8"	100.0%
#4	96.9%
#10	90.9%
#40	69.5%
#60	54.2%
#200	36.8%
Oversize Fraction VTM-1	
Bulk Gravity	
% Moisture	
% Oversize	
MDD	
Opt. MC	

Moisture-Density Curve Displayed: Fine Fraction Corrected for Oversize Fraction (ASTM D 4718)
 Sieve Size used to separate the Oversize Fraction: #4 Sieve 3/8 inch Sieve 3/4 inch Sieve
 Mechanical Rammer Manual Rammer Moist Preparation Dry Preparation

References / Comments / Deviations:

- AASHTO T88: Particle Size Analysis of Soils
- AASHTO T265: Laboratory Determination of Moisture Content of Soils
- AASHTO T 99: Moisture-Density Relations of Soil Using a 5.5 Lb. Rammer and a 12" Drop

Mal Krajan, ET
 Technical Responsibility

Signature

Laboratory Manager
 Position

5/24/2017
 Date

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Moisture - Density Report



VTM-1

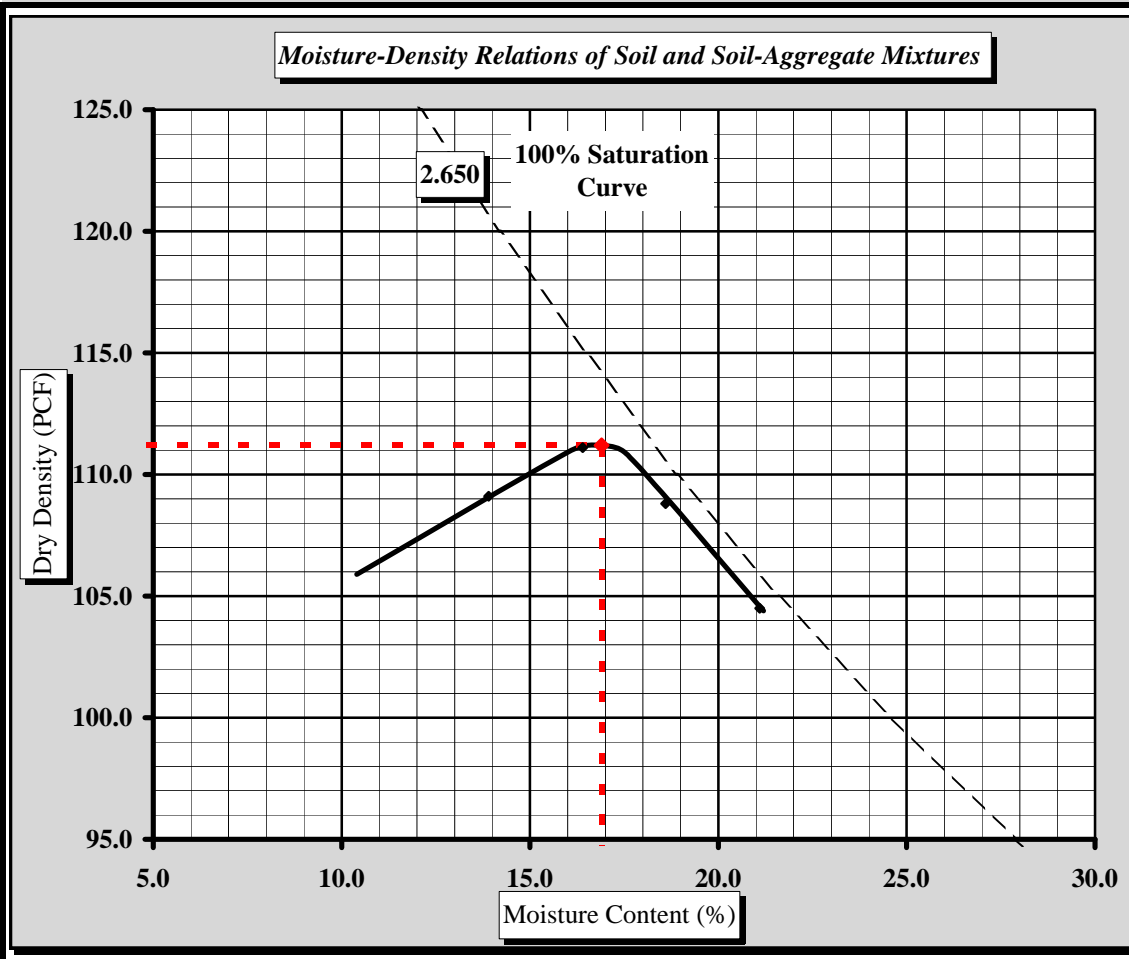
Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	10052825	Task:	017	Report Date:	5/12/17
Project Name:	Transurban - Fredex - 95XPL			Test Date(s):	5/10 - 5/12/17
Client Name:	HDR Engineering				
Client Address:	4480 Cox Road, Suite 103, Gle Allen, VA 23060				
Boring #:	17SWM-23	Sample #:	Bulk	Sample Date:	5/1/2017
Location:	Site-Borehole	Offset:	NA	Depth:	2 - 8 ft
Sample Description:	Brown Clayey SAND (SC)				

Maximum Dry Density 111.2 PCF. Optimum Moisture Content 16.9%

AASHTO T99 -- Method A



Soil Properties	
Natural Moisture Content	19.3%
Assumed Specific Gravity	2.650
Liquid Limit	50
Plastic Limit	17
Plastic Index	33
% Passing	
3/4"	100.0%
3/8"	100.0%
#4	100.0%
#10	99.0%
#40	86.3%
#60	67.9%
#200	47.5%
Oversize Fraction VTM-1	
Bulk Gravity	
% Moisture	
% Oversize	
MDD	
Opt. MC	

Moisture-Density Curve Displayed: Fine Fraction Corrected for Oversize Fraction (ASTM D 4718)
 Sieve Size used to separate the Oversize Fraction: #4 Sieve 3/8 inch Sieve 3/4 inch Sieve
 Mechanical Rammer Manual Rammer Moist Preparation Dry Preparation

References / Comments / Deviations:

- AASHTO T88: Particle Size Analysis of Soils
- AASHTO T265: Laboratory Determination of Moisture Content of Soils
- AASHTO T 99: Moisture-Density Relations of Soil Using a 5.5 Lb. Rammer and a 12" Drop

Mal Krajan, ET
 Technical Responsibility

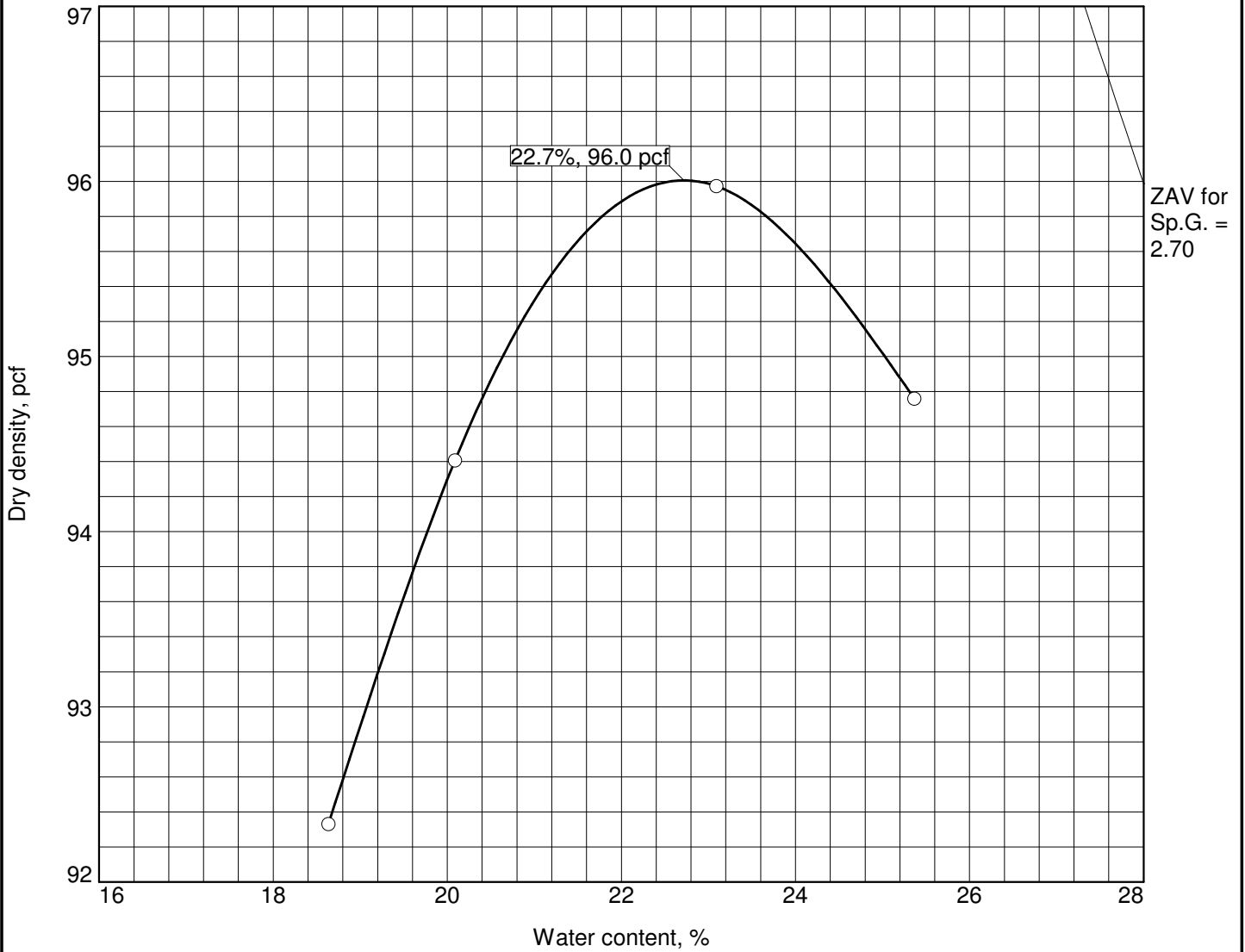
Signature

Laboratory Manager
 Position

5/21/2017
 Date

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MOISTURE DENSITY RELATIONSHIP (PROCTOR CURVE)



Test specification: VTM-1 Standard

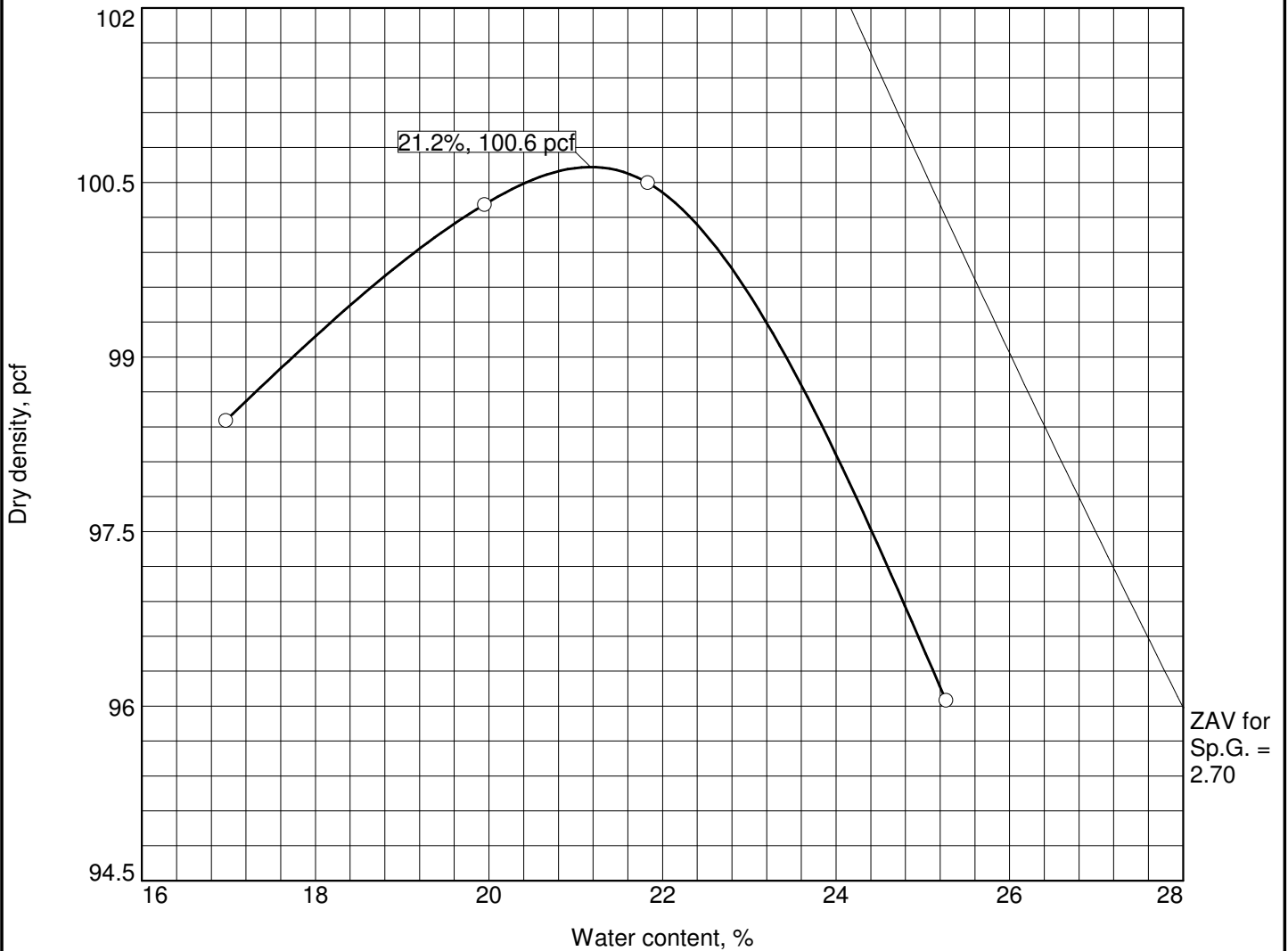
Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
0-8 ft.	CH	A-7-6(74)	25.3		92	68	0.7	95.2

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 96.0 pcf Optimum moisture = 22.7 %	Red-Orange, Fat CLAY
Project No. 10052825 Client: HDR Engineering Project: 95 Express Lanes - Fredericksburg Extension ○ Location: 17XP-03 Sample Number: 17XP-03	Remarks: Sample Obtained 4/13/17

GET SOLUTIONS, INC.

Figure

MOISTURE DENSITY RELATIONSHIP (PROCTOR CURVE)



Test specification: VTM-1 Standard

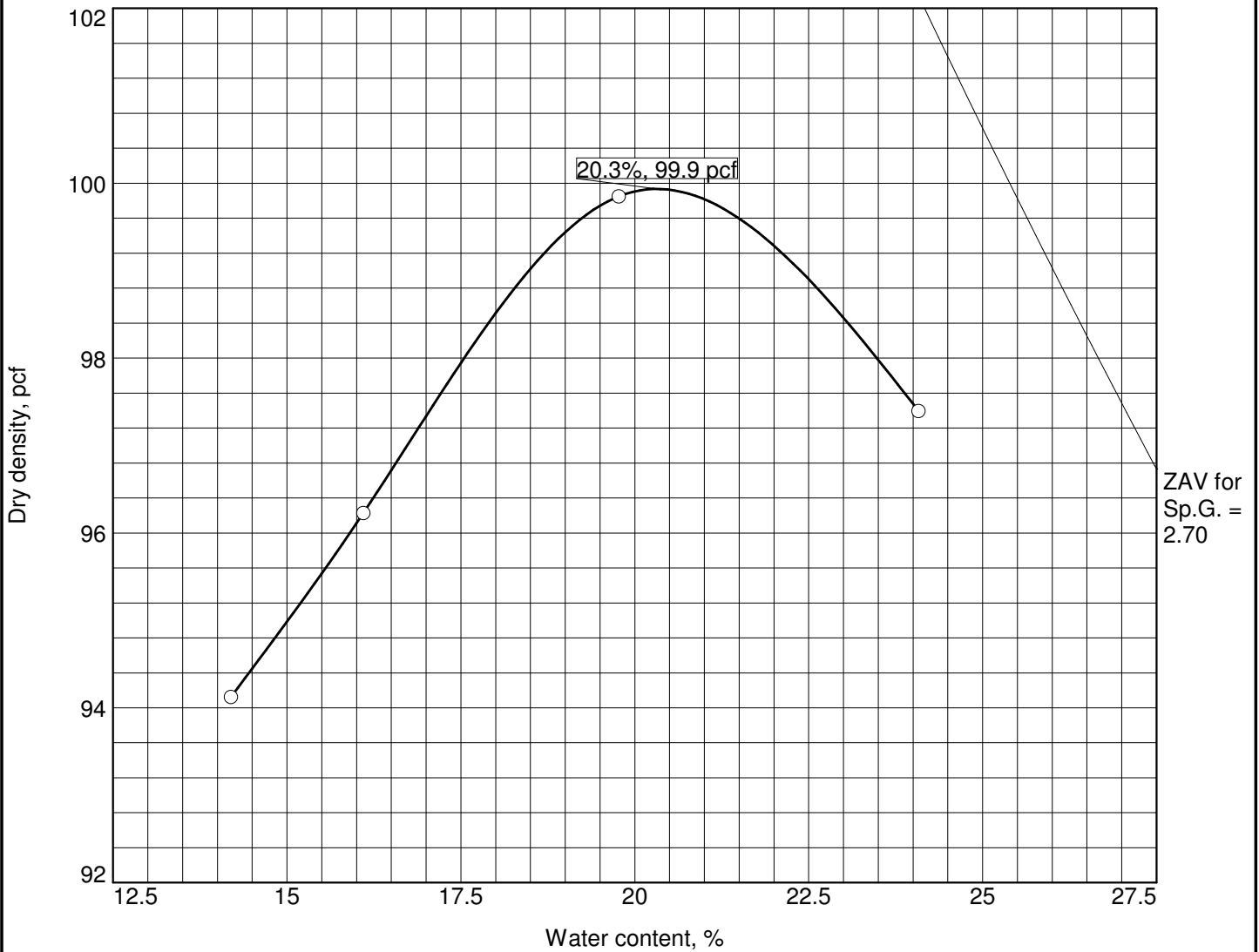
Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
2-6 ft.	CH	A-7-6(36)	23.8		63	41	0.4	82.7

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 100.6 pcf Optimum moisture = 21.2 %	Tan-Orange, Fat CLAY with Sand
Project No. 10052825 Client: HDR Engineering Project: 95 Express Lanes - Fredericksburg Extension ○ Location: 17XP-10 Sample Number: 17XP-10	Remarks: Sample Obtained 4/13/17

GET SOLUTIONS, INC.

Figure

MOISTURE DENSITY RELATIONSHIP (PROCTOR CURVE)



Test specification: VTM-1 Standard

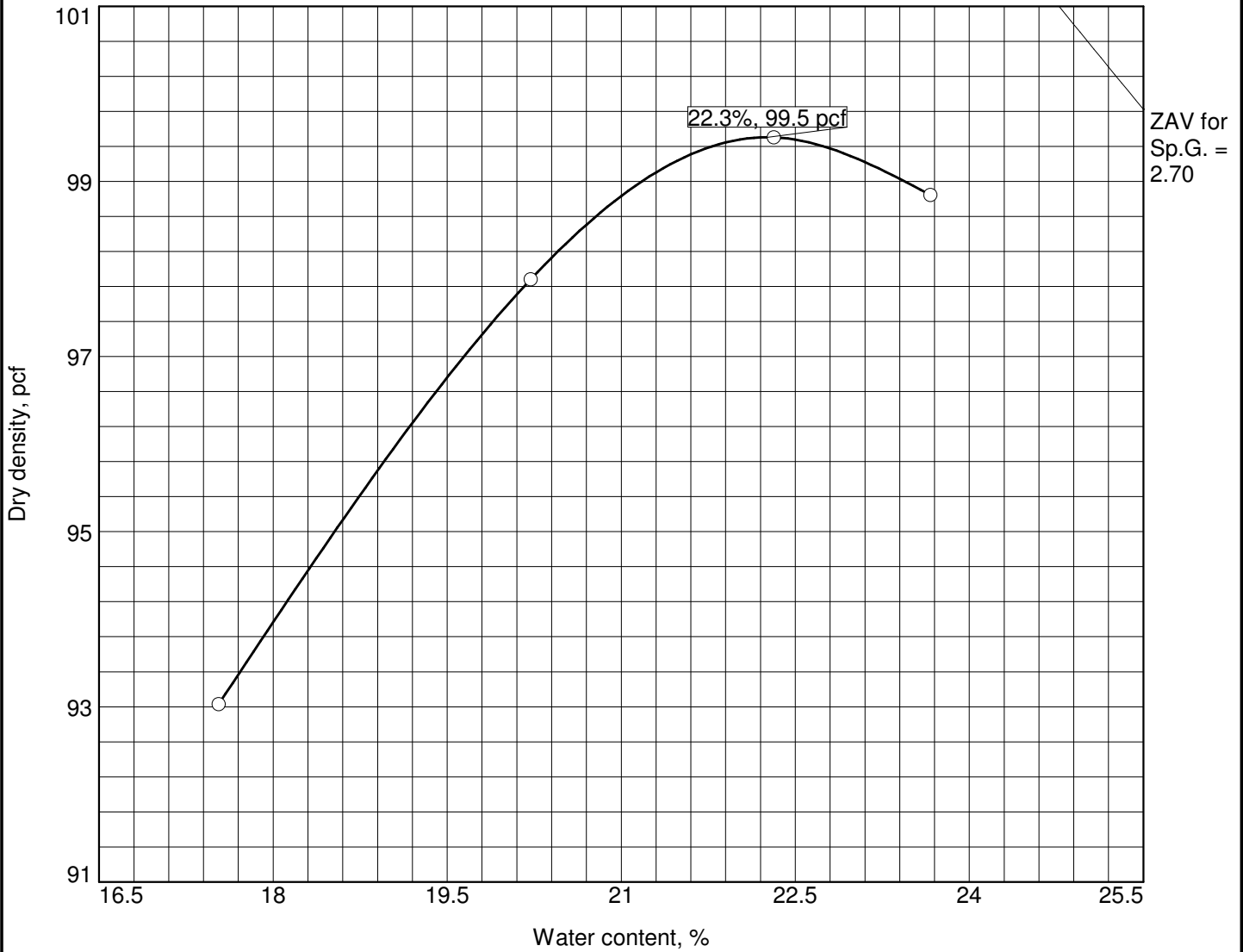
Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
0-6 ft.			17.7				0.4	86.8

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 99.9 pcf Optimum moisture = 20.3 %	Tan-Orange, Fat CLAY
Project No. 10052825 Client: HDR Engineering Project: 95 Express Lanes - Fredericksburg Extension ○ Location: 17XP-18 Sample Number: 17XP-18	Remarks: Sample Obtained 4/13/17

GET SOLUTIONS, INC.

Figure

MOISTURE DENSITY RELATIONSHIP (PROCTOR CURVE)



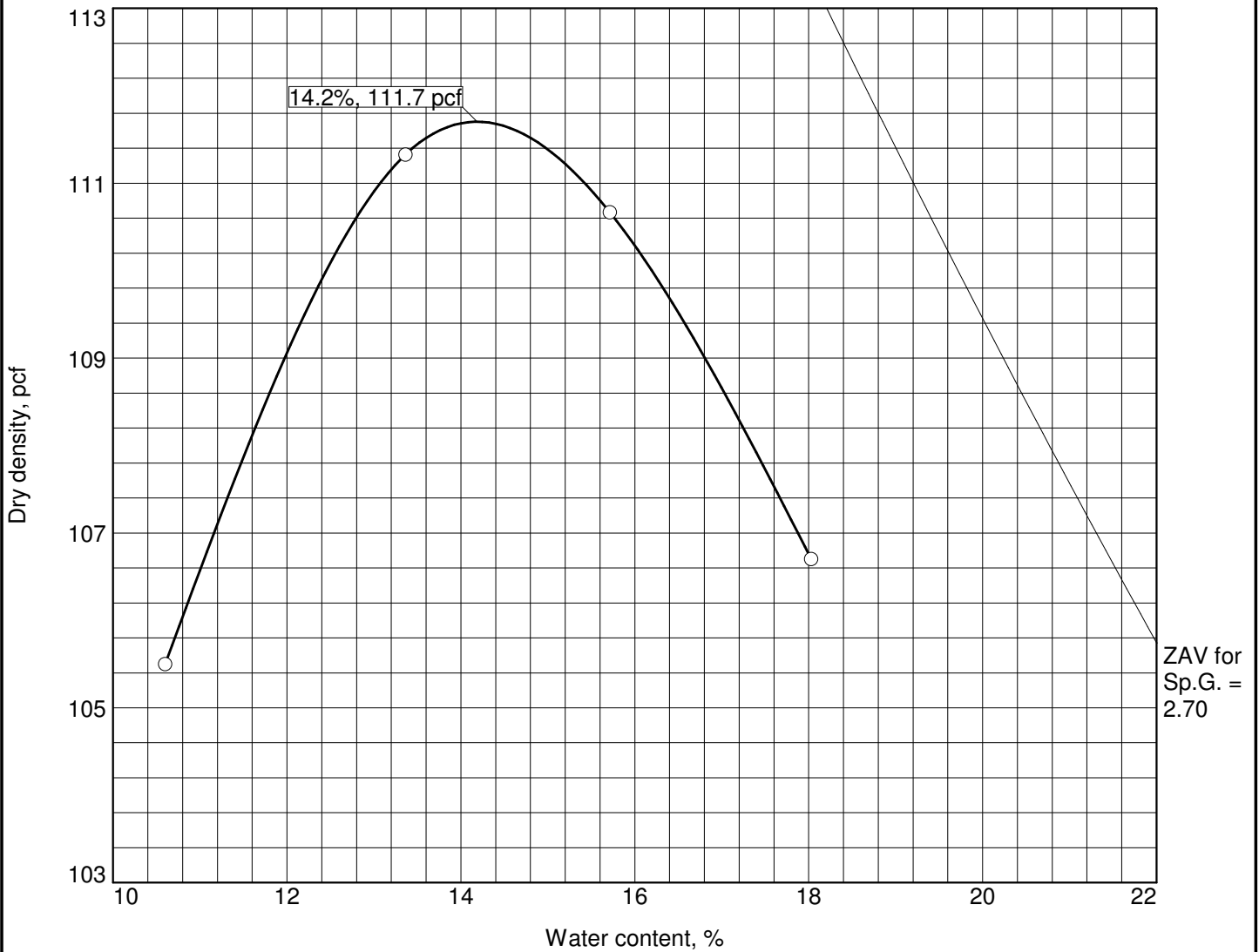
Test specification: VTM-1 Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
0-6 ft.	CH	A-7-6(26)	17		58	42	2.8	67.1

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 99.5 pcf Optimum moisture = 22.3 %	Orange, Sandy Fat CLAY
Project No. 10052825 Client: HDR Engineering Project: 95 Express Lanes - Fredericksburg Extension ○ Location: 17XP-20 Sample Number: 17XP-20	Remarks: Sample Obtained 4/20/17

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MOISTURE DENSITY RELATIONSHIP (PROCTOR CURVE)

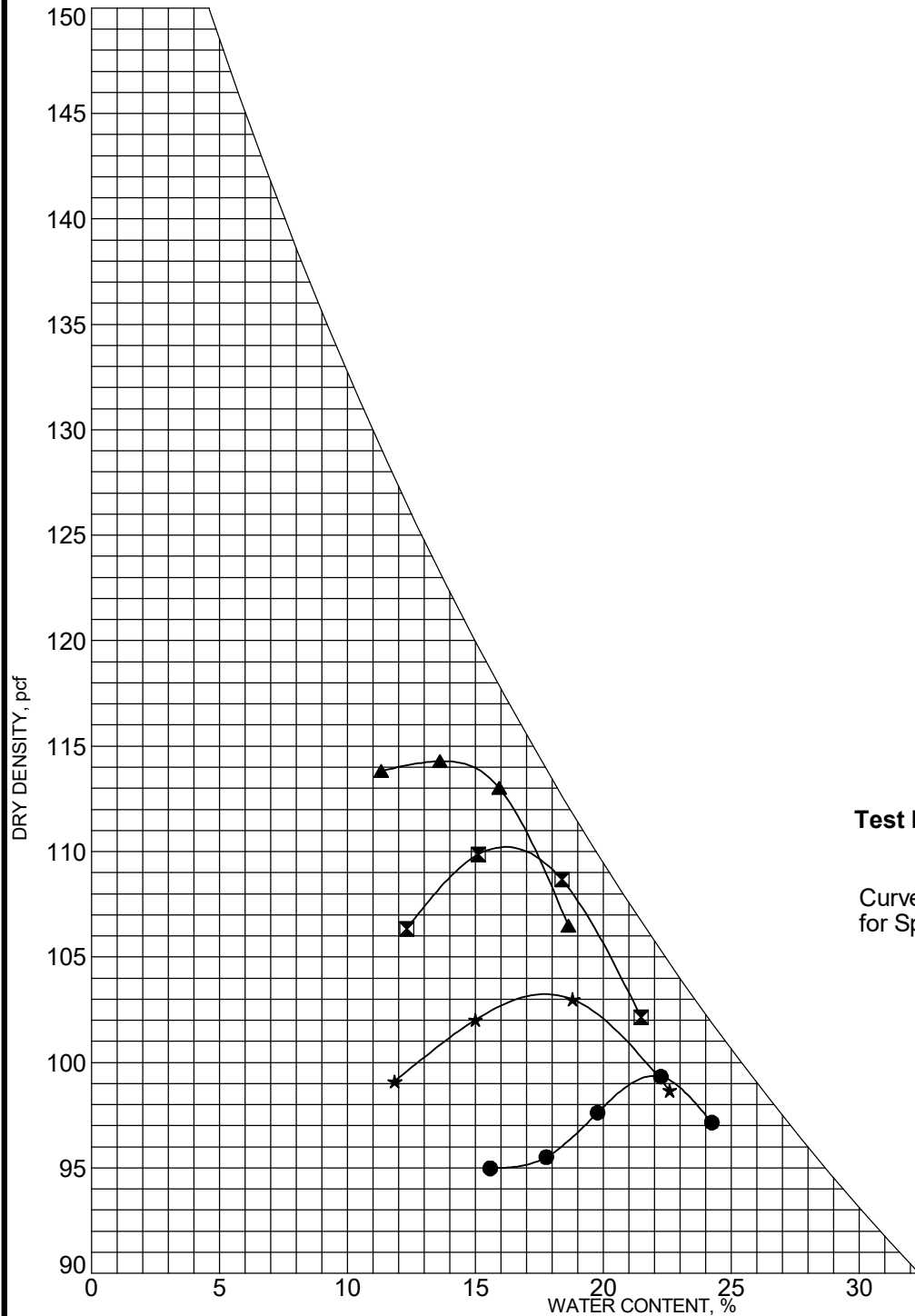


Test specification: ASTM D 698-12 Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
0-10 ft.	CL	A-7-6(11)	12		42	28	0.0	52.7

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 111.7 pcf Optimum moisture = 14.2 %	Tan, Sandy Lean CLAY
Project No. 10052825 Client: HDR Engineering Project: 95 Express Lanes - Fredericksburg Extension ○ Location: 17XP-51 Sample Number: 17XP-51	Remarks: Sample Obtained 4/20/17 17XP-51

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Test Method: VTM-1

Curve of 100% Saturation
for Specific Gravity Equal to: 2.7

* Oversize Correction

Boring	Sample No.	Depth, Ft	Classification	Max. Dry Density (pcf)	Opt. MC %	LL	PI
●	17XP-29	Bag	0.0-13.0	99.4	21.8	25	11
◻	17XP-31	Bag	0.0-13.0	110.3	16.3	42	21
▲	17XP-46	Bag	0.0-25.0	114.3	13.8	35	13
★	17XP-61	Bag	0.0-14.3	103.3	17.8	34	11

Tested By: EM, JW

Date: 4/21/2017

TLB COMPACTION MULTIPLE LAB.GPJ SALUT2014.GDT 5/4/17

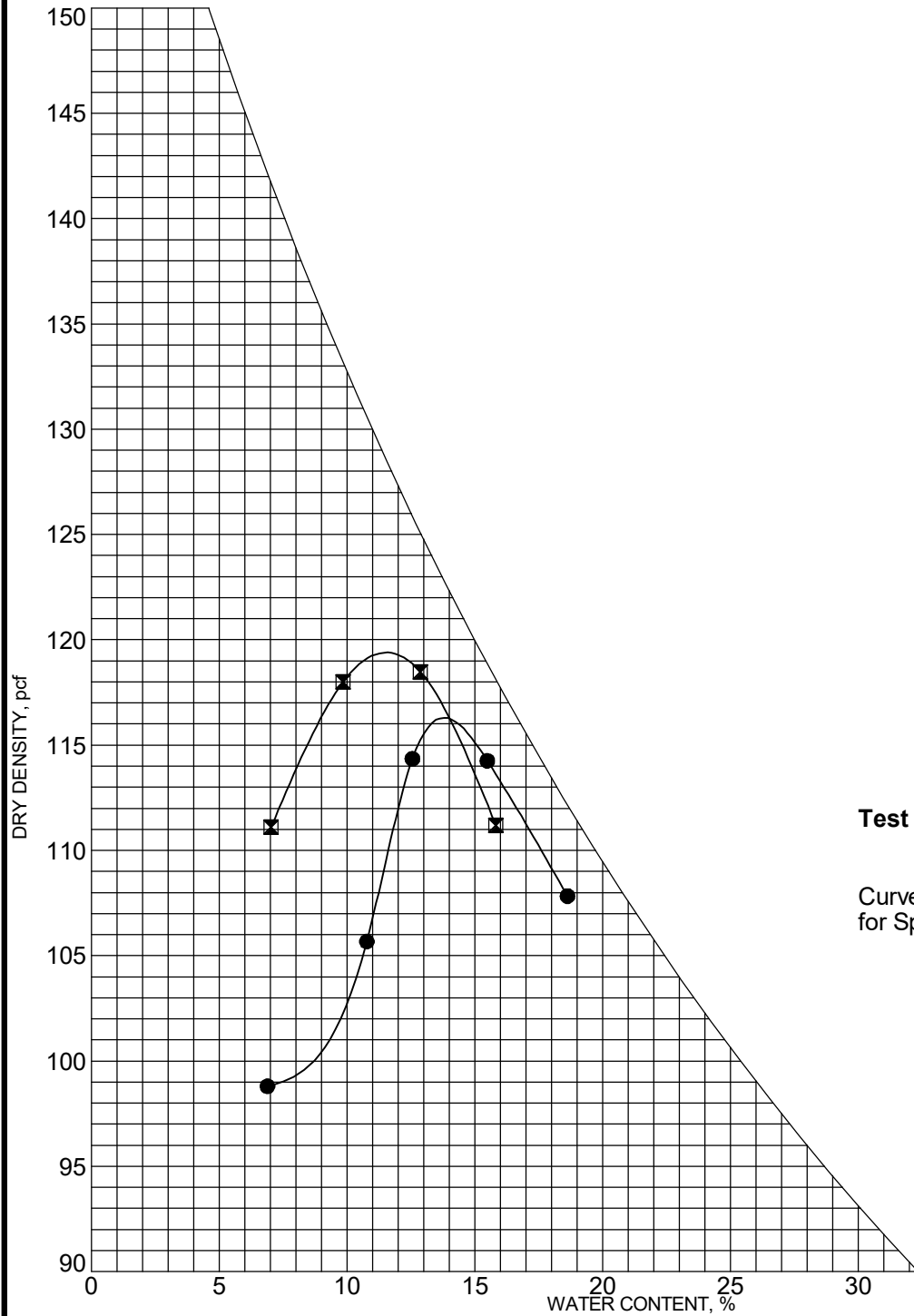


MOISTURE-DENSITY RELATIONSHIP

Project: 95 Express Lanes Fredericksburg Extension

Location: Fredericksburg, Virginia

Project Number: 13-0013 (HDR Project# 170419)



Test Method: VTM-1

Curve of 100% Saturation
for Specific Gravity Equal to: 2.7

* Oversize Correction

Boring	Sample No.	Depth, Ft	Classification	Max. Dry Density (pcf)	Opt. MC %	LL	PI
●	17XP-64	Bag	0.0-15.0	CLAYEY SAND(SC)	116.3	13.8	38 18
⊠	17XP-68	Bag	4.0-8.0	CLAYEY SAND(SC)	119.3	11.5	24 11

Tested By: EM, JW

Date: 4/22/2017

TLB COMPACTION MULTIPLE LAB.GPJ SALUT2014.GDT 5/4/17

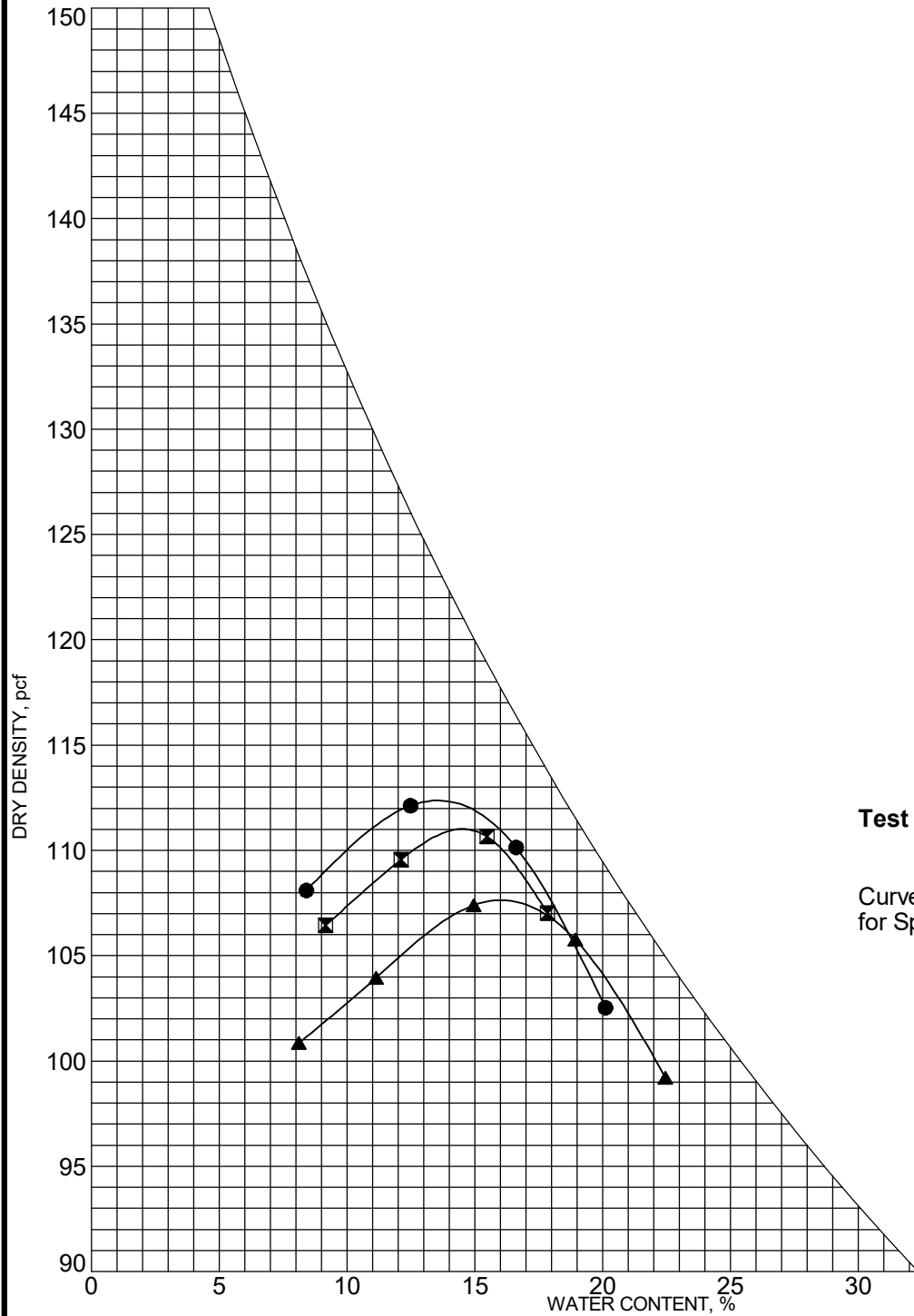


MOISTURE-DENSITY RELATIONSHIP

Project: 95 Express Lanes Fredericksburg Extension

Location: Fredericksburg, Virginia

Project Number: 13-0013 (HDR Project# 170419)



