ROADWAY EXPLORATION

Proposed Roundabout

HEN-34-0.85, PID 118189

The Intersection of SR 34 and CR 24

Ridgeville Township, Henry County, Ohio

Submitted to ODOT District 2

Date *April 2025*

Prepared by:

CT consultants
engineers • architects • planners
A Verdantas Company

Ohio Department of Transportation

April 25, 2025 CT Project No. 232187

Ms. Jorey Summersett, P.E.
ODOT District 2
317 East Poe Road
Bowling Green, Ohio 43402

Final Report
Roadway Exploration
HEN-34-0.85, PID 118189
Proposed Roundabout
Ridgeville Township, Henry County, Ohio

Dear Ms. Summersett:

Following is the final report of our Roadway Exploration performed by CT Consultants, Inc. – a Verdantas Company (CT) for the referenced project. The roadway portion of this study was performed in accordance with CT Proposal No. 232187, dated October 12, 2023, and was authorized by you via email on October 23, 2023, referencing Task Order No. 02-I for Agreement No. 37607, and Encumbrance Number 741861.

A draft report was provided to ODOT D2 on February 20, 2024. Comments regarding the draft report were provided to CT on March 18, 2024, including an indication for need of light pole foundation borings. Based on clarification of comments during the period of April through May 2024, CT submitted Proposal No. 232187-2, dated May 29, 2024, for the light pole foundation borings and evaluations. This portion of the scope of work was authorized by you via email on June 13, 2024, referencing Task Order No. 02-D for Agreement No. 40385, and Encumbrance Number 742864.

A revised draft report was provided on November 18, 2024, addressing the previous ODOT comments and presenting results of the light pole foundation borings and evaluations. This report contains the results of our studies, our engineering interpretation of the results with respect to the project characteristics, and our recommendations for design and construction of pavements as well as potential modifications to subgrade soils. Subgrade evaluations were performed in accordance with ODOT GDM Section 600 “Subgrade.” Additionally, this report contains the results of our evaluations for potential need of special foundations for light poles. This submittal also addresses comments regarding light pole special foundation embedment provided by ODOT on February 21, 2025.

Please contact our office if you have any questions regarding this report or require additional information.

Sincerely,

CT Consultants, Inc.

Cole Olson
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Geotechnical Project Manager

Christopher P. Iott, P.E.
Chief Geotechnical Engineer

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FINAL REPORT
HEN-34-0.85, PID 118189
PROPOSED ROUNDABOUT
RIDGEVILLE TOWNSHIP, HENRY COUNTY, OHIO

FOR

OHIO DEPARTMENT OF TRANSPORTATION DISTRICT 2
317 EAST POE ROAD
BOWLING GREEN, OHIO 43402

SUBMITTED

APRIL 25, 2025

CT PROJECT NO. 232187

CT CONSULTANTS, INC.
1915 NORTH 12TH STREET
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EXECUTIVE SUMMARY

This subsurface exploration report has been prepared for the proposed construction of a roundabout along State Route 34 at the intersection with County Road 24 in Ridgeville Township, Henry County, Ohio. This exploration included sixteen (16) test borings for the evaluation of existing pavement sections and subgrade conditions in areas of proposed roadway construction, as well as subsurface conditions for consideration of the potential need for special foundations for light poles. Subgrade evaluations were performed in accordance with ODOT GDM Section 600 "Subgrade" (July 2024). A summary of the conclusions and recommendations of this study are as follows:

1. Borings B-001-0, B-002-0, B-002-1, B-006-0, B-007-0, and B-009-0 were performed in existing pavements. The encountered surface materials generally consisted of asphalt ranging in thickness from approximately 11 to 13½ inches, underlain by aggregate base materials varying in thickness from approximately 4 to 9 inches.

2. The surface materials in the remaining borings consisted of topsoil ranging in thickness from 3 to 14 inches.

3. Based on our field and laboratory test results, the subsoils encountered underlying the surface materials can generally be characterized as relatively uniform cohesive soil. The cohesive soils consisted of predominantly medium stiff to very stiff silt and clay (A-6a), silty clay (A-6b), and clay (A-7-6) encountered underlying the surface materials to termination at depths of 7½ to 25 feet below existing grade.

4. Groundwater was not initially encountered during drilling nor observed upon completion of drilling operations in any of the borings. Based on the soil characteristics and moisture conditions encountered in the borings, it is our opinion that the "normal" groundwater level can generally be expected at depths on the order of 8 feet or greater below existing grades. Based on the predominantly clayey soil profile at the site, adequate control of seasonal groundwater seepage, perched water, and surface water run-off into shallow excavations should be achievable by minor dewatering systems, such as pumping from prepared sumps.

5. The subsoil conditions indicate that special foundation design will be required for light pole foundations. For light poles with height less than 40 feet, which are planned for this project, a minimum embedment of 6 feet is prescribed. However, to meet

minimum average soil strength requirements, embedment to depths of 10 feet or 15 feet are required.

6. Based on the ODOT GDM Section 600 analysis, a design CBR value of 6 percent was determined for the project.

7. The ODOT GDM Section 600 analysis indicates options for "planned" subgrade modification of either global chemical stabilization to a depth of 12 inches or over-excavation of unsuitable subgrade soils and replacement with new granular engineered fill. Based on the ODOT GDM Section 600 analysis results, it is anticipated that global chemical stabilization to a depth of 12 inches will be more economical compared to over-excavation and replacement with new granular engineered fill. Global chemical stabilization may be completed using lime or cement. However, as indicated in Section 5.1, caution should be exercised when using lime based on past experience in Northwest Ohio with similar soils.

This executive summary highlights our evaluations and recommendations and should only be utilized in conjunction with the accompanying report, including the detailed findings, analysis and recommendations, and qualifications presented herein.

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1.0 INTRODUCTION

This subsurface exploration report has been prepared for the construction of a roundabout along State Route 34, at the intersection with County Road 24, in Ridgeville Township, Henry County, Ohio. The project site is shown on the Site Location Map (Plate 1.0).

The roadway portion of this study was performed in accordance with CT Proposal No. 232187, dated October 12, 2023, and was authorized by Ms. Jorey Summersett of Ohio Department of Transportation (ODOT) District 2 via email on October 23, 2023, referencing Task Order No. 02-I for Agreement No. 37607 and Encumbrance Number 741861.

A draft report was provided to ODOT D2 on February 20, 2024. Comments regarding the draft report were provided to CT on March 18, 2024, including an indication for need of light pole foundation borings. Based on clarification of comments during the period of April through May 2024, CT submitted Proposal No. 232187-2, dated May 29, 2024, for the light pole foundation borings and evaluations. This portion of the scope of work was authorized by you via email on June 13, 2024, referencing Task Order No. 02-D for Agreement No. 40385, and Encumbrance Number 742864.

1.1 Purpose and Scope of Exploration

The purpose of this exploration was to evaluate the subsurface conditions and laboratory data relative to the design and construction of pavements as well as evaluation for potential need for special foundations for the referenced project. To accomplish this, CT performed sixteen (16) test borings, laboratory soil testing, a geotechnical engineering evaluation of the test results, and review of available geologic and soils data for the project area. There is no available record for historical soil boring in close vicinity of the project.

This report summarizes our understanding of the proposed construction, describes the investigative and testing procedures utilized to evaluate the subsurface conditions at the site, and presents our findings from the field and laboratory testing. This report also presents our evaluations and conclusions in accordance with ODOT Geotechnical Design Manual (GDM) Section 600 "Subgrade" (July 2024) and provides our design and construction recommendations for pavements.

This report includes:

- A description of the existing surface materials, subsurface soils, and groundwater conditions encountered in the borings.
- Design recommendations for pavements.
- Evaluations for potential need for special foundations for light poles.
- Recommendations concerning soil and groundwater-related construction procedures such as subgrade preparation in accordance with ODOT GDM Section 600 criteria, earthwork, pavement construction, and related field testing.

The scope of this study did not include an environmental assessment of the surface or subsurface materials at this site.

1.2 Proposed Construction

The project includes construction of a roundabout along State Route 34, at the intersection with Country Road 24, in Ridgeville Township, Henry County, Ohio.

New pavements are anticipated to consist of flexible (asphalt) sections for roadways. Based on the provided drawings, the typical pavement section is indicated to consist of 10½ inches of asphalt underlain by 6 inches of aggregate base, represented by a "cut" of approximately 1.4 feet. Based on the provided plans, grading to achieve final subgrade elevations is anticipated to require a maximum of 1.4 feet of cut (where

final grades will approximate existing grades) and a maximum of approximately 1.3 feet of fill.

It is planned to use standard light pole foundations per HL-20.11 unless soil conditions are found to require special foundations. Light poles for this project will be less than 40 feet in height.

2.0 GEOLOGY AND OBSERVATIONS OF THE PROJECT

2.1 General Geology and Hydrogeology

Published geologic maps from the Ohio Department of Natural Resources (ODNR) indicate that the project site is located within the Huron-Erie Lake Plains Section, in the Maumee Lake Plains Region. The site is located near the transition to the Paulding Clay Basin District within the Maumee Lake Plains Region. Within this region, the geologic deposits consist of lacustrine deposits underlain by glacial till, which may or may not have been wave planed. These soils are underlined by Silurian-age carbonate rock, such as dolomite, and shale.

The lacustrine soils consist of predominantly cohesive clay soils, predominantly Wisconsinan which can be massive to laminated, and may contain interbedded silt and fine sand.

The glacial till, predominantly Late Wisconsinan, as well as late Woodfordian ice deposits (also referred to as lake-planed moraine), was deposited by the advance and retreat of glacial ice. Due to the weight of the ice mass, the till deposits are moderately to highly over-consolidated, that is, the existing soil deposits have experienced a previous vertical stress significantly higher than the present effective vertical stress due to the remaining overlying soil strata in the profile. The till may contain cobbles and/or boulders in the soil matrix. Additionally, seams of granular soils may also be encountered within glacial tills. These granular seams may or may not be water bearing. In the Maumee Lake Plains Region, the surface of the glacial till plain has generally experienced some reworking from wave action of the historic lake.

Bedrock at the site is Sunbury Shale, Berea Sandstone, and Bedford Shale undivided (Michigan Basin Only), at depths ranging from approximately 100± feet below existing grades.

ODNR Karst data indicated no known karst in the subject project area. The nearest karst features are mapped approximately 45± miles east of the site.

The ODNR Mine Map application indicated no mines in the project area.

2.1.1 Generalized Near-Surface Soils

The USDA Natural Resource Conservation Service (NRCS) Web Soil Survey indicates that soils in the project area is mapped as predominantly Toledo silty clay, with Haskins fine sandy loam in the western portion and Wabasha silty clay in the southern portion.

Toledo silty clay soils consist of very poorly drained clayey glaciolacustrine deposits formed in lakebeds. The Haskins loam soils consist of somewhat poorly drained glaciolacustrine deposits over till, formed on ridges or knolls on beach ridges, outwash plains, or stream terraces. The Wabasha silty clay soils consist of very poorly drained clayey alluvium on flood plains.

2.2 Site Reconnaissance

CT performed a site reconnaissance on December 6, 2023. Existing pavements along State Route 34 and Country Road 24 appeared to be in generally fair condition. However, pavement at the northeast quadrant of the intersection exhibits fatigue pavement cracks, generally parallel to turning curve radius. Some transverse cracks are noticed along Country Road 24 within the project area. No sealing attempts are visible. Some transverse cracks are also noticed along CR 24.

Surrounding land usage was included rural residential developments and agricultural fields, with flat grades that where generally level or gently down sloped away of the pavement edges and generally slightly below the top of pavement. Shallow drainage dich with no ponding water was observed along the north side of the SR 34 and west of CR 24.

3.0 EXPLORATION

3.1 Historic Borings

Review of ODOT records for the project area indicated no historic borings had been performed within the project area. Available historic borings were all more than a mile away from the project area, thus they are not incorporated into this report.

3.2 Project Exploration Program

The roadway portion of this exploration included nine (9) test borings, designated as Borings B-001-0-23 through B-009-0-23, performed by TTL on December 11 and 22, 2023. These borings were located in the field by CT in accordance with a Schematic Plan prepared by ODOT District 2 supplied with request for proposal via email from October 2, 2023. The light pole foundation portion of this exploration included an additional seven (7) test borings, designated as B-002-1-24, B-002-2-24, B-004-1-24, B-004-2-24, B-005-1-24, B-007-1-24, and B-008-1-24, performed by TTL on July 12 and 15, 2024. These borings were located in the field by CT in accordance with provided Stage 1 Plans.

The borings have been identified in accordance with ODOT protocol, but the "-23" and "-24" portion of the nomenclature is generally omitted for discussion in this report. The approximate locations of the borings are shown on the Test Boring Location Plan (Plate 2.0).

Latitude, Longitude, and ground surface elevations at the boring locations were surveyed by a CT representative using a handheld GPS unit. Stationing and offsets, as well as ground surface elevation in a consistent datum, were provided by ODOT District 2 based on the handheld GPS coordinates. The Latitude, Longitude, ground surface elevations, stationing, and offsets are shown on the Logs of Test Borings.

In accordance with the ODOT Specifications for Geotechnical Explorations (SGE), Borings B-001, B-002, B-006, B-007, and B-009 were performed within the existing pavement as ODOT Type A borings. Prior to the performance of four selected borings, the pavement was cored, then continuous sampling was performed to a depth of 6 feet below the existing subgrade. Borings B-003, B-004, B-005, and B-008 were performed in new pavement areas as ODOT Type B borings, with samples obtained at 2.5 feet intervals to termination at the depth of 10 feet below the existing grade. The remaining borings for the light pole locations were performed as ODOT Type E5 borings, with samples obtained at 2.5 feet intervals to termination at the depth of 25 feet below the existing grade.

Experience indicates that the actual subsoil conditions at a site could vary from those generalized on the basis of test borings made at specific locations. Therefore, it is essential that a geotechnical engineer be retained to provide soil engineering services during the site preparation and pavement construction phases of the proposed project. This is to observe compliance with the design concepts, specifications, and recommendations, and to allow design changes in the event subsurface conditions differ from those anticipated prior to the start of construction.

3.3 Boring Methods

The test borings performed during this exploration were drilled with a Diedrich D70 track-mounted drilling rig. Pavement cores were obtained for selected borings using a nominal 4-inch diameter barrel. Pavement core photographic logs are attached to this report for Borings B-001, B-002, B-006, and B-007.

The borings were extended utilizing 2¼-inch inside diameter hollow steam augers. For the Type A subgrade borings, samples were obtained continuously using 18-inch split-spoon (SS) sample drives. For the Type B and E5 borings, samples were obtained at 2½-foot intervals. The samples were sealed in jars and transported to our laboratory for further classification and testing.

Split-spoon soil samples were obtained by the Standard Penetration Test Method (ASTM D 1586). The Standard Penetration Test (SPT) consists of driving a 2-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 number of blows per increment was recorded at each depth interval, and these data are presented under the "SPT" column on the Logs of Test Borings attached to this report. 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, or N_m-value, and is typically reported in blows per foot (bpf). The N_m-values were corrected to an equivalent rod energy ratio of 60 percent, N_{60}. The hammer/rod energy ratio for the D70 drilling rig was calibrated between the two phases of this exploration as summarized in the following table. The associated N_{60}-values are presented on the attached Logs of Test Borings.

Table 3.3. Diedrich D70 Rig Energy Ratio Data

Boring Program	Drilling Dates	Energy Ratio	Calibration Date
Roadway	December 2023	90.0	April 13, 2022
Light Pole Foundations	July 2024	87.4	June 11, 2024

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. In conjunction with published data and typical correlations, the N_{60}-values can be evaluated as a measure of soil compactness/consistency as well as shear strength.

Field and laboratory data were incorporated into gINT™ software for presentation purposes. It should be noted that these logs have been prepared on the basis of laboratory classification and testing as well as field logs of the encountered soils.

3.4 Laboratory Testing Program

All samples were visually classified in accordance with the ODOT Soil Classification System. All recovered samples of the subsoils were also tested in our laboratory for moisture content (ASTM D 2216). Unconfined compressive strength estimates were obtained for the intact cohesive samples using a calibrated hand penetrometer. These test results are presented on the Logs of Test Borings.

Laboratory testing for the roadway borings was performed in accordance with ODOT GDM Section 600 "Subgrade" criteria, including mechanical soil classification consisting of an Atterberg limits test (ASTM D 4318) and a particle size analysis (ASTM D 6913 and D 7928) for two samples from each boring within 6 feet of the proposed subgrade. Additional classification testing was performed for selected samples from the light pole foundation borings. Sulfate content determinations (ODOT Supplement 1122) were performed on one sample from each roadway boring within 3 feet of the proposed subgrade. These test results are presented on the Logs of Test Borings.

Six samples with noticeable organic impurities were tested for organic content by Loss-on-Ignition (LOI) method, per ASTM D2974. These test results are presented on the Logs of Test Borings.

4.0 FINDINGS

4.1 General Site Conditions

At the time of this investigation, the project vicinity consisted of agricultural fields and rural residential areas.

Borings B-001-0, B-002-0, B-002-1, B-006-0, B-007-0, and B-009-0 were performed in existing pavements. The encountered surface materials generally consisted of asphalt ranging in thickness from approximately 11 to 13½ inches, underlain by aggregate base materials varying in thickness from approximately 4 to 9 inches.

The following tables contain a summary of the encountered pavement section, as well as the subgrade soils.

Table 4.1. Summary of Encountered Pavement Section and Subgrade Soils

Boring Number	Asphalt Thickness (inches)	Aggregate Base Thickness (inches)	Subgrade Soil Type
B-001-0	13.5	5.5	A-6b
B-002-0	11	4	A-6b
B-002-1	12	9	A-7-6
B-006-0	12	9	A-6b
B-007-0	10.75	4.75	A-6a
B-009-0	11	6	A-6b

Pavement core photographic logs are attached to this report for Borings B-001-0, B-002-0, B-006-0, and B-007-0.

The remaining borings were performed in grassy areas within the new roundabout alignment and encountered surfacing topsoil material on the order of 3 to 14 inches in thickness, underlined by native cohesive soils (A-6a, A-6b, and A-7-6).

4.2 General Soil Conditions

Based on our field and laboratory test results, the subsoils encountered underlying the surface materials can generally be characterized as relatively uniform cohesive soil. The cohesive soils consisted of predominantly medium stiff to very stiff silt and clay (A-6a), silty clay (A-6b), and clay (A-7-6) encountered underlying the surface materials to termination at depths of 7½ to 25 feet below existing grade. Zones of soils exhibiting hard consistency were encountered in 11 of the 16 borings. SPT N_{60}-values generally varied from 8 to 33 blows per foot (bpf). Unconfined compressive strengths generally varied from 4,000 pounds per square foot (psf) to greater than 9,000 psf (maximum reading obtainable using a hand penetrometer). Moisture contents generally ranged from 20 to 34 percent.

Additional descriptions of the stratigraphy encountered in the borings are presented on the Logs of Test Borings.

4.3 Groundwater Conditions

Groundwater was not initially encountered during drilling nor observed upon completion of drilling operations in any of the borings. It should be noted that the boreholes were drilled and backfilled/sealed within the same day, and stabilized water levels may not have occurred over this limited time period.

Based on the soil characteristics and moisture conditions encountered in the borings, it is our opinion that the "normal" long-term groundwater table can generally be expected at depths on the order of 8 feet or greater below existing grades. This exploration did not include research of possible hydrological influences at the project site. It should be noted that 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 exploration.

4.4 Remedial Measures

The subsoil conditions indicate that special foundation design will be required for light pole foundations. For light poles with height less than 40 feet, which are planned for this project, a minimum embedment of 6 feet is prescribed. However, to meet minimum average soil strength requirements, embedment to depths of 10 feet or 15 feet are required.

The ODOT GDM Section 600 "Subgrade Analysis" worksheet (V14.6, 02/11/2022) indicates options for "planned" subgrade modification of either global chemical stabilization to a depth of 12 inches using cement or lime, or over-excavation of unsuitable subgrade soils and replacement with new granular engineered fill.

Based on the ODOT GDM Section 600 analysis results, it is anticipated that global chemical stabilization to a depth of 12 inches will be more economical compared to over-excavation and replacement with new granular engineered fill. As indicated in Section 5.1, cement should be considered for chemical stabilization of the project.

Where new embankment will be constructed in areas of existing ditches, ODOT GDM Section 500 "Embankments" indicates that the ditch should be undercut 2 feet below the ditch bottom for the width of the ditch.

Based on the test borings, the soils likely to be encountered in shallow excavations generally include OSHA Type A soils (cohesive soils with unconfined compressive strengths of 3,000 pounds per square foot (psf) or greater). Temporary excavations in Type A soils should be constructed no steeper than ¾ horizontal to 1 vertical (¾H:1V). It is planned to replace a pipe crossing beneath CR 24, just south of CR U at the southern extent of the project. Due to the ditches at the ends of the pipe, saturated conditions and sediment may have resulted in lower strengths than typical for the soils throughout the project site. As such, flatter slopes should be anticipated for excavations in these areas.

5.0 ANALYSES AND RECOMMENDATIONS

The following analysis and recommendations are based on our understanding of the proposed construction and on the data obtained during our field exploration. If the project alignment or subgrade depth should change significantly, a review of these recommendations should be made by CT.

5.1 Light Pole Foundation Special Design Considerations

Based on the plans provided for this project, twelve (12) light pole locations are indicated. The roadway alignment, station, offset, and associated nearest boring(s) for the light poles are summarized in the following table. Some borings performed as roadway borings were closer to light pole locations than light pole foundation borings. For these locations, we utilized the information from the closest roadway boring to the termination depth of that boring, and then supplemented deeper soil information with the closest light pole foundation boring.

Table 5.1.A. Light Pole Foundation Location Information

Light Pole Location Number	Roadway Alignment	Station	Offset	Boring Number(s)
AA-3	SR 34	46+45	21′ RT	B-002-1-24
AA-2	SR 34	47+88	8′ RT	B-002-1-24/B-002-2-24
AA-4	CR 24	107+49	18′ LT	B-002-2-24
AA-5	CR 24	105+99	15′ RT	B-007-1-24
AA-6	SR 34	50+77	10′ RT	B-003-0-23 Upper, then B-007-1-24
AA-1	SR 34	48+97	82′ LT	B-004-0-23 Upper, then B-004-1-24
AB-1	CR 24	110+12	72′ RT	B-004-1-24
AB-2	CR 24	111+48	37′ RT	B-008-1-24
AB-3	CR-24	112+89	3′ RT	B-008-1-24
AB-4	SR 34	50+24	106′ LT	B-004-1-24
AB-5	SR 34	51+86	65′ LT	B-004-2-24
AB-6	SR 34	53+24	53′ LT	B-005-1-24

Based on the ODOT Geotechnical Design Manual (GDM), Section 1204, a special foundation design will be required for cohesive soils with an average undrained shear strength (s_u, c) of less than 2,000 pounds per square foot (psf) or for granular soils with an average angle of internal friction (ϕ) less than 30 degrees and a wet density of less than 120 pounds per cubic foot (pcf). These soil properties are averaged over a foundation embedment depth, denoted as "L". The test borings performed for this exploration included cohesive soils for which average undrained shear strength considerations are included in this section. It should be noted that ODOT GDM requires the upper 3 feet be modeled as s_u = 250 psf material, regardless of the encountered conditions, for modeling of freeze-thaw effects.

Based on HL-20.11, minimum drilled shaft foundation depth is indicated as 6 feet for poles having a support height of less than 40 feet, which is anticipated for the light poles for this project. As presented below in Table 5.1.B, none of the borings indicated suitable soil conditions for standard light pole foundation design with an "L" of 6 feet. As such, we have also provided average soil parameters for use in design of foundations extended to depths of approximately 10 feet and 15 feet below existing grades in Tables 5.1.C and 5.1.D, respectively.

