"Delivering right solutions through quality services and engineering excellence"

Geotechnical Engineering Report

Sycolin Road Widening Phase IV
VDOT Project No. U000-253-312, P101, R201, C501
Leesburg, Virginia

Prepared for

Rinker Design Associates, P.C.
August 21, 2015
(*Rev. February 4, 2016, April 7, 2016, May 25, 2016*)

DMY

DMY ENGINEERING CONSULTANTS INC.

Dulles, VA
Gaithersburg, MD
Washington, DC

August 21, 2015
(Rev. February 4, 2016, April 7, 2016, May 25, 2016)

Mr. Mark Gunn, P.E.
Rinker Design Associates, P.C.
9385 Discovery Boulevard, Suite 200
Manassas, Virginia 20109

Reference: Geotechnical Engineering Report
Sycolin Road Widening Phase IV
VDOT Project No. U000-253-312, P101, R201, C501
Leesburg, Virginia
DMY Project No. 01.02095.01

Dear Mr. Gunn:

DMY Engineering Consultants Inc. (DMY) is pleased to submit this report of our geotechnical exploration for the above-referenced project. This report presents our understanding of the project information provided to us, a discussion of the encountered site and subsurface conditions, our field exploration and laboratory testing programs, the field and laboratory test results, and our geotechnical recommendations related to the proposed improvements. The report was revised on April 7, 2016 to address the review comments provided by VDOT on March 21, 2016. The report was revised on May 25, 2016 to reflect the minor design update to the proposed underground detention facility. Please note that no recommendation was changed in the latest revision.

We appreciate the opportunity to be of service to you on this project and would be happy to discuss our findings with you. We look forward to serving as your geotechnical engineer on the remainder of this project and on future projects.

Respectfully,

DMY ENGINEERING CONSULTANTS INC.

COMMONWEALTH OF VIRGINIA
PENG ZHANG
Lic. No. 048994
PROFESSIONAL ENGINEER

Paul Li, PhD, PE
Project Engineer

Peng "Paul" Zhang, PE
Principal Engineer

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1.0 PROJECT OVERVIEW

The Sycolin Road Widening Phase IV project is located in Leesburg, Virginia. The project consists of widening approximately 0.9 miles of Sycolin Road from south of Tolbert Lane to Claudia Drive. The site location is show on Figure 1 – Site Location Map in Appendix A.

Based on the project design drawings dated May 2015 prepared by Rinker Design and Associates, P.C. (RDA), the project consists of widening the existing two-lane Sycolin Road into a four-lane divided roadway with dedicated turn lanes at intersections. Other associated improvements include new curbs and gutters, a new shared use path, one culvert extension, and one stormwater detention facility within the project limits. The proposed construction work begins at Station 106+25 and extends generally north to end at Station 151+00.

The description of the proposed project given in the sections above is based on the information provided to us by RDA and information gathered during our site reconnaissance. If any of the assumptions or project information is incorrect, DMY should be informed so that we may revise our geotechnical recommendations, if necessary.

2.0 SITE GEOLOGY AND LOCAL SOIL MAPPING

2.1. REGIONAL GEOLOGY

Based on a review of the Virginia Geologic Map Data available through USGS's online resources (http://mrdata.usgs.gov/geology/state/state.php?state=VA), the project site is located within the West Piedmont Physiographic Province of Northern Virginia and is underlain by Newark Supergroup of the Upper Triassic Age.

In the Piedmont province, residual soils have developed from the in-place chemical and physical weathering of the underlying parent bedrock. The soils associated with this geology typically consist of sandy clays, silts, and silty sand materials along with varying amounts of weathered rock fragments and mica. With increasing depth, soil increases in granularity and strength, gradually transitions into highly weathered or Intermediate Geomaterials, and eventually transitions into competent bedrock.

An important aspect of the Piedmont subsurface profile is that highly variable conditions may exist over relatively short horizontal distances. This is caused by variation in mineral composition of the parent rock and the intensity of fractures and joints within the rock. Zones of highly weathered rock may be encountered within residual soils, and lenses of soil may occur in the rock mass. The subsurface profile may be altered by man, by excavating or filling, or by effects of water through the process of erosion or alluvial deposition.

3.0 FIELD EXPLORATION

The field exploration consisted of drilling Standard Penetration Test (SPT) borings, coring the existing pavement, and obtaining bulk samples for laboratory testing. The field exploration procedures are included in Appendix B. Following field operations, the soil samples were transported to our laboratory for further analysis and testing.

A total of 19 pavement cores were obtained along the existing roadway. A total of 37 SPT borings were drilled using either a truck mounted CME-45 C drilling rig or a track mounted CME-55 drilling rig with hollow-stem auger method. In addition to the SPT soil samples, 5 bulk soil samples were collected from the soil borings for laboratory testing. Upon completion of the field exploration, all boreholes were backfilled with compacted auger cuttings. Groundwater levels, where encountered, were measured at each boring location at the time of drilling and 24 hours after drilling, when it was feasible to keep the borehole open for a prolonged period. A solid PVC pipe was inserted in the open boreholes of the SWM and culvert borings to obtain the stabilized groundwater levels. The test locations were selected by DMY and were surveyed in the field by RDA. The locations of the borings and pavement cores are shown on Figure 1 – Boring & Core Location Plan in Appendix A.

4.0 PAVEMENT AND SUBSURFACE CONDITION

4.1. PAVEMENT CONDITION

Pavement cores were obtained at a total of 19 locations. The pavement core information is summarized in Table B1 – Summary of Pavement Core Information in Appendix B. The photographs of the pavement cores are also included in Appendix B.

A total of 16 pavement cores (CO-1 through CO-4, CO-6 through CO-8, CO-10 through CO-12, and CO-14 through CO-19) were obtained on the mainline of Sycolin Road, including turn lanes, acceleration lanes, and striped zones. The pavement cores showed asphalt concrete pavement thicknesses ranging from 7.0 to 12.0 inch with an average of 9.7 inches. The asphalt pavement was underlain by 6.0 to 17.0 inches of aggregate subbase with an average of 12.5 inches.

Three pavement cores (CO-5, CO-9, and CO-13) were obtained from the cross roads. The pavement cores showed asphalt concrete pavement thicknesses ranging from 4.5 to 13 inches. The asphalt pavement was underlain by 10.0 to 13.0 inches of aggregate subbase.

4.2. SUBSURFACE CONDITION

The subsurface conditions encountered at the locations explored are shown in the boring logs in Appendix B. The records represent our interpretation of the subsurface conditions based on visual observations and laboratory testing of the soil samples collected. The lines designating the interfaces between various strata on the boring logs are approximate, as the actual transitions between soil strata are often gradual. In the absence of foreign substances, it is difficult to distinguish between natural soils and clean soil fills. Although individual test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of the subsurface conditions at other locations or at other times.

A layer of topsoil approximately 1 to 5 inches thick was encountered in the majority of the borings drilled in the unpaved areas. Although the measured topsoil depths were found to be of minimal thickness during our exploration, the topsoil may be thicker in unexplored areas, particularly in vegetated undisturbed areas.

Below the topsoil or existing pavement, three basic strata were encountered at the borings within their termination depths. The soil strata included man-made fill, residual soils, and Intermediate Geomaterials (IGM). The borings drilled in the investigation encountered auger refusal at 13 locations. The following table summarizes the generalized soil descriptions from the available subsurface exploration.

Table 4-1: Summary of Subsurface Conditions

Geologic Strata	Soil Description	USCS Classification		SPT N-values	
		Primary	Secondary	Min	Max
FILL	Generally composed of soils obtained from nearby natural soils. The soils from this stratum generally retain some of the properties of the parent soil, but may contain debris and organic material.	ML & SM	SC, CL & GC	6	48
Piedmont Residual	Natural residual soils derived from the weathering of the in-place natural rock. The soils of these substrata have weathered to the point of no longer retaining any relic rock structure.	ML, CL, SM & SC	MH, CH, GC & SP-SM	6	65
IGM – Decomposed Rock	IGM is defined as natural residual soils derived from the weathering of the in-place natural rock. IGM is generally considered an intermediate material between soil and rock. VDOT defines IGM as having a minimum SPT N-value of 50 blows per 6 inches of penetration.	GC, ML & SC	SM	50/6”	50/0”

4.3. GROUNDWATER

Groundwater was measured at the time of drilling and, if feasible, also at 24 hours after drilling completion. Groundwater was only encountered in Boring CL-03 at the depths of 7.5 feet (EL. 350.34 feet) at the time of drilling and 8.0 feet (EL. 349.84 feet) at 24 hours after drilling completion, respectively. It should be noted that groundwater levels fluctuate with seasonal and climatic variations and may be different at other times and locations than those stated in this report.

5.0 LABORATORY TESTING AND RESULTS

5.1. LABORATORY TESTING

Representative soil samples were selected and tested in our laboratory to verify field classifications and to determine pertinent engineering properties. The table below is a summary of the laboratory testing program:

Table 5-1: Summary of Laboratory Tests

Lab Test	Test Method	Test Amount
Natural Moisture Content	AASHTO T-265	116
Atterberg Limits	AASHTO T-89 & T-90	36
Grain Size Analyses	AASHTO T-88	36
Standard Proctor	VTM-1	5
CBR	VTM-8	5

5.2. LABORATORY TEST RESULTS

Natural moisture content of the SPT samples ranged from 2.3 to 38.1 percent. The maximum dry density results ranged from 118.8 to 135.7 pounds per cubic foot (pcf) as obtained using the standard Proctor compaction test method (VTM-1). The corresponding optimum moisture content results ranged from 8.9 to 13.0 percent. The California Bearing Ratio (CBR) values as obtained using VTM-8 ranged from 14.5 to 22.7 with an average of 18.9. The laboratory testing results are included in Appendix C.

6.0 GEOTECHNICAL RECOMMENDATIONS

6.1. PAVEMENT

We have used the traffic data provided by RDA to perform the pavement design. The provided design traffic data are summarized in the following table.

Table 6-1: Design Traffic Data

	Sycolin Road	Temporary Pavement
Design Life (years)	20	1
Initial Design Year	2019	2019
ADT (2019)	16,236	16,236
ADT (2039)	24,126	16,561
Growth Rate	2	2
Percent Cars/Passenger Vehicles	88.7%	88.7%
Percent Single Unit Trucks and Buses	10.5%	10.5%
Percent Tractor Trailer Trucks	0.8%	0.8%
Total Calculated Design Lane ESALs	3,685,390	151,679

The design CBR value for the pavement design was derived from the 5 CBR tests on the soil samples collected along the proposed roadway areas. The laboratory CBR values ranged from 14.5 to 22.7. We recommend a design CBR value of 6.7 be used for this project.

The pavement design was performed in accordance with the *Guidelines for 1993 AASHTO Pavement Design*, which was published by VDOT and revised in July 2011. Detailed pavement design including the traffic load information and calculations are attached to this report in Appendix D.

We recommend the full depth pavement widening for the mainline using the section in the following table:

Table 6-2: Full Depth Pavement Recommendations

Roadway Stations	Pavement Section	Remarks
Sycolin Road	Surface Course (SM-9.5D) = 2” Intermediate Course (IM-19.0A) = 2” Base Course (BM-25.0A) = 6” Subbase Course (21B) = 12”	Applies to widening and reconstruction

The pavement construction should be performed in accordance with VDOT standard detail WP-2 for asphalt pavement widening.

VDOT standard UD-4 edge drains should be installed beneath the curb and gutter of all new pavements. VDOT standard UD-2 median drains should be installed in all new raised grass median areas. The underdrain pipes should be either connected to existing underdrain or storm structures.

The existing pavement may be resurfaced by milling and overlay of 2 inches of SM-9.5D with the exception of the airport access road, which only showed 4.5 inches of asphalt pavement in the pavement core. We recommend the airport access road pavement, where it will be used as future Sycolin Road, be reconstructed using the above recommended full depth pavement section.

Temporary pavements will be needed to maintain traffic during construction. A design life of 12 months was used for the temporary pavement. Where new temporary pavement is to be constructed, we recommend that the pavement sections to consist of the following:

Table 6-3: Temporary Pavement Section

Temporary Pavement Section	Surface Course (SM-9.5D) = 1.5” Base Course (BM-25.0A) = 3” Subbase Course (21B) = 6”

6.2. SITE PREPARATION

Site preparation should consist of any proposed demolition, removing existing underground utilities, existing structures, topsoil and vegetation, and any other soft or unsuitable material from the proposed construction areas. Utilities such as pipes should be removed entirely or abandoned by filling the pipe with grout to prevent future migration of soils into the pipe. Voids resulting from the removal of tree stumps should be filled with compacted structural fill. Disposal of demolition debris should be performed in accordance with local, state and federal regulations. Additional requirements included in *Section 301 – Clearing and Grubbing* of the *VDOT 2007 Road and Bridge Specifications* should be followed.

6.3. EARTHWORK

The earthwork for the proposed roadway construction should be performed in accordance with *Section 303 – Earthwork of the VDOT 2007 Road and Bridge Specifications*. Additional site specific recommendations are discussed in the following paragraphs.

6.3.1. SUBGRADE PREPARATION

Following the site preparation and any required excavation, the newly exposed roadway subgrade should be evaluated by an authorized representative of the Geotechnical Engineer of Record. During this evaluation, we recommend that all subgrade areas be proof-rolled using a fully loaded tandem axle dump truck (10-ton minimum) or similar rubber-tired vehicle. The proofrolling should be performed in such a pattern that the entire subgrade areas are loaded with at least one pass. Areas that are not accessible to proofrolling may be evaluated using other suitable methods such as a steel probe rod.

If the subgrade exhibits excessive deflections or pumping when proof-rolled or soft subgrade is detected by probing, an appropriate remedial measure would be recommended by the Geotechnical Engineer of Record at that time. Potential problem subgrade areas as identified by this soil investigation and the recommended remedial measures are detailed in the following paragraphs. The stabilized subgrade areas should be again evaluated and approved by the Geotechnical Engineer of Record prior to fill placement or pavement installation.

6.3.2. UNSUITABLE SOILS

The recommendations below are for potentially unsuitable soils focused within the upper 5 feet below the proposed pavement. Soils below this depth were generally not considered as they will likely below the zone of influence of the pavement. Unsuitable soils generally include soils that have excessive moisture, high plasticity (Liquid Limits greater than 50%), soils with low SPT N-values (generally less than 5 bpf), low CBR value (less than 6.7), and soils that contains excessive debris or organics. Thicker topsoil and root matter than what was encountered in the borings should be anticipated in wooded areas. The unsuitable pavement subgrade soils at the soil test boring locations are summarized in Table B2 – Summary of Pavement Subgrade Soil Conditions in Appendix B. The types and extent of the unsuitable soils are discussed in detail in the following paragraphs and were estimated based on individual soil test borings and laboratory test results.

<u>Highly Plastic or High Swell (>5%) Subgrade Soils:</u>

The soils at the proposed subgrade were found to be highly plastic soils (CH and MH soils) with Liquid Limits greater than 50% in some areas. We recommend that the top 2 feet of the in-situ subgrade soils in these areas be removed and replaced with VDOT Select Material Type I (minimum CBR 30). The removed soils should not be used as roadway embankment fill, but may be used to flatten slopes

upon approval be the Geotechnical Engineer of Record. The approximate locations where highly plastic soils are encountered at the proposed subgrade are:

Table 6-4: List of Areas with Highly Plastic Soil Subgrade

Roadway Stations	Widening Locations
143+00 to 145+00	Right
146+00 to 148+00	Left

Low CBR Subgrade Soils:

Low CBR (<6.7) soils were not encountered at the proposed subgrade elevations in any of the borings.

Soft or Very Loose Subgrade Soils:

Soft or very loose soils (SPT N-Values less than 5 bpf) were not encountered at the proposed subgrade elevations in any of the borings. If encountered during construction, the soft/loose subgrade soils should be densified in place.

Excessively Moist Subgrade Soils:

We have considered that soils with moisture content of greater than 120% of the optimum moisture contents to be excessively moist. In general, excessive moisture may be more or less depending on the amount of recent precipitation at the time construction is performed. Along some parts of the project alignment, the soils at/near the proposed subgrade were found to be excessively moist. This condition has the potential to cause pumping problems during subgrade and base construction. We recommend that upon completion of any necessary excavation in these areas, 2 feet of subgrade soils from beneath the proposed pavement and shoulders be removed, and either dried out and replaced, or replaced with drier soils. Alternatively, the subgrade may be improved in-place using lime or cement treatment. If lime or cement treatment is considered, bulk samples of the material should be obtained of areas requiring treatment to determine the required lime and cement content as well as the method of hydration and compaction required. The approximate locations where excessive moisture contents will likely be encountered are:

Table 6-5: List of Areas with Excessively Moist Subgrade

Roadway Stations	Widening Locations
118+00 to 120+00	Left
124+00 to 128+00	Left
127+00 to 131+00	Right
136+00 to 138+00	Left

137+00 to 139+00	Right
140+00 to 142+00	Left
141+00 to 143+00	Right

6.3.3. COMPACTED FILL

All engineered fills including roadway embankment and backfill around structures should have a Liquid Limit less than 45 and a Plasticity Index less than 20. Additionally, any borrow material to be used within 3 feet of the pavement subgrade elevation should have a minimum CBR value of 10. Before field operations begin, a representative sample of each proposed engineered fill should be collected and tested to determine its Atterberg Limits, gradation, maximum dry density, optimum moisture content, and natural moisture content. The test results will be used to evaluate the suitability of each proposed engineered fill for quality control purposes during fill placement.

Engineered fill materials should be placed in lifts not exceeding 8 inches in loose thickness for roadway embankments. In confined areas such as utility trenches, portable compaction equipment and thin lifts of 3 to 4 inches will likely be required to achieve the specified degrees of compaction. The engineered fill should be moisture conditioned to within 20 percent of the optimum moisture content and compacted to a minimum of 95 percent of the maximum dry density obtained in accordance with VTM-1, Standard Proctor Method. The top 6 inches of soil supporting pavements, sidewalks, or gutters should be compacted to a minimum of 100 percent of the maximum dry density in accordance with VTM-1, Standard Proctor Method.

6.3.4. CUT AND FILL SLOPES

Most of the proposed construction for the new pavement will take place at or near existing grades. Where new cut and fill slopes are to be constructed, we recommend the slopes be no steeper than 2H: 1V. Soil slopes should be covered for protection from rain. Surface run-off should be diverted away from the slopes. For erosion protection, a cover of grass or other vegetation should be established on permanent soil slopes as soon as possible. Temporary erosion protection of slopes should meet state and/or local requirements.

Where fill materials will be placed to widen existing fills, or placed upon sloping ground, the soil subgrade should be scarified and the new fill benched or keyed into the existing material in accordance with *Section 303.04 (h) – Embankments of the VDOT 2007 Road and Bridge Specifications.*

6.4. DRAINAGE STRUCTURES

Two drainage structures are planned as part of the proposed construction. The following table is a summary of the drainage structures with a size of 36 inches or greater.

Table 6-6: Summary of Drainage Pipes and Culvert

Structure I.D.	Approximate Location	Structure Dimensions	Approximate Invert Elevation	Reference Borings
7-9	Sta. 123+25 Left & Right	Double 5'x3' (approximately 90')	358.34' to 359.75'	CL-01 and CL-02
8-9 to 8-11	Sta. 126+25 Right	54" RCP (approximately 50')	350.25' to 350.68'	CL-03

The proposed culvert should be constructed in accordance with *Section 302 – Drainage Structures* of the *VDOT 2007 Road and Bridge Specifications* and the standard detail PB-1 of the *VDOT 2008 Road and Bridge Standards*. Additional foundation recommendations are provided as follows:

Fat CLAY (CH) was encountered in Boring CL-01 at the proposed invert elevation. Highly plastic soils (CH or MH) are unsuitable for direct support of drainage structures. We recommend that the highly plastic soils be undercut a minimum of 24" and replaced with compacted VDOT No. 25 or 26 bedding materials. This condition will likely be encountered on the left side of the roadway along the Double 5'x3' box culvert extension (Structure 7-9).

IGM was encountered in Borings CL-03 at or above the proposed invert elevations of Structures 8-9 to 8-11. Difficult excavation involving a large trackhoe equipped with a hoe ram may be needed to achieve the proposed grades. A minimum 6 inches of bedding materials consisting of compacted VDOT No. 25 or 26 should be maintained between the structure and subgrade. If groundwater was encountered above the proposed foundation subgrade during construction, we recommend that a layer of #57 stone be placed to a minimum of 6 inches above the groundwater prior to placing the regular bedding materials.

6.5. STORMWATER MANAGEMENT FACILITIES

One underground stormwater detention facility is proposed as part of the construction. The detention facility features quadruple 54-inch reinforced concrete pipes (RCP). The following table provides a summary of the facility.

Table 6-7: Summary of Stormwater Detention Facility

Structure I.D.	Approximate Location	Structure Dimensions	Approximate Invert Elevation	Reference Borings
8-22 to 8-23	Sta. 126+65 to 127+90, Right	Quadruple 54" RCP (approximately 125')	355.0' to 355.75'	SWM-03, SWM-04 and CL-03

The proposed underground detention facility should be constructed in accordance with *Section 302 – Drainage Structures* of the *VDOT 2007 Road and Bridge Specifications* and the standard detail PB-1 of the *VDOT 2008 Road and Bridge Standards*.

IGM and auger refusal materials was encountered above the proposed structure invert elevation in Borings SWM-03 and SWM-04. Difficult excavation involving a large trackhoe equipped with a hoe ram may be needed to achieve the proposed grades. A minimum 6 inches of bedding materials consisting of compacted VDOT No. 25 or 26 should be maintained between the structure and subgrade. If groundwater was encountered above the proposed foundation subgrade during construction, we recommend that a layer of #57 stone be placed to a minimum of 6 inches above the groundwater prior to placing the regular bedding materials.

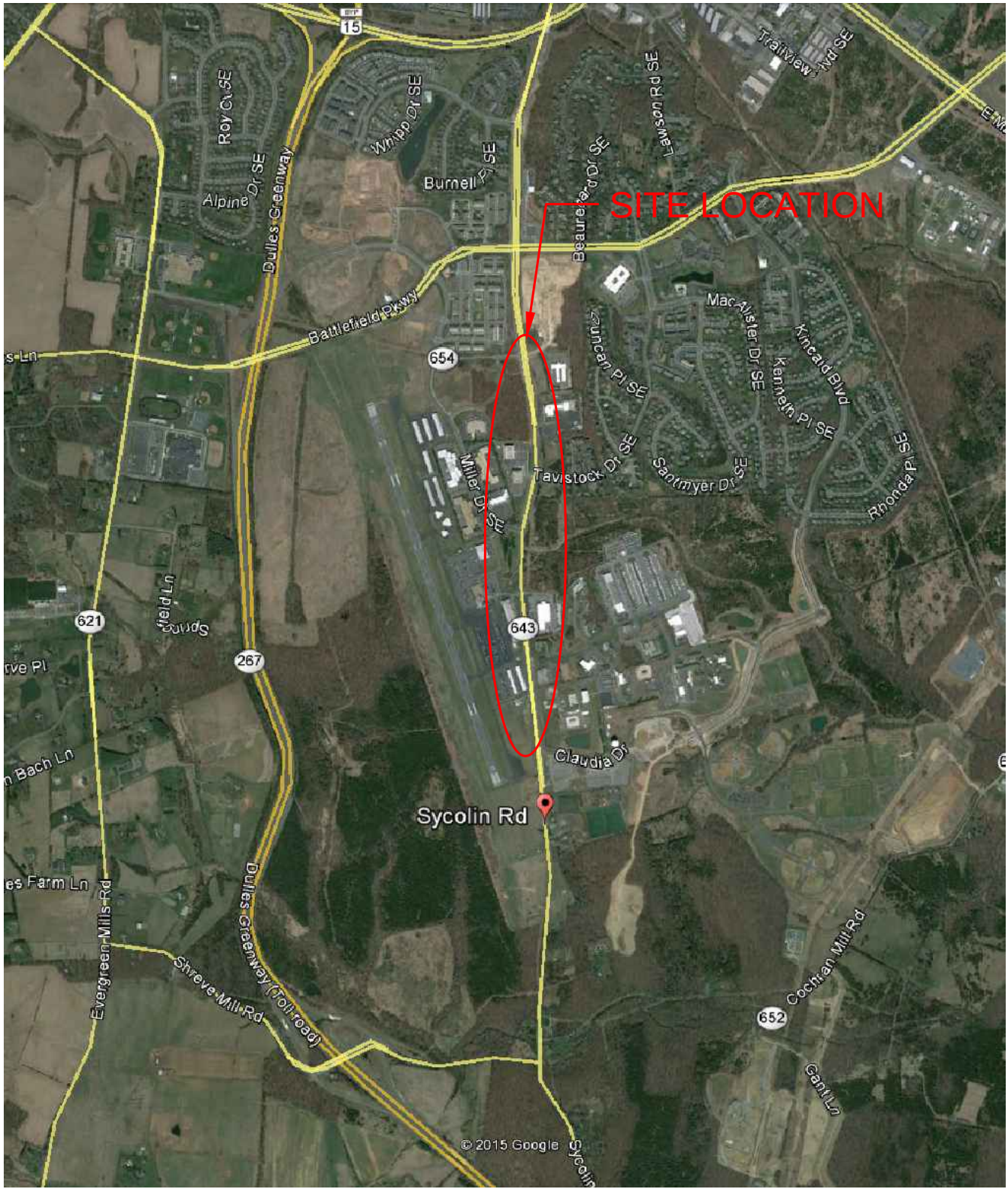
7.0 LIMITATIONS

The recommendations provided are based in part on project information provided to us and are only applied to the specific project and site discussed in this report. If the project information section in this report contains incorrect information or if additional information is available, DMY should be contacted to review our recommendations. We can then modify our recommendations for the proposed project.

Regardless of the thoroughness of a subsurface investigation, there is always a possibility that subsurface conditions may vary from those documented during a subsurface exploration at specific locations. In addition, the construction process itself may alter subsurface conditions. Therefore, experienced geotechnical personnel should be engaged to observe and document the construction procedures used and the conditions encountered. Unanticipated conditions and inadequate procedures should be reported to the design team along with timely recommendations. We recommend that DMY be retained to provide this service based upon our familiarity with the project, the subsurface conditions, and the intent of the recommendations.

We have prepared this report for use by the design professionals for design purposes in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made as to the professional advice included in this report.

APPENDIX A FIGURES



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SITE LOCATION MAP

DMY ENGINEERING CONSULTANTS INC.
45662 TERMINAL DRIVE, SUITE 110
DULLES, VIRGINIA 20166
PHONE: (703) 665-0586
FAX: (202) 688-1918

SYCOLIN ROAD WIDENING PHASE IV
LEESBURG, VIRGINIA

DATE:	DRAFTED BY:	PROJECT NO.:
7/15/15	PL	01.02095.01
SCALE:	CHECKED BY:	FIGURE NO.:
1"=2000'	PZ	1

PROJECT MANAGER Anne Geiger,(703) 771-2742 (Town of Leesburg)
SURVEYED BY Sidney Thomas, L.S., (703) 368-7373 (2015)
SUBSURFACE UTILITY BY Accumark,(800) 542-2990 (2015)
DESIGN SUPERVISED BY Mark A. Gunn, P.E., (703) 368-7373
DESIGNED BY Sohaib Qadir, P.E., (703) 368-7373

006
P.I.N. 234-20-5774-000
TOWN OF LEESBURG
DEED BOOK 421, PAGE 548
1001 SYCOLIN RD SE
61.1827 ACRES (PER TAX ASSESSMENT)
ZONING: MA

001
P.I.N. 192-45-4034-000
TOWN OF LEESBURG
DEED BOOK 421, PAGE 539
52.5 ACRES (PER TAX ASSESSMENT)
ZONING: MA

Metal Hanger Bldg.
#1007

2-Story Mezzanine Bldg.
w/ Metal Hanger
#1005

005
P.I.N. 191-15-5791-000
TOWN OF LEESBURG
DEED BOOK 421, PAGE 548
1005 SYCOLIN RD SE
2.3754 ACRES
ZONING: MA
(THIS IS A LEASE PARCEL
OWNED BY THE TOWN)

003
P.I.N. 191-15-6758-000
TOWN OF LEESBURG
DEED BOOK 1325, PAGE 1936
0.506 ACRE (PER TAX ASSESSMENT)
ZONING: MA

Conc
Conc.Ret.Wall
18" Conc. Pipe C&G
12" Conc. Pipe
18" Conc. Pipe
24" Conc. Pipe
C&G
Sign
15" Conc. Pipe

Match Line Sta. 112+50 (C.B.L.) - See Sheet 5

Tie to Sign
Exist. UD-4
C&G
TOWN OF LEESBURG
LOUDOUN COUNTY
Sycolin Road S.E.
(Rte. 643)
E.P.
Gravel Shoulder
RD-02
RD-04
CO-02
15"
6-1
113
114
115
116
117
118

CO-01
Sycolin Road
(Rte. 625)
Paved Shoulder
RD-03
RD-01
RW-1
RW-2
RD-05
6-2
6-3
6-4
50.00
62.50' RT
Prop. Retaining Wall
6' Chainlink Fence
RW-3
F
C

Match Line Sta. 118+50 (C.B.L.) - See Sheet 7

002
P.I.N. 191-16-9866-000
BOARD OF SUPERVISORS
OF LOUDOUN COUNTY, VIRGINIA
DEED BOOK 867, PAGE 1808, DEED BOOK
868, PAGE 809,
DEED BOOK 1795, PAGE 1692 AND
INSTRUMENT #200712180087268
PARCEL "I-A-I"
PER INSTRUMENT #200806060034512
41975 LOUDOUN CENTER PL
670.8927 ACRES (PER TAX ASSESSMENT)
ZONING: JLMA-20

LOUDOUN COUNTY
TOWN OF LEESBURG
TOWN/COUNTY LINE

007
P.I.N. 191-25-9906-000
BOARD OF SUPERVISORS
OF LOUDOUN COUNTY, VIRGINIA
DEED BOOK 1790, PAGE 1221
PARCEL B-2
PER DEED BOOK 880, PAGE 1964
1002 SYCOLIN RD SE
7.04 ACRES (PER TAX ASSESSMENT)
ZONING: I-1

Metal Warehouse Bldg.
#1002

Drainage Legend
4 → St'd. UD-4 Req'd.
5 → St'd. UD-2 Req'd.

SCALE
0 25' 50'

R.O.W. PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR CONSTRUCTION.

ADDITIONAL EASEMENTS FOR UTILITY RELOCATIONS MAY BE REQUIRED BEYOND THE PROPOSED RIGHT-OF-WAY SHOWN ON THESE PLANS.

Office Locations
Rinker Design Associates, P.C.
Civil Engineering - Surveying - Land Planning
Environmental - Transportation - Geotechnical
Right-of-Way Services

ENGINEER:
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8305 Discovery Blvd. • Manassas Park, VA 20111
Telephone: (703) 368-7373 Fax: (703) 257-5445
"We Welcome the Opportunity
to Make Your Vision Reality"

PROJECT MANAGER: MARK A. GUNN, P.E.