Test Method: VTM-1

Curve of 100% Saturation for Specific Gravity Equal to: 2.7

* Oversize Correction

Boring	Sample No.	Depth, Ft	Classification	Max. Dry Density (pcf)	Opt. MC %	LL	PI
●	17SWM-13	Bag	0.0-15.0	CLAYEY SAND(SC)	112.5	13.6	38 16
⊠	17WGS-03	Bag	0.0-13.0	SANDY LEAN CLAY(CL)	111.0	14.5	45 25
▲	17XP-23	Bag	0.0-10.0	SILTY SAND(SM)	107.7	16.0	30 5

Tested By: EM Date: 5/10/2017

TLB-COMPACTION-MULTIPLE-LAB-ASSIGNMENT2.GPJ - SAUJ2014.GBT 9/18/17



MOISTURE-DENSITY RELATIONSHIP

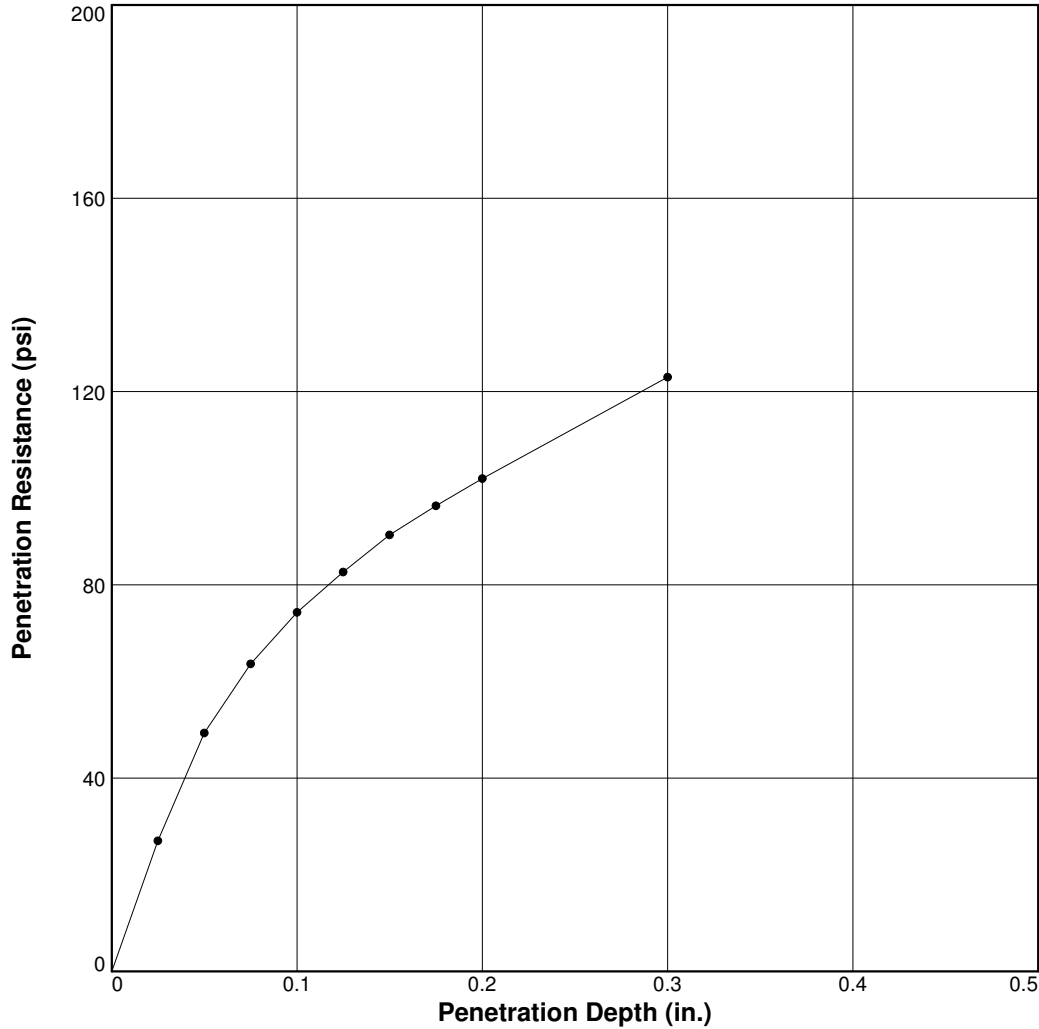
Project: 95 Express Lanes Fredericksburg Extension

Location: Fredericksburg, Virginia

Project Number: 13-0013 (HDR Project# 170419)

BEARING RATIO TEST REPORT

VTM-008 (2005)



	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ○	116.4	99	13.3	112.3	95.5	17.2	7.4	6.8	0.000	10	3.6
2 △											
3 □											

Material Description		USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Tan, Sandy Lean CLAY						

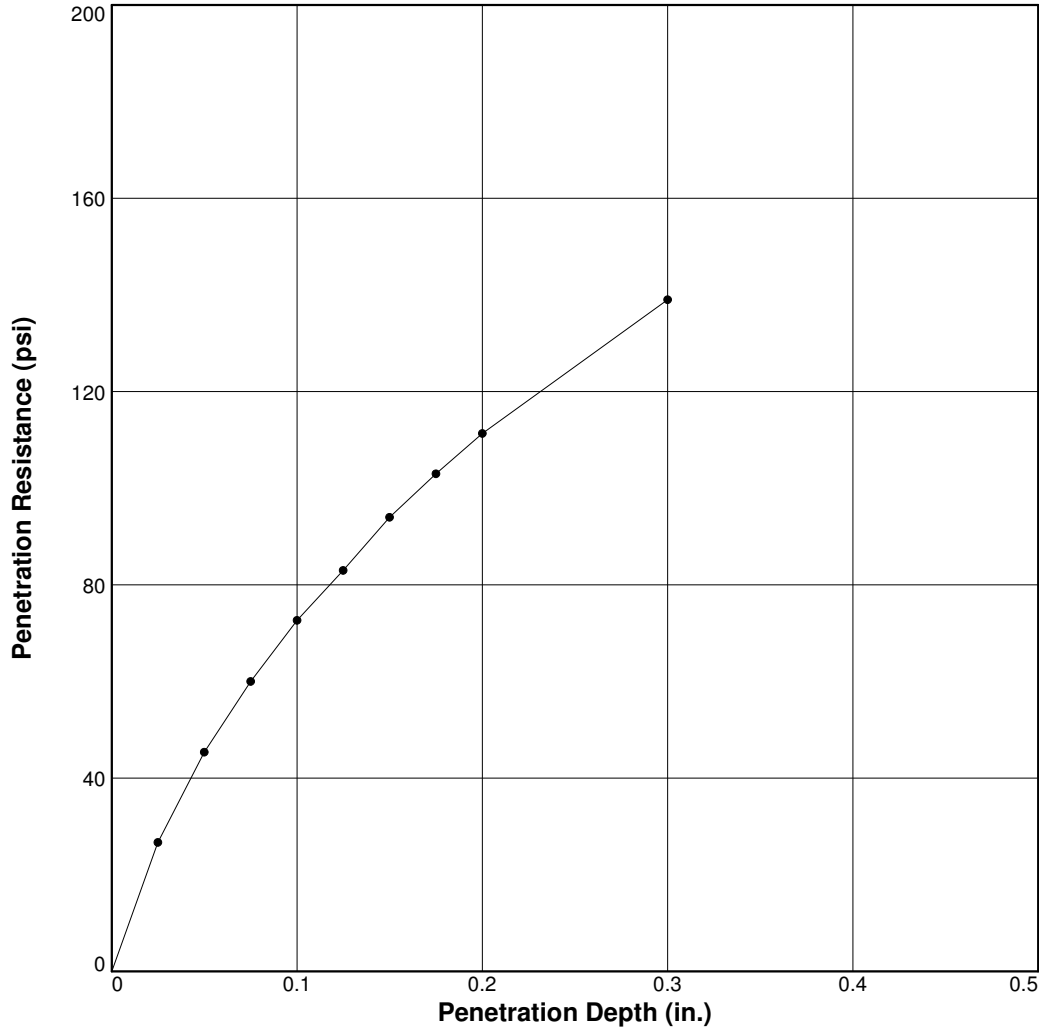
Project No: 10052825
Project: 95 Express Lanes - Fredericksburg Extension
Location: 17SWM-01
Sample Number: 17SWM-01 **Depth:** 0-8 ft.
Date: 4/13/17

Test Description/Remarks:

17SWM-01

BEARING RATIO TEST REPORT

VTM-008 (2005)



	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ○	117.9	100.3	12.5	116.7	99.3	13.9	7.3	7.4	0.000	10	1
2 △											
3 □											

Material Description		USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Orange-Gray, Clayey SAND						

Project No: 10052825
Project: 95 Express Lanes - Fredericksburg Extension
Location: 17SWM-15
Sample Number: 17SWM-15 **Depth:** 0-15 ft.
Date: 4/20/17

Test Description/Remarks:

17SWM-15

**CBR (California Bearing Ratio) of Laboratory
Compacted Soil**

VTM-8



Quality Assurance

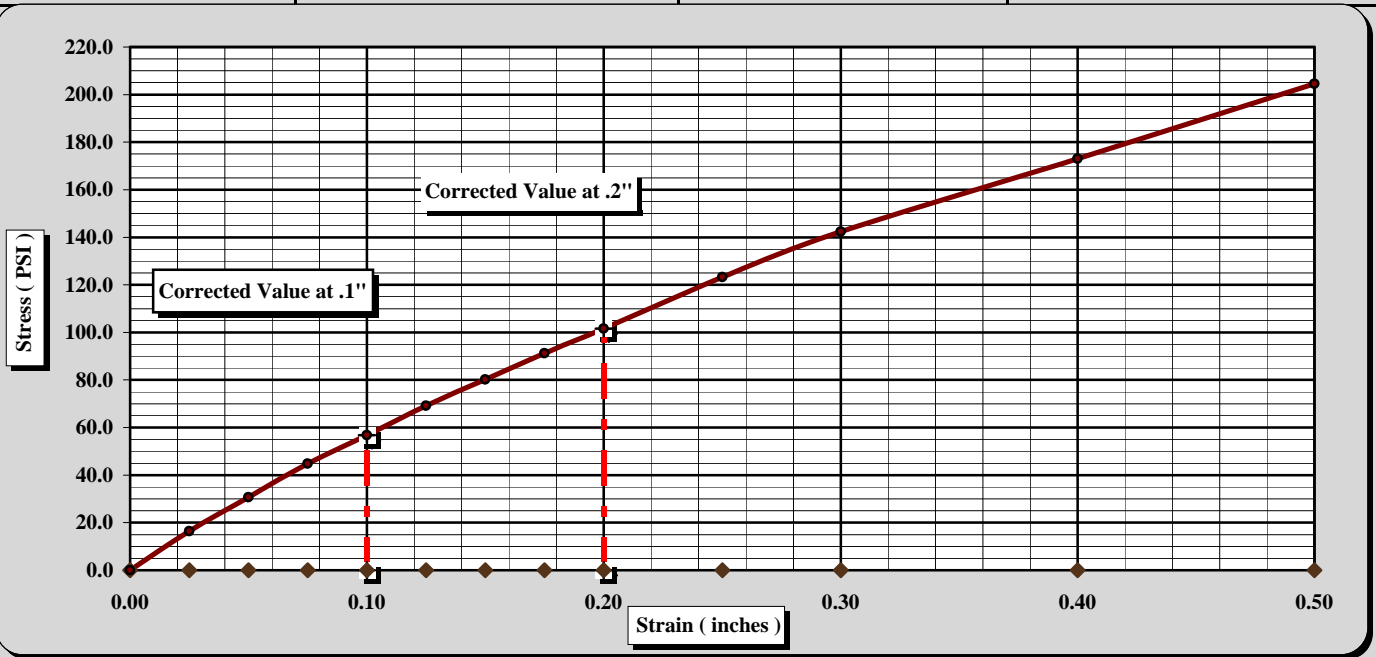
S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	10052825 Task: 017	Report Date:	5/17/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	5/11 - 5/17/17
Client Name:	HDR Engineering		
Client Address:	4480 Cox Rd, Suite 103, Glen Allen, VA 23060		
Boring #:	17SWM-19	Sample #:	Bulk
		Sample Date:	5/1/17
Location:	Site-Borhole	Offset:	N/A
		Depth (ft):	0 - 10 ft

Sample Description: Tan-Brown Clayey SAND (SC)

AASHTO T99 Method A	Maximum Dry Density:	118.9 PCF	Optimum Moisture Content:	11.7%
	Compaction Test performed on grading complying with CBR spec.		% Retained on the 3/4" sieve:	0.0%

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in.	5.7	CBR at 0.1 in.	5.7
CBR at 0.2 in.	6.8	CBR at 0.2 in.	6.8



CBR Sample Preparation:

The entire gradation was used and compacted in a 6" CBR mold in accordance with

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	63	Final Dry Density (PCF)	118.2
Initial Dry Density (PCF)	119.2	Average Final Moisture Content	12.7%
Moisture Content of the Compacted Specimen	11.9%	Moisture Content (top 1" after soaking)	13.3%
Percent Compaction	100.3%	Percent Swell	0.2%
Soak Time:	96-hr	Surcharge Weight	10.0
Liquid Limit	37	Surcharge Wt. per sq. Ft.	50.9
		Plastic Index	20

Notes/Deviations/References:

Test specimen was compacted 63-blow per layer at optimum moisture content.

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/21/2017
Date

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**CBR (California Bearing Ratio) of Laboratory
Compacted Soil**

VTM-8



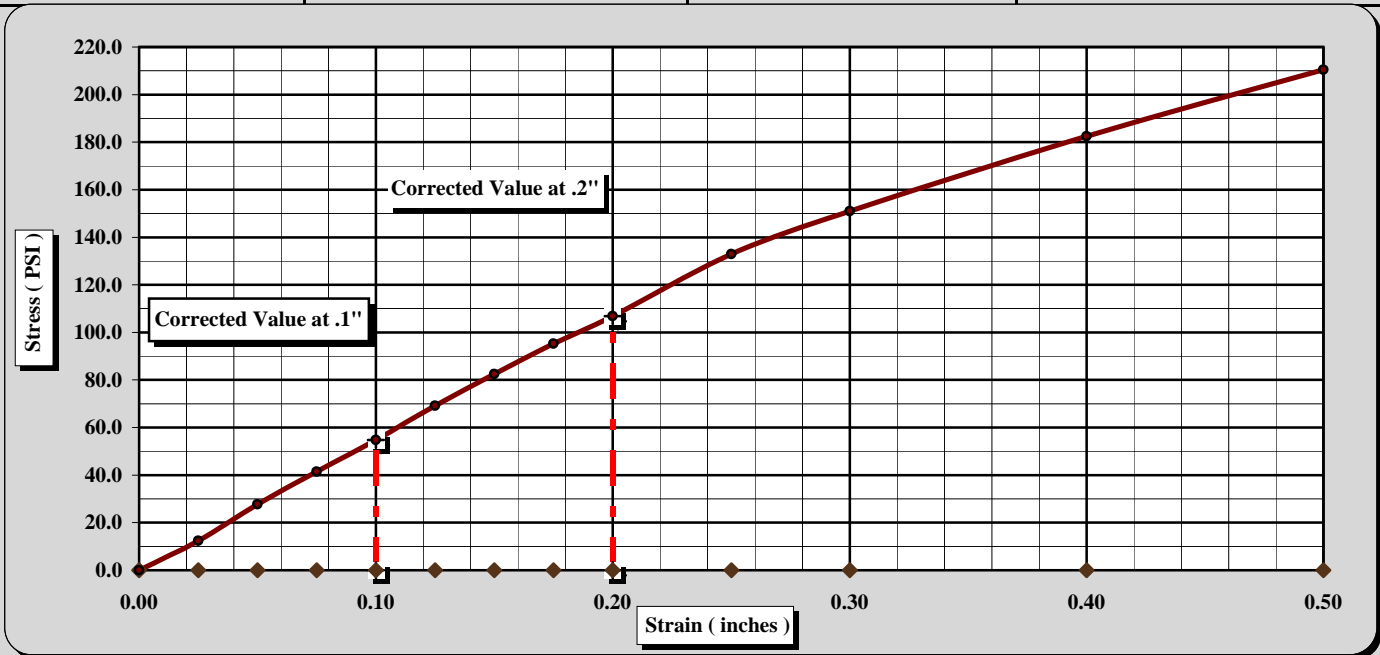
Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	10052825 Task: 017	Report Date:	5/17/17
Project Name:	Transurban - Fredex - 95XPL	Test Date(s)	5/11 - 5/17/17
Client Name:	HDR Engineering		
Client Address:	4480 Cox Rd, Suite 103, Glen Allen, VA 23060		
Boring #:	17SWM-21	Sample #:	Bulk
		Sample Date:	4/24/17
Location:	Site-Borhole	Offset:	N/A
		Depth (ft):	0 - 15 ft
Sample Description: Tan-Brown Clayey SAND (SC)			

AASHTO T99 Method A	Maximum Dry Density:	115.6 PCF	Optimum Moisture Content:	14.6%
	Compaction Test performed on grading complying with CBR spec.		% Retained on the 3/4" sieve:	0.0%

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in.	5.5	CBR at 0.1 in.	5.5
CBR at 0.2 in.	7.1	CBR at 0.2 in.	7.1



CBR Sample Preparation:

The entire gradation was used and compacted in a 6" CBR mold in accordance with

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	63	Final Dry Density (PCF)	115.1
Initial Dry Density (PCF)	115.6	Average Final Moisture Content	15.1%
Moisture Content of the Compacted Specimen	14.8%	Moisture Content (top 1" after soaking)	15.4%
Percent Compaction	100.0%	Percent Swell	0.1%
Soak Time:	96-hr	Surcharge Weight	10.0
Liquid Limit	45	Surcharge Wt. per sq. Ft.	50.9
		Plastic Index	27

Notes/Deviations/References:

Test specimen was compacted 63-blow per layer at optimum moisture content.

Mal Krajan, ET
Technical Responsibility

Signature

Laboratory Manager
Position

5/24/2017
Date

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**CBR (California Bearing Ratio) of Laboratory
Compacted Soil**

VTM-8



Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #: 10052825 **Task:** 017 **Report Date:** 5/17/17

Project Name: Transurban - Fredex - 95XPL **Test Date(s)** 5/11 - 5/17/17

Client Name: HDR Engineering

Client Address: 4480 Cox Rd, Suite 103, Glen Allen, VA 23060

Boring #: 17SWM-23 **Sample #:** Bulk **Sample Date:** 5/1/17

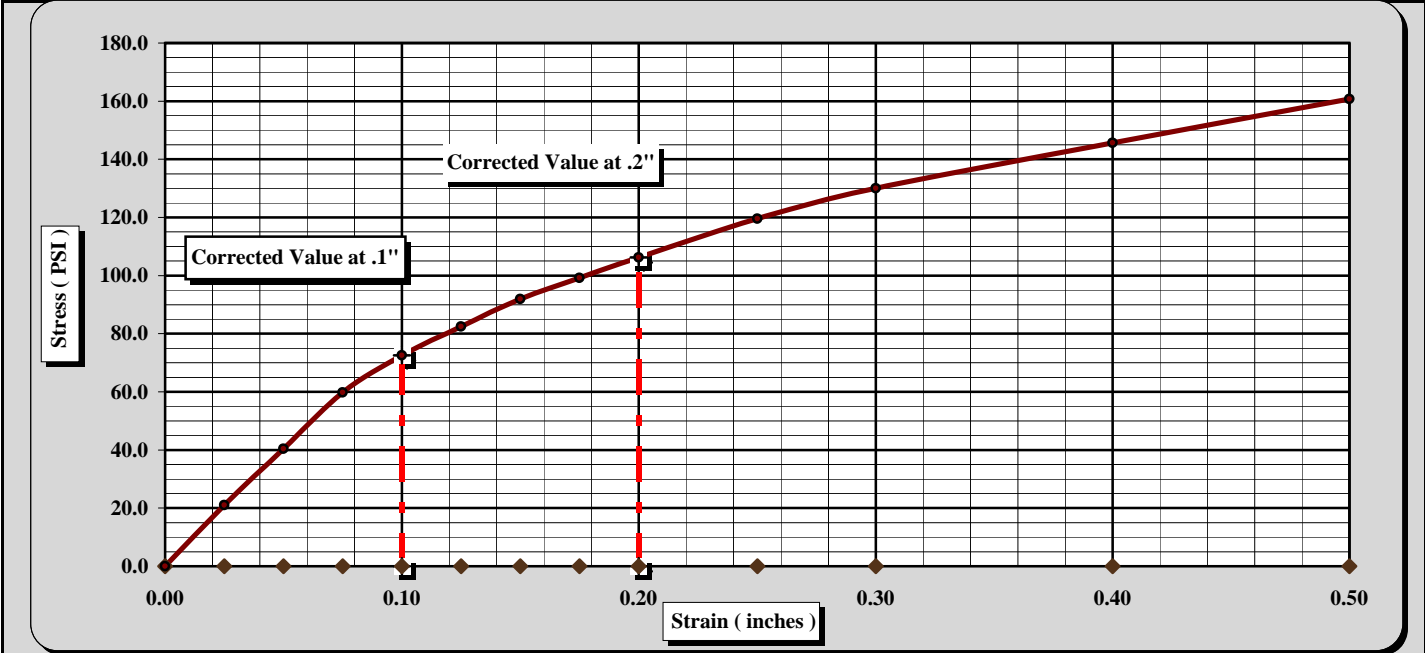
Location: Site-Borhole **Offset:** N/A **Depth (ft):** 2 - 8 ft

Sample Description: Brown Clayey SAND (SC)

AASHTO T99 Method A **Maximum Dry Density:** 111.2 PCF **Optimum Moisture Content:** 16.9%

Compaction Test performed on grading complying with CBR spec. **% Retained on the 3/4" sieve:** 0.0%

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in.	7.3	CBR at 0.2 in.	7.1
CBR at 0.1 in.	7.3	CBR at 0.2 in.	7.1



CBR Sample Preparation:

The entire gradation was used and compacted in a 6" CBR mold in accordance with

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	60	Final Dry Density (PCF)	109.3
Initial Dry Density (PCF)	111.4	Average Final Moisture Content	19.1%
Moisture Content of the Compacted Specimen	17.4%	Moisture Content (top 1" after soaking)	19.2%
Percent Compaction	100.2%	Percent Swell	0.4%
Soak Time: 96-hr	Surcharge Weight 10.0	Surcharge Wt. per sq. Ft.	50.9
Liquid Limit 50	Plastic Index 33		

Notes/Deviations/References:

Test specimen was compacted 60-blow per layer at optimum moisture content.

Mal Krajan, ET
Technical Responsibility

Signature

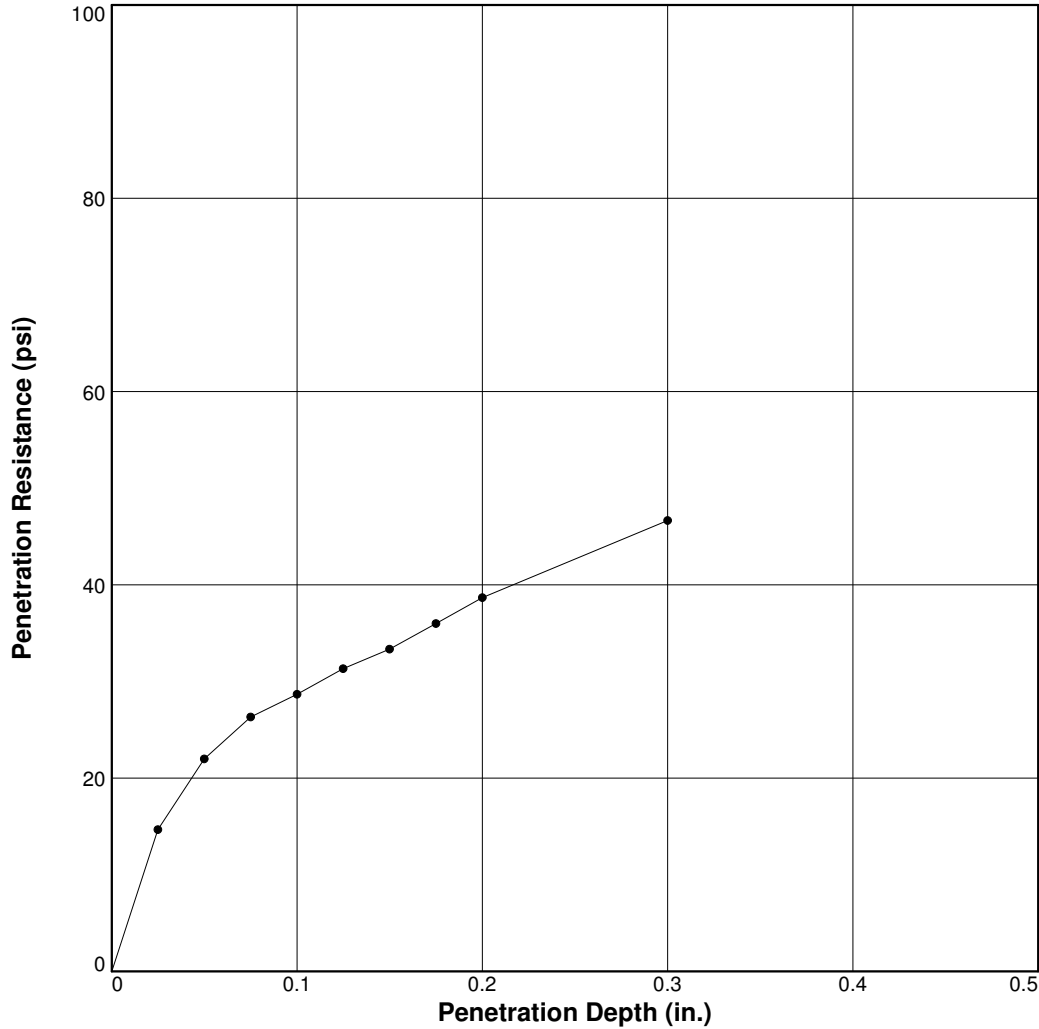
Laboratory Manager
Position

5/24/2017
Date

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BEARING RATIO TEST REPORT

VTM-008 (2005)



	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ○	95.6	99.6	22.2	93.4	97.3	28.2	2.9	2.6	0.000	10	2.4
2 △											
3 □											
Material Description							USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Red-Orange, Fat CLAY											

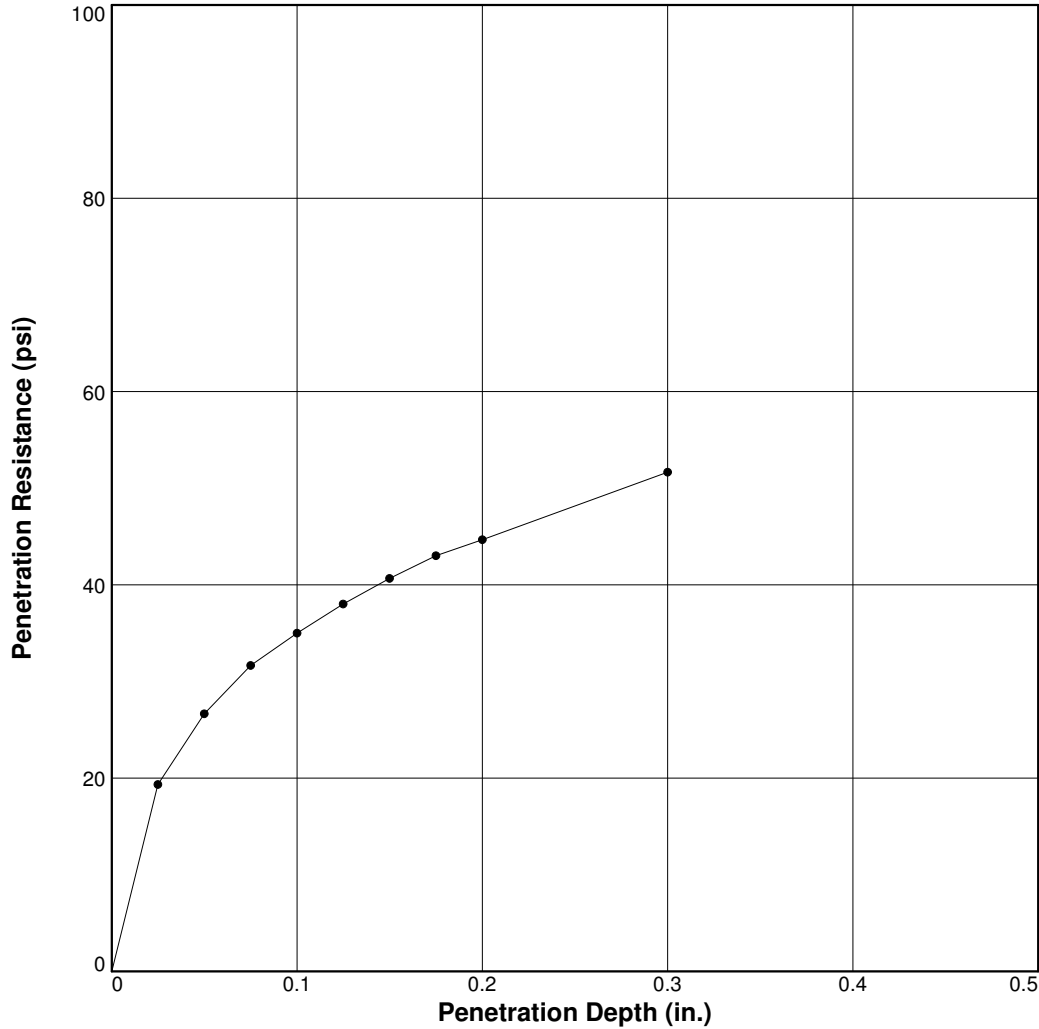
Project No: 10052825
Project: 95 Express Lanes - Fredericksburg Extension
Location: 17XP-03
Sample Number: 17XP-03 **Depth:** 0-8 ft.
Date: 4/13/17

Test Description/Remarks:

Sample Obtained 4/13/17

BEARING RATIO TEST REPORT

VTM-008 (2005)



	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ○	99.8	99.2	21.6	96.3	95.7	26.2	3.5	3.0	0.000	10	3.7
2 △											
3 □											

Material Description		USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Tan-Orange, Fat CLAY with Sand						

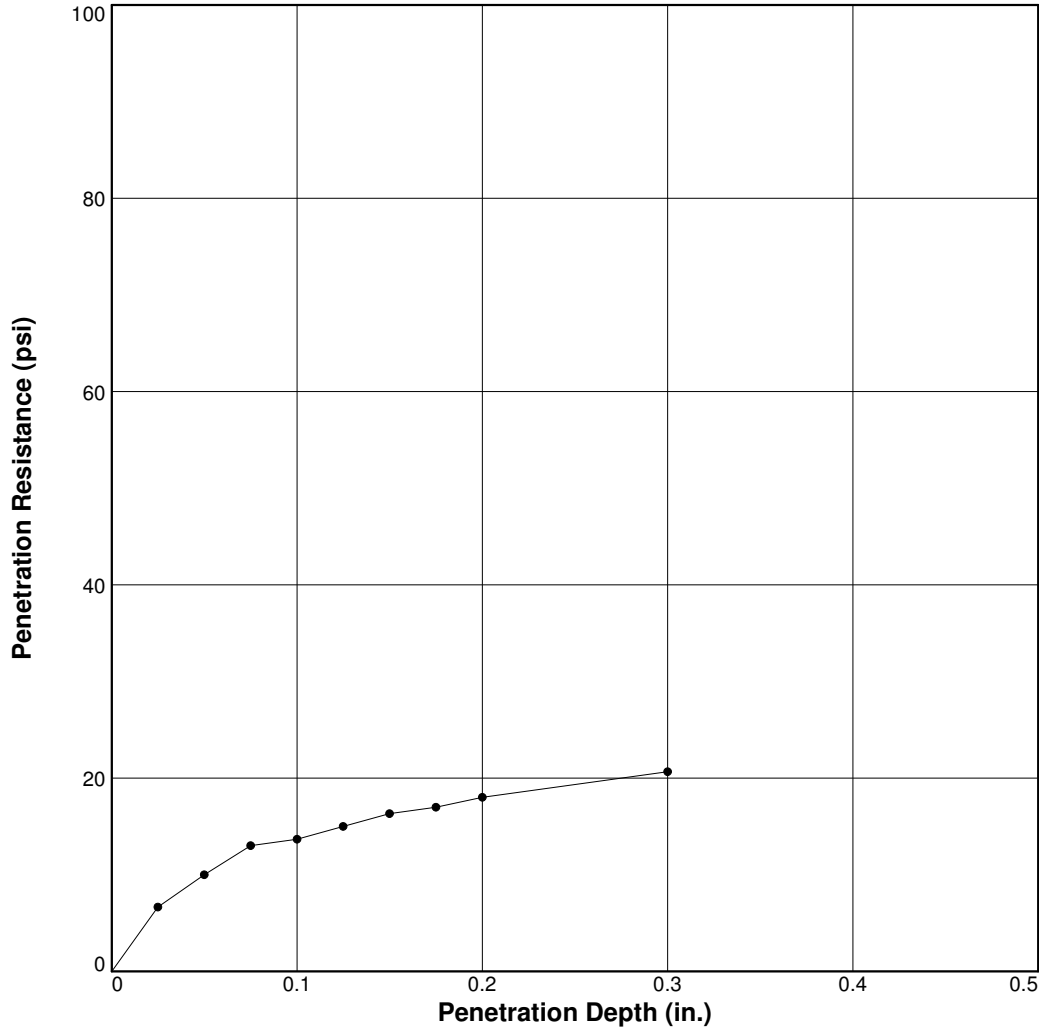
Project No: 10052825
Project: 95 Express Lanes - Fredericksburg Extension
Location: 17XP-10
Sample Number: 17XP-10 **Depth:** 2-6 ft.
Date: 4/13/17

Test Description/Remarks:

17XP-10

BEARING RATIO TEST REPORT

VTM-008 (2005)



	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ○	99.7	99.8	19.9	97.1	97.2	31.9	1.4	1.2	0.000	10	2.7
2 △											
3 □											

Material Description	USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Tan-Orange, Fat CLAY					

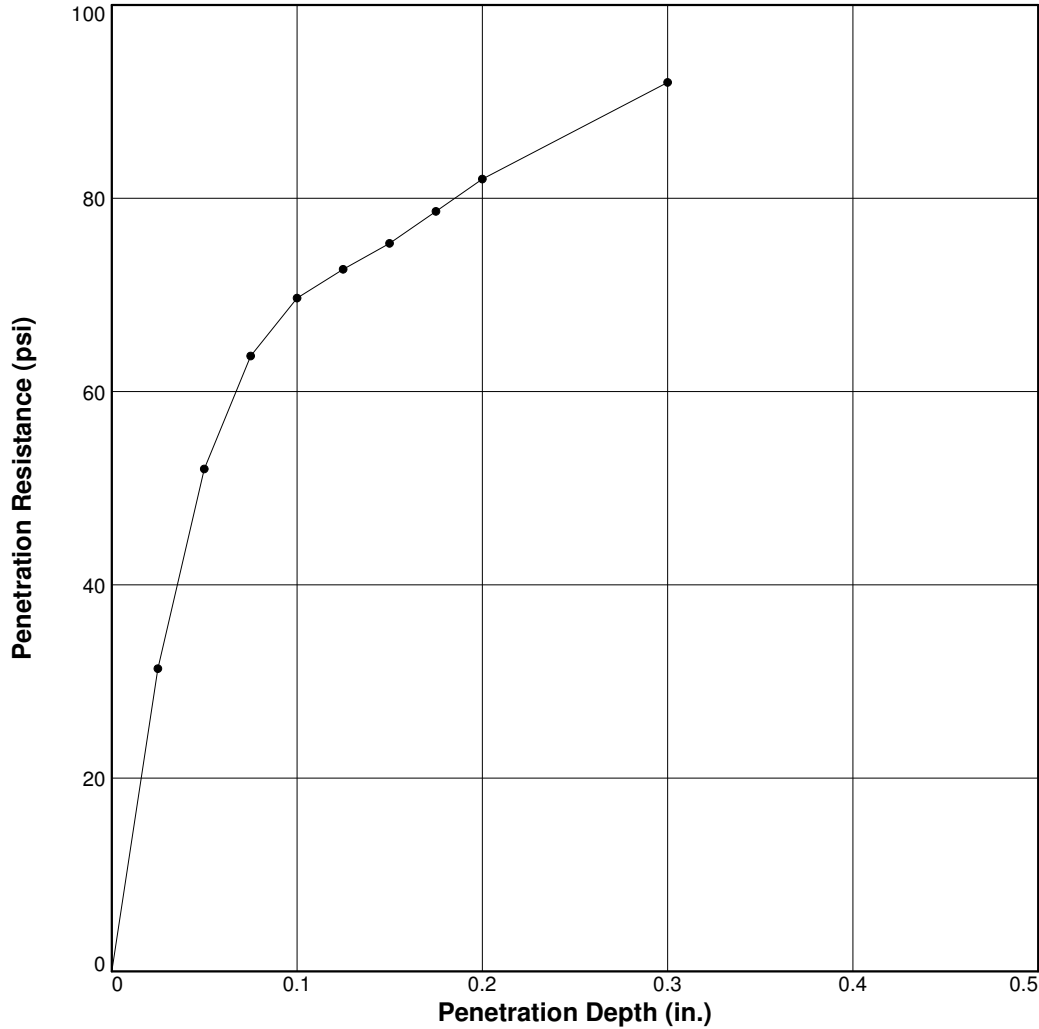
Project No: 10052825
Project: 95 Express Lanes - Fredericksburg Extension
Location: 17XP-18
Sample Number: 17XP-18 **Depth:** 0-6 ft.
Date: 4/13/17

Test Description/Remarks:

17XP-18

BEARING RATIO TEST REPORT

VTM-008 (2005)



	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ○	100.2	100.7	21.5	99.0	99.5	22.9	7.0	5.5	0.000	10	1.2
2 △											
3 □											
Material Description							USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Orange, Sandy Fat CLAY											