Table 5.1.B. Summary of Soil Data and Special Design Requirements for L = 6 Feet

Light Pole Location Number	Boring Number(s)	Average s_u (psf)	Special Design Required?
AA-3	B-002-1-24	1,625	Yes
AA-2	B-002-1-24	1,625	Yes
	B-002-2-24	1,125 (governs)	Yes
AA-4	B-002-2-24	1,125	Yes
AA-5	B-007-1-24	1,055	Yes
AA-6	B-003-0-23	875	Yes
AA-1	B-004-0-23	875	Yes
AB-1	B-004-1-24	1,250	Yes
AB-2 & AB-3	B-008-1-24	1,500	Yes
AB-4	B-004-1-24	1,250	Yes
AB-5	B-004-2-24	665	Yes
AB-6	B-005-1-24	830	Yes

Table 5.1.C. Summary of Soil Data and Special Design Requirements for L = 10 Feet			
Light Pole Location Number	Boring Number(s)	Average s_u (psf)	Is Embedment Length Suitable for Minimum Su=2,000 psf?
AA-3	B-002-1-24	2,350	Yes, use 10 ft. embedment.
AA-2	B-002-1-24	2,350	No
	B-002-2-24	1,700 (governs)	
AA-4	B-002-2-24	1,700	No
AA-5	B-007-1-24	1,710	No
AA-6	B-003-0-23	1,825	No
AA-1	B-004-0-23	1,525	No
AB-1	B-004-1-24	2,475	Yes, use 10 ft. embedment.
AB-2 & AB-3	B-008-1-24	2,275	Yes, use 10 ft. embedment.
AB-4	B-004-1-24	2,475	Yes, use 10 ft. embedment.
AB-5	B-004-2-24	1,500	No
AB-6	B-005-1-24	1,500	No

Table 5.1.D. Summary of Soil Data and Special Design Requirements for L = 15 Feet			
Light Pole Location Number	Boring Number(s)	Average s_u (psf)	Is Embedment Length Suitable for Minimum Su=2,000 psf?
AA-2	B-002-1-24	2,465	Yes, use 15 ft. embedment.
	B-002-2-24	2,050 (governs)	
AA-4	B-002-2-24	2,050	Yes, use 15 ft. embedment.
AA-5	B-007-1-24	2,040	Yes, use 15 ft. embedment.
AA-6	B-003-0-23 Upper, then B-007-1-24	2,115	Yes, use 15 ft. embedment.
AA-1	B-004-0-23 Upper, then B-004-1-24	2,415	Yes, use 15 ft. embedment.
AB-5	B-004-2-24	2,200	Yes, use 15 ft. embedment.
AB-6	B-005-1-24	2,045	Yes, use 15 ft. embedment.

5.2 "Plan Subgrades" Evaluation

An evaluation of the subgrade soils was completed in general accordance with ODOT Geotechnical Design Manual (GDM) Section 600 "Subgrade" (July 2024). As part of this evaluation, the ODOT "Subgrade Analysis" worksheet (V14.6, 02/11/22) was completed and is attached to this report.

Based on the provided drawings, the typical pavement section is indicated to consist of 10½ inches of asphalt underlain by 6 inches of aggregate base, represented by a "cut" of approximately 1.4 feet. Based on the provided plans, grading to achieve final subgrade elevations in the areas of the test borings is anticipated to require a maximum of 1.4 feet of cut (where final grades will approximate existing grades) and a maximum of approximately 1.3 feet of fill.

Based on ODOT GDM Section 600, soils classified as ODOT A-2-5, A-2-7, A-4b, A-5, A-7-5, A-8a, A-8b, or rock have been designated as being problematic with respect to pavement subgrade support. None of these soil types were encountered at planned subgrade elevations in the borings performed for this exploration.

Based on ODOT GDM Section 600 criteria, subgrade soils with moisture contents greater than 3 percent above optimum likely indicate the presence of unstable subgrade that may require some form of subgrade modification. For this site, 34 of the 36 evaluated samples exhibited moisture contents greater than 3 percent above the optimum as determined using ODOT GDM Section 600 criteria. In fact, all 34 of these samples were found to exhibit moisture contents greater than or equal to 5 percent above estimated optimum moisture content. Thus, where moisture contents were wet of optimum, they were more likely to be appreciably wet of optimum. These data indicate that scarification and aeration methods may not be feasible to achieve satisfactory proof rolling and stabilization of the cohesive subgrades.

The type and thickness of subgrade modification is determined by ODOT GDM Section 600 criteria based on the average, low SPT N_{60}-value (N_{60L}) of the subgrade soils in a particular portion of the project area, hand penetrometer values, soil type, and moisture content. Based on these criteria, six of the nine borings indicated planned subgrade modification. Possible alternatives for subgrade modification could include the following, using ODOT GDM Section 600 criteria based on the encountered conditions:

- 12 inches of undercut and replacement with granular engineered fill in the areas presented in Table 5.1.A below, or
- 12 inches of global chemical stabilization.

The ODOT GDM Section 600 spreadsheet indicates lime or cement stabilization as an option of this project. It is our understanding that recent projects in Northwest Ohio, which included similar cohesive soils to those at this project site, were planned to include global lime stabilization for subgrade modification. It was indicated that, for some of those projects, suitable strength could not be achieved with lime stabilization mix designs using a typical/economical lime percentage.

As such, cement should be considered for chemical stabilization of the project. Based on ODOT GDM Section 600 guidelines, 5 percent cement may be specified to estimate the quantity of cement required for the project. Based on the ODOT GDM Section 600 prescribed method (using a dry density of 115 pounds per cubic foot), the quantity of cement for a depth of 12 inches would be 51.75 pounds per square yard. When performing chemical stabilization design, use the dry density of the soil on the project as determined in the laboratory.

As prescribed by ODOT GDM Section 600 criteria, chemical stabilization must extend 18 inches beyond the edge of the pavement surface (on both sides), and where appropriate, 18 inches beyond paved shoulders or paved medians, including under new curbs and gutters.

ODOT GDM Section 600 indicates that, if it is determined that 30 percent or more of the subgrade area must be stabilized, consideration should be given to stabilizing the entire project (global chemical stabilization). As indicated in Table 5.2.1 in the following subsection, approximately 70 percent of the project segment lengths indicate potential need for subgrade modification. As such, global chemical stabilization is anticipated to be an economical alternative for this project provided the stabilization equipment can treat the entire project area with one mobilization.

Per ODOT GDM Section 600 criteria, a cost analysis of the various subgrade modifications options should be performed using bid tabs.

As required by ODOT GDM Section 600, sulfate content tests (ODOT Supplement 1122) were performed on a sample within the upper 3 feet of each boring. The sulfate content test results are summarized in the following table.

Table 5.2. Sulfate Content	
Boring/Sample Numbers	Sulfate Content (mg/kg)
B-001; SS-1B	250
B-002; SS-1B	240
B-003; SS-1	240
B-004; SS-2	250
B-005; SS-1	250
B-006; SS-2	240
B-007; SS-1B	240
B-008; SS-1	240
B-009; SS-1B	240

ODOT GDM Section 600 indicates that chemical stabilization cannot be utilized when sulfate contents for the majority of the samples exceed 3,000 parts per million (ppm), or individual soil samples exhibit sulfate contents of greater than 5,000 ppm. Based on the tested samples, sulfate content will not preclude the use of chemical stabilization for this project.

5.2.1 Undercut and Replacement Alternative

If the construction schedule requires multiple mobilizations of chemical stabilization equipment such that it becomes less economical than undercut and replacement, we are providing undercut and replacement alternative recommendations as follows.

If it is planned to use the undercut and replacement option, a summary of the depths of undercut and replacement indicated by ODOT GDM Section 600 analyses based on the borings are presented in the following table.

Table 5.2.1. ODOT GDM Section 600 Subgrade Analysis Indicated Undercut Depths			
Boring Number(s)	Location	Recommended ODOT GDM Section 600 Recommended Depth of Undercut and Replacement with Granular Engineered Fill (inches)	Approximate Project Segment Length (feet) and Percentage of Total Project Length
B-001	West limit of the project along SR 34 at about 20+00 WR to 9+25 WL / 22+00 WR.	None	200 (8%)
B-002 & B-003 & B-007	9+25 WL / 22+00 WR going east around southern portion of roundabout to south extent of CR 24 at approx. Sta. 500+00 SE / 6+00 SL, and going east to extent of SE at Sta. 503+25 / 71+00 EL / 81+00 ER. Also extending partially along northwestern portion of roundabout to approx. Sta. 14+50 WL.	12	1,075 (43%)
B-004 & B-005	Northeast quadrant of roundabout from approx. 31+00 NL / 61+00 NR to 83+50 ER / 73+50 EL.	None	550 (22%)
B-006	Sta. 83+50 ER / 73+50 EL to eastern project limit along SR 34 at approx. Sta. 85+50 ER / 75+50 EL	12	200 (8%)
B-008 & B-009	Sta. 31+00 NL / 61+00 NR to north extent along CR 24 at 35+75 NL / 66+00 NR.	12	475 (19%)
		Total Approximate Project Length:	2,500

Where undercut and replacement is utilized, all fill should consist of ODOT Item 304 Aggregate Base or Item 703.16C, Granular Material Type B or Type C. It is recommended that geotextile fabric (referenced in ODOT Item 204, and specified as ODOT Item 712.09, Type D) be utilized on the subgrade at the bottom of the undercut

zone. Although not anticipated to be required based on the conditions encountered in the borings and the proposed sections and grades, if particularly unstable subgrades are encountered during construction, or undercuts exceed approximately 18 inches, a geogrid could be used to reduce the total undercut and replacement of the unsuitable soils by 6 inches.

It should be noted that ODOT GDM Section 600 analyses are used as a pre-construction tool to plan subgrade modification alternatives. Actual subgrade modification will depend on field observations of proof-rolling conditions at the time of construction. Changes in soil moisture content could create more or less favorable subgrade conditions that may result in adjustments to subgrade modification or soil stabilization requirements at the time of construction.

5.3 Flexible (Asphalt) Pavement Design

Based on the ODOT GDM Section 600 analysis and the ODOT "Subgrade Analysis" spreadsheet, a design CBR value of 6 percent was determined for the project. It should be noted that the CBR determination by the spreadsheet is based on an average Group Index (GI) of all the evaluated samples, which was 11. Group indices for the tested samples ranged from 4 to 16, which would correlate with a CBR value of 4 to 8 percent. The A-6a and A-6b samples tested for complete classification were found to have GI ranging from 6 to 12, with an average GI value of 10, which would also correlate with a CBR value of 6 percent. Based on the average design value calculations from the ODOT "Subgrade Analysis" worksheet, it does not appear to be unconservative to use the associated design CBR value of 6 percent.

It should also be noted that the design CBR value is based on subgrades compacted to at least 100 percent of the maximum dry density as determined by ASTM D 698 (Standard Proctor) or verified as stable through proof-rolling in accordance with Section 5.3 of this report.

Based on the ODOT Pavement Design Manual (PDM), the subgrade resilient modulus (Mr, in psi) is calculated by multiplying the CBR value by 1,200. Therefore, the Mr for this project would be 7,200 psi. If global chemical stabilization is utilized, the ODOT PDM indicates that the improved subgrade resilient modulus due to global chemical stabilization (Mr_{GCS}) is calculated by multiplying the Mr value by 1.36. Therefore, for this project, the Mr_{GCS} would be 9,790 psi.

All pavement design and paving operations should conform to ODOT specifications. The pavement and subgrade preparation procedures outlined in this report should result in a reasonably workable and satisfactory pavement. It should be recognized, however, that all pavements need repairs or overlays over time as a result of progressive yielding under repeated loading for a prolonged period.

It is recommended that proof rolling, placement of aggregate base, and placement of asphalt be performed within as short a time period as possible. Exposure of the aggregate base to rain, snow, or freezing conditions may lead to deterioration of the subgrade and/or base materials due to excessive moisture conditions and to difficulties in achieving the required compaction.

5.4 Site and Subgrade Preparation

Site preparation activities should include the removal of vegetation, topsoil, root mats, pavements, and other deleterious non-soil materials from all proposed roadway areas. The actual amount of required stripping should be determined in the field by a geotechnical engineer or qualified representative.

For permanent sloped excavations and embankment slopes, we recommend that grades generally be no steeper than 3H:1V. Based on review of Stage 2 Plans, new embankment and cut slopes are planned at 3H:1V to 6H:1V, which meet this requirement. New embankment fill is anticipated to be placed on grades at or flatter than 4H:1V such that special benching and sidehill fill is not anticipated to be

required. Rather, standard specification benched embankment construction may be performed per ODOT CMS Item 203.05.

Where new embankment will be constructed in areas of existing ditches, ODOT GDM Section 500 "Embankments" indicates that the ditch should be undercut 2 feet below the ditch bottom for the width of the ditch.

The ODOT GDM Section 600 analysis indicates options for "planned" subgrade modification of either global stabilization to a depth of 12 inches or over-excavation of unsuitable subgrade soils and replacement with new granular engineered fill. Based on the ODOT GDM Section 600 analysis, 70 percent of the project is indicated to be unstable and require subgrade treatment. As such, it is anticipated that global chemical stabilization to a depth of 12 inches may be more economical compared to over-excavation and replacement with new granular engineered fill, if one mobilization of the equipment is utilized.

The Subgrade Analysis spreadsheet indicates that global chemical stabilization may be completed using lime or cement. However, as indicated in Section 5.1, caution should be exercised when using lime based on past experience in Northwest Ohio with similar soils. For global chemical stabilization, subgrade preparation procedures are provided in ODOT Construction and Materials Specifications (CMS) Item 206.

5.4.1 Undercut and Replacement Alternative

If the undercut and replacement alternative is found to be more economical, site and subgrade preparation activities should conform to ODOT Construction and Materials Specifications (CMS) Item 204 specifications.

Upon completion of the clearing and undercutting activities, all areas that are to receive fill, or that have been excavated to proposed final subgrade elevation, should

be inspected by a geotechnical engineer. Pavement subgrades should be proof rolled in accordance with ODOT CMS 204.06.

Any unsuitable materials observed during the inspection and proof-rolling operations should be undercut and replaced with compacted fill, or stabilized in place utilizing conventional remedial measures such as discing, aeration, and recompaction. As stated previously, based on the conditions encountered during our exploration, where cohesive subgrade soil moisture contents were wet of optimum, they were more likely to be significantly wet of optimum. Scarification and aeration methods may not be feasible for these areas.

5.5 Groundwater Control

As previously mentioned, groundwater was not initially encountered during drilling nor observed upon completion of drilling operations in any of the borings. Based on the soil characteristics and moisture conditions encountered in the borings, it is our opinion that the "normal" groundwater level can generally be expected at depths on the order of 8 feet or greater below existing grades. However, "perched" water may be encountered in aggregate base materials that are underlain by relatively impermeable cohesive soils.

Based on the predominantly clayey soil profile at the site, adequate control of seasonal groundwater seepage, perched water, and surface water run-off into shallow excavations should be achievable by minor dewatering systems, such as pumping from prepared sumps.

5.6 Excavations and Slopes

The sides of temporary excavations for construction should be adequately sloped to provide stable sides and safe working conditions. Otherwise, the excavation must be

properly braced against lateral movements. In any case, applicable Occupational Safety and Health Administration (OSHA) safety standards must be followed.

Based on the test borings, the soils likely to be encountered in shallow excavations generally include OSHA Type A soils (cohesive soils with unconfined compressive strengths of 3,000 pounds per square foot (psf) or greater). Temporary excavations in Type A soils should be constructed no steeper than ¾ horizontal to 1 vertical (¾H:1V). In all cases, flatter slopes may be required if lower strength soils or adverse seepage conditions are encountered during construction.

In particular, it is planned to replace a pipe crossing beneath CR 24, just south of CR U at the southern extent of the project. Due to the ditches at the ends of the pipe, saturated conditions and sediment may have resulted in lower strengths than typical for the soils throughout the project site. As such, flatter slopes should be anticipated for excavations in these areas.

5.7 Fill

Material for engineered fill or backfill required to achieve design grades should meet ODOT Item 203 "Embankment Fill" placement and compaction requirements. To maintain the recommended design CBR value, new engineered fill should consist of A-6b or better soils. In general, suitable fills may consist of any non-organic soils having a maximum dry density as determined by the Standard Proctor (ASTM D 698) of 90 pounds per cubic foot (pcf) or greater. On-site soils may be used as engineered fill materials provided that they are free of organic matter, debris, excessive moisture, and rock or stone fragments larger than 3 inches in diameter. Depending on seasonal conditions, the on-site soils may be wet of optimum and may require scarification and aeration to achieve satisfactory compaction. If the construction schedule does not allow for scarification and aeration activities, it may be more practical or economical to utilize imported granular fill.

Fill should be placed in uniform layers not more than 8 inches thick (loose measure) and adequately keyed into stripped and scarified soils. All fill placed within pavement areas should be compacted to a dry density consistent with the requirements of ODOT Item 203, based on the maximum dry density as determined by ASTM D 698.

The on-site soils consist of cohesive soils. For the cohesive soils, a sheepsfoot roller should provide the most effective soil compaction. For granular fill or dense-graded aggregate pavement base materials, a vibratory smooth-drum roller would be required to provide effective compaction.

Scarified subgrade soils and all fill material should be within 3 percent of the optimum moisture content to facilitate compaction. Furthermore, fill material should not be frozen or placed on a frozen base. It is recommended that all earthwork and site preparation activities be conducted under adequate specifications and properly monitored in the field by a qualified geotechnical testing firm.

6.0 QUALIFICATION OF RECOMMENDATIONS

Our evaluation of the pavement design and construction conditions has been based on the data obtained during our field exploration, as well as the criteria in ODOT GDM Section 600 "Subgrade" (July 2024). Additionally, our evaluation of the light pole foundation design and construction conditions has been based on the data obtained during our field exploration, as well as the criteria in ODOT GDM Section 1200 "Foundations for Towers, Poles, and Overhead Signs" (July 2024). The general subsurface conditions were based on interpretation of the subsurface data at specific boring locations. Regardless of the thoroughness of a subsurface exploration, there is the possibility that conditions between borings will differ from those at the boring locations, that conditions at the time of construction are not as anticipated by the designers, or that the construction process has altered the soil conditions. Therefore, experienced geotechnical engineers should observe earthwork and pavement construction to confirm that the conditions anticipated in design are noted. Otherwise, CT assumes no responsibility for construction compliance with the design concepts, specifications, or recommendations.

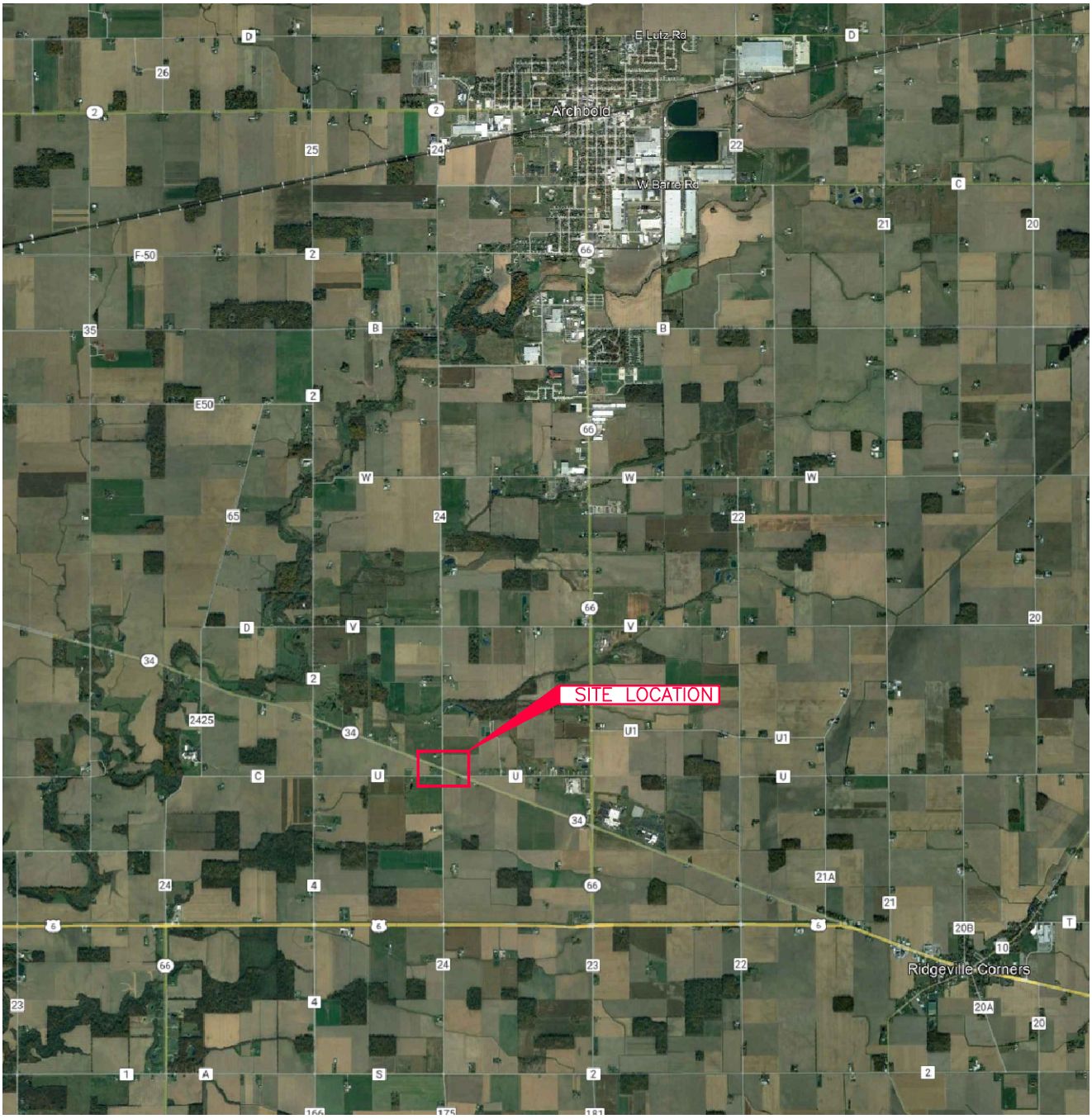
The design recommendations in this report have been developed on the basis of the previously described project characteristics and subsurface conditions. If project criteria or locations change, CT should be permitted to determine whether the recommendations must be modified. The findings of such a review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

The nature and extent of variations between the borings may not become evident until the course of construction. If such variations are encountered, it will be necessary to reevaluate the recommendations of this report after on-site observations of the conditions.

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. CT is not responsible for the conclusions, opinions, or recommendations of others based on this data.