PROJECT NAME: SYCOLIN ROAD WIDENING PHASE IV
FROM CLAUDIA DRIVE TO TOLBERT LANE S.E.
PLAN SHEET SYCOLIN ROAD
STATION 112+50 TO 118+50
Loudoun County, Virginia
Town of Leesburg
SUBMISSION DATE: 02/12/2016

ASSOCIATED PLAN
C.I.P. NUMBER: TLCI-2016-0002
VDOT PROJ. NO. U000-253-312
TOWN NUMBER: TBD

Sheet 6 of 20

REVISED 10/11/2013

PROJECT MANAGER Anne Geiger,(703) 771-2742 (Town of Leesburg)
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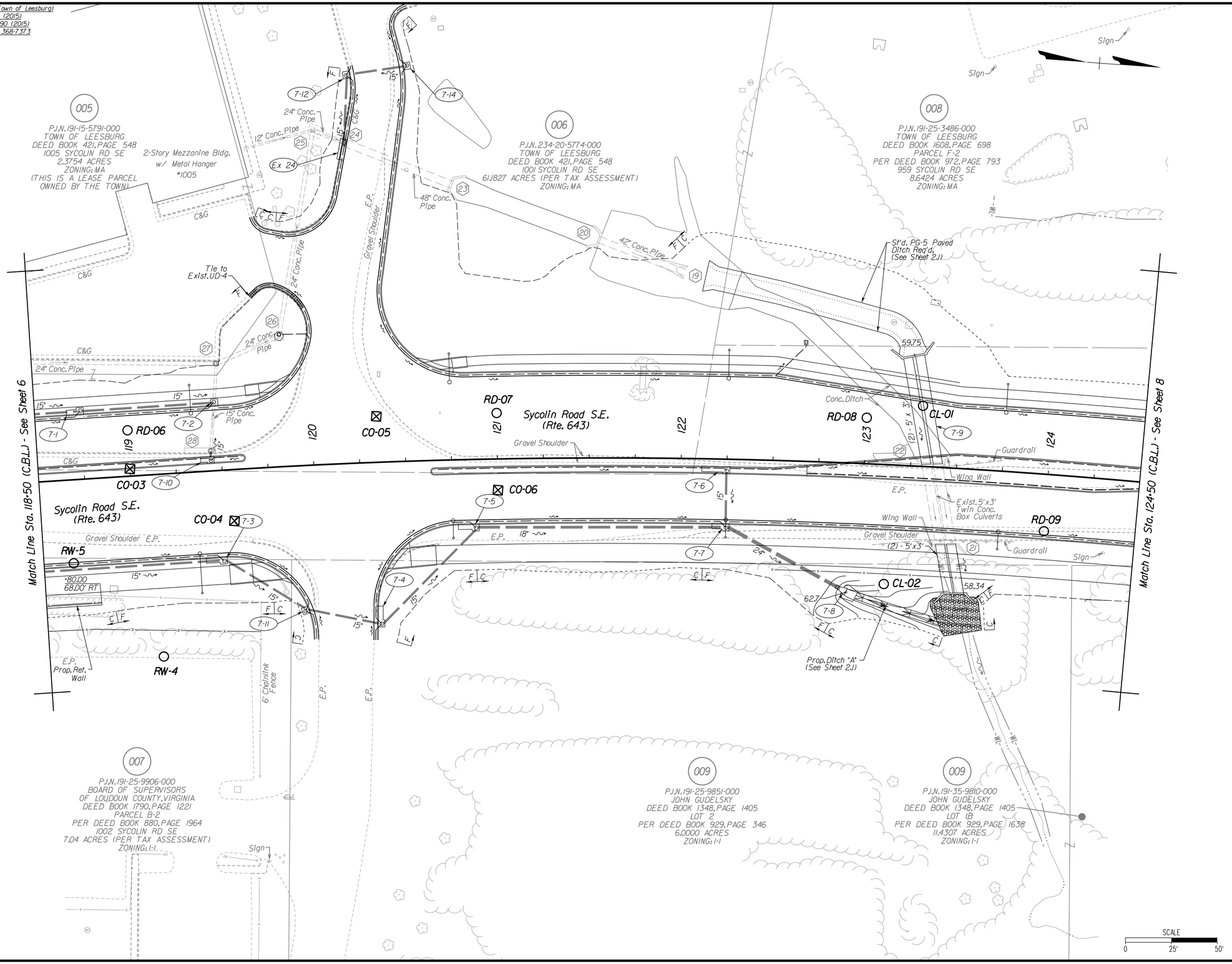
DESIGNED BY Sohaib Qadir, P.E., (703) 368-7373



R.O.W. PLANS

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REVISED 10/11/2013

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Civil Engineering - Surveying - Land Planning
Transportation - Environmental - Right-of-Way Services

ENGINEER:
Rinker Design Associates, P.C.
Engineering • Surveying • Land Planning • Transportation • Environmental Services

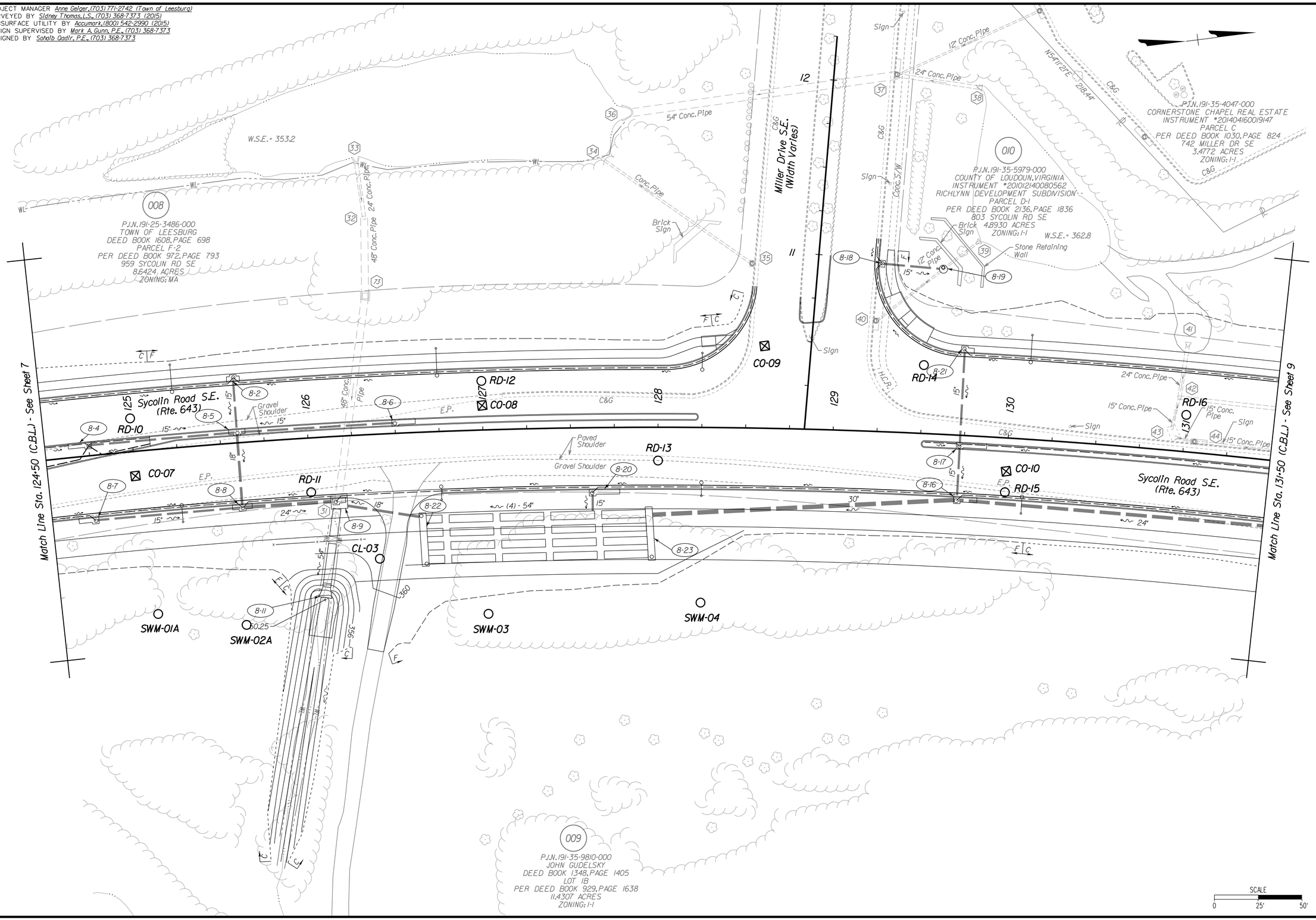
PROJECT MANAGER: MARK A. GUNN, P.E.

PROJECT NAME: SYCOLIN ROAD WIDENING PHASE IV
FROM CLAUDIA DRIVE TO TOLBERT LANE S.E.
PLAN SHEET SYCOLIN ROAD
STATION 118+50 TO 124+50
Loudoun County, Virginia
Town of Leesburg
SUBMISSION DATE: 02/12/2016

ASSOCIATED PLAN
C.I.P. NUMBER: TLCI-2016-0002
VDOT PROJ. NO. U000-253-312
TOWN NUMBER: TBD

Sheet 7 of 20

PROJECT MANAGER Anne Geiger,(703) 771-2742 (Town of Leesburg)
SURVEYED BY Sidney Thomas, L.S., (703) 368-7373 (2015)
SUBSURFACE UTILITY BY Accumark,(800) 642-2990 (2015)
DESIGN SUPERVISED BY Mark A. Gunn, P.E., (703) 368-7373
DESIGNED BY Sohaib Qadir, P.E., (703) 368-7373



Office Locations

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FROM CLAUDIA DRIVE TO TOLBERT LANE S.E.
PLAN SHEET SYCOLIN ROAD
STATION 124+50 TO 131+50
Loudoun County, Virginia

Town of Leesburg
SUBMISSION DATE: 02/12/2016

ASSOCIATED PLAN
C.I.P. NUMBER: TLCI-2016-0002
VDOT PROJ. NO. U000-253-312
TOWN NUMBER: TBD

Sheet
8 of 20

REVISED 10/11/2013

R.O.W. PLANS

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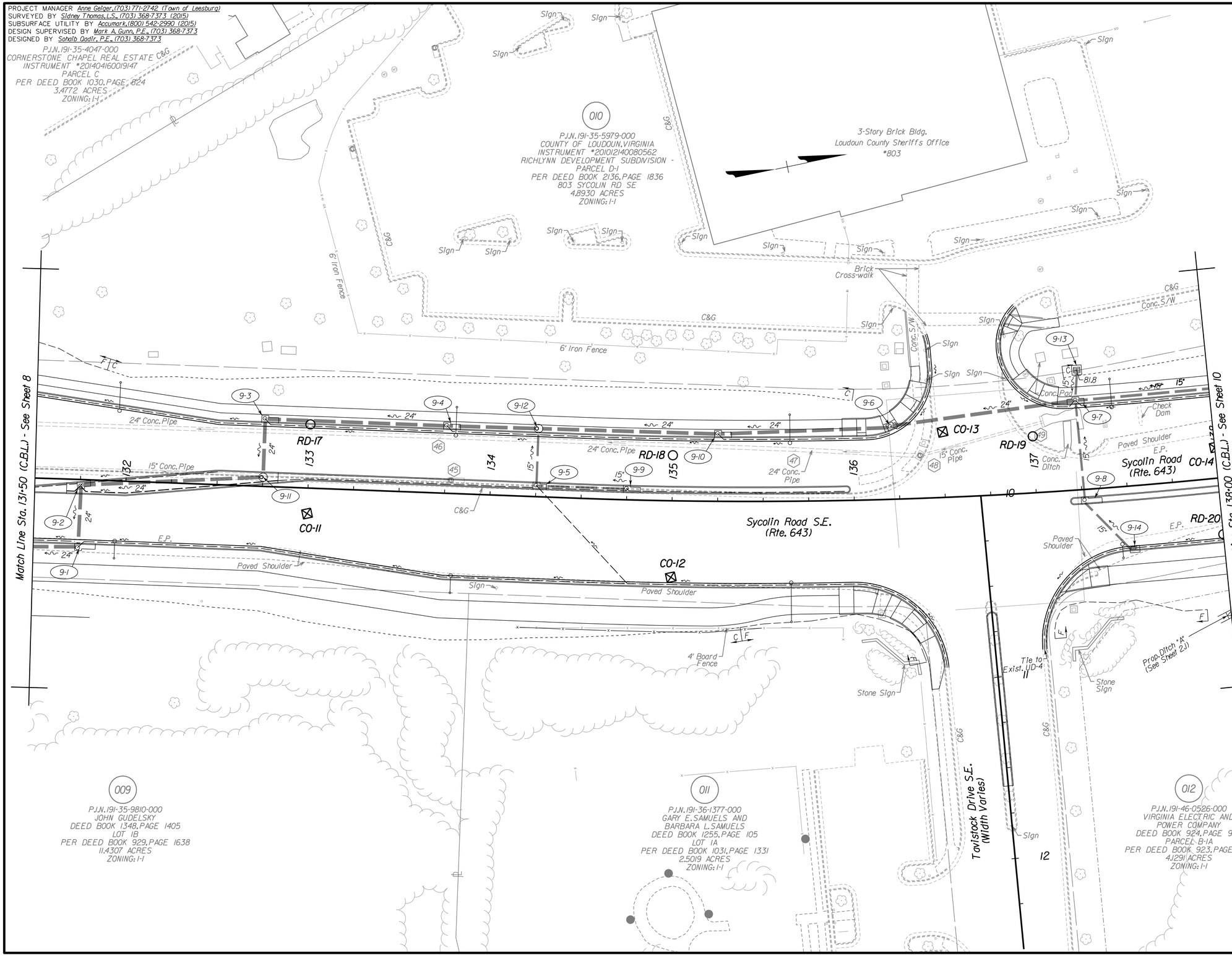

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Northern Virginia Office: 44983 Knoll Square, Suite 204, Ashburn, VA 20147, Phone: (703) 726-2278, Fax: (703) 726-2279
Fredericksburg Office: 2300 Dandridge Garrison Road, Suite 201, Fredericksburg, VA 22401, Phone: (540) 891-0555, Fax: (540) 891-0559
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PLAN SHEET SYCOLIN ROAD
STATION 131+50 TO 138+00
Loudoun County, Virginia

Town of Leesburg
SUBMISSION DATE: 02/12/2016

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C.I.P. NUMBER: TLCI-2016-0002
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TOWN NUMBER: TBD

Sheet 9 of 20

PROJECT MANAGER Anne Geiger,(703) 771-2742 (Town of Leesburg)
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010
P.I.N. 191-35-5979-000
COUNTY OF LOUDOUN, VIRGINIA
INSTRUMENT #201012140080562
RICHLYNN DEVELOPMENT SUBDIVISION -
PARCEL D-1
PER DEED BOOK 2136, PAGE 1836
4.8930 ACRES
ZONING: I-1

013
P.I.N. 191-45-5227-000
BOARD OF SUPERVISORS
OF LOUDOUN COUNTY, VIRGINIA
INSTRUMENT #201012140080561
RICHLYNN DEVELOPMENT SUBDIVISION -
PARCEL D-2
PER DEED BOOK 2136, PAGE 1836
801 SYCOLIN RD SE
3.5235 ACRES
ZONING: I-1

014
P.I.N. 190-15-5301-000
THE NATIONAL INSTITUTE FOR
AUTOMOTIVE SERVICE EXCELLENCE
DEED BOOK 1809, PAGE 686 CORRECTED
IN DEED BOOK 1864, PAGE 1008
AIRPORT COMMERCE PARK - LOT 3
PER INSTRUMENT #200408200088207
105 BLUE SEAL DR SE
11.9745 ACRES
ZONING: I-1

012
P.I.N. 191-46-0526-000
VIRGINIA ELECTRIC AND
POWER COMPANY
DEED BOOK 924, PAGE 950
PARCEL B-1A
PER DEED BOOK 923, PAGE 525
4.1291 ACRES
ZONING: I-1

012
P.I.N. 191-46-1875-000
VIRGINIA ELECTRIC AND
POWER COMPANY
DEED BOOK 924, PAGE 945
620 SYCOLIN RD SE
9.8973 ACRES
ZONING: I-1

EXISTING EASEMENTS
PER DEED BOOK 993,
PAGE 1788
(DO NOT HAVE READABLE
COPY OF PLAT)

Match Line Sta. 138+00 (C.B.L.) - See Sheet 9
Match Line Sta. 144+50 (C.B.L.) - See Sheet 11
Sycolin Road S.E. (Rte. 643)
Prop. Ditch "A" (See Sheet 2J)
Paved Shoulder E.P.
E.P.
C&G
Conc. S/W
Conc°
Sign
Check Dam
18" Conc. Pipe
15" Conc. Pipe
12" Conc. Pipe
RD-20
RD-21
RD-22
RD-23
RD-24
RD-25
RD-26
CO-14
CO-15
CO-16
CO-17
10-1
10-2
10-3
10-4
10-5
10-6

SCALE
0 25' 50'

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Rinker Design Associates, P.C.
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PLAN SHEET SYCOLIN ROAD
STATION 138+00 TO 144+50
Loudoun County, Virginia

SUBMISSION DATE: 02/12/2016
Town of Leesburg

ASSOCIATED PLAN
C.I.P. NUMBER: TLCI-2016-0002
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TOWN NUMBER: TBD

Sheet
10 of 20

REVISED 10/11/2013

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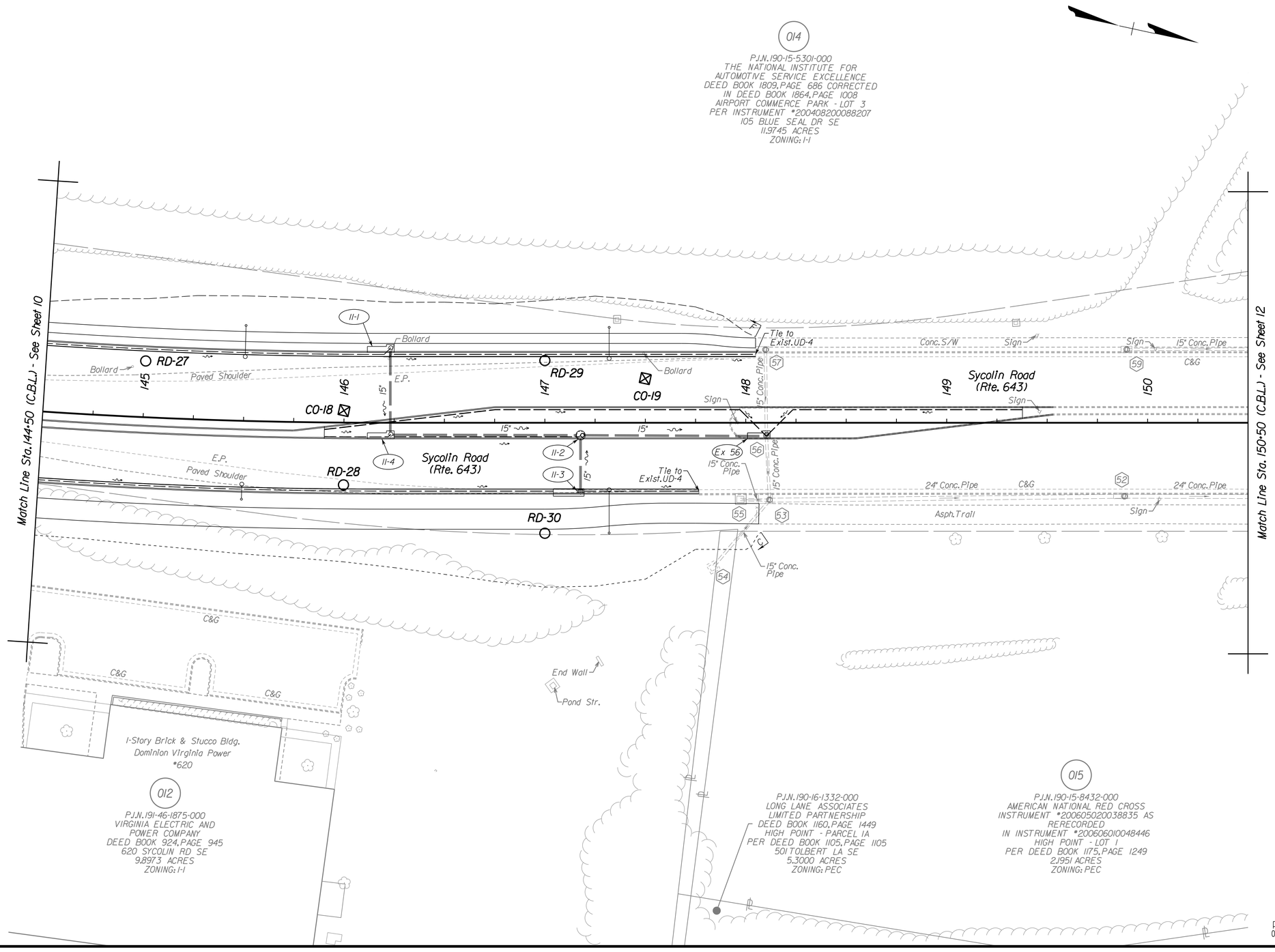

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PROJECT MANAGER: MARK A. GUNN, P.E.

PROJECT NAME: SYCOLIN ROAD WIDENING PHASE IV
FROM CLAUDIA DRIVE TO TOLBERT LANE S.E.
PLAN SHEET SYCOLIN ROAD
STATION 144+50 TO 150+50
Town of Leesburg
SUBMISSION DATE: 02/12/2016

ASSOCIATED PLAN
C.I.P. NUMBER: TLCI-2016-0002
VDOT PROJ. NO. U000-253-312
TOWN NUMBER: TBD

Sheet 11 of 20

REVISED 10/11/2013

APPENDIX B FIELD OPERATIONS

Table B1 - Summary of Pavement Core Information
Sycolin Road Widening PHASE IV
Leesburg, Virginia
VDOT No. U000-253-312 P101, R201, C501; DMY No. 01.02095.01

Core Number	Station	Offset	Lane ID	AC Thickness (inches)	HCC Thickness (inches)	OGDL Thickness (inches)	CTA Thickness (inches)	GAB Thickness (inches)	Remarks
Sycolin Road									
CO-01	114+00	R 24	NB Lane	11.5	-	-	-	13.5	
CO-02	117+00	L 10	SB Lane	12.0	-	-	-	13.5	
CO-03	119+00	L 4	SB Acceleration Lane	8.0	-	-	-	14.0	
CO-04	119+55	R 28	NB RTL	9.5	-	-	-	12.5	
CO-06	121+00	R 17	SB Lane	12.0	-	-	-	14.0	
CO-07	125+00	R 14	NB Lane	7.5	-	-	-	13.0	
CO-08	127+00	L 14	SB Acceleration Lane	8.5	-	-	-	10.0	
CO-10	130+00	R 19	NB Lane	8.5	-	-	-	13.0	
CO-11	133+00	R 14	Median Stripe Zone	8.5	-	-	-	11.0	
CO-12	135+00	R 42	NB RTL	9.5	-	-	-	12.0	
CO-14	138+00	L 17	SB RTL	12.0	-	-	-	11.0	
CO-15	141+00	L 4	Median Stripe Zone	11.0	-	-	-	10.0	
CO-16	142+00	R 17	NB RTL	9.5	-	-	-	13.0	
CO-17	144+00	L 4	SB Lane	7.0	-	-	-	6.0	
CO-18	146+00	L 6	Median Stripe Zone	9.0	-	-	-	16.0	
CO-19	147+50	L 22	SB Lane	11.0	-	-	-	17.0	
Unnamed Cross Road									
CO-05	120+35	L 25	WB RTL	4.5	-	-	-	10.0	unnamed road turning into the airport
Miller Drive SE									
CO-09	128+60	L 47	EB RTL	10.0	-	-	-	11.0	
Dominion Power Entrance									
CO-13	136+50	L 36	EB RTL	13.0	-	-	-	12.0	

AC: Asphalt Concrete HCC: Hydraulic Cement Concrete OGDL: Open Graded Drainage Layer CTA: Cement Treated Aggregate GAB: Graded Aggregate Base

Table B2 - Summary of Pavement Subgrade Soil Conditions

Sycolin Road Widening PHASE IV, Leesburg, VA

VDOT No. U000-253-312 P101, R201, C501; DMY No. 01.02095.01

Boring Information			Subgrade Soils Characteristics																
Boring ID	Station	Offset	Subgrade Soil Depth (feet)	Soil Class.	Fine Content (%)	LL (%)	PI (%)	CBR	Reference CBR/Proctor Tests	Swell (%)	OMC (%)	NMC (%)	SPT N-Value	High Plasticity (CH/MH)	Low CBR (CBR < 6.7)	Swell >5%	Soft/ Very Loose	Excessive Moisture (NMC >1.2 OMC)	Highly Organic	Subgrade Treatment Option
Sycolin Road																				
RD-01	114+00	R 36	2-5'	SC	26.4	29	13	18.5	-	0.5	10.8	12.4	45	-	-	-	-	-	-	
RD-02	115+00	L 28	2-5'	CL-ML	54.3	25	4	14.5	RD-06	1.1	13	11.2	27	-	-	-	-	-	-	
RD-03	116+00	R 26	2-5'	SC	-	-	-	18.5	RD-01	0.5	10.8	9.4	79	-	-	-	-	-	-	
RD-04	117+00	L 28	1-4'	GC-GM	31.5	26	6	18.5	RD-01	0.5	10.8	10.6	15	-	-	-	-	-	-	
RD-05	118+00	R 25	2-5'	GC	18.3	28	9	18.5	RD-01	0.5	10.8	9.4	100	-	-	-	-	-	-	
RD-06	119+00	L 25	1-4'	CL	60.3	27	10	14.5	-	1.1	13	20.7	8	-	-	-	-	Yes	-	A, B or C
RD-07	121+00	L 25	0-3'	ML	-	-	-	14.5	RD-06	1.1	13	4.4	100	-	-	-	-	-	-	
RD-08	123+00	L 25	0-3'	SC	-	-	-	18.5	RD-01	0.5	10.8	11.2	11	-	-	-	-	-	-	
RD-09	124+00	R 31	2-5'	GC	20.3	25	8	18.5	RD-01	0.5	10.8	5.9	100	-	-	-	-	-	-	
RD-10	125+00	L 19	2-5'	SM	-	-	-	18.5	RD-01	0.5	10.8	38.1	12	-	-	-	-	Yes	-	A, B or C
RD-11	126+00	R 31	0-3'	ML	-	-	-	14.5	RD-06	1.1	13	10	9	-	-	-	-	-	-	
RD-12	127+00	L 28	2-5'	CL	-	-	-	14.5	RD-06	1.1	13	17.2	12	-	-	-	-	Yes	-	A, B or C
RD-13	128+00	R 19	1-4'	CL	-	-	-	14.5	RD-06	1.1	13	33.9	8	-	-	-	-	Yes	-	A, B or C
RD-14	129+50	L 39	0-3'	ML	-	-	-	14.5	RD-06	1.1	13	9.3	15	-	-	-	-	-	-	
RD-15	130+00	R 31	2-5'	SM	-	-	-	18.5	RD-01	0.5	10.8	26.9	15	-	-	-	-	Yes	-	A, B or C
RD-16	131+00	L 21	0-3'	SM	-	-	-	18.5	RD-01	0.5	10.8	7.7	22	-	-	-	-	-	-	
RD-17	133+00	L 35	6-9'	AR @ 2.5'	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	
RD-18	135+00	L 25	4-7'	AR @ 4.5'	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	
RD-19	137+00	L 31	2-5'	CL	58.8	35	15	14.5	RD-06	1.1	13	17.8	8	-	-	-	-	Yes	-	A, B or C
RD-20	138+00	R 31	1-4'	GC	32.8	25	8	22.7	RD-22	0.8	9.4	13.1	9	-	-	-	-	Yes	-	A, B or C
RD-21	139+00	L 36	2-5'	AR @ 4.5'	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	
RD-22	140+00	R 28	0-3'	SC	43.3	33	15	22.7	-	0.8	9.4	7.5	9	-	-	-	-	-	-	
RD-23	141+00	L 28	2-5'	SM	48.8	43	16	22.7	RD-22	0.8	9.4	17.8	17	-	-	-	-	Yes	-	A, B or C
RD-24	142+00	R 45	5-8'	SM	39.5	38	13	22.7	RD-22	0.8	9.4	16.1	46	-	-	-	-	Yes	-	A, B or C
RD-25	143+00	L 24	2-5'	SC	17.1	31	11	17.1	RD-27	0.3	10.4	10.6	56	-	-	-	-	-	-	
RD-26	144+00	R 28	3-6'	MH	61.5	68	18	-	-	-	-	31.2	7	Yes	-	-	-	-	-	D
RD-27	145+00	L 28	2-5'	SC	44.1	28	10	17.1	-	0.3	10.4	7.4	13	-	-	-	-	-	-	
RD-28	146+00	R 31	1-4'	SC-SM	22.8	25	4	17.1	RD-27	0.3	10.4	6.2	14	-	-	-	-	-	-	
RD-29	147+00	L 31	2-5'	CH	-	-	-	-	-	-	-	35.2	8	Yes	-	-	-	-	-	D
RD-30	147+00	R 55	6-9'	AR @ 4.1'	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	

A. For unstable areas as identified by proofrolling, dry up subgrade soils using discing or other mechanical methods to within 120% of the optimum moisture content for a minimum of 2 feet and recompact in-place.

B. For unstable areas as identified by proofrolling, dry up subgrade soils using quicklime to within 120% of the optimum moisture content for a minimum of 2 feet and recompact in-place.

C. For unstable areas as identified by proofrolling, undercut to a depth of at least 2 feet below subgrade and backfill with compacted suitable fill with a minimum CBR value of 10.

D. Undercut to a depth of at least 2 feet below subgrade and backfill with Select Material Type I with a minimum CBR value of 30 on a layer of woven subgrade stabilization geotextile; or undercut to a depth of at least 3 feet below subgrade, then backfill with compacted suitable fill with a minimum CBR value of 10.

