GEOTECHNICAL SUBSURFACE INVESTIGATION
ALKIRE ROAD/DARBY CREEK DRIVE ROUNDABOUT
PID N0. 95637
COLUMBUS, FRANKLIN COUNTY, OHIO
PROJECT NO. C13-103

For:

Kevin J. Grathwol, P.E.
Senior Project Manager
GPD Group, Inc.
Glaus, Pyle, Schomer, Burns & Dehaven, Inc.
1801 Watermark Drive, Suite 150
Columbus, Ohio 43215

Submitted by:

DHDC Engineering Consulting Services, Inc.
2390 Advanced Business Center Drive
Columbus, Ohio 43228

Date:

April 28, 2014

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Senior Project Manager
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Columbus, Ohio 43215

Subject: **Geotechnical Subsurface Investigation**
Alkire Road/Darby Creek Drive Roundabout
PID No. 95637
Columbus, Franklin County, Ohio
DHDC Project No. C13-103

Dear Mr. Grathwol:

In compliance with your request, DHDC Engineering Consulting Services, Inc. (DHDC) has completed a subsurface exploration and geotechnical evaluation for the above referenced project. We appreciate the opportunity to be of service to you on this project. If you have any questions regarding our report or if we may be of further service, please contact us at your earliest convenience.

Respectfully submitted,

DHDC Engineering Consulting Services, Inc.

STATE OF OHIO
MOHAMMED O. HAQUE
E-63310
REGISTERED
PROFESSIONAL ENGINEER

Mohammed O. Haque, P.E.
Geotechnical Project Manager

Savvas P. Sophocleous
Project Engineer

Attachment

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1.0 INTRODUCTION

This report presents the results of a geotechnical investigation and soils evaluation for the proposed Alkire Road and Darby Creek Drive roundabout improvements in the City of Columbus, Franklin County, Ohio. This study was performed in accordance with DHDC proposal dated September 26, 2013.

The purpose of this exploration was to determine the soil profile at the proposed site to the depths explored, to evaluate the suitability of the subgrade materials for the support of the proposed pavement, and formulate recommendations relative to pavement design, earthwork operations, site preparation, drainage, and construction concerns for this project.

The scope of this investigation included a review of available geologic and soils data for the project area, a subsurface investigation consisting of ten (10) standard soil test borings located as shown on the attached Soil Boring Exhibit in the Appendix, field and laboratory soil testing, and an engineering analysis and evaluation of the subsurface conditions encountered at this site.

2.0 PROJECT AND SITE CHARACTERISTICS

The proposed improvements at the intersection of Alkire Road and Darby Creek Drive will consist of the construction of a new roundabout and the widening of the existing road lanes. As part of the improvements, curb and sidewalk will be installed on the north and south sides of Alkire Road and on the east and west side of Darby Creek Drive. It is DHDC's belief that some underground utility improvements will also be part of this project.

Soil Boring Exhibits in the Appendix show the existing street and the locations of the test borings completed for this study. While no grading plans have been made available to DHDC, it is assumed that the final grade of the proposed roadway will match the existing roadway grade.

The primary focus of this geotechnical investigation is to provide a brief description of the subsurface materials encountered and subgrade preparation recommendations for the proposed roadway improvement and reconstruction, and make comments and recommendations regarding fill construction.

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3.0 INVESTIGATIVE PROCEDURES

Ten (10) soil borings were performed for this investigation. As per the request, the soil borings were drilled to a depth of 10.0 feet below the exposed grades.

The test borings were performed in accordance with geotechnical investigative procedures outlined in American Society for Testing and Materials (ASTM) Standards D 1452 and D 5434. The test borings performed during this investigation were drilled with a truck rig utilizing 2¼-inch inside diameter hollow-stem augers. DHDC performed continuous sampling, starting at 1.0 feet below the exposed grade to the maximum depths explored of 10.0 feet below the exposed grade to collect the samples.

Split-spoon samples were obtained by the Standard Penetration Test (SPT) Method (ASTM D 1586), which consists of driving a 2.5-inch outside diameter split-spoon sampler into the soil with a 140-pound weight falling freely through a distance of 30 inches. The sampler was driven in three successive 6-inch increments with the number of blows per increment being recorded. The sum of the number of blows required to advance the sampler the second and third 6-inch increments is termed the Standard Penetration Resistance (N-value) and is presented on the Logs of Test Borings attached to this report. The split-spoon samples were sealed in jars and transported to our laboratory for further classification and testing.

Soil conditions encountered in the test borings are presented in the Logs of Test Borings, along with information related to sample data, SPT results, water conditions observed in the borings, and laboratory test data. It should be noted that these logs have been prepared on the basis of laboratory classification and testing as well as on field logs of the encountered soils.

All samples of the subsoils were visually or manually classified using the Unified Group Soil Classification System (ASTM D-2487 and D-2488). Selected samples were tested in the laboratory for moisture content (ASTM D 2216), Pocket Penetrometer (approximate Unconfined Compressive Strength), and Atterberg Limits (ASTM D-4318) tests. The results of these tests are presented on the soil boring logs attached to this report.

4.0 GENERAL SUBSURFACE CONDITIONS

4.1 Site Geologic Conditions

Geologic mapping indicates that the overburden soil at this site consists of glacial till and glacial outwash. The glacial till soil is mostly silty to sandy clay with trace to little amounts of sand and gravel. Layers of silt, silty sand, sandy silt, a mixture of silty sand and gravel are often encountered within the glacial till soil matrix. Perched or trapped groundwater is often encountered in cohesionless granular soil layers sandwiched between less permeable glacial till soil. The glacial outwash consists of sand and gravel with occasion presence of coarse gravel, cobble, and boulder. Glacial tills in this portion of Ohio are typically low to moderate plasticity cohesive soils.

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4.2 Soil Profile

Surface Material

Soil Borings B-1, B-7, B-9, and B-10 were drilled through the existing pavement. DHDC cored these boring locations to determine the asphaltic concrete and granular base thicknesses. The thickness of asphaltic concrete at the boring locations varied between 6.0 to 10.0 inches. Below the asphaltic concrete pavement, all but Boring B-7 encountered base material. Various types of base materials were encountered at the boring locations. The following table shows the depth of asphaltic concrete and granular base material encountered at the boring locations:

TABLE I

Boring No.	Elevation	Location	Asphaltic Concrete (in)	Base Material (in)
B-1	920.79	South side of Alkire Road, Eastbound Lane	9±	Macadam (8±)
B-7	915.6	East side of Derby Creek Drive, Northbound Lane	10±	No Base, Clayey Subbase
B-9	921.44	West side of Darby Creek drive, Southbound Lane	9±*	Fine graded Macadam (5±)
B-10	921.87	North side of Alkire Road, Westbound Lane	6±	ODOT 304 Stone (12±)

*** Last inch was very degraded.**

Granular base was encountered as surface material in Boring B-2. The thickness of granular base material in Boring B-2 was about 10 inches. The rest of the borings were drilled through the grassy shoulder of the existing roadway. Topsoil was encountered as surface material at Borings B-3 through B-6, and B-8. The thickness of topsoil encountered in these borings varied between 3 to 6 inches. This material is dark clayey silt containing considerable organic matter as a result of the past cultivations. This material is generally unsuitable for pavement support and should be wasted or stockpiled for later landscaping use.

Fill Material

Below the asphaltic concrete in Boring B-9 and below the granular base in Boring B-10, man-made fill material was encountered. The depth of fill materials encountered in Boring B-9 extended to a depth of about 4.0 feet and in Boring B-10 to a depth of about 2.0 feet. The fill materials encountered in Boring B-9 consisted of silty sandy clay to sandy clay. Whereas, the fill material encountered in Boring B-10 consisted of a mixture of sandy clay, sand, and gravel. The fill material were free of any organics and deleterious materials. Standard Penetration Test N-values within the fill material was 11 blows per foot (bpf). The moisture content of the cohesive fill material was 10 percent.

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Naturally Occurring Soil

The naturally occurring soil at this site consists of cohesive silty clay at shallow depths to silty sandy clay at deeper depths. Little to some amounts of gravel and occasional cobble were encountered within the cohesive soil matrix. The N-values within the near surface naturally occurring cohesive silty clay soil were in the range of 5 to 13 bpf, but were mostly between 6 to 8 bpf. The moisture content of the silty clay soils were in the range of 18 to 33 percent, but were mostly in twenties. Pocket Penetrometer values, which are the approximate Unconfined Compressive Strength, were between 0.75 to 2.25 tons per square foot (tsf) within the top three (3) feet.

Below the above described silty clay soil, silty sandy clay soil was encountered to the maximum depth explored of 10.0 feet below the exposed grade grades. The coloration of the silty sandy clay soil was mottled brown and gray at shallow depth to brownish gray to gray at deeper dept. The N-values within the silty sandy clay were in the range of 6 to 33 bpf, but were mostly between less than teens to low teens. It is most likely that few of the high N-values are due to the presence of coarse gravel and cobble within the soil matrix. The moisture contents of the silty sandy clay soils were in the range of 8 to 31 percent, but were mostly in low teens. Based on the Atterberg Limits performed on few selected samples of these clayey soils, these cohesive glacial till soils can be classified as CL according to the Unified Soil Classification System (USCS).

