GEOTECHNICAL ENGINEERING REPORT

for

Army Navy Drive Complete Streets Project
Arlington, Virginia

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1.0 EXECUTIVE SUMMARY

This report presents the findings of our geotechnical engineering study for the proposed Army Navy Drive Complete Streets Project located in Arlington, Virginia. This executive summary does not represent a complete summary of our project understanding and recommendations. The report is one cohesive document and should be read in its entirety.

The studied portion of Army Navy Drive borders the west and north boundaries of Pentagon City and is aligned generally parallel with Interstate 395. Army Navy Drive starts at the corner of South Adams Street and 25th Street South and ends at the intersection of 12th Street South. The studied portion for the Complete Streets Project includes the north section of the Army Navy Drive roadway located between the intersections of South Joyce Street and 12th Street South. The project will consist of reconfiguring Army Navy Drive into a multimodal roadway that includes increased bicycle, pedestrian and public transit spaces and incorporates new stormwater management facilities.

Our geotechnical investigation consisted of drilling 14 borings at accessible roadway areas and performing laboratory testing of collected soil samples.

A summary of pertinent information and our recommendations further discussed in this report are as follows:

- Subsurface conditions within the studied alignment generally consist of a layer asphalt pavement overlying successive strata of fill and granular (sand and gravel) terrace deposits.
- Asphalt pavement was observed to range from about 5 to 11 inches thick. Concrete pavement was encountered below asphalt in 7 of 14 borings and ranged in thickness from about 7.5 to 11 inches.
- Groundwater was first encountered in LB-3 at a depth of 13.5 feet below existing grade, or at approximate el 28.6. Upon completion, groundwater was observed at 15.1 feet below grade, or at approximate el 27. Groundwater was not encountered in any other borings performed for this study.
- Existing fill soil (Stratum A) are the pavement subgrade and are generally suitable for the support of new pavement areas associated with the improvements.
- Signal pole foundations can be designed as drilled shafts deriving their capacities from frictional and end-bearing resistance. Recommended axial capacities are given in Section 7.2. Lateral resistance can be developed along the length of the pier foundation. Lateral resistances should exclude the upper 5 feet of the pier to account for seasonal variations (shrink-swell and freeze-thaw) and future utility work. We recommend ultimate lateral resistance below this exclusion zone be designed using 2,000 and 2,800 pounds per linear foot for 3 and 4-foot-diemeter piers, respectively.

A complete summary of our field investigation and our geotechnical recommendations for the proposed Army Navy Drive Complete Streets Project are given in this report.

2.0 INTRODUCTION

This report presents the results of our geotechnical engineering study for the proposed Army Navy Drive Complete Streets Project in Arlington, Virginia. The purposes of this study were to:

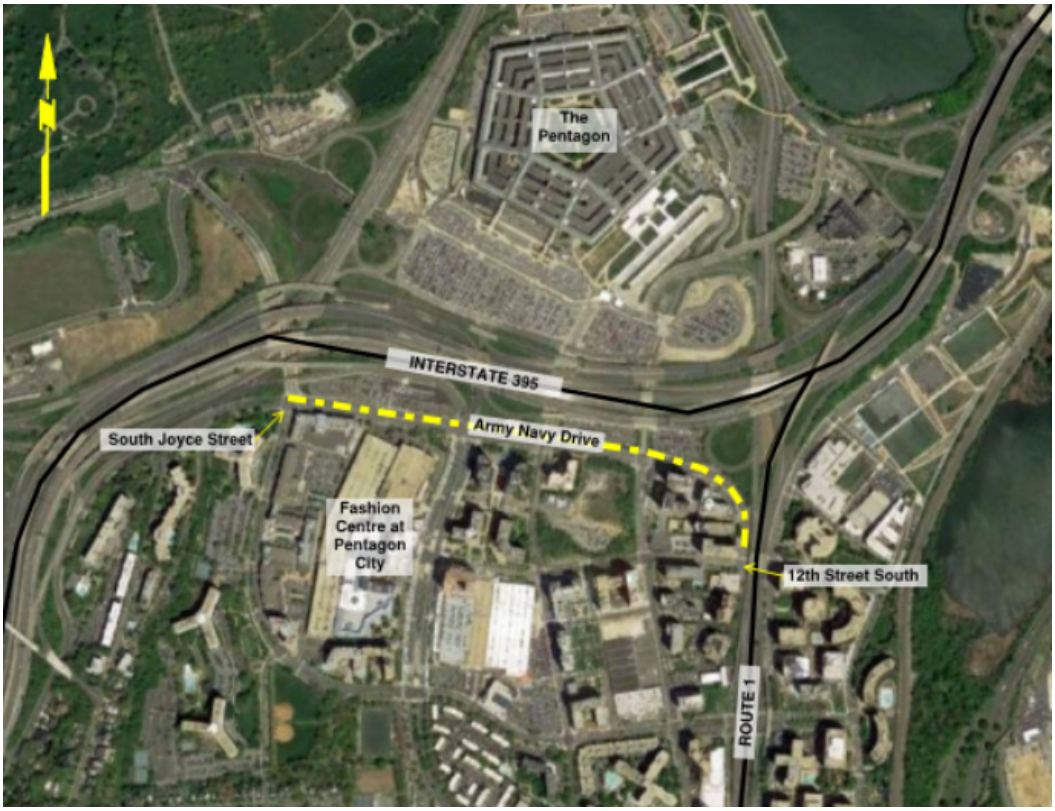
1) Research and review available site information;
2) Obtain subsurface and groundwater information by drilling borings within accessible roadway areas and completing specialty laboratory testing;
3) Provide recommendations for pavement design, signal pole foundation design, site preparation, site grading, and other geotechnical aspects of the proposed realignment;

Unless otherwise noted, all elevations given in this report are referenced to the North American Vertical Datum of 1988 (NAVD88). Surface elevations at investigation locations were determined by our surveyors during the investigation stakeout. Existing grades for the alignment beyond the investigation locations have not been provided at the time of this report. No environmental sampling or testing was completed as part of our investigation.

3.0 PROJECT DESCRIPTION

3.1 Existing Conditions

The Army Navy Drive Complete Streets project site is located in the Pentagon City neighborhood of Arlington County, Virginia. The west side of Army Navy Drive starts at the corner of South Adams Street and 25th Street South and ends on the east side at 12th Street South. The roadway alignment generally parallels US Interstate 395. The project study area consists of the north section of the Army Navy Drive located between the intersections of South Joyce Street and 12th Street South; see Figure 1 and Inset 1.



Inset 1

The studied portion of Army Navy Drive is a divided asphalt roadway with east and westbound lanes. Both the east and westbound lane consist of two-to-three lanes that are owned and operated by Arlington County. The studied portion of the road has intersections at South Joyce Street, South Hayes Street, South Fern Street, South Eads Street, and 12th Street South. The road provides access to three Pentagon parking lots located on the north side of the road. Arlington Transit bus stops are located along the westbound lane near the intersections of Joyce, Hayes, Fern, and Eads Street. Bus stops along the eastbound lane are located near the same intersections, except no bus stop is located near the Fern Street intersection. An underground WMATA tunnel for the blue and yellow lines is located beneath Hayes Street. Based on conversations with Arlington County, we understand that the existing roadway was milled and re-resurfaced in 2015.

3.2 Proposed Construction

According to the 6 November 2019 Army Navy Drive 30% Construction Drawings prepared by Arlington County, project consists of improvements to an approximate 4,200-foot-long section of Army Navy Drive between South Joyce Street and 12th Street South. The project will reconfigure Army Navy Drive into a multimodal roadway and provide increased accessibility for bicycle and pedestrian traffic, public transit, and establish more environmental (stormwater management) facilities including decreasing the impervious area along the corridor. Details of the proposed construction are as follows:

- Protected bike lane - A new bicycle lane will be located along the eastbound side of Army Navy Drive and will consist of a two-way path separated from vehicle traffic.
- Dedicated transit lanes - The curbside lanes in both directions between South Joyce Street and South Hayes Street will be re-purposed as a dedicated transit lane.
- Roadway improvements - The roadway will be will be reconfigured to reduce the number of travel lanes and narrow vehicle travel lanes. Improved and shorter pedestrian crossings will be constructed in an effort to provide a more accessible pedestrian area.
- Traffic signal installation – New traffic signals will be installed at intersections.

It is our understanding that a majority of existing medians, curbs, traffic signals, and pavement will be removed and replaced with the following:

- Mainline left turn lanes where they are currently missing
- Mainline protected left turn lane phasing
- Updated traffic signals at each intersection
- ADA accessible curb ramps
- Landscaping
- On-street tour bus parking

We understand that major utility re-routing is not planned at this time.

4.0 REVIEW OF AVAILABLE INFORMATION

We reviewed available historic maps, regional geologic information, and FEMA flood maps for the site and vicinity. Information obtained from these documents is summarized in the following sections:

4.1 Historic Maps

We reviewed the Washington West Quadrangle dated 1885 and the Military Map of Northern Virginia dated 1865 provided on the Arlington Virginia GIS system. The 1865 map indicates that the east portion of the project between South Eads and 12th Street South is aligned through the former Fort Runyon area. The 1885 map indicates that the former Chesapeake and Ohio Canal is aligned north-south and intersects Army Navy Drive between South Fern and South Eads Street.

We also reviewed the Alexandria County map dated 1900. This map indicates that a former stream crossed the roadway alignment between South Hayes and South Fern Streets. Former railways are noted on this plan that cross Army Navy Drive at two locations; the first between South Fern and South Eads Street (the approximate alignment of the former Chesapeake and Ohio Canal) and at the approximate center of the roadway turn between South Eads and 12th Street South.

4.2 Regional Geologic Map

We reviewed the 2006 *Simplified Geologic Map of Arlington County, Virginia, and Vicinity* prepared by the United States Geologic Survey; see Figure 3. Based on this map, the surficial geology at the site area and generally consists of terrace deposits, alluvium, and artificial fill. Terrace deposits generally consist of gray brown to medium orange gravel, sand, silt, and clay. These soils are generally found below el 50 and the thickness of this stratum may be up to 35 feet. Alluvium consists of river deposited soils that are similar to the terrace deposits but are typically less weathered and contains well-rounded pebbles and cobbles.

We also reviewed the Soils Map for Arlington County, Virginia on the Arlington County GIS system. This map indicates the surficial soil along the subject alignment is expected to consist of Udorthents Complex soils and Urban Land made from Udorthents Complex.

4.3 FEMA Flood Map

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), Panel Number 51013C0081C, dated 19 August 2013, the site is located outside of the mapped 100-year and 500-year floodplains; see Figure 4.

4.4 Arlington County Traffic Counts

Various sources for traffic counts in Average Daily Traffic (ADT) and Annual Average Daily Traffic (AADT) were provided by Arlington County for specific sections of Army Navy Drive and are summarized in Table 1. Original traffic count data is given in Appendix A. Our interpretation of the information given below is summarized in Section 7.1.

Average Daily Traffic

From	To	ADT[1] from Traffic Counts	VDOT Counts		
			Current AADT[2]	2020 AADT	2040 AADT
S. Joyce Street	Pentagon City Mall Garage Access	11,713[3]	14,061	16,369	17,234
Pentagon City Mall Garage Access	S. Hayes Street		20,202	21,234	21,455
S. Hayes Street	S. Fern Street	19,913[4]	23,109	27,334	27,714
S. Fern Street	S. Eads Street	–	17,029	19,744	19,665
S. Eads Street	12th Street S.	8,158[5]	6,572	7,068	7,620

Table 1

Notes:

1. ADT = Average Daily Traffic performed by third-party firm, Quality Counts, LLC
2. AADT = Annual Average Daily Traffic from Virginia Department of Transportation (VDOT) provided by Arlington County
3. ADT shown is from South Joyce Street to South Hayes Street from November 2019 traffic count data
4. ADT from October 2014 traffic count data
5. ADT from October 2019 traffic count data
6. " – " = Traffic Count Not Provided

5.0 SUBSURFACE INVESTIGATION

Our geotechnical investigation consisted of drilling borings and conducting laboratory tests on collected soil samples. Permits for work within the right-of-way were obtained from Arlington County before starting the work.

A Miss Utility ticket was completed before the start of the fieldwork. Our team noticed multiple utilities on the Arlington County plans that were not marked by the Miss Utility ticket and therefore each boring location was investigated for detectable utilities by our private utility markout firm prior to performing the investigation within the right-of-way.

5.1 Borings

Fourteen borings, identified as LB-1 through LB-14 were drilled by Free State Drilling between 2 and 6 April 2020, see Figure 2 for locations. Surface elevations at the boring locations were obtained from our field surveyors who staked out the investigation locations under the direction of our engineer.

The borings were drilled using a CME-55 track-mounted drill rig. Before drilling, the asphalt pavement at each boring location was cored using a 6-inch-diameter bit. General pavement core conditions were observed and recorded by our field engineer and photo-documented. The borings were advanced through the soil to depths of 10 feet (for pavement borings) and 25 feet (for traffic signal borings LB-3, LB-6, LB-8 and LB-10) below existing grade using hollow-stem augers. A standard 2-inch-outer-diameter split-spoon sampler was used to obtain samples of the underlying soil strata. The Standard Penetration Test (SPT)[1] was accomplished as part of the sampling procedure (in accordance with ASTM D1586) and the results were recorded by our inspecting engineer. An automatic hammer was used as part of the SPT test for all sampling in the borings. Our field engineer used a field pocket penetrometer to measure unconfined compressive strengths of disturbed cohesive soil samples.

Groundwater levels were recorded when first encountered and upon completion of each boring. All boreholes were backfilled with soil cuttings and surface patched with cold-patch asphalt upon completion.

The borings were completed under the full-time observation of an engineer from our office. Our engineer maintained logs of all explorations, classified encountered soil, and obtained representative material samples.

The individual boring logs are given in Appendix B. Pavement core photographs are given in Appendix C.

5.2 Laboratory Testing

During our investigation, soil samples were visually examined in the field, and classifications were confirmed by re-examination after completion of the investigation. Select samples were sent to a specialty testing laboratory where the following tests were performed:

- Grain Size Analysis (ASTM D422)
- Grain Size Analysis with Hydrometer (ASTM D422)
- Fines Content (ASTM D1140)

[1] The Standard Penetration Test (SPT) is a measure of the soil density and consistency. The SPT N-value is defined as the number of blows required to drive a 2-inch O.D. split-barrel sampler 12 inches, after an initial penetration of 6 inches using a 140 pound hammer falling freely for 30 inches.

- Water Content (ASTM D2216)
- Atterberg Limits (ASTM D-4318)
- California Bearing Ratio (CBR) Test (VTM-8)
- Standard Proctor Test (VTM-1)

The results of the laboratory testing are discussed together with the soil strata descriptions in the following sections. The laboratory test results are given in Appendix D.

6.0 SUBSURFACE CONDITIONS

The subsurface conditions at the site generally consist of a layer pavement overlying successive strata of fill and terrace deposits. The following sections describe the encountered subsurface conditions.

Since the automatic hammer was used in conjunction with the Standard Penetration Testing in the borings, the SPT N-values presented in the text of the following strata description sections are corrected (N_{60}) SPT N-values. SPT N-values presented in the boring logs are uncorrected N-values.

6.1 Pavement

Asphalt pavement was encountered at the surface of all boring locations. The asphalt ranged from about 5 to 14.5 inches thick and generally consisted of one or more surface course layers and a base course. One or more layers of concrete were encountered at boring locations LB-1, LB-2, and LB-5 through LB-9 below the asphalt. The concrete ranged from about 5 to 11 inches thick.

A summary of existing pavement thicknesses is given in Table 2 and photographs of the individual cores are given in Appendix C. Gravel subbase of variable thickness was encountered below the pavement in all borings.

Existing Pavement Summary

Boring	Roadway Station (Approx.)	Asphalt Thickness (inches)			Concrete Thickness (inches)
		Surface Course[1]	Base Course[1]	Total Asphalt Thickness	
LB-1	135+86	3	2	5	13
LB-2	138+89	3.5	NE	3.5	9
LB-3	140+50	5	8	13	NE
LB-4	142+87	3	6.5	9.5	NE
LB-5	145+12	2	3.5	5.5	7.5
LB-6	147+44	2	3	5	9.5
LB-7	150+37	3	3.5	3.5	8.5
LB-8	152+82	3.5	2.5	6	11
LB-9	156+17	2	3	5	9
LB-10	159+52	1	4	5	NE
LB-11	159+71	5	7	12	NE
LB-12	3+50	3	7	10	NE
LB-13	6+35	3	11.5	14.5	NE
LB-14	8+71	3	9	12	NE

Table 2

Notes:

1. Surface and Base course thickness is based on general observations of the asphalt core and observed aggregate size.
2. NE = Not Encountered
3. A detailed breakdown of asphalt and concrete core observations is given in the boring logs in Appendix B and in the Photographic Logs in Appendix C.

6.2 Stratum A - Fill

An approximate 0.5 to 12.2-foot-thick layer of fill was encountered beneath the pavement and subbase in all borings. This layer typically consisted of brown and gray sand, clayey sand, clay, sandy silt, and sandy gravel (typical USCS classifications of SW, SP, SC, CL, SM, and GW). Varying amounts of brick and asphalt and trace amounts of mica, cinders, concrete and wood were also present within the fill. The fill extended to depths ranging from approximately 3 to 13.5 feet below existing grade, or el 27.8 to 35.2. Borings LB-1, LB-2, and LB-5 were terminated in this stratum

Thick zones of debris were encountered in some borings that consisted of:

- Approximate 1 to 16-inch-thick layers of brick were encountered in borings LB-7, LB-8, and LB-9 between 3 and 7 feet below grade, or at about el 32.2 to 36.7.
- Approximate 1 to 11-inch-thick layers of buried asphalt were encountered in borings LB-7, LB-12, and LB-13 between 3.5 and 6.7 feet below grade, or at about el 28.4 to 39.9.
- Six inches of concrete was encountered 2.5 feet below grade or at el 28.5 in LB-14.

Stratum A was observed to be very loose to very dense as evidenced by SPT N_{60}-values ranging from 1 to 52 blows/foot (average SPT N_{60}-value of 17 blows/foot). Higher blow counts are likely attributed to gravel and cobbles-sized obstructions (rock, brick, and asphalt) within the fill. Laboratory Test results from Stratum A are given in Table 3.

Stratum A Laboratory Test Results

Test	Minimum	Maximum	Average
Moisture Content (%)	4.5	21.3	13.6
Gravel Content (%)	5.2	44.7	17.2
Sand Content (%)	31	63.8	47.2
Fines Content (%)	24.2	51.3	35.6
Liquid Limit (%)[1]	29	36	-
Plastic Limit (%)[1]	17	24	-
Plasticity Index (%)[1]	12	12	-
Optimum Moisture Content (%)[2]	7.5	13.7	10
Maximum Dry Unit Weight (pcf)[2]	117.6	134.9	125.8
California Bearing Ratio[3]	6.6	58	27.8

Table 3

Notes:

1. Two samples were tested from this stratum; therefore, an average value is not given.
2. Standard proctor compaction testing was performed in accordance with Virginia Department of Transportation (VDOT) testing standard VTM-1.
3. California Bearing Ratio was performed in accordance with VDOT testing standard VTM-8.

6.3 Stratum B – Terrace Deposits

Stratum B was encountered beneath Stratum A and consisted of primarily of sand and gravel. This stratum was observed to extend to the termination depth of all borings that did not terminate in Stratum A.

The sand portion of this stratum generally consisted of light brown, brown, and red-brown fine to coarse sand with varying amounts of silt and clay and trace amounts of fine gravel (typical USCS classifications of SW, SP, SC, and SM). The sand portion was observed to be very loose to medium dense as evidenced by SPT N_{60}-values ranging from 2 to 21 blows/foot (average of 10 blows/foot).

Fine gravel (typical USCS classification of GW) was encountered beneath the sand near the termination depth of LB-3, LB-8, and LB-10, at 23.5 feet below existing grade, or at about el 15.7 to 18.6. The gravel was observed to be dense as evidenced by SPT N_{60}-values of 30, 38, and 44 blows/foot. The thickness of this gravel layer is not determined.

Laboratory test results for Stratum B are given in Table 4.

Stratum B Laboratory Test Results

Test	Minimum	Maximum	Average
Moisture Content (%)	4	27	14.7
Gravel Content (%)	0.2	56.5	19.6
Sand Content (%)	32.4	92.6	54.2
Fines Content (%)	5.1	62.1	38
Liquid Limit (%)[1]	28		
Plastic Limit (%)[1]	19		
Plasticity Index (%)[1]	9		

Table 4

Notes:

1. One sample was tested from this stratum; therefore one value is reported.

6.4 Groundwater

Groundwater encountered in LB-3 at a depth of 13.5 feet below existing grade, or at approximate el 28.6, as inferred from the moisture content of the soil samples obtained in the split spoon sampler. Groundwater was measured in boring LB-3 at 15.1 feet below existing grade, or at approximate el 27 upon completion of drilling within the augers.

Groundwater was not encountered in any other borings performed at the site.

7.0 DESIGN RECOMMENDATIONS

Our geotechnical design recommendations for pavement are given in the following sections.

7.1 Asphalt Pavement Design

Army Navy Drive will be reconfigured to include a new bike lane, designated bus lanes, full-depth pavement areas, and landscaped areas. Our recommendations for pavement design are given in the following sections.

7.1.1 Army Navy Drive Full-Depth Pavement Design

Portions of the new roadway alignment will include new full-depth pavement. As such, we have designed asphalt pavement section for the proposed roadway improvements following the August 2018, Virginia Department of Transportation Materials Division Guidelines for 1993 AASHTO Pavement Design. Our pavement recommendations given herein are contingent upon the construction recommendations given in Section 8 of this report.

We anticipate that Stratum A soil will be encountered at the proposed pavement subgrades. California Bearing Ratio (CBR) values within Stratum A ranged from about 6.6 to 58 indicating poor to good subgrade material. Given the wide range of CBR values, we recommend using different design CBRs along the roadway to account for subgrade variability. A summary of our full-depth pavement design assumptions are given below and in Table 5.

Initial Serviceability: 4.2
Terminal Serviceability: 2.8
Design Life: 30 years
Reliability: 90 percent
Standard Deviation: 0.49

Pavement Design Recommendations

Roadway Section	Average Daily Traffic (2050)[1]	Vehicular Loading (Million ESALs)[1]		Lane Distribution Factor	Design CBR
		Typical	Bus Lane		
Joyce to Hayes	21,555	5.590	24.597	0.9 (2-lanes) 1.0 (Bus Lane)	7
Hayes to Fern	27,914	23.740	-	0.9 (2-lanes)	20
Fern to Eads	19,744	10.465	-	0.9 (2-lanes)	20
Eads to 12th Street	9,141	5.381	-	0.9 (2-lanes)	10

Table 5

Notes:

1. Average Daily Traffic (ADT) was determined based on traffic counts provided by Arlington County and applying a growth factor based on the AADT values determined by VDOT; see Appendix A.
2. In calculating the value of ESALs, we assumed future quantities of cars, single unit trucks, and tractor-trailers to be consistent with current traffic count percentages.

Given the design assumptions listed above, our recommendations for new full depth pavement design of the Army Navy Drive improvements are given in Table 6.

Vehicular Pavement Design Recommendations

Material	Minimum Pavement Design Thickness	
	Typical Lanes	Bus Lanes
Bituminous Surface Course	2 inches	2 inches
Bituminous Base Course	8 inches	10 inches
Aggregate Base Course[1,2]	6 inches typically; 8 inches when adjacent to bus lane	6 inches

Table 6

Notes:

1. Aggregate base course should consist of VDOT 21B aggregate connected to a standard UD-4 edgedrain.
2. The bottom of aggregate base course should match between lanes, therefore a thicker section is recommended for typical lanes adjacent to bus lanes.

Flexible pavement sections should follow the Arlington County guidelines outlined in Section 02600 of the Construction Standards and Specifications Manual. In conformance with these guidelines, the following sections of the Virginia Department of Transportation (VDOT) Road and Bridge Specifications should be used to guide asphalt material selection, mix design, and construction execution:

- A tack coat consisting of asphalt cement of viscosity grade CM-2 or CRS-2 in conformance with VDOT Section 210 should be applied between asphalt surfaces and each asphalt surface placed thereafter in conformance with VDOT Sections 310 and 315.
- Bituminous surface course should consist of Type SM-12.5D (formally Marshall VDOT Mix Design Type SM-2) in conformance with VDOT Section 211.
- Bituminous base course should consist of Type BM-25A (formally Marshall VDOT Mix Design Type BM-2) in conformance with VDOT Section 211.
- Application of asphalt concrete should conform to VDOT Section 315 that states pavement courses shall not be placed in lifts exceeding 4 times the nominal maximum size aggregate and designates a minimum lift thickness of 2.5 times the nominal maximum aggregate size.

7.1.2 Bicycle Lane Pavement

Bicycle lane pavement sections are typically designed in accordance with the Arlington County Construction Standards and Specifications Manual Section 02601 which assumes vehicular traffic loading is prohibited. However, we anticipate that bike lanes will be subject to occasional vehicular traffic and the minimum pavement section shown in Table 7 per Arlington County Standard R-1.4 should be used.

Bike Lane Pavement Design Recommendations

Material	Minimum Thickness
Bituminous Surface Course	2 inches
Bituminous Base Course	6 inches
Aggregate Base Course	6 inches

Table 7

7.2 Signal and Light Pole Foundation Design

We understand that new signal and light poles will be installed as part of the project. Signal and light pole foundations should be designed in accordance with Virginia Department of Transportation standards.

Very loose soils associated with the fill (Stratum A) were encountered in borings LB-3, LB-8, and LB-10. In addition, brick and deleterious material was encountered in boring LB-8 between approximately 5 to 5.5 feet below-grade. We recommend that signal and light pole foundations bear below loose soils and extend to a minimum depth of 10 feet below grade. The pole foundations should consist of properly reinforced concrete piers deriving their capacity from frictional and end-bearing resistance in soil. We recommend that the piers be designed as 3- or 4-foot-diameter shafts with a 28-day concrete compressive strength of 4,000. The allowable geotechnical axial capacities for the piers is given in Table 8.

Diameter (feet)	Pier Length (feet)	Allowable Axial Capacity (kips)
3	10	20
	15	30
4	10	35
	15	45

Table 8

Notes:

1. An allowable end-bearing capacity of 2,000 psf was used for design.
2. Allowable capacities include a factor of safety of 2 for frictional resistance and 3 for end bearing.
3. Frictional resistance has been excluded in the upper 5 feet of the pier.
4. Pier depth can be increased if additional axial capacity is required. We recommend that an allowable unit friction capacity of 200 psf be used for design.

Wing heights and lengths for the shafts and reinforcement should be designed by the project structural engineer to resist torsional forces induced on the signal pole foundation.

Passive lateral resistance can be developed along the depth of the pier foundation; however, resistance should be excluded in the upper 5 feet of each pier to account for seasonal variations (shrink-swell and freeze-thaw). The ultimate lateral resistance per foot below the 5 foot exclusion zone is given below. The structural engineer should apply proper safety factors or resistance factors to the lateral resistance parameters per applicable building codes or VDOT standards:

- 3-foot diameter – 2,000 pounds per linear foot (of pier embedment below 5 feet)
- 4-foot diameter – 2,800 pounds per linear foot (of pier embedment below 5 feet)

8.0 DESIGN RECOMMENDATIONS

8.1 Site Preparation

Prior to commencement of grading or fill placement, any miscellaneous trash, debris, or other unsuitable materials should be removed from the site. In existing vegetated areas, clearing and grubbing of all trees (including removal of any associated root systems) and vegetation designated for removal should be performed. All debris and trees/vegetation should be properly disposed off-site in accordance with applicable Federal, Virginia, and Arlington County regulations.

All site clearing work should be performed in accordance with any environmental regulations and requirements established for the project. In addition, all construction work should be performed so as not to adversely impact the neighboring buildings, the WMATA tunnel located below South Hayes Street, the existing access drive east of the realignment site, or off-site structures or utilities. Protection and monitoring of these elements should be provided as necessary during the curse of all construction activities at the site.

Topsoil and associated root-mat and organic material should be stripped from the proposed pavement areas. The reuse of the topsoil should be evaluated by a qualified Landscape Architect concerning nutrient levels, grain size, pH, etc. Topsoil deemed unsuitable for reuse should be properly disposed of off-site. All clearing activities should be performed in strict accordance with the approved soil erosion and sediment control plan prepared for the project.

Existing concrete pavement at the surface denoted for demolition should be completely removed. Concrete placement beneath the asphalt within the roadway should also be demolished, however, this concrete can alternatively be left in place if the Contractor verifies proper subbase thickness is present beneath the concrete. Demolished concrete should be removed from the site and properly disposed.

All utilities designated for abandonment must be either removed or completely filled using flowable fill or grout. Excavations made to remove utilities below proposed roadway subgrade elevations should be backfilled with approved compacted fill as discussed in Section 8.3 of this report.

8.2 Subgrade Preparation Procedures

Exposed subgrade soils should be scarified to a minimum depth of 6 inches at least 3 feet beyond the proposed edges of the pavement and compacted per VDOT standards after performing the aforementioned site preparation work. This should be completed prior to raising grades or placing subbase. The subgrade should be compacted to 100 percent of the maximum dry density as determined by VTM-1 within 2 percentage points of the optimum moisture content. Following density testing, the subgrade should be proofrolled with at least two passes of a fully loaded 10-wheel dump truck prior to placing fill to at least 3 feet beyond the outer edge of the shoulders. The proofroll should be completed in overlapping manner for the entire roadway width.

All proofroll activities and compaction testing should be inspected by a qualified geotechnical engineer certified by VDOT. Additional proofrolling coverages should be performed in any areas deemed necessary based on observations made by the geotechnical inspector. Soft subgrade areas identified during proofrolling should be undercut and replaced with VDOT Type I select material having a minimum CBR of 30.

Care should be taken to prevent disturbance of the proofrolled areas and softening of these materials prior to finished construction. At a minimum, all subgrade areas should be temporarily sloped and sealed with a smooth drum roller at the end of each working day, as necessary, so as to maximize surface water runoff, and minimize potential ponding and infiltration.

8.3 Engineered Fill

8.3.1 Fill Designation

Structural fill should be used to backfill beneath proposed pavements and bike lanes as required. We recommend that structural fill have no more than 30 percent fines (silt and clay), a liquid limit not more than 35, and a plasticity index not more than 10. Structural fill should be classified as GW, GP, GM, SW, SP, SM, or a combination of these in accordance with USCS classifications. Structural fill should not contain man-made debris or organics. The maximum particle size should not exceed 3 inches.

Subgrade areas determined by the geotechnical inspector to be unsuitable should be over-excavated and replaced with VDOT Type I select material.

Aggregate subbase for proposed new full-depth vehicular pavement areas and the bicycle path should meet the gradation of VDOT 21B dense-graded aggregate.

Drainage fill (if required) for use as subsurface drainage should consist of washed AASHTO No. 57 stone. The drainage fill should be separated from existing site soils using drainage geotextile fabric.

Non-structural fill should be only be used in landscaped areas of the site (planter areas). Non-structural fill should not have particles exceeding 3 inches within the uppermost foot of final grade and 6 inches below. Soils classified as CH, MH, OL, and PT in accordance with USCS should not be used at the site as backfill.

Grain size distribution, Atterberg Limits, maximum dry density, and the optimum water content determinations should be made on representative samples of the fill materials (on-site and imported) proposed by the Contractor. Additional subbase material testing should include standard proctor and CBR testing in accordance with VDOT standards VTM-1 and VTM-8, respectively.

8.3.2 Reuse of Existing On-site Soils

Existing on-site soil meeting the requirements of structural fill given in Section 8.3.1 can be reused as compacted fill to raise grades within pavement subgrade areas. Any deleterious materials should be separated from the fill prior to use. Stratum A soils not meeting the designation for structural fill can be reused in landscaped areas.

The Contractor's ability to successfully work the site soils, combined with the weather conditions and the time of year during the site preparation and filling phases of construction, will have a significant impact on timely project completion.

During periods of wet weather, the Contractor should make provisions to dry portions of the excavated material such as by discing/air drying prior to compaction to an acceptable moisture content as determined by the project Geotechnical Engineer.

Soils classified as expansive should not be used as backfill material at the site. Expansive soils are defined as soils with the following properties: a plasticity index of 15 or greater per ASTM D4318, greater than 10 percent finer than the No. 200 sieve, and more than 10 percent of soil particles less than five micrometers in size per ASTM D 422. Additionally, soils with an expansion index greater than 20 per ASTM D 4829 are

classified as expansive. The geotechnical engineer observing the construction should regularly test the Stratum A soils if they are to be used during site grading operations to confirm if this criteria is met.

Any encountered environmentally impacted soils should be addressed in accordance with the environmental requirements established for the site. If any environmentally impacted soils are encountered, the Contractor should immediately notify Arlington County. Further coordination with the Contractor and Arlington County will be necessary to finalize recommendations regarding off-site disposal or on-site reuse of any environmentally impacted on-site soils.

8.3.3 Imported Fill

Imported fill to be used as subgrade soils beneath pavements should meet the structural fill requirements given in Section 8.3.1. Imported fill to be used as roadway subbase should meet the VDOT requirements described in Section 8.3.1. Suitable fill should be free of organics and other deleterious materials. Imported fill intended for use as a roadway subbase should meet the maximum aggregate size of the required VDOT gradation.

Any approved imported fill should be "certified clean" free of hazardous substances and meeting all Arlington County, Virginia, and Federal regulations. The Contractor should provide documentation of compliance prior to delivery of any fill to the site. Grain size distribution, Atterberg limits, maximum dry density (determined using VTM-1), and the optimum water content determinations should be made on representative samples of the backfill and fill materials proposed by the Contractor.

8.3.4 Fill Placement and Compaction

All fill should be placed in uniform lifts and compacted to at least 100 percent of the material's maximum dry density as determined by the Standard Proctor Compaction Test (VTM-1). The water content at the time of compaction should be within two percentage points of the optimum water content. For use as pavement subgrades, on-site granular soils and imported select fill can be placed in maximum 8-inch-thick loose lifts. Aggregate subbase materials should be placed in maximum 6-inch-thick lifts in accordance with VDOT standards.

Each lift should compacted using a roller having a minimum static drum weight of 15 tons. Typically, sand and silt soils should be compacted with a smooth drum roller and clay soils (if encountered) should be compacted using a sheeps-foot roller. Smaller compaction equipment (i.e. walk-behind trench roller or jumping jack compactor) may be necessary in areas of limited maneuverability. All fill placement should be subject to inspection and testing by a qualified geotechnical engineer.

No fill material should be placed on areas where free water is standing, on a subgrade covered with snow, on frozen subgrade areas, or on surfaces that have not been approved by the geotechnical testing agency.

Fill placed in landscaped areas away from retaining walls and engineered slopes should be compacted to at least 92 percent of the material's maximum dry density as determined by VTM-1.

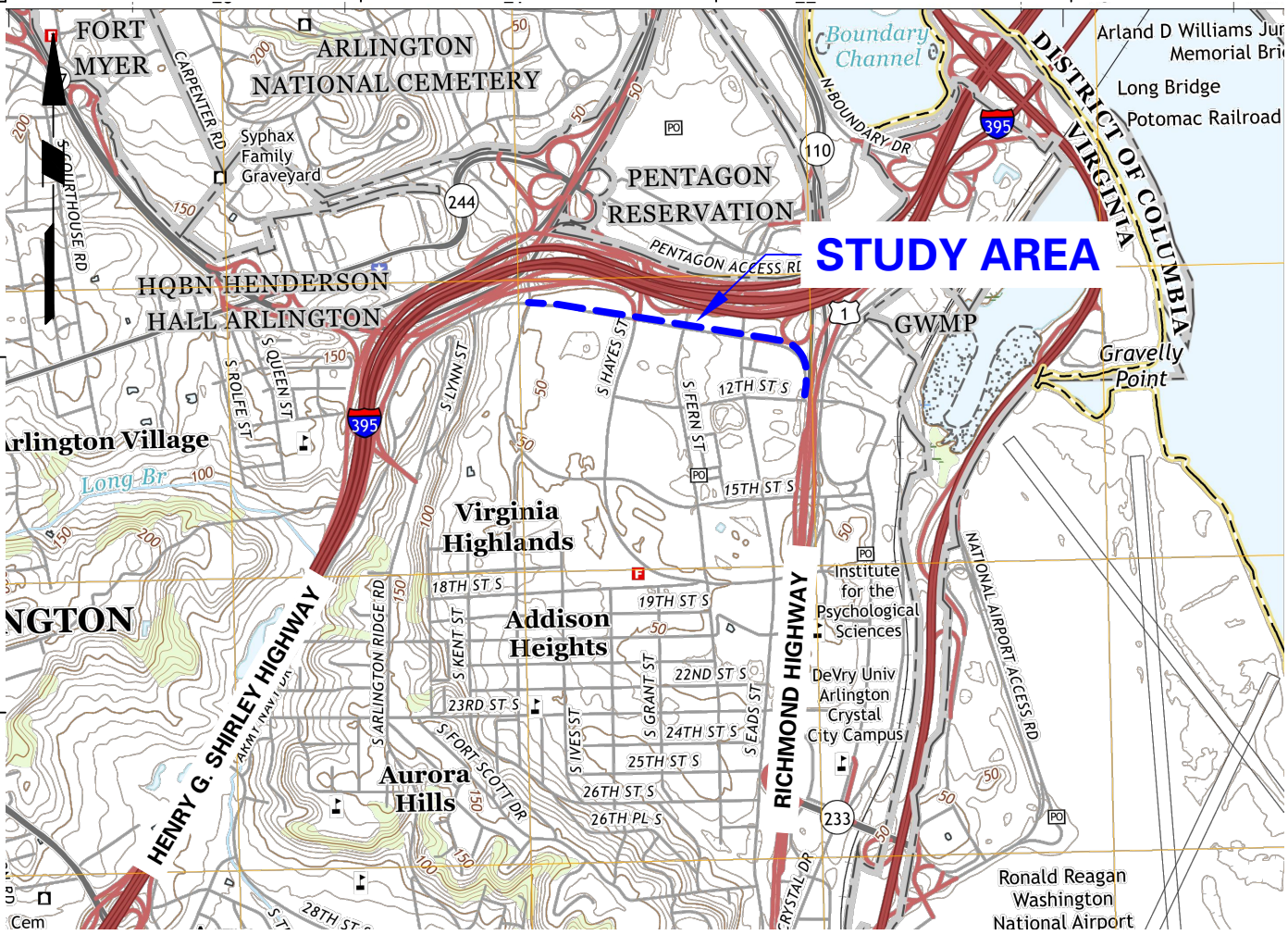
9.0 CLOSURE/LIMITATIONS

The conclusions and recommendations given in this report are based on subsurface conditions inferred from our investigation and our review of the available design documents and traffic studies provided by Arlington County. The recommendations given herein are contingent upon one another and no recommendation should be followed independent of the others. This report has been prepared to assist Arlington County for their design of the Army Navy Drive Complete Streets project and is only applicable to the design and construction of the specific project identified. Changes to proposed roadway layout, grading, or traffic loading should be provided to us so that we can review our recommendations and modify if necessary. Langan Engineering and Environmental Services, Inc. cannot assume responsibility for the use of this report to generate recommendations other than for the specific site and structures addressed in this report.

Information on subsurface strata and groundwater levels shown on the logs represent conditions encountered only at the locations indicated and at the time of investigation. Actual subsurface conditions may vary. If different conditions are encountered during construction, they should immediately be brought to Langan's attention for evaluation, as they may affect our recommendations.

Environmental issues (such as permitting or potentially contaminated soil and groundwater) are outside the scope of this study and, if required, should be addressed in a separate evaluation.

FIGURES



SOURCE: UNITED STATES GEOLOGICAL SURVEY (USGS) ALEXANDRIA QUADRANGLE, DATED 2016.

2000 0 1000 2000

SCALE IN FEET

LANGAN

Langan Engineering and Environmental Services, Inc.

1300 Wilson Boulevard, Suite 450
Arlington, VA 22209

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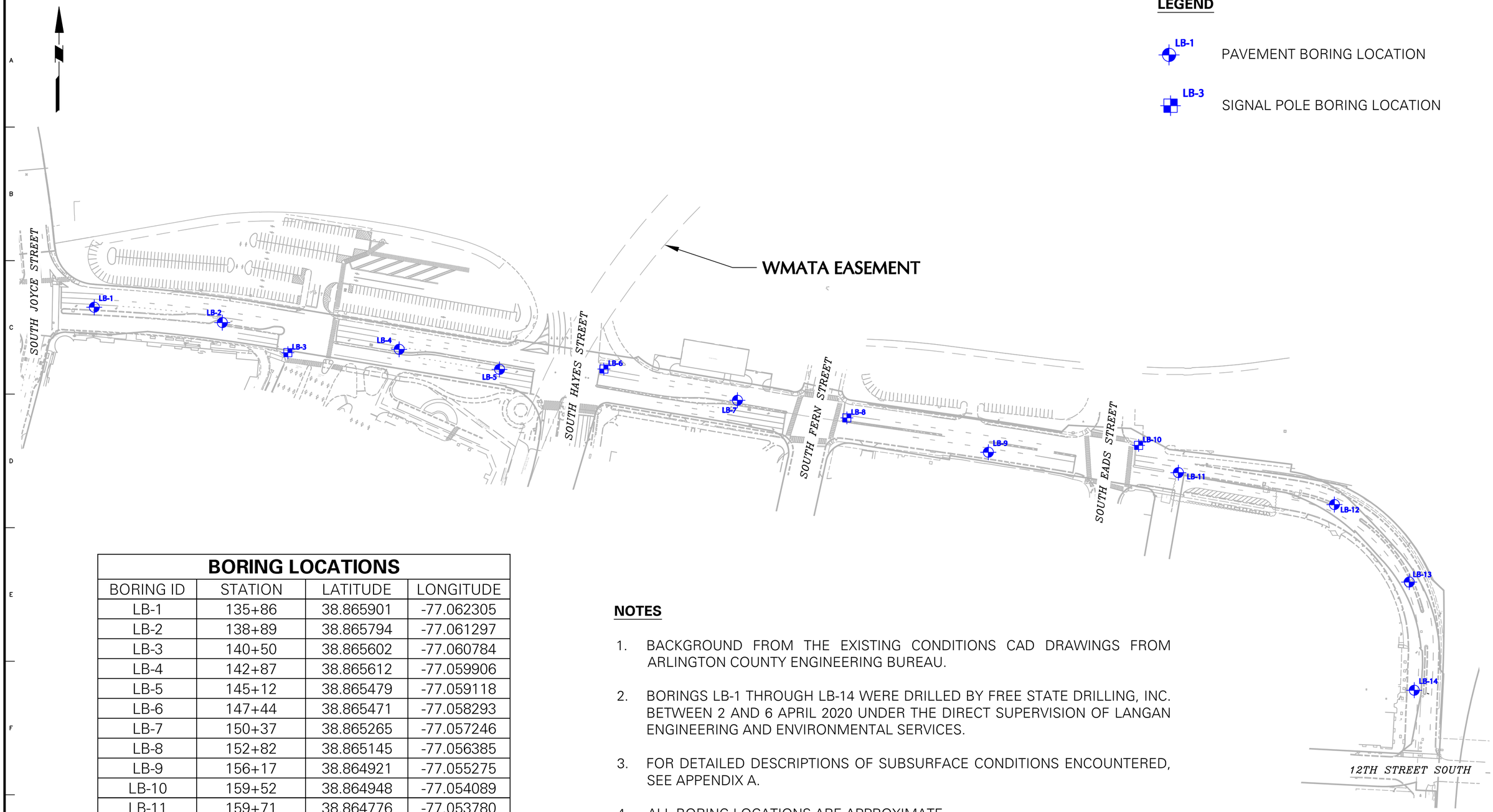
Project	ARMY NAVY DRIVE COMPLETE STREETS PROJECT ARLINGTON VIRGINIA
Drawing Title	SITE LOCATION MAP
Project No.	270060005
Date	7/7/2020
Drawn By	ANG
Checked By	KJL
Drawing No.	1
Sheet	1 of 4

Filename: \\langan.com\data\AR\data0\270060005\Project Data\CAD\05\2D-DesignFiles\Geotechnical\Site Location Map.dwg Date: 4/24/2020 Time: 14:46 User: aganapathy Style Table: Langan.stb Layout: ANSIA-BP



BORING LOCATIONS			
BORING ID	STATION	LATITUDE	LONGITUDE
LB-1	135+86	38.865901	-77.062305
LB-2	138+89	38.865794	-77.061297
LB-3	140+50	38.865602	-77.060784
LB-4	142+87	38.865612	-77.059906
LB-5	145+12	38.865479	-77.059118
LB-6	147+44	38.865471	-77.058293
LB-7	150+37	38.865265	-77.057246
LB-8	152+82	38.865145	-77.056385
LB-9	156+17	38.864921	-77.055275
LB-10	159+52	38.864948	-77.054089
LB-11	159+71	38.864776	-77.053780
LB-12	3+50	38.864565	-77.052554
LB-13	6+35	38.864080	-77.051974
LB-14	8+71	38.863412	-77.051948

NOTES

1. BACKGROUND FROM THE EXISTING CONDITIONS CAD DRAWINGS FROM ARLINGTON COUNTY ENGINEERING BUREAU.
2. BORINGS LB-1 THROUGH LB-14 WERE DRILLED BY FREE STATE DRILLING, INC. BETWEEN 2 AND 6 APRIL 2020 UNDER THE DIRECT SUPERVISION OF LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES.
3. FOR DETAILED DESCRIPTIONS OF SUBSURFACE CONDITIONS ENCOUNTERED, SEE APPENDIX A.
4. ALL BORING LOCATIONS ARE APPROXIMATE.

