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AN EMPLOYEE OWNED COMPANY



Consulting Engineers • Testing • Inspection Services • Analytical Laboratories

Established 1927

October 17, 2025

Choice One Engineering, Inc.
440 E. Hoewisher Road
Sidney, Ohio 45365

Attention: Mr. Tyler Beyke

Reference: Roadway Exploration Report
VAN-LEESON AVE. - PHASE 2
PID: 120200
City of Van Wert, Van Wert County, Ohio
CTL Project No. 24050005WAP

Mr. Beyke:

CTL Engineering, Inc. has completed the roadway exploration report for the above referenced project. We are providing a version of the report in portable document format (.pdf) via electronic mail (e-mail).

Thank you for the opportunity to be of service to you on this project. If you have any questions, please contact me at our office.

Respectfully Submitted,

CTL ENGINEERING, INC.

A handwritten signature in blue ink, appearing to read "Frederick Schoen", is written over a light blue horizontal line.

Frederick Schoen, P.E.
Project Manager

ROADWAY EXPLORATION REPORT

VAN-LEESON AVENUE - PHASE 2
CITY OF VAN WERT
VAN WERT COUNTY, OHIO

PID NO. 120200

CTL PROJECT NO. 24050005WAP

PREPARED FOR:

CHOICE ONE ENGINEERING, INC.
440 E. HOEWISHER ROAD
SIDNEY, OHIO 45365

PREPARED BY:

CTL ENGINEERING, INC.
102 COMMERCE DRIVE, P.O. BOX 44
WAPAKONETA, OH 45895

October 17, 2025

RECORD OF REVISIONS

Date of Transmittal	Description	Remarks
3/18/2025	1 st Submittal of Draft Report	--
10/17/2025	Submittal of Revised Report	Revised report per comments by ODOT

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TABLE OF CONTENTS

	<u>PAGE</u>
I. <u>EXECUTIVE SUMMARY</u>	1
II. <u>INTRODUCTION</u>	2
III. <u>GEOLOGY AND OBSERVATIONS</u>	2
A. Geology.....	2
B. Observations.....	3
IV. <u>EXPLORATION</u>	3
V. <u>FINDINGS</u>	4
A. Subsurface Conditions.....	4
B. Results of Laboratory Tests	5
VI. <u>ANALYSES AND RECOMMENDATIONS</u>	5
A. Roadway Subgrade Recommendations.....	5
B. Site Preparation and Earthwork Recommendations	8
VII. <u>CHANGED CONDITIONS</u>	9
VIII. <u>TESTING AND OBSERVATION</u>	9
IX. <u>CLOSING</u>	9

APPENDIX A GEOTECHNICAL PROFILE - ROADWAY

APPENDIX B TEST BORING RECORDS

APPENDIX C LABORATORY TEST RESULTS

APPENDIX D ROADWAY SUBGRADE ANALYSES





I. **EXECUTIVE SUMMARY**

The project consists of approximately 2,354 feet of full depth reconstruction of Leeson Avenue from John Brown Road to Rose Drive in City of Van Wert, Van Wert County, Ohio. The project includes new curb and gutter, sidewalk on both sides, filling in the ditch on south side of Leeson Avenue, and storm sewer improvements. According to the Stage 2 plans, the project limit begins at Station 10+30.80 and ends at Station 36+37.45.

A total of seven (7) soil test borings, designated as B-001-0-24 through B-007-0-24 were drilled for this project. The surface materials encountered consisted of varying materials including asphalt and aggregate base materials to various depths. Beneath the surficial materials, subgrade soils primarily consisted of fine-grained cohesive materials which were visually and mechanically classified as silty clay (A-6b), and clay (A-7-6) soils.

Groundwater was not encountered in any of the test borings during drilling or at the completion of drilling operations.

Based on the subsurface conditions encountered in the borings, and the results of the subgrade analyses, an estimated CBR value of 4 may be used in the pavement thickness design of the roadway. According to requirements outlined in ODOT's Geotechnical Design Manual (GDM), a majority of the roadway subgrade soils encountered will require stabilization due to being unstable. Please refer to the *Analyses and Recommendations* section for additional information.

Note: *This summary is provided for general information only, and it should not be used as the sole source of information for any design, estimating, or bidding. Detailed recommendations are provided throughout the subsequent geotechnical report. This report should be used in its entirety.*



II. INTRODUCTION

The project consists of approximately 2,354 feet of full depth reconstruction of Leeson Avenue from John Brown Road to Rose Drive in City of Van Wert, Van Wert County, Ohio. This portion of the project is phase 2 of the overall reconstruction of Leeson Ave. The current project includes new curb and gutter, sidewalk on both sides, filling in the ditch on south side of Leeson Avenue, and storm sewer improvements. According to the Stage 2 plans, the project limit begins at Station 10+30.80 and ends at Station 36+37.45.

The purpose of this geotechnical exploration is to determine the subsurface conditions beneath the proposed roadway in conjunction with providing recommendations for the construction and pavement design in general accordance with ODOT's Specification for Geotechnical Explorations (SGE) requirements dated January 2024.

CTL Engineering's (CTL) services were performed in accordance with its proposal number 23050125WAP-PPL, dated November 7, 2023.

III. GEOLOGY AND OBSERVATIONS

A. Geology

According to the Ohio Department of Natural Resources (ODNR), Physiographic Regions of Ohio map, the site is located within the Central Ohio Clayey Till Plain section of Ohio. The physiographic region is described as clayey till with intervening flat-lying ground moraines and intermorainal lake basins, and limited sand and gravel outwash.

According to the Web Soil Survey, *United States Department of Agriculture, Natural Resources Conservation Service*, the major surficial soils mapped at the subject site are described as Pewamo silty clay loam, 0 to 1 percent slopes (Pk) and Blount silt loam, ground moraine, 0 to 2 percent slopes (Blg1A1). These soils are classified as somewhat poorly to very poorly drained.

Surficial geologic mapping (Quaternary Geology, Ohio Division of Geological Survey) indicates that the overburden soil includes Late Wisconsinan age ground moraine deposits. According to the mapping of bedrock geology in the area, (Bedrock Geology 24K, Ohio Division of Geological Survey), the surficial soil deposits across the site are underlain by Silurian Age dolomite with brownish-black to gray shale laminae of Tymochtee Dolomite formation.

Mapping of the bedrock topography (Bedrock Topography of Ohio 24K (ODNR-DGS), *Digital Map, ODNR GIS, 2018*), indicates the bedrock surface elevation in the vicinity of the project area is approximately 730± feet above mean sea level. Based on this mapping and the existing ground surface elevations ranging approximately from 782± feet within the project limits, the estimated depth to the bedrock surface approximately 52± feet below existing surface grades.



It should be noted that the bedrock surface elevation in the referenced mapping was determined from individual data points in the vicinity of the project site. Therefore, the previously stated estimated depths and elevations to the bedrock surface could have a significant disparity from the actual depths and elevations to the bedrock surface within the project limits.

According to the mapping of karst features (Known and Probable Karst in Ohio, ODNR Geological Survey Map EG-1, 1999; Revised 2002, 2006), there are no mapped karst features in the general vicinity of the project area. Additionally, karst features were not observed at the ground surface during our field exploration.

According to the mapping of historic and active mines (ODNR Mines of Ohio), there are no documented mines in the general vicinity of the project area.

B. Observations of the Project

Multiple site visits were performed by CTL personnel, with the first conducted on February 14, 2024, followed by additional visits on February 21 and February 29, 2024, for reconnaissance and site evaluation. The surrounding area is relatively flat. The project area is located within rural and commercial settings with a municipal park located along the north side of the roadway and the county airport located along the south side. The existing pavement condition is considered to be in a moderate condition with longitudinal and transverse cracks throughout the project area.

Overhead utilities (electric and telecommunications) were observed to be located throughout the project site. Additionally, underground water and gas utilities were observed to be located within the project site during CTL's reconnaissance.

IV. EXPLORATION

Historical geotechnical records were searched in ODOT's Transportation Information Mapping System (TIMS) for the current roadway alignment. No historical geotechnical records were found.

A total of seven (7) soil test borings, identified as B-001-0-24 through B-007-0-24, were drilled for this project at the approximate locations shown on the plan and profile sheets in Appendix A.

The number and locations of the test borings were selected by CTL to meet ODOT guidelines and provide a general profile of the subsurface conditions across the site. The test borings were located in the field by CTL personnel. At the time when boring locations were selected, marked in the field, and borings drilled; Leeson Ave. was under construction with below-grade utilities replacement and improvements. Borings were intended to have been spaced at 350 to 400 feet intervals, but were adjusted in the field to avoid buried and overhead utilities, and to work around active construction activities. Choice One Engineering provided CTL with the test boring coordinates, ground surface elevations, and corresponding station and offsets.