Core CO-01

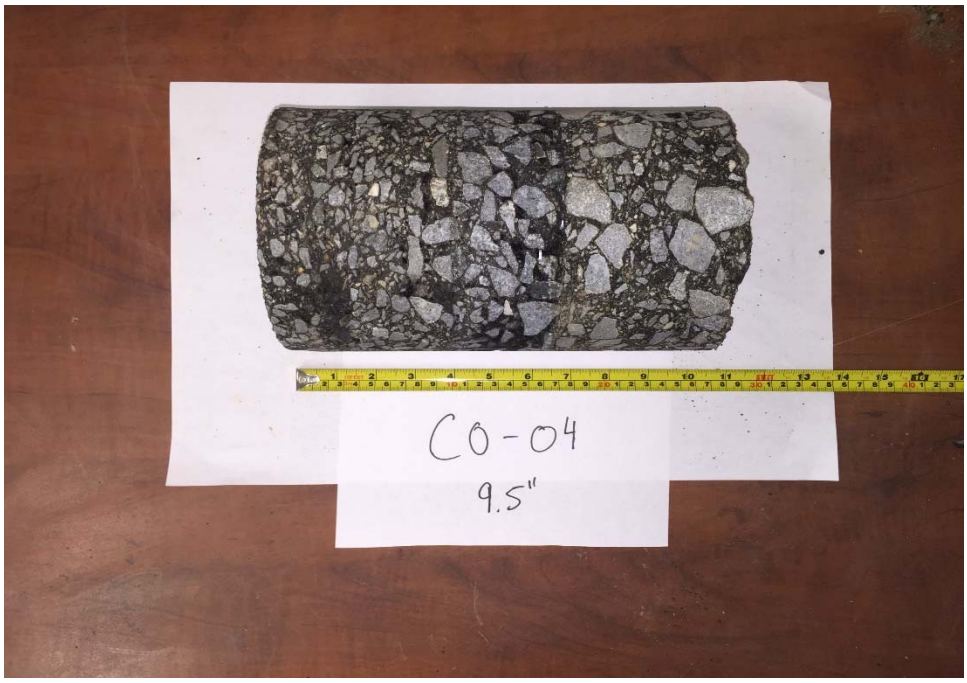
Sycolin Road, Station 114+00, R 24, Northbound Lane

Core CO-02

Sycolin Road, Station 117+00, L 10, Southbound Lane

Core CO-03

Sycolin Road, Station 119+00, L 4, Southbound Acceleration Lane



Core CO-04

Sycolin Road, Station 119+55, R 28, Northbound Right Turn Lane

Core CO-05

Sycolin Road, Station 120+35, L 25, Cross Road (no name)

Core CO-06

Sycolin Road, Station 121+00, R 17, Southbound Lane

Core CO-07

Sycolin Road, Station 125+00, R 14, Northbound Lane

Core CO-08
Sycolin Road, Station 127+00, L 14, Southbound Acceleration Lane

Core CO-09

Miller Drive, Station 128+60, L 47, Eastbound, Right Turn Lane

Core CO-10

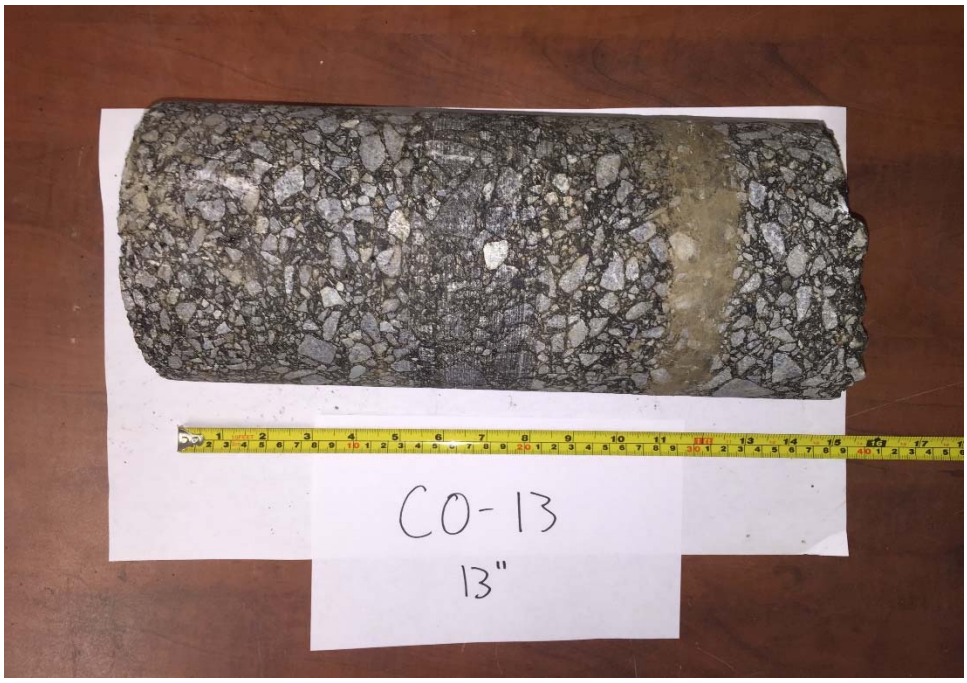
Sycolin Road, Station 130+00, R 19, Northbound Lane

Core CO-11

Sycolin Road, Station 133+00, R 14, Median Stripe Zone

Core CO-12

Sycolin Road, Station 135+50, R 42, Northbound, Right Turn Lane



Core CO-13

Dominion Power Entrance, Station 136+50, L 36, Eastbound, Right Turn Lane

Core CO-14

Sycoolin Road, Station 138+00, L 17, Southbound, Right Turn Lane

Core CO-15

Sycolin Road, Station 141+00, L 4, Median Stripe Zone

Core CO-16

Sycolin Road, Station 142+00, R 17, Northbound, Right Turn Lane

Core CO-17

Sycolin Road, Station 144+00, L 4, Southbound Lane

Core CO-18

Sycolin Road, Station 146+00, L 6, Median Stripe Zone

Core CO-19
Sycolin Road, Station 147+50, L 22, Southbound Lane

REFERENCE NOTES FOR BORING LOGS

I. Drilling and Sampling Symbols:

SS	-	Split Spoon Sampler	RB	-	Rock Bit Drilling
ST	-	Shelby Tube Sampler	BS	-	Bulk Sample of Cuttings
RC	-	Rock Core; NX, BX, AX	PA	-	Power Auger (no sample)
PM	-	Pressuremeter	HSA	-	Hollow Stem Auger
DC	-	Dutch Cone Penetrometer	WS	-	Wash Sample

Standard Penetration Test (SPT) resistance refers to the blows per foot (bpf) of a 140 lb hammer falling 30 inches on a 2 in. O.D. split-spoon sampler as specified in ASTM D-1586. The blow count is commonly referred to as the N-value.

II. Correlation of Penetration Resistances to Soil Properties:

Relative Density of Cohesionless Soils

SPT-N (bpf)	Relative Density
0 – 3	Very Loose
4 – 9	Loose
10 – 29	Medium Dense
30 – 50	Dense
>50	Very Dense

Consistency of Cohesive Soils

SPT-N (bpf)	Consistency
0 – 1	Very Soft
2 – 4	Soft
5 – 8	Firm
9 – 15	Stiff
16 – 30	Very Stiff
31 – 50	Hard
>50	Very Hard

Weathered Rock (WR) may be defined as SPT-N values exceeding 60 bpf depending on site specific conditions. Refer carefully to boring logs.

Rock Fragments, gravel, cobbles, boulders, or debris may produce N-values that are not representative of actual soil properties.

III. Unified Soil Classification Symbols:

GP – Poorly Graded Gravel
GW – Well Graded Gravel
GM – Silty Gravel
GC – Clayey Gravels
SP – Poorly Graded Sands
SW – Well Graded Sands
SM – Silty Sands
SC – Clayey Sands

ML – Low Plasticity Silts
MH – High Plasticity Silts
CL – Low Plasticity Clays
CH – High Plasticity Clays
OL – Low Plasticity Organics
OH – High Plasticity Organics
CL-ML – Dual Classification (Typical)

IV. Laboratory Testing and Water Level Symbols:

LL	- LIQUID LIMIT (%)
PI	- PLASTIC INDEX (%)
W	- MOISTURE CONTENT (%)
DD	- DRY DENSITY (PCF)
NP	- NON PLASTIC
-200	- PERCENT PASSING NO. 200 SIEVE
PP	- POCKET PENETROMETER (TSF)


Water Level at Time Drilling, or as Shown


Water Level at End of Drilling, or as Shown


Water Level After 24 Hours, or as Shown

UNIFIED SOIL CLASSIFICATION SYSTEM

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS
(more than 50% of material is larger than No. 200 sieve size.)

GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravels (Less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)	GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sands (Less than 5% fines)	SW	Well-graded sands, gravelly sands, little or no fines
		SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)	SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures

FINE-GRAINED SOILS
(50% or more of material is smaller than No. 200 sieve size.)

SILTS AND CLAYS Liquid limit less than 50%		ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS		PT	Peat and other highly organic soils

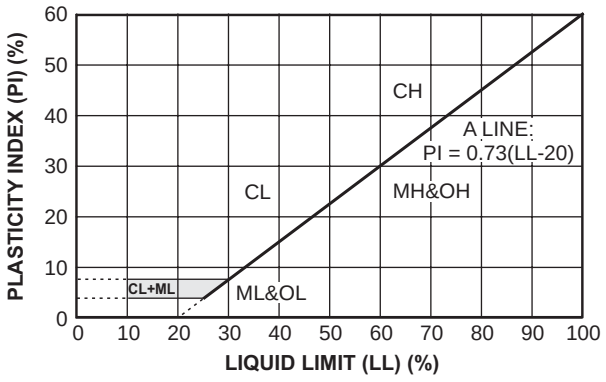
LABORATORY CLASSIFICATION CRITERIA

GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line with P.I. greater than 7	
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for GW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent ..... GW, GP, SW, SP
More than 12 percent ..... GM, GC, SM, SC
5 to 12 percent ..... Borderline cases requiring dual symbols

PLASTICITY CHART

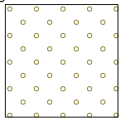


MATERIAL AND SAMPLE SYMBOLS LIST

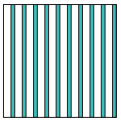
Pavement/Soils

ASPH- ASPHALT PVT

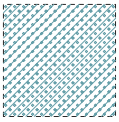
GP - Poorly-graded Gravel



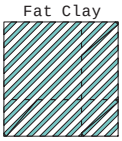
MH - Elastic Silt



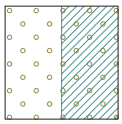
SC - Clayey Sand



CH - Fat Clay

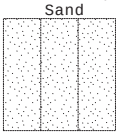


GP-GC

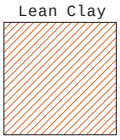


MH/CH

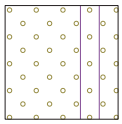
SM - Silty Sand



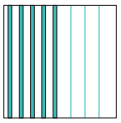
CL - Lean Clay



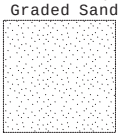
GP-GM



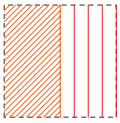
MH/ML



SP - Poorly-Graded Sand

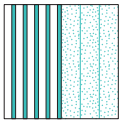


CL-ML

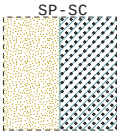


GW - Well-Graded Gravel

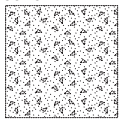
MH/SM



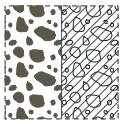
SP-SC



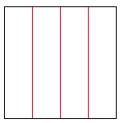
CONC- CONCRETE PVT



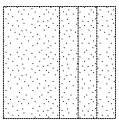
GW-GC



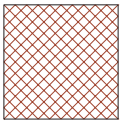
ML - Silt



SP-SM

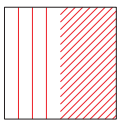


FL -Fill

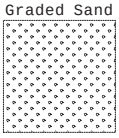


GW-GM

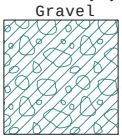
ML/CL



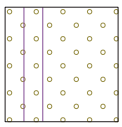
SW - Well-Graded Sand



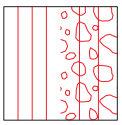
GC - Clayey Gravel



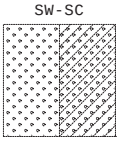
GM/GP



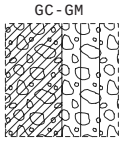
ML/GM



SW-SC

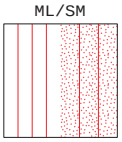


GC-GM

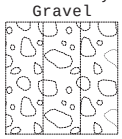


GM/ML

ML/SM

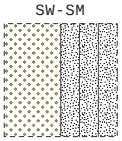


GM - Silty Gravel



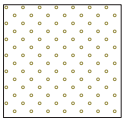
GM/SM

SW-SM

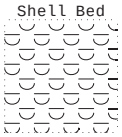


Sedimentary Rocks

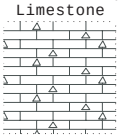
CGL - Conglomorate



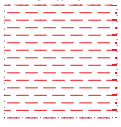
SE - Shell Bed



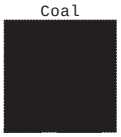
CLST - Cherty Limestone



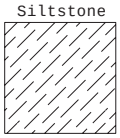
SHL - Shale



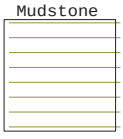
COL - Coal



SLS - Siltstone

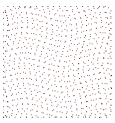


MST Mudstone

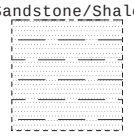


SST - Sandstone

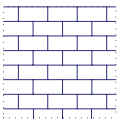
GWK - Graywacke



SST-SHL - Interbedded Sandstone/Shale



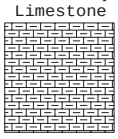
LST - Limestone



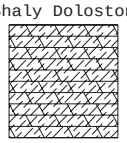
SST-SLS - Interbedded Sandstone/Siltstone

UCY - Underclay

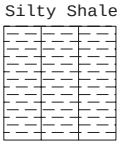
SHLS-Shaly Limestone



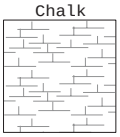
SHDS Shaly Dolostone



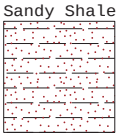
MSH Silty Shale



CHK Chalk



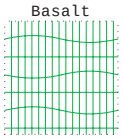
SSHL Sandy Shale



Igneous Rocks

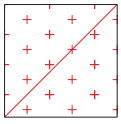
AND - Andesite

BST - Basalt

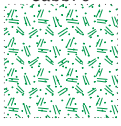


DBS - Diabase

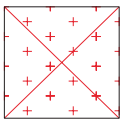
DRT - Diorite



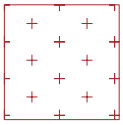
GBR - Gabbro



GRD - Granodiorite

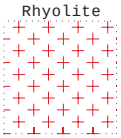


GRN Granite



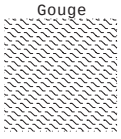
POR - Porphyry

RHY - Rhyolite



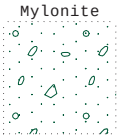
Metamorphic Rocks

GGE - Gouge

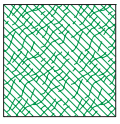


GNS - Gneiss

MYL - Mylonite

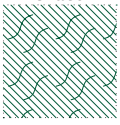


PHY - Phyllite



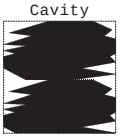
SCH - Schist

SLT - Slate

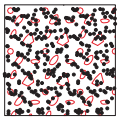


Misc.

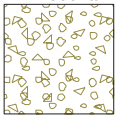
CAV - Cavity



HWR Highly Weathered Rock

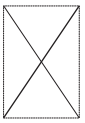


BRC - Breccia



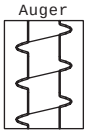
Sampling

SPT

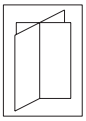


Core

Auger



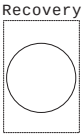
Vane



Undisturbed

Grab

No Recovery

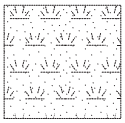


Other

MATERIAL AND SAMPLE SYMBOLS LIST

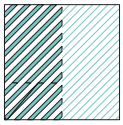
Pavement/Soils

TOPS-TOPSOIL



SC/CH

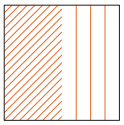
CH/CL



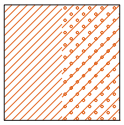
CH/MH

CH/SC

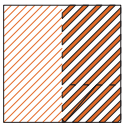
CL/ML



CL/SC

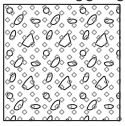


CL/CH

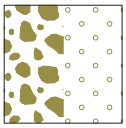


GP/GW

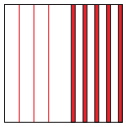
CRA Crushed Aggregate



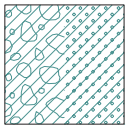
GW/GP



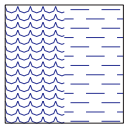
ML/MH



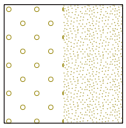
GC/SC



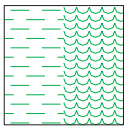
OH/OL



GP/SP

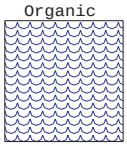


OL/OH

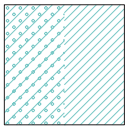


PT Peat

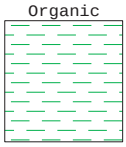
OH Organic



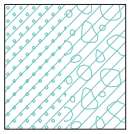
SC/CL



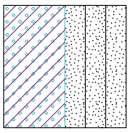
OL Organic



SC/GC

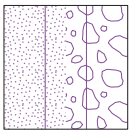


SC-SM

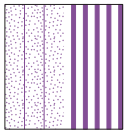


SP/SW

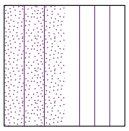
SM/GM



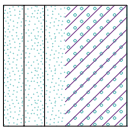
SM/MH



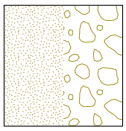
SM/ML



SM/SC



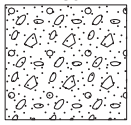
SP/GP



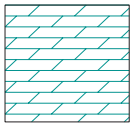
SW/SP

Sedimentary Rocks

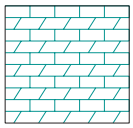
BLD-Boulder Bed



DLS Dolostone



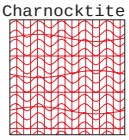
LST-DLS-Interbedded Limestone/Dolostone



CHRT

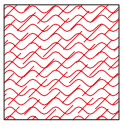
Igneous Rocks

CHT Charnocktite

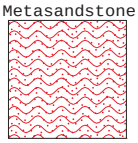


Metamorphic Rocks

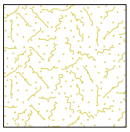
MSLS Metasiltstone



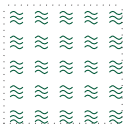
MSST Metasandstone



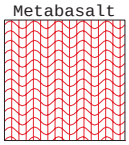
QZT - Quartzite



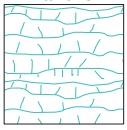
SPS Soapstone



MBST Metabasalt



MBL Marble



Sampling

VDOT Virginia Department of Transportation

PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: STRUCTURE 7-9

CL-01
PAGE 1 OF 1

STATION: 123+30 OFFSET: L 33
LATITUDE: 39.078856° N LONGITUDE: 77.553501° W
SURFACE ELEVATION: 363.21 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-22-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: M. Vargas
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
DRY AFTER 24 HRS

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
		6 16 22 18	100		2						0.0 / 363.21 Topsoil=3 inches **TOPS** 0.25 / 362.96 *Fill,* Gray and black, fine to coarse, SILTY SAND WITH GRAVEL FILL, dense, moist **SM**			6.0	
2	360	3 3 3 3	100		4						2.0 / 361.21 *Residual*, Gray, SILT, trace sand, firm, moist **ML**			20.5	
4		3 3 5 5	100		6						4.0 / 359.21 *Residual,* Brown and gray, FAT CLAY WITH SAND, trace gravel, firm, moist **CH**	56	30	22.6 23.9	71.5
8	355	2 4 4 8	100		8						8.0 / 355.21 *Residual,* White and brown, fine to coarse, CLAYEY GRAVEL WITH SAND, medium dense, moist **GC**	27	13	7.6	16.5
10		4 9 18 19	100		10										
12	350	50/0			13.5						12.5 / 350.71 *IGM,* White and brown, fine to coarse, CLAYEY GRAVEL WITH SAND, very dense, moist **GC** 13.5 / 349.71 Boring Terminated				

REMARKS: Rig Type: Truck CME 45c.
Temporary Piezometer installed. Cave in at 11.0'.

PAGE 1 OF 1
CL-01

SPT_LOGB:LOGS.GPJ:8.30.003:012512:7/24/15

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VDOT Virginia Department of Transportation

PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: STRUCTURE 7-9

CL-02

STATION: 123+50 OFFSET: R 56
LATITUDE: 39.078814° N LONGITUDE: 77.553155° W
SURFACE ELEVATION: 363.71 ft COORD. DATUM: NAD 83

Date(s) Drilled: 5-28-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
DRY AFTER 24 HRS

FIELD DATA / **LAB DATA**

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LAB: LIQUID LIMIT (LL)	LAB: PLASTICITY INDEX (PI)	LAB: MOISTURE CONTENT (%)	LAB: FINES CONTENT #200 (%)
0.0											0.0 / 363.71 Topsoil=4 inches **Tops**				
0.3											0.3 / 363.41 *Residual*, Brown, SILT WITH SAND, contains rock fragments, very stiff, moist **ML**			14.7	
0.5		7													
1.0		8	67												
1.5		10													
2.0	362	10			2										
2.5		4													
3.0		6	100											15.0	
3.5		20													
4.0	360	20			4										
4.5		7													
5.0		7	100											21.0	
5.5		15													
6.0	358	15			6										
6.5		50/6	100		6.5						6.0 / 357.71 *IGM*, Brown and gray, fine, CLAYEY GRAVEL WITH SAND, contains rock fragments, very dense, moist **GC**	37	14	20.9	36.6
7.0															
7.5	356														
8.0		50/1	0		8 8.08						8.1 / 355.61 Boring Terminated				

REMARKS: Rig Type: Truck CME 45c.
Offset 20' South due to exisiting stream, slope, and trees. Temporary Piezometer installed. Cave in at 7.0'.

SPT_LOGB:LOGS.GPJ:8.30.003:012512:7/24/15

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: STRUCTURE 8-11

CL-03
PAGE 1 OF 1

STATION: 126+15 OFFSET: R 64
LATITUDE: 39.079684° N LONGITUDE: 77.553095° W
SURFACE ELEVATION: 357.84 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-27-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
▽ FIRST ENCOUNTERED AT 7.5 ft DEPTH
▼ STABILIZED AT 8.0 ft

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
		4									0.0 / 357.84 Topsoil=4 inches **Tops**			
		7 22 16	63		2						0.3 / 357.54 *Fill*, Brown, SANDY LEAN CLAY WITH GRAVEL FILL, very stiff, moist **CL**			9.2
2	355	7 8 7 8	100		4						2.0 / 355.84 *Residual*, Gray and brown, SILT WITH SAND, firm to stiff, moist **ML**			22.7
4		4 4 4 5	100		6									18.3
6		10 12 13	52								6.0 / 351.84 *Residual*, Tan, fine, POORLY-GRADED GRAVEL WITH SILT, very dense, wet **GP**			14.9
8	350	50/5 17 50/3	67		7.92 8 8.75						7.5 / 350.34 *IGM*, Tan, fine, POORLY-GRADED GRAVEL WITH SILT, very dense, wet **GP**			12.5
10														
12	345	50/0			13.5						13.5 / 344.34 Boring Terminated.			

REMARKS: Rig Type: Truck CME 45c.
Offset 25' NE due to exisiting stream, slope, and trees. Temporary Piezometer installed. Cave in at 12.75'.

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CL-03

SPT_LOG:LOGS.GPJ:8.30.003:012512:7/24/15

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

RD-01
PAGE 1 OF 1

STATION: 114+00 OFFSET: R 36
LATITUDE: 39.076331° N LONGITUDE: 77.552922° W
SURFACE ELEVATION: 389.79 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-26-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5		4									0.0 / 389.79 Topsoil=2 inches **Tops**				
1.0		5	100								0.15 / 389.64 *Fill*, Gray and brown, fine to coarse, SILTY SAND WITH GRAVEL FILL, medium dense, moist **SM**			5.9	
1.5		7													
2.0	388	9			2										
2.5		7									2.0 / 387.79 *Residual*, Red, fine to medium, CLAYEY SAND, contains rock fragments, dense, moist **SC**				
3.0		15	100									25	10	8.9	20.6
3.5		30													
4.0	386	37			4										
4.5		26									4.0 / 385.79 *IGM*, Red, medium to coarse, CLAYEY SAND, contains rock fragments, very dense, moist **SC**			8.5	
5.0		50/5	100		4.92										
5.5															
6.0	384	50/4	100		6									15.0	
6.5					6.33						6.5 / 383.29 Boring Terminated.				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 5.75'.

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RD-01

SPT_LOGB:LOGS.GPJ:8.30.003:012512:7/21/15

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

RD-02
PAGE 1 OF 1

STATION: 115+00 OFFSET: L 28
LATITUDE: 39.076581° N LONGITUDE: 77.553190° W
SURFACE ELEVATION: 388.99 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-26-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5		8									0.0 / 388.99 Topsoil=2 inches **Tops**				
1.0	388	10	67								0.15 / 388.84 *Fill*, Red and brown, SILT FILL, trace sand and gravel, very stiff, moist **ML**			9.9	
1.5		12													
2.0		14			2										
2.5		8									2.0 / 386.99 *Residual*, Red and brown, SANDY SILTY CLAY WITH GRAVEL, very stiff, moist **CL-ML**				
3.0	386	13	84									25	4	11.2	54.3
3.5		14													
4.0		18			4										
4.5		17													
5.0	384	34	100											7.9	
5.5		50/6			5.5						5.0 / 383.99 *IGM*, Red and brown, SANDY CLAY WITH GRAVEL, very hard, moist **ML**				
6.0		50/5	79		6									13.5	
6.5					6.42						6.5 / 382.49 Boring Terminated.				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 5.5'.

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

RD-03
PAGE 1 OF 1

STATION: 116+00 OFFSET: R 26
LATITUDE: 39.076872° N LONGITUDE: 77.553046° W
SURFACE ELEVATION: 387.59 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-26-2015
Drilling Method(s): 3.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5		8									0.0 / 387.59 Crushed Aggregate=6 inches **CRA**				
1.0		14	75								0.5 / 387.09 *Fill*, Red, SILT WITH SAND, contains rock fragments, hard, moist **ML**			4.6	
1.5	386	25													
2.0		28			2										
2.5		12									2.0 / 385.59 *Residual*, Red and brown, fine to medium, CLAYEY SAND, contains rock fragments, dense, moist **SC**				
3.0		29	100											9.4	
3.5	384	50/6			3.5						3.0 / 384.59 *IGM*, Red and brown, fine to medium, CLAYEY SAND, contains rock fragments, very dense, moist **SC**				
4.0					4										
4.5		11													
5.0		26	67									27	8	9.5	22.7
5.5	382	50/6			5.5										
6.0					6										
6.5		34													
7.0		50/6	100		7						7.0 / 380.59 Boring Terminated.			5.5	

REMARKS: Rig Type: Truck CME 45c.
Cave in at 6.0'.

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

RD-04
PAGE 1 OF 1

STATION: 117+00 OFFSET: L 28
LATITUDE: 39.077126° N LONGITUDE: 77.553279° W
SURFACE ELEVATION: 384.62 ft COORD. DATUM: NAD 83

Date(s) Drilled: 5-26-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

FIELD DATA / **LAB DATA**

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LAB: LIQUID LIMIT (LL)	LAB: PLASTICITY INDEX (PI)	LAB: MOISTURE CONTENT (%)	LAB: FINES CONTENT #200 (%)
0.0											0.0 / 384.62 Topsoil=3 inches **Tops**				
0.5	384	4													
1.0		7	84								0.25 / 384.37 *Residual*, Red and gray, SILT, trace sand, stiff, moist **ML**			20.6	
1.5		8													
2.0		17			2										
2.5	382	14 46	100								2.0 / 382.62 *IGM*, Red and gray, fine, SILTY CLAYEY GRAVEL WITH SAND, very dense, moist **GC-GM**	26	6	10.6	31.5
3.0		50/2			3.17										
3.5															
4.0		28			4										
4.5	380	50/6	100											11.9	
5.0					5						5.0 / 379.62 Boring Terminated.				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 3.5'.

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

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STATION: 118+00 OFFSET: R 25
LATITUDE: 39.077417° N LONGITUDE: 77.553139° W
SURFACE ELEVATION: 384.6 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-26-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5	384	5									0.0 / 384.6 Topsoil=2 inches **Tops**				
1.0		12	67								0.2 / 384.4 *Residual*, Red and brown, POORLY-GRADED GRAVEL WITH SILT AND SAND, dense, moist **GP**			12.9	
1.5		26													
2.0		28			2										
2.5	382	10 50/6	100								2.5 / 382.1 *IGM*, Red and gray, fine, CLAYEY GRAVEL WITH SAND, contains rock fragments, very dense, moist **GC**	28	9	9.4	18.3
3.0					3										
3.5															
4.0		50/1	0		4 4.08						4.1 / 380.5 Auger Refusal				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 3.5'.

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

RD-06
PAGE 1 OF 1

STATION: 119+00 OFFSET: L 25
LATITUDE: 39.077672° N LONGITUDE: 77.553358° W
SURFACE ELEVATION: 381.84 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-26-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5		5									0.0 / 381.84 Topsoil=3 inches **Tops**				
1.0		13	59								0.25 / 381.59 *Fill*, Brown and tan, fine to coarse, SILT WITH SAND FILL, contains rock fragments, very stiff, moist **ML**			11.5	
1.5		4													
2.0	380	5			2										
2.5		2									2.0 / 379.84 *Fill*, Brown, SANDY LEAN CLAY FILL, contains rock fragments, firm, moist **CL**				
3.0		2	34											11.3	
3.5		6													
4.0	378	7			4						4.0 / 377.84 *Residual*, Gray, fine, POORLY GRADED GRAVEL WITH SILT AND SAND, loose, moist **GP-GM**				
4.5		3													
5.0		4	59										NP	4.2	7.6
5.5		3													
6.0	376	20			6						6.0 / 375.84 Boring Terminated.				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 4.5'.

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

RD-07
PAGE 1 OF 1

STATION: 121+00 OFFSET: L 25
LATITUDE: 39.078221° N LONGITUDE: 77.553436° W
SURFACE ELEVATION: 373.24 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-26-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LAB: LIQUID LIMIT LL	LAB: PLASTICITY INDEX PI	LAB: MOISTURE CONTENT (%)
0.2	373	14									0.0 / 373.24 Topsoil=2 inches **Tops**			
0.4		50/4	0											4.4
0.6					0.83									
0.8														
1.0														
1.2	372										0.15 / 373.09 *IGM*, Tan and brown, SILT WITH SAND, contains rock fragments, very hard, moist **ML**			
1.4														
1.6														
1.8														
2.0		50/5			2									
2.2	371		0											4.1
2.4					2.42									
											2.5 / 370.74 Auger Refusal			

REMARKS: Rig Type: Truck CME 45c.
Cave in at 2.0'.