150 0 75 150
SCALE: 1 INCH = 150 FEET

PROJECT NO. 270060005

LANGAN

LANGAN
Langan Engineering and Environmental Services, Inc.
1300 Wilson Boulevard, Suite 450
Arlington, VA 22209
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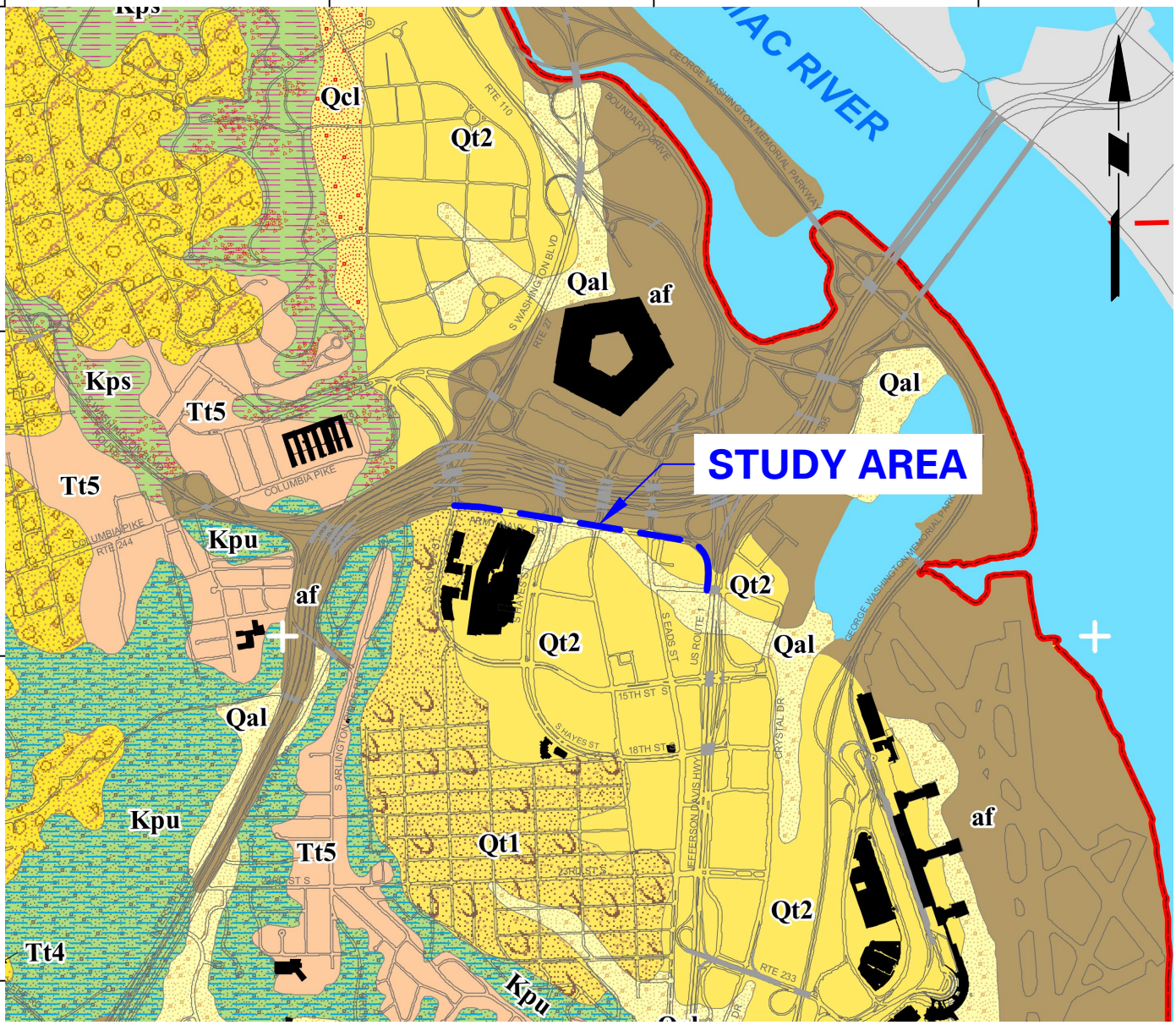
Project
ARMY NAVY DRIVE
COMPLETE STREETS PROJECT
ARLINGTON VIRGINIA

Drawing Title
BORING LOCATION PLAN

Project No. 270060005
Date 7/7/2020
Drawn By BHS
Checked By KJL

Drawing No. 2
Sheet 2 of 4

Filename: \\langan.com\data\AR\data0\270060005\Project Data\CAD\05\2D-DesignFiles\Geotechnical\Boring Location Plan - Revised Boring Locations.dwg Date: 4/24/2020 Time: 14:35 User: aganapathy Style Table: Langan.stb Layout: BLP



SOURCE: SIMPLIFIED GEOLOGIC MAP OF ARLINGTON COUNTY, VIRGINIA AND VICINITY PUBLISHED BY ARLINGTON COUNTY, UPDATED 2006.

LEGEND:

Af	ARTIFICIAL FILL
Qt2	TERRACE DEPOSITS (GRAY-BROWN TO ORANGE GRAVEL, SAND, SILT, AND CLAY)
Qal	ALLUVIUM (SAND, SILT, GRAVEL, AND CLAY FLUVIAL DEPOSITS)

2000 0 1000 2000

SCALE IN FEET

LANGAN
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Project
ARMY NAVY DRIVE
COMPLETE STREETS PROJECT
ARLINGTON VIRGINIA

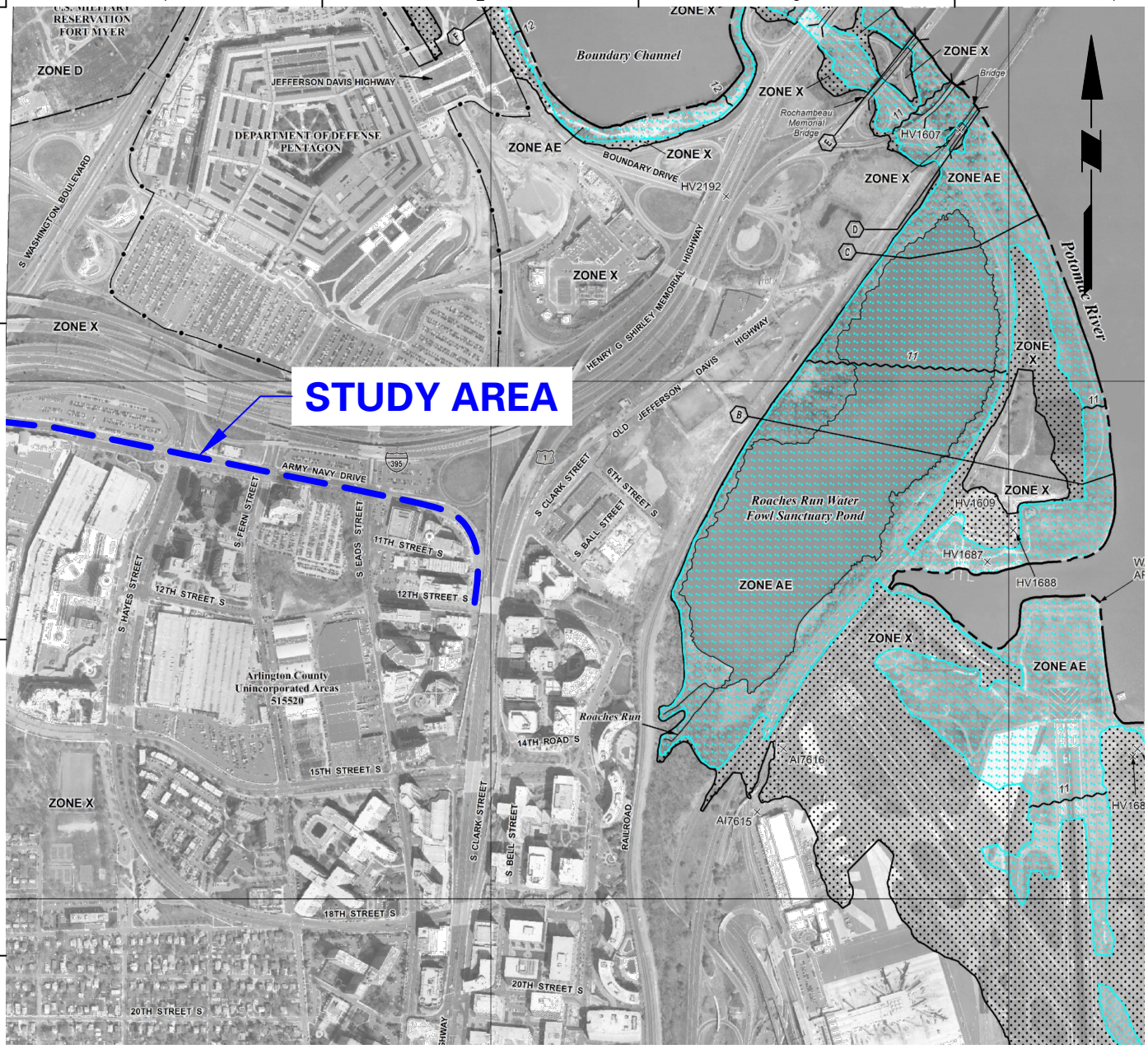
Drawing Title
REGIONAL GEOLOGIC MAP

Project No.	270060005
Date	7/7/2020
Drawn By	ANG
Checked By	KJL

Drawing No. 3

Sheet 3 of 4

Filename: \\langan.com\data\AR\data0\270060005\Project Data\CAD\05\2D-DesignFiles\Geotechnical\Regional Geologic Map.dwg Date: 4/24/2020 Time: 14:44 User: aganapathy Style Table: Langan.stb Layout: ANSIA-BP



SOURCE: FEDERAL EMERGENCY MANAGEMENT (FEMA) FLOOD INSURANCE RATE MAP (FIRM) PANEL 51013C0081C, EFFECTIVE DATE 19 AUGUST 2013.

LEGEND:

ZONE A	SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE X	OTHER FLOOD AREAS Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
ZONE X	OTHER AREAS Areas determined to be outside the 0.2% annual chance floodplain.

1000 0 500 1000

SCALE IN FEET

LANGAN
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T: 571.366.6800 F: 571.366.6801 www.langan.com

Project	ARMY NAVY DRIVE COMPLETE STREETS PROJECT ARLINGTON VIRGINIA
Drawing Title	FEMA FLOOD MAP
Project No.	270060005
Date	7/7/2020
Drawn By	ANG
Checked By	KJL
Drawing No.	4
Sheet	4 of 4

Filename: \\langan.com\data\AR\data0\270060005\Project Data\CAD\05\2D-DesignFiles\Geotechnical\FEMA Flood Map.dwg Date: 4/24/2020 Time: 14:41 User: aganapathy Style Table: Langan.stb Layout: ANSIA-BP

Appendix A

Provided Traffic Count Data

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Army Navy Dr btwn S Joyce St & S Hayes St
QC JOB #: 15109304
SPECIFIC LOCATION:
DIRECTION: EB, WB
CITY/STATE: Arlington, VA
DATE: Nov 6 2019

Start Time	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	0	9	2	0	0	0	0	0	0	1	0	0	0	3	15
12:15 AM	1	15	2	0	0	0	0	0	0	0	0	0	0	0	18
12:30 AM	0	13	1	2	0	0	0	0	0	0	0	0	0	0	16
12:45 AM	0	10	3	1	0	0	0	0	0	0	0	0	0	1	15
01:00 AM	0	5	3	1	5	1	0	0	0	0	0	0	0	0	15
01:15 AM	0	7	0	0	2	0	0	0	0	0	0	0	0	0	9
01:30 AM	0	5	1	0	0	0	0	0	0	0	0	0	0	0	6
01:45 AM	0	4	2	0	0	0	0	0	0	0	0	0	0	0	6
02:00 AM	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4
02:15 AM	0	4	2	0	0	0	0	0	0	0	0	0	0	0	6
02:30 AM	0	5	1	0	0	0	0	0	0	0	0	0	0	0	6
02:45 AM	0	5	0	1	0	0	0	0	0	0	0	0	0	0	6
03:00 AM	0	10	2	0	0	0	0	0	0	0	0	0	0	0	12
03:15 AM	0	13	0	0	0	0	0	0	0	0	0	0	0	0	13
03:30 AM	0	21	2	0	0	0	0	0	1	0	0	0	0	1	25
03:45 AM	0	23	7	0	0	0	0	0	0	0	0	0	0	0	30
04:00 AM	0	19	6	2	0	0	0	0	1	0	0	0	0	2	30
04:15 AM	0	27	7	1	0	0	0	0	0	0	0	1	0	0	36
04:30 AM	0	28	4	2	2	0	0	1	2	0	0	0	0	0	39
04:45 AM	0	32	6	1	0	0	0	0	1	0	0	0	0	0	40
05:00 AM	0	38	4	1	0	0	0	0	0	0	0	0	0	1	44
05:15 AM	1	66	10	4	2	1	0	2	0	0	0	0	0	1	87
05:30 AM	1	54	4	4	1	0	0	1	1	0	0	0	0	2	68
05:45 AM	0	64	15	5	2	1	0	0	0	0	0	0	0	2	89
Day Total															
Percent															
ADT 11715															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 11/14/2019 5:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Army Navy Dr btwn S Joyce St & S Hayes St
QC JOB #: 15109304
SPECIFIC LOCATION:
DIRECTION: EB, WB
CITY/STATE: Arlington, VA
DATE: Nov 6 2019

Start Time	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
06:00 AM	0	55	11	6	3	0	0	0	2	0	0	0	0	3	80
06:15 AM	2	74	**17**	6	6	1	0	0	0	0	0	0	**1**	5	112
06:30 AM	1	89	11	10	6	0	0	**3**	0	0	0	0	0	9	129
06:45 AM	2	104	13	11	4	1	0	1	0	0	0	0	0	6	142
07:00 AM	0	101	8	8	9	1	0	1	0	0	0	0	0	3	131
07:15 AM	**4**	133	10	9	9	0	**1**	1	0	0	0	0	0	16	183
07:30 AM	4	127	15	7	11	1	0	3	1	0	0	0	0	**19**	188
07:45 AM	3	148	17	10	5	1	0	1	1	0	0	0	0	7	193
08:00 AM	2	141	11	9	7	**3**	0	1	0	0	0	0	0	9	183
08:15 AM	1	141	12	**14**	7	1	0	3	0	0	0	0	0	15	194
08:30 AM	1	**152**	17	9	**12**	0	0	0	1	0	0	0	0	18	**210**
08:45 AM	1	151	13	9	7	1	0	2	1	0	0	0	0	8	193
09:00 AM	2	109	16	7	7	2	0	0	0	0	0	0	0	10	153
09:15 AM	2	99	6	6	5	2	0	2	0	0	0	0	0	4	126
09:30 AM	0	92	9	5	2	0	0	2	0	0	**1**	0	0	7	118
09:45 AM	0	89	5	7	4	1	0	1	0	0	0	0	0	10	117
10:00 AM	1	92	9	8	5	1	0	0	0	0	0	0	0	6	122
10:15 AM	0	93	12	3	4	0	0	2	0	1	0	0	0	3	118
10:30 AM	2	95	14	6	7	0	0	1	0	0	0	0	0	3	128
10:45 AM	1	80	6	3	6	0	0	1	0	0	0	0	0	7	104
11:00 AM	1	100	11	6	7	1	0	0	1	0	1	0	0	1	129
11:15 AM	1	105	11	7	3	0	0	1	1	0	0	1	0	4	134
11:30 AM	1	109	14	4	8	1	0	1	0	1	0	0	0	2	141
11:45 AM	0	100	12	8	4	0	0	2	0	1	0	0	0	9	136
Day Total															
Percent															
ADT 11715															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 11/14/2019 5:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Army Navy Dr btwn S Joyce St & S Hayes St
QC JOB #: 15109304
SPECIFIC LOCATION:
DIRECTION: EB, WB
CITY/STATE: Arlington, VA
DATE: Nov 6 2019

Start Time	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 PM	0	133	9	6	6	0	0	1	0	0	0	0	0	6	161
12:15 PM	3	118	9	2	5	0	0	0	0	0	**1**	0	0	12	150
12:30 PM	0	118	18	8	5	0	0	2	0	0	0	0	0	9	160
12:45 PM	1	143	9	5	5	0	0	1	0	1	0	0	**1**	10	176
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01:30 PM	2	119	17	5	9	0	0	**3**	0	0	0	0	0	11	166
01:45 PM	3	127	13	4	7	0	0	2	1	1	0	0	0	12	170
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04:00 PM	1	154	14	7	2	1	**1**	3	0	1	0	0	0	6	190
04:15 PM	0	179	20	8	9	0	0	1	0	0	0	1	0	7	225
04:30 PM	2	202	14	10	4	2	0	2	1	0	0	0	0	3	240
04:45 PM	2	229	20	9	3	1	0	1	2	0	0	0	0	21	288
05:00 PM	4	232	16	9	7	1	0	3	0	0	0	0	1	16	289
05:15 PM	**14**	**279**	**34**	6	8	1	0	2	2	1	0	0	0	**28**	**375**
05:30 PM	10	258	20	**13**	**11**	1	0	1	0	0	0	0	0	24	338
05:45 PM	6	210	20	7	7	2	0	1	0	0	0	0	0	22	275
Day Total															
Percent															
ADT 11715															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 11/14/2019 5:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Army Navy Dr btwn S Joyce St & S Hayes St
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06:00 PM	0	233	10	12	3	0	0	1	0	1	0	0	0	19	279
06:15 PM	1	223	12	9	4	2	1	3	0	1	0	1	0	11	268
06:30 PM	4	175	22	12	3	0	0	1	0	0	0	0	0	16	233
06:45 PM	3	172	9	7	4	1	0	1	1	0	0	0	0	6	204
07:00 PM	2	144	4	10	5	0	0	0	2	0	1	0	0	14	182
07:15 PM	1	152	8	5	4	0	0	0	0	0	0	0	0	9	179
07:30 PM	0	131	8	6	2	0	0	1	1	0	0	0	1	7	157
07:45 PM	0	116	3	4	2	0	0	0	0	0	0	0	0	6	131
08:00 PM	1	114	5	3	2	1	0	0	0	2	0	0	0	4	132
08:15 PM	1	98	11	5	2	0	0	1	0	0	0	0	0	5	123
08:30 PM	0	92	3	5	2	0	0	0	0	0	0	0	0	4	106
08:45 PM	0	83	8	5	1	1	0	1	0	0	0	0	0	8	107
09:00 PM	0	60	15	6	0	0	0	1	0	0	0	0	0	5	87
09:15 PM	0	74	4	4	2	0	0	1	0	0	0	0	0	4	89
09:30 PM	0	74	6	7	0	0	0	0	0	0	0	0	0	6	93
09:45 PM	0	54	1	4	0	0	0	1	0	0	0	0	0	2	62
10:00 PM	0	54	2	5	1	0	0	0	0	0	0	0	0	3	65
10:15 PM	0	58	4	3	2	0	0	1	0	0	0	0	0	2	70
10:30 PM	1	34	5	4	0	0	0	3	0	0	0	0	0	0	47
10:45 PM	0	32	5	2	0	0	0	0	0	0	0	0	0	2	41
11:00 PM	0	25	0	3	1	0	0	0	0	0	0	0	0	7	36
11:15 PM	0	26	0	3	1	0	0	0	0	0	0	0	0	2	32
11:30 PM	1	15	1	1	1	0	0	0	0	0	0	0	0	1	20
11:45 PM	0	7	1	2	0	0	0	0	0	0	0	0	0	4	14
Day Total	112	9140	873	487	330	41	3	76	27	13	5	5	4	599	11715
Percent	1%	78%	7.5%	4.2%	2.8%	0.3%	0%	0.6%	0.2%	0.1%	0%	0%	0%	5.1%	
ADT 11715															
AM Peak	7:15 AM	8:30 AM	6:15 AM	8:15 AM	8:30 AM	8:00 AM	7:15 AM	6:30 AM	4:30 AM	12:00 AM	9:30 AM	4:15 AM	6:15 AM	7:30 AM	8:30 AM
15-min Vol	4	152	17	14	12	3	1	3	2	1	1	1	1	19	210
PM Peak	5:15 PM	5:15 PM	5:15 PM	5:30 PM	5:30 PM	1:00 PM	4:00 PM	1:30 PM	1:15 PM	8:00 PM	12:15 PM	2:45 PM	12:45 PM	5:15 PM	5:15 PM
15-min Vol	14	279	34	13	11	3	1	3	2	2	1	1	1	28	375

Comments:

Report generated on 11/14/2019 5:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Army Navy Dr btwn S Joyce St & S Hayes St
QC JOB #: 15109304
SPECIFIC LOCATION:
DIRECTION: EB, WB
CITY/STATE: Arlington, VA
DATE: Nov 7 2019

Start Time	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	2	14	1	0	0	0	0	0	0	0	0	0	0	3	20
12:15 AM	0	6	0	1	0	0	0	0	0	0	0	0	0	2	9
12:30 AM	0	12	0	1	0	0	0	0	0	0	0	0	0	0	13
12:45 AM	0	10	2	1	0	0	0	0	0	0	0	0	0	0	13
01:00 AM	0	1	3	1	0	0	0	0	0	0	0	0	0	0	5
01:15 AM	0	2	1	0	1	0	0	0	0	0	0	0	0	0	4
01:30 AM	0	4	0	0	0	0	0	1	0	0	0	0	0	0	5
01:45 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
02:00 AM	0	4	0	1	1	0	0	0	0	0	0	0	0	0	6
02:15 AM	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4
02:30 AM	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
02:45 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
03:00 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
03:15 AM	0	4	0	0	0	0	0	0	1	0	0	0	0	0	5
03:30 AM	0	3	1	0	1	0	0	0	0	0	0	0	0	0	5
03:45 AM	0	10	2	0	0	0	0	0	0	0	0	0	0	0	12
04:00 AM	0	7	1	0	0	0	0	0	0	0	0	0	0	0	8
04:15 AM	0	3	2	0	0	0	0	0	0	0	0	0	0	1	6
04:30 AM	0	4	0	0	0	0	0	0	1	0	0	0	0	1	6
04:45 AM	0	13	1	0	1	0	0	0	0	0	0	0	0	1	16
05:00 AM	0	15	1	3	0	0	0	0	0	0	0	0	0	0	19
05:15 AM	1	22	3	4	1	1	0	0	0	0	0	0	0	3	35
05:30 AM	0	29	4	6	1	0	0	0	0	0	0	0	0	1	41
05:45 AM	0	41	2	2	1	0	0	1	0	0	0	0	0	5	52
Day Total															
Percent															
ADT 11712															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 11/14/2019 5:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Army Navy Dr btwn S Joyce St & S Hayes St
QC JOB #: 15109304
SPECIFIC LOCATION:
DIRECTION: EB, WB
CITY/STATE: Arlington, VA
DATE: Nov 7 2019

Start Time	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
06:00 AM	0	49	2	8	4	2	0	1	**2**	0	0	0	0	2	70
06:15 AM	1	64	6	7	3	0	0	1	0	0	0	0	0	7	89
06:30 AM	0	71	5	8	7	0	0	0	0	0	0	0	0	11	102
06:45 AM	1	73	7	**12**	**10**	1	0	0	1	0	0	0	0	13	118
07:00 AM	1	95	7	11	6	0	0	2	0	0	0	0	0	8	130
07:15 AM	1	118	7	9	6	0	0	1	0	0	**1**	0	0	11	154
07:30 AM	**3**	121	13	12	10	0	**1**	**6**	0	0	0	0	0	21	**187**
07:45 AM	1	104	10	7	5	0	0	3	0	0	0	0	0	**25**	155
08:00 AM	2	113	12	10	8	1	0	4	0	0	0	0	0	25	175
08:15 AM	2	130	7	10	7	0	0	3	1	**1**	0	0	0	20	181
08:30 AM	0	127	6	9	7	2	0	0	0	1	0	0	0	16	168
08:45 AM	2	119	13	5	10	2	0	1	0	0	0	0	0	9	161
09:00 AM	1	**136**	10	7	9	2	0	2	0	0	0	0	0	10	177
09:15 AM	0	89	12	7	9	1	1	0	0	0	0	0	0	6	125
09:30 AM	2	96	14	7	7	0	0	0	0	0	0	0	0	2	128
09:45 AM	1	95	12	6	3	1	0	0	0	0	0	0	0	4	122
10:00 AM	1	81	13	4	8	**3**	0	2	2	0	0	0	0	6	120
10:15 AM	1	90	11	3	8	1	0	1	0	0	0	0	0	5	120
10:30 AM	0	112	16	7	6	1	0	2	0	0	0	0	0	5	149
10:45 AM	1	107	15	2	4	1	1	1	0	1	1	0	0	1	135
11:00 AM	0	99	**20**	4	3	1	0	0	0	0	0	0	0	2	129
11:15 AM	2	104	5	5	4	1	0	1	0	0	0	0	0	6	128
11:30 AM	1	118	17	5	5	0	0	0	0	0	0	0	0	4	150
11:45 AM	1	108	12	6	1	0	0	0	0	0	0	0	0	6	134
Day Total															
Percent															
ADT															
11712															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 11/14/2019 5:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Army Navy Dr btwn S Joyce St & S Hayes St
QC JOB #: 15109304
SPECIFIC LOCATION:
DIRECTION: EB, WB
CITY/STATE: Arlington, VA
DATE: Nov 7 2019

Start Time	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 PM	1	124	15	4	2	0	0	2	0	0	0	0	0	3	151
12:15 PM	1	142	9	6	5	0	0	0	0	0	0	0	0	10	173
12:30 PM	1	137	15	7	6	0	0	0	0	0	0	0	0	2	168
12:45 PM	1	113	14	5	4	0	0	0	0	**1**	0	0	0	4	142
01:00 PM	5	144	9	5	3	1	1	1	0	0	0	0	0	6	175
01:15 PM	1	117	24	4	7	**4**	0	1	0	0	0	0	0	7	165
01:30 PM	3	121	12	5	2	0	0	**3**	0	0	0	0	0	6	152
01:45 PM	0	142	6	4	0	0	0	1	0	0	0	0	0	2	155
02:00 PM	0	128	8	9	4	0	0	0	0	0	0	0	0	2	151
02:15 PM	0	113	11	3	4	1	0	0	0	0	0	0	0	1	133
02:30 PM	0	146	15	7	5	0	0	1	0	0	0	0	0	4	178
02:45 PM	2	118	15	2	6	1	0	0	0	0	0	0	0	11	155
03:00 PM	1	128	16	5	4	2	0	0	0	0	0	0	0	5	161
03:15 PM	2	159	15	2	7	0	0	0	0	0	1	0	0	6	192
03:30 PM	0	150	11	7	2	0	0	1	0	0	0	0	0	10	181
03:45 PM	2	155	15	4	6	1	0	3	0	0	0	0	0	8	194
04:00 PM	2	207	16	9	5	1	0	1	1	1	0	0	0	8	251
04:15 PM	4	208	17	7	9	0	0	1	0	0	0	0	0	24	270
04:30 PM	2	194	11	6	8	1	0	2	0	0	**3**	0	0	29	256
04:45 PM	5	218	24	14	4	4	1	1	0	0	1	0	0	22	294
05:00 PM	4	274	27	7	4	2	**2**	1	0	1	0	0	**1**	25	348
05:15 PM	7	259	**28**	6	**10**	2	0	1	1	1	2	0	0	**34**	351
05:30 PM	4	**282**	18	8	9	3	0	1	0	0	1	0	1	33	**360**
05:45 PM	**10**	266	24	**19**	4	2	0	1	**2**	0	0	0	0	22	350
Day Total															
Percent															
ADT															
11712															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 11/14/2019 5:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Army Navy Dr btwn S Joyce St & S Hayes St
QC JOB #: 15109304
SPECIFIC LOCATION:
DIRECTION: EB, WB
CITY/STATE: Arlington, VA
DATE: Nov 7 2019

Start Time	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
06:00 PM	5	231	18	19	6	1	0	1	0	0	0	0	0	24	305
06:15 PM	3	175	15	8	3	2	0	1	1	0	0	0	0	19	227
06:30 PM	5	215	17	16	4	1	0	2	0	0	1	0	0	14	275
06:45 PM	2	166	13	9	7	0	0	1	2	0	0	0	0	11	211
07:00 PM	1	189	9	11	4	0	1	0	0	0	0	0	0	5	220
07:15 PM	0	137	6	9	3	0	1	1	0	0	0	0	0	5	162
07:30 PM	0	123	12	9	4	0	0	1	0	0	0	0	0	10	159
07:45 PM	0	141	6	7	4	0	0	0	1	0	0	0	0	6	165
08:00 PM	0	122	6	6	3	0	0	0	0	1	0	0	0	4	142
08:15 PM	0	104	8	6	1	0	0	0	0	1	0	0	0	1	121
08:30 PM	1	99	5	4	2	0	0	0	0	0	0	0	0	3	114
08:45 PM	0	95	9	3	2	0	0	0	0	0	0	0	0	0	109
09:00 PM	0	110	11	6	0	2	1	0	0	0	0	0	0	6	136
09:15 PM	0	93	5	5	1	0	0	0	0	0	0	0	0	2	106
09:30 PM	0	78	4	5	2	0	0	0	0	0	0	0	0	1	90
09:45 PM	1	71	2	2	3	0	0	1	0	0	1	0	0	0	81
10:00 PM	0	59	6	6	0	0	1	0	0	1	0	0	0	2	75
10:15 PM	0	42	1	3	2	0	0	0	0	0	0	0	0	0	48
10:30 PM	0	49	2	2	1	1	0	0	0	1	0	0	0	0	56
10:45 PM	0	46	3	1	1	0	0	0	0	0	0	0	0	3	54
11:00 PM	0	52	3	4	0	0	0	2	0	0	0	0	0	1	62
11:15 PM	0	26	3	2	3	0	0	0	0	0	0	0	0	2	36
11:30 PM	0	21	4	2	0	0	0	0	0	0	0	0	0	1	28
11:45 PM	0	17	3	1	1	0	0	0	0	0	0	0	0	0	22
Day Total	104	9143	823	492	334	53	11	65	16	11	12	0	2	646	11712
Percent	0.9%	78.1%	7%	4.2%	2.9%	0.5%	0.1%	0.6%	0.1%	0.1%	0.1%	0%	0%	5.5%	
ADT 11712															
AM Peak	7:30 AM	9:00 AM	11:00 AM	6:45 AM	6:45 AM	10:00 AM	7:30 AM	7:30 AM	6:00 AM	8:15 AM	7:15 AM	12:00 AM	12:00 AM	7:45 AM	7:30 AM
15-min Vol	3	136	20	12	10	3	1	6	2	1	1	0	0	25	187
PM Peak	5:45 PM	5:30 PM	5:15 PM	5:45 PM	5:15 PM	1:15 PM	5:00 PM	1:30 PM	5:45 PM	12:45 PM	4:30 PM	12:00 PM	5:00 PM	5:15 PM	5:30 PM
15-min Vol	10	282	28	19	10	4	2	3	2	1	3	0	1	34	360

Comments:

Report generated on 11/14/2019 5:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

SUMMARY - Tube Count - Vehicle Classification Data

LOCATION: Army Navy Dr btwn S Joyce St & S Hayes St
SPECIFIC LOCATION:
CITY/STATE: Arlington, VA

QC JOB #: 15109304
DIRECTION: EB, WB
DATE: Nov 6 2019

	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
Grand Total	216	18283	1696	979	664	94	14	141	43	24	17	5	6	1245	23427
Percent	0.9%	78%	7.2%	4.2%	2.8%	0.4%	0.1%	0.6%	0.2%	0.1%	0.1%	0%	0%	5.3%	

ADT
11713

Comments:

Report generated on 11/14/2019 5:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

LOCATION: Army Navy btwn of S Hayes St and S Fern St
SPECIFIC LOCATION: 0 ft from
CITY/STATE: Arlington, VA

QC JOB #: 13005610
DIRECTION: NB/SB
DATE: Oct 21 2014

Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	0	83	5	4	1	1	0	0	0	**1**	0	0	0	2	97
1:00 AM	0	52	8	2	1	0	0	1	0	0	0	0	0	0	64
2:00 AM	0	34	10	2	5	0	0	1	2	0	0	0	0	1	55
3:00 AM	0	49	6	1	3	0	0	0	1	0	1	0	0	0	61
4:00 AM	0	88	10	1	3	0	0	0	2	1	0	0	**1**	0	106
5:00 AM	2	283	49	11	18	1	0	2	0	1	0	0	0	9	376
6:00 AM	3	648	67	26	41	3	0	9	2	1	0	0	0	26	826
7:00 AM	14	1136	100	28	**50**	6	0	12	**6**	0	**2**	0	0	65	**1419**
8:00 AM	**16**	948	55	**31**	38	5	**2**	6	1	1	1	0	0	**182**	1286
9:00 AM	5	**1140**	**118**	30	40	5	1	**17**	2	1	1	0	0	51	1411
10:00 AM	4	747	98	26	27	**7**	0	7	1	0	0	0	0	43	960
11:00 AM	10	765	94	27	31	4	0	6	1	1	2	**1**	0	32	974
12:00 PM	3	817	88	**39**	33	**8**	0	**18**	2	2	0	0	0	41	1051
1:00 PM	3	899	83	31	28	3	0	14	2	1	0	0	0	42	1106
2:00 PM	7	899	**103**	23	30	3	0	10	1	**4**	0	0	1	29	1110
3:00 PM	3	965	90	34	25	4	**1**	10	0	1	0	0	1	37	1171
4:00 PM	6	1074	75	38	**41**	4	0	10	**3**	2	**3**	0	**4**	82	1342
5:00 PM	**9**	**1240**	77	26	32	5	0	8	1	1	3	0	2	**157**	**1561**
6:00 PM	7	1230	84	17	34	4	0	5	0	2	0	**1**	1	67	1452
7:00 PM	3	958	58	20	20	0	0	8	2	1	2	1	0	27	1100
8:00 PM	5	712	39	12	10	2	0	0	1	0	0	0	0	18	799
9:00 PM	2	571	39	10	6	2	0	2	0	0	0	0	0	19	651
10:00 PM	2	382	19	5	7	2	0	1	0	0	0	0	0	2	420
11:00 PM	2	173	11	9	5	5	0	0	2	0	0	0	0	2	209
Day Total	106	15893	1386	453	529	74	4	147	32	21	15	3	10	934	19607
Percent	0.5%	81.1%	7.1%	2.3%	2.7%	0.4%	0.0%	0.7%	0.2%	0.1%	0.1%	0.0%	0.1%	4.8%	
ADT 19607															
AM Peak	8:00 AM	9:00 AM	9:00 AM	8:00 AM	7:00 AM	10:00 AM	8:00 AM	9:00 AM	7:00 AM	12:00 AM	7:00 AM	11:00 AM	4:00 AM	8:00 AM	7:00 AM
Volume	16	1140	118	31	50	7	2	17	6	1	2	1	1	182	1419
PM Peak	5:00 PM	5:00 PM	2:00 PM	12:00 PM	4:00 PM	12:00 PM	3:00 PM	12:00 PM	4:00 PM	2:00 PM	4:00 PM	6:00 PM	4:00 PM	5:00 PM	5:00 PM
Volume	9	1240	103	39	41	8	1	18	3	4	3	1	4	157	1561

Comments:

LOCATION: Army Navy btwn of S Hayes St and S Fern St
SPECIFIC LOCATION: 0 ft from
CITY/STATE: Arlington, VA

QC JOB #: 13005610
DIRECTION: NB/SB
DATE: Oct 22 2014

Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	0	88	8	6	1	1	0	2	0	0	0	0	0	0	106
1:00 AM	1	45	12	1	0	0	0	0	0	0	0	0	0	1	60
2:00 AM	0	52	10	0	1	1	0	2	2	0	0	0	0	0	68
3:00 AM	0	39	5	0	1	0	0	0	1	0	0	0	0	0	46
4:00 AM	1	73	17	0	5	1	1	1	2	1	0	0	1	2	105
5:00 AM	0	316	45	16	7	1	0	2	0	0	0	0	0	7	394
6:00 AM	4	619	73	22	39	4	1	6	2	**2**	**1**	0	0	28	801
7:00 AM	6	1141	**108**	27	44	3	1	7	**4**	2	0	0	**3**	51	1397
8:00 AM	**8**	**1224**	76	**28**	**45**	**10**	**2**	**14**	3	1	1	0	0	**138**	**1550**
9:00 AM	6	1018	80	25	42	6	1	6	0	0	0	0	0	97	1281
10:00 AM	3	801	72	23	30	1	0	6	3	1	0	0	0	27	967
11:00 AM	3	757	81	24	29	4	0	5	2	1	0	**1**	0	36	943
12:00 PM	6	854	104	40	26	**8**	0	4	**3**	1	1	0	0	33	1080
1:00 PM	1	876	**108**	36	37	6	**1**	10	3	1	0	0	0	38	1117
2:00 PM	6	928	86	29	33	2	1	6	0	**3**	**2**	0	1	35	1132
3:00 PM	5	1026	87	37	36	2	0	7	2	1	2	0	1	44	1250
4:00 PM	5	1152	78	45	**38**	2	0	**14**	1	2	2	0	**3**	66	1408
5:00 PM	**11**	**1352**	81	**48**	38	7	0	14	1	3	2	0	1	**94**	**1652**
6:00 PM	8	1271	75	20	34	3	0	14	3	3	2	0	0	91	1524
7:00 PM	4	917	68	20	27	0	0	2	3	2	0	0	3	29	1075
8:00 PM	1	747	51	15	9	2	1	4	0	2	0	0	1	25	858
9:00 PM	1	625	40	6	7	0	0	2	0	0	0	0	0	13	694
10:00 PM	2	423	30	6	5	0	0	1	2	0	0	0	0	6	475
11:00 PM	3	201	14	10	3	1	0	1	2	0	0	0	0	2	237
Day Total	85	16545	1409	484	537	65	9	130	39	26	13	1	14	863	20220
Percent	0.4%	81.8%	7.0%	2.4%	2.7%	0.3%	0.0%	0.6%	0.2%	0.1%	0.1%	0.0%	0.1%	4.3%	
ADT 20220															
AM Peak	8:00 AM	8:00 AM	7:00 AM	8:00 AM	8:00 AM	8:00 AM	8:00 AM	8:00 AM	7:00 AM	6:00 AM	6:00 AM	11:00 AM	7:00 AM	8:00 AM	8:00 AM
Volume	8	1224	108	28	45	10	2	14	4	2	1	1	3	138	1550
PM Peak	5:00 PM	5:00 PM	1:00 PM	5:00 PM	4:00 PM	12:00 PM	1:00 PM	4:00 PM	12:00 PM	2:00 PM	2:00 PM		4:00 PM	5:00 PM	5:00 PM
Volume	11	1352	108	48	38	8	1	14	3	3	2		3	94	1652

Comments:

SUMMARY - Tube Count - Vehicle Classification Data

LOCATION: Army Navy btwn of S Hayes St and S Fern St
SPECIFIC LOCATION: 0 ft from
CITY/STATE: Arlington, VA

QC JOB #: 13005610
DIRECTION: NB/SB
DATE: Oct 21 2014 - Oct 22 2014

Start Time	Motor-cycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
Grand Total	191	32438	2795	937	1066	139	13	277	71	47	28	4	24	1797	39827
Percent	0.5%	81.4%	7.0%	2.4%	2.7%	0.3%	0.0%	0.7%	0.2%	0.1%	0.1%	0.0%	0.1%	4.5%	
ADT 19913															

Comments:

Report generated on 10/31/2014 11:10 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Army Navy Dr btwn S Eads St & 12th St S
QC JOB #: 15109305
SPECIFIC LOCATION:
DIRECTION: EB, WB
CITY/STATE: Arlington, VA
DATE: Nov 6 2019

Start Time	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	0	17	0	0	0	0	0	1	0	0	0	0	0	1	19
12:15 AM	0	10	2	0	0	0	0	0	0	0	0	0	0	1	13
12:30 AM	0	7	0	0	1	0	0	0	0	0	0	0	0	0	8
12:45 AM	0	6	2	0	1	1	0	0	0	0	0	0	0	0	10
01:00 AM	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4
01:15 AM	0	3	3	0	0	0	0	0	0	0	0	0	0	0	6
01:30 AM	0	3	3	0	1	0	0	0	0	0	0	0	0	0	7
01:45 AM	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
02:00 AM	0	9	0	0	1	0	0	1	0	0	0	0	0	0	11
02:15 AM	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5
02:30 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
02:45 AM	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
03:00 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
03:15 AM	0	2	2	0	0	0	0	0	0	0	0	0	0	0	4
03:30 AM	0	7	3	0	0	0	0	0	0	0	0	0	0	0	10
03:45 AM	0	10	0	0	0	0	0	0	0	0	0	0	0	0	10
04:00 AM	0	9	0	1	0	0	0	0	0	0	0	0	0	0	10
04:15 AM	0	9	2	0	1	0	0	0	0	0	0	0	0	1	13
04:30 AM	0	5	3	1	1	0	0	0	0	0	0	0	0	0	10
04:45 AM	0	7	1	0	0	0	0	0	0	0	0	0	0	0	8
05:00 AM	0	16	4	0	1	0	0	0	0	0	0	0	0	0	21
05:15 AM	0	20	2	1	0	0	0	0	0	0	0	0	0	0	23
05:30 AM	1	30	4	0	1	0	0	0	0	0	0	0	0	1	37
05:45 AM	1	46	5	1	2	0	0	0	0	0	0	0	0	2	57
Day Total															
Percent															
ADT 7991															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 11/14/2019 5:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Army Navy Dr btwn S Eads St & 12th St S
QC JOB #: 15109305
SPECIFIC LOCATION:
DIRECTION: EB, WB
CITY/STATE: Arlington, VA
DATE: Nov 6 2019

Start Time	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
06:00 AM	2	53	3	0	2	0	0	1	0	0	0	0	0	2	63
06:15 AM	2	60	3	1	5	0	0	1	0	0	0	0	0	1	73
06:30 AM	0	65	8	0	5	0	0	0	0	0	0	0	0	0	78
06:45 AM	1	77	7	2	3	1	0	0	0	0	0	0	0	4	95
07:00 AM	**5**	120	**15**	0	4	0	0	0	0	0	0	0	0	3	147
07:15 AM	5	110	12	1	4	1	0	0	0	0	0	0	0	2	135
07:30 AM	2	**143**	9	1	2	0	0	0	**1**	0	0	0	0	0	**158**
07:45 AM	1	126	8	0	4	0	**1**	0	0	0	0	0	0	0	140
08:00 AM	0	118	11	0	4	1	0	0	0	0	0	0	0	2	136
08:15 AM	0	123	9	2	3	1	0	1	0	0	0	0	0	5	144
08:30 AM	1	117	13	3	3	1	1	1	0	0	0	0	0	5	145
08:45 AM	1	119	15	**4**	4	**3**	1	0	0	0	0	0	**1**	**6**	154
09:00 AM	2	103	14	2	3	0	1	0	0	0	0	0	0	2	127
09:15 AM	1	92	10	3	3	1	0	0	0	0	0	0	0	3	113
09:30 AM	1	84	4	3	1	1	0	1	0	0	0	0	0	3	98
09:45 AM	1	79	7	2	4	0	1	1	0	0	0	0	0	4	99
10:00 AM	1	95	9	2	2	0	0	0	0	0	0	0	0	0	109
10:15 AM	0	71	11	3	5	0	0	1	0	0	0	0	0	1	92
10:30 AM	0	63	10	3	3	1	0	0	0	0	0	0	0	1	81
10:45 AM	0	46	5	0	4	0	1	0	0	0	0	0	0	1	57
11:00 AM	1	61	9	4	4	0	0	1	0	0	0	0	0	1	81
11:15 AM	1	66	10	1	**6**	0	0	0	0	**1**	0	0	0	2	87
11:30 AM	1	65	7	3	1	0	0	0	0	0	0	0	0	0	77
11:45 AM	0	88	4	3	2	1	0	0	0	0	0	0	0	0	98
Day Total															
Percent															
ADT 7991															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 11/14/2019 5:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Army Navy Dr btwn S Eads St & 12th St S
QC JOB #: 15109305
SPECIFIC LOCATION:
DIRECTION: EB, WB
CITY/STATE: Arlington, VA
DATE: Nov 6 2019

Start Time	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 PM	0	78	12	0	5	1	0	0	0	0	0	0	0	3	99
12:15 PM	2	88	11	1	2	0	0	2	0	0	0	0	0	2	108
12:30 PM	1	80	5	**6**	2	0	**1**	0	0	0	0	0	0	0	95
12:45 PM	1	67	8	3	**6**	1	0	0	0	0	0	0	0	2	88
01:00 PM	3	73	**17**	2	1	0	0	0	0	0	0	0	0	0	96
01:15 PM	0	65	9	2	3	0	0	1	0	0	0	0	0	1	81
01:30 PM	0	71	11	4	3	0	0	0	0	0	0	0	0	1	90
01:45 PM	0	91	16	2	4	0	0	1	0	0	**1**	0	0	1	116
02:00 PM	1	89	9	1	4	0	0	1	0	0	0	0	0	1	106
02:15 PM	0	96	10	1	3	0	0	0	0	0	0	0	0	1	111
02:30 PM	0	90	12	4	3	1	0	0	0	0	0	0	0	4	114
02:45 PM	0	101	1	1	1	0	0	1	0	0	0	0	0	0	105
03:00 PM	2	144	15	4	3	0	0	0	0	0	0	0	0	5	173
03:15 PM	2	119	11	2	6	0	0	1	0	0	0	0	0	10	151
03:30 PM	4	112	15	2	4	0	0	1	0	0	0	0	0	7	145
03:45 PM	2	108	15	2	6	2	0	0	0	0	0	0	0	14	149
04:00 PM	6	136	7	1	6	**3**	0	0	0	0	0	0	0	24	183
04:15 PM	0	146	6	3	1	0	0	0	0	0	0	0	0	26	182
04:30 PM	**8**	125	13	1	1	0	0	2	0	0	0	0	0	**31**	181
04:45 PM	2	111	6	2	3	0	1	**3**	0	0	0	0	0	22	150
05:00 PM	3	101	10	3	2	2	0	0	0	0	0	0	0	25	146
05:15 PM	2	106	8	4	2	0	0	1	0	0	0	0	0	21	144
05:30 PM	2	**159**	14	1	4	1	0	0	0	0	0	0	0	15	**196**
05:45 PM	1	113	11	2	2	1	0	0	0	0	0	0	0	14	144
Day Total															
Percent															
ADT 7991															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 11/14/2019 5:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Army Navy Dr btwn S Eads St & 12th St S
QC JOB #: 15109305
SPECIFIC LOCATION:
DIRECTION: EB, WB
CITY/STATE: Arlington, VA
DATE: Nov 6 2019

Start Time	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
06:00 PM	1	116	9	4	2	0	0	2	0	0	1	0	0	18	153
06:15 PM	2	121	10	2	1	0	0	1	0	0	0	0	0	19	156
06:30 PM	2	134	12	0	1	0	0	1	0	0	0	0	0	9	159
06:45 PM	1	115	6	0	2	0	0	0	0	0	0	0	0	5	129
07:00 PM	1	109	15	0	0	0	0	0	0	0	0	0	0	5	130
07:15 PM	1	111	3	0	1	0	0	0	0	0	0	0	0	1	117
07:30 PM	3	91	7	0	2	0	0	0	0	0	0	0	0	3	106
07:45 PM	0	93	9	1	1	0	0	0	0	0	0	0	0	0	104
08:00 PM	1	76	3	0	2	1	0	1	0	0	0	0	0	1	85
08:15 PM	0	52	4	0	0	0	0	0	0	0	0	0	0	0	56
08:30 PM	0	62	10	0	1	0	0	0	0	0	0	0	0	0	73
08:45 PM	0	83	4	0	1	1	1	0	1	0	0	0	0	1	92
09:00 PM	2	71	4	0	1	0	0	0	0	0	0	0	0	0	78
09:15 PM	1	86	5	3	2	0	0	0	0	0	0	0	0	3	100
09:30 PM	0	81	5	0	1	0	0	0	0	0	0	0	0	1	88
09:45 PM	2	50	3	0	0	0	0	0	0	0	0	0	0	2	57
10:00 PM	0	54	2	0	0	0	0	0	0	0	0	0	0	0	56
10:15 PM	0	53	6	0	0	0	0	0	0	0	0	0	0	0	59
10:30 PM	0	40	8	0	0	0	0	0	0	0	0	0	0	0	48
10:45 PM	0	33	1	0	0	0	0	0	0	0	0	0	0	0	34
11:00 PM	0	19	1	0	0	0	0	0	0	0	0	0	0	1	21
11:15 PM	0	11	3	0	1	0	0	0	0	0	0	0	0	0	15
11:30 PM	0	20	2	0	0	0	0	0	0	0	0	0	0	0	22
11:45 PM	0	15	4	0	1	0	0	0	0	0	0	0	0	0	20
Day Total	90	6537	640	111	189	27	9	29	2	1	2	0	1	353	7991
Percent	1.1%	81.8%	8%	1.4%	2.4%	0.3%	0.1%	0.4%	0%	0%	0%	0%	0%	4.4%	
ADT 7991															
AM Peak	7:00 AM	7:30 AM	7:00 AM	8:45 AM	11:15 AM	8:45 AM	7:45 AM	12:00 AM	7:30 AM	11:15 AM	12:00 AM	12:00 AM	8:45 AM	8:45 AM	7:30 AM
15-min Vol	5	143	15	4	6	3	1	1	1	1	0	0	1	6	158
PM Peak	4:30 PM	5:30 PM	1:00 PM	12:30 PM	12:45 PM	4:00 PM	12:30 PM	4:45 PM	8:45 PM	12:00 PM	1:45 PM	12:00 PM	12:00 PM	4:30 PM	5:30 PM
15-min Vol	8	159	17	6	6	3	1	3	1	0	1	0	0	31	196

Comments:

Report generated on 11/14/2019 5:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Army Navy Dr btwn S Eads St & 12th St S
QC JOB #: 15109305
SPECIFIC LOCATION:
DIRECTION: EB, WB
CITY/STATE: Arlington, VA
DATE: Nov 7 2019