Test borings were performed by CTL on March 1, 2024, utilizing 4.0-inch outside diameter Solid Flight Augers (SFA) powered by a track-mounted rotary drill rig. Split-barrel (spoon) samples and Standard Penetration Tests (SPTs) were performed in the test borings using a 140-pound automatic hammer falling 30 inches to drive 2-inch outside diameter split barrel samplers for 18 inches. The automatic hammer associated with the drill rig used for this project was calibrated at an energy ratio of 79.5 percent on April 1, 2024.

Materials recovered from the split-spoon sampling were preserved in glass jars, visually classified in the field, and delivered to CTL's soil laboratory for visual classification, testing and analysis. Samples were also tested for moisture content. Representative samples were subjected to laboratory testing which included Atterberg Limits, grain size distribution, hand penetrometer and water-soluble sulfate content tests.

Drilling, sampling, field and laboratory testing were performed according to standard geotechnical engineering practices and current AASHTO/ASTM/ODOT test procedures.

V. **FINDINGS**

A. **Subsurface Conditions**

A general description of the soils encountered during our subsurface exploration is presented below. Further details of the subsurface conditions encountered during CTL's geotechnical exploration are presented in the Test Boring Records in Appendix B.

1. **Surficial Materials**

The surficial material types and material thickness for each test boring are presented in Table 1.

Table 1 – Boring Surficial Material Thicknesses

Boring No.	Asphalt Thickness (inches)	Subbase Aggregate Thickness (inches)	Total Thickness (inches)
B-001-0-24	10.0	4.0	14.0
B-002-0-24	9.0	---	9.0
B-003-0-24	9.0	---	9.0
B-004-0-24	10.0	3.0	13.0
B-005-0-24	8.0	3.0	11.0
B-006-0-24	7.0	4.0	11.0
B-007-0-24	7.0	3.0	10.0



2. General Stratigraphy

Subgrade soils encountered across the project site primarily consisted of fine-grained cohesive materials which were visually and mechanically classified as silty clay (A-6b), and clay (A-7-6) soils. These soils were encountered beneath the pavement materials in each of the test borings and were described as brown, brown and gray, brownish gray, and gray, dark gray; with consistencies of stiff to hard, and moisture conditions of damp to moist.

3. Groundwater

Groundwater was not encountered in any of the test borings during drilling or at the completion of drilling operations. The boreholes were backfilled immediately; therefore, long-term groundwater level measurements were not determined. Borehole cave-in occurred in six (6) of the seven (7) boring, measured from about 5.5 to 6.9 feet below the existing ground surface.

It should be noted that the groundwater depths encountered during this subsurface exploration are generally not a reliable indication of long-term groundwater levels. Fluctuations in the level of the groundwater table (or saturated soils/perched water levels) will occur due to seasonal variances in rainfall, drainage, types of soils present and other factors. Groundwater can be perched at various elevations above the general static groundwater level after periods of rainfall, especially in the lower elevations and natural drainage paths of the site.

B. Results of Laboratory Tests

Soil samples obtained from split spoon sampling were subjected to laboratory testing. Each sample was tested to determine its moisture content. Fourteen (14) soil samples were also subjected to Atterberg Limits and grain size distribution tests, and seven (7) samples were subject of water-soluble sulfate testing.

A summary of our findings includes:

- Hand penetrometer values ranged from 1.00 to 4.50 tsf, averaging 2.77 tsf.
- Liquid Limit (LL) values ranged from 38 to 56, averaging 51.
- Plasticity Index (PI) values ranged 19 to 34, averaging 29.
- Moisture content values ranged from 20 to 32 percent, averaging 26 percent.
- Samples exhibited sulfate contents of less than 100 parts per million (ppm).

VI. ANALYSES AND RECOMMENDATIONS

Upon review and analyses of the subsurface soil and groundwater conditions, the site is considered suitable for the reconstruction of the roadway. Should the design information for the proposed project be substantially different from the assumptions stated in this report, CTL should be provided this information for our review and allowed to re-evaluate our recommendations, if necessary.



Excavations of roadway subgrade soils may be accomplished using conventional earth moving equipment. Excavation sidewalls should be sloped to meet OSHA standards or shored to protect workers.

Surface drainage across the site may be altered with the proposed construction. It is recommended that all surface water run-off be collected or directed away from pavements and/or their subgrades and towards drainage control structures so that subgrade soils under pavements do not become saturated and lose strength. Any subgrade drainage tiles, if encountered and disturbed during construction, should be reconnected, and groundwater flow should be redirected away from pavement areas.

Based upon the subsurface information obtained from the field and laboratory testing, the following recommendations are provided.

A. Roadway Subgrade Recommendations

A subgrade analysis was performed utilizing the subsurface information from the drilled borings, ODOT Geotechnical Design Manual (GDM) Section 600, and ODOT's Subgrade Analysis Spreadsheet. A copy of the Subgrade Analysis is provided in Appendix D. A proposed pavement thickness of 1.60 feet (19.25-inches) was assumed for estimating cut/fill in the Subgrade Analysis. The approximate depths of cut and fill at boring locations are summarized in Table 2.

Table 2 – Summary of Proposed Roadway Cut/Fill Depths

Boring No.	Alignment	Station and Offset	Boring Elevation, feet	Proposed Subgrade Elevation ⁽¹⁾ , feet	Cut (C) / Fill (F) Depth ⁽²⁾ , feet
B-001-0-24	Leeson Ave	STA. 10+49, 9' RT.	781.6	779.8	1.8 C
B-002-0-24	Leeson Ave	STA. 14+54, 8' LT.	781.2	778.7	2.5 C
B-003-0-24	Leeson Ave	STA. 18+77, 8' RT.	781.4	778.2	3.2 C
B-004-0-24	Leeson Ave	STA. 23+26, 9' LT.	782.8	780.0	2.8 C
B-005-0-24	Leeson Ave	STA. 27+27, 4' RT.	782.8	780.5	2.3 C
B-006-0-24	Leeson Ave	STA. 31+28, 8' LT.	782.8	780.2	2.6 C
B-007-0-24	Leeson Ave	STA. 35+47, 10' LT.	782.4	780.8	1.6 C

(1) Determined from centerline of the proposed roadway profile, and with an assumed 19.25-inch thick pavement section (asphalt and base materials).

(2) Determined from the test boring ground surface elevation and the centerline of the existing roadway profile and proposed roadway subgrade elevation.



The following is a summary of the analysis of the near surface subgrade soils.

- 100% of the subgrade soils consists of cohesive soils described as A-6b, and A-7-6 soils.
- 58% of the subgrade soils are estimated to have excessively high moisture contents
- 61% of the proposed subgrade is anticipated to be unstable.
- SPT N₆₀-values ranged from 5 to 15 blows per foot (bpf), averaging 10 bpf in the upper 6 feet of the existing soil profiles.
- The lowest N₆₀-value (N_{60L}) from each boring ranged from 5 to 8 blows per foot (bpf), averaging 7 bpf.
- Group Index values were calculated for each of the subgrade samples tested. Group Index values for the samples tested ranged from 7 to 19, with an average value of 17.
- These Group Index values correspond to an estimated average California Bearing Ratio (CBR) value of 4.0 percent.

The ODOT Subgrade Analysis identified test borings as requiring subgrade soil improvement due to being unstable. The subgrade stabilization may consist of excavate and replace per Item 204 with materials meeting the requirements of Item 703.16.C, Type C Granular Material underlain by a geotextile fabric per Item 712.09 or Item 712.15. The approximate areas and depths are summarized in Table 3.

Furthermore, isolated areas of exceptionally weak, unstable soils may be encountered during construction. If during construction such weak soils are identified, they may be over-excavated, followed by being backfilled with Item 703.16.C, Type C Granular Material. If severely weaker subgrade conditions are encountered, a multi-axial geogrid per Items 204 and 712.15 and Geotechnical Design Manual (GDM) Section 600 should be used.

The approximate depth of the over-excavate and replace is measured from the top of the proposed pavement subgrade level. The locations and values are only an estimate. The actual depths and horizontal limits of excavate and replace will be determined by the Project Engineer in the field based upon proofrolling.