Interbedded thin sand and gravel layers were encountered in few of the borings at various elevations. A mixture of sandy clay, sand, and gravel was encountered in Boring B-9 from a depth of 8.5 feet to the maximum depth explored of 10.0 feet below the exposed grade.

4.3 Groundwater Conditions

Observations concerning groundwater were made during and at the completion of the drilling operations. At completion of the drilling operations and prior to the withdrawal of augers, groundwater was measured at a depth of about 5.0 feet and 8.0 feet below the exposed grades in Borings B-2 and B-9, respectively. It is most likely that the groundwater encountered in these borings are most likely perched or trapped groundwater. No groundwater was encountered at any of the other borings during or at completion of the drilling operations.

Some perched or trapped groundwater can be encountered during wetter periods within the thin to thick layers of coehsionless sand and gravel sandwiched between less permeable cohesive silty to silty sandy clay, glacial till soil. Groundwater elevations can fluctuate with seasonal and climatic influences. Therefore, the groundwater conditions may vary at different times of the year from those encountered during this investigation.

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4.4 Seismic Site Classification

The "Site Class" in accordance with the 2003 International Building Code, Sections 1615.1.1 and 1615.1.5, pertains to the soil properties in the top 100 feet. Based on the test boring results, review of available geologic data, and Table 1615.1.1 of the 2003 International Building Code, it is our opinion that the "Site Class" Type "D" should be used for this site.

5.0 GEOTECHNICAL CONCLUSIONS AND RECOMMENDATIONS

Based upon our analysis of the soil conditions and the preliminary design details supplied for this project by the client as previously outlined, the following recommendations were developed. If the project characteristics are changed from those assumed herein, or if different subsurface conditions are encountered during construction, DHDC should be notified, so that our recommendations can be reviewed to see whether any modifications are needed.

5.1 Pavement Design

Existing Pavement Condition

Soil Borings B-1, B-7, B-9, and B-10 were drilled through the existing pavement. DHDC cored these boring locations to determine the accurate asphaltic concrete and granular base thicknesses. The thickness of asphaltic concrete at the boring locations varied between 6.0 to 10.0 inches. Below the asphaltic concrete pavement, all but Boring B-7 encountered base material. The base materials of the existing pavement were either macadam or ODOT Item No. 304 crushed limestone. The pavement cores indicate inconsistent pavement thicknesses and granular base material. The existing asphaltic concrete pavement is in fair to good. Visual examination of the existing pavement indicates that in the past the pavement might have been milled and reconstructed. Due to the inconsistent pavement section thicknesses, DHDC recommends the removal of the existing pavement and construction of a new pavement section, instead of partial milling and reconstruction of the pavement.

Pavement Section

The soils encountered in the test borings at this site are texturally similar, i.e., silty to silty sandy clays that are classified as CL according to the Unified Soil Classification System. The moisture content of the naturally occurring cohesive soils were mostly in twenties and few in low thirties within the upper three (3) feet. The upper layers of cohesive soils were mostly medium stiff and few soft. Since the soil with high moisture content were encountered at most of the borings to a depth of about 3.0 feet below the exposed grade, there is a good possibility that some of these subgrade soils may not pass the proofroll test. We recommend that the exposed subgrade be proofrolled with a fully loaded dump truck before any filling or pavement construction activities. Depending on the outcome of the proofroll test, the subgrade may

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require undercutting and stabilization. The existing fill materials were free of any organics and other deleterious materials. If the fill materials passes the proofroll test, then there will be no need to undercut these existing fill materials. However, during construction if the subgrade materials (either fill or naturally occurring soil) contain organics, wood and other deleterious materials, these subgrade soils should be undercut and replaced with compacted engineered fill. Should there be a need to stabilize the subgrade, DHDC's recommends that the unstable subgrade soils be stabilized using 5.0% of the dry weight of either lime or cement, and should be placed and compacted in accordance with recommendations contained in Section 5.3 of this report.

DHDC is recommending a CBR value of 4 for pavement design for subgrade soils passing the proofroll test and compacted in accordance with recommendations contained in Section 5.3 of this report. DHDC is also recommending a CBR value of 6, provided the top eight (8) inches of satisfactorily proofrolled subgrade is stabilized with 5% cement.

The on-site near surface subgrade soils are considered to be frost-susceptible. In order to reduce the potential for frost heave, positive drainage is recommended. Minimization of infiltration of water into the subgrade and rapid removal of subsurface water are essential for the successful long-term performance of pavement structures. Both the subgrade and the pavement surface should have a minimum slope of one quarter inch per foot to promote drainage. A means of water outlet should be provided at the pavement edges by extending the aggregate base course through to daylight, provided that perimeter grades slope away from pavements edges.

The new pavement section is based on the following traffic number, CBR value, and the parameters:

- Reliability: 80%
- Overall Standard Deviation: 0.49
- Design Serviceability: 2.0 (for Flexible Pavement)
- Design Period ESALs: 600,000 ESAL
- CBR value: 4% (Compacted Engineered fill or Satisfactorily Proofroll Subgrade)
- CBR Value: 6% (Satisfactorily Proofrolled and then Cement Treated to a depth of at least 8" of Subgrade by 5% Dry Weight of Cement)
- Subgrade Resiliant Modulus: 4,800 psi and 7,200 psi (for Cement Stabilized Subgrade)

Option I (Flexible Pavement)

Satisfactorily Proofrolled Subgrade

- CBR value: 4% (Compacted Engineered fill or Satisfactorily Proofroll Subgrade)
- Design Period ESALs: 600,000 ESAL
- Required Structural Number: 3.6

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- Item No. 448 – 1¼" Asphalt Concrete Surface Course, Type 1, PG64-22
- Item No. 407 – Tack Coat for Intermediate Course applied at 0.05 gallons per square yard
- Item No. 448 – 1¾" Asphalt Concrete, Intermediate Course, Type 2, PG64-22
- Item No. 301 – 5" Asphalt Concrete Base, PG64-22
- Item No. 304 – 6" Aggregate Base
- Satisfactorily Proofrolled and Compacted Subgrade

Cement Treated Subgrade

- CBR Value: 6% (Satisfactorily Proofrolled and then Cement Treated Subgrade to a depth of at least 8"of Subgrade by 5% Dry Weight of Cement)
- Design Period ESALs: 600,000 ESAL
- Required Structural Number: 3.1

- Item No. 448 – 1 ¼" Asphalt Concrete Surface Course, Type 1, PG64-22
- Item No. 407 – Tack Coat for Intermediate Course applied at 0.05 gallons per square yard
- Item No. 448 – 1¾" Asphalt Concrete, Intermediate Course, Type 2, PG64-22
- Item No. 301 – 4" Asphalt Concrete Base, PG64-22
- Item No. 304 – 5" Aggregate Base
- Satisfactorily Proofrolled and Compacted Subgrade

5.2 Subgrade Preparation for Road Reconstruction and Lane Expansion

DHDC drilled ten (10) soil borings through the existing pavement areas. Fill materials were noted at Borings B-9 and B-10. These fill materials were probably placed at the time of the existing roadway construction to bring the site to the desired finish subgrade elevation. As stated earlier, no organics or other deleterious materials were encountered in the fill materials. Provide the subgrade fill materials passes the proofroll test, there will be no need to remove the existing fill materials.

It is DHDC's recommendation that after the removal of topsoil and asphaltic concrete, the exposed subgrade should be proofrolled with suitable heavy equipment, preferably a 20 to 30 ton loaded dump truck. At this time, the subgrade should also be inspected by a geotechnical engineer or his representative to verify that the subgrade soils resemble materials described in the soil boring logs. Any soft yielding areas delineated by the proofrolling should be undercut or otherwise stabilized as directed by the geotechnical engineer. Depending on the outcome of the proofroll test, the subgrade may require undercutting or stabilization. In the event that soft or loose soils are encountered during proofrolling, the soils should be disked, dried and recompacted. However, if it is not possible to improve the subgrade soils because of weather conditions or scheduling, it is recommended that the subgrade soils be stabilized using cement or a geogrid with additional crushed stone placed over the subgrade. The undercut areas should be backfill with compacted engineered fill consisting of well graded granular materials.

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5.3 Fill for Roadway Subgrade

If new fill is required, any non-organic naturally-occurring soils with Liquid Limit (LL) less than 50, Plasticity Index (PI) less than 25, and organic content less than 5 percent can be used for structural fill, including the soils encountered in the test borings. The fill should contain pieces no larger than 3 inches in dimensions. If fill construction takes place during the winter months, care should be taken so as not to place fill over frozen soil, nor should froze materials be used within the fill. It is recommended that well graved sand and gravel or ODOT Item No. 304 stone be used as compacted engineered fill in areas where minimal fill will be required to attain the desired finish subgrade elevation, or to backfill isolated undercut areas. Due to the high moisture content of the surficial cohesive silty to silty sandy clay soil, these materials will not be readily available for use as compacted engineered fill.

The fill should be placed in lifts of uniform thickness. The lift thickness should not exceed that which can be properly compacted throughout its entire depth with the equipment available. All structural fills supporting pavements should be compacted to 95 percent of the Modified Proctor maximum dry density (ASTM D-1557). For proper and timely construction of the fills, the soils should be placed at or near the optimum moisture content as determined by the specified Proctor test. Suitable equipment for either aerating or adding water should be available as the soil moisture and weather conditions dictate.