Start Time	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 AM	0	15	0	0	1	0	0	0	0	0	0	0	0	0	16
12:15 AM	0	8	0	0	0	0	0	0	0	0	0	0	0	0	8
12:30 AM	0	9	3	0	0	0	0	0	0	0	0	0	0	0	12
12:45 AM	0	6	1	0	1	1	0	0	0	0	0	0	0	0	9
01:00 AM	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4
01:15 AM	0	7	1	0	0	0	0	0	0	0	0	0	0	0	8
01:30 AM	0	1	2	0	0	0	0	0	0	0	0	0	0	0	3
01:45 AM	0	7	0	0	0	0	0	0	0	0	0	0	0	0	7
02:00 AM	0	5	1	0	0	0	0	0	0	0	0	0	0	0	6
02:15 AM	0	3	0	0	1	0	0	0	0	0	0	0	0	0	4
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
03:00 AM	0	3	1	0	0	0	0	0	0	0	0	0	0	0	4
03:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
03:30 AM	0	5	0	1	0	0	0	0	0	0	0	0	0	0	6
03:45 AM	0	8	5	0	0	0	0	0	0	0	0	0	0	0	13
04:00 AM	0	11	0	0	1	0	0	0	0	0	0	0	0	0	12
04:15 AM	0	6	4	0	1	0	0	0	0	0	0	0	0	0	11
04:30 AM	0	8	2	0	0	0	0	0	0	0	0	0	0	1	11
04:45 AM	0	14	4	1	2	0	0	0	0	0	0	0	0	0	21
05:00 AM	0	16	4	0	0	0	0	0	0	0	0	0	0	0	20
05:15 AM	0	28	5	0	0	0	0	0	0	0	0	0	0	0	33
05:30 AM	0	37	2	0	2	1	0	0	0	0	0	0	0	0	42
05:45 AM	0	61	2	0	1	0	0	0	0	0	0	0	0	0	64
Day Total															
Percent															
ADT 8326															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 11/14/2019 5:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Army Navy Dr btwn S Eads St & 12th St S
QC JOB #: 15109305
SPECIFIC LOCATION:
DIRECTION: EB, WB
CITY/STATE: Arlington, VA
DATE: Nov 7 2019

Start Time	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
06:00 AM	3	54	5	1	2	0	0	0	0	0	0	0	0	2	67
06:15 AM	2	71	19	1	2	0	0	0	0	0	0	0	0	1	96
06:30 AM	1	59	8	0	2	0	0	0	0	**1**	0	0	0	2	73
06:45 AM	1	80	10	1	3	0	0	0	0	0	0	0	0	3	98
07:00 AM	**5**	87	16	1	5	0	0	2	0	0	0	0	0	4	120
07:15 AM	0	118	9	2	0	0	0	0	0	0	0	0	0	2	131
07:30 AM	0	114	12	1	**7**	0	0	0	0	0	0	0	0	1	135
07:45 AM	0	121	14	1	3	0	0	0	0	0	0	0	0	3	142
08:00 AM	3	121	19	**8**	1	0	0	0	0	0	0	0	0	5	157
08:15 AM	3	128	12	0	2	**2**	0	1	0	0	0	0	0	2	150
08:30 AM	1	**149**	13	1	4	0	0	0	0	0	0	0	0	13	**181**
08:45 AM	2	118	17	4	5	1	0	0	0	0	0	0	0	**21**	168
09:00 AM	2	107	13	1	1	1	0	1	0	0	0	0	0	3	129
09:15 AM	1	89	15	3	2	2	0	0	0	0	0	0	0	3	115
09:30 AM	0	126	14	2	3	1	0	2	0	0	0	0	0	3	151
09:45 AM	0	99	7	3	4	0	0	2	0	0	0	0	0	0	115
10:00 AM	0	81	8	3	2	0	0	0	0	0	0	0	0	3	97
10:15 AM	1	60	**22**	3	2	0	**1**	0	0	0	0	0	0	1	90
10:30 AM	0	74	4	2	4	0	0	1	0	0	0	0	0	1	86
10:45 AM	1	73	9	1	2	1	0	0	0	0	0	0	0	3	90
11:00 AM	0	82	8	2	1	1	0	**3**	**1**	0	0	0	0	0	98
11:15 AM	0	78	10	3	3	0	0	1	0	1	0	0	0	0	96
11:30 AM	0	83	5	3	3	0	0	0	0	0	0	0	0	1	95
11:45 AM	0	64	5	3	2	0	0	1	0	0	0	0	0	0	75
Day Total															
Percent															
ADT 8326															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 11/14/2019 5:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Army Navy Dr btwn S Eads St & 12th St S
QC JOB #: 15109305
SPECIFIC LOCATION:
DIRECTION: EB, WB
CITY/STATE: Arlington, VA
DATE: Nov 7 2019

Start Time	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
12:00 PM	0	76	16	4	2	1	0	0	0	0	0	0	0	1	100
12:15 PM	0	74	8	1	3	0	0	2	0	0	0	0	0	0	88
12:30 PM	0	104	5	4	4	1	0	1	0	0	0	0	0	3	122
12:45 PM	1	85	14	2	3	0	0	0	0	0	0	0	0	2	107
01:00 PM	1	82	6	2	3	0	0	1	0	0	0	0	0	1	96
01:15 PM	2	78	16	1	3	0	0	0	0	0	0	0	0	1	101
01:30 PM	1	85	**18**	4	**6**	0	0	0	0	0	0	0	0	2	116
01:45 PM	1	94	13	2	1	0	0	**3**	0	0	0	0	0	0	114
02:00 PM	2	99	14	2	1	0	0	0	0	0	0	0	0	5	123
02:15 PM	1	95	10	0	6	0	0	1	0	0	0	0	0	5	118
02:30 PM	0	111	9	4	2	0	0	1	0	0	0	0	0	2	129
02:45 PM	1	112	9	1	4	0	0	0	0	0	0	0	0	1	128
03:00 PM	1	117	14	5	2	0	0	0	0	0	0	0	0	14	153
03:15 PM	2	123	17	5	3	1	0	1	0	0	0	0	0	17	169
03:30 PM	1	111	8	4	4	0	0	0	0	0	0	0	0	19	147
03:45 PM	2	128	14	4	2	**2**	0	0	0	0	0	0	**1**	10	163
04:00 PM	5	**156**	11	3	4	0	0	1	0	0	0	0	0	9	**189**
04:15 PM	6	138	8	**6**	3	0	0	0	0	0	0	0	0	16	177
04:30 PM	2	114	11	2	2	0	0	0	0	0	0	0	0	25	156
04:45 PM	4	79	18	6	4	0	0	0	0	0	0	0	0	35	146
05:00 PM	5	48	12	4	0	1	0	1	0	0	0	0	0	35	106
05:15 PM	6	58	4	2	2	0	0	0	**1**	0	0	0	1	31	105
05:30 PM	1	53	5	0	1	0	0	0	0	0	0	0	0	26	86
05:45 PM	**10**	88	10	2	2	0	0	1	0	0	0	0	0	29	142
Day Total															
Percent															
ADT															
8326															
AM Peak 15-min Vol															
PM Peak 15-min Vol															

Comments:

Report generated on 11/14/2019 5:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

LOCATION: Army Navy Dr btwn S Eads St & 12th St S
QC JOB #: 15109305
SPECIFIC LOCATION:
DIRECTION: EB, WB
CITY/STATE: Arlington, VA
DATE: Nov 7 2019

Start Time	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
06:00 PM	5	72	5	1	2	0	0	0	0	0	0	0	0	**41**	126
06:15 PM	4	60	4	4	2	0	0	0	0	0	0	0	0	27	101
06:30 PM	1	107	7	3	4	1	0	1	0	0	0	0	0	27	151
06:45 PM	0	113	12	0	1	0	0	0	0	**1**	0	0	0	10	137
07:00 PM	1	113	4	0	1	0	0	0	0	0	0	0	0	6	125
07:15 PM	0	106	7	1	1	0	0	0	1	0	0	0	0	1	117
07:30 PM	2	116	3	0	0	0	0	1	0	0	0	0	0	4	126
07:45 PM	1	108	3	3	1	0	0	0	1	0	0	0	0	2	119
08:00 PM	0	91	8	0	1	0	0	0	0	0	0	0	0	1	101
08:15 PM	0	107	3	0	5	0	0	0	0	0	0	0	0	0	115
08:30 PM	3	115	4	0	2	1	0	1	1	0	0	0	0	1	128
08:45 PM	1	89	8	3	2	0	0	0	0	0	0	0	0	1	104
09:00 PM	0	102	2	1	1	0	0	1	0	0	0	0	0	2	109
09:15 PM	1	76	9	3	2	0	0	0	0	0	0	0	0	6	97
09:30 PM	0	81	4	0	0	0	0	0	0	0	0	0	0	0	85
09:45 PM	0	64	3	2	1	0	0	0	0	0	0	0	0	1	71
10:00 PM	0	71	4	0	1	0	0	0	0	0	0	0	0	1	77
10:15 PM	0	48	6	0	2	0	0	0	0	0	0	0	0	0	56
10:30 PM	0	47	5	1	0	0	0	0	0	0	0	0	0	0	53
10:45 PM	0	45	7	0	2	0	0	0	0	0	0	0	0	0	54
11:00 PM	0	37	1	0	0	1	0	0	0	0	0	0	0	0	39
11:15 PM	0	21	3	0	0	1	0	3	0	0	0	0	0	4	32
11:30 PM	0	17	2	0	0	1	0	0	0	0	0	0	0	0	20
11:45 PM	0	21	3	0	2	1	0	0	0	0	0	0	0	2	29
Day Total	100	6637	698	144	175	23	1	34	5	3	0	0	2	504	8326
Percent	1.2%	79.7%	8.4%	1.7%	2.1%	0.3%	0%	0.4%	0.1%	0%	0%	0%	0%	6.1%	
ADT 8326															
AM Peak	7:00 AM	8:30 AM	10:15 AM	8:00 AM	7:30 AM	8:15 AM	10:15 AM	11:00 AM	11:00 AM	6:30 AM	12:00 AM	12:00 AM	12:00 AM	8:45 AM	8:30 AM
15-min Vol	5	149	22	8	7	2	1	3	1	1	0	0	0	21	181
PM Peak	5:45 PM	4:00 PM	1:30 PM	4:15 PM	1:30 PM	3:45 PM	12:00 PM	1:45 PM	5:15 PM	6:45 PM	12:00 PM	12:00 PM	3:45 PM	6:00 PM	4:00 PM
15-min Vol	10	156	18	6	6	2	0	3	1	1	0	0	1	41	189

Comments:

Report generated on 11/14/2019 5:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Vehicle Classification Data

SUMMARY - Tube Count - Vehicle Classification Data

LOCATION: Army Navy Dr btwn S Eads St & 12th St S
SPECIFIC LOCATION:
CITY/STATE: Arlington, VA

QC JOB #: 15109305
DIRECTION: EB, WB
DATE: Nov 6 2019

	Motorcycles	Cars & Trailer	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	Total
Grand Total	190	13174	1338	255	364	50	10	63	7	4	2	0	3	857	16317
Percent	1.2%	80.7%	8.2%	1.6%	2.2%	0.3%	0.1%	0.4%	0%	0%	0%	0%	0%	5.3%	

ADT
8158

Comments:

Report generated on 11/14/2019 5:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Appendix B

Boring Logs

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Log of Boring **LB-1** Sheet 1 of 1

Project: Army Navy Drive Complete Streets Project	Project No.: 270060005
Location: Arlington, Virginia	Elevation and Datum: Approx. el 46 (NAVD88)
Drilling Company: Free State Drilling	Date Started: 4/6/20 — Date Finished: 4/6/20
Drilling Equipment: CME-55 Track-Mounted Drill Rig	Completion Depth: 10.5 ft — Rock Depth: Not Encountered
Size and Type of Bit: 2-1/4-inch Hollow-Stem Augers	Number of Samples: Disturbed 5 — Undisturbed - — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ NE — Completion ▼ NE — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Ronald Stidham
Sampler: 2-inch OD Split Spoon	Field Engineer: Amber Ganapathy
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+46.0	ASPHALT (13 inches thick)	0						Cored through pavement with a 6 inch core bit. Began drilling at 09:00.
	+44.9	CONCRETE (5 inches thick)	1						
	+44.5	*AGGREGATE SUBBASE*, Brown and gray, fine to coarse, SANDY GRAVEL FILL, trace clay, medium dense, moist (GW)	2	S1	SS	16	15 9 14 7	23	SS 1.5 to 3.5 ft Collected Bulk Sample B-1 from 2 to 5 ft.
	+42.5	*FILL*, Brown, fine to coarse, CLAYEY SAND FILL, trace fine gravel, contains layers of fine to coarse sand, medium dense, moist (SC)	3 4 5	S2	SS	22	3 4 6 6	10	Augered to 3.5 ft. SS 3.5 to 5.5 ft
		FILL, Brown, fine to coarse, CLAYEY SAND FILL, trace fine gravel, contains cinders and layer of fine to coarse sandy gravel, medium dense, moist (SC)	6 7	S3	SS	24	5 5 6 7	11	Augered to 5.5 ft. SS 5.5 to 7.5 ft
		No Recovery	8	S4	SS	0	5 8 7	15	Augered to 7.5 ft. SS 7.5 to 9 ft
	+37.0	*FILL*, Brown, CLAY FILL, trace fine gravel, contains brick, stiff, moist (CL)	9 10	S5	SS	12	6 7 7	14	Augered to 9 ft. SS 9 to 10.5 ft
	+35.5	End of Boring at 10.5 ft	11						Completed drilling at 10:00. Borehole caved at 8.5 ft after auger removal. Groundwater not encountered during drilling. Borehole backfilled with soil cuttings and surface patched with asphalt upon completion.
		Boring Location Coordinates: Lat = 38.865901 Long = -77.062305	12 13 14 15 16						Pavement Summary: *Surface Course Layer 1*: good condition (1.5 in) *Surface Course Layer 2*: fair condition (1.5 in) *Base Course*: fair condition (2 in) *Concrete Layer 1*: good condition (7.5 in) *Concrete Layer 2*: good condition (5.5 in)

N-Value (Blows/ft) scale: 10 20 30 40

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Log of Boring **LB-10** Sheet 1 of 2

Project: Army Navy Drive Complete Streets Project	Project No.: 270060005
Location: Arlington, Virginia	Elevation and Datum: Approx. el 39.2 (NAVD88)
Drilling Company: Free State Drilling	Date Started: 4/2/20 — Date Finished: 4/2/20
Drilling Equipment: CME-55 Track-Mounted Drill Rig	Completion Depth: 25 ft — Rock Depth: Not Encountered
Size and Type of Bit: 2-1/4-inch Hollow-Stem Augers	Number of Samples: Disturbed 8 — Undisturbed - — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ NE — Completion ▼ NE — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Ronald Stidham
Sampler: 2-inch OD Split Spoon	Field Engineer: Amber Ganapathy
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+39.2		0						
	+38.8	ASPHALT (5 inches thick)							Cored through pavement with a 6 inch core bit. Began drilling at 12:55. SS 1 to 3 ft
	+38.0	*AGGREGATE SUBBASE*, Brown, fine to coarse, SAND WITH FINE GRAVEL FILL, trace silt, clay, and fine gravel, medium dense, moist (GW)	1						
		FILL, Brown, fine to medium, SAND FILL, trace silt and fine gravel, medium dense, moist (SP)	2	S1	SS	8	8 6 6 9	12	
			3						Augered to 3 ft. SS 3 to 5 ft
			4	S2	SS	24	9 8 7 6	15	
		FILL, Brown, fine to coarse, SAND FILL, trace silt and clay, contains brick, loose, moist (SW)	5						Augered to 5 ft. SS 5 to 7 ft
			6	S3	SS	24	4 4 4 3	8	
	+32.2		7						
		No Recovery - Soil cuttings indicate brown sand with silt, very loose							Augered to 7 ft. SS 7 to 8.5 ft
			8	S4	SS	0	1 1 1	2	
		TERRACE DEPOSIT, Brown to light brown, fine to medium, SAND, loose, moist (SP)	9	S5	SS	16	1 2 2	4	Augered to 8.5 ft. SS 8.5 to 10 ft
			10						Augered to 13.5 ft.
			11						
			12						
			13						
		TERRACE DEPOSIT, Brown, fine to medium, SAND, trace silt, loose, moist (SP)	14	S6	SS	18	2 3 3	6	SS 13.5 to 15 ft
			15						Augered to 18.5 ft.
			16						

N-Value (Blows/ft) scale: 10 20 30 40

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Log of Boring **LB-10** Sheet 2 of 2

Project	Project No.
Army Navy Drive Complete Streets Project	270060005
Location	**Elevation and Datum**
Arlington, Virginia	Approx. el 39.2 (NAVD88)

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+23.2		16					10 20 30 40	
			17						
			18						
		TERRACE DEPOSIT, Red-brown, fine to medium, SAND, trace silt, loose, moist (SP)	19	S7	SS	18	2 2 2	4	SS 18.5 to 20 ft
			20						Augered to 23.5 ft.
			21						
			22						
			23						
	+15.7								
		TERRACE DEPOSIT, Red-brown, fine to coarse, SAND WITH FINE GRAVEL, trace silt, dense, moist (SW)	24	S8	SS	12	6 14 17	31	SS 23.5 to 25 ft
	+14.2		25						
		End of Boring at 25 ft Boring Location Coordinates: Lat = 38.864948 Long = -77.054089	26						Completed drilling at 13:30. Borehole caved at 23.5 ft after auger removal. Groundwater not encountered during drilling. Borehole backfilled with soil cuttings and surface patched with asphalt upon completion. Pavement Summary: *Surface Course* good condition (1 in) *Base Course* good condition (4 in)
			27						
			28						
			29						
			30						
			31						
			32						
			33						
			34						
			35						
			36						

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Log of Boring **LB-11** Sheet 1 of 1

Project: Army Navy Drive Complete Streets Project	Project No.: 270060005
Location: Arlington, Virginia	Elevation and Datum: Approx. el 38.2 (NAVD88)
Drilling Company: Free State Drilling	Date Started: 4/2/20 — Date Finished: 4/2/20
Drilling Equipment: CME-55 Track-Mounted Drill Rig	Completion Depth: 10.5 ft — Rock Depth: Not Encountered
Size and Type of Bit: 2-1/4-inch Hollow-Stem Augers	Number of Samples: Disturbed 5 — Undisturbed - — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ NE — Completion ▼ NE — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Ronald Stidham
Sampler: 2-inch OD Split Spoon	Field Engineer: Amber Ganapathy
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks
	+38.2	ASPHALT (12 inches thick)	0						Cored through pavement with a 6 inch core bit. Began drilling at 09:00. SS 1 to 3 ft. Collected Bulk Sample B-1 from 1 to 3 ft.
	+37.2	*AGGREGATE SUBBASE*, Gray, fine, GRAVEL FILL, trace clay, medium dense, moist (GW)	1	S1	SS	7	12 5 4 5	9	
	+37.0	BRICK (2 inches thick)							
	+36.8	*FILL*, Brown, fine to coarse, SAND, trace clay and fine gravel, loose, moist (SW)	2						
	+35.2	*TERRACE DEPOSIT*, Orange-brown, fine to medium, SAND WITH SILT, medium dense, moist (SM)	3	S2	SS	8	5 5 5 4	10	Augered to 3 ft. SS 3 to 5 ft
			4						
	+33.2	*TERRACE DEPOSIT*, Orange-brown, fine to medium, SAND, trace silt, loose, moist (SP)	5	S3	SS	12	3 4 5 4	9	Augered to 5 ft. SS 5 to 7 ft
			6						
		TERRACE DEPOSIT, Light brown, fine to medium, SAND, trace silt and fine gravel, loose, moist (SP)	7	S4	SS	16	2 5 3 3	8	Augered to 7 ft. SS 7 to 9 ft
			8						
		TERRACE DEPOSIT, Light brown, fine to medium, SAND, trace silt and fine gravel, loose, moist (SP)	9	S5	SS	16	2 4 6	10	Augered to 9 ft. SS 9 to 10.5 ft
			10						
	+27.7	*TERRACE DEPOSIT*, Red-brown, fine to coarse, SAND, trace silt, medium dense, moist (SW)							
		End of Boring at 10.5 ft	11						Completed drilling at 09:45. Borehole caved at 8 ft after auger removal. Groundwater not encountered during drilling. Borehole backfilled with soil cuttings and surface patched with asphalt upon completion.
		Boring Location Coordinates: Lat = 38.864776 Long = -77.053780	12						
			13						Pavement Summary: *Surface Course 1*: fair condition (2.5 in) *Surface Course 2*: fair condition (2.5 in) *Base Course*: fair condition (7 in)
			14						
			15						
			16						

N-Value (Blows/ft) scale: 10 20 30 40

\\LANGAN.COM\DATA\VAR\DATA0\270060005\PROJECT DATA_DISCIPLINE\GEOTECHNICAL\GINTLOGS\270060005 - ARMY NAVY DRIVE.GPJ ... 4/24/2020 3:49:29 PM ... Report: Log - LANGAN

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Log of Boring **LB-12** Sheet 1 of 1

Project: Army Navy Drive Complete Streets Project	Project No.: 270060005
Location: Arlington, Virginia	Elevation and Datum: Approx. el 36.3 (NAVD88)
Drilling Company: Free State Drilling	Date Started: 4/2/20 — Date Finished: 4/2/20
Drilling Equipment: CME-55 Track-Mounted Drill Rig	Completion Depth: 10 ft — Rock Depth: Not Encountered
Size and Type of Bit: 2-1/4-inch Hollow-Stem Augers	Number of Samples: Disturbed 5 — Undisturbed - — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ NE — Completion ▼ NE — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Ronald Stidham
Sampler: 2-inch OD Split Spoon	Field Engineer: Amber Ganapathy
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+36.3	ASPHALT (10 inches thick)	0						Cored through pavement with a 6 inch core bit. Began drilling at 11:40. SS 1 to 3 ft Collected Bulk Sample B-1 from 1 to 5 ft.
	+35.5	*AGGREGATE SUBBASE*, Brown, fine to coarse, SANDY GRAVEL FILL, trace clay, contains brick, medium dense, moist (GW)	1						
			2	S1	SS	14	7 12 14 16	26	
	+33.3	*FILL*, Brown, fine to coarse, SAND WITH FINE GRAVEL FILL, trace clay, medium dense, moist (GW)	3						Augered to 3 ft. SS 3 to 5 ft
			4	S2	SS	12	9 17 12 8	29	
		FILL, Brown, fine to coarse, SAND WITH FINE GRAVEL FILL, trace clay, dense, moist (GW)	5						Augered to 5 ft. SS 5 to 7 ft
			6	S3	SS	18	43 16 19 26	35	
	+29.8	ASPHALT (6 inches thick)							
	+29.3	*FILL*, Brown, fine to coarse, SAND FILL, trace clay and fine gravel, contains brick, medium dense, moist (SW)	7						Augered to 7 ft. SS 7 to 8.5 ft
			8	S4	SS	18	6 9 10	19	
	+28.1	*TERRACE DEPOSIT*, Light brown, fine to medium, SAND, trace silt, medium dense, moist (SP)							Augered to 8.5 ft. SS 8.5 to 10 ft
	+27.3	*TERRACE DEPOSIT*, Red-brown, fine to coarse, SAND, trace silt, loose, moist (SW)	9	S5	SS	18	4 3 3	6	
	+26.3	*TERRACE DEPOSIT*, Red-brown, fine to coarse, CLAYEY SAND, trace silt, loose, moist (SW) End of Boring at 10 ft	10						Completed drilling at 12:20. Borehole caved at 7.5 ft after auger removal. Groundwater not encountered during drilling. Borehole backfilled with soil cuttings and surface patched with asphalt upon completion.
		Boring Location Coordinates: Lat = 38.864565 Long = -77.052554	11						
			12						Pavement Summary: *Surface Course*: fair condition (3 in) *Base Course*: poor condition, stripped (7 in)
			13						
			14						
			15						
			16						

N-Value (Blows/ft) scale: 10 20 30 40

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Log of Boring **LB-13** Sheet 1 of 1

Project: Army Navy Drive Complete Streets Project	Project No.: 270060005
Location: Arlington, Virginia	Elevation and Datum: Approx. el 35.1 (NAVD88)
Drilling Company: Free State Drilling	Date Started: 4/2/20 / Date Finished: 4/2/20
Drilling Equipment: CME-55 Track-Mounted Drill Rig	Completion Depth: 10.2 ft / Rock Depth: Not Encountered
Size and Type of Bit: 2-1/4-inch Hollow-Stem Augers	Number of Samples: Disturbed 5 / Undisturbed - / Core -
Casing Diameter (in): - / Casing Depth (ft): -	Water Level (ft.): First NE / Completion NE / 24 HR. -
Casing Hammer: - / Weight (lbs): - / Drop (in): -	Drilling Foreman: Ronald Stidham
Sampler: 2-inch OD Split Spoon	Field Engineer: Amber Ganapathy
Sampler Hammer: Auto / Weight (lbs): 140 / Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)
	+35.1	ASPHALT (14.5 inches thick)	0					
	+33.9	*AGGREGATE SUBBASE*, Red-brown, fine to coarse, SAND WITH FINE GRAVEL FILL, trace clay, dense, moist (GW)	1					
			2	S1	SS	16	10, 22, 20, 17	42
	+31.9	*FILL*, Brown, fine to coarse, CLAYEY SAND WITH FINE GRAVEL FILL, medium dense, moist (SC)	3					
			4	S2	SS	18	7, 8, 10, 11	18
	+29.9	*FILL*, Brown, fine to coarse, SAND WITH CLAY FILL, trace fine gravel, loose, moist (SC)	5					
			6	S3	SS	18	8, 5, 4, 39	9
	+28.4	ASPHALT (11 inches thick)	7					
	+27.5	*FILL*, Brown, fine to medium, SAND WITH CLAY, medium dense, moist (SC)	8	S4	SS	12	27, 9, 9	18
	+26.4	*TERRACE DEPOSIT*, Red-brown, fine, SAND WITH CLAY, loose, moist (SC)	9					
			10	S5	SS	12	3, 3, 3	6
	+24.9	End of Boring at 10.2 ft Boring Location Coordinates: Lat = 38.864080 Long = -77.051974	11					
			12					
			13					
			14					
			15					
			16					

N-Value (Blows/ft) scale: 10 20 30 40

Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)

Cored through pavement with a 6 inch core bit.
Began drilling at 10:50.
SS 1.2 to 3.2 ft
Collected Bulk Sample B-1 from 1.2 to 5 ft.

Augered to 3.2 ft.
SS 3.2 to 5.2 ft

Augered to 5.2 ft; grinding and rig chatter at 4 ft.
SS 5.2 to 7.2 ft

Augered to 7.2 ft; grinding at 7 ft.
SS 7.2 to 8.7 ft

Augered to 8.7 ft.
SS 8.7 to 10.2 ft

Completed drilling at 11:20.
Borehole caved at 7.9 ft after auger removal. Groundwater not encountered during drilling. Borehole backfilled with soil cuttings and surface patched with asphalt upon completion.

Pavement Summary:
Surface Course:
good condition (3 in)
Base Course:
good condition (11.5 in)

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Log of Boring **LB-14** Sheet 1 of 1

Project: Army Navy Drive Complete Streets Project	Project No.: 270060005
Location: Arlington, Virginia	Elevation and Datum: Approx. el 31 (NAVD88)
Drilling Company: Free State Drilling	Date Started: 4/2/20 / Date Finished: 4/2/20
Drilling Equipment: CME-55 Track-Mounted Drill Rig	Completion Depth: 10 ft / Rock Depth: Not Encountered
Size and Type of Bit: 2-1/4-inch Hollow-Stem Augers	Number of Samples: Disturbed 5 / Undisturbed - / Core -
Casing Diameter (in): - / Casing Depth (ft): -	Water Level (ft.): First ▽ NE / Completion ▼ NE / 24 HR. ▼ -
Casing Hammer: - / Weight (lbs): - / Drop (in): -	Drilling Foreman: Ronald Stidham
Sampler: 2-inch OD Split Spoon	Field Engineer: Amber Ganapathy
Sampler Hammer: Auto / Weight (lbs): 140 / Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks
	+31.0	ASPHALT (12 inches thick)	0						Cored through pavement with a 6 inch core bit. Began drilling at 10:50. SS 1 to 3 ft. Collected Bulk Sample B-1 from 1 to 5 ft.
	+30.0	*AGGREGATE SUBBASE*, Brown, fine to coarse, SANDY GRAVEL FILL, trace clay, contains brick, dense, moist (GW)	1	S1	SS	16	11, 22, 24, 16	46	
	+28.5	CONCRETE (6 inches thick)	2						
	+28.0	*TERRACE DEPOSIT*, Brown, fine, SAND WITH CLAY, loose, moist (SC)	3	S2	SS	18	2, 3, 3, 5	6	Augered to 3 ft. SS 3 to 5 ft.
		TERRACE DEPOSIT, Brown, fine, SAND WITH CLAY, medium dense, moist (SC)	4						
	+25.0	*TERRACE DEPOSIT*, Brown, fine to medium, SAND, trace silt, medium dense, moist (SP)	5	S3	SS	18	7, 5, 5, 6	10	Augered to 5 ft. SS 5 to 7 ft.
	+24.0	*TERRACE DEPOSIT*, Brown, fine, SAND WITH SILT, medium dense, moist (SM)	6						
			7	S4	SS	12	22, 6, 4	10	Augered to 7 ft. SS 7 to 8.5 ft.
		TERRACE DEPOSIT, Red-brown, fine, SAND WITH SILT, medium dense, moist (SM)	8						
			9	S5	SS	12	10, 9, 6	15	Augered to 8.5 ft. SS 8.5 to 10 ft.
	+21.0	End of Boring at 10 ft Boring Location Coordinates: Lat = 38.863412 Long = -77.051948	10						Completed drilling at 11:20. Borehole caved at 7.9 ft after auger removal. Groundwater not encountered during drilling. Borehole backfilled with soil cuttings and surface patched with asphalt upon completion. Pavement Summary: *Surface Course*: good condition (3 in) *Base Course*: good condition (9 in)
			11						
			12						
			13						
			14						
			15						
			16						

N-Value (Blows/ft) scale: 10 20 30 40

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Log of Boring **LB-2** Sheet 1 of 1

Project: Army Navy Drive Complete Streets Project	Project No.: 270060005
Location: Arlington, Virginia	Elevation and Datum: Approx. el 42.2 (NAVD88)
Drilling Company: Free State Drilling	Date Started: 4/6/20 — Date Finished: 4/6/20
Drilling Equipment: CME-55 Track-Mounted Drill Rig	Completion Depth: 10 ft — Rock Depth: Not Encountered
Size and Type of Bit: 2-1/4-inch Hollow-Stem Augers	Number of Samples: Disturbed 5 — Undisturbed - — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ NE — Completion ▼ NE — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Ronald Stidham
Sampler: 2-inch OD Split Spoon	Field Engineer: Amber Ganapathy
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks
	+42.2		0						Cored through pavement with a 6 inch core bit. Began drilling at 10:15.
	+41.9	ASPHALT (3.5 inches thick)							
		CONCRETE (9 inches thick)							
	+41.2	*AGGREGATE SUBBASE*, Brown and gray, fine, SANDY GRAVEL FILL, trace clay, dense, moist (GW)	1	S1	SS	16	38 11 8 8	19	SS 1 to 3 ft Collected Bulk Sample B-1 from 2 to 5 ft.
	+40.4	*FILL*, Red-brown, fine to medium, SAND WITH CLAY FILL, contains mica, medium dense, moist (SC)	2						
		FILL, Gray, fine to medium, CLAYEY SAND FILL, trace clay, contains wood, loose, moist (SP)	3	S2	SS	16	3 4 2 4	6	Augered to 3 ft. SS 3 to 5 ft
		FILL, Brown and gray, fine to coarse, CLAYEY SAND FILL, trace fine gravel, medium dense, moist (SC)	4						
			5	S3	SS	18	4 5 7 8	12	Augered to 5 ft. SS 5 to 7 ft
		FILL, Brown, fine to coarse, SAND FILL, trace coarse gravel, contains wood, medium dense, moist (SW)	6						
			7	S4	SS	14	2 5 10	15	Augered 7 ft. SS 7 to 8.5 ft
		FILL, Brown, fine to coarse, CLAYEY SAND FILL, trace fine to coarse gravel, contains brick, loose, moist (SC)	8						
			9	S5	SS	10	3 5 4	9	Augered to 8.5 ft. SS 8.5 to 10 ft
	+32.2	End of Boring at 10 ft	10						Completed drilling at 10:50. Borehole caved at 8.4 ft after auger removal. Groundwater not encountered during drilling. Borehole backfilled with soil cuttings and surface patched with asphalt upon completion.
		Boring Location Coordinates: Lat = 38.865794 Long = -77.061297	11						
			12						Pavement Summary: *Surface Course*: fair condition (3.5 in) *Concrete Layer*: good condition (9 in)
			13						
			14						
			15						
			16						

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Log of Boring **LB-3** Sheet 1 of 2

Project: Army Navy Drive Complete Streets Project	Project No.: 270060005
Location: Arlington, Virginia	Elevation and Datum: Approx. el 42.1 (NAVD88)
Drilling Company: Free State Drilling	Date Started: 4/6/20 — Date Finished: 4/6/20
Drilling Equipment: CME-55 Track-Mounted Drill Rig	Completion Depth: 25 ft — Rock Depth: Not Encountered
Size and Type of Bit: 2-1/4-inch Hollow-Stem Augers	Number of Samples: Disturbed 8 — Undisturbed - — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ 13.5 — Completion ▼ 15.1 — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Ronald Stidham
Sampler: 2-inch OD Split Spoon	Field Engineer: Amber Ganapathy
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+42.1	ASPHALT (13 inches thick)	0						Cored through pavement with a 6 inch core bit. Began drilling at 10:15. SS 1 to 3 ft
	+41.0		1						
	+40.8	*AGGREGATE SUBBASE*, Gray, CLAY WITH GRAVEL FILL, trace fine to medium sand, medium dense, moist (GC)							
		FILL, Brown, CLAY FILL, trace fine to coarse sand, stiff, moist (CL)	2	S1	SS	16	12 5 5	10	
	+39.1		3				6		Augered to 3 ft. SS 3 to 5 ft
		FILL, Brown, SILTY SAND FILL, trace fine to coarse gravel, contains mica and wood, loose, moist (SM)	4	S2	SS	18	3 3 4	7	
							4		
		FILL, Brown, SILTY SAND FILL, trace fine to coarse gravel, contains brick, mica, and wood, loose, moist (SM)	5						Augered to 5 ft. SS 5 to 7 ft
			6	S3	SS	18	5 3 3	6	
							4		
		FILL, Brown, SILTY SAND FILL, contains mica, very loose, moist (SM)	7						Augered to 7 ft. SS 7 to 9 ft
			8	S4	SS	10	1 1 1	2	
		FILL, Brown, SILTY SAND FILL, contains mica and rock fragments, very loose, moist (SM)	9	S5	SS	10	2 1 1	2	Augered to 8.5 ft. SS 8.5 to 10 ft
			10						Augered to 13.5 ft.
			11						
			12						
			13						
	+28.6								
		TERRACE DEPOSIT, Brown, CLAY WITH FINE SAND, soft, wet (CL)	14	S6	SS	18	1 2 2	4	SS 13.5 to 15 ft
		▼	15						Augered to 18.5 ft.
			16						

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Log of Boring **LB-3** Sheet 2 of 2

Project	Project No.
Army Navy Drive Complete Streets Project	270060005
Location	**Elevation and Datum**
Arlington, Virginia	Approx. el 42.1 (NAVD88)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+26.1		16						
			17						
			18						
	+23.6	*TERRACE DEPOSIT*, Brown, fine to medium, SAND, trace silt and fine gravel, loose, wet (SP)	19	S7	SS	18	1 2 3	5	SS 18.5 to 20 ft
			20						Augered to 23.5 ft.
			21						
			22						
			23						
	+18.6	*TERRACE DEPOSIT*, Brown, fine to coarse, GRAVEL WITH SAND AND SILT, medium dense, wet (GW)	24	S8	SS	18	6 12 9	21	SS 23.5 to 25 ft
	+17.1	End of Boring at 25 ft Boring Location Coordinates: Lat = 38.865602 Long = -77.060784	25						Completed drilling at 11:25. Groundwater observed at 15.9 ft inside augers. Borehole caved at 18 ft after auger removal. Groundwater observed at 15.1 ft. Borehole backfilled with soil cuttings and surface patched with asphalt upon completion. Pavement Summary: *Surface Course*: good condition (5 in) *Base Course*: good condition (8 in)
			26						
			27						
			28						
			29						
			30						
			31						
			32						
			33						
			34						
			35						
			36						

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Log of Boring **LB-4** Sheet 1 of 1

Project: Army Navy Drive Complete Streets Project	Project No.: 270060005
Location: Arlington, Virginia	Elevation and Datum: Approx. el 44.7 (NAVD88)
Drilling Company: Free State Drilling	Date Started: 4/3/20 — Date Finished: 4/3/20
Drilling Equipment: CME-55 Track-Mounted Drill Rig	Completion Depth: 10 ft — Rock Depth: Not Encountered
Size and Type of Bit: 2-1/4-inch Hollow-Stem Augers	Number of Samples: Disturbed 5 — Undisturbed - — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ NE — Completion ▼ NE — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Ronald Stidham
Sampler: 2-inch OD Split Spoon	Field Engineer: Amber Ganapathy
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+44.7	ASPHALT (9.5 inches thick)	0						Cored through pavement with a 6 inch core bit. Began drilling at 13:15.
	+43.9	*AGGREGATE SUBBASE*, Gray, fine, GRAVEL FILL, trace clay, medium dense, moist (GW)	1						
	+43.0	*FILL*, Brown, fine to coarse, SAND WITH CLAY FILL, trace fine gravel, contains brick, medium dense, moist (SC)	2	S1	SS	16	12, 9, 6, 6	15	SS 1 to 3 ft Collected Bulk Sample B-1 from 2 to 5 ft.
		FILL, Brown, fine to coarse, SAND WITH CLAY FILL, trace fine gravel, loose, moist (SC)	3	S2	SS	18	3, 4, 4, 4	8	Augered to 3 ft. SS 3 to 5 ft
		FILL, Brown, fine to coarse, SAND WITH CLAY FILL, trace fine gravel, loose, moist (SC)	5	S3	SS	18	4, 4, 3, 3	7	Augered to 5 ft. SS 5 to 7 ft
	+37.7	*TERRACE DEPOSIT*, Brown, fine, SANDY CLAY, soft, moist (SC)	7	S4	SS	16	1, 1, 2	3	Augered to 7 ft. SS 7 to 8.5 ft q_u=1.5 to 4.0 tsf
		TERRACE DEPOSIT, Brown, SANDY CLAY, trace fine gravel, soft, moist (SC)	9	S5	SS	16	1, 2, 2	4	Augered to 8.5 ft. SS 8.5 to 10 ft q_u=0.5 tsf
	+34.7	End of Boring at 10 ft Boring Location Coordinates: Lat = 38.865612 Long = -77.059906	10						Completed drilling at 13:45. Borehole caved at 8.5 ft after auger removal. Groundwater not encountered during drilling. Borehole backfilled with soil cuttings and surface patched with asphalt upon completion. Pavement Summary: *Surface Course*: good condition (3 in) *Base Course*: good condition (6.5 in)
			16						

N-Value scale: 10 20 30 40

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Log of Boring **LB-5** Sheet 1 of 1

Project: Army Navy Drive Complete Streets Project	Project No.: 270060005
Location: Arlington, Virginia	Elevation and Datum: Approx. el 45.9 (NAVD88)
Drilling Company: Free State Drilling	Date Started: 4/6/20 — Date Finished: 4/6/20
Drilling Equipment: CME-55 Track-Mounted Drill Rig	Completion Depth: 10 ft — Rock Depth: Not Encountered
Size and Type of Bit: 2-1/4-inch Hollow-Stem Augers	Number of Samples: Disturbed 5 — Undisturbed - — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ NE — Completion ▼ NE — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Ronald Stidham
Sampler: 2-inch OD Split Spoon	Field Engineer: Amber Ganapathy
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+45.9		0						Cored through pavement with a 6 inch core bit. Began drilling at 11:00.
	+45.4	ASPHALT (5.5 inches thick)							
	+44.8	CONCRETE (7.5 inches thick)	1						
	+44.2	*AGGREGATE SUBBASE*, Gray, fine, GRAVEL FILL, trace fine to coarse sand and clay, very dense, moist (GW)							
		FILL, Red-brown, fine to coarse, SAND WITH SILT FILL, trace clay and fine gravel, contains mica, medium dense, moist (SM)	2	S1	SS	18	32 8 8 9	16	SS 1 to 3 ft Collected Bulk Sample B-1 from 2 to 5 ft.
	+42.9	*FILL*, Red-brown, fine to coarse, SANDY GRAVEL WITH SILT FILL, trace clay, medium dense, moist (GW)	3						Augered to 3 ft.
			4	S2	SS	8	8 7 7 7	14	SS 3 to 5 ft
	+40.9	*FILL*, Red-brown, fine to coarse, SAND FILL, trace clay and fine gravel, contains mica, medium dense, moist (SW)	5						Augered to 5 ft.
			6	S3	SS	10	6 6 10 6	16	SS 5 to 7 ft
	+38.9	*FILL*, Light brown, fine to coarse, SAND WITH CLAY FILL, trace fine to coarse gravel, medium dense, moist (SC)	7						Augered to 7 ft.
			8	S4	SS	16	2 10 8	18	SS 7 to 8.5 ft
	+36.9	*FILL*, Brown, CLAY WITH FINE SAND FILL, trace fine gravel, stiff, moist (SC)	9						Augered to 8.5 ft.
				S5	SS	18	3 6 7	13	SS 8.5 to 10 ft q_u=1.0 tsf
	+35.9	End of Boring at 10 ft	10						Completed drilling at 12:15. Borehole caved at 8.1 ft after auger removal. Groundwater not encountered during drilling. Borehole backfilled with soil cuttings and surface patched with asphalt upon completion.
		Boring Location Coordiantes: Lat = 38.865479 Long = -77.059118	11						Pavement Summary: *Surface Course*: good condition (2 in) *Base Course*: good condition (3.5 in) *Concrete Layer*: good condition (7.5 in)
			12						
			13						
			14						
			15						
			16						

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Log of Boring **LB-6** Sheet 1 of 2

Project: Army Navy Drive Complete Streets Project	Project No.: 270060005
Location: Arlington, Virginia	Elevation and Datum: Approx. el 45.6 (NAVD88)
Drilling Company: Free State Drilling	Date Started: 4/3/20 — Date Finished: 4/3/20
Drilling Equipment: CME-55 Track-Mounted Drill Rig	Completion Depth: 25 ft — Rock Depth: Not Encountered
Size and Type of Bit: 2-1/4-inch Hollow-Stem Augers	Number of Samples: Disturbed 8 — Undisturbed - — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ NE — Completion ▼ NE — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Ronald Stidham
Sampler: 2-inch OD Split Spoon	Field Engineer: Amber Ganapathy
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+45.6		0						Cored through pavement with a 6 inch core bit. Began drilling at 12:00.
	+45.2	ASPHALT (5 inches thick)							
		CONCRETE (9.5 inches thick)	1						
	+44.4	*AGGREGATE SUBBASE*, Gray, fine, SANDY GRAVEL FILL, trace silt, medium dense, moist (GW)							
	+43.9	*FILL*, Brown, fine to coarse, CLAYEY SAND FILL, trace fine gravel, contains layer of sandy clay, medium dense, moist (SC)	2	S1	SS	6	21 2 2 2	4	SS 1.5 to 3.5 ft
			3						Augered to 3.5 ft.
			4	S2	SS	18	2 5 5 4	10	SS 3.5 to 5.5 ft
		FILL, Brown, fine to coarse, CLAYEY SAND FILL, trace fine gravel, contains glass, medium dense, moist (SC)	5						Augered to 5.5 ft.
			6	S3	SS	18	3 5 7	12	SS 5.5 to 7 ft
	+38.6	*FILL*, Light brown, fine to coarse, SAND FILL, trace clay, medium dense, moist (SW)	7						Augered to 7 ft.
	+37.9	*FILL*, Brown, CLAY FILL, trace fine to coarse sand, very stiff, moist (CL)	8	S4	SS	10	5 10 8	18	SS 7 to 8.5 ft q_u=1.5 to 2.0 tsf
	+37.1	*FILL*, Brown, fine, SAND FILL, trace clay and cinders, medium dense, moist (SP)	9	S5	SS	16	3 10 9	19	Augered to 8.5 ft. SS 8.5 to 10 ft
			10						Augered to 13.5 ft.
			11						
			12						
			13						
	+32.1	*TERRACE DEPOSIT*, Orange-brown, fine to coarse, SAND WITH CLAY, medium dense, moist (SC)	14	S6A S6B	SS	18	3 4 10	14	SS 13.5 to 15 ft q_u=5.0 tsf
	+31.3	*TERRACE DEPOSIT*, Brown, CLAY WITH FINE SAND, medium dense, moist (SC)	15						Augered to 18.5 ft.
			16						

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Log of Boring **LB-6** Sheet 2 of 2

Project	Project No.
Army Navy Drive Complete Streets Project	270060005
Location	**Elevation and Datum**
Arlington, Virginia	Approx. el 45.6 (NAVD88)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+29.6		16					10 20 30 40	
			17						
			18						
	+27.1	*TERRACE DEPOSIT*, Brown, fine, CLAYEY SAND, medium dense, moist (SC)	19	S7	SS	18	2 5 7	12	SS 18.5 to 20 ft
			20						Augered to 23.5 ft.
			21						
			22						
			23						
		TERRACE DEPOSIT, Brown, fine to medium, CLAYEY SAND, medium dense, moist (SC)	24	S8	SS	18	2 3 8	11	SS 23.5 to 25 ft
	+20.6	End of Boring at 25 ft Boring Location Coordinates: Lat = 38.865471 Long = -77.058293	25						Completed drilling at 13:00. Borehole caved at 23.5 ft after auger removal. Groundwater not encountered during drilling. Borehole backfilled with soil cuttings and surface patched with asphalt upon completion. Pavement Summary: *Surface Course*: good condition (2 in) *Base Course* fair condition (3 in) *Concrete Layer* good condition (9.5 in)
			26						
			27						
			28						
			29						
			30						
			31						
			32						
			33						
			34						
			35						
			36						

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Log of Boring **LB-7** Sheet 1 of 1

Project: Army Navy Drive Complete Streets Project	Project No.: 270060005
Location: Arlington, Virginia	Elevation and Datum: Approx. el 43.5 (NAVD88)
Drilling Company: Free State Drilling	Date Started: 4/3/20 — Date Finished: 4/3/20
Drilling Equipment: CME-55 Track-Mounted Drill Rig	Completion Depth: 10 ft — Rock Depth: Not Encountered
Size and Type of Bit: 2-1/4-inch Hollow-Stem Augers	Number of Samples: Disturbed 5 — Undisturbed - — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ NE — Completion ▼ NE — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Ronald Stidham
Sampler: 2-inch OD Split Spoon	Field Engineer: Amber Ganapathy
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+43.5	ASPHALT (6.5 inches thick)	0						Cored through pavement with a 6 inch core bit. Began drilling at 11:10.
	+43.0	CONCRETE (8.5 inches thick)	1						
	+42.3	*AGGREGATE SUBBASE*, Brown, fine, GRAVEL WITH SAND FILL, trace clay, medium dense, moist (GW)							
	+42.0	*FILL*, Brown, fine to coarse, CLAYEY SAND FILL, trace fine gravel, contains asphalt and brick, medium dense, moist (SC)	2	S1	SS	14	18 6 11 8	17	SS 1.5 to 3.5 ft Collected Bulk Sample B-1 from 2 to 5 ft.
	+40.0		3						
	+39.9	ASPHALT (1 inch thick)							
	+39.8	BRICK (1 inch thick)	4						Augered to 3.5 ft.
		FILL, Brown, fine to coarse, SAND WITH CLAY FILL, trace fine gravel, contains asphalt and brick, medium dense, moist (SC)		S2	SS	12	6 4 10 6	14	SS 3.5 to 5.5 ft
	+38.0		5						
	+37.8	BRICK (3 inches thick)							Augered to 5.5 ft.
		FILL, Brown, fine to coarse, SAND WITH CLAY AND GRAVEL FILL, contains brick, loose, moist (SC)	6	S3	SS	8	5 4 3	7	SS 5.5 to 7 ft
	+36.5		7						
		FILL, Gray, CLAY, medium stiff, moist (CH)							Augered to 7 ft.
	+36.0	*FILL*, Beige, fine to coarse, CLAYEY SAND, medium dense, moist (SC)	8	S4	SS	18	2 5 10	15	SS 7 to 8.5 ft q_u=3.0 tsf at 7 ft
	+35.0								
		TERRACE DEPOSIT, Brown, fine, CLAYEY SAND, medium dense, moist (SC)	9	S5	SS	16	4 9 10	19	Augered to 8.5 ft. SS 8.5 to 10 ft
	+33.5		10						
		End of Boring at 10 ft Boring Location Coordinates: Lat = 38.865265 Long = -77.057246	11						Completed drilling at 11:45. Borehole caved at 8 ft after auger removal. Groundwater not encountered during drilling. Borehole backfilled with soil cuttings and surface patched with asphalt upon completion. Pavement Summary: *Surface Course*: fair condition (3 in) *Base Course*: good condition (3.5 in) *Concrete Layer*: good condition (8.5 in)
			12						
			13						
			14						
			15						
			16						