Table 3 – Estimated Location and Depths for Excavate and Replace

<u>Boring</u>	<u>Stationing</u>	<u>Problem Unstable/ Unsuitable</u>	<u>Approximate Depth of Excavate and Replace (in)</u>
B-001-0-24 & B-002-0-24	10+30 to 16+50	Unstable	12
B-003-0-24 & B-004-0-24	16+50 to 25+25	Unstable	18*
B-005-0-24 to B-007-0-24	25+25 to 33+85	Unstable	12



*At borings B-003-0-24 and B-004-0-24, which were drilled near Stations 18+77 and 23+26, unstable soils are expected to be encountered. As an alternative to excavating to a depth of 18-inches and utilizing geotextile fabric, the over-excavation of the unstable subgrade to a depth of 12-inches and using a multi-axial geogrid per Items 204 and 712.15 and Geotechnical Design Manual (GDM) Section 600 may be considered.

Furthermore, as an alternative to the over-excavation and replace depths in Table 3, chemical stabilization using lime would be an option for this project. Per the Subgrade Analysis, the recommended depth for chemical stabilization is 14 inches.

According to ODOT GDM Section 605, 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 stabilization). A cost analysis of the options should be evaluated along with considering the presence of shallow underground utilities and the maintenance of traffic.

B. Site Preparation and Earthwork Recommendations

General construction and earthwork recommendations are provided below. Site preparation and earthwork should be performed in accordance with the ODOT Construction and Material Specifications.

1. Embankments for roadway construction should follow ODOT Specifications, Section 203 and related sections.
2. During construction, adequate drainage should be provided on the surface of the exposed soils. Absorption of heavy rainfall, accumulations of water and heavy construction traffic may result in softening these soils, hence, severely weakening the subgrade soils.
3. Compaction of the subgrade materials should be performed in accordance with ODOT Item 204. Any soft soils encountered during the compaction operations which will not readily compact should be removed and replaced with engineered fill.
4. The side slopes should be seeded and mulched as soon as possible to allow vegetation growth to develop and minimize or limit erosion, sloughing and potential slope failure.
5. Temporary excavations in excess of 4.0 feet in depth should be sloped, benched or shored in accordance with OSHA regulations.



VII. CHANGED CONDITIONS

The evaluations, conclusions, and recommendations in this report are based on our interpretation of the field and laboratory data obtained during the exploration, our understanding of the project and our experience with similar sites and subsurface conditions using generally accepted geotechnical engineering practices. Although individual test borings are representative of the subsurface conditions at the boring locations on the dates drilled, they are not necessarily representative of the subsurface conditions between boring locations or subsurface conditions during other seasons of the year.

In the event that changes in the project are proposed, additional information becomes available, or if it is apparent that subsurface conditions are different from those provided in this report, CTL should be notified so that our recommendations can be modified, if required.

VIII. TESTING AND OBSERVATION

During the design process, it is recommended that CTL work with the project designers to confirm that the geotechnical recommendations are properly incorporated into the final plans and specifications, and to assist with establishing criteria for the construction observation and testing.

IX. CLOSING

The report was prepared by CTL Engineering, Inc. (Consultant) solely for the use of Client in accordance with an executed contract. The Client's use of or reliance on this report is limited by the terms and conditions of the contract and by the qualifications and limitations stated in the report. It is also acknowledged that the Client's use of and reliance of this report is limited for reasons which include: actual site conditions that may change with time; hidden conditions, not discoverable within the scope of the assessment, may exist at the site; and the scope of the investigation may have been limited by time, budget and other constraints imposed by the Client.

Neither the report, nor its contents, conclusions or recommendations, are intended for the use of any party other than the Client. Consultant and the Client assume no liability for any reliance placed on this report by such party. The rights of the Client under contract may not be assigned to any person or entity, without the consent of the Consultant which consent shall not be unreasonably withheld. This geotechnical report does not address the environmental conditions of the site. The Consultant is not responsible for consequences or conditions arising from facts that were concealed, withheld, or not fully disclosed at the time the assessment was conducted.

To the fullest extent permitted by law, the Consultant and Client agree to indemnify and hold each other, and their officers and employees harmless from and against claims, damages, losses and expenses arising out of unknown or concealed conditions. Furthermore, neither the Consultant nor its employees shall be liable to the Owner in an



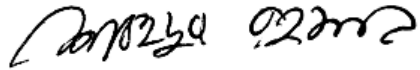
amount in excess of the available professional liability insurance coverage of the Consultant. In addition, Client and Consultant agree neither shall be liable for any special, indirect or consequential damages of any kind or nature.

The Consultant's services have been provided consistent with its professional standard of care. No other warranties are made, either expressed or implied.

Thank you for the opportunity to be of service to you on this project. If you have any questions regarding our services, please contact our office.

Respectfully Submitted,

CTL ENGINEERING, INC.



Shahedur Rahman, P.E.
Project Engineer



Frederick Schoen, P.E.
Project Manager
OH License E-66510



APPENDIX A

PROJECT AND BORING LOCATION PLANS **WITH SOIL PROFILE SHEET**



PROJECT DESCRIPTION

THE PROJECT DESIGNATED AS, VAN-LEESON AVE PHASE 2, CONSISTS OF APPROXIMATELY 2,354 FEET OF FULL DEPTH RECONSTRUCTION OF LEESON AVENUE FROM JOHN BROWN ROAD TO ROSE DRIVE IN CITY OF VAN WERT, VAN WERT COUNTY, OHIO.

HISTORIC RECORDS

HISTORICAL GEOTECHNICAL RECORDS WERE SEARCHED IN ODOT'S TRANSPORTATION INFORMATION MAPPING SYSTEM (TIMS) FOR THE CURRENT ROADWAY ALIGNMENT. NO HISTORICAL GEOTECHNICAL RECORDS WERE FOUND.

GEOLOGY

ACCORDING TO THE OHIO DEPARTMENT OF NATURAL RESOURCES (ODNR), PHYSIOGRAPHIC REGIONS OF OHIO MAP, THE SITE IS LOCATED WITHIN THE REGION OF CENTRAL OHIO CLAYEY TILL PLAIN OF OHIO. THE PHYSIOGRAPHIC REGION IS DESCRIBED AS BEGING CLAYEY TILL; WITH INTERVENING FLAT-LYING GROUND MORAINES AND INTERMORAINAL LAKE BASINS; AND LIMITED SAND AND GRAVEL OUTWASH DEPOSITS.

SURFICIAL GEOLOGIC MAPPING (QUATERNARY GEOLOGY, OHIO DIVISION OF GEOLOGICAL SURVEY) INDICATES THAT THE OVERBURDEN SOIL INCLUDES LATE WISCONSINAN AGE GROUND MORAINE DEPOSITS. ACCORDING TO THE MAPPING OF BEDROCK GEOLOGY IN THE AREA, (BEDROCK GEOLOGY 24K, OHIO DIVISION OF GEOLOGICAL SURVEY), THE SURFICIAL SOIL DEPOSITS ACROSS THE SITE ARE UNDERLAIN BY SILURIAN AGE DOLOMITE WITH BROWNISH-BLACK TO GRAY SHALE LAMINAE OF TYMOCHTEE DOLOMITE FORMATION.

ACCORDING TO THE ODNR WEBSITE, NO MAPPED DEEP MINES ARE LOCATED WITHIN THE PROJECT AREA. ACCORDING TO ODNR'S KARST INTERACTIVE MAP WEBSITE, THERE ARE NO MAPPED KARST FEATURES AT THE SITE.

RECONNAISSANCE

A SITE VISIT WAS PERFORMED BY AN ENGINEER FROM CTL ON APRIL 12, 2024. THE SURROUNDING AREA IS RELATIVELY FLAT. THE PROJECT AREA IS LOCATED WITHIN RURAL AND COMMERCIAL SETTINGS WITH A MUNICIPAL PARK LOCATED ALONG THE NORTH SIDE OF LEESON AVE. AND THE COUNTY AIRPORT ALONG IT'S SOUTH SIDE. THE EXISTING PAVEMENT CONDITION IS MODERATE WITH LONGITUDINAL AND TRANSVERSE CRACKS THROUGHOUT THE PROJECT AREA. OVERHEAD UTILITIES (ELECTRIC AND TELECOMMUNICATIONS) WERE OBSERVED TO BE LOCATED THROUGHOUT THE PROJECT SITE. ADDITIONALLY, UNDERGROUND WATER AND GAS UTILITIES WERE OBSERVED TO BE LOCATED WITHIN THE PROJECT SITE DURING CTL'S RECONNAISSANCE.

SUBSURFACE EXPLORATION

SEVEN (7) SUBGRADE TEST BORINGS, IDENTIFIED AS B-001-0-24 THROUGH B-007-0-24 WERE DRILLED FOR THIS PROJECT ON MARCH 1, 2024. THE BORINGS WERE EXTENDED TO THE DEPTH OF 7.0 FEET BELOW GRADE.

