Geotechnical Engineering Report

Columbia Pike
Multimodal Street Improvements
Arlington, Virginia



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April 27, 2016

Mr. Mike Albright Kimley-Horn & Associates, Inc. 11400 Commerce Park Drive, Suite 400 Reston, Virginia 20191

Subject: Geotechnical Engineering Report, Columbia Pike

Multimodal Street Improvements, Arlington, Virginia

(GeoConcepts Project No. 14189)

Madrona

Dear Mr. Albright:

GeoConcepts Engineering, Inc. (GeoConcepts) is pleased to present the following geotechnical engineering report prepared for Columbia Pike Multimodal Street Improvements in Arlington, Virginia.

We appreciate the opportunity to serve as your geotechnical consultant on this project. Please do not hesitate to contact me if you have any questions or want to meet to discuss the findings and recommendations contained in the report.

Sincerely,

GEOCONCEPTS ENGINEERING, INC.

Fernanda Madrona, EIT Senior Staff Engineer

fmadrona@geoconcepts-eng.com



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1.0 Scope of Services

This geotechnical engineering report presents the results of the field investigation, soil laboratory testing, and engineering analysis of the geotechnical data. This report specifically addresses the following:

- Recommended soil design parameters for the proposed site retaining walls.
- An assessment of subgrade conditions for support of flexible pavements, including recommended
 flexible pavement sections based on an estimated design California Bearing Ratio (CBR) value from
 soil laboratory test results and design traffic data by others.
- Earthwork recommendations for construction of loadbearing fills, including an assessment of onsite soils to be excavated for re-use as fill.

Services not specifically identified in the contract for this project are not included in the scope of services.

2.0 Site Description

Arlington County is planning multimodal street improvements along a 3.5-mile stretch of Columbia Pike from the Fairfax County line on the west end to South Joyce Street on the east end. Based on plans provided to us, the proposed construction consists of demolition and reconstruction of Columbia Pike in the following segments:

- Segment A: South Orme Street to about 200 feet east of South Oak Street, Stations 57+00 to 64+00.
- Segment C: South Courthouse Road to South Quinn Street, Stations 63+50 to 73+00.
- Segment D: South Garfield Street to South Courthouse Road, Stations 89+00 to 111+50.
- Segment F: South Wakefield Street to South Oakland Street, Stations 134+50 to 167+00.
- Segments H & I: South Jefferson Street to Four Mile Run, Stations 181+50 to 205+00.

In addition, proposed plans include site retaining walls, bicycle lanes, wider sidewalks, enhanced pedestrian crossings, landscaped median areas, and tree plantings.

3.0 Subsurface Conditions

Subsurface conditions were investigated by drilling a total of 60 test borings along the proposed roadway improvements and 14 test borings along the proposed site retaining wall areas. Test boring logs and boring location plans are presented in Appendix A of this report.

3.1 Geology

The site is located within the Coastal Plain Physiographic Province of Virginia. The Coastal Plain consists of a seaward thickening wedge of unconsolidated to semi-consolidated sedimentary deposits from the Cretaceous Geologic Period to the Holocene Geologic Epoch. These deposits represent marginal-marine to marine sediments consisting of interbedded sands and clays. The Coastal Plain is bordered to the east by the Atlantic Ocean and to the west by the Piedmont Physiographic Province. The dividing line between the Coastal Plain and the Piedmont is locally referred to as the "Fall Line". This name comes from the waterfalls that form as a result of the differential erosion that occurs as streams cross the Piedmont/Coastal Plain contact.

The existing fill soils of Stratum A are believed to be related to previous site grading. The natural soils assigned to Strata B, C, D, and E are believed to be Alluvial deposits of Quaternary age, Pleistocene age terrace deposits, Potomac Group sedimentary deposits, and residual sediments derived from early Paleozoic bedrock.



The Alluvial and Terrace Deposits are granular units dominated by gravels, sands, and silts, with lesser amounts of clay distributed heterogeneously. The Alluvial materials are gray to gray-brown, and poorly stratified, while the Terrace Deposits are more highly oxidized showing lighter colors ranging from light gray to yellow and red. The Terrace Deposits tend to be more stratified than the more recent Alluvial deposits.

The Potomac Group sediments are the oldest sedimentary deposits in the Washington, DC area, and date from the Early Cretaceous Period. These sediments are known to be highly over-consolidated as a result of the weight of a substantial thickness of overlying soils that have since been eroded away.

The bedrock underlying the site is mapped as the Indian Run Formation of the Cambrian geologic period.

3.2 Stratification

The subsurface materials encountered have been stratified for purposes of our discussions herein. These stratum designations do not imply that the materials encountered are continuous across the site. Stratum designations have been established to characterize similar subsurface conditions based on material gradations and parent geology. The subsurface materials encountered in the test borings completed at the site have been assigned to the following strata:

Stratum A (Existing Fill)	loose to very dense or soft to very stiff, POORLY GRADED SAND (SP) with gravel, clayey SAND (SC), LEAN CLAY (CL) and FAT CLAY (CH) with various amounts of sand, moist, brown, orange-brown, and gray-brown
Stratum B (Alluvial)	medium dense to very dense or stiff to very stiff, clayey SAND (SC) with gravel, LEAN CLAY (CL) and FAT CLAY (CH) with various amounts of sand, moist

Stratum C1	firm to hard, LEAN CLAY (CL) and FAT CLAY (CH),
(Terrace Deposits)	with various amounts of sand, moist, gray, brown,

and orange-brown

to wet, brown, orange-brown, and gray

Stratum C2 very loose to very dense, POORLY GRADED SAND (SP), clayey SAND (SC), and POORLY GRADED (Terrace Deposits) GRAVEL (GP), moist to wet, orange-brown, red, brown and white

soft to very stiff, LEAN CLAY (CL) and FAT CLAY Stratum D1 (Potomac Group) (CH) with various amounts of sand, moist, brown,

orange-brown, and gray Stratum D2

(Potomac Group) loose to very dense, silty SAND (SM), clayey SAND (SC), and POORLY GRADED SAND (SP), moist to wet,

brown, black, orange-brown, white

(Residual) loose to very dense or stiff to very hard, silty SAND

(SM), clayey SAND (SC), and sandy SILT (ML),

micaceous, moist, gray, orange -brown Stratum E2

Stratum E1

(Intermediate Geomaterial, IGM) very dense, silty SAND (SM), moist, gray



The two letter designations included in the strata descriptions presented above and on the test boring logs represent the Unified Soil Classification System (USCS) group symbol and group name for the samples based on laboratory testing per ASTM D-2487 and visual classifications per ASTM D-2488. It should be noted that visual classifications per ASTM D-2488 may not match classifications determined by laboratory testing per ASTM D-2487.

3.3 Groundwater

Groundwater level observations were made in the field during drilling. Groundwater was encountered at six boreholes during drilling, and a summary of the water level readings rounded off to the nearest 0.5 feet depth is presented below in Table 3.3-1.

Table 3.3-1: Groundwater Summary

Test Boring No.	Depth to Groundwater (feet)
AB-12	28.5
CRW-1	14.0
CB-9	8.0
FRW-1	9.0
FRW-8	5.5
IRW-4A	13.0

The groundwater observations presented herein are considered to be an indication of the groundwater levels at the dates and times indicated. Where more impervious Strata B, C1, and D1 clay soils are encountered, the amount of water seepage into the borings is limited, and it is generally not possible to establish the location of the groundwater table through short term water level observations. Accordingly, the groundwater information presented herein should be used with caution. Also, fluctuations in groundwater levels should be expected with seasons of the year, construction activity, changes to surface grades, precipitation, or other similar factors.

3.4 Soil Laboratory Test Results

Selected soil samples obtained from the field investigation were tested for grain size distribution, Atterberg limits, compaction characteristics using standard effort, California Bearing Ratio (CBR), and natural moisture contents. A summary of soil laboratory test results is presented below, and the results of natural moisture content tests are presented on the test boring logs in Appendix A.

3.4.1 Classification Test Results

Maximum and minimum values of percent fines passing the US Standard No. 200 sieve, liquid limits, and plasticity indices for each stratum are presented below in Table 3.4.1-1. A detailed summary of soil classification test results is presented in Table B-1 in Appendix B.

Table 3.4.1-1: Classification Test Results Summary

Stratum Range of % Passing #200 Sieve		Range of Liquid Limit (LL)	Range of Plasticity Index (PI)
Stratum A (Existing Fill)	22-45	32-48	16-26
Stratum B (Alluvial)	51	36	17
Stratum C1 (Terrace Deposits)	59-87	21-51	4-30



Stratum	Range of % Passing #200 Sieve	Range of Liquid Limit (LL)	Range of Plasticity Index (PI)
Stratum C2 (Terrace Deposits)	9-44	27-30	12-16
Stratum D1 (Potomac Group)	51-94	53-71	33-44
Stratum D2 (Potomac Group)	29-32	44-74	29-54
Stratum E1 (Residual)	21	53	20

3.4.2 Standard Proctor and California Bearing Ratio (CBR) Test Results

A total of 14 standard proctor tests (VTM-1) and CBR tests (VTM-8) were performed on bulk samples collected from the test borings. A summary of standard proctor and CBR test results is presented below in Table 3.4.2-1. Individual sample results are presented in Appendix B.

Table 3.4.2-1: Standard Proctor and CBR Test Results Summary

Test Boring No.	Sample Depth (ft)	Stratum	USCS/AASHTO Symbol	Maximum Dry Density (pcf)	Optimum Moisture Content (%)	Max. Swell (%)	CBR Value* (%)
AB-12	0.0-5.0	А	SC/A-2-7	123	12	0.2	12.1
AB-15	0.0-5.0	A/C2	SC/A-2-6	127	9	0.2	13.7
CRW-2	0.0-5.0	Α	SC/A-6	121	13	0.3	4.7
CB-5	0.0-5.0	C1	CL/A-7-6	124	11	2.4	2.1
CB-8	0.0-5.0	C2	SC/A-6	113	15	0.9	1.6
DB-2	0.0-5.0	C1	CH/A-7-6	127	9	5.4	2.5
DB-6	0.0-5.0	C2	SC/A-2-6	129	8	0.8	9.0
DB-10	0.0-5.0	C2	SC/A-6	124	10	0.2	16.0
FB-2	0.0-5.0	D2	SC/A-2-7	131	9	0.1	9.9
FB-9	0.0-5.0	В	CL/A-6	115	14	2.5	4.3
FB-18	0.0-5.0	C1	CL/A-4	97	25	5.1	2.3
HB-5	0.0-5.0	D2	SC/A-2-7	115	13	1.2	8.0
IB-2	0.0-5.0	D1	CH/A-7-6	112	15	3.8	4.3
IB-9	0.0-5.0	D2	SC/A-2-7	129	9	1.6	8.8

^{*} CBR values correspond to 0.1-inch penetration, performed on a sample compacted to 95% compaction.

4.0 Engineering Analysis

Recommendations regarding soil design parameters, pavements, and earthwork are presented herein.



4.1 Soil Design Parameters

Recommended soil design parameters to be used for this project are presented in Table 4.1-1 herein.

Table 4.1-1: Recommended Soil Design Parameters

	Total Unit	Angle of Internal	Lateral Earth Pressure Coefficients			Coefficient
Stratum	Weight (pcf)	Friction (degrees)	Active (Ka)	At-Rest (Ko)	Passive (Kp)	of Sliding Friction
Stratum A (Existing Fill)	125	30	0.33	0.50	3.00	0.35
Stratum B (Alluvial)	120	28	0.36	0.53	2.77	0.35
Stratum C1 (Terrace Deposits)	120	28	0.36	0.53	2.77	0.30
Stratum C2 (Terrace Deposits)	125	32	0.31	0.47	3.25	0.40
Stratum D1 (Potomac Group)	120	20	0.49	0.66	2.04	0.30
Stratum D2 (Potomac Group)	125	34	0.28	0.44	3.54	0.40
Stratum E1 (Residual)	125	30	0.33	0.50	3.00	0.35
Stratum E2 (IGM)	130	38	0.24	0.38	4.20	0.50

4.2 Pavements

Pavement subgrades are expected to consist of existing fill, natural soils, or new compacted fill. These materials are generally considered suitable for support of the planned roadways. However, where pavement subgrades consist of unsuitable soils (soft or loose soils with a SPT blow count less than 5, soils classified as CH, MH, OH and OL in accordance with the Unified Soil Classification System (USCS), and soils with a CBR value less than 5), we recommend undercutting the unsuitable soil to a depth of at least 3 feet and backfilling with new compacted fill with a minimum CBR value of 5 in accordance with Section 303.04(b) paragraph 5 of the VDOT Road and Bridge Specifications. Recommendations regarding new compacted fill are presented in Section 4.3 of this report, and specific locations where unsuitable soils are expected along the proposed roadways are presented in Section 4.3.1 of this report.

4.2.1 Traffic Analyses

A pavement design was performed using the traffic data and information provided in the Columbia Pike Multimodal Street Improvements Transportation Study dated June 2012. Columbia Pike is classified as an undivided primary route. The proposed pavement will have 10 to 11 feet wide lanes in each direction. We have used the traffic data summary presented in Table 4.2.1-1 for pavement section design.

Table 4.2.1-1: Design Values for Pavement Section Design

Design Degenerator	Flexible Pa Design		Rigid Pavement Design Value	
Design Parameter	Segments A, C, D, and F H and I		Segments A, C, D, and F	Segments H and I
Highway Classification	Undivided Primary Route(1)		livided Primary Route ⁽¹⁾ Undivided Primary Route	
Design Years	20(1)		30(1)
Two Way ADT (2018)	31,525(2)	31,955(2)	31,525(2)	31,955(2)



Decign Decemeter	Flexible Pa Design		Rigid Pavement Design Value		
Design Parameter	Segments A, C, D, and F	Segments H and I	Segments A, C, D, and F	Segments H and I	
Percent Trucks (Class 5 or Greater)	5(3)		5(3))
Traffic Growth Rate (%)	0.21(1) 0.38(1)		0.21(1)	0.38(1)	
Number of Lanes in Design Direction	2(1)		2(1))	
Lane Distribution Factor	90(4)		90%	4)	
Average Initial Truck Factor (ESALs/Truck)	1.05(4)		1.59	J (4)	
Obtained ESALs based on the data above	5,550,524 5,718,512		12,741,724	13,241,836	

Notes:

4.2.2 Pavement Design Recommendations

Pavement sections were designed according to the 1993 AASHTO Guide for Design of Pavement Structures taking into consideration the laboratory tests results from 14 California Bearing Ratio (CBR) tests performed under this contract. Table 4.2.2-1 below presents the average California Bearing Ratio (CBR) test results and the recommended design CBR value for each section. Design roadbed soil resilient modulus and mean effective K-value used for the pavement design are also presented in Table 4.2.2-1.

Table 4.2.2-1: Recommended Pavement Subgrade Design Parameters

Roadway	Average CBR	2/3 of Average CBR	Design CBR used for Pavement Design ⁽¹⁾	Soil Resilient Modulus (psi) ⁽²⁾	Mean Effective K-value (psi/inch) (3)
Segment A	12.9	8.6			
Segment C	2.8	1.9 ⁽⁴⁾			
Segment D	9.2	6.1	3.33	5,000	257
Segment F	5.5	3.7			
Segment H/I	7.0	4.7			

Notes:

If fill placed at the site is generated from off-site borrow areas, the actual CBR value for the pavement subgrades may be significantly different from the value presented herein. Therefore, CBR tests should be performed on the in-place subgrade after rough grading and installation of utilities within roadways. Final pavement sections should be based on CBR tests taken on subgrade soils at the time of construction.

Additional pavement design parameters used for the flexible pavement and rigid pavement design are presented in Table 4.2.2-2 herein.

⁽¹⁾ From Multimodal Street Improvements Transportation Study dated June 2012

⁽²⁾ Estimated from the information provided

⁽³⁾ Assumed for design

⁽⁴⁾ Values from VDOT Pavement Design Standards

⁽¹⁾ Design CBR for Pavement Design = 5*2/3 = 3.33

⁽²⁾ Soil Resilient Modulus = 1500*CBR

⁽³⁾ Mean effective K-value (k-value) = Mr/19.4, max 500 psi/inch

⁽⁴⁾ Undercut and replacement of soils with CBR>5 is recommended per Section 4.3.1 of this report



Table 4.2.2-2: Pavement Design Parameters

Design Parameter	Flexible Pavement Design Value	Rigid Pavement Design Value
Initial Serviceability	4.2	4.5
Terminal Serviceability	2.8	2.8
Standard Deviation	0.49	0.39
Reliability	90%	90%

Based on the estimated design CBR, resilient modulus value, and traffic loading, the following flexible and rigid pavement sections are recommended below in Table 4.2.2-3. Pavement design calculations are presented in Appendix C of this report.

Table 4.2.2-3: Recommended Pavement Sections

Roadway	Segments	Segments			
	A, C, D, and F	H and I			
Flexible Pavement Layer	Thickness (inche	es)			
SM-9.5	2.0	2.0			
BM-25.0	8.0	8.0			
Aggregate Base Material Type I, No. 21A	12.0	12.0			
Rigid Pavement Layer	Thickness (inche	es)			
JPCP	10	10			
Aggregate Base Material Type I, No. 21A	6	6			
Minimum Percent Steel Reinforcement Required	0.1 (WWF placed at mid-depth	of the concrete)			
Dowel Requirements	1-inch diameter smooth dowel along transverse joints, 18-inch length, 12-inch O.C., placed at mid-height of concrete. Epoxy coated rebar is recommended to prevent corrosion.				

Proper drainage is imperative in the design and construction of flexible pavements. The aggregate base material, Type I, size No. 21A should be connected to a longitudinal pavement drain (UD-4) with outlets or is daylighted to provide for positive lateral drainage. Depending on the bridge profile, a transverse crossdrain (CD-2) may also be placed at the bridge approaches. Typical edgedrain/underdrain details are presented as figure 2 at the end of this report. The roadway shoulder or adjacent ground should be graded so that surface drainage runs away from the pavement and does not stand on the pavement's edge. The overall pavement design should also include suitable storm inlets and diversion structures for collecting surface runoff and to limit excessive ponding on paved surfaces.

Construction loading conditions may be more severe than post-construction conditions and typically occurs prior to placement of the total pavement sections. Construction traffic activity on partially constructed pavement sections may result in subgrade and pavement failures due to the reduced support qualities of a partial section and the relatively heavy loads associated with construction traffic. Accordingly,



consideration should be given to the construction of designated haul roads where the thickness of the granular subbase and/or asphalt base course has been increased to account for the heavier-loaded construction traffic. We suggest that placement of the asphalt surface course not occur until all the major construction has been completed for pavement areas subjected to construction traffic.

4.3 Earthwork

Fill may be required for site grading in pavement areas and as backfill against retaining walls. Unsuitable existing fill, soft or loose natural soils, organic material, and rubble should be stripped to approved subgrades as determined by the geotechnical engineer. Asphalt, crushed stone, and concrete depths presented on the boring logs should not be considered as stripping depths, as stripping depths may vary widely across the site. Stripping depths will probably extend to greater depths due to the presence of minor amounts of organics, roots, and other surficial materials that will require removal as a part of the stripping operations. In addition, seasonal soil moisture variations can affect stripping depths. In general, less stripping may occur during summer months when drier weather conditions can be expected. The depth of required stripping should be determined prior to construction by the excavation contractor using test pits, probes, or other means that the contractor wishes to employ, and this determination should be the responsibility of the excavation contractor. All subgrades should be proofrolled with a minimum 20 ton, loaded dump truck or suitable rubber tire construction equipment approved by the geotechnical engineer, prior to the placement of new fill.

For pavement areas, the new fill should extend at least 2 feet outside pavement edges, as illustrated by Figure 3 at the end of this report. Fill material should be placed in lifts not exceeding 8 inches loose thickness, with fill materials compacted by hand operated tampers or light compaction equipment placed in maximum 4-inch thick loose lifts. Fill should be compacted at +/- 2% of the optimum moisture content to at least 95 percent of the maximum dry density per VTM-1. The upper 6 inches of pavement subgrades should be compacted to at least 100 percent of the maximum dry density per the same standard.

Materials used for compacted fill should consist of soils classifying SC, SM, SP, SW, GC, GM, GP, or GW per ASTM D-2487, with a maximum dry density greater than 105 pcf. Materials used for backfill against walls below grade should consist of soils classifying SM, SP, SW, GM, GP, or GW, with a liquid limit and plasticity index less than 40 and 15, respectively. It is expected that portions of the soils excavated at the site will be suitable for re-use as fill based on classification. However, the Stratum A existing fill may not be suitable for re-use as new compacted fill due to deleterious man-made materials in the fill. In addition, drying of excavated soils by spreading and aerating may be necessary to obtain proper compaction. This may not be practical during the wet period of the year. Accordingly, earthwork operations should be planned for early Spring through late Fall, when drier weather conditions can be expected. Individual borrow areas, both from on-site and off-site sources, should be sampled and tested to verify classification of materials prior to their use as fill.

Fill materials should not be placed on frozen or frost-heaved soils, and/or soils that have been recently subjected to precipitation. All frozen or frost-heaved soils should be removed prior to continuation of fill operations. Borrow fill materials should not contain frozen materials at the time of placement.

Compaction equipment that is compatible with the soil type used for fill should be selected. Theoretically, any equipment type can be used as long as the required density is achieved; however, sheepsfoot roller equipment are best suited for fine-grained soils and vibratory smooth drum rollers are best suited for granular soils. Ideally, a smooth drum roller should be used for sealing the surface soils at the end of the day or prior to upcoming rain events. In addition, compaction equipment used adjacent to walls below grade should be selected so as to not impose undesirable surcharge on walls. All areas receiving fill should be graded to facilitate positive drainage of any water associated with precipitation and surface run-off.

For utility excavation backfill, we recommend that open graded stone be used to backfill the pipe trench to the spring line of the pipe. Backfill should be compacted in lifts not exceeding 6 inches loose thickness, to at least 95 percent of the maximum dry density per VTM-1. Hand operated compaction equipment should



be used until the backfill has reached a level 1 foot above the top of the pipe to prevent damaging the pipe. Also, backfill material within 2 feet of the top of the pipe should not contain rock fragments or gravel greater than 1-inch in diameter.

After completion of compacted fill operations in retaining wall or pavement areas, construction of building elements or asphalt should begin immediately, or the finished subgrade should be protected from exposure to inclement weather conditions. Exposure to precipitation and freeze/thaw cycles will cause the finished subgrade to soften and become excessively disturbed. If development plans require that finished subgrades remain exposed to weather conditions after completion of fill operations, additional fill should be placed above finished grades to protect the newly placed fill. Alternatively, a budget should be established for reworking of the upper 1 to 2 feet of previously placed compacted fill.

4.3.1 Treatment of Unsuitable Pavement Subgrade Soils

The majority of on-site soils are suitable as pavement subgrade materials. However, soft or loose soils with a SPT blow count less than 5, soils classified as CH, MH, OH and OL in accordance with the Unified Soil Classification System (USCS), and soils with a CBR value less than 5 are not considered suitable for direct support of the proposed roadway. Removal and replacement of these unsuitable soils are recommended to limit potential total and differential settlement of pavements and structures. Table C-1 in Appendix C presents specific locations where unsuitable soils were encountered along the project alignment. In areas where no treatment is required, subgrade soils shall be dried or wetted to attain an appropriate range of moisture content for compaction purposes, prior to placement of aggregate base course.

5.0 General Limitations

Recommendations contained in this report are based upon the data obtained from the relatively limited number of test borings. This report does not reflect conditions that may occur between the points investigated, or between sampling intervals in test borings. The nature and extent of variations between test borings and sampling intervals may not become evident until the course of construction. Therefore, it is essential that on-site observations of subgrade conditions be performed during the construction period to determine if re-evaluation of the recommendations in this report must be made. It is critical to the successful completion of this project that GeoConcepts be retained during construction to observe the implementation of the recommendations provided herein.

This report has been prepared to aid in the evaluation of the site and to assist your office and the design professionals in the design of this project. It is intended for use with regard to the specific project as described herein. Changes in proposed construction, grading plans, etc. should be brought to our attention so that we may determine any effect on the recommendations presented herein.

An allowance should be established for additional costs that may be required for foundation and earthwork construction as recommended in this report. Additional costs may be incurred for various reasons including wet fill materials, soft subgrade conditions, unexpected groundwater problems, rock excavation, etc.

This report should be made available to bidders prior to submitting their proposals to supply them with facts relative to the subsurface conditions revealed by our investigation and the results of analyses and studies that have been performed for this project. In addition, this report should be given to the successful contractor and subcontractors for their information only.

We recommend the project specifications contain the following statement: "A geotechnical engineering report has been prepared for this project by GeoConcepts Engineering, Inc. This report is for informational purposes only and should not be considered part of the contract documents. The opinions expressed in this report are those of the geotechnical engineer and represent their interpretation of the subsoil conditions, tests and results of analyses that they performed. Should the data contained in this report not be adequate for the contractor's purposes, the contractor may make their own investigations, tests and analyses prior to bidding."



This report was prepared in accordance with generally accepted geotechnical engineering practices. No warranties, expressed or implied, are made as to the professional services included in this report.

We appreciate the opportunity to be of service for this project. Please contact the undersigned if you require clarification of any aspect of this report.

AUL E. BURKAI Lic. No. 02155

Sincerely,

GEOCONCEPTS ENGINEERING, INC.

Fernanda Madrona, EIT Senior Staff Engineer

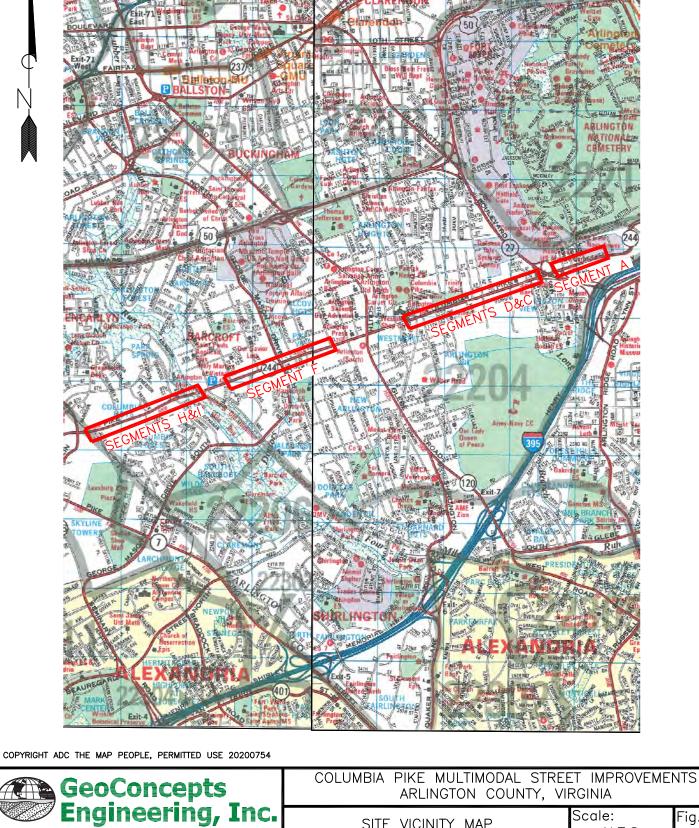
Paul E. Burkart, PE Principal

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SITE VICINITY MAP

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Drawn By:

Date:

APRIL 2016

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Scale:

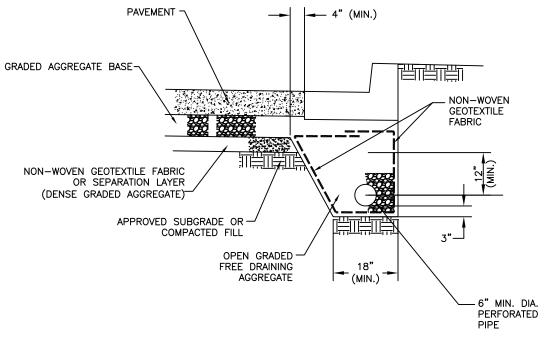
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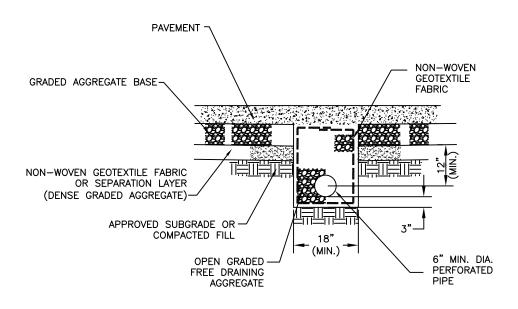
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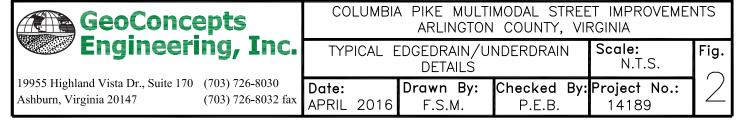
Fig.

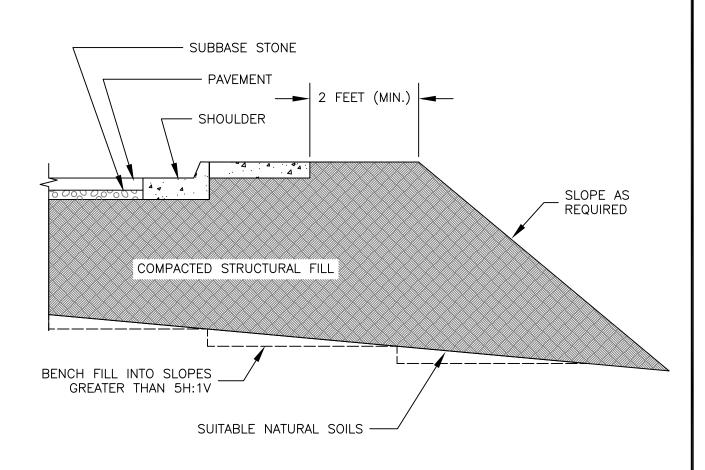


TYPICAL SHOULDER EDGEDRAIN DETAIL



TYPICAL INTERIOR UNDERDRAIN DETAIL







19955 Highland Vista Dr., Suite 170 (703) 726-8030 Ashburn, Virginia 20147 (703) 726-8032 fax COLUMBIA PIKE MULTIMODAL STREET IMPROVEMENTS
ARLINGTON COUNTY, VIRGINIA

COMF	Scale:	Fig.		
	FILL DIAGRA	М	N.T.S.	
Date:	Drawn By:	Checked By:	Project No.: 14189	5
APRIL 2016	F.S.M.	P.E.B.	14189	



Appendix A Subsurface Investigation

Subsurface Investigation Procedures (1 page)

Identification of Soil (1 page)

Test Boring Notes (1 page)

Hand Auger Boring Notes (1 page)

Test Boring Logs (75 pages)

Pavement Core Photographs (61 pages)

Boring Location Plans, Figures A.1 through A.11 (11 pages)



Subsurface Investigation Procedures

1. Test Borings - Hollow Stem Augers

The borings are advanced by turning an auger with a center opening of 2-1/4 inches. A plug device blocks off the center opening while augers are advanced. Cuttings are brought to the surface by the auger flights. Sampling is performed through the center opening in the hollow stem auger, by standard methods, after removal of the plug. Usually, no water is introduced into the boring using this procedure.

2. Standard Penetration Tests

Standard penetration tests are performed by driving a 2 inch O.D., 1-3% inch I.D. sampling spoon with a 140-pound hammer falling 30 inches, according to ASTM D-1586. After an initial 6 inches penetration to assure the sampling spoon is in undisturbed material, the number of blows required to drive the sampler an additional 12 inches is generally taken as the N value. In the event 30 or more blows are required to drive the sampling spoon the initial 6 inch interval, the sampling spoon is driven to a total penetration resistance of 100 blows or 18 inches, whichever occurs first. The sampling operation is terminated after a total of 100 hammer blows and the depth of penetration is recorded.

3. Hand Auger Borings

Hand auger borings HA-2, HA-3, HA-4, and HA-19 were advanced using a 3-inch diameter auger attached to steel rods and handle extensions. The auger is manually advanced from the ground surface with excavated soil removed from the borehole with each pass of the auger.

4. Test Boring Stakeout

The test boring stakeout was provided by GeoConcepts personnel using available site plans. If the risk related to using approximate boring locations is unacceptable, we recommend an as-drilled survey of boring locations and elevations be completed by a licensed surveyor.



Identification of Soil

I. DEFINITION OF S	SOIL GROUP NAMES	ASTM D-2487	Symbol	Group Name
	Gravels	Clean Gravels	GW	WELL GRADED GRAVEL
Coarse-Grained Soils	More than 50% of coarse	Less than 5% fines	GP	POORLY GRADED GRAVEL
More than 50%	fraction retained on No. 4 sieve	Gravels with Fines	GM	silty GRAVEL
retained	retained on No. 4 sieve	More than 12% fines	GC	clayey GRAVEL
on No. 200 sieve		Clean Sands	SW	WELL GRADED SAND
	Sands	Less than 5% fines	SP	POORLY GRADED SAND
	50% or more of coarse fraction passes No. 4 sieve	Sands with fines	SM	silty SAND
	Traction passes No. 4 sieve	More than 12% fines	SC	clayey SAND
		Inorganic	CL	LEAN CLAY
	Silts and Clays Liquid Limit less than		ML	SILT
Fine-Grained Soils	50	Organic	OL	ORGANIC CLAY
50% or more passes the No. 200 sieve	30			ORGANIC SILT
the No. 200 Sieve		Inorganic	СН	FAT CLAY
	Silts and Clays		MH	ELASTIC SILT
	Liquid Limit 50 or more	Organic	OH	ORGANIC CLAY
				ORGANIC SILT
Highly Organic Soils	Primarily organic matter, dark i	n color, and organic odor	PT	PEAT

II. DEFINITION OF MINOR COMPONENT PROPORTIONS

<u>Minor Component</u> <u>Approximate Percentage of Fraction by Weight</u>

Gravelly, Sandy (adjective)

Sand, Gravel

Silt, Clay

30% or more coarse grained
15% to 29% coarse grained
5% to 12% fine grained

III. GLOSSARY OF MISCELLANEOUS TERMS

CEMENTED SAND

FILL

SYMBOLS Unified Soil Classification Symbols are shown above as group symbols. Use "A" Line Chart for

laboratory identification. Dual symbols are used for borderline classification.

BOULDERS & COBBLES Boulders are considered pieces of rock larger than 12 inches, while cobbles range from 3 to 12 inches.