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Log of Boring **LB-8** Sheet 1 of 2

Project: Army Navy Drive Complete Streets Project	Project No.: 270060005
Location: Arlington, Virginia	Elevation and Datum: Approx. el 41.3 (NAVD88)
Drilling Company: Free State Drilling	Date Started: 4/3/20 — Date Finished: 4/3/20
Drilling Equipment: CME-55 Track-Mounted Drill Rig	Completion Depth: 25 ft — Rock Depth: Not Encountered
Size and Type of Bit: 2-1/4-inch Hollow-Stem Augers	Number of Samples: Disturbed 8 — Undisturbed - — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ NE — Completion ▼ NE — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Ronald Stidham
Sampler: 2-inch OD Split Spoon	Field Engineer: Amber Ganapathy
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+41.3		0						
	+40.8	ASPHALT (6 inches thick)							Cored through pavement with a 6 inch core bit. Began drilling at 09:05.
		CONCRETE (11 inches thick)	1						
	+39.9	*AGGREGATE SUBBASE*, Gray and brown, fine, SANDY GRAVEL FILL, trace clay, medium dense, moist (GW)							
	+39.1	*FILL*, Red-brown, fine to medium, SAND FILL, trace clay, medium dense, moist (SP)	2	S1	SS	10	13 6 6 5	12	SS 1.5 to 3.5 ft
			3						Augered to 3.5 ft.
			4	S2	SS	20	2 10 11 8	21	SS 3.5 to 5.5 ft
	+36.3	BRICK (8 inches thick)	5						
	+35.6		6	S3	SS	6	4 3 2	5	Augered to 5.5 ft. SS 5.5 to 7 ft
		No Recovery - Soil cuttings indicate clayey sand and brick fill, very loose	7	S4	SS	0	1 WOH 1		Augered to 7 ft. SS 7 to 8.5 ft
	+32.8	*FILL*, Brown, CLAY FILL, trace fine to coarse sand, contains asphalt and brick, very soft, moist (CL)	8						Augered to 8.5 ft.
			9	S5	SS	14	1 1 1	2	SS 8.5 to 10 ft q_u=0.75 tsf
			10						Augered to 13.5 ft.
			11						
			12						
			13						
	+27.8	*TERRACE DEPOSIT*, Brown, CLAY, trace fine to coarse sand, very soft, moist (CL)	14	S6	SS	12	WOH WOH 1		SS 13.5 to 15 ft q_u=0.5 tsf
			15						Augered to 18.5 ft.
			16						

\\LANGAN.COM\DATA\AR\DATA0\270060005\PROJECT DATA_DISCIPLINE\GEOTECHNICAL\GINTLOGS\270060005 - ARMY NAVY DRIVE.GPJ ... 4/24/2020 3:50:23 PM ... Report: Log - LANGAN

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Log of Boring **LB-8** Sheet 2 of 2

Project	Project No.
Army Navy Drive Complete Streets Project	270060005
Location	**Elevation and Datum**
Arlington, Virginia	Approx. el 41.3 (NAVD88)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+25.3		16					10 20 30 40	
			17						
			18						
	+22.8	*TERRACE DEPOSIT*, Brown, fine to medium, SAND, trace fine to coarse gravel and clay, medium dense, moist (SP)	19	S7	SS	12	7 7 6	13	SS 18.5 to 20 ft
			20						Augered to 23.5 ft.
			21						
			22						
			23						
	+17.8	*TERRACE DEPOSIT*, Red-brown, fine to coarse, GRAVELLY SAND, trace clay, medium dense, moist (GW)	24	S8	SS	12	7 10 17	27	SS 23.5 to 25 ft
	+16.3	End of Boring at 25 ft Boring Location Coordinates: Lat = 38.865145 Long = -77.056385	25						Completed drilling at 10:15. Borehole caved at 23.2 ft after auger removal. Groundwater not encountered during drilling. Borehole backfilled with soil cuttings and surface patched with asphalt upon completion. Pavement Summary: *Surface Course*: good condition (3.5 in) *Base Course*: good condition (2.5 in) *Concrete Layer* good condition (11 in)
			26						
			27						
			28						
			29						
			30						
			31						
			32						
			33						
			34						
			35						
			36						

LANGAN

Log of Boring **LB-9** Sheet 1 of 1

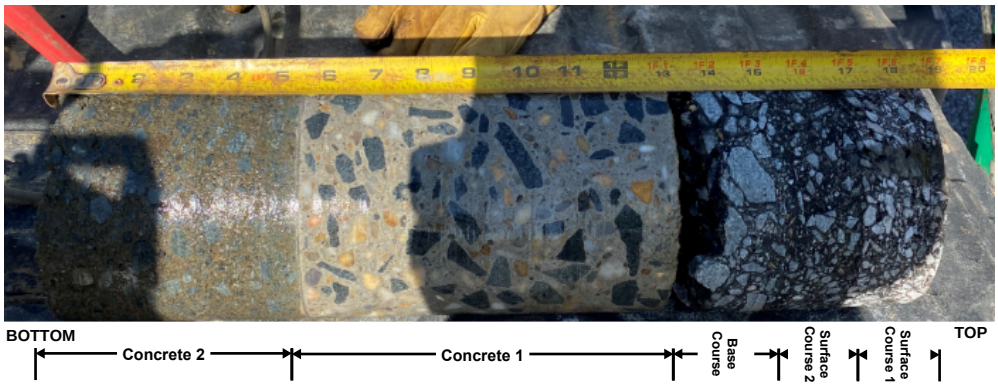
Project: Army Navy Drive Complete Streets Project	Project No.: 270060005
Location: Arlington, Virginia	Elevation and Datum: Approx. el 39.7 (NAVD88)
Drilling Company: Free State Drilling	Date Started: 4/6/20 — Date Finished: 4/6/20
Drilling Equipment: CME-55 Track-Mounted Drill Rig	Completion Depth: 10.5 ft — Rock Depth: Not Encountered
Size and Type of Bit: 2-1/4-inch Hollow-Stem Augers	Number of Samples: Disturbed 5 — Undisturbed - — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ NE — Completion ▼ NE — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Ronald Stidham
Sampler: 2-inch OD Split Spoon	Field Engineer: Amber Ganapathy
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+39.7		0						
	+39.2	ASPHALT (5.5 inches thick)							Cored through pavement with a 6 inch core bit. Began drilling at 12:30.
		CONCRETE (9 inches thick)	1						
	+38.5	*AGGREGATE SUBBASE*, Gray, fine to coarse, GRAVELLY SAND FILL, medium dense, moist (GW)	2	S1	SS	16	20 15 12 10	27	SS 1.3 to 3.3 ft Collected Bulk Sample B-1 from 2 to 5 ft.
	+36.7	BRICK (16 inches thick)	3						Augered to 3.5 ft; grinding at 3 ft.
	+35.4	*FILL*, Brown, fine to coarse, SAND WITH CLAY FILL, trace fine gravel, contains brick and cinders, medium dense, moist (SC)	4	S2	SS	16	12 18 10 7	28	SS 3.5 to 5.5 ft
		FILL, Brown, fine to medium, SAND WITH CLAY FILL, medium dense, moist (SC)	5						Augered to 5.5 ft. SS 5.5 to 7.5 ft
			6	S3	SS	20	7 8 10 10	18	
	+32.2	BRICK (6 inches thick)	7						Augered to 7.5 ft. SS 7.5 to 9 ft
	+31.7	*TERRACE DEPOSIT*, Light brown, fine to medium, SAND FILL, trace clay, medium dense, moist (SP)	8	S4	SS	16	5 6 9	15	
		TERRACE DEPOSIT, Light brown, fine to medium, SAND FILL, trace silt, medium dense, moist (SP)	9	S5	SS	16	5 9 10	19	Augered to 9 ft; rig chatter at 8 ft. SS 9 to 10.5 ft
	+29.2	End of Boring at 10.5 ft	10						Completed drilling at 13:15. Borehole caved at 8.5 ft after auger removal. Groundwater not encountered during drilling. Borehole backfilled with soil cuttings and surface patched with asphalt upon completion.
		Boring Location Cordinates: Lat = 38.864921 Long = -77.055275	11						Pavement Summary: *Surface Course* good condition (2 in) *Base Course* good condition (3 in) *Concrete Layer* good condition (9 in)
			12						
			13						
			14						
			15						
			16						

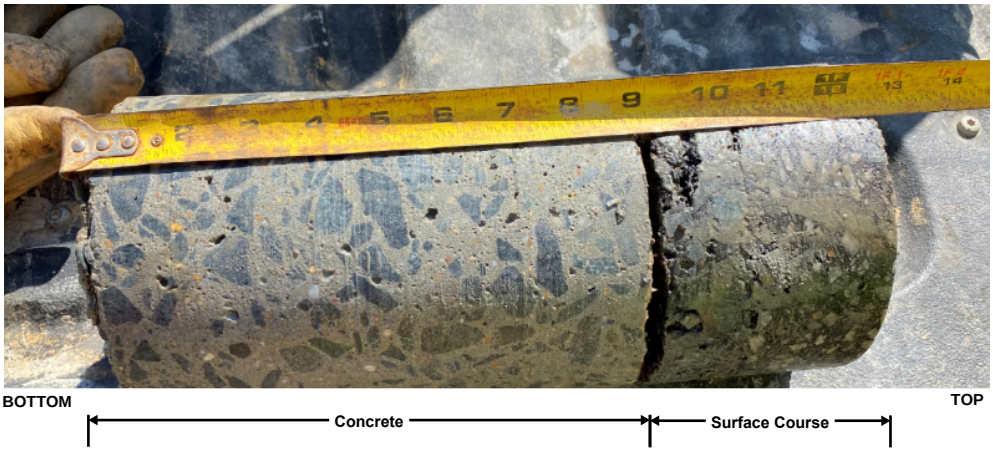
\\LANGAN.COM\DATA\VAR\DATA0\270060005\PROJECT DATA_DISCIPLINE\GEOTECHNICAL\GINTLOGS\270060005 - ARMY NAVY DRIVE.GPJ ... 4/24/2020 3:50:30 PM ... Report: Log - LANGAN

Appendix C

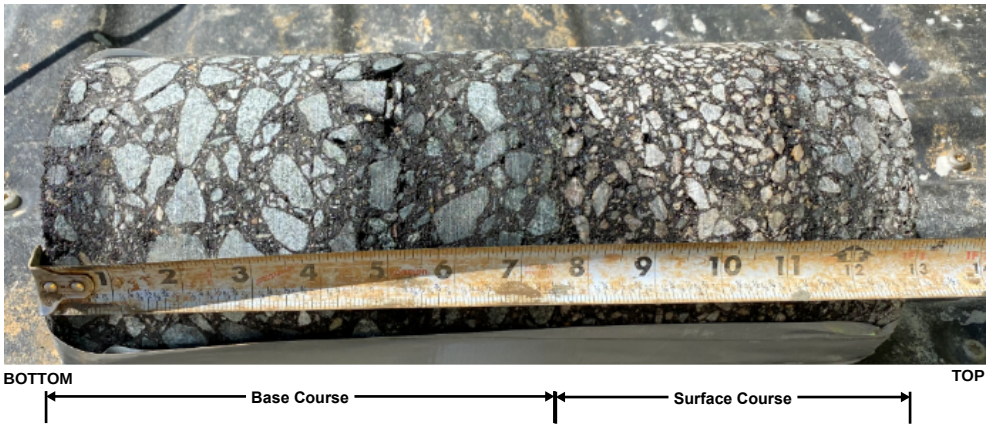
Pavement Core Photographic Log


BOTTOM
TOP
Concrete 2
Concrete 1
Base Course
Surface Course 2
Surface Course 1

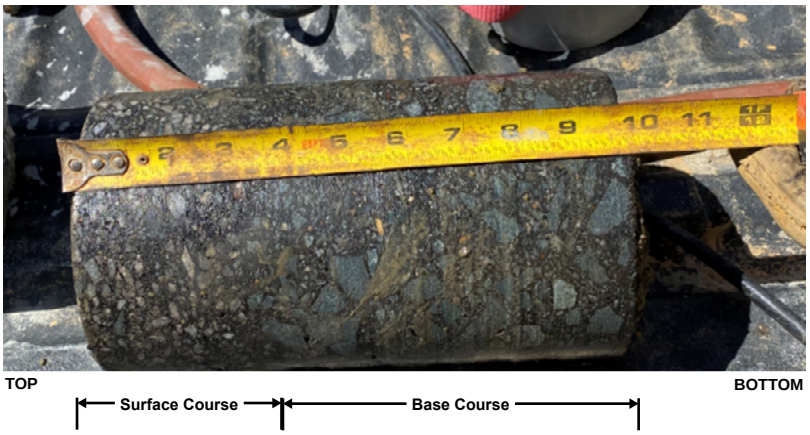
LB-1


BOTTOM
TOP
Concrete
Surface Course

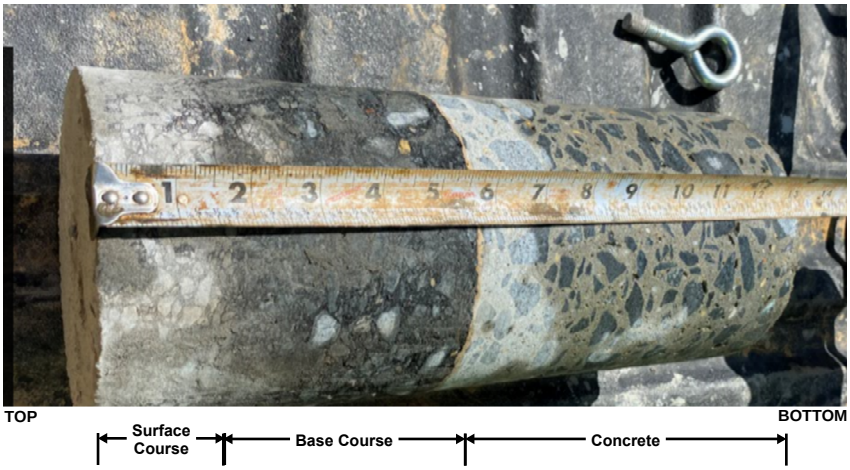
LB-2


BOTTOM
TOP
Base Course
Surface Course

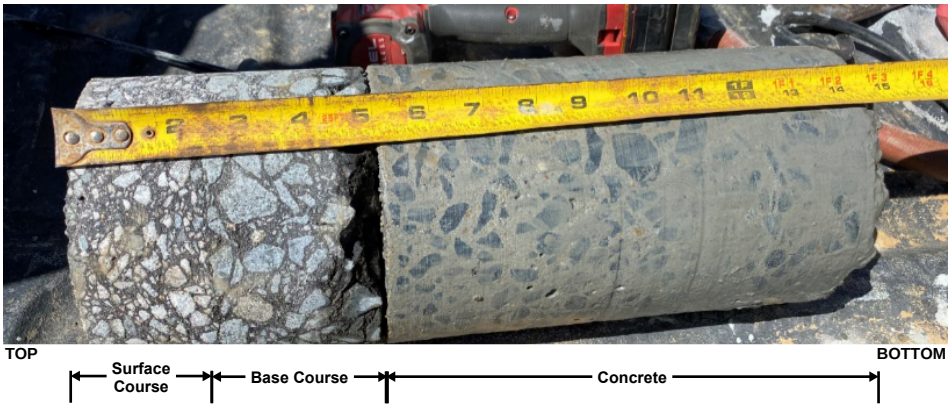
LB-3


TOP
BOTTOM
Surface Course
Base Course

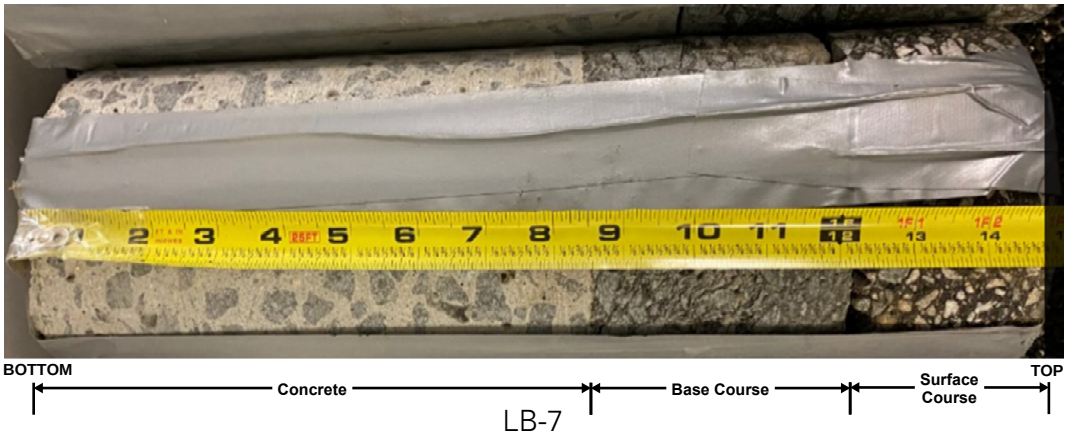
LB-4


TOP
BOTTOM
Surface Course
Base Course
Concrete

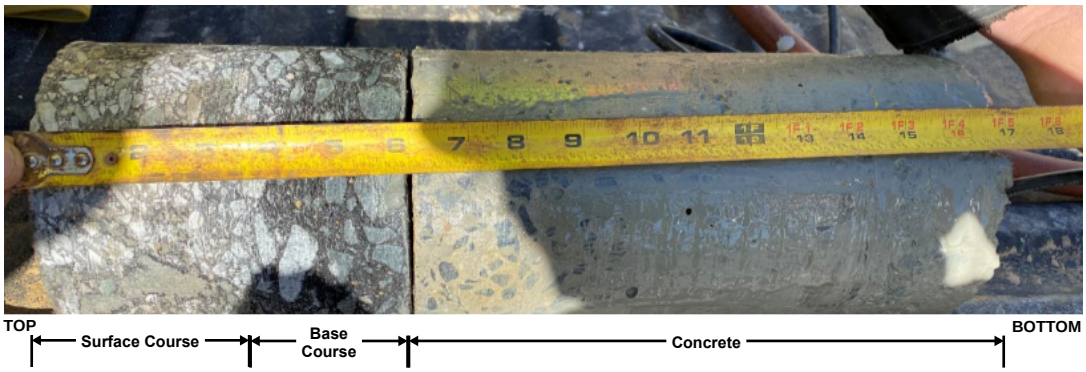
LB-5


TOP
BOTTOM
Surface Course
Base Course
Concrete

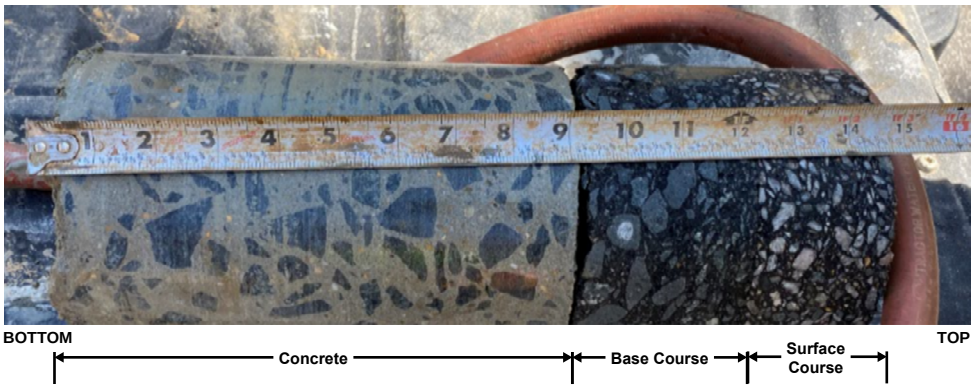
LB-6


BOTTOM
Concrete
Base Course
Surface Course
TOP

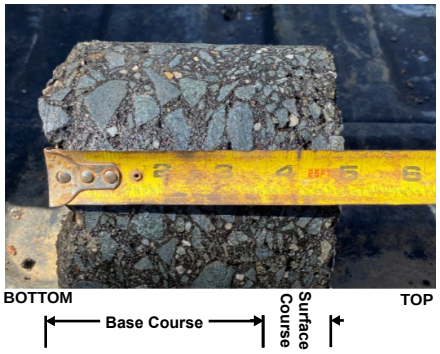
LB-7


TOP
Surface Course
Base Course
Concrete
BOTTOM

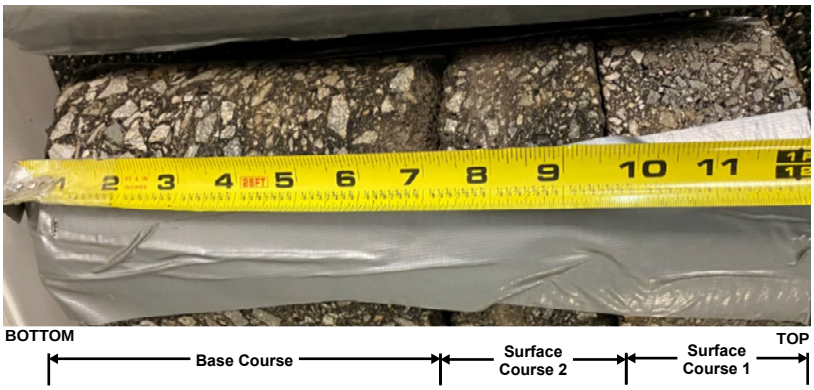
LB-8


BOTTOM
Concrete
Base Course
Surface Course
TOP

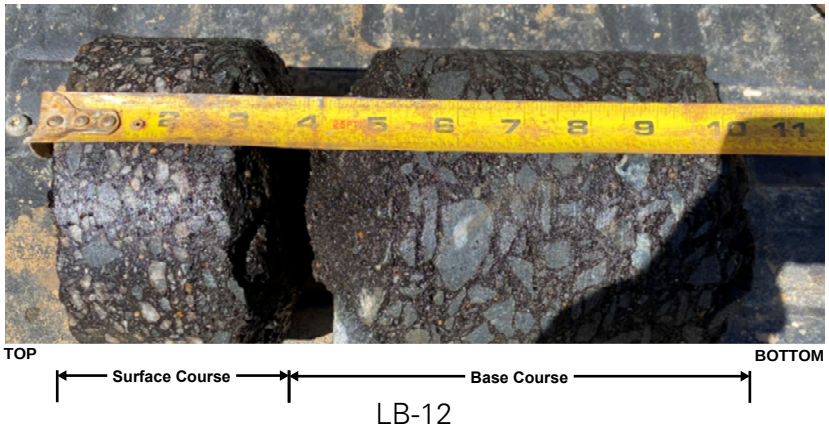
LB-9



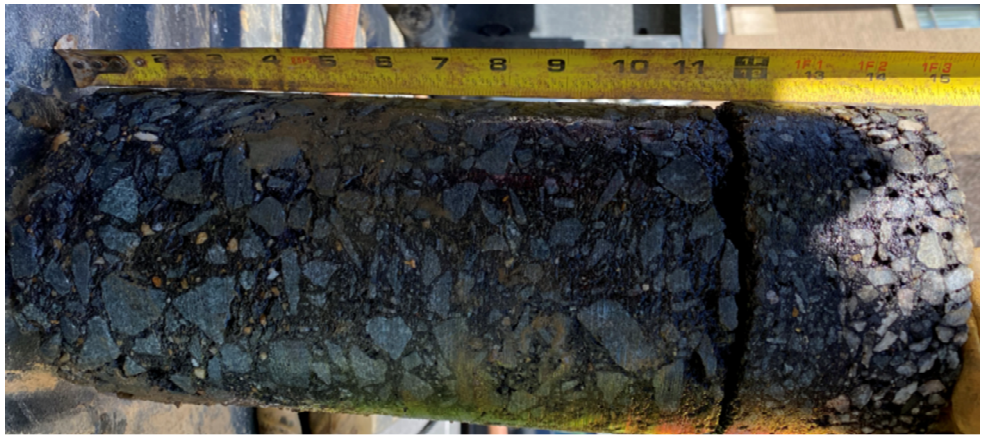
LB-10



LB-11



LB-12


BOTTOM
TOP
Base Course
Surface Course

LB-13


BOTTOM
TOP
Base Course
Surface Course

LB-14

Appendix D

Laboratory Test Data

SUMMARY OF LABORATORY TESTING

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

PROJECT NO.	270060005	**SAMPLE DATE**	-	**JAY KAY TESTING, INC.**
SAMPLES:	90	**LOCATION:**	*Arlington, VA*	5233 Lehman Road, Suite 110
REPORT:	04/22/20	**REMARKS:**	-	Spring Grove, PA 17362
				Phone: (814) 404-9283

BORING	SAMPLE	DEPTH	MC %	OM %	LL	PL	PI	% FINES	USCS
LB-1	Bulk	2-5	13.5	-	-	-	-	26.6	-
LB-1	S-1	1.5-3.5	18.4	-	-	-	-	-	-
LB-1	S-2	3.5-5.5	15.1	-	-	-	-	-	-
LB-1	S-3	5.5-7.5	17.6	-	-	-	-	-	-
LB-1	S-5	9-10.5	18.6	-	29	17	12	-	-
LB-2	Bulk	2-5	15.0	-	-	-	-	-	-
LB-2	S-1	1-3	16.9	-	-	-	-	-	-
LB-2	S-2	3-5	19.4	-	-	-	-	-	-
LB-2	S-3	5-7	16.1	-	-	-	-	38.6	-
LB-2	S-4	7-8.5	13.5	-	-	-	-	-	-
LB-2	S-5	8.5-10	14.8	-	-	-	-	-	-
LB-3	S-1	1-3	17.2	-	36	24	12	-	-
LB-3	S-2	3-5	14.7	-	-	-	-	-	-
LB-3	S-3	5-7	17.0	-	-	-	-	43.1	-
LB-3	S-4	7-8.5	15.8	-	-	-	-	-	-
LB-3	S-5	8.5-10	20.2	-	-	-	-	-	-
LB-3	S-6	13.5-15	26.1	-	-	-	-	-	-
LB-3	S-7	18.5-20	24.3	-	-	-	-	-	-
LB-3	S-8	23.5-25	11.1	-	-	-	-	11.1	-
LB-4	Bulk	2-5	9.4	-	-	-	-	44.3	-
LB-4	S-1	1-3	14.0	-	-	-	-	-	-
LB-4	S-2	3-5	13.9	-	-	-	-	-	-
LB-4	S-3	5-7	14.5	-	-	-	-	-	-
LB-4	S-4	7-8.5	18.5	-	-	-	-	62.1	-
LB-4	S-5	8.5-10	18.9	-	-	-	-	-	-
LB-5	Bulk	2-5	9.4	-	-	-	-	-	-
LB-5	S-1	1-3	16.4	-	-	-	-	-	-
LB-5	S-2	3-5	7.1	-	-	-	-	-	-
LB-5	S-3	5-7	16.2	-	-	-	-	-	-
LB-5	S-4	7-8.5	17.7	-	-	-	-	-	-
LB-5	S-5	8.5-10	20.2	-	-	-	-	-	-
LB-6	S-1	1.5-3.5	7.4	-	-	-	-	-	-
LB-6	S-2	3.5-5.5	17.4	-	-	-	-	-	-
LB-6	S-3	5.5-7	17.1	-	-	-	-	-	-
LB-6	S-4	7-8.5	14.9	-	-	-	-	-	-

Jay Kay Testing, Inc. (AASHTO-Accredited)

SUMMARY OF LABORATORY TESTING

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

PROJECT NO.	270060005	**SAMPLE DATE**	-	**JAY KAY TESTING, INC.**
SAMPLES:	90	**LOCATION:**	*Arlington, VA*	5233 Lehman Road, Suite 110
REPORT:	04/22/20	**REMARKS:**	-	Spring Grove, PA 17362
				Phone: (814) 404-9283

BORING	SAMPLE	DEPTH	MC %	OM %	LL	PL	PI	% FINES	USCS
LB-6	S-5	8.5-10	19.7	-	-	-	-	-	-
LB-6	S-6 B	13.5-15	15.4	-	-	-	-	-	-
LB-6	S-6 T	13.5-15	21.1	-	-	-	-	-	-
LB-6	S-7	18.5-20	18.5	-	-	-	-	56.5	-
LB-6	S-8	23.5-25	19.0	-	-	-	-	-	-
LB-7	Bulk	2-5	9.3	-	-	-	-	32.3	-
LB-7	S-1	1.5-3.5	13.7	-	-	-	-	44.8	-
LB-7	S-2	3.5-5.5	21.3	-	-	-	-	-	-
LB-7	S-3	5.5-7	12.5	-	-	-	-	-	-
LB-7	S-4	7-8.5	18.6	-	-	-	-	-	-
LB-7	S-5	8.5-10	14.6	-	-	-	-	-	-
LB-8	S-1	1.5-3.5	12.5	-	-	-	-	-	-
LB-8	S-2	3.5-5.5	18.5	-	-	-	-	-	-
LB-8	S-3	5.5-7	10.5	-	-	-	-	-	-
LB-8	S-5	8.5-10	19.2	-	-	-	-	-	-
LB-8	S-6	13.5-15	27.0	-	28	19	9	-	-
LB-8	S-7	18.5-20	15.9	-	-	-	-	-	-
LB-8	S-8	23.5-25	11.4	-	-	-	-	-	-
LB-9	Bulk	2-5	9.8	-	-	-	-	-	-
LB-9	S-1	1.3-3.3	13.3	-	-	-	-	-	-
LB-9	S-2	3.5-5.5	15.1	-	-	-	-	-	-
LB-9	S-3	5.5-7.5	10.3	-	-	-	-	33.7	-
LB-9	S-4	7-8.5	6.9	-	-	-	-	-	-
LB-9	S-5	8.5-10	7.8	-	-	-	-	-	-
LB-10	S-1	1-3	13.0	-	-	-	-	-	-
LB-10	S-2	3-5	8.5	-	-	-	-	-	-
LB-10	S-3	5-7	8.0	-	-	-	-	-	-
LB-10	S-5	8.5-10	4.5	-	-	-	-	-	-
LB-10	S-6	13.5-15	13.9	-	-	-	-	-	-
LB-10	S-7	18.5-20	19.0	-	-	-	-	-	-
LB-10	S-8	23.5-25	6.0	-	-	-	-	-	-
LB-11	Bulk	1-3	14.7	-	-	-	-	51.3	-
LB-11	S-1	1-3	11.6	-	-	-	-	24.3	-
LB-11	S-2	3-5	10.6	-	-	-	-	-	-
LB-11	S-3	5-7	7.4	-	-	-	-	-	-

Jay Kay Testing, Inc. (AASHTO-Accredited)

SUMMARY OF LABORATORY TESTING

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

PROJECT NO.	270060005	**SAMPLE DATE**	-	**JAY KAY TESTING, INC.**
SAMPLES:	90	**LOCATION:**	*Arlington, VA*	5233 Lehman Road, Suite 110
REPORT:	04/22/20	**REMARKS:**	-	Spring Grove, PA 17362
				Phone: (814) 404-9283

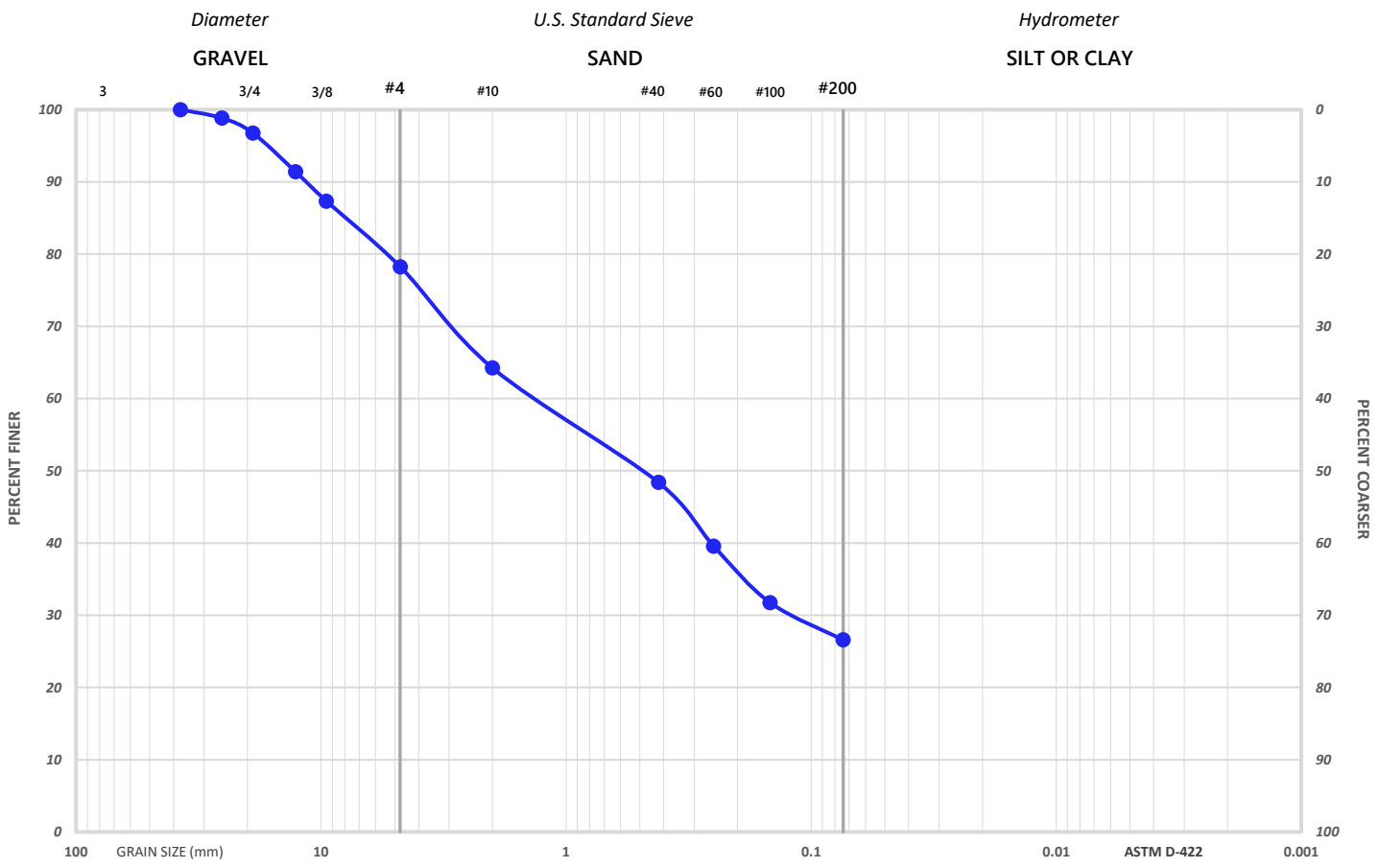
BORING	SAMPLE	DEPTH	MC %	OM %	LL	PL	PI	% FINES	USCS
LB-11	S-4	7-9	4.0	-	-	-	-	5.1	-
LB-11	S-5	9-10.5	6.1	-	-	-	-	-	-
LB-12	Bulk	1-5	4.5	-	-	-	-	-	-
LB-12	S-1	1-3	8.2	-	-	-	-	-	-
LB-12	S-2	3-5	10.9	-	-	-	-	-	-
LB-12	S-3	5-7	8.7	-	-	-	-	-	-
LB-12	S-4	7-8.5	10.4	-	-	-	-	-	-
LB-12	S-5	8.5-10	14.0	-	-	-	-	-	-
LB-13	Bulk	1-5	5.7	-	-	-	-	28.3	-
LB-13	S-1	1-3	8.4	-	-	-	-	-	-
LB-13	S-2	3-5	11.0	-	-	-	-	-	-
LB-13	S-3	5-7	15.0	-	-	-	-	-	-
LB-13	S-4	7-8.5	14.7	-	-	-	-	-	-
LB-13	S-5	8.5-10	23.7	-	-	-	-	-	-
LB-14	Bulk	1-5	4.5	-	-	-	-	24.2	-
LB-14	S-1	1-3	9.4	-	-	-	-	-	-
LB-14	S-2	3-5	17.2	-	-	-	-	55.1	-
LB-14	S-3	5-7	13.3	-	-	-	-	-	-
LB-14	S-4	7-8.5	15.9	-	-	-	-	-	-
LB-14	S-5	8.5-10	15.4	-	-	-	-	-	-

Jay Kay Testing, Inc. (AASHTO-Accredited)

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

Boring:	**LB-1**	Project No.:	270060005	
Sample:	**Bulk**	Sample Date:	-	
Depth:	**2-5'**	Location:	*Arlington, VA*	

JAY KAY TESTING, INC.
5233 Lehman Road, Suite 110
Spring Grove, PA 17362
Phone: (814) 404-9283



GRAIN SIZE ANALYSIS

Diameter	75.0	50.8	37.5	25.4	19.0	12.7	9.51	4.75	2.0	0.42	0.25	0.147	0.074
Sieve Size	3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#40	#60	#100	**# 200**
% Passing	-	-	100.0	98.8	96.8	91.4	87.3	78.2	64.2	48.4	39.6	31.7	**26.6**

% GRAVEL	% SAND	*Coarse Gravel*	*Fine Gravel*	*Coarse Sand*	*Medium Sand*	*Fine Sand*	CC	CU
21.8	**51.6**	3.2	18.6	14.0	15.8	21.8	-	-

Moisture Content	13.5	Organic Content	-
pH	-	Other	-

ATTERBERG LIMITS

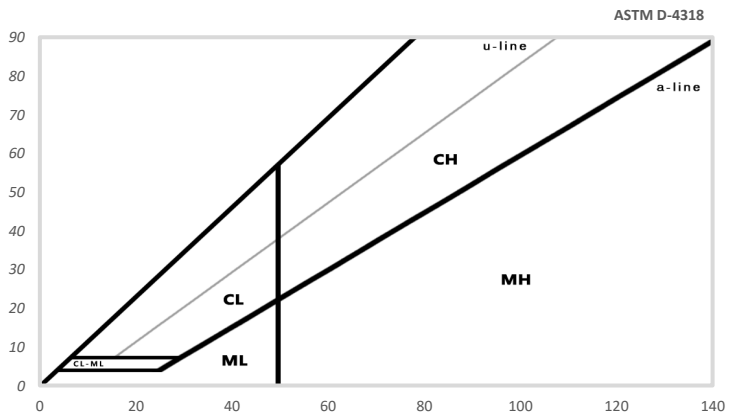
Liquid Limit	-
Plastic Limit	-
Plasticity Index	-

CLASSIFICATION

AASHTO	-
USCS	-

VISUAL SOIL DESCRIPTION

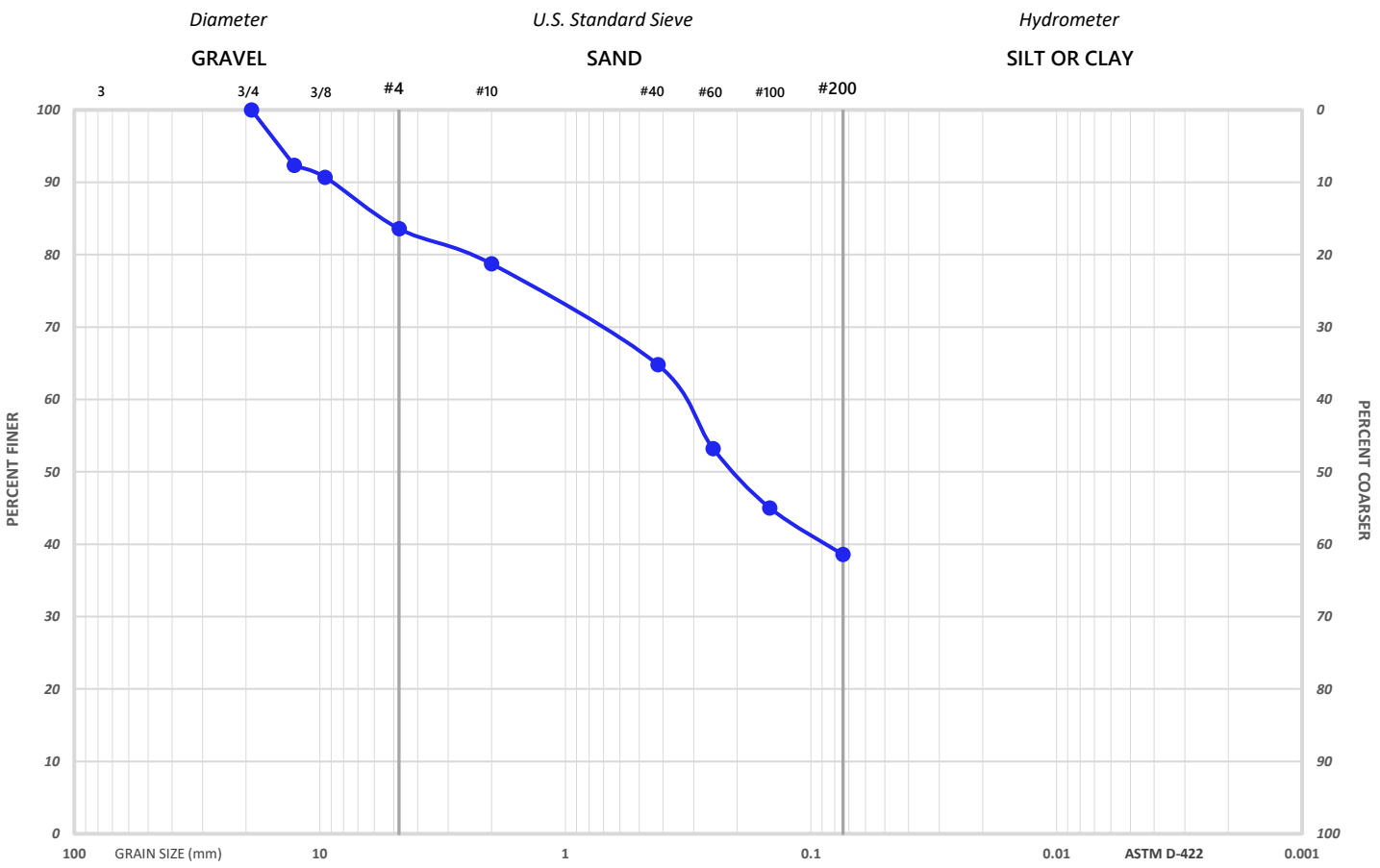
Brown clayey SAND with gravel



ARMY NAVY DRIVE COMPLETE STREETS PROJECT

Boring:	**LB-2**	Project No.:	270060005
Sample:	**S-3**	Sample Date:	-
Depth:	**5-7'**	Location:	*Arlington, VA*

JAY KAY TESTING, INC.
5233 Lehman Road, Suite 110
Spring Grove, PA 17362
Phone: (814) 404-9283



GRAIN SIZE ANALYSIS

Diameter	75.0	50.8	37.5	25.4	19.0	12.7	9.51	4.75	2.0	0.42	0.25	0.147	0.074
Sieve Size	3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#40	#60	#100	**# 200**
% Passing	-	-	-	-	100.0	92.3	90.7	83.6	78.7	64.8	53.2	45.0	**38.6**

% GRAVEL	% SAND	*Coarse Gravel*	*Fine Gravel*	*Coarse Sand*	*Medium Sand*	*Fine Sand*	CC	CU
16.4	**45.0**	-	16.4	4.9	13.9	26.2	-	-

Moisture Content	16.1	Organic Content	-
pH	-	Other	-

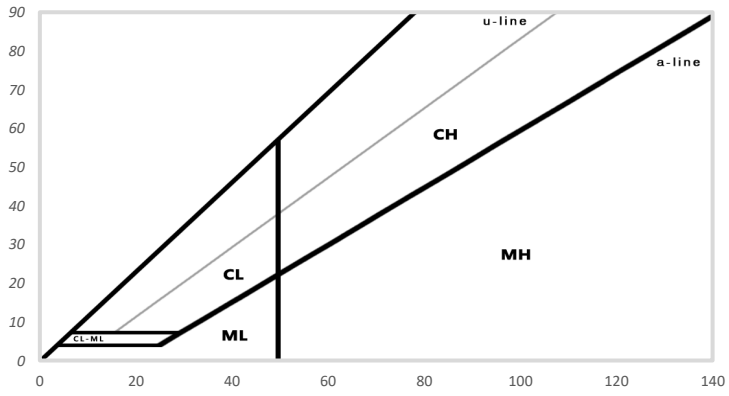
ATTERBERG LIMITS

Liquid Limit	-
Plastic Limit	-
Plasticity Index	-

CLASSIFICATION

AASHTO	-
USCS	-

ASTM D-4318



VISUAL SOIL DESCRIPTION

Brown clayey SAND with gravel

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

Boring:	**LB-3**	Project No.:	270060005
Sample:	**S-3**	Sample Date:	-
Depth:	**5-7'**	Location:	*Arlington, VA*

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5233 Lehman Road, Suite 110
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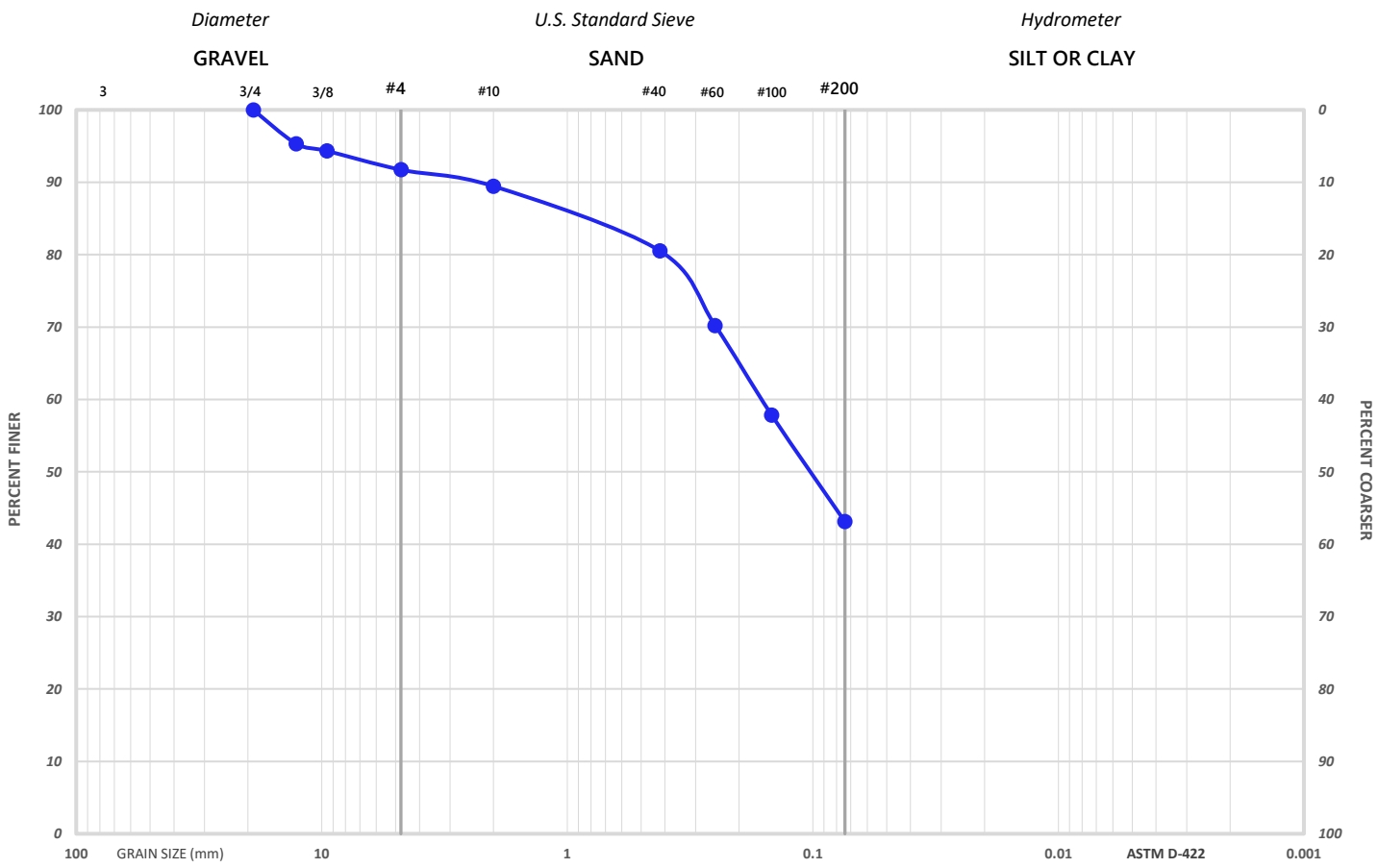
Phone: (814) 404-9283