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RD-07

SPT_LOG:LOGS.GPJ:8.30.003:012512:7/21/15

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

RD-08
PAGE 1 OF 1

STATION: 123+00 OFFSET: L 25
LATITUDE: 39.078773° N LONGITUDE: 77.553471° W
SURFACE ELEVATION: 364.41 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-22-2015
Drilling Method(s): 3.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: D. Pao
Logger: D. Hoover

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SOIL: SAMPLE LEGEND	SOIL: SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5	364	2									0.0 / 364.41 Topsoil=4 inches **Tops**				
1.0		3	59								0.3 / 364.11 *Fill*, Brown, fine to medium, CLAYEY SAND FILL, loose, moist **SC**			11.2	
1.5		5													
2.0		6			2										
2.5	362	5									2.0 / 362.41 *Residual*, Red and brown, fine to coarse, CLAYEY GRAVEL WTH SAND, medium dense, moist **GC**				
3.0		11	59									28	9	10.9	28.8
3.5		14													
4.0		18			4										
4.5	360	9									4.0 / 360.41 *Residual*, Brown and gray, LEAN CLAY, very stiff, moist **CL**				
5.0		10	75											25.5	
5.5		7													
6.0		6			6						6.0 / 358.41 Boring Terminated.				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 5.5'.

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RD-08

SPT_LOGB:LOGS.GPJ:8.30.003:012512:7/21/15

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

RD-09
PAGE 1 OF 1

STATION: 124+00 OFFSET: R 31
LATITUDE: 39.079048° N LONGITUDE: 77.553276° W
SURFACE ELEVATION: 361.94 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-27-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5		4									0.0 / 361.94 Topsoil=3 inches **Tops**				
1.0		8	100								0.25 / 361.69 *Fill*, Gray, SILTY SAND WITH GRAVEL FILL, medium dense, moist **SM**			8.9	
1.5		12													
2.0	360	30			2										
2.5		18 50/3	56		2.75						2.0 / 359.94 *Residual*, Gray and brown, fine, CLAYEY GRAVEL WITH SAND, very dense, dry **GC**	25	8	5.9	20.3
3.0											2.5 / 359.44 *IGM*, Gray and brown, fine, CLAYEY GRAVEL WTH SAND, very dense, dry **GC**				
3.5															
4.0	358	50/3	68		4 4.25									6.5	
											4.3 / 357.64 Auger Refusal				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 4.0'.

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SPT_LOGB:LOGS.GPJ:8.30.003:012512:7/21/15

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

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PAGE 1 OF 1

STATION: 125+00 OFFSET: L 19
LATITUDE: 39.079326° N LONGITUDE: 77.553442° W
SURFACE ELEVATION: 361.91 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-22-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5		2									0.0 / 361.91 Topsoil=3 inches **Tops**				
1.0		4	84								0.25 / 361.66 *Residual*, Red and tan, SILT, trace sand, contains rock fragments, stiff, moist **ML**			19.5	
1.5		5													
2.0	360	6			2										
2.5		5									2.0 / 359.91 *Residual*, Tan and brown, fine to medium, SILTY SAND, contains rock fragments, medium dense, moist **SM**				
3.0		4	100											38.1	
3.5		8													
4.0	358	8			4										
4.5		6													
5.0		8	100									56	13	29.4	45.5
5.5		10													
6.0	356	12			6										
6.5		6													
7.0		6	100											18.9	
7.5		8													
8.0	354	16			8						8.0 / 353.91 Boring Terminated.				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 7.5'.

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SPT_LOGB:LOGS.GPJ:8.30.003:012512:7/21/15

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

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PAGE 1 OF 1

STATION: 126+00 OFFSET: R 31
LATITUDE: 39.079591° N LONGITUDE: 77.553246° W
SURFACE ELEVATION: 359.33 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-27-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SOIL: SAMPLE LEGEND	SOIL: SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5		4									0.0 / 359.33 Crushed Aggregate =2.4 inches **CRA**				
1.0		4	67								0.2 / 359.13 *Fill*, Red and brown, SILT WITH SAND FILL, trace gravel, stiff, moist **ML**			10.0	
1.5	358	5													
2.0		6			2										
2.5		4									2.0 / 357.33 *Residual*, Brown and black, fine to coarse, SILTY CLAYEY SAND, loose to medium dense, moist **SC-SM**				
3.0		6	100									29	7	14.7	38.0
3.5	356	8													
4.0		8			4										
4.5		4													
5.0		4	100											25.3	
5.5	354	4													
6.0		5			6						6.0 / 353.33 Boring Terminated.				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 5.0'.

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SPT_LOGB:LOGS.GPJ:8.30.003:012512:7/21/15

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

RD-12

STATION: 127+00 OFFSET: L 28
LATITUDE: 39.079879° N LONGITUDE: 77.553422° W
SURFACE ELEVATION: 363.62 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-22-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5		6									0.0 / 363.62 Topsoil=3 inches **Tops**				
1.0		9	84								0.25 / 363.37 *Fill*, Tan and red, SANDY SILT WITH GRAVEL FILL, very stiff, moist **ML**			12.0	
1.5	362	8													
2.0		6			2										
2.5		3									2.0 / 361.62 *Residual*, Gray and red, LEAN CLAY WITH SAND, trace gravel, contains trace roots, firm to stiff, moist **CL**				
3.0		5	100											17.2	
3.5	360	7													
4.0		7			4										
4.5		3													
5.0		5	100									28	9	19.9	76.7
5.5	358	5													
6.0		5			6										
6.5		3													
7.0		3	100											18.6	
7.5	356	5													
8.0		7			8						8.0 / 355.62 Boring Terminated.				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 6.0'.

SPT_LOGB:LOGS.GPJ:8.30.003:012512:7/21/15

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

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PAGE 1 OF 1

STATION: 128+00 OFFSET: R 19
LATITUDE: 39.080137° N LONGITUDE: 77.553216° W
SURFACE ELEVATION: 363.74 ft COORD. DATUM: NAD 83

Date(s) Drilled: 5-27-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

FIELD DATA / **LAB DATA**

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LAB: LIQUID LIMIT LL	LAB: PLASTICITY INDEX PI	LAB: MOISTURE CONTENT (%)	LAB: FINES CONTENT #200 (%)
0.5		4									0.0 / 363.74 Crushed Aggregate=4.8 inches **AB**				
1.0		6	59								0.4 / 363.34 *Fill*, Red and brown, SILT FILL, trace sand and gravel, stiff, moist **ML**			10.1	
1.5	362	6													
2.0		8			2										
2.5		3									2.0 / 361.74 *Residual*, Brown and white, LEAN CLAY WITH SAND, contains rock fragments, firm, moist **CL**				
3.0		4	84											33.9	
3.5		4													
4.0	360	5			4						4.0 / 359.74 *Residual*, Brown and white, medium to coarse, POORLY GRADED SAND WITH SILT AND GRAVEL, loose, moist **SP-SM**				
4.5		3													
5.0		4	84											6.1	8.6
5.5		5													
6.0	358	10			6						6.0 / 357.74 Boring Terminated.				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 4.25'.

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SPT_LOGB:LOGS.GPJ:8.30.003:012512:7/21/15

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

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PAGE 1 OF 1

STATION: 129+50 OFFSET: L 39
LATITUDE: 39.080570° N LONGITUDE: 77.553334° W
SURFACE ELEVATION: 369.96 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-22-2015
Drilling Method(s): 3.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: D. Pao
Logger: D. Hoover

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SOIL: SAMPLE LEGEND	SOIL: SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT (LL)	PLASTICITY INDEX (PI)	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5		4									0.0 / 369.96 Topsoil=2 inches **Tops**				
1.0		5	25								0.15 / 369.81 *Fill*, Red, SILT WITH GRAVEL FILL, trace sand, stiff, moist **ML**			9.3	
1.5		10													
2.0	368	16			2										
2.5		13									2.0 / 367.96 *Residual*, Brown and white, fine to coarse, CLAYEY SAND, contains rock fragments, very dense, moist **SC**				
3.0		25	87									28	9	9.4	22.5
3.5		40													
4.0	366	50/5			3.92						3.5 / 366.46 *IGM*, Brown and white, fine to coarse, CLAYEY SAND, contains rock fragments, very dense, moist **SC**				
4.5		28 50/3	100		4 4.75									5.0	
5.0															
5.5															
6.0	364	50/2	100		6 6.17									5.9	
											6.2 / 363.76 Auger Refusal				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 5.5'.

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SPT_LOGB:LOGS.GPJ:8.30.003:012512:7/21/15

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

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STATION: 130+00 OFFSET: R 31
LATITUDE: 39.080669° N LONGITUDE: 77.553059° W
SURFACE ELEVATION: 371.39 ft COORD. DATUM: NAD 83

Date(s) Drilled: 5-27-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

FIELD DATA / **LAB DATA**

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LAB: LIQUID LIMIT (LL)	LAB: PLASTICITY INDEX (PI)	LAB: MOISTURE CONTENT (%)	LAB: FINES CONTENT #200 (%)
0.5		35									0.0 / 371.39 Crushed Aggregate=3.6 inches **CRA**				
1.0		30	50								0.3 / 371.09 *Fill*, Red and brown, SILT, trace gravel, hard, moist **ML**			8.9	
1.5	370	18													
2.0		8			2										
2.5		6									2.0 / 369.39 *Residual*, Brown and white, fine to coarse, SILTY SAND, contains rock fragments, pockets of fat clays, elastic silts, medium dense, moist **SM**				
3.0		6	84											26.9	
3.5	368	9													
4.0		11			4										
4.5		9													
5.0		9	100									34	8	21.9	45.3
5.5	366	12													
6.0		14			6										
6.5		7													
7.0		8	100											17.1	
7.5	364	10													
8.0		12			8						8.0 / 363.39 Boring Terminated.				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 6.75'.

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

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PAGE 1 OF 1

STATION: 131+00 OFFSET: L 21
LATITUDE: 39.080967° N LONGITUDE: 77.553164° W
SURFACE ELEVATION: 374.72 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-22-2015
Drilling Method(s): 3.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: D. Pao
Logger: D. Hoover

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SOIL: SAMPLE LEGEND	SOIL: SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LAB: LIQUID LIMIT (LL)	LAB: PLASTICITY INDEX (PI)	LAB: MOISTURE CONTENT (%)
0.2		7									0.0 / 374.72 Topsoil=2 inches **Tops**			
0.4														
0.6														
0.8	374	10												
1.0			75								0.15 / 374.57 *Residual*, Brown, fine to coarse, SILTY SAND, contains rock fragments, medium dense, moist **SM**			7.7
1.2		12												
1.4														
1.6														
1.8	373	43												
2.0		50/3	100		2									
2.2					2.25						2.0 / 372.72 *IGM*, Brown, fine to coarse, SILTY SAND, contains rock fragments, very dense, moist **SM**			8.8
2.4														
2.6														
2.8	372													
3.0														
3.2														
3.4														
3.6														
3.8	371													
4.0		50/0			4						4.0 / 370.72 Auger Refusal			

REMARKS: Rig Type: Truck CME 45c.
Cave in at 3.5'.

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SPT_LOG:LOGS.GPJ:8.30.003:012512:7/21/15

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

RD-17

STATION: 133+00 OFFSET: L 35
LATITUDE: 39.081510° N LONGITUDE: 77.553039° W
SURFACE ELEVATION: 384.03 ft COORD. DATUM: NAD 83

Date(s) Drilled: 5-22-2015
Drilling Method(s): 3.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: D. Pao
Logger: D. Hoover

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

FIELD DATA / **LAB DATA**

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LAB: LIQUID LIMIT (LL)	LAB: PLASTICITY INDEX (PI)	LAB: MOISTURE CONTENT (%)
0.2		8									0.0 / 384.03 Topsoil=2 inches **Tops**			
0.4														
0.6		14												
0.8											0.15 / 383.88 *Fill*, Brown, SANDY SILT WITH GRAVEL FILL, very stiff to very hard, moist **ML**			
1.0	383		17											9.8
1.2		14												
1.4														
1.6														
1.8		15												
2.0	382	50/4	100		2									6.3
2.2					2.33						2.0 / 382.03 *IGM*, Brown, SANDY SILT WITH GRAVEL, very hard, moist **ML**			
2.4		50/0			2.5						2.5 / 381.53 Auger Refusal			

REMARKS: Rig Type: Truck CME 45c.
Cave in at 2.0'.

SPT_LOG:LOGS.GPJ:8.30.003:012512:7/21/15

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

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PAGE 1 OF 1

STATION: 135+00 OFFSET: L 25
LATITUDE: 39.082034° N LONGITUDE: 77.552831° W
SURFACE ELEVATION: 383.08 ft COORD. DATUM: NAD 83

Date(s) Drilled: 5-22-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: M. Vargas
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

FIELD DATA / **LAB DATA**

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LAB: LIQUID LIMIT (LL)	LAB: PLASTICITY INDEX (PI)	LAB: MOISTURE CONTENT (%)	LAB: FINES CONTENT #200 (%)
0.5		9									0.0 / 383.08 *Fill*, Gray and brown, SILTY SAND WITH GRAVEL FILL, moist **SM**				
1.0	382	12	13											14.9	
1.5		14									0.15 / 382.93 *Fill*, Gray and brown, SANDY SILT WITH GRAVEL FILL, very stiff, moist **ML**				
2.0		14			2										
2.5		10									2.0 / 381.08 *IGM*, Brown and tan, medium to coarse, SILTY SAND WTH GRAVEL, very dense, moist **SM**				
3.0	380	30	100											6.1	
3.5		44													
4.0		50/4			3.83 4										
4.5		25 50/2 50/0	75		4.5 4.67						4.5 / 378.58 Auger Refusal			7.5	27.4

REMARKS: Rig Type: Truck CME 45c.
Cave in at 3.75'.

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

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PAGE 1 OF 1

STATION: 137+00 OFFSET: L 31
LATITUDE: 39.082570° N LONGITUDE: 77.552718° W
SURFACE ELEVATION: 381.74 ft COORD. DATUM: NAD 83

Date(s) Drilled: 5-28-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

FIELD DATA / **LAB DATA**

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5		7									0.0 / 381.74 Topsoil=2 inches **Tops**				
1.0		8	100								0.15 / 381.59 *Fill*, Gray and black, fine to coarse, SILTY SAND WITH GRAVEL FILL, medium dense, moist **SM**			2.5	
1.5	380	8													
2.0		7			2										
2.5		3									2.0 / 379.74 *Fill*, Brown and gray, SANDY LEAN CLAY WIT GRAVEL FILL, firm to stiff, moist **CL**				
3.0		4	50									35	15	17.8	58.8
3.5	378	4													
4.0		7			4										
4.5		3													
5.0		4	100											23.6	
5.5		5													
6.0	376	5			6						6.0 / 375.74 *Residual*, Brown and tan, fine to medium, CLAYEY SAND, contains rock fragments, medium dense, moist **SC**				
6.5		3													
7.0		7	100									46	19	21.4	36.9
7.5		7													
8.0	374	10			8						8.0 / 373.74 Boring Terminated.				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 6.75'.

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SPT_LOGB:LOGS.GPJ:8.30.003:012512:7/21/15

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

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PAGE 1 OF 1

STATION: 138+00 OFFSET: R 31
LATITUDE: 39.082819° N LONGITUDE: 77.552455° W
SURFACE ELEVATION: 382.92 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-27-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SOIL: SAMPLE LEGEND	SOIL: SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT (LL)	PLASTICITY INDEX (PI)	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5		5									0.0 / 382.92 Crushed Aggregate=4.8 inches **CRA**				
1.0	382	8	100		2						0.4 / 382.52 *Fill*, Red and brown, fine, CLAYEY GRAVEL WITH SAND FILL, loose to medium dense, moist **GC**			10.3	
1.5		10													
2.0		10													
2.5		6													
3.0	380	5	100		4							25	8	13.1	32.8
3.5		4													
4.0		5													
4.5		4									4.0 / 378.92 *Residual*, Gray and brown, ELASTIC SILT, stiff, moist **MH**				
5.0	378	8	100		6							52	21	28.4	96.0
5.5		7													
6.0		7									6.0 / 376.92 Boring Terminated.				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 5.75'.

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VDOT Virginia Department of Transportation

PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

RD-21

STATION: 139+00 OFFSET: L 36
LATITUDE: 39.083110° N LONGITUDE: 77.552656° W
SURFACE ELEVATION: 382.84 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-22-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: M. Vargas
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
0.2		5									0.0 / 382.84			
0.4											*Residual*, Red and brown, SILT, trace sand, very stiff, moist **ML**			
0.6														
0.8		9												
1.0	382		104											20.5
1.2		17												
1.4														
1.6														
1.8		50/5												
2.0	381				1.92						1.5 / 381.34			
2.2		50/6			2						*IGM*, Red and brown, SILT, trace sand, very hard, moist **ML**			
2.4			0											
2.6					2.5									
2.8	380													
3.0														
3.2														
3.4														
3.6														
3.8	379													
4.0		50/0			4									
		50/0			4.5						4.5 / 378.34			
											Auger Refusal			

REMARKS: Rig Type: Truck CME 45c.
Cave in at 2.0'.

SPT_LOG:LOGS.GPJ:8.30.003:012512:7/21/15

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

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STATION: 140+00 OFFSET: R 28
LATITUDE: 39.083374° N LONGITUDE: 77.552411° W
SURFACE ELEVATION: 384.27 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-27-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5	384	3									0.0 / 384.27 Topsoil=3 inches **Tops**				
1.0		4	42								0.25 / 384.02 *Fill*, SILT FILL, trace sand and gravel, stiff, moist **ML**			16.2	
1.5		5													
2.0		7			2						1.0 / 383.27 *IGM*, fine to coarse, CLAYEY SAND WITH GRAVEL, very dense, moist **SC**				
2.5	382	26	100											7.6	12.1
3.0		50/6			3										
3.5															
4.0					4						4.0 / 380.27 *IGM*, White and tan, fine to coarse, SILTY SAND WITH GRAVEL, very dense, moist **SM**				
4.5	380	34	50											17.2	
5.0		50/6			5						5.0 / 379.27 Boring Terminated.				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 3.5'.

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

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STATION: 141+00 OFFSET: L 28
LATITUDE: 39.083651° N LONGITUDE: 77.552602° W
SURFACE ELEVATION: 386.5 ft COORD. DATUM: NAD 83

Date(s) Drilled: 5-22-2015
Drilling Method(s): 3.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: D. Pao
Logger: D. Hoover

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

FIELD DATA												LAB DATA			
		SOIL				ROCK									
DEPTH (ft)	ELEVATION (ft)	STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP ° STRATA	DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5	386										0.0 / 386.5 Asphalt=10.2 inches **Asph**				
1.0											0.85 / 385.65 Aggregated base=7.5 inches **CRA**				
1.5		5			1.5						1.5 / 385.0 *Residual*, White, Brown and Gray, fine to coarse, SILTY SAND, medium dense, moist **SM**				
2.0		8													
2.5	384	11	92											16.9	
3.0															
3.5		10			3.5										
4.0		7													
4.5	382	7	100									43	16	17.8	48.8
5.0		10													
5.5		9			5.5										
6.0		6													
6.5	380	7	100											29.4	
7.0		9													
7.5		9			7.5						7.5 / 379.0 Boring Terminated.				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 5.75'.

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SPT_LOGB:LOGS.GPJ:8.30.003:012512:7/21/15

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

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PAGE 1 OF 1

STATION: 142+00 OFFSET: R 45
LATITUDE: 39.083766° N LONGITUDE: 77.552340° W
SURFACE ELEVATION: 393.0 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-27-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT (LL)	PLASTICITY INDEX (PI)	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.0											0.0 / 393.0 Topsoil=1 inches **Tops**				
0.5		2									0.1 / 392.9 *Residual*, White and brown, fine to coarse, SILTY SAND, contains rock fragments, loose to medium dense, moist **SM**				
1.0	392	4	75		2									11.0	
1.5		5													
2.0		7													
2.5		3													
3.0	390	5	84		4									37.9	
3.5		9													
4.0		12													
4.5		6													
5.0	388	16	100									38	13	16.1	39.5
5.5		30													
6.0		50/5									5.5 / 387.5 *IGM*, White and brown, fine to coarse, SILTY SAND, contains rock fragments, very dense, **SM**			22.3	
6.5		50/3	100		5.92 6 6.25										
7.0	386														
7.5															
8.0		50/1	100		8 8.08						8.1 / 384.9 Boring Terminated.			6.5	

REMARKS: Rig Type: Truck CME 45c.
Offset 25' south due to slope and overhead trees. Cave in at 7.25'.

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

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STATION: 143+00 OFFSET: L 24
LATITUDE: 39.084194° N LONGITUDE: 77.552616° W
SURFACE ELEVATION: 392.43 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-22-2015
Drilling Method(s): 3.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: D. Pao
Logger: D. Hoover

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5	392	7									0.0 / 392.43 Topsoil=3 inches **Tops**				
1.0		11	59								0.25 / 392.18 *Residual*, Gray and brown, fine to coarse, CLAYEY SAND WITH GRAVEL, contains rock fragments, medium dense to very dense, moist **SC**			24.0	
1.5		15													
2.0		12			2										
2.5	390	15													
3.0		22	100									31	11	10.6	17.1
3.5		34													
4.0		48			4										
4.5	388	5												13.1	
5.0		34	85												
5.5		50/2			5.17						5.0 / 387.43 *IGM*, Gray and brown, fine to coarse, CLAYEY SAND, contains rock fragments, very dense, moist **SC**				
6.0		50/0			6						6.0 / 386.43 Boring Terminated.				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 5.5'.

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

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PAGE 1 OF 1

STATION: 144+00 OFFSET: R 28
LATITUDE: 39.084482° N LONGITUDE: 77.552468° W
SURFACE ELEVATION: 395.64 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-27-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SOIL: SAMPLE LEGEND	SOIL: SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5		3									0.0 / 395.64 Topsoil=3 inches **Tops**				
1.0		4	67								0.25 / 395.39 *Residual*, Brown and white, fine to coarse, SILTY SAND, contains rock fragments, loose to medium dense, moist **SM**			14.5	
1.5	394	7													
2.0		6			2										
2.5		2													
3.0		2	100											14.6	
3.5	392	5													
4.0		7			4										
4.5		3									4.0 / 391.64 *Residual*, Brown and white, SANDY ELASTIC SILT WITH GRAVEL, contains rock fragments, pockets of fat clays, elastic silts, stiff to hard, moist **MH**				
5.0		5	100									68	18	31.2	51.6
5.5		6													
6.0	390	10			6										
6.5		4													
7.0		15	100											33.1	
7.5		19													
8.0	388	26			8						8.0 / 387.64 Boring Terminated.				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 6.25'.

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

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STATION: 145+00 OFFSET: L 28
LATITUDE: 39.084733° N LONGITUDE: 77.552712° W
SURFACE ELEVATION: 392.16 ft COORD. DATUM: NAD 83

Date(s) Drilled: 5-22-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: M. Vargas
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LAB: LIQUID LIMIT (LL)	LAB: PLASTICITY INDEX (PI)	LAB: MOISTURE CONTENT (%)	LAB: FINES CONTENT #200 (%)
0.5	392	9									0.0 / 392.16 *Fill*, Brown and gray, SILTY SAND WITH GRAVEL FILL, medium dense, moist **SM**				
1.0		9	67											10.4	
1.5		12													
2.0	390	20			2										
2.5		6									2.0 / 390.16 *Fill*, Brown and gray, medium to coarse, CLAYEY GRAVEL, medium dense to dense, moist **GC**				
3.0		7	25									32	10	13.6	29.9
3.5		6													
4.0	388	6			4										
4.5		5													
5.0		14	59											11.8	
5.5		27													
6.0	386	33			6										
6.5		49	100		6.58						6.0 / 386.16 *IGM*, Tan and orange, fine, POORLY-GRADED GRAVEL WITH SILT AND SAND, very dense, moist **GP**			15.4	
		50/1									6.6 / 385.56 Auger Refusal				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 5.5'.

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

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PAGE 1 OF 1

STATION: 146+00 OFFSET: R 31
LATITUDE: 39.085031° N LONGITUDE: 77.552569° W
SURFACE ELEVATION: 388.84 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-27-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5											0.0 / 388.84 Asphalt=6.6 inches **Asph**				
1.0	388										0.55 / 388.29 Aggregated base=7.5 inches **CRA**				
1.5		10			1.2						1.2 / 387.64 *Residual*, Brown and tan, fine to coarse, SILTY CLAYEY SAND, medium dense, moist **SC-SM**				
2.0		8	100												
2.5		6												25.4	
3.0	386	6			3.2										
3.5		5									3.2 / 385.64 *IGM*, Brown and tan, fine to coarse, SILTY CLAYEY SAND, contains rock fragments, very dense, moist **SC-SM**				
4.0		29	100									25	4	6.2	22.8
4.5		40													
5.0	384	50/6			5.2										
5.5		26													
6.0		25	75											16.1	
		28													
		50/6			7.2						7.2 / 381.64 Boring Terminated.				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 5.25'.

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

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PAGE 1 OF 1

STATION: 147+00 OFFSET: L 31
LATITUDE: 39.085267° N LONGITUDE: 77.552854° W
SURFACE ELEVATION: 384.99 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-22-2015
Drilling Method(s): 3.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: D. Pao
Logger: D. Hoover

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SOIL: SAMPLE LEGEND	SOIL: SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT (LL)	PLASTICITY INDEX (PI)	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.5		3									0.0 / 384.99 Topsoil=3 inches **Tops**				
1.0	384	3	67								0.25 / 384.74 *Fill*, Gray and brown, LEAN CLAY WITH GRAVEL FILL, firm, moist **CL**			19.0	
1.5		3													
2.0		3			2										
2.5		3									2.0 / 382.99 *Residual*, Brown and mottled, FAT CLAY, firm, moist **CH**				
3.0	382	5	67									68	42	29.7	89.6
3.5		3													
4.0		4			4										
4.5		2													
5.0	380	2	84											35.2	
5.5		4													
6.0		7			6										
6.5		2									6.0 / 378.99 *Residual*, Brown and orange, SANDY SILT, stiff, moist **ML**				
7.0	378	4	84											19.7	
7.5		7													
8.0		9			8						8.0 / 376.99 Boring Terminated.				

REMARKS: Rig Type: Truck CME 45c.
Cave in at 6.25'.

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: ROADWAY

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STATION: 147+00 OFFSET: R 55
LATITUDE: 39.085314° N LONGITUDE: 77.552557° W
SURFACE ELEVATION: 391.42 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-28-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
0.5		4									0.0 / 391.42 Topsoil=4 inches **Tops**			
1.0		5	84								0.3 / 391.12 *Residual*, Brown and tan, SILT, trace sand, stiff, moist **ML**			13.7
1.5	390	7												
2.0		12			2									
2.5		20	81								2.0 / 389.42 *IGM*, Gray and tan, fine, POORLY-GRADED GRAVEL WITH SILT AND SAND, very dense, moist **GP**			4.5
3.0		50/4			2.83									
3.5	388													
4.0		50/1	0		4 4.08						4.1 / 387.32 Auger Refusal			

REMARKS: Rig Type: Truck CME 45c.
Cave in at 3.0'.

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: SWM 8-2

SWM-01A
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STATION: 125+00 OFFSET: R 89
LATITUDE: 39.079328° N LONGITUDE: 77.553045° W
SURFACE ELEVATION: 358.64 ft COORD. DATUM: NAD 83

Date(s) Drilled: 5-28-2015
Drilling Method(s): 2.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Stein

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
DRY AFTER 24 HRS

FIELD DATA													LAB DATA			
		SOIL				ROCK										
DEPTH (ft)	ELEVATION (ft)	STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP ° STRATA	DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA		LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
													LL	PI		
0.5	358	3 14	75								0.0 / 358.64 Topsoil=4 inches **Tops** 0.3 / 358.34 *Residual*, Brown and black, fine to medium, SANDY LEAN CLAY, very stiff, moist **CL**				17.6	
1.0																
1.5		7 12														
2.0					2											
2.5	356	10 10									2.0 / 356.64 *Residual*, Brown and tan, SILT, very stiff, moist **ML**					
3.0			100												15.0	
3.5		14 16														
4.0					4											
4.5	354	18 50/6	67								4.5 / 354.14 *IGM*, Gray and tan, POORLY-GRADED SAND WITH CLAY AND GRAVEL, very dense, dry **SP-SC**		27	9	7.0	11.6
5.0					5											
5.5																
6.0		50/6	100		6										2.3	
6.5	352				6.5											
7.0																
7.5																
8.0		50/0			8						8.0 / 350.64 Boring Terminated.					

REMARKS: Rig Type: Truck CME 45c.
Cave in at 6.0'.

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: SWM 8-2

SWM-02A
PAGE 1 OF 1

STATION: 125+50 OFFSET: R 86.5
LATITUDE: 39.079463° N LONGITUDE: 77.552999° W
SURFACE ELEVATION: 356.72 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-30-2015
Drilling Method(s): 3.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Hoover

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
DRY AFTER 24 HRS

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
0.5		1									0.0 / 356.72 Topsoil=4 inches **Tops**			
1.0	356	5	50								0.3 / 356.42 *Residual,* Brown, SILT WITH SAND, contains rock fragments, stiff, moist **ML**			5.9
1.5		9												
2.0		9			2									
2.5		6									2.0 / 354.72 *Residual,* Brown, LEAN CLAY, trace sand, contains rock fragments, stiff, moist **CL**			
3.0	354	5	50											16.3
3.5		10												
4.0		10			4									
4.5		31									4.0 / 352.72 *IGM,* Brown, LEAN CLAY, trace sand, contains rock fragments, very hard, moist **CL**			
5.0	352	50/6	42		5									11.4
5.5														
6.0		50/1	0		6 6.08						6.1 / 350.62 Auger Refusal			

REMARKS: Rig Type: Truck CME 45c.
Cave in at 4.75'.

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SPT_LOG:LOGS.GPJ:8.30.003:012512:7/24/15

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PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: Detention Facility

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STATION: 127+00 OFFSET: R 108
LATITUDE: 39.079842° N LONGITUDE: 77.552957° W
SURFACE ELEVATION: 358.13 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-30-2015
Drilling Method(s): 3.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Hoover

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
DRY AFTER 24 HRS

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
0.0	358	1									0.0 / 358.13 Topsoil=4 inches **Tops**			
0.5		5									0.3 / 357.83 *Residual*, Brown, LEAN CLAY, trace sand, contains rock fragments, stiff to very hard, **CL**			
1.0		6	46											13.8
1.5		5												
2.0	356	6			2									
2.5		30	113											9.1
3.0		50/4			3.33									
3.5														
4.0	354	50/2	100		4 4.17						4.0 / 354.13 *IGM*, Brown, LEAN CLAY, trace sand, contains rock fragments, very hard, **CL**			6.4
4.5														
5.0		50/1	100		5 5.08						5.1 / 353.03 Auger Refusal			
5.5														
6.0														

REMARKS: Rig Type: Truck CME 45c.
Cave in at 4.0'.