6.0 QUALIFICATION OF RECOMMENDATIONS

Our evaluation has been based on our understanding of the site, limited project information, and the data obtained during our field investigation. The general subsurface conditions were based on interpretation of the subsurface data at specific boring locations. Regardless of the thoroughness of a subsurface investigation, there is the possibility that conditions will differ from those encountered at the boring locations, that conditions are not as anticipated by the designers, or that the construction process has altered the soil conditions. Therefore, experienced geotechnical engineers should observe construction to confirm that the conditions anticipated in the design are noted. Otherwise, DHDC assumes no responsibility for construction compliance with the design concepts, specifications, or recommendations.

The design recommendations in this report have been developed on the basis of the previously described project characteristics and subsurface conditions. If project criteria or locations change, DHDC should be permitted to determine whether the recommendations must be modified. The findings of such a review will be presented in a supplemental report.

Our professional services have been performed, our findings derived, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied. DHDC is not responsible for the conclusions, opinions, or recommendations of others based on this data.

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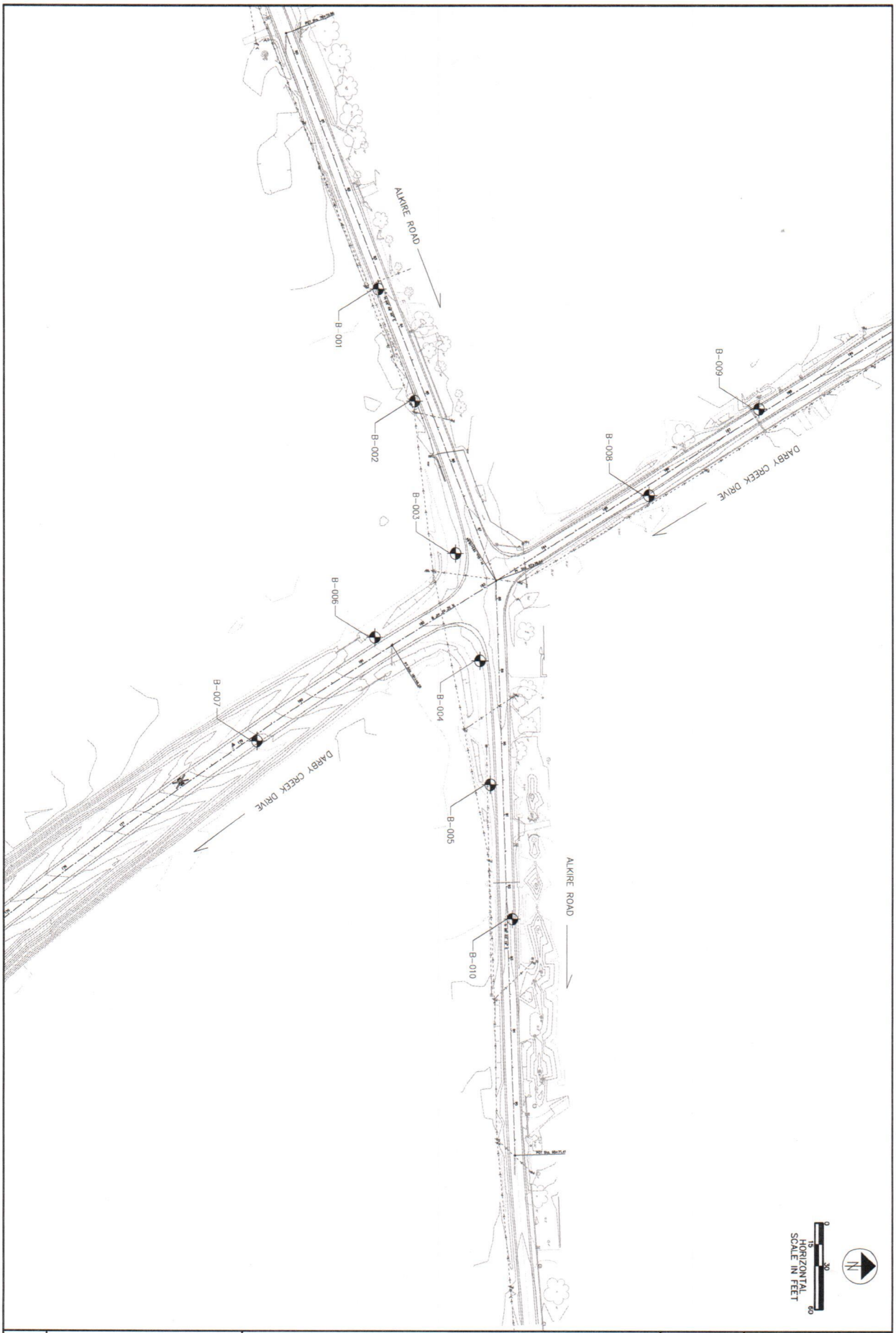
APPENDIX: SOIL BORING EXHIBIT



	C13–103	BORING LOCATION PLAN ALKIRE ROAD / DARBY CREEK DRIVE ROUNDABOUT	PID NO. 95637	DESIGN AGENCY

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APPENDIX: SOIL TERMS

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DESCRIPTION OF SOIL TERMS

The following terminology was used to describe soils throughout this report and is generally adapted from ASTM 2487/2488 and ODOT Geotechnical Specifications.

GRANULAR SOILS – The relative compactness of granular soils is described as:
Adapted from "Foundation Engineering Handbook" by Hsaf-Yang Fang, 1991.

Description	Blows per foot – SPT (N)		
Very Loose	2	–	4
Loose	5	–	10
Medium Dense	11	–	30
Dense	31	–	50
Very Dense	Over	–	50

COHESIVE SOILS – The relative consistency of cohesive soils is described as:
Adapted from "Foundation Analysis and Design" by Joseph Bowels, 1977, and "ODOT Specifications for Subsurface Investigations", 1995. Correlation is for estimating purposes only.

Description	Blows per foot – SPT (N)			Unconfined UCS (ksf)		
Very Soft	Below	–	2	Less Than	–	0.50
Soft	2	–	5	0.50	–	1.00
Medium Stiff	6	–	10	1.00	–	2.00
Stiff	11	–	15	2.00	–	4.00
Very Stiff	16	–	30	4.00	–	8.00
Hard	Over	–	30	Over	–	8.00

GRADATION – The following size related denominations are used to describe soils:

Soil Fraction	USCS Size	ODOT Size
Boulders	Larger than 12"	Larger than 12"
Cobbles	12" to 3"	12" to 3"
Gravel – Coarse	3" to 3/4"	3" to 3/4"
Gravel – Fine	3/4" to 4.75 mm	3/4" to 2.0 mm (#10)
Sand – Coarse	4.77 mm to 2.0 mm	2.0 mm to 0.42 mm (#40)
Sand – Medium	2.0 mm to 0.42 mm	
Sand – Fine	0.42 mm to 0.074 mm	0.42 mm to 0.074 mm (#200)
Silt	0.074 mm to 0.005 mm	0.074 mm to 0.005 mm
Clay	< 0.005 mm	< 0.005 mm

MODIFIERS OF COMPONENTS – Modifiers of components are as follows:

Term	Range		
Trace	0%	–	10%
Little	10%	–	20%
Some	20%	–	35%
And	35%	–	50%

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APPENDIX: BORING LOGS (10)

BORING NUMBER B-1

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CLIENT GPD Group
PROJECT NAME Alkire-Darby Creek Roundabout
PROJECT NUMBER C13-103
PROJECT LOCATION Franklin County, Ohio
DATE STARTED 12/31/13 **COMPLETED** 12/31/13
GROUND ELEVATION 920.79 ft **HOLE SIZE** 4.25 inches
DRILLING CONTRACTOR DHDC
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY B.O.W. **CHECKED BY** M.O.H.
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Asphaltic Concrete (9")										
		Granular Base (8")										
		Medium stiff, Light brown, **SILTY CLAY** (CL) [glacial till], with trace to little sand, Moist	SS 1	78	4-4-5 (9)	2.25		19				
2.5		Stiff to very stiff, Mottled light brown and gray, **SILTY SANDY CLAY** (CL) [glacial till], with little gravel and cobble, Moist	SS 2	83	3-6-7 (13)	2.5		16				
5.0			SS 3	100	6-7-11 (18)	3.0		13				63
		Stiff to hard, Brown and gray, **SILTY SANDY CLAY** (CL) [glacial till], with little to some gravel and cobble, Moist	SS 4	100	4-6-9 (15)	3.0		14				
7.5			SS 5	100	10-14-18 (32)			11				
			SS 6	89	10-15-18 (33)			9				
10.0		Boring Terminated at 10.0 feet No Groundwater Encountered										

BORING NUMBER B-2

DHDC
Engineering Consulting Services, Inc.