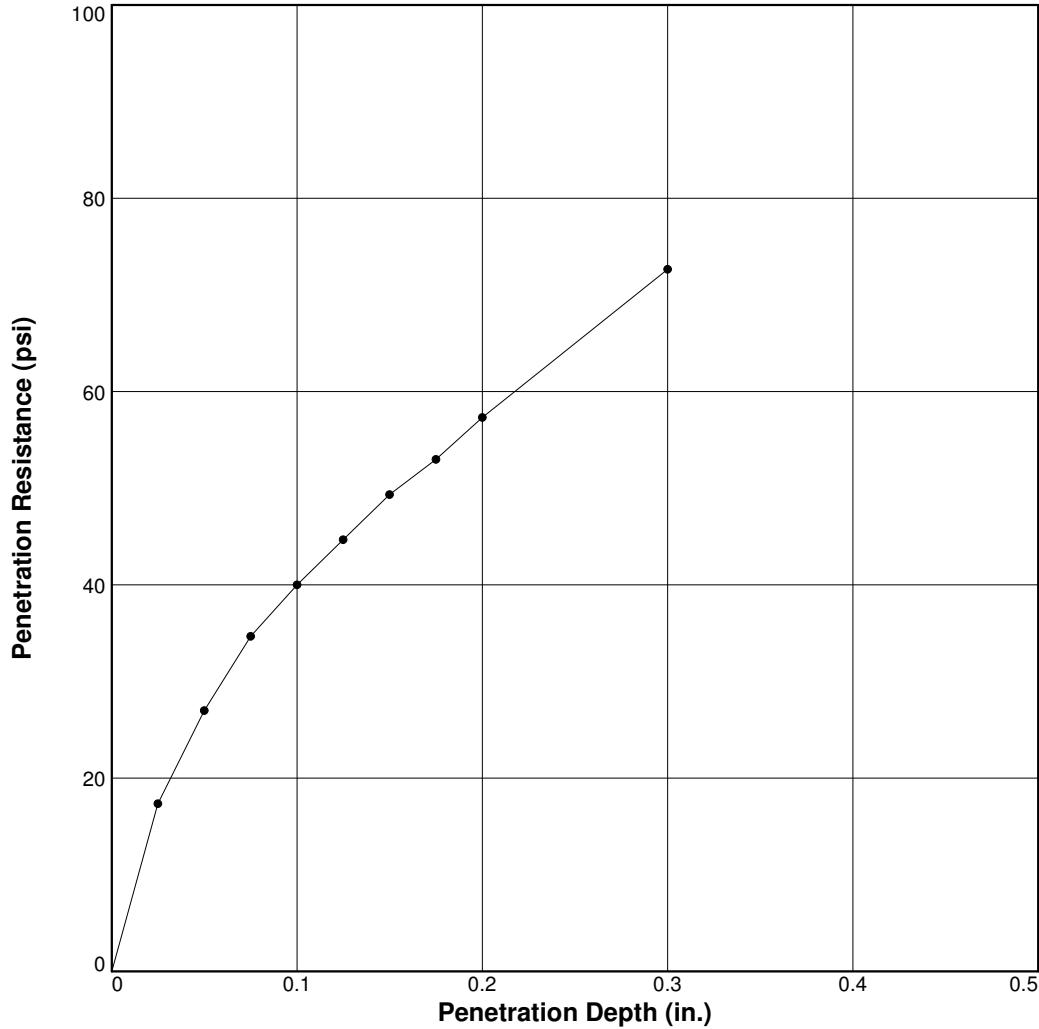
Project No: 10052825
Project: 95 Express Lanes - Fredericksburg Extension
Location: 17XP-20
Sample Number: 17XP-20 **Depth:** 0-6 ft.
Date: 4/20/17

Test Description/Remarks:

17XP-20

BEARING RATIO TEST REPORT

VTM-008 (2005)

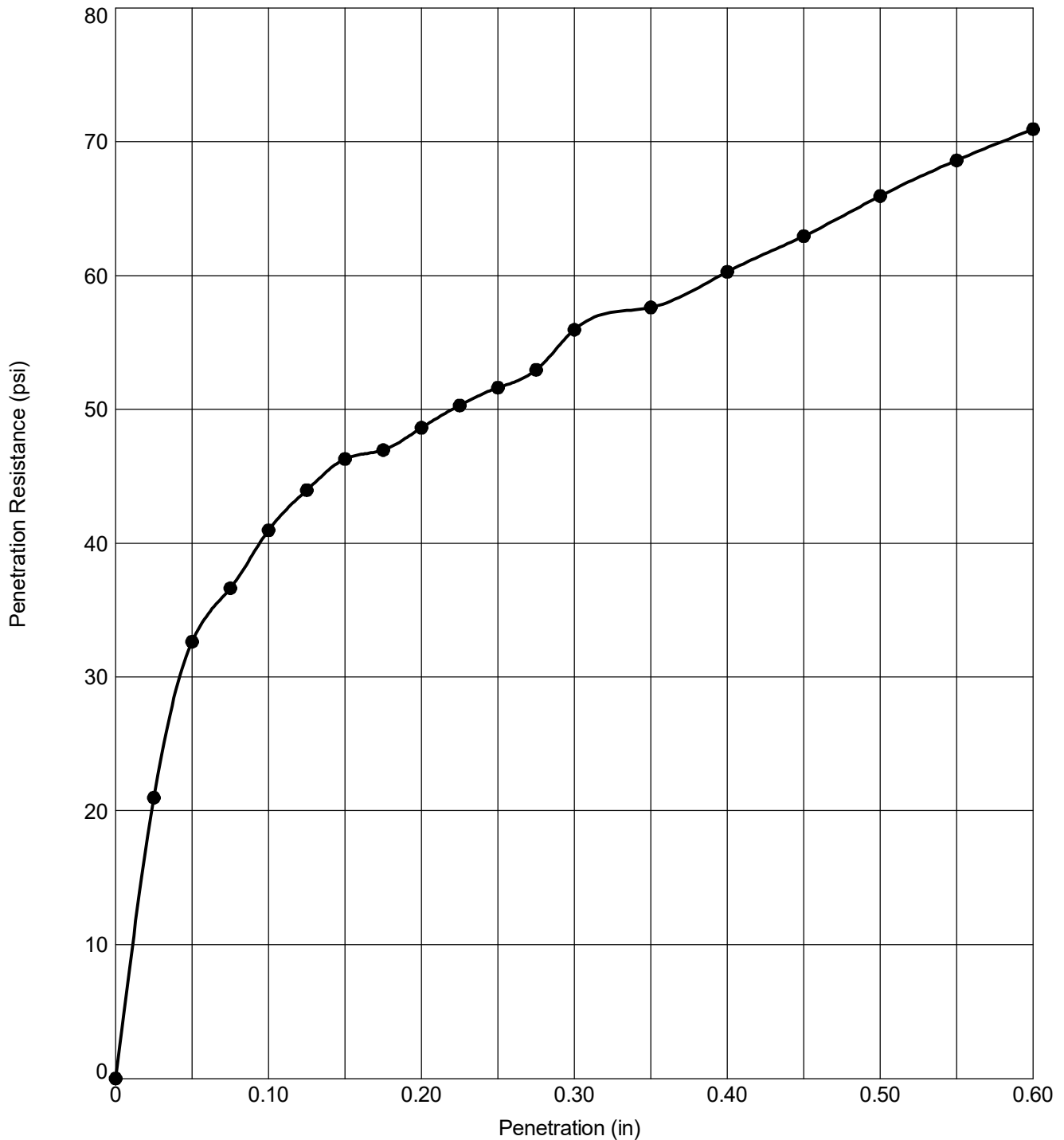


	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ○	110.3	98.7	14.3	108.5	97.1	16.6	4.0	3.8	0.000	10	1.6
2 △											
3 □											
Material Description							USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Tan, Sandy Lean CLAY											

Project No: 10052825
Project: 95 Express Lanes - Fredericksburg Extension
Location: 17XP-51
Sample Number: 17XP-51 **Depth:** 0-10 ft.
Date: 4/20/17

Test Description/Remarks:

17XP-51



Sample Ident: 17XP-29 (Bag) Tested By: BA, JW Date: 4/28/2017

Material Description: LEAN CLAY with SAND(CL)

	Molded			Soaked			CBR		Pen. Surcharge (lbs)	% Swell
	Density (pcf)	% Max Density	% Moisture	Density (pcf)	% Max Density	% Moisture	0.1 in	0.2 in		
●	97.4	98.0	21.6	94.5	95.0	28.8	4.1	3.2	10.0	2.4

TEST METHOD: VTM-8

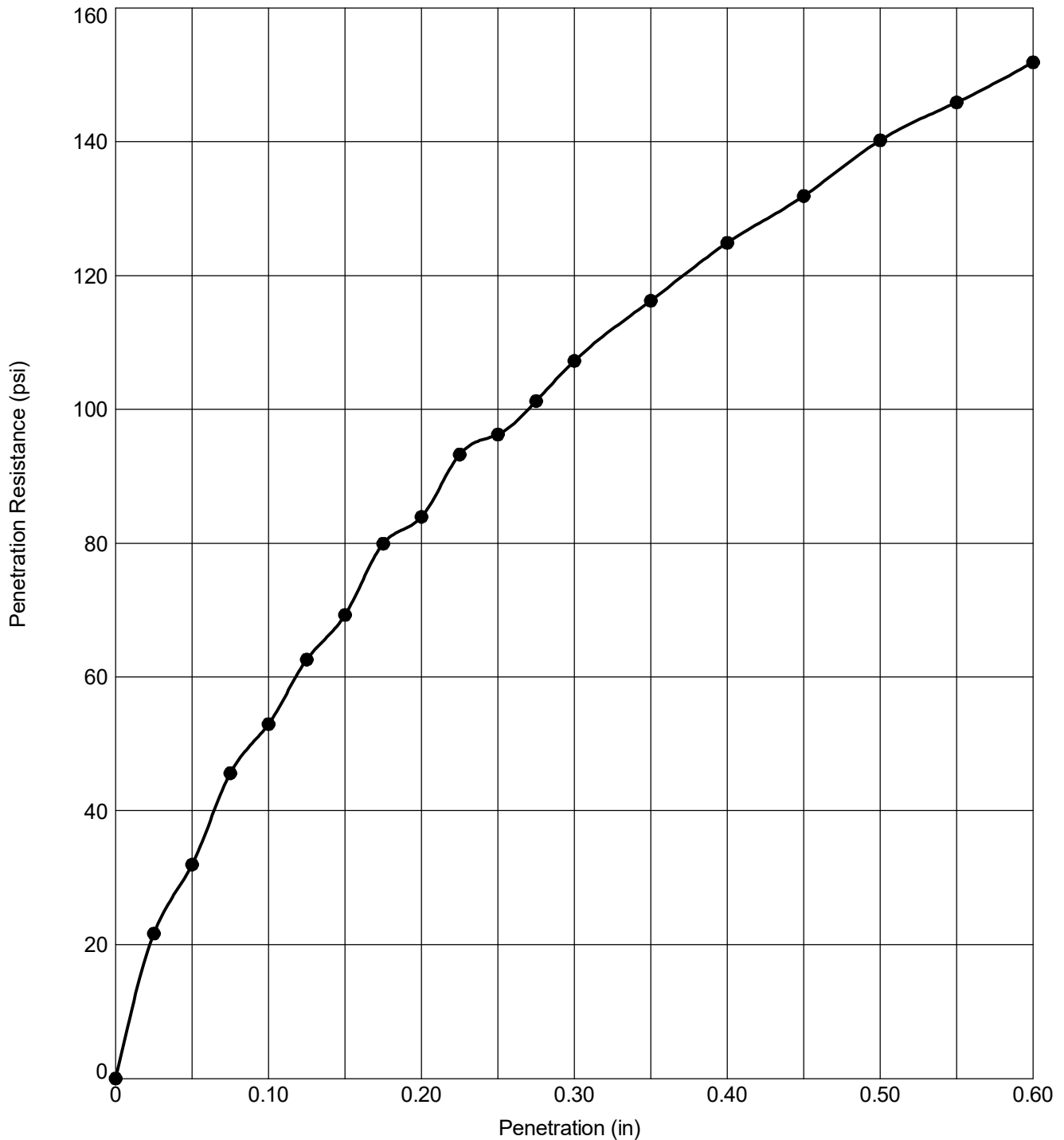


PENETRATION VS STRESS

Project: 95 Express Lanes Fredericksburg Extension

Location: Fredericksburg, Virginia

Project Number: 13-0013 (HDR Project# 170419)



Sample Ident: 17XP-31 (Bag) Tested By: BA, JW Date: 4/28/2017

Material Description: CLAYEY SAND(SC)

	Molded			Soaked			CBR		Pen. Surcharge (lbs)	% Swell
	Density (pcf)	% Max Density	% Moisture	Density (pcf)	% Max Density	% Moisture	0.1 in	0.2 in		
●	111.0	100.6	16.5	111.9	101.4	17.2	5.3	5.6	10.0	0.3

TEST METHOD: VTM-8

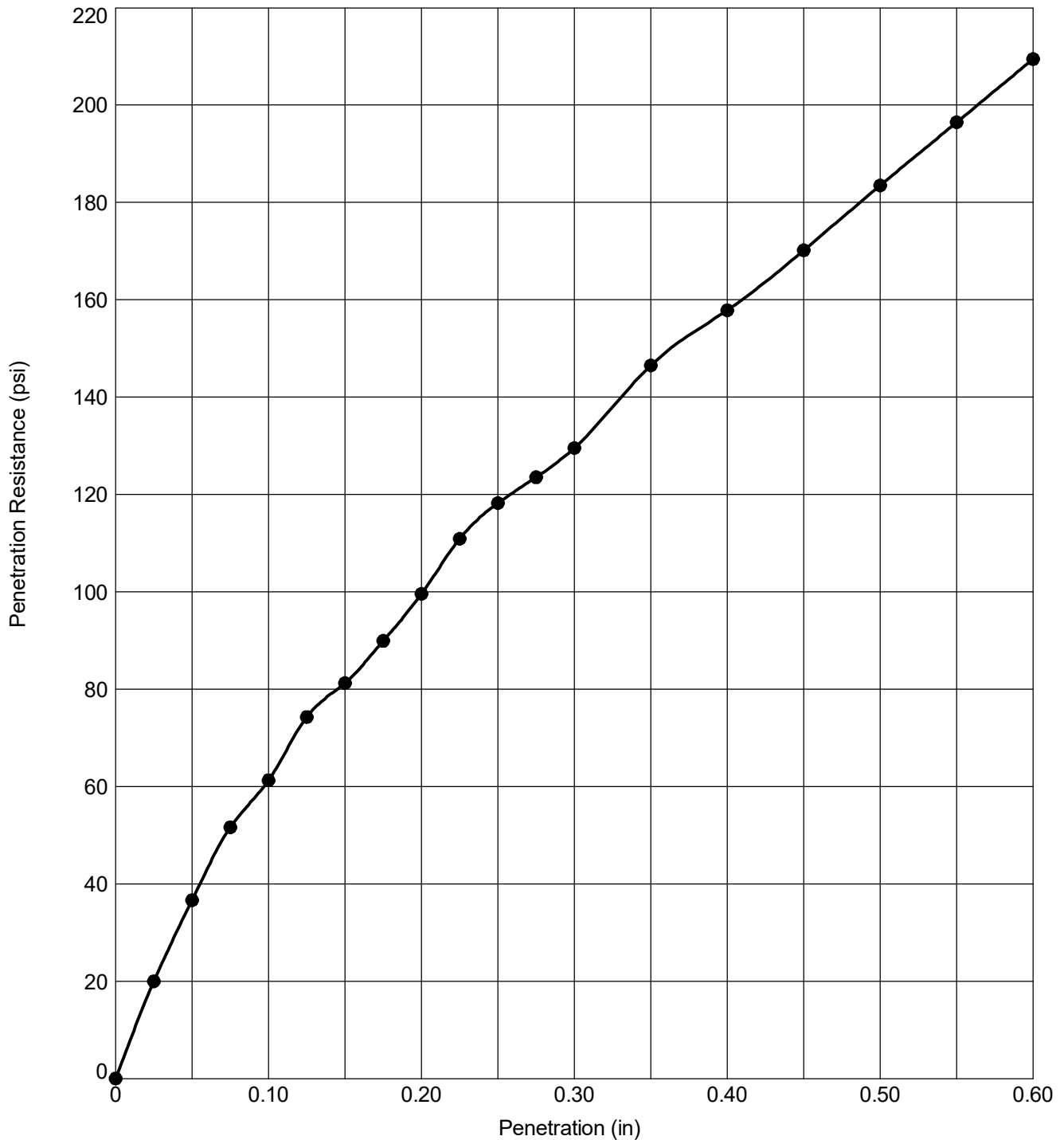


PENETRATION VS STRESS

Project: 95 Express Lanes Fredericksburg Extension

Location: Fredericksburg, Virginia

Project Number: 13-0013 (HDR Project# 170419)



Sample Ident: 17XP-46 (Bag) Tested By: BA, JW Date: 4/28/2017

Material Description: CLAYEY SAND(SC)

	Molded			Soaked			CBR		Pen. Surcharge (lbs)	% Swell
	Density (pcf)	% Max Density	% Moisture	Density (pcf)	% Max Density	% Moisture	0.1 in	0.2 in		
●	115.9	101.4	14	116.0	101.5	15.4	6.1	6.6	10.0	0.6

TEST METHOD: VTM-8

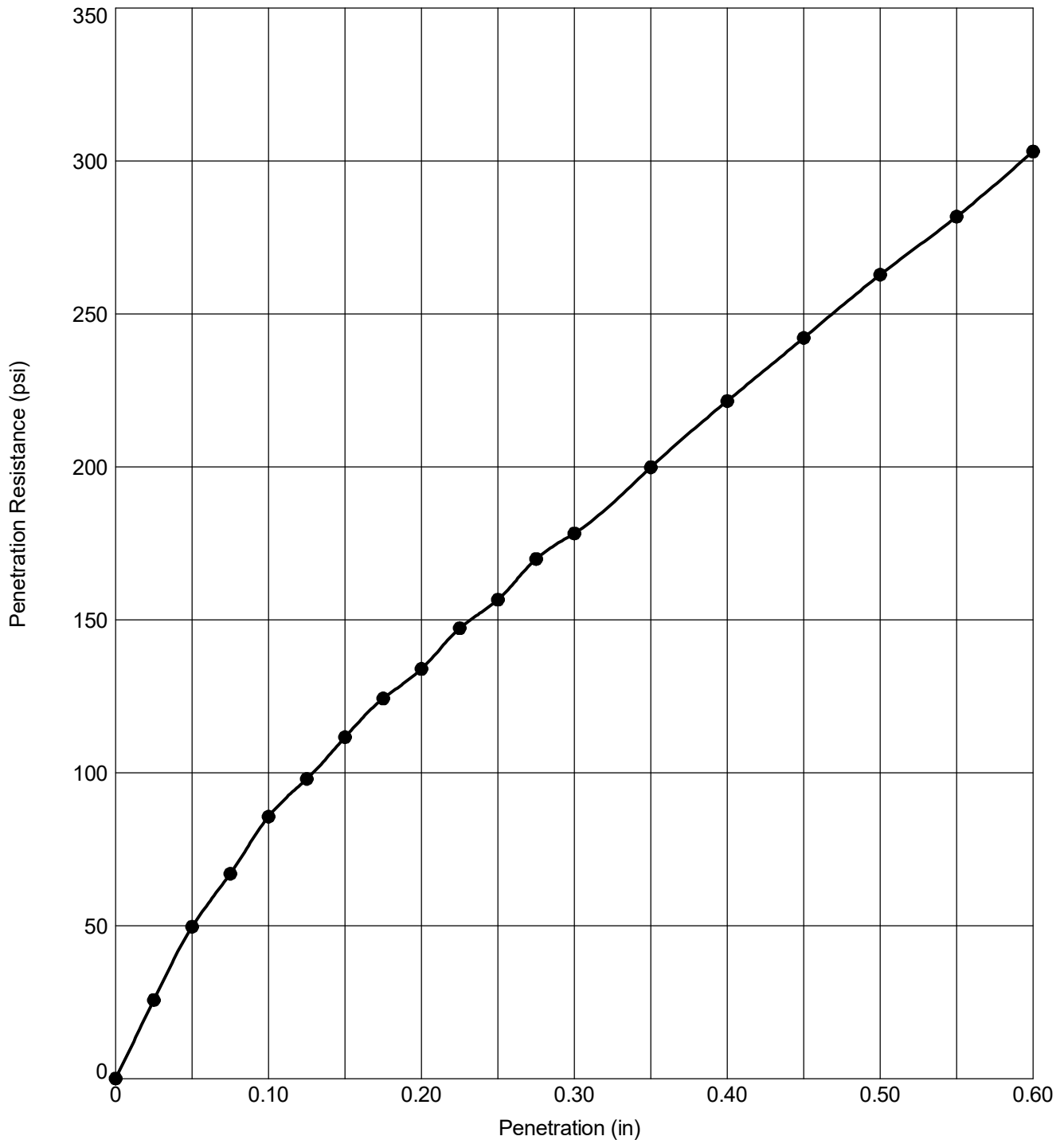


PENETRATION VS STRESS

Project: 95 Express Lanes Fredericksburg Extension

Location: Fredericksburg, Virginia

Project Number: 13-0013 (HDR Project# 170419)



Sample Ident: 17XP-61 (Bag) Tested By: BA, JW Date: 4/28/2017

Material Description: CLAYEY SAND(SC)

	Molded			Soaked			CBR		Pen. Surcharge (lbs)	% Swell
	Density (pcf)	% Max Density	% Moisture	Density (pcf)	% Max Density	% Moisture	0.1 in	0.2 in		
●	104.9	101.5	17.9	103.3	100.0	22.1	8.6	8.9	10.0	0.6

TEST METHOD: VTM-8

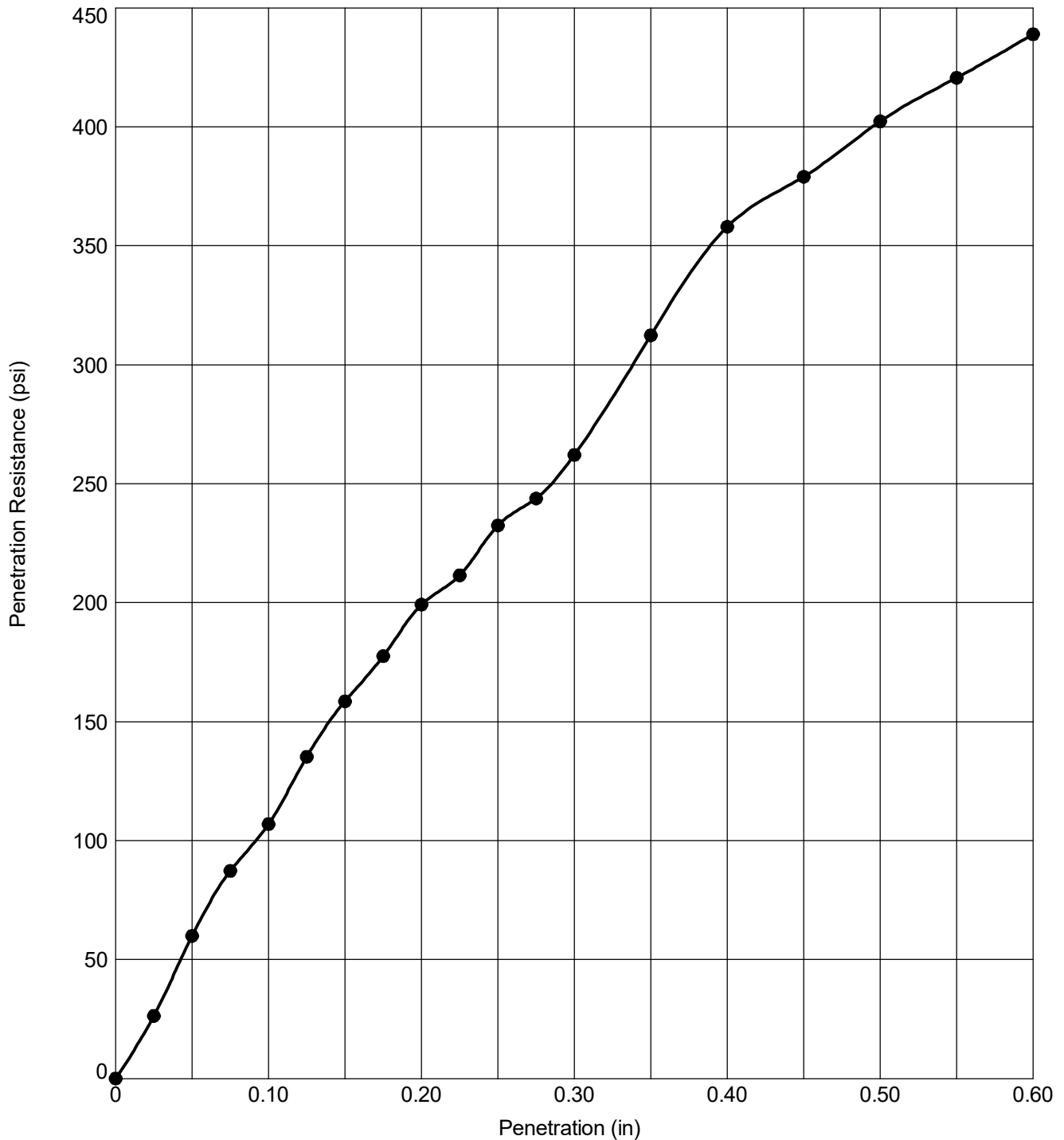


PENETRATION VS STRESS

Project: 95 Express Lanes Fredericksburg Extension

Location: Fredericksburg, Virginia

Project Number: 13-0013 (HDR Project# 170419)



Sample Ident: 17XP-64 (Bag) Tested By: BA, JW Date: 4/28/2017

Material Description: CLAYEY SAND(SC)

	Molded			Soaked			CBR		Pen. Surcharge (lbs)	% Swell
	Density (pcf)	% Max Density	% Moisture	Density (pcf)	% Max Density	% Moisture	0.1 in	0.2 in		
●	117.1	100.7	13.7	116.6	100.3	14.8	10.7	13.3	10.0	0.2

TEST METHOD: VTM-8

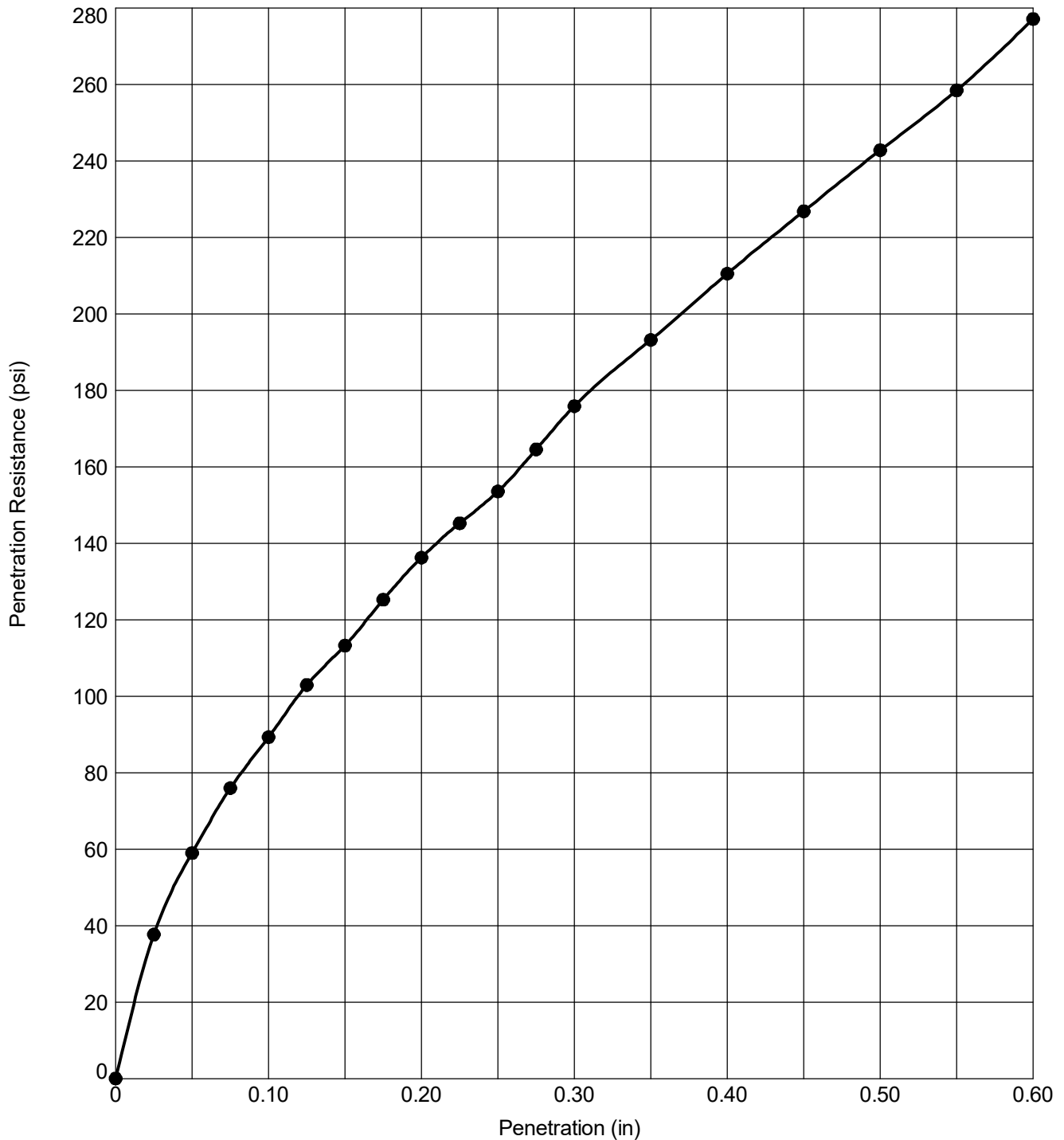


PENETRATION VS STRESS

Project: 95 Express Lanes Fredericksburg Extension

Location: Fredericksburg, Virginia

Project Number: 13-0013 (HDR Project# 170419)



Sample Ident: 17XP-68 (Bag) Tested By: BA, JW Date: 4/28/2017

Material Description: CLAYEY SAND(SC)

	Molded			Soaked			CBR		Pen. Surcharge (lbs)	% Swell
	Density (pcf)	% Max Density	% Moisture	Density (pcf)	% Max Density	% Moisture	0.1 in	0.2 in		
●	119.8	100.5	11.5	118.5	99.3	14.1	8.9	9.1	10.0	0.1

TEST METHOD: VTM-8

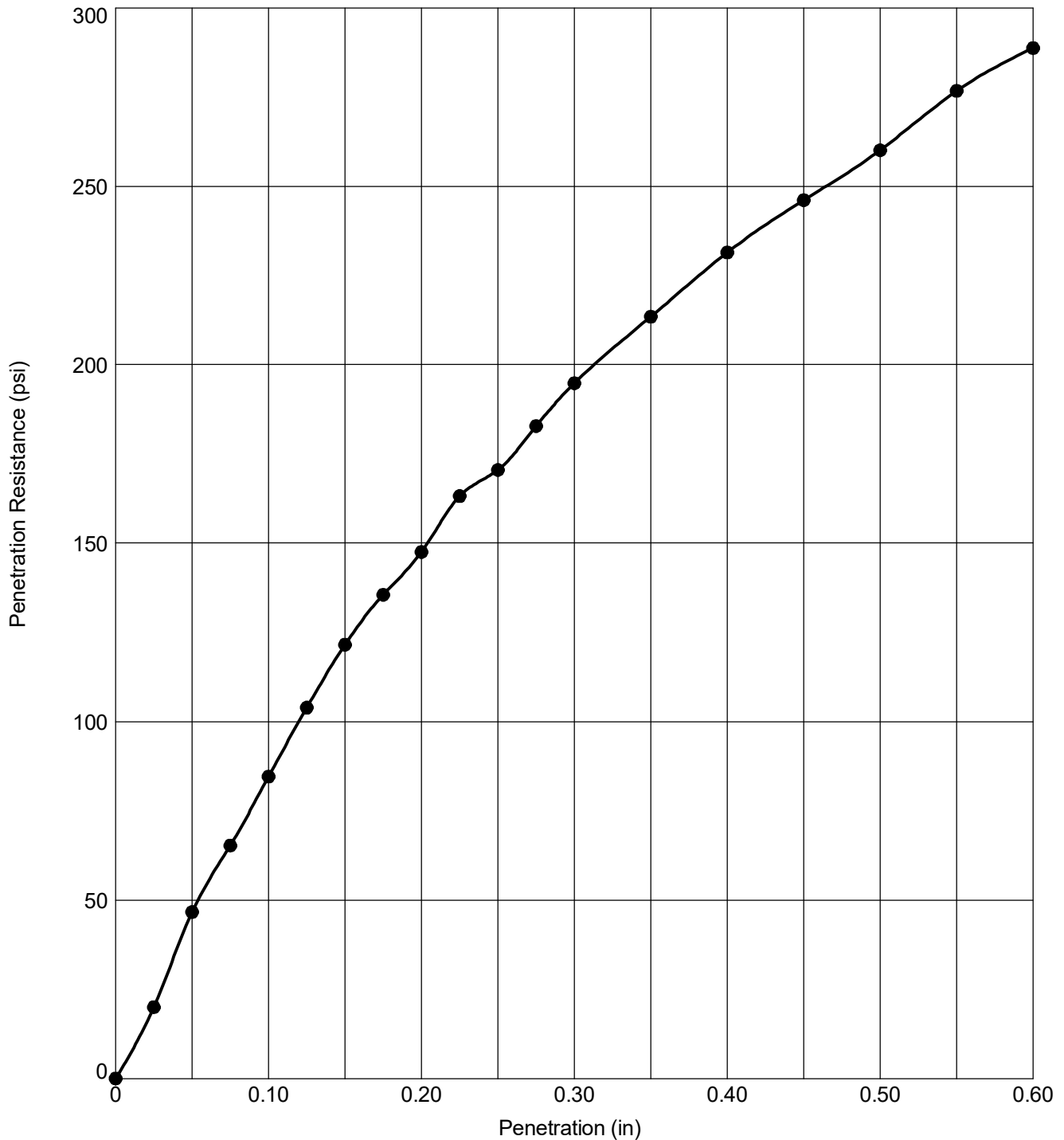


PENETRATION VS STRESS

Project: 95 Express Lanes Fredericksburg Extension

Location: Fredericksburg, Virginia

Project Number: 13-0013 (HDR Project# 170419)



Sample Ident: 17SWM-13 (Bag) Tested By: EM Date: 5/16/2017

Material Description: CLAYEY SAND(SC)

	Molded			Soaked			CBR		Pen. Surcharge (lbs)	% Swell
	Density (pcf)	% Max Density	% Moisture	Density (pcf)	% Max Density	% Moisture	0.1 in	0.2 in		
●	114.1	101.5	13.4	113.3	100.7	15.9	8.5	9.8	10.0	0.2

TEST METHOD: VTM-8

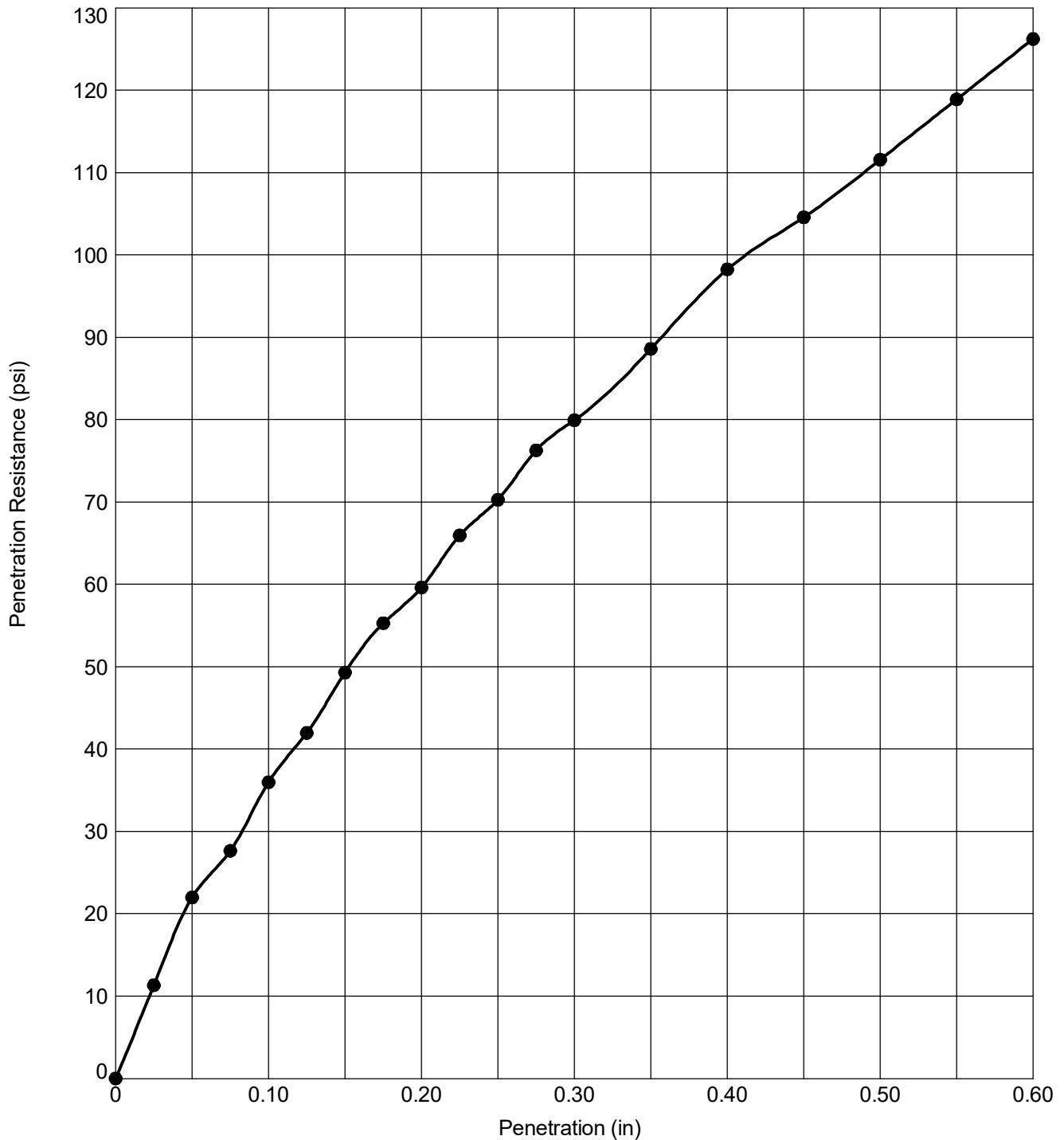


PENETRATION VS STRESS

Project: 95 Express Lanes Fredericksburg Extension

Location: Fredericksburg, Virginia

Project Number: 13-0013 (HDR Project# 170419)



Sample Ident: 17WGS-03 (Bag) Tested By: EM Date: 5/16/2017

Material Description: SANDY LEAN CLAY(CL)

	Molded			Soaked			CBR		Pen. Surcharge (lbs)	% Swell
	Density (pcf)	% Max Density	% Moisture	Density (pcf)	% Max Density	% Moisture	0.1 in	0.2 in		
●	110.5	99.5	14.8	108.4	97.6	22.1	3.6	4.0	10.0	3.4