IGM Residual rock material with a standard penetration test (SPT) resistance of at least 60 blows per foot. ROCK/SPOON REFUSAL Rock material with a standard penetration test (SPT) resistance of 50 blows for 1 inch.

ROCK FRAGMENTS Angular pieces of rock which have separated from original vein or strata and are present in a soil

matrix. Only used in residual soils

QUARTZ A hard silicate mineral often found in residual soils. Only used when describing residual soils.

Usually localized rock-like deposits within a soil stratum composed of sand grains cemented by calcium carbonate, iron oxide, or other minerals. Commonly encountered in Coastal Plain sediments, primarily

in the Potomac Group sands (Kps).

MICACEOUS A term used to describe soil that "glitters" or is shiny. Most commonly encountered in fine-grained

soils.

ORGANIC MATERIALS Topsoil - Surface soils that support plant life and contain organic matter.

(Excluding Peat) Liquite - Hard, brittle decomposed organic matter with low fixed carbon content (a low grade of coal).

Man-made deposit containing soil, rock, and other foreign matter.

CONTAINS This is used when a fill deposit contains a secondary component that does not apply to a USCS

classification. Only used for fill deposits

WITH This is used when a residual soil contains a secondary component that does not contribute to its USCS

classification. Only used for natural soils.

PROBABLE FILL Soils which contain no visually detected foreign matter but which are suspect with regard to origin.

LAYERS ½ to 12 inch seam of minor soil component.

COLOR Two most predominant colors present should be described.

MOISTURE CONDITIONS Wet, moist, or dry to indicate visual appearance of specimen.



Test Boring Notes

- 1. Classification of soil is by visual inspection and is in accordance with ASTM D-2488.
- 2. Estimated groundwater levels are indicated on the logs. These are only estimates from available data and may vary with precipitation, porosity of soil, site topography, etc.
- 3. Sampling data presents standard penetrations for 6-inch intervals or as indicated with graphic representations adjacent to the sampling data.
- 4. The logs and related information depict subsurface conditions at the specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at the test locations. Also, the passage of time may result in a change in the subsurface conditions at the test locations.
- 5. The stratification lines represent the approximate boundary between soil types as determined in the sampling operation. Some variation may be expected vertically between samples taken. The soil profile, groundwater level observations and penetration resistances presented on the logs have been made with reasonable care and accuracy and must be considered only an approximate representation of subsurface conditions to be encountered at the particular location.
- 6. Intermediate Geomaterial (IGM) is defined as residual earth material with a penetration resistance between 60 blows per foot and refusal. Spoon refusal at the surface of rock, boulders, or obstructions is defined as a penetration resistance of 50 blows for 0 inches penetration. Auger refusal is taken as the depth at which further penetration of the auger is not possible without risking significant damage to the drilling equipment.



Hand Auger Boring Notes

- 1. Classification of soil is by visual inspection and is in accordance with the Unified Soil Classification System. Soil classification symbols are in accordance with ASTM D-2488.
- 2. Estimated groundwater levels are indicated on the log. These are only estimates from available data and may vary with precipitation, porosity of soil, site topography, etc.
- 3. Sampling data presents Dynamic Cone Penetration (DCP) values for 1-3/4 inch intervals.
- 4. The logs and related information depict subsurface conditions at the specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at the test locations. Also, the passage of time may result in a change in the subsurface conditions at the test locations.
- 5. The stratification lines represent the approximate boundary between soil types as determined in the sampling operation. Some variation may be expected vertically between samples taken. The soil profile, water level observations, and penetration resistances presented on the logs have been made with reasonable care and accuracy and must be considered only an approximate representation of subsurface conditions to be encountered at the particular locations.
- 6. Refusal depths on the hand auger logs are the depths at which obstructions were encountered and the hand auger could no longer be advanced.



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** M. Showalter **AB-12** LOCATION: DRILLING CONTRACTOR: **Arlington County, Virginia** Connelly & Associates Inc. SHEET 1 OF 2 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn and Associates, Inc. 3/8/16 - 3/8/16 K. Kersh PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 Automatic hammer 3.25" HSA 155.3 SOIL STRATUM GRAPHIC **STANDARD** % ELEV. DEPTH WAS PENETRATION MATERIAL DESCRIPTION REC (in) MC BLOW TEST RESISTANCE COUNTS (BPF) Asphalt = 0.38ft. 154.9 Concrete = 0.6ft. 154.3 Fill, orange, fine to medium, clayey SAND, medium dense, moist, SC 3+6+7+9 24 16.1 3+5+6+7 24 4+7+7+7 24 14.9 4+5+6+5 24 4+5+5+6 24 10 7+11+13 18 15 136.8 Terrace deposit, tan orange and brown, medium to coarse, WELL GRADED SAND with clay and gravel, medium dense, C2 14+15+11 18 moist, SW-SC **GROUND WATER LEVELS:** SAMPLE TYPES: 28.5 ft ELEV. 126.8 Split Spoon CAVED: 21.0 ft ELEV. 134.3 NOT ENCOUNTERED UPON COMPLETION

BOREHOLE/TEST PIT COLUMBIA PIKE MULTIMODAL STREET IMPROVEMENTS LOGS.GPJ. GEOCONCEPTS TEMPLATE 02-12-2015.GDT 4/22/16



BOREHOLE/TEST PIT COLUMBIA PIKE MULTIMODAL STREET IMPROVEMENTS LOGS.GPJ GEOCONCEPTS TEMPLATE 02-12-2015,GDT 4/22/16

19955 Highland Vista Dr., #170 Ashburn, Virginia 20147 Phone: (703) 726-8030 Fax: (703) 726-8032 fax

BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** M. Showalter **AB-12** LOCATION: DRILLING CONTRACTOR: **Arlington County, Virginia** Connelly & Associates Inc. SHEET 2 OF 2 STRATUM GRAPHIC STANDARD DEPTH SAMPLE ELEV. PENETRATION MATERIAL DESCRIPTION E) (ft) BLOW TEST RESISTANCE 8 COUNTS (BPF) 40 60 Terrace deposit, tan orange and brown, medium to coarse, WELL GRADED SAND with clay and gravel, medium dense, moist, SW-SC (continued) 131.8 Dense 23+18+19 12 7.0 25 C2 126.8 Wet 5+18+29 18 30 121.8 Medium dense 5+7+9 18 26.4 35 120.3 Bottom of Boring at 35.0 ft 40 **GROUND WATER LEVELS:** SAMPLE TYPES: 28.5 ft ELEV. 126.8 Split Spoon CAVED: 21.0 ft ELEV. 134.3 NOT ENCOUNTERED UPON COMPLETION REMARKS: Bulk sample collected from 0.0 to 5.0 ft.



PROJECT:

LOCATION:

153.0

152.4 152.2

150.6

148.6

146.6

144.6

142.6

10

Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: LOGGED BY: **Columbia Pike Multimodal Street Improvements** M. Showater **AB-13** DRILLING CONTRACTOR: **Arlington County, Virginia** Connelly & Associates Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn and Associates, Inc. 3/8/16 - 3/8/16 K. Kersh GROUND SURFACE ELEVATION (ft): PROJECT NUMBER: DRILLING METHOD: OFFSET NOTES: 14189 Automatic hammer 3.25" HSA 153.6 STRATUM GRAPHIC **STANDARD** % ELEV. DEPTH WAS PENETRATION MATERIAL DESCRIPTION REC (in) MC BLOW TEST RESISTANCE COUNTS (BPF) Asphalt = 0.55ft. Concrete = 0.575ft. Crushed stone = 0.25ft. Fill, brown tan and red, fine, clayey SAND, medium dense, 7+11+13+8 18 moist, SC Fill, gray and orange, fine, sandy LEAN CLAY, stiff, moist, CL 6+3+6+4 13.7 24 Fill, brown and gray, medium, clayey SAND, loose, moist, SC 2+2+2+2 4 Orange, medium to coarse, medium dense 2+4+6+8 24 Terrace deposit, orange, medium to coarse, clayey SAND, medium dense, moist, SC C2 5+7+11+16 24 Bottom of Boring at 11.0 ft

15

GROUND WATER LEVELS:

NOT ENCOUNTERED DURING DRILLING

NOT ENCOUNTERED UPON COMPLETION

CAVED: 7.0 ft ELEV. 146.6

SAMPLE TYPES:

Split Spoon

REMARKS: Bulk sample collected from 0.0 to 5.0 ft.



BOREHOLE/TEST PIT COLUMBIA PIKE MULTIMODAL STREET IMPROVEMENTS LOGS. GPJ GEOCONCEPTS TEMPLATE 02-12-2015.GDT 4/26/16

19955 Highland Vista Dr., #170 Ashburn, Virginia 20147 Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJE	CT:					LOGGED BY:	20117			BORING NUMB	ER:	
	Columb	oia Pi	ke M	lultimo	dal Street Improvements	M. Showate	er					
LOCAT						DRILLING CONTRACTOR:				AB-	14	
		4	rling	ıton Co	unty, Virginia	Connelly & Associ	iates Ir	ıc.		SHEET 1	OF 1	
OWNE	R/CLIENT:		<u></u>	,	uy, vgu	DRILLER:	utoo ii	DATES	DRILL		01 1	
		Kiml	ων_ Η	orn and	d Associates, Inc.	K. Kersh				/8/16 - 3/8/10	3	
PROJE	CT NUMBER:		еу-п	orii anc	GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOT						,	
	14189					Automotic homeon 2 05!!	LICA					
	14	109			151.8	Automatic hammer 3.25"	ПЭА			SOIL		
ELEV. (ft)	SAMPLE SAMPLE TYPE	STRATUM	GRAPHIC		MATERIAL DESCRIF	PTION	BL	PT OW JNTS	REC (in)	STANDA	ANCE	MC (%)
151.8 151.3 150.7					alt = 0.55ft.					20 10 00		
150.7	1 + 1		2 A A		rete = 0.575ft.							
140.7				<i>F⊪</i> , gr	ay and orange, clayey SAND, m	edium dense, moist, SC	7+9+	11+13	24	7		10.5
148.7		Α		Fill, or	range, LEAN CLAY with sand, ve	ery stiff, moist, CL	5+8+	10+13	24	•		
146.7	5 -			Terrac dense	ce deposit, orange and gray, fine e, moist, SC	, clayey SAND, medium	8+14-	+16+21	24			-
144.7	-	C2		Orang	ge and white, medium to coarse,	with gravel, dense	9+17-	+14+12	24	•		
142.7	10-			Mediu	ım dense		3+8-	+8+12	24			_
140.7	15 —			Bottor	n of Boring at 11.1 ft							
GROUN	ND WATER LE	EVELS	S:				1	SAMPLE	TYPI	ES:	<u> </u>	
	OT ENCOUNT OT ENCOUNT					5.5 ftELEV146.3		s s	split Sp	ooon		



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** M. Showater **AB-15** LOCATION: DRILLING CONTRACTOR: **Arlington County, Virginia** Connelly & Associates Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn and Associates, Inc. 3/8/16 - 3/8/16 K. Kersh PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 Automatic hammer 3.25" HSA 148.6 STRATUM GRAPHIC **STANDARD** % ELEV. DEPTH A HAVE PENETRATION MATERIAL DESCRIPTION REC (in) MC BLOW TEST RESISTANCE COUNTS (BPF) Asphalt = 0.5ft. 148.1 Concrete = 0.58ft. 147.5 Fill, orange, coarse, clayey SAND with gravel, medium dense, moist. SC 6+10+12+14 24 10.1 Α 145.6 Terrace deposit, orange, medium, clayey SAND with gravel, medium dense, moist, SC 1+10+11+12 24 14.2 143.5 Coarse 8+11+13+14 24 C2 6+8+9+11 24 10 5+5+13+15 24 137.6 Bottom of Boring at 11.0 ft 15 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon CAVED: 5.0 ft ELEV. 143.6 NOT ENCOUNTERED UPON COMPLETION

REMARKS: Bulk sample collected from 0.0 to 5.0 ft.

BOREHOLETEST PIT COLUMBIA PIKE MULTIMODAL STREET IMPROVEMENTS LOGS.GPJ GEOCONCEPTS TEMPLATE 02-12-2015,GDT 4/22/16



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** M. Showater **AB-16** LOCATION: DRILLING CONTRACTOR: **Arlington County, Virginia** Connelly & Associates Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn and Associates, Inc. 3/8/16 - 3/8/16 K. Kersh PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 Automatic hammer 3.25" HSA 146.2 STRATUM GRAPHIC STANDARD % ELEV. DEPTH HAND PENETRATION MATERIAL DESCRIPTION REC (in) MC BLOW TEST RESISTANCE COUNTS (BPF) Asphalt = 0.5ft. 145.7 Concrete = 0.75ft. 144.9 Fill, brown, clayey SAND, loose, moist, SC 18 10.4 1+3+3+5 142.9 Fill, orange and brown, LEAN CLAY, very stiff, moist, CL 3+8+10+5 12 8+3+4+3 18 139.2 138.9 Contains intact clay brick Terrace deposit, gray, fine, sandy silty CLAY, contains organics, soft, moist, CL-ML C1 1+1+1+1 24 18.5 136.9 Terrace deposit, gray, fine to coarse, clayey SAND with gravel, 10 loose, moist, SC C2 12 1+3+7+9 134.9 Bottom of Boring at 11.3 ft 15 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon CAVED: 6.5 ft ELEV. 139.7 NOT ENCOUNTERED UPON COMPLETION

REMARKS:

BOREHOLE/TEST PIT COLUMBIA PIKE MULTIMODAL STREET IMPROVEMENTS LOGS.GPJ GEOCONCEPTS TEMPLATE 02-12-2015.GDT 4/26/16



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh CRW-1 LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn & Associates, Inc. 2/27/15 - 2/27/15 K. Kersh PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD %) OEPTH MENT SPT BLOW PENETRATION MATERIAL DESCRIPTION (ii) ğ TEST RESISTANCE COUNTS (BPF) Asphalt = 0.5ft. Concrete = 0.7ft. Fill, brown, f-c, clayey SAND with gravel, medium dense, moist, SC Α 9+9+16 10 Terrace deposit, orange - brown, f-m, clayey SAND, medium dense, 12 9.2 4+9+10 moist, SC 14+12+13 10 C2 5+6+8 3 10 Wet 4+7+4 4 15 Bottom of Boring at 15.0 ft 20 25 **GROUND WATER LEVELS:** SAMPLE TYPES: 14.0 ft Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 8.0 ft REMARKS:

BOREHOLE/TEST PIT SEG. D&C LOGS.GPJ GEOCONCEPTS TEMPLATE 02-12-2015.GDT 4/22/16



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJE	ECT:					LOGGED BY:				BORING NUMBER:	
	C	olun	nbia	Pike Multimo	dal Street Improvements	L. Pugh				CDW 3	
LOCAT	ΓΙΟΝ:					DRILLING CONTRACTOR:				CRW-2	•
			С	olumbia Pike	, Arlington , VA	Connelly & Assoc	iates, In			SHEET 1 OF	1
OWNE	R/CLI	ENT:				DRILLER:		DATES D	RILL	ED:	
				mley-Horn &	Associates, Inc.	K. Kersh				27/15 - 2/27/15	
PROJE	ECT N	UMBE	R:		GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:	OFI			ES:	
		1	4189)	NOT SURVEYED	2.25" H.S.A					
	Ш	≥	ပ							SOIL	\neg
DEPTH (ft)	SAMPL TYPE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION		SI BL COU	PT OW JNTS	(ii)	STANDARD PENETRATION TEST RESISTANC (BPF) 20 40 60 80	-
			6310201-005	Asphalt = 0.							
	\bigvee			Concrete = 0	D.4ft. , clayey SAND, loose, moist, SC		0+	5+5	14		4.2
	\triangleright	۸	\bowtie	Medium den	* *	,	31,	313	17	T T T T T T T T T T T T T T T T T T T	7.2
5-	X	Α					4+	7+7	14		
				Terrace dep	<i>osit</i> , brown, f-c, clayey SAND, n	nedium dense, moist, SC	6+9	9+16	1)	
10-		C2		Orange - bro	own		5+:	5+8	18		
15-				With gravel	oring at 15.0 ft		9+9)+16	10		
20 -	-										
25 -	- - -										
	_										
GROU	ND W	ATER	LEVE	LS:			<u> </u>	SAMPLE	TYPE	ES:	
				ED DURING DRIL	2.5			Sp.	olit Sp	ooon	
REMA	RKS:	Bulk	san	nple from 0' to	0.5'						

BOREHOLE/TEST PIT SEG. D&C LOGS.GPJ GEOCONCEPTS TEMPLATE 02-12-2015.GDT 4/22/16



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **CB-3** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: 2/27/15 - 2/27/15 Kimley-Horn & Associates, Inc. K. Kersh PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD %) OEPTH MENT PENETRATION MATERIAL DESCRIPTION (ii) MC BLOW TEST RESISTANCE COUNTS (BPF) Asphalt = 0.6ft. Concrete = 0.6ft. Terrace deposit, brown, f, sandy silty CLAY with gravel, stiff, moist, 7+7+4 10 14.4 C1 Brown and gray 2+4+6 12 Terrace deposit, light brown, f, clayey SAND, medium dense, moist, 4+7+10 5 11.6 C2 Orange - brown, f-c, with gravel, dense 10 14+17+17 10 Bottom of Boring at 10.0 ft 15 20 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 3.3 ft

REMARKS:



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **CB-4** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: C. Wolfe Kimley-Horn & Associates, Inc. 2/25/15 - 2/25/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD % OEPTH MENT PENETRATION MATERIAL DESCRIPTION REC (ir) MC BLOW TEST RESISTANCE COUNTS (BPF) Asphalt = 0.5ft. Concrete = 0.6ft. C1 Terrace deposit, brown, LEAN CLAY with gravel, very stiff, moist, CL 15+12+8 6 18.7 Terrace deposit, white, f-c, POORLY GRADED GRAVEL with sand, 40+41+34 12 very dense, moist, GP 12+17+22 2 4.8 C2 Terrace deposit, orange - brown, f-c, clayey SAND, medium dense, 18 3+6+5 moist, SC 10 Bottom of Boring at 10.0 ft 15 20 25 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 5.8 ft REMARKS:



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJE	ECT:					LOGGED BY:				BORIN	3 NUM	BER:			
LOCA			nbia	Pike Multimod	dal Street Improvements	L. Pugh DRILLING CONTRACTOR:					CE	3-5			
			(Columbia Pike	, Arlington , VA	Connelly & Associa	ates. li	10.		ç	HEET	1 OF 1			
OWNE	R/CL	IENT:		Joining Tillo	, rumigion , tr	DRILLER:	atoo, 11	DATES	DRILLI		"""	1 01 1	•		
PROJE	ECT N	IUMBE		imley-Horn &	Associates, Inc. GROUND SURFACE ELEVATION (ft):	C. Wolfe DRILLING METHOD:		OFFSET		:5/15 ES:	- 2/25	/15			
		1	4189	9	NOT SURVEYED	2.25" H.S.A									
		Σ	0							SOIL					
DEPTH (ft)	SAMPLE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION		BL	PT OW JNTS	REC (in)		(BPF	TION STANCE)	MC (%)		
			p 14	Asphalt = 0.											
	X			-	osit, light brown, f-m, sandy LEA	N CLAY, stiff, moist, CL	11-	+5+7	18	•			9.7		
		C1		writte and b	rown, very stiff		6+	8+9	18	Ť					
5-	-X	C2		Terrace dep	osit, black, f-c, clayey SAND, mo	pist, SC	5+	6+7	3	•					
10-		C1		moist, CL	osit, orange - brown, f, LEAN CL	.AY with sand, firm,	3+	3+4	16	•			23.3		
15 - 20 - 25 -	-														
GROU				ELS: RED DURING DRILI	LING			SAMPLE	E TYPE Split Sp						
				RED UPON COMPI											

BOREHOLE/TEST PIT SEG. D&C LOGS.GPJ GEOCONCEPTS TEMPLATE 02-12-2015.GDT 4/26/16



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJE	CT:					LOGGED BY:		BORII	NG NUMBER:					
	С	olun	nbia	Pike Multimo	dal Street Improvements	L. Pugh								
LOCAT						DRILLING CONTRACTOR:		1	CB-6					
			(Columbia Pika	, Arlington , VA	Connelly & Assoc	riatos Inc		SHEET 1 OF 1					
OWNE	R/CLI	ENT:		olumbia i ike	, Aimigion , VA	DRILLER:	LED:	SHEET TOT T						
			V	imlay Harn 9	Accoriates Inc	C. Wolfe	,	2/25/15 - 2/25/15						
PROJE	CT N	UMBE		imiey-nom &	Associates, Inc. GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:	OFFSET NO		0 - 2/25/15					
		1	4189	,	NOT SURVEYED	2.25" H.S.A		9	OIL					
DEPTH (ft)	SAMPLE TYPE	STRATUM	GRAPHIC		MATERIAL DESCRIPT	ON	SPT BLOW COUNTS	(in)	STANDARD					
	X			Asphalt = 0. Concrete = 0 Terrace dep moist, SC		with gravel, medium dense,	14+11+7	14						
5-	X	C2					4+5+8	3	•					
10 - 15 - 20 -				Bottom of Bo	oring at 10.0 ft		4+8+11	2						
GROU	DD W	ATER	LEVF	ELS:			SAMPLE TY	PES:						
N	OT EI	NCOU	NTER	ED DURING DRILI	F 2		Split S							
REMAI	RKS:													

BOREHOLE/TEST PIT SEG. D&C LOGS.GPJ GEOCONCEPTS TEMPLATE 02-12-2015.GDT 4/22/16



Phone: (703) 726-8030 Fax: (703) 726-8032 fax BORING NUMBER:

PROJECT:		LOGGED BY:			E	BORING NUM	BER:			
Columbia Pike Multimod	dal Street Improvements	L. Pugh DRILLING CONTRACTOR:				CE	3-7			
Columbia Pike	, Arlington , VA	Connelly & Associa	ıtes. İr	ıc.		SHEET	1 OF 1			
OWNER/CLIENT:	, rumigion , tr	DRILLER:	1100, 11	DATES	DRILLE		1 01 1			
Kimley-Horn & A	Associates, Inc. GROUND SURFACE ELEVATION (ft):	C. Wolfe DRILLING METHOD:		OFFSET		2/25/15 - 2/25/15 OTES:				
14189	NOT SURVEYED	2.25" H.S.A								
						SOIL				
SAMPLE TYPE STRATUM GRAPHIC	MATERIAL DESCRIPTION		BL	PT .OW JNTS	REC (in)	STANDA PENETRA TEST RESIS (BPF 20 40 6	ATION STANCE)	MC (%)		
Asphalt = 0.6										
Concrete = 0 Terrace deprimoist, SC	osit, brown, f-c, clayey SAND wi	th gravel, medium dense,	11+	8+14	10	1				
5 C2			8+1	15+8	12	•		5.3		
			5+	6+7	6					
C1 Terrace depo	osit, orange - brown, f, LEAN CL	AY with sand, stiff,	5+	4+5	12			22.5		
	oring at 10.0 ft									
GROUND WATER LEVELS: NOT ENCOUNTERED DURING DRILL NOT ENCOUNTERED UPON COMPL REMARKS:	5.0			SAMPLE	TYPE					

BOREHOLE/TEST PIT SEG. D&C LOGS.GPJ GEOCONCEPTS TEMPLATE 02-12-2015.GDT 4/26/16



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJE	CT:					LOGGED BY:				BORING	NUM	BER:	
		olun	ıbia	Pike Multimod	dal Street Improvements	L. Pugh					_CE	3-8	
LOCAT	ION:					DRILLING CONTRACTOR:					CE	9-0	
			С	olumbia Pike	, Arlington , VA	Connelly & Assoc	iates, lı				HEET	1 OF 1	
OWNE	R/CLI	ENT:				DRILLER:		DATES	DRILL	ED:			
DDO IE	OT 11	LIMPE		mley-Horn &	Associates, Inc.	T. Chew		OFFOF		24/15 -	2/24	/15	
PROJE	CIN				GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:		OFFSE	INOI	E5:			
		1	4189)	NOT SURVEYED	2.25" H.S.A				SOIL			
DEPTH (ft)	SAMPLE TYPE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION		BL	SPT LOW UNTS	REC (in)	ST PEN TEST	(BPF	ARD ATION STANCE) 60 80	MC (%)
			p 4	Asphalt = 0.		,	7						
_	M	C2		Concrete = 0	ਹ.ਰπ. o <i>sit</i> , brown, f, clayey SAND, very	loose, moist, SC	√ 3+	2+2	18				16.6
_	$\langle \cdot \rangle$				osit, brown, f, LEAN CLAY with s		\dashv			\\:\:\:			
-	\triangle	C1		,	, , , , , , , , , , , , , , , , , , , ,	, ,,	2+	5+3	18	7			21.2
5 -				Terrace depe	osit, dark orange - brown, f-c, cla se, moist, SC	yey SAND with gravel,	11-	+7+9	18	•			13.7
-		C2					13+	14+15	18)		
10				Bottom of Bo	oring at 10.0 ft								
15 — -	-												_
20 —													
- - -													
25 —													+ $ $
- - -													
GROUN	ND W	ATER	LEVE	LS:				SAMPL	 E TYPI	L : : : : ES:			
N(OT EI	NCOU	NTER	ED DURING DRILI ED UPON COMPL nple from 0' to	LETION CAVED: 5.1 ft				Split Sp				
				,									

BOREHOLE/TEST PIT SEG. D&C LOGS.GPJ GEOCONCEPTS TEMPLATE 02-12-2015.GDT 4/26/16



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJE	ECT:					LOGGED BY:				BORING	NUME	BER:		
			nbia	Pike Multimo	dal Street Improvements	L. Pugh					СЕ	ο ο		
LOCA	TION:					DRILLING CONTRACTOR:					CL)-9		
OWNE	-D/OI	- LIT	C	olumbia Pike	, Arlington , VA	Connelly & Assoc	iates, Ir	DATES	DDULL		IEET	1 OF 1	1	
OWNE	:R/CL	IENT:						DATES						
PROJE	CT N	UMBF		imley-Horn &	Associates, Inc. GROUND SURFACE ELEVATION (ft):	C. Wolfe DRILLING METHOD:		OFFSF	2/25/15 - 2/25/15 OFFSET NOTES:					
			4189	•	NOT SURVEYED	2.25" H.S.A								
	T			<u> </u>	NOT SURVETED	2.23 H.3.A				SOIL				
DEPTH (ft)	SAMPLE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION		BL	SPT LOW UNTS	REC (in)	PEN TEST I	ANDA ETRA RESIS (BPF) 40 6	TION TANCE	MC (%)	
	_		ρ Δ. Δ Δ	Asphalt = 0. Concrete = 0										
	\overline{X}			Terrace dep	osit, brown, f-m, clayey SAND	with gravel, medium	10+	13+10	18	ę				
	\forall			dense, mois Dark orange	t, SC e - brown, dense		Q±1	1+22	18					
	high = 100000000000000000000000000000000000			3	,		071	1722	10					
5-	-	C2		Light brown, moist, GP	f-c, POORLY GRADED GRAV	EL with sand, very dense,	22+3	30+24	6		•			
¥ 	-		0000				39+3	34+38	18			\	5.8	
10-				Bottom of B	oring at 10.0 ft									
	+									: : :				
	1													
	1													
15-]													
	_													
	-													
	-													
20 -	1												1	
	-													
25 -	-												-	
	-													
	1													
	1													
										Liii				
GROU								SAMPLI	= TYPE	±S:				
		JNTEF		8.0 ft					Split Sp	oon				
\ \ \	NOT E	NCOL	NTER	ED UPON COMPI	LETION CAVED: 5.2 ft									
REMA	RKS:							L						

BOREHOLE/TEST PIT SEG. D&C LOGS.GPJ GEOCONCEPTS TEMPLATE 02-12-2015.GDT 4/22/16



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **DB-1** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: T. Chew Kimley-Horn & Associates, Inc. 2/23/15 - 2/23/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD % OEPTH MENT PENETRATION MATERIAL DESCRIPTION REC (in) MC BLOW TEST RESISTANCE COUNTS (BPF) Asphalt = 0.2ft. Concrete = 0.6ft. 3+4+6 18 12.1 Terrace deposit, orange - brown, f, LEAN CLAY with sand, and gravel, stiff, moist, CL C1 18 8+11+13 Very stiff Terrace deposit, orange brown and red, f-c, clayey SAND with gravel, 12+14+15 18 medium dense, moist, SC C2 Dense 13+15+17 18 10 Bottom of Boring at 10.0 ft 15 20 25 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 5.1 ft REMARKS:



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **DB-2** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: T. Chew 2/23/15 - 2/23/15 Kimley-Horn & Associates, Inc. PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD % OEPTH MENT PENETRATION MATERIAL DESCRIPTION REC (in) ğ BLOW TEST RESISTANCE COUNTS (BPF) Asphalt = 0.4ft. Concrete = 0.5ft. 5+7+6 18 17.5 Terrace deposit, orange - brown, sandy FAT CLAY with gravel, micaceous, stiff, moist, CH 8+10+15 18 21.7 Very stiff Without gravel 18+16+13 18 Terrace deposit, orange - brown, f, clayey SAND, medium dense, C2 18 8+10+8 moist, SC 10 Bottom of Boring at 10.0 ft 15 20 25 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 4.7 ft REMARKS: Bulk sample from 0' to 5'



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJECT:						LOGGED BY:		BORIN	IG NUMBER:
	С	olum	nbia	Pike Multimod	dal Street Improvements	L. Pugh			
LOCAT						DRILLING CONTRACTOR:			DB-3
			c	olumbia Pike	, Arlington , VA	Connelly & Associates,	Inc		SHEET 1 OF 1
OWNE	R/CLI	ENT:		oranibia i iko	, ramigion, tr	DRILLER:	DATES DRILL		OFFICE TOTAL
			K	imlay-Harn &	Associates, Inc.	T. Chew	21	22/15	- 2/23/15
PROJE	CT N	UMBE		illiey-norii &	GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:	OFFSET NOT		- 2/23/13
		4	4400		NOT SURVEYED	2 25" U.S. A			
		11	4189	,	NOI SURVETED	2.25" H.S.A		S	OIL
DEPTH (ft)	SAMPLE TYPE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION	ı	SPT BLOW COUNTS	(in)	STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80
-	X	C2		Asphalt = 0.2 Concrete = 0 Terrace depo	0.6ft. <i>osit</i> , brown, f-c, clayey SAND wit	h gravel, dense, moist, SC	15+15+32 33+14+9	18	•
5-	C1 C1								•
10-		C2		•	osit, white, f, clayey SAND, medi	um dense, SC	4+4+7	b	
15	-								
25 —									
GROUI	ND W	ATFR	 FVF	I S [.]			SAMPLE TYP	FS:	
N	OT EN	NCOU	NTER	ED DURING DRILI ED UPON COMPL	5.2		Split Sp		
REMAR	RKS:								



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJE	CT:					LOGGED BY:				BORII	IG NU	MBER:	
		olun	nbia	Pike Multimod	dal Street Improvements	L. Pugh					ח	B-4	
LOCAT	ION:					DRILLING CONTRACTOR:					ט	D-4	
			C	olumbia Pike	, Arlington , VA	Connelly & Associa	ates, lı				SHEE	Γ 1 OF 1	
OWNER	R/CLI	ENT:				DRILLER:		DATES	DRILL	ED:			
PROJE	CT N	UMBE		imley-Horn &	Associates, Inc. GROUND SURFACE ELEVATION (ft):	T. Chew DRILLING METHOD:		OFFSET			- 2/1	9/15	
		1	4189)	NOT SURVEYED	2.25" H.S.A							
	ш	Σ	ပ							SOIL		NA DD	
DEPTH (ft)	SAMPLI	STRATUM	GRAPHIC		MATERIAL DESCRIPTION		BL	SPT .OW UNTS	REC (in)	TES	T RES (BF	RATION ISTANCE	MC (%)
_			~~	Asphalt = 0.9 \text{Crushed sto}									
_	X				rown, clayey GRAVEL with sand,	loose, moist, GC	8+	5+5	12	•			13.4
-	X	Α		, 3 - 1	. , , . .	,	5+	4+3	18				
5-	X	C1		Terrace dependent	osit, orange - brown, LEAN CLAY	Y, micaceous, soft,	5+	2+1	6	\			
- -				Torrace den	osit, orange - brown, clayey SAN	D with gravel medium							
10-	X	C2		dense, mois	t, SC	D with graver, medium	3+	5+12	18	•			
15—					oring at 10.0 ft								
GROUN	ID W	ATER	LEVĒ	LS:				SAMPLE	TYPI	ES:			
	OT EI			ED DURING DRILI	4.7			S	split Sp	ooon			



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **DB-5** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn & Associates, Inc. T. Chew 2/19/15 - 2/19/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD %) DEPTH MENT SPT BLOW PENETRATION MATERIAL DESCRIPTION (ii) ğ TEST RESISTANCE COUNTS (BPF) Asphalt = 0.8ft. Crushed stone = 0.1ft. 18 7+18+15 Fill, gray - brown, f-c, POORLY GRADED SAND with gravel, dense, 23+35+48 18 Very dense 50/3 3 26+27+33 18 10 Bottom of Boring at 10.0 ft 15 20 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 5.2 ft REMARKS:



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJE	ECT:					LOGGED BY:				BORING	3 NUMI	BER:	
LOCA			nbia	Pike Multimod	dal Street Improvements	L. Pugh DRILLING CONTRACTOR:					DE	3-6	
			(Columbia Pike	, Arlington , VA	Connelly & Associa	tes. Ir	ıc.		9	HEET	1 OF 1	
OWNE	R/CLI	ENT:		- Ciumbia i inc	, ,	DRILLER:		DATES	DRILL			1 01 1	
PROJE	ECT N	UMBE		imley-Horn &	Associates, Inc. GROUND SURFACE ELEVATION (ft):	T. Chew DRILLING METHOD:		OFFSET		19/15 - ES:	2/19/	15	
		1	4189	9	NOT SURVEYED	2.25" H.S.A							
		Σ	၂						1	SOIL	TANID 4		
DEPTH (ft)	SAMPLI TYPE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION		BL	PT .OW JNTS	REC (in)	PE TEST	TANDA NETRA RESIS (BPF 40 6	TION TANCE)	MC (%)
		C2		Asphalt = 0. Concrete = 0 Terrace dep loose, moist Brown, loose	0.5ft. <i>osit</i> , orange - brown, f, clayey S <i>A</i> , SC	AND with gravel, very		1+2 2+2	2				11.0
5-	-	C1		Terrace dep moist, CL	osit, orange - brown, f, LEAN CL	.AY with sand, stiff,	3+	4+5	18	•			
10-				Gray, withou	oring at 10.0 ft		5+	6+6	18				
15-	-												
25 -	-												
	IOT EI	NCOU	NTER	ELS: RED DURING DRILI RED UPON COMPL	4.0			SAMPLE	E TYPI plit Sp				
REMA	RKS:	Bull	sar	mple from 0' to	o 5'								



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **DB-7** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn & Associates, Inc. R. Wilcher 2/12/15 - 2/12/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD % CH) (ft) SAMPLI SPT BLOW PENETRATION MATERIAL DESCRIPTION (ii) ğ TEST RESISTANCE COUNTS (BPF) Asphalt = 0.3ft. Concrete = 0.6ft. 7+8+4 18 Terrace deposit, orange - brown, f-c, clayey SAND with gravel, medium dense, moist, SC 18 6+7+8 C2 Loose 3+4+3 4 Terrace deposit, gray, LEAN CLAY, micaceous, firm, moist, CL 18 C1 2+3+4 33.5 10 Bottom of Boring at 10.0 ft 15 20 25 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 5.7 ft

REMARKS:



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJECT:		LOGGED BY:				BORING	> NUIVI	BEK:		
	dal Street Improvements	L. Pugh					Dī	3-8		
LOCATION:		DRILLING CONTRACTOR:					DL	J -U		
Columbia Pike OWNER/CLIENT:	e, Arlington , VA	Connelly & Associate DRILLER:		C. DATES DF) I I I		HEET	1 OF	= 1	
Kimley-Horn & PROJECT NUMBER:	Associates, Inc. GROUND SURFACE ELEVATION (ft):	R. Wilcher DRILLING METHOD:		OFFSET N		2/15 - ≣S:	2/12	/15		
14189	NOT SURVEYED	2.25" H.S.A								
쁘 돌 입						SOIL	TANDA	\PD		
SAMPLE TYPE STATUM GRAPHIC	MATERIAL DESCRIPTION		SF BLC COU	OW L	ў (Ē)	PEI TEST	NETRA RESIS (BPF	ATION STAN(:)	CE	MC (%)
Asphalt = 0.		<u></u>					-10 C			
Concrete =	0.4ft. <i>osit</i> , brown, f-c, clayey SAND, m	edium dense moist SC	7+8	3+8	18	•				
F-m, loose	osh, brown, r o, dayey or hab, m	edidiri derise, moist, ee	6+4	1+6	18	1				
5 C2			0+4	++0	10					
			3+4	1+4	4	•				
- //										
C1 Terrace dep	osit, gray, LEAN CLAY, micaceo	us, stiff, moist, CL	5+6	8+8	18	•				33.4
Bottom of B	oring at 10.0 ft									
15—										
-										
-										
-										
20—										
25—							- : :			
-										
-										
-										
GROUND WATER LEVELS:		1		SAMPLE T	ГҮРЕ	S:		•		
NOT ENCOUNTERED DURING DRIL	LING			Spli	it Sp	oon				
NOT ENCOUNTERED UPON COMP	LETION CAVED: 5.0 ft			<u></u>						
REMARKS:										
I CLIFF II VI V.										