GRAIN SIZE ANALYSIS

Diameter	75.0	50.8	37.5	25.4	19.0	12.7	9.51	4.75	2.0	0.42	0.25	0.147	0.074
Sieve Size	3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#40	#60	#100	**# 200**
% Passing	-	-	-	-	100.0	95.3	94.3	91.7	89.5	80.5	70.2	57.8	**43.1**

% GRAVEL	% SAND	*Coarse Gravel*	*Fine Gravel*	*Coarse Sand*	*Medium Sand*	*Fine Sand*	CC	CU
8.3	**48.6**	-	8.3	2.2	9.0	37.4	-	-

Moisture Content	17.0	Organic Content	-
pH	-	Other	-

ATTERBERG LIMITS

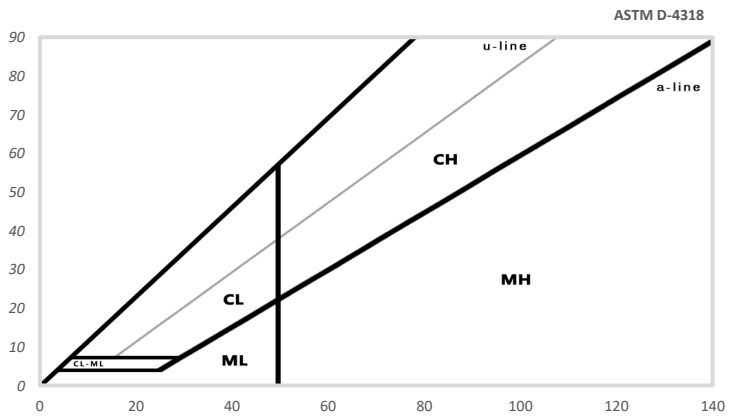
Liquid Limit	-
Plastic Limit	-
Plasticity Index	-

CLASSIFICATION

AASHTO	-
USCS	-

VISUAL SOIL DESCRIPTION

Brown silty SAND



ARMY NAVY DRIVE COMPLETE STREETS PROJECT

Boring:	**LB-3**	Project No.:	270060005
Sample:	**S-8**	Sample Date:	-
Depth:	**23.5-25'**	Location:	*Arlington, VA*

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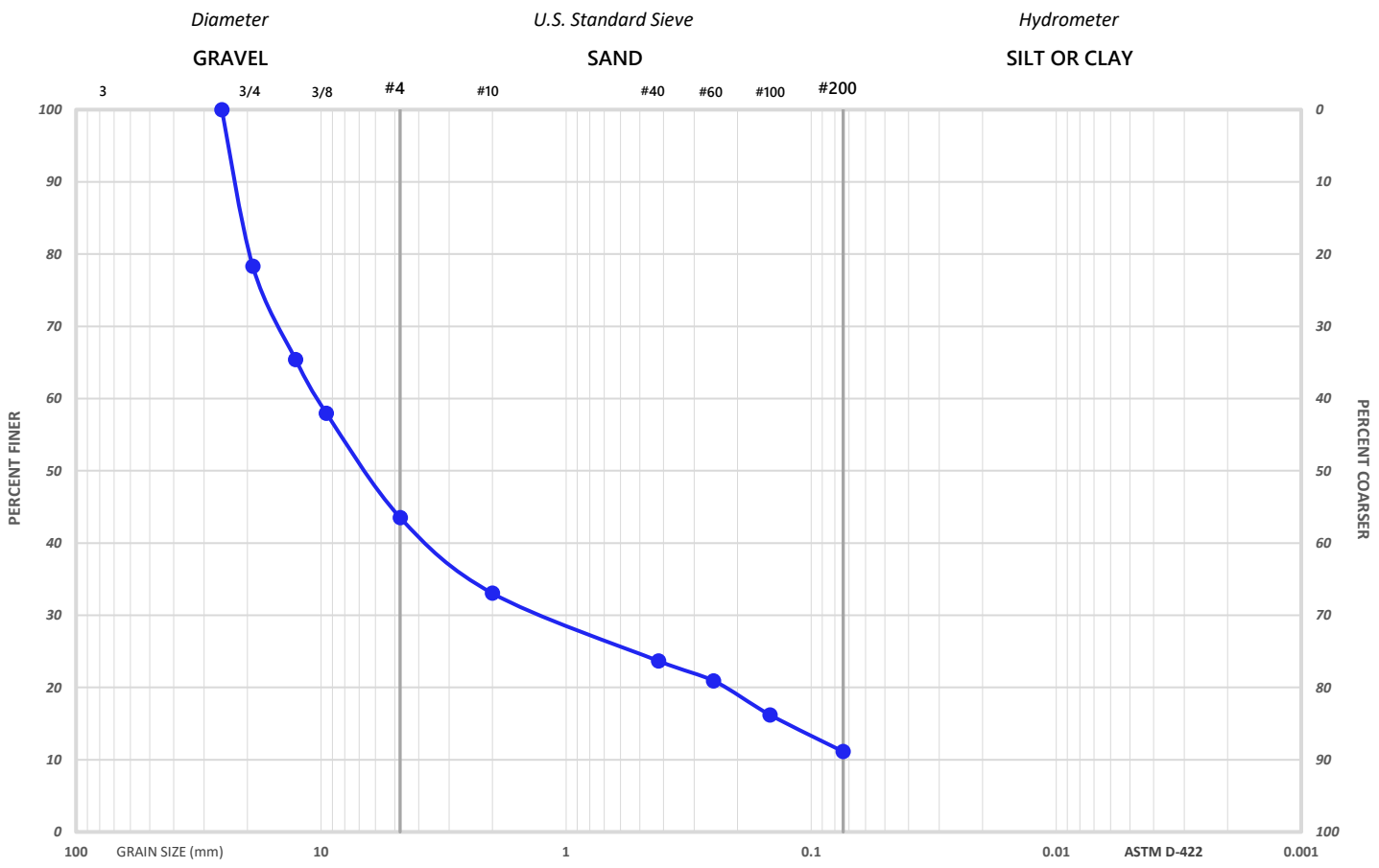


GRAIN SIZE ANALYSIS

Diameter	75.0	50.8	37.5	25.4	19.0	12.7	9.51	4.75	2.0	0.42	0.25	0.147	0.074
Sieve Size	3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#40	#60	#100	**# 200**
% Passing	-	-	-	100.0	78.3	65.4	58.0	43.5	33.0	23.7	20.9	16.2	**11.1**

% GRAVEL	% SAND	*Coarse Gravel*	*Fine Gravel*	*Coarse Sand*	*Medium Sand*	*Fine Sand*	CC	CU
56.5	**32.4**	21.7	34.8	10.5	9.3	12.6	2.72	166.94

Moisture Content	11.1	Organic Content	-
pH	-	Other	-

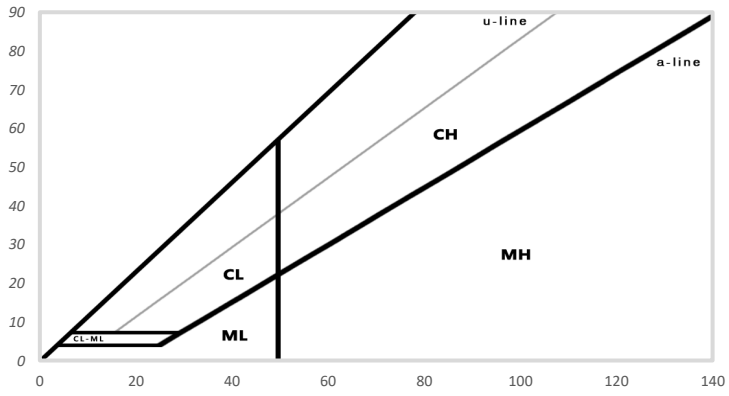
ATTERBERG LIMITS

Liquid Limit	-
Plastic Limit	-
Plasticity Index	-

CLASSIFICATION

AASHTO	-
USCS	-

ASTM D-4318



VISUAL SOIL DESCRIPTION

Brown well graded GRAVEL with silt and sand

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

Boring:	**LB-4**	Project No.:	270060005	
Sample:	**Bulk**	Sample Date:	-	
Depth:	**2-5'**	Location:	*Arlington, VA*	

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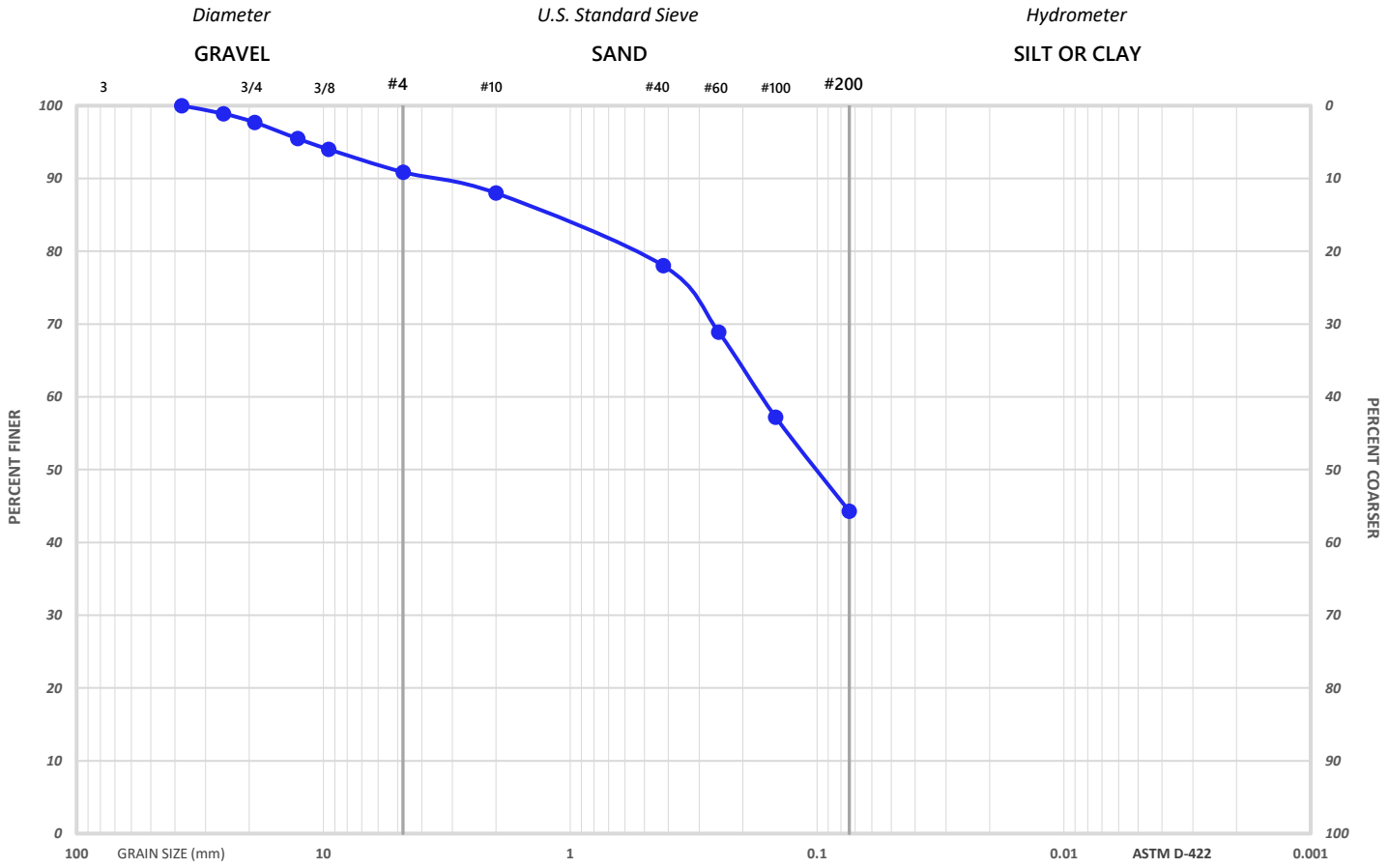
Phone: (814) 404-9283



GRAIN SIZE ANALYSIS

Diameter	75.0	50.8	37.5	25.4	19.0	12.7	9.51	4.75	2.0	0.42	0.25	0.147	0.074
Sieve Size	3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#40	#60	#100	**# 200**
% Passing	-	-	100.0	98.9	97.7	95.5	94.0	90.9	88.0	78.0	68.9	57.2	**44.3**

% GRAVEL	% SAND	*Coarse Gravel*	*Fine Gravel*	*Coarse Sand*	*Medium Sand*	*Fine Sand*	CC	CU
9.1	**46.6**	2.3	6.8	2.9	10.0	33.7	-	-

Moisture Content	9.4	Organic Content	-
pH	-	Other	-

ATTERBERG LIMITS

Liquid Limit	-
Plastic Limit	-
Plasticity Index	-

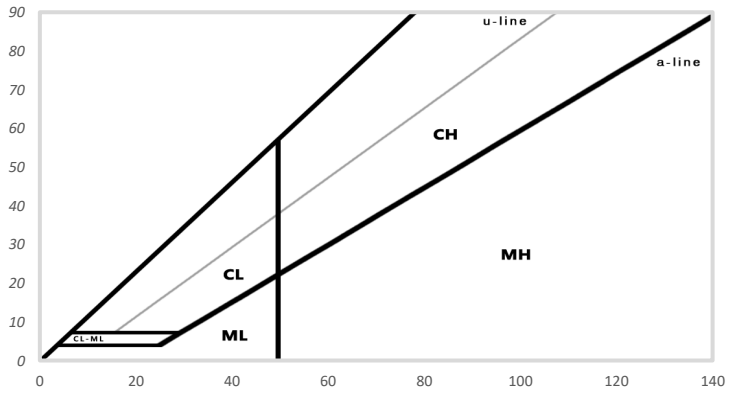
CLASSIFICATION

AASHTO	-
USCS	-

VISUAL SOIL DESCRIPTION

Brown clayey SAND

ASTM D-4318



ARMY NAVY DRIVE COMPLETE STREETS PROJECT

Boring:	**LB-4**	Project No.:	270060005
Sample:	**S-4**	Sample Date:	-
Depth:	**7-8.5'**	Location:	*Arlington, VA*

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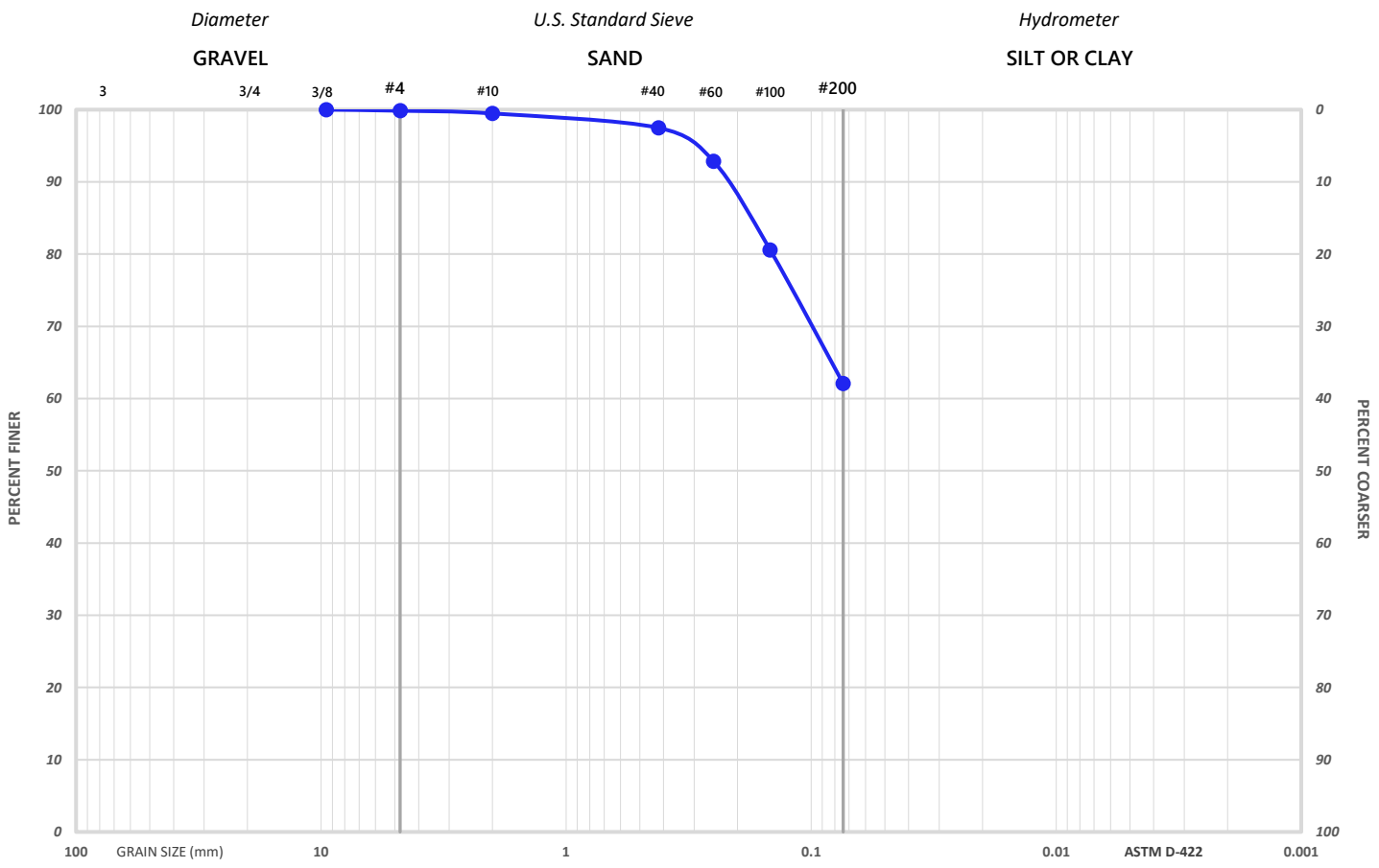
Spring Grove, PA 17362
Phone: (814) 404-9283



GRAIN SIZE ANALYSIS

Diameter	75.0	50.8	37.5	25.4	19.0	12.7	9.51	4.75	2.0	0.42	0.25	0.147	0.074
Sieve Size	3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#40	#60	#100	**# 200**
% Passing	-	-	-	-	-	-	100.0	99.8	99.5	97.5	92.8	80.6	**62.1**

% GRAVEL	% SAND	*Coarse Gravel*	*Fine Gravel*	*Coarse Sand*	*Medium Sand*	*Fine Sand*	CC	CU
0.2	**37.7**	-	0.2	0.3	2.0	35.4	-	-

Moisture Content	18.5	Organic Content	-
pH	-	Other	-

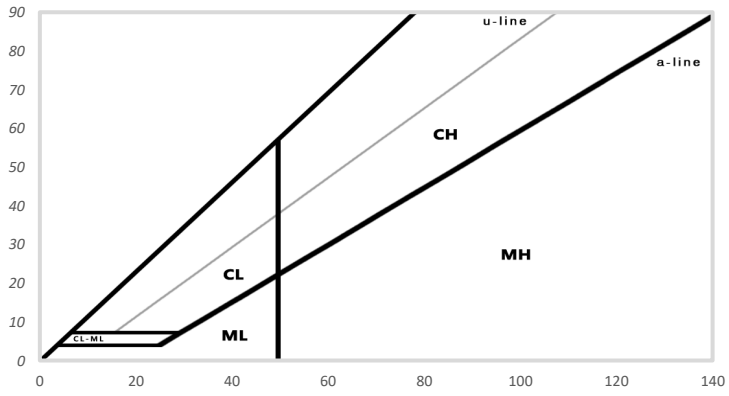
ATTERBERG LIMITS

Liquid Limit	-
Plastic Limit	-
Plasticity Index	-

CLASSIFICATION

AASHTO	-
USCS	-

ASTM D-4318



VISUAL SOIL DESCRIPTION

Brown sandy silt

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

Boring:	**LB-7**	Project No.:	270060005
Sample:	**Bulk**	Sample Date:	-
Depth:	**2-5'**	Location:	*Arlington, VA*

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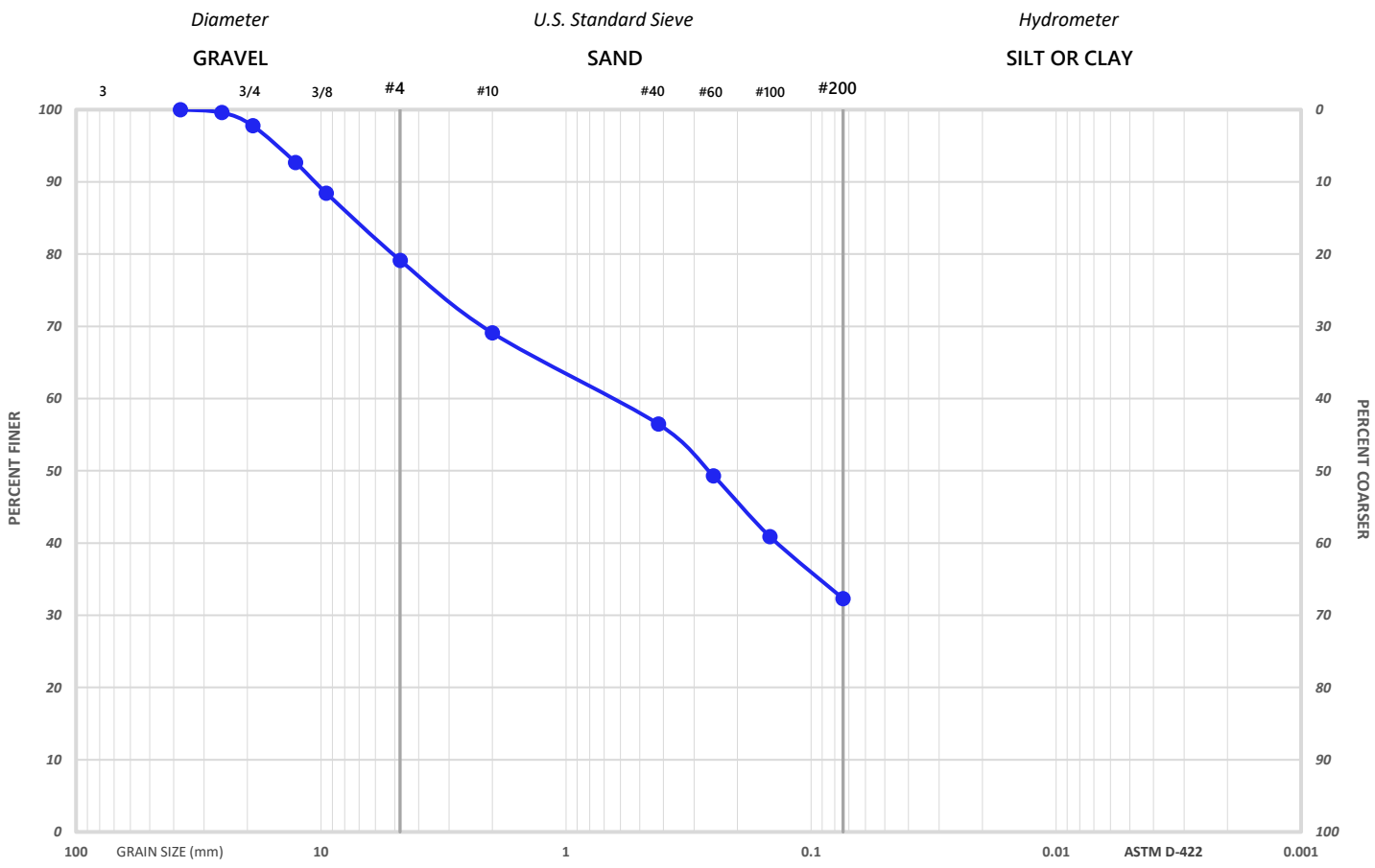
Phone: (814) 404-9283



GRAIN SIZE ANALYSIS

Diameter	75.0	50.8	37.5	25.4	19.0	12.7	9.51	4.75	2.0	0.42	0.25	0.147	0.074
Sieve Size	3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#40	#60	#100	**# 200**
% Passing	-	-	100.0	99.6	97.8	92.7	88.4	79.1	69.1	56.5	49.3	40.9	**32.3**

% GRAVEL	% SAND	*Coarse Gravel*	*Fine Gravel*	*Coarse Sand*	*Medium Sand*	*Fine Sand*	CC	CU
20.9	**46.8**	2.2	18.7	10.0	12.6	24.2	-	-

Moisture Content	9.3	Organic Content	-
pH	-	Other	-

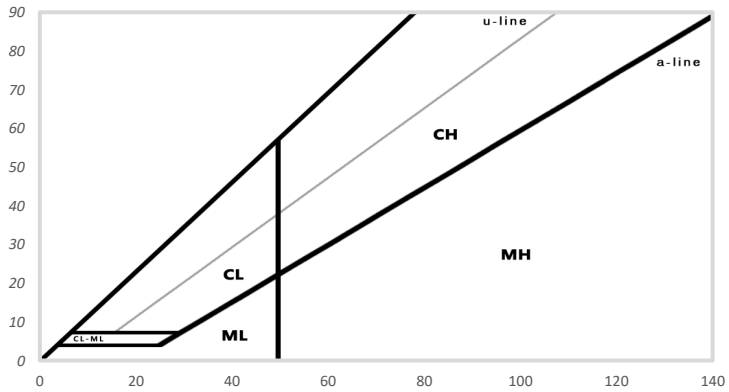
ATTERBERG LIMITS

Liquid Limit	-
Plastic Limit	-
Plasticity Index	-

CLASSIFICATION

AASHTO	-
USCS	-

ASTM D-4318



VISUAL SOIL DESCRIPTION

Dark brown silty SAND with gravel

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

Boring:	**LB-7**	Project No.:	270060005
Sample:	**S-1**	Sample Date:	-
Depth:	**1.5-3.5'**	Location:	*Arlington, VA*

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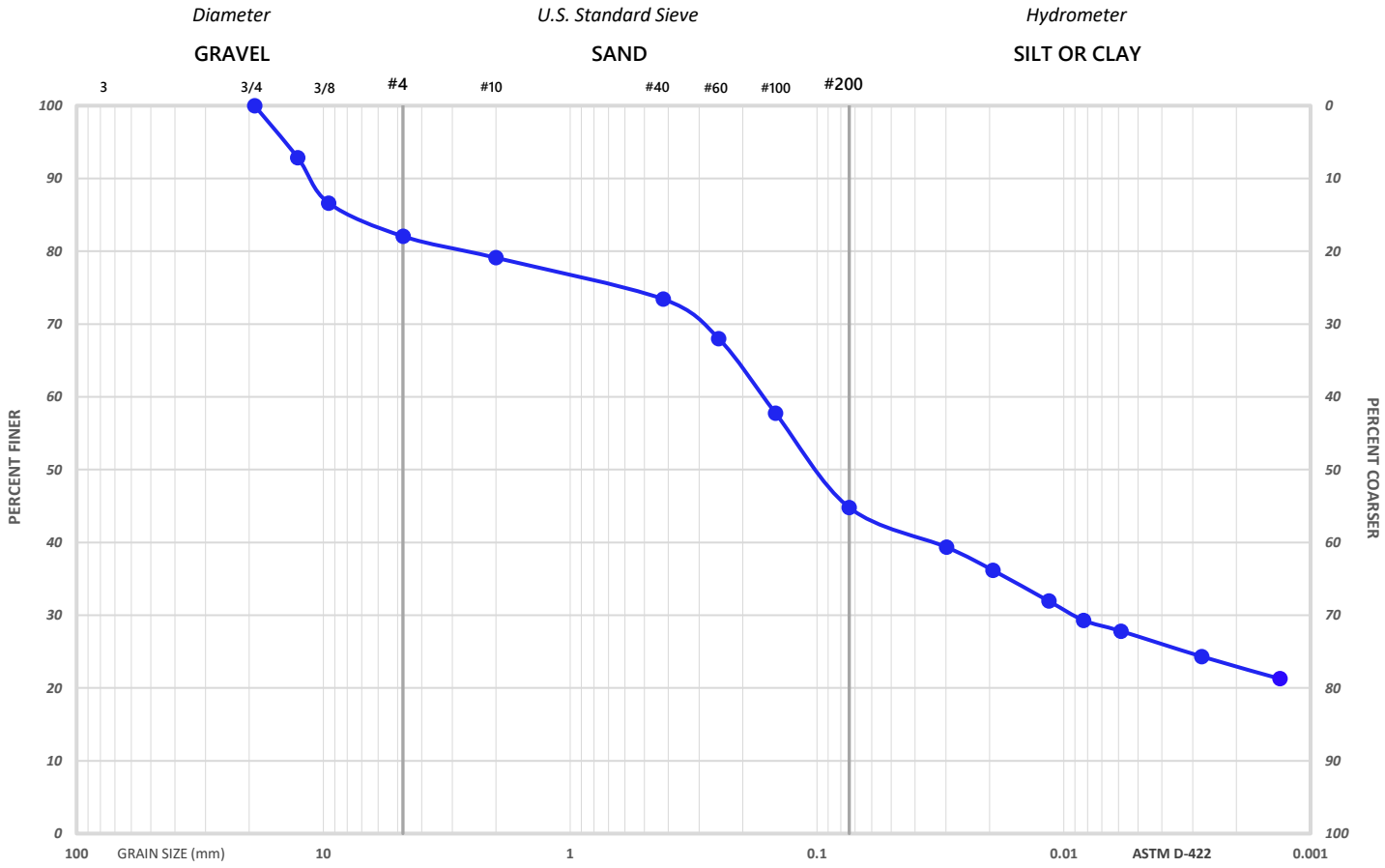
Spring Grove, PA 17362
Phone: (814) 404-9283



GRAIN SIZE ANALYSIS

Diameter	75.0	50.8	37.5	25.4	19.0	12.7	9.51	4.75	2.0	0.42	0.25	0.147	0.074
Sieve Size	3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#40	#60	#100	**# 200**
% Passing	-	-	-	-	100.0	92.8	86.6	82.0	79.1	73.4	68.0	57.7	**44.8**

% GRAVEL	% SAND	*Coarse Gravel*	*Fine Gravel*	*Coarse Sand*	*Medium Sand*	*Fine Sand*	CC	CU
18.0	**37.2**	-	18.0	2.9	5.7	28.6	-	-

Moisture Content	13.7	Organic Content	-
pH	-	Other	-

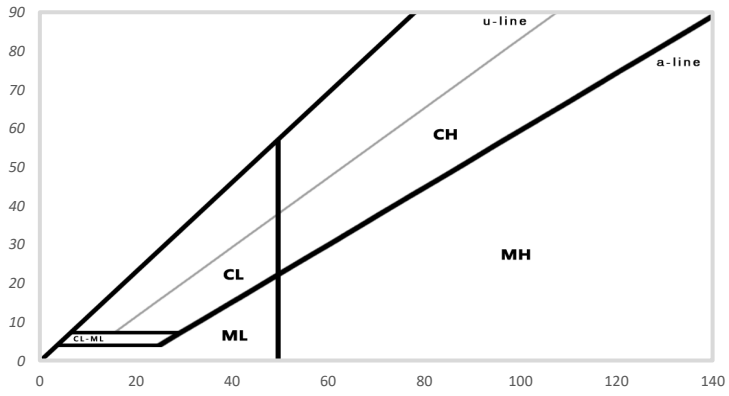
ATTERBERG LIMITS

Liquid Limit	-
Plastic Limit	-
Plasticity Index	-

CLASSIFICATION

AASHTO	-
USCS	-

ASTM D-4318



VISUAL SOIL DESCRIPTION

Brown clayey SAND with gravel

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

Boring:	**LB-9**	Project No.:	270060005	
Sample:	**S-3**	Sample Date:	-	
Depth:	**5.5-7.5'**	Location:	*Arlington, VA*	

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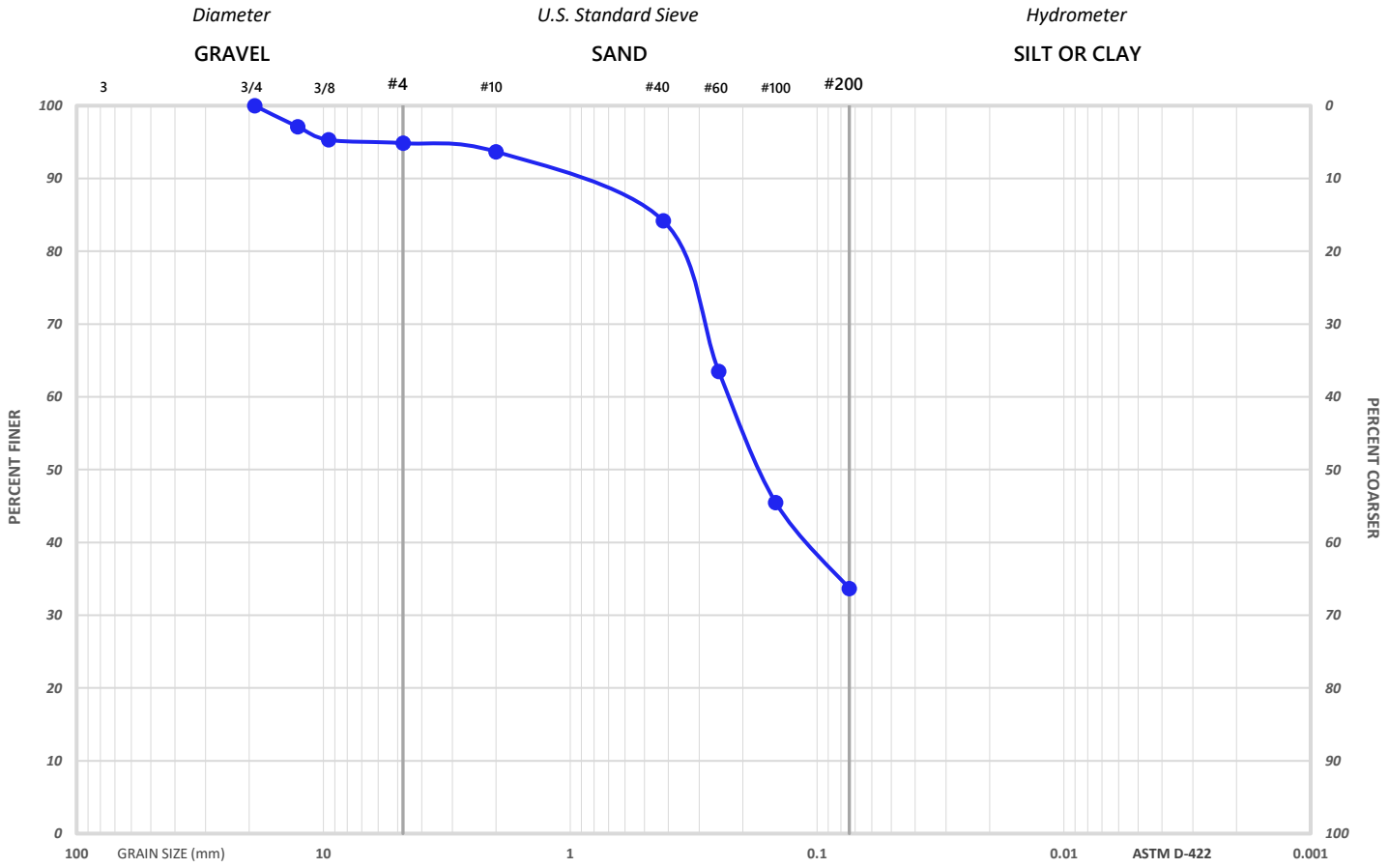
5233 Lehman Road, Suite 110
Spring Grove, PA 17362
Phone: (814) 404-9283



GRAIN SIZE ANALYSIS

Diameter	75.0	50.8	37.5	25.4	19.0	12.7	9.51	4.75	2.0	0.42	0.25	0.147	0.074
Sieve Size	3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#40	#60	#100	**# 200**
% Passing	-	-	-	-	100.0	97.1	95.3	94.8	93.7	84.2	63.5	45.5	**33.7**

% GRAVEL	% SAND	*Coarse Gravel*	*Fine Gravel*	*Coarse Sand*	*Medium Sand*	*Fine Sand*	CC	CU
5.2	**61.1**	-	5.2	1.1	9.5	50.5	-	-

Moisture Content	10.3	Organic Content	-
pH	-	Other	-

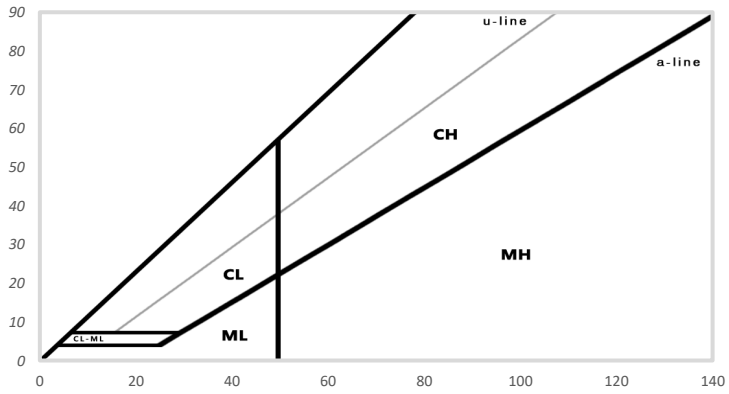
ATTERBERG LIMITS

Liquid Limit	-
Plastic Limit	-
Plasticity Index	-

CLASSIFICATION

AASHTO	-
USCS	-

ASTM D-4318



VISUAL SOIL DESCRIPTION

Brown silty SAND

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

Boring:	**LB-11**	Project No.:	270060005
Sample:	**Bulk**	Sample Date:	-
Depth:	**1-3'**	Location:	*Arlington, VA*

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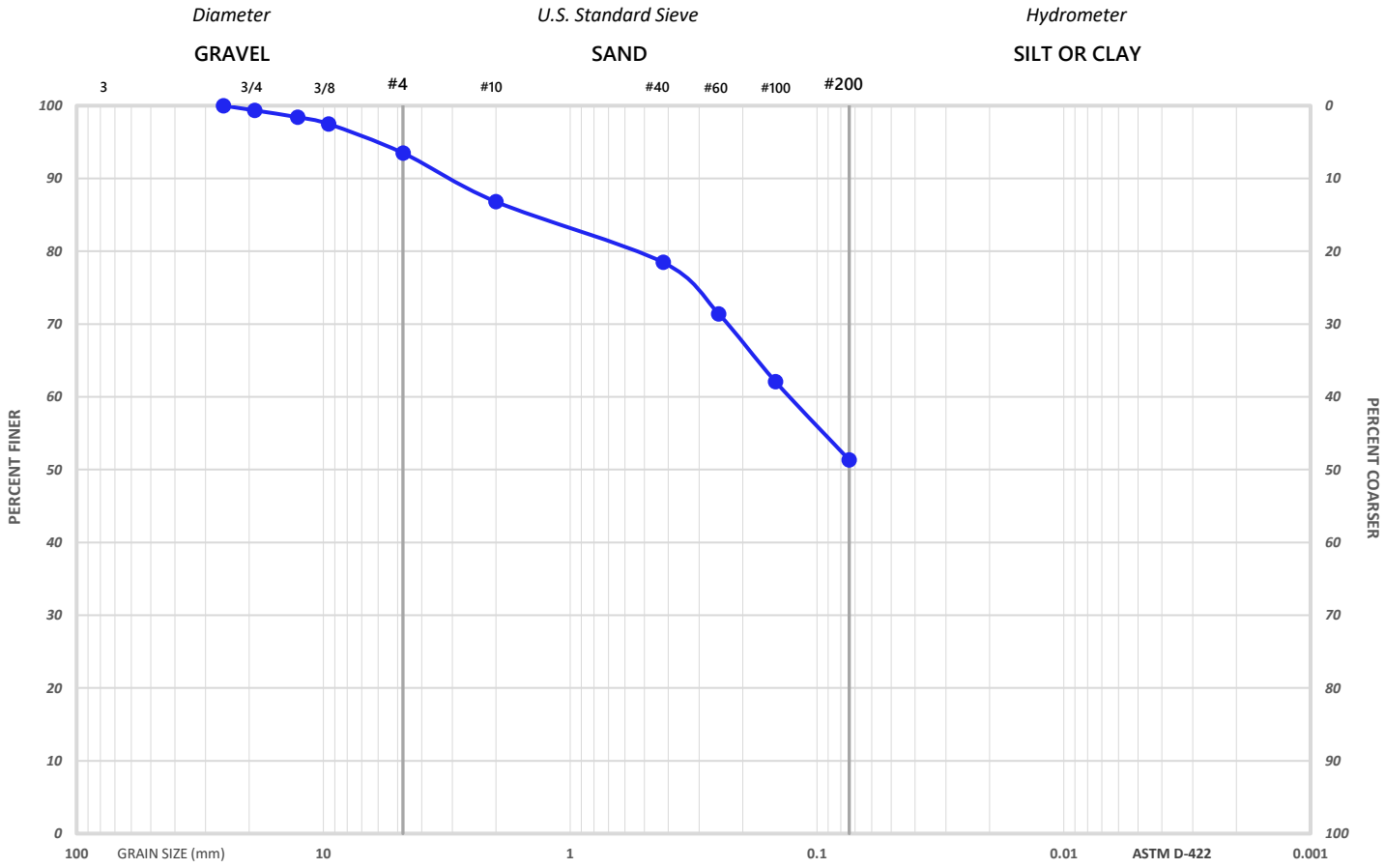
5233 Lehman Road, Suite 110
Spring Grove, PA 17362
Phone: (814) 404-9283



GRAIN SIZE ANALYSIS

Diameter	75.0	50.8	37.5	25.4	19.0	12.7	9.51	4.75	2.0	0.42	0.25	0.147	0.074
Sieve Size	3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#40	#60	#100	**# 200**
% Passing	-	-	-	100.0	99.4	98.4	97.5	93.5	86.8	78.5	71.4	62.1	**51.3**

% GRAVEL	% SAND	*Coarse Gravel*	*Fine Gravel*	*Coarse Sand*	*Medium Sand*	*Fine Sand*	CC	CU
6.5	**42.2**	0.6	5.9	6.7	8.3	27.2	-	-

Moisture Content	14.7	Organic Content	-
pH	-	Other	-

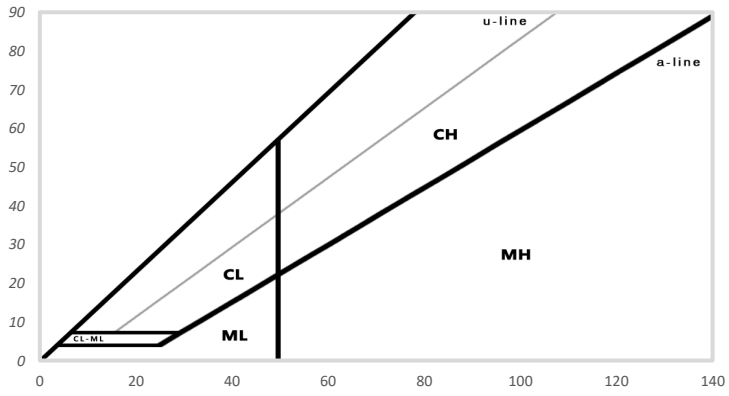
ATTERBERG LIMITS

Liquid Limit	-
Plastic Limit	-
Plasticity Index	-

CLASSIFICATION

AASHTO	-
USCS	-

ASTM D-4318



VISUAL SOIL DESCRIPTION

Dark brown sandy clay

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

Boring:	**LB-11**	Project No.:	270060005	
Sample:	**S-1**	Sample Date:	-	
Depth:	**1-3'**	Location:	*Arlington, VA*	

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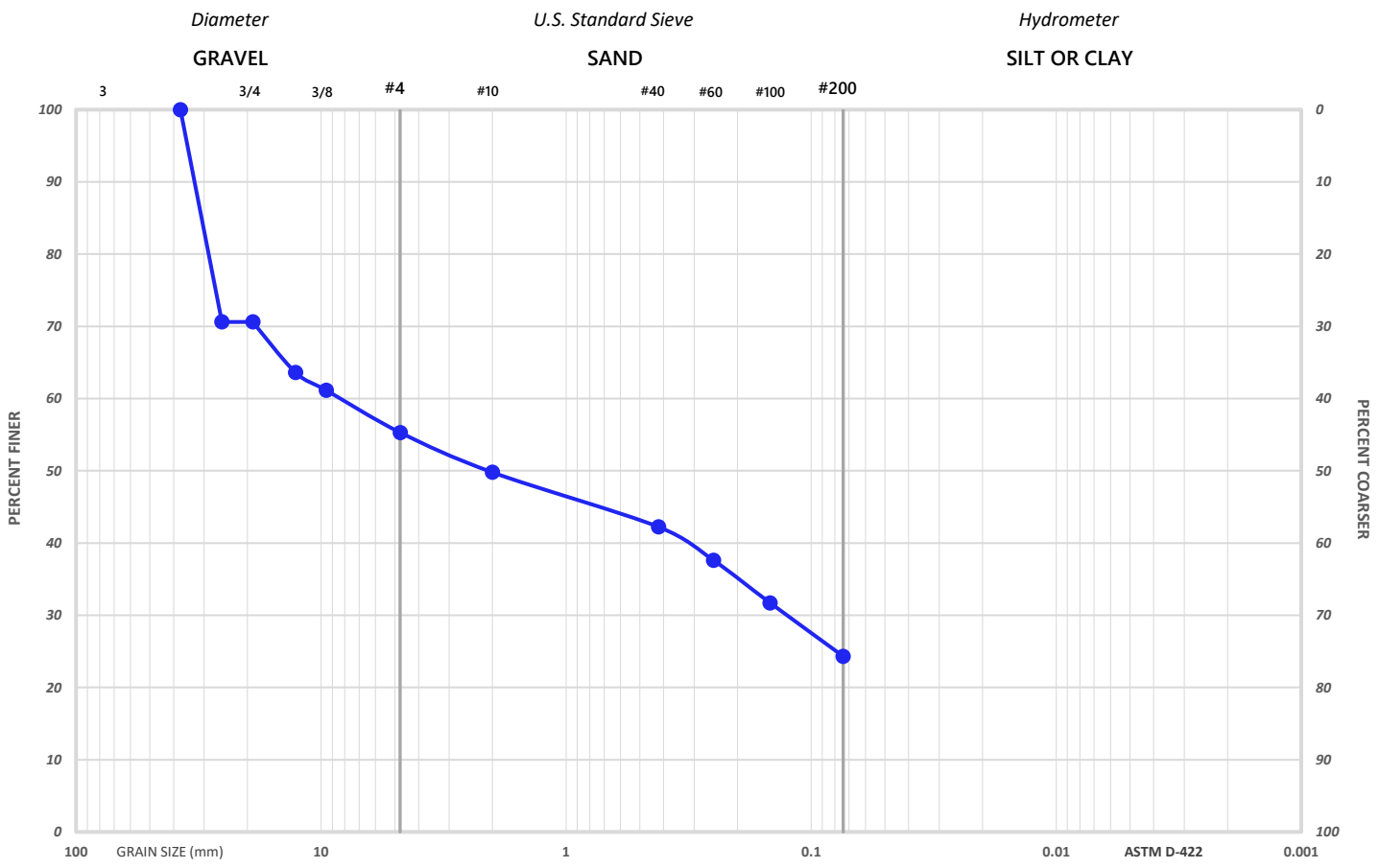