THE BORINGS WERE PERFORMED WITH A TRACK MOUNTED DRILL RIG UTILIZING 4.00-INCH DIAMETER SOLID FLIGHT AUGERS (SFA). STANDARD PENETRATION TESTS (SPTS) WERE CONDUCTED USING A 140-POUND AUTOMATIC HAMMER, FALLING 30 INCHES, TO DRIVE 2-INCH O.D. THE HAMMER SYSTEM USED WAS CALIBRATED ON APRIL 1, 2024. THE ENERGY TRANSFER RATIO ASSOCIATED WITH THE AUTOMATIC SPT HAMMER WAS 79.5 PERCENT.

EXPLORATION FINDNGS

THE BORINGS EXHIBITED 7 TO 10 INCHES OF ASPHALT OVERLYING 0 TO 4 INCHES OF AGGREGATE SUBBASE AT THE SURFACE. BELOW THE SURFACE COVER, THE BORINGS ENCOUNTERED FINE GRAINED COHESIVE SOILS EXTENDING DOWN TO THE DRILLED DEPTHS. THE SOILS WERE DESCRIBED AS STIFF TO HARD, SILTY CLAY (A-6b), OR CLAY (A-7-6) AND EXHIBITING DAMP TO MOIST MOISTURE CONDITIONS.

GROUNDWATER WAS NOT ENCOUNTERED IN ANY OF THE TEST BORINGS DURING DRILLING OR AT THE COMPLETION OF DRILLING OPERATIONS.

SPECIFICATIONS

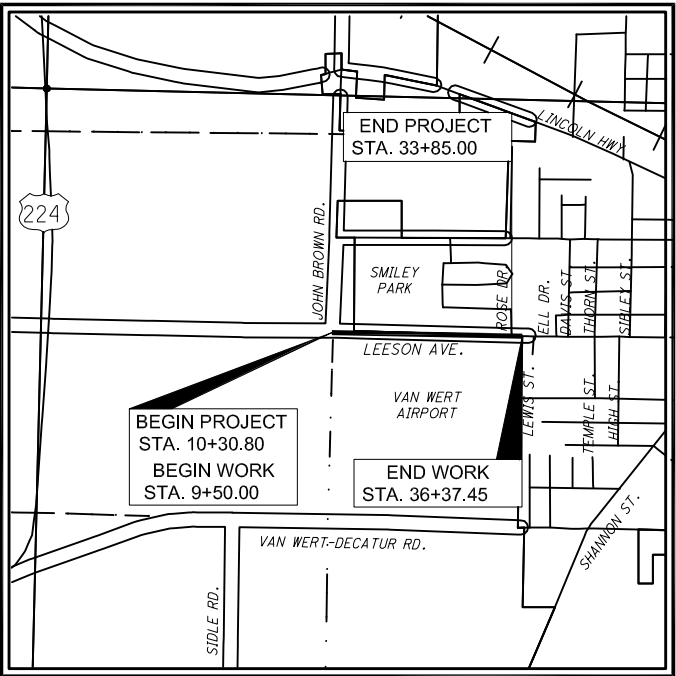
THIS GEOTECHNICAL EXPLORATION WAS PERFORMED IN ACCORDANCE WITH THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, OFFICE OF GEOTECHNICAL ENGINEERING, SPECIFICATIONS FOR GEOTECHNICAL EXPLORATIONS, DATED JANUARY 2024.

AVAILABLE INFORMATION

THE SOIL, BEDROCK, AND GROUNDWATER INFORMATION COLLECTED FOR THIS SUBSURFACE EXPLORATION THAT CAN BE CONVENIENTLY DISPLAYED ON THE GEOTECHNICAL PROFILE SHEETS HAS BEEN PRESENTED. GEOTECHNICAL REPORTS, IF PREPARED, ARE AVAILABLE FOR REVIEW ON THE OFFICE OF CONTRACT SALES WEBSITE.

LEGEND

DESCRIPTION	ODOT CLASS	CLASSIFIED MECH./VISUAL	
<div><div></div></div> SILTY CLAY	A-6b (7)	1	5
<div><div></div></div> CLAY	A-7-6 (17)	13	9
	TOTAL	14	14
<div><div>XXXXX</div></div> PAVEMENT OR BASE = X = APPROXIMATE THICKNESS	VISUAL		
<div><div></div></div> EXPLORATION LOCATION - PLAN VIEW			
<div><div></div></div> DRIVE SAMPLE AND/OR ROCK CORE BORING PLOTTED TO VERTICAL SCALE ONLY. HORIZONTAL BAR INDICATES A CHANGE IN STRATIGRAPHY.			
WC	INDICATES WATER CONTENT IN PERCENT.		
N ₆₀	INDICATES STANDARD PENETRATION RESISTANCE NORMALIZED TO 60% DRILL ROD ENERGY RATIO.		
SS	INDICATES A SPLIT SPOON SAMPLE.		

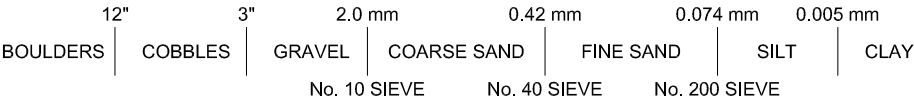


LOCATION MAP

SCALE IN MILES



PARTICLE SIZE DEFINITIONS



RECON. - FS 02/14/2024, 02/21/2024, 02/29/2024

DRILLING - CTL ENGINEERING, INC. 03/01/2024

DRAWN - SACHINA 10/14/2025

REVIEWED - FS 10/14/2025

DESIGN AGENCY



DESIGNER

N.K.S

REVIEWER

FS 10-14-25

PROJECT ID

120200

SUBSET

1

4

SHEET

-

-

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SUMMARY OF SOIL TEST DATA
VAN-LEESON AVE

EXPLORATION NO., STATION & OFFSET	FROM	TO	SAMPLE ID	N ₆₀	% REC	HP tsf	% GR	% CS	% FS	% SILT	% CLAY	LL	PL	PI	% WC	ODOT CLASS (GI)	ppm SO ₄		
B-001-0-24 STA. 10+49, 9' RT. LATITUDE = 40.866025 LONGITUDE = -84.610133	00.00-02.50		SS-1	15	44	4.50	2	2	11	33	52	49	22	27	20	A-7-6 (17)	<100		
	02.50-04.00		SS-2	11	56	3.25	2	3	9	32	54	50	21	29	24	A-7-6 (18)	-		
	04.00-05.50		SS-3	8	44	3.50			SAME AS SS-2						25	A-7-6 (VISUAL)	-		
	05.50-07.00		SS-4	12	100	3.00			SAME AS SS-2						30	A-7-6 (VISUAL)	-		
B-002-0-24 STA. 14+54, 8' LT. LATITUDE = 40.866075 LONGITUDE = -84.608672	00.00-02.50		SS-1	15	67	4.50	7	7	11	31	44	45	24	21	21	A-7-6 (13)	<100		
	02.50-04.00		SS-2	9	56	3.00	1	2	4	29	64	56	22	34	26	A-7-6 (19)	-		
	04.00-05.50		SS-3	8	22	1.75			SAME AS SS-2						28	A-7-6 (VISUAL)	-		
	05.50-07.00		SS-4	11	100	2.00			SAME AS SS-2						28	A-7-6 (VISUAL)	-		
B-003-0-24 STA. 18+77, 8' RT. LATITUDE = 40.866046 LONGITUDE = -84.607139	00.00-02.50		SS-1	11	100	2.75	0	2	9	36	53	51	24	27	26	A-7-6 (17)	<100		
	02.50-04.00		SS-2	5	56	2.25	3	3	9	32	53	51	21	30	25	A-7-6 (18)	-		
	04.00-05.50		SS-3	7	67	2.50			SAME AS SS-2						22	A-7-6 (VISUAL)	-		
	05.50-07.00		SS-4	12	67	2.00			SAME AS SS-2						31	A-7-6 (VISUAL)	-		
B-004-0-24 STA. 23+26, 9' LT. LATITUDE = 40.866105 LONGITUDE = -84.605513	00.00-02.50		SS-1	12	22	4.25	3	3	13	35	46	47	25	22	22	A-7-6 (14)	<100		
	02.50-04.00		SS-2	7	56	3.50	1	3	10	32	54	50	22	28	31	A-7-6 (17)	-		
	04.00-05.50		SS-3	5	33	1.25			SAME AS SS-2						32	A-7-6 (VISUAL)	-		
	05.50-07.00		SS-4	12	100	3.75	BROWN AND GRAY, SILTY CLAY, TRACE SAND, MOIST										22	A-6b (VISUAL)	-
B-005-0-24 STA. 27+27, 4' RT. LATITUDE = 40.866081 LONGITUDE = -84.604067	00.00-02.50		SS-1	12	33	4.50	3	3	10	35	49	47	23	24	23	A-7-6 (15)	<100		
	02.50-04.00		SS-2	9	67	3.00	2	3	11	33	51	49	19	30	25	A-7-6 (18)	-		
	04.00-05.50		SS-3	8	67	2.50			SAME AS SS-2						23	A-7-6 (VISUAL)	-		
	05.50-07.00		SS-4	13	100	1.00	BROWN AND GRAY, SILTY CLAY, LITTLE SAND, MOIST										29	A-6b (VISUAL)	-
B-006-0-24 STA. 31+28, 8' LT. LATITUDE = 40.866123 LONGITUDE = -84.602619	00.00-02.50		SS-1	11	67	4.50	24	11	13	24	28	38	19	19	24	A-6b (7)	<100		
	02.50-04.00		SS-2	9	78	2.50	0	2	9	29	60	53	21	32	25	A-7-6 (19)	-		
	04.00-05.50		SS-3	8	100	4.00			SAME AS SS-2						26	A-7-6 (VISUAL)	-		
	05.50-07.00		SS-4	15	100	2.00			BROWN, SILTY CLAY, LITTLE SAND, TRACE GRAVEL, MOIST.						26	A-6b (VISUAL)	-		
B-007-0-24 STA. 35+47, 10' LT. LATITUDE = 40.866139 LONGITUDE = -84.601104	00.00-02.50		SS-1	11	33	4.00	2	2	10	33	53	50	23	27	23	A-7-6 (17)	<100		
	02.50-04.00		SS-2	8	22	2.00	2	3	9	32	54	50	20	30	26	A-7-6 (18)	-		
	04.00-05.50		SS-3	9	78	2.75	BROWN AND GRAY, SILTY CLAY, LITTLE SAND, TRACE GRAVEL, MOIST										21	A-6b (VISUAL)	-
	05.50-07.00		SS-4	13	100	2.00			SAME AS SS-3						22	A-6b (VISUAL)	-		