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **DB-9** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: R. Wilcher Kimley-Horn & Associates, Inc. 2/12/15 - 2/12/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD % OEPTH MENT PENETRATION MATERIAL DESCRIPTION REC (in) MC BLOW TEST RESISTANCE COUNTS (BPF) Asphalt = 0.2ft. Concrete = 0.9ft. C2 Terrace deposit, orange - brown, f, clayey SAND, medium dense, 5+7+8 18 11.3 moist, SC Terrace deposit, orange - brown, f, LEAN CLAY with sand, very stiff, 4+6+10 18 18.7 C₁ moist, CL Terrace deposit, orange - brown, f, clayey SAND, medium dense, 12+12+13 18 15.6 moist, SC C2 Terrace deposit, orange - brown, f-m, LEAN CLAY with sand, firm, C1 13+3+2 18 29.4 moist, CL 10 Bottom of Boring at 10.0 ft 15 20 25 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 5.4 ft

REMARKS:



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **DB-10** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn & Associates, Inc. T. Chew 2/18/15 - 2/18/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD DEPTH HE %) SPT BLOW PENETRATION MATERIAL DESCRIPTION REC (in) ğ TEST RESISTANCE COUNTS (BPF) Asphalt = 0.3ft. Concrete = 0.7ft. C1 5+3+3 18 Terrace deposit, orange - brown, LEAN CLAY, firm, moist, CL Terrace deposit, orange - brown, clayey SAND, medium dense, 18 4+6+7 16.1 moist, SC 7+9+12 18 C2 8+9+12 18 10 Bottom of Boring at 10.0 ft 15 20 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 5.4 ft

REMARKS: Bulk sample from 0' to 5'



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **DB-11** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: R. Wilcher Kimley-Horn & Associates, Inc. 2/11/15 - 2/11/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD %) OEPTH MENT PENETRATION MATERIAL DESCRIPTION REC (ii) MC BLOW TEST RESISTANCE COUNTS (BPF) Asphalt = 0.3ft. Concrete = 0.6ft. 13+27+12 18 13.3 Terrace deposit, brown, f-m, LEAN CLAY with sand, hard, moist, CL Firm C₁ 0 11+4+3 Terrace deposit, brown, f, clayey SAND, medium dense, moist, SC 6+8+7 18 C2 Orange - brown, f-c, dense 19+16+15 18 10 Bottom of Boring at 10.0 ft 15 20 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 5.0 ft

REMARKS:



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh FRW-1 LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn & Associates, Inc. T. Chew 2/4/15 - 2/4/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD OEPTH MENT PENETRATION MATERIAL DESCRIPTION REC (in) **BLOW** TEST RESISTANCE COUNTS (BPF) Asphalt = 0.7ft. Concrete = 0.5ft. Potomac group, brown, f-c, clayey SAND with gravel, dense, moist, SC 13+18+14 13 Medium dense, without gravel 7+6+8 14 Loose 14+5+5 8 D2 2 6+4+3 10 D1 Potomac group, gray, FAT CLAY, stiff, moist, CH 18 6+5+4 Bottom of Boring at 15.0 ft **GROUND WATER LEVELS:** SAMPLE TYPES: 9.0 ft Split Spoon ▼ UPON COMPLETION: 12.0 ft CAVED: 13.0 ft

BOREHOLE/TEST PIT SEG. F LOGS.GPJ GEOCONCEPTS TEMPLATE 02-12-2015.GDT 4/22/16

REMARKS:



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJECT:						LOGGED BY:	BORING NUMBER:			
	Co	olum	bia l	Pike Multimo	dal Street Improvements	L. Pugh			EDW 0	
LOCATIO	ON:					DRILLING CONTRACTOR:			FRW-2	
			С	olumbia Pike	, Arlington , VA	Connelly & Associate			SHEET 1 OF 1	
OWNER	/CLIE	ENT:				DRILLER:	DATES DRILI	LED:		
				mley-Horn &	Associates, Inc.	T. Chew			- 2/4/15	
PROJEC	T NL	JMBEI	₹:		GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:	OFFSET NOT	TES:		
		14	1189	<u> </u>	NOT SURVEYED	2.25" H.S.A				
DEPTH 0	TYPE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION	N	SPT BLOW COUNTS	REC (in)	STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80	
				Asphalt = 0.						
-			Δ A A	Concrete = (
					oup, brown, f-c, clayey SAND wit	th gravel, dense, moist, SC	12+20+17	16	,	
	\bigvee			Medium den		16+12+7	14	•		
5	X			Gray, micac		5+5+4	11	•		
10		D2		Very loose			3+2+2	10		
	X			Potomac gro	oup, orange - brown, f-c, POORL ise, moist, SP-SC	Y GRADED SAND with clay,	5+6+10	18		
15	,			Bottom of Bo	oring at 15.0 ft					
GROUNI	D WA	ATER	LEVE	LS:			SAMPLE TYF	PES:		
NOT ENCOUNTERED DURING DRILLING NOT ENCOUNTERED UPON COMPLETION CAVED: 8.0 ft REMARKS:						Split S	spoon			
KEWAR	vo.									



19955 Highland Vista Dr., #170

Phone: (703) 726-8030 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh FRW-3 LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: T. Chew 2/4/15 - 2/4/15 Kimley-Horn & Associates, Inc. PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD SAMPLI (#) PENETRATION MATERIAL DESCRIPTION REC (in) **BLOW** TEST RESISTANCE COUNTS (BPF) Asphalt = 0.7ft. Concrete = 0.6ft. Potomac group, brown, f-c, clayey SAND with gravel, dense, moist, SC 15+21+18 18 Medium dense, moist 18 15+10+5 D2 20+16+10 15 Potomac group, brown, f-c, sandy FAT CLAY with gravel, soft, moist, CH 14 1+2+2 Firm, moist 3 3+4+4 Bottom of Boring at 15.0 ft **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 7.5 ft REMARKS:



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJE	CT:					LOGGED BY:	,1-17			MBER:	
LOCAT			nbia l	Pike Multimod	dal Street Improvements	L. Pugh			FR	2W-4	
LOCAT	ION:		_			DRILLING CONTRACTOR:					
OWNE	R/CL	IENT:	С	olumbia Pike	, Arlington , VA	Connelly & Associate DRILLER:	DATES DRILI		SHEET	Г 1 OF	1
			Ki	mlev-Horn &	Associates, Inc.	T. Chew			- 2/4	/15	
PROJE	CT N	IUMBE		illoy Holli a	GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:	OFFSET NOT			,	
		1	4189		NOT SURVEYED	2.25" H.S.A					
	111	Σ	U			,		S	OIL		
DEPTH (ft)	SAMPLE	STRATUM	GRAPHIC		MATERIAL DESCRIPTIO	N	SPT BLOW COUNTS	REC (in)	TES	STANDA ENETRA T RESIS (BPF 40 6	ATION STANCE ()
				Asphalt = 0.	7ft.				20	40 0	00 00
-			P P	Concrete = 0					: :		
-	\mathbb{N}			Potomac gro	oup, brown, f-c, clayey SAND, lo	ose, moist, SC	12+4+3	6			
							121410				
-	\mathbb{N}	D2					5+4+4	5			
-							31414				
5-											
	M			Potomac gro gravel, stiff,	oup, orange brown and gray, f, s moist, CL	andy LEAN CLAY with	4+4+5	6			
-				gravor, ourr,	moiot, CI		41413		T		
-	1										
-	<u> </u>			Detember	aven liedet breaven I EAN OLAY re	signature was stiff majet O					
-	\mathbb{V}			Potomac gro	oup, light brown, LEAN CLAY, m	ilicaceous, very stiff, moist, CL	4+7+9	18			
10-	\triangle	D1									
-											
-	-										
_											
				Gray							
-	1			Glay			8+10+14	18			
15	\swarrow			Dettern of D	oring at 15 O ft						
				ם סווטווו טו שנ	oring at 15.0 ft				: :		
-											
-											
_											
-											
GROU	ND W	/ATFR	LEVE	S [.]			SAMPLE TYF	PES:			
					LING						
				ED DURING DRILI			Split S	poon			
N	OT E	NCOU	NTER	ED UPON COMPL	LETION CAVED: 7.0 ft						
REMAR	RKS:										



19955 Highland Vista Dr., #170

Phone: (703) 726-8030

Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh FRW-5 LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: T. Chew Kimley-Horn & Associates, Inc. 2/5/15 - 2/5/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD OEPTH MENT PENETRATION MATERIAL DESCRIPTION REC (in) **BLOW** TEST RESISTANCE COUNTS (BPF) Asphalt = 0.7ft. Concrete = 0.6ft. Potomac group, brown, f-c, clayey SAND, medium dense, moist, SC 4+8+9 13 Loose 10+4+5 14 With gravel, medium dense 6+10+10 16 D2 12 8+5+7 Potomac group, gray, LEAN CLAY, very stiff, moist, CL D1 18 7+8+14 Bottom of Boring at 15.0 ft **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 8.0 ft REMARKS:



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh FRW-6 LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: T. Chew Kimley-Horn & Associates, Inc. 2/5/15 - 2/5/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC **STANDARD** 8 OEPTH MENT PENETRATION MATERIAL DESCRIPTION REC (in) MC BLOW TEST RESISTANCE COUNTS (BPF) Asphalt = 1ft. Concrete = 0.5ft. Potomac group, brown, f-c, clayey SAND with gravel, medium dense, moist, SC 11+8+7 4 17.8 D2 10+9+5 5 14.0 Potomac group, gray, FAT CLAY, stiff, moist, CH 4+6+7 18 37.2 Potomac group, orange - brown, f-m, clayey SAND, medium dense, moist, SC 5+7+12 18 22.6 D2 Potomac group, light gray, f-c, POORLY GRADED SAND with clay, medium dense, moist, SP-SC 7+7+10 18 13.0 15 Bottom of Boring at 15.0 ft SAMPLE TYPES:

Split Spoon

GROUND WATER LEVELS:

NOT ENCOUNTERED DURING DRILLING

NOT ENCOUNTERED UPON COMPLETION CAVED: 8.0 ft

REMARKS:



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh FRW-7 LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: T. Chew Kimley-Horn & Associates, Inc. 2/5/15 - 2/5/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD OEPTH MENT PENETRATION MATERIAL DESCRIPTION REC (in) **BLOW** TEST RESISTANCE COUNTS (BPF) Asphalt = 0.5ft. Concrete = 0.5ft. Potomac group, light brown, FAT CLAY, micaceous, stiff, moist, CH 7+5+4 14 Very stiff, moist 4+7+10 18 Potomac group, orange - brown, f-m, clayey SAND, medium dense, moist. SC 7+9+12 17 Potomac group, light gray, f-c, POORLY GRADED SAND with clay, medium dense, moist, SP-SC 18 10+7+8 D2 8+10+11 14 15 Bottom of Boring at 15.0 ft **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon

BOREHOLE/TEST PIT SEG. F LOGS.GPJ GEOCONCEPTS TEMPLATE 02-12-2015.GDT 4/22/16

REMARKS:

NOT ENCOUNTERED UPON COMPLETION CAVED: 7.5 ft



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJE	OJECT:						SED BY:	BORING NUMBER:			
		olun	bia	Pike Multimo	dal Street Improvements		L. Pu	gh		FRW-8	
LOCA	TION:					DRILL	ING CONTRACTOR:			1 1244-0	
OVA/NIE		ENIT.	С	olumbia Pike	, Arlington , VA	DRILL	Connelly & Ass		DDILL ED:	SHEET 1 OF 1	
OWNE	-R/CL	ENI:				DRILL		DATES	DRILLED:		
PROJE	CT N	LIMBE		mley-Horn &	Associates, Inc. GROUND SURFACE ELEVATION (fi	ft). DRILL	T. Chew ING METHOD:	OFFSE	2/5/1 9 F NOTES:	5 - 2/5/15	
11100								0.102	1110120.		
			4189	1	NOT SURVEYED		2.25" H.S.A			SOIL	
DEPTH (ft)	SAMPLE	STRATUM	GRAPHIC		MATERIAL DESCRIF	PTION		SP1 BLO COUN	v (EC	STANDARD	
				Asphalt = 0.							
	 		D A A	Concrete = 0) modium	dance maint CC				
				White	oup, brown, f-c, clayey SAND	o, medium	dense, moist, SC	8+14	+6 4	7	
	$\frac{1}{2}$			VVIIIC				5+5+	7 18	•	
5-								4+5+	6 18	•	
		D2						4+7-	8 18		
10 -	-										
	$\sqrt{}$	D1		Potomac gro stiff, moist, (oup, gray and orange brown, CL	f-c, sandy	LEAN CLAY, very	5+9+	11 18		
15-					oring at 15.0 ft						
GROU	ND W	ATER	LEVE	LS:				SAMPL	E TYPES:		
		JNTER		5.5ft	LETION CAVED: 7.4 ft				Split Spoon		
REMA	RKS:										



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **FB-1** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: R. Wilcher Kimley-Horn & Associates, Inc. 2/10/15 - 2/10/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD OEPTH MENT PENETRATION MATERIAL DESCRIPTION REC (in) **BLOW** TEST RESISTANCE COUNTS (BPF) Asphalt = 1ft. Crushed stone = 0.1ft. Potomac group, brown, f-m, sandy FAT CLAY, firm, moist, CH D1 6 6+4+3 Potomac group, brown, f-c, clayey SAND with gravel, medium dense, moist, SC 5+9+12 8 Loose, without gravel D2 5+2+3 12 D1 Potomac group, dark gray, FAT CLAY, micaceous, firm, moist, CH 18 3+4+4 10 Bottom of Boring at 10.0 ft 15

SAMPLE TYPES:

Split Spoon

GROUND WATER LEVELS:

NOT ENCOUNTERED DURING DRILLING

NOT ENCOUNTERED UPON COMPLETION CAVED: 5.5 ft

REMARKS:



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJE	CT:					LOGGED BY: BORING NUMBER:							
	С	olum	ıbia	Pike Multimod	dal Street Improvements	L. Pugh					-		
LOCAT	TION:					DRILLING CONTRACTOR:					r	3-2	
			С	olumbia Pike	, Arlington , VA	Connelly & Assoc	iates, lı				HEET	1 OF 1	
OWNE	R/CLI	ENT:				DRILLER:		DATES	DRILL	.ED:			
PROJE	CT N	LIMPE		mley-Horn &	Associates, Inc. GROUND SURFACE ELEVATION (ft):	T. Chew DRILLING METHOD:		OFFSE1		2/4/15	- 2/4/	15	
PROJE	CIN							OFFSE	NOI	E3.			
		1	4189	<u> </u>	NOT SURVEYED	2.25" H.S.A	T			SOIL			
DEPTH (ft)	SAMPLE TYPE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION		BL	PT OW JNTS	REC (in)	PE TEST	STANDA NETRA RESIS (BPF	TION STANCE)	MC (%)
			NI SANCIN	Asphalt = 0.0									
			P 4 4 A	Concrete = 0									
	X			SC	oup, brown, f-c, clayey SAND wit		12+	18+15	17		•		6.2
	\mathbb{N}			Potomac gro dense, mois	oup, dark gray, f-m, silty SAND, r t, SM	nicaceous, medium	6+	7+9	8	•			
5-	X	D2		Potomac gro	oup, brown, f-c, clayey SAND wit	h gravel, medium dense,	9+	8+7	9	•			
	X	D1		Potomac gro	oup, gray, FAT CLAY, firm, moist	t, CH	2+	3+3	14				
10 -	-			Bottom of Bo	oring at 10.0 ft								
15 -	-												
GROU	ND W	ATER	LEVE	LS:				SAMPLE	TYP	ES:	<u> </u>		1
٨	IOT E	NCOU	NTER	ED DURING DRILI	0.0			S	Split Sp	ooon			
LIVIA		Duik	Jail	ipie collecteu	110111 0.0 10 3.0								



19955 Highland Vista Dr., #170

Phone: (703) 726-8030

Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh FB-3 LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: 2/9/15 - 2/9/15 Kimley-Horn & Associates, Inc. R. Wilcher PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC **STANDARD** 8 OEPTH MENT PENETRATION MATERIAL DESCRIPTION REC (in) ğ BLOW TEST RESISTANCE COUNTS (BPF) Asphalt = 0.7ft. Crushed stone = 0.1ft. Potomac group, brown and black, f-c, clayey SAND with gravel, 10+9+7 18 D2 medium dense, moist, SC Potomac group, gray, FAT CLAY, micaceous, stiff, moist, CH 5+5+7 18 37.5 Potomac group, orange - brown, clayey SAND, medium dense, moist. SC 8+8+4 4 D2 D1 Potomac group, gray, FAT CLAY with sand, firm, moist, CH 3+4+4 6 10 Bottom of Boring at 10.0 ft 15 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 5.5 ft REMARKS:



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJECT:						LOGGED BY:		BORIN	NG NUMBER:
	С	olum	bia l	Pike Multimod	dal Street Improvements	L. Pugh			FB-4
LOCAT	ION:					DRILLING CONTRACTOR:			ГD-4
			С	olumbia Pike	, Arlington , VA	Connelly & Associate			SHEET 1 OF 1
OWNE	R/CLI	ENT:				DRILLER:	DATES DRIL	LED:	
PROJE	CT N	LIMDE		mley-Horn &	Associates, Inc. GROUND SURFACE ELEVATION (ft):	T. Chew DRILLING METHOD:	OFFSET NO		- 2/5/15
FROJE	CIN						OFFSET NO	IES.	
		1	4189		NOT SURVEYED	2.25" H.S.A		S	OIL
DEPTH (ft)	SAMPLE TYPE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION	N	SPT BLOW COUNTS	REC (in)	STANDARD
				Asphalt = 0.8	8ft.				
-			P 4 △	Concrete = 0					
-	M			_	oup, brown, f-c, clayey SAND wit	h gravel, loose, moist, SC	12+5+4	4	7
-				Very loose			4+2+2	4	
5-		D2		Without grav	vel		3+2+3	8	
-	-	52					3.2.3		
-	M			Potomac gro moist, SP	oup, brown, f-c, POORLY GRAD	ED SAND with gravel, dense,	16+18+19	10	\
10 - - - 15	-			Bottom of Bo	oring at 10.0 ft				
	OT EN	NCOU	NTER	LS: ED DURING DRILI ED UPON COMPL	0.0		SAMPLE TYP		
REMAF	RKS:						I		



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJECT:						LOGGED BY:	BORING NUMBER:			
	С	olun	nbia	Pike Multimod	dal Street Improvements	L. Pugh			ED E	
LOCAT	ION:					DRILLING CONTRACTOR:			FB-5	
			С	olumbia Pike	, Arlington , VA	Connelly & Associate			SHEET 1 OF 1	
OWNE	R/CLI	ENT:				DRILLER:	DATES DRIL	LED:		
				mley-Horn &	Associates, Inc.	R. Wilcher			- 2/9/15	
PROJE	CT N	UMBE	R:		GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:	OFFSET NO	TES:		
		1	4189	1	NOT SURVEYED	2.25" H.S.A				
	ш	Σ	ပ္					S	OIL	
DEPTH (ft)	SAMPL	STRATUM	GRAPHIC		MATERIAL DESCRIPTION	ı	SPT BLOW COUNTS	(in)	STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80	
				Asphalt = 0.9	9ft.				20 40 00 00	
-				∖Crushed sto	ne = 0.1ft.		7			
_	JXI			Potomac gro	oup, orange - brown, f-c, sandy F	AT CLAY, stiff, moist, CH	2+4+5	18	$ lack \phi $	
	(-)			Brown, with	gravel					
-	1XI				g. a. r. o.		2+5+7	12		
-	\vdash									
5-										
	M	D1		Firm			2+2+5	10		
-	$ \Lambda $						2+3+5	10		
_										
-										
-	M			Potomac gro	oup, gray, FAT CLAY, micaceous	s, stiff, moist, CH	4+4+6	18		
40	\mathbb{N}						4+4+0	10		
10 —				Bottom of Bo	oring at 10.0 ft					
-	-									
_										
-										
-	-									
15-										
15-										
-	1									
_										
-										
-	-									
GROU	ND W	ATER	LEVE	LS:			SAMPLE TY	PES:		
N	OT EN	NCOU	NTERI	ED DURING DRILL	LING		Split S	Spoon		
NOT ENCOUNTERED UPON COMPLETION CAVED: 4.3 ft										
DET	21/0									
REMAF	KKS:									



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh FB-6 LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn & Associates, Inc. T. Chew 2/5/15 - 2/5/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD OEPTH AND LIKE PENETRATION MATERIAL DESCRIPTION REC (in) **BLOW** TEST RESISTANCE COUNTS (BPF) Asphalt = 0.6ft. Concrete = 0.6ft. Potomac group, light brown, f-m, clayey SAND, medium dense, moist, SC 5+8+6 18 18 4+5+7 D2 9+10+8 6 18 4+6+9 10 Bottom of Boring at 10.0 ft 15 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 5.8 ft

REMARKS:



19955 Highland Vista Dr., #170

Phone: (703) 726-8030 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **FB-7** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: R. Wilcher 2/9/15 - 2/9/15 Kimley-Horn & Associates, Inc. PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD OEPTH MENT PENETRATION MATERIAL DESCRIPTION REC (in) **BLOW** TEST RESISTANCE COUNTS (BPF) Asphalt = 0.7ft. Concrete = 0.5ft. Potomac group, orange - brown, f, FAT CLAY with sand, micaceous, stiff, moist, CH 4+5+7 18 With gravel 18 5+7+7 D1 Orange brown and gray, without gravel 20+4+6 18 Potomac group, orange - brown, f-c, clayey SAND with gravel, dense, D2 moist, SC 24+30+14 12 10 Bottom of Boring at 10.0 ft 15 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 5.0 ft REMARKS:



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJEC	ROJECT:						LOGGED BY: BORING NUMBER:								
	С	olun	bia	Pike Multimo	dal Street Improveme	ents		L. Pugh							
LOCATI					•		DRILLING CONTRACT						FE	3-8	
			С	olumbia Pike	, Arlington , VA		Connelly	/ & Associate	es. In	C.		ç	SHEET	1 OF	1
OWNER	R/CLII	ENT:			,		DRILLER:	, 0.7.0000.00		DATES I	DRILLI				
			Ki	mlov-Horn &	Associates, Inc.		R. Wi	lchor			2/1	0/15	- 2/10	/15	
PROJEC	CT N	JMBE		illiey-rioili &	GROUND SURFACE ELEV	/ATION (ft):	DRILLING METHOD:	ICITEI		OFFSET			- 2/10	/13	
			4400				2.25"								
		1	4189	<u> </u>	NOT SURVE	TEU	2.25"	п.ә.А				SOIL			
DEDTU	ш.	Σ	皇										STAND	ARD	(%
DEPTH (ft)	AMP TYP	STRATUM	GRAPHIC		MATERIAL DE	SCRIPTION			SF BL0	WC	(ii)	PE TES1	NETRA RESIS	ARD ATION STANCE	MC (%)
	Ŋ.	ST	9						COU	INTS	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	20	(BPF 40 6	;) so so	2
				Asphalt = 0.								= 20			
			P 4	Concrete = 0											
	\bigvee			Alluvial, brow	wn, f-c, sandy FAT CL	_AY with gra	avel, very stiff, moi	ist, CH	2.0	.10	12				
	Λ								3+9	+10	12	T			
					nge - brown, f-m, clay	ey SAND, n	nedium dense, mo	oist,							
	XI			SC					9+12	2+14	18	•			22.7
-	\hookrightarrow														
5															
	\setminus / \mid	В							40.4	0.40	40				
-	Al								10+1	0+13	18	ľ			
	$\stackrel{\leftarrow}{}$														
-															
1 1	XI								10+1	0+10	12	•			
10-	$/ \downarrow$			Dettern of D	t 40 0 ft								<u> </u>		
				BOLLOIII OI B	oring at 10.0 ft										
												: :			
-															
15-															-
												: :			
1 4												: :			
1 1															
GROUN	ID W	ATER	LEVE	LS:						SAMPLE	TYPE	S:	<u> </u>	1 1 1 1	
NC)T FN	ICOI II	ITFRI	ED DURING DRIL	LING					<u>_</u> _	-1:1 0				
										∑ s	plit Sp	oon			
l NC	OT E	NCOU	NTER	ED UPON COMPI	ETION CAVED: 5.3	ft									
REMAR	KS.														



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJECT:					LOGGED BY:	BORING NUMBER:		
С	olum	ıbia I	Pike Multimod	dal Street Improvements	L. Pugh			
LOCATION:					DRILLING CONTRACTOR:		1	FB-9
		_	olumbia Diko	, Arlington , VA	Connelly & Associa	toe Inc	,	SHEET 1 OF 1
OWNER/CLI	ENT:		Oldilibia Fike	, Armigion , VA	DRILLER:	DATES DRIL		SHEET TOP T
		ız:	malalla.ma 0	Annaista Ina				2/0/45
PROJECT N	UMBF		miey-Horn &	Associates, Inc. GROUND SURFACE ELEVATION (ft):	R. Wilcher DRILLING METHOD:	OFFSET NO		- 2/9/15
						0.1.021.110	0.	
	1	4189		NOT SURVEYED	2.25" H.S.A		90	OIL
DEPTHHE SAMPLE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION	ı	SPT BLOW COUNTS	REC (in)	STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80
			Asphalt = 0.6					
-		9 4	Concrete = 0					
				nge - brown, f-c, sandy LEAN CL	AY, stiff, moist, CL	11+4+6	8	
			Very stiff			4+14+13	18)
5	В		Wet			4+5+9	6	
-			0					
10			Orange brow			7+9+14	18	
15 —			Bottom of Bo	oring at 10.0 ft				
GROUND W	ATER	LEVE	LS:			SAMPLE TYP	PES:	
NOT EI	NCOU	NTER	ED DURING DRILL	0.0		Split S		



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **FB-10** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn & Associates, Inc. R. Wilcher 2/9/15 - 2/9/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD % OEPTH AND LIKE SPT BLOW COUNTS PENETRATION MATERIAL DESCRIPTION (ii) ğ TEST RESISTANCE (BPF) Asphalt = 0.4ft. Concrete = 0.6ft. Alluvial, orange - brown, f-m, clayey SAND with gravel, medium dense, moist, SC 5+7+4 18 F-c 4+4+7 18 Brown, very dense В 43+37+23 18 Alluvial, gray, FAT CLAY, soft, moist, CH 1+1+1 2 36.7 10 Bottom of Boring at 10.0 ft 15 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 5.5 ft

REMARKS:



Phone: (703) 726-8030 Fax: (703) 726-8032 fax BORING NUMBER:

PROJE	CT:					LOGGED BY:			BORING NUMBER:			
	С	olun	nbia	Pike Multimod	dal Street Improvements	L. Pugh			ED 44			
LOCAT	ION:					DRILLING CONTRACTOR:			FB-11			
			C	olumbia Pike	, Arlington , VA	Connelly & Associates	, Inc. SHEET 1 OF 1					
OWNE	R/CLI	ENT:				DRILLER:	DATES DRILL	ED:				
PROJE	CT N	UMBE		imley-Horn &	Associates, Inc. GROUND SURFACE ELEVATION (ft):	Z. Macomber DRILLING METHOD:		2/3/15 - 2/3/15 OFFSET NOTES:				
		1	4189)	NOT SURVEYED	2.25" H.S.A						
		5						SC	DIL			
DEPTH (ft)	SAMPLE TYPE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION		SPT BLOW COUNTS STANDARD PENETRATION TEST RESISTANC (BPF) 20 40 60 80					
			P 4.	Asphalt = 0.3			-					
		D1		Concrete = 0 Potomac gro gravel, very	0.6ft. oup, orange brown and gray, f-m, stiff, moist, CH	3+9+10	17	•				
_		D1					3+9+10	6	•			
5-		D2		Potomac gro dense, mois	oup, orange - brown, f-c, clayey S t, SC	17+9+10	13	•				
				Dotomoo ara	oun grov LEAN CLAV vonvetiff	maint Cl	-					
10-	X	D1		_	oup, gray, LEAN CLAY, very stiff,	moist, CL	10+12+12	5				
15 -				Bottom of Bo	oring at 10.0 ft							
GROU	GROUND WATER LEVELS:							ES:				
N	OT FI	NCOLI	NTFR	ED DURING DRILI	LING		0.511.0					
	IOT EI	NCOU		Split S	poon							



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **FB-12** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn & Associates, Inc. Z. Macomber 2/3/15 - 2/3/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 2.25" H.S.A 14189 **NOT SURVEYED** STRATUM GRAPHIC STANDARD %) OEPTH MENT SPT BLOW COUNTS PENETRATION MATERIAL DESCRIPTION (ii) ğ TEST RESISTANCE (BPF) Asphalt = 0.4ft. Concrete = 0.6ft. Potomac group, light brown, FAT CLAY, stiff, moist, CH D1 4+7+7 18 34.9 Potomac group, light brown, clayey SAND, medium dense, moist, SC 7+9+12 18 11+12+15 18 D2 6+10+10 18 10 Bottom of Boring at 10.0 ft 15 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 5.5 ft REMARKS:



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJECT:	:				LOGGED BY:	SED BY: BORING NUMBER:					
		mbia	Pike Multimo	dal Street Improvements	L. Pugh			FB-13			
LOCATION	1:	_			3.422.00 33.00 3.00						
OWNER/C	LIENT		olumbia Pike	, Arlington , VA	Connelly & Associate DRILLER:	DCIATES, Inc. SHEET 1 OF 1 DATES DRILLED:					
			imalas i Llaura 9	Accoriates Inc							
PROJECT	NUMB		imley-norm &	Associates, Inc. GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:		2/3/15 - 2/3/15 FFSET NOTES:				
		14189	\	NOT SURVEYED	2.25" H.S.A						
					2.23 TI.O.A		SOIL				
DEPTH S	STRATUM	GRAPHIC		MATERIAL DESCRIPTION	N	SPT BLOW COUNTS	REC (in)	STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80			
		D 0	Asphalt = 0.								
 	 	P 4 4	Concrete = 0	0.6ft. o <i>up</i> , brown, f-m, clayey SAND, m	nedium dense moist SC						
	D2					5+12+8	7	1			
			Potomac gro micaceous,	oup, orange brown and gray, f, F. very stiff, moist, CH	AT CLAY with sand,	6+12+18	18				
5	\ 7		Gray								
	D1					7+12+17	18	•			
10			Bottom of Bo	oring at 10.0 ft		8+11+11	18				
15—											
-											
GROUND	WATE	R LEVE	LS:			SAMPLE TYP	PES:				
	NOT ENCOUNTERED DURING DRILLING NOT ENCOUNTERED UPON COMPLETION CAVED: 6.5 ft REMARKS:										



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJECT:						LOGGED BY:				BORING NUM	BER:			
LOCA			nbia	Pike Multimo	dal Street Improvements	L. Pugh DRILLING CONTRACTOR:	FB-14							
			c	Columbia Pike	, Arlington , VA	Connelly & Associ	ciates, Inc. SHEET 1 OF 1							
OWNE	OWNER/CLIENT: DRILLER:									DATES DRILLED:				
PROJE	ECT N	IUMBE		imley-Horn &	Associates, Inc. GROUND SURFACE ELEVATION (ft):	Z. Macomber DRILLING METHOD:	2/3/15 - 2/3/15 OFFSET NOTES:							
		1	4189)	NOT SURVEYED	2.25" H.S.A								
	5 0							SOIL						
DEPTH (ft)	SAMPLE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION		BL	SPT LOW UNTS	REC (in)	STAND. PENETRA TEST RESIS (BPF) 20 40 6	ATION STANCE ()	MC (%)		
			200	Asphalt = 0.										
	+		9 4	Concrete = 0	บ.ธณ. อนp, orange - brown, f-c, clayey ร	SAND with gravel	-							
				medium den	ise, moist, SC	Mur graver,	3+	8+7	13	•				
	$\frac{1}{1}$						9+1	1+15	18					
5 -	-	D2		Potomac gro	oup, orange - brown, f-c, POORL avel, dense, moist, SP-SC	Y GRADED SAND with	12+	16+18	16	•				
	-													
10-		D1		moist, CH	oup, orange brown - gray, FAT C	LAY, micaceous, firm,	8+	4+4	11	4		38.9		
15 -	-				oring at 10.0 ft									
GROU	ND W	ATER	LEVE	ELS:			•	SAMPLI	E TYPE	ES:	•			
N	IOT E			ED DURING DRIL	6.0			5	Split Sp	oon				
REMA	RKS:													