TEST METHOD: VTM-8

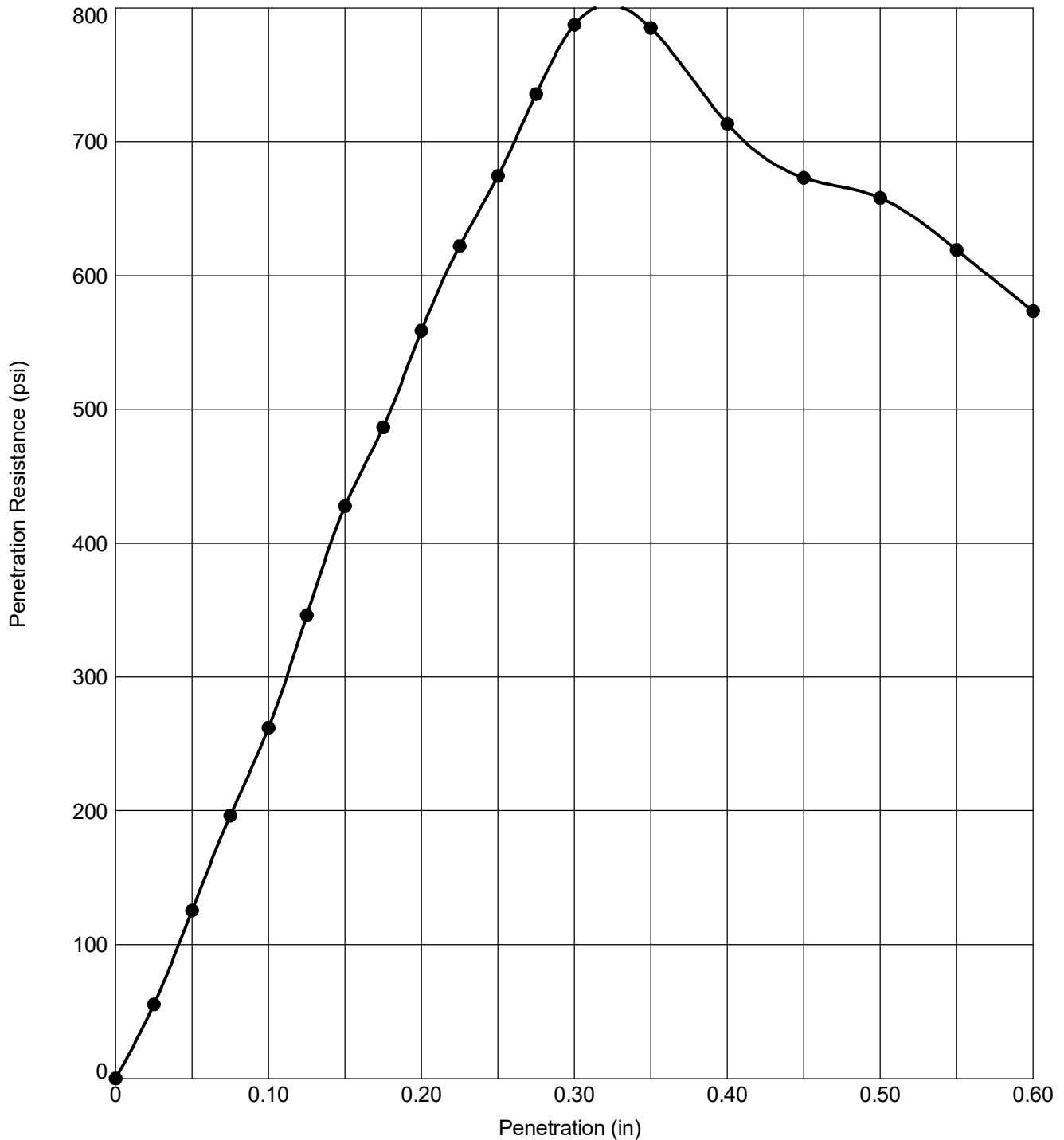


PENETRATION VS STRESS

Project: 95 Express Lanes Fredericksburg Extension

Location: Fredericksburg, Virginia

Project Number: 13-0013 (HDR Project# 170419)



Sample Ident: 17XP-23 (Bag) Tested By: EM Date: 5/16/2017

Material Description: SILTY SAND(SM)

	Molded			Soaked			CBR		Pen. Surcharge (lbs)	% Swell
	Density (pcf)	% Max Density	% Moisture	Density (pcf)	% Max Density	% Moisture	0.1 in	0.2 in		
●	108.6	100.9	15.7	108.8	101.0	16.9	26.2	37.3	10.0	0.0

TEST METHOD: VTM-8



PENETRATION VS STRESS

Project: 95 Express Lanes Fredericksburg Extension

Location: Fredericksburg, Virginia

Project Number: 13-0013 (HDR Project# 170419)

COMPANY: SOIL AND LAND USE TECHNOLOGY, INC.
 SITE: 1-95 EXPRESS LANES, VA PROJECT # 17-0013
 DATE: APRIL 25, 2017
 METHOD: % Total Sulfur: ASTM D4239

SULFUR FORMS

Sample Number	DEPTH (feet)	Total Sulfur %
17XP-24	0 - 10	.001
17XP-26	0 - 6	<.001
17XP-28	0 - 10	.002
17XP-29	0 - 10	<.001
17XP-30	0 - 13	<.001
17XP-45	0 - 15	.001
17XP-48	0 - 10	<.001
17SWM-11	4 - 6	.067
17SWM-11	8 - 10	<.001
17SWM-11	13 - 15	<.001
17SWM-11	18 - 20	<.001
17XP-24	13 - 15	<.001
17XP-24	23 - 25	<.001
17XP-28	13 - 15	<.001
17XP-43	0 - 13	<.001
17XP-43	13 - 15	<.001
17XP-43	18 - 20	.809
17XP-45	18 - 20	.125
17XP-45	23 - 25	1.28

APPROVED: 

COMPANY: SOIL AND LAND USE TECHNOLOGY, INC.
 SITE: 1-95 EXPRESS LANES, FREDERICKSBURG, VA PROJECT # 17-0013
 DATE: MAY 12, 2017
 METHOD: % Total Sulfur: ASTM D4239

SULFUR FORMS

Sample Number	DEPTH (feet)	Total Sulfur %
17XP-22	0-10	<.001
17XP-23	0-15	<.001
17SWM-12	2-4	.001
17SWM-12	6-8	<.001
17SWM-12	13-15	<.001
17SWM-13	2-4	<.001
17SWM-13	6-8	<.001
17SWM-13	13-15	<.001
17SWM-13	18-20	<.001
17XP-23	23-25	<.001
17XP-23	33-35	<.001
17XP-23	48-50	.002
17XP-23	58-60	<.001
17SWM-08	0-2	<.001
17SWM-08	2-4	<.001
17SWM-08	6-8	<.001
17SWM-08	13.5-15.5	<.001
17SWM-08	18-20	<.001
17SWM-08	23-25	<.001

APPROVED: _____



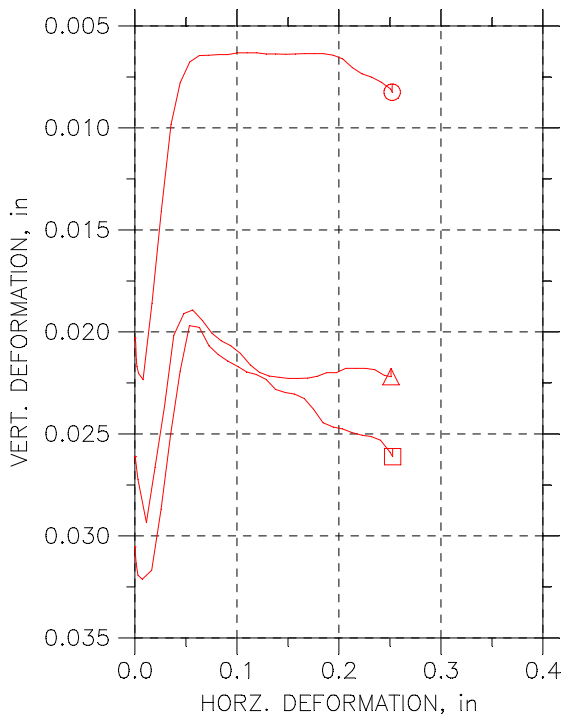
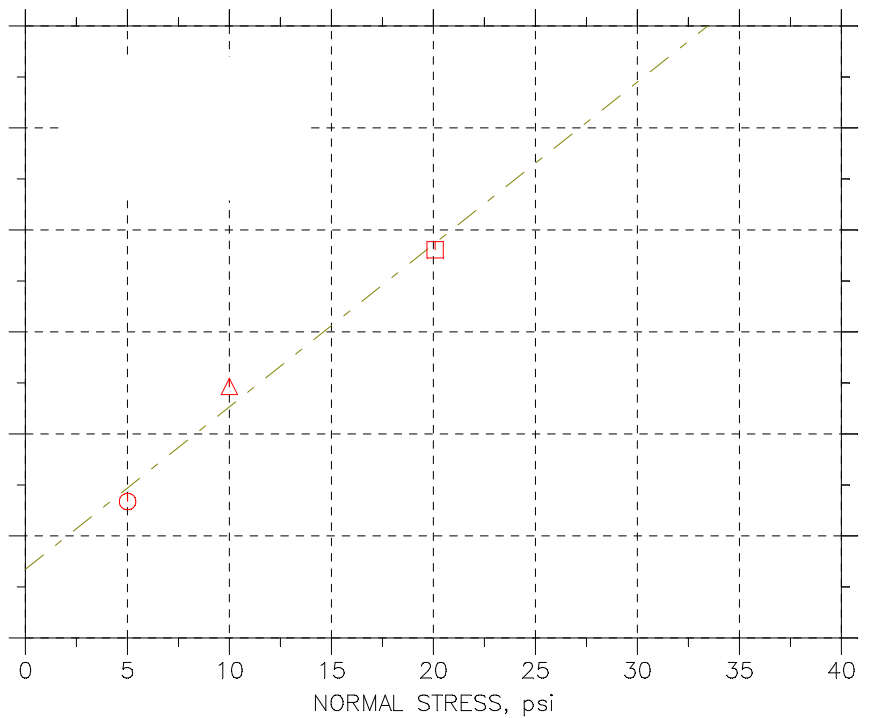
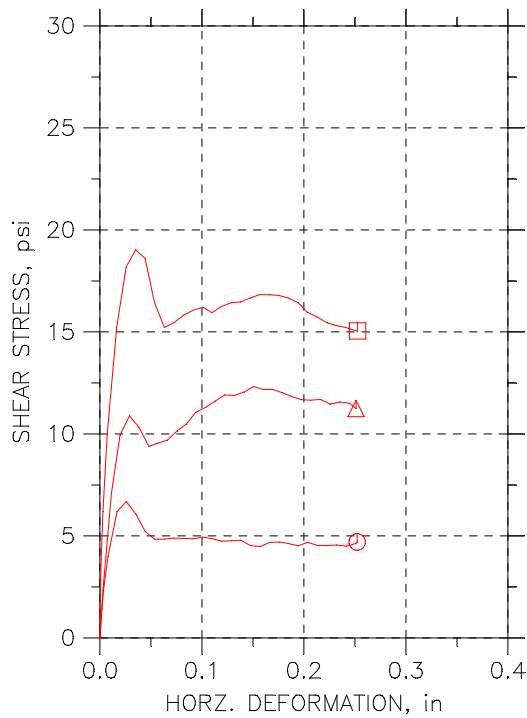
COMPANY: SOIL AND LAND USE TECHNOLOGY, INC.
 SITE: 1-95 EXPRESS LANES, FREDERICKSBURG, VA
 SaLUT PROJECT # 17-0013
 DATE: JUNE 2, 2017
 METHOD: % Total Sulfur: ASTM D4239

SULFUR FORMS

Sample Number	DEPTH (feet)	Total Sulfur %
17XP-37	2.0-4.0	<.001
17XP-37	4.0-6.0	.001
17XP-37	6.0-8.0	.001
17XP-37	8.0-10.0	<.001
17XP-37	10.0-12.0	.001
17XP-37	13.0-15.0	.001
17XP-38	2.0-4.0	<.001
17XP-38	4.0-6.0	<.001
17XP-38	6.0-8.0	<.001
17XP-38	8.0-10.0	<.001
17XP-38	10.0-12.0	<.001
17XP-38	13.0-15.0	<.001
17XP-39	2.3-3.3	<.001
17XP-39	3.3-4.3	.002
17XP-39	4.3-6.3	<.001
17XP-39	6.3-8.3	.008
17XP-39	8.3-10.3	<.001
17XP-39	10.3-12.3	<.001
17XP-40	2.0-4.0	.001

APPROVED: _____

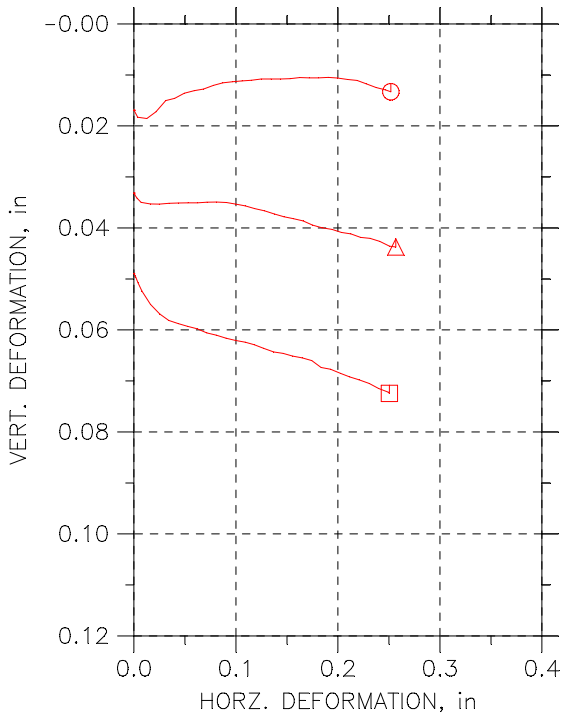
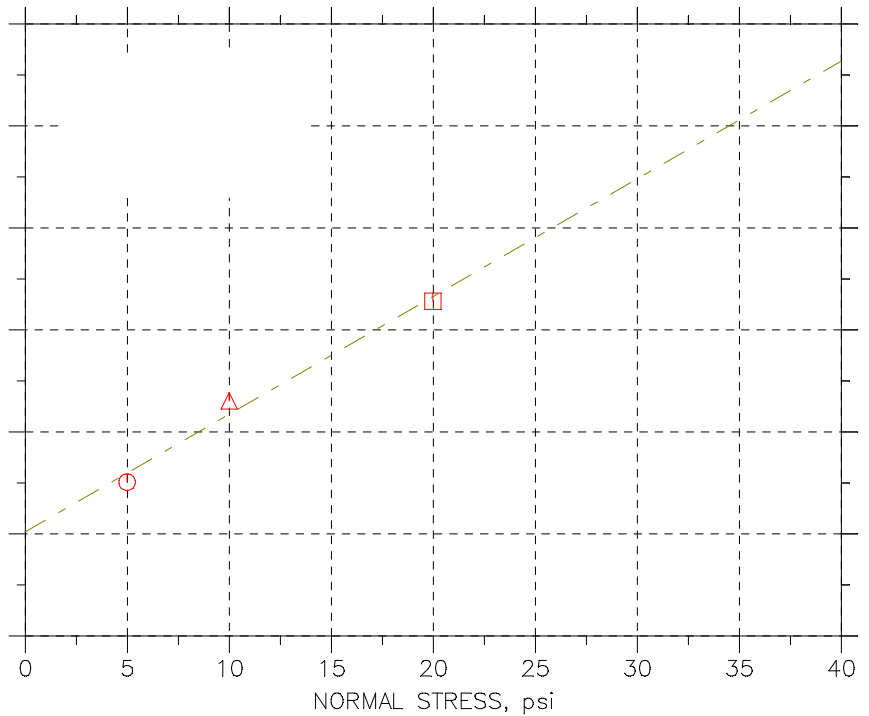
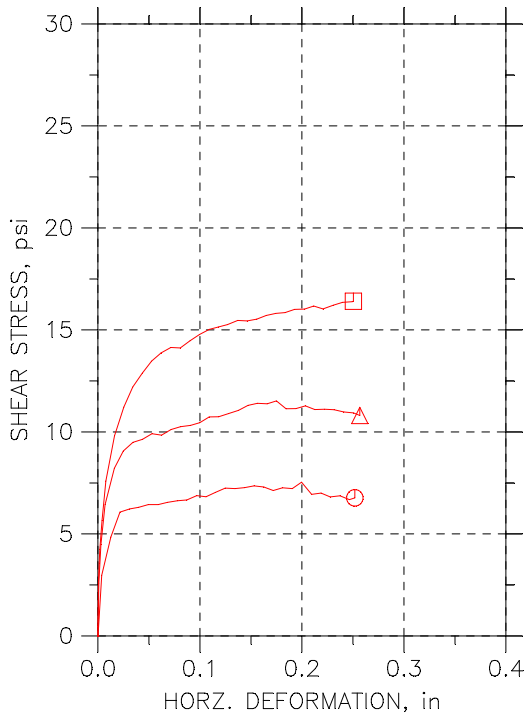
DIRECT SHEAR TEST REPORT



Symbol	○	△	□	
Test No.	1	2	3	
Sample No.	B-1	B-1	B-1	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.495	2.496	2.496
	Area, in ²	4.8891	4.893	4.893
	Height, in	1.007	1.009	1.009
	Water Content, %	15.77	15.10	15.44
	Dry Density, pcf	107.28	107.74	107.32
	Saturation, %	71.40	69.12	69.98
	Void Ratio	0.61195	0.60499	0.61134
	Consol. Height, in	0.98816	0.9831	0.97921
	Consol. Void Ratio	0.5818	0.56379	0.56377
Final	Water Content, %	18.61	17.78	15.72
	Dry Density, pcf	108.16	110.17	110.17
	Saturation, %	86.09	86.43	76.47
	Void Ratio	0.59875	0.56968	0.56963
	Normal Stress, psi	5.0077	9.9964	20.081
	Max. Shear Stress, psi	6.6849	12.324	19.026
	Ult. Shear Stress, psi	4.7017	11.244	15.051
	Time to Failure, min	6.0036	34.001	8.0033
	Disp. Rate, in/min	0.01	0.01	0.01
	Estimated Specific Gravity	2.77	2.77	2.77
	Liquid Limit	30	30	30
	Plastic Limit	25	25	25
	Plasticity Index	5	5	5

Project: 95 Express Lanes	
Location: Fredericksburg, VA	
Project No.: 16866-0 (HDR Project# 10052825)	
Boring No.: 17XP-23	
Sample Type: Remolded	
Description: CLAYEY SAND (SC)	
Remarks: Direct Shear - 16866-0 - 17XP-23 / B-1 - 0.0' - 10.0' - 5 PSI	

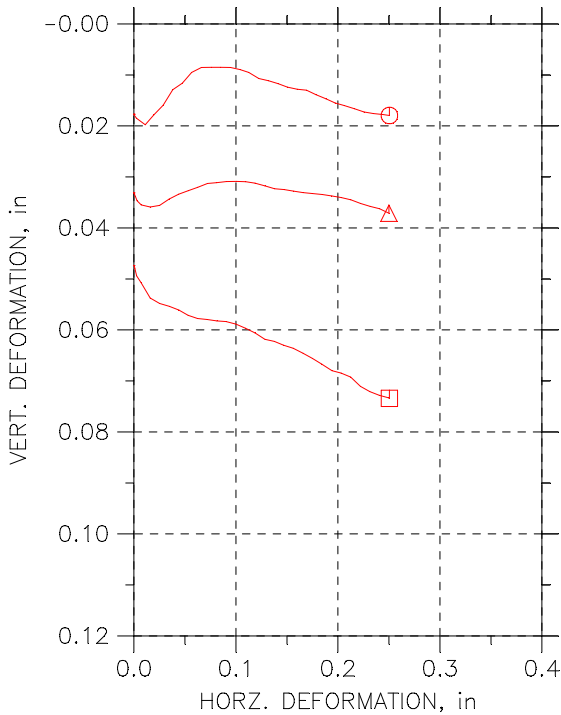
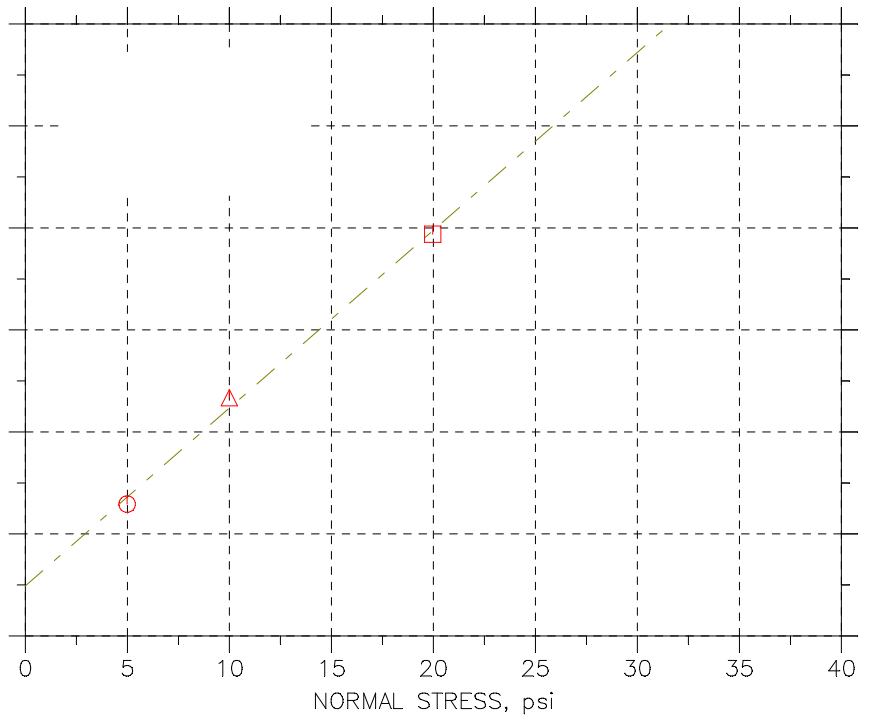
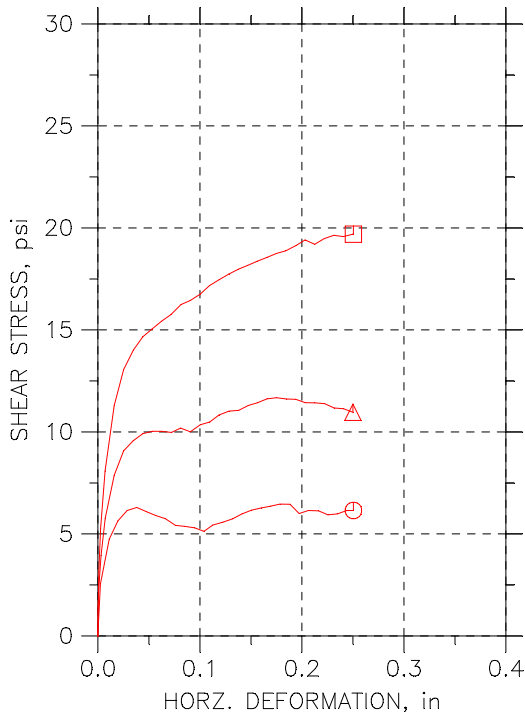
DIRECT SHEAR TEST REPORT



Symbol	⊙	△	□	
Test No.	1	2	3	
Sample No.	B-1	B-1	B-1	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.496	2.496	2.497
	Area, in ²	4.893	4.893	4.897
	Height, in	1.009	1.008	1.009
	Water Content, %	15.85	15.79	16.15
	Dry Density, pcf	110.35	110.62	109.98
	Saturation, %	77.40	77.68	78.17
	Void Ratio	0.56706	0.56321	0.57238
Consol. Height, in	0.99265	0.97559	0.96023	
Consol. Void Ratio	0.54166	0.51295	0.49638	
Final	Water Content, %	16.79	15.31	15.23
	Dry Density, pcf	111.82	115.64	118.48
	Saturation, %	85.11	85.58	91.84
	Void Ratio	0.54639	0.49538	0.45948
Normal Stress, psi	4.9816	9.9853	19.977	
Max. Shear Stress, psi	7.5368	11.522	16.408	
Ult. Shear Stress, psi	6.7687	10.81	16.408	
Time to Failure, min	44	38.001	54.246	
Disp. Rate, in/min	0.01	0.01	0.01	
Estimated Specific Gravity	2.77	2.77	2.77	
Liquid Limit	42	42	42	
Plastic Limit	21	21	21	
Plasticity Index	21	21	21	

Project: 95 Express Lanes	
Location: Fredericksburg, VA	
Project No.: 16866-0 (HDR Project# 10052825)	
Boring No.: 17XP-31	
Sample Type: Remolded	
Description: CLAYEY SAND (SC)	
Remarks: Direct Shear - 16866-0 - 17XP-31 / B-1 - 0.0' - 13.0' - 5 PSI	

DIRECT SHEAR TEST REPORT

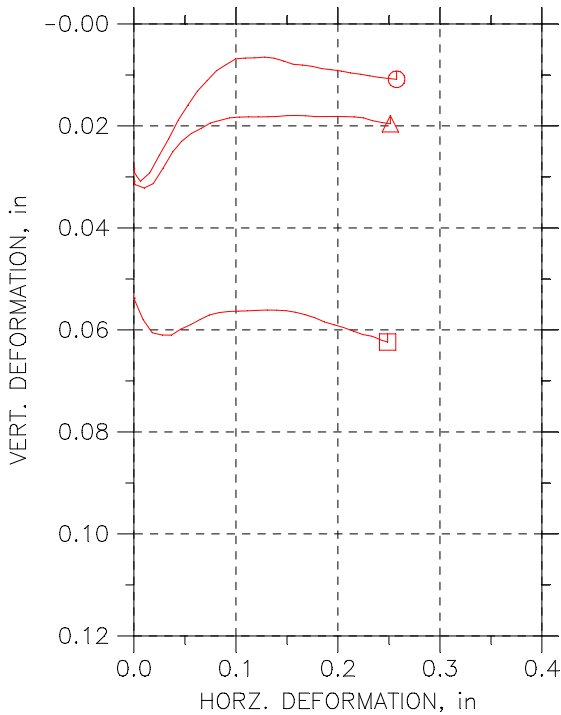
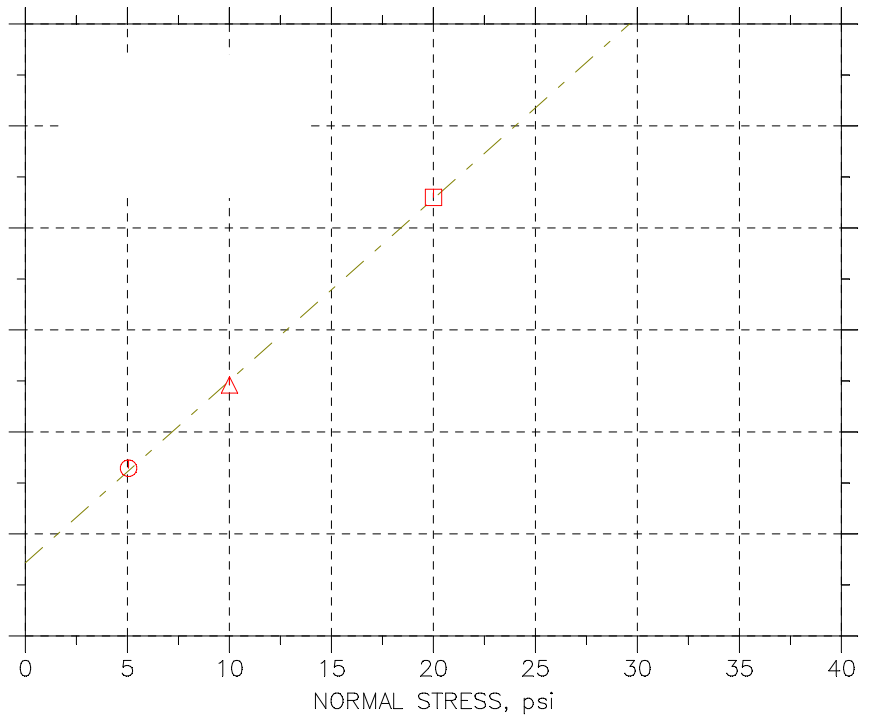
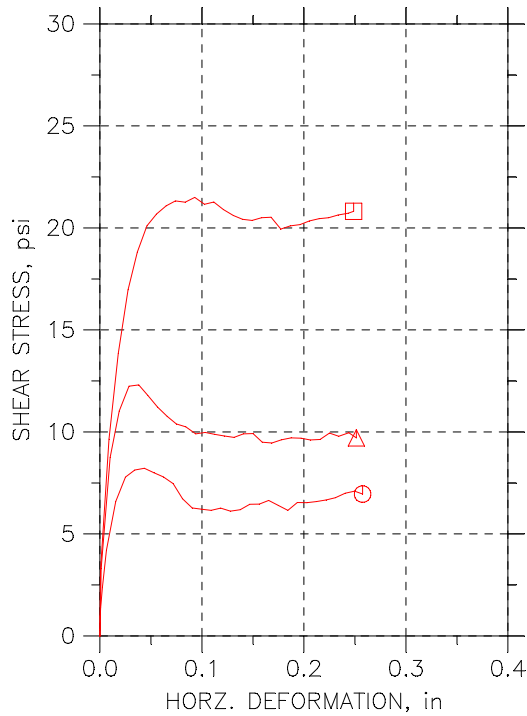


Symbol	⊙	△	□	
Test No.	1	2	3	
Sample No.	B-1	B-1	B-1	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.495	2.496	2.497
	Area, in ²	4.8891	4.893	4.897
	Height, in	1.007	1.009	1.011
	Water Content, %	13.17	13.79	13.52
	Dry Density, pcf	114.23	114.58	114.48
	Saturation, %	70.99	75.02	73.37
	Void Ratio	0.51379	0.50922	0.51058
Consol. Height, in	0.98963	0.97612	0.96381	
Consol. Void Ratio	0.48768	0.46004	0.44007	
Final	Water Content, %	14.52	13.78	11.98
	Dry Density, pcf	116.31	118.96	123.44
	Saturation, %	82.64	84.13	82.81
	Void Ratio	0.48679	0.45369	0.40088
Normal Stress, psi	4.9856	9.9964	19.966	
Max. Shear Stress, psi	6.4621	11.678	19.689	
Ult. Shear Stress, psi	6.1501	10.966	19.689	
Time to Failure, min	40	38.001	54.154	
Disp. Rate, in/min	0.01	0.01	0.01	
Estimated Specific Gravity	2.77	2.77	2.77	
Liquid Limit	35	35	35	
Plastic Limit	22	22	22	
Plasticity Index	13	13	13	

Project: 95 Express Lanes
Location: Fredericksburg, VA
Project No.: 16866-0 (HDR Project# 10052825)
Boring No.: 17XP-46
Sample Type: Remolded
Description: CLAYEY SAND (SC)
Remarks: Direct Shear - 16866-0 - 17XP-46 / B-1 - 0.0' - 25.0' - 5 PSI

Normal Stress, psi	4.9856	9.9964	19.966
Max. Shear Stress, psi	6.4621	11.678	19.689
Ult. Shear Stress, psi	6.1501	10.966	19.689
Time to Failure, min	40	38.001	54.154
Disp. Rate, in/min	0.01	0.01	0.01
Estimated Specific Gravity	2.77	2.77	2.77
Liquid Limit	35	35	35
Plastic Limit	22	22	22
Plasticity Index	13	13	13

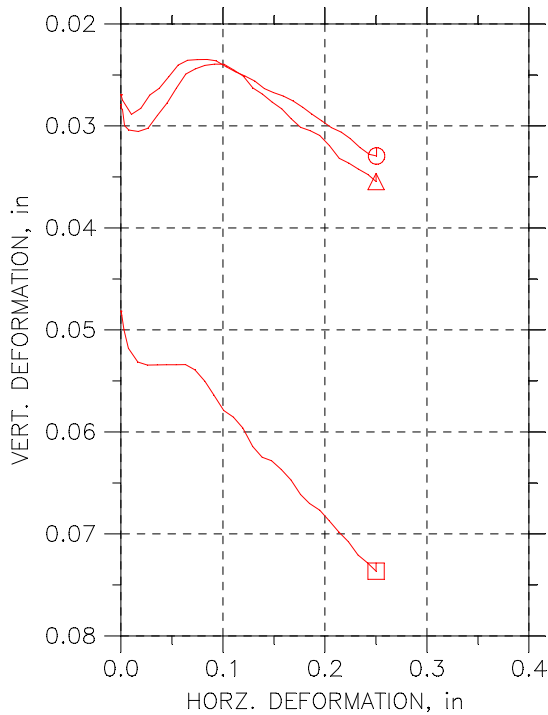
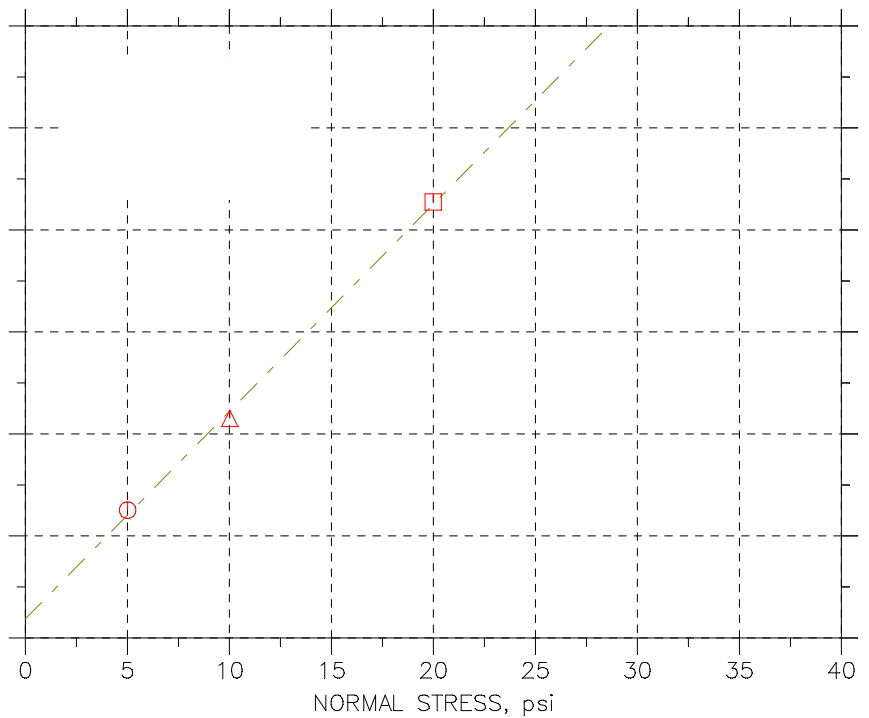
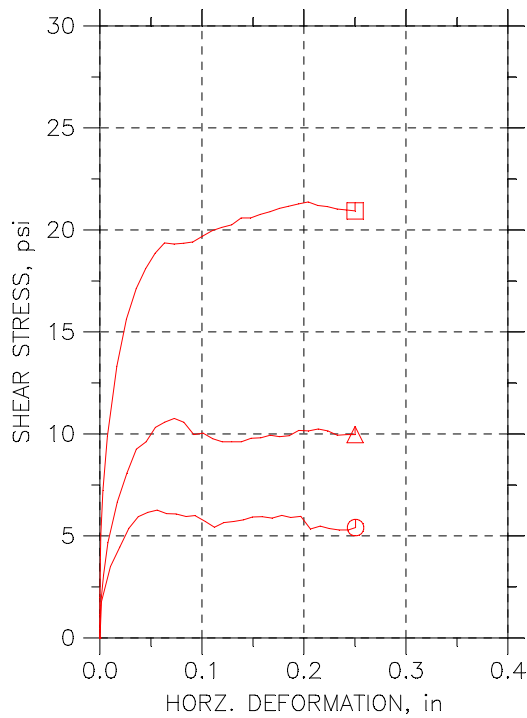
DIRECT SHEAR TEST REPORT



Symbol	⊙	△	□	
Test No.	1	2	3	
Sample No.	B-1	B-1	B-1	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.497	2.492	2.493
	Area, in ²	4.897	4.8774	4.8813
	Height, in	1.011	1.007	1.008
	Water Content, %	13.41	13.55	13.96
	Dry Density, pcf	115.98	116.7	116.13
	Saturation, %	75.69	77.92	79.07
	Void Ratio	0.49094	0.48175	0.48906
Consol. Height, in	0.98462	0.97632	0.9547	
Consol. Void Ratio	0.45204	0.43661	0.41033	
Final	Water Content, %	14.50	14.57	14.11
	Dry Density, pcf	117.24	119.02	123.79
	Saturation, %	84.55	89.10	98.51
	Void Ratio	0.47493	0.45294	0.3969
Normal Stress, psi	5.055	10.006	20.008	
Max. Shear Stress, psi	8.2204	12.308	21.493	
Ult. Shear Stress, psi	6.9523	9.7054	20.812	
Time to Failure, min	10.003	10.003	22.002	
Disp. Rate, in/min	0.01	0.01	0.01	
Estimated Specific Gravity	2.77	2.77	2.77	
Liquid Limit	38	38	38	
Plastic Limit	20	20	20	
Plasticity Index	18	18	18	

Project: 95 Express Lanes	
Location: Fredericksburg, VA	
Project No.: 16866-0 (HDR Project# 10052825)	
Boring No.: 17XP-64	
Sample Type: Remolded	
Description: CLAYEY SAND (SC)	
Remarks: Direct Shear - 16866-0 - 17XP-64 / B-1 - 0.0' - 15.0' - 5 PSI	

DIRECT SHEAR TEST REPORT



Symbol	⊙	△	□	
Test No.	1	2	3	
Sample No.	B-1	B-1	B-1	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.497	2.497	2.497
	Area, in ²	4.897	4.897	4.897
	Height, in	1.011	1.011	1.009
	Water Content, %	10.31	11.71	10.81
	Dry Density, pcf	119.25	119.35	118.95
	Saturation, %	63.46	72.26	65.96
	Void Ratio	0.45005	0.44884	0.45375
Consol. Height, in		0.98416	0.98353	0.96097
Consol. Void Ratio		0.41156	0.40948	0.38455
Final	Water Content, %	10.37	10.28	9.43
	Dry Density, pcf	123.27	123.69	128.32
	Saturation, %	71.31	71.52	75.15
	Void Ratio	0.40279	0.39803	0.34763
Normal Stress, psi		5.0108	10.022	19.988
Max. Shear Stress, psi		6.2627	10.757	21.369
Ult. Shear Stress, psi		5.4061	9.9669	20.935
Time to Failure, min		14.003	16.003	44
Disp. Rate, in/min		0.01	0.01	0.01
Estimated Specific Gravity		2.77	2.77	2.77
Liquid Limit		24	24	24
Plastic Limit		13	13	13
Plasticity Index		11	11	11

Project: 95 Express Lanes	
Location: Fredericksburg, VA	
Project No.: 16866-0 (HDR Project# 10052825)	
Boring No.: 17XP-68	
Sample Type: Remolded	
Description: CLAYEY SAND (SC)	
Remarks: Direct Shear - 16866-0 - 17XP-68 / B-1 - 4.0' - 8.0' - 5 PSI	

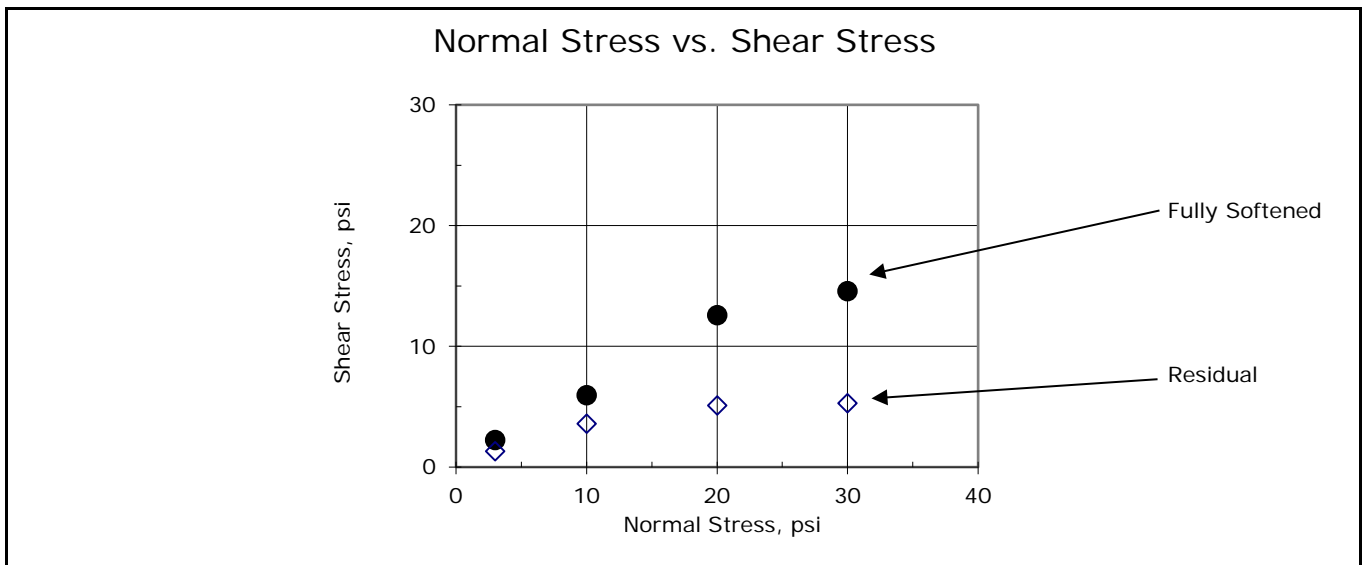


Client:	HDR Engineering, Inc.		
Project Name:	95 Express Lanes Extension		
Project Location:	---		
GTX #:	306713	Tested By:	md
Test Date:	07/25/17	Checked By:	jdt
Boring ID:	---		
Sample ID:	Composite 1 (17RW-09/17BR-10)		
Depth, ft:	4.0-25		
Description:	Wet, greenish gray clay		
Preparation:	Material was passed through a #40 sieve and then prepared to the approximate Liquid Limit moisture content. Material was then allowed to cure for 48 hours prior to testing.		