GRAIN SIZE ANALYSIS

Diameter	75.0	50.8	37.5	25.4	19.0	12.7	9.51	4.75	2.0	0.42	0.25	0.147	0.074
Sieve Size	3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#40	#60	#100	**# 200**
% Passing	-	-	100.0	70.6	70.6	63.6	61.1	55.3	49.8	42.2	37.6	31.7	**24.3**

% GRAVEL	% SAND	*Coarse Gravel*	*Fine Gravel*	*Coarse Sand*	*Medium Sand*	*Fine Sand*	CC	CU
44.7	**31.0**	29.4	15.3	5.5	7.6	17.9	-	-

Moisture Content	11.6	Organic Content	-
pH	-	Other	-

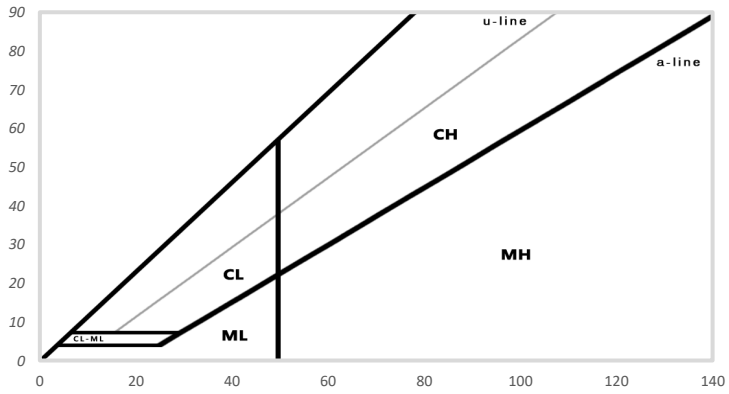
ATTERBERG LIMITS

Liquid Limit	-
Plastic Limit	-
Plasticity Index	-

CLASSIFICATION

AASHTO	-
USCS	-

ASTM D-4318



VISUAL SOIL DESCRIPTION

Reddish-brown silty clayey GRAVEL with sand

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

Boring:	**LB-11**	Project No.:	270060005	
Sample:	**S-4**	Sample Date:	-	
Depth:	**7-9'**	Location:	*Arlington, VA*	

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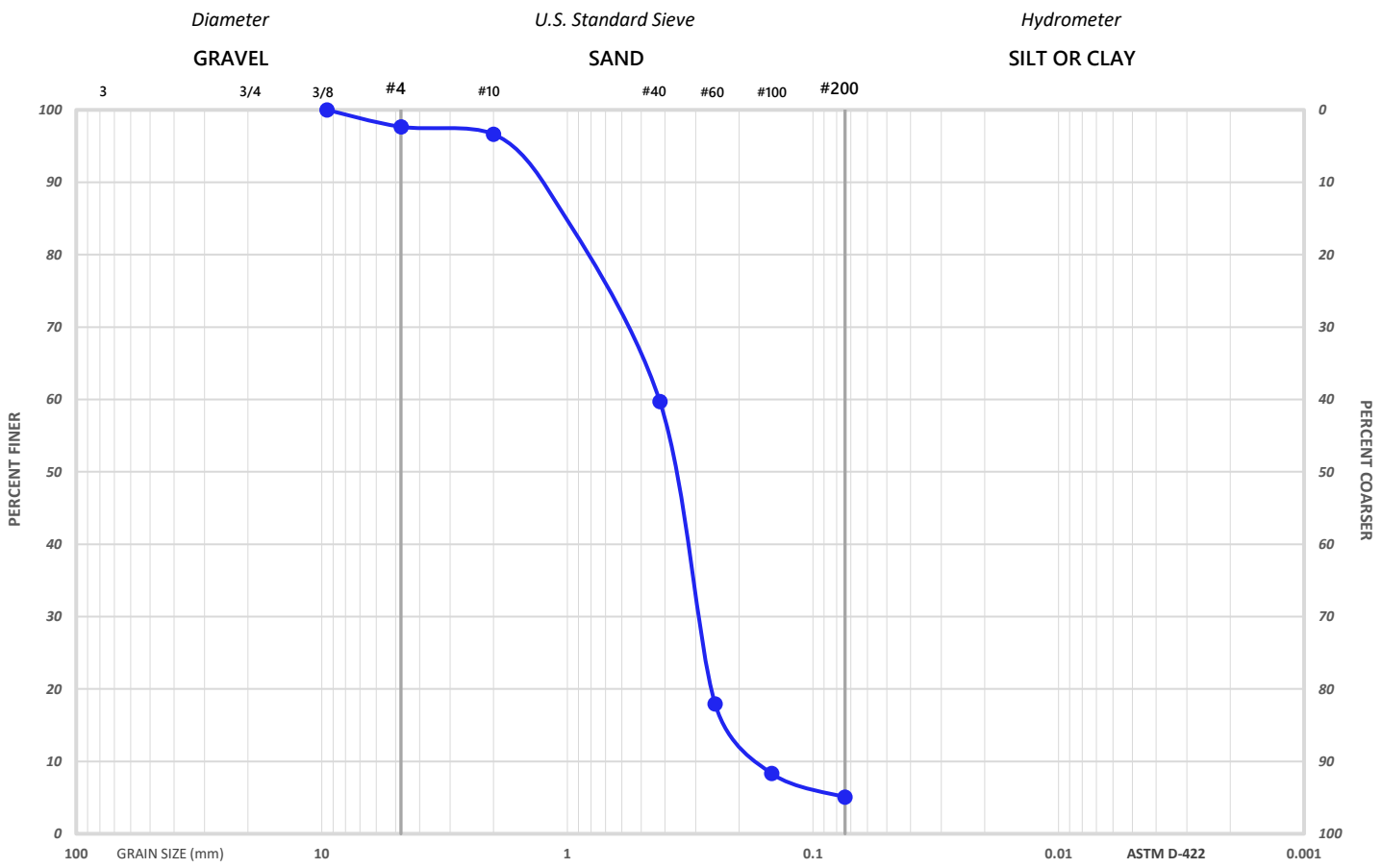


GRAIN SIZE ANALYSIS

Diameter	75.0	50.8	37.5	25.4	19.0	12.7	9.51	4.75	2.0	0.42	0.25	0.147	0.074
Sieve Size	3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#40	#60	#100	**# 200**
% Passing	-	-	-	-	-	-	100.0	97.7	96.6	59.7	17.9	8.3	**5.1**

% GRAVEL	% SAND	*Coarse Gravel*	*Fine Gravel*	*Coarse Sand*	*Medium Sand*	*Fine Sand*	CC	CU
2.3	**92.6**	-	2.3	1.1	36.9	54.6	1.15	2.44

Moisture Content	4.0	Organic Content	-
pH	-	Other	-

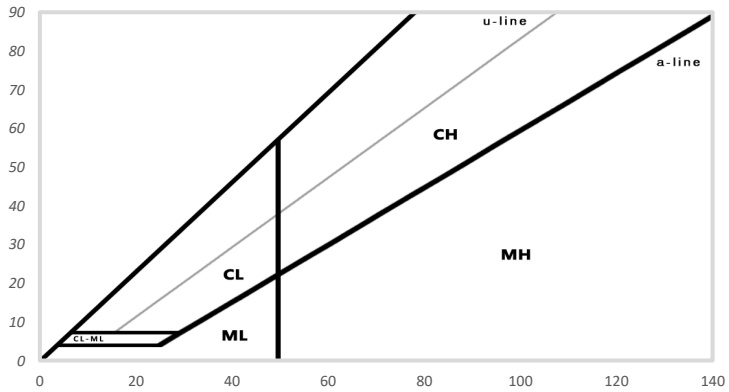
ATTERBERG LIMITS

Liquid Limit	-
Plastic Limit	-
Plasticity Index	-

CLASSIFICATION

AASHTO	-
USCS	-

ASTM D-4318



VISUAL SOIL DESCRIPTION

Light brown poorly graded SAND with silt

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

Boring:	**LB-13**	Project No.:	270060005
Sample:	**Bulk**	Sample Date:	-
Depth:	**1-5'**	Location:	*Arlington, VA*

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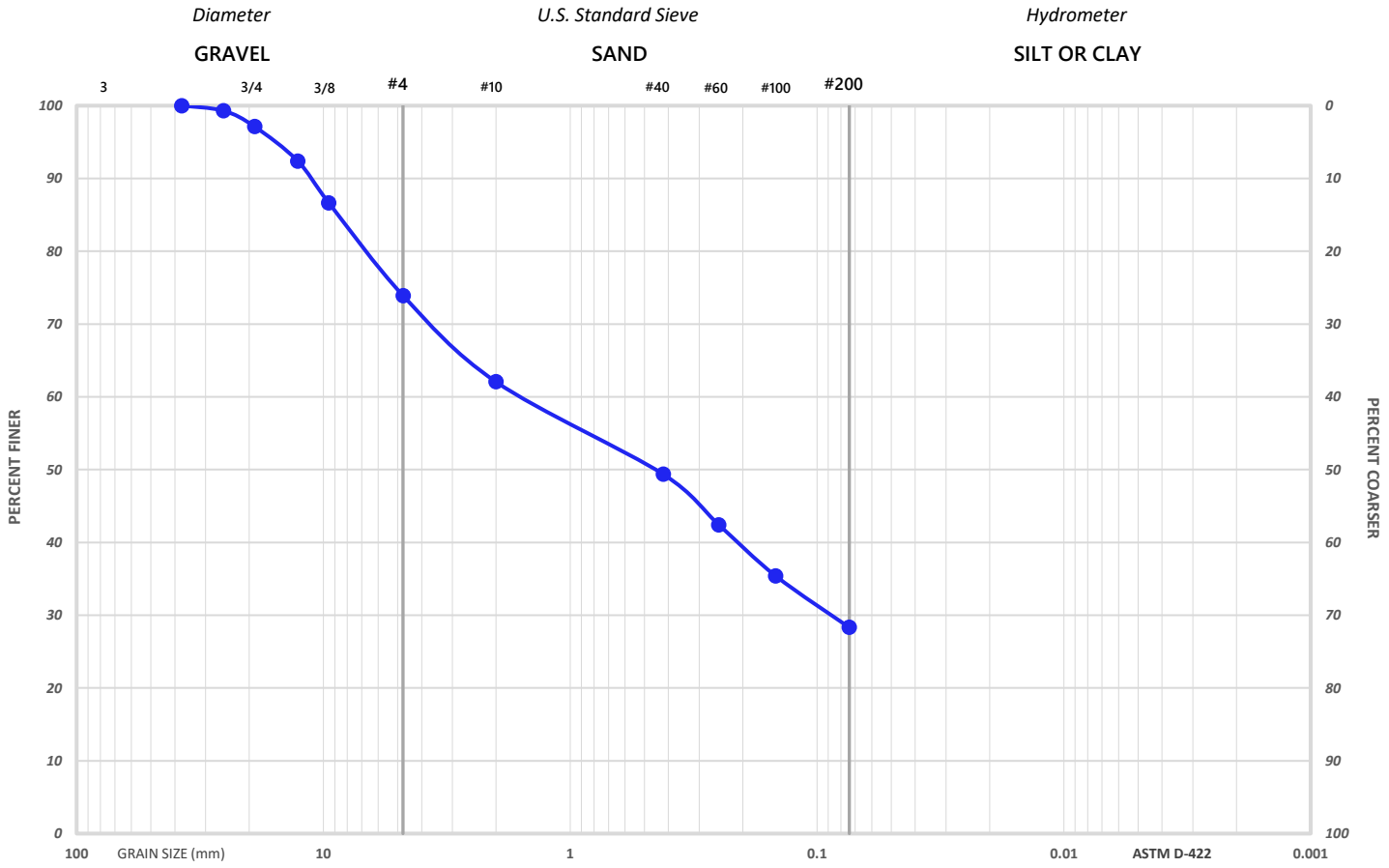
Spring Grove, PA 17362
Phone: (814) 404-9283



GRAIN SIZE ANALYSIS

Diameter	75.0	50.8	37.5	25.4	19.0	12.7	9.51	4.75	2.0	0.42	0.25	0.147	0.074
Sieve Size	3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#40	#60	#100	**# 200**
% Passing	-	-	100.0	99.3	97.1	92.4	86.7	73.9	62.1	49.4	42.4	35.4	**28.3**

% GRAVEL	% SAND	*Coarse Gravel*	*Fine Gravel*	*Coarse Sand*	*Medium Sand*	*Fine Sand*	CC	CU
26.1	**45.6**	2.9	23.2	11.8	12.7	21.1	-	-

Moisture Content	5.7	Organic Content	-
pH	-	Other	-

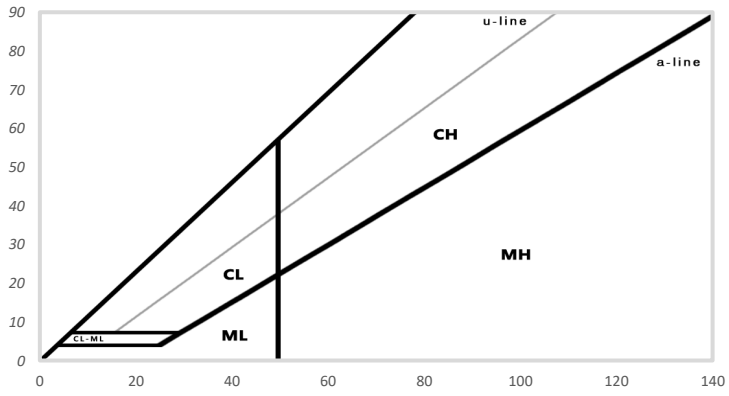
ATTERBERG LIMITS

Liquid Limit	-
Plastic Limit	-
Plasticity Index	-

CLASSIFICATION

AASHTO	-
USCS	-

ASTM D-4318



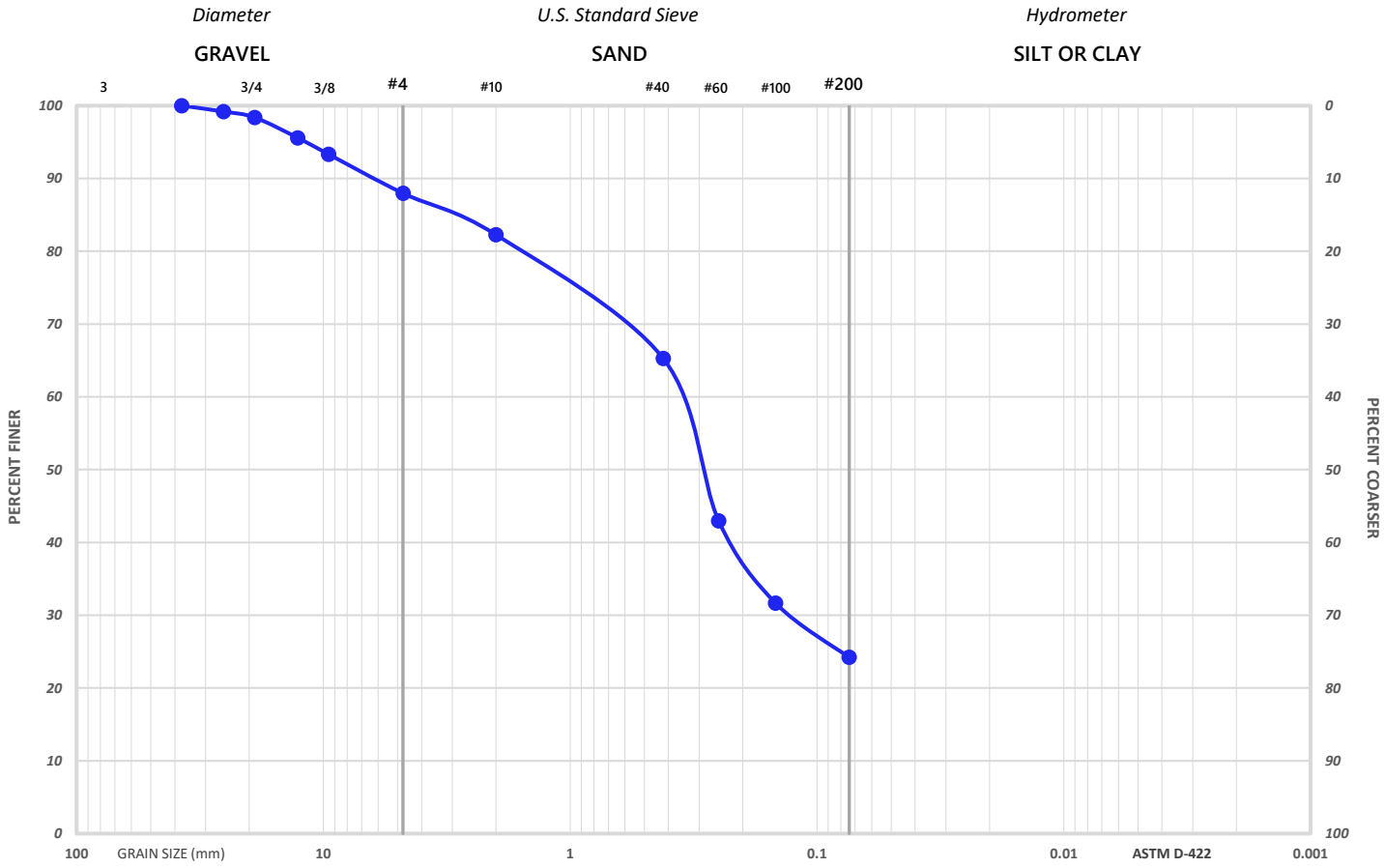
VISUAL SOIL DESCRIPTION

Light brown silty SAND with gravel

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

Boring:	**LB-14**	Project No.:	270060005	
Sample:	**Bulk**	Sample Date:	-	
Depth:	**1-5'**	Location:	*Arlington, VA*	

JAY KAY TESTING, INC.
5233 Lehman Road, Suite 110
Spring Grove, PA 17362
Phone: (814) 404-9283



GRAIN SIZE ANALYSIS

Diameter	75.0	50.8	37.5	25.4	19.0	12.7	9.51	4.75	2.0	0.42	0.25	0.147	0.074
Sieve Size	3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#40	#60	#100	**# 200**
% Passing	-	-	100.0	99.2	98.4	95.6	93.3	88.0	82.3	65.3	42.9	31.7	**24.2**

% GRAVEL	% SAND	*Coarse Gravel*	*Fine Gravel*	*Coarse Sand*	*Medium Sand*	*Fine Sand*	CC	CU
12.0	**63.8**	1.6	10.4	5.7	17.0	41.1	-	-

Moisture Content	4.5	Organic Content	-
pH	-	Other	-

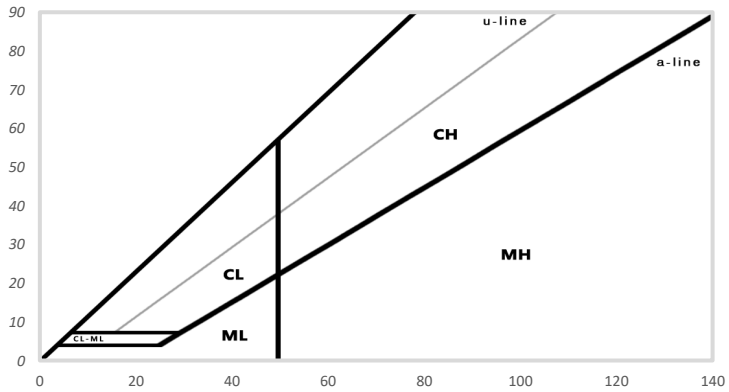
ATTERBERG LIMITS

Liquid Limit	-
Plastic Limit	-
Plasticity Index	-

CLASSIFICATION

AASHTO	-
USCS	-

ASTM D-4318



VISUAL SOIL DESCRIPTION

Light brown silty SAND

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

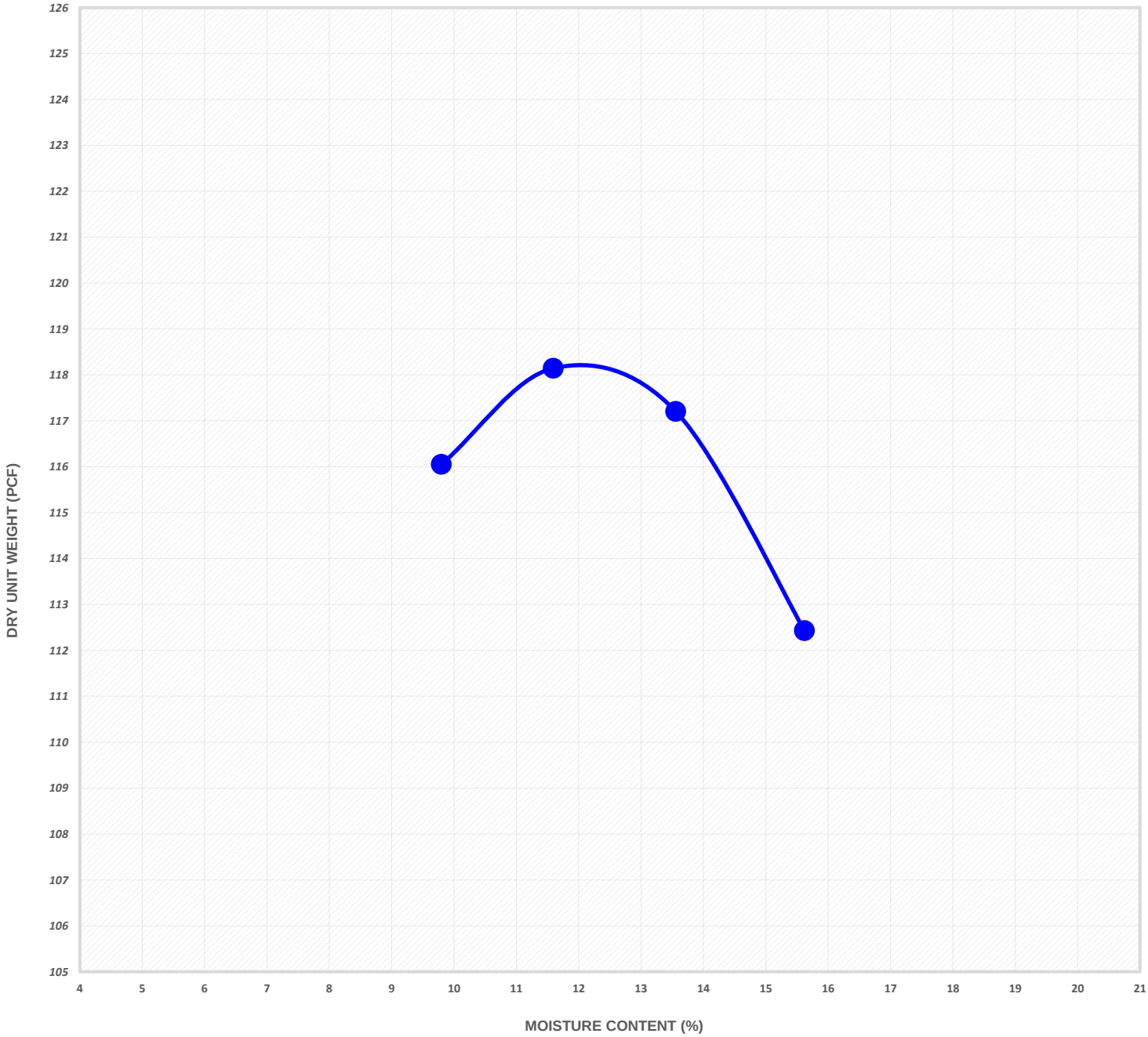
Boring:	**LB-1**	Project No.:	270060005	**JAY KAY TESTING, INC.**
Sample:	**Bulk**	Sample Date:	-	5233 Lehman Road, Suite 110
Depth:	**2-5'**	Location:	*Arlington, VA*	Spring Grove, PA 17362
				Phone: (814) 404-9283

STANDARD PROCTOR TEST RESULTS

TEST METHOD: VTM-1

*Corrected for 21.8% retained on #4 sieve

	UNCORRECTED		CORRECTED *
Maximum Dry Unit Weight	118.2	PCF	125.6
Optimum Moisture Content	11.9	MC	9.7



MC	LL	PL	PI	USCS	AASHTO	FINES	VISUAL SOIL DESCRIPTION
13.5	-	-	-	-	-	26.6	Brown clayey SAND with gravel

Boring:	**LB-2**	Project No.:	270060005	
Sample:	**Bulk**	Sample Date:	-	
Depth:	**2-5'**	Location:	*Arlington, VA*	

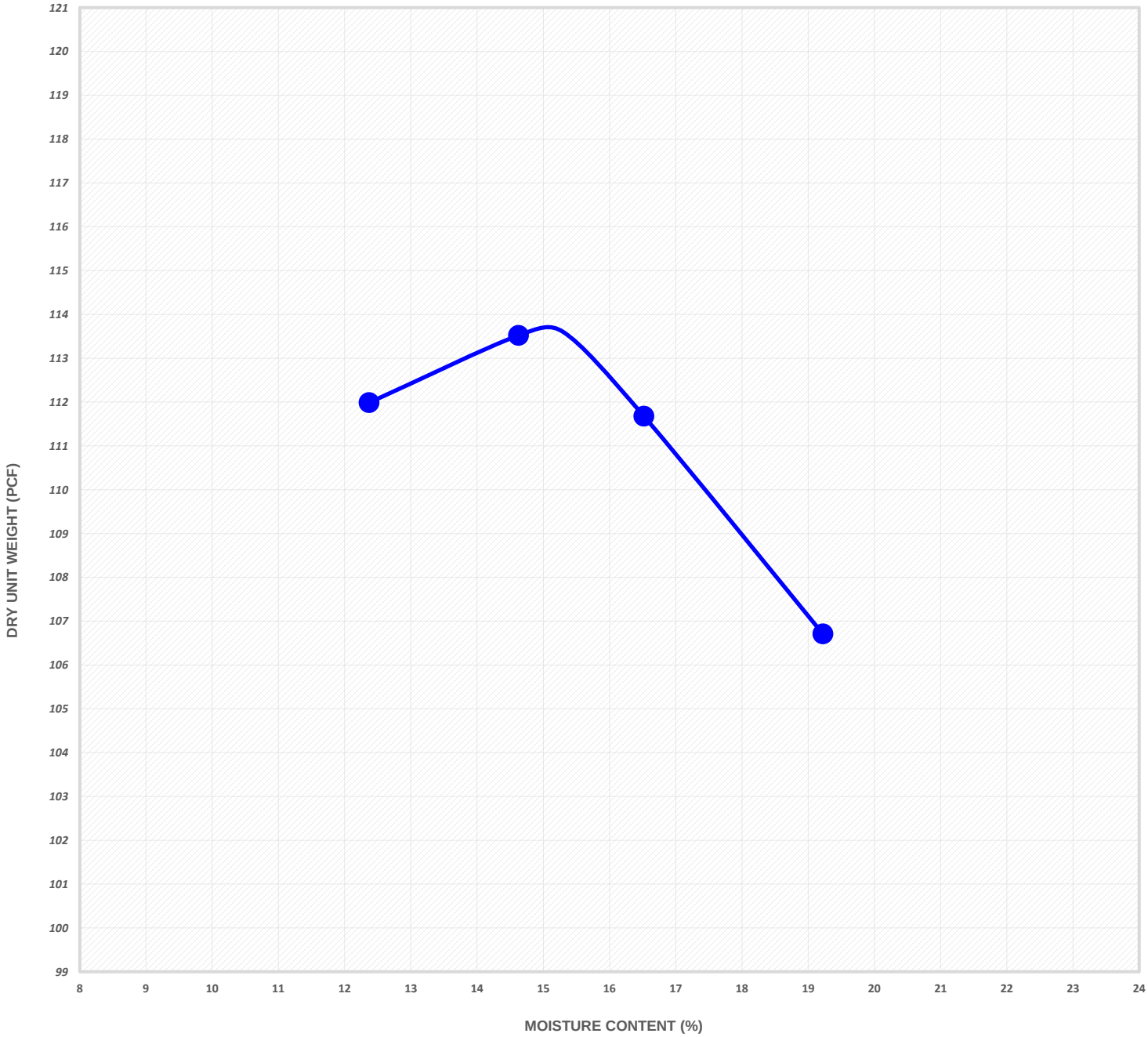
JAY KAY TESTING, INC.
5233 Lehman Road, Suite 110
Spring Grove, PA 17362
Phone: (814) 404-9283

STANDARD PROCTOR TEST RESULTS

TEST METHOD: VTM-1

*Corrected for 10.9% retained on #4 sieve

	UNCORRECTED		CORRECTED *
Maximum Dry Unit Weight	113.8	PCF	117.6
Optimum Moisture Content	15.1	MC	13.7



MC	LL	PL	PI	USCS	AASHTO	FINES	VISUAL SOIL DESCRIPTION
15.0	-	-	-	-	-	-	Brown silty SAND

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

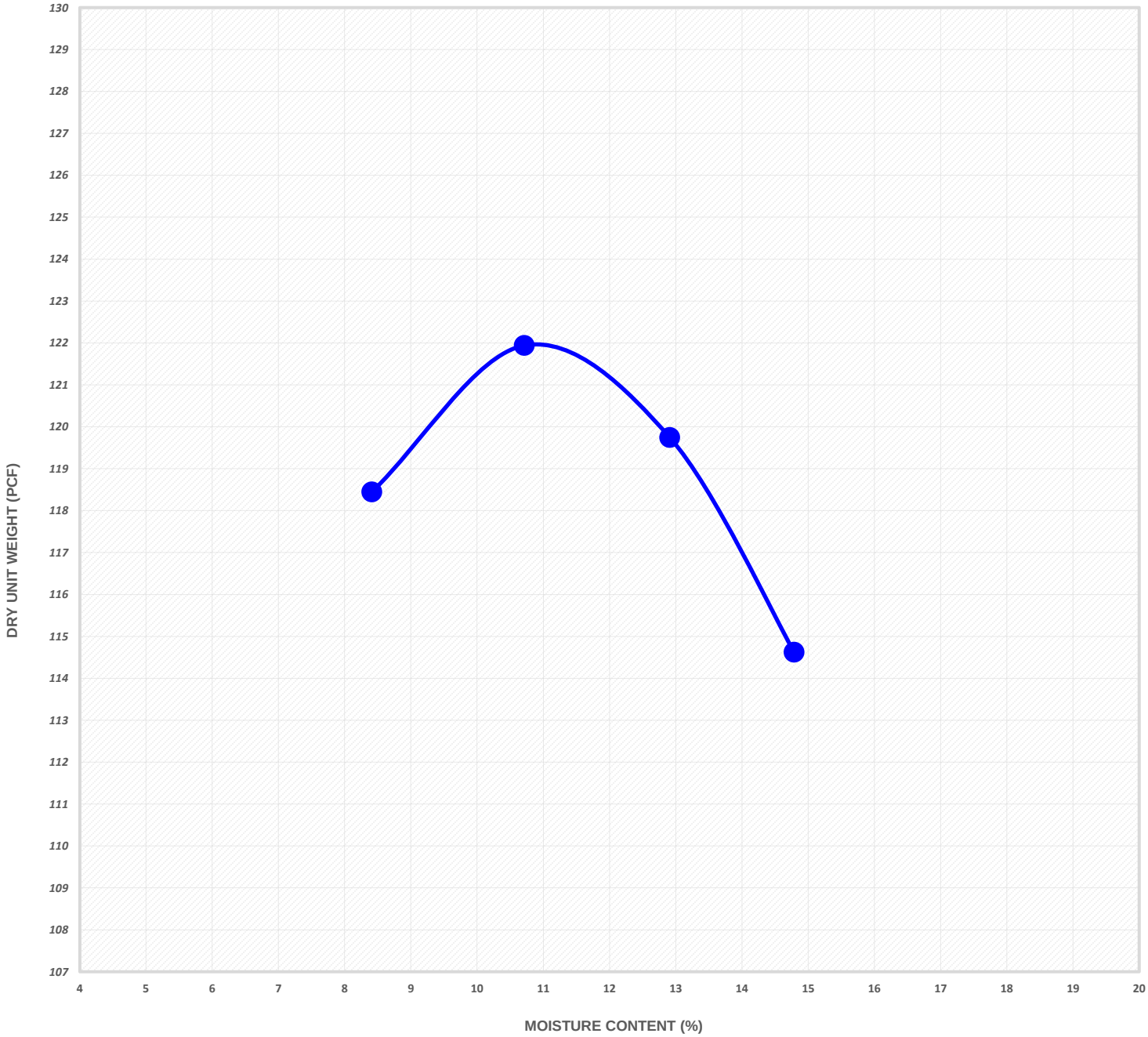
Boring:	**LB-4**	Project No.:	270060005
Sample:	**Bulk**	Sample Date:	-
Depth:	**2-5'**	Location:	*Arlington, VA*

JAY KAY TESTING, INC.
5233 Lehman Road, Suite 110
Spring Grove, PA 17362
Phone: (814) 404-9283

STANDARD PROCTOR TEST RESULTS

TEST METHOD: VTM-1

MAXIMUM DRY UNIT WEIGHT	OPTIMUM MOISTURE CONTENT
121.9	10.9
PCF	%



MC	LL	PL	PI	USCS	AASHTO	FINES	VISUAL SOIL DESCRIPTION
9.4	-	-	-	-	-	44.3	Brown clayey SAND

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

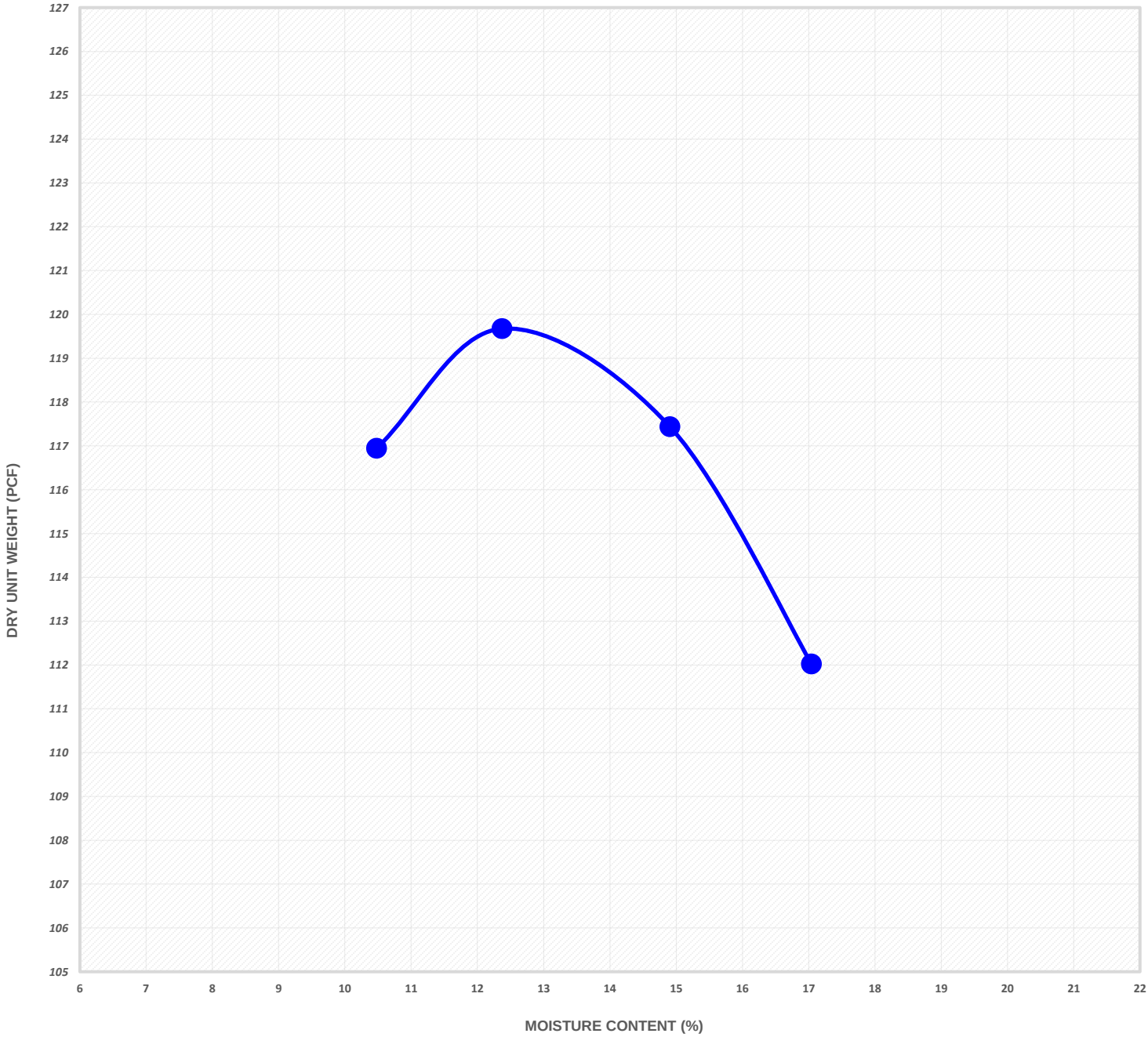
Boring:	**LB-5**	Project No.:	270060005	**JAY KAY TESTING, INC.**
Sample:	**Bulk**	Sample Date:	-	5233 Lehman Road, Suite 110
Depth:	**2-5'**	Location:	*Arlington, VA*	Spring Grove, PA 17362
				Phone: (814) 404-9283

STANDARD PROCTOR TEST RESULTS

TEST METHOD: VTM-1

*Corrected for 19.0% retained on #4 sieve

	UNCORRECTED		CORRECTED *
Maximum Dry Unit Weight	119.7	PCF	126.0
Optimum Moisture Content	12.4	MC	10.4



MC	LL	PL	PI	USCS	AASHTO	FINES	VISUAL SOIL DESCRIPTION
9.4	-	-	-	-	-	-	Brown silty SAND with gravel

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

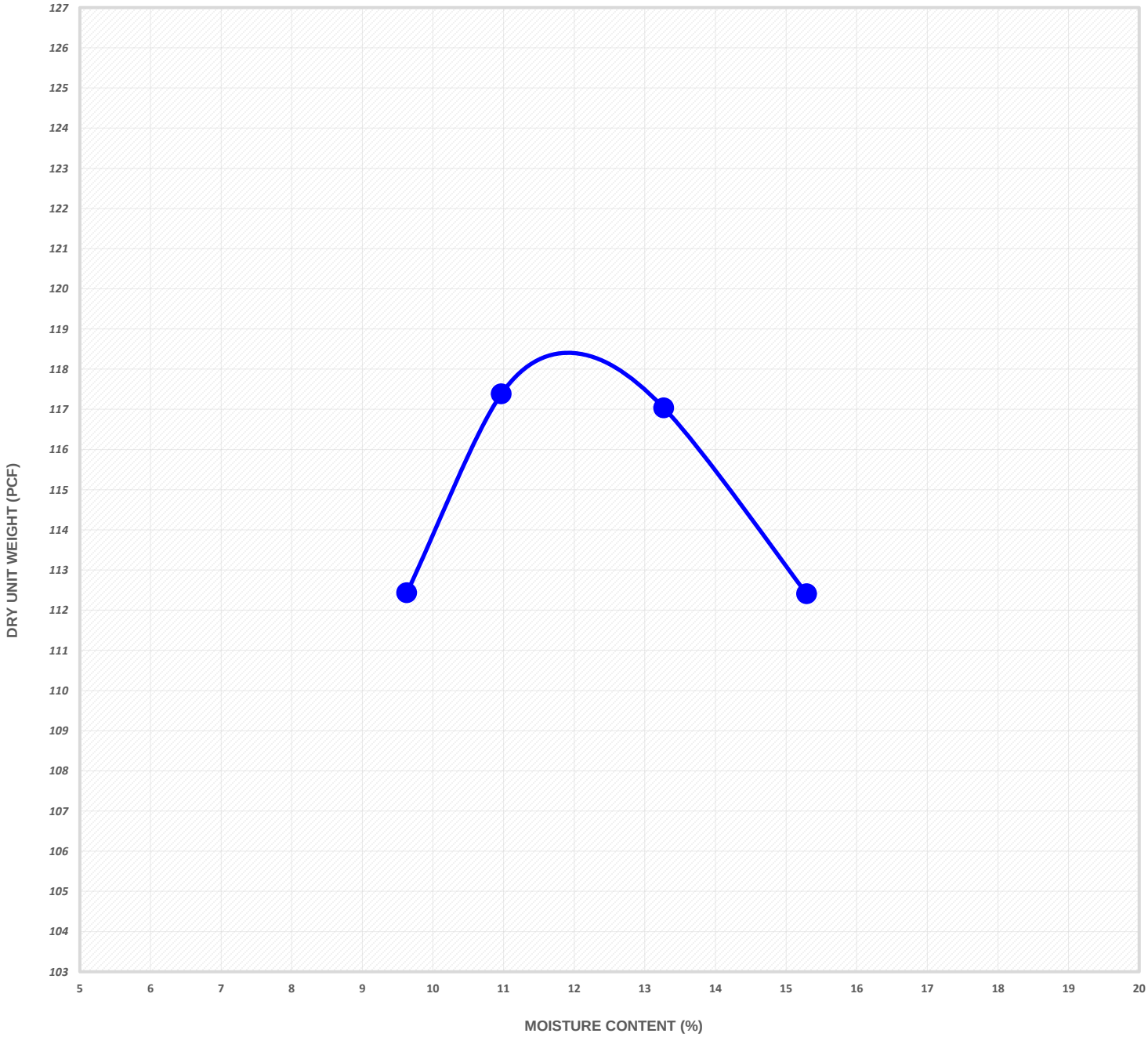
Boring:	**LB-7**	Project No.:	270060005	**JAY KAY TESTING, INC.**
Sample:	**Bulk**	Sample Date:	-	5233 Lehman Road, Suite 110
Depth:	**2-5'**	Location:	*Arlington, VA*	Spring Grove, PA 17362
				Phone: (814) 404-9283

STANDARD PROCTOR TEST RESULTS

TEST METHOD: VTM-1

*Corrected for 20.9% retained on #4 sieve

	UNCORRECTED		CORRECTED *
Maximum Dry Unit Weight	118.4	PCF	125.5
Optimum Moisture Content	11.9	MC	9.8



MC	LL	PL	PI	USCS	AASHTO	FINES	VISUAL SOIL DESCRIPTION
9.3	-	-	-	-	-	32.3	Dark brown silty SAND with gravel

Boring: **LB-9**
Sample: **Bulk**
Depth: **2-5'**

Project No.: 270060005
Sample Date: -
Location: *Arlington, VA*

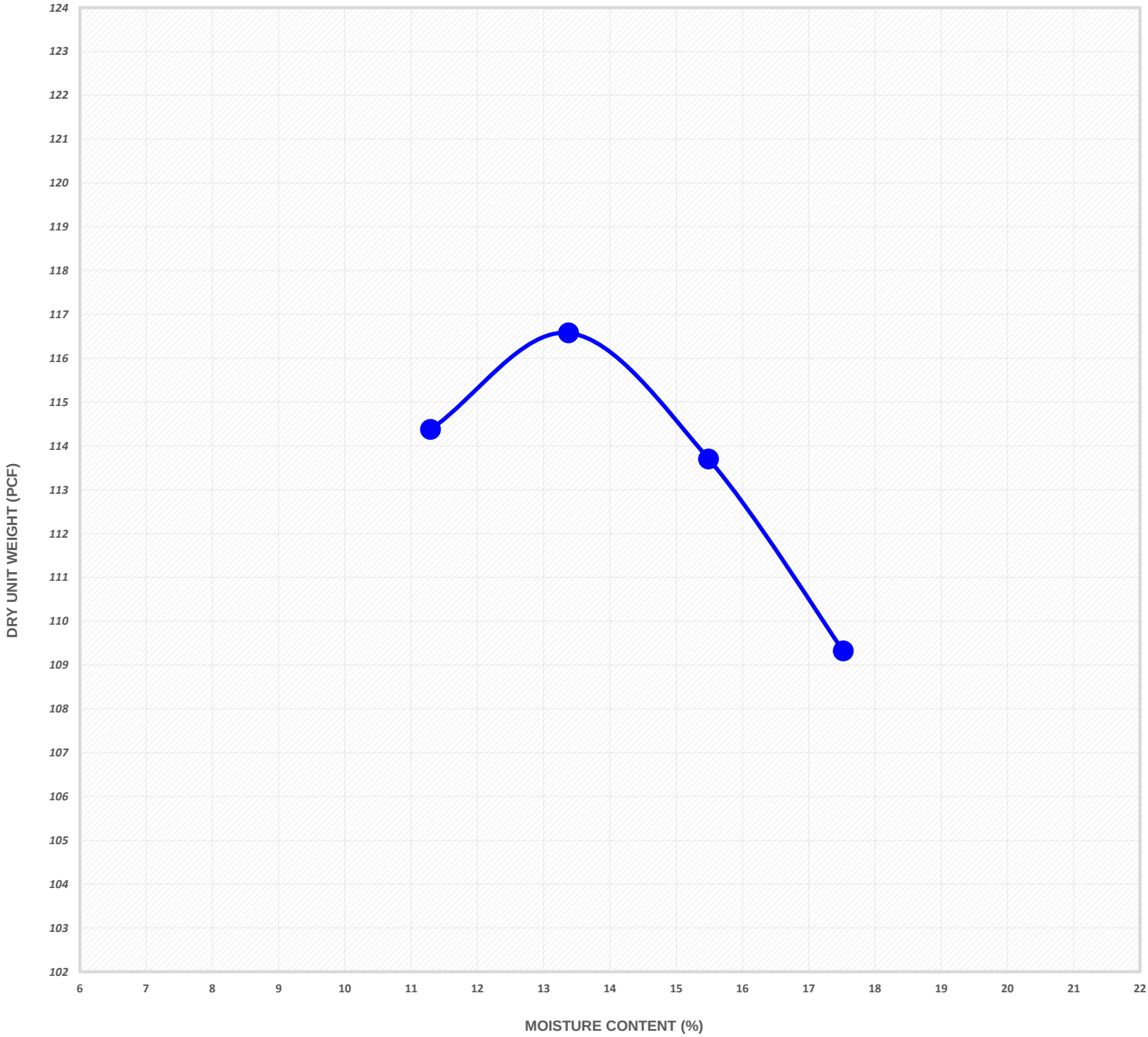
JAY KAY TESTING, INC.
5233 Lehman Road, Suite 110
Spring Grove, PA 17362
Phone: (814) 404-9283

STANDARD PROCTOR TEST RESULTS

TEST METHOD: VTM-1

*Corrected for 26.8% retained on #4 sieve

	UNCORRECTED		CORRECTED *
Maximum Dry Unit Weight	116.6	PCF	126.1
Optimum Moisture Content	13.2	MC	10.2



MC	LL	PL	PI	USCS	AASHTO	FINES	VISUAL SOIL DESCRIPTION
9.8	-	-	-	-	-	-	Reddish-brown silty SAND with gravel