PROJECT:

19955 Highland Vista Dr., #170 Ashburn, Virginia 20147

LOGGED BY:

Phone: (703) 726-8030 Fax: (703) 726-8032 fax BORING NUMBER:

			nbia	Pike Multimod	dal Street Improvements	L. Pugh	FB-15				
LOCAT	ION:					DRILLING CONTRACTOR:	FB-13				
			C	olumbia Pike	, Arlington , VA	Connelly & Associates	s, Inc. SHEET 1 OF 1				
OWNE	R/CLI	ENT:				DRILLER:	DATES DRILLED:				
			K	imlev-Horn &	Associates, Inc.	Z. Macomber	1/28/15 - 1/28/15				
PROJE	CT N	UMBE			GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:	OFFSET NOT				
		1	4189	1	NOT SURVEYED	2.25" H.S.A					
					SOIL						
DEPTH (ft)	SAMPLE TYPE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION	1	SPT BLOW COUNTS STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80				
			P 4	Asphalt = 0.4							
-			4 A	Concrete = 0	ว.6tt. <i>osit</i> , orange - brown, f-c, POORL loose, moist, SP-SC	Y GRADED SAND with clay,	- -	14			
-	\triangle			Micaceous	oose, moist, 3r-3c		5+5+5 1	14			
-	X						7+4+5	15	•		
5-	X	C2		Medium den	se		6+9+6	13			
-							4+9+15	18			
10-				Bottom of Bo	oring at 10.0 ft						
-											
15 - - -											
GROU	ND W	ATER	LEVE	LS:			SAMPLE TYP	ES:			
NOT ENCOUNTERED DURING DRILLING NOT ENCOUNTERED UPON COMPLETION CAVED: $\underline{6.5}$ ft								oon			
REMAF	RKS:										



19955 Highland Vista Dr., #170

Phone: (703) 726-8030 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **FB-16** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn & Associates, Inc. Z. Macomber 1/28/15 - 1/28/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 2.25" H.S.A 14189 **NOT SURVEYED** STRATUM GRAPHIC STANDARD %) DEPTH MENT SPT BLOW PENETRATION MATERIAL DESCRIPTION (ii) ğ TEST RESISTANCE COUNTS (BPF) Asphalt = 0.2ft. Concrete = 0.3ft. Terrace deposit, orange - brown, f-m, POORLY GRADED SAND with 6+4+6 15 clay, micaceous, loose, moist, SP-SC With gravel, medium dense 4+6+10 14 7.6 C2 5+7+6 18 9+11+12 16 10 Bottom of Boring at 10.0 ft 15 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 5.0 ft REMARKS:



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJE	CT:					LOGGED BY: BORING NUMBER:			IG NUMBER:			
	С	olum	bia	Pike Multimod	dal Street Improvements	L. Pugh			ED 47			
LOCAT	ION:					DRILLING CONTRACTOR:			FB-17			
			С	olumbia Pike	, Arlington , VA	Connelly & Associates, Inc. SHEET 1 OF 1						
OWNE	R/CLI	ENT:				DRILLER:	DATES DRILL					
			Ki	mley-Horn &	Associates, Inc.	Z. Macomber	1/2	/29/15 - 1/29/15				
PROJE	CT N	UMBE			GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:	OFFSET NOT					
		1	4189		NOT SURVEYED	2.25" H.S.A						
						ALLO THOM						
DEPTH (ft)	SAMPLE TYPE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION	N	SPT BLOW COUNTS	REC (in)	STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80			
			P &	Asphalt = 0.4								
-			3 4	Concrete = 0	ο.οπ. osit, orange - brown, f-c, clayey	SAND with gravel very						
-				dense, mois	t, SC	o, and wan graves, very	6+35+31	15	/•			
-				Dense		10+16+15	18					
5-		C2		Very dense		10+45+50/6	10	>>				
- 10-							50/6	5	>>•			
- - - 15				Bottom of Bo	oring at 10.0 ft							
- - -	-											
GROUN	ND W	ATER	LEVE	LS:			SAMPLE TYP	ES:				
N	NOT ENCOUNTERED DURING DRILLING NOT ENCOUNTERED UPON COMPLETION CAVED: 6.0 ft											
REMAF	RKS:	Bulk	san	nple collected	from 0.0' to 5.0'							



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJECT:					LOGGED BY:				BORING NUMBER:			
	Colur	nbia	Pike Multimod	dal Street Improvements	L. Pugh				ED	40		
LOCATION	l:				DRILLING CONTRACTOR:				FB	-18		
		C	olumbia Pike	, Arlington , VA	Connelly & Assoc	iates, I	nc.		SHEET	1 OF 1		
OWNER/C	LIENT:				DRILLER:		DATES	DRILL	ED:			
			mley-Horn &	Associates, Inc.	Z. Macomber				29/15 - 1/29/	15		
PROJECT	NUMBE	R:		GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:		OFFSET	NOT	ES:			
	1	4189)	NOT SURVEYED	2.25" H.S.A							
DEPTH LE	Σ	U							SOIL			
DEPTH E	STRATUM	GRAPHIC		MATERIAL DESCRIPTION		5	SPT	0.0	PENETRA	TION	MC (%)	
W S	STR	GR				CO	LOW UNTS	REC (ii)	(011)	ž	
			Asphalt = 0.	 5ft.					20 40 6	0 80		
		P 4	Concrete = 0	D.6ft.								
	1		Terrace dep	osit, gray, LEAN CLAY, stiff, moi	st, CL	١ .	2.0	40			10.0	
						3+	+3+8	18	.		18.6	
	7		Hard									
X						10+	17+18	18	1 7			
 	1											
5			Very stiff									
$ \rangle$	C1		very sum			10+	14+16	18				
1 1/2	7											
-												
			lland									
	4		Hard			12+	16+15	18				
10] '[-'	10.10	'				
10			Bottom of Bo	oring at 10.0 ft								
-												
-												
_												
15—											1	
-												
-												
GROUND \	NATER	LEVE	LS:				SAMPLE	TYPI	 ES:	<u> </u>		
NOT	ENCOL	INTER	ED DURING DRILI	LING				nlit C-	oon			
				7.0				Split Sp	OON			
NOT	ENCOL	JNTER	ED UPON COMPL	LETION CAVED: ft								
REMARKS	:						1					



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **HA-19** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn & Associates, Inc. L. Pugh 2/10/15 - 2/10/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): OFFSET NOTES: DRILLING METHOD: 14189 **NOT SURVEYED Hand Augers** SOIL STRATUM GRAPHIC Geoprobe Pen. (in) CH) SAMPLE DCP MATERIAL DESCRIPTION BLOW COUNTS Asphalt = 0.9ft. Crushed stone = 0.1ft. 19₄35/ D2 Potomac group, orange - brown, f-c, clayey SAND with gravel, dense, moist, SC 6+10+7 22+35/ Medium dense Dense Bottom of Boring at 2.2 ft 5 10 15 **GROUND WATER LEVELS:** SAMPLE TYPES: Dynamic NOT ENCOUNTERED DURING DRILLING Cone Penetrometer NOT ENCOUNTERED UPON COMPLETION CAVED: 2.0 ft

REMARKS:



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJE	CT:					LOGGED BY:		BORIN	IG NUMBER:
	С	olun	nbia	Pike Multimod	dal Street Improvements	L. Pugh			UD 4
LOCAT	ION:					DRILLING CONTRACTOR:			HB-1
			C	olumbia Pike	, Arlington , VA	Connelly & Associates,	Inc.	:	SHEET 1 OF 1
OWNE	R/CLI	ENT:			-	DRILLER:	DATES DRILL	ED:	
PROJE	CT N	UMBE		imley-Horn & /	Associates, Inc. GROUND SURFACE ELEVATION (ft):	Z. Macomber DRILLING METHOD:	0FFSET NOT		- 1/13/15
		1	4189)	NOT SURVEYED	2.25" H.S.A			
		_						SC	DIL
DEPTH (ft)	SAMPLE TYPE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION		SPT BLOW COUNTS	REC (in)	STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80
			ઌૢ ૢૢ૾૾	Asphalt = 0.5	5ft.				
-	X			Crushed stor Alluvial, oran moist, SC	ne = 0.3ft. nge - brown, f-c, clayey SAND wit	th gravel, medium dense,	22+20+10	7	•
-	X	В		Dense			10+19+19	0	
5-	X			Micaceous, v	very dense		20+36+36	15	
	\wedge			Auger Refus	al at 6.5 ft				
10-									
GROUI	ND W	ATER	LEVF	iLS:			SAMPLE TYP	ES:	
				ED DURING DRILL	ING				
				ED DURING DRILL	2.0		Split S	poon	
REMAF	RKS:								



19955 Highland Vista Dr., #170

Phone: (703) 726-8030 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **HB-2** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn & Associates, Inc. Z. Macomber 1/22/15 - 1/22/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD OEPTH MENT PENETRATION MATERIAL DESCRIPTION REC (in) **BLOW** TEST RESISTANCE COUNTS (BPF) Asphalt = 0.5ft. Concrete = 0.5ft. Alluvial, orange - brown, f-c, clayey SAND with gravel, medium dense, moist, SC 13+5+8 6 Dense 14+19+23 12 В Brown, micaceous, medium dense 19+12+9 15 Potomac group, light brown, f-m, silty SAND, micaceous, very dense, D2 moist, SM 18 16+26+31 10 Bottom of Boring at 10.0 ft 15 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 6.0 ft REMARKS:



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJE	CT:					LOGGED BY:		BORIN	IG NUMBER:
	С	olun	nbia	Pike Multimod	dal Street Improvements	L. Pugh			UD 2
LOCAT	ION:					DRILLING CONTRACTOR:			HB-3
			С	olumbia Pike	, Arlington , VA	Connelly & Associate	s, Inc.	,	SHEET 1 OF 1
OWNE	R/CLI	ENT:				DRILLER:	DATES DRIL		
			Ki	mley-Horn &	Associates, Inc.	Z. Macomber	1,	/22/15	- 1/22/15
PROJE	CT N	UMBE			GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:	OFFSET NO		
		1	4189)	NOT SURVEYED	2.25" H.S.A			
								SC	OIL
DEPTH (ft)	SAMPLE TYPE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION	N	SPT BLOW COUNTS	REC (in)	STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80
			P 4	Asphalt = 0.4					
-			P 4	Concrete = 0	0.6ft. nge - brown, f-c, clayey SAND w	ith gravel medium dense	4		
-	X			moist, SC	without gravel	iui gravei, medidin dense,	7+6+9	4	
-		В		Light blown,	without graver		6+6+8	12	•
5				Potomac gro	oup, white, f-c, POORLY GRADE	ED SAND with clay, loose,	4+3+5	18	•
-		D2							
10-	M			dense, mois		SAND with gravel, medium	7+7+9	10	.
- 15				Bottom of Bo	oring at 10.0 ft				
	OT EN	NCOU	NTERI	LS: ED DURING DRILI ED UPON COMPL	7.0		SAMPLE TYI		
REMAR	RKS:						1		



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJECT:		LOGGED BY:				BORING NUMB	ER:	
Columbia Pike Multimod	dal Street Improvements	L. Pugh DRILLING CONTRACTOR:				НВ	-4	
Columbia Pike	, Arlington , VA	Connelly & Associ	ates. Ir	ıc.		SHEET 1	OF 1	
OWNER/CLIENT:	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	DRILLER:		DATES	DRILL		<u> </u>	
Kimley-Horn & PROJECT NUMBER:	Associates, Inc. GROUND SURFACE ELEVATION (ft):	Z. Macomber DRILLING METHOD:		OFFSET		19/15 - 1/19/ 1 ES:	15	
14189	NOT SURVEYED	2.25" H.S.A						
> O						SOIL		
(#) HATATOM SAMPLE TYPE SAMPLE STRATUM GRAPHIC	MATERIAL DESCRIPTION		BL	PT .OW JNTS	REC (in)	STANDAF PENETRAT TEST RESIST (BPF) 20 40 60	ION ANCE	MC (%)
Asphalt = 0.								
	συρ, orange - brown, f-c, clayey S	SAND with gravel, loose,	4+	3+3	9	•		12.2
Residual, gr	ay, f-m, silty SAND, micaceous,	dense, moist, SM						
E1			8+1	1+25	4			9.7
5 Weathered I	ock, gray, silty SAND, micaceou	s, very dense, moist, SM	5	0/6	4		>>(22.3
E2 Bottom of Bo	oring at 9.8 ft		25+3	4+50/4	16		X .	011.2
GROUND WATER LEVELS:			I	SAMPLE	TYPE	ĒS:		1
NOT ENCOUNTERED DURING DRIL	LING			s	plit Sp	oon		
NOT ENCOUNTERED UPON COMPLETE REMARKS:	LETION CAVED: 6.5 ft				•			



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PROJE	CT:					LOGGED BY: BORING NUMBER:					
	С	olum	bia	Pike Multimod	dal Street Improvements	L. Pugh	1			UD 5	
LOCAT	ION:					DRILLING CONTRACTOR:				HB-5	
			С	olumbia Pike	, Arlington , VA	Connelly & Assoc	ciates, li	nc.		SHEET 1 OF 1	
OWNE	R/CLI	ENT:				DRILLER:		DATES	DRILL	.ED:	
			Ki	mley-Horn &	Associates, Inc.	Z. Macomber			1/2	28/15 - 1/28/15	
PROJE	CT N	UMBE			GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:		OFFSET			
		1	4189		NOT SURVEYED	2.25" H.S.A					
										SOIL	
DEPTH (ft)	SAMPLE TYPE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION		BL	SPT LOW UNTS	REC (in)	STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80	MC (%)
			PA	Asphalt = 0.4							
-			7 A	Concrete = 0	D.6ft. Dup, white and orange brown, f-c	s clavov SAND, modium	4				
-				dense, mois	t, SC	, clayey SAND, medium	5+	7+12	12	•	
-				Contains gra	avel, dense		15+	13+18	16	•	17.3
5-		D2		Medium den	se		6+1	1+11	18		
10-				clay, with gra	oup, yellow and white, f-c, POOF avel, very dense, moist, SP-SC	RLY GRADED SAND with	16+	20+45	18		
15				Bottom of Bo	oring at 10.0 ft						
GROU	ND W.	ATER	LEVE	LS:				SAMPLE	E TYPI	ES:	
N	OT EI	NCOU	NTER	ED DURING DRILI	LETION CAVED: 5.5 ft			S	Split Sp	poon	
REMAR	KKS:	Bulk	san	iple collected	from 0.0' to 5.0'						



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PROJE	CT:				LOGGED BY:	BORING NUMBER:			
	С	olum	bia	Pike Multimod	dal Street Improvements	L. Pugh			UD 6
LOCAT	ION:					DRILLING CONTRACTOR:			HB-6
			С	olumbia Pike	, Arlington , VA	Connelly & Associate			SHEET 1 OF 1
OWNE	R/CLII	ENT:				DRILLER:	DATES DRIL	LED:	
				mley-Horn &	Associates, Inc.	Z. Macomber			- 1/28/15
PROJE	CT N	UMBEI	₹:		GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:	OFFSET NO	TES:	
		14	4189		NOT SURVEYED	2.25" H.S.A			
	щ	Σ	ပ					SO	OIL
DEPTH (ft)	SAMPL TYPE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION	ı	SPT BLOW COUNTS	REC (in)	(DFI)
				Asphalt = 0.	5ft.				20 40 60 80
-			2 A	Concrete = 0		(
_				moist, SC	oup, white, f-c, clayey SAND, cor	itains gravel, medium dense,	6+9+12	14	
-				Without grav	vel		7+14+14	6	•
5-		Da							
_	A	D2					9+11+11	18	
-									
-	X			Contains gra	avel		6+11+13	18	
10-			<i>Z</i> :Z:x	Bottom of Bo	oring at 10.0 ft				
-									
-									
15 —									
_									
-									
_									
GROUN	ND W	ATER	LEVE	LS:			SAMPLE TYP	PES:	
				ED DURING DRILI ED UPON COMPL	6.0		Split S	Spoon	
REMAR	RKS:								



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PROJE	ECT:					LOGGED BY:		BORII	NG NUMBER:
LOCA			nbia	Pike Multimo	dal Street Improvements	L. Pugh DRILLING CONTRACTOR:			HB-7
			(Columbia Pike	, Arlington , VA	Connelly & Associat	es Inc		SHEET 1 OF 1
OWNE	R/CLI	IENT:		Joinnible 1 INC	, Almigion , VA	DRILLER:	DATES DRIL	LED:	OHLLI I OH I
PROJE	ECT N	UMBE		imley-Horn &	Associates, Inc.	Z. Macomber DRILLING METHOD:	OFFSET NO		5 - 1/28/15
		1	4189	9	NOT SURVEYED	2.25" H.S.A			
		Σ	O					S	OIL
DEPTH (ft)	SAMPLE TYPE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION	N	SPT BLOW COUNTS	REC (in)	STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80
			~	Asphalt = 0.					
		D2	4 4	Concrete = 0 Potomac gromoist, SC	J.5π. <i>pup</i> , orange - brown, f-c, clayey 9	SAND with gravel, loose,	7+4+5	8	P
5-				Potomoo gr	oup, orange brown and gray, f, s	andy LEAN CLAV contains	5+3+5	2	
		D1		gravel, stiff,	συρ, orange brown and gray, i, sa moist, CL	andy LEAN CLAT, contains	5+7+6	10	
10-				Firm			2+3+3	4	•
15 -				Bottom of Bo	oring at 10.0 ft				
	IOT EI	NCOU	NTER	ELS: RED DURING DRILI RED UPON COMPL	6.0		SAMPLE TYF		



19955 Highland Vista Dr., #170

Phone: (703) 726-8030

Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh IRW-1 LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn & Associates, Inc. Z. Macomber 1/13/15 - 1/13/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A SOIL STRATUM GRAPHIC STANDARD % OEPTH MENT PENETRATION MATERIAL DESCRIPTION REC (in) MC BLOW TEST RESISTANCE COUNTS (BPF) Topsoil = 0.2ft. Fill, brown, f-c, sandy FAT CLAY with gravel, soft, moist, CH 1+1+1 12 20.9 Potomac group, orange - brown, f, POORLY GRADED GRAVEL with sand, dense, moist, GP 10+17+15 1 2.0 D2 Residual, orange - brown, f-m, silty SAND, micaceous, very stiff, moist. SM 12+11+10 10 18.7 Dark gray, very hard 20+29+42 18 13.6 E1 Very stiff 19+16+14 18 20.6 15 Bottom of Boring at 15.0 ft **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 10.5 ft REMARKS:



Phone: (703) 726-8030

Fax: (703) 726-8032 fax BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh HA-2 LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA GeoConcepts Engineering, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn & Associates, Inc. L. Pugh 1/15/15 - 1/15/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: **NOT SURVEYED** 14189 **Hand Auger** SOIL STRATUM GRAPHIC Geoprobe Pen. (in) DEPTH (ft) DCP MATERIAL DESCRIPTION BLOW COUNTS 3+12+15 Topsoil = 0.3ft. Fill, brown, f, POORLY GRADED GRAVEL, medium dense, moist, GP Hand Auger Refusal at 0.5 ft 5 10 15 **GROUND WATER LEVELS:** SAMPLE TYPES: Dynamic NOT ENCOUNTERED DURING DRILLING Cone Penetrometer NOT ENCOUNTERED UPON COMPLETION CAVED: 0.5 ft REMARKS:



Phone: (703) 726-8030 Fax: (703) 726-8032 fax BORING NUMBER:

PROJECT:		LOGGED BY:		BORING NUMBER:	
	dal Street Improvements	L. Pugh		HA-3	
LOCATION:		DRILLING CONTRACTOR:			
Columbia Pike OWNER/CLIENT:	e, Arlington , VA	GeoConcepts Engine DRILLER:	eering, Inc. DATES DRI	SHEET 1 OF	1
Kimley-Horn &	Associates, Inc.	L. Pugh		1/15/15 - 1/15/15	
PROJECT NUMBER:	GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:	OFFSET NO	OTES:	
14189	NOT SURVEYED	Hand Auger			
STRATUM GRAPHIC		ESCRIPTION		DCP BLOW COUNTS	Geoprobe Pen. (in)
Concrete =		20		2+3+3	5
]] [[] [f-c, clayey SAND, loose, moist, \$				
A Fill, brown, f	-c, sandy LEAN CLAY with grav	rel, very stiff, moist, CL		2+4+15	5
				9+9+9	5
D2 / Potomac gro	oup, orange - brown, f-c, clayey	SAND with grovel year dense	moiet SC	19 \ 35/	2
	Refusal at 4.5 ft	SAND WILL GLAVEL, VELY GELISE	i, moist, sc		
10—					
GROUND WATER LEVELS: NOT ENCOUNTERED DURING DRIL NOT ENCOUNTERED UPON COMP	4.5		SAMPLE TY Dyna Cone Pene	amic	



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJE	ECT:					LOGGED BY:		BORING	G NUMBER:	
	С	olun	nbia	Pike Multimo	dal Street Improvements	L. Pugh				
LOCAT						DRILLING CONTRACTOR:			HA-4	
			c	columbia Pike	, Arlington , VA	GeoConcepts Engine	ering Inc	ç	HEET 1 OF 1	
OWNE	R/CLI	IENT:		oranibia i ino	, ramigion , tr	DRILLER:	DATES DE		WILL! 1 OI 1	
			K	imlov-Horn &	Associates, Inc.	L. Pugh		1/15/15	- 1/15/15	
PROJE	ECT N	IUMBE		illiey-Holli &	GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:	OFFSET N		- 1/13/13	
		1	4189	,	NOT SURVEYED	Hand Auger			SOIL	
DEPTH (ft)	SAMPLE TYPE	STRATUM	GRAPHIC		MATERIAL DI	ESCRIPTION			DCP BLOW COUNTS	Geoprobe Pen. (in)
			₽ \$	Concrete = 0 Fill, brown, f	0.3ft. -c, clayey SAND with gravel, me	edium dense, moist, SC			6+12+18	5
		Α							6+14+14	5
			XX	Hand Auger	Refusal at 2.5 ft					
5-	-									
	-									
	-									
10-										
	-									
	-									
15-	+									
	-									
	-									
GROU	ND W	ATER	LEVE	LS:			SAMPLE 1	TYPES:		1
N	OT E	NCOU	NTER	ED DURING DRIL	LING		Dyr	namic		
					2.5			netrometer		
	IUI E	NCOU	NIEK	RED UPON COMPL	LETION CAVED: π					
REMAI	RKS:									



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **IRW-4A** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn & Associates, Inc. Z. Macomber 1/20/15 - 1/20/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD OEPTH MENT PENETRATION MATERIAL DESCRIPTION REC (in) **BLOW** TEST RESISTANCE COUNTS (BPF) Asphalt = 0.4ft. Concrete = 0.6ft. Potomac group, orange - brown, f-c, clayey SAND with gravel, loose, 6+5+4 13 Medium dense, without gravel 3+6+13 18 Potomac group, light brown, f-c, POORLY GRADED SAND with clay and gravel, very dense, moist, SP-SC 13+35+50/6 18 D2 Potomac group, light brown, f-c, clayey SAND with gravel, medium dense, moist, SC 18 18+12+12 Wet 7+10+14 18 Bottom of Boring at 15.0 ft **GROUND WATER LEVELS:** SAMPLE TYPES: 13.0 ft Split Spoon ▼ UPON COMPLETION: 13.0 ft CAVED: 8.0 ft 1/20/2015: NOT ENCOUNTERED



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PROJE	CT:					LOGGED BY:		BORIN	IG NUMBER:
	С	olun	bia	Pike Multimod	dal Street Improvements	L. Pugh			ID 4
LOCAT	ION:					DRILLING CONTRACTOR:			IB-1
			С	olumbia Pike	, Arlington , VA	Connelly & Associate	s, Inc.		SHEET 1 OF 1
OWNE	R/CLI	ENT:				DRILLER:	DATES DRILL		
			Ki	imley-Horn &	Associates, Inc.	Z. Macomber	1/2	21/15	- 1/21/15
PROJE	CT N	UMBE			GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:	OFFSET NOT		
		1	4189)	NOT SURVEYED	2.25" H.S.A			
								S	OIL
DEPTH (ft)	SAMPLE TYPE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION	N	SPT BLOW COUNTS	REC (in)	STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80
			p 4	Asphalt = 0.5			_		
-				Concrete = 0	ມ.ຣπ. - brown, f-c, clayey SAND with gi	ravel loose moist SC	-		
_] X [\bowtie	r m, orange	Stown, 1 o, diayoy o, 1145 willing	raver, recoo, moiet, cc	5+5+5	15	
	(\bowtie	Very dense					
-	V	Α	\bowtie	very derise			4+6+50/6	14	>>
_	$/ \setminus$		\bowtie						
			\bowtie	Crushed asp	phalt				
5-				Potomac gro	oup, light brown, f-c, clayey SAN	D with gravel, medium dense,			
_	ļΧI			moist, SC	, , , , , ,	,	11+10+13	18	• •
	igwedge								
-									
_		D2							
-	V						8+10+14	18	
40							0.10.14	10	
10 -				Bottom of Bo	oring at 10.0 ft				
_	-								
-									
_	-								
-									
15									
-									
_									
-									
_									
GROUN	ND W	ATER	LEVE	LS:			SAMPLE TYP	ES:	
N/		אכטו וי	JTED	ED DURING DRILI	LING				
							Split S	poon	
N	OT EI	NCOU	NTER	ED UPON COMPL	LETION CAVED: 5.0 ft				
REMAF	RKS.								



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJE	CT:					LOGGED BY: BORING NUM			BORING NUMBER	R:		
	С	olun	bia	Pike Multimod	dal Street Improvements	L. Pugh				ID 1	,	
LOCAT	ION:					DRILLING CONTRACTOR:				IB-2	_	
			С	olumbia Pike	, Arlington , VA	Connelly & Assoc	iates, lı	1C.		SHEET 1	OF 1	
OWNE	R/CLI	ENT:				DRILLER:		DATES	DRILL	ED:		
			Ki	mley-Horn &	Associates, Inc.	Z. Macomber				20/15 - 1/20/15	5	
PROJE	CT N	UMBE	R:		GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:		OFFSE	T NOT	ES:		
		1	4189	l	NOT SURVEYED	2.25" H.S.A						
		Σ	ပ							SOIL		
DEPTH (ft)	SAMPLE	STRATUM	GRAPHIC		MATERIAL DESCRIPTION		BL	SPT LOW UNTS	REC (in)	STANDARE PENETRATIO TEST RESISTA (BPF) 20 40 60	ON NCE	MC (%)
			P 4	Asphalt = 0.4								
-			P 4 4	Concrete = 0).6ft. pup, brown, f-c, sandy FAT CLA`	V with gravel stiff moist	4					
	X			CH	oup, blown, i-c, sandy FAT CLA	r, with graver, still, moist,	5+	7+8	16	•		
_	\square									: : : :		
-				Orange - bro	own, very stiff		8+1	2+14	18	7		24.7
	$ \rangle $						0.1	2114	10			24.1
_		5.4										
5		D1		Without grav	vel							
_	X			TTILLIOUT GLUT	o i		5+	7+8	18			
	igwedge											
-												
_						DADED CAMP III I						
-	V			Potomac gro	oup, light brown, f-c, POORLY G se, moist, SP-SC	RADED SAND with clay,	0+1	1+14	18			
	$ \wedge $			modium don	oc, molec, or oc		3+1	1714	10			
10 —												
-												
		D2										
-												
-												
				Potomac arc	oup, light brown and orange brov	vn. f. sandv I FAN CLAY.						
-	X			very stiff, mo	pist, CL	, .,,	9+	9+18	18			
15	\wedge			Dottom of De	oring at 15.0 ft		_					
				BOULDIN OF BU	oning at 15.0 it							
-												
-												
-												
-												
GROUN	ND W	ATER	LEVE	LS:			1	SAMPL	E TYPI	ES:		
NO	AT EN	NCOU	NTER	ED DURING DRILI	LING				Split Sp	noon		
					0.5				υριιι υμ	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
N	OLE	NCOU	NIEK	ED UPON COMPL	LETION CAVED: ft							
REMAR	RKS:	Bulk	san	ple collected	from 0.0' to 5.0'							



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **IB-3** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn & Associates, Inc. Z. Macomber 1/20/15 - 1/20/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD OEPTH MENT PENETRATION MATERIAL DESCRIPTION REC (in) **BLOW** TEST RESISTANCE COUNTS (BPF) Asphalt = 1ft. Fill, orange - brown, f-c, clayey SAND with gravel, medium dense, moist, 12+7+7 3 12+50/6 10 Crushed asphalt Potomac group, dark gray, f-c, clayey SAND with gravel, medium dense, moist. SC 10 14+12+10 D2 16+37+28 18 10 Bottom of Boring at 10.0 ft 15 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING

Split Spoon

REMARKS:

NOT ENCOUNTERED UPON COMPLETION CAVED: 5.0 ft



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJECT:		LOGGED BY:			BORING NUME	BER:	
Columbia Pike Multimod	dal Street Improvements	L. Pugh			IB.	1	
LOCATION:		DRILLING CONTRACTOR:			ID.	-4	
Columbia Pike	, Arlington , VA	Connelly & Associ			SHEET	1 OF 1	
OWNER/CLIENT:		DRILLER:	DATES	DRILL	.ED:		
	Associates, Inc.	Z. Macomber	05505		20/15 - 1/20/	15	
PROJECT NUMBER:	GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:	OFFSE	INOI	ES:		
14189	NOT SURVEYED	2.25" H.S.A			0011		
(#) Add H LE SAMPLE TYPE STRATUM GRAPHIC	MATERIAL DESCRIPTION		SPT BLOW COUNTS	REC (in)	SOIL STANDA PENETRA TEST RESIS (BPF) 20 40 60	TION TANCE	MC (%)
Asphalt = 1ft							
moist, SC	brown, f-c, clayey SAND with g wn, f-c, POORLY GRADED GRA		6+6+9 18+50/5	6	•	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	13.2
Potomac grodense, moist	oup, white, f-c, POORLY GRADE t, SP	ED SAND with gravel,	22+17+15	11	•		3.7
medium den	oup, orange - brown, f-c, clayey se, moist, SC	SAND with gravel,	14+6+7	14	•		
15—	oring at 10.0 ft						
GROUND WATER LEVELS:			SAMPL	E TYP	ES:		
NOT ENCOUNTERED DURING DRILL NOT ENCOUNTERED UPON COMPL REMARKS:	5.0			Split Sp	ooon		



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **IB-5** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn & Associates, Inc. Z. Macomber 1/15/15 - 1/15/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD OEPTH MENT PENETRATION MATERIAL DESCRIPTION REC (in) **BLOW** TEST RESISTANCE COUNTS (BPF) Asphalt = 0.7ft. Crushed stone = 0.2ft. Potomac group, orange - brown, f-c, clayey SAND with gravel, dense, 23+20+25 18 moist, SC Loose D2 0 5+6+4 Residual, gray, f-m, sandy SILT, micaceous, stiff, moist, ML 7+6+6 15 E1 Residual, orange - brown, f-c, silty SAND, micaceous, dense, moist, SM 18 9+15+17 10 Bottom of Boring at 10.0 ft 15 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING

Split Spoon

REMARKS:

NOT ENCOUNTERED UPON COMPLETION CAVED: 5.5 ft



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJECT: LOGGED BY:							BORING NUMBER:		
					L. Pugh			ID 6	
LOCAT	ION:					DRILLING CONTRACTOR:	CTOR:		IB-6
	Columbia Pike, Arlington , VA Connelly & Associate								SHEET 1 OF 1
OWNE	R/CLI	ENT:				DRILLER:	DATES DRILI	ED:	
			K	imley-Horn &	Associates, Inc.	Z. Macomber	1/	15/15	- 1/15/15
PROJE	CT N	UMBE	R:	-	GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:	OFFSET NOT	ΓES:	
		1	4189)	NOT SURVEYED	2.25" H.S.A			
		5						SC	OIL
DEPTH (ft)	SAMPLE TYPE	STRATUM	GRAPHIC		MATERIAL DESCRIPTIO	ON	SPT BLOW COUNTS	REC (in)	STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80
			000	Asphalt = 0.6					
-				Crushed sto	ne = 0.3ft. -c, POORLY GRADED SAND v	with gravel modium dones			
-	X	Α		moist, SP			22+7+22	2	•
-	M	D2		Potomac gro dense, mois	oup, orange - brown, f-c, clayey t, SC	SAND with gravel, medium	35+12+16	15	,
5-				Residual, ora	ange - brown, f-m, sandy SILT,	micaceous, stiff, moist, ML	5+6+7	18	•
- 10 —		E1		Very stiff			6+10+12	18	
- - - 15-				Gray	asing at 45 0 ft		9+14+20	18	
- -				Bottom of Bo	oring at 15.0 ft				
GROUN	GROUND WATER LEVELS:						SAMPLE TYP	PES:	
	NOT ENCOUNTERED DURING DRILLING NOT ENCOUNTERED UPON COMPLETION CAVED: 11.0 ft					Split S	poon		
REMAF	RKS:						I		