PLATES



LEGEND

APPROXIMATE SITE LOCATION

N

APPROXIMATE SCALE – FEET

0 5,800 11,600

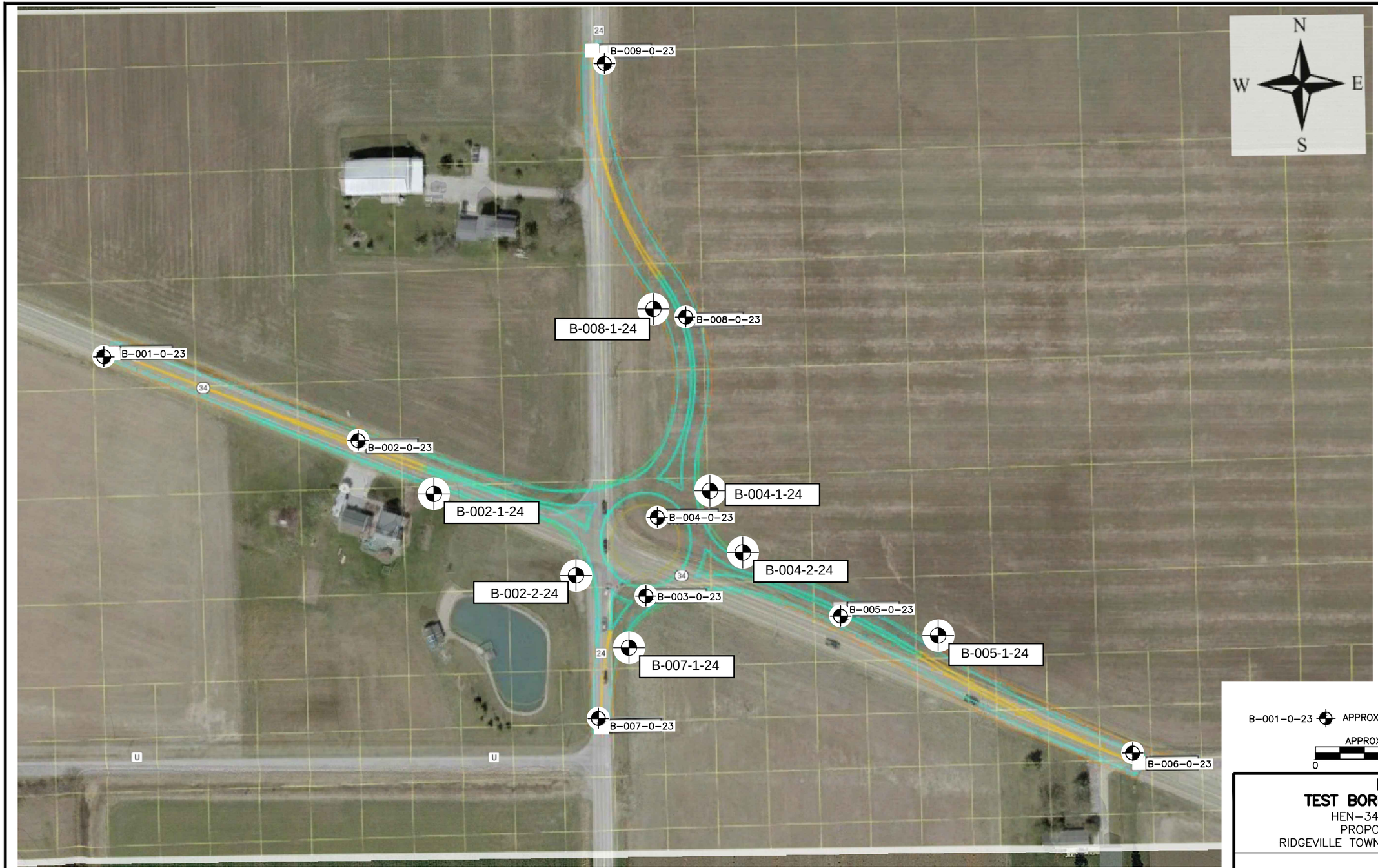
PLATE 1.0
SITE LOCATION MAP

HEN–34–0.85, PID 118189
PROPOSED ROUNDABOUT
RIDGEVILLE TOWNSHIP, HENRY COUNTY, OHIO

PREPARED FOR
ODOT DISTRICT 2
BOWLING GREEN, OHIO

DRAWN	TRR/1–17–24	CHECKED	CPI/1–23–24
REVISED		APPROVED	
JOB NO.	232187		
DRAWING NUMBER	B_232187–01–PLATE 1 SM		

your trusted advisor
consultants
engineers
architects
planners



LEGEND

B-001-0-23 APPROXIMATE TEST BORING LOCATION

APPROXIMATE SCALE – FEET

0 120 240

PLATE 2.0
TEST BORING LOCATION PLAN

HEN-34-0.85, PID 118189
PROPOSED ROUNDABOUT
RIDGEVILLE TOWNSHIP, HENRY COUNTY, OHIO

PREPARED FOR
ODOT DISTRICT 2
BOWLING GREEN, OHIO

DRAWN	CRO /11/11/24	CHECKED	
REVISED		APPROVED	
JOB NO.	232187		
DRAWING NUMBER	B_232187-01-PLATE 2 BLP		

your trusted advisor consultants engineers architects planners

PROPOSED ROUNDABOUT OVERLAY "BORING LAYOUT" PROVIDED BY ODOT DISTRICT 2 VIA EMAIL ON OCTOBER 2, 2023.

FIGURES

PROJECT: HEN-34-00.85	DRILLING FIRM / OPERATOR: TTL / TB	DRILL RIG: DIEDRICH D70 TRACK	STATION / OFFSET: 42+65, 9' RT.	EXPLORATION ID B-001-0-23
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: CT / KKC	HAMMER: DIEDRICH AUTOMATIC	ALIGNMENT: SR 34	
PID: 118189 SFN: N/A	DRILLING METHOD: HSA	CALIBRATION DATE: 4/13/22	ELEVATION: 720.1 (NAVD88) EOB: 7.2 ft.	PAGE 1 OF 1
START: 12/11/23 END: 12/11/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90	LAT / LONG: 41.458027, -84.327367	

MATERIAL DESCRIPTION AND NOTES	ELEV. 720.1	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
ASPHALT - 13.5 INCHES	718.9	1																
AGGREGATE BASE - 5.5 INCHES	718.5					SS-1A	-	-	-	-	-	-	-	-	-	-	A-2-6 (V)	
VERY STIFF, BROWN, **SILTY CLAY**, SOME SAND, LITTLE GRAVEL, MOIST		2	12 5 6	17	67	SS-1B	2.25	18	9	15	21	37	34	17	17	22	A-6b (7)	
	715.9	3	6 8 14	33	89	SS-2	3.25	-	-	-	-	-	-	-	-	26	A-6b (V)	
HARD, BROWN, **SILT AND CLAY**, TRACE SAND, MOIST		4																
		5	3 6 9	23	89	SS-3	4.50	0	2	6	24	68	31	18	13	23	A-6a (9)	
		6	11 14 18	48	100	SS-4	4.50	-	-	-	-	-	-	-	-	26	A-6a (V)	
	712.9	7 EOB																

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.25 BAG ASPHALT PATCH; AUGER CUTTINGS MIXED WITH 0.5 BAG BENTONITE CHIPS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 11/14/24 11:01 - X:\PROJECTS\232187.GPJ

PROJECT: HEN-34-00.85	DRILLING FIRM / OPERATOR: TTL / TB	DRILL RIG: DIEDRICH D70 TRACK	STATION / OFFSET: 45+93, 9' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: CT / KKC	HAMMER: DIEDRICH AUTOMATIC	ALIGNMENT: SR 34
PID: 118189 SFN: N/A	DRILLING METHOD: HSA	CALIBRATION DATE: 4/13/22	ELEVATION: 720.6 (NAVD88) EOB: 7.0 ft.
START: 12/11/23 END: 12/11/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90	LAT / LONG: 41.457747, -84.326232

EXPLORATION ID B-002-0-23

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
	720.6																	
ASPHALT - 11 INCHES	719.7																	
AGGREGATE BASE - 4 INCHES	719.3	1				SS-1A	-	-	-	-	-	-	-	-	-	-	A-2-6 (V)	
STIFF, BROWN, **SILTY CLAY**, "AND"SAND, TRACE GRAVEL, MOIST	718.1	2	4 4 3	11	56	SS-1B	2.00	1	7	34	26	32	32	16	16	17	A-6b (7)	
HARD, BROWN, **SILT AND CLAY**, TRACE SAND, MOIST		3	7 9 12	32	78	SS-2	4.50	0	2	3	27	68	33	19	14	23	A-6a (10)	
@4': LITTLE SAND, TRACE GRAVEL		4	7 9 12	32	100	SS-3	4.50	-	-	-	-	-	-	-	-	23	A-6a (V)	
		5																
		6	11 15 19	51	89	SS-4	4.50	-	-	-	-	-	-	-	-	24	A-6a (V)	
	713.6	EOB 7																

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.25 BAG ASPHALT PATCH; AUGER CUTTINGS MIXED WITH 0.5 BAG BENTONITE CHIPS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 11/14/24 11:01 - X:\PROJECTS\232187.GPJ

PROJECT: HEN-34-00.85	DRILLING FIRM / OPERATOR: TTL / TB	DRILL RIG: DIEDRICH D70 TRACK	STATION / OFFSET: 47+08, 9' RT.	EXPLORATION ID B-002-1-24
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: DIEDRICH AUTOMATIC	ALIGNMENT: SR 34	
PID: 118189 SFN: N/A	DRILLING METHOD: HSA	CALIBRATION DATE: 6/11/24	ELEVATION: 720.7 (NAVD88) EOB: 25.0 ft.	PAGE 1 OF 1
START: 7/15/24 END: 7/15/24	SAMPLING METHOD: SPT	ENERGY RATIO (%): 87.4	LAT / LONG: 41.457583, -84.325861	

MATERIAL DESCRIPTION AND NOTES	ELEV. 720.7	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
ASPHALT - 12 INCHES	719.7																	
AGGREGATE BASE - 9 INCHES	718.9	1	27 10 4	20	11	SS-1	-	-	-	-	-	-	-	-	-	6	A-1-b (V)	
VERY STIFF TO HARD, BROWN, **CLAY**, LITTLE SILT, TRACE SAND, DAMP		2																
		3																
		4	4 7 8	22	56	SS-2	>4.5	0	3	6	18	73	47	24	23	22	A-7-6 (15)	
		5																
@6': HARD, GRAY/BROWN		6																
		7	5 9 12	31	67	SS-3	>4.5	-	-	-	-	-	-	-	-	23	A-7-6 (V)	
		8																
@8.5': VERY STIFF HARD, BROWN/GRAY, MOIST		9	4 6 7	19	100	SS-4	>4.5	-	-	-	-	-	-	-	-	25	A-7-6 (V)	
		10																
@11': GRAY, LITTLE SAND		11	5 8 10	26	100	SS-5	>4.5	0	4	12	25	59	49	26	23	26	A-7-6 (15)	
@13': VERY STIFF, DAMP		12																
		13																
		14	4 4 6	15	100	SS-6	3.25	-	-	-	-	-	-	-	-	25	A-7-6 (V)	
		15																
@16': TRACE SAND, MOIST		16																
		17	4 6 7	19	100	SS-7	3.50	-	-	-	-	-	-	-	-	26	A-7-6 (V)	
	702.2	18																
STIFF TO VERY STIFF, GRAY, **CLAY**, SOME SILT, TRACE SAND, TRACE GRAVEL, MOIST		19	3 3 4	10	100	SS-8	2.75	1	2	6	23	68	43	22	21	24	A-7-6 (13)	
	699.7	20																
VERY STIFF, GRAY, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, MOIST		21																
		22	3 4 7	16	100	SS-9	3.00	2	5	11	24	58	42	22	20	25	A-7-6 (12)	
	697.2	23																
STIFF TO VERY STIFF, GRAY, **CLAY**, SOME SILT, TRACE SAND, MOIST		24	2 3 4	10	100	SS-10	2.25	-	-	-	-	-	-	-	-	36	A-7-6 (V)	
	695.7 EOB	25																

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; PUMPED 7 CF CEMENT-BENTONITE GROUT

PROJECT: HEN-34-00.85	DRILLING FIRM / OPERATOR: TTL / TB	DRILL RIG: DIEDRICH D70 TRACK	STATION / OFFSET: 107+66, 43' LT.	EXPLORATION ID B-002-2-24
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: DIEDRICH AUTOMATIC	ALIGNMENT: CR 24	
PID: 118189 SFN: N/A	DRILLING METHOD: HSA	CALIBRATION DATE: 6/11/24	ELEVATION: 719.1 (NAVD88) EOB: 25.0 ft.	PAGE 1 OF 1
START: 7/15/24 END: 7/15/24	SAMPLING METHOD: SPT	ENERGY RATIO (%): 87.4	LAT / LONG: 41.457243, -84.325275	

MATERIAL DESCRIPTION AND NOTES	ELEV. 719.1	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
TOPSOIL - 4 INCHES	718.8																	
STIFF TO VERY STIFF, BROWN/GRAY, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, TRACE WIRE, DAMP FILL		1	2 3 5	12	89	SS-1	>4.5	-	-	-	-	-	-	-	-	24	A-7-6 (V)	
	715.6	2																
VERY STIFF, BROWN/GRAY, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, DAMP		3																
		4	2 4 5	13	100	SS-2	4.25	-	-	-	-	-	-	-	-	26	A-7-6 (V)	
@6': TRACE ORGANICS		5																
		6	4 5 6	16	100	SS-3	3.75	0	3	9	24	64	53	26	27	17	A-7-6 (17)	
		7																
		8																
@9.5': VERY STIFF TO HARD, GRAY, MOIST		9	3 7 9	23	100	SS-4	4.25	0	3	7	22	68	49	24	25	27	A-7-6 (16)	
		10																
		11																
		12	6 7 10	25	100	SS-5	4.25	-	-	-	-	-	-	-	-	26	A-7-6 (V)	
@13.8': VERY STIFF		13																
		14	3 5 5	15	100	SS-6	3.00	-	-	-	-	-	-	-	-	25	A-7-6 (V)	
		15																
		16																
		17	4 5 7	17	100	SS-7	2.50	-	-	-	-	-	-	-	-	26	A-7-6 (V)	
	701.1	18																
STIFF TO VERY STIFF, GRAY, **CLAY**, SOME SILT, LITTLE SAND, MOIST		19	3 3 4	10	100	SS-8	2.50	0	3	10	23	64	48	25	23	33	A-7-6 (15)	
		20																
@21: TRACE SAND		21																
		22	3 5 5	15	100	SS-9	3.00	-	-	-	-	-	-	-	-	29	A-7-6 (V)	
		23																
		24	3 3 5	12	100	SS-10	2.50	0	2	3	22	73	48	26	22	32	A-7-6 (14)	
	694.1	EOB 25																

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: AUGER CUTTINGS MIXED WITH 1 BAG BENTONITE CHIPS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 11/14/24 11:04 - X:\PROJECTS\232187.GPJ

PROJECT: HEN-34-00.85	DRILLING FIRM / OPERATOR: TTL / TB	DRILL RIG: DIEDRICH D70 TRACK	STATION / OFFSET: 49+89, 40' RT.	EXPLORATION ID B-003-0-23
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: CT / KKC	HAMMER: DIEDRICH AUTOMATIC	ALIGNMENT: SR 34	
PID: 118189 SFN: N/A	DRILLING METHOD: HSA	CALIBRATION DATE: 4/13/22	ELEVATION: 718.5 (NAVD88) EOB: 10.0 ft.	PAGE 1 OF 1
START: 12/22/23 END: 12/22/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90	LAT / LONG: 41.457224, -84.324947	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
TOPSOIL - 14 INCHES	718.5																	
	717.3	1																
VERY STIFF, BROWN, **SILTY CLAY**, SOME SAND, TRACE ORGANICS, MOIST LOI - 3.9%		2	2 2 3	8	67	SS-1	2.25	0	2	29	24	45	35	19	16	23	A-6b (9)	
		3																
		4	2 2 4	9	89	SS-2	2.50	0	3	20	27	50	39	20	19	29	A-6b (12)	
	712.5	5																
HARD, BROWN, **SILTY CLAY**, TRACE SAND, MOIST		6	4 5 9	21	100	SS-3	4.50	-	-	-	-	-	-	-	-	24	A-6b (V)	
		7																
@8': GRAY		8																
		9	4 7 10	26	100	SS-4	4.50	-	-	-	-	-	-	-	-	27	A-6b (V)	
	708.5	EOB 10																

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: AUGER CUTTINGS MIXED WITH 0.5 BAG BENTONITE CHIPS

PROJECT: HEN-34-00.85	DRILLING FIRM / OPERATOR: TTL / TB	DRILL RIG: DIEDRICH D70 TRACK	STATION / OFFSET: 49+69, 57' LT.	EXPLORATION ID B-004-0-23
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: CT / KKC	HAMMER: DIEDRICH AUTOMATIC	ALIGNMENT: SR 34	
PID: 118189 SFN: N/A	DRILLING METHOD: HSA	CALIBRATION DATE: 4/13/22	ELEVATION: 718.9 (NAVD88) EOB: 10.0 ft.	PAGE 1 OF 1
START: 12/22/23 END: 12/22/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90	LAT / LONG: 41.457491, -84.324890	

MATERIAL DESCRIPTION AND NOTES	ELEV. 718.9	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
TOPSOIL - 12 INCHES	717.9																	
VERY STIFF, BROWN, **SILT AND CLAY**, SOME SAND, TRACE ORGANICS, MOIST LOI = 4.9 %	716.6	1	2 4 7	17	83	SS-1A	3.50	0	0	24	23	53	31	17	14	20	A-6a (10)	
HARD, BROWN, **SILT AND CLAY**, LITTLE SAND, MOIST		2				SS-1B	-	-	-	-	-	-	-	-	-	-	A-6a (V)	
		3																
		4	3 2 5	11	44	SS-2	4.50	0	1	12	23	64	33	19	14	22	A-6a (10)	
		5																
@6': VERY STIFF		6	4 7 9	24	100	SS-3	2.00	-	-	-	-	-	-	-	-	26	A-6a (V)	
		7																
		8																
@8.5': HARD		9	5 9 14	35	100	SS-4	4.50	-	-	-	-	-	-	-	-	24	A-6a (V)	
	708.9	EOB 10																

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: AUGER CUTTINGS MIXED WITH 0.5 BAG BENTONITE CHIPS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 11/14/24 11:05 - X:\PROJECTS\232187.GPJ

PROJECT: HEN-34-00.85	DRILLING FIRM / OPERATOR: TTL / TB	DRILL RIG: DIEDRICH D70 TRACK	STATION / OFFSET: 50+31, 89' LT.	EXPLORATION ID B-004-1-24
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: DIEDRICH AUTOMATIC	ALIGNMENT: SR 34	
PID: 118189 SFN: N/A	DRILLING METHOD: HSA	CALIBRATION DATE: 6/11/24	ELEVATION: 718.9 (NAVD88) EOB: 25.0 ft.	PAGE 1 OF 1
START: 7/12/24 END: 7/12/24	SAMPLING METHOD: SPT	ENERGY RATIO (%): 87.4	LAT / LONG: 41.457509, -84.324632	

MATERIAL DESCRIPTION AND NOTES	ELEV. 718.9	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
TOPSOIL - 5 INCHES	718.5																	
MEDIUM STIFF TO STIFF, BROWN/GRAY, **CLAY**, SOME SILT, LITTLE SAND, TRACE CALCITE STAIN SEAM, MOIST	715.4	1–3	2 2 3	7	67	SS-1	>4.5	0	1	10	28	61	48	23	25	24	A-7-6 (16)	
VERY STIFF TO HARD, BROWN/GRAY, **CLAY**, SOME SILT, LITTLE SAND, DAMP		4–5	3 4 7	16	78	SS-2	>4.5	-	-	-	-	-	-	-	-	23	A-7-6 (V)	
@6': HARD, GRAY, TRACE GRAVEL		6–8	6 10 13	34	100	SS-3	>4.5	-	-	-	-	-	-	-	-	23	A-7-6 (V)	
@8.5': VERY STIFF TO HARD, GRAY/BROWN, TRACE SAND		9–10	6 9 11	29	100	SS-4	>4.5	-	-	-	-	-	-	-	-	23	A-7-6 (V)	
@11': HARD, GRAY, LITTLE SILT, MOIST		11–13	7 10 18	41	100	SS-5	>4.5	1	2	5	19	73	45	24	21	25	A-7-6 (13)	
@13.8': VERY STIFF		14–15	3 5 6	16	100	SS-6	3.25	-	-	-	-	-	-	-	-	26	A-7-6 (V)	
@16: VERY STIFF TO HARD	700.4	16–18	4 5 8	19	100	SS-7	4.25	-	-	-	-	-	-	-	-	25	A-7-6 (V)	
STIFF TO VERY STIFF, GRAY, **SILTY CLAY**, TRACE SAND, MOIST	697.9	19–20	3 3 5	12	100	SS-8	2.50	0	2	3	22	73	39	23	16	25	A-6b (10)	
STIFF TO VERY STIFF, GRAY, **CLAY**, SOME SILT, TRACE SAND, DAMP		21–23	3 5 5	15	100	SS-9	2.25	-	-	-	-	-	-	-	-	27	A-7-6 (V)	
@23.5: MOIST	693.9	24–25 EOB	3 4 5	13	100	SS-10	2.50	0	2	3	22	73	51	28	23	32	A-7-6 (15)	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: AUGER CUTTINGS MIXED WITH 1 BAG BENTONITE CHIPS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 11/14/24 11:06 - X:\PROJECTS\232187.GPJ

PROJECT: HEN-34-00.85	DRILLING FIRM / OPERATOR: TTL / TB	DRILL RIG: DIEDRICH D70 TRACK	STATION / OFFSET: 50+97, 41' LT.	EXPLORATION ID B-004-2-24
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: DIEDRICH AUTOMATIC	ALIGNMENT: SR 34	
PID: 118189 SFN: N/A	DRILLING METHOD: HSA	CALIBRATION DATE: 6/11/24	ELEVATION: 718.5 (NAVD88) EOB: 25.0 ft.	PAGE 1 OF 1
START: 7/12/24 END: 7/12/24	SAMPLING METHOD: SPT	ENERGY RATIO (%): 87.4	LAT / LONG: 41.457322, -84.324473	

MATERIAL DESCRIPTION AND NOTES	ELEV. 718.5	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
TOPSOIL - 6 INCHES	718.0																	
STIFF TO VERY STIFF, BROWN/GRAY, **CLAY**, SOME SILT. LITTLE SAND, TRACE ORGANICS, DAMP		1	3 3 4	10	78	SS-1	2.25	-	-	-	-	-	-	-	-	24	A-7-6 (V)	
		2																
@3.5': MEDIUM STIFF TO STIFF		3	2 2 3	7	50	SS-2	2.25	-	-	-	-	-	-	-	-	25	A-7-6 (V)	
		4																
@6': STIFF TO VERY STIFF, GRAY		5	4 4 4	12	67	SS-3	3.75	0	3	7	26	64	49	26	23	25	A-7-6 (15)	
	710.5	6																
VERY STIFF TO HARD, GRAY, **CLAY**, LITTLE SILT. TRACE SAND, TRACE GRAVEL, DAMP		7																
		8	6 7 11	26	100	SS-4	>4.5	-	-	-	-	-	-	-	-	24	A-7-6 (V)	
		9																
		10																
		11	7 9 12	31	100	SS-5	>4.5	1	2	6	18	73	48	24	24	24	A-7-6 (15)	
	705.0	12																
STIFF TO VERY STIFF, GRAY, **CLAY**, LITTLE SILT, TRACE SAND, TRACE GRAVEL, MOIST		13																
		14	4 4 6	15	100	SS-6	3.75	-	-	-	-	-	-	-	-	25	A-7-6 (V)	
		15																
@16': VERY STIFF		16																
		17	4 6 8	20	100	SS-7	3.50	1	2	6	19	72	46	26	20	26	A-7-6 (13)	
@18': STIFF TO VERY STIFF, DAMP		18																
		19	3 3 4	10	100	SS-8	2.50	-	-	-	-	-	-	-	-	25	A-7-6 (V)	
		20																
@21': SOME SILT, MOIST		21																
		22	3 4 5	13	100	SS-9	2.00	0	2	5	20	73	51	25	26	32	A-7-6 (17)	
		23																
		24	3 3 5	12	100	SS-10	2.00	-	-	-	-	-	-	-	-	33	A-7-6 (V)	
	693.5	25																
		EOB																

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: AUGER CUTTINGS MIXED WITH 1 BAG BENTONITE CHIPS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 11/14/24 11:08 - X:\PROJECTS\232187.GPJ