CLIENT GPD Group
PROJECT NAME Alkire-Darby Creek Roundabout
PROJECT NUMBER C13-103
PROJECT LOCATION Franklin County, Ohio
DATE STARTED 12/31/13 **COMPLETED** 12/31/13
GROUND ELEVATION 920.69 ft **HOLE SIZE** 4.25 inches
DRILLING CONTRACTOR DHDC
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY B.O.W. **CHECKED BY** M.O.H.
AT END OF DRILLING 5.00 ft / Elev 915.69 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Granular Base (10")										
		Medium stiff, Light brown, **SILTY CLAY** (CL) [glacial till], with trace to little sand, Very moist	SS 1	89	4-4-4 (8)	1.0		30	47	22	25	
2.5		Medium stiff, Mottled light brown and gray, **SILTY SANDY CLAY** (CL) [glacial till], with little gravel and cobble, Moist	SS 2	67	4-4-5 (9)	3.0		22				
		Very stiff to stiff, Brown and gray, **SILTY SANDY CLAY** (CL) [glacial till], with little to some gravel and cobble, Moist	SS 3	83	5-6-10 (16)			11				
5.0		▼ ... **SAND** and **GRAVEL** layer at 5.0 feet depth ...	SS 4	100	4-4-8 (12)	2.5		15				
7.5		Very stiff to hard, Brownish gray, **SILTY SANDY CLAY** (CL) [glacial till], with little to some gravel, Moist	SS 5	100	5-6-10 (16)	4.0		15				
			SS 6	89	10-15-18 (33)	4.5+		11				
10.0		Boring Terminated at 10.0 feet Groundwater encountered at 5.0 feet										

BORING NUMBER B-3

DHDC
Engineering Consulting Services, Inc.

CLIENT GPD Group
PROJECT NAME Alkire-Darby Creek Roundabout
PROJECT NUMBER C13-103
PROJECT LOCATION Franklin County, Ohio
DATE STARTED 12/31/13 **COMPLETED** 12/31/13
GROUND ELEVATION 920.77 ft **HOLE SIZE** 4.25 inches
DRILLING CONTRACTOR DHDC
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY B.O.W. **CHECKED BY** M.O.H.
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		TOPSOIL (4")										
		Medium stiff, Dark brownish gray, **SILTY CLAY** (CL) [glacial till], with trace sand and hair roots, Very moist	SS 1	67	2-3-4 (7)	1.5		28	50	22	28	
2.5		Medium stiff, Mottled brown and gray **SILTY CLAY** (CL) [glacial till], with trace sand and gravel, Moist	SS 2	89	3-3-4 (7)	0.75		25				
5.0		Medium stiff, Mottled light brown and gray, **SILTY SANDY CLAY** (CL) [glacial till], with little gravel and cobble, Moist	SS 3	56	3-3-3 (6)			17				
			SS 4	83	3-4-4 (8)	2.0		16				
7.5		Very stiff to hard, Brownish gray, **SILTY SANDY CLAY** (CL) [glacial till], with little to some gravel, Moist	SS 5	100	4-7-9 (16)	4.0		13				
			SS 6	89	9-10-19 (29)	3.5		11				
10.0		Boring terminated at 10.0 feet No Groundwater Encountered										

BORING NUMBER B-4

DHDC
Engineering Consulting Services, Inc.

CLIENT GPD Group
PROJECT NAME Alkire-Darby Creek Roundabout
PROJECT NUMBER C13-103
PROJECT LOCATION Franklin County, Ohio
DATE STARTED 12/31/13 **COMPLETED** 12/31/13
GROUND ELEVATION 921.17 ft **HOLE SIZE** 4.25 inches
DRILLING CONTRACTOR DHDC
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY B.O.W. **CHECKED BY** M.O.H.
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		TOPSOIL (4")										
		Stiff, Dark brownish gray, **SILTY CLAY** (CL) [glacial till], with trace sand and hair roots, Moist	SS 1	67	3-6-7 (13)	2.0		24	45	21	24	
2.5		Medium stiff, Mottled brown and gray **SILTY CLAY** (CL) [glacial till], with trace sand and gravel, Very moist	SS 2	78	3-3-4 (7)	1.0		26				
		Medium stiff, Mottled light brown and gray, **SILTY SANDY CLAY** (CL) [glacial till], with little gravel and cobble, Moist	SS 3	89	3-3-5 (8)	2.5		19				
5.0			SS 4	78	4-4-5 (9)			16				
7.5		Stiff, Brownish gray, **SILTY SANDY CLAY** (CL) [glacial till], with little to some gravel, Moist	SS 5	100	4-6-7 (13)	2.25		16				
		Very stiff, Gray, **SILTY SANDY CLAY** (CL) [glacial till], with little to some gravel, Moist	SS 6	100	6-7-13 (20)	4.5		13				
10.0		Boring Terminated at 10.0 feet No Groundwater Encountered										

BORING NUMBER B-5

DHDC
Engineering Consulting Services, Inc.

CLIENT GPD Group
PROJECT NAME Alkire-Darby Creek Roundabout
PROJECT NUMBER C13-103
PROJECT LOCATION Franklin County, Ohio
DATE STARTED 12/31/13 **COMPLETED** 12/31/13
GROUND ELEVATION 920.97 ft **HOLE SIZE** 4.25 inches
DRILLING CONTRACTOR DHDC
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY B.O.W. **CHECKED BY** M.O.H.
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		TOPSOIL (6")										
		Medium stiff, Gray, **SILTY CLAY** (CL) [glacial till], with trace sand and hair roots, Very moist	SS 1	67	3-5-5 (10)	1.25		33				
2.5		Medium stiff, Light brown, **SILTY CLAY** (CL) [glacial till], with trace to little sand, Very moist	SS 2	89	2-3-3 (6)	0.75		28				
5.0		Medium stiff, Mottled light brown and gray, **SILTY CLAY** (CL) [glacial till], with trace to little sand and gravel, Very moist	SS 3	78	3-3-4 (7)			14				
		Medium stiff to stiff, Brownish gray, **SILTY SANDY CLAY** (CL) [glacial till], with little to some gravel, Moist	SS 4	100	3-4-4 (8)	2.5		15				
7.5			SS 5	100	4-8-12 (20)	2.5		13				
		... Very moist **SANDY SILT** layer at about 9.5 feet depth ...	SS 6	100	9-10-15 (25)							
10.0		Boring Terminated at 10.0 feet No Groundwater Encountered										

BORING NUMBER B-6

DHDC
Engineering Consulting Services, Inc.

CLIENT GPD Group
PROJECT NUMBER C13-103
DATE STARTED 12/30/13 **COMPLETED** 12/30/13
DRILLING CONTRACTOR DHDC
DRILLING METHOD Hollow Stem Auger
LOGGED BY B.O.W. **CHECKED BY** M.O.H.
NOTES

PROJECT NAME Alkire-Darby Creek Roundabout
PROJECT LOCATION Franklin County, Ohio
GROUND ELEVATION 919.37 ft **HOLE SIZE** 4.25 inches
GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		TOPSOIL (6")										
		Medium stiff, Mottled light brown and gray, **SILTY SANDY CLAY** (CL) [glacial till], with little gravel and cobble, Moist	SS 1	89	2-4-6 (10)			21				
2.5		Medium stiff, Dark gray and brown, **SILTY CLAY** (CL) [glacial till], with trace to little sand and gravel, Very moist ... Cobble fragments ...	SS 2	100	3-3-4 (7)			29				
		Medium stiff, Brownish gray, **SILTY SANDY CLAY** (CL) [glacial till], with little to some gravel, Very moist	SS 3	56	3-5-5 (10)	3.0		18				
5.0		Very stiff, Brownish gray, **SILTY SANDY CLAY** (CL) [glacial till], with little to some gravel, Moist	SS 4	100	6-8-10 (18)			11				
7.5			SS 5	22	7-12-14 (26)	4.5+		12				
			SS 6	100	13-16-17 (33)	4.5+		8				
10.0		Hard, Gray, **SILTY SANDY CLAY** (CL) [glacial till], with little to some gravel, Moist										
		Boring Terminated at 10.0 feet No Groundwater Encountered										

BORING NUMBER B-7

DHDC
Engineering Consulting Services, Inc.

CLIENT GPD Group
PROJECT NAME Alkire-Darby Creek Roundabout
PROJECT NUMBER C13-103
PROJECT LOCATION Franklin County, Ohio
DATE STARTED 12/30/13 **COMPLETED** 12/30/13
GROUND ELEVATION 915.6 ft **HOLE SIZE** 4.25 inches
DRILLING CONTRACTOR DHDC
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY B.O.W. **CHECKED BY** M.O.H.
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Asphaltic Concrete (10")										
		Medium stiff, Dark brown, **SILTY CLAY** (CL) [glacial till], with trace sand and gravel, Moist ... Trace organic odor ...	SS 1	61	3-4-4 (8)			19				
2.5		Stiff to very stiff, Brownish gray, **SILTY SANDY CLAY** (CL) [glacial till], with little to some gravel, Moist	SS 2	89	3-5-6 (11)	3.5		13				61
5.0			SS 3	100	4-6-14 (20)	4.0		10				
			SS 4	83	3-9-12 (21)			11				
7.5			SS 5	100	7-10-10 (20)			10				
		Very stiff, Gray, **SILTY SANDY CLAY** (CL) [glacial till], with little to some gravel, Moist	SS 6	100	1-12-15 (27)			11				
10.0		Boring Terminated at 10.0 feet No Groundwater Encountered										

BORING NUMBER B-8

DHDC
Engineering Consulting Services, Inc.