PAGE 1 OF 1
SWM-03

SPT_LOG:LOGS.GPJ:8.30.003:012512:7/24/15

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VDOT Virginia Department of Transportation

PROJECT #: U000-253-312 P101,R201, C501
LOCATION: Leesburg, VA
STRUCTURE: Detention Facility

SWM-04
PAGE 1 OF 1

STATION: 128+23 OFFSET: R 104
LATITUDE: 39.080173° N LONGITUDE: 77.552921° W
SURFACE ELEVATION: 364.33 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 5-30-2015
Drilling Method(s): 3.25 in HSA
SPT Method: Automatic
Other Test(s):
Driller: R. Balbuena
Logger: D. Hoover

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
DRY AFTER 24 HRS

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
0.5	364	3									0.0 / 364.33 Topsoil=4 inches **Tops**			
1.0		3	50								0.3 / 364.03 *Residual*, Brown, LEAN CLAY, trace sand, contains rock fragments, stiff to very hard, **CL**			16.1
1.5		6												
2.0		6			2									
2.5	362	30	69											11.3
3.0		50/4			3.33									
3.5											3.4 / 360.93 *IGM*, Brown, LEAN CLAY, trace sand, contains rock fragments, very hard, **CL**			
4.0		50/6			4									
4.5	360		100		4.5									4.8
5.0														
5.5														
6.0		50/1	100		6 6.08						6.1 / 358.23 Auger Refusal			

REMARKS: Rig Type: Truck CME 45c.
Cave in at 4.25'.

PAGE 1 OF 1
SWM-04

SPT_LOG:LOGS.GPJ:8.30.003:012512:7/24/15

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APPENDIX C LABORATORY TESTING

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SUMMARY OF LABORATORY RESULTS

CLIENT Rinker Design Associates, P. C.

PROJECT NAME Sycolin Road Widening Phase IV

PROJECT NUMBER 01.02095.01

PROJECT LOCATION Leesburg, Virginia

Sample ID	Depth (FT)	Liquid Limit	Plastic Limit	Plasticity Index	%<#200 Sieve	Water Content (%)	Proctor Method	Max Dry Density (pcf)	Optimum Moisture (%)	Oversize Fraction (%)	Sample Description/Classification
CL-01-1	0.0 - 2.0					6.0					
CL-01-2	2.0 - 4.0					20.5					
CL-01-3	4.0 - 6.0					22.6					
CL-01-4	6.0 - 8.0	56	26	30	71.5	23.9					Light brown, Fat Clay With Sand (**CH**)
CL-01-5	8.0 - 10.0	27	14	13	16.5	7.6					Gray, Clayey Gravel With Sand (**GC**)
CL-02-1	0.0 - 2.0					14.7					
CL-02-2	2.0 - 4.0					15.0					
CL-02-3	4.0 - 6.0					21.0					
CL-02-4	6.0 - 8.0	37	23	14	36.6	20.9					Brown, Clayey Gravel With Sand (**GC**)
CL-03-1	0.0 - 2.0					9.2					
CL-03-2	2.0 - 4.0					22.7					
CL-03-3	4.0 - 6.0					18.3					
CL-03-4	6.0 - 8.0					14.9					
CL-03-5	8.0 - 10.0					12.5					
RD-01-1	0.0 - 2.0					5.9					
RD-01-2	2.0 - 4.0	25	15	10	20.6	8.9					Red, Clayey Sand (**SC**)
RD-01	2.0 - 5.0	29	16	13	26.4	12.7	VTM1	130.1	10.8	No. 4-15.0 %	Red, Clayey Sand (**SC**)
RD-01-3	4.0 - 6.0					8.5					
RD-01-4	6.0 - 8.0					15.0					
RD-02-1	0.0 - 2.0					9.9					
RD-02-2	2.0 - 4.0	25	21	4	54.3	11.2					Dark brown, Sandy Silty Clay With Gravel (**CL-ML**)
RD-02-3	4.0 - 6.0					7.9					
RD-02-4	6.0 - 8.0					13.5					
RD-03-1	0.0 - 2.0					4.6					
RD-03-2	2.0 - 4.0					9.4					
RD-03-3	4.0 - 6.0	27	19	8	22.7	9.5					Dark brown, Clayey Sand (**SC**)
RD-03-4	6.0 - 8.0					5.5					
RD-04-1	0.0 - 2.0					20.6					
RD-04-2	2.0 - 4.0	26	20	6	31.5	10.6					Reddish brown, Silty, Clayey Gravel With Sand (**GC-GM**)
RD-04-3	4.0 - 6.0					11.9					

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SUMMARY OF LABORATORY RESULTS

CLIENT Rinker Design Associates, P. C.

PROJECT NAME Sycolin Road Widening Phase IV

PROJECT NUMBER 01.02095.01

PROJECT LOCATION Leesburg, Virginia

Sample ID	Depth (FT)	Liquid Limit	Plastic Limit	Plasticity Index	%<#200 Sieve	Water Content (%)	Proctor Method	Max Dry Density (pcf)	Optimum Moisture (%)	Oversize Fraction (%)	Sample Description/Classification
RD-05-1	0.0 - 2.0					12.9					
RD-05-2	2.0 - 4.0	28	19	9	18.3	9.4					Brown, Clayey Gravel With Sand (**GC**)
RD-06-1	0.0 - 2.0					11.5					
RD-06	1.0 - 4.0	27	17	10	60.3	20.7	VTM1	118.8	13.0	No. 4-8.9 %	Brown, Sandy Lean Clay (**CL**)
RD-06-2	2.0 - 4.0					11.3					
RD-06-3	4.0 - 6.0	NP	NP	NP	7.6	4.2					Gray, Poorly Graded Gravel With Silt And Sand (**GP-GM**)
RD-07-1	0.0 - 2.0					4.4					
RD-07-2	2.0 - 4.0					4.1					
RD-08-1	0.0 - 2.0					11.2					
RD-08-2	2.0 - 4.0	28	19	9	28.8	10.9					Brown, Clayey Gravel With Sand (**GC**)
RD-08-3	4.0 - 6.0					25.5					
RD-09-1	0.0 - 2.0					8.9					
RD-09-2	2.0 - 4.0	25	17	8	20.3	5.9					Brown, Clayey Gravel With Sand (**GC**)
RD-09-2	4.0 - 4.3					6.5					
RD-10-1	0.0 - 2.0					19.5					
RD-10-2	2.0 - 4.0					38.1					
RD-10-3	4.0 - 6.0	56	43	13	45.5	29.4					Brown, Silty Sand (**SM**)
RD-10-4	6.0 - 8.0					18.9					
RD-11-1	0.0 - 2.0					10.0					
RD-11-2	2.0 - 4.0	29	22	7	38.0	14.7					Brown, Silty, Clayey Sand (**SC-SM**)
RD-11	2.0 - 5.0	31	21	10	41.0	12.6	VTM1	135.7	8.9	No. 4-22.1 %	Brown, Clayey Sand With Gravel (**SC**)
RD-11-3	4.0 - 6.0					25.3					
RD-12-1	0.0 - 2.0					12.0					
RD-12-2	2.0 - 4.0					17.2					
RD-12-3	4.0 - 6.0	28	19	9	76.7	19.9					Light brown, Lean Clay With Sand (**CL**)
RD-12-4	6.0 - 8.0					18.6					
RD-13-1	0.0 - 2.0					10.1					
RD-13-2	2.0 - 4.0					33.9					
RD-13-3	4.0 - 6.0	NP	NP	NP	8.6	6.1					Gray, Poorly Graded Sand With Silt And Gravel (**SP-SM**)
RD-14-1	0.0 - 2.0					9.3					

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SUMMARY OF LABORATORY RESULTS

CLIENT Rinker Design Associates, P. C.

PROJECT NAME Sycolin Road Widening Phase IV

PROJECT NUMBER 01.02095.01

PROJECT LOCATION Leesburg, Virginia

Sample ID	Depth (FT)	Liquid Limit	Plastic Limit	Plasticity Index	%<#200 Sieve	Water Content (%)	Proctor Method	Max Dry Density (pcf)	Optimum Moisture (%)	Oversize Fraction (%)	Sample Description/Classification
RD-14-2	2.0 - 4.0	28	19	9	22.5	9.4					Brown, Clayey Sand (**SC**)
RD-14-3	4.0 - 6.0					5.0					
RD-14-4	6.0 - 8.0					5.9					
RD-15-1	0.0 - 2.0					8.9					
RD-15-2	2.0 - 4.0					26.9					
RD-15-3	4.0 - 6.0	34	26	8	45.3	21.9					Brown, Silty Sand (**SM**)
RD-15-4	6.0 - 8.0					17.1					
RD-16-1	0.0 - 2.0					7.7					
RD-16-2	2.0 - 2.3					8.8					
RD-17-1	0.0 - 2.0					9.8					
RD-17-2	2.0 - 2.4					6.3					
RD-18-1	0.0 - 2.0					14.9					
RD-18-2	2.0 - 4.0					6.1					
RD-18-3	4.0 - 6.0	NP	NP	NP	27.4	7.5					Tan, Silty Sand With Gravel (**SM**)
RD-19-1	0.0 - 2.0					2.5					
RD-19-2	2.0 - 4.0	35	20	15	58.8	17.8					Sandy Lean Clay With Gravel (**CL**)
RD-19-3	4.0 - 6.0					23.6					
RD-19-4	6.0 - 8.0	46	27	19	36.9	21.4					Light brown, Clayey Sand (**SC**)
RD-20-1	0.0 - 2.0					10.3					
RD-20-2	2.0 - 4.0	25	17	8	32.8	13.1					Gray, Clayey Gravel With Sand (**GC**)
RD-20-3	4.0 - 6.0	52	31	21	96.0	28.4					Brown, Elastic Silt (**MH**)
RD-21-1	0.0 - 2.0					20.5					
RD-22-1	0.0 - 2.0					16.2					
RD-22	1.0 - 4.0	33	18	15	43.3	7.5	VTM1	130.9	9.4	No. 4-21.6 %	Brown, Clayey Sand With Gravel (**SC**)
RD-22-2	2.0 - 4.0	NP	NP	NP	12.1	7.6					Gray, Silty Sand With Gravel (**SM**)
RD-22-3	4.0 - 6.0					17.2					
RD-23-1	1.5 - 3.5					16.9					
RD-23-2	3.5 - 5.5	43	27	16	48.8	17.8					Gray, Silty Sand (**SM**)
RD-23-3	5.5 - 7.5					29.4					
RD-24-1	0.0 - 2.0					11.0					

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SUMMARY OF LABORATORY RESULTS

CLIENT Rinker Design Associates, P. C.

PROJECT NAME Sycolin Road Widening Phase IV

PROJECT NUMBER 01.02095.01

PROJECT LOCATION Leesburg, Virginia

Sample ID	Depth (FT)	Liquid Limit	Plastic Limit	Plasticity Index	%<#200 Sieve	Water Content (%)	Proctor Method	Max Dry Density (pcf)	Optimum Moisture (%)	Oversize Fraction (%)	Sample Description/Classification
RD-24-2	2.0 - 4.0					37.9					
RD-24-3	4.0 - 6.0	38	25	13	39.5	16.1					Gray, Silty Sand (**SM**)
RD-24-4	6.0 - 8.0					22.3					
RD-24-5	8.0 - 10.0					6.5					
RD-25-1	0.0 - 2.0					24.0					
RD-25-2	2.0 - 4.0	31	20	11	17.1	10.6					Brown, Clayey Sand With Gravel (**SC**)
RD-25-3	4.0 - 5.2					13.1					
RD-26-1	0.0 - 2.0					14.5					
RD-26-2	2.0 - 4.0					14.6					
RD-26-3	4.0 - 6.0	68	50	18	51.6	31.2					Gray, Sandy Elastic Silt With Gravel (**MH**)
RD-26-4	6.0 - 8.0					33.1					
RD-27-1	0.0 - 2.0					10.4					
RD-27-2	2.0 - 4.0	32	22	10	29.9	13.6					Brown, Clayey Gravel (**GC**)
RD-27	2.0 - 5.0	28	18	10	44.1	7.4	VTM1	127.7	10.4	No. 4-24.0 %	Brown, Clayey Sand With Gravel (**SC**)
RD-27-3	4.0 - 6.0					11.8					
RD-27-4	6.0 - 8.0					15.4					
RD-28-1	0.0 - 2.0					25.4					
RD-28-2	2.0 - 4.0	25	21	4	22.8	6.2					Brown, Silty, Clayey Sand (**SC-SM**)
RD-28-3	4.0 - 6.0					16.1					
RD-29-1	0.0 - 2.0					19.0					
RD-29-2	2.0 - 4.0	68	26	42	89.6	29.7					Light brown, Fat Clay (**CH**)
RD-29-3	4.0 - 6.0					35.2					
RD-29-4	6.0 - 8.0					19.7					
RD-30-1	0.0 - 2.0					13.7					
RD-30-2	2.0 - 4.0					4.5					
SWM-01A-1	0.0 - 2.0					17.6					
SWM-01A-2	2.0 - 4.0					15.0					
SWM-01A-3	4.0 - 6.0	27	18	9	11.6	7.0					Brown, Poorly Graded Sand With Clay And Gravel (**SP-SC**)
SWM-01A-4	6.0 - 6.5					2.3					
SWM-02A-1	0.0 - 2.0					5.9					

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SUMMARY OF LABORATORY RESULTS

CLIENT Rinker Design Associates, P. C.

PROJECT NAME Sycolin Road Widening Phase IV

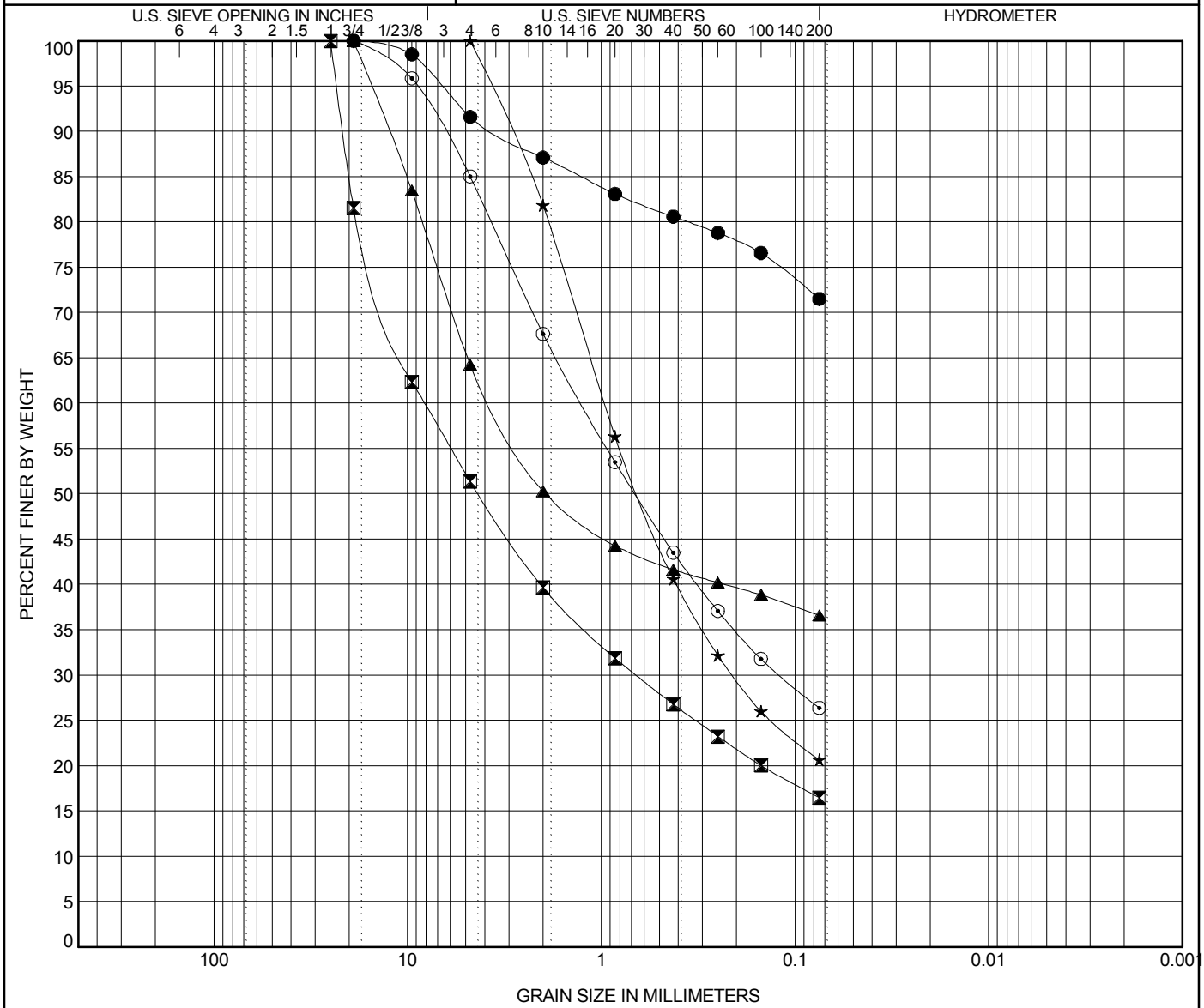
PROJECT NUMBER 01.02095.01

PROJECT LOCATION Leesburg, Virginia

Sample ID	Depth (FT)	Liquid Limit	Plastic Limit	Plasticity Index	%<#200 Sieve	Water Content (%)	Proctor Method	Max Dry Density (pcf)	Optimum Moisture (%)	Oversize Fraction (%)	Sample Description/Classification
SWM-02A-2	2.0 - 4.0					16.3					
SWM-02A-3	4.0 - 6.0					11.4					
SWM-03-1	0.0 - 2.0					13.8					
SWM-03-2	2.0 - 4.0					9.1					
SWM-03-3	4.0 - 4.2					6.4					
SWM-04-1	0.0 - 2.0					16.1					
SWM-04-2	2.0 - 4.0					11.3					
SWM-04-3	4.0 - 4.5					4.8					

PROJECT NAME: Sycolin Road Widening Phase IV
PROJECT NO.: 01.02095.01
LOCATION: Leesburg, Virginia
CLIENT: Rinker Design Associates, P. C.

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

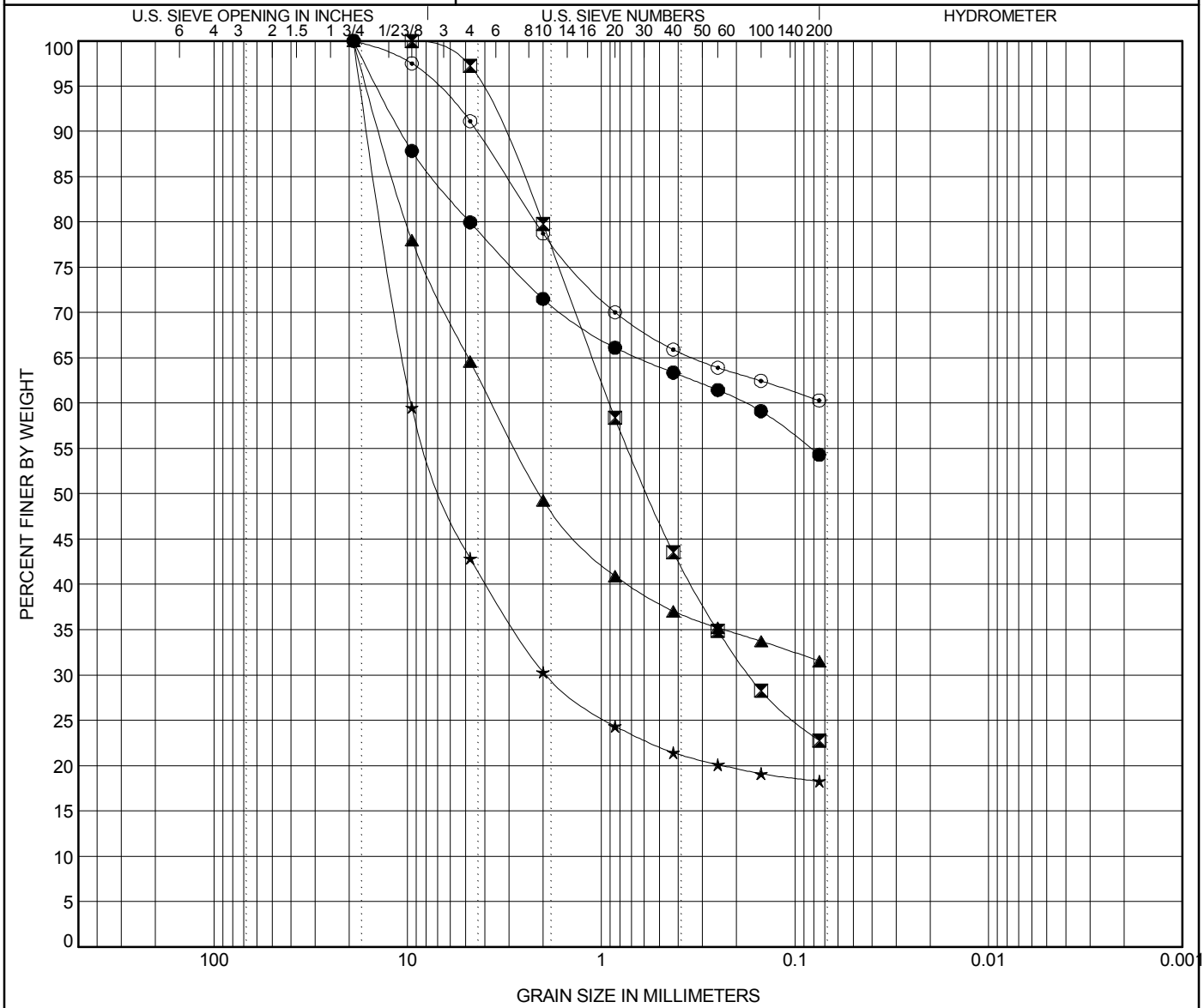
	SAMPLE	DEPTH (FT)	SAMPLE DESCRIPTION	LL	PL	PI
●	**CL-01-4**	**6.0-8.0**	Light brown, Fat Clay With Sand (**CH**)	**56**	**26**	**30**
⧓	**CL-01-5**	**8.0-10.0**	Gray, Clayey Gravel With Sand (**GC**)	**27**	**14**	**13**
▲	**CL-02-4**	**6.0-8.0**	Brown, Clayey Gravel With Sand (**GC**)	**37**	**23**	**14**
★	**RD-01-2**	**2.0-4.0**	Red, Clayey Sand (**SC**)	**25**	**15**	**10**
⊙	**RD-01**	**2.0-5.0**	Red, Clayey Sand (**SC**)	**29**	**16**	**13**

			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**CL-01**	**6.0-8.0**	**19**				**8.4**	**20.1**	**71.5**	
⧓	**CL-01**	**8.0-10.0**	**25**	**8.198**	**0.66**		**48.6**	**34.9**	**16.5**	
▲	**CL-02**	**6.0-8.0**	**19**	**3.652**			**35.8**	**27.7**	**36.6**	
★	**RD-01**	**2.0-4.0**	**4.75**	**0.961**	**0.209**		**0.0**	**79.4**	**20.6**	
⊙	**RD-01**	**2.0-5.0**	**19**	**1.26**	**0.12**		**15.0**	**58.7**	**26.4**	

GRAIN SIZE 6/29/15

PROJECT NAME: Sycolin Road Widening Phase IV
PROJECT NO.: 01.02095.01
LOCATION: Leesburg, Virginia
CLIENT: Rinker Design Associates, P. C.

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

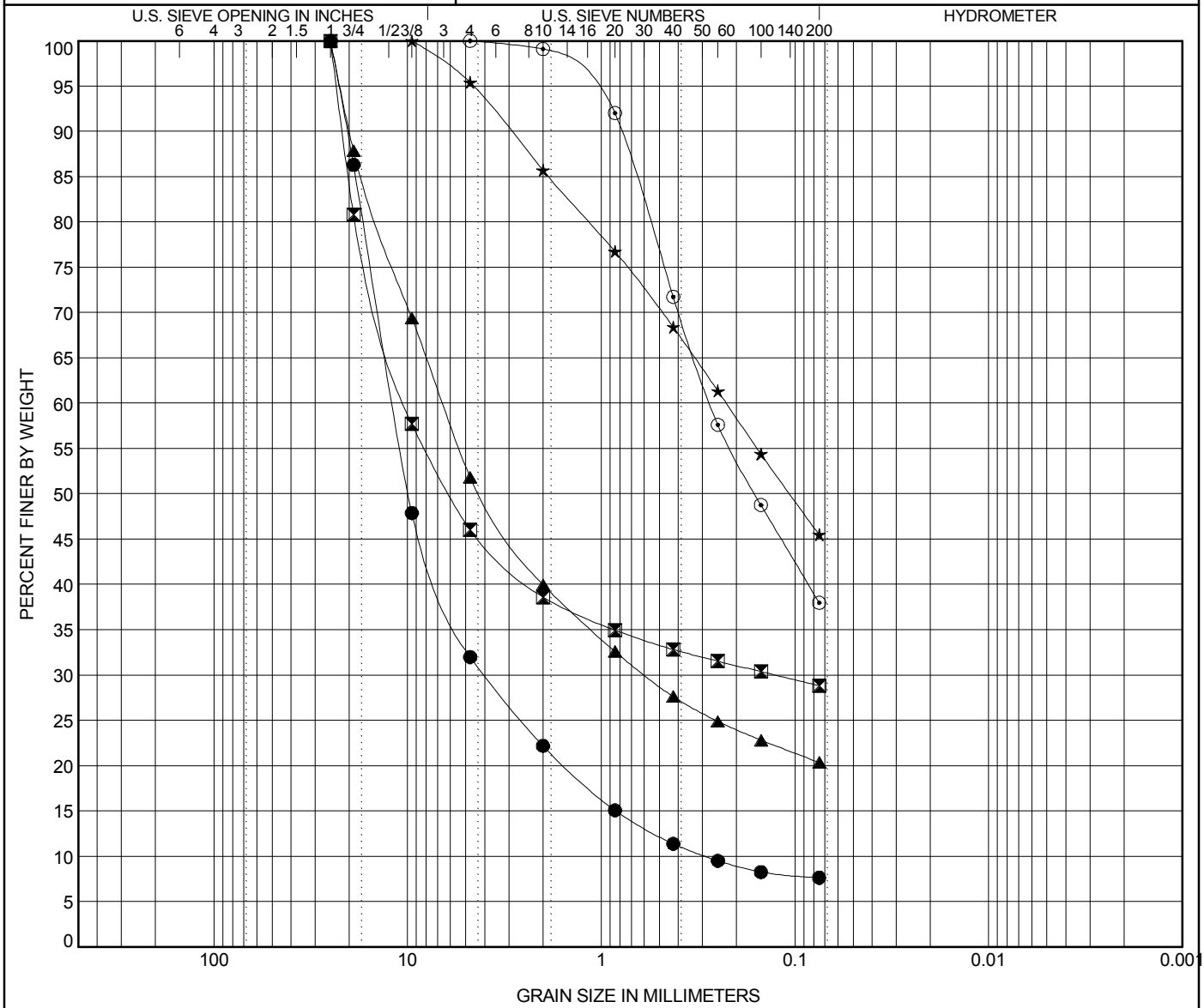
	SAMPLE	DEPTH (FT)	SAMPLE DESCRIPTION	LL	PL	PI
●	**RD-02-2**	**2.0-4.0**	Dark brown, Sandy Silty Clay With Gravel (**CL-ML**)	**25**	**21**	**4**
⧓	**RD-03-3**	**4.0-6.0**	Dark brown, Clayey Sand (**SC**)	**27**	**19**	**8**
▲	**RD-04-2**	**2.0-4.0**	Reddish brown, Silty, Clayey Gravel With Sand (**GC-GM**)	**26**	**20**	**6**
★	**RD-05-2**	**2.0-4.0**	Brown, Clayey Gravel With Sand (**GC**)	**28**	**19**	**9**
⊙	**RD-06**	**1.0-4.0**	Brown, Sandy Lean Clay (**CL**)	**27**	**17**	**10**

			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**RD-02**	**2.0-4.0**	**19**	**0.182**			**20.0**	**25.7**	**54.3**	
⧓	**RD-03**	**4.0-6.0**	**9.5**	**0.907**	**0.172**		**2.7**	**74.5**	**22.7**	
▲	**RD-04**	**2.0-4.0**	**19**	**3.662**			**35.4**	**33.1**	**31.5**	
★	**RD-05**	**2.0-4.0**	**19**	**9.579**	**1.914**		**57.1**	**24.6**	**18.3**	
⊙	**RD-06**	**1.0-4.0**	**19**				**8.9**	**30.8**	**60.3**	

GRAIN SIZE 6/29/15

PROJECT NAME: Sycolin Road Widening Phase IV
PROJECT NO.: 01.02095.01
LOCATION: Leesburg, Virginia
CLIENT: Rinker Design Associates, P. C.