PROJECT: HEN-34-00.85	DRILLING FIRM / OPERATOR: TTL / TB	DRILL RIG: DIEDRICH D70 TRACK	STATION / OFFSET: 52+23, 25' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: CT / KKC	HAMMER: DIEDRICH AUTOMATIC	ALIGNMENT: SR 34
PID: 118189 SFN: N/A	DRILLING METHOD: HSA	CALIBRATION DATE: 4/13/22	ELEVATION: 717.9 (NAVD88) EOB: 10.0 ft.
START: 12/22/23 END: 12/22/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90	LAT / LONG: 41.457491, -84.324070

EXPLORATION ID: B-005-0-23

PAGE: 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
TOPSOIL - 12 INCHES	717.9																	
	716.9																	
MEDIUM STIFF, BROWN, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, TRACE ORGANICS, MOIST LOI - 3.5%		1	2 2 3	8	78	SS-1	1.00	6	5	14	23	52	38	20	18	26	A-6b (11)	
		2																
@3': VERY STIFF, TRACE SAND		3																
		4	1 3 4	11	100	SS-2	2.25	-	-	-	-	-	-	-	-	24	A-6b (V)	
	711.9	5																
HARD, BROWN, **SILTY CLAY**, SOME SAND, MOIST		6	6 6 7	20	100	SS-3	4.50	0	3	28	21	48	39	20	19	25	A-6b (10)	
		7																
@8': GRAY, LITTLE SAND, TRACE GRAVEL		8																
		9	4 7 9	24	100	SS-4	4.50	-	-	-	-	-	-	-	-	23	A-6b (V)	
	707.9	EOB 10																

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: AUGER CUTTINGS MIXED WITH 0.5 BAG BENTONITE CHIPS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 11/14/24 11:08 - X:\PROJECTS\232187.GPJ

PROJECT: HEN-34-00.85	DRILLING FIRM / OPERATOR: TTL / TB	DRILL RIG: DIEDRICH D70 TRACK	STATION / OFFSET: 53+05, 38' LT.	EXPLORATION ID B-005-1-24
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: DIEDRICH AUTOMATIC	ALIGNMENT: SR 34	
PID: 118189 SFN: N/A	DRILLING METHOD: HSA	CALIBRATION DATE: 6/11/24	ELEVATION: 718.0 (NAVD88) EOB: 25.0 ft.	PAGE 1 OF 1
START: 7/12/24 END: 7/12/24	SAMPLING METHOD: SPT	ENERGY RATIO (%): 87.4	LAT / LONG: 41.457103, -84.323774	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
TOPSOIL - 4 INCHES	718.0																	
MEDIUM STIFF TO STIFF, GRAY, **CLAY**, SOME SILT, LITTLE SAND, TRACE ORGANICS, MOIST	717.7	1	3 2 3	7	89	SS-1	2.50	0	1	16	24	59	53	28	25	31	A-7-6 (17)	
STIFF TO VERY STIFF, GRAY/BROWN, **CLAY**, SOME SILT, LITTLE SAND, DAMP	714.5	4	4 3 4	10	33	SS-2	>4.5	-	-	-	-	-	-	-	-	26	A-7-6 (V)	
VERY STIFF TO HARD, BROWN/GRAY, **CLAY**, LITTLE SILT, LITTLE SAND, DAMP	712.0	7	3 4 7	16	100	SS-3	>4.5	-	-	-	-	-	-	-	-	24	A-7-6 (V)	
@8.5': TRACE SAND, MOIST		9	3 5 6	16	100	SS-4	>4.5	0	3	6	18	73	53	26	27	27	A-7-6 (17)	
@11': GRAY, TRACE GRAVEL, DAMP		12	5 8 9	25	100	SS-5	>4.5	-	-	-	-	-	-	-	-	25	A-7-6 (V)	
@14.2': VERY STIFF		14	3 4 7	16	100	SS-6	3.75	-	-	-	-	-	-	-	-	24	A-7-6 (V)	
@16': MOIST	700.0	17	6 6 7	19	100	SS-7	2.50	3	1	5	19	72	47	24	23	26	A-7-6 (15)	
STIFF TO VERY STIFF, GRAY, **CLAY**, LITTLE SILT, TRACE SAND, DAMP		19	3 3 5	12	100	SS-8	2.75	-	-	-	-	-	-	-	-	25	A-7-6 (V)	
@21': MOIST		22	3 4 5	13	100	SS-9	2.25	0	2	5	20	73	54	28	26	32	A-7-6 (17)	
	693.0	EOB 25	3 4 5	13	100	SS-10	2.00	-	-	-	-	-	-	-	-	34	A-7-6 (V)	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: AUGER CUTTINGS MIXED WITH 1 BAG BENTONITE CHIPS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 11/14/24 11:09 - X:\PROJECTS\232187.GPJ

PROJECT: HEN-34-00.85	DRILLING FIRM / OPERATOR: TTL / TB	DRILL RIG: DIEDRICH D70 TRACK	STATION / OFFSET: 56+14, 9' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: CT / KKC	HAMMER: DIEDRICH AUTOMATIC	ALIGNMENT: SR 34
PID: 118189 SFN: N/A	DRILLING METHOD: HSA	CALIBRATION DATE: 4/13/22	ELEVATION: 720.3 (NAVD88) EOB: 7.0 ft.
START: 12/11/23 END: 12/11/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90	LAT / LONG: 41.456708, -84.322274

EXPLORATION ID: B-006-0-23

PAGE: 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
ASPHALT - 12 INCHES	720.3																	
	719.3																	
AGGREGATE BASE -9 INCHES	718.5	1	22 (5 5)	15	28	SS-1A	-	-	-	-	-	-	-	-	-	12	A-2-6 (V)	
STIFF, GRAY, **SILTY CLAY**, TRACE SAND, MOIST		2				SS-1B	-	-	-	-	-	-	-	-	-	-		
		3	5 (7 9)	24	89	SS-2	1.75	0	2	7	23	68	40	20	20	30	A-6b (12)	
	715.5	4	3 (3 4)	11	100	SS-3A	-	-	-	-	-	-	-	-	-	28	A-6b (V)	
VERY STIFF, GRAY/BROWN, **SILTY CLAY**, LITTLE SAND, MOIST		5				SS-3B	2.25	0	1	9	22	68	39	21	18	28	A-6b (11)	
	714.3	6	4 (5 7)	18	89	SS-4A	-	-	-	-	-	-	-	-	-	-	A-6b (V)	
VERY STIFF, BROWN, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, MOIST						SS-4B	4.00	-	-	-	-	-	-	-	-	22	A-6b (V)	
	713.3	EOB 7																

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.25 BAG ASPHALT PATCH; AUGER CUTTINGS MIXED WITH 0.5 BAG BENTONITE CHIPS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 11/14/24 11:10 - X:\PROJECTS\232187.GPJ

PROJECT: HEN-34-00.85	DRILLING FIRM / OPERATOR: TTL / TB	DRILL RIG: DIEDRICH D70 TRACK	STATION / OFFSET: 106+08, 11' LT.	EXPLORATION ID B-007-0-23
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: CT / KKC	HAMMER: DIEDRICH AUTOMATIC	ALIGNMENT: CR 24	
PID: 118189 SFN: N/A	DRILLING METHOD: HSA	CALIBRATION DATE: 4/13/22	ELEVATION: 720.0 (NAVD88) EOB: 7.0 ft.	PAGE 1 OF 1
START: 12/11/23 END: 12/11/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90	LAT / LONG: 41.456809, -84.325155	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
ASPHALT - 10.75 INCHES	720.0																	
	719.1																	
AGGREGATE BASE - 4.75 INCHES	718.7	1				SS-1A	-	-	-	-	-	-	-	-	-	-	A-2-6 (V)	
VERY STIFF, GRAY, **SILT AND CLAY**, SOME GRAVEL, LITTLE SAND, MOIST		2	5 4 4	12	39	SS-1B	3.50	31	4	7	19	39	32	19	13	25	A-6a (6)	
	717.0	3				SS-2A	-	-	-	-	-	-	-	-	-	29	A-6a (V)	
VERY STIFF, GRAY/BROWN, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, MOIST			5 5 6	17	67	SS-2B	2.25	7	3	7	20	63	39	19	20	30	A-6b (12)	
@4': BROWN		4	3 3 4	11	100	SS-3	2.25	-	-	-	-	-	-	-	-	28	A-6b (V)	
		5																
		6	5 6 7	20	100	SS-4	2.00	-	-	-	-	-	-	-	-	29	A-6b (V)	
	713.0	EOB 7																

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.25 BAG ASPHALT PATCH; AUGER CUTTINGS MIXED WITH 0.5 BAG BENTONITE CHIPS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 11/14/24 11:11 - X:\PROJECTS\232187.GPJ

PROJECT: HEN-34-00.85	DRILLING FIRM / OPERATOR: TTL / TB	DRILL RIG: DIEDRICH D70 TRACK	STATION / OFFSET: 106+74, 29' RT.	EXPLORATION ID B-007-1-24
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: DIEDRICH AUTOMATIC	ALIGNMENT: CR 24	
PID: 118189 SFN: N/A	DRILLING METHOD: HSA	CALIBRATION DATE: 6/11/24	ELEVATION: 718.4 (NAVD88) EOB: 25.0 ft.	PAGE 1 OF 1
START: 7/15/24 END: 7/15/24	SAMPLING METHOD: SPT	ENERGY RATIO (%): 87.4	LAT / LONG: 41.456991, -84.325007	

MATERIAL DESCRIPTION AND NOTES	ELEV. 718.4	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
TOPSOIL - 8 INCHES	717.7																	
STIFF TO VERY STIFF, BROWN/GRAY, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, TRACE WIRE, DAMP FILL		1	3 4 3	10	83	SS-1	3.50	2	3	12	25	58	49	25	24	24	A-7-6 (15)	
@3.8': GRAY/BROWN, TRACE CALCITE STAINSEAM	712.4	2 3 4	3 4 5	13	100	SS-2A	>4.5	-	-	-	-	-	-	-	-	23	A-7-6 (V)	
VERY STIFF TO HARD, GRAY/BROWN, **CLAY**, LITTLE SILT, TRACE SAND, DAMP		5 6 7 8	4 5 7	17	100	SS-3	>4.5	0	3	5	19	73	56	28	28	26	A-7-6 (18)	
@8.5': GRAY		9 10	5 6 8	20	100	SS-4	>4.5	-	-	-	-	-	-	-	-	25	A-7-6 (V)	
@11': HARD	705.6	11 12	7 9 13	32	100	SS-5	>4.5	-	-	-	-	-	-	-	-	25	A-7-6 (V)	
STIFF TO VERY STIFF, GRAY, **CLAY**, LITTLE SILT, TRACE SAND, TRACE GRAVEL, MOIST		13 14 15 16 17	3 3 4	10	100	SS-6	3.00	1	3	5	18	73	47	22	25	26	A-7-6 (15)	
	699.9	18	3 4 6	15	100	SS-7	3.50	-	-	-	-	-	-	-	-	24	A-7-6 (V)	
STIFF, GRAY, **CLAY**, SOME SILT, TRACE SAND, MOIST		19 20 21 22 23	3 2 4	9	100	SS-8	1.75	0	2	3	22	73	45	22	23	30	A-7-6 (14)	
@23.5': STIFF TO VERY STIFF	693.4	EOB 24 25	4 4 6	15	100	SS-9	1.75	-	-	-	-	-	-	-	-	25	A-7-6 (V)	
			3 3 5	12	100	SS-10	2.50	-	-	-	-	-	-	-	-	32	A-7-6 (V)	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: AUGER CUTTINGS MIXED WITH 1 BAG BENTONITE CHIPS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 11/14/24 11:12 - X:\PROJECTS\232187.GPJ

PROJECT: HEN-34-00.85	DRILLING FIRM / OPERATOR: TTL / TB	DRILL RIG: DIEDRICH D70 TRACK	STATION / OFFSET: 111+00, 99' RT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: CT / KKC	HAMMER: DIEDRICH AUTOMATIC	ALIGNMENT: CR 24
PID: 118189 SFN: N/A	DRILLING METHOD: HSA	CALIBRATION DATE: 4/13/22	ELEVATION: 719.7 (NAVD88) EOB: 10.0 ft.
START: 12/22/23 END: 12/22/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90	LAT / LONG: 41.458162, -84.324766

EXPLORATION ID B-008-0-23

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
TOPSOIL - 10 INCHES	719.7																	
	718.9																	
VERY STIFF, BROWN, **SILTY CLAY**, TRACE SAND, TRACE ORGANICS, MOIST @1': LOI - 3.4%		1	2 3 5	12	89	SS-1	3.00	0	1	4	28	67	37	20	17	26	A-6b (11)	
	716.7	2																
HARD, GRAY/BROWN, **SILT AND CLAY**, TRACE SAND, MOIST		3																
		4	7 9 12	32	100	SS-2	4.50	0	2	6	24	68	32	18	14	22	A-6a (10)	
		5																
@6': BROWN		6	12 17 21	57	100	SS-3	4.50	-	-	-	-	-	-	-	-	23	A-6a (V)	
	711.2	7																
VERY STIFF, GRAY/BROWN, **SILTY CLAY**, TRACE SAND, MOIST		8																
		9	5 7 10	26	100	SS-4	4.50	0	2	3	28	67	40	20	20	26	A-6b (12)	
	709.7	EOB 10																

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: AUGER CUTTINGS MIXED WITH 0.5 BAG BENTONITE CHIPS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 11/14/24 11:13 - X:\PROJECTS\232187.GPJ

PROJECT: HEN-34-00.85	DRILLING FIRM / OPERATOR: TTL / TB	DRILL RIG: DIEDRICH D70 TRACK	STATION / OFFSET: 111+04, 68' RT.	EXPLORATION ID B-008-1-24
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: DIEDRICH AUTOMATIC	ALIGNMENT: CR 24	
PID: 118189 SFN: N/A	DRILLING METHOD: HSA	CALIBRATION DATE: 6/11/24	ELEVATION: 719.9 (NAVD88) EOB: 25.0 ft.	PAGE 1 OF 1
START: 7/12/24 END: 7/12/24	SAMPLING METHOD: SPT	ENERGY RATIO (%): 87.4	LAT / LONG: 41.458171, -84.324877	

MATERIAL DESCRIPTION AND NOTES	ELEV. 719.9	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
TOPSOIL - 3 INCHES	719.6																	
STIFF TO VERY STIFF, BROWN/GRAY, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, DAMP		1	3 3 4	10	83	SS-1	4.25	-	-	-	-	-	-	-	-	23	A-7-6 (V)	
	716.4	2																
VERY STIFF TO HARD, BROWN/GRAY, **CLAY**, SOME SILT, TRACE SAND, TRACE GRAVEL, TRACE CALCITE STAIN SEAM, MOIST		3																
		4	5 7 9	23	67	SS-2	>4.5	1	2	4	20	73	52	24	28	23	A-7-6 (18)	
@6': GRAY, SLIGHTLY ORGANIC (LOI = 1.7%)		5																
		6	5 8 12	29	83	SS-3	4.25	0	2	4	21	73	59	26	33	28	A-7-6 (20)	
@8.5': GRAY/BROWN, TRACE SAND		7																
		8	5 5 8	19	100	SS-4	>4.5	-	-	-	-	-	-	-	-	27	A-7-6 (V)	
@11': LITTLE SAND		9																
		10	6 8 9	25	100	SS-5	>4.5	1	4	12	25	58	55	27	28	27	A-7-6 (18)	
		11																
		12	5 7 9	23	100	SS-6	>4.5	-	-	-	-	-	-	-	-	24	A-7-6 (V)	
@16': BROWN/GRAY		13																
		14	6 8 10	26	100	SS-7	>4.5	-	-	-	-	-	-	-	-	21	A-7-6 (V)	
		15																
		16	4 6 9	22	100	SS-8	>4.5	1	3	11	24	61	52	26	26	25	A-7-6 (17)	
@21': VERY STIFF		17																
		18	5 9 11	29	100	SS-9	3.75	-	-	-	-	-	-	-	-	25	A-7-6 (V)	
		19																
@23.5': GRAY		20	3 5 6	16	100	SS-10	2.75	-	-	-	-	-	-	-	-	24	A-7-6 (V)	
	694.9	EOB 21																

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: AUGER CUTTINGS MIXED WITH 1 BAG BENTONITE CHIPS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 11/14/24 11:14 - X:\PROJECTS\232187.GPJ

PROJECT: HEN-34-00.85	DRILLING FIRM / OPERATOR: TTL / TB	DRILL RIG: DIEDRICH D70 TRACK	STATION / OFFSET: 114+09, 6' RT.	EXPLORATION ID B-009-0-23
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: CT / KKC	HAMMER: DIEDRICH AUTOMATIC	ALIGNMENT: CR 24	
PID: 118189 SFN: N/A	DRILLING METHOD: HSA	CALIBRATION DATE: 4/13/22	ELEVATION: 719.9 (NAVD88) EOB: 7.0 ft.	PAGE 1 OF 1
START: 12/22/23 END: 12/22/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90	LAT / LONG: 41.459008, -84.325111	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
ASPHALT - 11 INCHES	719.9																	
	719.0																	
AGGREGATE BASE - 6 INCHES	718.5	1				SS-1A	-	-	-	-	-	-	-	-	-	-	A-2-6 (V)	
VERY STIFF, GRAY, **SILTY CLAY**, TRACE SAND, TRACE ORGANICS, MOIST LOI - 4.4%		2	6 4 4	12	78	SS-1B	3.00	0	2	6	30	62	40	20	20	27	A-6b (12)	
		3	5 4 5	14	83	SS-2	2.75	0	1	2	27	70	40	19	21	32	A-6b (12)	
@4': GRAY/BROWN, LITTLE SAND, TRACE GRAVEL		4	4 5 7	18	100	SS-3	2.25	-	-	-	-	-	-	-	-	25	A-6b (V)	
@5.5': TRACE SAND		5 6	7 9 10	29	100	SS-4	3.00	-	-	-	-	-	-	-	-	25	A-6b (V)	
	712.9	EOB 7																

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.25 BAG ASPHALT PATCH; AUGER CUTTINGS MIXED WITH 0.5 BAG BENTONITE CHIPS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 11/14/24 11:14 - X:\PROJECTS\232187.GPJ

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)


A-6A: Ohio DOT: A-6a, silt and clay


A-6B: Ohio DOT: A-6b, silty clay


A-7-6: Ohio DOT: A-7-6, clay


PAVEMENT OR BASE: Ohio DOT: Pavement or Aggregate base


TOPSOIL: Ohio DOT: Sod and Topsoil

SAMPLER SYMBOLS

WELL CONSTRUCTION SYMBOLS


Bentonite: Bottom of hole


Soil Cuttings Backfill mixed with Bentonite Pellets or Chips


Asphalt or Concrete Pavement Patch

Notes:

1. Exploratory roadway borings were drilled on December 11 and December 22, 2023.
2. Exploratory light pole foundation borings were drilled on July 12 and 15, 2024.
3. Exploratory borings were drilled using 2¼-inch diameter hollow-stem augers.
4. These logs are subject to the limitations, conclusions, and recommendations in the report and should not be interpreted separate from the report.
5. The borings were located in the field by CT in accordance with the Proposed Boring Location Plan, attached to the proposals.
6. Ground surface elevation, stationing and offsets for all borings were provided by ODOT District 2 based on handheld GPS coordinates obtained by CT Consultants.

APPENDIX A

ENGINEERING CALCULATIONS

CT No.:	**232187**							
Project:	**HEN-34-00.85 Roundabout**							
PID:	**118189**							
Subject:	**Light Pole Foundation Average Shear Strength Evaluations**							
	Special Foundation Requirement Evaluation for							
	6 ft deep drilled shaft for support height of less than 40 feet (HL-20.11)							
							Recommended	
Top Depth	**Bottom Depth**	**Thickness**	**N60**	**Su=N60*125**	**HP**	**Su=HP*1000**	**Su**	
(ft)	**(ft)**	**(ft)**	**(bpf)**	**(psf)**	**(tsf)**	**(psf)**	**(psf)**	**Notes**
Boring No.:	**B-002-1-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	6	3	22	2750	4.5	4500	3000	
		For 6 ft deep drilled shaft, Weighted Average Su (psf):					**1625**	**<2000 psf, Special Foundation Required**
Boring No.:	**B-002-2-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	3.5	0.5	12	1500	4.5	4500	2000	
3.5	6	2.5	13	1625	4.25	4250	2000	
		For 6 ft deep drilled shaft, Weighted Average Su (psf):					**1125**	**<2000 psf, Special Foundation Required**
Boring No.:	**B-003-0-23**							
0	3	3	-	-	-	-	250	Required per GDM
3	6	3	9	1125	2.5	2500	1500	
		For 6 ft deep drilled shaft, Weighted Average Su (psf):					**875**	**<2000 psf, Special Foundation Required**
Boring No.:	**B-004-0-23**							
0	3	3	-	-	-	-	250	Required per GDM
3	6	3	11	1375	4.5	4500	1500	
		For 6 ft deep drilled shaft, Weighted Average Su (psf):					**875**	**<2000 psf, Special Foundation Required**
Boring No.:	**B-004-1-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	3.5	0.5	7	875	4.5	4500	1000	
3.5	6	2.5	16	2000	4.5	4500	2500	
		For 6 ft deep drilled shaft, Weighted Average Su (psf):					**1250**	**<2000 psf, Special Foundation Required**
Boring No.:	**B-004-2-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	3.5	0.5	10	1250	2.25	2250	1500	
3.5	6	2.5	7	875	2.25	2250	1000	
		For 6 ft deep drilled shaft, Weighted Average Su (psf):					**667**	**<2000 psf, Special Foundation Required**
						Say Su (psf)=	**665**	
Boring No.:	**B-005-1-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	3.5	0.5	7	875	2.5	2500	1000	
3.5	6	2.5	10	1250	4.5	4500	1500	
		For 6 ft deep drilled shaft, Weighted Average Su (psf):					**833**	**<2000 psf, Special Foundation Required**
						Say Su (psf)=	**830**	
Boring No.:	**B-007-1-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	3.8	0.8	10	1250	3.5	3500	1500	
3.8	6	2.2	13	1625	4.5	4500	2000	
		For 6 ft deep drilled shaft, Weighted Average Su (psf):					**1058**	**<2000 psf, Special Foundation Required**
						Say Su (psf)=	**1055**	
Boring No.:	**B-008-1-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	3.5	0.5	10	1250	4.25	4250	1500	
3.5	6	2.5	23	2875	4.5	4500	3000	
		For 6 ft deep drilled shaft, Weighted Average Su (psf):					**1500**	**<2000 psf, Special Foundation Required**