CLIENT GPD Group
PROJECT NAME Alkire-Darby Creek Roundabout
PROJECT NUMBER C13-103
PROJECT LOCATION Franklin County, Ohio
DATE STARTED 12/30/13 **COMPLETED** 12/30/13
GROUND ELEVATION 921.58 ft **HOLE SIZE** 4.25 inches
DRILLING CONTRACTOR DHDC
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY B.O.W. **CHECKED BY** M.O.H.
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		TOPSOIL (3")										
		Soft, Light brown, **SILTY CLAY** (CL) [glacial till], with trace to little sand, Very moist										
			SS 1	89	2-2-3 (5)	1.25		19				85
2.5		Medium stiff to stiff, Mottled brown and gray **SILTY SANDY CLAY** (CL) [glacial till], with little to some gravel and occasional cobble, Moist	SS 2	100	2-3-6 (9)			15				
			SS 3	100	3-4-6 (10)			14				
5.0			SS 4	89	3-6-8 (14)			14				
7.5		Very stiff, Mottled brown and gray **SILTY SANDY CLAY** (CL) [glacial till], with little to some gravel and occasional cobble, Moist	SS 5	100	7-12-12 (24)			14				
			SS 6	100	7-11-13 (24)			14				
10.0		Boring Terminated at 10.0 Feet No Groundwater Encountered										

BORING NUMBER B-9

DHDC
Engineering Consulting Services, Inc.

CLIENT GPD Group
PROJECT NUMBER C13-103
DATE STARTED 12/30/13 **COMPLETED** 12/30/13
DRILLING CONTRACTOR DHDC
DRILLING METHOD Hollow Stem Auger
LOGGED BY B.O.W. **CHECKED BY** M.O.H.
NOTES

PROJECT NAME Alkire-Darby Creek Roundabout
PROJECT LOCATION Franklin County, Ohio
GROUND ELEVATION 921.44 ft **HOLE SIZE** 4.25 inches
GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING 8.00 ft / Elev 913.44 ft
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Asphaltic Concrete (9")										
		FILL: Brown and gray, **SILTY SANDY CLAY** (CL), with little sand and gravel, Moist	SS 1	78	3-5-6 (11)			10				
2.5		FILL: Brown **SANDY CLAY**, Moist	SS 2	72	2-3-4 (7)			20				
		Medium stiff, Dark gray, **SILTY CLAY** (CL) [glacial till], with trace sand, Very moist	SS 3	78	2-3-4 (7)			27				
5.0		Medium stiff, Brownish gray, **SILTY SANDY CLAY** (CL) [glacial till], Moist to very moist	SS 4	100	2-4-4 (8)			25				
7.5		▼	SS 5	100	3-4-4 (8)			28				
		A mixture of **SANDY CLAY, SAND** and **GRAVEL**, Very moist	SS 6	89	4-5-5 (10)			31				
10.0		Boring Terminated at 10.0 Feet Groundwater Encountered at 8.0 Feet										

BORING NUMBER B-10

DHDC
Engineering Consulting Services, Inc.

CLIENT GPD Group
PROJECT NUMBER C13-103
DATE STARTED 12/30/13 **COMPLETED** 12/30/13
DRILLING CONTRACTOR DHDC
DRILLING METHOD Hollow Stem Auger
LOGGED BY B.O.W. **CHECKED BY** M.O.H.
NOTES

PROJECT NAME Alkire-Darby Creek Roundabout
PROJECT LOCATION Franklin County, Ohio
GROUND ELEVATION 921.87 ft **HOLE SIZE** 4.25 inches
GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Asphaltic Concrete (6")										
		Granular Base (12")										
		FILL: A mixture of **SANDY CLAY, SAND** and **GRAVEL**, Very moist	SS 1	67	3-4-7 (11)			9				
2.5		Medium stiff, Dark gray, **SILTY CLAY** (CL) [glacial till], with trace sand, Moist	SS 2	67	3-3-3 (6)	1.5		18				
		Medium stiff, Brownish gray, **SILTY SANDY CLAY** (CL) [glacial till], Very moist	SS 3	89	3-4-4 (8)	1.5		27				
5.0			SS 4	83	2-3-4 (7)			26				
7.5		Medium stiff, Mottled brown and gray **SILTY SANDY CLAY** (CL) [glacial till], with little to some gravel and occasional cobble, Moist	SS 5	83	4-4-6 (10)			31				
		Very stiff, Mottled brown and gray **SILTY SANDY CLAY** (CL) [glacial till], with little to some gravel and occasional cobble, Very moist	SS 6	94	6-12-15 (27)			15				
10.0		Boring Terminated at 10.0 feet No Groundwater Encountered										

DHDC
Engineering Consulting Services, Inc.

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Columbus, Ohio 43228
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APPENDIX: SOIL PROFILE

PROJECT DESCRIPTION

THE PROPOSED IMPROVEMENTS AT THE INTERSECTION OF ALKIRE ROAD AND DARBY CREEK DRIVE IN THE CITY OF COLUMBUS, FRANKLIN COUNTY, OHIO WILL CONSIST OF THE CONSTRUCTION OF A NEW ROUNDABOUT AND THE WIDENING OF THE EXISTING ROAD LANES. AS PART OF THE IMPROVEMENTS, CURB AND SIDEWALK WILL BE INSTALLED ON THE NORTH AND SOUTH SIDES OF ALKIRE ROAD AND ON THE EAST AND WEST SIDE OF DARBY CREEK DRIVE.

GEOLOGY

THE PROJECT SITE IS LOCATED WITHIN AN AREA FORMED PRIMARILY BY WISCONSINAN-AGED MIXED DRIFT CONTAINING TILL, DEBRIS FLOWS, AND ICE-CONTACT SAND AND GRAVEL ACCORDING TO THE GLACIAL MAP OF OHIO. THE GLACIAL TILL SOIL IS MOSTLY SILTY TO SANDY CLAY WITH TRACE TO LITTLE AMOUNTS OF SAND AND GRAVEL. LAYERS OF SILT, SILTY SAND, SANDY SILT, A MIXTURE OF SILTY SAND AND GRAVEL ARE OFTEN ENCOUNTERED WITHIN THE GLACIAL TILL SOIL MATRIX. THE GLACIAL OUTWASH CONSISTS OF SAND AND GRAVEL WITH OCCASION PRESENCE OF COARSE GRAVEL, COBBLE, AND BOULDER. GLACIAL TILLS IN THIS PORTION OF OHIO ARE TYPICALLY LOW TO MODERATE PLASTICITY COHESIVE SOILS.

RECONNAISSANCE

DHDC VISITED THE SITE ON DECEMBER 27, 2013. DURING THE SITE VISIT, DHDC CORED BORING LOCATIONS B-1, B-7, B-9, AND B-10 TO DETERMINE THE ASPHALTIC CONCRETE AND GRANULAR BASE THICKNESSES. THE PAVEMENT CORES INDICATE INCONSISTENT PAVEMENT THICKNESSES AND GRANULAR BASE MATERIAL. THE EXISTING ASPHALTIC CONCRETE PAVEMENT IS IN FAIR TO GOOD. VISUAL EXAMINATION OF THE EXISTING PAVEMENT INDICATES THAT IN THE PAST THE PAVEMENT MIGHT HAVE BEEN MILLED AND RECONSTRUCTED.

SUBSURFACE EXPLORATION

TEN (10) SOIL BORINGS WERE PERFORMED WITH A TRUCK RIG BETWEEN DECEMBER 30 AND 31, 2013. THE SOIL BORINGS WERE DRILLED TO A DEPTH OF 10.0 FEET BELOW THE EXPOSED GRADES. STANDARD PENETRATION TESTS (SPTS) METHOD (ASTM D-1586), WERE CONDUCTED USING A 140-POUND WEIGHT HAMMER FALLING FREELY THROUGH A DISTANCE OF 30 INCHES TO DRIVE A 2-INCH O.D. SPLIT BARREL SAMPLER 18 INCHES INTO THE SOIL. THE SAMPLER WAS DRIVEN IN THREE SUCCESSIVE 6-INCH INCREMENTS WITH THE NUMBER OF BLOWS PER INCREMENT BEING RECORDED. SOIL CONDITIONS ENCOUNTERED IN THE TEST BORINGS ARE PRESENTED IN THE BORING LOGS ALONG WITH INFORMATION RELATED TO SAMPLE DATA, SPT RESULTS, WATER CONDITIONS OBSERVED IN THE BORINGS, AND LABORATORY TEST DATA.

EXPLORATION FINDINGS

DHDC CORED BORING LOCATIONS B-1, B-7, B-9, AND B-10. THE THICKNESS OF ASPHALTIC CONCRETE AT THE BORING LOCATIONS VARIED BETWEEN 6.0 TO 10.0 INCHES. BELOW THE ASPHALTIC CONCRETE PAVEMENT, ALL BUT BORING B-7 ENCOUNTERED BASE MATERIAL. THE REST OF THE BORINGS WERE DRILLED THROUGH THE GRASSY SHOULDER OF THE EXISTING ROADWAY. TOPSOIL WAS ENCOUNTERED AS THE SURFACE MATERIAL. THE THICKNESS OF TOPSOIL ENCOUNTERED VARIED BETWEEN 3 TO 6 INCHES. MAN-MADE FILL MATERIALS WERE ENCOUNTERED IN BORINGS B-9 AND 10. THE DEPTH OF FILL MATERIALS VARIED BETWEEN 2.0 TO 4.0 FEET. THE NATURALLY OCCURRING SOIL AT THIS SITE CONSISTS OF COHESIVE SILTY CLAY AT SHALLOW DEPTHS TO SILTY SANDY CLAY AT DEEPER DEPTHS. LITTLE TO SOME AMOUNTS OF GRAVEL AND OCCASIONAL COBBLE WERE ENCOUNTERED WITHIN THE COHESIVE SOIL MATRIX.