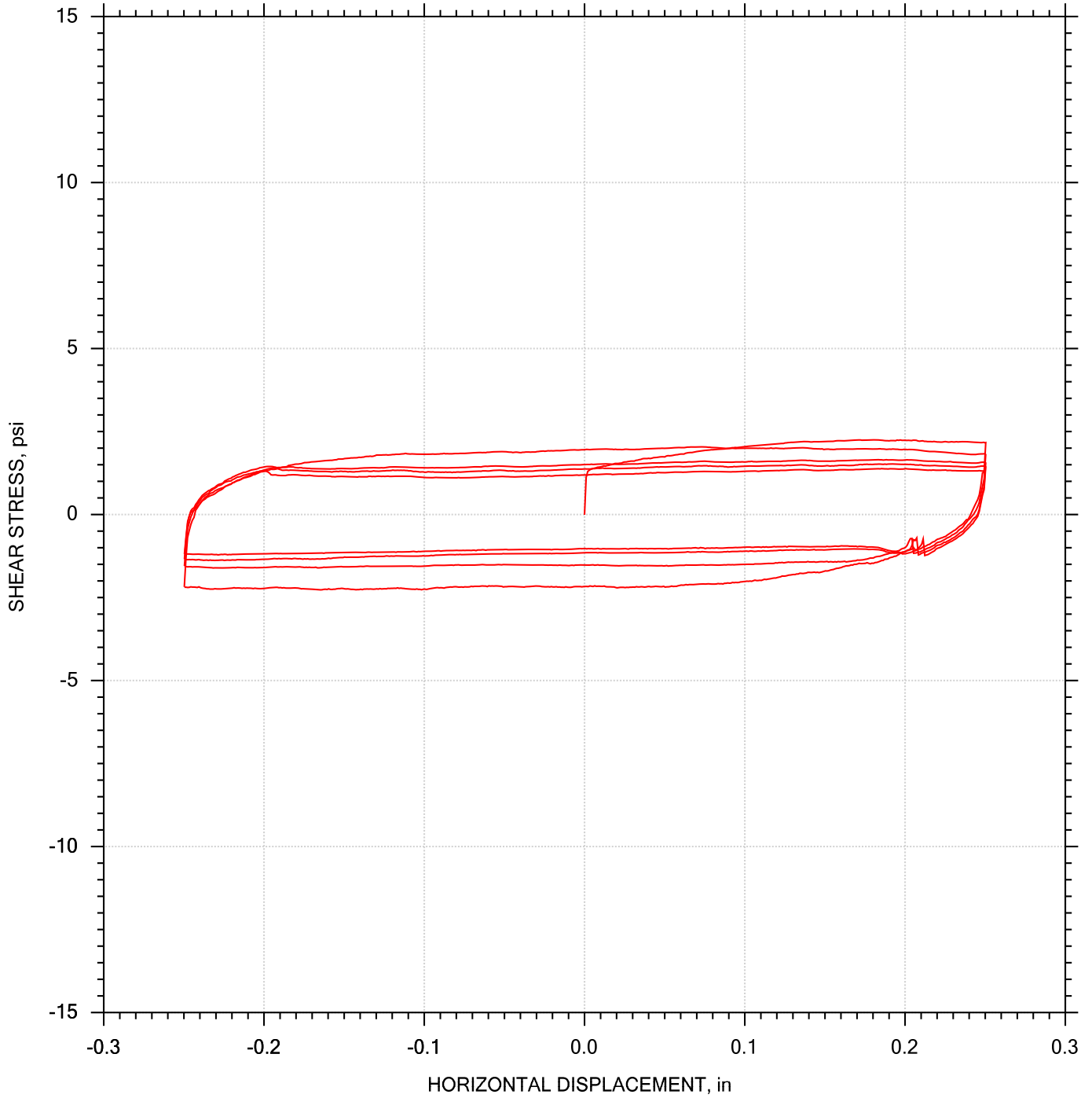
Direct Shear (ASTM D3080) and Residual Shear (USACOE EM1110-modified)

Parameter	Point 1	Point 2	Point 3	Point 4
Test No.	RS-5	RS-6	RS-7	RS-8
Initial Moisture Content, %	66.1	66.1	66.1	66.1
Initial Dry Density, pcf	68.6	69.8	69.8	67.0
Nominal Rate of Shear Strain, inches/min	0.00035	0.00035	0.00035	0.00035
Vertical Consolidation Stress, psi	3.0	10	20	30
Peak Shear Stress, psi	2.3	6.0	12.6	14.6
Post-Peak Shear Stress, psi	1.3	3.6	5.1	5.3
Final Moisture Content, %	55.5	43.5	41.6	37.4

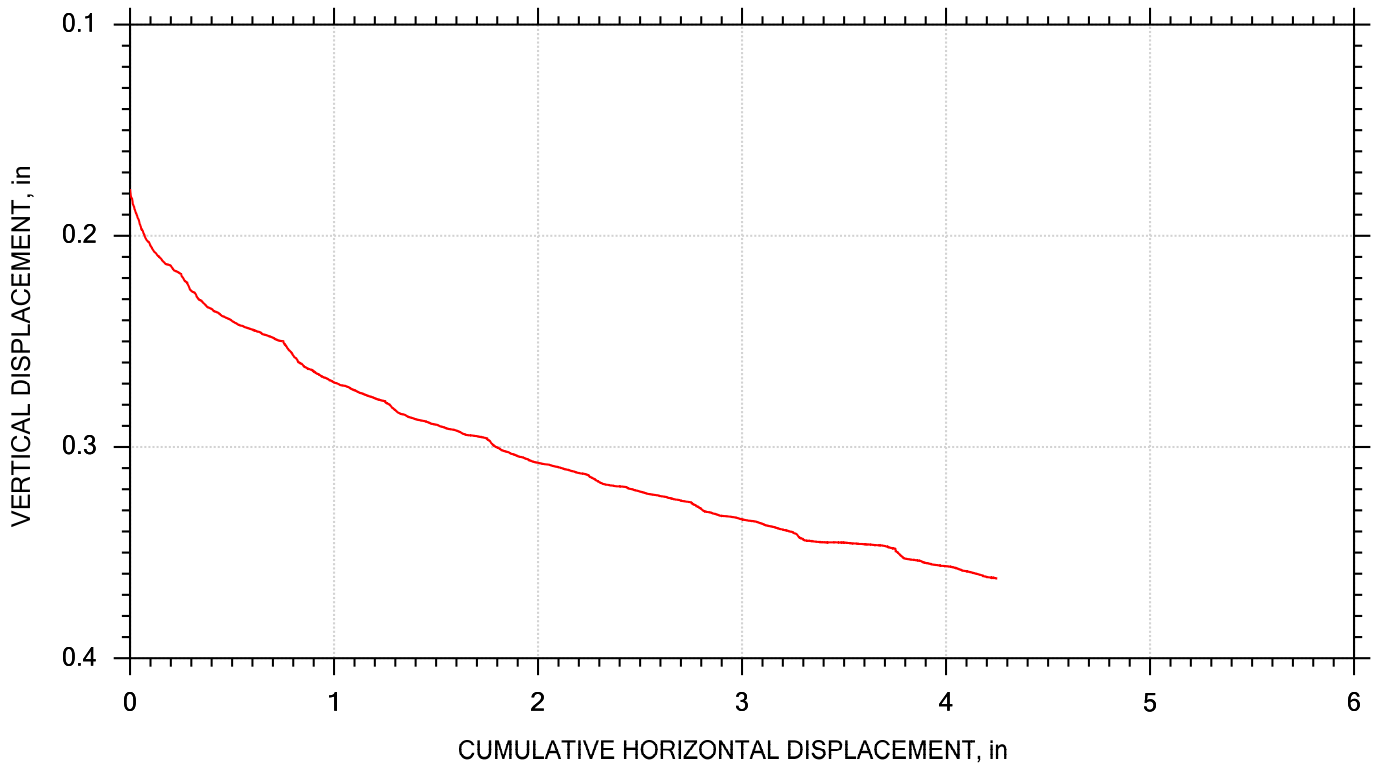
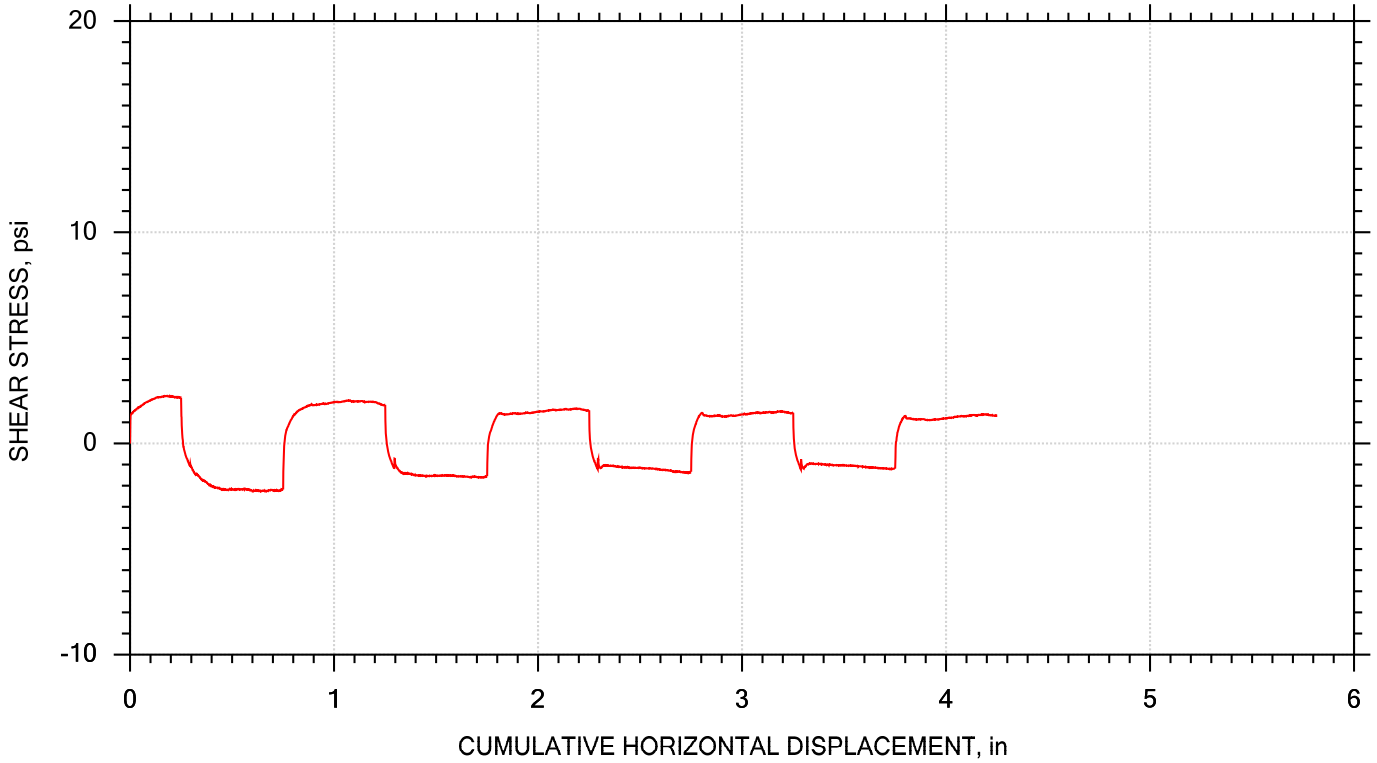
Peak Friction Angle, degrees:	---	Post-Peak Friction Angle, degrees:	---
Peak Cohesion, psi:	---	Post-Peak Cohesion, psi:	---



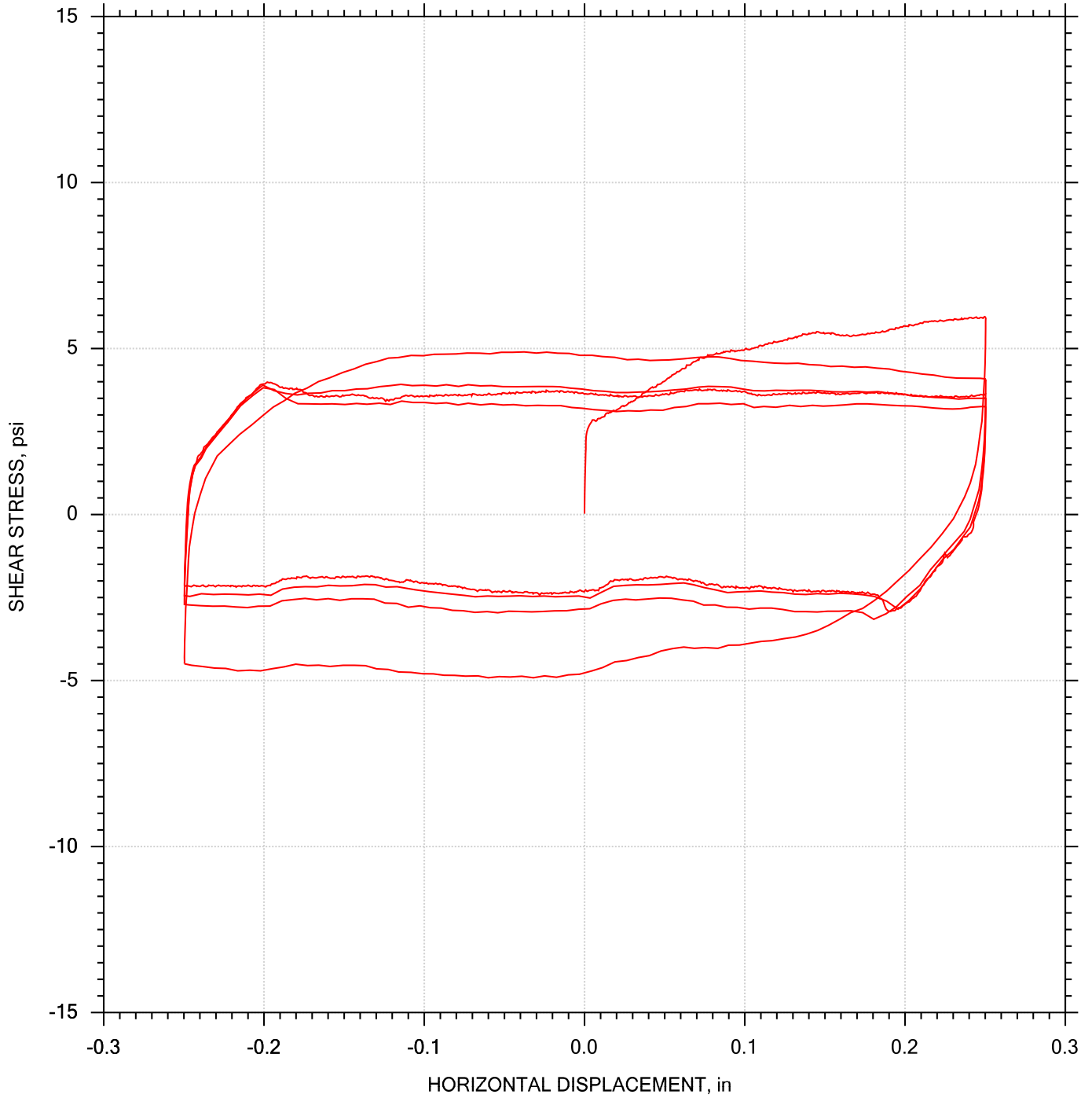
Comments: See attached plots for additional information
 Peak shear strength determined by shearing specimen at 0.00035 ipm
 Post-Peak (Residual) strength determined after 3 shearing cycles at 0.0035 ipm followed by one cycle at 0.00035 ipm.



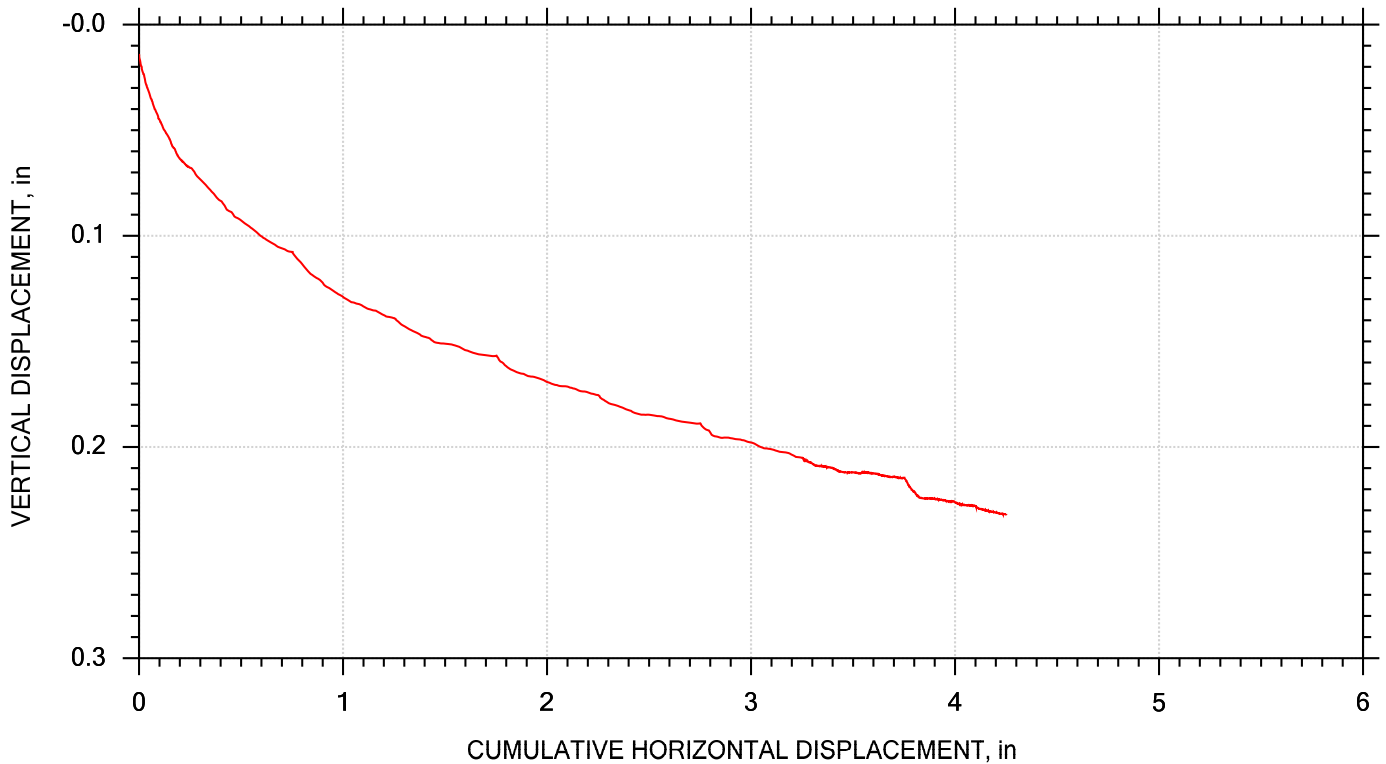
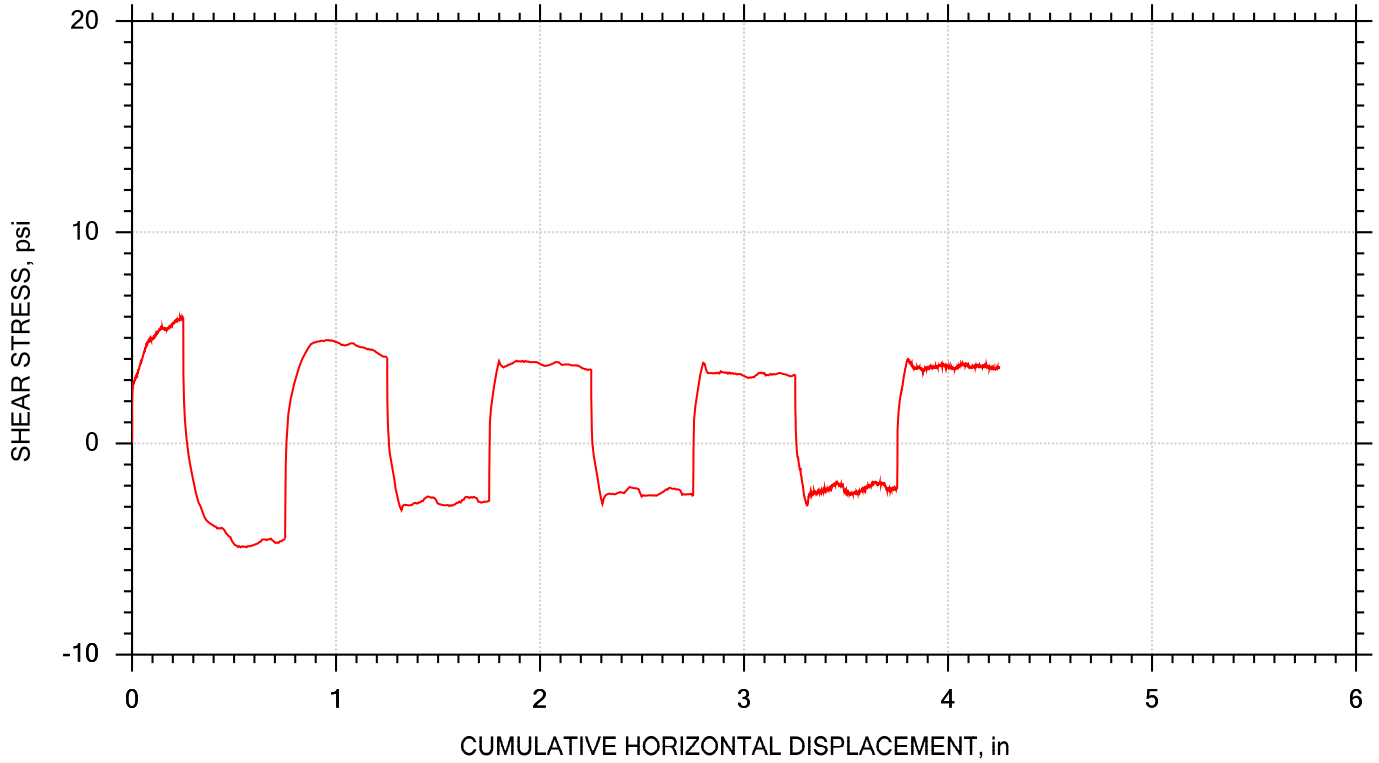
Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 1	Test Date: 07/25/17	Depth: 4.0-25 ft
Test No.: RS-5	Sample Type: Remold	Elevation: ---
Description: Wet, greenish gray clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 2 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-5.dat		



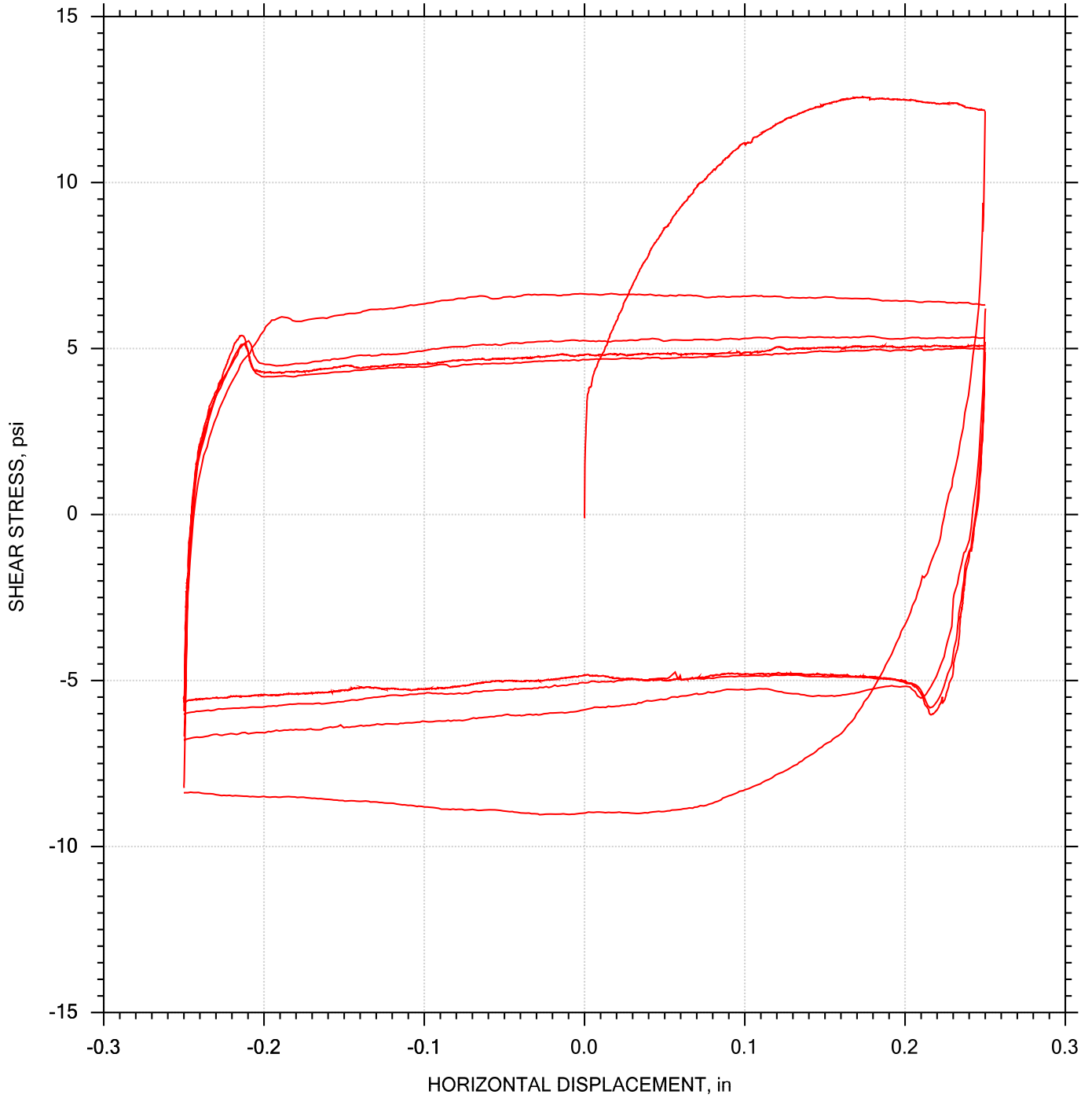
Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 1	Test Date: 07/25/17	Depth: 4.0-25 ft
Test No.: RS-5	Sample Type: Remold	Elevation: ---
Description: Wet, greenish gray clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 3 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-5.dat		



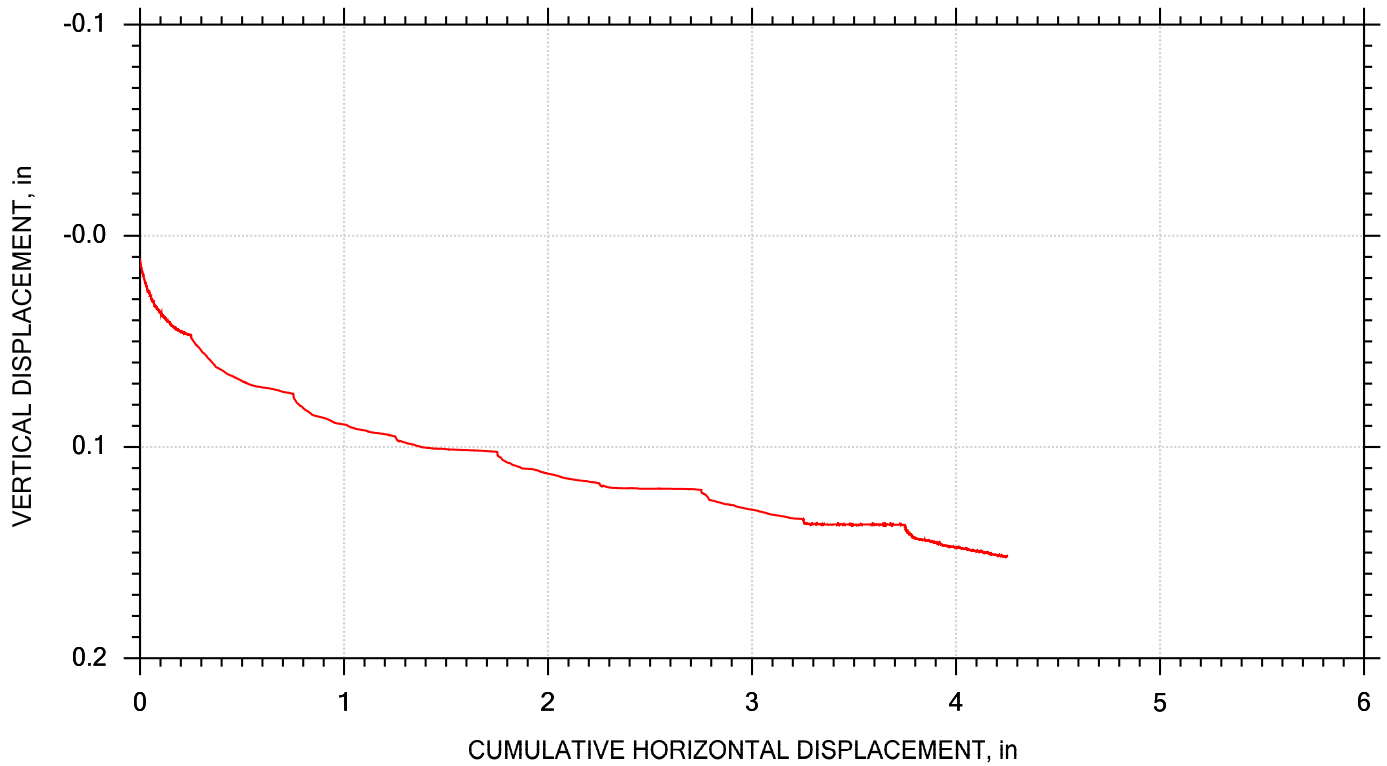
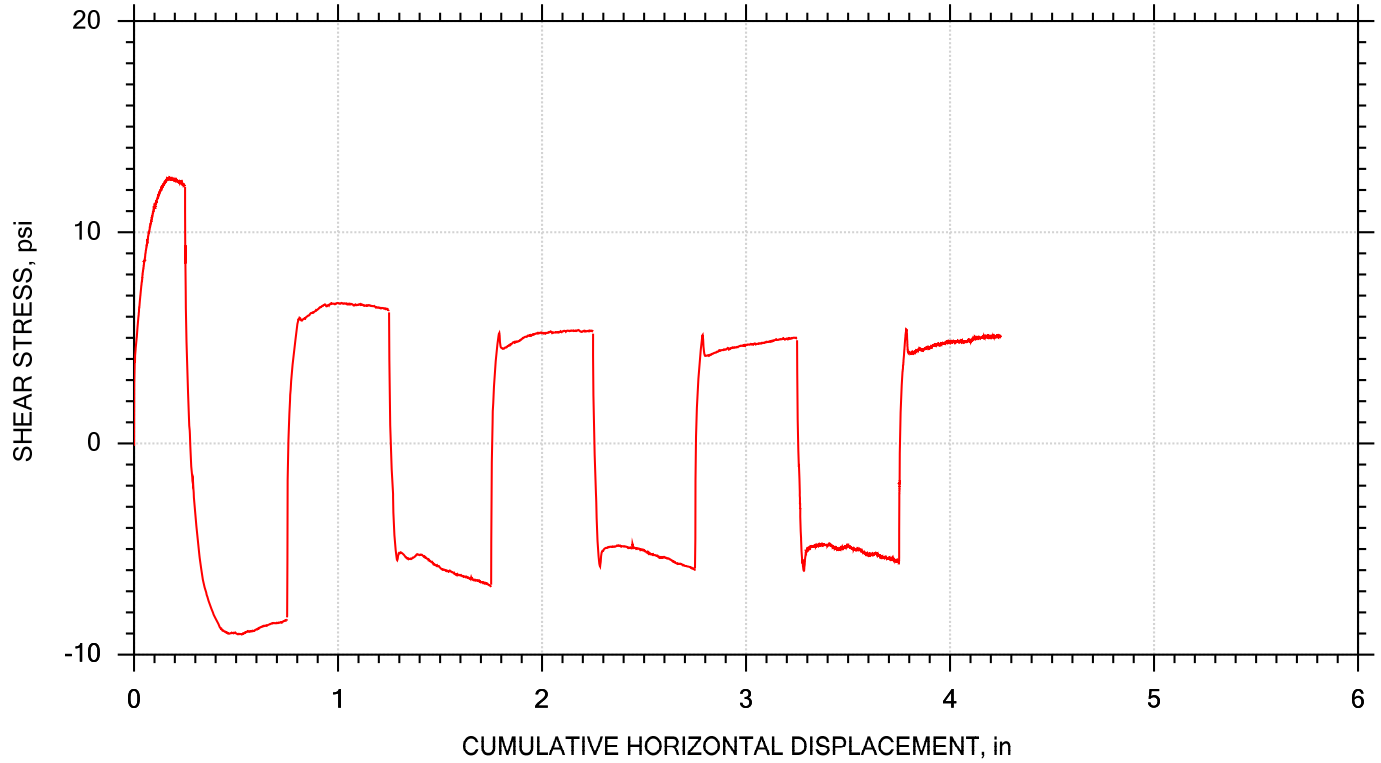
Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 1	Test Date: 07/27/17	Depth: 4-25 ft
Test No.: RS-6	Sample Type: Remold	Elevation: ---
Description: Wet, greenish gray clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 4 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-6A.dat		



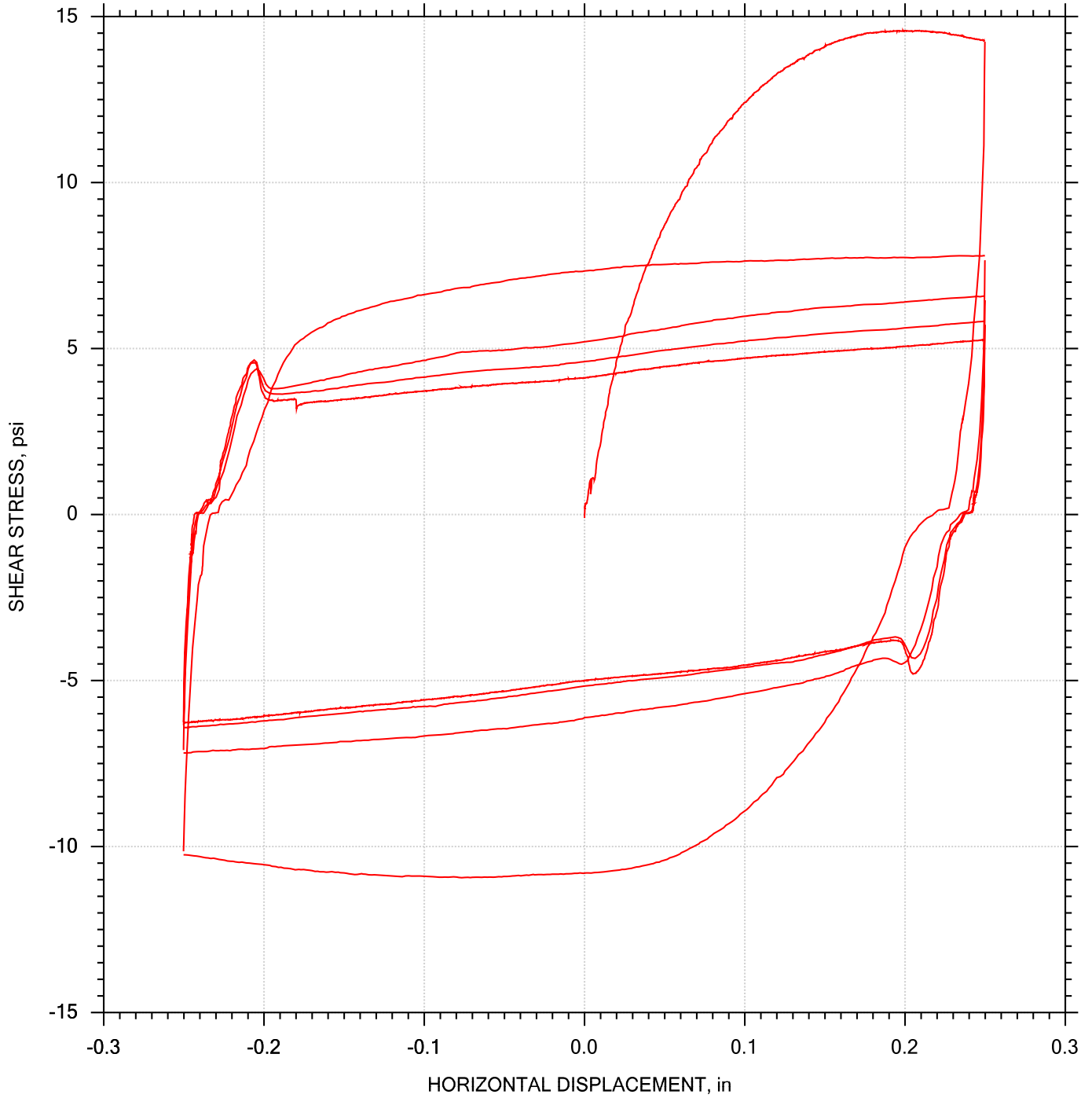
Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 1	Test Date: 07/27/17	Depth: 4-25 ft
Test No.: RS-6	Sample Type: Remold	Elevation: ---
Description: Wet, greenish gray clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 5 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-6A.dat		