CT No.:	**232187**							
Project:	**HEN-34-00.85 Roundabout**							
PID:	**118189**							
Subject:	**Light Pole Foundation Average Shear Strength Evaluations**							
	Special Foundation Requirement Evaluation for							
	approximately 10 ft deep drilled shaft for potential special foundation							
							Recommended	
Top Depth	**Bottom Depth**	**Thickness**	**N60**	**Su=N60*125**	**HP**	**Su=HP*1000**	**Su**	
(ft)	**(ft)**	**(ft)**	**(bpf)**	**(psf)**	**(tsf)**	**(psf)**	**(psf)**	**Notes**
Boring No.:	**B-002-1-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	6	3	22	2750	4.5	4500	3000	
6	8.5	2.5	31	3875	4.5	4500	4000	
8.5	10	1.5	19	2375	4.5	4500	2500	
		For 10 ft deep drilled shaft, Weighted Average Su (psf):					**2350**	
Boring No.:	**B-002-2-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	3.5	0.5	12	1500	4.5	4500	2000	
3.5	6	2.5	13	1625	4.25	4250	2000	
6	9.5	3.5	16	2000	3.75	3750	2500	
9.5	10	0.5	23	2875	4.25	4250	3000	
		For 10 ft deep drilled shaft, Weighted Average Su (psf):					**1700**	
Boring No.:	**B-003-0-23**							
0	3	3	-	-	-	-	250	Required per GDM
3	6	3	9	1125	2.5	2500	1500	
6	8	2	21	2625	4.5	4500	3000	
8	10	2	26	3250	4.5	4500	3500	
		For 10 ft deep drilled shaft, Weighted Average Su (psf):					**1825**	
Boring No.:	**B-004-0-23**							
0	3	3	-	-	-	-	250	Required per GDM
3	6	3	11	1375	4.5	4500	1500	
6	8.5	2.5	24	3000	2.0	2000	2500	
8.5	10	1.5	19	2375	4.5	4500	2500	
		For 10 ft deep drilled shaft, Weighted Average Su (psf):					**1525**	
Boring No.:	**B-004-1-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	3.5	0.5	7	875	4.5	4500	1000	
3.5	6	2.5	16	2000	4.5	4500	2500	
6	8.5	2.5	34	4250	4.5	4500	4500	
8.5	10	1.5	29	3625	4.5	4500	4000	
		For 10 ft deep drilled shaft, Weighted Average Su (psf):					**2475**	
Boring No.:	**B-004-2-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	3.5	0.5	10	1250	2.25	2250	1500	
3.5	6	2.5	7	875	2.25	2250	1000	
6	8	2	12	1500	3.75	3750	2000	
8	10	2	26	3250	4.5	4500	3500	
		For 10 ft deep drilled shaft, Weighted Average Su (psf):					**1500**	

CT No.:	**232187**							
Project:	**HEN-34-00.85 Roundabout**							
PID:	**118189**							
Subject:	**Light Pole Foundation Average Shear Strength Evaluations**							
	Special Foundation Requirement Evaluation for							
	approximately 10 ft deep drilled shaft for potential special foundation							
							Recommended	
Top Depth	**Bottom Depth**	**Thickness**	**N60**	**Su=N60*125**	**HP**	**Su=HP*1000**	**Su**	
(ft)	**(ft)**	**(ft)**	**(bpf)**	**(psf)**	**(tsf)**	**(psf)**	**(psf)**	**Notes**
Boring No.:	**B-005-1-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	3.5	0.5	7	875	2.5	2500	1000	
3.5	6	2.5	10	1250	4.5	4500	1500	
6	8.5	2.5	16	2000	4.5	4500	2500	
8.5	10	1.5	16	2000	4.5	4500	2500	
		For 10 ft deep drilled shaft, Weighted Average Su (psf):					**1500**	
Boring No.:	**B-007-1-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	3.8	0.8	10	1250	3.5	3500	1500	
3.8	6	2.2	13	1625	4.5	4500	2000	
6	8.5	2.5	17	2125	4.5	4500	2500	
8.5	10	1.5	20	2500	4.5	4500	3000	
		For 10 ft deep drilled shaft, Weighted Average Su (psf):					**1710**	
Boring No.:	**B-008-1-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	3.5	0.5	10	1250	4.25	4250	1500	
3.5	6	2.5	23	2875	4.5	4500	3000	
6	8.5	2.5	29	3625	4.25	4250	4000	
8.5	10	1.5	19	2375	4.5	4500	2500	
		For 10 ft deep drilled shaft, Weighted Average Su (psf):					**2275**	

CT No.:	**232187**							
Project:	**HEN-34-00.85 Roundabout**							
PID:	**118189**							
Subject:	**Light Pole Foundation Average Shear Strength Evaluations**							
	Special Foundation Requirement Evaluation for							
	approximately 15 ft deep drilled shaft for potential special foundation							
							Recommended	
Top Depth	**Bottom Depth**	**Thickness**	**N60**	**Su=N60*125**	**HP**	**Su=HP*1000**	**Su**	
(ft)	**(ft)**	**(ft)**	**(bpf)**	**(psf)**	**(tsf)**	**(psf)**	**(psf)**	**Notes**
Boring No.:	**B-002-1-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	6	3	22	2750	4.5	4500	3000	
6	8.5	2.5	31	3875	4.5	4500	4000	
8.5	11	2.5	19	2375	4.5	4500	2500	
11	13	2	26	3250	4.5	4500	3500	
13	15	2	15	1875	3.25	3250	2000	
		For 15 ft deep drilled shaft, Weighted Average Su (psf):					**2467**	
						Say Su (psf)=	**2465**	
Boring No.:	**B-002-2-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	3.5	0.5	12	1500	4.5	4500	2000	
3.5	6	2.5	13	1625	4.25	4250	2000	
6	9.5	3.5	16	2000	3.75	3750	2500	
9.5	13.8	4.3	23	2875	4.25	4250	3000	
13.8	15	1.2	15	1875	3.0	3000	2000	
		For 15 ft deep drilled shaft, Weighted Average Su (psf):					**2053**	
						Say Su (psf)=	**2050**	
Boring No.:	**B-003-0-23 to 10 feet, then B-007-1-24 for deeper information**							
0	3	3	-	-	-	-	250	Required per GDM
3	6	3	9	1125	2.5	2500	1500	
6	8	2	21	2625	4.5	4500	3000	
8	10	2	26	3250	4.5	4500	3500	
10	11	1	20	2500	4.5	4500	3000	
11	12.8	1.8	32	4000	4.5	4500	4000	
12.8	15	2.2	10	1250	3	3000	1500	
		For 15 ft deep drilled shaft, Weighted Average Su (psf):					**2117**	
						Say Su (psf)=	**2115**	
Boring No.:	**B-004-0-23 to 10 feet, then B-004-1-24 for deeper information**							
0	3	3	-	-	-	-	250	Required per GDM
3	6	3	11	1375	4.5	4500	1500	
6	8.5	2.5	24	3000	2.0	2000	2500	
8.5	10	1.5	19	2375	4.5	4500	2500	
10	11	1	29	3625	4.5	4500	4000	
11	13.8	2.8	41	5125	4.5	4500	5000	
13.8	15	1.2	16	2000	3.25	3250	2500	
		For 15 ft deep drilled shaft, Weighted Average Su (psf):					**2417**	
						Say Su (psf)=	**2415**	
Boring No.:	**B-004-1-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	3.5	0.5	7	875	4.5	4500	1000	
3.5	6	2.5	16	2000	4.5	4500	2500	
6	8.5	2.5	34	4250	4.5	4500	4500	
8.5	11	2.5	29	3625	4.5	4500	4000	
11	13.8	2.8	41	5125	4.5	4500	5500	
13.8	15	1.2	16	2000	3.25	3250	2500	
		For 15 ft deep drilled shaft, Weighted Average Su (psf):					**3143**	
						Say Su (psf)=	**3140**	

CT No.:	**232187**							
Project:	**HEN-34-00.85 Roundabout**							
PID:	**118189**							
Subject:	**Light Pole Foundation Average Shear Strength Evaluations**							
	Special Foundation Requirement Evaluation for							
	approximately 15 ft deep drilled shaft for potential special foundation							
							Recommended	
Top Depth	**Bottom Depth**	**Thickness**	**N60**	**Su=N60*125**	**HP**	**Su=HP*1000**	**Su**	
(ft)	**(ft)**	**(ft)**	**(bpf)**	**(psf)**	**(tsf)**	**(psf)**	**(psf)**	**Notes**
Boring No.:	**B-004-2-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	3.5	0.5	10	1250	2.25	2250	1500	
3.5	6	2.5	7	875	2.25	2250	1000	
6	8	2	12	1500	3.75	3750	2000	
8	13.5	5.5	31	3875	4.5	4500	4000	
13.5	15	1.5	15	1875	3.75	3750	2000	
		For 15 ft deep drilled shaft, Weighted Average Su (psf):					**2200**	
Boring No.:	**B-005-1-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	3.5	0.5	7	875	2.5	2500	1000	
3.5	6	2.5	10	1250	4.5	4500	1500	
6	8.5	2.5	16	2000	4.5	4500	2500	
8.5	11	2.5	16	2000	4.5	4500	2500	
11	14.2	3.2	25	3125	4.5	4500	3500	
14.2	15	0.8	16	2000	3.75	3750	2500	
		For 15 ft deep drilled shaft, Weighted Average Su (psf):					**2047**	
						Say Su (psf)=	**2045**	
Boring No.:	**B-007-1-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	3.8	0.8	10	1250	3.5	3500	1500	
3.8	6	2.2	13	1625	4.5	4500	2000	
6	8.5	2.5	17	2125	4.5	4500	2500	
8.5	11	2.5	20	2500	4.5	4500	3000	
11	12.8	1.8	32	4000	4.5	4500	4000	
12.8	15	2.2	10	1250	3	3000	1500	
		For 15 ft deep drilled shaft, Weighted Average Su (psf):					**2040**	
Boring No.:	**B-008-1-24**							
0	3	3	-	-	-	-	250	Required per GDM
3	3.5	0.5	10	1250	4.25	4250	1500	
3.5	6	2.5	23	2875	4.5	4500	3000	
6	8.5	2.5	29	3625	4.25	4250	4000	
8.5	11	2.5	19	2375	4.5	4500	2500	
11	15	4	23	2875	4.5	4500	3000	
		For 15 ft deep drilled shaft, Weighted Average Su (psf):					**2483**	
						Say Su (psf)=	**2480**	

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Design Manual Section 600

Instructions: Enter data in the shaded cells only.
(Enter state route number, project description,county, consultant's name, prepared by name, and date prepared. This information will be transferred to all other sheets. The date prepared must be entered in the appropriate cell on this sheet to remove these instructions prior to printing.)

HEN-34-0.85
PID 118189

PROPOSED ROUNDABOUT AT THE INTERSECTION OF SR 34 AND CR 24, RIDGEVILLE TOWNSHIP, HENRY COUNTY, OHIO

CT CONSULTANTS, INC

Prepared By: CHRISTOPHER IOTT, P.E.
Date prepared: Sunday, February 18, 2024

CT CONSULTANTS, INC.
1915 NORTH 12TH STREET
TOLEDO
OHIO 43606
(419) 214-5020
CIOTT@CTCONSULTANTS.COM

NO. OF BORINGS: 9

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.6 2/11/2022

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-001-0-23	SR34	42+65	9	RT	Diedrich D70 Track	90	720.1	718.7	1.4 C
2	B-002-0-23	SR34	45+93	9	LT	Diedrich D70 Track	90	720.6	719.6	1.0 C
3	B-003-0-23	SR34	49+89	40	RT	Diedrich D70 Track	90	718.5	718.3	0.2 C
4	B-004-0-23	SR34	49+69	57	LT	Diedrich D70 Track	90	718.9	720.2	1.3 F
5	B-005-0-23	SR34	52+23	25	LT	Diedrich D70 Track	90	717.9	718.0	0.1 F
6	B-006-0-23	SR34	56+14	9	LT	Diedrich D70 Track	90	720.3	718.9	1.4 C
7	B-007-0-23	CR24	106+08	11	LT	Diedrich D70 Track	90	720.0	718.6	1.4 C
8	B-008-0-23	CR24	111+00	99	RT	Diedrich D70 Track	90	719.7	719.1	0.6 C
9	B-009-0-23	CR24	114+09	6	RT	Diedrich D70 Track	90	719.9	718.5	1.4 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.6 2/11/2022

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B	SS-1B	1.6	2.7	0.2	1.3	17		2.25	34	17	17	21	37	58	22	16	A-6b	7	250		Mc			None
	001-0	SS-2	2.7	4.2	1.3	2.8	33		3.25							26	16	A-6b	16			Mc			
	23	SS-3	4.2	5.7	2.8	4.3	23		4.5	31	18	13	24	68	92	23	14	A-6a	9						
		SS-4	5.7	7.2	4.3	5.8	48	17	4.5							26	14	A-6a	10						
2	B	SS-1B	1.3	2.5	0.3	1.5	11		2	32	16	16	26	32	58	17	16	A-6b	7	240		N_{60}		12''	12''
	002-0	SS-2	2.5	4.0	1.5	3.0	32		4.5	33	19	14	27	68	95	23	14	A-6a	10			Mc			204 Geotextile
	23	SS-3A	4.0	5.3	3.0	4.3	32		4.5							23	14	A-6a	10						
		SS-4	5.3	7.0	4.3	6.0	51	11	4.5							24	14	A-6a	10						
3	B	SS-1	1.0	3.5	0.8	3.3	8		2.25	35	19	16	24	45	69	23	16	A-6b	9	240		N_{60} & Mc		12''	12''
	003-0	SS-2	3.5	6.0	3.3	5.8	9		2.5	39	20	19	27	50	77	29	16	A-6b	12						204 Geotextile
	23	SS-3	6.0	8.0	5.8	7.8	21		4.5							24	16	A-6b							
		SS-4	8.0	10.0	7.8	9.8	26	8	4.5							27	16	A-6b							
4	B	SS-1A	1.0	2.3	2.3	3.6	17		3.5	31	17	14	23	53	76	20	14	A-6a	10						None
	004-0	SS-2	2.3	7.0	3.6	8.3	11		4.5	33	19	14	23	64	87	22	14	A-6a	10	250					
	23	SS-3B	7.0	8.5	8.3	9.8	24		2							26	16	A-6b							
		SS-4	8.5	10.0	9.8	11.3	35	11	4.5							24	16	A-6b							
5	B	SS-1	1.0	3.0	1.1	3.1	8		1	38	20	18	23	52	75	26	16	A-6b	11	250		HP & Mc			None
	005-0	SS-2	3.0	6.0	3.1	6.1	11		2.25							24	16	A-6b	16						
	23	SS-3	6.0	8.0	6.1	8.1	20		4.5	39	20	19	21	48	69	25	16	A-6b							
		SS-4	8.0	10.0	8.1	10.1	24	8	4.5							23	16	A-6b							
6	B	SS-1A	1.0	1.8	-0.4	0.4	66									12	10	A-2-6	4						12''
	006-0	SS-1B/2	1.8	4.8	0.4	3.4	24		1.75	40	20	20	23	68	91	30	16	A-6b	12	240		HP & Mc		12''	204 Geotextile
	23	SS-3B	4.8	6.0	3.4	4.6	11		2.25	39	21	18	22	68	90	28	16	A-6b	11						
		SS-4B	6.0	7.0	4.6	5.6	18	11	4							22	16	A-6b	16						
7	B	SS-1B/2A	1.3	3.0	-0.1	1.6	12		3.5	32	19	13	19	39	58	25	14	A-6a	6	240		N_{60} & Mc		12''	12''
	007-0	SS-2B	3.0	4.0	1.6	2.6	17		2.25	39	19	20	20	63	83	30	16	A-6b	12			Mc			204 Geotextile
	23	SS-3	4.0	5.5	2.6	4.1	11		2.25							28	16	A-6b	16						
		SS-4	5.5	7.0	4.1	5.6	20	11	2							29	16	A-6b	16						
8	B	SS-1	0.8	3.0	0.2	2.4	12		3	37	20	17	28	67	95	26	16	A-6b	11	240		N_{60} & Mc		12''	12''
	008-0	SS-2	3.0	6.0	2.4	5.4	32		4.5	32	18	14	24	68	92	22	14	A-6a	10						204 Geotextile
	23	SS-3	6.0	8.5	5.4	7.9	57		4.5							23	14	A-6a							
		SS-4	8.5	10.0	7.9	9.4	26	12	4.5	40	20	20	28	67	95	26	16	A-6b							
9	B	SS-1B	1.4	3.0	0.0	1.6	12		3	40	20	20	30	62	92	27	16	A-6b	12	240		N_{60} & Mc		12''	12''
	009-0	SS-2B	3.0	4.0	1.6	2.6	14		2.75	40	19	21	27	70	97	32	16	A-6b	12			N_{60} & Mc			204 Geotextile
	23	SS-3	4.0	5.5	2.6	4.1	18		2.25							25	16	A-6b	16						
		SS-4	5.5	7.0	4.1	5.6	29	12	3							25	16	A-6b	16						

PID: PID 118189

County-Route-Section: HEN-34-0.85
No. of Borings: 9

Geotechnical Consultant: CT CONSULTANTS, INC
Prepared By: CHRISTOPHER IOTT, P.E.
Date prepared: 2/18/2024

Chemical Stabilization Options		
320	Rubblize & Roll	No
206	Cement Stabilization	Option
	Lime Stabilization	Option
206	Depth	12''

Excavate and Replace Stabilization Options	
Global Geotextile Override(N60L):	18''
Override(HP):	24''
Global Geogrid Override(N60L):	12''
Override(HP):	18''

Design CBR	6

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	0%	HP ≤ 0.5	0%
$N_{60} < 12$	27%	0.5 < HP ≤ 1	3%
$12 \leq N_{60} < 15$	13%	1 < HP ≤ 2	10%
$N_{60} \geq 20$	43%	HP > 2	83%
M+	37%		
Rock	0%		
Unsuitable	0%		

Excavate and Replace at Surface	
Average	10''
Maximum	12''
Minimum	0''

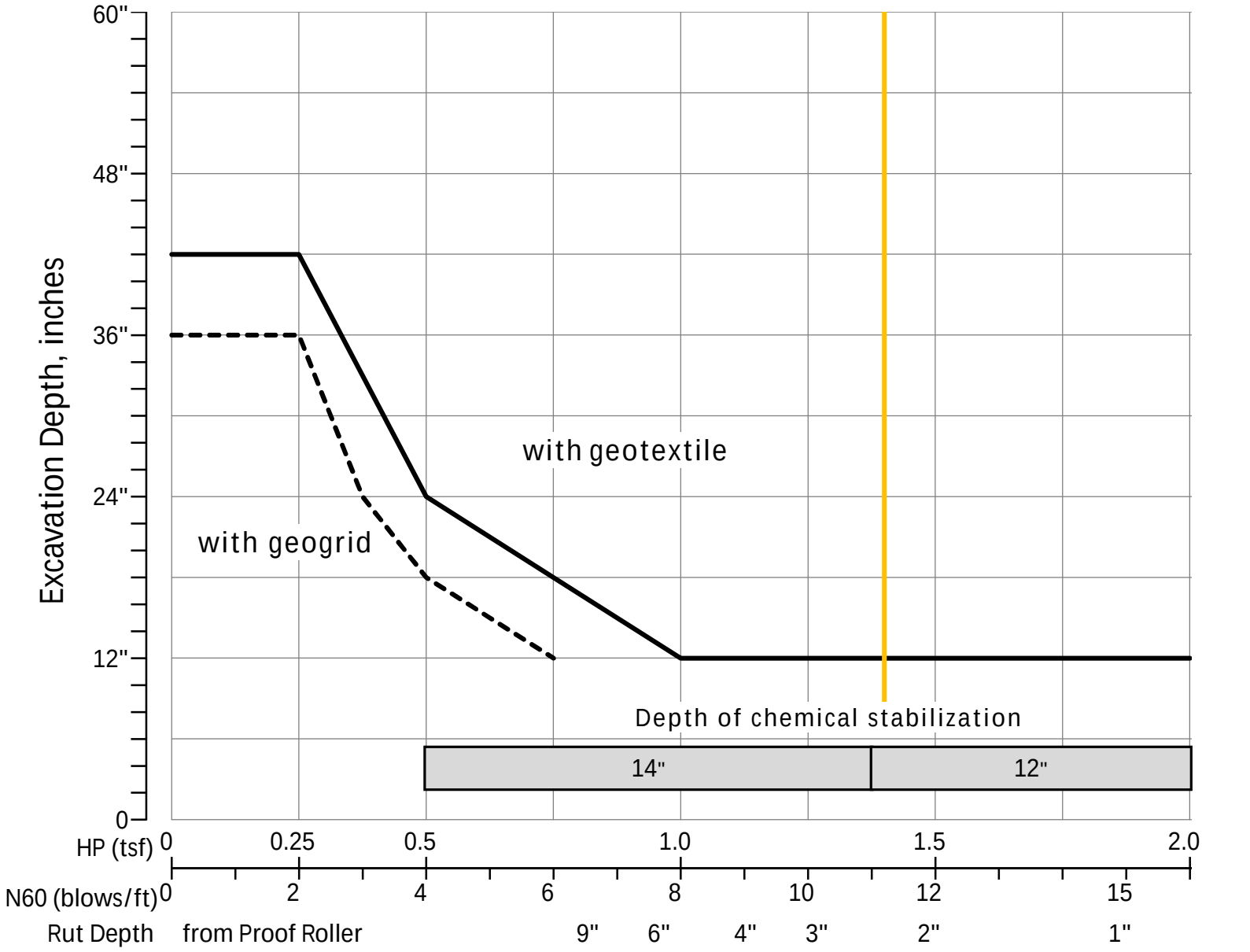
% Proposed Subgrade Surface	
Unstable & Unsuitable	71%
Unstable	71%
Unsuitable	0%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	23	11	3.31	36	19	17	24	57	82	25	15	11
Maximum	66	17	4.50	40	21	21	30	70	97	32	16	16
Minimum	8	8	1.00	31	16	13	19	32	58	12	10	4

Classification Counts by Sample

ODOT Class	Rock	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-3	A-3a	A-4a	A-4b	A-5	A-6a	A-6b	A-7-5	A-7-6	A-8a	A-8b	Totals
Count	0	0	0	0	0	1	0	0	0	0	0	0	10	25	0	0	0	0	36
Percent	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	28%	69%	0%	0%	0%	0%	100%
% Rock|Granular|Cohesive	0%	3%									97%								100%
Surface Class Count	0	0	0	0	0	1	0	0	0	0	0	0	4	12	0	0	0	0	17
Surface Class Percent	0%	0%	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	24%	71%	0%	0%	0%	0%	100%

Fig. 600-1 – Subgrade Stabilization

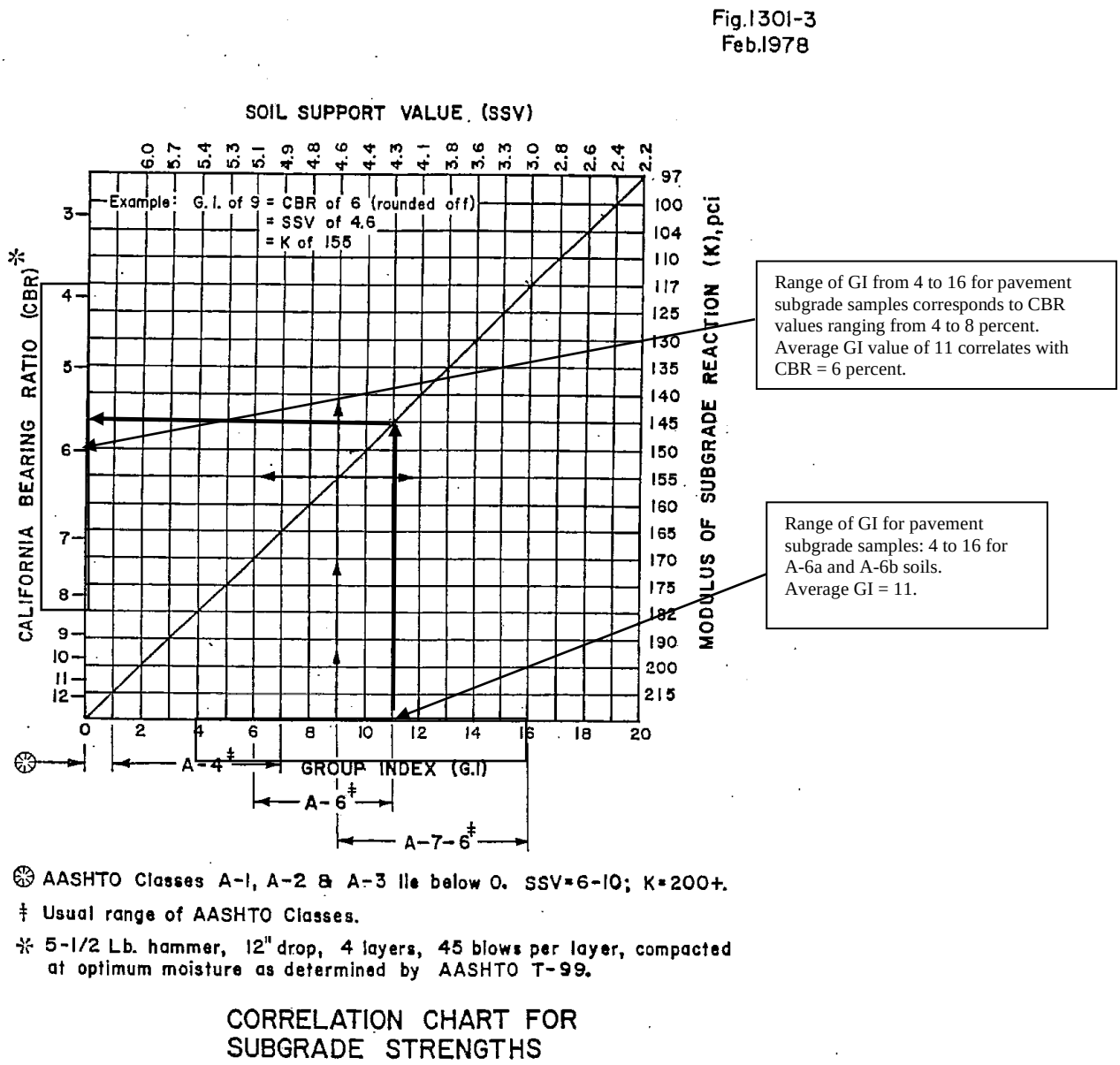


OVERRIDE TABLE

Calculated Average	New Values	Check to Override
3.31		☐ HP
11.22		☐ N60L

Average HP
Average N_{60L}

HEN-34-0.85, PID 118189 Proposed Roundabout
Ridgeville Township, Henry County, Ohio



CORRELATION CHART FOR
SUBGRADE STRENGTHS

Based on the ODOT "Subgrade Analysis" worksheet, a design CBR value of 6 percent was determined for the project. It should be noted that the CBR determination by the spreadsheet is based on an **average** Group Index of all the evaluated samples. Group indices for the tested samples ranged from 4 to 16, which would correlate with a CBR value of 4 to 8 percent. The A-6a and A-6b samples tested for complete classification were found to have GI ranging from 6 to 12, with an average GI value of 10, which would also correlate with a CBR value of 6 percent. Based on the average design value calculations from the ODOT "Subgrade Analysis" worksheet, it does not appear to be unconservative to use the associated design CBR value of 6 percent.

