SUBGRADE EXPLORATION

Proposed Intersection Improvements

WYA-23-0.04, PID 109362

US Route 23 from Township Road 68 to Township Road 62

Antrim and Pitt Townships, Wyandot County, Ohio

Submitted to DGL Consulting Engineers, LLC
Date *August 2020*

Prepared by

TTL associates inc
Environmental, Geotechnical Engineering & Testing

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August 6, 2020 **TTL Project No. 1906601**

Mr. Richard J. McGuckin, P.E., CPESC
DGL Consulting Engineers, LLC
3455 Briarfield Boulevard, Suite E
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Draft Report
Subgrade Exploration
Proposed Intersection Improvements
WYA-23-0.04, PID 109362
US Route 23 from Township Road 68 to Township Road 62
Antrim and Pitt Townships, Wyandot County, Ohio

Dear Mr. McGuckin:

Following is the report of our Subgrade Exploration performed by TTL Associates, Inc. (TTL) for the referenced project. This study was performed in accordance with TTL Proposal No. 1906601R, dated January 27, 2020, and was authorized by DGL via a subconsultant service agreement, dated April 30, 2020, referencing prime agreement No. 34061.

This report contains the results of our study, 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 GB-1 "Plan Subgrades." In accordance with ODOT protocol, this report is being submitted as "Draft" pending questions and comments by DGL and ODOT. However, the report is considered complete and comprehensive with respect to the requested scope of work.

Should you have any questions regarding this report or require additional information, please contact our office.

Sincerely,

TTL Associates, Inc.

Luke G. Holmes, EIT
Staff Geotechnical Professional

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

c.c.: Ms. Amy Zimmerman – DGL Consulting Engineers, LLC

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DRAFT REPORT
SUBGRADE EXPLORATION
PROPOSED INTERSECTION IMPROVEMENTS
WYA-23-0.04, PID 109362
US ROUTE 23 FROM TOWNSHIP ROAD 68 TO TOWNSHIP ROAD 62
ANTRIM AND PITT TOWNSHIPS, WYANDOT COUNTY, OHIO

FOR

DGL CONSULTING ENGINEERS, LLC
3455 BRIARFIELD BOULEVARD, SUITE E
MAUMEE, OHIO 43537

SUBMITTED

AUGUST 6, 2020
TTL PROJECT NO. 1906601

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EXECUTIVE SUMMARY

This subgrade exploration report has been prepared for the proposed intersection improvements along US Route 23, at intersections from Township Road 68 (TR 68) to County Road 62/Township Road 62 (CR 62/TR 62), in Antrim and Pitt Townships, Wyandot County, Ohio. The site starts approximately 4 miles southeast of Upper Sandusky, Ohio, and ends at the boarder of Marion County. This exploration included 14 test borings and 8 stand-alone pavement cores, for the evaluation of existing pavement sections and subgrade conditions in areas of proposed roadway construction. Subgrade evaluations were performed in accordance with ODOT GB-1 "Plan Subgrades" (January 18, 2019). A summary of the conclusions and recommendations of this study are as follows:

1. The borings were performed in grass medians, existing pavement shoulders, and connectors. The borings performed in pavements generally encountered asphalt underlain by crushed stone. However, the two cores performed at the intersection of US 23 with CR 62/TR 62 encountered a layer of concrete between the asphalt and the crushed stone.

2. Granular existing **fill** materials were encountered in Boring B-016 underlying the pavement cross section to depth of 5 feet below existing grade. The granular fill materials consisted of predominantly gravel (ODOT A-1-a). Cohesive existing **fill** materials were encountered underlying the surface and granular fill materials in multiple borings. These cohesive fill materials consisted of predominantly silty clay (ODOT A-6b) and clay (ODOT A-7-6), and contained varying amounts of crushed stone.

3. Native soils consisted of predominantly medium stiff to very stiff cohesive soils encountered underlying the surface and fill materials. The cohesive soils consisted of silt and clay (ODOT A-6a), silty clay (ODOT A-6b), as well as clay (ODOT A-7-6). Interbedded **loose** to medium dense granular soils were encountered in half of the borings. The granular soils consisted of coarse and fine sand (ODOT A-3a).