AT COMPLETION OF THE DRILLING OPERATIONS AND PRIOR TO THE WITHDRAWAL OF AUGERS, GROUNDWATER WAS MEASURED AT A DEPTH OF ABOUT 5.0 FEET AND 8.0 FEET BELOW THE EXPOSED GRADES IN BORINGS B-2 AND B-9, RESPECTIVELY. IT IS MOST LIKELY THAT THE GROUNDWATER ENCOUNTERED IN THESE BORINGS ARE MOST LIKELY PERCHED OR TRAPPED GROUNDWATER. NO GROUNDWATER WAS ENCOUNTERED AT ANY OF THE OTHER BORINGS DURING OR AT COMPLETION OF THE DRILLING OPERATIONS.

SPECIFICATIONS

THIS GEOTECHNICAL EXPLORATION WAS PERFORMED IN ACCORDANCE WITH THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, OFFICE OF GEOTECHNICAL ENGINEERING, SPECIFICATIONS FOR GEOTECHNICAL EXPLORATIONS, **DATED APRIL 2010**.

AVAILABLE INFORMATION

ALL AVAILABLE SOIL AND BEDROCK INFORMATION THAT CAN BE CONVENIENTLY SHOWN ON THE SOIL PROFILE SHEETS HAS BEEN SO REPORTED. ADDITIONAL SUBSURFACE EXPLORATIONS MAY HAVE BEEN MADE TO STUDY SOME SPECIAL ASPECT OF THE PROJECT. COPIES OF THIS DATA, IF ANY, MAY BE INSPECTED IN THE DISTRICT DEPUTY DIRECTOR'S OFFICE, OFFICE OF GEOTECHNICAL ENGINEERING AT 1600 WEST BROAD STREET OR THE OFFICE OF STRUCTURAL ENGINEERING AT 1980 WEST BROAD STREET.

LEGEND

DESCRIPTION	ODOT CLASS	CLASSIFIED MECH./VISUAL
GRAVEL AND/OR STONE FRAGMENTS WITH SAND, SILT AND CLAY	A-2-6	0 2
SILTY CLAY / SILTY SANDY CLAY	A-6b	3 54
	TOTAL	3 56
ASPHALTIC CONCRETE	VISUAL	
GRANULAR BASE	VISUAL	
UNCONTROLLED FILL	VISUAL	

SOD AND TOPSOIL = X = APPROXIMATE THICKNESS

BORING LOCATION PLAN - PLAN VIEW

DRIVE SAMPLE AND/OR ROCK CORE BORING PLOTTED TO VERTICAL SCALE ONLY. HORIZONTAL BAR INDICATES A CHANGE IN STRATIGRAPHY

WC — INDICATES WATER CONTENT IN PERCENT.

W— — INDICATES FREE WATER ELEVATION.

N — INDICATES STANDARD PENETRATION RESISTANCE.

N_{60} — INDICATES STANDARD PENETRATION RESISTANCE NORMALIZED TO 60% DRILL ROD ENERGY RATIO.

● — INDICATES A PLASTIC MATERIAL WITH A MOISTURE CONTENT EQUAL TO OR GREATER THAN THE LIQUID LIMIT MINUS 3.

⊖ — INDICATES A NON-PLASTIC MATERIAL WITH A MOISTURE CONTENT GREATER THAN 25% OR GREATER THAN 19% WITH A WET APPEARANCE.

✳ — INDICATES A SAMPLE TAKEN WITHIN 3 FT OF PROPOSED GRADE.

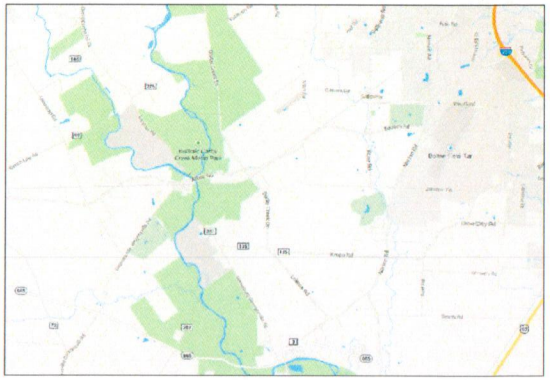
SS — INDICATES A SPLIT SPOON SAMPLE, STANDARD PENETRATION TEST.

ST — INDICATES A SHELBY TUBE SAMPLE.

HA — INDICATES A HAND AUGER SAMPLE.

NP — INDICATES A NON-PLASTIC SAMPLE.

TR — INDICATES TOP OF ROCK.



LOCATION MAP

SCALE IN MILES
0 1 2 3 4

N

PARTICLE SIZE DEFINITIONS

12"	3"	2.0 mm	0.42 mm	0.074 mm	0.005 mm
Boulders	Cobbles	Gravel	Coarse Sand	Fine Sand	Silt	Clay
		No. 10 Sieve	No. 40 Sieve	No. 200 Sieve	

INDEX OF SHEETS

LOCATION FROM STA. TO STA.	PLAN VIEW SHEET	PROFILE SHEET	CROSS-SECTION SHEET	CUT MAX.	FILL EMB. MAX.
ALKIRE ROAD					
82+00 93+00	2	2			
DARBY CREEK DRIVE					
177+50 188+00	3	3			