APPENDIX B

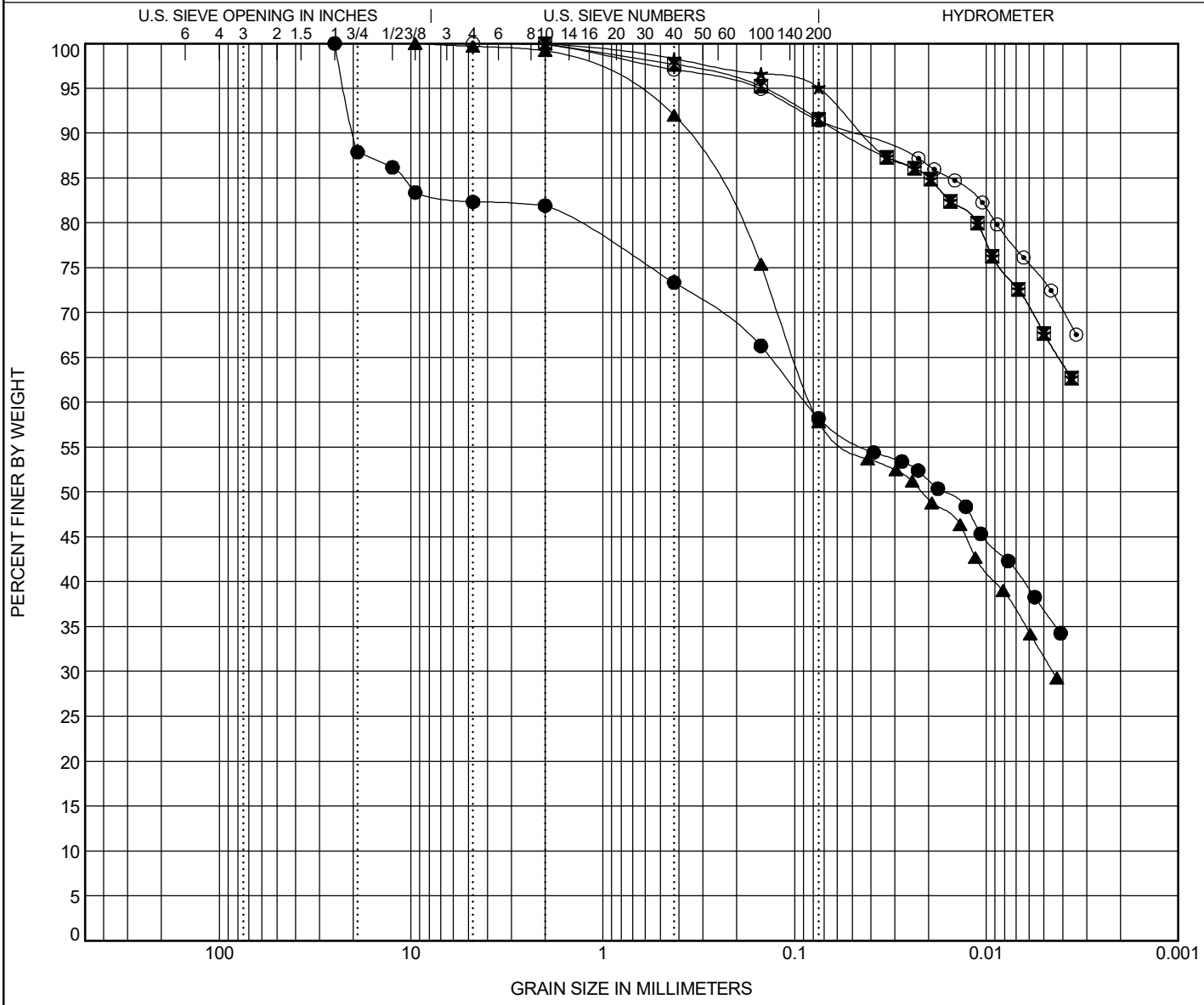
SOIL LABORATORY TEST DATA

GRAIN SIZE DISTRIBUTION

OHIO DEPARTMENT OF TRANSPORTION
OFFICE OF GEOTECHNICAL ENGINEERING

PROJECT HEN-34-00.85 **PID** 118189

OGE NUMBER N/A **PROJECT TYPE** ROADWAY



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Specimen Identification			ODOT (Modified AASHTO) ~ USCS Classification	LL	PL	PI
●	B-001-0-23	1.6	**A-6b ~ SANDY LEAN CLAY with GRAVEL(CL)**	34	17	17
⊠	B-001-0-23	4.2	**A-6a ~ LEAN CLAY(CL)**	31	18	13
▲	B-002-0-23	1.3	**A-6b ~ SANDY LEAN CLAY(CL)**	32	16	16
★	B-002-0-23	2.5	**A-6a ~ LEAN CLAY(CL)**	33	19	14
⊙	B-002-1-24	3.5	**A-7-6 ~ LEAN CLAY(CL)**	47	24	23

Specimen Identification			D90	D50	D30	D10	%G	%CS	%FS	%M	%C	Cc	Cu
●	B-001-0-23	1.6	**19.933**	**0.017**			**18**	**9**	**15**	**21**	**37**		
⊠	B-001-0-23	4.2	**0.056**				**0**	**2**	**6**	**24**	**68**		
▲	B-002-0-23	1.3	**0.375**	**0.022**	**0.005**		**1**	**7**	**34**	**26**	**32**		
★	B-002-0-23	2.5	**0.044**				**0**	**2**	**3**	**27**	**68**		
⊙	B-002-1-24	3.5	**0.05**				**0**	**3**	**6**	**18**	**73**		

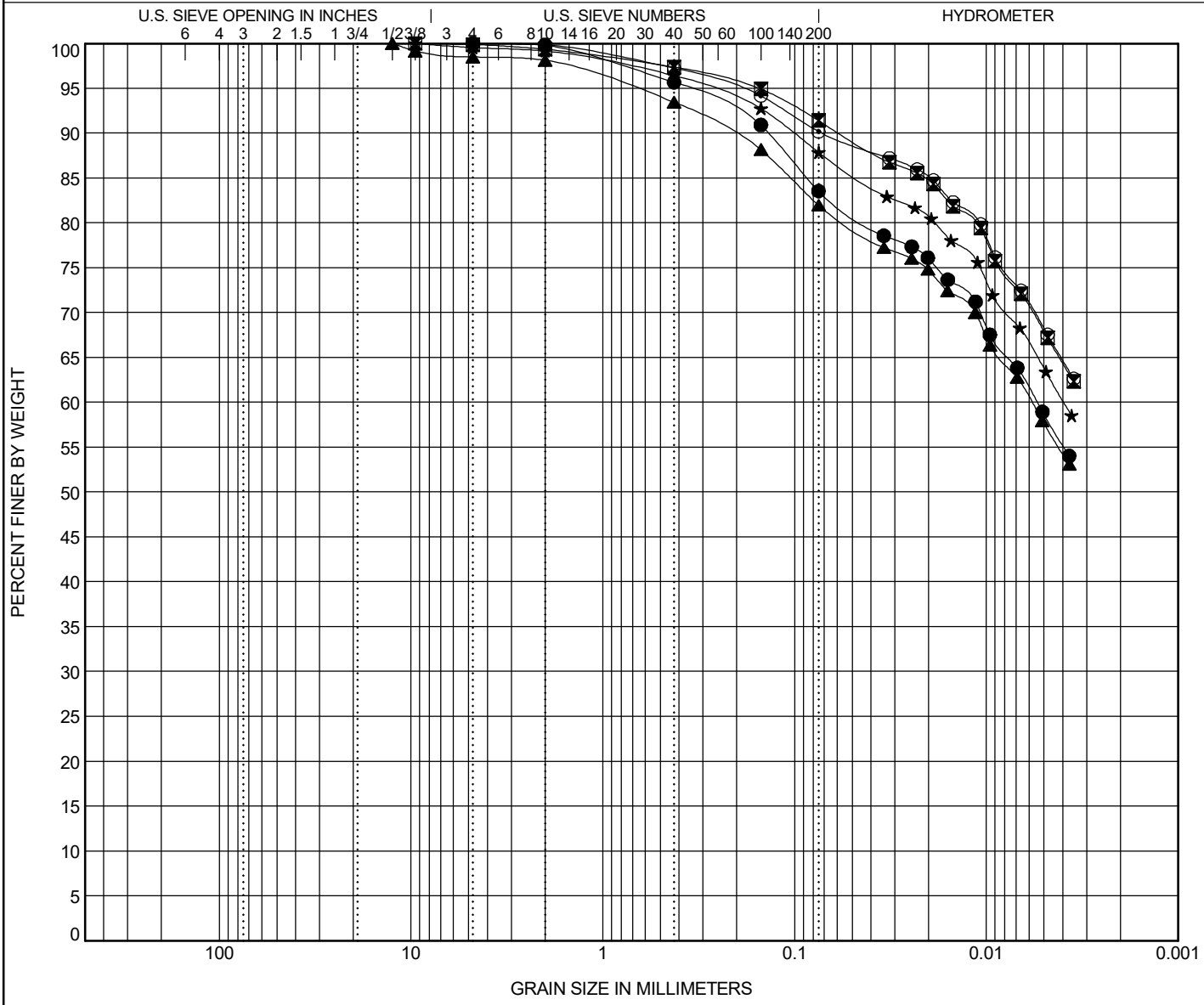
GRAIN SIZE - OH DOT.GDT - 11/18/24 07:53 - X:\PROJECTS\232187.GPJ

GRAIN SIZE DISTRIBUTION

OHIO DEPARTMENT OF TRANSPORTION
OFFICE OF GEOTECHNICAL ENGINEERING

PROJECT HEN-34-00.85 **PID** 118189

OGE NUMBER N/A **PROJECT TYPE** ROADWAY



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

	Specimen Identification		ODOT (Modified AASHTO) ~ USCS Classification	LL	PL	PI
●	B-002-1-24	11.0	A-7-6 ~ LEAN CLAY with SAND(CL)	49	26	23
⊠	B-002-1-24	18.5	A-7-6 ~ LEAN CLAY(CL)	43	22	21
▲	B-002-1-24	21.0	A-7-6 ~ LEAN CLAY with SAND(CL)	42	22	20
★	B-002-2-24	6.0	A-7-6 ~ FAT CLAY(CH)	53	26	27
⊙	B-002-2-24	8.5	A-7-6 ~ LEAN CLAY(CL)	49	24	25

	Specimen Identification		D90	D50	D30	D10	%G	%CS	%FS	%M	%C	Cc	Cu
●	B-002-1-24	11.0	0.138				0	4	12	25	59		
⊠	B-002-1-24	18.5	0.058				1	2	6	23	68		
▲	B-002-1-24	21.0	0.215				2	5	11	24	58		
★	B-002-2-24	6.0	0.102				0	3	9	24	64		
⊙	B-002-2-24	8.5	0.071				0	3	7	22	68		

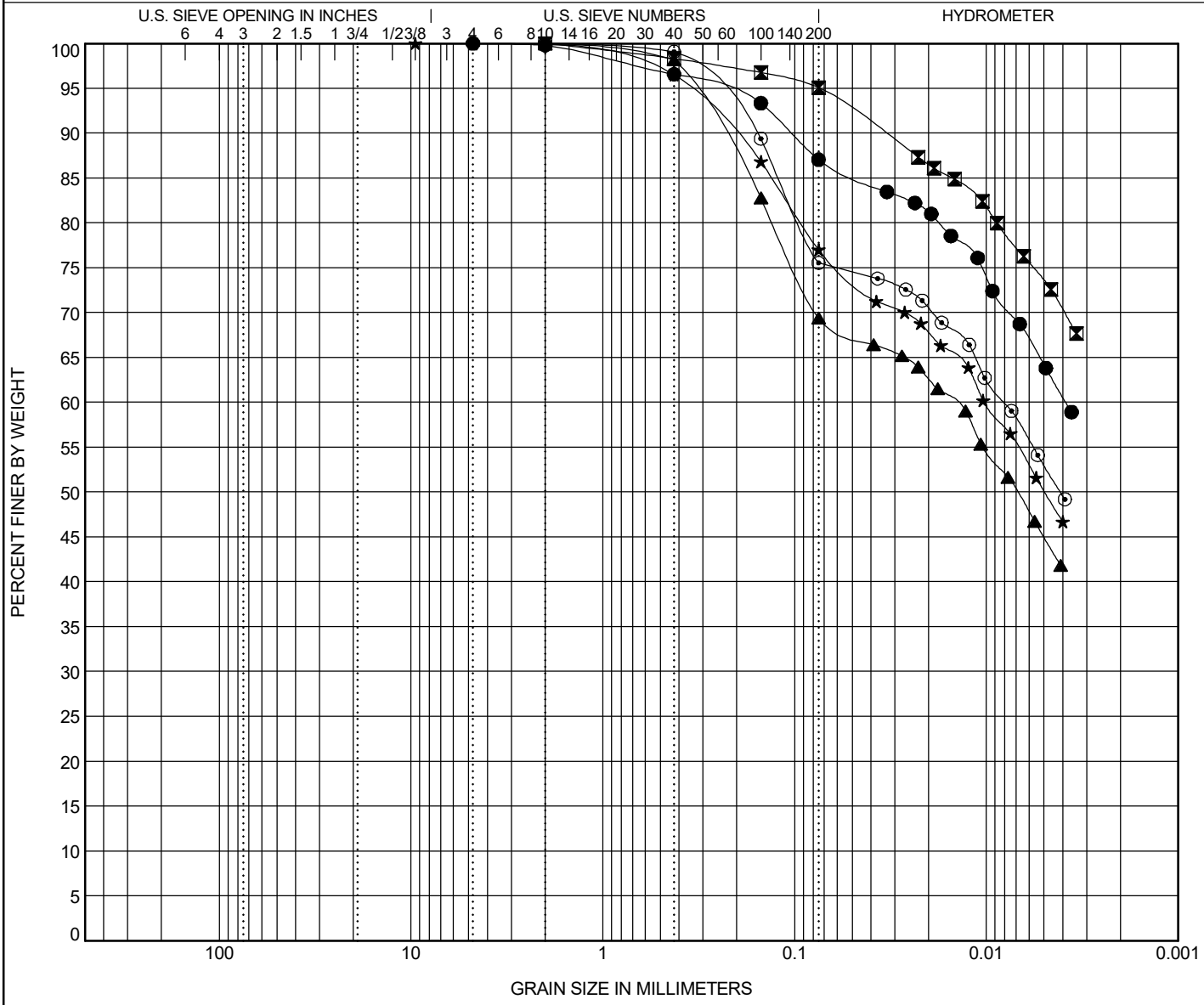
GRAIN SIZE - OH DOT.GDT - 11/18/24 07:55 - X:\PROJECTS\232187.GPJ

GRAIN SIZE DISTRIBUTION

OHIO DEPARTMENT OF TRANSPORTION
OFFICE OF GEOTECHNICAL ENGINEERING

PROJECT HEN-34-00.85 **PID** 118189

OGE NUMBER N/A **PROJECT TYPE** ROADWAY



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Specimen Identification			ODOT (Modified AASHTO) ~ USCS Classification	LL	PL	PI
●	B-002-2-24	18.5	A-7-6 ~ LEAN CLAY(CL)	48	25	23
⊠	B-002-2-24	23.5	A-7-6 ~ LEAN CLAY(CL)	48	26	22
▲	B-003-0-23	1.0	A-6b ~ SANDY LEAN CLAY(CL)	35	19	16
★	B-003-0-23	3.5	A-6b ~ LEAN CLAY with SAND(CL)	39	20	19
⊙	B-004-0-23	1.0	A-6a ~ LEAN CLAY with SAND(CL)	31	17	14

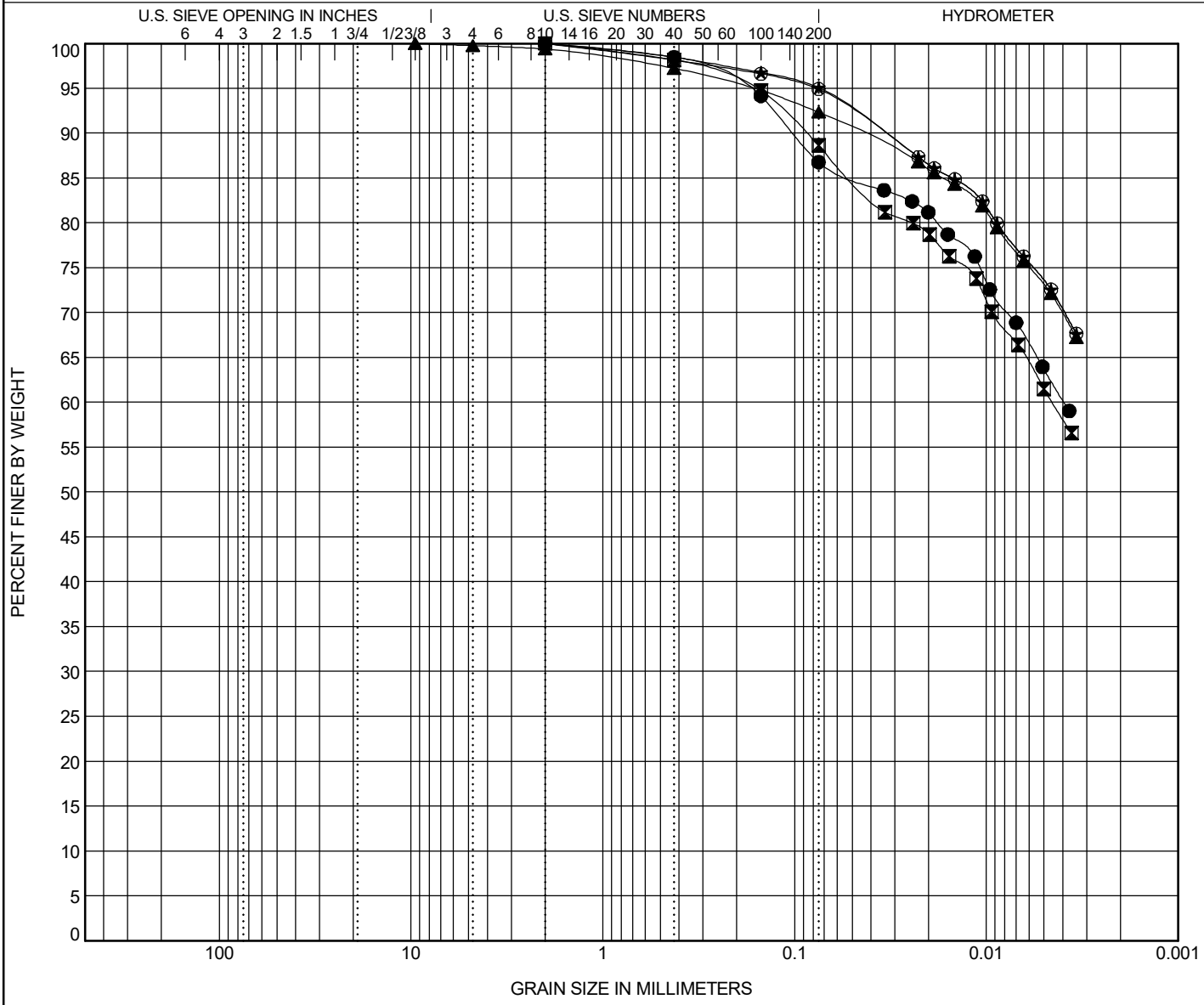
Specimen Identification			D90	D50	D30	D10	%G	%CS	%FS	%M	%C	Cc	Cu
●	B-002-2-24	18.5	0.104				0	3	10	23	64		
⊠	B-002-2-24	23.5	0.034				0	2	3	22	73		
▲	B-003-0-23	1.0	0.245	0.007			0	2	29	24	45		
★	B-003-0-23	3.5	0.211	0.005			0	3	20	27	50		
⊙	B-004-0-23	1.0	0.16	0.004			0	0	24	23	53		

GRAIN SIZE DISTRIBUTION

OHIO DEPARTMENT OF TRANSPORTION
OFFICE OF GEOTECHNICAL ENGINEERING

PROJECT HEN-34-00.85 **PID** 118189

OGE NUMBER N/A **PROJECT TYPE** ROADWAY



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Specimen Identification			ODOT (Modified AASHTO) ~ USCS Classification	LL	PL	PI
●	B-004-0-23	3.5	A-6a ~ LEAN CLAY(CL)	33	19	14
⊠	B-004-1-24	1.0	A-7-6 ~ LEAN CLAY(CL)	48	23	25
▲	B-004-1-24	11.0	A-7-6 ~ LEAN CLAY(CL)	45	24	21
★	B-004-1-24	18.5	A-6b ~ LEAN CLAY(CL)	39	23	16
⊙	B-004-1-24	23.5	A-7-6 ~ FAT CLAY(CH)	51	28	23

Specimen Identification			D90	D50	D30	D10	%G	%CS	%FS	%M	%C	Cc	Cu
●	B-004-0-23	3.5	0.102				0	1	12	23	64		
⊠	B-004-1-24	1.0	0.088				0	1	10	28	61		
▲	B-004-1-24	11.0	0.045				1	2	5	19	73		
★	B-004-1-24	18.5	0.034				0	2	3	22	73		
⊙	B-004-1-24	23.5	0.034				0	2	3	22	73		