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJECT: LOGGED BY:						BORIN	NG NUMBER:		
LOCAT	Columbia Pike Multimodal Street Improvements L. Pugh DRILLING CONTRACTOR:							IB-7	
			(`olumbia Piko	, Arlington , VA	Connelly & Associates,	Inc		SHEET 1 OF 1
OWNE						DATES DRIL		SHEET TOT T	
Kimley-Horn & Associates, Inc.				imley-Horn &	Z. Macomber DRILLING METHOD:	1/19/15 - 1/19/15 OFFSET NOTES:		- 1/19/15	
		1	4189)	NOT SURVEYED	2.25" H.S.A			
DEPTH HIGH OF MATERIAL DESCRIPTION MATERIAL DESCRIPTION				N	SPT BLOW COUNTS	REC (in)	STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80		
				Asphalt = 0.9	9ft.				
		D2		dense, mois	oup, orange - brown, f-c, clayey	-	7+17+12	10	•
				r coluuul, gl	ay, 1-111, 311ty OAND, IIIICaccous,	medium dense, moist, siv i	5+6+9	14	
5-		E1					2+10+15	18	
		E2		SM	rock, gray, f-m, silty SAND, mica	ceous, very dense, moist,	15+25+45	18	
15 -				Bottom of Bo	oring at 10.0 ft				
N	GROUND WATER LEVELS: NOT ENCOUNTERED DURING DRILLING NOT ENCOUNTERED UPON COMPLETION CAVED: 7.0 ft					SAMPLE TYF			
REMAI	RKS:								



Phone: (703) 726-8030 Fax: (703) 726-8032 fax

PROJECT:						LOGGED BY: BORING NUMBER		IG NUMBER:	
	Columbia Pike Multimodal Street Improvements				dal Street Improvements	L. Pugh		ID 0	
LOCAT	ION:				<u>.</u>	DRILLING CONTRACTOR:		IB-8	
			С	olumbia Pike	, Arlington , VA	Connelly & Associate			SHEET 1 OF 1
OWNE	OWNER/CLIENT: DRILLER:						DATES DRIL	LED:	
	Kimley-Horn & Associates, Inc. Z. Macomber								- 1/15/15
PROJE	PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD:					OFFSET NO	TES:		
		14	4189)	NOT SURVEYED	2.25" H.S.A			
DEPTH (ft)	AMPLE TYPE	STRATUM	GRAPHIC		MATERIAL DESCRIPTIO	N	SPT BLOW	REC (in)	STANDARD PENETRATION TEST RESISTANCE
	o	<u>ه</u>	G	Asphalt = 0.8	8ft.		COUNTS		(BPF) 20 40 60 80
			991	Crushed sto					
	X				oup, orange - brown, f-c, clayey	SAND with gravel, medium	10+6+7	12	7
-	X			Dark gray, m	nicaceous		4+4+7	10	
5-				Potomoo ara	oup, orange - brown, c, POORL`	CRADED CRAVEL Joses			
-		D2		moist, GP	oup, drange - brown, c, POORL	GRADED GRAVEL, 1005e,	4+4+6	1	•
-	_								
-				Potomac gro	oup, brown, f-c, clayey SAND, m	icaceous, firm, moist, SC	3+3+4	0	
10 –				Bottom of Bo	oring at 10.0 ft				
-									
-									
15									
-									
-									
-									
GROUI	GROUND WATER LEVELS:						SAMPLE TY	PES:	
	NOT ENCOUNTERED DURING DRILLING NOT ENCOUNTERED UPON COMPLETION CAVED: 6.5 ft					Split S	Spoon		
									_
REMAR	RKS:							_	



19955 Highland Vista Dr., #170

Phone: (703) 726-8030 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **IB-9** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn & Associates, Inc. Z. Macomber 1/13/15 - 1/13/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A SOIL STRATUM GRAPHIC STANDARD % OEPTH MENT SPT BLOW PENETRATION MATERIAL DESCRIPTION REC (in) ğ TEST RESISTANCE COUNTS (BPF) Asphalt = 0.8ft. Potomac group, orange - brown, f-c, clayey SAND with gravel, medium dense, moist, SC 4+7+6 15 7.6 4+6+13 0 D2 Dense 15+12+21 3 Residual, dark gray, f-m, clayey SAND, loose, moist, SC E1 5+4+3 4 10 Bottom of Boring at 10.0 ft 15 **GROUND WATER LEVELS:** SAMPLE TYPES: NOT ENCOUNTERED DURING DRILLING Split Spoon NOT ENCOUNTERED UPON COMPLETION CAVED: 4.0 ft REMARKS: Bulk sample collected from 0.0' to 5.0'



Phone: (703) 726-8030 19955 Highland Vista Dr., #170 Fax: (703) 726-8032 fax Ashburn, Virginia 20147 BORING NUMBER: PROJECT: LOGGED BY: **Columbia Pike Multimodal Street Improvements** L. Pugh **IB-10** LOCATION: DRILLING CONTRACTOR: Columbia Pike, Arlington, VA Connelly & Associates, Inc. SHEET 1 OF 1 OWNER/CLIENT: DRILLER: DATES DRILLED: Kimley-Horn & Associates, Inc. Z. Macomber 1/15/15 - 1/15/15 PROJECT NUMBER: GROUND SURFACE ELEVATION (ft): DRILLING METHOD: OFFSET NOTES: 14189 **NOT SURVEYED** 2.25" H.S.A STRATUM GRAPHIC STANDARD OEPTH AND LIKE PENETRATION MATERIAL DESCRIPTION REC (in) **BLOW** TEST RESISTANCE COUNTS (BPF) Asphalt = 0.5ft. Crushed stone = 0.3ft. Potomac group, orange - brown, f-c, clayey SAND, micaceous, dense, moist, SC 15+20+12 1 Brown, medium dense 16+6+7 18 D2 With gravel 7+8+6 1 Residual, brown, f-m, clayey SAND, micaceous, loose, moist, SC E1 3 1+2+4 10 Bottom of Boring at 10.0 ft 15 **GROUND WATER LEVELS:** SAMPLE TYPES:

Split Spoon

NOT ENCOUNTERED DURING DRILLING

NOT ENCOUNTERED UPON COMPLETION CAVED: 6.5 ft

REMARKS:





Core #	Total	Asphalt	Concrete	
	Thickness	Thickness	Thickness	
	(inch)	(inch)	(inch)	
AB-12	11.5	4.5	7.0	





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
AB-13	13.5	6.5	7.0





Core #	Total	Asphalt	Concrete		
	Thickness	Thickness	Thickness		
	(inch)	(inch)	(inch)		
AB-14	13.5	6.5	7.0		





Core #	Total Thickness (inch)	Asphalt Thickness (inch)	Concrete Thickness (inch)
AB-15	13.0	6.0	7.0





Core #	Total	Asphalt	Concrete		
	Thickness	Thickness	Thickness		
	(inch)	(inch)	(inch)		
AB-16	15.0	6.0	9.0		





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
CB-9	15.5	6.0	9.5





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
CB-8	13.0	6.25	6.75





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
CB-7	12.75	6.5	6.25





Core #	Total	Asphalt	Concrete	
	Thickness	Thickness	Thickness	
	(inch)	(inch)	(inch)	
CB-6	13.0	7.0	6.0	





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
CB-5	13.25	6.75	6.5





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
CB-4	13.5	6.5	7.0





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
CB-3	14.5	7.5	7.0





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
CRW-2	14.0	7.5	6.5





Core #	Total Thickness (inch)	Asphalt Thickness (inch)	Estimated Concrete Thickness (inch)
CRW-1	12.0	6.0	6.0*

^{*} Estimated thickness, no recovery





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
DB-11	8.5	2.75	5.75





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
DB-10	12.0	3.5	8.5





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
DB-9	13.0	2.5	10.5





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
DB-8	8.5	3.25	5.25





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
DB-7	10.0	3.75	6.25





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
DB-6	9.75	3.5	6.25





Core #	Total Asphalt Thickness (inch)	Subbase Material Type
DB-5	8.0	Crushed stone





Core #	Total Asphalt Thickness (inch)	Subbase Material Type
DB-4	9.0	Crushed stone





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
DB-3	7.75	2.25	5.5





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
DB-2	10.5	4.5	6.0





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
DB-1	9.75	3.0	6.75





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FRW-1	13.5	8.0	5.5





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FRW-2	15.5	8.5	7.0





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FRW-3	15.5	8.5	7.0





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FRW-4	15.5	8.5	7.0





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FRW-5	15.5	8.5	7.0





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FRW-6	13.0	7.0	6.0





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FRW-7	12.5	5.75	6.75





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FRW-8	15.0	8.0	7.0





Core #	Total Asphalt Thickness (inch)	Subbase Material Type
FB-1	11.5	Crushed Stone





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FB-2	16.0	9.0	7.0





Core #	Total Asphalt Thickness (inch)	Subbase Material Type
FB-3	8.5	Crushed Stone





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FB-4	16.0	9.0	7.0





Core #	Total Asphalt Thickness (inch)	Subbase Material Type
FB-5	10.5	Crushed stone





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FB-6	15.5	7.75	7.75





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FB-7	14.5	8.0	6.5





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FB-8	14.0	7.5	6.5





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FB-9	13.5	6.75	6.75





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FB-10	12.5	5.25	7.25





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FB-11	10.75	3.75	7.0





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FB-12	11.0	4.25	6.75





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FB-13	11.75	4.5	7.25





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FB-14	13.5	6.5	7.0





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FB-15	12.0	5.25	6.75





Core #	Total Thickness (inch)	Asphalt Thickness (inch)	Concrete Thickness (inch)
FB-16	8.5	2.25	6.25





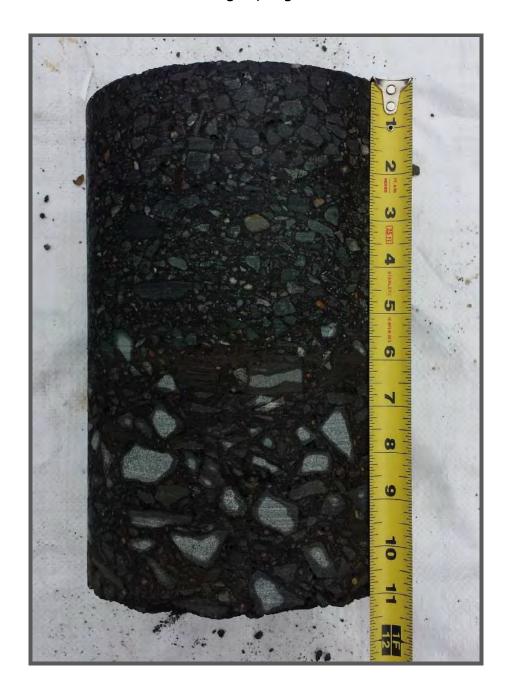
Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FB-17	12.5	5.75	6.75





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
FB-18	13.5	6.5	7.0





Core #	Total Asphalt Thickness (inch)	Subbase Material Type
FB-19	11.0	Crushed stone





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
HB-7	13.0	6.25	6.75





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
HB-6	13.0	6.75	6.25





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
HB-3	12.5	5.0	7.5





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
HB-2	13.0	6.0	7.0





Core #	Total	Asphalt	Concrete
	Thickness	Thickness	Thickness
	(inch)	(inch)	(inch)
IB-1	12.5	6.0	6.5





Core #	Total Asphalt Thickness (inch)	Subbase Material Type
IB-2	13.0	Crushed Stone





Core #	Total Asphalt Thickness (inch)	Subbase Material Type
IB-10	8.5	Crushed Stone





Core #	Total Asphalt Thickness (inch)	Subbase Material Type
IB-9	8.0	Crushed Stone





Core #	Total Asphalt Thickness (inch)	Subbase Material Type
IB-8	8.5	Crushed Stone

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Appendix B Soil Laboratory Test Results

Table B-1: Summary of Soil Laboratory Test Results (1 page)
Liquid Limit and Grain Size Analysis Test Data (44 pages)
Moisture Density Relationship Test Data (14 pages)
CBR Test Data (14 pages)

Table B-1: Summary of Soil Laboratory Test Results

ojesti es.	u			mprovements, Arlington, Virginia	Sieve	Results	Att	erberg Li	mits		ct No.: 14189
Test Boring No.	Depth	Sample	Stratum	Description of Soil Specimen	Percent Retained # 4 Sieve	Percent Passing # 200 Sieve	LL	PL	PI	Natural Moisture Content (%)	Remarks
AB-12	0.0-5.0	Bulk	Α	clayey SAND (SC)	5.5	31.8	50	24	26	16.1	CBR=12.1%
AB-12	5.0-7.0	Split- Spoon	Α	clayey SAND (SC)	1.5	26.4	48	24	24	14.9	
AB-12	23.0-25.0	Split- Spoon	C2	WELL GRADED SAND with clay and gravel (SW-SC)	43.5	9.6	30	18	12	7.0	
AB-13	3.0-5.0	Split- Spoon	C1	sandy LEAN CLAY (CL)	1.3	64.8	24	17	7	13.7	
AB-15	0.0-5.0	Bulk	A/C2	clayey SAND (SC)	11.7	30.8	37	17	20	10.1	CBR=13.7%
AB-16	7.3-9.3	Split- Spoon	C1	Sandy Silty CLAY (CL-ML)	8.6	58.7	22	18	4	18.5	
CRW-2	0.0-5.0	Bulk	Α	clayey SAND (SC)	9.9	44.9	34	15	19	14.2	CBR=4.7%
CB-3	1.0-2.5	Split- Spoon	C1	sandy silty CLAY with gravel (CL-ML)	16.6	64.0	21	15	6	14.4	
CB-5	0.0-5.0	Bulk	C1	sandy LEAN CLAY (CL)	14.3	59.1	41	18	23	9.7	CBR=2.1%
CB-8	0.0-5.0	Bulk	C2	clayey SAND (SC)	5.3	42.1	30	15	15	16.6	CBR=1.6%
DB-2	0.0-5.0	Bulk	C1	sandy FAT CLAY with gravel (CH)	18.2	61.2	51	21	30	17.5	CBR=2.5%
DB-4	5.0-6.5	Split- Spoon	А	clayey GRAVEL with sand (GC)	43.3	22.2	32	16	16	13.4	
DB-6	0.0-5.0	Bulk	C2	clayey SAND with gravel (SC)	15.1	32.1	31	15	16	11.0	CBR=9.0%
DB-10	0.0-5.0	Bulk	C2	clayey SAND (SC)	2.1	44.4	27	14	13	16.1	CBR=16.0%
FRW-6	5.0-6.5	Split- Spoon	D1	FAT CLAY (CH)	0.0	93.6	71	27	44	37.2	
FB-2	0.0-5.0	Bulk	D2	clayey SAND with gravel (SC)	16.4	26.8	72	26	46	6.2	CBR=9.9%
FB-9	0.0-5.0	Bulk	В	sandy LEAN CLAY (CL)	8.8	51.1	36	19	17	14.5	CBR=4.3%
FB-18	0.0-5.0	Bulk	C1	LEAN CLAY (CL)	0.1	86.7	25	17	8	18.6	CBR=2.3%
HB-5	0.0-5.0	Bulk	D2	clayey SAND (SC)	5.0	29.0	74	20	54	17.3	CBR=8.0%
IRW-1	5.0-6.5	Split- Spoon	E1	silty SAND (SM)	0	21.3	53	33	20	18.7	
IB-2	0.0-5.0	Bulk	D1	sandy FAT CLAY (CH)	1.8	51	53	20	33	24.7	CBR=4.3%
IB-9	0.0-5.0	Bulk	D2	clayey SAND with gravel (SC)	26.2	31.7	44	15	29	7.6	CBR=8.8%

- Notes:

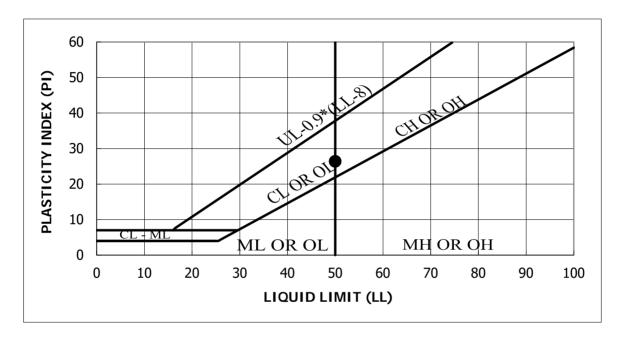
 1. Soil tests are in accordance with applicable ASTM standards.

 2. Soil classification symbols are in accordance with Unified Soil Classification System.

 3. Key to abbreviations: LL= Liquid Limit; PL= Plastic Limit; PI= Plasticity Index; NP= Nonplastic; N/T= Not Tested 4. CBR values correspond to 0.1 inch penetration resistance of soil sample compacted to 95% of maximum dry density



LIQUID AND PLASTIC LIMIT - ASTM D4318									
Project No. 14189 Project Name Columbia Pike Multimodal St. Improvements									
Test Boring No.	AB-12	Depth (Feet)	0.0'-5.0'						
Lab Order No.									



Material Description	- 11	PL	PI % Pas		% Passing		w (%)
Material Description	LL	FL		#4	#200	USCS	W (78)
CLAYEY SAND	50	24	26	94.5	31.8	SC	16.1
Color		Brown		AASHTO Classification		A-2-7	

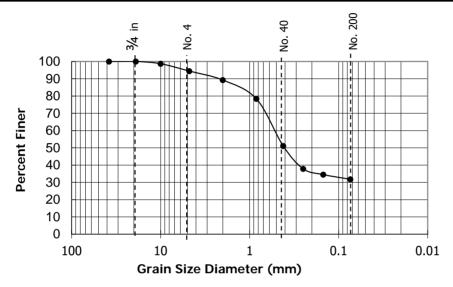
Test Method: ASTM D 4318

Soil Classification by ASTM D2487 and AASHTO M 145

Reviewed by Lindsay Borts



	GRAIN SIZE ANALYSIS - ASTM D422						
Project No. 14189 Project Name Columbia Pike Multimodal St. Improvements							
Test Boring No.	AB-12	Depth (Feet)	0.0'-5.0'				
Lab Order No.	3754-2	Date	3/17/2016				



SIEVE	% Passing
1 ½ "	100
3/4"	100
3/8"	99
#4	94
#10	89
#20	78
#40	51
#60	38
#100	35
#200	32
Pan	

SC	
CLAYEY SAND	
50	
26	
5.5	
62.7	
31.8	
A-2-7	
Brown	
	CLAYEY SAND 50 26 5.5 62.7 31.8 A-2-7

Lindsay Bouts

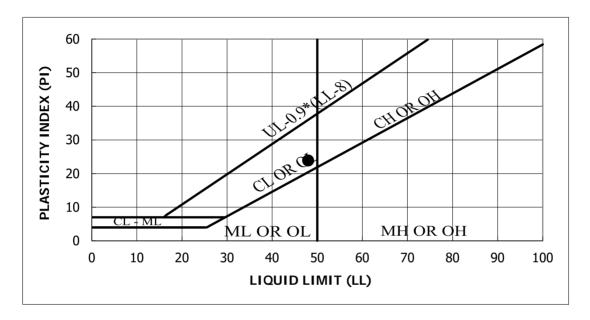
Test Method: ASTM D 422

Soil Classification by ASTM D2487 and AASHTO M 145

Reviewed by:



LIQUID AND PLASTIC LIMIT - ASTM D4318							
Project No.	14189	Project Name	Columbia Pike Multimodal Street Improvements				
Test Boring No.	AB-12	Depth (Feet)	5.0-7.0				
Lab Order No.	3754-1	Date	3/22/2016				



Material Description	11	PL	PI % Passing		ssing	USCS	w (%)
Material Description	LL	FL	F1 [#4	#200	0303	W (78)
CLAYEY SAND	48	24	24	98.5	26.4	SC	14.9
Color	Red	ddish Brown		AASHTO CI	assification	A-2-7	

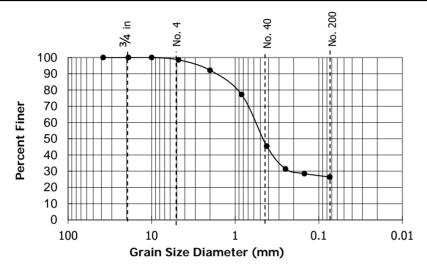
Test Method: ASTM D 4318

Soil Classification by ASTM D2487 and AASHTO M 145

Reviewed by Lindsay Barts



GRAIN SIZE ANALYSIS - ASTM D422								
Project No. 14189 Project Name Columbia Pike Multimodal Street Improvements								
Test Boring No. AB-12 Depth (Feet) 5.0-7.0								
Lab Order No.	<u> </u>							



SIEVE	% Passing
1 ½ "	100
3/4"	100
3/8"	100
#4	99
#10	92
#20	77
#40	45
#60	31
#100	29
#200	26
Pan	

SC	
CLAYEY SAND	
48	
24	
1.5	
72.1	
26.4	
A-2-7	
Reddish Brown	
	CLAYEY SAND 48 24 1.5 72.1 26.4 A-2-7

Lindsay Bouts

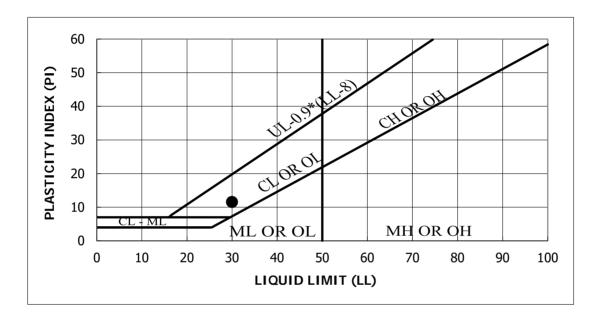
Test Method: ASTM D 422

Soil Classification by ASTM D2487 and AASHTO M 145

Reviewed by:



LIQUID AND PLASTIC LIMIT - ASTM D4318							
Project No. 14189 Project Name Columbia Pike Multimodal Street Improvements							
Test Boring No.	AB-12	23.0-25.0					
Lab Order No. 3754-3 Date 3/22/2016							



Material Description	- 11	LL PL	PI	% Passing		USCS	w (%)
Waterial Description	LL	r L		#4	#200	5	W (78)
WELL GRADED SAND with clay and gravel	30	18	12	56.5	9.6	SW-SC	7.0
Color	Brown		AASHTO Classification		A-2-6		

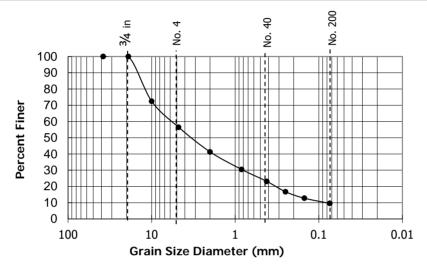
Test Method: ASTM D 4318

Soil Classification by ASTM D2487 and AASHTO M 145

Reviewed by Lindsay Barts



GRAIN SIZE ANALYSIS - ASTM D422								
Project No. 14189 Project Name Columbia Pike Multimodal Street Improvements								
Test Boring No.	Test Boring No. AB-12 Depth (Feet) 23.0-25.0							
Lab Order No.	3754-3	 						



SIEVE	% Passing
1 ½ "	100
3/4"	100
3/8"	72
#4	56
#10	41
#20	30
#40	23
#60	17
#100	13
#200	10
Pan	

USCS Group Symbol	SW-SC
USCS Group Name	WELL GRADED SAND with clay and gravel
Cu	70.5
Cc	1.3
LL	30
PI	12
Gravel	43.5
Sand	46.9
Fines	9.6
AASHTO Classification	A-2-6
Color	Brown
Toot Mothady ACTM D 422	

Indsay Borts

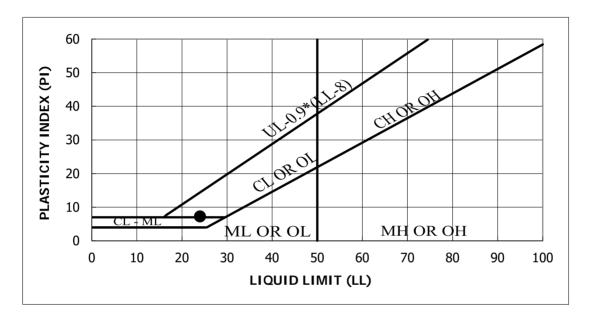
Test Method: ASTM D 422

Soil Classification by ASTM D2487 and AASHTO M 145

Reviewed by:



LIQUID AND PLASTIC LIMIT - ASTM D4318								
Project No. 14189 Project Name Columbia Pike Multimodal Street Improvements								
Test Boring No.	AB-13	3.0-5.0						
Lab Order No.								



Material Description	11	PL	PI	% Passing		USCS	w (%)
Waterial Description	LL	r L		#4	#200	0303	W (78)
sandy Lean Clay	24	17	7	98.7	64.8	CL	13.7
Color	D	ark Brown	AASHTO Classification A-4		A-4		

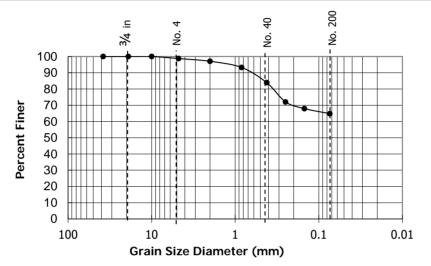
Test Method: ASTM D 4318

Soil Classification by ASTM D2487 and AASHTO M 145

Reviewed by Lindsay Barts



GRAIN SIZE ANALYSIS - ASTM D422							
Project No. 14189 Project Name Columbia Pike Multimodal Street Improvements							
Test Boring No.	Test Boring No. AB-13 Depth (Feet) 3.0-5.0						
Lab Order No.							



SIEVE	% Passing
1 ½ "	100
3/4"	100
3/8"	100
#4	99
#10	97
#20	93
#40	84
#60	72
#100	68
#200	65
Pan	

CL	
sandy Lean Clay	
24	
7	
1.3	
33.9	
64.8	
A-4	
Dark Brown	
	sandy Lean Clay 24 7 1.3 33.9 64.8 A-4

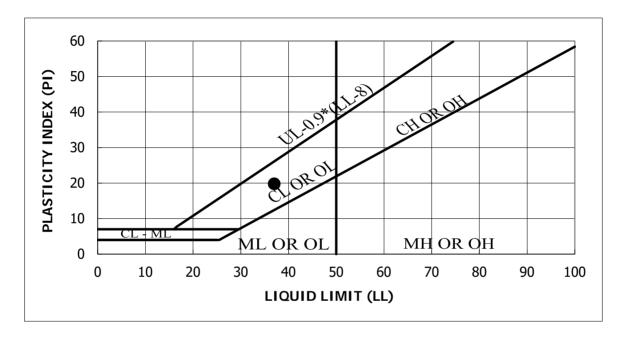
Test Method: ASTM D 422

Soil Classification by ASTM D2487 and AASHTO M 145 Lindsay Books

Reviewed by:



LIQUID AND PLASTIC LIMIT - ASTM D4318								
Project No. 14189 Project Name Columbia Pike Multimodal St. Improvements								
Test Boring No.	Test Boring No. AB-15 Depth (Feet) 0.0'-5.0'							
Lab Order No.								



Material Description	- 11	PL	PI -	% Passing		USCS	w (%)
Waterial Description	LL	P.L		#4	#200	0303	W (78)
CLAYEY SAND	37	17	20	88.3	30.8	SC	10.1
Color		Brown	AASHTO Classification		A-2-6		

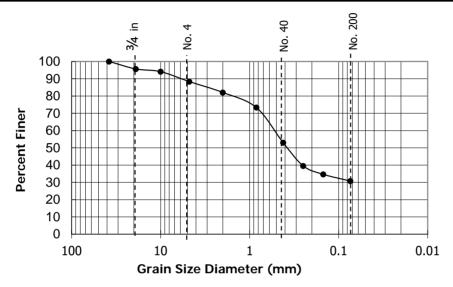
Test Method: ASTM D 4318

Soil Classification by ASTM D2487 and AASHTO M 145

Reviewed by Lindsay Bark



GRAIN SIZE ANALYSIS - ASTM D422				
Project No.	14189	Project Name	Columbia Pike Multimodal St. Improvements	
Test Boring No.	AB-15	Depth (Feet)	0.0'-5.0'	
Lab Order No.	3754-7	Date	3/17/2016	



SIEVE	% Passing
1 ½ "	100
3/4"	96
3/8"	94
#4	88
#10	82
#20	73
#40	53
#60	40
#100	35
#200	31
Pan	

USCS Group Symbol	SC	
USCS Group Name	CLAYEY SAND	
Cu		
Сс		
LL	37	
PI	20	
Gravel	11.7	
Sand	57.6	
Fines	30.8	
AASHTO Classification	A-2-6	
Color	Brown	
Test Methed ACTM D 400		

Lindsay Bortz

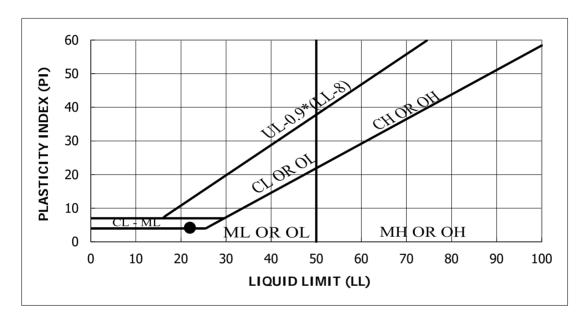
Test Method: ASTM D 422

Soil Classification by ASTM D2487 and AASHTO M 145

Reviewed by:



LIQUID AND PLASTIC LIMIT - ASTM D4318						
Project No.	14189	Project Name	Columbia Pike Multimodal Street Improvements			
Test Boring No.	AB-16	Depth (Feet)	7.3-9.3			
Lab Order No.	3754-10	Date	3/22/2016			



Material Description	11	PL	PI	% Pa	% Passing USCS w (%)		w (%)
Material Description	LL	FL	г	#4	#200	0303	W (78)
sandy silty Clay	22	18	4	91.4	58.7	CL-ML	18.5
Color	Gray		AASHTO Classification		A-4		

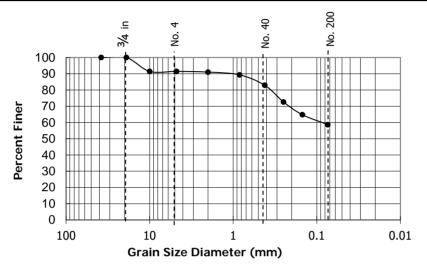
Test Method: ASTM D 4318

Soil Classification by ASTM D2487 and AASHTO M 145

Reviewed by Lindsay Borts



GRAIN SIZE ANALYSIS - ASTM D422					
Project No.	Project No. 14189 Project Name Columbia Pike Multimodal Street Improvements				
Test Boring No.	AB-16	Depth (Feet)	7.3-9.3		
Lab Order No.	3754-10	Date	3/22/2016		



SIEVE	% Passing
1 ½ "	100
3/4"	100
3/8"	91
#4	91
#10	91
#20	89
#40	83
#60	73
#100	65
#200	59
Pan	

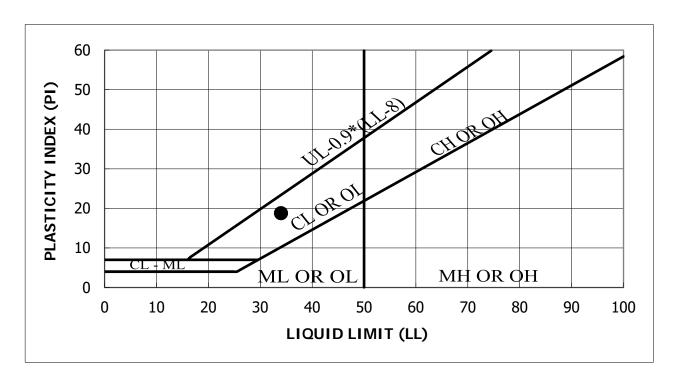
CL-ML	
sandy silty Clay	
22	
4	
8.6	
32.8	
58.7	
A-4	
Gray	
	sandy silty Clay 22 4 8.6 32.8 58.7 A-4

Test Method: ASTM D 422

Soil Classification by ASTM D2487 and AASHTO M 145 $\,$ Lindsay Bortz



LIQUID AND PLASTIC LIMIT - ASTM D4318						
Project No.	14189	Project Name	Columbia Pike Multimodal St. Improvements			
Test Boring No.	CRW-2	Depth (Feet)	0.0'-5.0'			
Lab Order No.	3486-13	Date	3/5/2015			



Material Description	LL	PL	PI	% Passing USCS		w (%)	
Waterial Description	LL	r L		#4	#200	0303	W (78)
CLAYEY SAND	34	15	19	90.1	44.9	SC	14.2
Color		Brown	AASHTO Classification A-6		A-6		

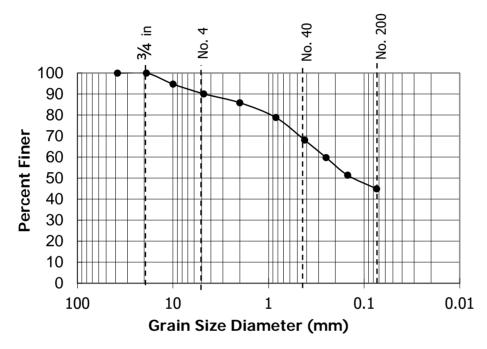
Te	est	: Me	thod	l: AS	STM	D 431	18	
_								

Soil Classification by ASTM D2487 and AASHTO M 145

Tested by _____ Reviewed by _



GRAIN SIZE ANALYSIS - ASTM D422						
Project No.	14189	Project Name	Columbia Pike Multimodal St. Improvements			
Test Boring No.	CRW-2	Depth (Feet)	0.0'-5.0'			
Lab Order No.	3486-13	Date	3/5/2015			



SIEVE	% Passing
1 ½ "	100
3/4"	100
3/8"	95
#4	90
#10	86
#20	79
#40	68
#60	60
#100	51
#200	45
Pan	

USCS Group Symbol	SC	
USCS Group Name	CLAYEY SAND	
Cu		
Cc		
LL	34	
PI	19	
Gravel	9.9	
Sand	45.2	
Fines	44.9	
AASHTO Classification	A-6	
Color	Brown	

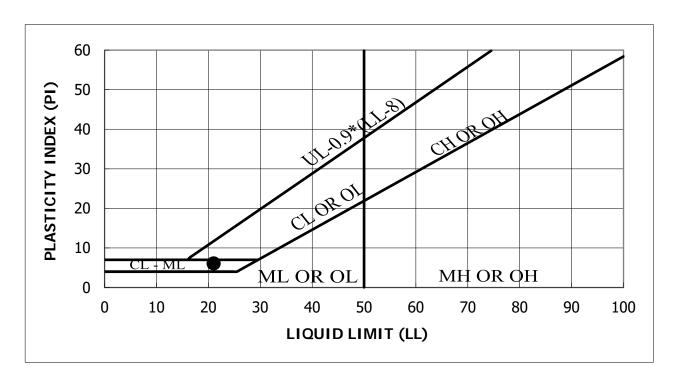
Test Method: ASTM D 422

Soil Classification by ASTM D2487 and AASHTO M 145

Tested by:_____



LIQUID AND PLASTIC LIMIT - ASTM D4318						
Project No.	14189	Project Name	Columbia Pike Multimodal St. Improvements			
Test Boring No.	CB-3	Depth (Feet)	1.0'-2.5'			
Lab Order No.	3486-1	Date	3/13/2015			