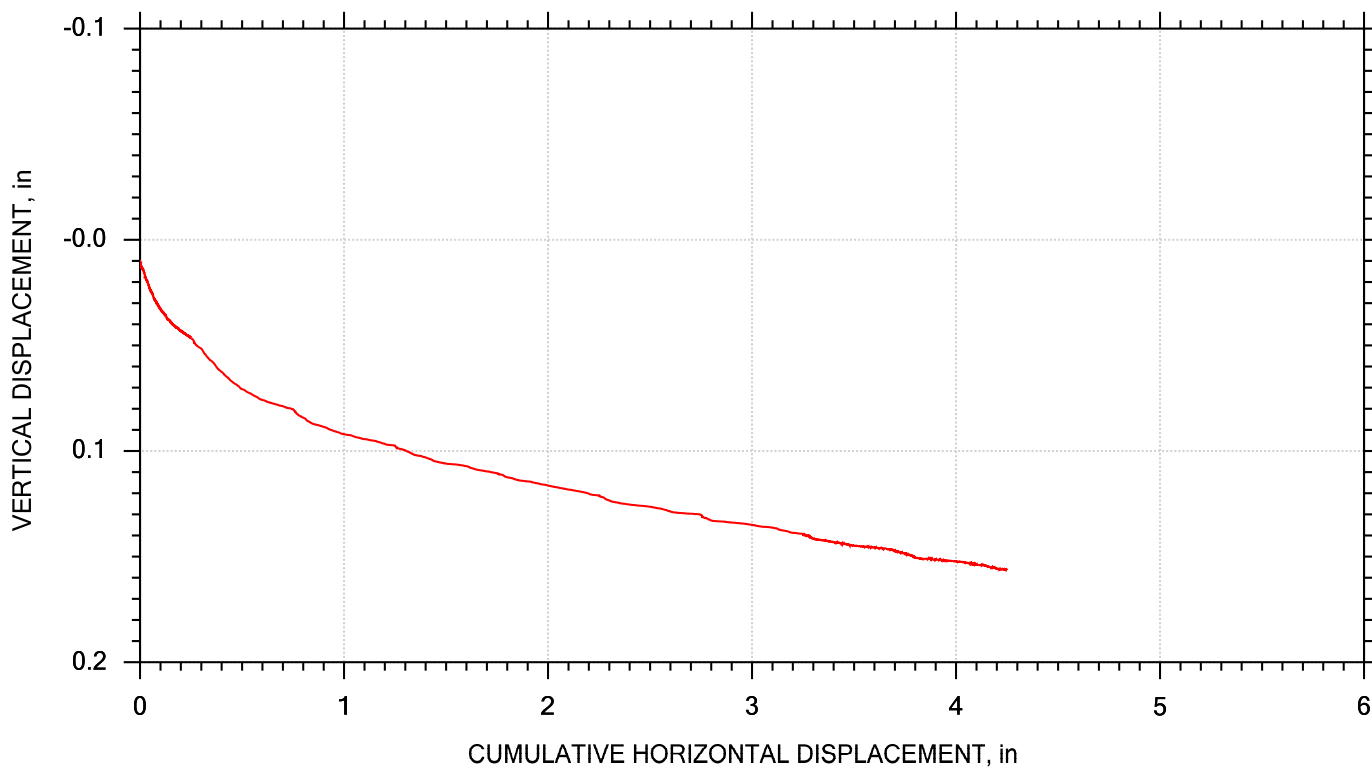
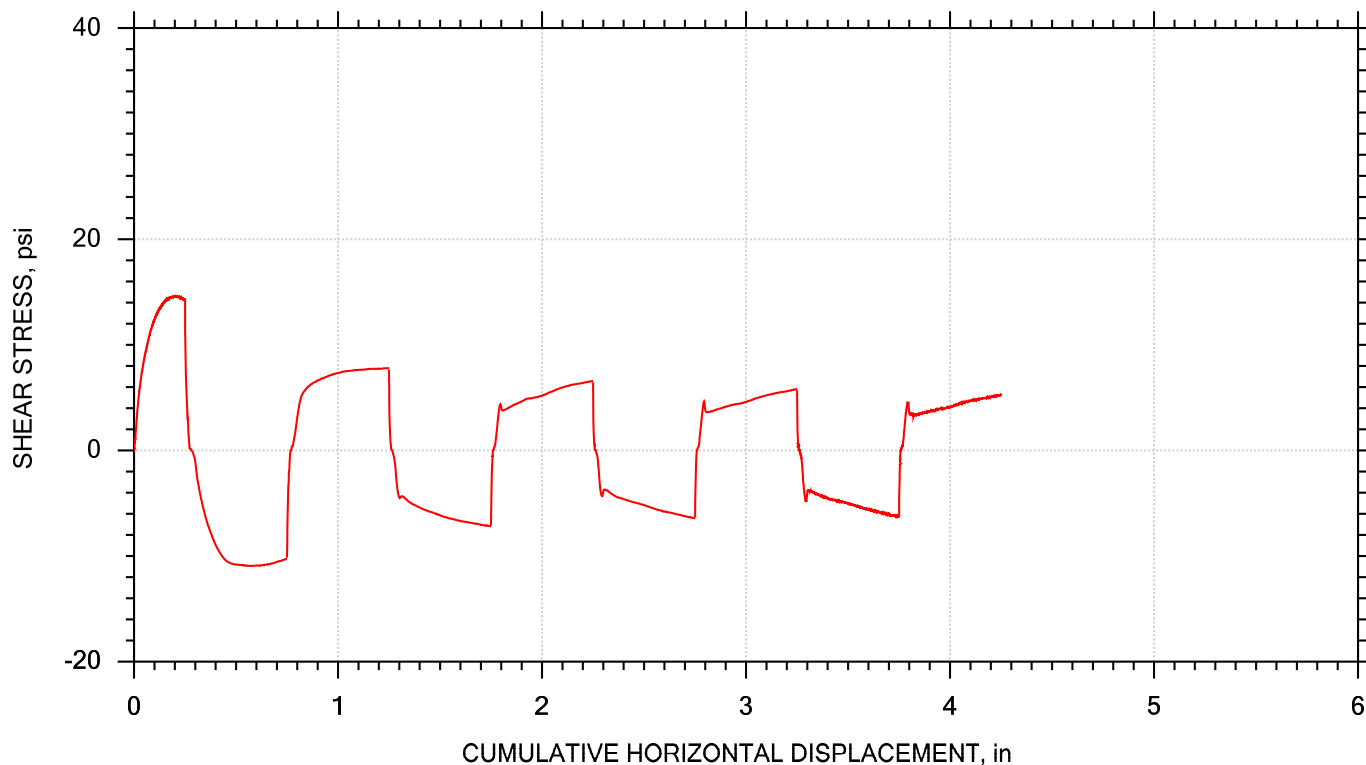
Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 1	Test Date: 07/25/17	Depth: 4.0-25 ft
Test No.: RS-7	Sample Type: Remold	Elevation: ---
Description: Wet, greenish gray clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 6 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-7Aj.dat		



Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 1	Test Date: 07/25/17	Depth: 4.0-25 ft
Test No.: RS-7	Sample Type: Remold	Elevation: ---
Description: Wet, greenish gray clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 7 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-7Aj.dat		



Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 1	Test Date: 07/25/17	Depth: 4.0-25 ft
Test No.: RS-8	Sample Type: Remold	Elevation: ---
Description: Wet, greenish gray clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 8 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-8A.dat		



Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 1	Test Date: 07/25/17	Depth: 4.0-25 ft
Test No.: RS-8	Sample Type: Remold	Elevation: ---
Description: Wet, greenish gray clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 9 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-8A.dat		

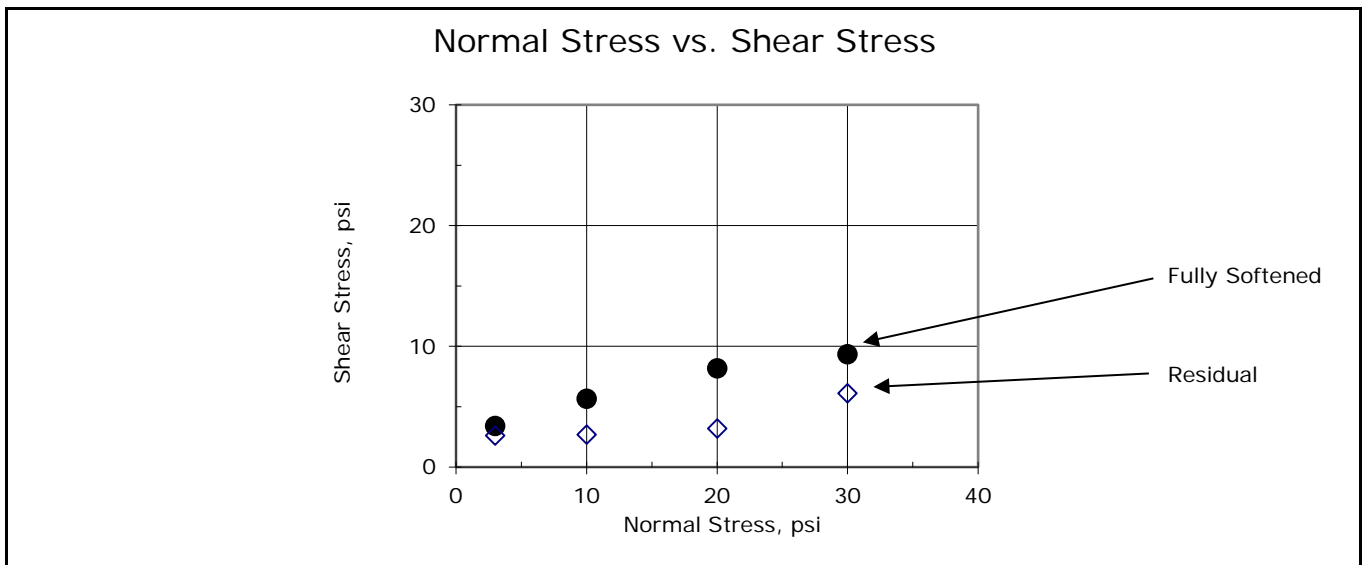


Client:	HDR Engineering, Inc.		
Project Name:	95 Express Lanes Extension		
Project Location:	---		
GTX #:	306713	Tested By:	md
Test Date:	07/20/17	Checked By:	jdt
Boring ID:	---		
Sample ID:	Composite 2 (17RR-BR-10 / BR-11/ RW-12)		
Depth, ft:	28-65		
Description:	Wet, dark reddish brown clay		
Preparation:	Material was passed through a #40 sieve and then prepared to the approximate Liquid Limit moisture content. Material was then allowed to cure for 48 hours prior to testing.		

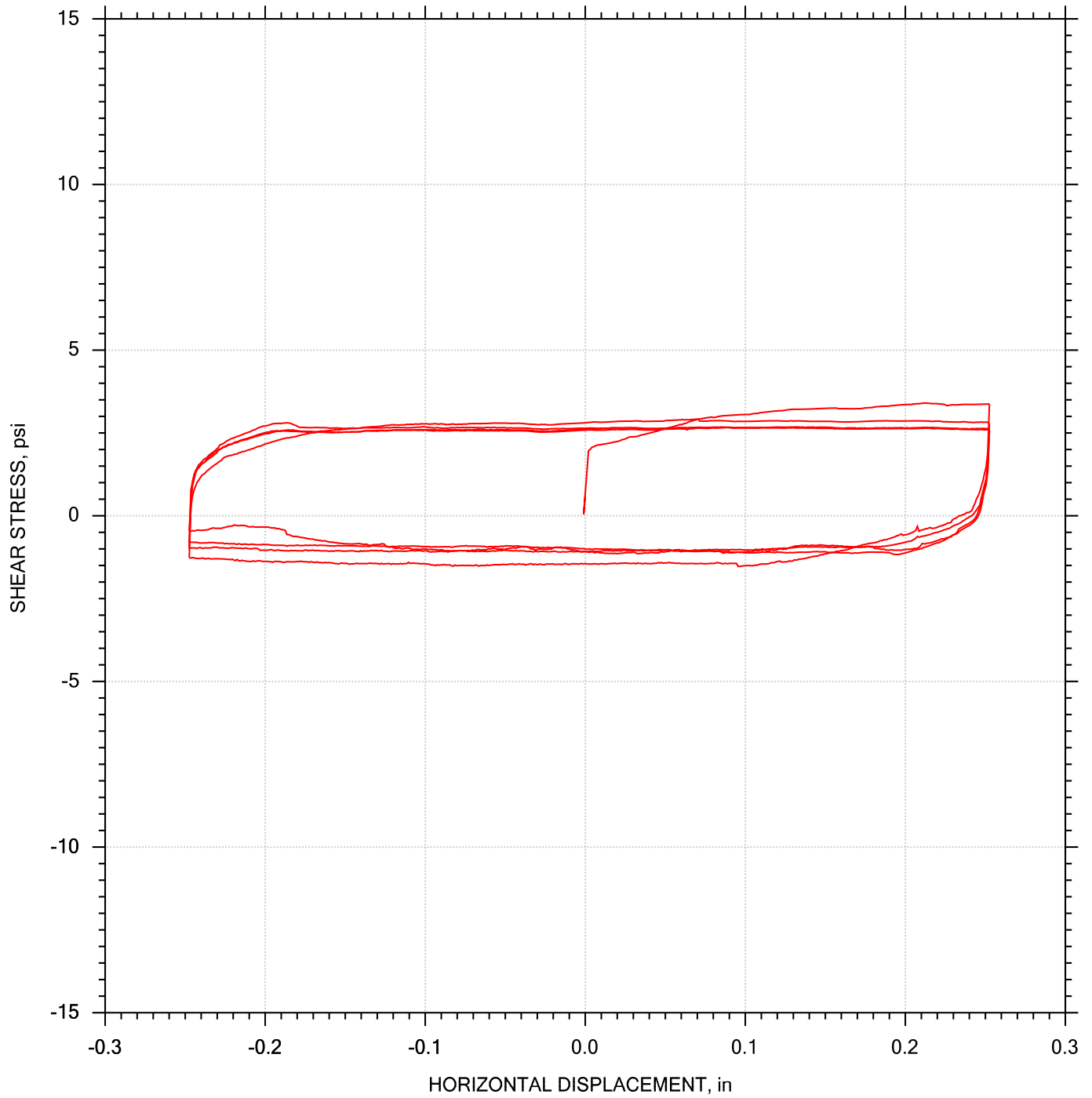
Direct Shear (ASTM D3080) and Residual Shear (USACOE EM1110-modified)

Parameter	Point 1	Point 2	Point 3	Point 4
Test No.	RS-1	RS-2	RS-3	RS-4
Initial Moisture Content, %	77.3	77.3	77.3	77.3
Initial Dry Density, pcf	58.58	61.8	61.8	60.5
Nominal Rate of Shear Strain, inches/min	0.00035	0.00035	0.00035	0.00035
Vertical Consolidation Stress, psi	3.0	10	20	30
Peak Shear Stress, psi	3.4	5.7	8.2	9.4
Post-Peak Shear Stress, psi	2.6	2.7	3.2	6.1
Final Moisture Content, %	55.5	43.5	41.6	37.4

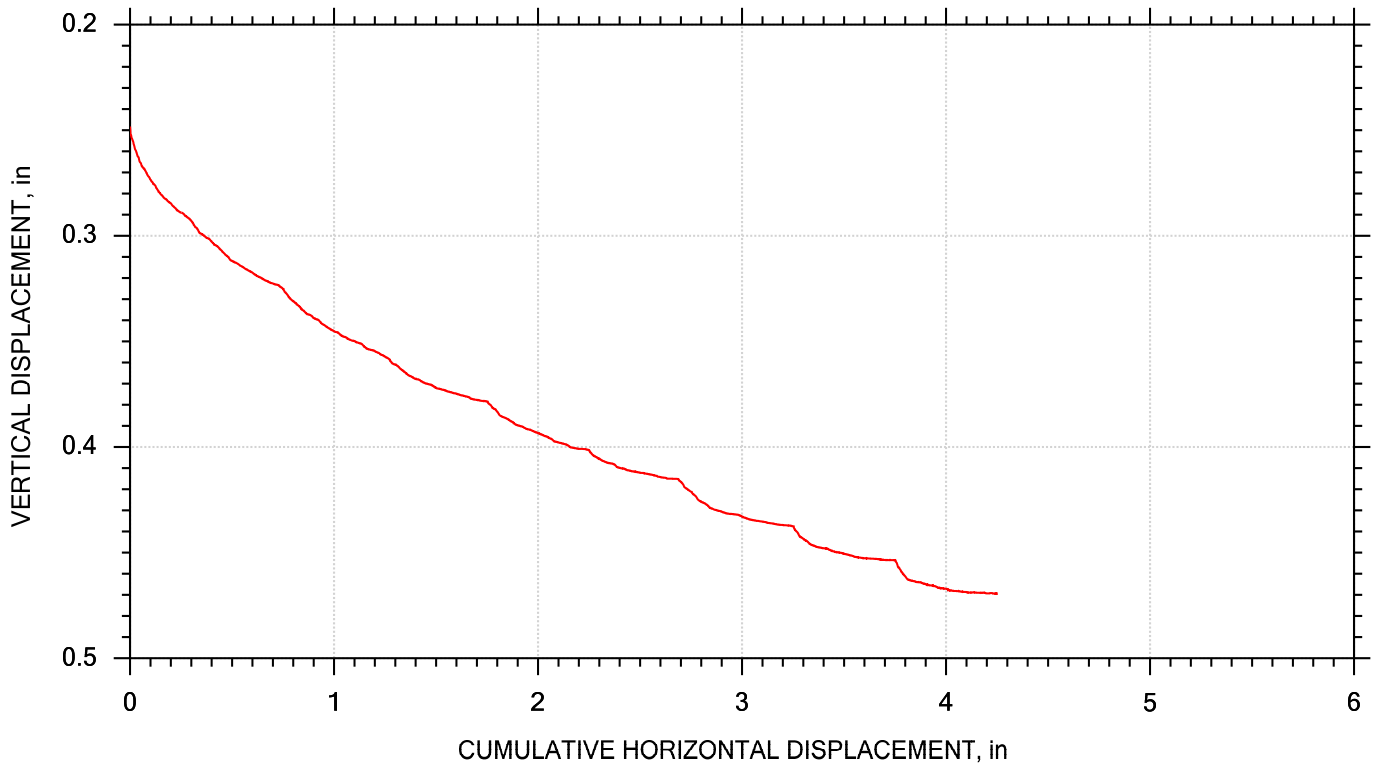
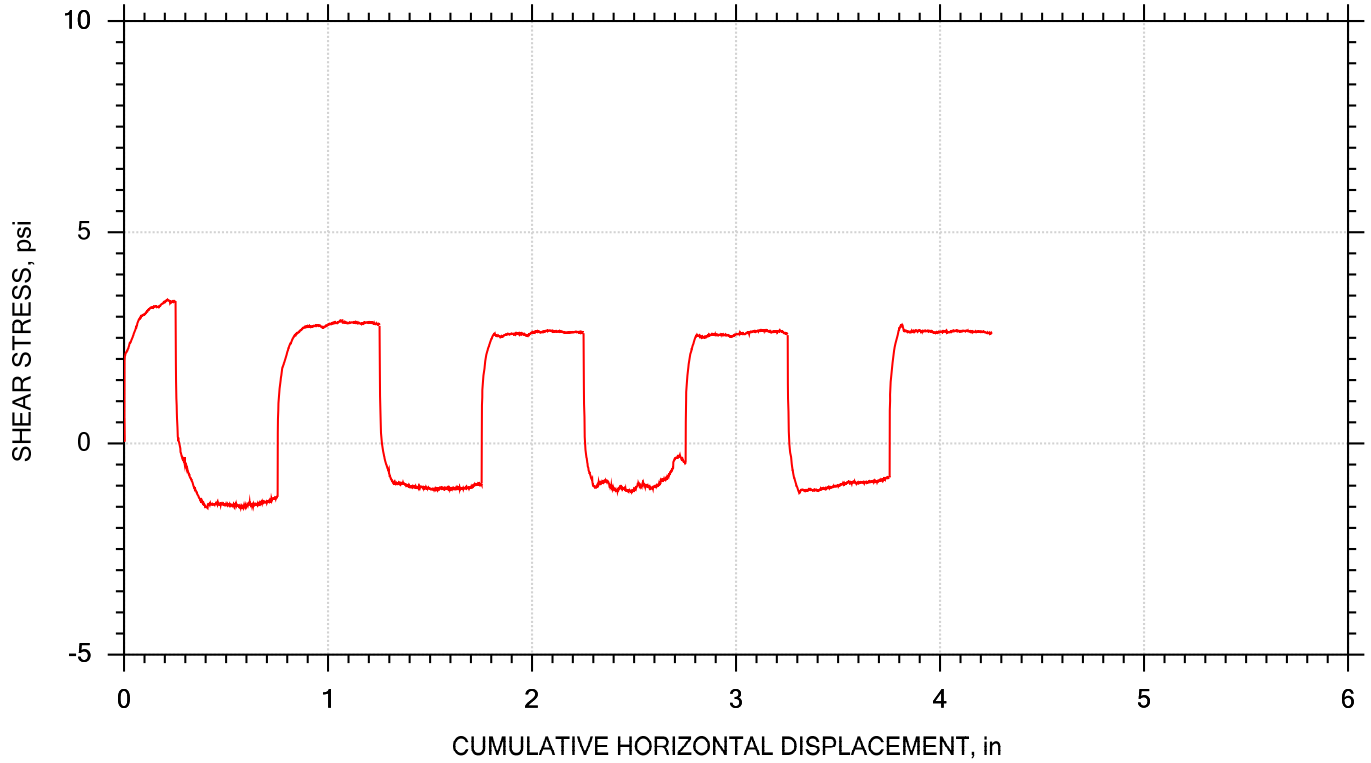
Peak Friction Angle, degrees:	---	Post-Peak Friction Angle, degrees:	---
Peak Cohesion, psi:	---	Post-Peak Cohesion, psi:	---



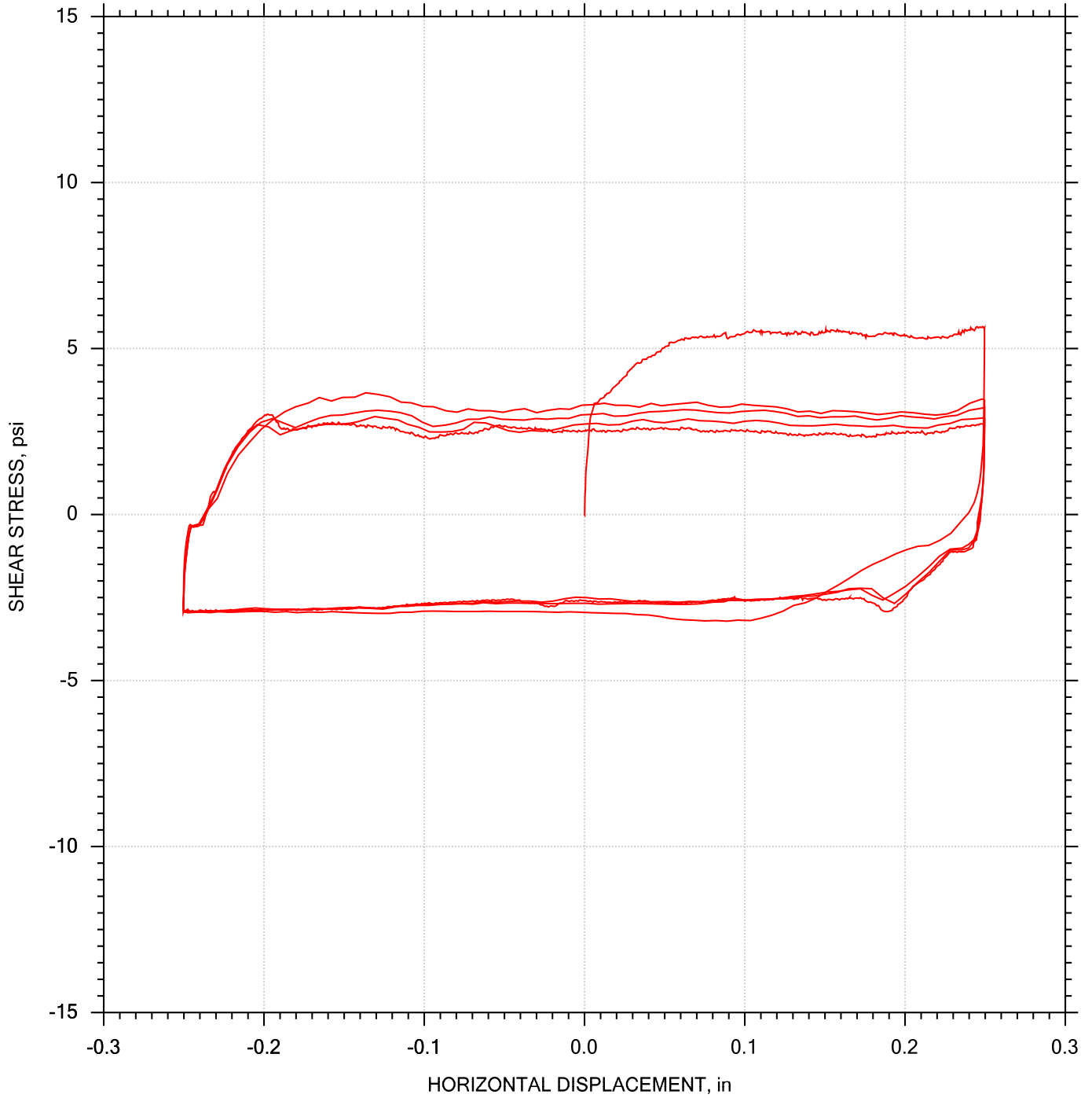
Comments: See attached plots for additional information
 Peak shear strength determined by shearing specimen at 0.00035 ipm
 Post-Peak (Residual) strength determined after 3 shearing cycles at 0.0035 ipm followed by one cycle at 0.00035 ipm.



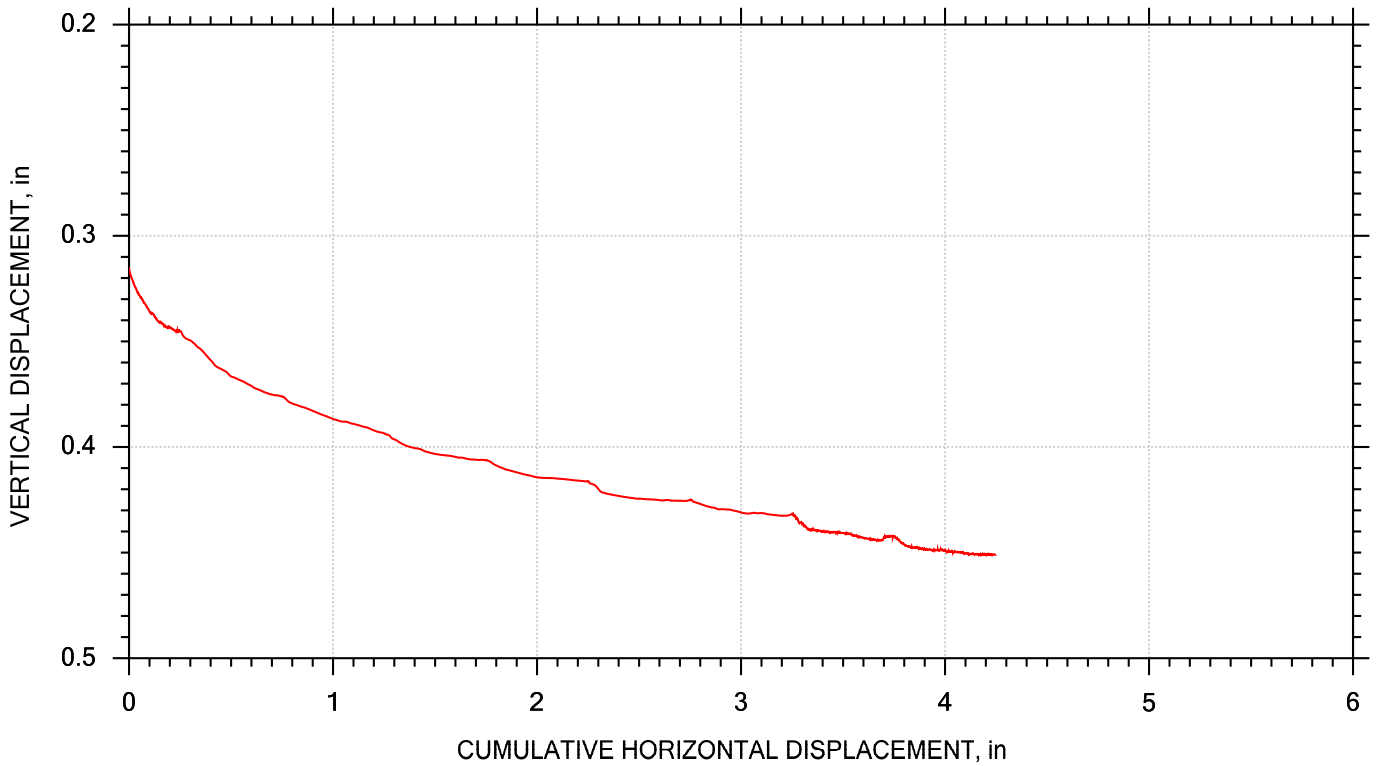
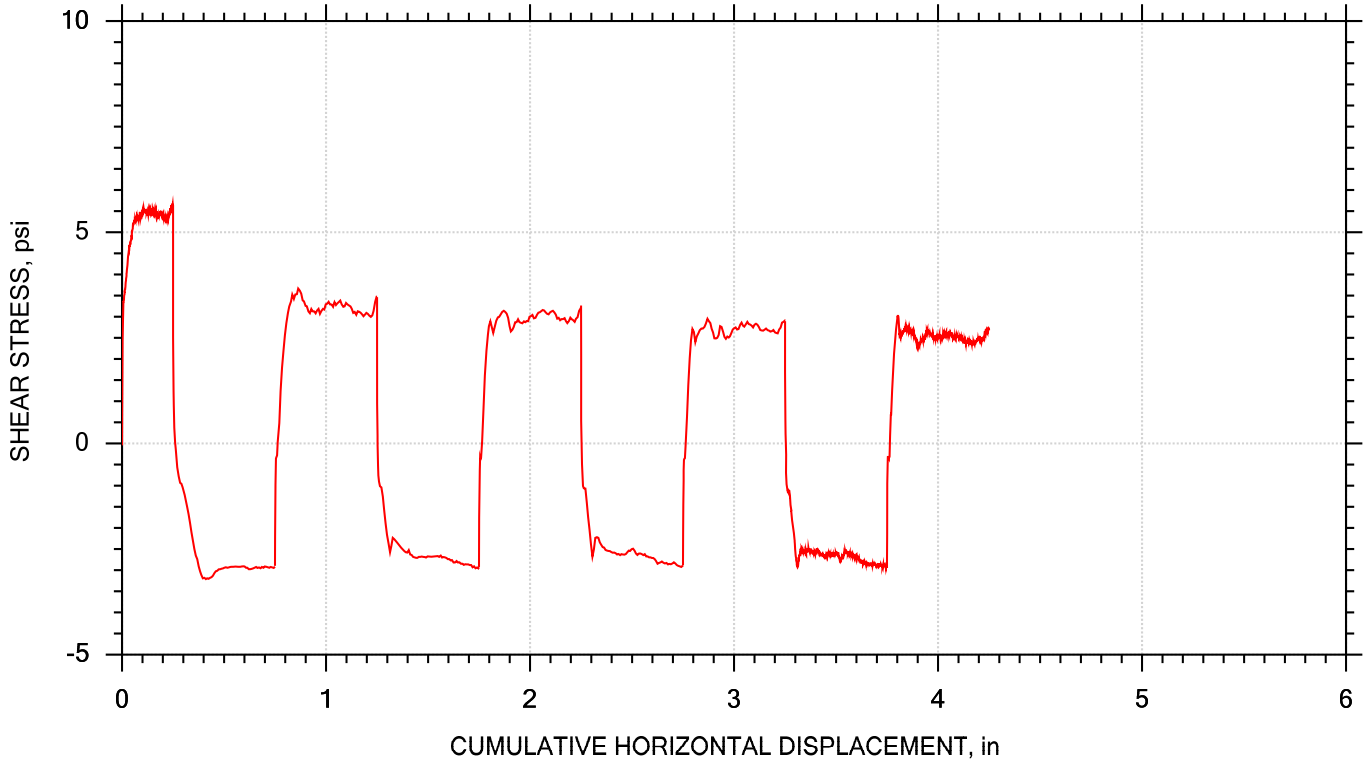
Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 2	Test Date: 07/20/17	Depth: 28-55 ft
Test No.: RS-1	Sample Type: Remold	Elevation: ---
Description: Wet, dark reddish brown clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 2 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-1a.dat		



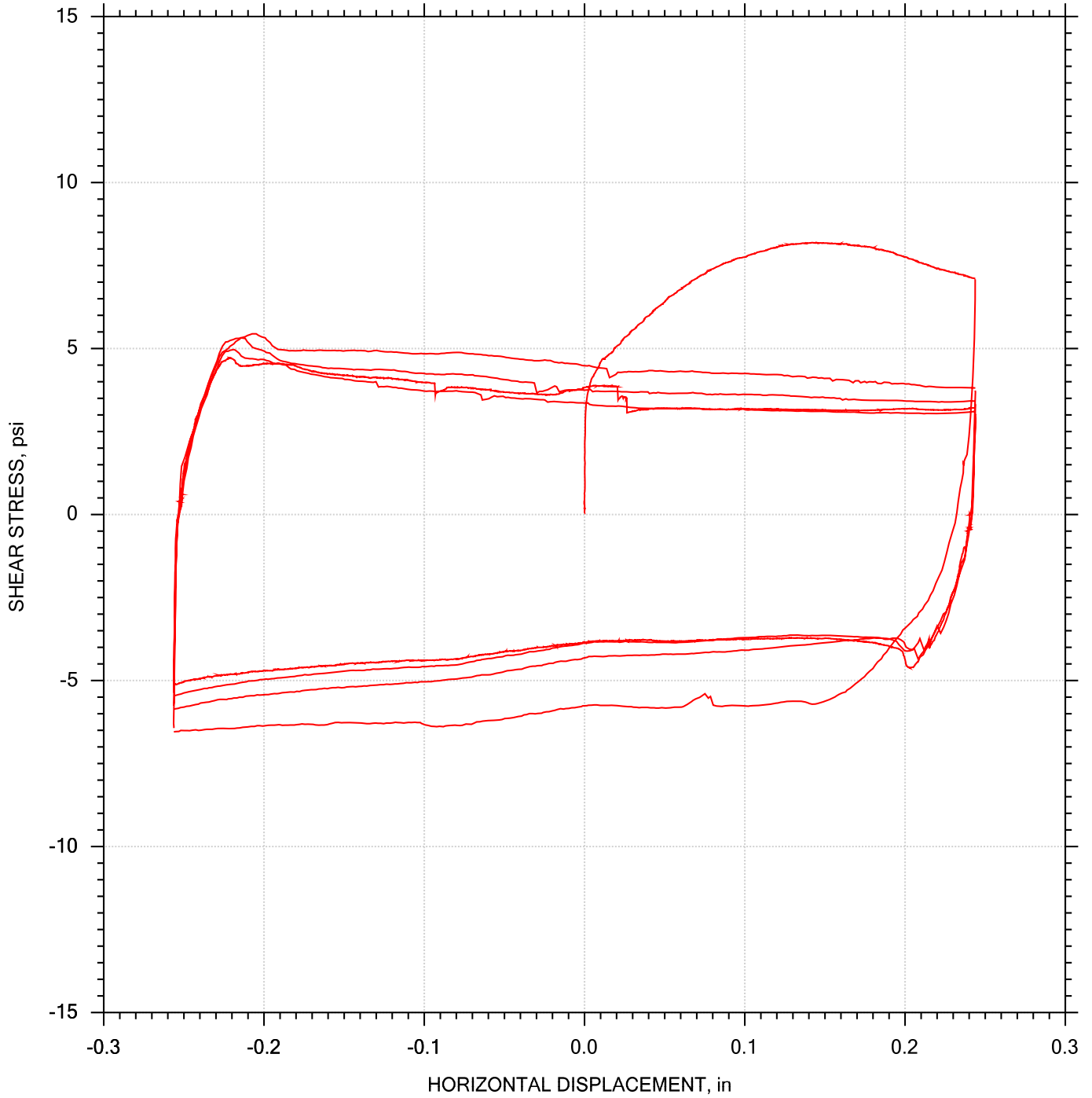
Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 2	Test Date: 07/20/17	Depth: 28-55 ft
Test No.: RS-1	Sample Type: Remold	Elevation: ---
Description: Wet, dark reddish brown clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 3 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-1a.dat		