4. Based on the limited data available, such as the soil characteristics and the groundwater conditions encountered in the borings, it is our opinion that the "normal" groundwater level may be encountered at depths on the order of 4 feet or greater below existing pavement grades. However, for the partial R-cut planned east of State Route 294, in the area of Borings B-010 through B-012, the "normal" water level may approach 2 feet below pavement grade (possibly due to the 8 to 10 feet of cut that was performed for the original US Route 23 construction in this area. Based on the "normal" groundwater level anticipated generally 4 feet or deeper below existing grades 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. If excavations extend into granular soils below the groundwater level, installation of multiple point wells would likely be required in addition to pumping from prepared sumps.

5. Based on the GB-1 analysis performed separately for each intersection, design CBR values of 6 percent and 7 percent were determined for the SR 294 and CR 113/TR 124 intersections, respectively, with planned partial R-cuts. It should be noted that the CBR determination by the GB-1 spreadsheet is based on an **average** Group Index of all the evaluated samples from the specific intersection. GB-1 analyses performed for the two cul-de-sac locations at the northern two intersections associated with this project indicated a design CBR value of 5 percent. The higher Group Indices associated with the cohesive soils that were prominent in the borings performed at these two intersections would correlate with a CBR value of 3 to 4 percent. Therefore, we recommend design consider a CBR value of 4 percent for the TR 65 and CR 62/TR 62 cul-de-sacs.

6. Based on the GB-1 analysis results, subgrade modification may consider global chemical stabilization (typically using lime to depths of 12 to 14 inches), or over-excavation and replacement with new granular engineered fill. This new pavement project includes relatively small areas of new pavement at various widespread intersections. Therefore, we anticipate over-excavation and replacement will be the more economical subgrade stabilization method for this project. If global chemical stabilization is still considered, it should be noted that the sulfate contents for the tested Boring B-011 subgrade soil samples were greater than 8,000 parts per million (ppm), which is not conducive for chemical stabilization in the area of this boring. GB-1 indicates that the District Geotechnical Engineer should be contacted to discuss options including stabilization as needed using excavate and replace methods.

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 subgrade exploration report has been prepared for the proposed intersection improvements along US Route 23, at intersections from Township Road 68 (TR 68) to County Road 62/Township Road 62 (CR 62/TR 62), in Antrim and Pitt Townships, Wyandot County, Ohio. The site starts approximately 4 miles southeast of Upper Sandusky, Ohio, and ends at the boarder of Marion County as shown on the Site Location Map (Plate 1.0).

This study was performed in accordance with TTL Proposal No. 1906601R, dated January 27, 2020, and was authorized by DGL via a subconsultant service agreement, dated April 30, 2020, referencing prime agreement No. 34061.

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 for the referenced project. To accomplish this, TTL performed 14 test borings and 8 stand-alone pavement cores, laboratory soil testing, a geotechnical engineering evaluation of the test results, and review of available geologic and soils data for the project area.

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 GB-1 “Plan Subgrades” (January 18, 2019) 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.
- Recommendations concerning soil and groundwater-related construction procedures such as subgrade preparation in accordance with ODOT GB-1 criteria, earthwork, pavement construction, and related field testing.

1.2 Proposed Construction

The project is planned to include removal of at-grade crossings along US 23 at TR 68, County Road 74 (CR 74), TR 72, TR 65, and CR 62/TR 62. At the US 23 intersections with State Route 294 (SR 294) and CR 113/TR 124, it is planned to provide partial R-cuts. Final site grades are anticipated to approximate existing site grades. Information regarding traffic loads was not provided at the time of this report.

We have assumed that final roadway grades will approximate existing roadway grades and consist of asphalt pavements. Existing pavement cross-sections encountered in the borings performed for this exploration were on the order of 11 to 32½ inches in thickness. For subgrade evaluations, we have assumed that the new pavement cross-section will be on the order of 18 inches (1½ feet) in thickness. Final roadway grades are assumed to approximate existing roadway grades.

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 in the Central Ohio Clayey Till Plains Region of the Till Plains Section. The project site is also located in part through Lake Basin deposits outside the Huron-Erie Lake Plains section. Within this section of Lake Basin deposits, the upper profile geology includes predominantly silty and sandy lacustrine deposits, formed in historic glacial lakes following retreat and melting of glacial ice. The lacustrine soils are underlain by glacial till deposits. Within Central Ohio Clayey Till Plains, the upper profile geology includes predominantly clayey Wisconsinan-age till over Silurian-age rock.