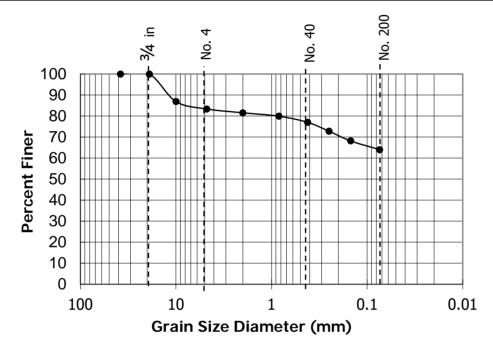
Material Description	LL	PL	PI	% Passing		USCS	w (%)
Material Description	LL	r L	г	#4	#200	0303	W (78)
sandy silty Clay with gravel	21	15	6	83.4	64.0	CL-ML	14.4
Color	D	ark Gray		AASHTO C	assification		A-4

Test Method: ASTM D 4318	
Soil Classification by ASTM D248	7 and AASHTO M 145

Tested by _____ Reviewed by _____



GRAIN SIZE ANALYSIS - ASTM D422						
Project No. 14189 Project Name Columbia Pike Multimodal St. Improvements						
Test Boring No.	Test Boring No. CB-3 Depth (Feet) 1.0'-2.5'					
Lab Order No.	3486-1	Date	3/13/2015			



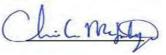
SIEVE	% Passing
1 ½ "	100
3/4"	100
3/8"	87
#4	83
#10	82
#20	80
#40	77
#60	73
#100	68
#200	64
Pan	

USCS Group Symbol	CL-ML	
USCS Group Name	sandy silty Clay with gravel	
Cu		
Сс		
LL	21	
PI	6	
Gravel	16.6	
Sand	19.3	
Fines	64.0	
AASHTO Classification	A-4	
Color	Dark Gray	

Test Method: ASTM D 422

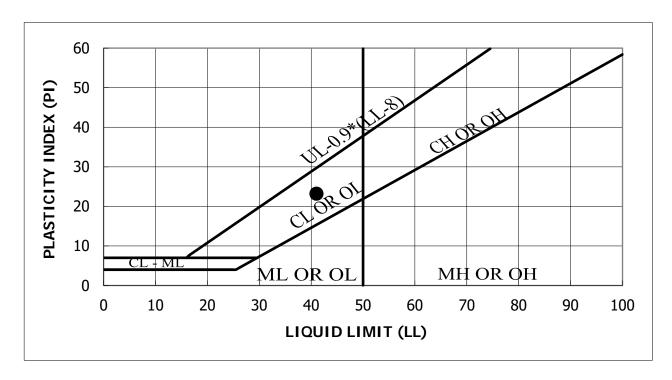
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by:_____





LIQUID AND PLASTIC LIMIT - ASTM D4318							
Project No. 14189 Project Name Columbia Pike Multimodal St. Improvements							
Test Boring No.	Test Boring No. CB-5 Depth (Feet) 0.0'-5.0'						
Lab Order No.	3486-12	Date	3/5/2015				



Material Description	LL PL	PI	% Passing		USCS	w (%)	
Waterial Description	LL	r L	FI	#4	#200	0303	W (70)
sandy Lean Clay	41	18	23	85.7	59.1	CL	9.7
Color	Light G	Grayish Brown		AASHTO C	lassification	on A-7-6	

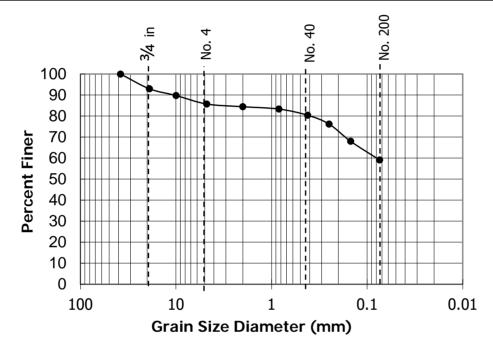
Test Method: ASTM D 4318

Soil Classification by ASTM D2487 and AASHTO M 145 $\,$

Tested by _____



GRAIN SIZE ANALYSIS - ASTM D422							
Project No. 14189 Project Name Columbia Pike Multimodal St. Improvements							
Test Boring No.	Test Boring No. CB-5 Depth (Feet) 0.0'-5.0'						
Lab Order No.	3486-12	Date	3/5/2015				



SIEVE	% Passing
1 ½ "	100
3/4"	93
3/8"	90
#4	86
#10	84
#20	83
#40	80
#60	76
#100	68
#200	59
Pan	

USCS Group Symbol	CL	
USCS Group Name	sandy Lean Clay	
Cu		
Сс		
LL	41	
PI	23	
Gravel	14.3	
Sand	26.6	•
Fines	59.1	
AASHTO Classification	A-7-6	
Color	Light Grayish Brown	

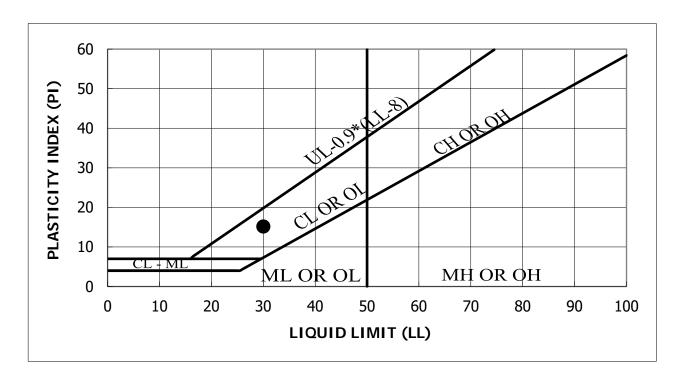
Test Method: ASTM D 422

Soil Classification by ASTM D2487 and AASHTO M 145

Tested by:_____



LIQUID AND PLASTIC LIMIT - ASTM D4318								
Project No. 14189 Project Name Columbia Pike Street Improvements								
Test Boring No.	Test Boring No. CB-8 Depth (Feet) 0.0'-5.0'							
Lab Order No.	3483-2	Date	3/5/2014					



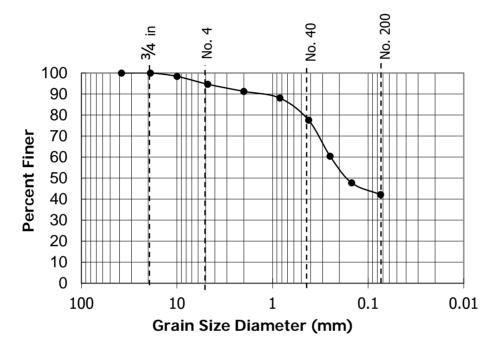
Material Description	LL PL	PI	% Passing		USCS	w (%)	
Waterial Description	LL	r L		#4	#200	0303	W (78)
CLAYEY SAND	30	15	15	94.7	42.1	SC	16.6
Color	Dark B	rownish Gray		AASHTO CI	assification		A-6

Test Method: ASTM D 4318 Soil Classification by ASTM D2487 and AASHTO M 145

Tested by _____



GRAIN SIZE ANALYSIS - ASTM D422						
Project No.	14189	Project Name	Columbia Pike Street Improvements			
Test Boring No.	CB-8	Depth (Feet)	0.0'-5.0'			
Lab Order No.	3483-2	Date	3/5/2014			



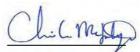
SIEVE	% Passing
1 ½ "	100
3/4"	100
3/8"	98
#4	95
#10	91
#20	88
#40	78
#60	60
#100	48
#200	42
Pan	

USCS Group Symbol	SC	
USCS Group Name	CLAYEY SAND	
Cu		
Сс		
LL	30	
PI	15	
Gravel	5.3	
Sand	52.5	
Fines	42.1	
AASHTO Classification	A-6	
Color	Dark Brownish Gray	

Test Method: ASTM D 422

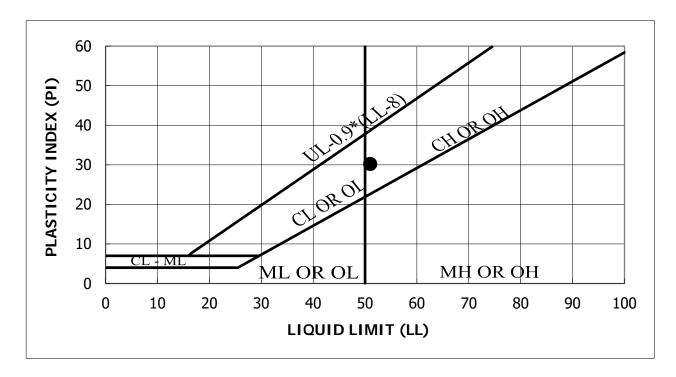
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by:_____





LIQUID AND PLASTIC LIMIT - ASTM D4318						
Project No.	14189	Project Name	Columbia Pike Street Improvements			
Test Boring No.	DB-2	Depth (Feet)	0.0'-5.0'			
Lab Order No.	3483-1	Date	3/5/2014			



Material Description	LL	PL	PI	% Passing		USCS	w (%)
Waterial Description	LL	FL		#4	#200	0303	W (78)
sandy Fat Clay with gravel	51	21	30	81.8	61.2	CH	17.5
Color	Ora	nge Brown		AASHTO C	assification		A-7-6

Test Method: ASTM D 4318 Soil Classification by ASTM D2487 and AASHTO M 145

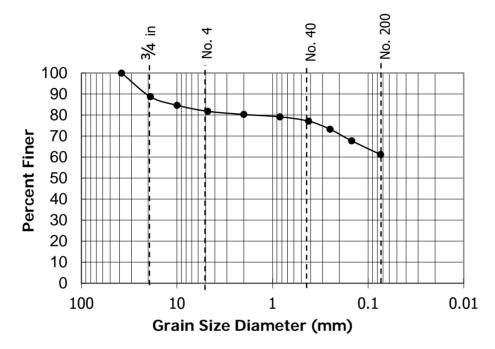
Tested by _____

Reviewed by

Chi (Mysty)



GRAIN SIZE ANALYSIS - ASTM D422						
Project No.	14189	Project Name	Columbia Pike Street Improvements			
Test Boring No.	DB-2	Depth (Feet)	0.0'-5.0'			
Lab Order No.	3483-1	Date	3/5/2014			



SIEVE	% Passing
1 ½ "	100
3/4"	89
3/8"	85
#4	82
#10	80
#20	79
#40	77
#60	73
#100	68
#200	61
Pan	

USCS Group Symbol	СН	
USCS Group Name	sandy Fat Clay with gravel	
Cu		
Cc		
LL	51	
PI	30	
Gravel	18.2	
Sand	20.6	
Fines	61.2	
AASHTO Classification	A-7-6	
Color	Orange Brown	

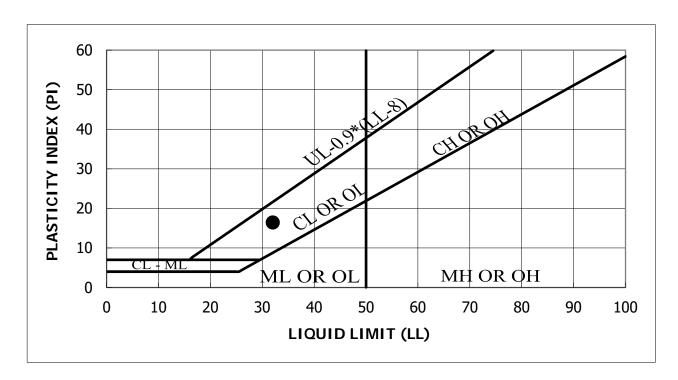
Test Method: ASTM D 422

Soil Classification by ASTM D2487 and AASHTO M 145

Tested by:_____



LIQUID AND PLASTIC LIMIT - ASTM D4318							
Project No.	14189	Project Name	Columbia Pike Multimodal				
Test Boring No.	DB-4	Depth (Feet)	5.0'-6.5'				
Lab Order No.	3484-3	Date	3/3/2015				



Material Description	LL	PL	PI	% Passing		USCS	w (%)
Waterial Description	LL	FL		#4	#200	0303	W (78)
CLAYEY GRAVEL with sand	32	16	16	56.7	22.2	GC	13.4
Color	D	ark Gray		AASHTO C	assification		A-2-6

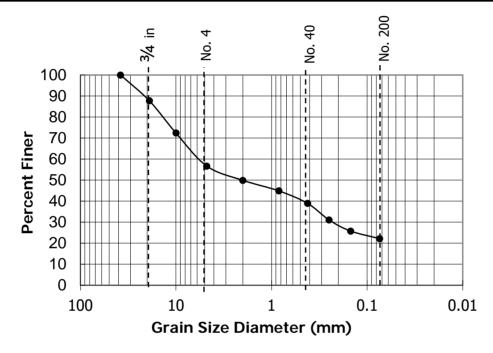
Test Method: ASTM D 4318

Soil Classification by ASTM D2487 and AASHTO M 145

Reviewed by _______ Sh___ Havio Tested by _____



GRAIN SIZE ANALYSIS - ASTM D422						
Project No.	14189	Project Name	Columbia Pike Multimodal			
Test Boring No.	DB-4	Depth (Feet)	5.0'-6.5'			
Lab Order No.	3484-3	Date	3/3/2015			



SIEVE	% Passing
1 ½ "	100
3/4"	88
3/8"	72
#4	57
#10	50
#20	45
#40	39
#60	31
#100	26
#200	22
Pan	

USCS Group Symbol	GC		
USCS Group Name	CLAYEY GRAVEL with sand		
Cu			
Cc			
LL	32		
PI	16		
Gravel	43.3		
Sand	34.5		
Fines	22.2		
AASHTO Classification	A-2-6		
Color	Dark Gray		

Test Method: ASTM D 422

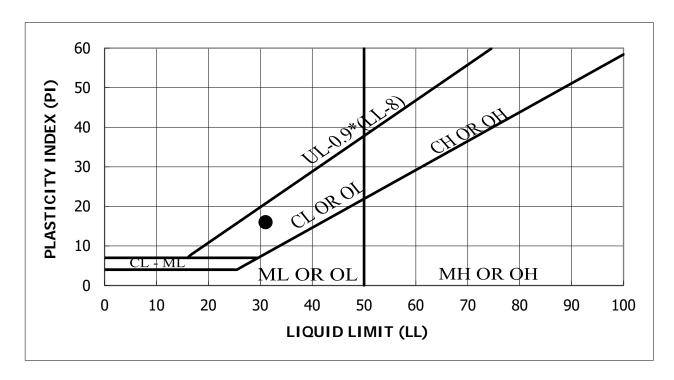
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by:_____

Reviewed by: <u>Havio</u>



LIQUID AND PLASTIC LIMIT - ASTM D4318						
Project No. 14189 Project Name Columbia Pike Multimodal						
Test Boring No.	DB-6	Depth (Feet)	0.0'-5.0'			
Lab Order No.	3481-2	Date	3/3/2015			



Material Description	LL PL PI		% Pa	ssing	USCS	w (%)	
Waterial Description		r L		#4	#200	0303	W (78)
CLAYEY SAND with gravel	31	15	16	84.9	32.1	SC	11.0
Color	D	ark Gray	AASHTO Classification A-2-6		A-2-6		

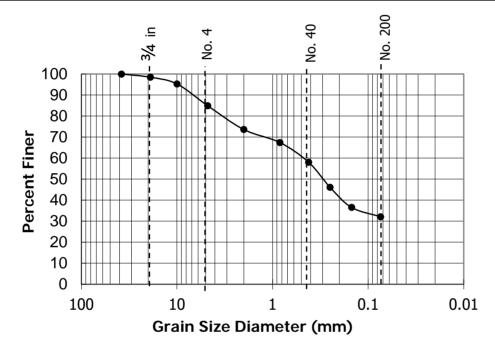
Test Method: ASTM D 4318

Soil Classification by ASTM D2487 and AASHTO M 145

Tested by ______ Reviewed by _____ Havio



GRAIN SIZE ANALYSIS - ASTM D422						
Project No. 14189 Project Name Columbia Pike Multimodal						
Test Boring No.	DB-6	Depth (Feet)	0.0'-5.0'			
Lab Order No.	3481-2	Date	3/3/2015			



SIEVE	% Passing
1 ½ "	100
3/4"	98
3/8"	95
#4	85
#10	74
#20	67
#40	58
#60	46
#100	37
#200	32
Pan	

USCS Group Symbol	SC	
USCS Group Name	CLAYEY SAND with gravel	
Cu		
Cc		
LL	31	
PI	16	
Gravel	15.1	
Sand	52.8	
Fines	32.1	
AASHTO Classification	A-2-6	
Color	Dark Gray	

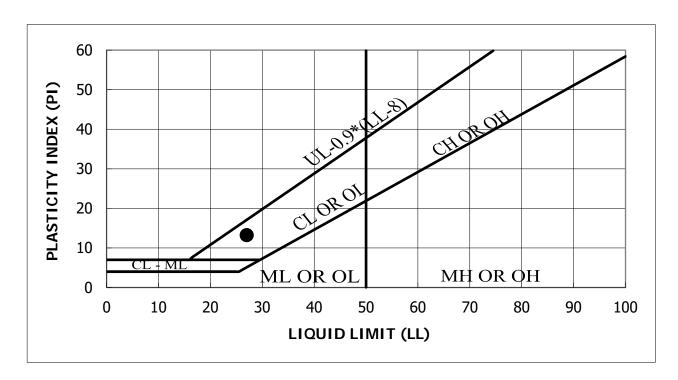
Test Method: ASTM D 422

Soil Classification by ASTM D2487 and AASHTO M 145 Sh Havio

Tested by:___



LIQUID AND PLASTIC LIMIT - ASTM D4318						
Project No. 14189 Project Name Columbia Pike Multimodal						
Test Boring No.	DB-10	Depth (Feet)	0.0'-5.0'			
Lab Order No.	3481-1	Date	3/3/2015			



Material Description	ption LL PL		ΡI	% Passing		USCS	w (%)
Material Description	LL	r L		#4	#200	0303	W (78)
CLAYEY SAND	27	14	13	97.9	44.4	SC	16.1
Color	Brov	vnish Gray	AASHTO Classification A-6		A-6		

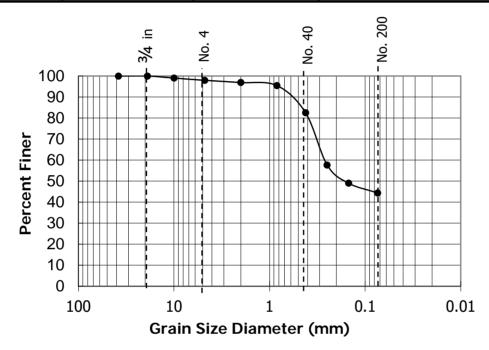
Test Method: ASTM D 4318

Soil Classification by ASTM D2487 and AASHTO M 145

Tested by ______ Reviewed by ______ Havio



GRAIN SIZE ANALYSIS - ASTM D422						
Project No. 14189 Project Name Columbia Pike Multimodal						
Test Boring No.	DB-10	Depth (Feet)	0.0'-5.0'			
Lab Order No.	3481-1	Date	3/3/2015			



SIEVE	% Passing
1 ½ "	100
3/4"	100
3/8"	99
#4	98
#10	97
#20	95
#40	83
#60	58
#100	49
#200	44
Pan	

USCS Group Symbol	SC	
USCS Group Name	CLAYEY SAND	
Cu		
Cc		
LL	27	
PI	13	
Gravel	2.1	
Sand	53.6	
Fines	44.4	
AASHTO Classification	A-6	
Color	Brownish Gray	

Test Method: ASTM D 422

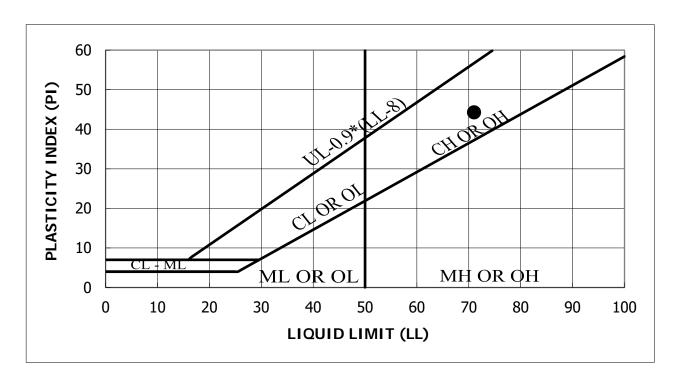
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by:_____

Reviewed by: Ihm Havis



LIQUID AND PLASTIC LIMIT - ASTM D4318						
Project No. 14189 Project Name Columbia Pike Multimodal St. Improvements						
Test Boring No.	FRW-6	Depth (Feet)	5.0'-6.5'			
Lab Order No.	3480-8	Date	3/6/2015			



Material Description	LL	PL	PI % Passing		USCS	w (%)	
Material Description	LL	r L	F 1	#4	#200	0303	W (78)
Fat Clay	71	27	44	100.0	93.6	CH	37.2
Color		Gray		AASHTO C	lassification		A-7-6

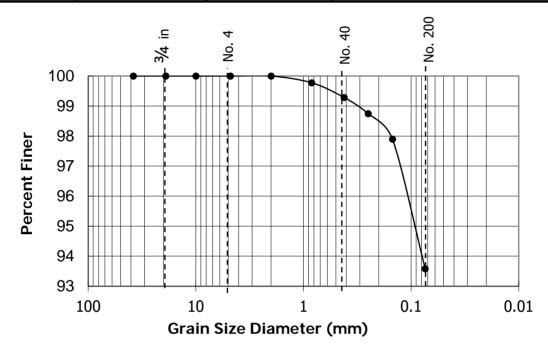
Test	Method:	ASTM	D 4318	

Soil Classification by ASTM D2487 and AASHTO M 145

Tested by ______ Reviewed by _____



GRAIN SIZE ANALYSIS - ASTM D422				
Project No. 14189 Project Name Columbia Pike Multimodal St. Improvements				
Test Boring No.	FRW-6	Depth (Feet)	5.0'-6.5'	
Lab Order No.	3480-8	Date	3/6/2015	



SIEVE	% Passing
1 ½ "	100
3/4"	100
3/8"	100
#4	100
#10	100
#20	100
#40	99
#60	99
#100	98
#200	94
Pan	

USCS Group Symbol	СН
USCS Group Name	Fat Clay
Cu Cc	
Сс	
LL	71
PI	44
Gravel	0.0
Sand	6.4
Fines	93.6
AASHTO Classification	A-7-6
Color	Gray

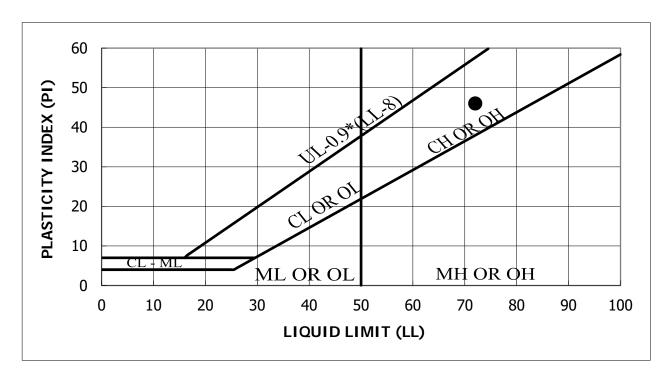
Test Method: ASTM D 422

Soil Classification by ASTM D2487 and AASHTO M 145

Tested by:_____



LIQUID AND PLASTIC LIMIT - ASTM D4318				
Project No. 14189 Project Name Columbia Pike Multimodal St. Improvements				
Test Boring No.	FB-2	Depth (Feet)	0.0'-5.0'	
Lab Order No.	3480-14	Date	3/6/2015	



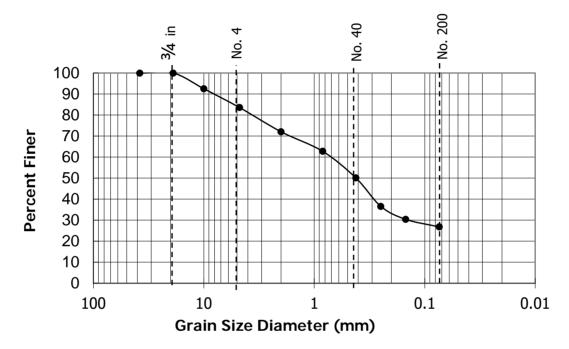
Material Description	on LL PL PI %		% Pa	Passing USCS		w (%)	
Waterial Description	L	r L		#4	#200	0303	W (78)
CLAYEY SAND with gravel	72	26	46	83.6	26.8	SC	6.2
Color	D	ark Gray		AASHTO C	assification		A-2-7

Test Method: ASTM D 4318
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by _____ Reviewed by _____



GRAIN SIZE ANALYSIS - ASTM D422				
Project No. 14189 Project Name Columbia Pike Multimodal St. Improvements				
Test Boring No.	FB-2	Depth (Feet)	0.0'-5.0'	
Lab Order No.	3480-14	Date	3/6/2015	



SIEVE	% Passing
1 ½ "	100
3/4"	100
3/8"	93
#4	84
#10	72
#20	63
#40	50
#60	37
#100	30
#200	27
Pan	

USCS Group Symbol	SC
USCS Group Name	CLAYEY SAND with gravel
Cu	
Cc	
LL	72
PI	46
Gravel	16.4
Sand	56.8
Fines	26.8
AASHTO Classification	A-2-7
Color	Dark Gray

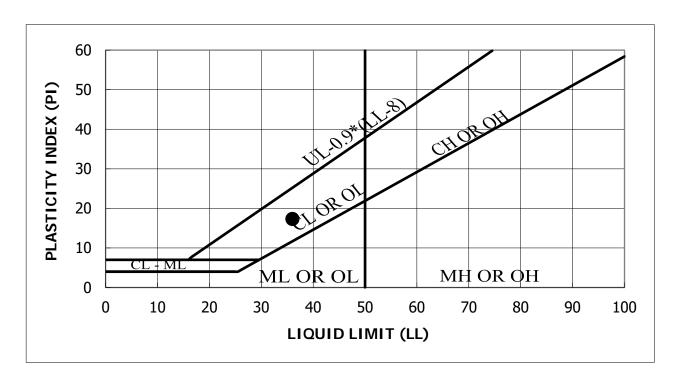
Test Method: ASTM D 422

Soil Classification by ASTM D2487 and AASHTO M 145

Tested by:



LIQUID AND PLASTIC LIMIT - ASTM D4318				
Project No. 14189 Project Name Columbia Pike Multimodal St. Improvements				
Test Boring No.	FB-9	Depth (Feet)	0.0'-5.0'	
Lab Order No.	3480-13	Date	3/6/2015	



Material Description	LL	PL	PI	% Passing		USCS	w (%)
Waterial Description	LL	r L	г	#4	#200	0303	W (76)
sandy Lean Clay	36	19	17	91.2	51.1	CL	14.5
Color	Brownish Gray		AASHTO Classification		A-6		

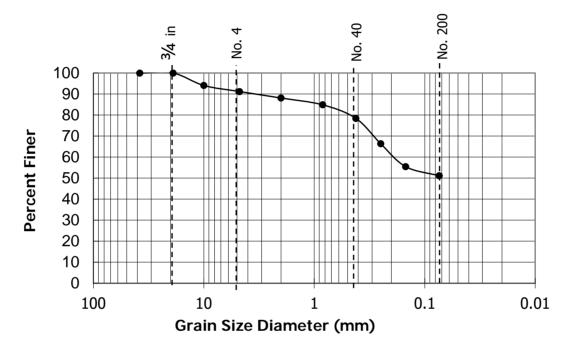
Test Method: ASTM D 4318

Soil Classification by ASTM D2487 and AASHTO M 145 $\,$

Tested by _____



GRAIN SIZE ANALYSIS - ASTM D422						
Project No. 14189 Project Name Columbia Pike Multimodal St. Improvements						
Test Boring No.	Test Boring No. FB-9 Depth (Feet) 0.0'-5.0'					
Lab Order No.	3480-13	Date	3/6/2015			



SIEVE	% Passing
1 ½ "	100
3/4"	100
3/8"	94
#4	91
#10	88
#20	85
#40	78
#60	66
#100	55
#200	51
Pan	

USCS Group Symbol	CL
USCS Group Name	sandy Lean Clay
Cu	
Сс	
LL	36
PI	17
Gravel	8.8
Sand	40.1
Fines	51.1
AASHTO Classification	A-6
Color	Brownish Gray

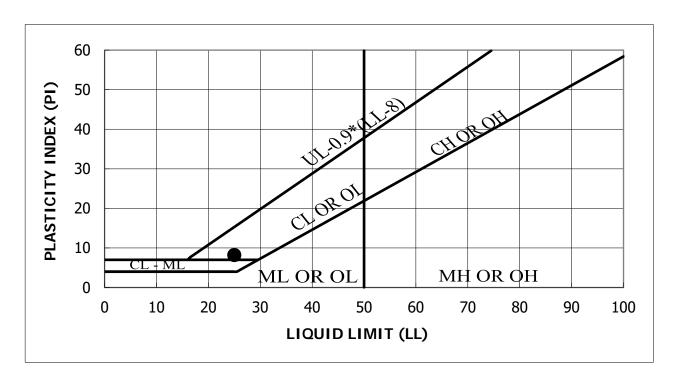
Test Method: ASTM D 422

Soil Classification by ASTM D2487 and AASHTO M 145

Tested by:_____



LIQUID AND PLASTIC LIMIT - ASTM D4318							
Project No. 14189 Project Name Columbia Pike Multimodal St. Improvements							
Test Boring No.	FB-18	Depth (Feet)	0.0'-5.0'				
Lab Order No.	3480-12	Date	3/6/2015				



Material Description	LL	PL PI		% Pa	ssing	USCS	w (%)
Material Description	LL	r L		#4	#200	0303	VV (76)
Lean Clay	25	17	8	99.9	86.7	CL	18.6
Color		Gray		AASHTO C	assification	ion A-4	

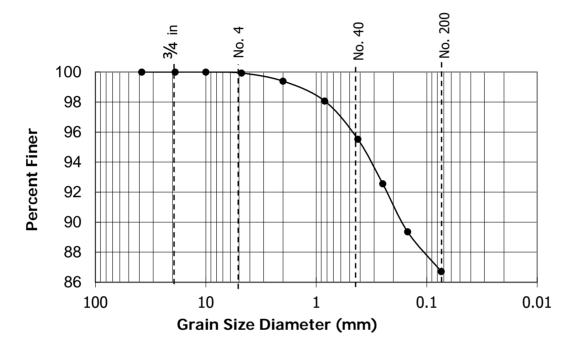
ı	est	Method:	ASIM	D 4318	

Soil Classification by ASTM D2487 and AASHTO M 145

Tested by ______ Reviewed by _____



GRAIN SIZE ANALYSIS - ASTM D422							
Project No. 14189 Project Name Columbia Pike Multimodal St. Improvements							
Test Boring No.	Test Boring No. FB-18 Depth (Feet) 0.0'-5.0'						
Lab Order No.	3480-12	Date	3/6/2015				



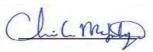
SIEVE	% Passing
1 ½ "	100
3/4"	100
3/8"	100
#4	100
#10	99
#20	98
#40	96
#60	93
#100	89
#200	87
Pan	

USCS Group Symbol	CL
USCS Group Name	Lean Clay
Cu	
Cc	
LL	25
PI	8
Gravel	0.1
Sand	13.2
Fines	86.7
AASHTO Classification	A-4
Color	Gray

Test Method: ASTM D 422

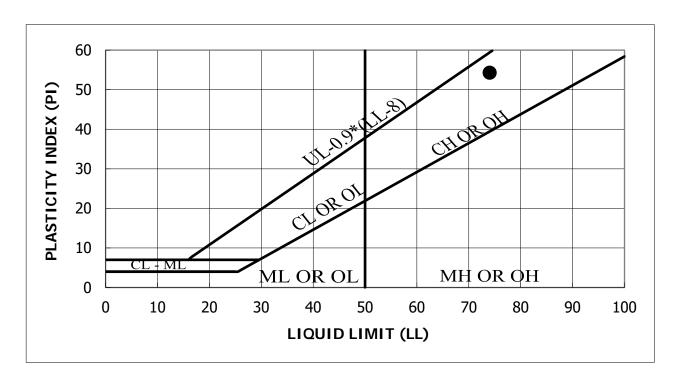
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by:





LIQUID AND PLASTIC LIMIT - ASTM D4318						
Project No. 14189 Project Name Columbia Pike - Segment H/I						
Test Boring No.	HB-5	Depth (Feet)	0.0'-5.0'			
Lab Order No.	3468	Date	2/5/2015			



Material Description	LL	DI	PL PI		% Passing		w (%)
Waterial Description	LL	r L		#4	#200	USCS	W (78)
CLAYEY SAND	74	20	54	94.9	28.6	SC	17.3
Color		Gray		AASHTO C	assification		A-2-7

Test Method: ASTM D 4318

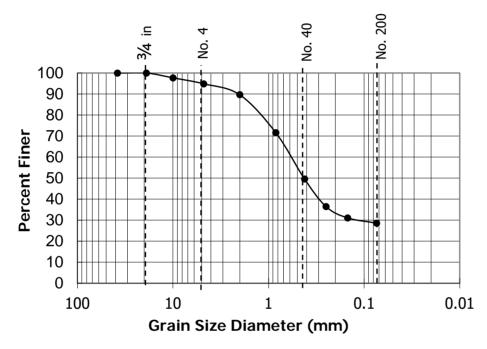
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by _____

Reviewed by Marris



GRAIN SIZE ANALYSIS - ASTM D422						
Project No.	14189	Project Name	Columbia Pike - Segment H/I			
Test Boring No.	HB-5	Depth (Feet)	0.0'-5.0'			
Lab Order No.	3468	Date	2/5/2015			



SIEVE	% Passing
1 ½ "	100
3/4"	100
3/8"	98
#4	95
#10	90
#20	72
#40	50
#60	36
#100	31
#200	29
Pan	

USCS Group Symbol	SC	
USCS Group Name	CLAYEY SAND	
Cu		
Cc		
LL	74	
PI	54	
Gravel	5.1	
Sand	66.3	
Fines	28.6	
AASHTO Classification	A-2-7	
Color	Gray	•