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

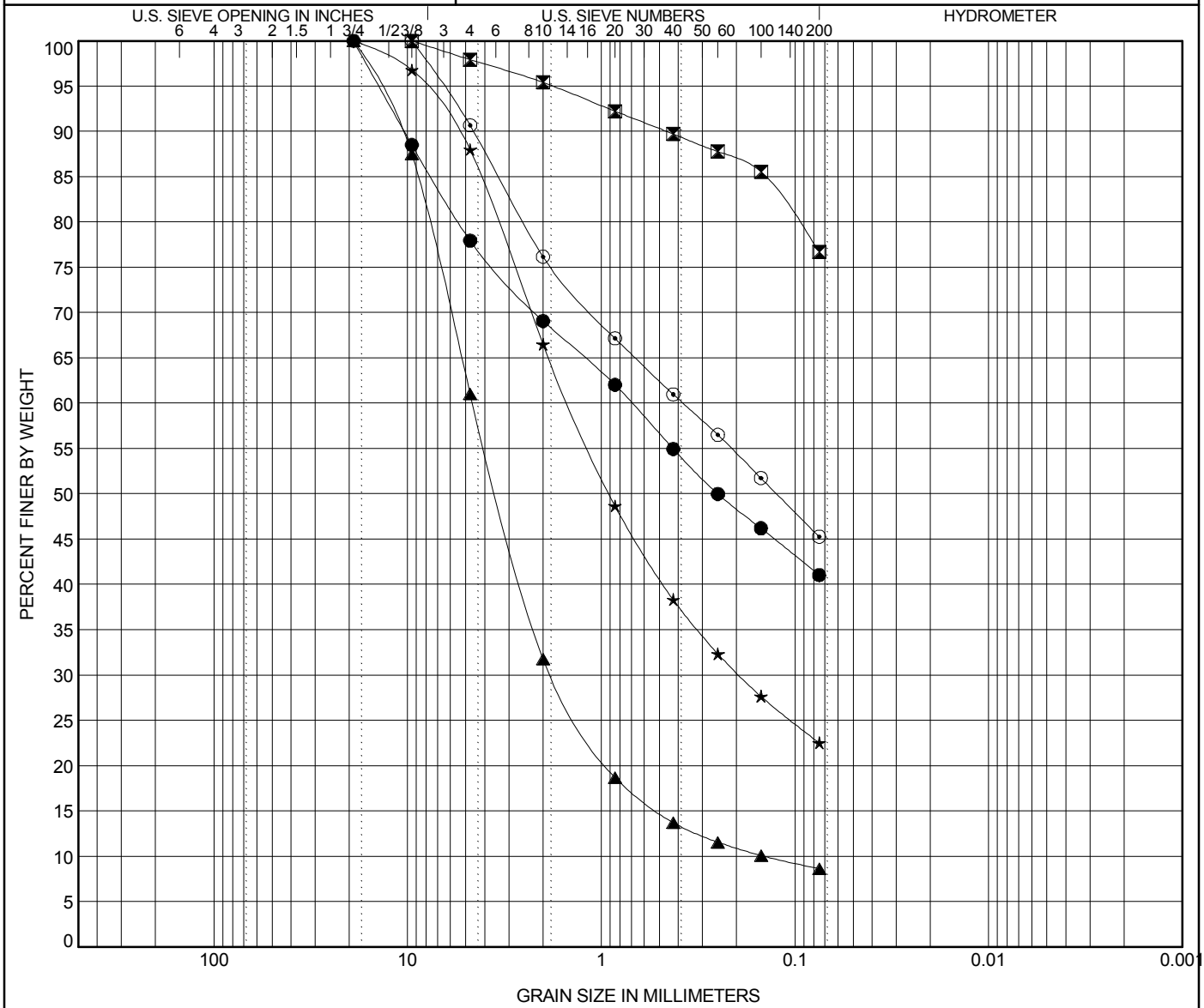
	SAMPLE	DEPTH (FT)	SAMPLE DESCRIPTION	LL	PL	PI
●	**RD-06-3**	**4.0-6.0**	Gray, Poorly Graded Gravel With Silt And Sand (**GP-GM**)	**NP**	**NP**	**NP**
⧓	**RD-08-2**	**2.0-4.0**	Brown, Clayey Gravel With Sand (**GC**)	**28**	**19**	**9**
▲	**RD-09-2**	**2.0-4.0**	Brown, Clayey Gravel With Sand (**GC**)	**25**	**17**	**8**
★	**RD-10-3**	**4.0-6.0**	Brown, Silty Sand (**SM**)	**56**	**43**	**13**
⊙	**RD-11-2**	**2.0-4.0**	Brown, Silty, Clayey Sand (**SC-SM**)	**29**	**22**	**7**

			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**RD-06-3**	**4.0-6.0**	**25**	**11.822**	**3.99**	**0.289**	**68.0**	**24.4**	**7.6**	
⧓	**RD-08-2**	**2.0-4.0**	**25**	**10.176**	**0.127**		**54.0**	**17.2**	**28.8**	
▲	**RD-09-2**	**2.0-4.0**	**25**	**6.56**	**0.593**		**48.2**	**31.5**	**20.3**	
★	**RD-10-3**	**4.0-6.0**	**9.5**	**0.226**			**4.6**	**49.9**	**45.5**	
⊙	**RD-11-2**	**2.0-4.0**	**4.75**	**0.273**			**0.0**	**62.0**	**38.0**	

GRAIN SIZE 6/29/15

PROJECT NAME: Sycolin Road Widening Phase IV
PROJECT NO.: 01.02095.01
LOCATION: Leesburg, Virginia
CLIENT: Rinker Design Associates, P. C.

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

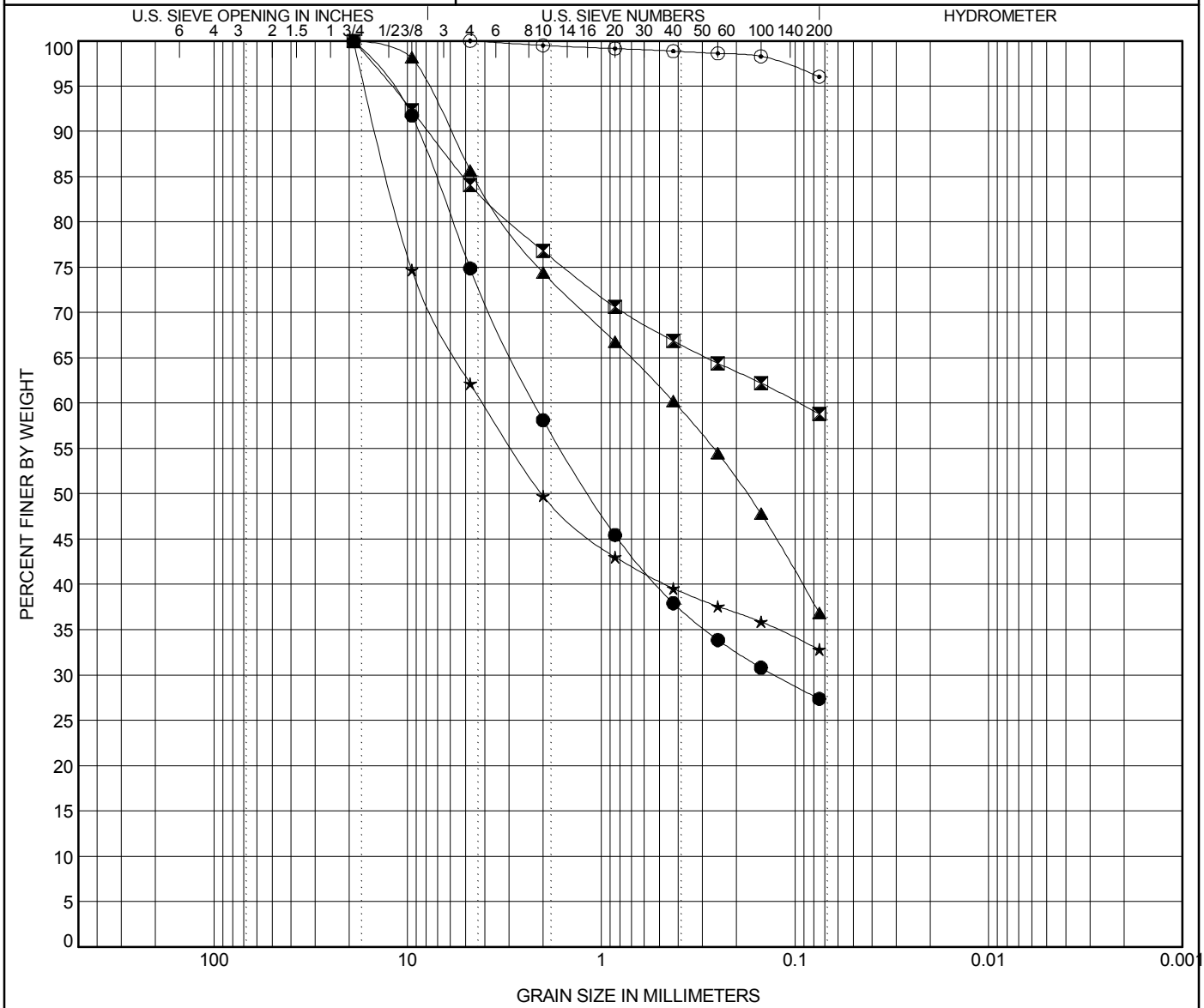
	SAMPLE	DEPTH (FT)	SAMPLE DESCRIPTION	LL	PL	PI
●	**RD-11**	**2.0-5.0**	Brown, Clayey Sand With Gravel (**SC**)	**31**	**21**	**10**
⧓	**RD-12-3**	**4.0-6.0**	Light brown, Lean Clay With Sand (**CL**)	**28**	**19**	**9**
▲	**RD-13-3**	**4.0-6.0**	Gray, Poorly Graded Sand With Silt And Gravel (**SP-SM**)	**NP**	**NP**	**NP**
★	**RD-14-2**	**2.0-4.0**	Brown, Clayey Sand (**SC**)	**28**	**19**	**9**
⊙	**RD-15-3**	**4.0-6.0**	Brown, Silty Sand (**SM**)	**34**	**26**	**8**

			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**RD-11-**	**2.0-5.0**	**19**	**0.697**			**22.1**	**36.9**	**41.0**	
⧓	**RD-12-3**	**4.0-6.0**	**9.5**				**2.1**	**21.2**	**76.7**	
▲	**RD-13-3**	**4.0-6.0**	**19**	**4.61**	**1.783**	**0.145**	**39.0**	**52.4**	**8.6**	
★	**RD-14-2**	**2.0-4.0**	**19**	**1.464**	**0.194**		**12.0**	**65.5**	**22.5**	
⊙	**RD-15-3**	**4.0-6.0**	**9.5**	**0.379**			**9.3**	**45.4**	**45.3**	

GRAIN SIZE 6/29/15

PROJECT NAME: Sycolin Road Widening Phase IV
PROJECT NO.: 01.02095.01
LOCATION: Leesburg, Virginia
CLIENT: Rinker Design Associates, P. C.

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

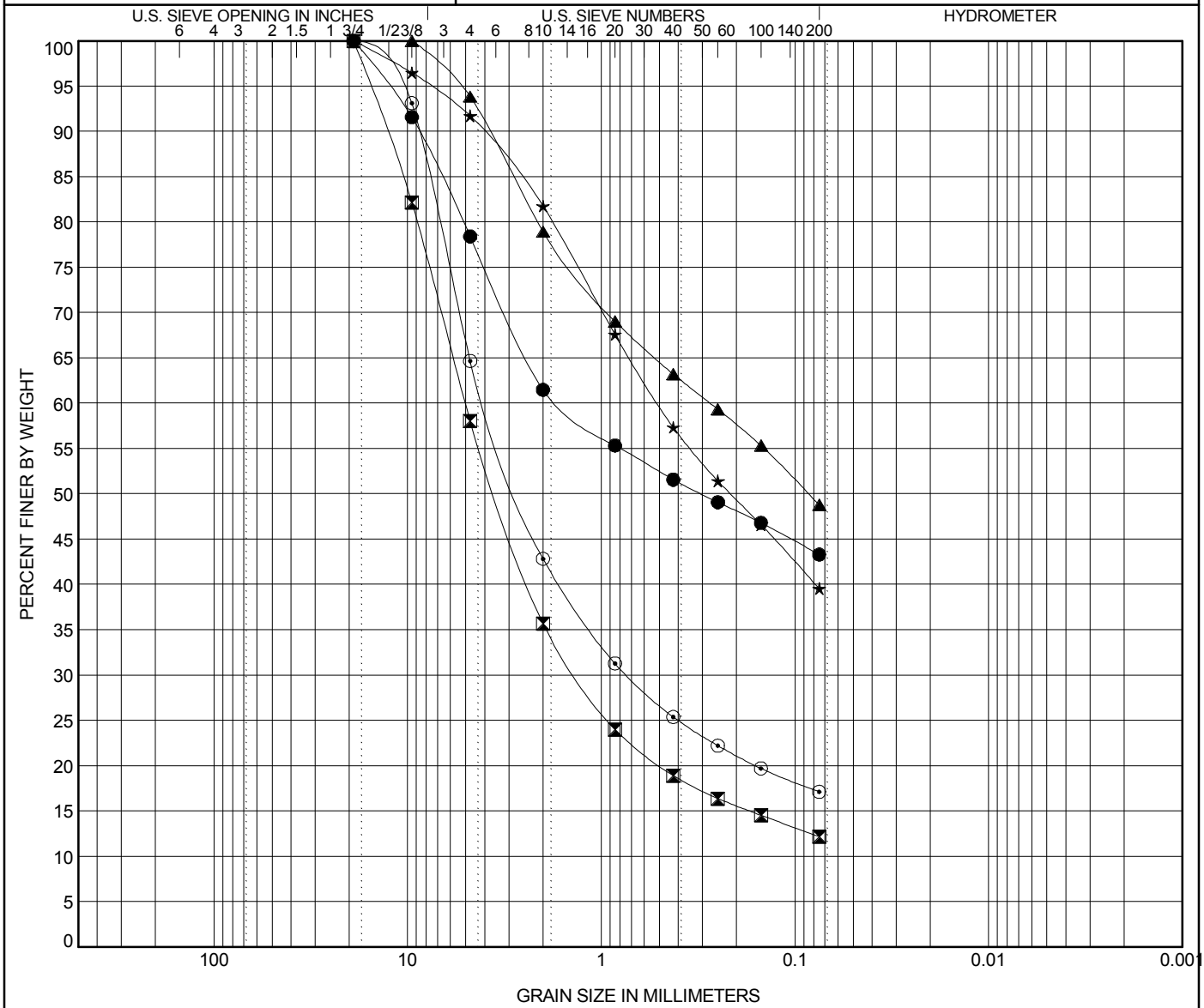
	SAMPLE	DEPTH (FT)	SAMPLE DESCRIPTION	LL	PL	PI
●	**RD-18-3**	**4.0-6.0**	Tan, Silty Sand With Gravel (**SM**)	**NP**	**NP**	**NP**
⧓	**RD-19-2**	**2.0-4.0**	Sandy Lean Clay With Gravel (**CL**)	**35**	**20**	**15**
▲	**RD-19-4**	**6.0-8.0**	Light brown, Clayey Sand (**SC**)	**46**	**27**	**19**
★	**RD-20-2**	**2.0-4.0**	Gray, Clayey Gravel With Sand (**GC**)	**25**	**17**	**8**
⊙	**RD-20-3**	**4.0-6.0**	Brown, Elastic Silt (**MH**)	**52**	**31**	**21**

			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**RD-18-3**	**4.0-6.0**	**19**	**2.203**	**0.128**		**25.1**	**47.5**	**27.4**	
⧓	**RD-19-2**	**2.0-4.0**	**19**	**0.095**			**15.9**	**25.3**	**58.8**	
▲	**RD-19-4**	**6.0-8.0**	**19**	**0.416**			**14.3**	**48.8**	**36.9**	
★	**RD-20-2**	**2.0-4.0**	**19**	**4.084**			**37.8**	**29.4**	**32.8**	
⊙	**RD-20-3**	**4.0-6.0**	**4.75**				**0.0**	**4.0**	**96.0**	

GRAIN SIZE 6/29/15

PROJECT NAME: Sycolin Road Widening Phase IV
PROJECT NO.: 01.02095.01
LOCATION: Leesburg, Virginia
CLIENT: Rinker Design Associates, P. C.

GRAIN SIZE DISTRIBUTION



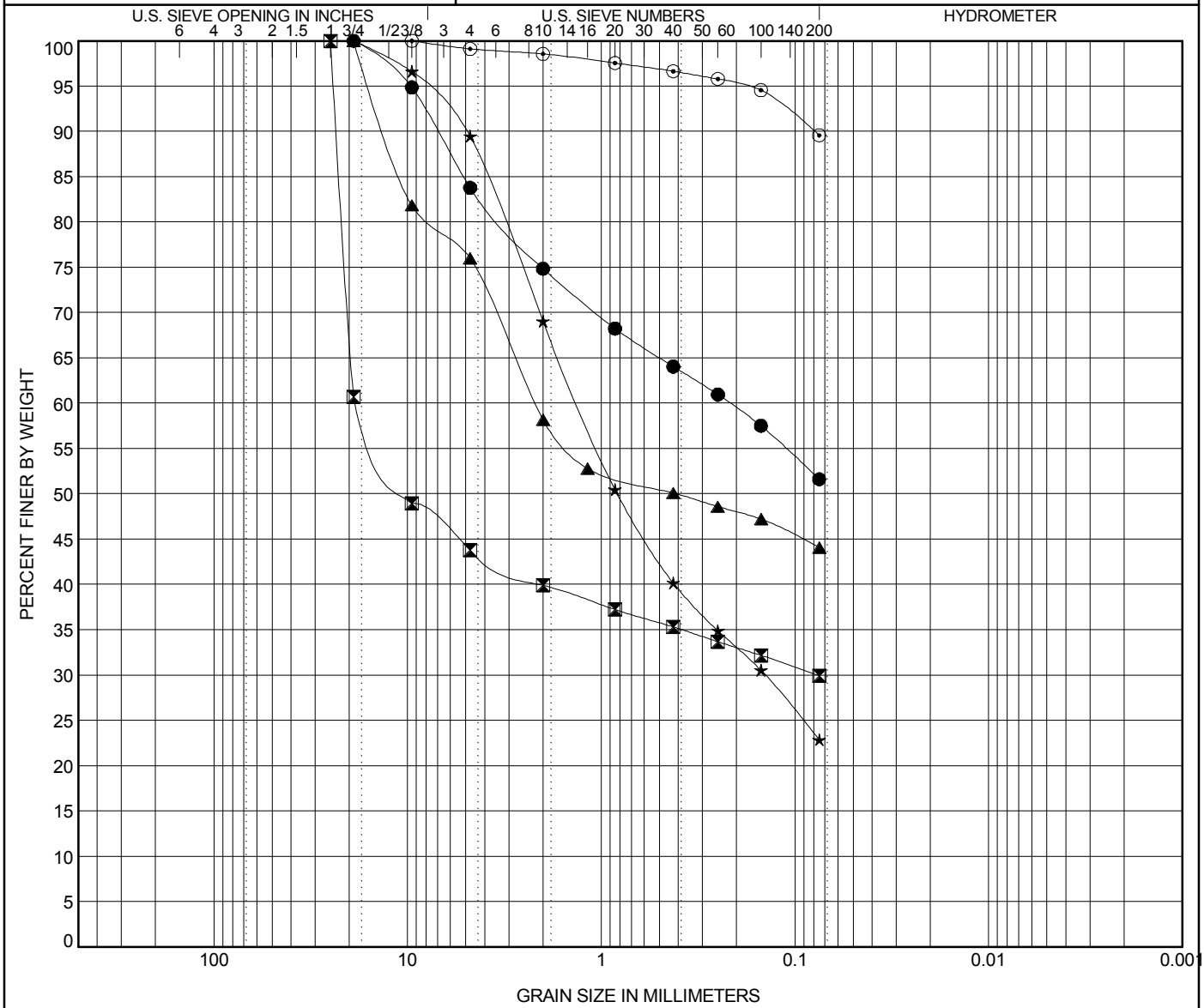
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	SAMPLE	DEPTH (FT)	SAMPLE DESCRIPTION	LL	PL	PI
●	**RD-22**	**1.0-4.0**	Brown, Clayey Sand With Gravel (**SC**)	**33**	**18**	**15**
⧓	**RD-22-2**	**2.0-4.0**	Gray, Silty Sand With Gravel (**SM**)	**NP**	**NP**	**NP**
▲	**RD-23-2**	**3.5-5.5**	Gray, Silty Sand (**SM**)	**43**	**27**	**16**
★	**RD-24-3**	**4.0-6.0**	Gray, Silty Sand (**SM**)	**38**	**25**	**13**
⊙	**RD-25-2**	**2.0-4.0**	Brown, Clayey Sand With Gravel (**SC**)	**31**	**20**	**11**

			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**RD-22-**	**1.0-4.0**	**19**	**1.629**			**21.6**	**35.1**	**43.3**	
⧓	**RD-22-2**	**2.0-4.0**	**19**	**5.026**	**1.319**		**42.0**	**45.9**	**12.1**	
▲	**RD-23-2**	**3.5-5.5**	**9.5**	**0.274**			**6.1**	**45.1**	**48.8**	
★	**RD-24-3**	**4.0-6.0**	**19**	**0.509**			**8.3**	**52.2**	**39.5**	
⊙	**RD-25-2**	**2.0-4.0**	**19**	**3.95**	**0.733**		**35.3**	**47.6**	**17.1**	

PROJECT NAME: Sycolin Road Widening Phase IV
PROJECT NO.: 01.02095.01
LOCATION: Leesburg, Virginia
CLIENT: Rinker Design Associates, P. C.

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

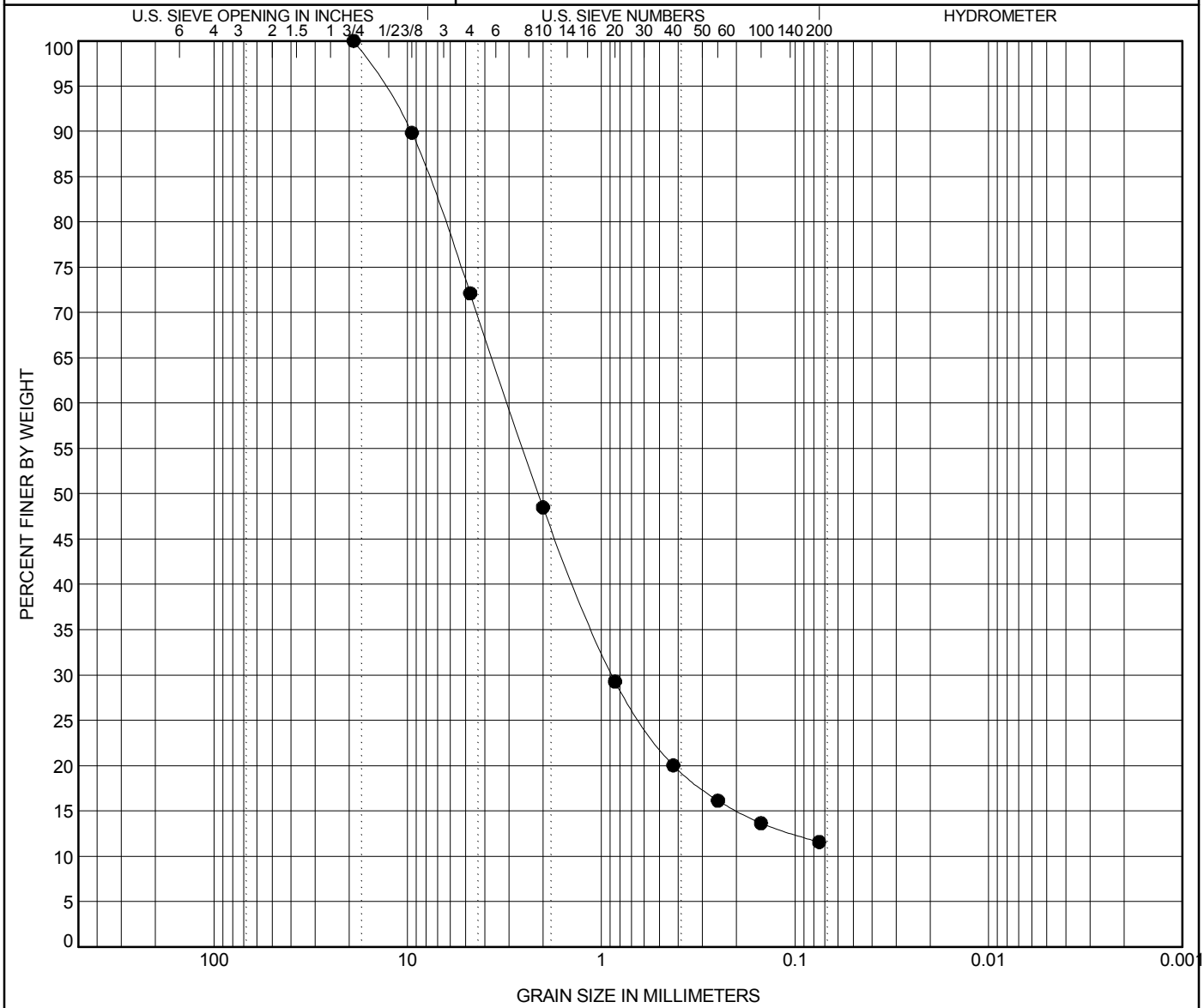
	SAMPLE	DEPTH (FT)	SAMPLE DESCRIPTION	LL	PL	PI
●	**RD-26-3**	**4.0-6.0**	Gray, Sandy Elastic Silt With Gravel (**MH**)	**68**	**50**	**18**
⧓	**RD-27-2**	**2.0-4.0**	Brown, Clayey Gravel (**GC**)	**32**	**22**	**10**
▲	**RD-27**	**2.0-5.0**	Brown, Clayey Sand With Gravel (**SC**)	**28**	**18**	**10**
★	**RD-28-2**	**2.0-4.0**	Brown, Silty, Clayey Sand (**SC-SM**)	**25**	**21**	**4**
⊙	**RD-29-2**	**2.0-4.0**	Light brown, Fat Clay (**CH**)	**68**	**26**	**42**

			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**RD-26-3**	**4.0-6.0**	**19**	**0.217**			**16.2**	**32.2**	**51.6**	
⧓	**RD-27-2**	**2.0-4.0**	**25**	**18.243**	**0.077**		**56.2**	**13.8**	**29.9**	
▲	**RD-27-**	**2.0-5.0**	**19**	**2.186**			**24.0**	**32.0**	**44.1**	
★	**RD-28-2**	**2.0-4.0**	**19**	**1.319**	**0.143**		**10.5**	**66.6**	**22.8**	
⊙	**RD-29-2**	**2.0-4.0**	**9.5**				**0.9**	**9.5**	**89.6**	

GRAIN SIZE 6/29/15

PROJECT NAME: Sycolin Road Widening Phase IV
PROJECT NO.: 01.02095.01
LOCATION: Leesburg, Virginia
CLIENT: Rinker Design Associates, P. C.

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

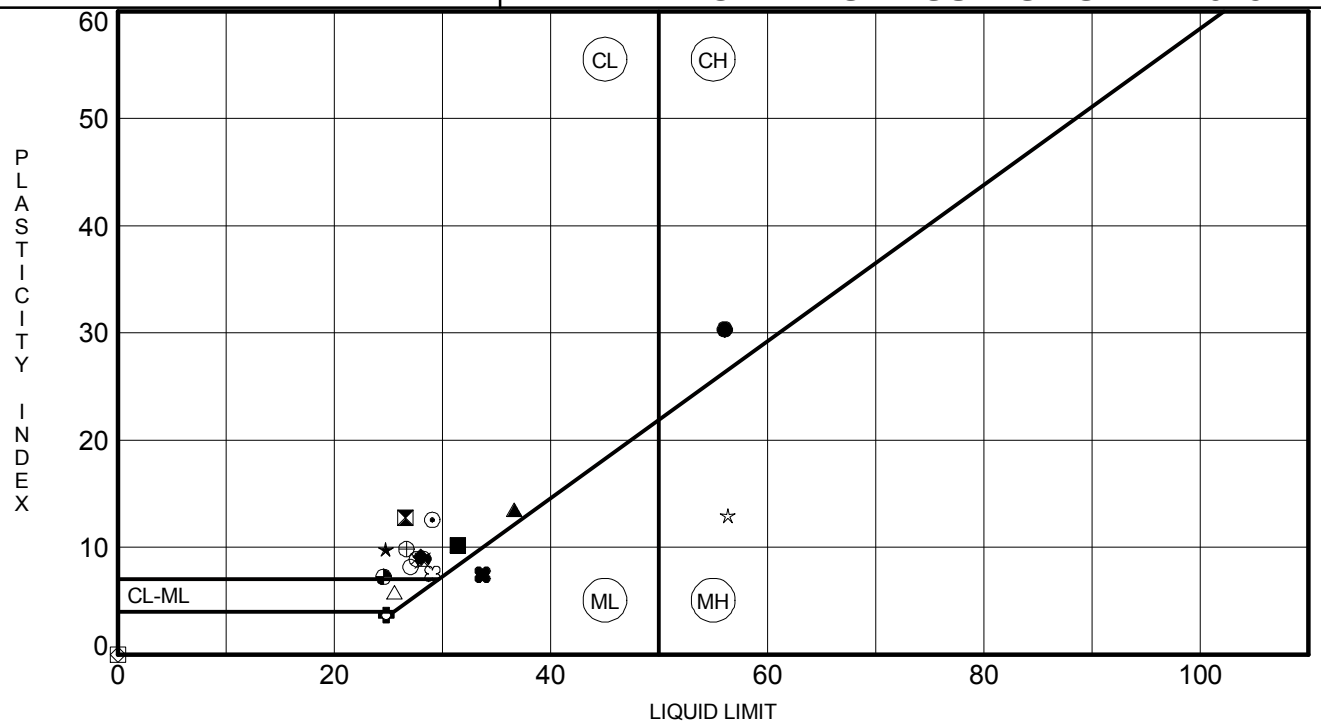
	SAMPLE	DEPTH (FT)	SAMPLE DESCRIPTION	LL	PL	PI
●	**SWM-01A-3**	**4.0-6.0**	Brown, Poorly Graded Sand With Clay And Gravel (**SP-SC**)	**27**	**18**	**9**

		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**SWM-01A-3 4.0-6.0**	**19**	**3.047**	**0.878**		**27.9**	**60.6**	**11.6**	

GRAIN SIZE 6/29/15

PROJECT NAME: Sycolin Road Widening Phase IV
PROJECT NO.: 01.02095.01
LOCATION: Leesburg, Virginia
CLIENT: Rinker Design Associates, P. C.