GEOTECHNICAL PROFILE - ROADWAY
STA. 9+00.00 TO STA. 22+50.00



DESIGNER	
N.K.S	
REVIEWER	
FS	10-14-2
PROJECT ID	
120200	
SUBSET	TOTAL
3	4
SHEET	TOTAL
-	-

APPENDIX B

TEST BORING RECORDS

EXPLANATION OF TERMS AND SOIL DESCRIPTIONS

(ODOT Specifications of Geotechnical Explorations)

CONSISTENCY AND RELATIVE DENSITY DESCRIPTIONS

Descriptors for soil consistency used in this report are based upon the Standard Penetration Test (SPT), ASTM D 1587, with the penetration (N) values corrected to N_{60} , based upon the efficiency of the SPT Hammer (Energy Ratio) used for the soil sampling.

<u>NON-COHESIVE SOILS</u>		<u>COHESIVE SOILS</u>		
<u>Consistency</u>	<u>SPT-N_{60} (bpf)</u>	<u>Consistency</u>	<u>SPT-N_{60} (bpf)</u>	<u>Qu (tsf)</u>
Very Loose	< 5	Very Soft	< 2	< 0.25
Loose	5 – 10	Soft	2 – 4	0.25 – 0.5
Medium Dense	11 – 30	Medium Stiff	5 – 8	0.5 – 1.0
Dense	31 – 50	Stiff	9 – 15	1.0 – 2.0
Very Dense	> 50	Very Stiff	16 – 30	2.0 – 4.0
		Hard	> 30	> 4.0

COMPONENT MODIFIERS

<u>SOIL MODIFIERS</u>		<u>ORGANIC CONTENT</u>	
<u>Modifier</u>	<u>% by Weight</u>	<u>Modifier</u>	<u>% by Weight</u>
Trace	0 – 10	Organic	$LL_{oven}/LL_{air} < 0.75$
Little	10 – 20	Slightly	2 – 4
Some	20 – 35	Moderately	4 – 10
“And”	35 – 50	Highly	> 10

MOISTURE DESCRIPTIONS

<u>Terms</u>	<u>Non-Cohesive Soils</u>	<u>Cohesive Soils</u>
Dry	Moisture Absent	Powdery
Damp	Some Moisture	Below Plastic Limit
Moist	Damp to the Touch	Between Plastic and Liquid Limits
Wet	Visible Water	Above Liquid Limit

PARTICLE SIZE DESCRIPTIONS

<u>Component</u>	<u>AASHTO Particle Size</u>
Boulders	≥ 12 -in. (300 mm)
Cobbles	< 12-in. (300 mm) to 3-in. (75 mm)
Coarse Gravel	< 3-in. (75 mm) to $\frac{3}{4}$ -in. (19 mm)
Fine Gravel	< $\frac{3}{4}$ -in. (19 mm) to #10 Sieve (2.0 mm)
Coarse Sand	< #10 Sieve (2.0 mm) to #40 Sieve (0.42 mm)
Fine Sand	< #40 Sieve (0.42 mm) to #200 Sieve (0.074 mm)
Silt	< #200 Sieve (0.074 mm) to 0.005 mm
Clay	< 0.005 mm





CTL ENGINEERING, INC.

KEY TO SYMBOLS

PROJECT VAN-LEESON AVE.

PID 120200

OGE NUMBER 24050005WAP

PROJECT TYPE ROADWAY

LITHOLOGIC SYMBOLS (Unified Soil Classification System)



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

SAMPLER SYMBOLS

WELL CONSTRUCTION SYMBOLS



Soil Cuttings Backfill mixed with Bentonite
Pellets or Chips



Asphalt or Concrete Pavement Patch

ABBREVIATIONS

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

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION
▽ Water Level at Time
Drilling, or as Shown
▼ Water Level at End of
Drilling, or as Shown
▽ Water Level After 24
Hours, or as Shown

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT GDT - 9/29/25 11:05 - O:\PROJECT\2024\WAP-05\24050005WAP_CHOICE ONE ENGINEERING_VAN-LEESON AVE--PH-2-PID 1202006

PROJECT: VAN-LEESON AVE.		DRILLING FIRM / OPERATOR: CTL / J.S.		DRILL RIG: CME 550X TRACK RIG		STATION / OFFSET: 10+49, 9' RT.		EXPLORATION ID														
TYPE: ROADWAY		SAMPLING FIRM / LOGGER: CTL / M. HUGHES		HAMMER: AUTOMATIC HAMMER		ALIGNMENT: LEESON AVE.		B-001-0-24														
PID: 120200 SFN: N/A		DRILLING METHOD: 4.0-IN. SFA		CALIBRATION DATE: 4/1/24		ELEVATION: 781.6 (MSL) EOB: 7.0 ft.		PAGE														
START: 3/1/24 END: 3/1/24		SAMPLING METHOD: SPT		ENERGY RATIO (%): 79.5		LAT / LONG: 40.866025, -84.610133		1 OF 1														
MATERIAL DESCRIPTION AND NOTES			ELEV.	DEPTHS		SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG				ODOT CLASS (GI)	BACK FILL	
			781.6								GR	CS	FS	SI	CL	LL	PL	PI	WC			
ASPHALT (10")			780.8																			
SUBBASE (4")			780.4																			
HARD, BROWNISH GRAY, CLAY, SOME SILT, LITTLE SAND, TRACE GRAVEL, DAMP @2.5'; VERY STIFF, BROWN AND GRAY, MOIST				1	4																	
				2	5	15	44	SS-1	4.50	2	2	11	33	52	49	22	27	20	A-7-6 (17)			
				3	3	4	11	56	SS-2	3.25	2	3	9	32	54	50	21	29	24	A-7-6 (18)		
				4	3	4																
				5	3	8	44	SS-3	3.50	-	-	-	-	-	-	-	-	-	25	A-7-6 (V)		
@5.5'; TRACES OF SAND				6	4	5	12	100	SS-4	3.00	-	-	-	-	-	-	-	-	30	A-7-6 (V)		
			774.6	EOB		7	4															
NOTES: CAVED AT 6'-10"; LAT/LONG/ELEV FROM CONSULTANT SURVEY GRADE INSTRUMENTS																						
ABANDONMENT METHODS, MATERIALS, QUANTITIES: NOT RECORDED																						

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT GDT - 9/29/25 11:05 - O:\PROJECT\2024\WAP-05\24050005WAP_CHOICE ONE ENGINEERING_VAN-LEESON AVE--PH-2-PID 1202006