Test Method: ASTM D 422

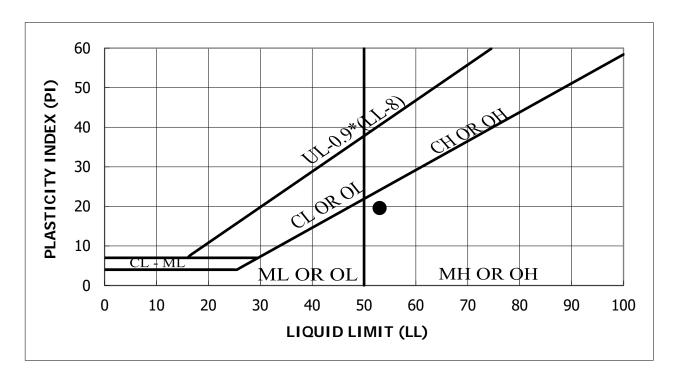
Soil Classification by ASTM D2487 and AASHTO M 145

Reviewed by:

Tested by:___



LIQUID AND PLASTIC LIMIT - ASTM D4318						
Project No. 14189 Project Name Columbia Pike Multimodal						
Test Boring No.	IRW-1	Depth (Feet)	5.0-6.5			
Lab Order No.	3462-7	Date	2/2/2015			



Material Description	LL	PL	PI	% Passing		USCS	w (%)
Waterial Description		r L		#4	#200	0303	W (78)
SILTY SAND	53	33	20	100.0	21.3	SM	18.7
Color Brownish Gray			AASHTO C	lassification		A-2-7	

Test Method: ASTM D 4318

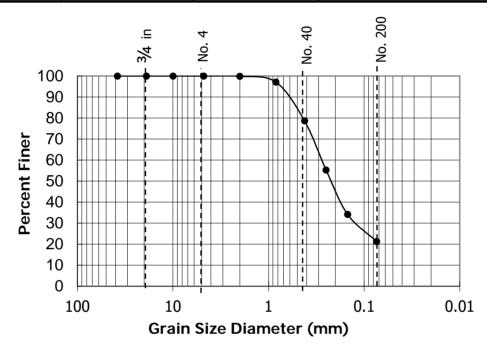
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by _____

Reviewed by Sham Harris



GRAIN SIZE ANALYSIS - ASTM D422						
Project No.	14189	Project Name	Columbia Pike Multimodal			
Test Boring No.	IRW-1	Depth (Feet)	5.0-6.5			
Lab Order No.	3462-7	Date	2/2/2015			



SIEVE	% Passing
1 ½ "	100
3/4"	100
3/8"	100
#4	100
#10	100
#20	97
#40	79
#60	55
#100	34
#200	21
Pan	

USCS Group Symbol	SM	
USCS Group Name	SILTY SAND	
Cu		
Cc		
LL	53	
PI	20	
Gravel	0.0	
Sand	78.7	
Fines	21.3	
AASHTO Classification	A-2-7	
Color	Brownish Gray	

Test Method: ASTM D 422

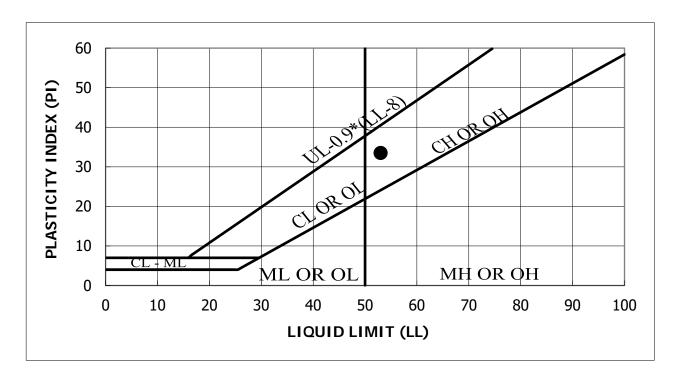
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by:_____

Reviewed by: The Harris



LIQUID AND PLASTIC LIMIT - ASTM D4318							
Project No.	14189	Project Name	Columbia Pike Multimodal				
Test Boring No.	IB-2	Depth (Feet)	0.0-5.0				
Lab Order No.	3462-13	Date	2/2/2015				



Material Description	LL	PL	PI	% Passing		USCS	w (%)
Waterial Description		r L		#4	#200	0303	W (78)
sandy Fat Clay	53	20	33	98.2	51.0	СН	24.7
Color Brownish Gray			AASHTO C	lassification		A-7-6	

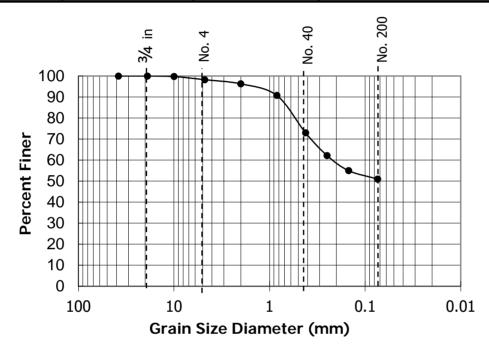
Test Method: ASTM D 4318

Soil Classification by ASTM D2487 and AASHTO M 145

Tested by ______ Reviewed by ______ Havio



GRAIN SIZE ANALYSIS - ASTM D422						
Project No.	14189	Project Name	Columbia Pike Multimodal			
Test Boring No.	IB-2	Depth (Feet)	0.0-5.0			
Lab Order No.	3462-13	Date	2/2/2015			



SIEVE	% Passing
1 ½ "	100
3/4"	100
3/8"	100
#4	98
#10	96
#20	91
#40	73
#60	62
#100	55
#200	51
Pan	

USCS Croup Symbol	CH	
USCS Group Symbol	СП	
USCS Group Name	sandy Fat Clay	
Cu		
Сс		
LL	53	
PI	33	
Gravel	1.8	
Sand	47.3	
Fines	51.0	
AASHTO Classification	A-7-6	
Color	Brownish Gray	

Test Method: ASTM D 422

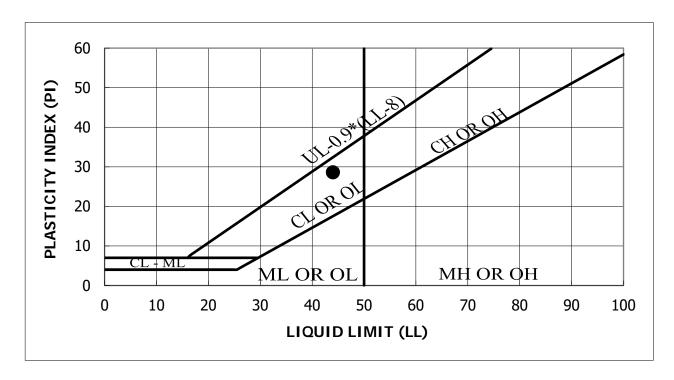
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by:_____

Reviewed by: She Harris



LIQUID AND PLASTIC LIMIT - ASTM D4318				
Project No.	14189	Project Name	Columbia Pike Multimodal	
Test Boring No.	IB-9	Depth (Feet)	3462-12	
Lab Order No.	3462-12	Date	2/2/2015	



Material Description	LL	PL PI		% Pa	uscs		w (%)
Waterial Description	L	r L		#4	#200	0303	W (78)
CLAYEY SAND with gravel	44	15	29	73.8	31.7	SC	7.6
Color		Gray		AASHTO C	assification		A-2-7

Test Method: ASTM D 4318

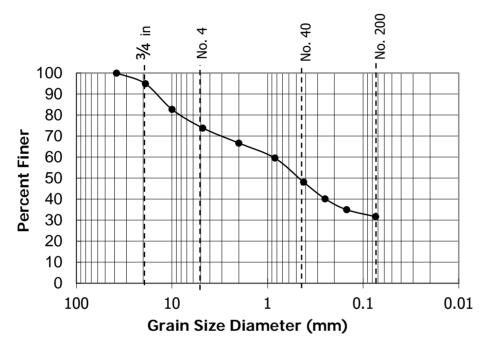
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by _____

Reviewed by Marvio



GRAIN SIZE ANALYSIS - ASTM D422				
Project No. 14189 Project Name Columbia Pike Multimodal				
Test Boring No.	IB-9	Depth (Feet)	3462-12	
Lab Order No.	3462-12	Date	2/2/2015	



SIEVE	% Passing
1 ½ "	100
3/4"	95
3/8"	83
#4	74
#10	67
#20	60
#40	48
#60	40
#100	35
#200	32
Pan	

USCS Group Symbol	SC	
USCS Group Name	CLAYEY SAND with gravel	
Cu		
Cc		
LL	44	
PI	29	
Gravel	26.2	
Sand	42.2	
Fines	31.7	
AASHTO Classification	A-2-7	
Color	Gray	

Test Method: ASTM D 422

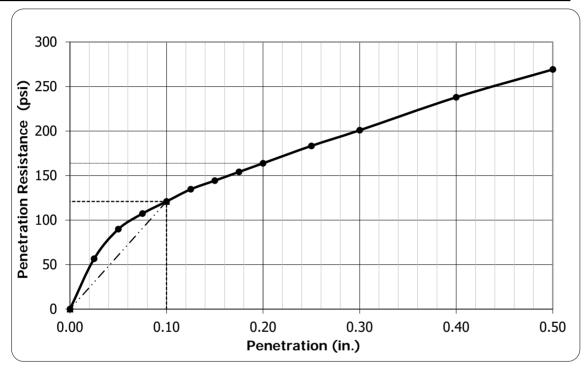
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by:_____

Reviewed by: <u>Am Harrio</u>



CALIFORNIA BEARING RATIO (CBR) TEST - ASTM- D1833				
Project No.	14189	Project Name	Columbia Pike Multimodal St. Improven	
Test Boring No.	AB-12	Depth (Feet)	0.0'-5.0'	
Lab Order No.	3754-2	Date	3/17/2016	



Molded	
Dry Density (pcf)	122.6
Moisture (%)	11.9
Percent of Max. Density (%)	99.7

Soaked	
Dry Density (pcf)	122.4
Moisture (%)	14.7
Percentage of Max. Density (%)	99.5

CE	3R (%)
0.1 in.	12.1
0.2 in.	10.9

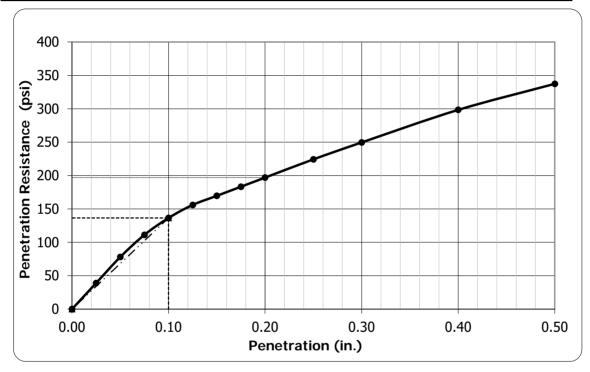
Linearity Correction	0.000
Surcharge (lbs)	10
Max Swell (%)	0.2

Material Description	CLAYEY SAND
USCS	SC
Max Density	123
Optimum Moisture (%)	12
LL	50
PI	26
Color	Brown

Lindsay Bouts



CALIFORNIA BEARING RATIO (CBR) TEST - ASTM- D1833				
Project No.	14189	Project Name	Columbia Pike Multimodal St. Improven	
Test Boring No.	AB-15	Depth (Feet)	0.0'-5.0'	
Lab Order No.	3754-7	Date	3/17/2016	



Molded		
Dry Density (pcf)	127.3	
Moisture (%)	9.0	
Percent of Max. Density (%)	100.3	

Soaked		
Dry Density (pcf)	127.1	
Moisture (%)	12.6	
Percentage of Max. Density (%)	100.1	

CBR (%)		
0.1 in.	13.7	
0.2 in.	13.1	

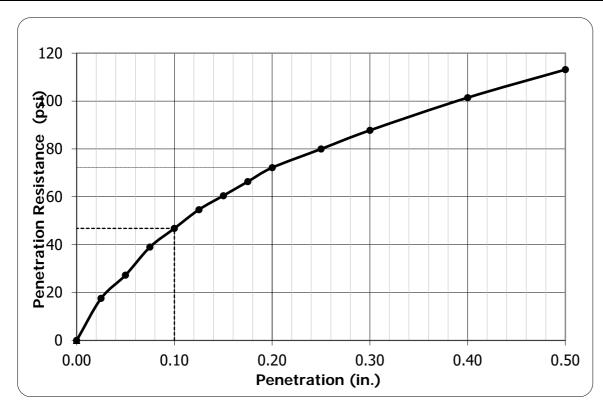
Linearity Correction	0.000
Surcharge (lbs)	10
Max Swell (%)	0.2

Material Description	CLAYEY SAND
USCS	SC
Max Density	127
Optimum Moisture (%)	9
LL	37
PI	20
Color	Brown

Lindsay Bouts



	CALIFORNIA BE	ARING RATIO (C	CBR) TEST - VTM-008
Project No.	14189	Project Name	Columbia Pike Multimodal St. Improvements
Test Boring No.	CRW-2	Depth (Feet)	0.0'-5.0'
Lab Order No.	3486-13	Date	3/5/2015



Molded	
Dry Density (pcf)	120.1
Moisture (%)	12.7
	99.3
Max. Density (%)	

Soaked	
Dry Density (pcf)	119.8
Moisture (%)	14.9
Percentage of Max. Density (%)	99.0

	CBR (%)	
0.1 in.		4.7
0.2 in.		4.8

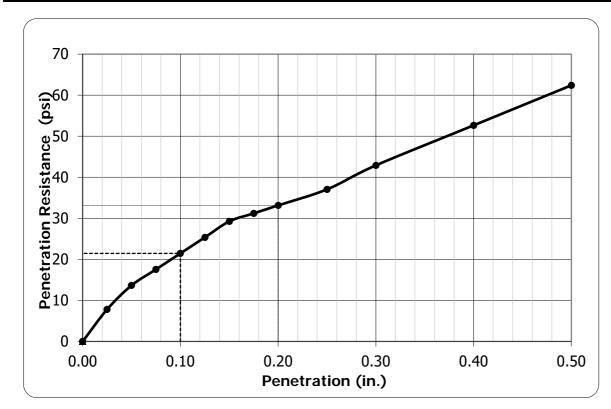
Linearity Correction	0.000
Surcharge (lbs)	10
Max Swell (%)	0.3

Material Description	CLAYEY SAND
USCS	SC
Max Density	121
Optimum Moisture (%)	13
LL	34
PI	19
Color	Brown

She Harno



	CALIFORNIA BEA	RING RATIO (C	BR) TEST - VTM-008
Project No.	14189	Project Name	Columbia Pike Multimodal St. Improvements
Test Boring No.	CB-5	Depth (Feet)	0.0'-5.0'
Lab Order No.	3486-12	Date	3/5/2015



Molded	
Dry Density (pcf)	122.8
Moisture (%)	11.4
Percent of Max. Density (%)	99.0

Soaked	
Dry Density (pcf)	119.9
Moisture (%)	17.9
Percentage of Max. Density (%)	96.7

	CBR (%)	
0.1 in.		2.1
0.2 in.		2.2

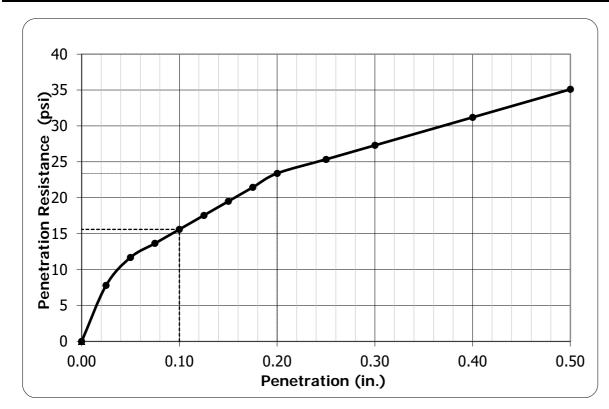
Tested by:	
------------	--

Linearity Correction	0.000
Surcharge (lbs)	10
Max Swell (%)	2.4

Material Description	sandy Lean Clay
USCS	CL
Max Density	124
Optimum Moisture (%)	11
LL	41
PI	23
Color	Light Grayish Brown

She Harris

CALIFORNIA BEARING RATIO (CBR) TEST - VTM-008			
Project No.	14189	Project Name	Columbia Pike Street Improvements
Test Boring No.	CB-8	Depth (Feet)	0.0'-5.0'
Lab Order No.	3483-2	Date	3/5/2014



Molded	
Dry Density (pcf)	112.7
Moisture (%)	15.1
Percent of Max. Density (%)	99.7

Soaked		
Dry Density (pcf)	111.7	
Moisture (%)	16.8	
Percentage of Max. Density (%)	98.8	

	CBR (%)
0.1 in.	1.6
0.2 in.	1.6

Linearity Correction	0.000
Surcharge (lbs)	10
Max Swell (%)	0.9

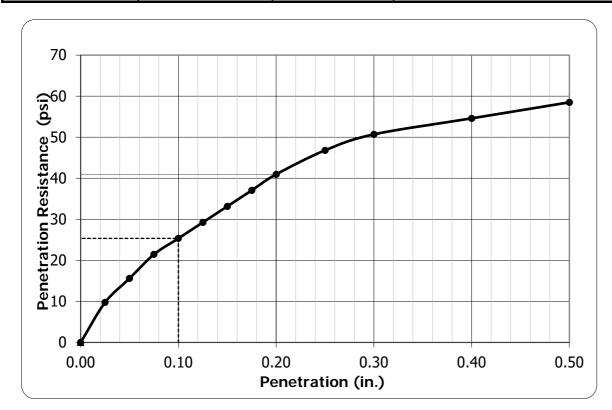
Material Description	CLAYEY SAND
USCS	SC
Max Density	113
Optimum Moisture (%)	15
LL	30
PI	15
Color	Dark Brownish Gray

Reviewed by:

Havio



CALIFORNIA BEARING RATIO (CBR) TEST - VTM-008			
Project No.	14189	Project Name	Columbia Pike Street Improvements
Test Boring No.	DB-2	Depth (Feet)	0.0'-5.0'
Lab Order No.	3483-1	Date	3/5/2014



Molded	
Dry Density (pcf)	126.8
Moisture (%)	9.1
Percent of Max. Density (%)	99.8

Soaked		
Dry Density (pcf)	120.3	
Moisture (%)	24.2	
Percentage of Max. Density (%)	94.7	

CBR (%)		
0.1 in.	2.5	
0.2 in.	2.7	

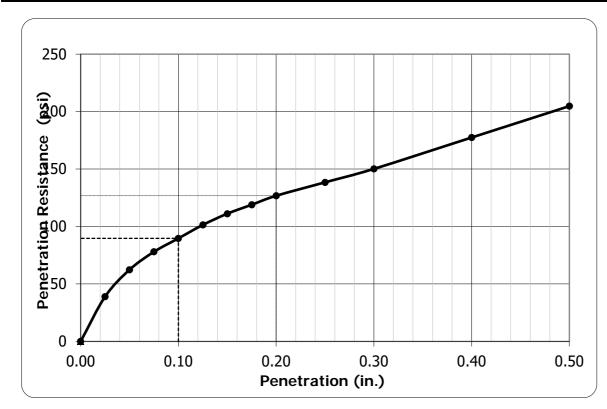
Linearity Correction	0.000
Surcharge (lbs)	10
Max Swell (%)	5.4

Material Description	sandy Fat Clay with gravel
USCS	СН
Max Density	127
Optimum Moisture (%)	9
LL	51
PI	30
Color	Orange Brown

She Harris



CALIFORNIA BEARING RATIO (CBR) TEST - VTM-008			
Project No. 14189 Project Name Columbia Pike Multimodal			Columbia Pike Multimodal
Test Boring No.	DB-6	Depth (Feet)	0.0'-5.0'
Lab Order No.	3481-2	Date	3/3/2015



Molded		
Dry Density (pcf)	129.3	
Moisture (%)	8.0	
Percent of Max. Density (%)	100.2	

Soaked		
Dry Density (pcf)	128.2	
Moisture (%)	12.8	
Percentage of Max. Density (%)	99.4	

CBR (%)		
0.1 in.		9.0
0.2 in.		8.5

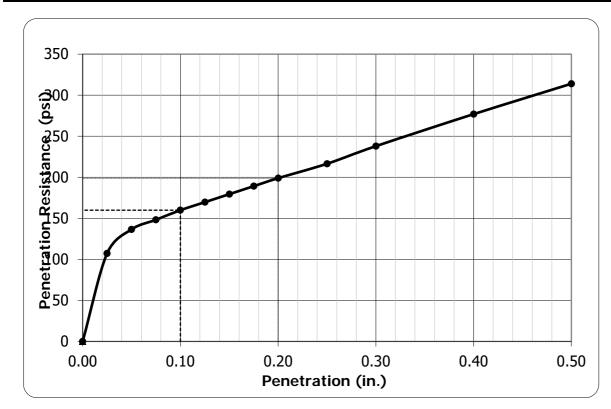
Linearity Correction	0.000
Surcharge (lbs)	10
Max Swell (%)	0.8

Material Description	CLAYEY SAND with gravel
USCS	SC
Max Density	129
Optimum Moisture (%)	8
LL	31
PI	16
Color	Dark Gray

She Havio



CALIFORNIA BEARING RATIO (CBR) TEST - VTM-008			
Project No. 14189 Project Name Columbia Pike Multimodal			Columbia Pike Multimodal
Test Boring No.	DB-10	Depth (Feet)	0.0'-5.0'
Lab Order No.	3481-1	Date	3/3/2015



Molded		
Dry Density (pcf)	123.2	
Moisture (%)	10.0	
Percent of Max. Density (%)	99.3	

Soaked		
Dry Density (pcf)	122.9	
Moisture (%)	12.7	
Percentage of Max. Density (%)	99.1	

CBR (%)		
0.1 in.	16.0	
0.2 in.	13.3	

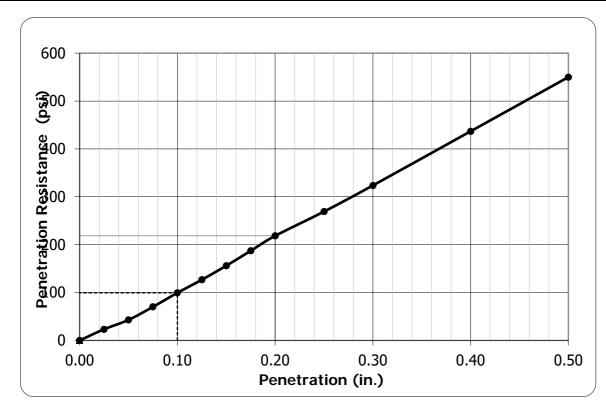
Linearity Correction	0.000
Surcharge (lbs)	10
Max Swell (%)	0.2

Material Description	CLAYEY SAND
USCS	SC
Max Density	124
Optimum Moisture (%)	10
LL	27
PI	13
Color	Brownish Gray

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CALIFORNIA BEARING RATIO (CBR) TEST - VTM-008			
Project No. 14189 Project Name Columbia Pike Multimodal St. Improvements			
Test Boring No.	FB-2	Depth (Feet)	0.0'-5.0'
Lab Order No.	3480-14	Date	3/6/2015



Molded	
Dry Density (pcf)	130.6
Moisture (%)	9.4
Percent of Max. Density (%)	99.7

Soaked		
Dry Density (pcf)	130.5	
Moisture (%)	10.3	
Percentage of Max. Density (%)	99.6	

CBR (%)		
0.1 in.		9.9
0.2 in.		14.6

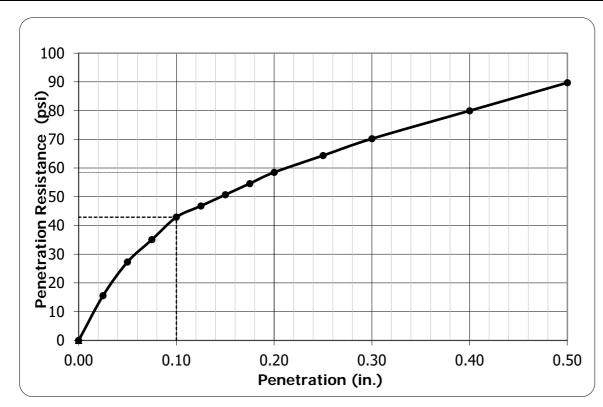
Linearity Correction	0.000
Surcharge (lbs)	10
Max Swell (%)	0.1

Material Description	CLAYEY SAND with gravel
USCS	SC
Max Density	131
Optimum Moisture (%)	9
LL	72
PI	46
Color	Dark Gray

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CALIFORNIA BEARING RATIO (CBR) TEST - VTM-008			
Project No. 14189 Project Name Columbia Pike Multimodal St. Improvements			
Test Boring No. FB-9 Depth (Feet) 0.0'-5.0'			
Lab Order No.	3480-13	Date	3/6/2015



Molded		
Dry Density (pcf)	115.1	
Moisture (%)	14.3	
Percent of Max. Density (%)	100.1	

Soaked		
Dry Density (pcf)	112.3	
Moisture (%)	21.1	
Percentage of Max. Density (%)	97.6	

CBR (%)		
0.1 in.	4.3	
0.2 in.	3.9	

,	Tested by:	
	rested by:	

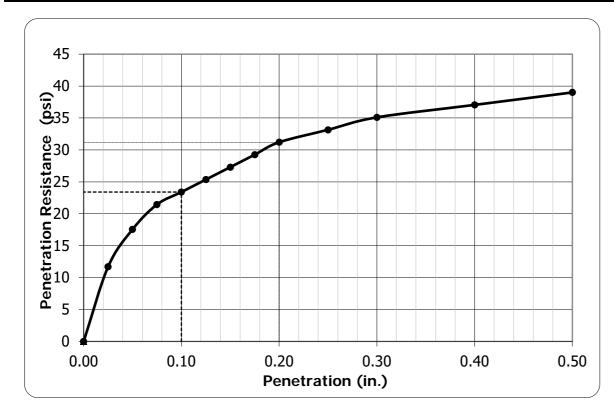
Linearity Correction	0.000
Surcharge (lbs)	10
Max Swell (%)	2.5

Material Description	sandy Lean Clay
USCS	CL
Max Density	115
Optimum Moisture (%)	14
LL	36
PI	17
Color	Brownish Gray

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Reviewed by:	18/2- 20	



CALIFORNIA BEARING RATIO (CBR) TEST - VTM-008			
Project No. 14189 Project Name Columbia Pike Multimodal St. Improvements			
Test Boring No. FB-18 Depth (Feet) 0.0'-5.0'			
Lab Order No.	3480-12	Date	3/6/2015



Molded	
Dry Density (pcf)	97.2
Moisture (%)	25.0
Percent of Max. Density (%)	100.2

Soaked		
Dry Density (pcf)	92.5	
Moisture (%)	59.4	
Percentage of Max. Density (%)	95.4	

	CBR (%)
0.1 in.	2.3
0.2 in.	2.1

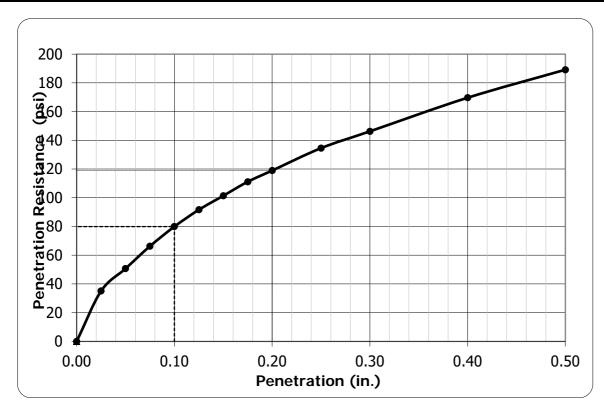
Linearity Correction	0.000
Surcharge (lbs)	10
Max Swell (%)	5.1

Material Description	Lean Clay
USCS	CL
Max Density	97
Optimum Moisture (%)	25
LL	25
PI	8
Color	Gray

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CALIFORNIA BEARING RATIO (CBR) TEST - VTM-008			
Project No.	14189	Project Name	Columbia Pike - Segment H/I
Test Boring No.	HB-5	Depth (Feet)	0.0'-5.0'
Lab Order No.	3468	Date	2/5/2015



Molded	
Dry Density (pcf)	115.6
Moisture (%)	12.7
Percent of Max. Density (%)	100.5

Soaked	
Dry Density (pcf)	114.3
Moisture (%)	16.9
Percentage of Max. Density (%)	99.4

	CBR (%)	
0.1 in.		8.0
0.2 in.		7.9

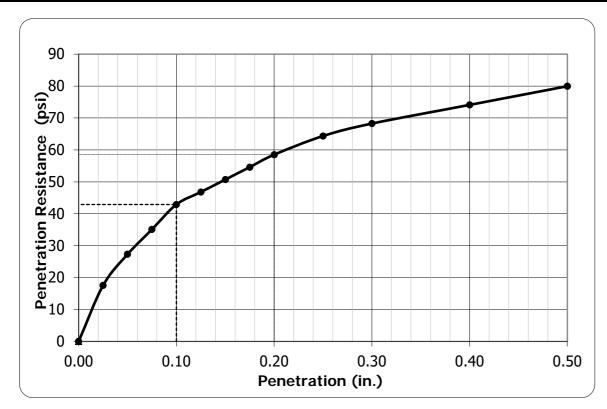
Linearity Correction	0.000
Surcharge (lbs)	10
Max Swell (%)	1.2

Material Description	CLAYEY SAND
USCS	SC
Max Density	115
Optimum Moisture (%)	13
LL	74
PI	54
Color	Gray

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CALIFORNIA BEARING RATIO (CBR) TEST - VTM-008			
Project No.	14189	Project Name	Columbia Pike Multimodal
Test Boring No.	IB-2	Depth (Feet)	0.0-5.0
Lab Order No.	3462-13	Date	2/2/2015



Molded		
Dry Density (pcf)	111.9	
Moisture (%)	15.4	
Percent of Max. Density (%)	99.9	

Soaked		
Dry Density (pcf)	107.7	
Moisture (%)	22.5	
Percentage of Max. Density (%)	96.2	

С	CBR (%)
0.1 in.	4.3
0.2 in.	3.9

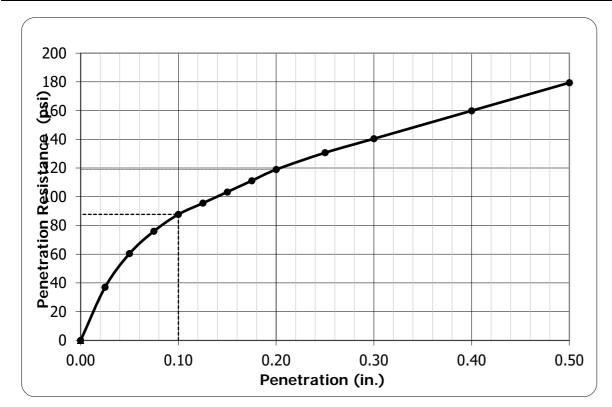
,	Tested by:	
	rested by:	

Linearity Correction	0.000
Surcharge (lbs)	10
Max Swell (%)	3.8

Material Description	sandy Fat Clay
USCS	СН
Max Density	112
Optimum Moisture (%)	15
LL	53
PI	33
Color	Brownish Gray

Sh Harris

CALIFORNIA BEARING RATIO (CBR) TEST - VTM-008			
Project No.	14189	Project Name	Columbia Pike Multimodal
Test Boring No.	IB-9	Depth (Feet)	3462-12
Lab Order No.	3462-12	Date	2/2/2015



Molded		
Dry Density (pcf)	128.8	
Moisture (%)	9.2	
Percent of Max. Density (%)	99.9	

Soaked		
Dry Density (pcf)	126.8	
Moisture (%)	13.9	
Percentage of Max. Density (%)	98.3	

(CBR (%)
0.1 in.	8.8
0.2 in.	7.9

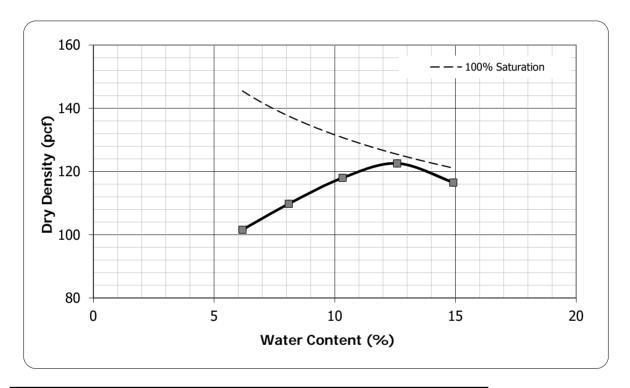
Linearity Correction	0.000
Surcharge (lbs)	10
Max Swell (%)	1.6

Material Description	CLAYEY SAND with gravel
USCS	SC
Max Density	129
Optimum Moisture (%)	9
LL	44
PI	29
Color	Gray

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MOISTURE DENSITY RELATIONSHIP - VTM-001								
Project No.	14189	Project Name	Columbia Pike Multimodal St. Improvements					
Test Boring No.	AB-12	Depth (Feet)	0.0'-5.0'					
Lab Order No.	3754-2	Date	3/17/2016					

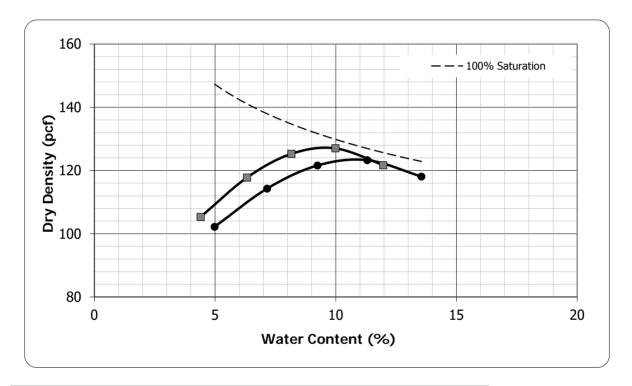


TEST RESULTS	Before Correc.		After Correc.					
Maximum Dry Density (pcf)	123				Color			
Optimum Moisture Content (%)	12				Brown			
Material	Classification		Nat. Moist. (%)	Sp. G. (Assumed)	LL	ΡI	% > # 4	% < #200
CLAYEY SAND	USCS	AASHTO	16.1	2.7	50	26	5.5	31.8
CLATET SAND	SC	SC A-2-7		2.,	30	20	5.5	51.0

Reviewed by Lindsay Barts



MOISTURE DENSITY RELATIONSHIP - VTM-001								
Project No.	14189	Project Name	Columbia Pike Multimodal St. Improvements					
Test Boring No.	AB-15	Depth (Feet)	0.0'-5.0'					
Lab Order No.	3754-7	Date	3/17/2016					