The lacustrine soils consist of predominantly sands and sandy silts, and may exhibit alternating thin layers of interbedded silts and clays known as varves. Varved soils are characteristic of lacustrine deposits, and the thin layering is typically attributed to seasonal or other cyclic variations of sedimentation in the lake waters.

The glacial till, also referred to as 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 till soil matrix. Additionally, seams of granular soils may be encountered within glacial tills. These granular seams may or may not be water bearing.

On the "Geologic Map of Ohio," the southeastern portion of the project site is mapped as bedrock consisting of Devonian-age Columbus and Delaware limestone and shale, transitioning to Monroe limestone in the northwestern portion of the project area. Bedrock across the site is mapped at Elevs. 850± to 820±, corresponding to depths varying from approximately 90 feet below existing grades in the southeast to 30 feet in the middle portion, then deeper to approximately 65 feet in the northwestern portion.

The USDA Natural Resource Conservation Service (NRCS) Web Soil Survey indicates that soils in the project area are predominantly mapped as a variety of loams at each of the intersections. Details of mapped near surface soils are summarized in the table below.

Table 2.1 NRCS Web Soil Survey Summary by Intersection					
Intersection/ Connector	**Identification**	**Comprised Of**	**Formation**	**Drainage**	**Permeability**
CR 62/ TR 62	Milford silty clay loam (Mh)	Lacustrine Deposits	Lake Plains	Poorly Drained	Moderately High
TR 65	Tiro silt loam (TrA)	Lacustrine Deposits overlying Wisconsin Till	Ground Moraines	Somewhat Poorly Drained	Moderately Low to Moderately High
CR 113/ TR 124	Glynwood silt loam (Gwg1B2) *Northwest of Intersection*	Wisconsin Till	Ground Moraines	Moderately Well Drained	Low to Moderately High
	Glynwood clay loam (Gwg5C2) *Southeast of Intersection*	Clayey Till			
SR 294	Blount silt loam (Blg1A1) *North of Intersection*	Wisconsin Till	Ground Moraines	Somewhat Poorly Drained	Low to Moderately High
	Glynwood silt loam (Gwg1B2) *South of Intersection*			Moderately Well Drained	
TR 72	Blount silt loam (Blg1A1)	Wisconsin Till	Ground Moraines	Somewhat Poorly Drained	Low to Moderately High
CR 74	Luray silty clay loam (Lu)	Lacustrine Deposits	Flats	Very Poorly Drained	Moderately High
TR 68	Glynwood clay loam (Gwd5C2)	Clayey Till	End Moraines	Moderately Well Drained	Low to Moderately High

2.2 Site Reconnaissance

TTL performed a site reconnaissance on May 8, 2020. The site is located in a predominantly rural/agricultural area.

In the areas of the intersections/connectors, the existing roadway pavements consisted of asphalt with longitudinal and transverse cracks. The cracks along US Route 23 (US 23) were generally sealed, however, cracks in the connectors were generally not sealed.

Grades along the pavement at individual intersections were generally flat but varied between intersections.

Review of the Ohio Department of Natural Resources (ODNR) Map of Mines indicates multiple active surface mines in the vicinity of the project area. With the closest mine approximately 1,000 feet north of the intersection of US 23 and County Road 124 (CR 124).

3.0 EXPLORATION

3.1 Historic Borings

Review of ODOT records for the project area indicated numerous historic auger borings had been performed along US Route 23 (US 23) in 1964 for WYA-23-0.00. Ten borings were performed near the intersections pertinent to this project. Since the historic borings were hand auger borings that did not include Standard Penetration Tests, they were not utilized for GB-1 evaluations for this project and are not shown on the test boring location plans. However, the cover sheet, as well as the pertinent plan-and-profile drawings from the historic Soil Profile, are included in Appendix C of this report.

The historic borings were not numerated. For designation within this report, these borings were numerated as B-CCC-D-EE as follows:

- B = Boring.
- CCC = Whole historic station number (181 for Sta. 181+50, etc.).
- D = Number of times offset from original boring location (0 since none were offset).
- EE = Date which the borings were performed (64 for 1964).