PROJECT: VAN-LEESON AVE.		DRILLING FIRM / OPERATOR: CTL / J.S.		DRILL RIG: CME 550X TRACK RIG		STATION / OFFSET: 14+54, 8' LT.		EXPLORATION ID													
TYPE: ROADWAY		SAMPLING FIRM / LOGGER: CTL / M. HUGHES		HAMMER: AUTOMATIC HAMMER		ALIGNMENT: LEESON AVE.		B-002-0-24													
PID: 120200 SFN: N/A		DRILLING METHOD: 4.0-IN. SFA		CALIBRATION DATE: 4/1/24		ELEVATION: 781.2 (MSL) EOB: 7.0 ft.		PAGE													
START: 3/1/24 END: 3/1/24		SAMPLING METHOD: SPT		ENERGY RATIO (%): 79.5		LAT / LONG: 40.866075, -84.608672		1 OF 1													
MATERIAL DESCRIPTION AND NOTES			ELEV.	DEPTHS		SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG				ODOT CLASS (GI)	BACK FILL
			781.2								GR	CS	FS	SI	CL	LL	PL	PI	WC		
ASPHALT (9")			780.5																		
HARD, DARK GRAY, CLAY, SOME SILT, LITTLE SAND, TRACE GRAVEL, DAMP				1		4															
				2		5	15	67	SS-1	4.50	7	7	11	31	44	45	24	21	21	A-7-6 (13)	
VERY STIFF, BROWNISH GRAY, CLAY, SOME SILT, TRACE SAND, TRACE GRAVEL, MOIST			778.7	3		3	9	56	SS-2	3.00	1	2	4	29	64	56	22	34	26	A-7-6 (19)	
@4.0'; STIFF				4		3															
				5		3	8	22	SS-3	1.75	-	-	-	-	-	-	-	-	28	A-7-6 (V)	
@5.5'; VERY STIFF				6		5															
			774.2	7		4	11	100	SS-4	2.00	-	-	-	-	-	-	-	-	28	A-7-6 (V)	
				EOB																	
NOTES: LAT/LONG/ELEV FROM CONSULTANT SURVEY GRADE INSTRUMENTS																					
ABANDONMENT METHODS, MATERIALS, QUANTITIES: NOT RECORDED																					

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT GDT - 9/29/25 11:05 - O:\PROJECT\2024\WAP-05\24050005WAP_CHOICE ONE ENGINEERING_VAN-LEESON AVE--PH-2-PID 1202006

PROJECT: VAN-LEESON AVE.		DRILLING FIRM / OPERATOR: CTL / J.S.		DRILL RIG: CME 550X TRACK RIG		STATION / OFFSET: 18+77, 8' RT.		EXPLORATION ID											
TYPE: ROADWAY		SAMPLING FIRM / LOGGER: CTL / M. HUGHES		HAMMER: AUTOMATIC HAMMER		ALIGNMENT: LEESON AVE.		B-003-0-24											
PID: 120200 SFN: N/A		DRILLING METHOD: 4.0-IN. SFA		CALIBRATION DATE: 4/1/24		ELEVATION: 781.4 (MSL) EOB: 7.0 ft.		PAGE											
START: 3/1/24 END: 3/1/24		SAMPLING METHOD: SPT		ENERGY RATIO (%): 79.5		LAT / LONG: 40.866046, -84.607139		1 OF 1											
MATERIAL DESCRIPTION AND NOTES		ELEV.	DEPTHS	SPT/RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG				ODOT CLASS (GI)	BACK FILL
		781.4							GR	CS	FS	SI	CL	LL	PL	PI	WC		
ASPHALT (9")		780.7																	
VERY STIFF, GRAY, CLAY, 'AND' SILT, LITTLE SAND, MOIST			1	3															
			2	4	11	100	SS-1	2.75	0	2	9	36	53	51	24	27	26	A-7-6 (17)	
@2.5'; BROWN AND GRAY, SOME SILT, TRACE GRAVEL			3	2	5	56	SS-2	2.25	3	3	9	32	53	51	21	30	25	A-7-6 (18)	
			4	2															
@5.0'; TRACE SAND			5	2	7	67	SS-3	2.50	-	-	-	-	-	-	-	-	22	A-7-6 (V)	
			6	2															
		774.4	EOB	4	12	67	SS-4	2.00	-	-	-	-	-	-	-	-	31	A-7-6 (V)	
			7	5															
NOTES: CAVED AT 6'-9"; LAT/LONG/ELEV FROM CONSULTANT SURVEY GRADE INSTRUMENTS																			
ABANDONMENT METHODS, MATERIALS, QUANTITIES: NOT RECORDED																			

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT GDT - 9/29/25 11:05 - O:\PROJECT\2024\WAP-05\24050005WAP_CHOICE ONE ENGINEERING_VAN-LEESON AVE--PH-2-PID 1202006

PROJECT: VAN-LEESON AVE.		DRILLING FIRM / OPERATOR: CTL / J.S.		DRILL RIG: CME 550X TRACK RIG		STATION / OFFSET: 23+26, 9' LT.		EXPLORATION ID													
TYPE: ROADWAY		SAMPLING FIRM / LOGGER: CTL / M. HUGHES		HAMMER: AUTOMATIC HAMMER		ALIGNMENT: LEESON AVE.		B-004-0-24													
PID: 120200 SFN: N/A		DRILLING METHOD: 4.0-IN. SFA		CALIBRATION DATE: 4/1/24		ELEVATION: 782.8 (MSL) EOB: 7.0 ft.		PAGE													
START: 3/1/24 END: 3/1/24		SAMPLING METHOD: SPT		ENERGY RATIO (%): 79.5		LAT / LONG: 40.866105, -84.605513		1 OF 1													
MATERIAL DESCRIPTION AND NOTES			ELEV.	DEPTHS		SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG				ODOT CLASS (GI)	BACK FILL
			782.8								GR	CS	FS	SI	CL	LL	PL	PI	WC		
ASPHALT (10")			782.0																		
SUBBASE (3")			781.7	1		2															
HARD, DARK GRAY, CLAY, 'AND' SILT, LITTLE SAND, TRACE GRAVEL, DAMP				2		4	12	22	SS-1	4.25	3	3	13	35	46	47	25	22	22	A-7-6 (14)	
			779.8	3		2	7	56	SS-2	3.50	1	3	10	32	54	50	22	28	31	A-7-6 (17)	
VERY STIFF, GRAY, CLAY, SOME SILT, LITTLE SAND, TRACE GRAVEL, MOIST @4.0'; STIFF				4		2															
			777.3	5		2	5	33	SS-3	1.25	-	-	-	-	-	-	-	-	32	A-7-6 (V)	
VERY STIFF, BROWN AND GRAY, SILTY CLAY, TRACE SAND, MOIST				6		2															
			775.8	7		4	12	100	SS-4	3.75	-	-	-	-	-	-	-	-	22	A-6b (V)	
				EOB																	
NOTES: CAVED AT 5'-6"; LAT/LONG/ELEV FROM CONSULTANT SURVEY GRADE INSTRUMENTS																					
ABANDONMENT METHODS, MATERIALS, QUANTITIES: NOT RECORDED																					

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT GDT - 9/29/25 11:05 - O:\PROJECT\2024\WAP-05\24050005WAP-CHOICE ONE ENGINEERING-VAN-LEESON AVE--PH-2-PID 1202006

PROJECT: VAN-LEESON AVE.		DRILLING FIRM / OPERATOR: CTL / J.S.		DRILL RIG: CME 550X TRACK RIG		STATION / OFFSET: 27+27, 4' RT.		EXPLORATION ID													
TYPE: ROADWAY		SAMPLING FIRM / LOGGER: CTL / M. HUGHES		HAMMER: AUTOMATIC HAMMER		ALIGNMENT: LEESON AVE.		B-005-0-24													
PID: 120200 SFN: N/A		DRILLING METHOD: 4.0-IN. SFA		CALIBRATION DATE: 4/1/24		ELEVATION: 782.8 (MSL) EOB: 7.0 ft.		PAGE													
START: 3/1/24 END: 3/1/24		SAMPLING METHOD: SPT		ENERGY RATIO (%): 79.5		LAT / LONG: 40.866081, -84.604067		1 OF 1													
MATERIAL DESCRIPTION AND NOTES			ELEV.	DEPTHS		SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG				ODOT CLASS (GI)	BACK FILL
			782.8								GR	CS	FS	SI	CL	LL	PL	PI	WC		
ASPHALT (8")			782.1																		
SUBBASE (3")			781.9																		
HARD, BROWNISH GRAY, CLAY, 'AND' SILT, LITTLE SAND, TRACE GRAVEL, DAMP @2.5'; VERY STIFF, SOME SILT, MOIST				1	2																
				2	4	12	33	SS-1	4.50	3	3	10	35	49	47	23	24	23	A-7-6 (15)		
				3	2	4	9	67	SS-2	3.00	2	3	11	33	51	49	19	30	25	A-7-6 (18)	
				4	3																
STIFF, BROWN AND GRAY, SILTY CLAY, LITTLE SAND, TRACE GRAVEL, MOIST			777.3	5	3	8	67	SS-3	2.50	-	-	-	-	-	-	-	-	-	23	A-7-6 (V)	
			775.8	6	3	4	13	100	SS-4	1.00	-	-	-	-	-	-	-	-	-	29	A-6b (V)
				7	6																
				EOB																	
NOTES: CAVED AT 6'-9"; LAT/LONG/ELEV FROM CONSULTANT SURVEY GRADE INSTRUMENTS																					
ABANDONMENT METHODS, MATERIALS, QUANTITIES: NOT RECORDED																					