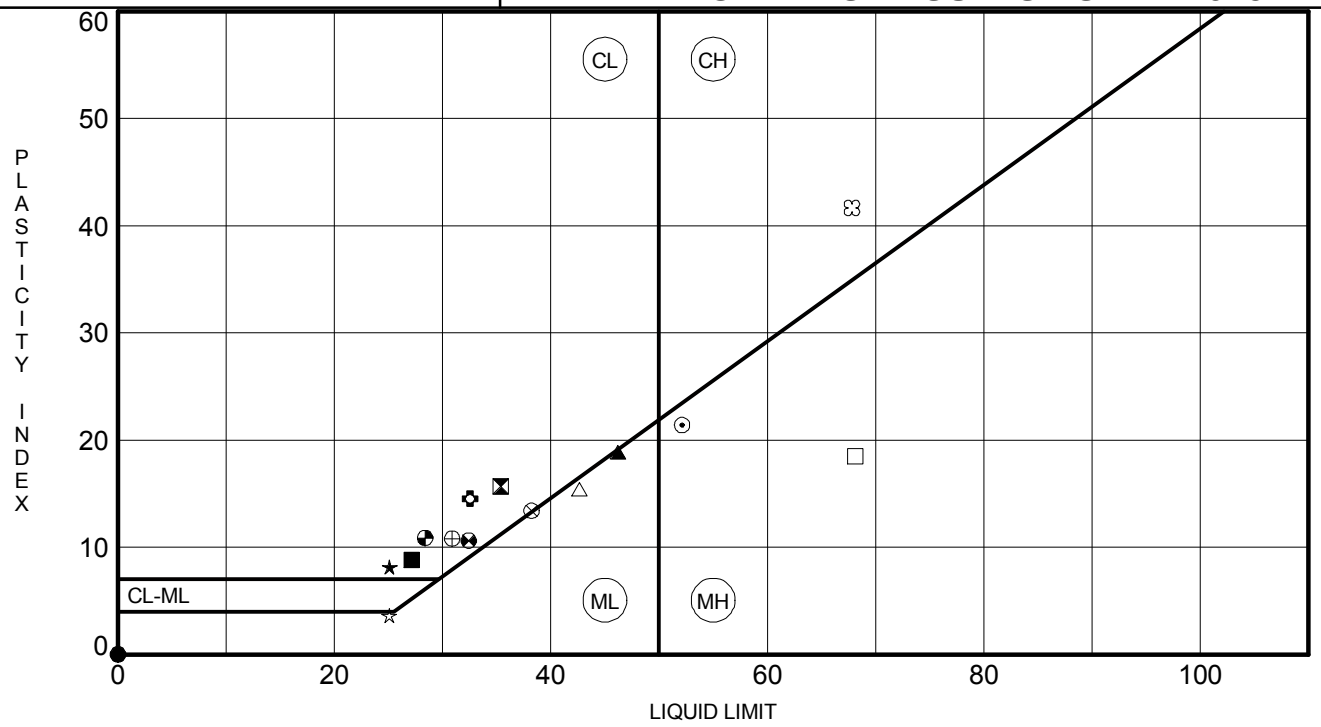
ATTERBERG LIMITS RESULTS ASTM D4318



	SAMPLE	DEPTH (FT)	LL	PL	PI	Fines	SAMPLE DESCRIPTION
●	**CL-01-4**	**6.0-8.0**	**56**	**26**	**30**	**71.5**	Light brown, Fat Clay With Sand (**CH**)
⊠	**CL-01-5**	**8.0-10.0**	**27**	**14**	**13**	**16.5**	Gray, Clayey Gravel With Sand (**GC**)
▲	**CL-02-4**	**6.0-8.0**	**37**	**23**	**14**	**36.6**	Brown, Clayey Gravel With Sand (**GC**)
★	**RD-01-2**	**2.0-4.0**	**25**	**15**	**10**	**20.6**	Red, Clayey Sand (**SC**)
⊙	**RD-01**	**2.0-5.0**	**29**	**16**	**13**	**26.4**	Red, Clayey Sand (**SC**)
✿	**RD-02-2**	**2.0-4.0**	**25**	**21**	**4**	**54.3**	Dark brown, Sandy Silty Clay With Gravel (**CL-ML**)
○	**RD-03-3**	**4.0-6.0**	**27**	**19**	**8**	**22.7**	Dark brown, Clayey Sand (**SC**)
△	**RD-04-2**	**2.0-4.0**	**26**	**20**	**6**	**31.5**	Reddish brown, Silty, Clayey Gravel With Sand (**GC-GM**)
⊗	**RD-05-2**	**2.0-4.0**	**28**	**19**	**9**	**18.3**	Brown, Clayey Gravel With Sand (**GC**)
⊕	**RD-06**	**1.0-4.0**	**27**	**17**	**10**	**60.3**	Brown, Sandy Lean Clay (**CL**)
□	**RD-06-3**	**4.0-6.0**	**NP**	**NP**	**NP**	**7.6**	Gray, Poorly Graded Gravel With Silt And Sand (**GP-GM**)
❀	**RD-08-2**	**2.0-4.0**	**28**	**19**	**9**	**28.8**	Brown, Clayey Gravel With Sand (**GC**)
◕	**RD-09-2**	**2.0-4.0**	**25**	**17**	**8**	**20.3**	Brown, Clayey Gravel With Sand (**GC**)
☆	**RD-10-3**	**4.0-6.0**	**56**	**43**	**13**	**45.5**	Brown, Silty Sand (**SM**)
⊠	**RD-11-2**	**2.0-4.0**	**29**	**22**	**7**	**38.0**	Brown, Silty, Clayey Sand (**SC-SM**)
■	**RD-11**	**2.0-5.0**	**31**	**21**	**10**	**41.0**	Brown, Clayey Sand With Gravel (**SC**)
◆	**RD-12-3**	**4.0-6.0**	**28**	**19**	**9**	**76.7**	Light brown, Lean Clay With Sand (**CL**)
◇	**RD-13-3**	**4.0-6.0**	**NP**	**NP**	**NP**	**8.6**	Gray, Poorly Graded Sand With Silt And Gravel (**SP-SM**)
⊠	**RD-14-2**	**2.0-4.0**	**28**	**19**	**9**	**22.5**	Brown, Clayey Sand (**SC**)
✖	**RD-15-3**	**4.0-6.0**	**34**	**26**	**8**	**45.3**	Brown, Silty Sand (**SM**)

PROJECT NAME: Sycolin Road Widening Phase IV
PROJECT NO.: 01.02095.01
LOCATION: Leesburg, Virginia
CLIENT: Rinker Design Associates, P. C.

ATTERBERG LIMITS RESULTS ASTM D4318

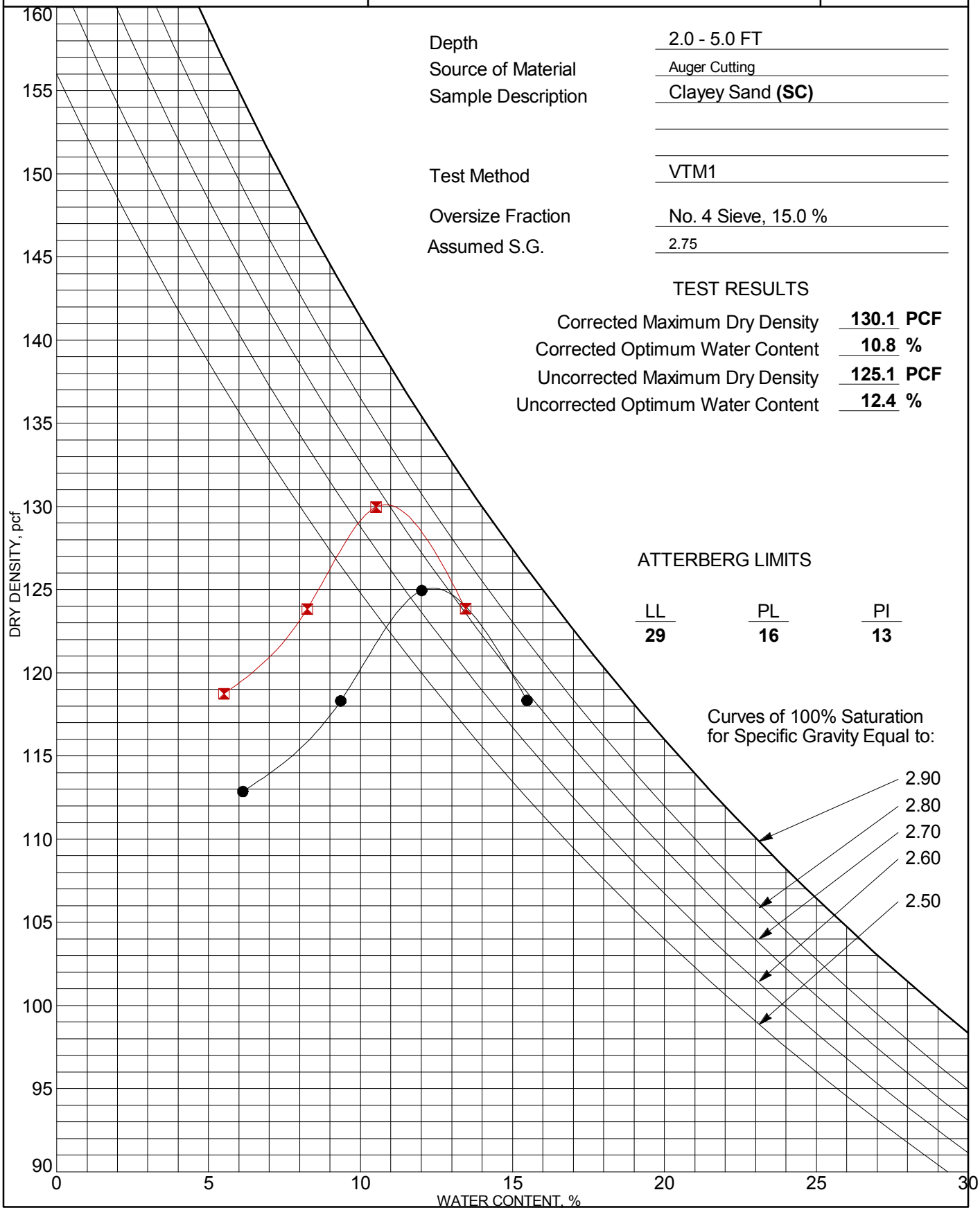


	SAMPLE	DEPTH (FT)	LL	PL	PI	Fines	SAMPLE DESCRIPTION
●	**RD-18-3**	**4.0-6.0**	**NP**	**NP**	**NP**	**27.4**	Tan, Silty Sand With Gravel (**SM**)
⊠	**RD-19-2**	**2.0-4.0**	**35**	**20**	**15**	**58.8**	Sandy Lean Clay With Gravel (**CL**)
▲	**RD-19-4**	**6.0-8.0**	**46**	**27**	**19**	**36.9**	Light brown, Clayey Sand (**SC**)
★	**RD-20-2**	**2.0-4.0**	**25**	**17**	**8**	**32.8**	Gray, Clayey Gravel With Sand (**GC**)
⊙	**RD-20-3**	**4.0-6.0**	**52**	**31**	**21**	**96.0**	Brown, Elastic Silt (**MH**)
✿	**RD-22**	**1.0-4.0**	**33**	**18**	**15**	**43.3**	Brown, Clayey Sand With Gravel (**SC**)
○	**RD-22-2**	**2.0-4.0**	**NP**	**NP**	**NP**	**12.1**	Gray, Silty Sand With Gravel (**SM**)
△	**RD-23-2**	**3.5-5.5**	**43**	**27**	**16**	**48.8**	Gray, Silty Sand (**SM**)
⊗	**RD-24-3**	**4.0-6.0**	**38**	**25**	**13**	**39.5**	Gray, Silty Sand (**SM**)
⊕	**RD-25-2**	**2.0-4.0**	**31**	**20**	**11**	**17.1**	Brown, Clayey Sand With Gravel (**SC**)
□	**RD-26-3**	**4.0-6.0**	**68**	**50**	**18**	**51.6**	Gray, Sandy Elastic Silt With Gravel (**MH**)
⊛	**RD-27-2**	**2.0-4.0**	**32**	**22**	**10**	**29.9**	Brown, Clayey Gravel (**GC**)
◕	**RD-27**	**2.0-5.0**	**28**	**18**	**10**	**44.1**	Brown, Clayey Sand With Gravel (**SC**)
☆	**RD-28-2**	**2.0-4.0**	**25**	**21**	**4**	**22.8**	Brown, Silty, Clayey Sand (**SC-SM**)
⊠	**RD-29-2**	**2.0-4.0**	**68**	**26**	**42**	**89.6**	Light brown, Fat Clay (**CH**)
■	**SWM-01A-3**	**4.0-6.0**	**27**	**18**	**9**	**11.6**	Brown, Poorly Graded Sand With Clay And Gravel (**SP-SC**)

PROJECT NAME: Sycolin Road Widening Phase IV
PROJECT NO.: 01.02095.01
LOCATION: Leesburg, Virginia
CLIENT: Rinker Design Associates, P. C.

RD-01

MOISTURE-DENSITY RELATIONSHIP



Depth	2.0 - 5.0 FT
Source of Material	Auger Cutting
Sample Description	Clayey Sand **(SC)**
Test Method	VTM1
Oversize Fraction	No. 4 Sieve, 15.0 %
Assumed S.G.	2.75

TEST RESULTS

Corrected Maximum Dry Density	**130.1**	**PCF**
Corrected Optimum Water Content	**10.8**	**%**
Uncorrected Maximum Dry Density	**125.1**	**PCF**
Uncorrected Optimum Water Content	**12.4**	**%**

ATTERBERG LIMITS

LL	PL	PI
29	**16**	**13**

Curves of 100% Saturation for Specific Gravity Equal to:

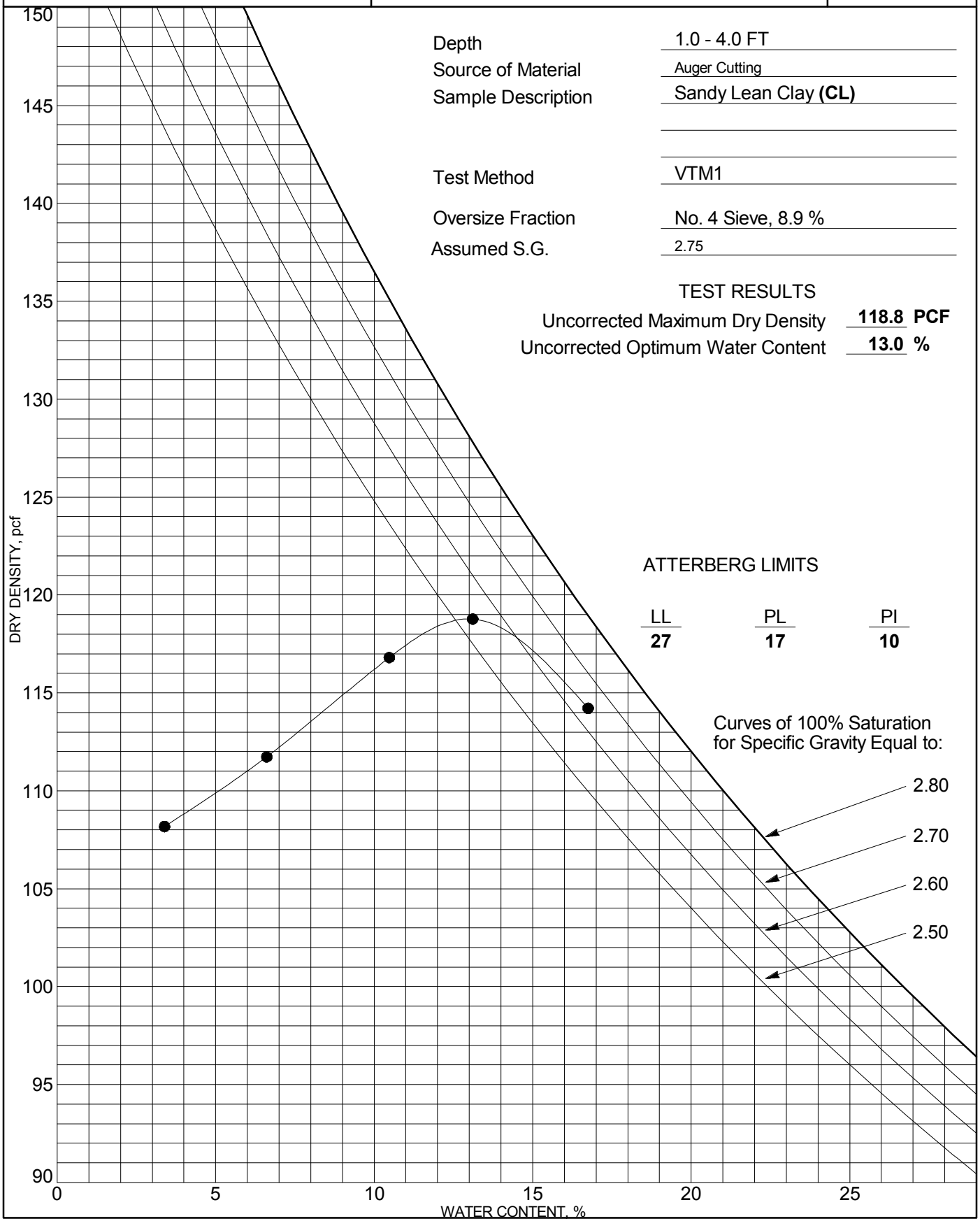
2.90
2.80
2.70
2.60
2.50

COMPACTION 6/23/15

PROJECT NAME: Sycolin Road Widening Phase IV
PROJECT NO.: 01.02095.01
LOCATION: Leesburg, Virginia
CLIENT: Rinker Design Associates, P. C.

RD-06

MOISTURE-DENSITY RELATIONSHIP



Depth	1.0 - 4.0 FT
Source of Material	Auger Cutting
Sample Description	Sandy Lean Clay **(CL)**
Test Method	VTM1
Oversize Fraction	No. 4 Sieve, 8.9 %
Assumed S.G.	2.75

TEST RESULTS

Uncorrected Maximum Dry Density	**118.8** **PCF**
Uncorrected Optimum Water Content	**13.0** **%**

ATTERBERG LIMITS

LL	PL	PI
27	**17**	**10**

Curves of 100% Saturation for Specific Gravity Equal to:

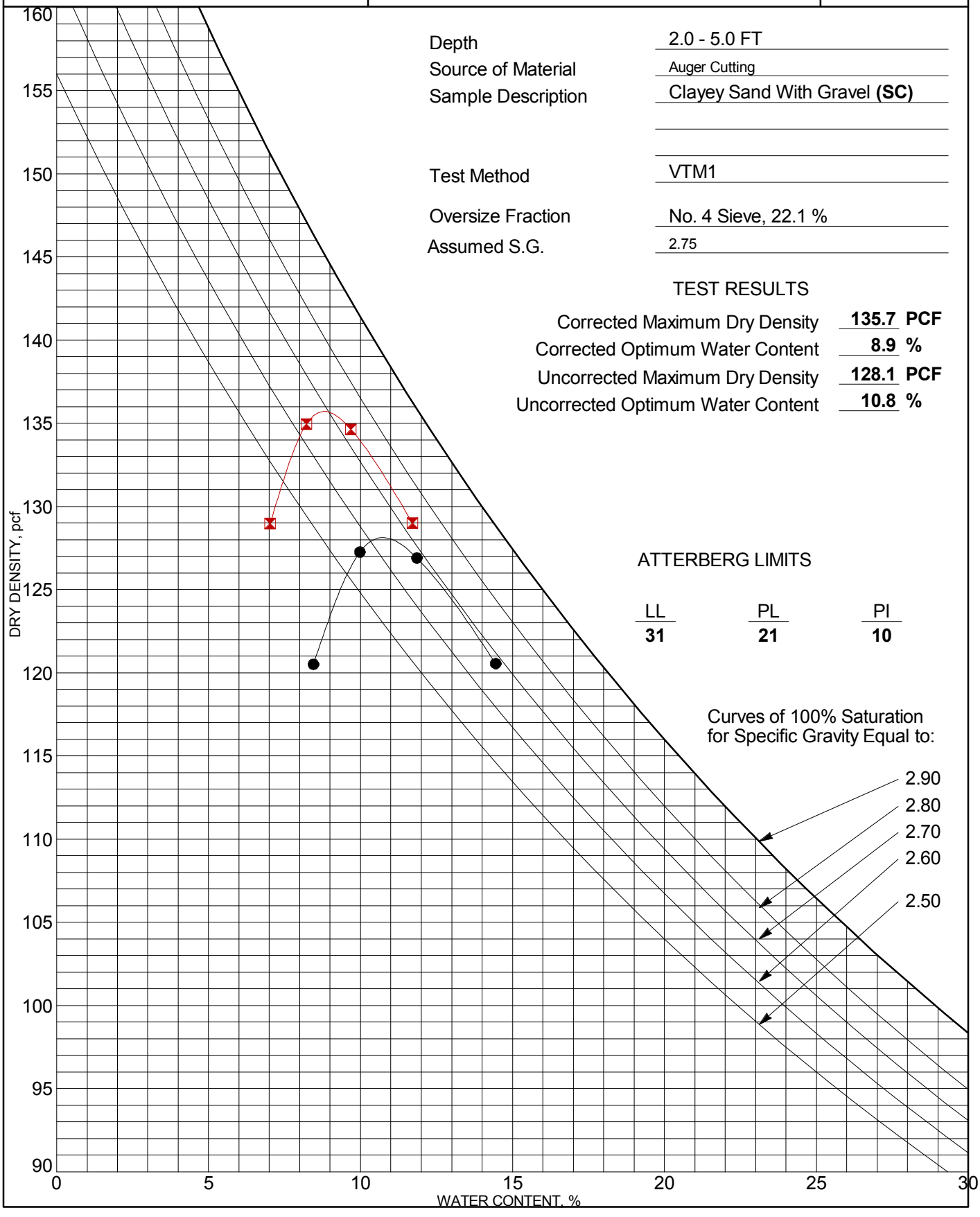
2.80
2.70
2.60
2.50

COMPACTION NO CORRECTION 6/23/15

PROJECT NAME: Sycolin Road Widening Phase IV
PROJECT NO.: 01.02095.01
LOCATION: Leesburg, Virginia
CLIENT: Rinker Design Associates, P. C.

RD-11

MOISTURE-DENSITY RELATIONSHIP



Depth	2.0 - 5.0 FT
Source of Material	Auger Cutting
Sample Description	Clayey Sand With Gravel **(SC)**
Test Method	VTM1
Oversize Fraction	No. 4 Sieve, 22.1 %
Assumed S.G.	2.75

TEST RESULTS

Corrected Maximum Dry Density	**135.7**	**PCF**
Corrected Optimum Water Content	**8.9**	**%**
Uncorrected Maximum Dry Density	**128.1**	**PCF**
Uncorrected Optimum Water Content	**10.8**	**%**

ATTERBERG LIMITS

LL	PL	PI
31	**21**	**10**

Curves of 100% Saturation for Specific Gravity Equal to:

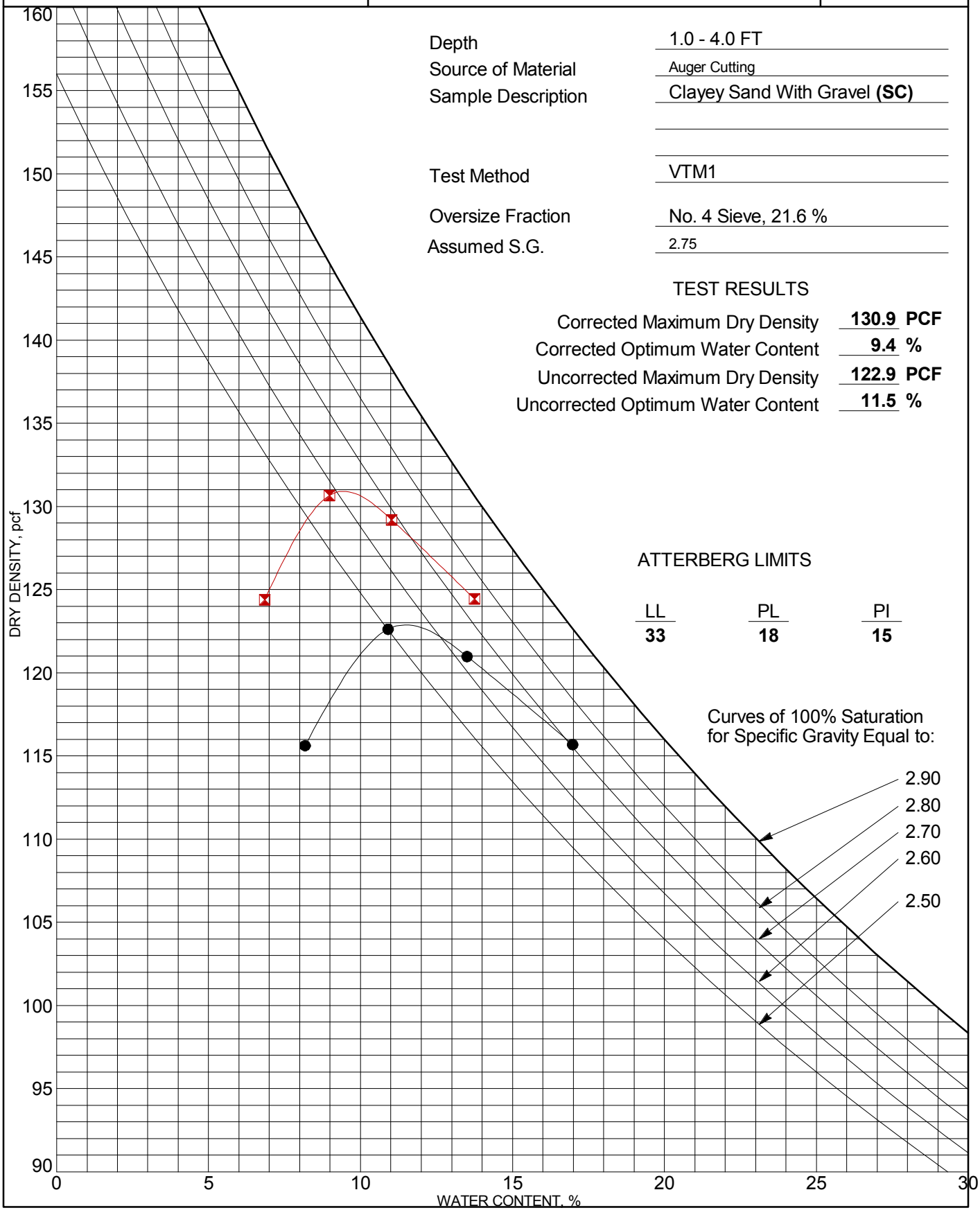
2.90
2.80
2.70
2.60
2.50

COMPACTION 6/23/15

PROJECT NAME: Sycolin Road Widening Phase IV
PROJECT NO.: 01.02095.01
LOCATION: Leesburg, Virginia
CLIENT: Rinker Design Associates, P. C.

RD-22

MOISTURE-DENSITY RELATIONSHIP



Depth	1.0 - 4.0 FT
Source of Material	Auger Cutting
Sample Description	Clayey Sand With Gravel **(SC)**
Test Method	VTM1
Oversize Fraction	No. 4 Sieve, 21.6 %
Assumed S.G.	2.75

TEST RESULTS

Corrected Maximum Dry Density	**130.9**	**PCF**
Corrected Optimum Water Content	**9.4**	**%**
Uncorrected Maximum Dry Density	**122.9**	**PCF**
Uncorrected Optimum Water Content	**11.5**	**%**

ATTERBERG LIMITS

LL	PL	PI
33	**18**	**15**

Curves of 100% Saturation for Specific Gravity Equal to:

2.90
2.80
2.70
2.60
2.50

COMPACTION 6/23/15

PROJECT NAME: Sycolin Road Widening Phase IV
PROJECT NO.: 01.02095.01
LOCATION: Leesburg, Virginia
CLIENT: Rinker Design Associates, P. C.

RD-27

MOISTURE-DENSITY RELATIONSHIP

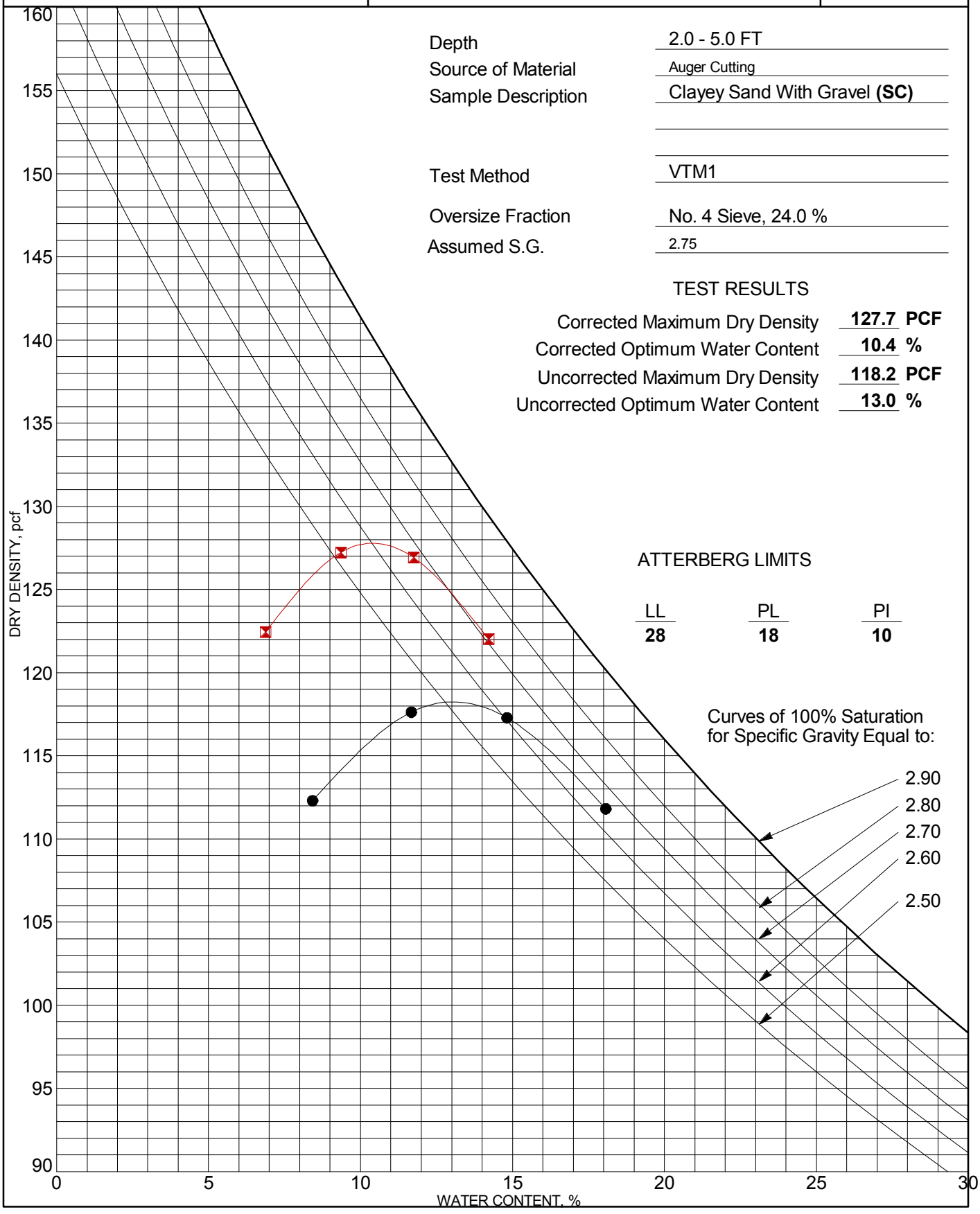
Depth	2.0 - 5.0 FT
Source of Material	Auger Cutting
Sample Description	Clayey Sand With Gravel **(SC)**
Test Method	VTM1
Oversize Fraction	No. 4 Sieve, 24.0 %
Assumed S.G.	2.75

TEST RESULTS

Corrected Maximum Dry Density	**127.7**	**PCF**
Corrected Optimum Water Content	**10.4**	**%**
Uncorrected Maximum Dry Density	**118.2**	**PCF**
Uncorrected Optimum Water Content	**13.0**	**%**

ATTERBERG LIMITS

LL	PL	PI
28	**18**	**10**



COMPACTION 6/23/15

PROJECT NAME: Sycolin Road Widening Phase IV
PROJECT NO.: 01.02095.01
LOCATION: Leesburg, Virginia
CLIENT: Rinker Design Associates, P. C.