The locations of the historic borings located within and just beyond the extents of the project intersection areas are summarized in the following table:

Table 3.1. Historic Boring Information

Boring Number	US 23 Station (feet)	Approximate Offset (feet)	Ground Surface Elevation (feet)	Boring Termination Depth (feet)
B-181-0-64	181+50	CL	879.9	4
B-183-0-64	183+00	CL	876.9	5
B-188-0-64	188+65	CL	884.5	30
B-193-0-64	193+00	CL	882.6	22
B-227-0-64	227+00	CL	869.1	5
B-230-0-64	230+00	CL	884.2	5
B-233-0-64	233+50	CL	893.1	15
B-238-0-64	238+40	CL	882.6	10
B-240-0-64	240+75	CL	864.3	23½
B-297-0-64	297+58	CL	902.5	10

The soils encountered in the historic borings at the currently planned subgrade elevation consisted of predominantly cohesive soils including silt and clay (ODOT A-6a), silty clay (ODOT A-6b), and clay (ODOT A-7-6). Layers of sandy silt (ODOT A-4a) and silt (ODOT A-4b) soils were also encountered in multiple borings, albeit approximately 10 feet below currently planned top of pavement of deeper. Therefore, these materials are not anticipated to be within the upper 3 feet of the subgrade.

We have assumed that the information provided in the historic borings was accurate and correct, at the time of those respective explorations, but cannot guarantee as such. Additionally, subgrade soil conditions may have changed or may have been modified due to construction performed following completion of the historic subsurface explorations.

3.2 Project Exploration Program

This exploration included 14 test borings, 10 of which were extended through existing pavements and included pavement cores, as well as 8 stand-alone pavement cores. The stand-alone pavement cores were designated as Cores X-001-0-19 through X-006-0-19, X-019-0-19, and X-021-0-19, and the test borings were designated as Borings B-007-0-19 through B-018-0-19, B-020-0-19, and B-022-0-19. The cores and borings were performed by TTL during the period from May 19 to June 11, 2020. These cores and borings are fully designated as in accordance with ODOT protocol, however the "-0-19" portion of the nomenclature is generally omitted for ease of identification in the discussions within this report. The cores and borings were located in the field by TTL based on a site plan provided by DGL. The approximate locations of the cores and borings are shown on the Test Boring and Core Location Plans (Plates 2.1 through 2.3).

Stationing and offsets at the core and boring locations were estimated to the nearest 5-foot increment based on the site plan provided by DGL. Latitude, Longitude, and ground surface elevations were surveyed by TTL via a hand held GPS. The accuracy from the handheld GPS device was generally found to be approximately 2 to 6 inches horizontal, and approximately 4 to 12 inches vertical. These data are presented on the logs of test borings as well as in the table below.

Table 3.2 General Boring and Coring Location Information						
Boring (B)/ Core (X) Number	**Corresponding Intersection/ Connector**	**Alignment and Station (feet)**	**Offset (feet)**	**Ground Surface Elevation (feet)**	**Latitude (Degrees)**	**Longitude (Degrees)**
X-001-0-19	TR 68	US 23 (BACK)[1], Sta. 1054+00	70' LT	940.1	40.702689	-83.161688
X-002-0-19	TR 68	US 23 (BACK) [1], Sta. 1053+75	80' RT	940.8	40.702885	-83.161221
X-003-0-19	CR 74	US 23, Sta. 68+10	65' LT	912.2	40.716232	-83.177680
X-004-0-19	CR 74	US 23, Sta. 68+00	65' RT	911.7	40.716442	-83.177270
X-005-0-19	TR 72	US 23, Sta. 103+25	65' LT	891.3	40.723072	-83.186609
X-006-0-19	TR 72	US 23, Sta. 102+95	65' RT	891.8	40.723244	-83.186159
B-007-0-19	SR 294	US 23, Sta. 180+70	CL	881.1	40.737114	-83.207481
B-008-0-19	SR 294	US 23, Sta. 182+00	55' RT	883.1	40.737477	-83.207712
B-009-0-19	SR 294	US 23, Sta. 182+00	20' LT	883.4	40.737330	-83.207904
B-010-0-19	SR 294	US 23, Sta. 191+00	25' RT	874.6	40.739085	-83.210158
B-011-0-19	SR 294	US 23, Sta. 191+00	55' LT	874.3	40.738931	-83.210348
B-012-0-19	SR 294	US 23, Sta. 192+50	CL	870.5	40.739335	-83.210640
B-013-0-19	CR 113/TR 124	US 23, Sta. 227+05	CL	873.9	40.745739	-83.219786
B-014-0-19	CR 113/TR 124	US 23, Sta. 228+60	20' RT	880.1	40.746118	-83.220100
B-015-0-19	CR 113/TR 124	US 23, Sta. 228+60	55' LT	879.2	40.745948	-83.220265
B-016-0-19	CR 113/TR 124	US 23, Sta. 237+60	25' RT	881.6	40.747338	-83.222932
B-017-0-19	CR 113/TR 124	US 23, Sta. 237+60	55' LT	881.5	40.747153	-83.223062
B-018-0-19	CR 113/TR 124	US 23, Sta. 239+00	CL	877.1	40.747474	-83.223451
X-019-0-19	TR 65	US 23, Sta. 297+05	60' RT	905.3	40.760052	-83.234381
B-020-0-19	TR 65	US 23, Sta. 297+95	60' LT	904.5	40.760168	-83.234905
X-021-0-19	CR 62/TR 62	US 23, Sta. 294+75	60' RT	893.6	40.774462	-83.241156
B-022-0-19	CR 62/TR 62	US 23, Sta. 295+75	65' LT	892.3	40.774595	-83.241701