[illegible]

NOTES: CAVED AT 6'-11"; LAT/LONG/ELEV FROM CONSULTANT SURVEY GRADE INSTRUMENTS

ABANDONMENT METHODS, MATERIALS, QUANTITIES: NOT RECORDED

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT GDT - 9/29/25 11:05 - O:\PROJECT\2024\WAP-05\24050005WAP_CHOICE ONE ENGINEERING_VAN-LEESON AVE--PH-2-PID 1202006

PROJECT: VAN-LEESON AVE.		DRILLING FIRM / OPERATOR: CTL / J.S.		DRILL RIG: CME 550X TRACK RIG		STATION / OFFSET: 35+47, 10' LT.		EXPLORATION ID													
TYPE: ROADWAY		SAMPLING FIRM / LOGGER: CTL / M. HUGHES		HAMMER: AUTOMATIC HAMMER		ALIGNMENT: LEESON AVE.		B-007-0-24													
PID: 120200 SFN: N/A		DRILLING METHOD: 4.0-IN. SFA		CALIBRATION DATE: 4/1/24		ELEVATION: 782.4 (MSL) EOB: 7.0 ft.		PAGE													
START: 3/1/24 END: 3/1/24		SAMPLING METHOD: SPT		ENERGY RATIO (%): 79.5		LAT / LONG: 40.866139, -84.601104		1 OF 1													
MATERIAL DESCRIPTION AND NOTES			ELEV.	DEPTHS		SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG				ODOT CLASS (GI)	BACK FILL
			782.4								GR	CS	FS	SI	CL	LL	PL	PI	WC		
ASPHALT (7")			781.8	1		3															
SUBBASE (3")			781.6	2		4	11	33	SS-1	4.00	2	2	10	33	53	50	23	27	23	A-7-6 (17)	
VERY STIFF, BROWNISH GRAY, CLAY, SOME SILT, LITTLE SAND, TRACE GRAVEL, DAMP @2.5'; BROWN AND GRAY, MOIST				3		2	8	22	SS-2	2.00	2	3	9	32	54	50	20	30	26	A-7-6 (18)	
			778.4	4		3															
VERY STIFF, BROWN AND GRAY, SILTY CLAY, LITTLE SAND, TRACE GRAVEL, MOIST				5		3	9	78	SS-3	2.75	-	-	-	-	-	-	-	-	21	A-6b (V)	
				6		3															
			775.4	6		4	13	100	SS-4	2.00	-	-	-	-	-	-	-	-	22	A-6b (V)	
				7		6															
				EOB																	
NOTES: CAVED AT 6'-2"; LAT/LONG/ELEV FROM CONSULTANT SURVEY GRADE INSTRUMENTS																					
ABANDONMENT METHODS, MATERIALS, QUANTITIES: NOT RECORDED																					

APPENDIX C

LABORATORY TEST RESULTS



OHIO DEPARTMENT OF TRANSPORTATION
DETERMINING SULFATE CONTENT IN SOILS
SUPPLEMENT 1122

Project C-R-S: VAN-Leeson Avenue Ph 2

PID No: 120200

Report Date: 3/28/2024

Consultant: CTL Engineering, Inc.

Technician: R. Voss



CTL ENGINEERING, INC.
102 COMMERCE DR. P.O. BOX 44
WAPAKONETA, OHIO 45895
PHONE: (419) 738-1447
FAX: (419) 738-7670

Sample or Boring ID	Station	Offset	Latitude & Longitude or State Plane Coordinates		Elevation	Soaking Time (hr)	Replicate Sample Readings						Sulfate Content (ppm)
							1		2		3		
							Dilution	Reading	Dilution	Reading	Dilution	Reading	
B-001-0-24, SS-1	10+48.7	9' Rt.	40.866025	-84.610133	780.6	20	20	< 5	20	< 5	20	< 5	< 100
B-002-0-24, SS-1	14+53.7	8' Lt.	40.866075	-84.608672	780.2	20	20	< 5	20	< 5	20	< 5	< 100
B-003-0-24, SS-1	18+77.0	8' Rt.	40.866046	-84.607139	780.4	20	20	< 5	20	< 5	20	< 5	< 100
B-004-0-24, SS-1	23+26.4	9' Lt.	40.866105	-84.605513	781.8	20	20	< 5	20	< 5	20	< 5	< 100
B-005-0-24, SS-1	27+27.3	4' Rt	40.866081	-84.604067	781.8	20	20	< 5	20	< 5	20	< 5	< 100
B-006-0-24, SS-1	31+27.6	8' Lt.	40.866123	-84.602619	781.8	20	20	< 5	20	< 5	20	< 5	< 100
B-007-0-24, SS-1	35+46.9	10' Lt.	40.866139	-84.601104	781.4	20	20	< 5	20	< 5	20	< 5	< 100

APPENDIX D

SUBGRADE ANALYSES

OHIO DEPARTMENT OF TRANSPORTATION**OFFICE OF GEOTECHNICAL ENGINEERING****PLAN SUBGRADES**
Geotechnical Design Manual Section 600**VAN-LEESON AVE. - PH. 2**
120200**Full-depth reconstruction of Leeson Ave. between John Brown Rd. to Rose Dr. (end of Ph. 1). Includes new curb, gutters, sidewalks, and drainage.****CTL Engineering, Inc.****Prepared By:** Gaurav Verma
Date prepared: Friday, September 26, 2025CTL Engineering, Inc.
102 Commerce Drive
P.O. Box 44
Wapakoneta, Ohio 45895
41-738-1447
ctlwapak@ctleng.com**NO. OF BORINGS:** 7**NO. OF DCPS:** 0



#	Boring ID	Alignment	Station	Add DCP Test Data Worksheets				Boring EL.	Proposed Subgrade EL.	Cut Fill
				Offset	Dir	Drill Rig	ER			
1	B-001-0-24	Leeson Ave.	10+49	9'	Rt	CME 550x Track	80	781.6	779.8	1.8 C
2	B-002-0-24	Leeson Ave.	14+54	8'	Lt	CME 550x Track	80	781.2	778.7	2.5 C
3	B-003-0-24	Leeson Ave.	18+77	8'	Rt	CME 550x Track	80	781.4	778.2	3.2 C
4	B-004-0-24	Leeson Ave.	23+26	9'	Lt	CME 550x Track	80	782.8	780.0	2.8 C
5	B-005-0-24	Leeson Ave.	27+27	4'	Rt	CME 550x Track	80	782.8	780.5	2.3 C
6	B-006-0-24	Leeson Ave.	31+28	8'	Lt	CME 550x Track	80	782.8	780.2	2.6 C
7	B-007-0-24	Leeson Ave.	35+47	10'	Lt	CME 550x Track	80	782.4	780.8	1.6 C