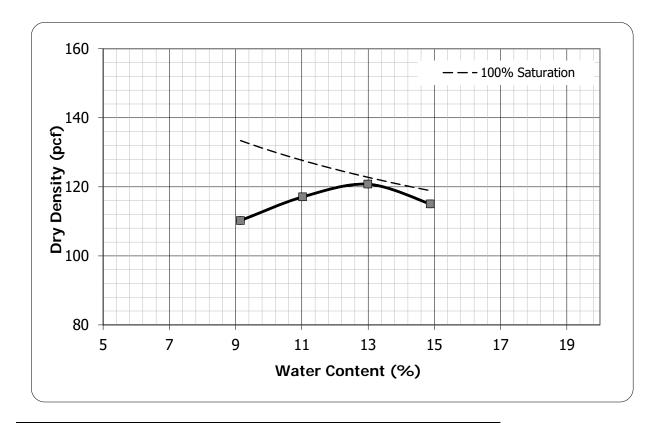


TEST RESULTS	Before Correc.		After Correc.							
Maximum Dry Density (pcf)	124	124		127		Color				
Optimum Moisture Content (%)	11		9		Brown					
Material	Classification		Nat. Moist. (%)	Sp. G. (Assumed)	LL	ΡI	% > # 4	% < #200		
CLAYEY SAND	USCS SC	AASHTO A-2-6	10.1	2.65	37	20	11.7	30.8		

Reviewed by Lindsay Borts



MOISTURE DENSITY RELATIONSHIP - VTM-001									
Project No. 14189 Project Name Columbia Pike Multimodal St. Improvem									
Test Boring No.	CRW-2	Depth (Feet)	0.0'-5.0'						
Lab Order No.	3486-13	Date	3/5/2015						



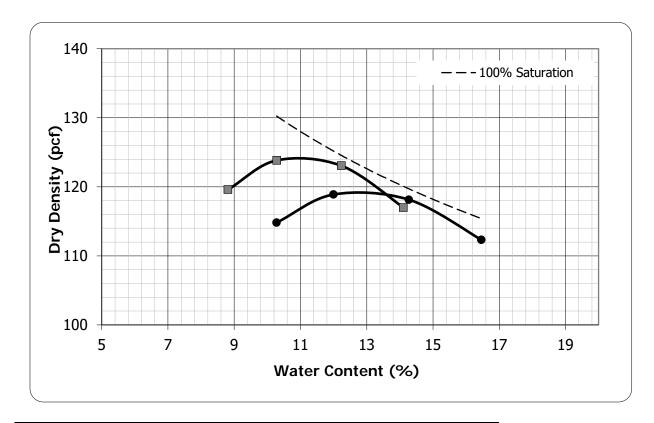
TEST RESULTS	Before Correc.		After Correc.						
Maximum Dry Density (pcf)	121				Color				
Optimum Moisture Content (%)	13				Brown				
Material	Classification		Nat. Moist. (%)	Sp. G. (Assumed)	LL	ΡI	% > #4	% < #200	
CLAVEV CAND	USCS	AASHTO	14.2	2.65	24	10	0.0	44.0	
CLAYEY SAND	SC	A-6	14.2	2.65	34	19	9.9	44.9	

Tested by _____





MOISTURE DENSITY RELATIONSHIP - VTM-001									
Project No. 14189 Project Name Columbia Pike Multimodal St. Improven									
Test Boring No.	CB-5	Depth (Feet)	0.0'-5.0'						
Lab Order No.	3486-12	Date	3/5/2015						



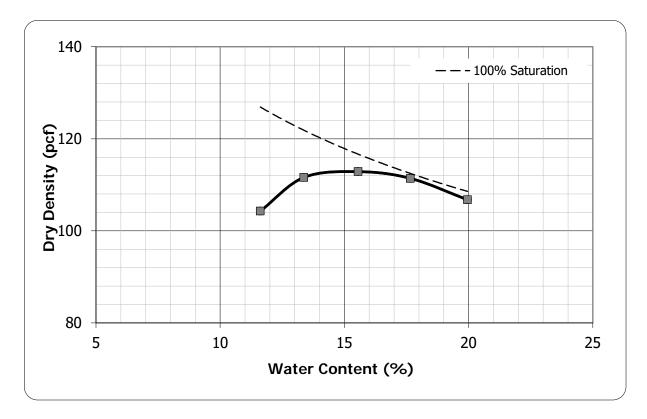
TEST RESULTS	Before Correc.		After Correc.						
Maximum Dry Density (pcf)	119		124		Color				
Optimum Moisture Content (%)	13 11		Light Grayish Brown						
Material	Classification		Nat. Moist. (%)	Sp. G. (Assumed)	LL	ΡI	% > #4	% < #200	
candy Lean Clay	USCS	AASHTO	9.7	2.65	41	23	14.3	59.1	
sandy Lean Clay	CL	A-7-6	9.7	2.65	41	23	14.5	59.1	

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MOISTURE DENSITY RELATIONSHIP - VTM-001								
Project No. 14189 Project Name Columbia Pike Street Improvements								
Test Boring No.	CB-8	Depth (Feet)	0.0'-5.0'					
Lab Order No.	3483-2	Date	3/5/2014					



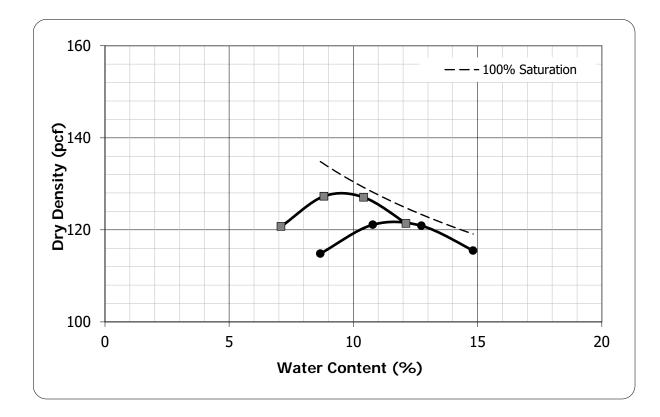
TEST RESULTS	Before Correc.		After Correc.					
Maximum Dry Density (pcf)	1	113			Color			
Optimum Moisture Content (%)	15				Dark Brownish Gray			У
Material	Classification		Nat. Moist. (%)	Sp. G. (Assumed)	LL	ΡI	% > # 4	% < #200
CLAVEV CAND	USCS	AASHTO	16.6	2.65	20	15	г э	42.1
CLAYEY SAND	SC	A-6	16.6	2.65	30	15	5.3	42.1

Tested by _____





MOISTURE DENSITY RELATIONSHIP - VTM-001									
Project No. 14189 Project Name Columbia Pike Street Improvements									
Test Boring No.	DB-2	Depth (Feet)	0.0'-5.0'						
Lab Order No.	3483-1	Date	3/5/2014						



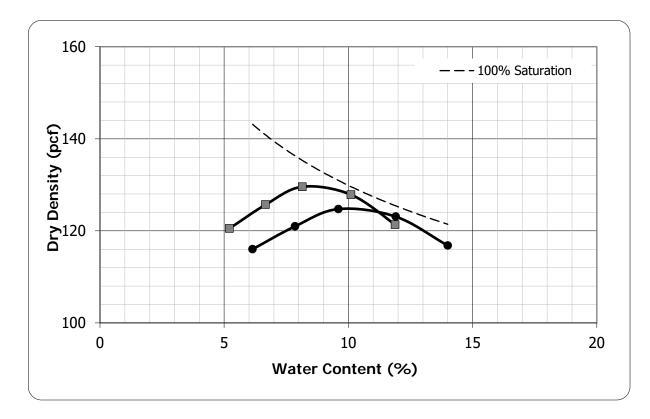
TEST RESULTS	Before Correc.		After Correc.							
Maximum Dry Density (pcf)	1	121		127		Color				
Optimum Moisture Content (%)	12		9		Orange Brown					
Material	Classification		Nat. Moist. (%)	Sp. G. (Assumed)	LL	ΡI	% > # 4	% < #200		
sandy Fat Clay with gravel	USCS	AASHTO	17.5	2.65	51	30	18.2	61.2		
Sally Fat Clay With graver	CH	A-7-6	17.5	2.03	31	50	10.2	01.2		

Tested by _____





MOISTURE DENSITY RELATIONSHIP - VTM-001									
Project No.	Columbia Pike Multimodal								
Test Boring No.	DB-6	Depth (Feet)	0.0'-5.0'						
Lab Order No. 3481-2 Date			3/3/2015						

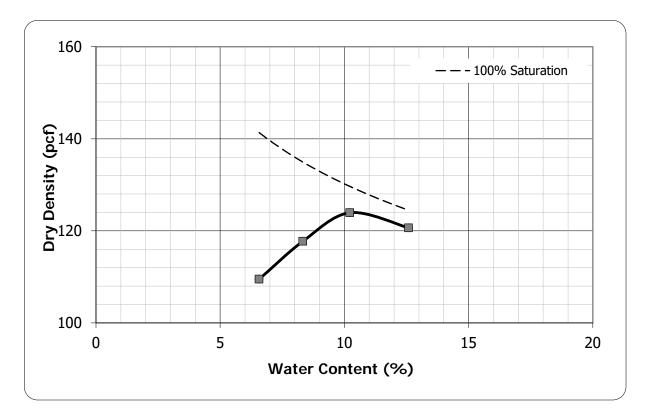


TEST RESULTS	Before Correc.		After Correc.						
Maximum Dry Density (pcf)	1	125		125 129		Color			
Optimum Moisture Content (%)	10		10 8		Dark Gray				
Material	Classification		Nat. Moist. (%)	Sp. G. (Assumed)	LL	PI	% > # 4	% < #200	
CLAYEY SAND with gravel	USCS SC	AASHTO A-2-6	11.0	2.65	31	16	15.1	32.1	

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MOISTURE DENSITY RELATIONSHIP - VTM-001									
Project No.	14189	Project Name	Columbia Pike Multimodal						
Test Boring No.	DB-10	Depth (Feet)	0.0'-5.0'						
Lab Order No.	3481-1	3/3/2015							

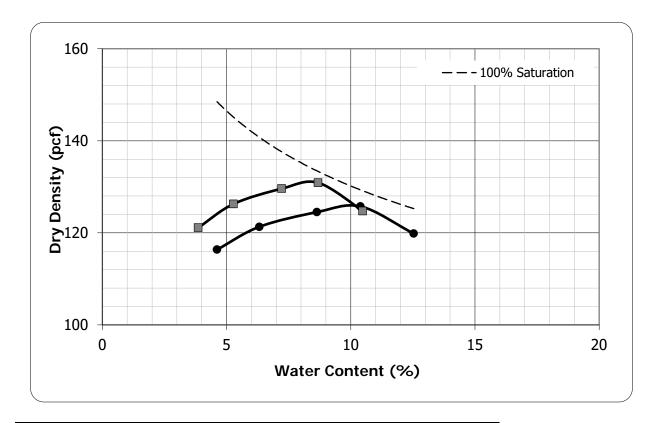


TEST RESULTS	Before Correc.		After Correc.						
Maximum Dry Density (pcf)	1	L24			Color				
Optimum Moisture Content (%)		10		10		Brownish Gray			
Material	Classification		Nat. Moist. (%)	Sp. G. (Assumed)	LL	PI	% > # 4	% < #200	
CLAVEV CAND	USCS	AASHTO	16.1	2.65	27	12	2.1	44.4	
CLAYEY SAND	SC	SC A-6		2.65	27	13	2.1	44.4	

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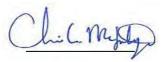


MOISTURE DENSITY RELATIONSHIP - VTM-001										
Project No. 14189 Project Name Columbia Pike Multimodal St. Impro										
Test Boring No.	FB-2	Depth (Feet)	0.0'-5.0'							
Lab Order No.	3480-14	Date	3/6/2015							



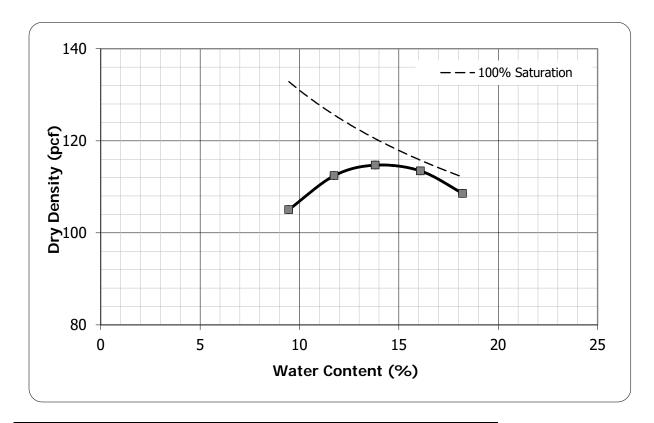
TEST RESULTS	Before Correc.		After Correc.						
Maximum Dry Density (pcf)	126		131		Color				
Optimum Moisture Content (%)	10		9		Dark Gray				
Material	Classification		Nat. Moist. (%)	Sp. G. (Assumed)	LL	ΡI	% > #4	% < #200	
CLAVEY CAND with gravel	USCS	AASHTO	6.2	2.65	72	46	16.4	26.8	
CLAYEY SAND with gravel	SC	A-2-7	0.2	2.65	/2	40	16.4	20.0	

Tested by _____





MOISTURE DENSITY RELATIONSHIP - VTM-001										
Project No.	14189	Project Name	Columbia Pike Multimodal St. Improvements							
Test Boring No.	FB-9	Depth (Feet)	0.0'-5.0'							
Lab Order No.	3480-13	Date	3/6/2015							



TEST RESULTS	Before Correc.		After Correc.						
Maximum Dry Density (pcf)	1	115				Color			
Optimum Moisture Content (%)	14		14		Brownish Gray				
Material	Classification		Nat. Moist. (%)	Sp. G. (Assumed)	LL	PI	% > #4	% < #200	
candy Lean Clay	USCS	AASHTO	14.5	2.65	36	17	0 0	51.1	
sandy Lean Clay	CL	A-6	14.5	2.65	30	1/	8.8	51.1	

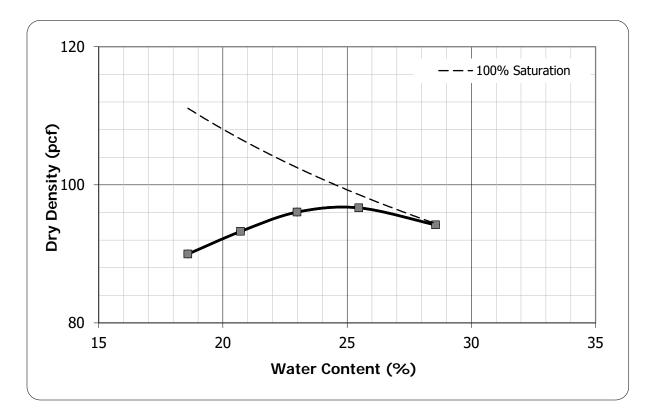
Tested by _____

Reviewed by

Chi C. My

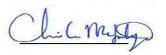


MOISTURE DENSITY RELATIONSHIP - VTM-001							
Project No.	14189	Project Name	Columbia Pike Multimodal St. Improvements				
Test Boring No.	FB-18	Depth (Feet)	0.0'-5.0'				
Lab Order No.	3480-12	Date	3/6/2015				



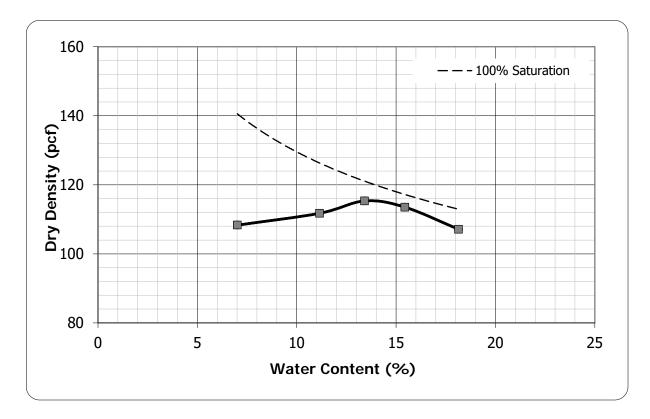
TEST RESULTS	Before Correc.		rrec. After Correc.					
Maximum Dry Density (pcf)	97		97		Color			
Optimum Moisture Content (%)	25		25				Gray	
Material	Classi	fication	Nat. Moist. (%)	Sp. G. (Assumed)	LL	ΡI	% > #4	% < #200
Loan Clay	USCS	AASHTO	18.6	2.65	25	8	0.1	86.7
Lean Clay	CL	A-4	10.0	2.65	25	٥	0.1	00.7

Tested by _____





MOISTURE DENSITY RELATIONSHIP - VTM-001						
Project No.	14189	Project Name	Columbia Pike - Segment H/I			
Test Boring No.	HB-5	Depth (Feet)	0.0'-5.0'			
Lab Order No.	3468	Date	2/5/2015			

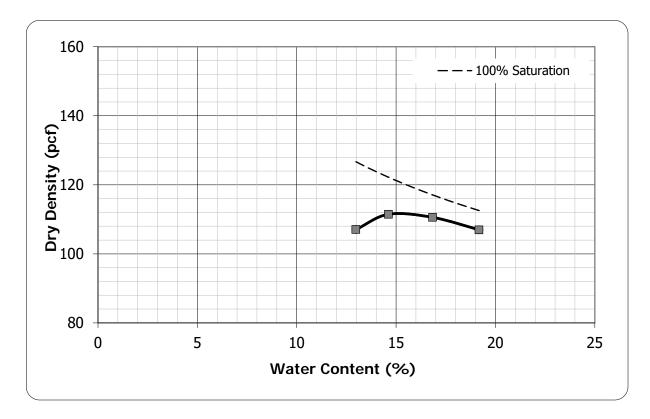


TEST RESULTS	Before Correc.		After Correc.					
Maximum Dry Density (pcf)	115				Color			
Optimum Moisture Content (%)	13		13		Gray			
Material	Classi	fication	Nat. Moist. (%)	Sp. G. (Assumed)	LL	ΡI	% > # 4	% < #200
CLAYEY SAND	USCS SC	AASHTO A-2-7	17.3	2.65	74	54	5.1	28.6

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	l by	by Sh



MOISTURE DENSITY RELATIONSHIP - VTM-001						
Project No.	14189	Project Name	Columbia Pike Multimodal			
Test Boring No.	IB-2	Depth (Feet)	0.0-5.0			
Lab Order No.	3462-13	Date	2/2/2015			

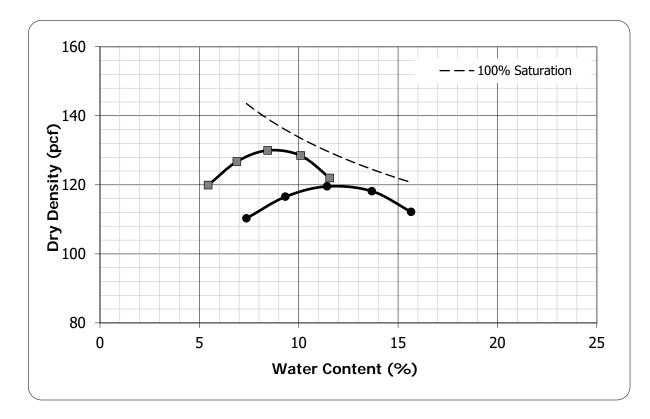


TEST RESULTS	Before Correc.		After Correc.					
Maximum Dry Density (pcf)	112				Color			
Optimum Moisture Content (%)	15		15		Brownish Gray			
Material	Classi	fication	Nat. Moist. (%)	Sp. G. (Assumed)	LL	PI	% > # 4	% < #200
sandy Fat Clay	USCS	AASHTO	24.7	2.75	53	33	1.8	51.0
Salidy I at Clay	CH	A-7-6	۷٦./	2./3	33	33	1.0	31.0

Tested by	Reviewed by	Show	Havno
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MOISTURE DENSITY RELATIONSHIP - VTM-001						
Project No.	14189	Project Name	Columbia Pike Multimodal			
Test Boring No.	IB-9	Depth (Feet)	3462-12			
Lab Order No.	3462-12	Date	2/2/2015			



TEST RESULTS	Before Correc.		After Correc.					
Maximum Dry Density (pcf)	119		119 129		Color			
Optimum Moisture Content (%)	12		12 9		Gray			
Material	Classi	fication	Nat. Moist. (%)	Sp. G. (Assumed)	LL	PI	% > # 4	% < #200
CLAYEY SAND with gravel	USCS SC	AASHTO A-2-7	7.6	2.75	44	29	26.2	31.7

Tested by	Reviewed by	Show	Havi
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Appendix C Pavement Design Calculations

Flexible Pavement Design Calculations (2 pages)

Rigid Pavement Design Calculations (4 pages)

Table C-1: Unsuitable Soil Summary and Recommendations (3 pages)

DARWin Pavement Design and Analysis System

A Proprietary AASHTOWare Computer Software Product

Flexible Structural Design Module

Columbia Pike Segments A, C, D, and F

Flexible Structural Design

18-kip ESALs Over Initial Performance Period	5,550,524
Initial Serviceability	4.2
Terminal Serviceability	2.8
Reliability Level	90 %
Overall Standard Deviation	0.49
Roadbed Soil Resilient Modulus	5,000 psi
Stage Construction	1
Calculated Design Structural Number	5.61 in

Simple ESAL Calculation

Performance Period (years)	20
Two-Way Traffic (ADT)	31,525
Number of Lanes in Design Direction	2
Percent of All Trucks in Design Lane	90 %
Percent Trucks in Design Direction	50 %
Percent Heavy Trucks (of ADT) FHWA Class 5 or Greater	5 %
Average Initial Truck Factor (ESALs/truck)	1.05
Annual Truck Factor Growth Rate	0 %
Annual Truck Volume Growth Rate	0.21 %
Growth	Compound

Total Calculated Cumulative ESALs 5,550,524

Specified Layer Design

		Struct Coef.	Drain Coef.	Thickness	Width	Calculated
<u>Layer</u>	Material Description	<u>(Ai)</u>	<u>(Mi)</u>	(Di)(in)	<u>(ft)</u>	SN (in)
1	SM-9.5	0.44	1	2	11	0.88
2	BM-25.0	0.44	1	8	11	3.52
3	Graded Aggregate Base 21A	0.12	1	12	11	1.44
Total	-	-	-	22.00	-	5.84

DARWin Pavement Design and Analysis System

A Proprietary AASHTOWare Computer Software Product

Flexible Structural Design Module

Columbia Pike Segments H&I

Flexible Structural Design

18-kip ESALs Over Initial Performance Period	5,718,512
Initial Serviceability	4.2
Terminal Serviceability	2.8
Reliability Level	90 %
Overall Standard Deviation	0.49
Roadbed Soil Resilient Modulus	5,000 psi
Stage Construction	1
Calculated Design Structural Number	5.64 in

Simple ESAL Calculation

Performance Period (years)	20
Two-Way Traffic (ADT)	31,955
Number of Lanes in Design Direction	2
Percent of All Trucks in Design Lane	90 %
Percent Trucks in Design Direction	50 %
Percent Heavy Trucks (of ADT) FHWA Class 5 or Greater	5 %
Average Initial Truck Factor (ESALs/truck)	1.05
Annual Truck Factor Growth Rate	0 %
Annual Truck Volume Growth Rate	0.38 %
Growth	Compound

Total Calculated Cumulative ESALs 5,718,512

Specified Layer Design

		Struct Coef.	Drain Coef.	Thickness	Width	Calculated
<u>Layer</u>	Material Description	<u>(Ai)</u>	<u>(Mi)</u>	(Di)(in)	<u>(ft)</u>	<u>SN (in)</u>
ĺ	SM-9.5	0.44	1	2	11	0.88
2	BM-25.0	0.44	1	8	11	3.52
3	Graded Aggregate Base 21A	0.12	1	12	11	1.44
Total	-	-	-	22.00	-	5.84

^{*}Note: This value is not represented by the inputs or an error occurred in calculation.

DARWin Pavement Design and Analysis System

A Proprietary AASHTOWare Computer Software Product

Rigid Structural Design Module

Columbia Pike Segments A, C, D, and F

Rigid Structural Design

Pavement Type	JPCP
18-kip ESALs Over Initial Performance Period	12,741,724
Initial Serviceability	4.5
Terminal Serviceability	2.8
28-day Mean PCC Modulus of Rupture	650 psi
28-day Mean Elastic Modulus of Slab	5,000,000 psi
Mean Effective k-value	257 psi/in
Reliability Level	90 %
Overall Standard Deviation	0.39
Load Transfer Coefficient, J	2.7
Overall Drainage Coefficient, Cd	1
Calculated Design Thickness	9.81 in

Simple ESAL Calculation

Performance Period (years)	30
Two-Way Traffic (ADT)	31,525
Number of Lanes in Design Direction	2
Percent of All Trucks in Design Lane	90 %
Percent Trucks in Design Direction	50 %
Percent Heavy Trucks (of ADT) FHWA Class 5 or Greater	5 %
Average Initial Truck Factor (ESALs/truck)	1.59
Annual Truck Factor Growth Rate	0 %
Annual Truck Volume Growth Rate	0.21 %
Growth	Compound

Layer Information

Joint Spacing	16 ft
Dowel Material	Steel
Dowel Diameter	1 in
Dowel Length	18 in
Dowel Space	12 in
Dowel Coating	Epoxi

Total Calculated Cumulative ESALs

			One Dir
		Thickness	Width
<u>Layer</u>	Material Description	<u>(in)</u>	<u>(ft)</u>
1	IPCP	9 8098206	_

12,741,724

			One Dir
		Thickness	Width
<u>Layer</u>	Material Description	<u>(in)</u>	<u>(ft)</u>
2	Crushed Aggregate	6	-
3	-	-	-
Total	-	15.81	-

DARWin Pavement Design and Analysis System

A Proprietary AASHTOWare Computer Software Product

Rigid Structural Design Module

Columbia Pike Segments H&I

Rigid Structural Design

Pavement Type	JPCP
18-kip ESALs Over Initial Performance Period	13,241,836
Initial Serviceability	4.5
Terminal Serviceability	2.8
28-day Mean PCC Modulus of Rupture	650 psi
28-day Mean Elastic Modulus of Slab	5,000,000 psi
Mean Effective k-value	257 psi/in
Reliability Level	90 %
Overall Standard Deviation	0.39
Load Transfer Coefficient, J	2.7
Overall Drainage Coefficient, Cd	1
Calculated Design Thickness	9.87 in

Effective Modulus of Subgrade Reaction

			Roadbed Soil Resilient	Base Elastic Modulus
<u>Period</u>	<u>Description</u>		Modulus (psi)	<u>(psi)</u>
Base Type		-		
Base Thickness		- in		
Depth to Bedrock		- ft		
Projected Slab Thickness		- in		
Loss of Support Category		-		
Effective Modulus of Subgrade	e Reaction	- psi/in*		

^{*}Note: This value is not represented by the inputs or an error occurred in calculation.

Simple ESAL Calculation

Performance Period (years)	30
Two-Way Traffic (ADT)	31,955
Number of Lanes in Design Direction	2
Percent of All Trucks in Design Lane	90 %
Percent Trucks in Design Direction	50 %
Percent Heavy Trucks (of ADT) FHWA Class 5 or Greater	5 %
Average Initial Truck Factor (ESALs/truck)	1.59
Annual Truck Factor Growth Rate	0 %
Annual Truck Volume Growth Rate	0.38 %
Growth	Compound

Layer Information

Joint Spacing	16 ft
Dowel Material	Steel
Dowel Diameter	1 in
Dowel Length	18 in
Dowel Space	12 in
Dowel Coating	Epoxi

		Thickness	One Dir Width
<u>Layer</u>	Material Description	<u>(in)</u>	<u>(ft)</u>
1	JPCP	9.8707114	-
2	Crushed Aggregate	6	-
3	-	-	_
Total	-	15.87	-

Table C-1: Unsuitable Soil Summary and Recommendations

	Station No.		suitable 3011 3uiii	Unsuitable Soil (ft)			
Location	From	То	Representative Boring No.	CH/MH OH/OL	Soft or Loose Soil	CBR <5	Recommended Treatment below Pavement Subgrade
	57+00	58+00	AB-12				No Treatment Required
	58+00	59+75	AB-13			3.0-5.0	No Treatment Required
Segment A	59+75	61+00	AB-14			3.0-5.0	No Treatment Required
	61+00	62+50	AB-15				No Treatment Required
	62+50	64+00	AB-16			3.0-7.5	No Treatment Required
	73+00	74+00	CRW-1				No Treatment Required
	74+00	75+25	CRW-2			0.0-5.0	В
	75+25	77+00	CB-3			0.0-5.0	В
	77+00	78+00	CB-4			0.0-2.5	В
Segment C	78+00	81+00	CB-5			0.0-5.0 8.5-10.0	В
	81+00	83+00	CB-6				No Treatment Required
	83+00	85+50	CB-7			8.5-10.0	No Treatment Required
	85+50	87+50	CB-8		0.0-2.5	2.5-5.0	А
	87+50	89+00	CB-9				No Treatment Required
	89+00	91+50	DB-1			0.0-5.0	В
	91+50	94+25	DB-2	0.0-8.5		0.0-8.5	В
	94+25	96+50	DB-3			5.0-8.5	No Treatment Required
	96+50	98+50	DB-4		5.0-8.5	5.0-8.5	No Treatment Required
	98+50	100+50	DB-5				No Treatment Required
Segment D	100+50	102+75	DB-6		0.8-5.0	5.0-10.0	А
	102+75	105+00	DB-7			8.5-10.0	No Treatment Required
	105+00	107+00	DB-8			8.5-10.0	No Treatment Required
	107+00	109+00	DB-9			2.5-5.0 8.5-10.0	No Treatment Required
	109+00	110+50	DB-10			0.0-2.5	В
	110+50	112+00	DB-11			0.0-5.0	В

Table C-1: Unsuitable Soil Summary and Recommendations

	Statio	n No.		Uns	uitable Soil((ft)	Recommended
Location	Location From To		Representative Boring No.	CH/MH OH/OL	Soft or Loose Soil	CBR <5	Treatment below Pavement Subgrade
	136+00	136+50	FRW-1	13.5-15.0		13.5-15.0	No Treatment Required
	136+50	136+75	FB-1	0.0-2.5 8.5-10.0		0.0-2.5 8.5-10.0	В
	136+75	137+25	FB-2	13.5-15.0		13.5-15.0	No Treatment Required
	137+25	138+00	FRW-2		8.5-13.5		No Treatment Required
	138+00	138+50	FRW-3	8.5-15.0	8.5-10.0	8.5-10.0	No Treatment Required
	138+50	139+00	FB-3	2.5-5.0 8.5-10.0		2.5-5.0 8.5-10.0	No Treatment Required
	139+00	139+75	FRW-4	1		5.0-15.0	No Treatment Required
	139+75	140+25	FB-4		3.0-4.5		No Treatment Required
	140+25	141+00	FRW-5	-		13.5-15.0	No Treatment Required
	141+00	141+75	FRW-6	5.0-8.5		5.0-8.5	No Treatment Required
	141+75	142+25	FB-5	0.0-10.0		0.0-10.0	В
	142+25	142+75	FRW-7	0.0-5.0		0.0-5.0	В
Segment F	142+75	143+25	FB-6				No Treatment Required
Segment F	143+25	144+25	FRW-8			13.5-15.0	No Treatment Required
	144+25	146+00	FB-7	0.0-8.5		0.0-8.5	В
	146+00	147+75	FB-8	0.0-3.5		0.0-3.5	В
	147+75	149+25	FB-9				No Treatment Required
	149+25	151+75	FB-10	8.5-10.0	8.5-10.0	8.5-10.0	No Treatment Required
	151+75	154+00	FB-11	0.0-5.0 8.5-10.0		0.0-5.0 8.5-10.0	В
	154+00	155+50	FB-12	0.0-2.5		0.0-2.5	В
	155+50	157+00	FB-13	2.5-10.0		2.5-10.0	No Treatment Required
	157+00	159+00	FB-14	8.5-10.0		8.5-10.0	No Treatment Required
	159+00	159+75	FB-15				No Treatment Required
	159+75	163+25	FB-17				No Treatment Required
	163+25	165+00	FB-18			0.0-10.0	В
	165+00	167+00	HA-19				No Treatment Required

Table C-1: Unsuitable Soil Summary and Recommendations

	Statio	Station No.	Representative Boring No.	Unsuitable Soil (ft)			December
Location	From	То		CH/MH OH/OL	Soft or Loose Soil	CBR <5	Recommended Treatment below Pavement Subgrade
	182+00	183+00	HB-2				No Treatment Required
	183+00	186+75	HB-3				No Treatment Required
Segment H	186+75	188+50	HB-4				No Treatment Required
Segment II	188+50	190+50	HB-5	-			No Treatment Required
	190+50	192+50	HB-6	1			No Treatment Required
	192+50	194+00	HB-7	1		5.0-10.0	No Treatment Required
	198+00	195+50	IB-1				No Treatment Required
	195+50	196+00	IRW-4A				No Treatment Required
	196+00	169+50	HA-4				No Treatment Required
	169+50	197+00	IB-2	0.0-8.5		0.0-8.5	В
	197+00	198+25	HA-3			1.5-4.0	В
	198+25	200+20	IB-3				No Treatment Required
Cogmont I	200+20	202+25	IB-4				No Treatment Required
Segment I	202+25	204+25	IB-5				No Treatment Required
	204+25	205+25	HA-2				No Treatment Required
	205+25	206+00	IB-6				No Treatment Required
	206+00	207+00	IRW-1	0.0-2.5	0.0-2.5	0.0-2.5	В
	207+00	208+50	IB-7				No Treatment Required
	208+50	209+00	IB-8				No Treatment Required
	209+00	212+00	IB-10				No Treatment Required
S Thomas St.	0+00	3+00	FB-16				No Treatment Required
S Columbus St.	0+00	3+00	HB-1				No Treatment Required
S Jefferson St.	0+00	3+00	IB-9				No Treatment Required

RECOMENDED TREATMENTS:

A. Excavate unsuitable materials (soft or loose soils) to a minimum depth of 3 feet below subgrade and allow to dry, prior to re-use as new compacted fill.

B. Excavate unsuitable materials (CBR<5, CH/MH/OH/OL) to a minimum depth of 3 feet below subgrade and replace with new compacted fill with a minimum

B. Excavate unsuitable materials (CBR<5, CH/MH/OH/OL) to a minimum depth of 3 feet below subgrade and replace with new compacted fill with a minimum CBR value of 5.