[1]Note: All core and borings reference the "AHEAD" stationing used in the site plan provided by DGL with the exception of Cores X-001 and X-002. These cores reference the "BACK" stationing. The equivalency equation provided by the plans is as follows: Station 323+27.93 BACK = Station 265+18.48 AHEAD (+) 5809.45 linear feet.

In accordance with the ODOT Specifications for Geotechnical Explorations (SGE), the borings were performed as ODOT Type A borings to a depth of at least 6 feet below top of subgrade, and were generally extended to depths on the order of 7 to 8½ feet below top of 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, especially at previously developed sites such as this site. 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

Cores were obtained using a nominal 4-inch diameter core barrel.

The test borings performed during this exploration were drilled with a GeoProbe® 7822DT with drilling capabilities. The borings were extended utilizing solid-stem augers. Samples were generally obtained continuously using 18-inch split-spoon (SS) sample drives. 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 GeoProbe® 7822DT was 97.0 percent, and was last calibrated on November 11, 2019. This energy ratio is limited to an upper bound of 90 percent for the purposes of analyses and reporting in accordance with the ODOT Specification for Geotechnical Explorations (SGE). The N_{60}-values are presented on the attached Logs of Test Borings.

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 was performed in accordance with GB-1 "Plan Subgrades" 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 at least two samples from each boring within 6 feet of the proposed subgrade. These test results are presented on the Logs of Test Borings and Grain Size Distribution sheets.

Sulfate content determinations (ODOT Supplement 1122) were performed on one sample from each boring, generally within 3 feet of the proposed subgrade. However, surface elevations for the borings performed in the US Route 23 median at the CR 113/TR 124 intersection were approximately 3 to 4½ feet lower than the anticipated subgrade elevation. In any case, a sample within the upper 3 feet of each of these borings was tested for sulfate content. These test results are presented on the Logs of Test Borings.

4.0 FINDINGS

4.1 General Site Conditions

At the time of this exploration, the project vicinity consisted of primarily rural and agricultural areas. Grades at individual intersections were relatively flat with elevation changes generally on the order of one foot or less. Over the entire project area, ground surface elevations varied from Elevs. 871± to 941±.

The borings were performed in grass medians, existing pavement shoulders, and connectors. The borings in grass medians encountered topsoil on the order of 3 to 4 inches in thickness. The borings performed in pavements encountered surface materials consisting of asphalt with thicknesses generally ranging from of 4 to 12½ inches, underlain by crushed stone with thicknesses of generally varying from 4 to 24½ inches. However, two cores performed at the intersection of US 23 with CR 62/TR 62 encountered a layer of concrete between the asphalt and the crushed stone, with thickness concrete on the order of 6½ inches and 9½ inches. Additionally, two borings/cores encountered a secondary pavement cross section underling the first. A summary of the encountered pavement sections is summarized in the following table.