#	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 001-0 24	SS-1	1.0	2.5	-0.8	0.7	15	8	4.5	49	22	27	33	52	85	20	19	A-7-6	17	99					12" 204 Geotextile	
		SS-2	2.5	4.0	0.7	2.2	11		3.3	50	21	29	32	54	86	24	18	A-7-6	18			N ₆₀ & Mc		12"		
		SS-3	4.0	5.5	2.2	3.7	8		3.5							25	18	A-7-6	16							
		SS-4	5.5	7.0	3.7	5.2	12		3							30	18	A-7-6	16							
2	B 002-0 24	SS-1	1.0	2.5	-1.5	0.0	15	8	4.5	45	24	21	31	44	75	21	21	A-7-6	13	99					12" 204 Geotextile	
		SS-2	2.5	4.0	0.0	1.5	9		3	56	22	34	29	64	93	26	19	A-7-6	19			N ₆₀ & Mc		12"		
		SS-3	4.0	5.5	1.5	3.0	8		1.8							28	18	A-7-6	16			HP & Mc				
		SS-4	5.5	7.0	3.0	4.5	11		2							28	18	A-7-6	16							
3	B 003-0 24	SS-1	1.0	2.5	-2.2	-0.7	11	5	2.75	51	24	27	36	53	89	26	21	A-7-6	17	99					18" 204 Geotextile	
		SS-2	2.5	4.0	-0.7	0.8	5		2.25	51	21	30	32	53	85	25	18	A-7-6	18			N ₆₀ & Mc		21"		
		SS-3	4.0	5.5	0.8	2.3	7		2.5							22	18	A-7-6	16			N ₆₀ & Mc		15"		
		SS-4	5.5	7.0	2.3	3.8	12		2							31	18	A-7-6	16							
4	B 004-0 24	SS-1	1.0	2.5	-1.8	-0.3	12	5	4.3	47	25	22	35	46	81	22	22	A-7-6	14	99					18" 204 Geotextile	
		SS-2	2.5	4.0	-0.3	1.2	7		3.5	50	22	28	32	54	86	31	19	A-7-6	17			N ₆₀ & Mc		15"		
		SS-3	4.0	5.5	1.2	2.7	5		1.3							32	18	A-7-6	16			HP & Mc				
		SS-4	5.5	7.0	2.7	4.2	12		3.8							22	16	A-6b	16							
5	B 005-0 24	SS-1	1.0	2.5	-1.3	0.2	12	8	4.5	47	23	24	35	49	84	23	20	A-7-6	15	99			N ₆₀ & Mc		12"	12" 204 Geotextile
		SS-2	2.5	4.0	0.2	1.7	9		3	49	19	30	33	51	84	25	18	A-7-6	18			N ₆₀ & Mc		12"		
		SS-3	4.0	5.5	1.7	3.2	8		2.5							23	18	A-7-6	16			N ₆₀ & Mc				
		SS-4	5.5	7.0	3.2	4.7	13		1							29	16	A-6b	16							
6	B 006-0 24	SS-1	1.0	2.5	-1.6	-0.1	11	8	4.5	38	19	19	24	28	52	24	16	A-6b	7	99					12" 204 Geotextile	
		SS-2	2.5	4.0	-0.1	1.4	9		2.5	53	21	32	29	60	89	25	18	A-7-6	19			N ₆₀ & Mc		12"		
		SS-3	4.0	5.5	1.4	2.9	8		4							26	18	A-7-6	16			N ₆₀ & Mc				
		SS-4	5.5	7.0	2.9	4.4	15		2							26	16	A-6b	16							
7	B 007-0 24	SS-1	1.0	2.5	-0.6	0.9	11	8	4	50	23	27	33	53	86	23	20	A-7-6	17	99			N ₆₀ & Mc		12"	12" 204 Geotextile
		SS-2	2.5	4.0	0.9	2.4	8		2	50	20	30	32	54	86	26	18	A-7-6	18			N ₆₀ & Mc		12"		
		SS-3	4.0	5.5	2.4	3.9	9		2.8							21	16	A-6b	16							
		SS-4	5.5	7.0	3.9	5.4	13		2							22	16	A-6b	16							

PID: 120200

County-Route-Section: VAN-LEESON AVE. - PH. 2

No. of Borings: 7

Geotechnical Consultant: CTL Engineering, Inc.

Prepared By: Gaurav Verma

Date prepared: 9/26/2025

Chemical Stabilization Options		
320	Rubblize & Roll	No
206	Cement Stabilization	No
	Lime Stabilization	Option
206	Depth	14"

Excavate and Replace Stabilization Options	
Global Geotextile Average(N60L): Average(HP):	15" 0"
Global Geogrid Average(N60L): Average(HP):	0" 0"

Design CBR	4
---------------	---

% Samples within 3 feet of subgrade			
N ₆₀ ≤ 5	8%	HP ≤ 0.5	0%
N ₆₀ < 12	67%	0.5 < HP ≤ 1	0%
12 ≤ N ₆₀ < 15	13%	1 < HP ≤ 2	25%
N ₆₀ ≥ 20	0%	HP > 2	63%
M+	58%		
Rock	0%		
Unsuitable Soil	0%		

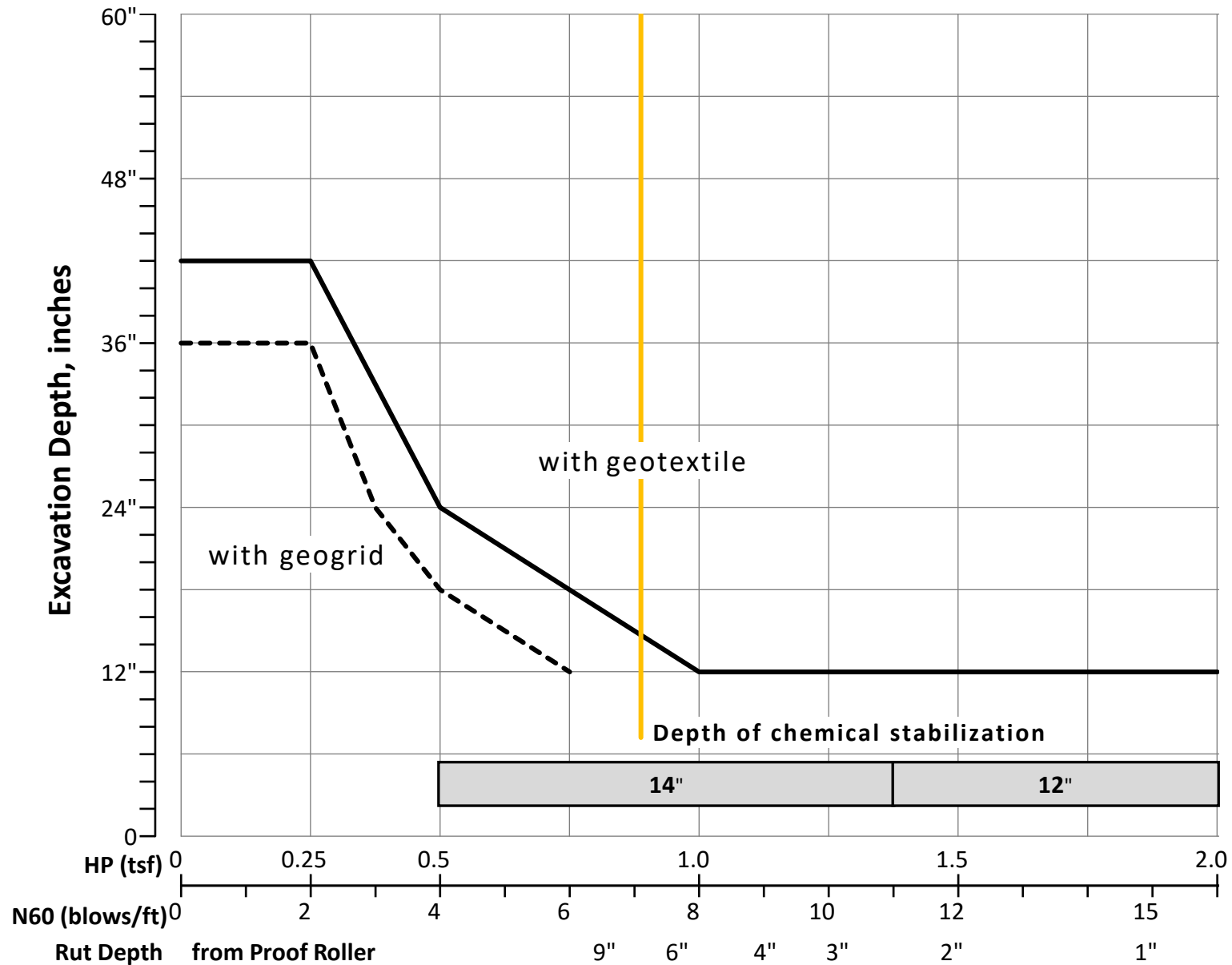
Excavate and Replace at Surface	
Average	12"
Maximum	12"
Minimum	12"

% Proposed Subgrade Surface	
Unstable & Unsuitable	61%
Unstable	61%
Unsuitable (Soil & Rock)	0%

	N ₆₀	N _{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M _C	M _{OPT}	GI
Average	10	7	2.78	51	21	29	32	54	86	26	18	17
Maximum	15	8	4.50	56	25	34	36	64	93	32	22	19
Minimum	5	5	1.00	38	19	19	24	28	52	20	16	7

Classification Counts by Sample																					
ODOT Class	UCF	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	0	0	0	0	0	0	0	0	0	5	0	19	0	0	24	
Percent	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	21%	0%	79%	0%	0%	100%	
% Rock Granular Cohesive	0%	0%	0%									100%									100%
Surface Class Count	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	20	0	0	23	
Surface Class Percent	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	13%	0%	87%	0%	0%	100%	

Fig. 600-1 – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
2.78	0.50	☐ HP
7.14	6.00	☐ N60L

Average HP

Average N_{60L}