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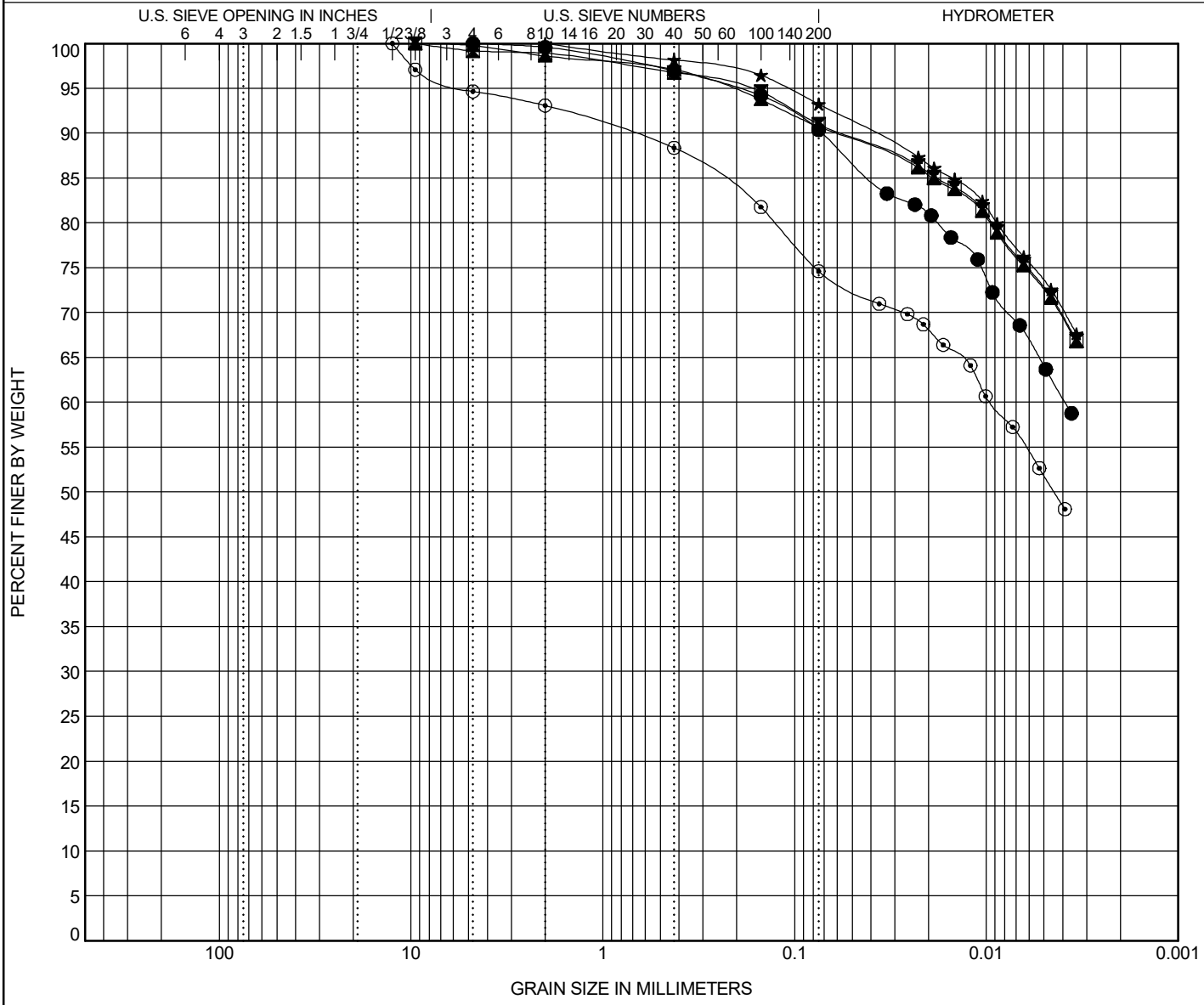
OFFICE OF GEOTECHNICAL ENGINEERING

PROJECT HEN-34-00.85 **PID** 118189

OGE NUMBER N/A **PROJECT TYPE** ROADWAY



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

	Specimen Identification		ODOT (Modified AASHTO) ~ USCS Classification	LL	PL	PI
●	B-004-2-24	6.0	**A-7-6 ~ LEAN CLAY(CL)**	**49**	**26**	**23**
⊠	B-004-2-24	11.0	**A-7-6 ~ LEAN CLAY(CL)**	**48**	**24**	**24**
▲	B-004-2-24	16.0	**A-7-6 ~ LEAN CLAY(CL)**	**46**	**26**	**20**
★	B-004-2-24	21.0	**A-7-6 ~ FAT CLAY(CH)**	**51**	**25**	**26**
⊙	B-005-0-23	1.0	**A-6b ~ LEAN CLAY with SAND(CL)**	**38**	**20**	**18**

	Specimen Identification		D90	D50	D30	D10	%G	%CS	%FS	%M	%C	Cc	Cu
●	B-004-2-24	6.0	**0.072**				**0**	**3**	**7**	**26**	**64**		
⊠	B-004-2-24	11.0	**0.058**				**1**	**2**	**6**	**18**	**73**		
▲	B-004-2-24	16.0	**0.062**				**1**	**2**	**6**	**19**	**72**		
★	B-004-2-24	21.0	**0.039**				**0**	**2**	**5**	**20**	**73**		
⊙	B-005-0-23	1.0	**0.729**	**0.004**			**6**	**5**	**14**	**23**	**52**		

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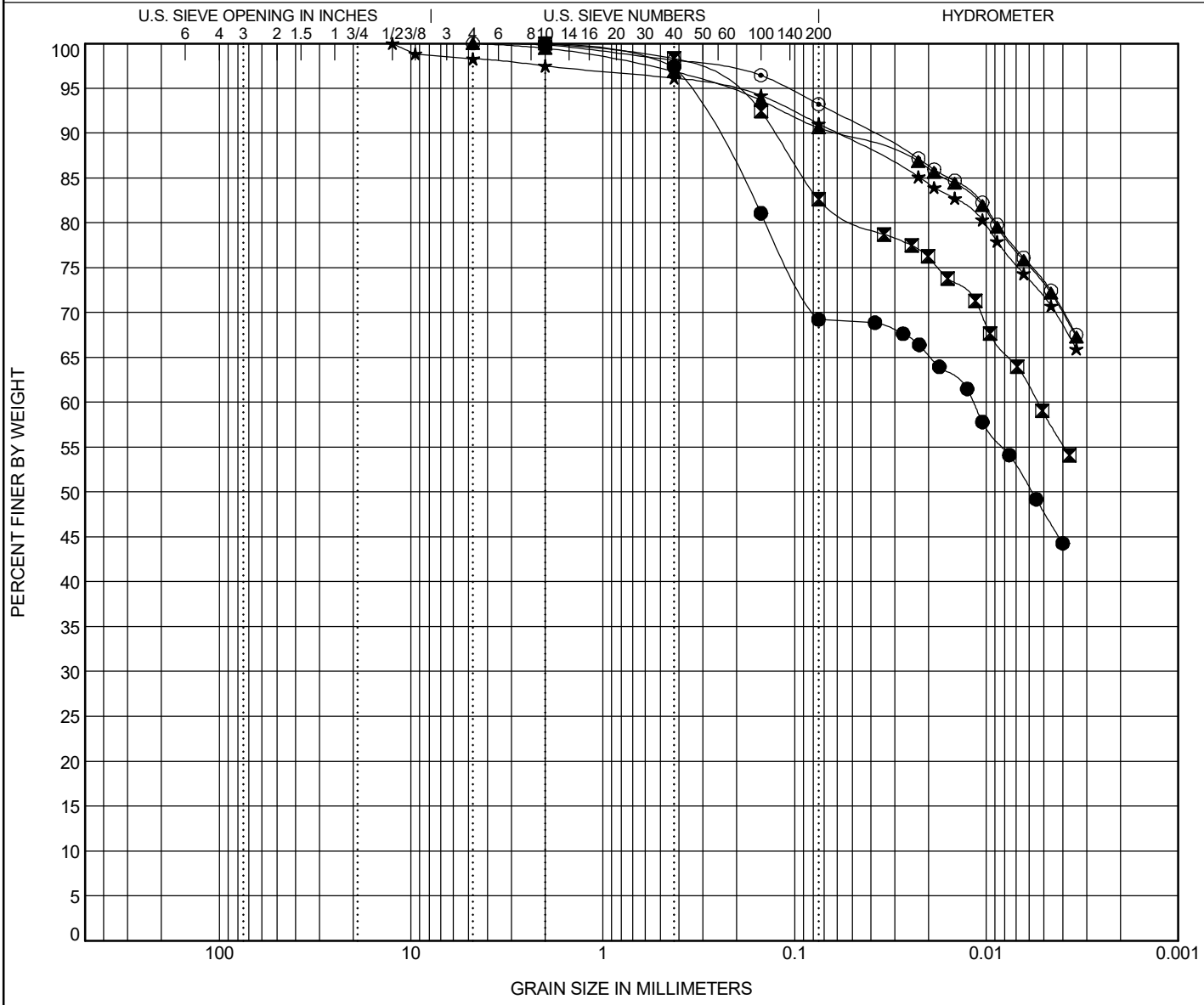
PROJECT HEN-34-00.85 **PID** 118189

OGE NUMBER N/A **PROJECT TYPE** ROADWAY



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Specimen Identification			ODOT (Modified AASHTO) ~ USCS Classification	LL	PL	PI
●	B-005-0-23	6.0	**A-6b ~ SANDY LEAN CLAY(CL)**	**39**	**20**	**19**
⊠	B-005-1-24	1.0	**A-7-6 ~ FAT CLAY with SAND(CH)**	**53**	**28**	**25**
▲	B-005-1-24	8.5	**A-7-6 ~ FAT CLAY(CH)**	**53**	**26**	**27**
★	B-005-1-24	16.0	**A-7-6 ~ LEAN CLAY(CL)**	**47**	**24**	**23**
⊙	B-005-1-24	21.0	**A-7-6 ~ FAT CLAY(CH)**	**54**	**28**	**26**

Specimen Identification			D90	D50	D30	D10	%G	%CS	%FS	%M	%C	Cc	Cu
●	B-005-0-23	6.0	**0.265**	**0.006**			**0**	**3**	**28**	**21**	**48**		
⊠	B-005-1-24	1.0	**0.126**				**0**	**1**	**16**	**24**	**59**		
▲	B-005-1-24	8.5	**0.062**				**0**	**3**	**6**	**18**	**73**		
★	B-005-1-24	16.0	**0.061**				**3**	**1**	**5**	**19**	**72**		
⊙	B-005-1-24	21.0	**0.04**				**0**	**2**	**5**	**20**	**73**		

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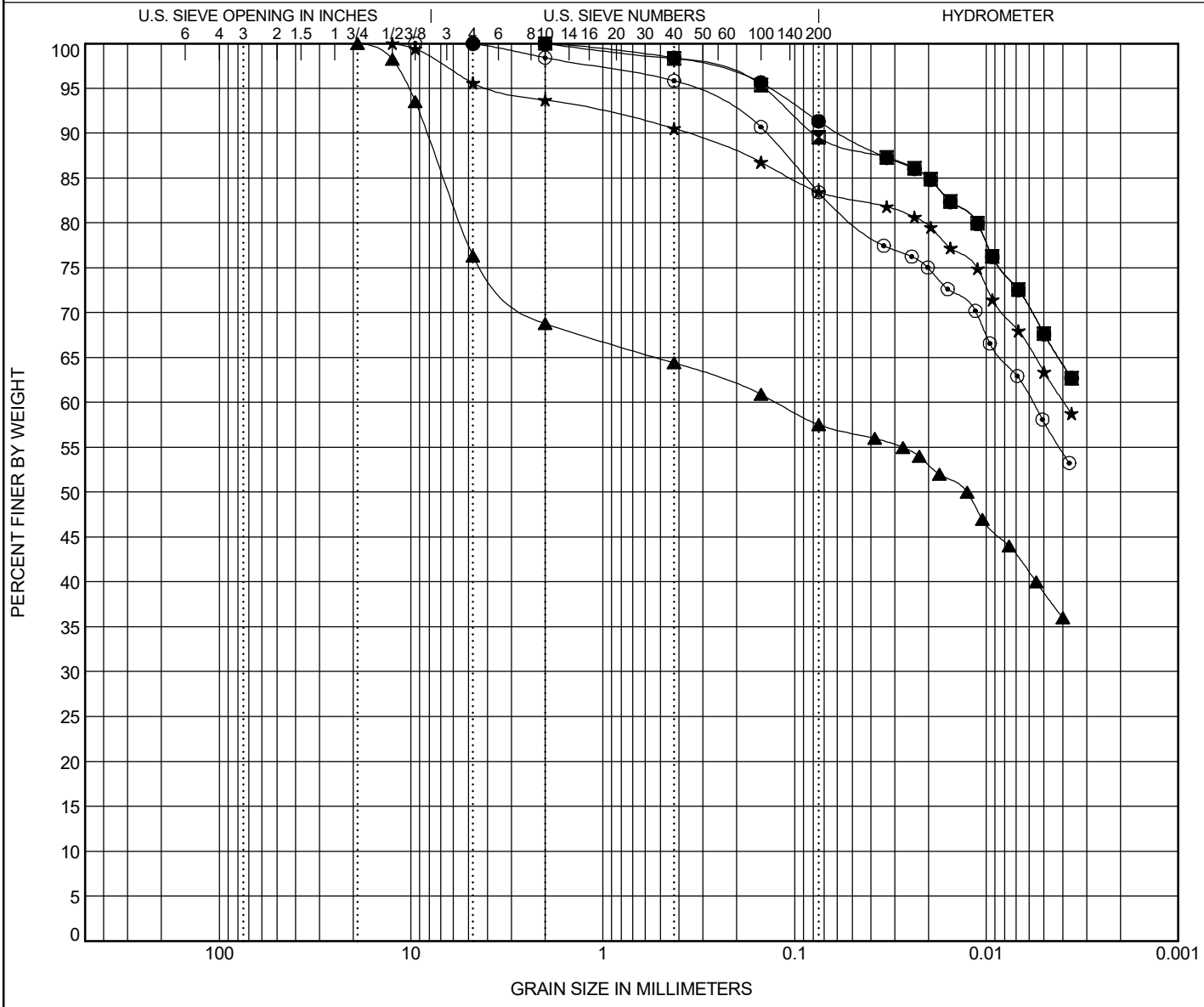
PROJECT HEN-34-00.85 **PID** 118189

OGE NUMBER N/A **PROJECT TYPE** ROADWAY



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Specimen Identification			ODOT (Modified AASHTO) ~ USCS Classification	LL	PL	PI
●	B-006-0-23	2.5	**A-6b ~ LEAN CLAY(CL)**	**40**	**20**	**20**
⊠	B-006-0-23	4.8	**A-6b ~ LEAN CLAY(CL)**	**39**	**21**	**18**
▲	B-007-0-23	1.3	**A-6a ~ GRAVELLY LEAN CLAY with SAND(CL)**	**32**	**19**	**13**
★	B-007-0-23	3.0	**A-6b ~ LEAN CLAY with SAND(CL)**	**39**	**19**	**20**
⊙	B-007-1-24	1.0	**A-7-6 ~ LEAN CLAY with SAND(CL)**	**49**	**25**	**24**

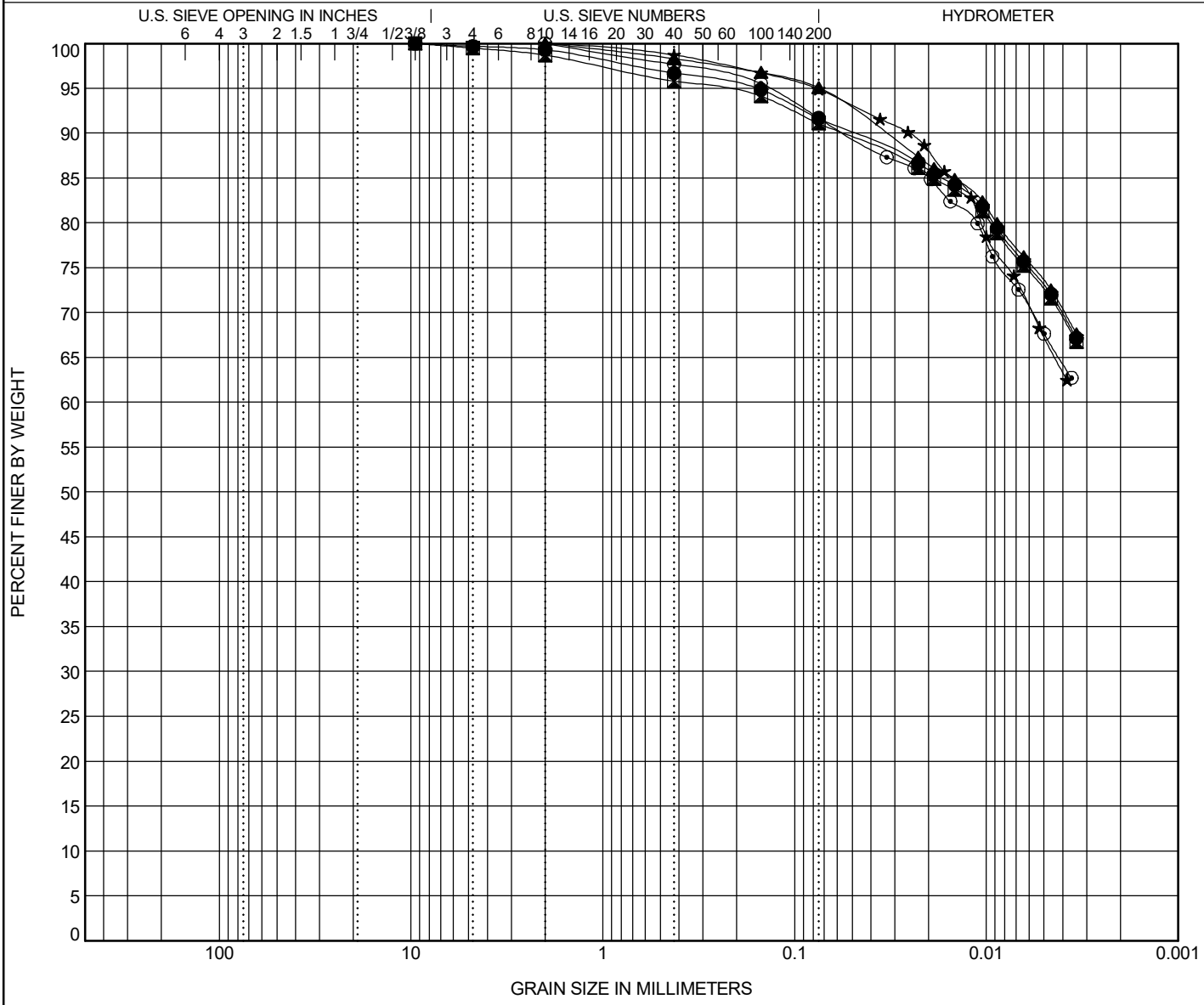
Specimen Identification			D90	D50	D30	D10	%G	%CS	%FS	%M	%C	Cc	Cu
●	B-006-0-23	2.5	**0.057**				**0**	**2**	**7**	**23**	**68**		
⊠	B-006-0-23	4.8	**0.079**				**0**	**1**	**9**	**22**	**68**		
▲	B-007-0-23	1.3	**8.248**	**0.013**			**31**	**4**	**7**	**19**	**39**		
★	B-007-0-23	3.0	**0.367**				**7**	**3**	**7**	**20**	**63**		
⊙	B-007-1-24	1.0	**0.14**				**2**	**3**	**12**	**25**	**58**		

GRAIN SIZE DISTRIBUTION

OHIO DEPARTMENT OF TRANSPORTION
OFFICE OF GEOTECHNICAL ENGINEERING

PROJECT HEN-34-00.85 **PID** 118189

OGE NUMBER N/A **PROJECT TYPE** ROADWAY



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Specimen Identification			ODOT (Modified AASHTO) ~ USCS Classification	LL	PL	PI
●	B-007-1-24	6.0	A-7-6 ~ FAT CLAY(CH)	56	28	28
⊠	B-007-1-24	13.5	A-7-6 ~ LEAN CLAY(CL)	47	22	25
▲	B-007-1-24	18.5	A-7-6 ~ LEAN CLAY(CL)	45	22	23
★	B-008-0-23	1.0	A-6b ~ LEAN CLAY(CL)	37	20	17
⊙	B-008-0-23	3.5	A-6a ~ LEAN CLAY(CL)	32	18	14

Specimen Identification			D90	D50	D30	D10	%G	%CS	%FS	%M	%C	Cc	Cu
●	B-007-1-24	6.0	0.05				0	3	5	19	73		
⊠	B-007-1-24	13.5	0.057				1	3	5	18	73		
▲	B-007-1-24	18.5	0.034				0	2	3	22	73		
★	B-008-0-23	1.0	0.025				0	1	4	28	67		
⊙	B-008-0-23	3.5	0.055				0	2	6	24	68		

GRAIN SIZE DISTRIBUTION

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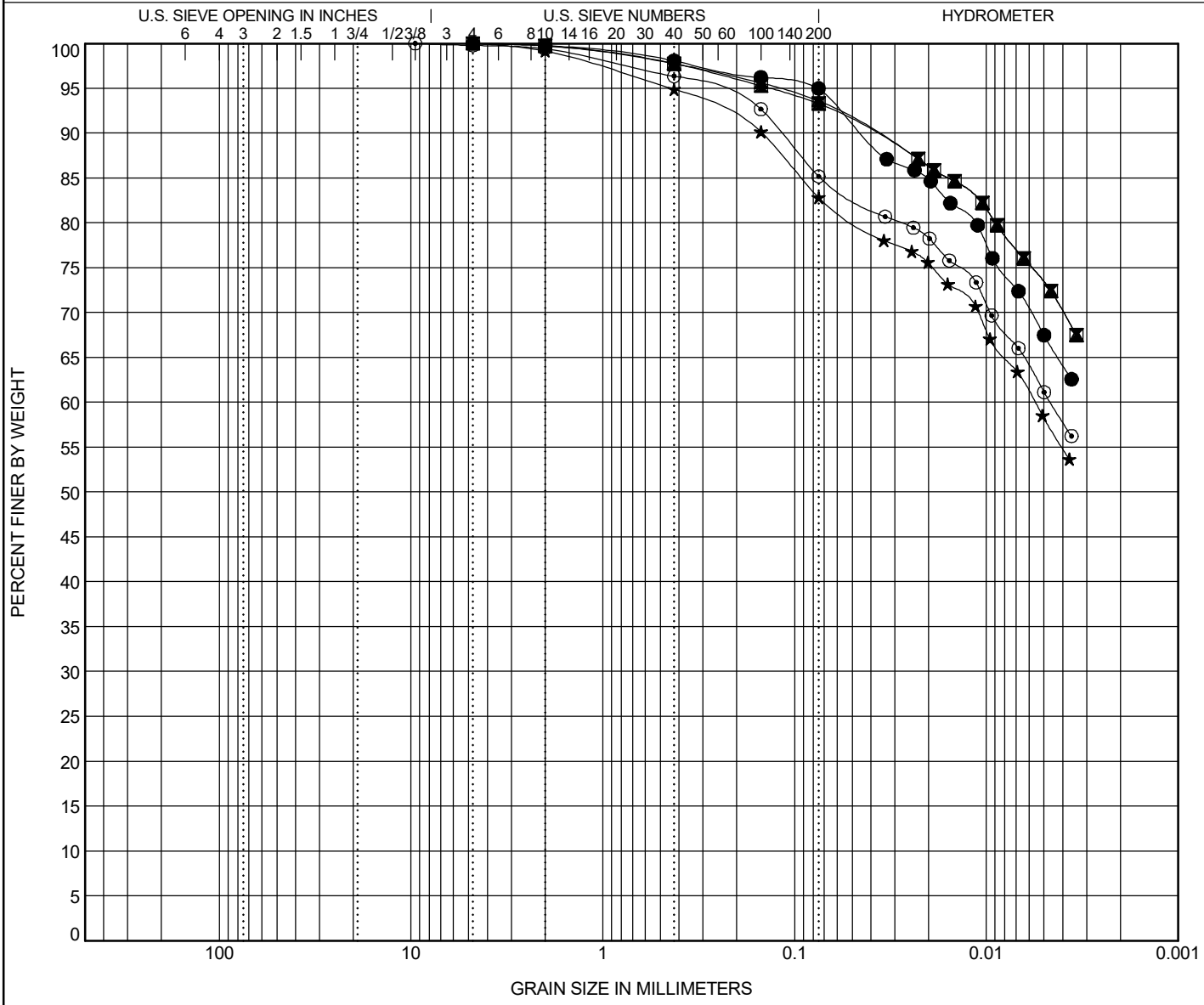
PROJECT HEN-34-00.85 **PID** 118189