Table 4.1. Summary of Encountered Pavement Section

Boring Number	Asphalt Thickness (inches)	Concrete Thickness (inches)	Crushed Stone Thickness (inches)
X-001	9½	-	5¾
X-002	7	-	8
X-003	11¼	-	6¾
X-004	9½	-	6
X-005	13½	-	6
X-006	12½	-	6½
B-008	4¾	-	7¼
B-009	7	-	19½
B-010	8	-	24½
B-011	2½ (Note 1)	-	- (Note 1)
B-014	4	-	10
B-015	6	-	21¼
B-016	8	-	21
B-017	5¾	-	8¼
X-019	2¾ (Note 2)	-	¾ (Note 2)
B-020	9¼	-	14¾
X-021	7	6½	4
B-022	6½	9½	5

"-" = Not encountered

Note: *See next page*

Note: 1 – Boring B-011 encountered a ¾ inch void underlying the asphalt, all of which was underlain with a second pavement cross-section consisting of 4½ inches of asphalt underlain by 16 inches of crushed stone.
2 – Core X-019: Underlying the upper indicated pavement cross-section, a second pavement cross-section was encountered consisting of 4½ inches of asphalt underlain by 5 inches of crushed stone.

Granular existing **fill** materials were encountered in Boring B-016 underlying the pavement cross section to depth of 5 feet below existing grade (Elev. 877±). The granular fill materials consisted of predominantly gravel (ODOT A-1-a). An SPT N_{60}-value of 18 blows per foot (bpf) and a moisture of 9 percent were determined for the recovered sample.

Cohesive existing **fill** materials were encountered underlying the surface and granular fill materials in the borings listed below. These cohesive fill materials consisted of predominantly silty clay (ODOT A-6b) and clay (ODOT A-7-6), and contained varying amounts of crushed stone. SPT N_{60}-values ranged from 6 to 14 bpf. Unconfined compressive strengths ranged from 3,000 pounds per square foot (psf) to 5,500 psf. Moisture contents ranged from 13 to 23 percent.

- In Boring B-008, cohesive fill extended to a depth of 2.5 feet (Elev. 881±).
- In Boring B-016, cohesive fill extended to a depth of approximately 6¼ feet (Elev. 875±) underlying granular fill materials.
- In Boring B-017, cohesive fill extended to a depth of approximately 2¾ feet (Elev. 879±).
- In Boring B-020, cohesive fill extended to a depth of approximately 3¼ feet (Elev. 901±).
- In Boring B-022, cohesive fill extended to a depth of 2½ feet (Elev. 890±).

4.2 General Soil Conditions

Based on the results of our field and laboratory tests, the subsoils encountered underlying the surface and fill materials can generally be characterized as predominantly native cohesive soils interbedded with isolated zones of granular soils.

Native soils consisted of predominantly medium stiff to very stiff cohesive soils encountered underlying the surface and fill materials in the borings listed in Table 4.2. The cohesive soils consisted of silt and clay (ODOT A-6a), silty clay (ODOT A-6b), as well as clay (ODOT A-7-6). SPT N_{60}-values generally varied from 6 to 30 blows per foot (bpf). However, higher SPT N_{60}-values were also encountered, indicative of a hard consistency. Unconfined compressive strengths varied from 1,000 pound per square foot (psf) to greater than 9,000 psf

(maximum reading obtainable via a calibrated hand penetrometer). Moisture contents varied from 13 to 30 percent.

Granular soils were encountered underlying the surface and fill materials, as well as interbedded within the native cohesive soils in the borings listed in Table 4.2. The granular soils ranged from consisted of coarse and fine sand (ODOT A-3a). SPT N_{60}-values ranged from 8 to 30 bpf, indicating **loose** to medium dense compactness. Moisture contents ranged from 16 to 24 percent.