RECON. - 12-27-2013
DRILLING - 12-30-31-2013
DRAWN - 3-31-2014
REVIEWED - 4-22-2014

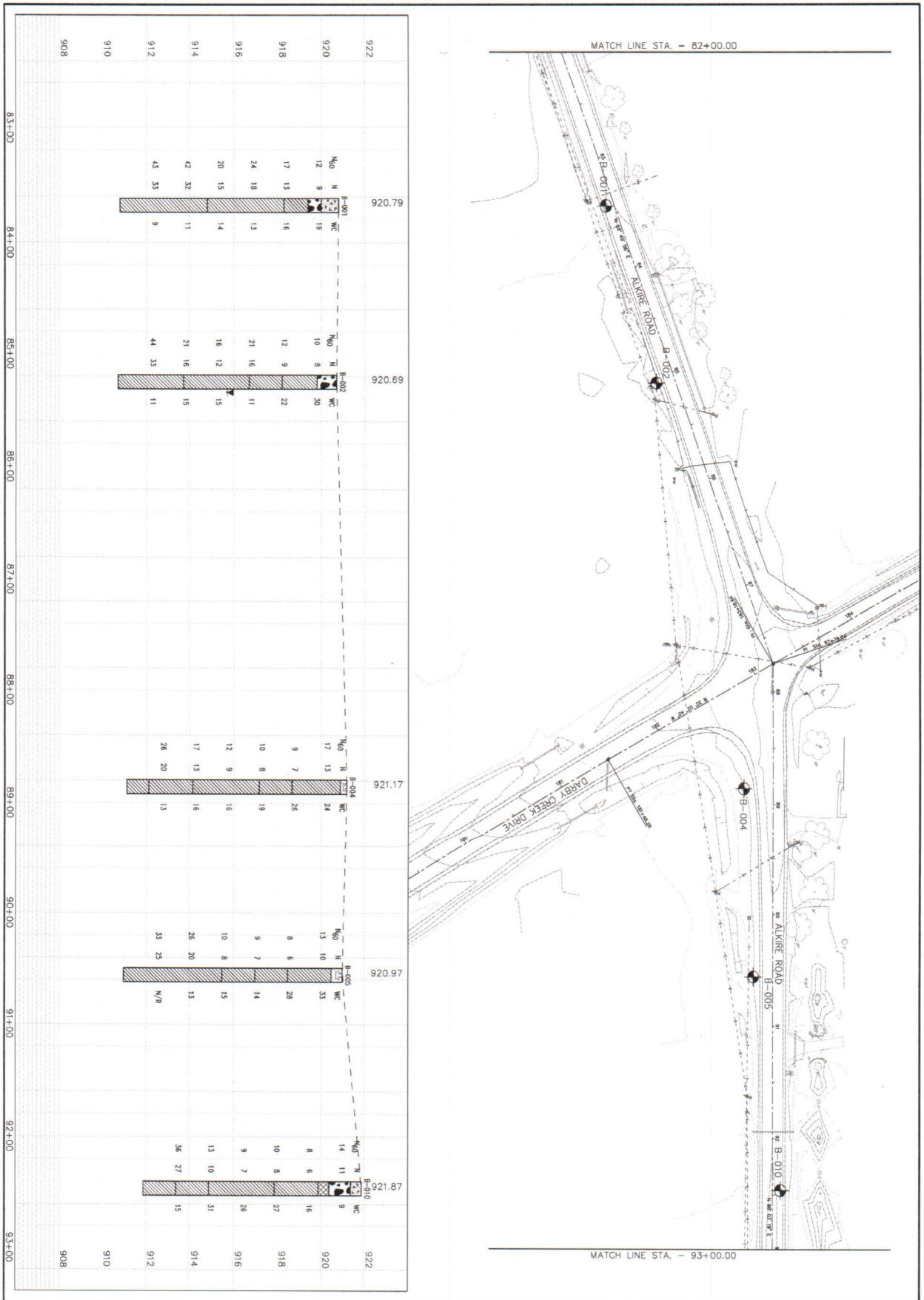
DESIGN AGENCY

PID NO. 95637

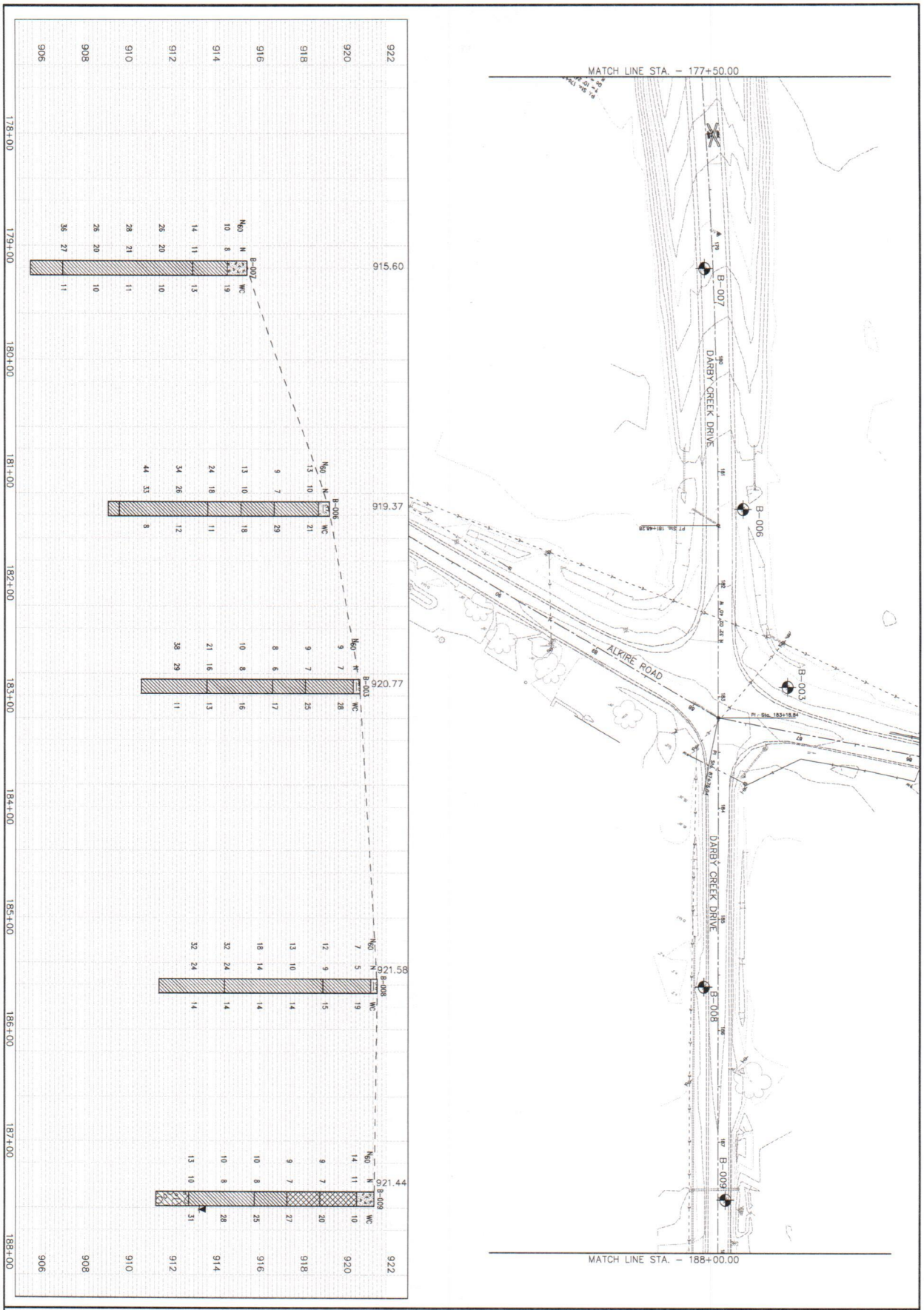
COVER SHEET
ALKIRE ROAD / DARBY CREEK DRIVE ROUNDABOUT

C13-103

1-3



2/3	C13-103	SOIL PROFILE ALKIRE ROAD / DARBY CREEK DRIVE ROUNDABOUT	PID NO. 95637	DRAWN Z CHECKED MOH	0 40 20 80 HORIZONTAL SCALE IN FEET	N



3 of 3	C13–103	SOIL PROFILE ALKIRE ROAD / DARBY CREEK DRIVE ROUNDABOUT	PID NO. 95637	DRAWN Z CHECKED MOH	0 40 20 80 HORIZONTAL SCALE IN FEET	N

DHDC
Engineering Consulting Services, Inc.

2390 Advanced Business Center Drive
Columbus, Ohio 43228
o: 614.527.7656
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www.dhdcinc.com

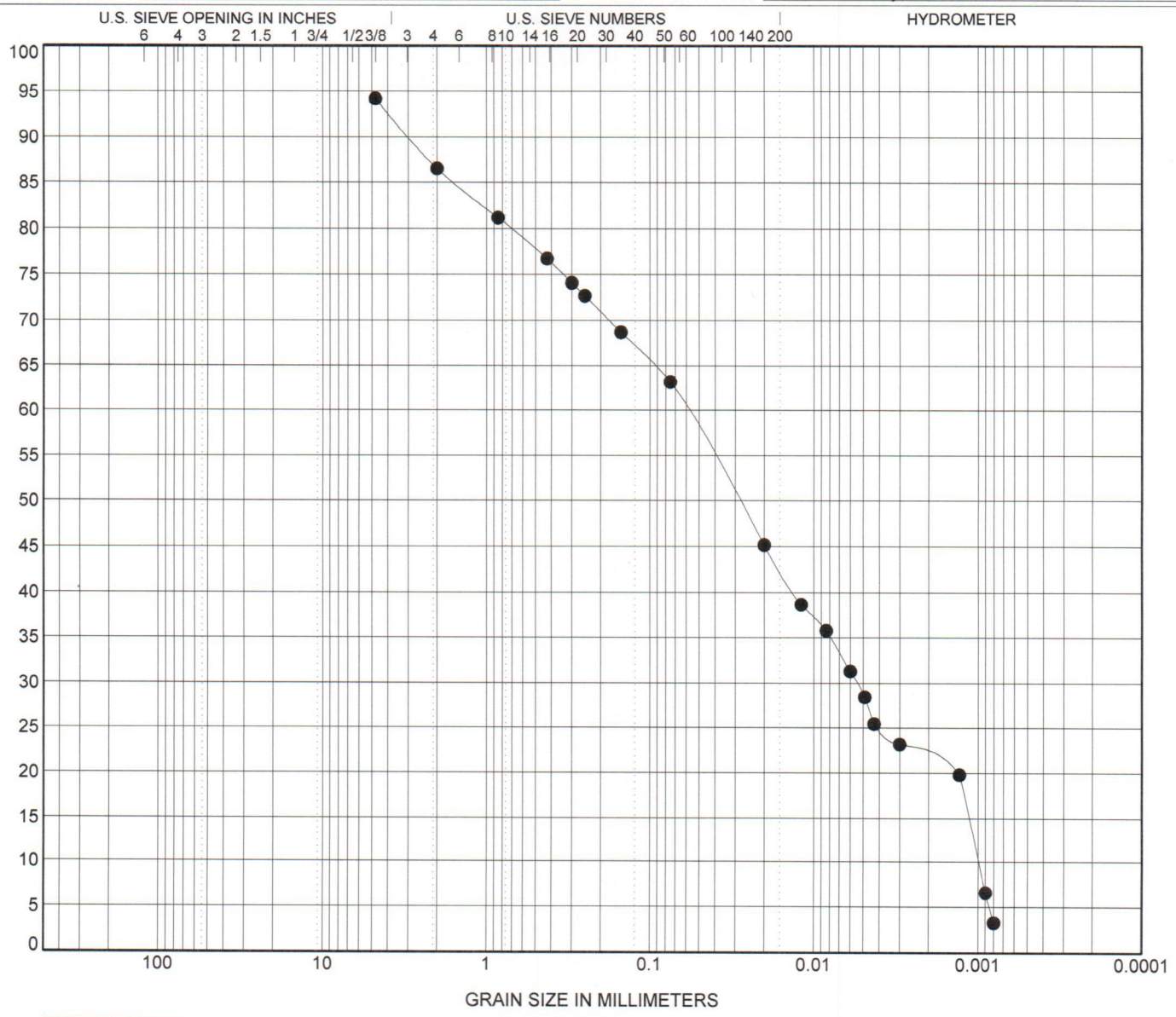
APPENDIX: LAB TEST REPORT

GRAIN SIZE DISTRIBUTION

DHDC Engineering Consulting Services, Inc.