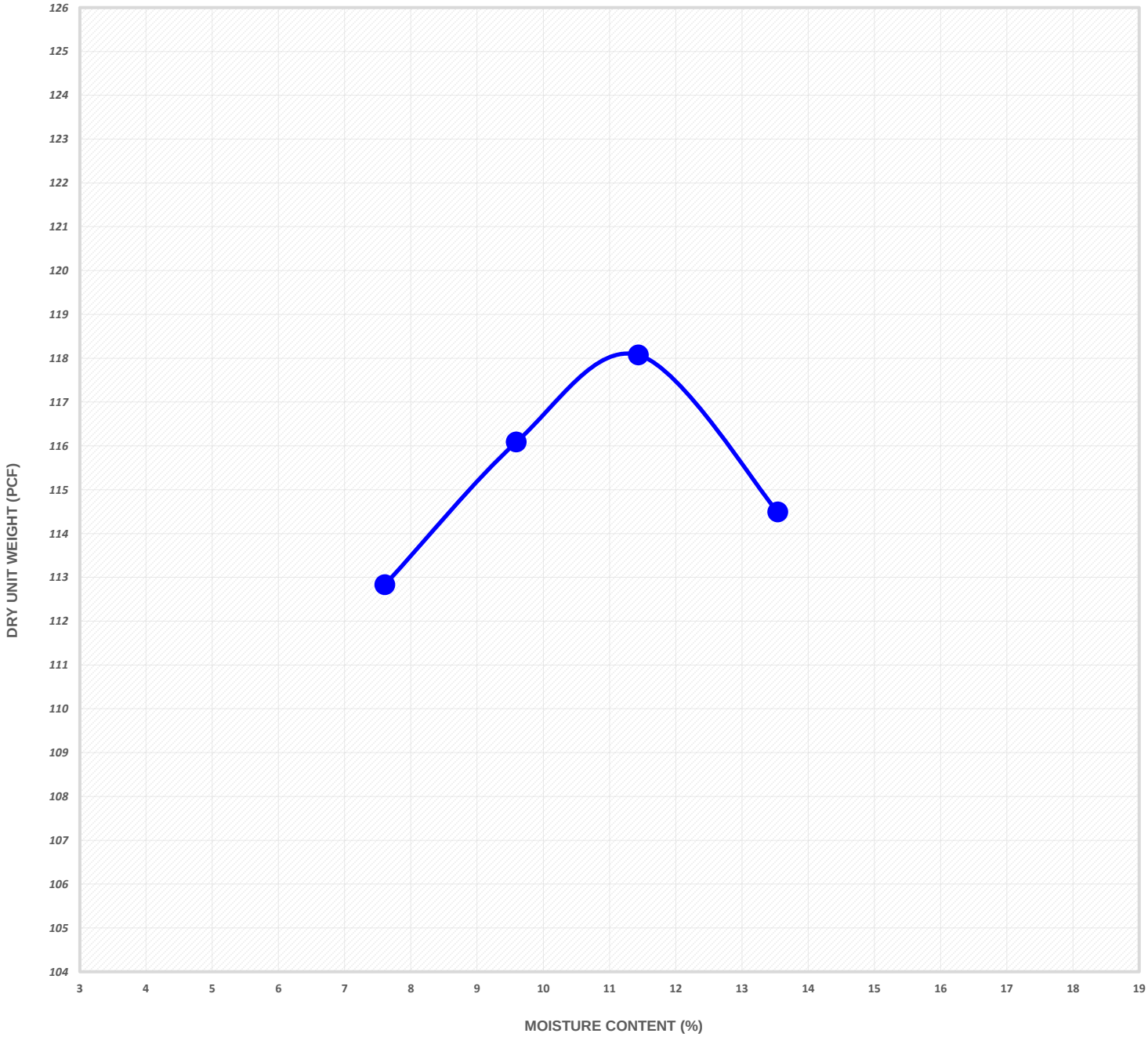
ARMY NAVY DRIVE COMPLETE STREETS PROJECT

Boring:	**LB-11**	Project No.:	270060005	**JAY KAY TESTING, INC.**
Sample:	**Bulk**	Sample Date:	-	5233 Lehman Road, Suite 110
Depth:	**1-3'**	Location:	*Arlington, VA*	Spring Grove, PA 17362
				Phone: (814) 404-9283

STANDARD PROCTOR TEST RESULTS

TEST METHOD: VTM-1

MAXIMUM DRY UNIT WEIGHT	OPTIMUM MOISTURE CONTENT
118.1	11.2
PCF	%



MC	LL	PL	PI	USCS	AASHTO	FINES	VISUAL SOIL DESCRIPTION
14.7	-	-	-	-	-	51.3	Dark brown sandy clay

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

Boring:	**LB-12**	Project No.:	270060005	
Sample:	**Bulk**	Sample Date:	-	
Depth:	**1-5'**	Location:	*Arlington, VA*	

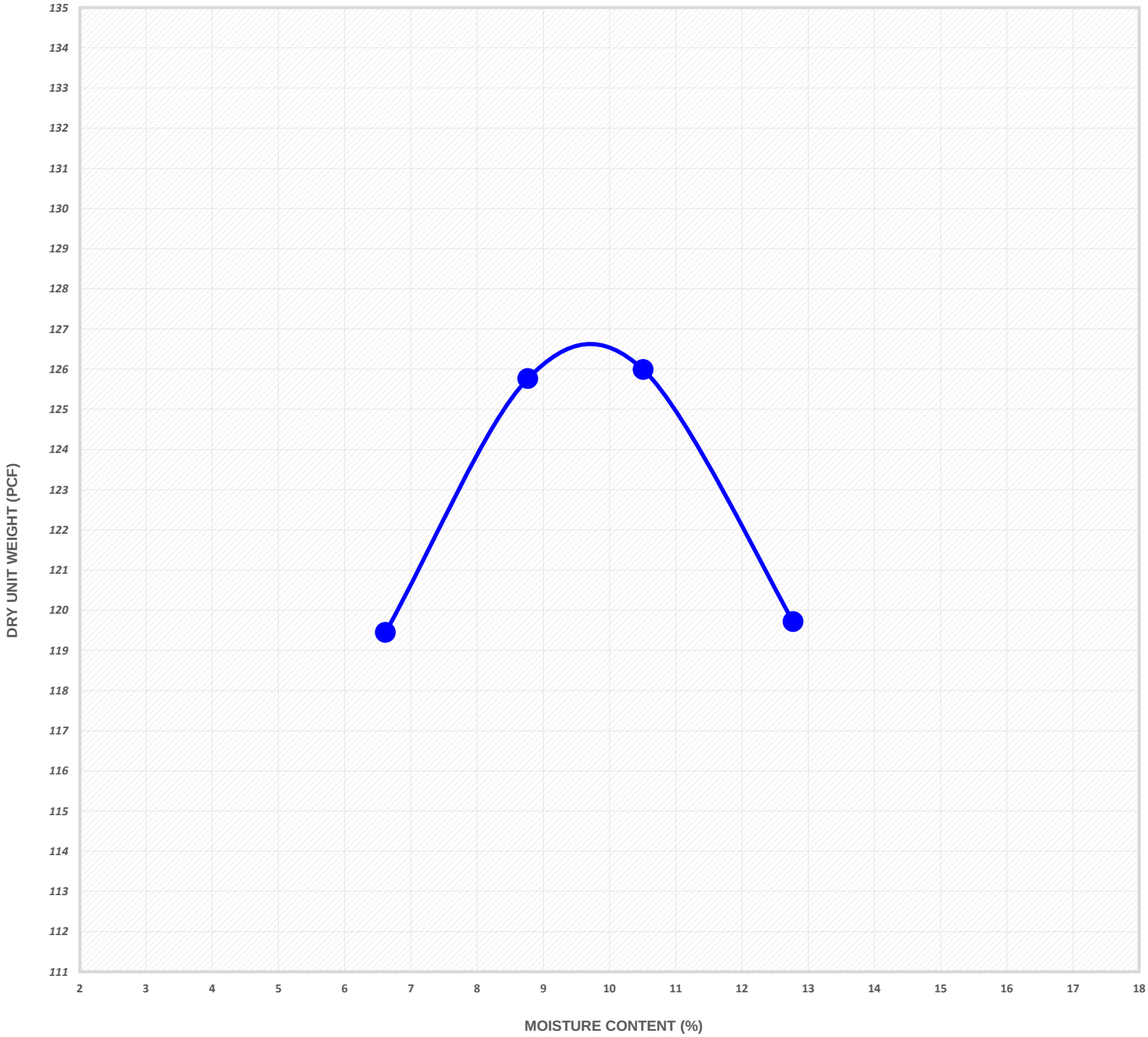
JAY KAY TESTING, INC.
5233 Lehman Road, Suite 110
Spring Grove, PA 17362
Phone: (814) 404-9283

STANDARD PROCTOR TEST RESULTS

TEST METHOD: VTM-1

*Corrected for 26.5% retained on #4 sieve

	UNCORRECTED		CORRECTED *
Maximum Dry Unit Weight	126.7	PCF	134.5
Optimum Moisture Content	9.7	MC	7.7



MC	LL	PL	PI	USCS	AASHTO	FINES	VISUAL SOIL DESCRIPTION
4.5	-	-	-	-	-	-	Light brown silty SAND with gravel

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

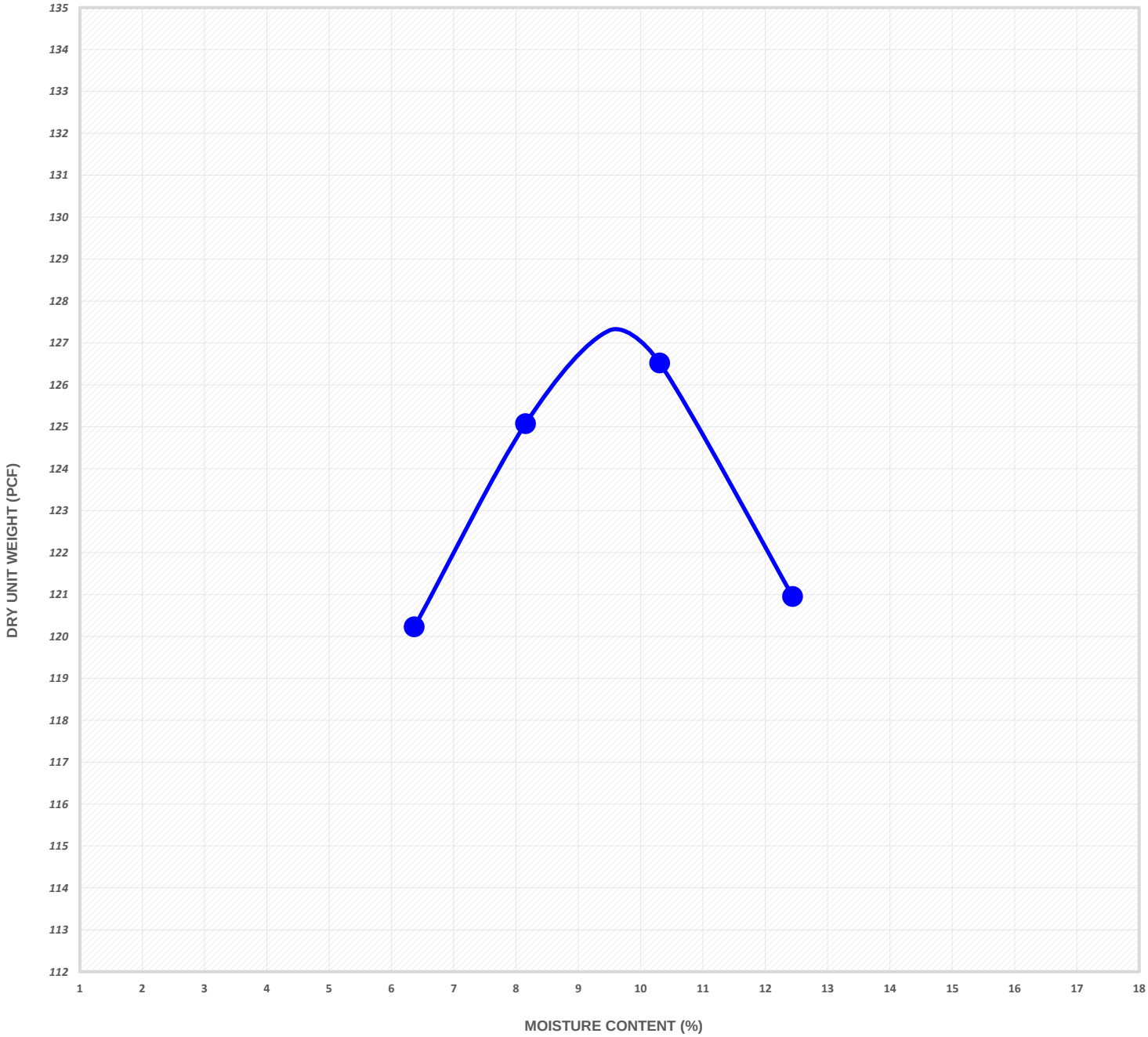
Boring:	**LB-13**	Project No.:	270060005	**JAY KAY TESTING, INC.**
Sample:	**Bulk**	Sample Date:	-	5233 Lehman Road, Suite 110
Depth:	**1-5'**	Location:	*Arlington, VA*	Spring Grove, PA 17362
				Phone: (814) 404-9283

STANDARD PROCTOR TEST RESULTS

TEST METHOD: VTM-1

*Corrected for 26.1% retained on #4 sieve

	UNCORRECTED		CORRECTED *
Maximum Dry Unit Weight	127.3	PCF	134.9
Optimum Moisture Content	9.5	MC	7.5



MC	LL	PL	PI	USCS	AASHTO	FINES	VISUAL SOIL DESCRIPTION
5.7	-	-	-	-	-	28.3	Light brown silty SAND with gravel

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

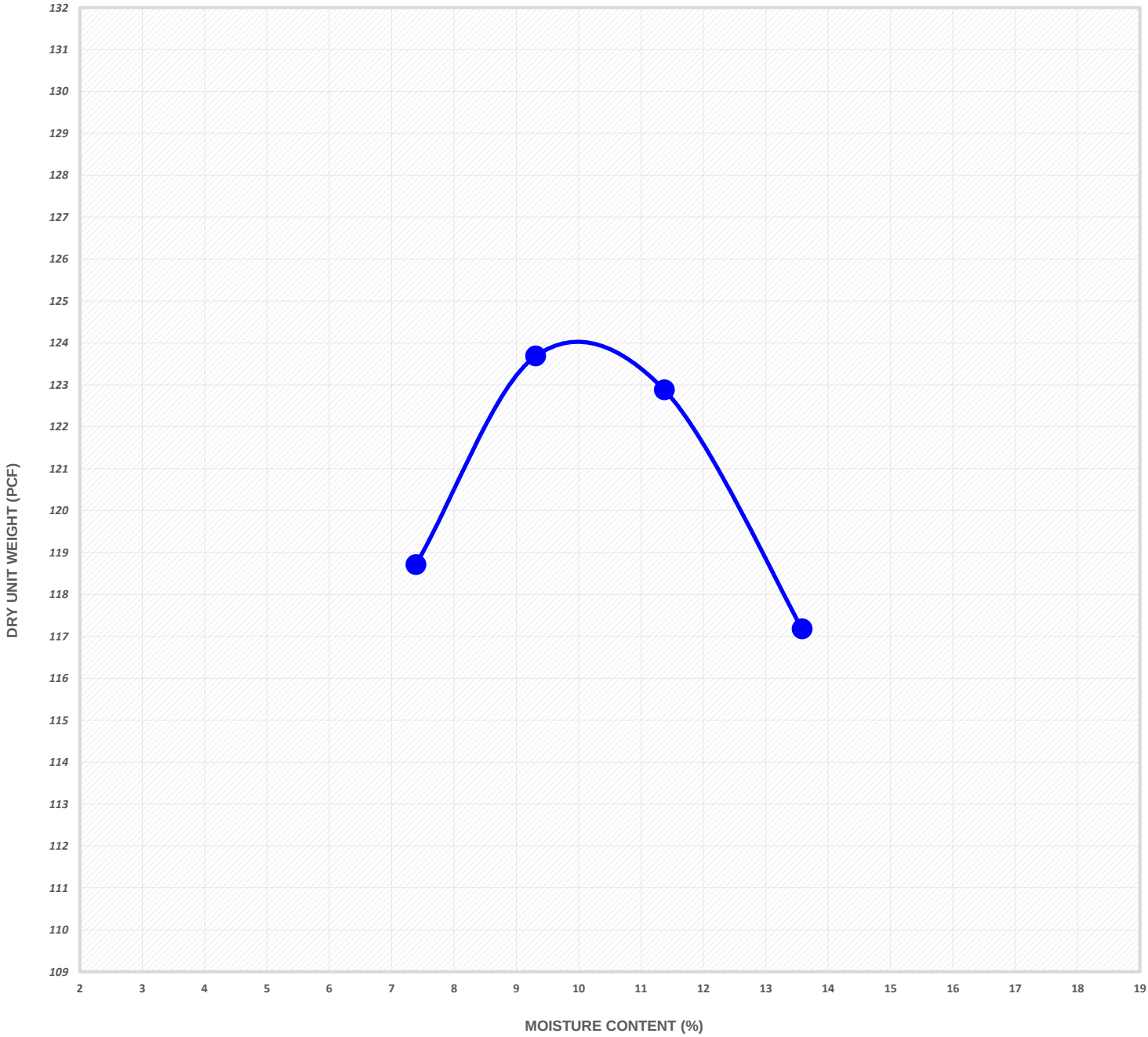
Boring:	**LB-14**	Project No.:	270060005	**JAY KAY TESTING, INC.**
Sample:	**Bulk**	Sample Date:	-	5233 Lehman Road, Suite 110
Depth:	**1-5'**	Location:	*Arlington, VA*	Spring Grove, PA 17362
				Phone: (814) 404-9283

STANDARD PROCTOR TEST RESULTS

TEST METHOD: VTM-1

*Corrected for 12.0% retained on #4 sieve

	UNCORRECTED		CORRECTED *
Maximum Dry Unit Weight	124.0	PCF	127.6
Optimum Moisture Content	9.9	MC	9.0



MC	LL	PL	PI	USCS	AASHTO	FINES	VISUAL SOIL DESCRIPTION
4.5	-	-	-	-	-	24.2	Light brown silty SAND

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

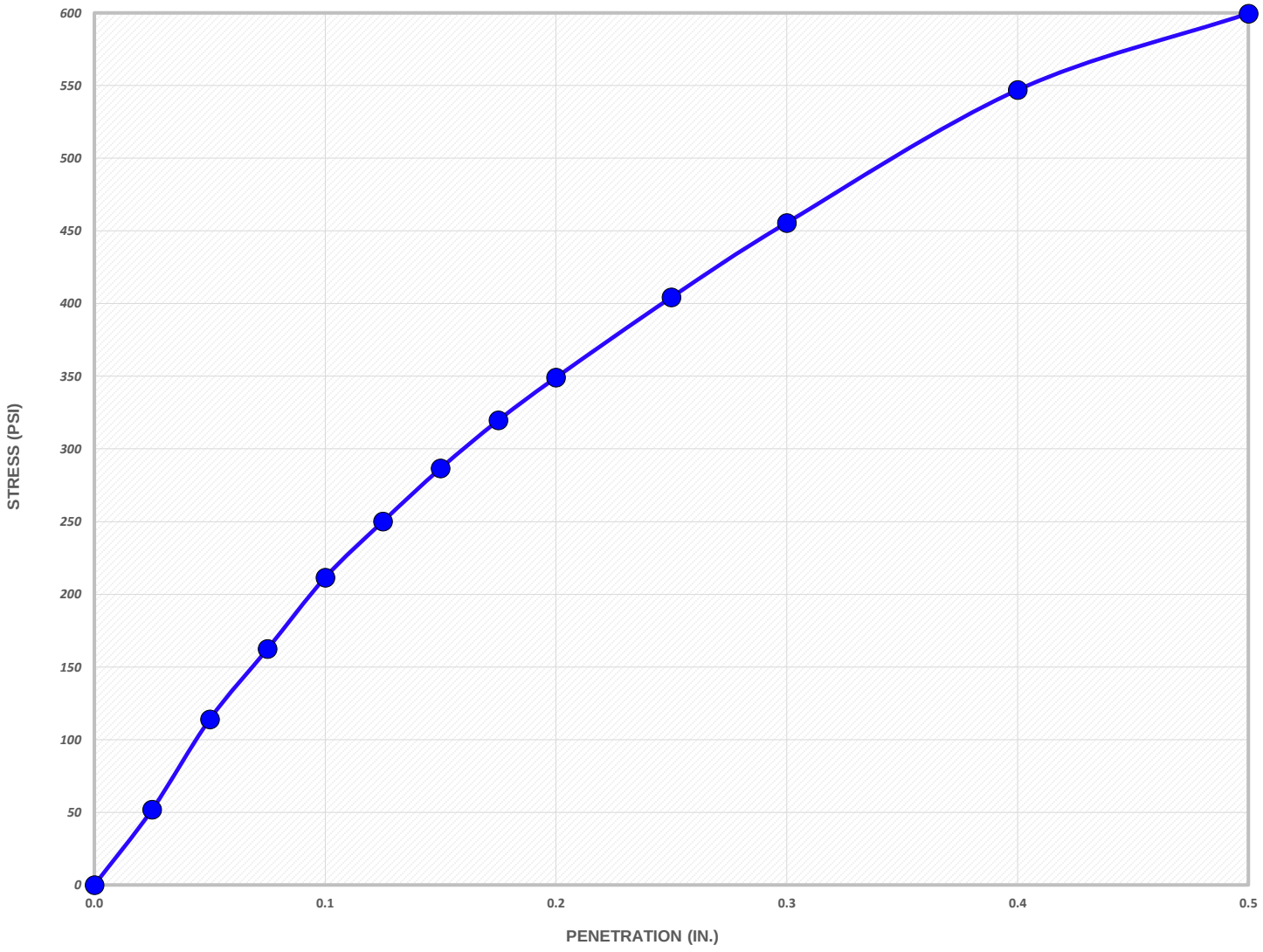
Boring:	**LB-1**	Project No.:	270060005	**JAY KAY TESTING, INC.**
Sample:	**Bulk**	Sample Date:	-	5233 Lehman Road, Suite 110
Depth:	**2-5'**	Location:	*Arlington, VA*	Spring Grove, PA 17362
				Phone: (814) 404-9283

CALIFORNIA BEARING RATIO TEST RESULTS

CBR AT 0.1"	CBR AT 0.2"
21.1	23.3

	Dry Unit Weight	Moisture Content	Compaction	Swell	Surcharge
As Molded	125.3	10.1	99.8	-	50
After Soak	125.3	11.5	99.7	0.25	50
	PCF	**%**	**%**	**%**	**PSF**

METHOD: VTM-8, COMPACTION: VTM-1



MC	LL	PL	PI	USCS	AASHTO	FINES	VISUAL SOIL DESCRIPTION
13.5	-	-	-	-	-	26.6	Brown clayey SAND with gravel

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

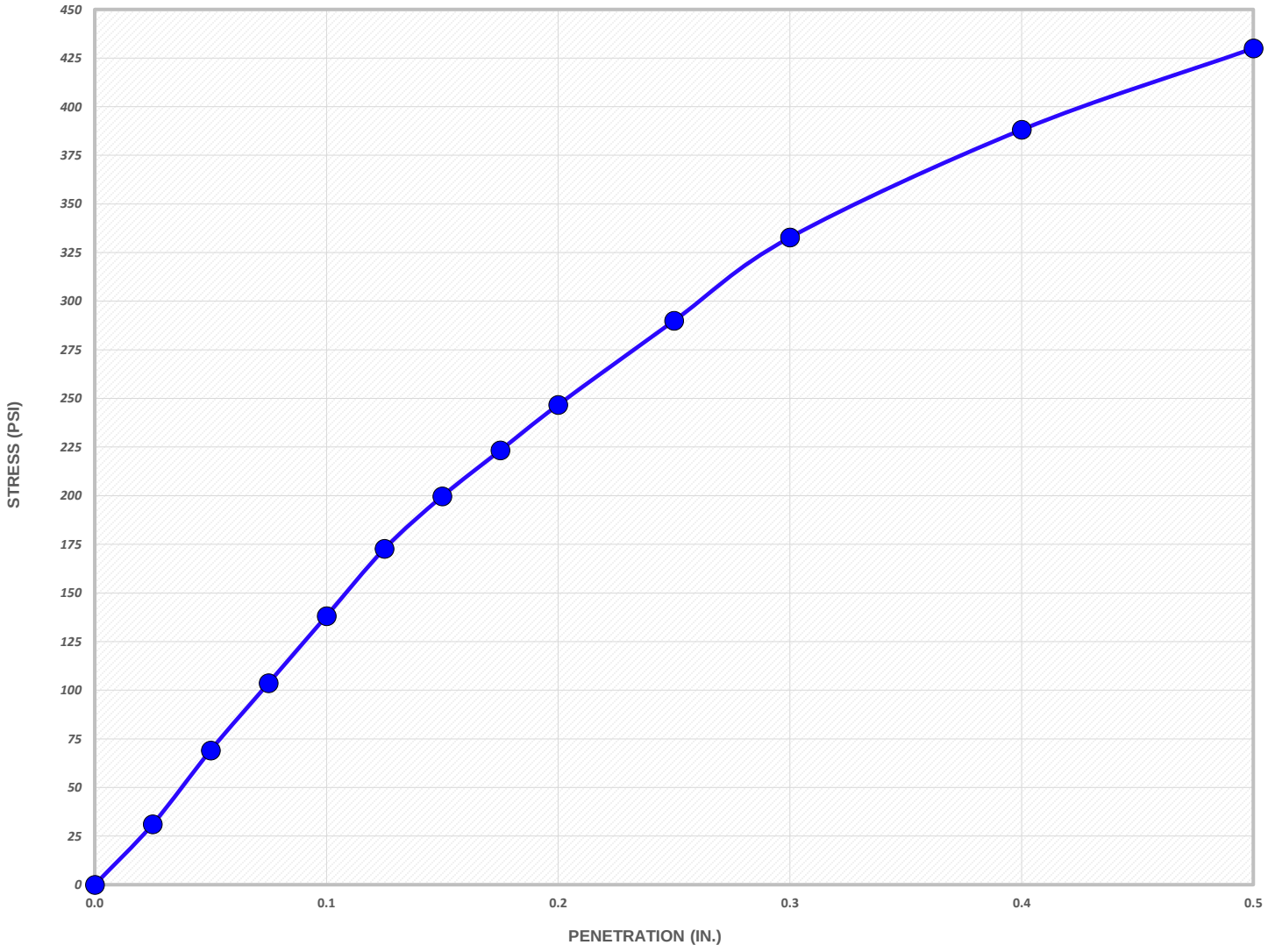
Boring:	**LB-2**	Project No.:	270060005	**JAY KAY TESTING, INC.**
Sample:	**Bulk**	Sample Date:	-	5233 Lehman Road, Suite 110
Depth:	**2-5'**	Location:	*Arlington, VA*	Spring Grove, PA 17362
				Phone: (814) 404-9283

CALIFORNIA BEARING RATIO TEST RESULTS

CBR AT 0.1"	CBR AT 0.2"
13.8	16.4

	Dry Unit Weight	Moisture Content	Compaction	Swell	Surcharge
As Molded	118.2	13.5	100.5	-	50
After Soak	116.7	16.1	99.2	0.66	50
	PCF	**%**	**%**	**%**	**PSF**

METHOD: VTM-8, COMPACTION: VTM-1



MC	LL	PL	PI	USCS	AASHTO	FINES	VISUAL SOIL DESCRIPTION
15.0	-	-	-	-	-	-	Brown silty SAND

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

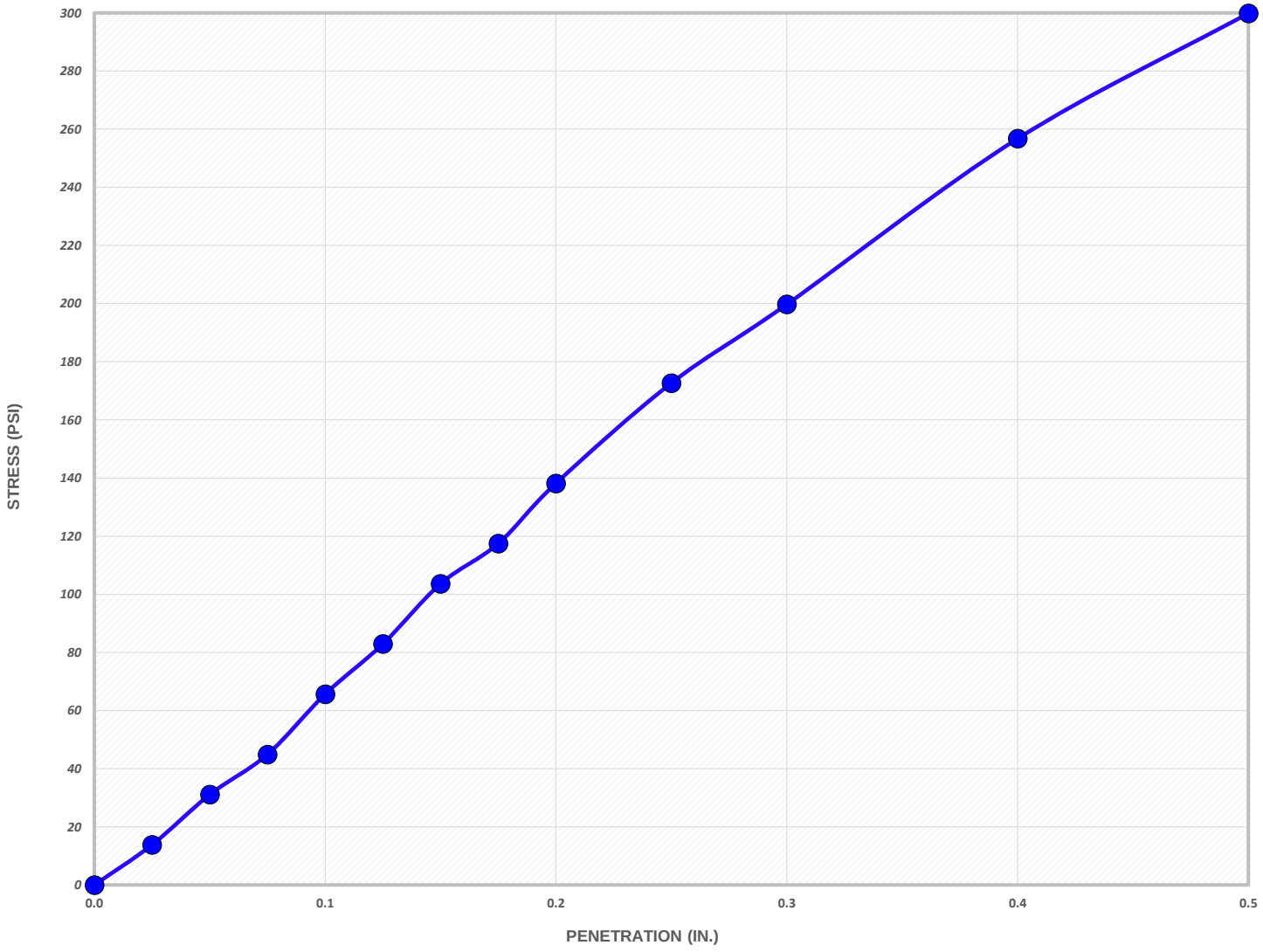
Boring:	**LB-4**	Project No.:	270060005	**JAY KAY TESTING, INC.**
Sample:	**Bulk**	Sample Date:	-	5233 Lehman Road, Suite 110
Depth:	**2-5'**	Location:	*Arlington, VA*	Spring Grove, PA 17362
				Phone: (814) 404-9283

CALIFORNIA BEARING RATIO TEST RESULTS

CBR AT 0.1"	CBR AT 0.2"
6.6	9.2

	Dry Unit Weight	Moisture Content	Compaction	Swell	Surcharge
As Molded	124.8	11.0	102.4	-	50
After Soak	125.3	11.9	102.8	0.31	50
	PCF	**%**	**%**	**%**	**PSF**

METHOD: VTM-8, COMPACTION: VTM-1



MC	LL	PL	PI	USCS	AASHTO	FINES	VISUAL SOIL DESCRIPTION
9.4	-	-	-	-	-	44.3	Brown clayey SAND

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

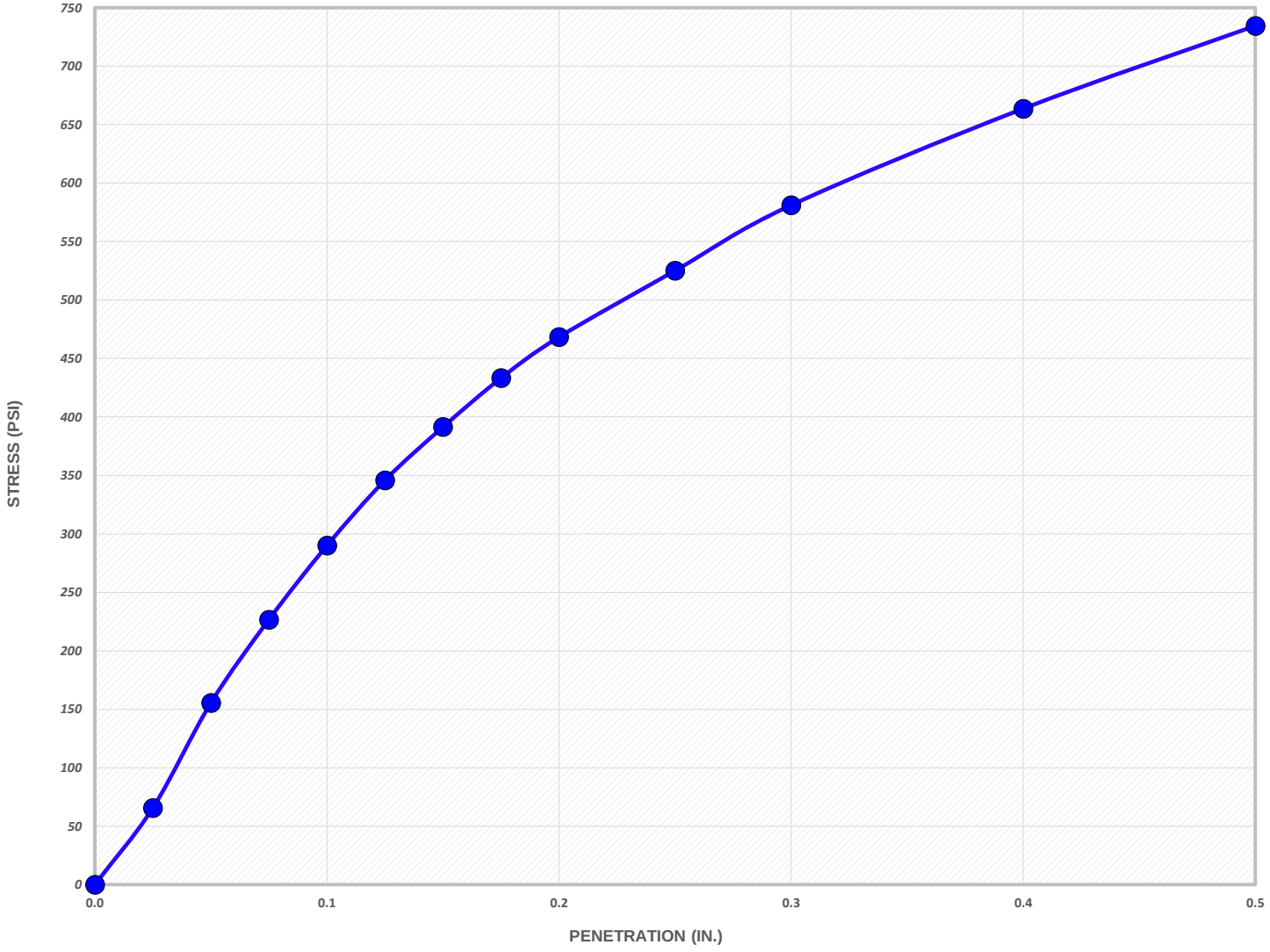
Boring:	**LB-5**	Project No.:	270060005	**JAY KAY TESTING, INC.**
Sample:	**Bulk**	Sample Date:	-	5233 Lehman Road, Suite 110
Depth:	**2-5'**	Location:	*Arlington, VA*	Spring Grove, PA 17362
				Phone: (814) 404-9283

CALIFORNIA BEARING RATIO TEST RESULTS

CBR AT 0.1"	CBR AT 0.2"
29.0	**31.2**

	Dry Unit Weight	Moisture Content	Compaction	Swell	Surcharge
As Molded	125.3	10.2	99.5	-	50
After Soak	125.5	12.1	99.6	0.39	50
	PCF	**%**	**%**	**%**	**PSF**

METHOD: VTM-8, COMPACTION: VTM-1



MC	LL	PL	PI	USCS	AASHTO	FINES	VISUAL SOIL DESCRIPTION
9.4	-	-	-	-	-	-	Brown silty SAND with gravel

Boring: **LB-7**
Sample: **Bulk**
Depth: **2-5'**

Project No.: 270060005
Sample Date: -
Location: *Arlington, VA*

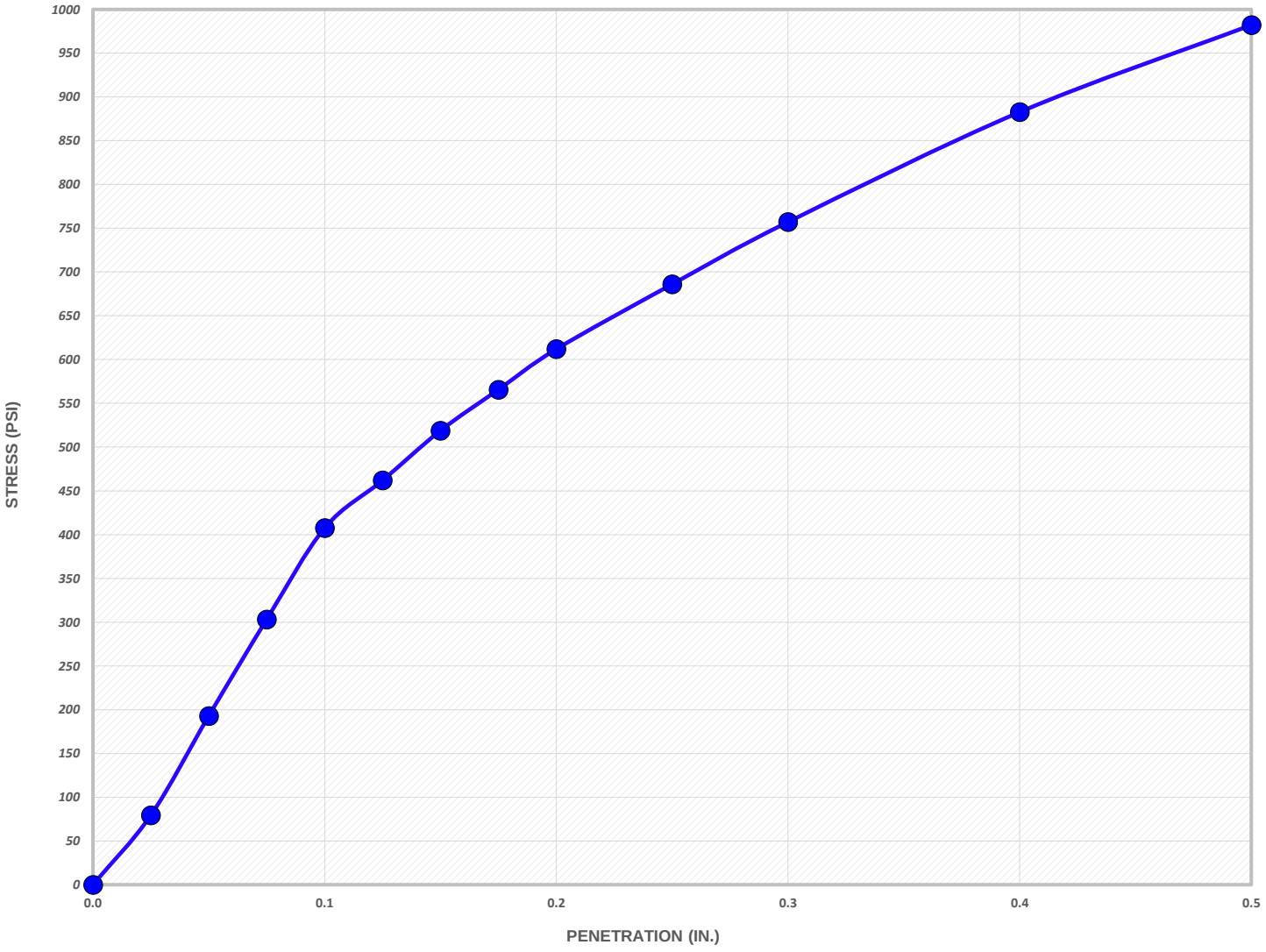
JAY KAY TESTING, INC.
5233 Lehman Road, Suite 110
Spring Grove, PA 17362
Phone: (814) 404-9283

CALIFORNIA BEARING RATIO TEST RESULTS

CBR AT 0.1": **40.7**
CBR AT 0.2": **40.8**

	Dry Unit Weight	Moisture Content	Compaction	Swell	Surcharge
As Molded	123.1	9.5	98.1	-	50
After Soak	123.4	11.6	98.3	0.11	50
	PCF	**%**	**%**	**%**	**PSF**

METHOD: VTM-8, COMPACTION: VTM-1



MC	LL	PL	PI	USCS	AASHTO	FINES	VISUAL SOIL DESCRIPTION
9.3	-	-	-	-	-	32.3	Dark brown silty SAND with gravel

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

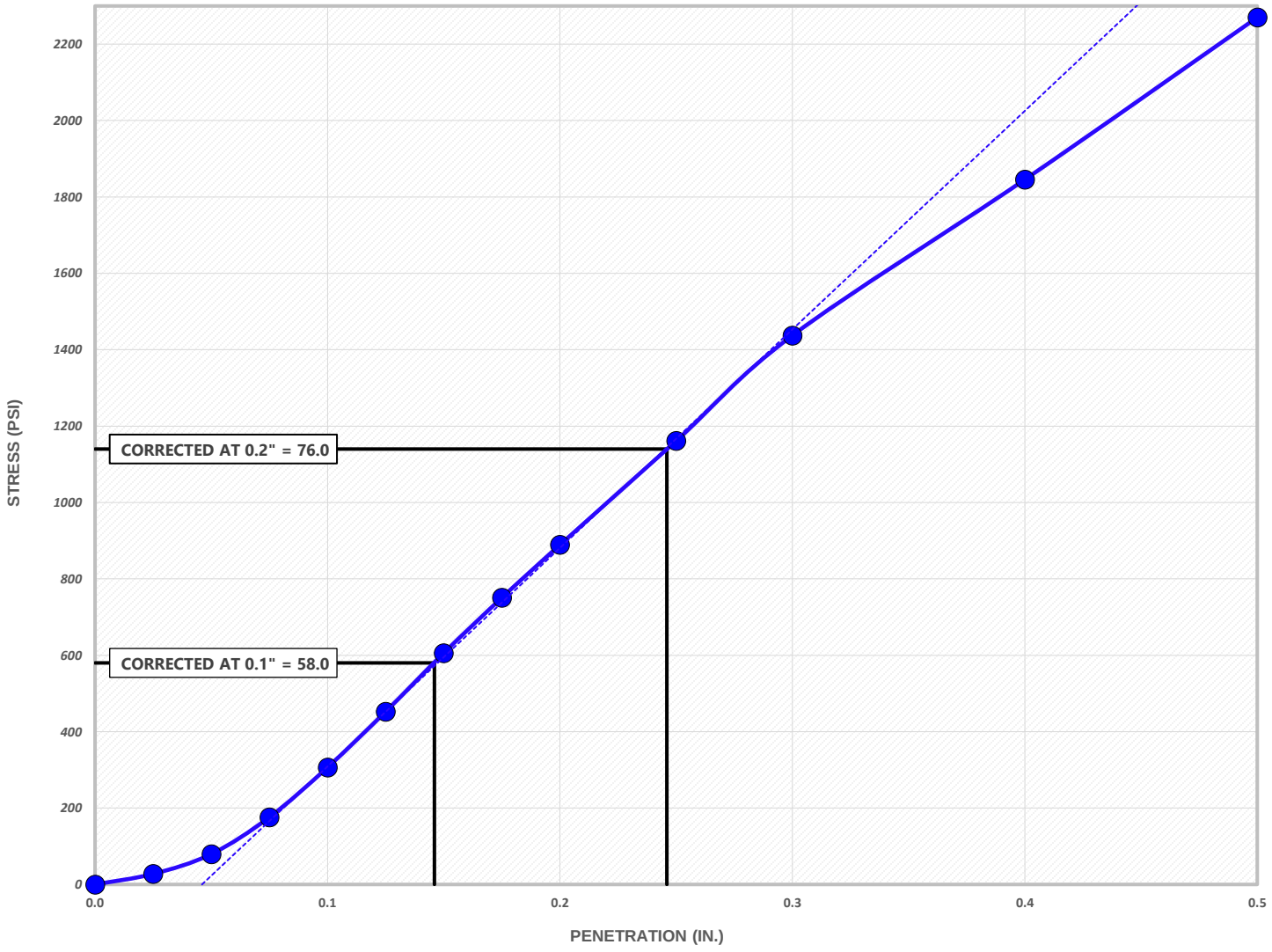
Boring:	**LB-9**	Project No.:	270060005	**JAY KAY TESTING, INC.**
Sample:	**Bulk**	Sample Date:	-	5233 Lehman Road, Suite 110
Depth:	**2-5'**	Location:	*Arlington, VA*	Spring Grove, PA 17362
				Phone: (814) 404-9283

CALIFORNIA BEARING RATIO TEST RESULTS

CORRECTED CBR AT 0.1"	CORRECTED CBR AT 0.2"
58.0	76.0

	Dry Unit Weight	Moisture Content	Compaction	Swell	Surcharge
As Molded	120.4	11.7	95.5	-	50
After Soak	120.8	12.8	95.8	-0.11	50
	PCF	%	%	%	PSF

METHOD: VTM-8, COMPACTION: VTM-1



MC	LL	PL	PI	USCS	AASHTO	FINES	VISUAL SOIL DESCRIPTION
9.8	-	-	-	-	-	-	Reddish-brown silty SAND with gravel

Boring: **LB-11**
Sample: **Bulk**
Depth: **1-3'**

Project No.: 270060005
Sample Date: -
Location: *Arlington, VA*

JAY KAY TESTING, INC.
5233 Lehman Road, Suite 110
Spring Grove, PA 17362
Phone: (814) 404-9283