Table 4.2. General Depths of Native Soils

Boring Number	Cohesive Soils		Interbedded Granular Soils	
	Approximate Depth Range (feet)	Approximate Elevation Range (feet)	Approximate Depth Range (feet)	Approximate Elevation Range (feet)
B-007	½ – 7½	881± – 874±	–	–
B-008	2½ – 7	881± – 876±	–	–
B-009	2¼ – 8½	881± – 875±	3 – 4¾	880± – 879±
B-010	2¾ – 8½	872± – 866±	5 – 6	870± – 869±
B-011	2 – 6	872± – 868±	6 – 8½	868± – 866±
B-012	1½ – 7½	869± – 863±	¼ – 1½	870± – 869±
B-013	¼ – 7½	874± – 866±	–	–
B-014	1¼ – 4½	879± – 876±	4½ – 7	876± – 873±
B-015	2¼ – 8½	877± – 871±	–	–
B-016	–	–	6¼ – 11½	875± – 870±
B-017	2¾ – 7	879± – 875±	–	–
B-018	¼ – 7½	877± – 870±	–	–
B-020	3¼ – 8½	901± – 896±	–	–
B-022	2½ – 8½	890± – 884±	4¼ – 4¾	888±

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

4.3 Groundwater Conditions

Groundwater was initially encountered during drilling operations in Borings B-007, B-009 through B-012, B-015, and B-016 at depths ranging from less than 1 foot below existing grade to approximately 7 feet. Groundwater was only observed upon completion of drilling in Borings B-007 and B-012. In these two borings, which were performed in the median, ponded water was present at the ground surface. It should be noted that the boreholes were drilled and backfilled within the same day, and stabilized water levels may not have occurred over this limited time period.

Based on the limited data available, such as the soil characteristics and the groundwater conditions encountered in the borings, it is our opinion that the "normal" groundwater level may be encountered at depths on the order of 4 feet or greater below existing pavement grades. However, for the partial R-cut planned east of State Route 294, in the area of Borings B-010 through B-012, the "normal" water level may approach 2 feet below pavement grade (possibly due to the 8 to 10 feet of cut that was performed for the original US Route 23 construction in this area. 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. In particular, "perched" water may be encountered in native granular soils, crushed stone pavement base materials, or granular fill materials that are underlain by relatively impermeable native cohesive soils. Therefore, groundwater conditions may vary at different times of the year from those encountered during our exploration.

4.4 Remedial Measures

Based on the GB-1 "Subgrade Analysis" worksheet (V14.5, 01/18/19), 7 of the 14 borings contained subgrade soils within the upper profile which indicated subgrade modification is likely to be required. Based on the GB-1 analysis results, subgrade modification may consider global chemical stabilization (typically using lime to depths of 12 to 14 inches), or over-excavation and replacement with new granular engineered fill. This new pavement project includes relatively small areas of new pavement at various widespread intersections. Therefore, we anticipate over-excavation and replacement will be the more economical subgrade stabilization method for this project. If global chemical stabilization is still considered, it should be noted that the sulfate contents for the tested Boring B-011 subgrade soil samples were greater than 8,000 parts per million (ppm), which is not conducive for chemical stabilization in the area of this boring. GB-1 indicates that the District Geotechnical Engineer should be contacted to discuss options including stabilization as needed using excavate and replace methods.

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

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 TTL.

5.1 GB-1 "Plan Subgrades" Evaluation

An evaluation of the subgrade soils was completed in general accordance with ODOT Geotechnical Bulletin GB-1 "Plan Subgrades" (January 18, 2019). As part of this evaluation, the ODOT "Subgrade Analysis" worksheet (V14.5, 01/18/19) was completed for the entire project as well as for individual intersections. A total of five "Subgrade Analysis" worksheets are attached to this report.

Existing pavement cross-sections encountered in the borings performed for this exploration were on the order of 11 to 32½ inches in thickness. For subgrade evaluations, we have assumed that the new pavement cross-section will be on the order of 18 inches (1½ feet) in thickness, and that final pavement grades will approximate existing pavement grades. Based on lower grades in the existing medians, we anticipate approximately ½ foot to 4½ feet of fill will be required to achieve design subgrade elevations.

Based on GB-1, soils classified as ODOT A-4b, A-2-5, 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. The subgrade materials encountered in the borings located within the project area included granular and cohesive soils consisting of ODOT A-1-a, A-1-b, A-2-6, A-3a, A-6a, A-6b, and A-7-6 soils.