CLIENT GPD Group **PROJECT NAME** Alkire-Darby Creek Roundabout

PROJECT NUMBER C13-103 **PROJECT LOCATION** Franklin County, Ohio



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● B-1	4.0	Brown and Gray SILTY SANDY CLAY (CL)				0.51	60.07

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-1	4.0	4.75	0.059	0.005	0.001		31.0	34.4	28.7

GRAIN SIZE DISTRIBUTION

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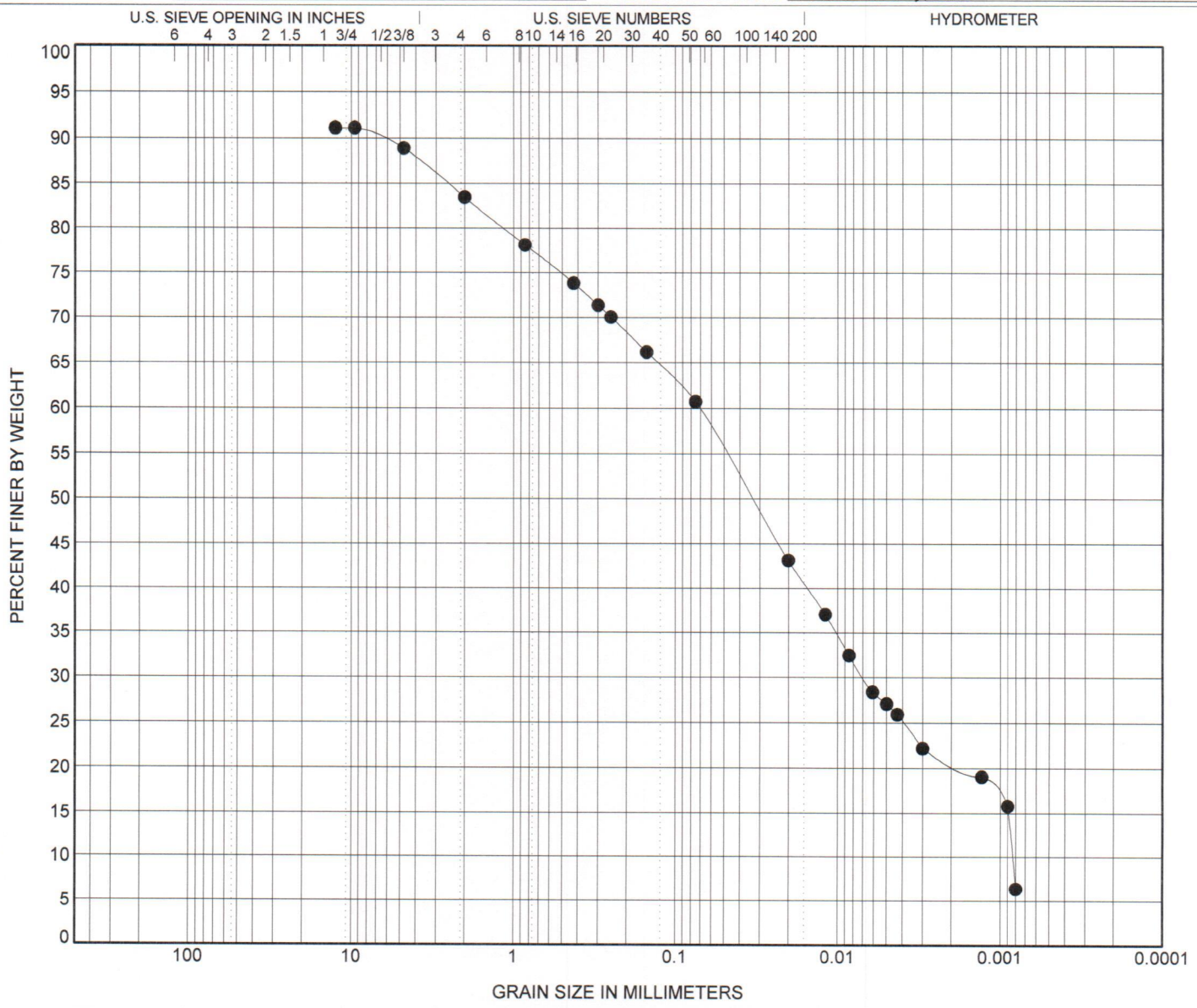
CLIENT GPD Group
PROJECT NAME Alkire-Darby Creek Roundabout
PROJECT NUMBER C13-103
PROJECT LOCATION Franklin County, Ohio



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**B-7**	**2.5**	**Brownish Gray SILTY SANDY CLAY (CL)**				**0.81**	**84.77**

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-7**	**2.5**	**12.5**	**0.071**	**0.007**	**0.001**	**2.2**	**28.2**	**33.6**	**27.1**

GRAIN SIZE DISTRIBUTION

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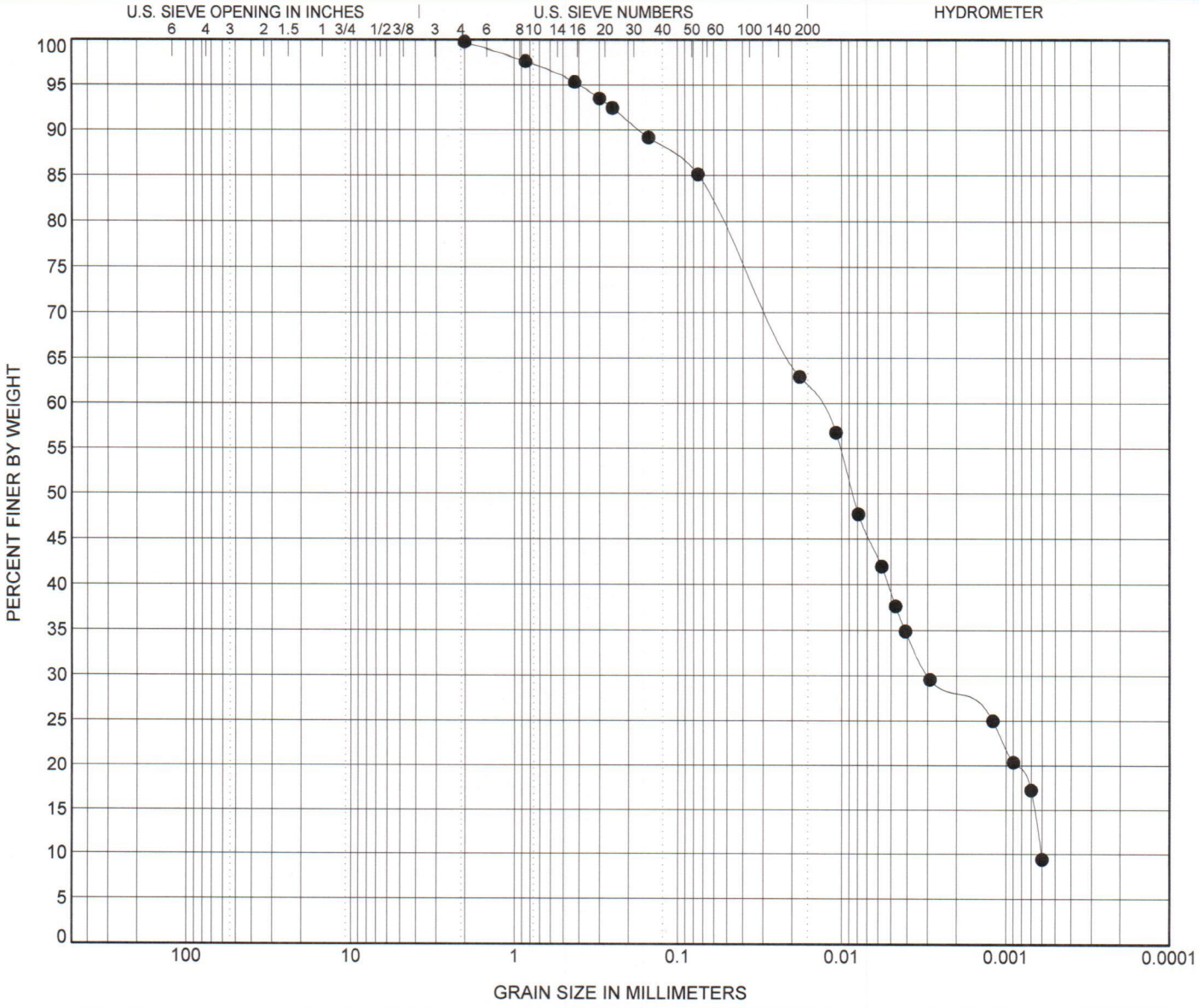
PROJECT NUMBER C13-103 **PROJECT LOCATION** Franklin County, Ohio



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● **B-8**	**1.0**	**Light Brown SILTY CLAY (CL), with little Sand**				**1.04**	**23.26**

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **B-8**	**1.0**	**2**	**0.014**	**0.003**	**0.001**		**14.6**	**46.1**	**39.0**

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APPENDIX: ASPHALT CORING REPORT

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ASPHALT CORING REPORT

PROJECT:	ALKIRE ROAD AND DARBY CREEK DRIVE INTERSECTION IMPROVEMENTS COLUMBUS, OHIO	**FILE NO.:**	C13-103X10
		DATE:	12/27/13
CLIENT:	GPD GROUP, INC.		
TECHNICIAN(S):	ANTHONY VANIK, GABRIEL VANIK, AND MATTHEW AUSTIN		

Core No.	Location	Core Length (in)	Base Depth (in)	Base Material
B-1	South side of Alkire Road in the eastbound lane and 2'6" north of the edge of the pavement	9	8	Macadam
B-7	On the east side of Darby Creek Drive in the northbound lane and 3'6" west of the edge of the pavement	10	No base	Clay
B-9	On the west side of Darby Creek Drive in the southbound lane and 2'6" east of the edge of the pavement	9*	5	Fine graded macadam
B-10	North side of Alkire Road in the westbound lane and 2'6" south of the edge of the pavement	6	12	304

*last inch was very degraded

DHDC Engineering Consulting Services, Inc.

Michael Sminchak
Operations Manager

smh 11/23/10