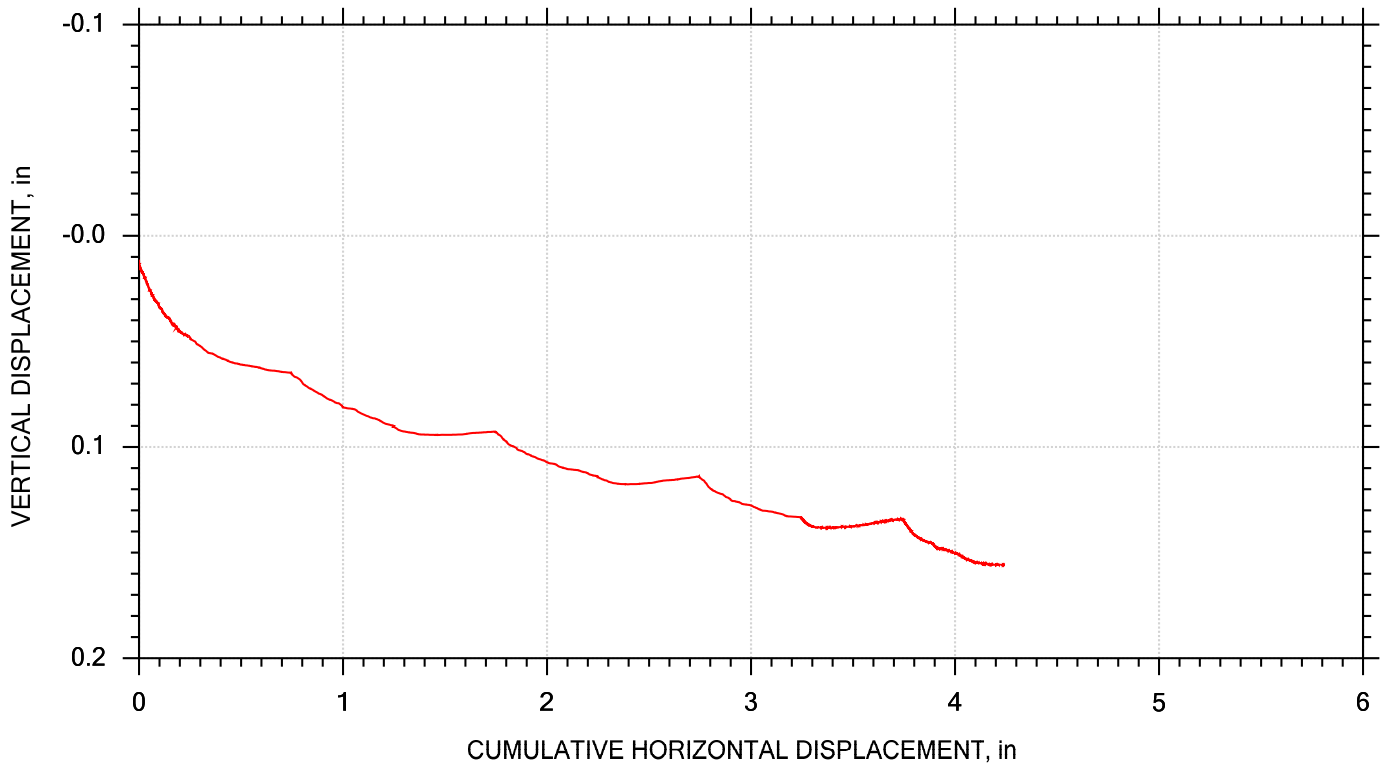
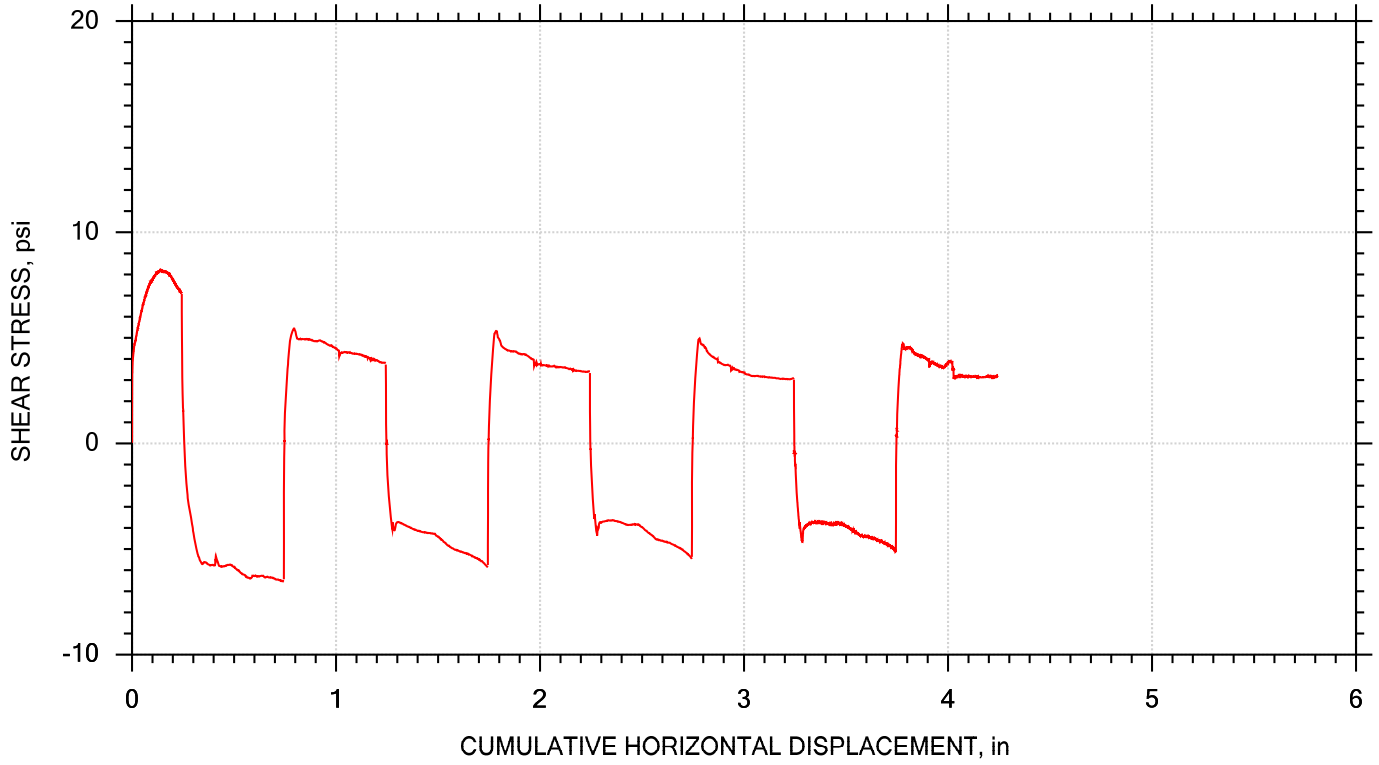
Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 2	Test Date: 07/20/17	Depth: 28.55 ft
Test No.: RS-2	Sample Type: Remold	Elevation: ---
Description: Wet, dark reddish brown clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 4 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-2Aa.dat		



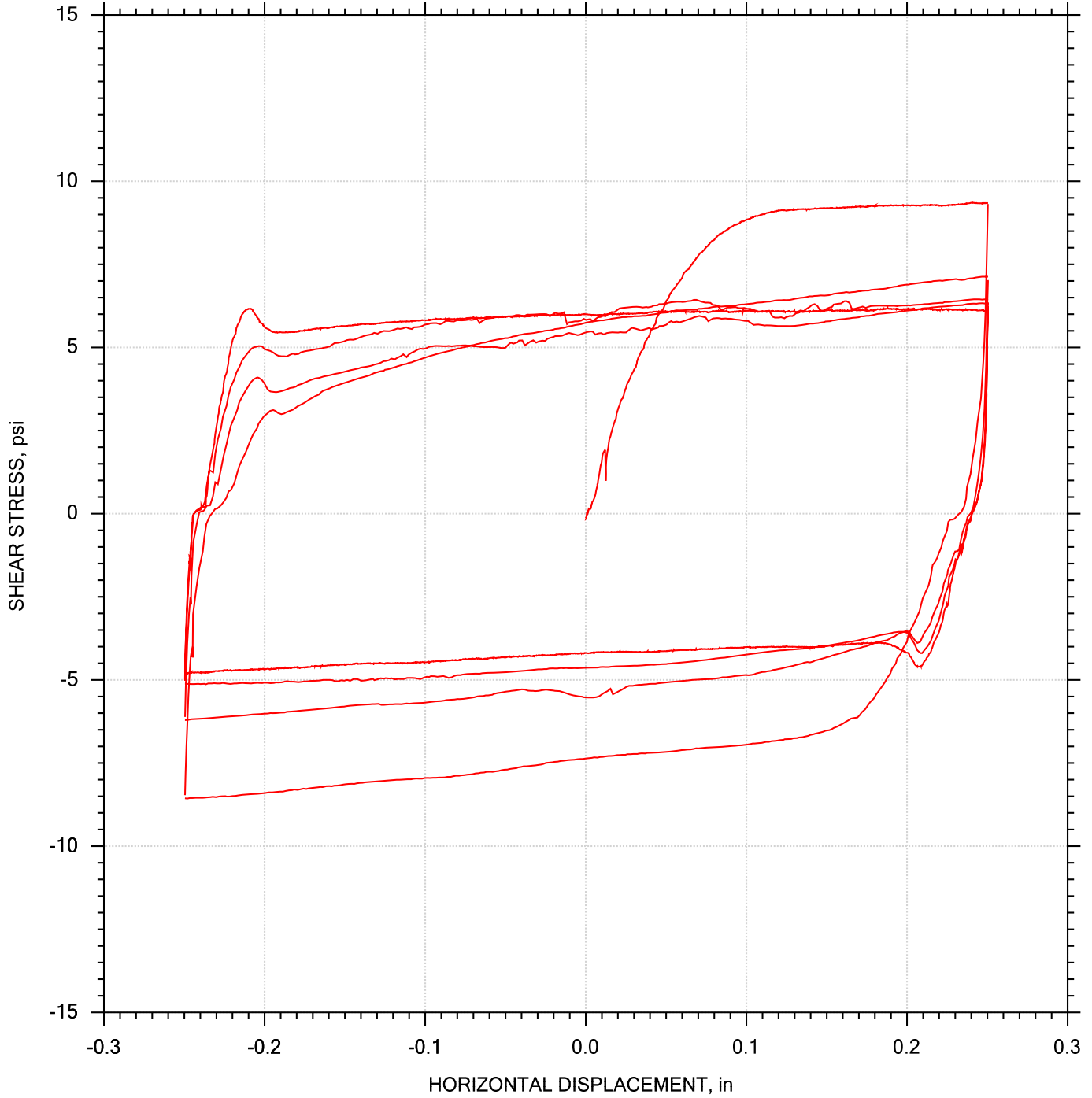
Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 2	Test Date: 07/20/17	Depth: 28.55 ft
Test No.: RS-2	Sample Type: Remold	Elevation: ---
Description: Wet, dark reddish brown clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 5 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-2Aa.dat		



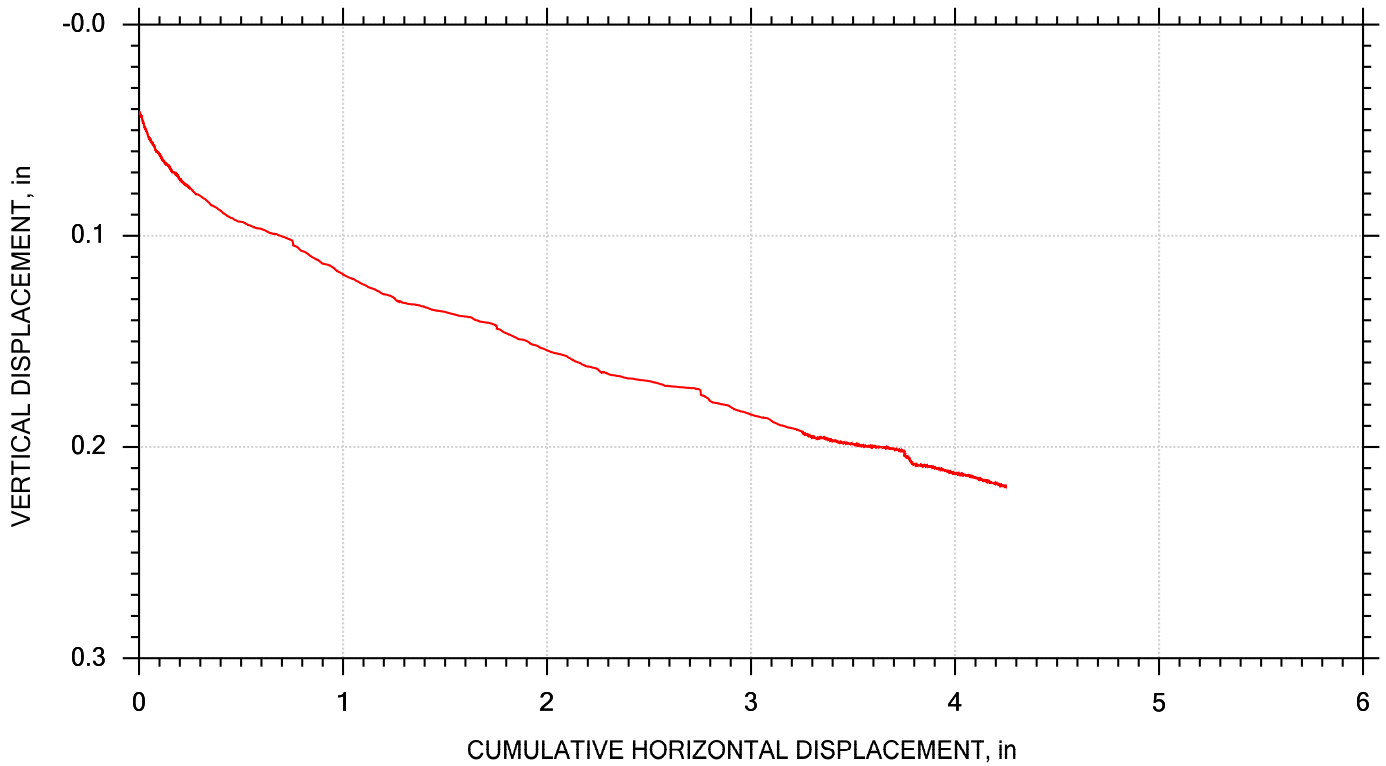
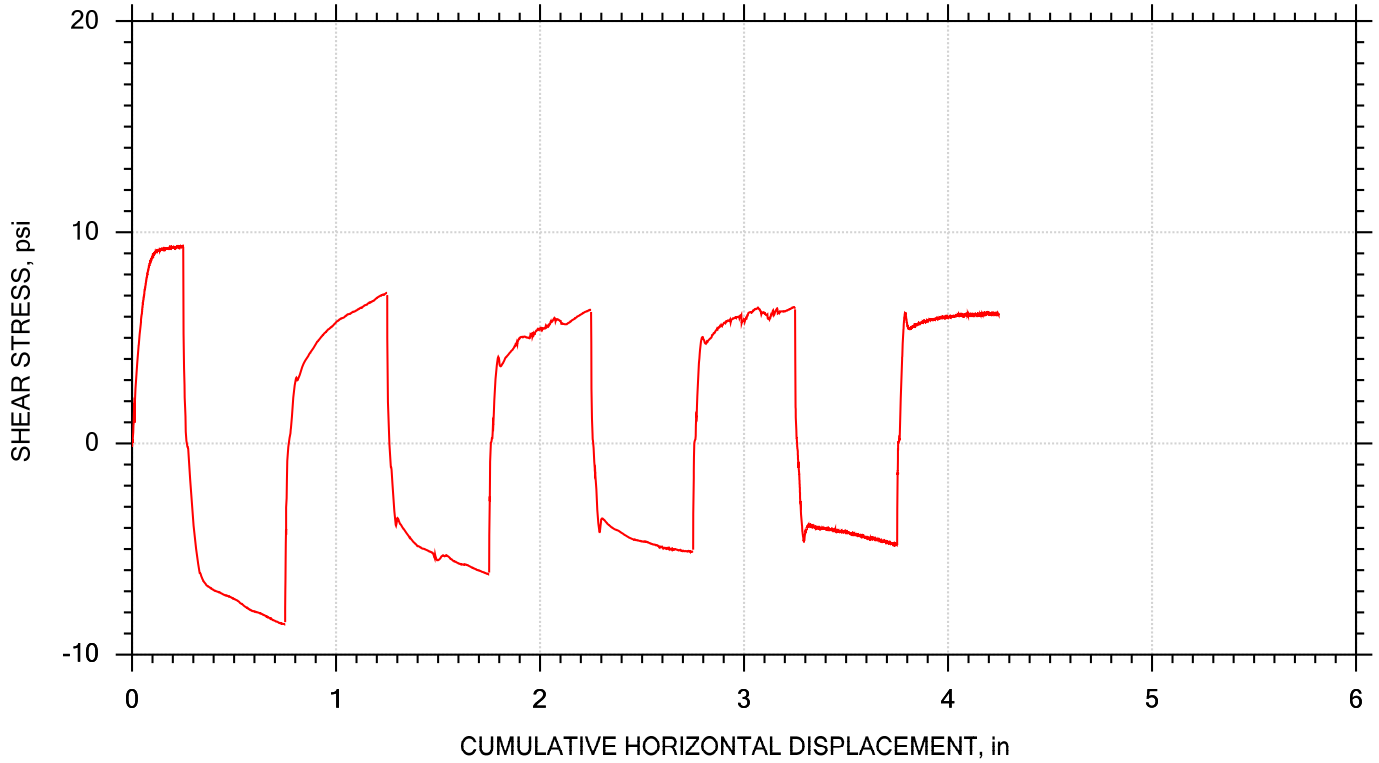
Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 2	Test Date: 07/20/17	Depth: 28-55 ft
Test No.: RS-3	Sample Type: Remold	Elevation: ---
Description: Wet, dark reddish brown clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 6 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-3Aa.dat		



Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 2	Test Date: 07/20/17	Depth: 28-55 ft
Test No.: RS-3	Sample Type: Remold	Elevation: ---
Description: Wet, dark reddish brown clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 7 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-3Aa.dat		



Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 2	Test Date: 07/20/17	Depth: 28-55 ft
Test No.: RS-4	Sample Type: Remold	Elevation: ---
Description: Wet, dark reddish brown clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 8 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-4Aa.dat		



Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 2	Test Date: 07/20/17	Depth: 28-55 ft
Test No.: RS-4	Sample Type: Remold	Elevation: ---
Description: Wet, dark reddish brown clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 9 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-4Aa.dat		

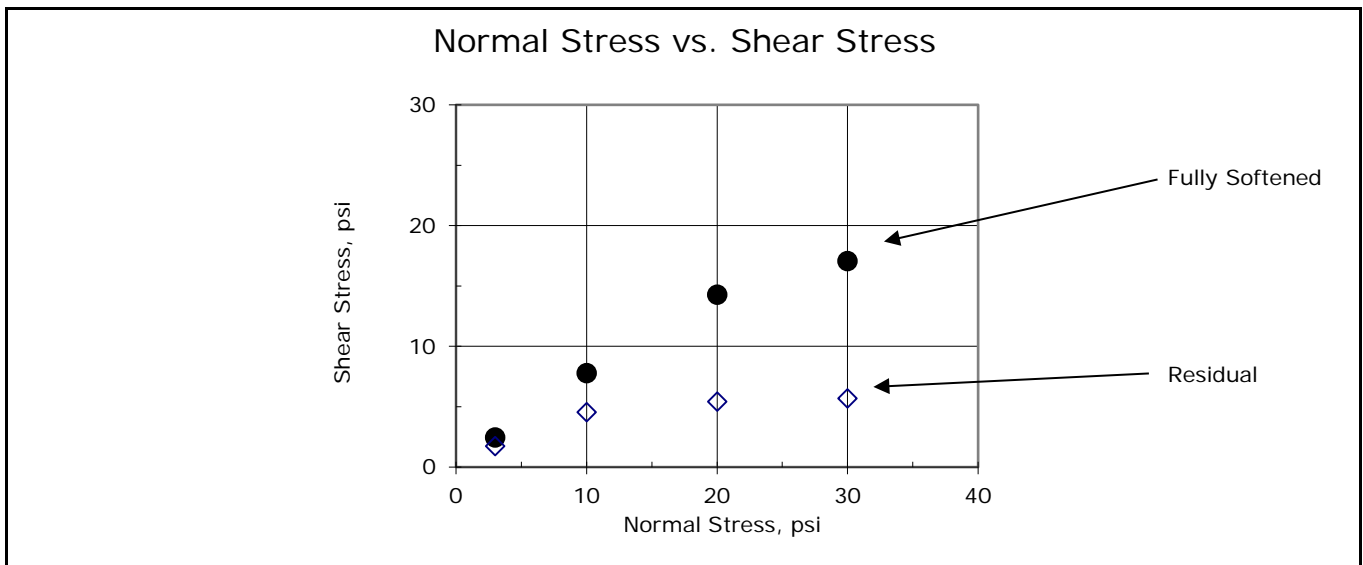


Client:	HDR Engineering, Inc.		
Project Name:	95 Express Lanes Extension		
Project Location:	---		
GTX #:	306713	Tested By:	md
Test Date:	07/29/17	Checked By:	jdt
Boring ID:	---		
Sample ID:	Composite 3 (17XP-21A/24)		
Depth, ft:	6-40		
Description:	Wet, light yellowish brown clay		
Preparation:	Material was passed through a #40 sieve and then prepared to the approximate Liquid Limit moisture content. Material was then allowed to cure for 48 hours prior to testing.		

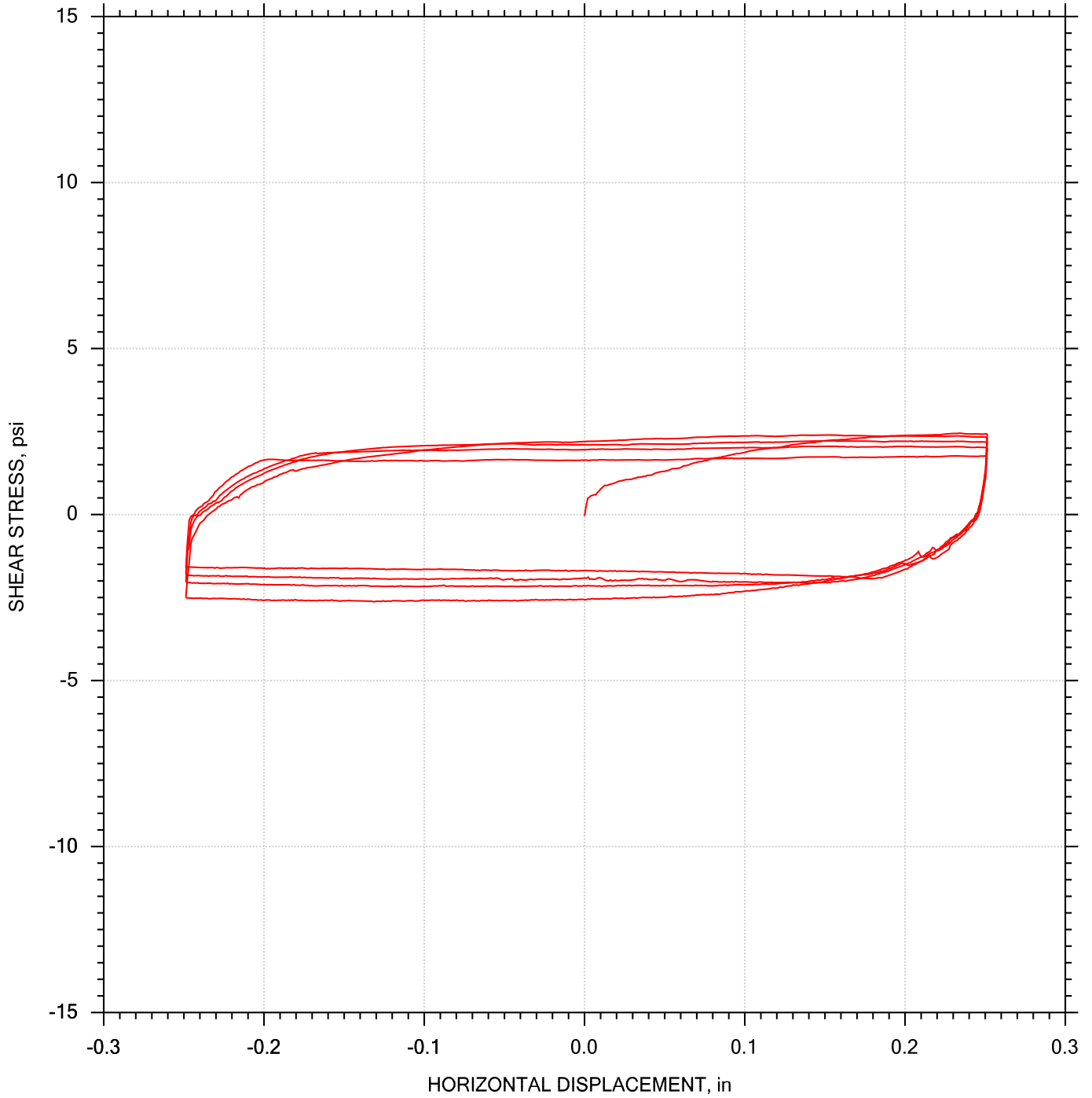
Direct Shear (ASTM D3080) and Residual Shear (USACOE EM1110-modified)

Parameter	Point 1	Point 2	Point 3	Point 4
Test No.	RS-9	RS-10	RS-11	RS-12
Initial Moisture Content, %	56.2	56.2	56.2	56.2
Initial Dry Density, pcf	75.92	76.45	74.2	75.7
Nominal Rate of Shear Strain, inches/min	0.00035	0.00035	0.00035	0.00035
Vertical Consolidation Stress, psi	3.0	10	20	30
Peak Shear Stress, psi	2.5	7.8	14.3	17.1
Post-Peak Shear Stress, psi	1.8	4.6	5.4	5.7
Final Moisture Content, %	44.1	36.8	34.6	31.3

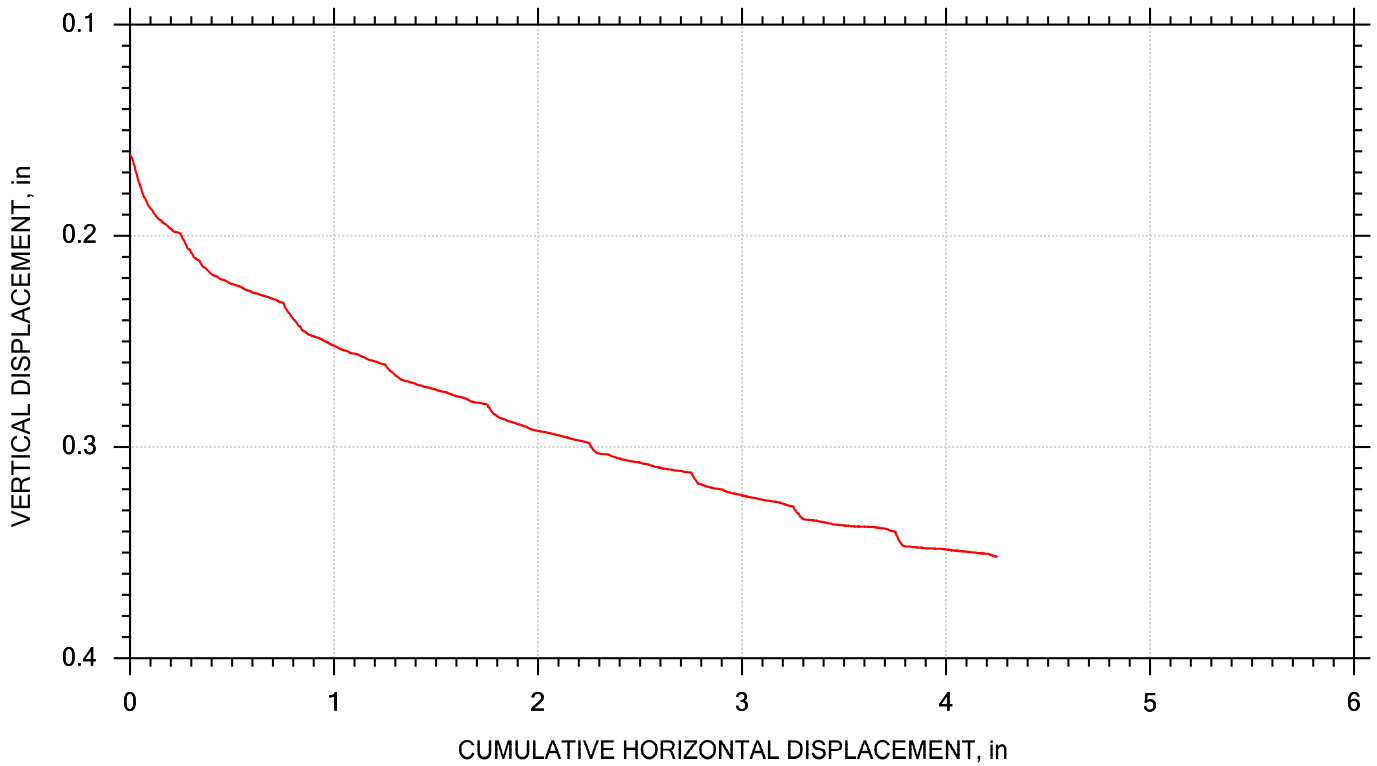
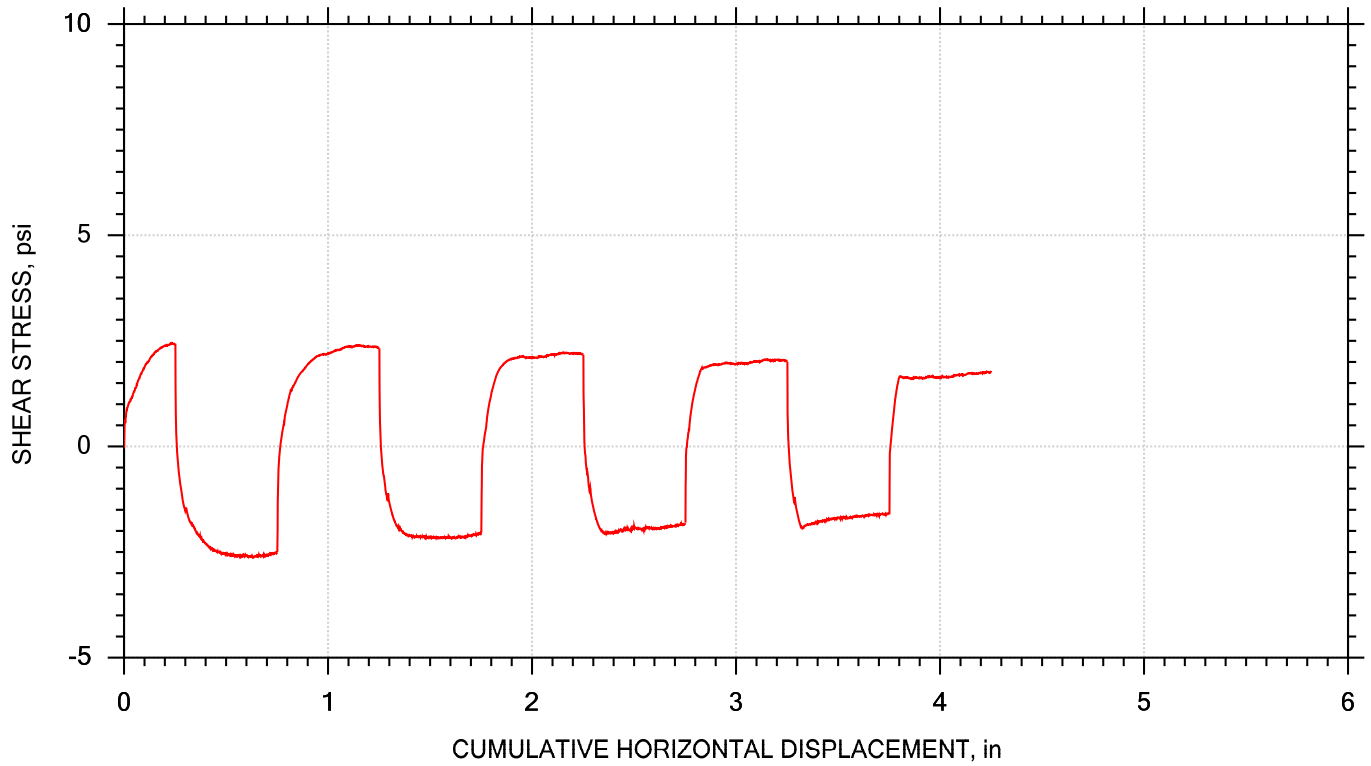
Peak Friction Angle, degrees:	---	Post-Peak Friction Angle, degrees:	---
Peak Cohesion, psi:	---	Post-Peak Cohesion, psi:	---



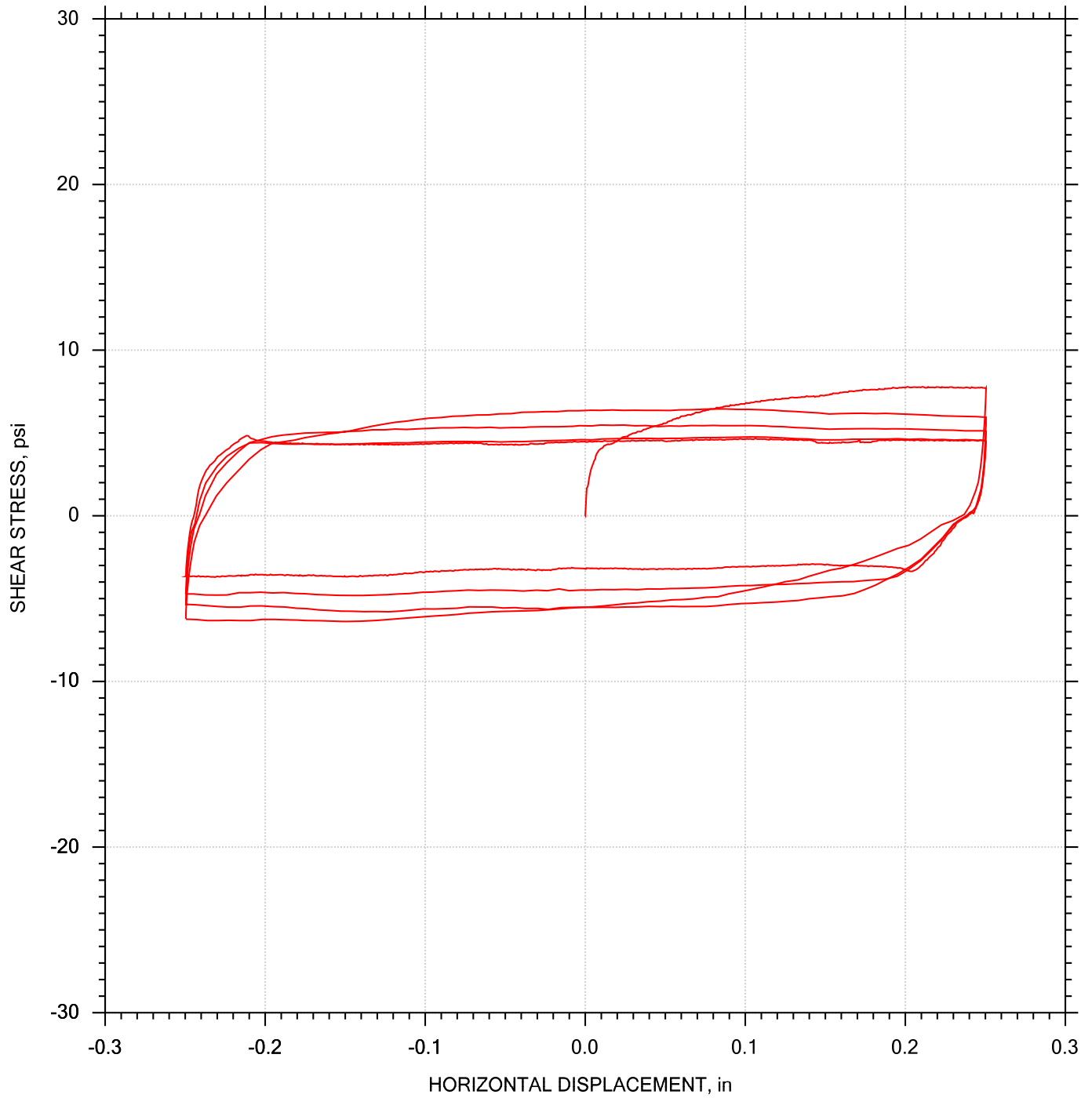
Comments: See attached plots for additional information
 Peak shear strength determined by shearing specimen at 0.00035 ipm
 Post-Peak (Residual) strength determined after 3 shearing cycles at 0.0035 ipm followed by one cycle at 0.00035 ipm.