OGE NUMBER N/A **PROJECT TYPE** ROADWAY



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Specimen Identification		ODOT (Modified AASHTO) ~ USCS Classification	LL	PL	PI
●	**B-008-0-23 8.5**	**A-6b ~ LEAN CLAY(CL)**	**40**	**20**	**20**
⊠	**B-008-1-24 3.5**	**A-7-6 ~ FAT CLAY(CH)**	**52**	**24**	**28**
▲	**B-008-1-24 6.0**	**A-7-6 ~ FAT CLAY(CH)**	**59**	**26**	**33**
★	**B-008-1-24 11.0**	**A-7-6 ~ FAT CLAY with SAND(CH)**	**55**	**27**	**28**
⊙	**B-008-1-24 18.5**	**A-7-6 ~ FAT CLAY(CH)**	**52**	**26**	**26**

Specimen Identification		D90	D50	D30	D10	%G	%CS	%FS	%M	%C	Cc	Cu
●	**B-008-0-23 8.5**	**0.045**				**0**	**2**	**3**	**28**	**67**		
⊠	**B-008-1-24 3.5**	**0.04**				**1**	**2**	**4**	**20**	**73**		
▲	**B-008-1-24 6.0**	**0.039**				**0**	**2**	**4**	**21**	**73**		
★	**B-008-1-24 11.0**	**0.148**				**1**	**4**	**12**	**25**	**58**		
⊙	**B-008-1-24 18.5**	**0.117**				**1**	**3**	**11**	**24**	**61**		

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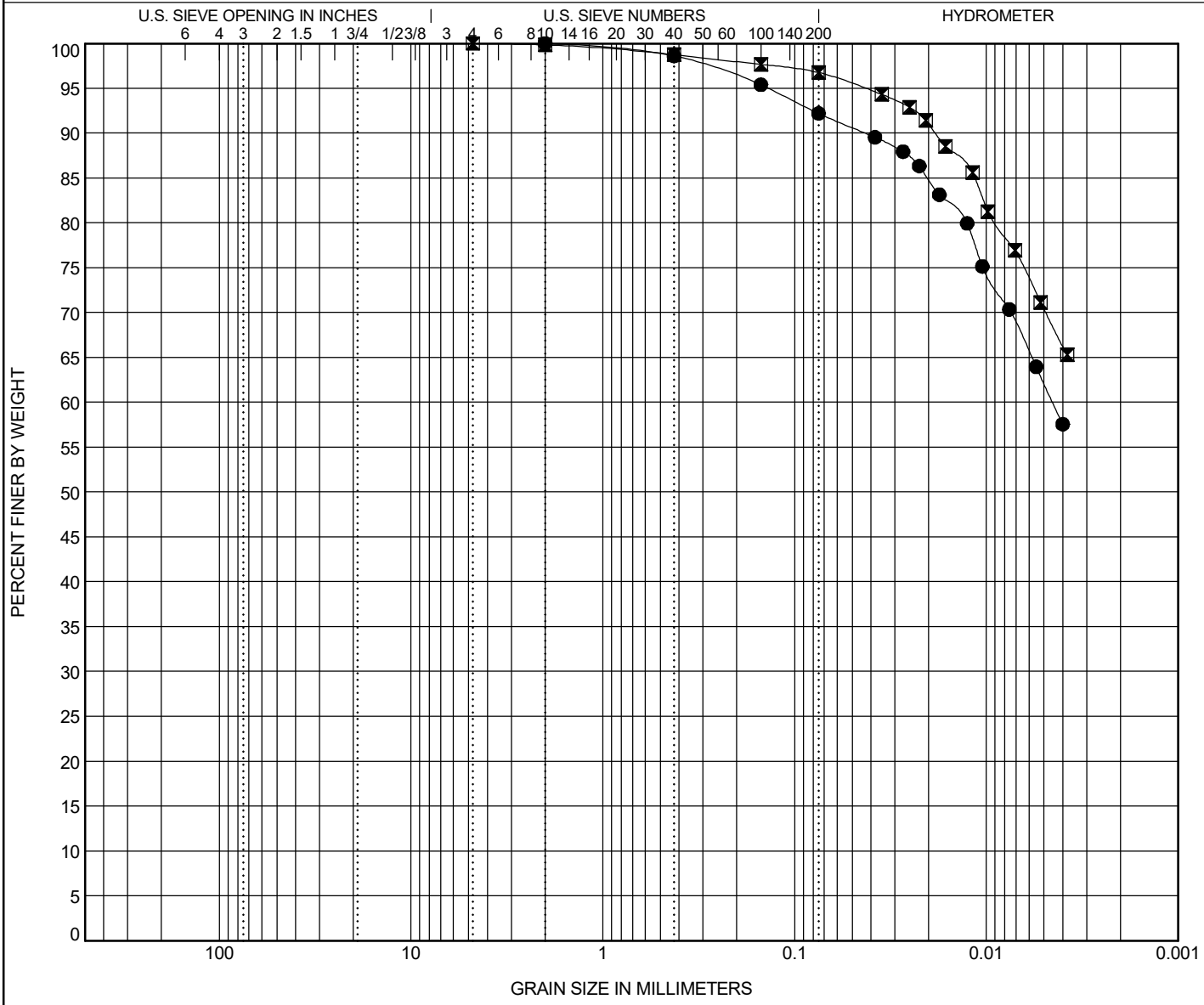
PROJECT HEN-34-00.85 **PID** 118189

OGE NUMBER N/A **PROJECT TYPE** ROADWAY



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

	Specimen Identification		ODOT (Modified AASHTO) ~ USCS Classification	LL	PL	PI
●	**B-009-0-23**	**1.4**	**A-6b ~ LEAN CLAY(CL)**	**40**	**20**	**20**
⊠	**B-009-0-23**	**2.5**	**A-6b ~ LEAN CLAY(CL)**	**40**	**19**	**21**

	Specimen Identification		D90	D50	D30	D10	%G	%CS	%FS	%M	%C	Cc	Cu
●	**B-009-0-23**	**1.4**	**0.043**				**0**	**2**	**6**	**30**	**62**		
⊠	**B-009-0-23**	**2.5**	**0.018**				**0**	**1**	**2**	**27**	**70**		

GRAIN SIZE - OH DOT.GDT - 11/18/24 08:12 - X:\PROJECTS\232187.GPJ

APPENDIX C

PAVEMENT CORE PHOTOGRAPHIC LOGS

CORE LOG for B-001-0-23

Project: HEN-34-0.85, PID No. 118189
Project Location: Henry County, Ohio
CT Project No. 232187
Drill Date: December 11, 2023

ASPHALT THICKNESS (in)	=	13.5
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

CORE LOG for B-002-0-23

Project: HEN-34-0.85, PID No. 118189
Project Location: Henry County, Ohio
CT Project No. 232187
Drill Date: December 11, 2023

ASPHALT THICKNESS (in)	=	11.0
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Horizontal break at 2.5 inches

Note: Particles of aggregate base presented in the photo

CORE LOG for B-006-0-23

Project: HEN-34-0.85, PID No. 118189
Project Location: Henry County, Ohio
CT Project No. 232187
Drill Date: December 11, 2023

ASPHALT THICKNESS (in)	=	11.0
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Horizontal break at 9 inches

Note: The field description indicates 12 inches of pavement thickness.

Most likely, during transportation loose bottom of the core was lost resulting in shorter core length presented in the photo.

CORE LOG for B-007-0-23

Project: HEN-34-0.85, PID No. 118189
Project Location: Henry County, Ohio
CT Project No. 232187
Drill Date: December 11, 2023

ASPHALT THICKNESS (in)	=	10.75
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Horizontal break at 5 inches

APPENDIX D

ODOT DESIGN CHECKLISTS

I. Geotechnical Design Checklists

Project: HEN-34-0.85	PDP Path:
PID: 118189	Review Stage:

Checklist	Included in This Submission
II. Reconnaissance and Planning	✓
III. A. Centerline Cuts III. B. Embankments	
III. C. Subgrade	✓
IV. A. Foundations of Structures	✓
IV. B. Retaining Wall	
V. A. Landslide Remediation V. B. Rockfall Remediation V. C. Wetland or Peat Remediation V. D. Underground Mine Remediation V. E. Surface Mine Remediation V. F. Karst Remediation	
VI. A. Geotechnical Profile	
VI. D. Geotechnical Reports	✓

II. Reconnaissance and Planning Checklist

C-R-S:	HEN-34-0.85	PID:	118189	Reviewer:	CPI	Date:	11/17/2024

Reconnaissance		(Y/N/X)	Notes:
1	Based on Section 302.1 in the SGE, have the necessary plans been developed in the following areas prior to the commencement of the subsurface exploration reconnaissance:		
	Roadway plans	✓	
	Structures plans		
	Geohazards plans		
2	Have the resources listed in Section 302.2.1 of the SGE been reviewed as part of the office reconnaissance?	Y	
3	Have all the features listed in Section 302.3 of the SGE been observed and evaluated during the field reconnaissance?	Y	
4	If notable features were discovered in the field reconnaissance, were the GPS coordinates of these features recorded?	X	

Planning - General		(Y/N/X)	Notes:
5	In planning the geotechnical exploration program for the project, have the specific geologic conditions, the proposed work, and historic subsurface exploration work been considered?	Y	
6	Has the ODOT Transportation Information Mapping System (TIMS) been accessed to find all available historic boring information and inventoried geohazards?	Y	
7	Have the borings been located to develop the maximum subsurface information while using a minimum number of borings, utilizing historic geotechnical explorations to the fullest extent possible?	Y	
8	Have the topography, geologic origin of materials, surface manifestation of soil conditions, and any other special design considerations been utilized in determining the spacing and depth of borings?	Y	
9	Have the borings been located so as to provide adequate overhead clearance for the equipment, clearance of underground utilities, minimize damage to private property, and minimize disruption of traffic, without compromising the quality of the exploration?	Y	

II. Reconnaissance and Planning Checklist

Planning - General	(Y/N/X)	Notes:
10 Have the scaled boring plans, showing all project and historic borings, and a schedule of borings in tabular format, been submitted to the District Geotechnical Engineer?	Y	
The schedule of borings should present the following information for each boring:		
a. exploration identification number	y	
b. location by station and offset	y	
c. estimated amount of rock and soil, including the total for each for the entire program.	y	

Planning – Exploration Number	(Y/N/X)	Notes:
11 Have the coordinates, stations and offsets of all explorations (borings, soundings, test pits, etc.) been identified?	y	
12 Has each exploration been assigned a unique identification number, in the following format X-ZZZ-W-YY, as per Section 303.2 of the SGE?	y	
13 When referring to historic explorations that did not use the identification scheme in 12 above, have the historic explorations been assigned identification numbers according to Section 303.2 of the SGE?	X	No historic borings

II. Reconnaissance and Planning Checklist

Planning – Boring Types		(Y/N/X)	Notes:
14	Based on Sections 303.3 to 303.7.6 of the SGE, have the location, depth, and sampling requirements for the following boring types been determined for the project?	Y	
	Check all boring types utilized for this project:		
	Existing Subgrades (Type A)	✓	
	Roadway Borings (Type B)	✓	
	Embankment Foundations (Type B1)		
	Cut Sections (Type B2)		
	Sidehill Cut Sections (Type B3)		
	Sidehill Cut-Fill Sections (Type B4)		
	Sidehill Fill Sections on Unstable Slopes (Type B5)		
	Geohazard Borings (Type C)		
	Lakes, Ponds, and Low-Lying Areas (Type C1)		
	Peat Deposits, Compressible Soils, and Low Strength Soils (Type C2)		
	Uncontrolled Fills, Waste Pits, and Reclaimed Surface Mines (Type C3)		
	Underground Mines (C4)		
	Landslides (Type C5)		
	Rock Slope (Type C6)		
	Karst (Type C7)		
	Proposed Underground Utilities (Type D)		
	Structure Borings (Type E)		
	Bridges (Type E1)		
	Culverts (Type E2 a,b,c)		
	Retaining Walls (Type E3 a and b)		
	Noise Barrier (Type E4)		
	CCTV & High Mast Lighting Towers (Type E5)		
	Buildings and Salt Domes (Type E6)		

III.C. Subgrade Checklist

C-R-S:	HEN-34-0.85	PID:	118189	Reviewer:	CPI	Date:	4/25/2025

Use this Checklist in conjunction with the Subgrade design guidance in GDM Section 600
If you do not have any subgrade work on the project, you do not have to fill out this checklist.

Subgrade	(Y/N/X)	Notes:
1 Has the subsurface exploration adequately characterized the soil or rock according to GDM Section 600?	Y	
a. Has each sample been visually classified and inspected for the presence of gypsum? Has a moisture content been performed on each sample?	Y	
b. Has mechanical classification (Plastic Limit (PL), Liquid Limit (LL), and gradation testing) been done on at least two samples from each boring within six feet of the proposed subgrade?	Y	
c. Has the sulfate content of at least one sample from each boring within 3 feet of the proposed subgrade been determined, per Supplement 1122, Determining Sulfate Content in Soils?	Y	
d. Has the sulfate content of all samples that exhibit gypsum crystals been determined?	X	
e. Have A-2-5, A-4b, A-5, A-7-5, A-8a, or A-8b soils within the top 3 feet of the proposed subgrade been mechanically classified?	X	
2 If soils classified as A-2-5, A-4b, A-5, A-7-5, A-8a, or A-8b, or having a LL>65, are present at the proposed subgrade (geotechnical profile), do the plans specify that these materials need to be removed and replaced or chemically stabilized?	X	
a. If these materials are to be removed and replaced, have the station limits, depth, and lateral limits for the planned removal been provided?	X	
3 If there is any rock, shale, or coal present at the proposed subgrade (C&MS 204.05), do the plans specify the removal of the material?	X	
a. If removal of any rock, shale, or coal is required, have the station limits, depth, and lateral limits for the planned removal of the material at proposed subgrade been provided?	X	

III.C. Subgrade Checklist

Subgrade	(Y/N/X)	Notes:
4 In accordance with GDM Section 600, do the SPT (N_{60})/HP values and existing moisture contents for the proposed subgrade soils indicate the need for subgrade stabilization?	Y	
a. If removal and replacement is applicable, has the detail of subgrade removal been shown on the plans, including depth of removal, station limits, lateral extent, replacement material, and plan notes (Item 204 - Subgrade Compaction and Proof Rolling)?	X	Plans to be prepared by others. Direction provided in the report. Review will be completed as part of Geotechnical Plan Review for Stage 2.
b. If chemical stabilization is applicable, has the detail of this treatment been shown on the plans, including depth, percentage of chemical, station limits, lateral extent, and plan notes?	X	Plans to be prepared by others. Direction provided in the report. Review will be completed as part of Geotechnical Plan Review for Stage 2.
Indicate type of chemcial stabilization specified:		
cement stabilization	✓	
lime stabilization	✓	
5 If removal and replacement has been specified, do the plans include Plan Note G121 from L&D3?	X	Plans to be prepared by others. Review will be completed as part of Geotechnical Plan Review for Stage 2.
6 If drainage or groundwater is an issue with the proposed subgrade, has an appropriate drainage system (e.g., pipe, underdrains) been provided?	X	
7 Has an appropriate quantity of Proof Rolling (C&MS 204.06) and has Plan Note G111 from L&D3 been included in the plans?	X	Plans to be prepared by others. Review will be completed as part of Geotechnical Plan Review for Stage 2.
8 Has a design CBR value been provided?	Y	

IV.A Foundations of Structures Checklist

C-R-S:	HEN-34-0.85	PID:	118189	Reviewer:	CPI	Date:	11/17/2024

Use this Checklist in conjunction with the bridge foundation design guidance in GDM Section 1300
If you do not have such a foundation or structure on the project, you do not have to fill out this checklist.

Soil and Bedrock Strength Data		(Y/N/X)	Notes:
1	Has the shear strength of the foundation soils been determined?	Y	
	Check method used:		
	laboratory shear tests		
	estimation from SPT or field tests	✓	
2	Have sufficient soil shear strength, consolidation, and other parameters been determined so that the required allowable loads for the foundation/structure can be designed?	Y	
3	Has the shear strength of the foundation bedrock been determined?	X	
	Check method used:		
	laboratory shear tests		
	other (describe other methods)		
Spread Footings		**(Y/N/X)**	**Notes:**
4	Are there spread footings on the project? If no, go to Question 11	N	
5	Have the recommended bottom of footing elevation and reason for this recommendation been provided?		
a.	Has the recommended bottom of footing elevation taken scour from streams or other water flow into account?		
6	Were representative sections analyzed for the entire length of the structure for the following:		
a.	factored bearing resistance?		
b.	factored sliding resistance?		
c.	eccentric load limitations (overturning)?		
d.	predicted settlement?		
e.	overall (global) stability?		
7	Has the need for a shear key been evaluated?		
a.	If needed, have the details been included in the plans?		
8	If special conditions exist (e.g. geometry, sloping rock, varying soil conditions), was the bottom of footing “stepped” to accommodate them?		
9	Have the Service I and Maximum Strength Limit States for bearing pressure on soil or rock been provided?		

IV.A Foundations of Structures Checklist

Spread Footings	(Y/N/X)	Notes:
10 If weak soil is present at the proposed foundation level, has the removal / treatment of this soil been developed and included in the plans?		
a. Have the procedure and quantities related to this removal / treatment been included in the plans?		
Pile Structures	**(Y/N/X)**	**Notes:**
11 Are there piles on the project? If no, go to Question 17	N	
12 Has an appropriate pile type been selected?		
Check the type selected:		
H-pile (driven)		
H-pile (prebored)		
Cast In-place Reinforced Concrete Pipe		
Micropile		
Continuous Flight Auger (CFA)		
other (describe other types)		
13 Have the estimated pile length or tip elevation and section (diameter) based on either the Ultimate Bearing Value (UBV) or the depth to top of bedrock been specified? Indicate method used.		
14 If scour is predicted, has pile resistance in the scour zone been neglected?		
15 Has a wave equation drivability analysis been performed as per BDM 305.3.1.2 to determine whether the pile can be driven to either the UBV, the pile tip elevation, or refusal on bedrock without overstressing the pile?		
16 If required for design, have sufficient soil parameters been provided and calculations performed to evaluate the:		
a. Nominal unit tip resistance and maximum settlement of the piles?		
b. Nominal unit side resistance for each contributing soil layer and maximum deflection of the piles?		
c. Downdrag load on piles driven through new embankment or compressible soil layers, as per BDM 305.3.2.2?		
d. Potential for and impact of lateral squeeze from soft foundation soils?		

IV.A Foundations of Structures Checklist

Pile Structures		(Y/N/X)	Notes:
17	If piles are to be driven to strong bedrock (Q_u >7.5 ksi) or through very dense granular soils or overburden containing boulders, have "pile points" been recommended in order to protect the tips of the steel piling, as per BDM 305.3.5.6?		
18	If subsurface obstacles exist, has preboring been recommended to avoid these obstructions?		
19	If piles will be driven through 15 feet or more of new embankment, has preboring been specified as per BDM 305.3.5.7?		

IV.A Foundations of Structures Checklist

Drilled Shafts	(Y/N/X)	Notes:
20 Are there drilled shafts on the project? If no, go to the next checklist.	Y	
21 Have the drilled shaft diameter and embedment length been specified?	N	Special Foundation Design required for light pole foundations
22 Have the recommended drilled shaft diameter and embedment been developed based on the nominal unit side resistance and nominal unit tip resistance for vertical loading situations?	N	
23 For shafts undergoing lateral loading, have the following been determined:		
a. total factored lateral shear?	N	
b. total factored bending moment?	N	
c. maximum deflection?	N	
d. reinforcement design?	N	
24 If a bedrock socket is required, has a minimum rock socket length equal to 1.5 times the rock socket diameter been used, as per BDM 305.4.2?	X	
25 Generally, bedrock sockets are 6" smaller in diameter than the soil embedment section of the drilled shaft. Has this factor been accounted for in the drilled shaft design?	X	
26 If scour is predicted, has shaft resistance in the scour zone been neglected?	X	
27 Has the site been assessed for groundwater influence?	X	Special Foundation Design required for light pole foundations should consider groundwater influence.
a. If yes, and if artesian flow is a potential concern, does the design address control of groundwater flow during construction?	X	
28 Have all the proper items been included in the plans for integrity testing?	X	
29 If special construction features (e.g., slurry, casing, load tests) are required, have all the proper items been included in the plans?	X	
30 If necessary, have wet construction methods been specified?	X	
General	(Y/N/X)	Notes:
31 Has the need for load testing of the foundations been evaluated?	X	
a. If needed, have details and plan notes for load testing been included in the plans?		

VI.B. Geotechnical Reports

C-R-S:	HEN-34-0.85	PID:	118189	Reviewer:	CPI	Date:	4/25/2025

General		(Y/N/X)	Notes:
1	Has an electronic copy of all geotechnical submissions been provided to the District Geotechnical Engineer (DGE)?	Y	
2	Has the first complete version of a geotechnical report being submitted been labeled as 'Draft'?	Y	
3	Subsequent to ODOT's review and approval, has the complete version of the revised geotechnical report being submitted been labeled 'Final'?	Y	This is the final report submission.
4	Has the boring data been submitted in a native format that is DIGGS (Data Interchange for Geotechnical and Geoenvironmental) compatable? gINT files meet this demand?	Y	gINT files are being provided with this final report.
5	Does the report cover format follow ODOT's Brand and Identity Guidelines Report Standards found at http://www.dot.state.oh.us/brand/Pages/default.aspx ?	Y	
6	Have all geotechnical reports being submitted been titled correctly as prescribed in Section 706.1 of the SGE?	Y	
Report Body		(Y/N/X)	Notes:
7	Do all geotechnical reports being submitted contain the following:		
a.	an Executive Summary as described in Section 706.2 of the SGE?	Y	
b.	an Introduction as described in Section 706.3 of the SGE?	Y	
c.	a section titled "Geology and Observations of the Project," as described in Section 706.4 of the SGE?	Y	
d.	a section titled "Exploration," as described in Section 706.5 of the SGE?	Y	
e.	a section titled "Findings," as described in Section 706.6 of the SGE?	Y	
f.	a section titled "Analyses and Recommendations," as described in Section 706.7 of the SGE?	Y	
Appendices		(Y/N/X)	Notes:
8	Do all geotechnical reports being submitted contain all applicable Appendices as described in Section 706.8 of the SGE?	Y	
9	Do the Appendices present a site Boring Plan showing all boring locations as described in Section 706.8.1 of the SGE?	Y	

VI.B. Geotechnical Reports

Appendices		(Y/N/X)	Notes:
10	Do the Appendices include boring logs and color pictures of rock, if applicable, as described in Section 706.8.2 of the SGE?	Y	
11	Do the Appendices include reports of undisturbed test data as described in Section 706.8.3 of the SGE?	X	
12	Do the Appendices include calculations in a logical format to support recommendations as described in Section 706.8.4 of the SGE?	Y	