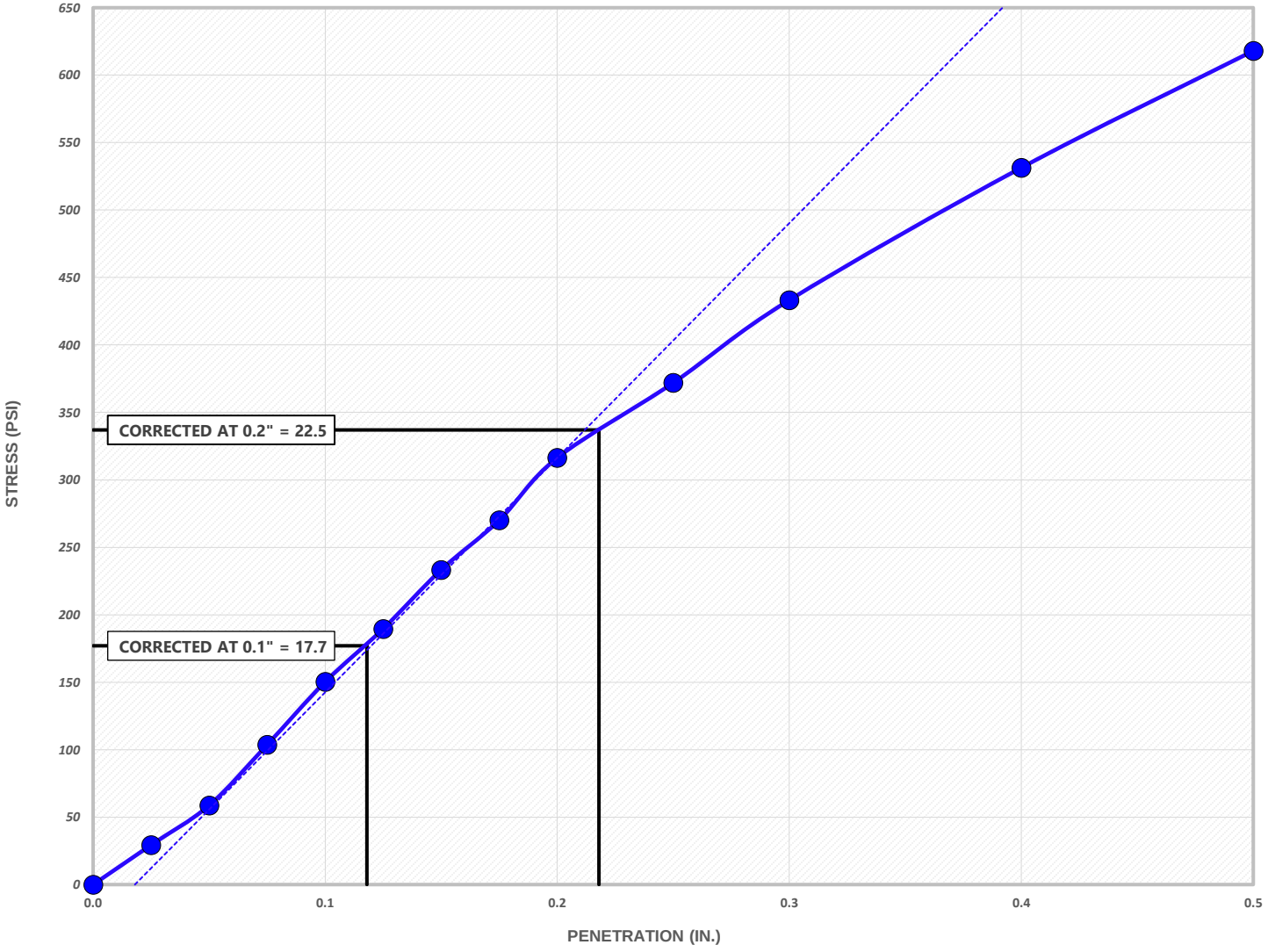
CALIFORNIA BEARING RATIO TEST RESULTS

CORRECTED CBR AT 0.1": **17.7**

CORRECTED CBR AT 0.2": **22.5**

	Dry Unit Weight	Moisture Content	Compaction	Swell	Surcharge
As Molded	120.1	10.9	101.7	-	50
After Soak	119.8	12.6	101.5	0.46	50
	PCF	%	%	%	PSF

METHOD: VTM-8, COMPACTION: VTM-1



MC	LL	PL	PI	USCS	AASHTO	FINES	VISUAL SOIL DESCRIPTION
14.7	-	-	-	-	-	51.3	Dark brown sandy clay

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

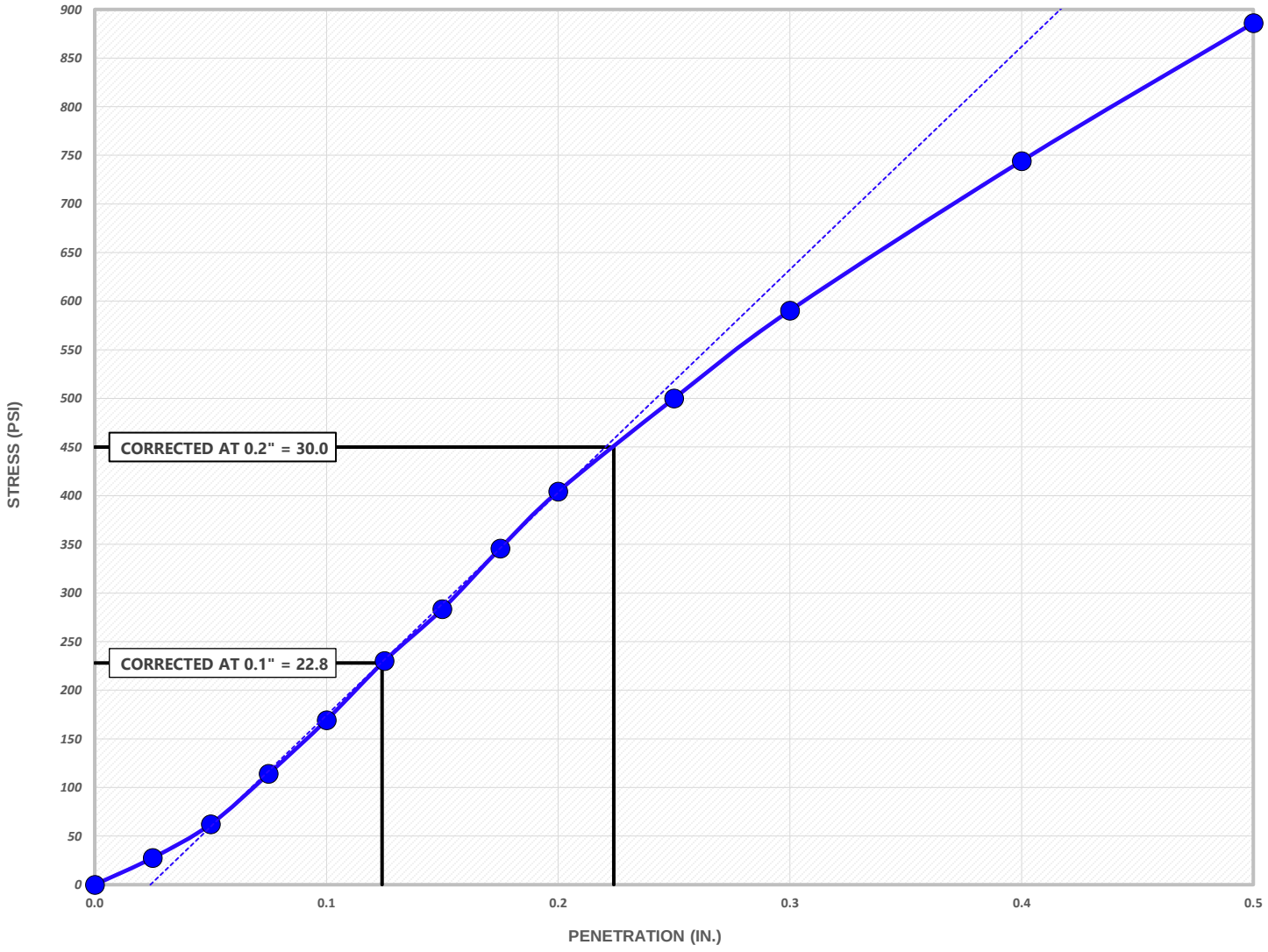
Boring:	**LB-12**	Project No.:	270060005	**JAY KAY TESTING, INC.**
Sample:	**Bulk**	Sample Date:	-	5233 Lehman Road, Suite 110
Depth:	**1-5'**	Location:	*Arlington, VA*	Spring Grove, PA 17362
				Phone: (814) 404-9283

CALIFORNIA BEARING RATIO TEST RESULTS

CORRECTED CBR AT 0.1"	CORRECTED CBR AT 0.2"
22.8	30.0

	Dry Unit Weight	Moisture Content	Compaction	Swell	Surcharge
As Molded	135.2	7.6	100.5	-	50
After Soak	135.8	8.2	100.9	-0.03	50
	PCF	%	%	%	PSF

METHOD: VTM-8, COMPACTION: VTM-1



MC	LL	PL	PI	USCS	AASHTO	FINES	VISUAL SOIL DESCRIPTION
4.5	-	-	-	-	-	-	Light brown silty SAND with gravel

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

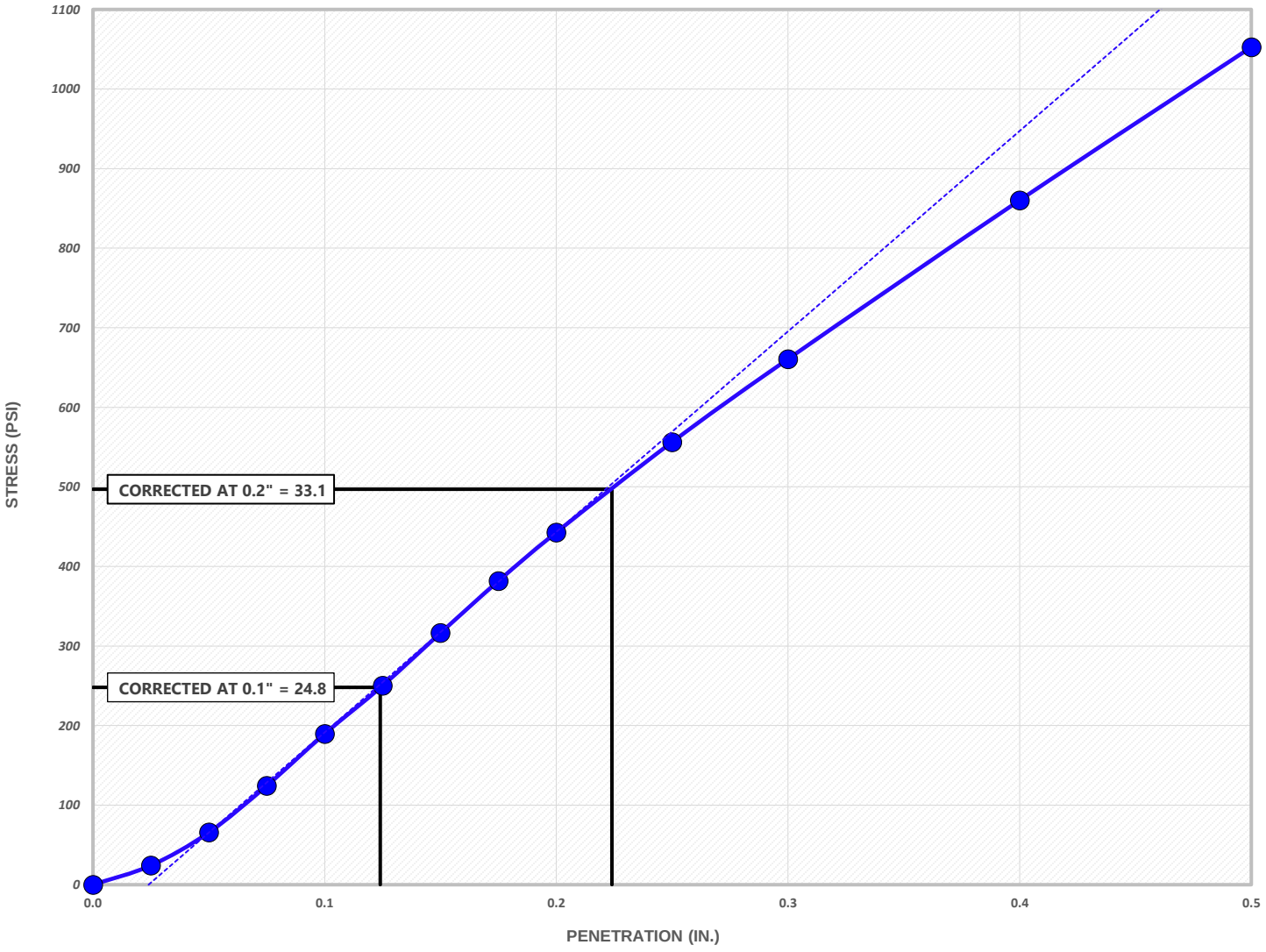
Boring:	**LB-13**	Project No.:	270060005	**JAY KAY TESTING, INC.**
Sample:	**Bulk**	Sample Date:	-	5233 Lehman Road, Suite 110
Depth:	**1-5'**	Location:	*Arlington, VA*	Spring Grove, PA 17362
				Phone: (814) 404-9283

CALIFORNIA BEARING RATIO TEST RESULTS

CORRECTED CBR AT 0.1"	CORRECTED CBR AT 0.2"
24.8	**33.1**

	Dry Unit Weight	Moisture Content	Compaction	Swell	Surcharge
As Molded	134.9	7.3	100.0	-	50
After Soak	134.9	8.4	100.0	-0.02	50
	PCF	**%**	**%**	**%**	**PSF**

METHOD: VTM-8, COMPACTION: VTM-1



MC	LL	PL	PI	USCS	AASHTO	FINES	VISUAL SOIL DESCRIPTION
5.7	-	-	-	-	-	28.3	Light brown silty SAND with gravel

ARMY NAVY DRIVE COMPLETE STREETS PROJECT

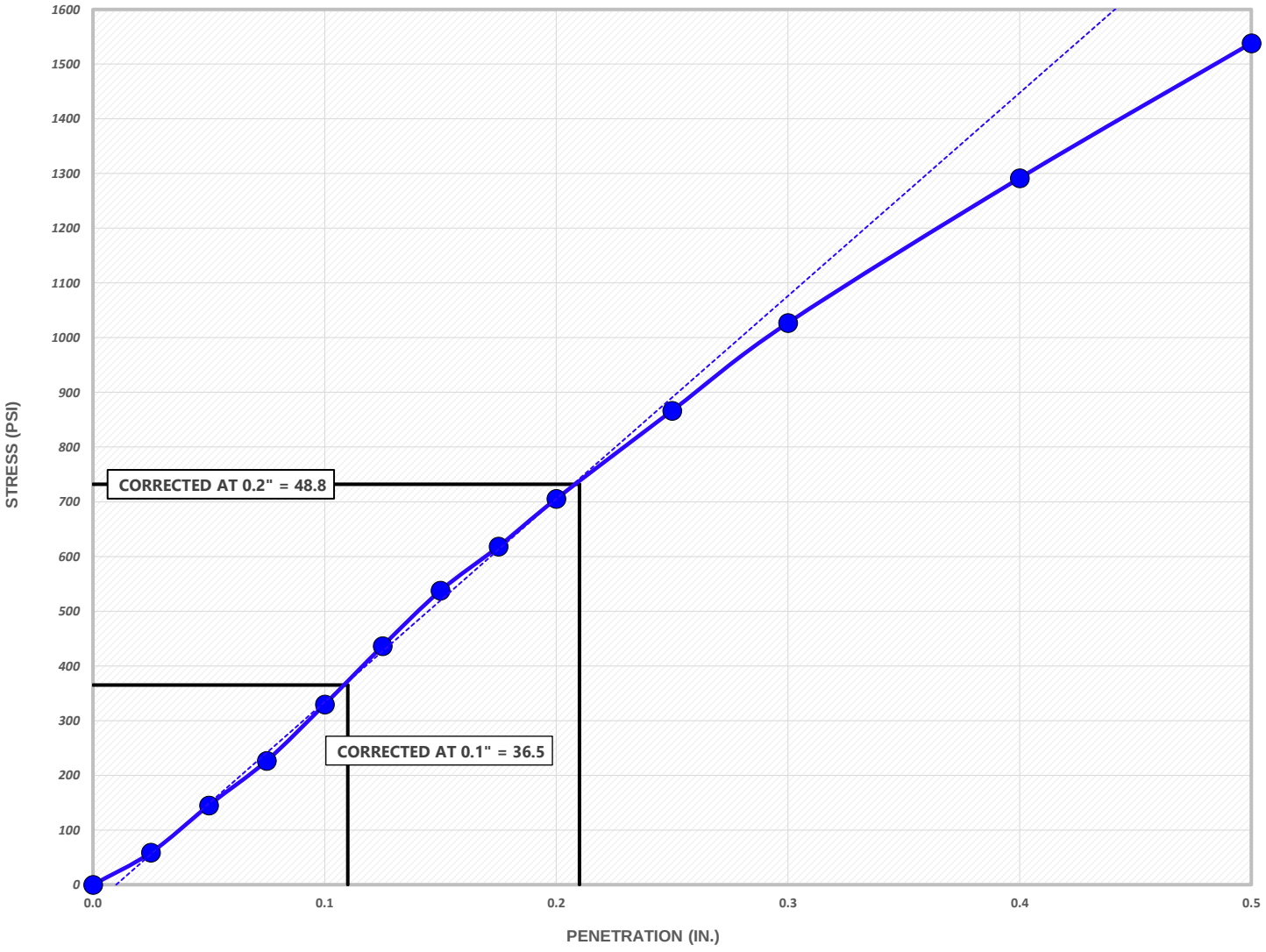
Boring:	**LB-14**	Project No.:	270060005	**JAY KAY TESTING, INC.**
Sample:	**Bulk**	Sample Date:	-	5233 Lehman Road, Suite 110
Depth:	**1-5'**	Location:	*Arlington, VA*	Spring Grove, PA 17362
				Phone: (814) 404-9283

CALIFORNIA BEARING RATIO TEST RESULTS

CORRECTED CBR AT 0.1"	CORRECTED CBR AT 0.2"
36.5	48.8

	Dry Unit Weight	Moisture Content	Compaction	Swell	Surcharge
As Molded	127.0	8.9	99.5	-	50
After Soak	126.3	11.0	99.0	-0.11	50
	PCF	**%**	**%**	**%**	**PSF**

METHOD: VTM-8, COMPACTION: VTM-1



MC	LL	PL	PI	USCS	AASHTO	FINES	VISUAL SOIL DESCRIPTION
4.5	-	-	-	-	-	24.2	Light brown silty SAND

Appendix E

Calculations

Pavement Design Requirements for Eads-12th (CBR Value = 10)

1. Design Requirements

For a pavement design life of 30 years, use the Anticipated Traffic Data for design:

Anticipated Traffic Data

Average Daily Traffic (2019)[see note 1]:	8,158	Vehicles/Day (Average Daily Traffic, ADT)
Annual Growth Rate (G)[see note 2]:	0.38	%
Anticipated Traffic Data for Design ADT at 30 years:	9,141	Vehicles/Day (Design ADT) in year 2050

Anticipated Daily Traffic Breakdown by Vehicle

8,708	Cars/Passenger Vehicles	4	5 Axle Single Trailer Trucks
146	Buses	2	6+ Axle Single Trailer Trucks
201	2 Axle Single Unit Trucks	1	5- Axle Multi Trailer Trucks
36	3+ Axle Single Unit Trucks	0	6 Axle Multi Trialer Trucks
6	4- Axle Single Trailer Trucks	2	7+ Axle Multi Trailer Trucks

Notes:

(1) Traffic information provided by Arlington County.

(2) Annual Growth Rate estimated from VDOT AADT projections for 2020 and 2040.

(3) Anticipated Daily Traffic Breakdown by Vehicle mirrors daily vehicle proportions given in traffic counts.

2. Determine Number of ESALs:

VDOT Vehicle Factors

Vehicle Classification	ESAL Factor
Cars/Passenger Vehicles	0.0002
Buses	2.5
2 Axle Single Unit Trucks	0.46
3+ Axle Single Unit Trucks	0.46
4- Axle Single Trailer Trucks	1.05

Vehicle Classification	ESAL Factor
5 Axle Single Trailer Trucks	1.2
6+ Axle Single Trailer Trucks	1.05
5- Axle Multi Trailer Trucks	1.05
6 Axle Multi Trialer Trucks	1.06
7+ Axle Multi Trailer Trucks	1.39

ESAL = (Number Vehicles per day) x (ESAL Factor) x (D_D) x (D_L) x (Design Life in Days)

Design Life = 30 years x 364 days/year = 10,920 days

Design Life for Vehicle Traffic less than 7 days/week: N/A days/week, Design Life = N/A days

Directional Distribution Factor, D_D = 1

Lane Distribution Factor, D_L = 0.9

Number of Passes per Vehicle = 1

17,116	Cars/Passenger Vehicle ESALS	47,174	5 Axle Single Trailer Truck ESALs
3,587,220	Bus ESALS	20,639	6+ Axle Single Trailer Truck ESALs
908,697	2 Axle Single Unit Truck ESALS	10,319	5- Axle Multi Trailer Truck ESALs
162,752	3+ Axle Single Unit Truck ESALS	0	6 Axle Multi Trialer Truck ESALs
61,916	4- Axle Single Trailer Truck ESALS	27,322	7+ Axle Multi Trailer Truck ESALs

Total Equivalent Single Axle Loads = 4,843,156 ESALs

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		Date: 4/15/2020	
		Calculations By: ANG 4/15/20	
		Checked By: KJL 4/21/20	Page 1 of 2

3. Determine Structural Number:

$$\log_{10}(W_{18}) = Z_R \times S_o + 9.36 \times \log_{10}(SN+1) - 0.20 + \frac{\log_{10}\left(\frac{\Delta PSI}{4.2-1.5}\right)}{0.40 + \frac{1094}{(SN+1)^{5.19}}} + 2.32 \times \log_{10}(M_R) - 8.07$$

Equivalent Single Axle Loads, W_{18} = 4,843,156 CBR = 10

Standard Deviation = 0.49 Subgrade Resilient Modulus, M_R = 1,500 x CBR = 15,000

Initial Serviceability Index = 4.2 Reliability Factor, R = 0.9

Terminal Serviceability Index = 2.8 Standard Normal Deviate, Z_R = -1.282

ΔPSI = Initial Serviceability Index - Terminal Serviceability Index = 1.4

Therefore, Required Structural Number, $SN_{Required}$ = 3.67

4. Determine Minimum Recommended Pavement Section:

Material Structural Number = Thickness of Material (inches) x AASHTO Material Coefficient

Recommended SN = Surface Course SN + Base Course SN + Aggregate SN ≥ $SN_{Required}$

Material	AASHTO Material Coefficient
Bituminous Concrete Asphalt Surface Course	0.44
Bituminous Base Course	0.44
Dense Graded Aggregate	0.12

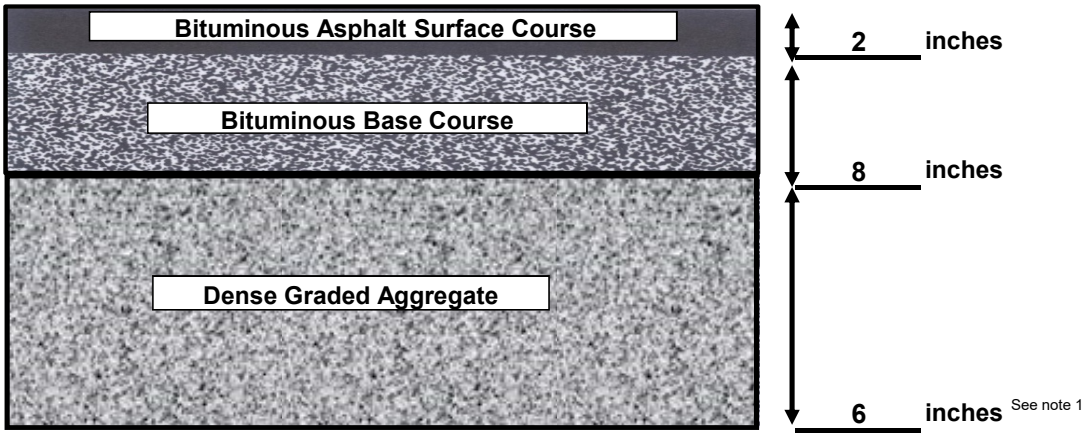
Recommended Thicknesses:

2 inches of Bituminous Concrete Asphalt Surface Course

8 inches of Bituminous Base Course

6 inches of Dense Graded Aggregate

Therefore, Recommended SN = 5.12 ≥ 3.67 SECTION IS OK



Notes:

(1) Dense Graded Aggregate can be increased to 8 inches for drainage considerations

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		Date: 4/15/2020	
		Calculations By: ANG 4/15/20	
		Checked By: KJL 4/21/20	Page 2 of 2

Pavement Design Requirements for Fern-Eads (CBR Value = 20)

1. Design Requirements

For a pavement design life of 30 years, use the Anticipated Traffic Data for design:

Anticipated Traffic Data

Average Daily Traffic (2019)[see note 1]:	19,744	Vehicles/Day (Average Daily Traffic, ADT)
Annual Growth Rate (G)[see note 2]:	0.00	%
Anticipated Traffic Data for Design ADT at 30 years:	19,744	Vehicles/Day (Design ADT) in year 2050

Anticipated Daily Traffic Breakdown by Vehicle

18,826	Cars/Passenger Vehicles	8	5 Axle Single Trailer Trucks
316	Buses	5	6+ Axle Single Trailer Trucks
434	2 Axle Single Unit Trucks	2	5- Axle Multi Trailer Trucks
79	3+ Axle Single Unit Trucks	0	6 Axle Multi Trialer Trucks
12	4- Axle Single Trailer Trucks	4	7+ Axle Multi Trailer Trucks

Notes:

(1) Traffic information provided by Arlington County.

(2) Annual Growth Rate estimated from VDOT AADT projections for 2020 and 2040

(3) Anticipated Daily Traffic Breakdown by Vehicle mirrors daily vehicle proportions given in traffic counts.

2. Determine Number of ESALs:

VDOT Vehicle Factors

Vehicle Classification	ESAL Factor
Cars/Passenger Vehicles	0.0002
Buses	2.5
2 Axle Single Unit Trucks	0.46
3+ Axle Single Unit Trucks	0.46
4- Axle Single Trailer Trucks	1.05

Vehicle Classification	ESAL Factor
5 Axle Single Trailer Trucks	1.2
6+ Axle Single Trailer Trucks	1.05
5- Axle Multi Trailer Trucks	1.05
6 Axle Multi Trialer Trucks	1.06
7+ Axle Multi Trailer Trucks	1.39

ESAL = (Number Vehicles per day) x (ESAL Factor) x (D_D) x (D_L) x (Design Life in Days)

Design Life = 30 years x 364 days/year = 10,920 days

Design Life for Vehicle Traffic less than 7 days/week: N/A days/week, Design Life = N/A days

Directional Distribution Factor, D_D = 1

Lane Distribution Factor, D_L = 0.9

Number of Passes per Vehicle = 1

37,004	Cars/Passenger Vehicle ESALS	94,349	5 Axle Single Trailer Truck ESALs
7,764,120	Bus ESALS	51,597	6+ Axle Single Trailer Truck ESALs
1,962,062	2 Axle Single Unit Truck ESALS	20,639	5- Axle Multi Trailer Truck ESALs
357,150	3+ Axle Single Unit Truck ESALS	0	6 Axle Multi Trialer Truck ESALs
123,833	4- Axle Single Trailer Truck ESALS	54,644	7+ Axle Multi Trailer Truck ESALs

Total Equivalent Single Axle Loads = 10,465,397 ESALs

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	Arlington Virginia
Calculation Title	Asphalt Pavement Design
Project No.	270060005
Date	4/15/2020
Calculations By	ANG 4/15/20
Checked By	KJL 4/21/20

3. Determine Structural Number:

$$\log_{10}(W_{18}) = Z_R \times S_o + 9.36 \times \log_{10}(SN+1) - 0.20 + \frac{\log_{10}\left(\frac{\Delta PSI}{4.2-1.5}\right)}{0.40 + \frac{1094}{(SN+1)^{5.19}}} + 2.32 \times \log_{10}(M_R) - 8.07$$

Equivalent Single Axle Loads, W_{18} = 10,465,397

CBR = 20

Standard Deviation = 0.49

Subgrade Resilient Modulus, M_R = 1,500 x CBR = 30,000

Initial Serviceability Index = 4.2

Reliability Factor, R = 0.9

Terminal Serviceability Index = 2.8

Standard Normal Deviate, Z_R = -1.282

ΔPSI = Initial Serviceability Index - Terminal Serviceability Index = 1.4

Therefore, Required Structural Number, $SN_{Required}$ = 3.16

4. Determine Minimum Recommended Pavement Section:

Material Structural Number = Thickness of Material (inches) x AASHTO Material Coefficient

Recommended SN = Surface Course SN + Base Course SN + Aggregate SN ≥ $SN_{Required}$

Material	AASHTO Material Coefficient
Bituminous Concrete Asphalt Surface Course	0.44
Bituminous Base Course	0.44
Dense Graded Aggregate	0.12

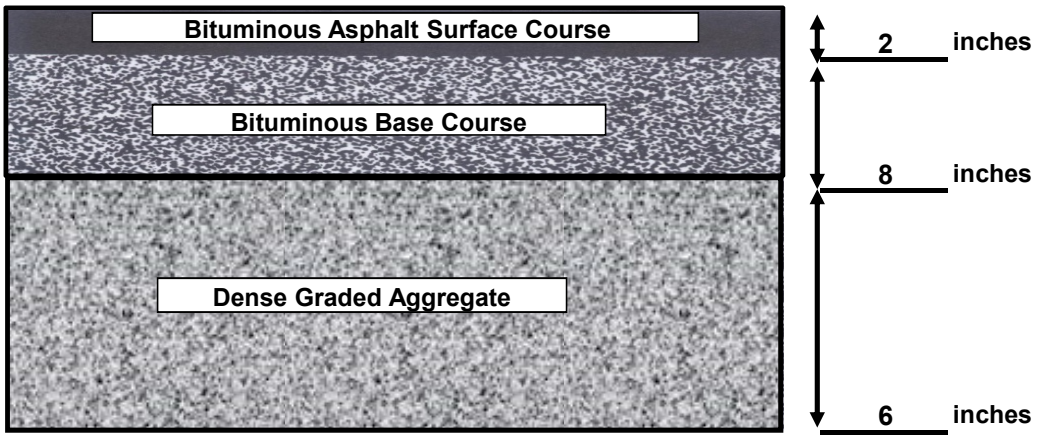
Recommended Thicknesses:

2 inches of Bituminous Concrete Asphalt Surface Course

8 inches of Bituminous Base Course

6 inches of Dense Graded Aggregate

Therefore, Recommended SN = 5.12 ≥ 3.16 SECTION IS OK



Notes:
(1) Dense Graded Aggregate can be increased to 8 inches for drainage considerations

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Project	Calculation Title	Project No.	
Army Navy Drive Complete Streets Project Arlington Virginia	**Asphalt Pavement Design**	270060005	
		Date 4/15/2020	
		Calculations By ANG 4/15/20	
		Checked By KJL 4/21/20	Page 2 of 2

Pavement Design Requirements for Hayes-Fern (CBR Value = 20)

1. Design Requirements

For a pavement design life of 30 years, use the Anticipated Traffic Data for design:

Anticipated Traffic Data

Average Daily Traffic (2019)[see note 1]:	27,334	Vehicles/Day (Average Daily Traffic, ADT)
Annual Growth Rate (G)[see note 2]:	0.07	%
Anticipated Traffic Data for Design ADT at 30 years:	27,914	Vehicles/Day (Design ADT) in year 2050

Anticipated Daily Traffic Breakdown by Vehicle

26,068	Cars/Passenger Vehicles	50	5 Axle Single Trailer Trucks
670	Buses	33	6+ Axle Single Trailer Trucks
753	2 Axle Single Unit Trucks	20	5- Axle Multi Trailer Trucks
93	3+ Axle Single Unit Trucks	3	6 Axle Multi Trialer Trucks
194	4- Axle Single Trailer Trucks	17	7+ Axle Multi Trailer Trucks

Notes:

(1) Traffic information provided by Arlington County.

(2) Annual Growth Rate estimated from VDOT AADT projections for 2020 and 2040

(3) Anticipated Daily Traffic Breakdown by Vehicle mirrors daily vehicle proportions given in traffic counts.

2. Determine Number of ESALs:

VDOT Vehicle Factors

Vehicle Classification	ESAL Factor
Cars/Passenger Vehicles	0.0002
Buses	2.5
2 Axle Single Unit Trucks	0.46
3+ Axle Single Unit Trucks	0.46
4- Axle Single Trailer Trucks	1.05

Vehicle Classification	ESAL Factor
5 Axle Single Trailer Trucks	1.2
6+ Axle Single Trailer Trucks	1.05
5- Axle Multi Trailer Trucks	1.05
6 Axle Multi Trialer Trucks	1.06
7+ Axle Multi Trailer Trucks	1.39

ESAL = (Number Vehicles per day) x (ESAL Factor) x (D_D) x (D_L) x (Design Life in Days)

Design Life = 30 years x 364 days/year = 10,920 days

Design Life for Vehicle Traffic less than 7 days/week: N/A days/week, Design Life = N/A days

Directional Distribution Factor, D_D = 1

Lane Distribution Factor, D_L = 0.9

Number of Passes per Vehicle = 1

51,239	Cars/Passenger Vehicle ESALS	589,680	5 Axle Single Trailer Truck ESALs
16,461,900	Bus ESALS	340,540	6+ Axle Single Trailer Truck ESALs
3,404,223	2 Axle Single Unit Truck ESALS	206,388	5- Axle Multi Trailer Truck ESALs
420,442	3+ Axle Single Unit Truck ESALS	31,253	6 Axle Multi Trialer Truck ESALs
2,001,964	4- Axle Single Trailer Truck ESALS	232,236	7+ Axle Multi Trailer Truck ESALs

Total Equivalent Single Axle Loads = 23,739,864 ESALs

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	Arlington Virginia
Calculation Title	Asphalt Pavement Design
Project No.	270060005
Date	4/15/2020
Calculations By	ANG 4/15/20
Checked By	KJL 4/21/20

3. Determine Structural Number:

$$\log_{10}(W_{18}) = Z_R \times S_o + 9.36 \times \log_{10}(SN+1) - 0.20 + \frac{\log_{10}\left(\frac{\Delta PSI}{4.2-1.5}\right)}{0.40 + \frac{1094}{(SN+1)^{5.19}}} + 2.32 \times \log_{10}(M_R) - 8.07$$

Equivalent Single Axle Loads, W_{18} = 23,739,864 CBR = 20

Standard Deviation = 0.49 Subgrade Resilient Modulus, M_R = 1,500 x CBR = 30,000

Initial Serviceability Index = 4.2 Reliability Factor, R = 0.9

Terminal Serviceability Index = 2.8 Standard Normal Deviate, Z_R = -1.282

ΔPSI = Initial Serviceability Index - Terminal Serviceability Index = 1.4

Therefore, Required Structural Number, $SN_{Required}$ = 3.66

4. Determine Minimum Recommended Pavement Section:

Material Structural Number = Thickness of Material (inches) x AASHTO Material Coefficient

Recommended SN = Surface Course SN + Base Course SN + Aggregate SN ≥ $SN_{Required}$

Material	AASHTO Material Coefficient
Bituminous Concrete Asphalt Surface Course	0.44
Bituminous Base Course	0.44
Dense Graded Aggregate	0.12

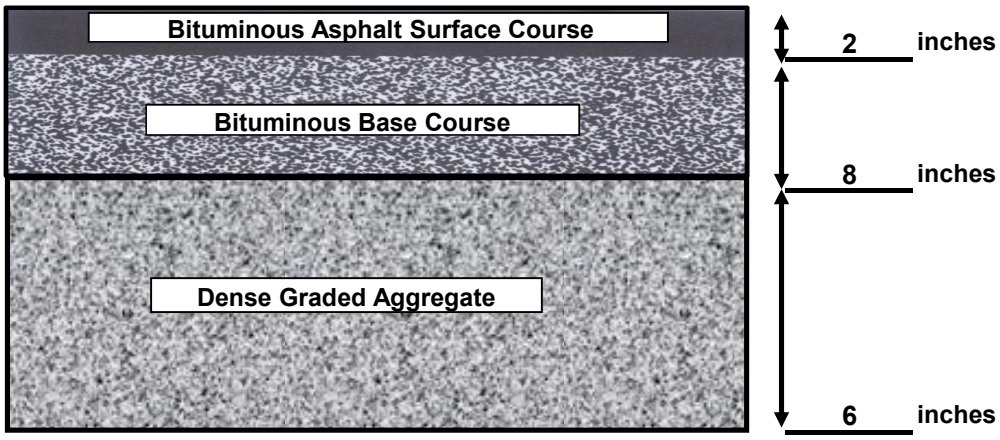
Recommended Thicknesses:

2 inches of Bituminous Concrete Asphalt Surface Course

8 inches of Bituminous Base Course

6 inches of Dense Graded Aggregate

Therefore, Recommended SN = 5.12 ≥ 3.66 SECTION IS OK



Notes:
(1) Dense Graded Aggregate can be increased to 8 inches for drainage considerations

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		Date 4/15/2020	
		Calculations By ANG 4/15/20	
Arlington Virginia		Checked By KJL 4/21/20	Page 2 of 2

Pavement Design Requirements for Joyce-Hayes (CBR Value = 7)

1. Design Requirements

For a pavement design life of 30 years, use the Anticipated Traffic Data for design:

Anticipated Traffic Data

Average Daily Traffic (2019)[see note 1]:	21,234	Vehicles/Day (Average Daily Traffic, ADT)
Annual Growth Rate (G)[see note 2]:	0.05	%
Anticipated Traffic Data for Design ADT at 30 years:	21,555	Vehicles/Day (Design ADT) in year 2050

Anticipated Daily Traffic Breakdown by Vehicle

19,737	Cars/Passenger Vehicles	40	5 Axle Single Trailer Trucks
0	Buses	22	6+ Axle Single Trailer Trucks
611	2 Axle Single Unit Trucks	16	5- Axle Multi Trailer Trucks
100	3+ Axle Single Unit Trucks	5	6 Axle Multi Trialer Trucks
130	4- Axle Single Trailer Trucks	6	7+ Axle Multi Trailer Trucks

Notes:

(1) Traffic information provided by Arlington County.

(2) Annual Growth Rate estimated from VDOT AADT projections for 2020 and 2040

(3) Anticipated Daily Traffic Breakdown by Vehicle mirrors daily vehicle proportions given in traffic counts.

2. Determine Number of ESALs:

VDOT Vehicle Factors

Vehicle Classification	ESAL Factor
Cars/Passenger Vehicles	0.0002
Buses	2.5
2 Axle Single Unit Trucks	0.46
3+ Axle Single Unit Trucks	0.46
4- Axle Single Trailer Trucks	1.05

Vehicle Classification	ESAL Factor
5 Axle Single Trailer Trucks	1.2
6+ Axle Single Trailer Trucks	1.05
5- Axle Multi Trailer Trucks	1.05
6 Axle Multi Trialer Trucks	1.06
7+ Axle Multi Trailer Trucks	1.39

ESAL = (Number Vehicles per day) x (ESAL Factor) x (D_D) x (D_L) x (Design Life in Days)

Design Life = 30 years x 364 days/year = 10,920 days

Design Life for Vehicle Traffic less than 7 days/week: N/A days/week, Design Life = N/A days

Directional Distribution Factor, D_D = 1

Lane Distribution Factor, D_L = 0.9

Number of Passes per Vehicle = 1

38,795	Cars/Passenger Vehicle ESALS	471,744	5 Axle Single Trailer Truck ESALs
0	Bus ESALS	227,027	6+ Axle Single Trailer Truck ESALs
2,762,258	2 Axle Single Unit Truck ESALS	165,110	5- Axle Multi Trailer Truck ESALs
452,088	3+ Axle Single Unit Truck ESALS	52,088	6 Axle Multi Trialer Truck ESALs
1,341,522	4- Axle Single Trailer Truck ESALS	81,966	7+ Axle Multi Trailer Truck ESALs

Total Equivalent Single Axle Loads = 5,592,598 ESALs

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	Arlington Virginia
Calculation Title	Asphalt Pavement Design
Project No.	270060005
Date	4/15/2020
Calculations By	ANG 4/15/20
Checked By	KJL 4/21/20

3. Determine Structural Number:

$$\log_{10}(W_{18}) = Z_R \times S_o + 9.36 \times \log_{10}(SN+1) - 0.20 + \frac{\log_{10}\left(\frac{\Delta PSI}{4.2-1.5}\right)}{0.40 + \frac{1094}{(SN+1)^{5.19}}} + 2.32 \times \log_{10}(M_R) - 8.07$$

Equivalent Single Axle Loads, W_{18} = 5,592,598

CBR = 7

Standard Deviation = 0.49

Subgrade Resilient Modulus, M_R = 1,500 x CBR = 10,500

Initial Serviceability Index = 4.2

Reliability Factor, R = 0.9

Terminal Serviceability Index = 2.8

Standard Normal Deviate, Z_R = -1.282

ΔPSI = Initial Serviceability Index - Terminal Serviceability Index = 1.4

Therefore, Required Structural Number, $SN_{Required}$ = 4.33

4. Determine Minimum Recommended Pavement Section:

Material Structural Number = Thickness of Material (inches) x AASHTO Material Coefficient

Recommended SN = Surface Course SN + Base Course SN + Aggregate SN ≥ $SN_{Required}$

Material	AASHTO Material Coefficient
Bituminous Concrete Asphalt Surface Course	0.44
Bituminous Base Course	0.44
Dense Graded Aggregate	0.12

Recommended Thicknesses:

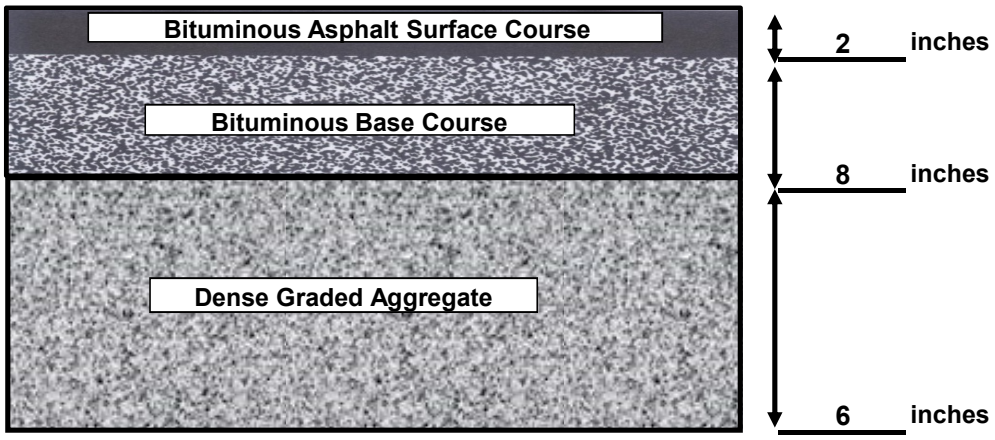
2 inches of Bituminous Concrete Asphalt Surface Course

8 inches of Bituminous Base Course

6 inches of Dense Graded Aggregate

Therefore, Recommended SN = 5.12 ≥ 4.33 SECTION IS OK

Notes:
(1) Dense Graded Aggregate can be increased to 8 inches for drainage considerations



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Calculation Title: Asphalt Pavement Design

Project No. 270060005

Date 4/15/2020

Calculations By ANG 4/15/20

Checked By KJL 4/21/20

Pavement Design Requirements for Joyce-Hayes Bus Lane (CBR Value = 7)

1. Design Requirements

For a pavement design life of 30 years, use the Anticipated Traffic Data for design:

Anticipated Traffic Data

Average Daily Traffic (2019)[see note 1]:	21,234	Vehicles/Day (Average Daily Traffic, ADT)
Annual Growth Rate (G)[see note 2]:	0.05	%
Anticipated Traffic Data for Design ADT at 30 years:	21,555	Vehicles/Day (Design ADT) in year 2050

Anticipated Daily Traffic Breakdown by Vehicle

0	Cars/Passenger Vehicles	0	5 Axle Single Trailer Trucks
901	Buses	0	6+ Axle Single Trailer Trucks
0	2 Axle Single Unit Trucks	0	5- Axle Multi Trailer Trucks
0	3+ Axle Single Unit Trucks	0	6 Axle Multi Trialer Trucks
0	4- Axle Single Trailer Trucks	0	7+ Axle Multi Trailer Trucks

Notes:

(1) Traffic information provided by Arlington County.

(2) Annual Growth Rate estimated from VDOT AADT projections for 2020 and 2040

(3) Anticipated Daily Traffic Breakdown by Vehicle mirrors daily vehicle proportions given in traffic counts.

2. Determine Number of ESALs:

VDOT Vehicle Factors

Vehicle Classification	ESAL Factor
Cars/Passenger Vehicles	0.0002
Buses	2.5
2 Axle Single Unit Trucks	0.26
3+ Axle Single Unit Trucks	0.42
4- Axle Single Trailer Trucks	0.3

Vehicle Classification	ESAL Factor
5 Axle Single Trailer Trucks	1.2
6+ Axle Single Trailer Trucks	0.93
5- Axle Multi Trailer Trucks	0.82
6 Axle Multi Trialer Trucks	1.06
7+ Axle Multi Trailer Trucks	1.39

ESAL = (Number Vehicles per day) x (ESAL Factor) x (D_D) x (D_L) x (Design Life in Days)

Design Life = 30 years x 364 days/year = 10,920 days

Design Life for Vehicle Traffic less than 7 days/week: N/A days/week, Design Life = N/A days

Directional Distribution Factor, D_D = 1

Non-Bus Lane Distribution Factor, D_L = 0.9 Bus Lane Distribution Factor, D_L = 1

Number of Passes per Vehicle = 1

0	Cars/Passenger Vehicle ESALS	0	5 Axle Single Trailer Truck ESALs
24,597,300	Bus ESALS	0	6+ Axle Single Trailer Truck ESALs
0	2 Axle Single Unit Truck ESALS	0	5- Axle Multi Trailer Truck ESALs
0	3+ Axle Single Unit Truck ESALS	0	6 Axle Multi Trialer Truck ESALs
0	4- Axle Single Trailer Truck ESALS	0	7+ Axle Multi Trailer Truck ESALs

Total Equivalent Single Axle Loads = 24,597,300 ESALs

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Project	Army Navy Drive Complete Streets Project
	Arlington Virginia
Calculation Title	Asphalt Pavement Design
Project No.	270060005
Date	4/15/2020
Calculations By	ANG 4/15/20
Checked By	KJL 4/21/20

3. Determine Structural Number:

$$\log_{10}(W_{18}) = Z_R \times S_o + 9.36 \times \log_{10}(SN+1) - 0.20 + \frac{\log_{10}\left(\frac{\Delta PSI}{4.2-1.5}\right)}{0.40 + \frac{1094}{(SN+1)^{5.19}}} + 2.32 \times \log_{10}(M_R) - 8.07$$

Equivalent Single Axle Loads, W_{18} = 24,597,300

CBR = 7

Standard Deviation = 0.49

Subgrade Resilient Modulus, M_R = 1,500 x CBR = 10,500

Initial Serviceability Index = 4.2

Reliability Factor, R = 0.9

Terminal Serviceability Index = 2.8

Standard Normal Deviate, Z_R = -1.282

ΔPSI = Initial Serviceability Index - Terminal Serviceability Index = 1.4

Therefore, Required Structural Number, $SN_{Required}$ = 5.43

4. Determine Minimum Recommended Pavement Section:

Material Structural Number = Thickness of Material (inches) x AASHTO Material Coefficient

Recommended SN = Surface Course SN + Base Course SN + Aggregate SN ≥ $SN_{Required}$

Material	AASHTO Material Coefficient
Bituminous Concrete Asphalt Surface Course	0.44
Bituminous Base Course	0.44
Dense Graded Aggregate	0.12

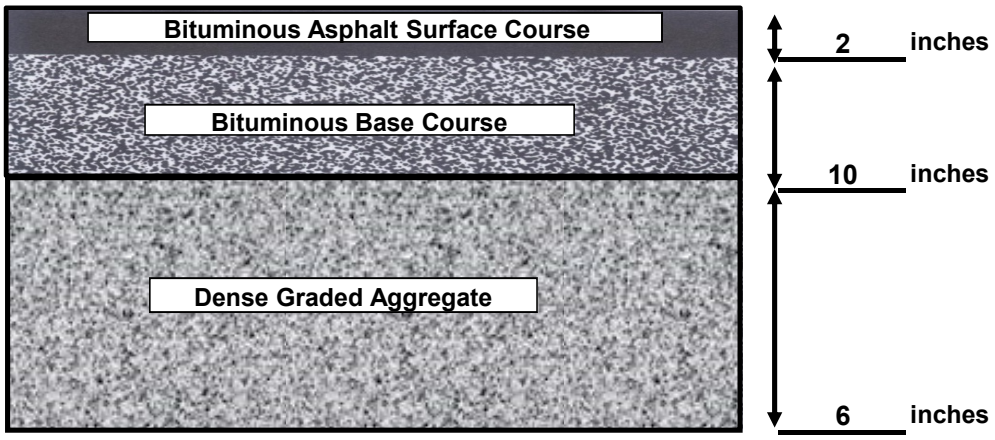
Recommended Thicknesses:

2 inches of Bituminous Concrete Asphalt Surface Course

10 inches of Bituminous Base Course

6 inches of Dense Graded Aggregate

Therefore, Recommended SN = 6 ≥ 5.43 SECTION IS OK



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