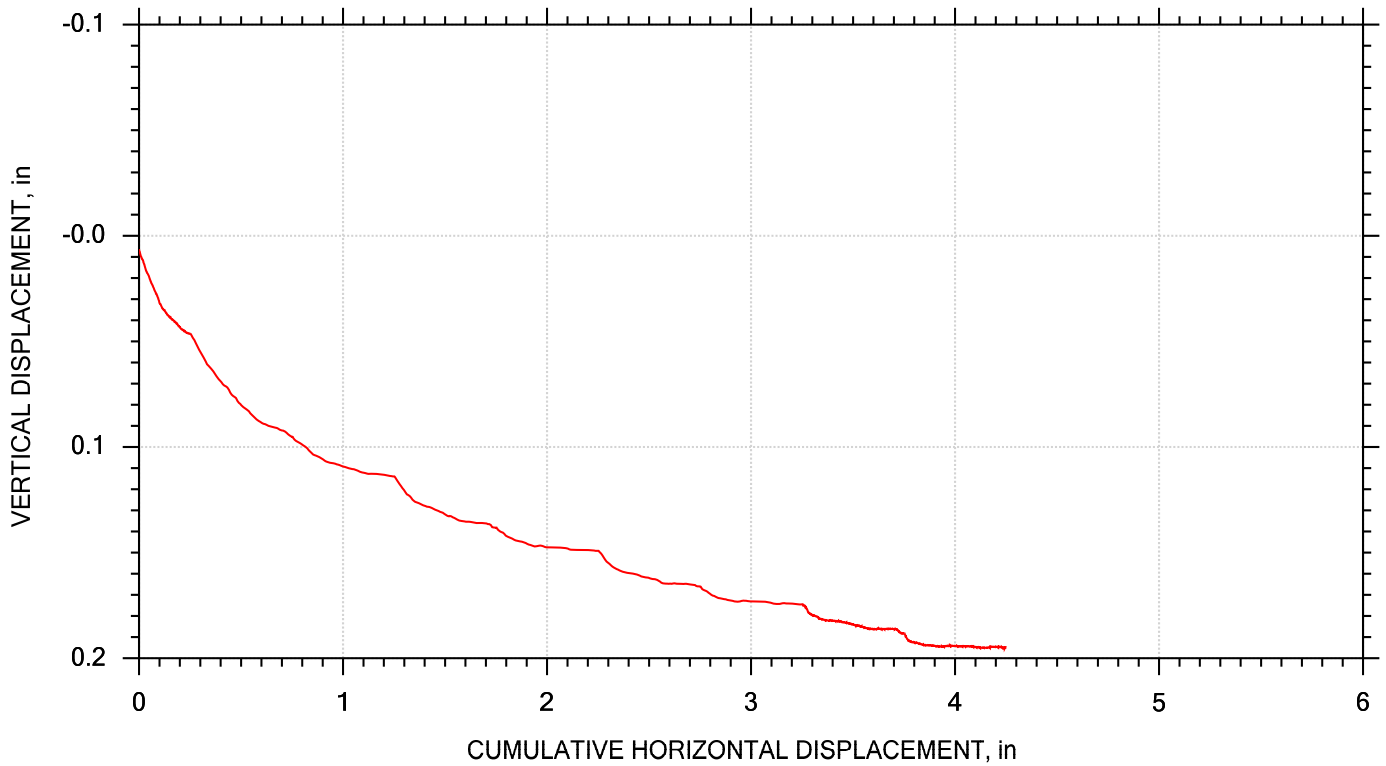
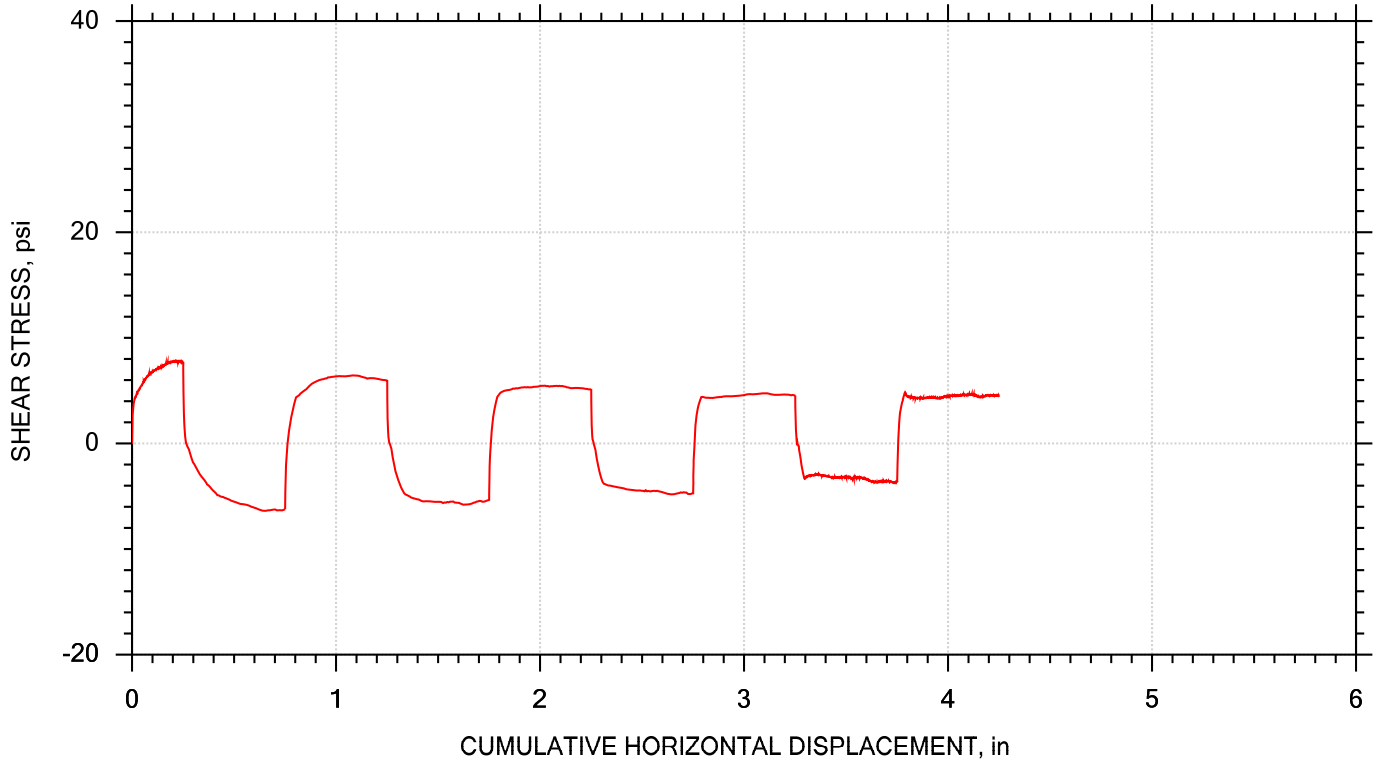
Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 3	Test Date: 07/29/17	Depth: 6-40 ft
Test No.: RS-9	Sample Type: Remold	Elevation: ---
Description: Wet, light yellowish brown clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 2 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-9.dat		



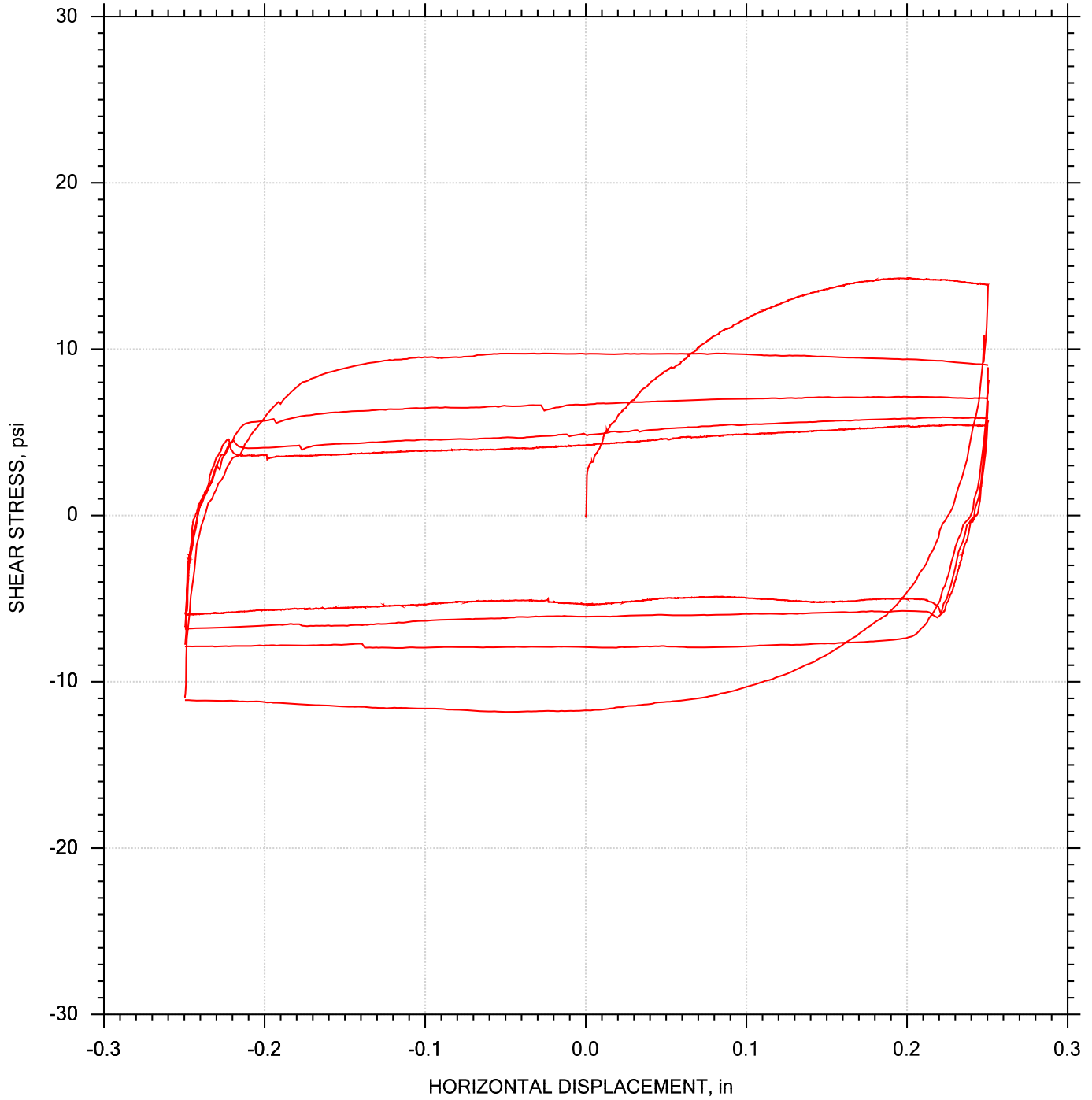
Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 3	Test Date: 07/29/17	Depth: 6-40 ft
Test No.: RS-9	Sample Type: Remold	Elevation: ---
Description: Wet, light yellowish brown clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 3 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-9.dat		



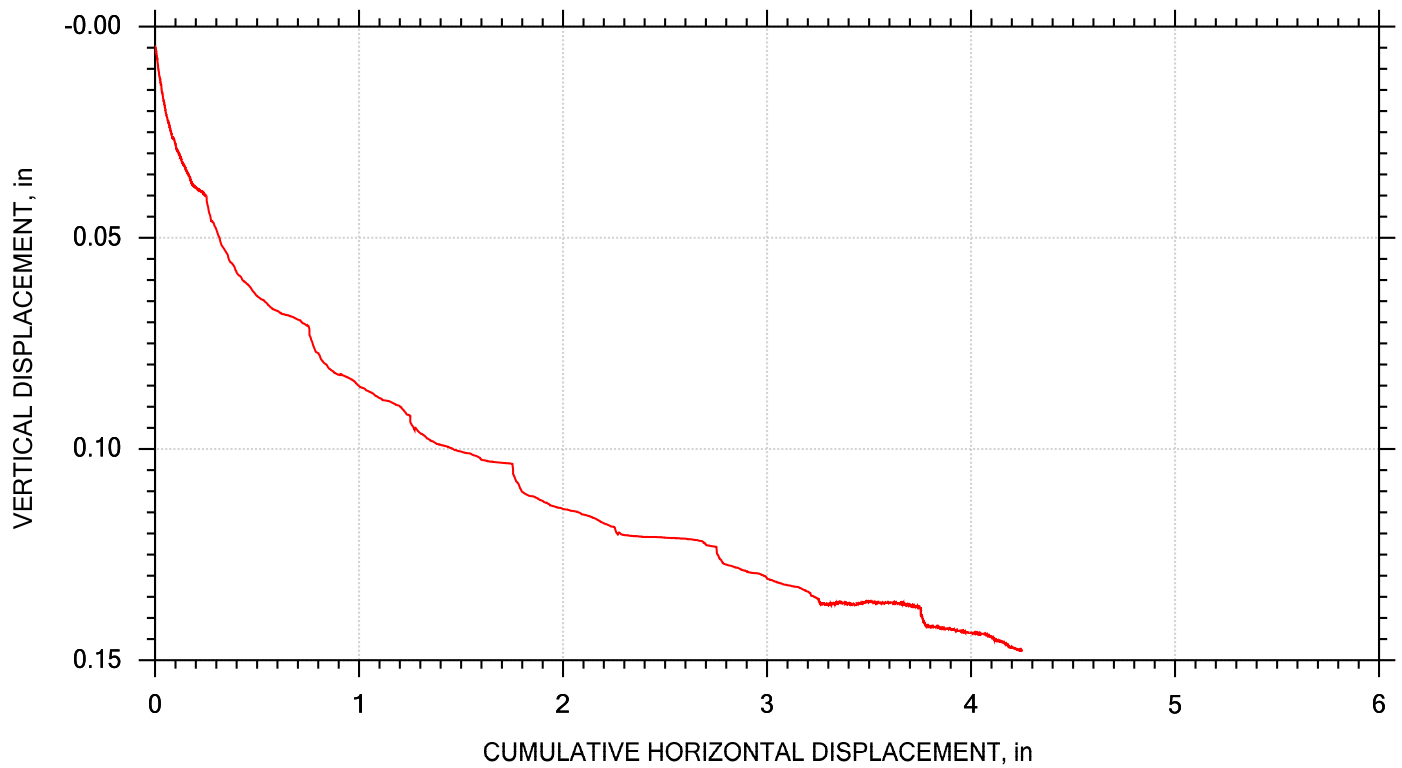
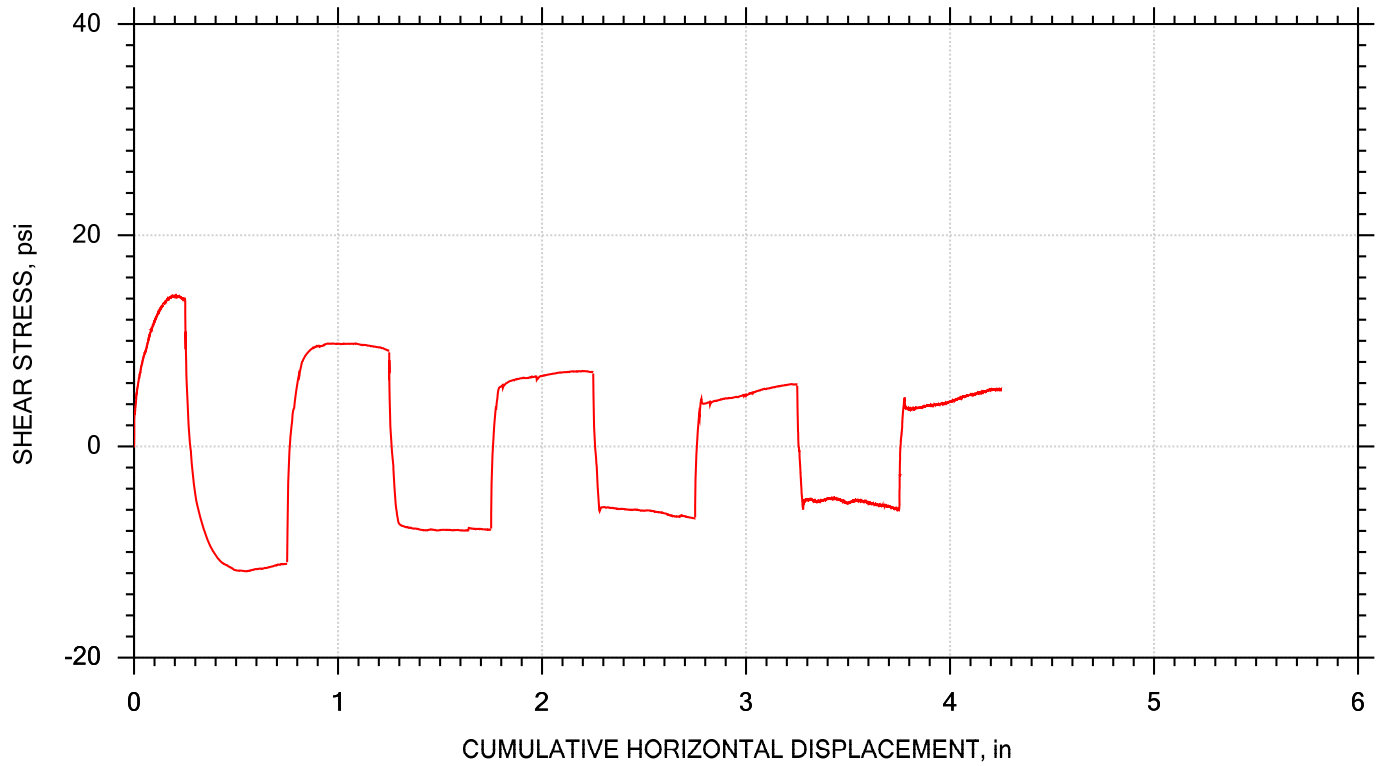
Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 3	Test Date: 08/02/17	Depth: 6-40 ft
Test No.: RS-10B	Sample Type: Remold	Elevation: ---
Description: Wet, light yellowish brown clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 4 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-10C.dat		



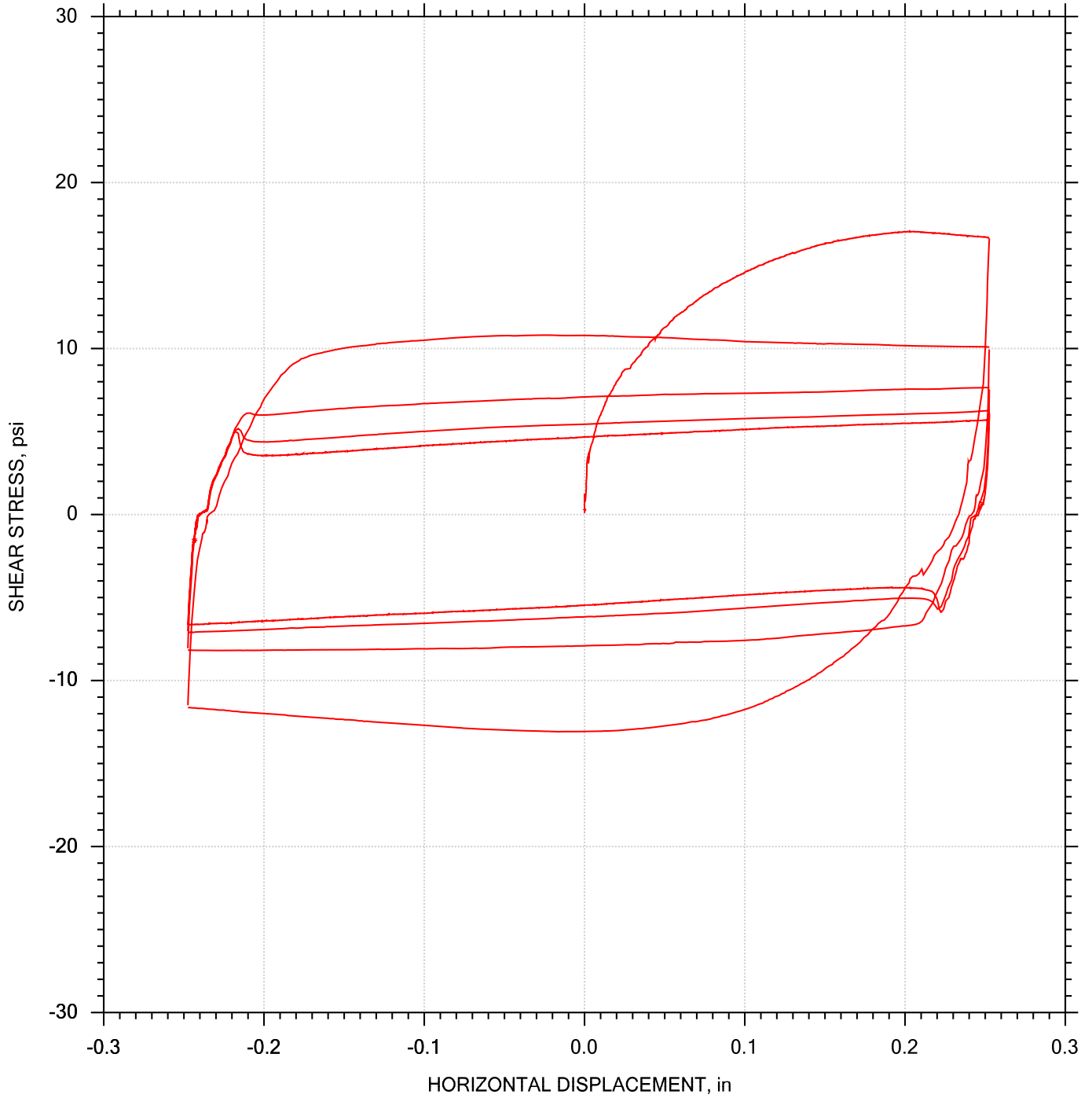
Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 3	Test Date: 08/02/17	Depth: 6-40 ft
Test No.: RS-10B	Sample Type: Remold	Elevation: ---
Description: Wet, light yellowish brown clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 5 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-10C.dat		



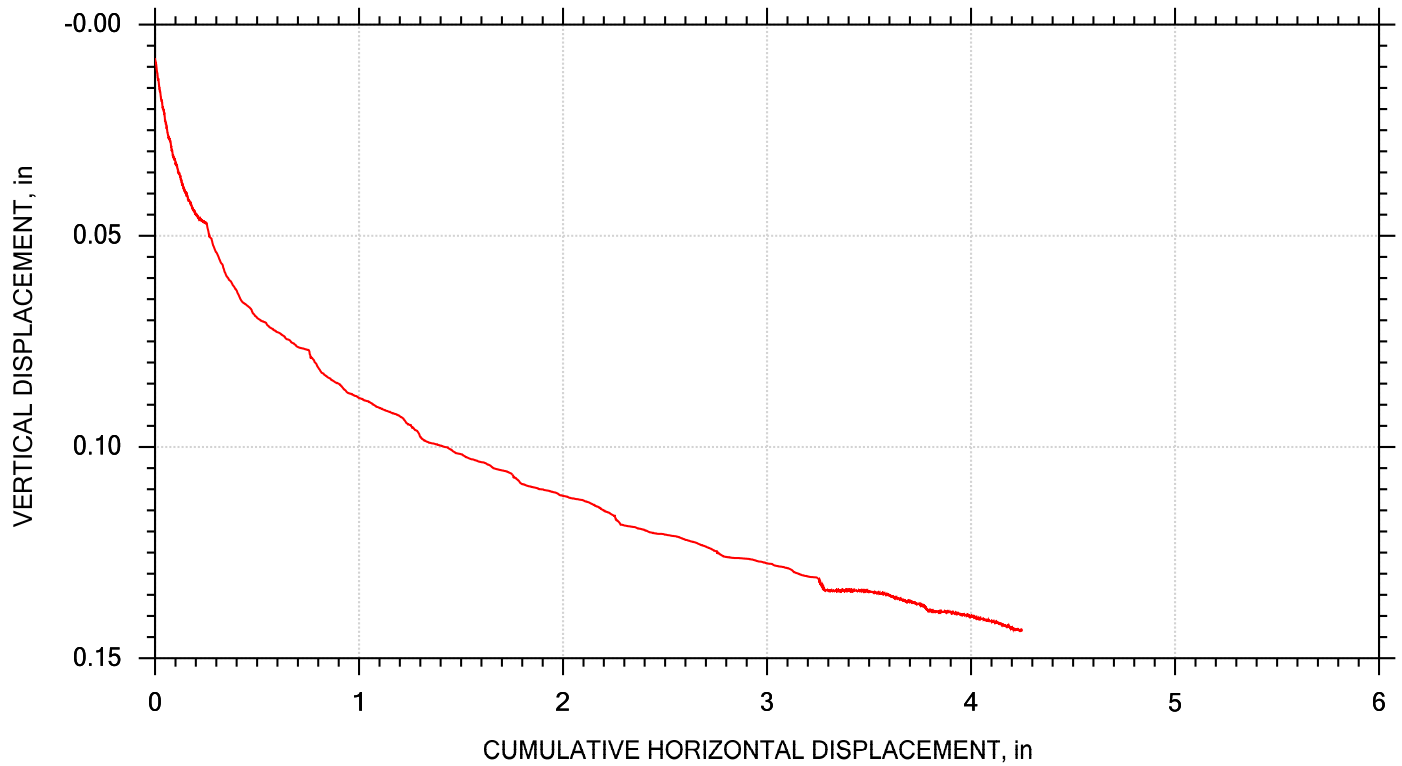
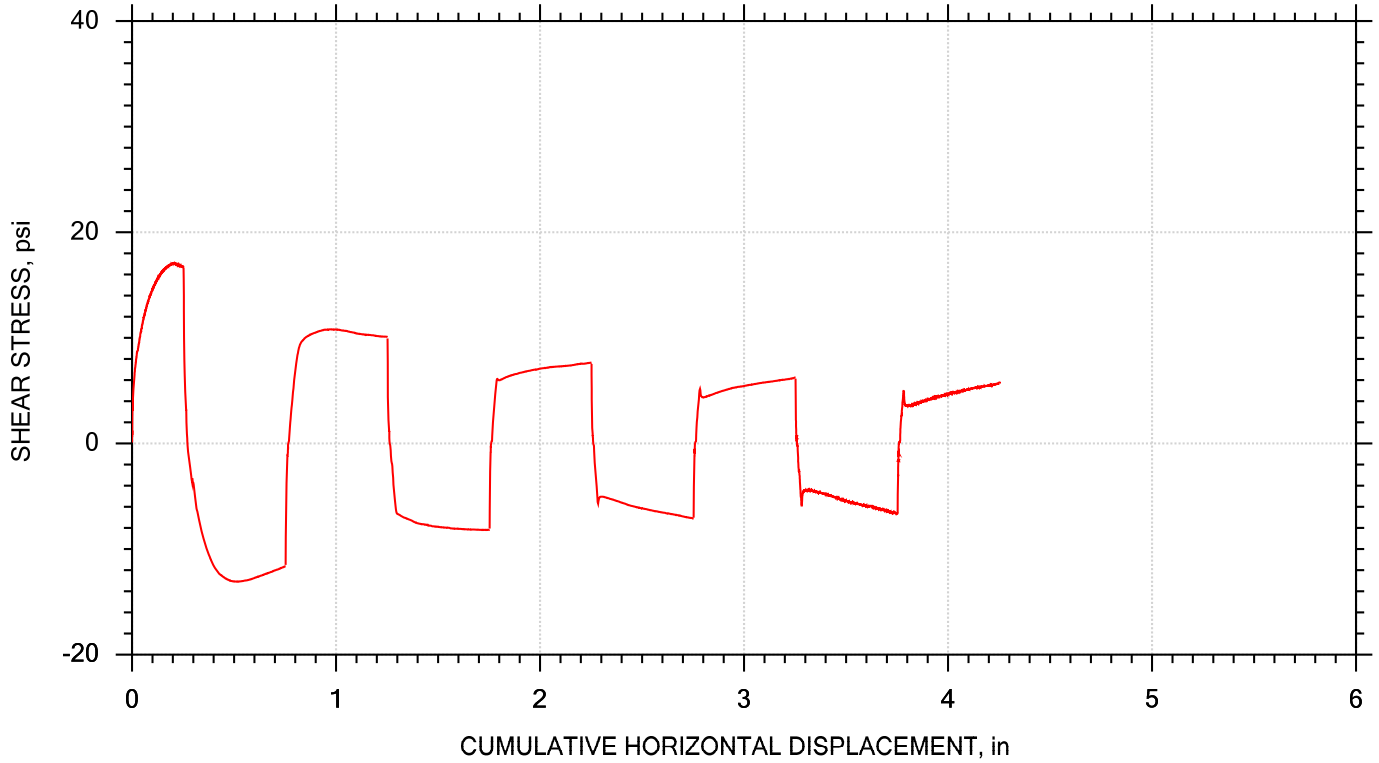
Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 3	Test Date: 07/29/17	Depth: 6-40 ft
Test No.: RS-11	Sample Type: Remold	Elevation: ---
Description: Wet, light yellowish brown clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 6 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-11Aj.dat		



Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 3	Test Date: 07/29/17	Depth: 6-40 ft
Test No.: RS-11	Sample Type: Remold	Elevation: ---
Description: Wet, light yellowish brown clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 7 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-11Aj.dat		



Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 3	Test Date: 08/02/17	Depth: 6-40 ft
Test No.: RS-12B	Sample Type: Remold	Elevation: ---
Description: Wet, light yellowish brown clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 8 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-12BCj.dat		



Project: 95 Express Lanes Extension	Location: ---	Project No.: GTX-306713
Boring No.: ---	Tested By: md	Checked By: jdt
Sample No.: Composite 3	Test Date: 08/02/17	Depth: 6-40 ft
Test No.: RS-12B	Sample Type: Remold	Elevation: ---
Description: Wet, light yellowish brown clay		
Remarks: Sample passed through a #40 sieve and then prepared at the approximate Liquid Limit.		Page 9 of 9
File: \\HAL1\Projects\GTX306713 - HDR - 95 Express Lanes\6 Lab Testing\Soil\RS\306713-RS-12BCj.dat		

UNCONFINED COMPRESSION
(ASTM D7012 Method C)



S&ME, Inc. - Knoxville 1413 Topside Road, Louisville, TN 37777

Project Name: I-95 Fredericksburg Express Lanes
Project Number: 1243-17-017

Report Date: June 1, 2017
Reviewed By: Jason B. Burgess

Boring No.	Sample No.	Depth (ft)	Dimensions, in.		Shape (See Key)	Area (in ²)	Unit Weight (lbs/ft ³)	Loading Rate (psi/sec)	Maximum Load (lbs)	Strength (psi)	Moisture (%)
			Length	Diameter							
17XP-59	N/A	0 - 15	4.29	1.98	A	3.08	128.3	59	10,560	3,429	4.6
17XP-60	N/A	28 - 33	4.42	1.98	A	3.08	119.9	63	8,291	2,692	3.6

NOTES: Effective (as received) unit weight as determined by RTH 109-93.
Loading rates were selected to target reaching failure between 2 and 15 minutes.

SHAPE KEY

ASTM D4543-08 *Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance* Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this practice is permitted."

- A Test specimen measurements met the desired shape tolerances of ASTM D4543-08 (side straightness, end flatness & parallelism, and end perpendicularity to axis)
- B Test specimen measurements met the desired shape tolerances of ASTM D4543-08 for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.
- C Test specimen measurements met the desired shape tolerances of ASTM D4543-08 for end flatness & parallelism. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- D Test specimen measurements met the desired shape tolerances of ASTM D4543-08 for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- E Test specimen measurements met the desired shape tolerances of ASTM D4543-08 for end flatness and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness and parallelism. Specimen prepared to closest tolerances practicable.

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



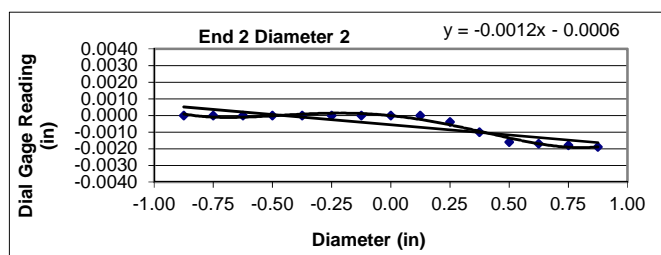
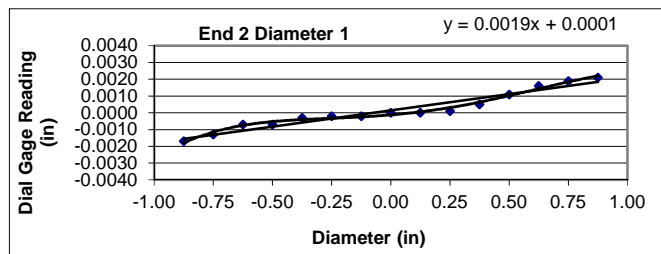
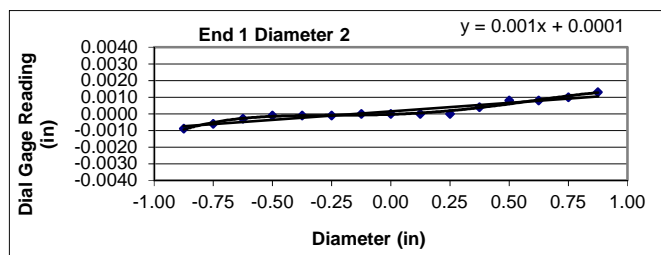
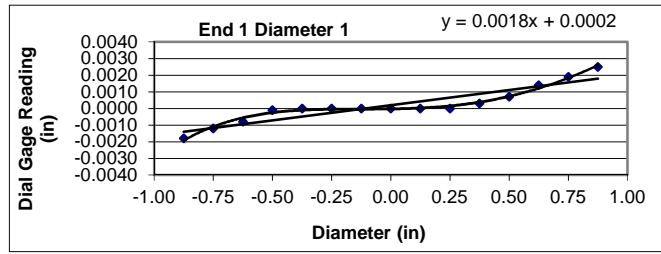
1413 Topside Road, Louisville, TN 37777

Project: I-95 Fredericksburg Express Lane	Diameter (in): 1.98	Date: 5/31/2017
Project No.: 1243-17-017	Length (in): 4.29	Tested by: BKP
Boring Id: 17XP - 59	Unit Weight (pcf): 128.3	Reviewed by: JBB
Sample No.: N/A	Moisture Content (%): 4.6	
Depth (ft): 0' - 15'		

Deviation From Straightness (Procedure S1)
Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	-0.0018	-0.0009	-0.0017	0.0000
- 6/8	-0.0012	-0.0006	-0.0013	0.0000
- 5/8	-0.0008	-0.0003	-0.0007	0.0000
- 4/8	-0.0001	-0.0001	-0.0007	0.0000
- 3/8	0.0000	-0.0001	-0.0003	0.0000
- 2/8	0.0000	-0.0001	-0.0002	0.0000
- 1/8	0.0000	0.0000	-0.0002	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	0.0000	0.0000
2/8	0.0000	0.0000	0.0001	-0.0004
3/8	0.0003	0.0004	0.0005	-0.0010
4/8	0.0007	0.0008	0.0011	-0.0016
5/8	0.0014	0.0008	0.0016	-0.0017
6/8	0.0019	0.0010	0.0019	-0.0018
7/8	0.0025	0.0013	0.0021	-0.0019



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.
Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1			
End 1:	Slope of Best Fit Line:		0.00182
	Angle of Best Fit Line:		0.10444
End 2:	Slope of Best Fit Line:		0.00193
	Angle of Best Fit Line:		0.11083
	Max Angular Difference:		-0.01
Parallelism Diameter 2			
End 1:	Slope of Best Fit Line:		0.00102
	Angle of Best Fit Line:		0.05861
End 2:	Slope of Best Fit Line:		-0.00122
	Angle of Best Fit Line:		-0.07006
	Max Angular Difference:		0.13

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0043	0.0022	YES
End 1 Diam 2	0.0022	0.0011	YES
End 2 Diam 1	0.0038	0.0019	YES
End 2 Diam 2	0.0019	0.0010	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



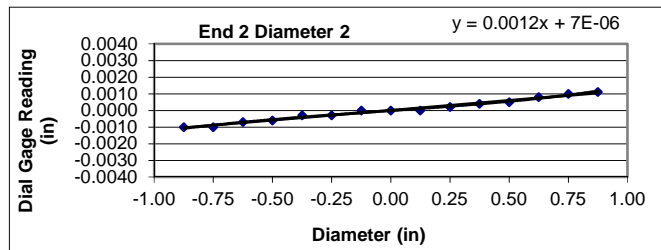
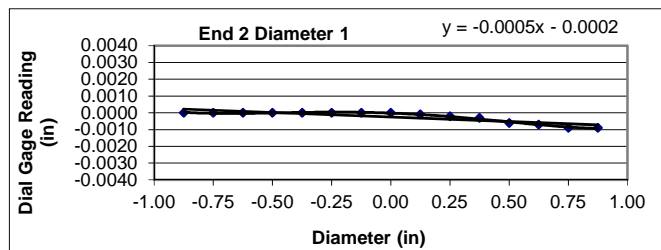
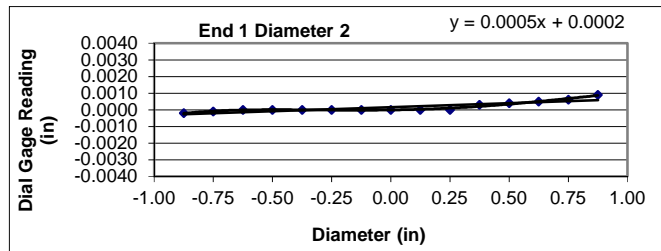
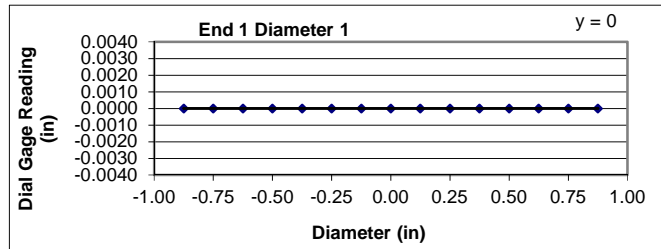
1413 Topside Road, Louisville, TN 37777

Project: I-95 Fredericksburg Express Lane	Diameter (in): 1.98	Date: 5/31/2017
Project No.: 1243-17-017	Length (in): 4.42	Tested by: BKP
Boring Id: 17XP - 60	Unit Weight (pcf): 119.9	Reviewed by: JBB
Sample No.: N/A	Moisture Content (%): 3.6	
Depth (ft): 28 - 33		

Deviation From Straightness (Procedure S1)
Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0000	-0.0002	0.0000	-0.0010
- 6/8	0.0000	-0.0001	0.0000	-0.0010
- 5/8	0.0000	0.0000	0.0000	-0.0007
- 4/8	0.0000	0.0000	0.0000	-0.0006
- 3/8	0.0000	0.0000	0.0000	-0.0003
- 2/8	0.0000	0.0000	0.0000	-0.0003
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0000	-0.0001	0.0000
2/8	0.0000	0.0000	-0.0002	0.0002
3/8	0.0000	0.0003	-0.0003	0.0004
4/8	0.0000	0.0004	-0.0006	0.0005
5/8	0.0000	0.0005	-0.0007	0.0008
6/8	0.0000	0.0006	-0.0009	0.0010
7/8	0.0000	0.0009	-0.0009	0.0011



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.



Parallelism Diameter 1		
End 1:	Slope of Best Fit Line:	0.00000
	Angle of Best Fit Line:	0.00000
End 2:	Slope of Best Fit Line:	-0.00054
	Angle of Best Fit Line:	-0.03110
	Max Angular Difference:	0.03
Parallelism Diameter 2		
End 1:	Slope of Best Fit Line:	0.00048
	Angle of Best Fit Line:	0.02767
End 2:	Slope of Best Fit Line:	0.00119
	Angle of Best Fit Line:	0.06826
	Max Angular Difference:	-0.04


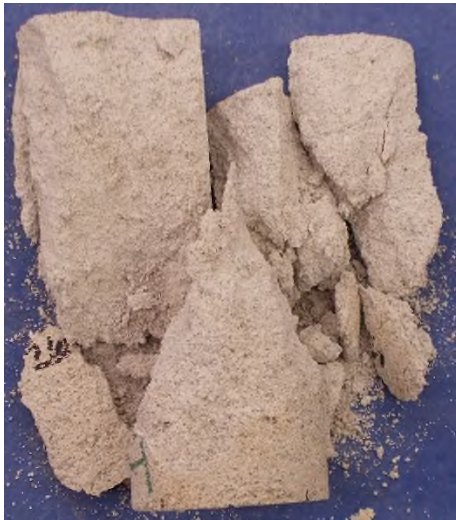
Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0000	0.0000	YES
End 1 Diam 2	0.0011	0.0006	YES
End 2 Diam 1	0.0009	0.0005	YES
End 2 Diam 2	0.0021	0.0011	YES

Perpendicularity Tolerance Met? YES

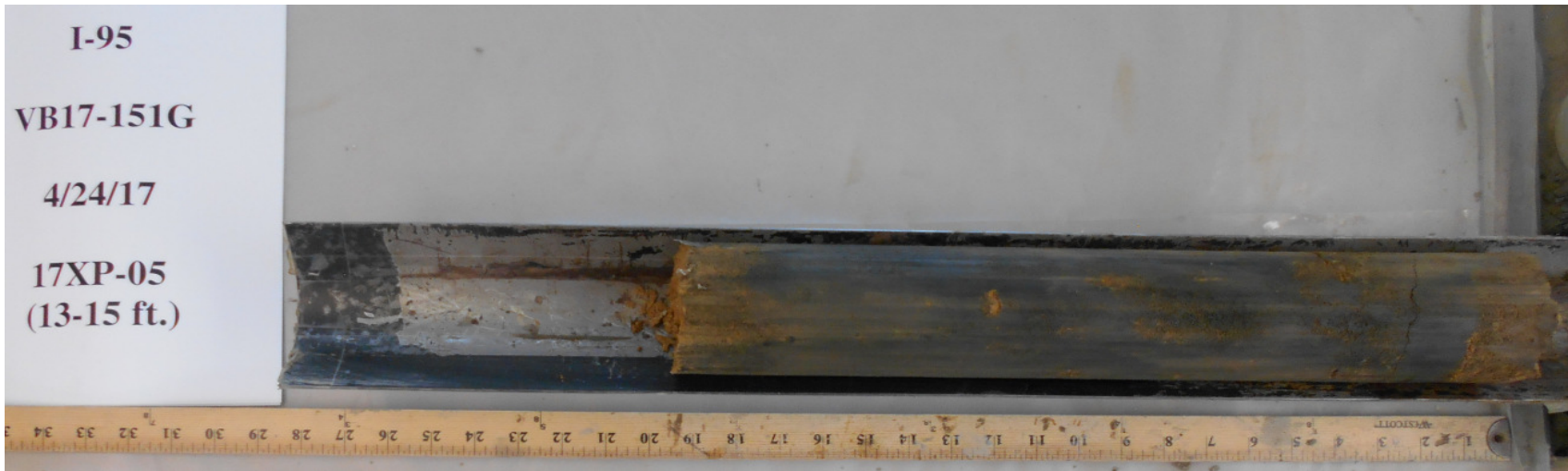
 		Date: 5/31/2017
		Photographer: Ben Painter
1	Location / Orientation	17XP-59 (0' – 15')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012 Method C)

 		Date: 5/31/2017
		Photographer: Ben Painter
2	Location / Orientation	17XP-60 (28' – 33')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012 Method C)

Project:	I-95 Express Lanes Fredericksburg Extension	Location:	Fredericksburg, Virginia
Job No:	10052825	Client:	HDR Engineering
Boring:	17XP-05	Date Sampled:	4/24/2017

Length (in.)	Depth below Grade (ft.)	Description:
19.5	13-15	Tan orange, Clayey SAND (SC), moist

Picture:



Natural Moisture	-#200 Sieve	Atterberg Limits
(%)	(%)	LL/PL/PI
19.3	44	22/9/13

Project:	I-95 Express Lanes Fredericksburg Extension	Location:	Fredericksburg, Virginia
Job No:	10052825	Client:	HDR Engineering
Boring:	17XP-74	Date Sampled:	4/24/2017

Length (in.)	Depth below Grade (ft.)	Description:
23	4-6	Light gray mottled tan, Fat CLAY (CH) with little Sand, moist

Picture:



Natural Moisture	-#200 Sieve	Atterberg Limits
(%)	(%)	LL/PL/PI
30.3	82	50/22/28