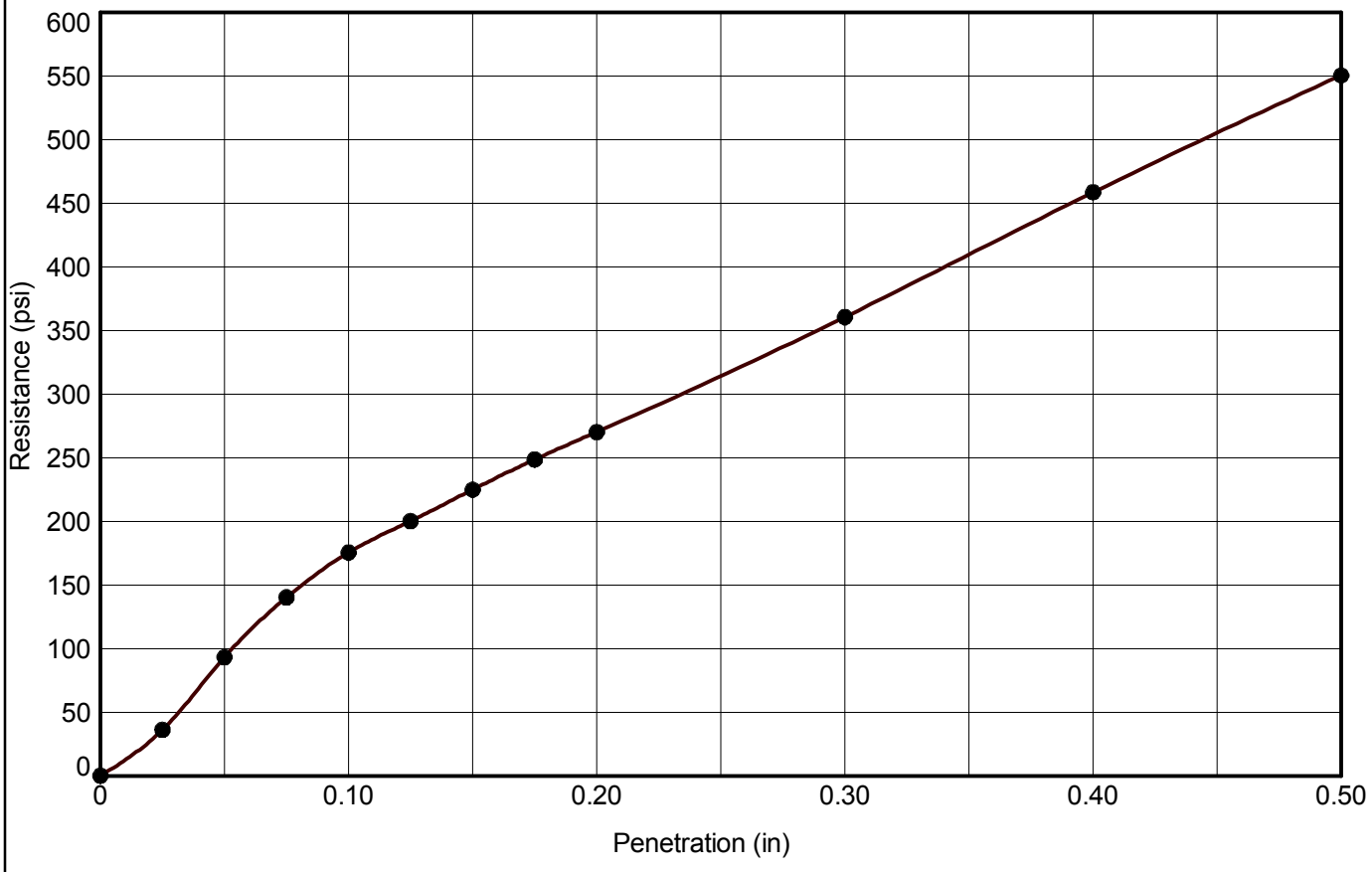
CALIFORNIA BEARING RATIO

SAMPLE ID RD-01
SAMPLE DEPTH 2.0 - 5.0 FT
SOURCE MATERIAL Auger Cutting
SAMPLE DESCRIPTION Clayey Sand **(SC)**

Condition	Saturated	CBR Method	VTM 8
Surcharge Wt., (lb)	25	Proctor Method	VTM1
Initial Dry Density, pcf	128.7	Maximum Dry Density, pcf	130.1
Initial Moisture, %	9.7	Optimum Water Content, %	10.8
Initial Compaction, %	98.9	Percent Oversize, % No. 4 Sieve	15.0
CBR at 0.1 inch Penetration, %	18.5	Gravel, %	15.0
CBR at 0.2 inch Penetration, %	19.0	Fines, %	26.4
Swell, %	0.5	Liquid Limit	29
Top 1" Moisture After Penetration, %	13.3	Plastic Limit	16
Moisture After Penetration, %	11.7	Plasticity Index	13

Remarks:

Penetration (in) Vs. Resistance



Prepared By:_____

Reviewed By:_____

CBR PENETRATION 6/22/15

PROJECT NAME: Sycolin Road Widening Phase IV
PROJECT NO.: 01.02095.01
LOCATION: Leesburg, Virginia
CLIENT: Rinker Design Associates, P. C.

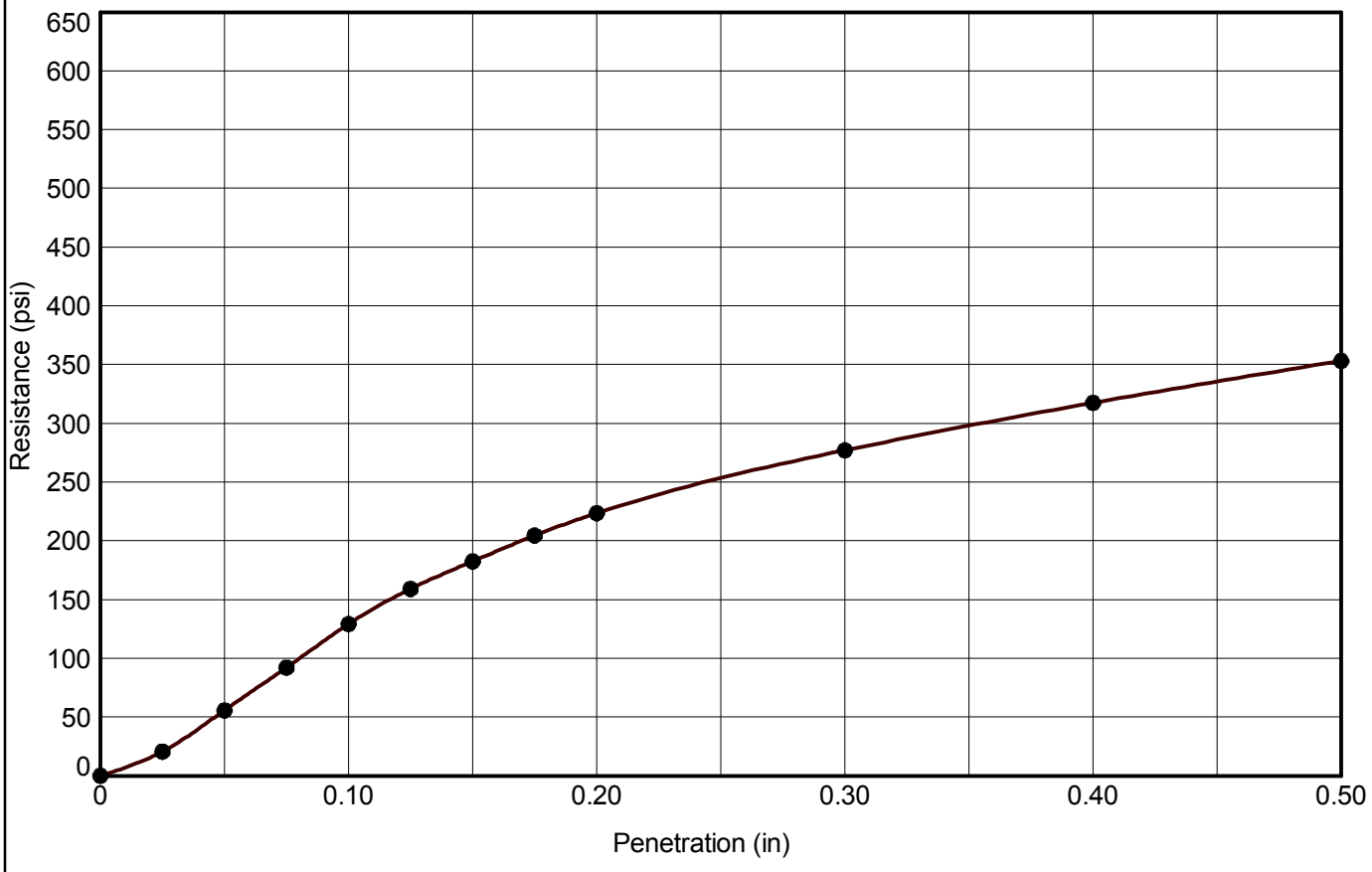
CALIFORNIA BEARING RATIO

SAMPLE ID RD-06
SAMPLE DEPTH 1.0 - 4.0 FT
SOURCE MATERIAL Auger Cutting
SAMPLE DESCRIPTION Sandy Lean Clay **(CL)**

Condition	Saturated	CBR Method	VTM 8
Surcharge Wt., (lb)	25	Proctor Method	VTM1
Initial Dry Density, pcf	120.6	Maximum Dry Density, pcf	118.8
Initial Moisture, %	11.5	Optimum Water Content, %	13.0
Initial Compaction, %	101.5	Percent Oversize, % No. 4 Sieve	8.9
CBR at 0.1 inch Penetration, %	14.5	Gravel, %	8.9
CBR at 0.2 inch Penetration, %	15.3	Fines, %	60.3
Swell, %	1.1	Liquid Limit	27
Top 1" Moisture After Penetration, %	15.3	Plastic Limit	17
Moisture After Penetration, %	12.5	Plasticity Index	10

Remarks:

Penetration (in) Vs. Resistance



Prepared By:_____

Reviewed By:_____

CBR PENETRATION 6/22/15

PROJECT NAME: Sycolin Road Widening Phase IV
PROJECT NO.: 01.02095.01
LOCATION: Leesburg, Virginia
CLIENT: Rinker Design Associates, P. C.

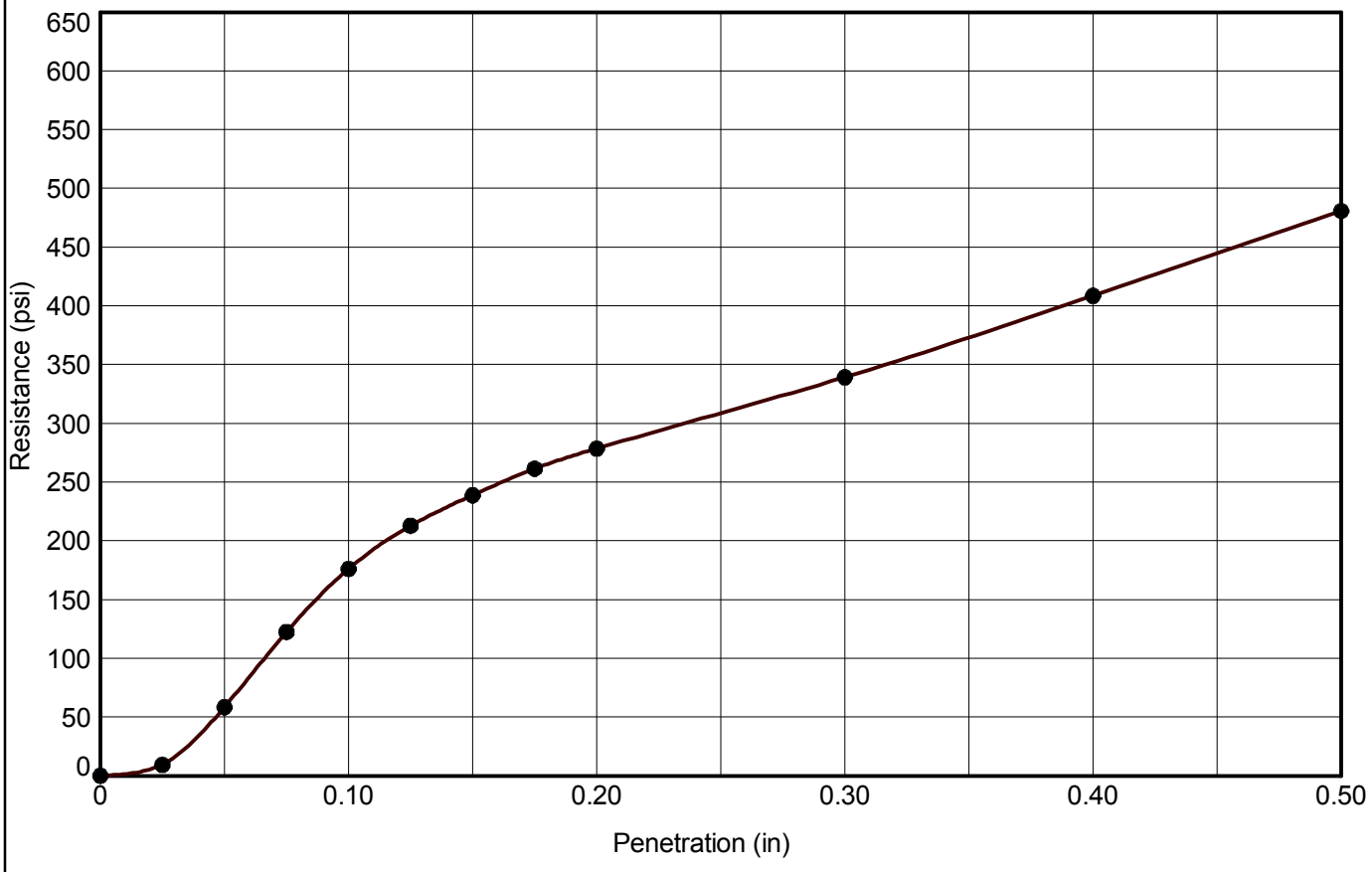
CALIFORNIA BEARING RATIO

SAMPLE ID RD-11
SAMPLE DEPTH 2.0 - 5.0 FT
SOURCE MATERIAL Auger Cutting
SAMPLE DESCRIPTION Clayey Sand With Gravel **(SC)**

Condition	Saturated	CBR Method	VTM 8
Surcharge Wt., (lb)	25	Proctor Method	VTM1
Initial Dry Density, pcf	134.1	Maximum Dry Density, pcf	135.7
Initial Moisture, %	8.0	Optimum Water Content, %	8.9
Initial Compaction, %	98.8	Percent Oversize, % No. 4 Sieve	22.1
CBR at 0.1 inch Penetration, %	21.5	Gravel, %	22.1
CBR at 0.2 inch Penetration, %	19.3	Fines, %	41.0
Swell, %	1.2	Liquid Limit	31
Top 1" Moisture After Penetration, %	13.8	Plastic Limit	21
Moisture After Penetration, %	10.4	Plasticity Index	10

Remarks:

Penetration (in) Vs. Resistance



Prepared By:_____

Reviewed By:_____

CBR PENETRATION 6/22/15

PROJECT NAME: Sycolin Road Widening Phase IV
PROJECT NO.: 01.02095.01
LOCATION: Leesburg, Virginia
CLIENT: Rinker Design Associates, P. C.

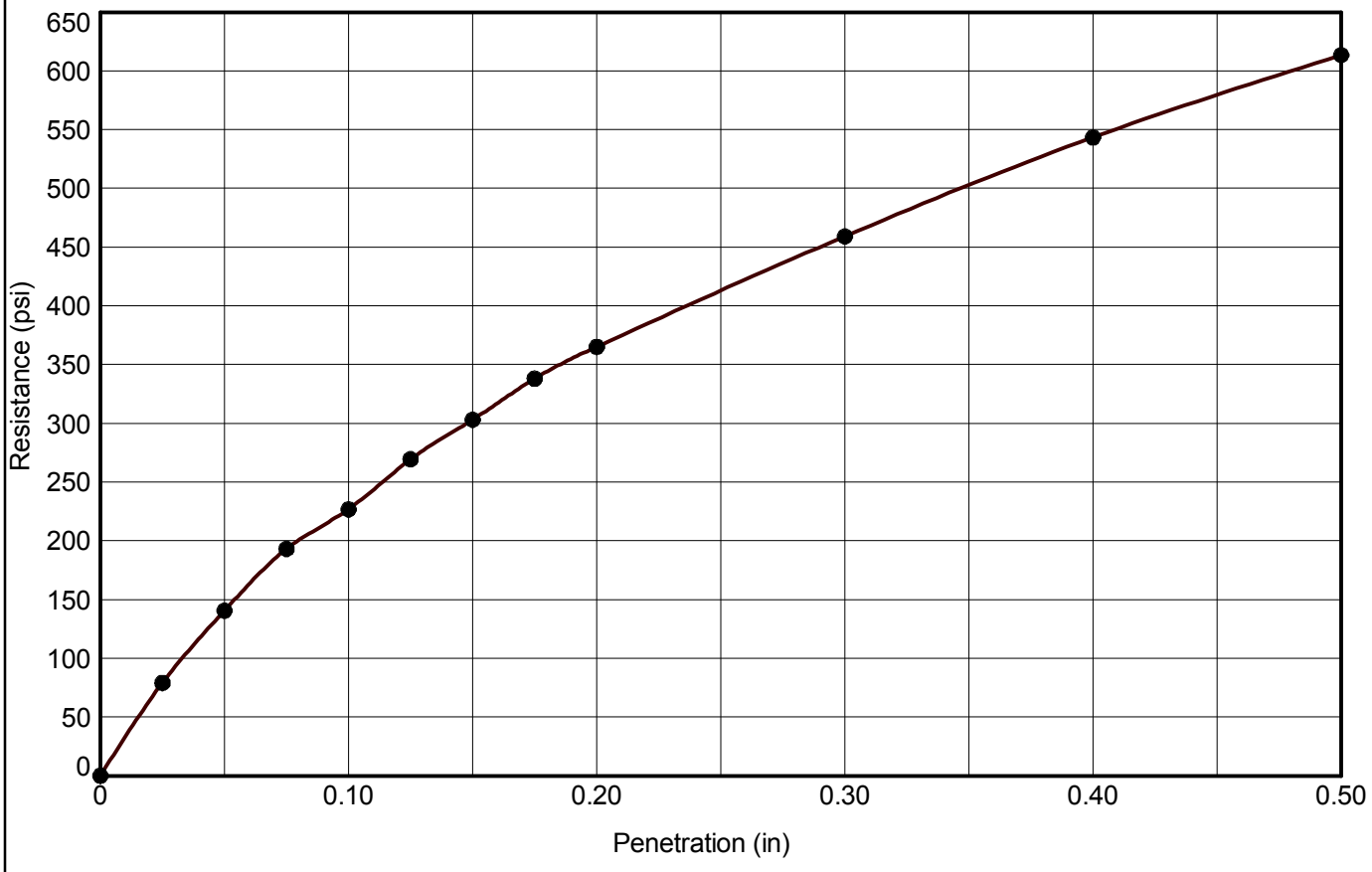
CALIFORNIA BEARING RATIO

SAMPLE ID RD-22
SAMPLE DEPTH 1.0 - 4.0 FT
SOURCE MATERIAL Auger Cutting
SAMPLE DESCRIPTION Clayey Sand With Gravel **(SC)**

Condition	Saturated	CBR Method	VTM 8
Surcharge Wt., (lb)	25	Proctor Method	VTM1
Initial Dry Density, pcf	129.5	Maximum Dry Density, pcf	130.9
Initial Moisture, %	8.6	Optimum Water Content, %	9.4
Initial Compaction, %	98.9	Percent Oversize, % No. 4 Sieve	21.6
CBR at 0.1 inch Penetration, %	22.7	Gravel, %	21.6
CBR at 0.2 inch Penetration, %	24.3	Fines, %	43.3
Swell, %	0.8	Liquid Limit	33
Top 1" Moisture After Penetration, %	17.7	Plastic Limit	18
Moisture After Penetration, %	10.9	Plasticity Index	15

Remarks:

Penetration (in) Vs. Resistance



Prepared By:_____

Reviewed By:_____

CBR PENETRATION 6/22/15

PROJECT NAME: Sycolin Road Widening Phase IV
PROJECT NO.: 01.02095.01
LOCATION: Leesburg, Virginia
CLIENT: Rinker Design Associates, P. C.

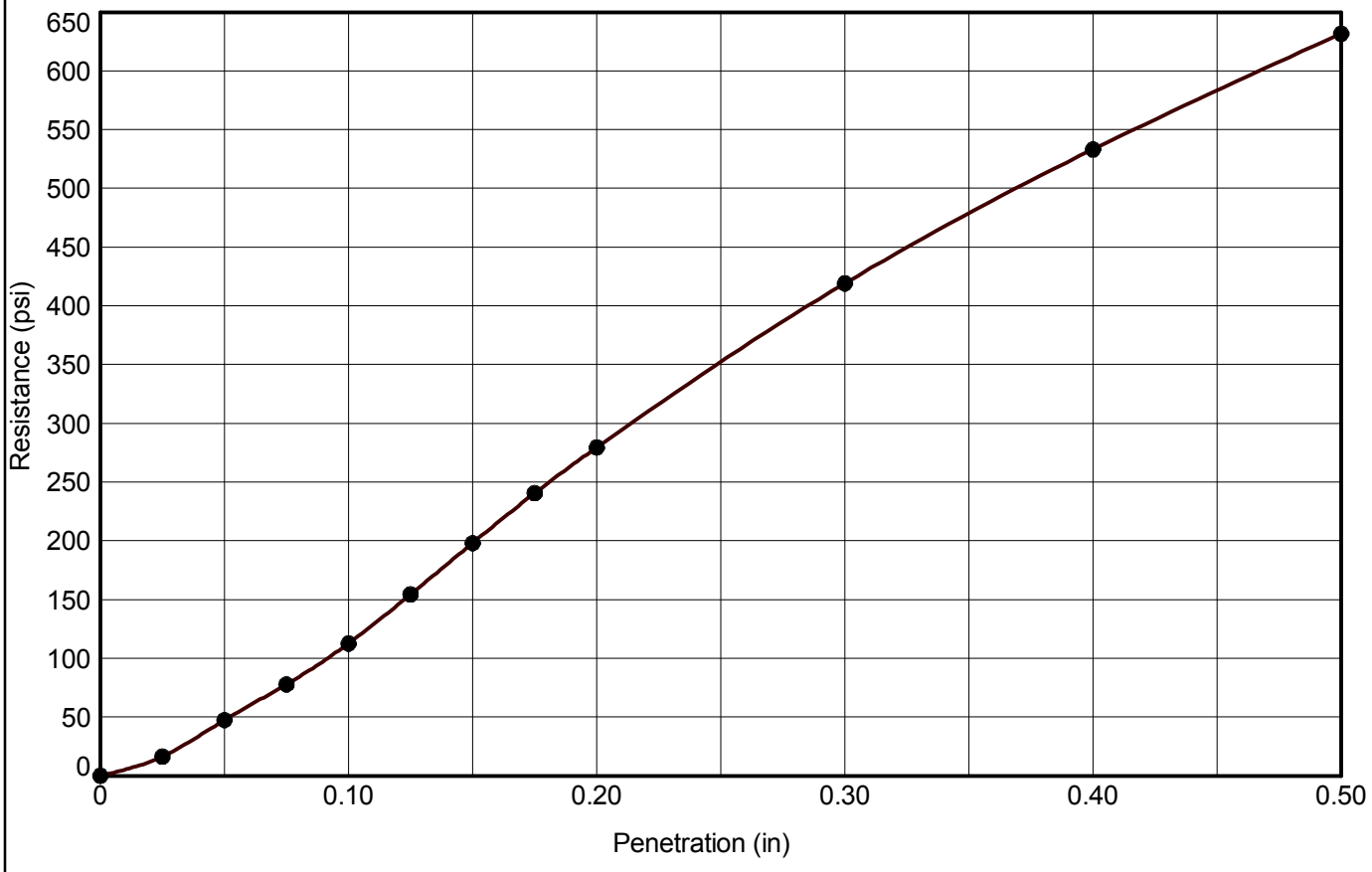
CALIFORNIA BEARING RATIO

SAMPLE ID RD-27
SAMPLE DEPTH 2.0 - 5.0 FT
SOURCE MATERIAL Auger Cutting
SAMPLE DESCRIPTION Clayey Sand With Gravel **(SC)**

Condition	Saturated	CBR Method	VTM 8
Surcharge Wt., (lb)	25	Proctor Method	VTM1
Initial Dry Density, pcf	129.4	Maximum Dry Density, pcf	127.7
Initial Moisture, %	9.3	Optimum Water Content, %	10.4
Initial Compaction, %	101.3	Percent Oversize, % No. 4 Sieve	24.0
CBR at 0.1 inch Penetration, %	17.1	Gravel, %	24.0
CBR at 0.2 inch Penetration, %	20.5	Fines, %	44.1
Swell, %	0.3	Liquid Limit	28
Top 1" Moisture After Penetration, %	17.7	Plastic Limit	18
Moisture After Penetration, %	10.9	Plasticity Index	10

Remarks:

Penetration (in) Vs. Resistance



Prepared By:_____

Reviewed By:_____

CBR PENETRATION 6/22/15

APPENDIX D PAVEMENT DESIGN CALCULATIONS

Traffic Load Worksheet

Project Name: Sycolin Road Widening Phase IV

Project Location: Leesburg, Virginia

DMY Project Number: 01.02095.01

Pavement Location: Sycolin Road Full Depth Pavement Design

INPUT DATA	
Design Life (years) =	20
Initial Design Year =	2019
Initial Design Year AADT =	16236
Directional Ratio =	50.0%
Growth Rate (%) =	2
% Cars/Passernger Vehicles =	88.7
% Single Unit Trucks =	10.5
% Tractor Trailer Trucks =	0.8
ESAL Factor - Cars =	0.0002
ESAL Factor - Single Unit Trucks =	0.46
ESAL Factor - Tractor Trailer Trucks =	1.05
Travel Lanes (each direction) =	2
Lane Distribution Factor =	0.9

RESULTS	
Total ESALs for Design Life (W18) =	**3685390**
ESALs - Cars/Passenger Vehicles =	11495
ESALs - Single Unit Trucks =	3129614
ESALs - Tractor Trailer Trucks =	544281

Remarks:	
Prepared by:	PL
Reviewed by:	PZ

Year		AADT	Total ADT
2019	1	16236	5926140
2020	2	16561	11970803
2021	3	16892	18136359
2022	4	17230	24425226
2023	5	17574	30839871
2024	6	17926	37382808
2025	7	18284	44056604
2026	8	18650	50863876
2027	9	19023	57807294
2028	10	19404	64889580
2029	11	19792	72113511
2030	12	20187	79481921
2031	13	20591	86997700
2032	14	21003	94663794
2033	15	21423	102483210
2034	16	21852	110459014
2035	17	22289	118594334
2036	18	22734	126892361
2037	19	23189	135356348
2038	20	23653	143989615
2039	**21**	**24126**	**152795547**
2040	22	24608	161777598
2041	23	25101	170939290
2042	24	25603	180284216
2043	25	26115	189816040
2044	26	26637	199538501
2045	27	27170	209455411
2046	28	27713	219570659
2047	29	28267	229888213
2048	30	28833	240412117

Based on "Guidelines for 1993 AASHTO Pavement Design" published by VDOT and revised July 2011.

Pavement Design Worksheet

Project Name: Sycolin Road Widening Phase IV

Project Location: Leesburg, Virginia

DMY Project Number: 01.02095.01

Pavement Location: Sycolin Road Full Depth Pavement Design

Design Life (years) =	20
Total ESALs - W_{18} =	3685390
Reliability - R (%) =	**90**
Standard Normal Deviate - Z_R =	-1.282
Standard Deviation - S_0 =	0.49
Initial Serviceability =	**4.2**
Terminal Serviceability =	**2.8**
Serviceability Loss - ΔPSI =	1.4
Design CBR =	**6.7**
Design M_r =	10050
Log W_{18} =	6.57
Right Side of AASHTO Equation =	6.57
Required SN =	**4.11**

OK

Pavement Course	a1	Thickness	SN
SM 9.5	0.44	2	0.88
IM 19	0.44	2	0.88
BM 25	0.44	6	2.64
Existing AC	0.396		0.00
Existing HCC	0.5		0.00
OGDL-Bounded	0.1		0.00
GAB	0.12	12	1.44
CTAB	0.2		0.00
			0.00
			0.00
Total		22	5.84

Prepared by:	PL
Reviewed by:	PZ

Remarks: Based on traffic data provided by RDA

Pavement Design Worksheet

Project Name: Sycolin Road Widening Phase IV

Project Location: Leesburg, Virginia

DMY Project Number: 01.02095.01

Pavement Location: Sycolin Road Resurface Pavement Design

Design Life (years) =	20
Total ESALs - W_{18} =	3685390
Reliability - R (%) =	**90**
Standard Normal Deviate - Z_R =	-1.282
Standard Deviation - S_0 =	0.49
Initial Serviceability =	**4.2**
Terminal Serviceability =	**2.8**
Serviceability Loss - ΔPSI =	1.4
Design CBR =	**6.7**
Design M_r =	10050
Log W_{18} =	6.57
Right Side of AASHTO Equation =	6.57
Required SN =	**4.11**

OK

Pavement Course	a1	Thickness	SN
SM 9.5	0.44	2	0.88
IM 19	0.44		0.00
BM 25	0.44		0.00
Existing AC	0.396	7.7	3.05
Existing HCC	0.5		0.00
OGDL-Bounded	0.1		0.00
GAB	0.12	12	1.44
CTAB	0.2		0.00
			0.00
			0.00
Total		21.7	5.37

Prepared by:	PL
Reviewed by:	PZ

Remarks: Based on traffic data provided by RDA

Pavement Design Worksheet

Project Name: Sycolin Road Widening Phase IV

Project Location: Leesburg, Virginia

DMY Project Number: 01.02095.01

Pavement Location: Sycolin Road Temporary Pavement Design

Design Life (years) =	1
Total ESALs - W_{18} =	168532
Reliability - R (%) =	**85**
Standard Normal Deviate - Z_R =	-1.037
Standard Deviation - S_0 =	0.49
Initial Serviceability =	**4.2**
Terminal Serviceability =	**2.8**
Serviceability Loss - ΔPSI =	1.4
Design CBR =	**6.7**
Design M_r =	10050
Log W_{18} =	5.23
Right Side of AASHTO Equation =	5.23
Required SN =	**2.28**

OK

Pavement Course	a1	Thickness	SN
SM 9.5	0.44	1.5	0.66
IM 19	0.44	0	0.00
BM 25	0.44	3	1.32
Existing AC	0.396		0.00
Existing HCC	0.5		0.00
OGDL-Bounded	0.1		0.00
GAB	0.12	6	0.72
CTAB	0.2		0.00
			0.00
			0.00
Total		10.5	2.70

Prepared by:	PL
Reviewed by:	PZ

Remarks: Based on traffic data provided by RDA