Based on GB-1 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. Moisture contents for approximately half of the tested subgrade soil samples were greater than 3 percent above the optimum as determined using GB-1 criteria. It should be noted that approximately three quarters of the evaluated samples with moisture contents greater than 3 percent above optimum had moisture contents equal to or greater than 5 percent above optimum. Thus, where moisture contents were wet of optimum, they were appreciably wet of optimum. The encountered granular subgrade soils should be generally conducive for subgrade modification consisting of scarification, aeration, and in-place

re-compaction, provided weather conditions and construction schedule will allow for these activities. However, 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 GB-1 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, 7 of the 14 borings contained subgrade soils within the upper profile which indicated subgrade modification is likely to be required. Based on the GB-1 analysis results, subgrade modification may consider global chemical stabilization using lime (with cement being an additional alternative for the CR 113/TR 124 intersection), or over-excavation and replacement with new granular engineered fill. The GB-1 prescribed type and depth of global chemical stabilization for each intersection is summarized in the following table.

Table 5.1.A. GB-1 Recommended Type and Depth of Global Chemical Stabilization

Location	Chemical Type	Stabilization Depth (Inches)
SR 294	Lime	12
CR 113/TR 124	Lime or Cement	14
TR 65	Lime	12
CR 62/TR 62	Lime	14

As required by GB-1, sulfate content tests (ODOT Supplement 1122) were performed on a sample within the upper 3 feet of anticipated subgrade elevation from each boring. The sulfate content test results are summarized in the following table.

Table 5.1.B. Sulfate Content

Boring Number	Sulfate Content (ppm)	Boring Number	Sulfate Content (ppm)
B-007	<100	B-014	150
B-008	290	B-015	1,470
B-009	1,450	B-016	1,500
B-010	445	B-017	380
B-011	>8,000	B-018	1,470
B-012	<100	B-020	190
B-013	270	B-022	595

With the exception of the test results for Boring B-011, based on GB-1 criteria, sulfate content would not be restrictive to considering global chemical stabilization. However, this new pavement project includes relatively small areas of new pavement at various widespread intersections. Therefore, we anticipate over-excavation and replacement will be the more economical subgrade stabilization method for this project.

If global chemical stabilization is still considered, it should be noted that the sulfate contents for the tested Boring B-011 subgrade soil samples were greater than 8,000 parts per million (ppm). GB-1 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. GB-1 indicates that the District Geotechnical Engineer should be contacted to discuss options including stabilization as needed using excavate and replace methods.

A summary of the depths of undercut indicated by GB-1 analyses is presented in the following table.

Table 5.1.C. GB-1 Recommended Depth of Undercut and Replacement with Granular Engineered Fill

Intersection Location	Area at Intersection	Boring Number	GB-1 Recommended Depth of Undercut and Replacement with Granular Engineered Fill (inches)
SR 294 (South Partial R-cut)	Median	B-007	3
	NB Outside Shoulder	B-008	None
	SB Inside Shoulder	B-009	12
SR 294 (North Partial R-cut)	NB Inside Shoulder	B-010	None
	SB Outside Shoulder	B-011	12
	Median	B-012	None
CR 113/TR 124 (South Partial R-cut)	Median	B-013	None
	NB Outside Shoulder	B-014	12
	SB Inside Shoulder	B-015	None
CR 113/TR 124 (North Partial R-cut)	NB Inside Shoulder	B-016	None
	SB Outside Shoulder	B-017	16
	Median	B-018	None
TR 65	Cul-De-Sac	B-020	12
CR 62/TR 62	Cul-De-Sac	B-022	12

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. 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 GB-1 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.

5.2 Flexible (Asphalt) Pavement Design

Based on the GB-1 analysis, a design CBR of 6 percent was determined for the entire project, considering all borings performed at all four intersections. It should be noted that the CBR determination by the GB-1 spreadsheet is based on an average Group Index of all the evaluated samples from each intersection of the project. Additional GB-1 analyses were performed by separating the boring data into the four intersections, since they are relatively widespread. The design CBR values determined by GB-1 analyses performed at each individual intersection are summarized in the following table.

Table 5.2 GB-1 CBR Results by Intersection

Intersection/ Connector	Borings	GB-1 Calculated Design CBR
SR 294	B-007 through B-012	6
CR 113/TR 124	B-013 through B-018	7
TR 65	B-020	5 (TTL Recommends 4)
CR 62/TR 62	B-022	5 (TTL Recommends 4)

As indicated by the results tabulated based on separate project intersection locations, the design CBR value may range from 4 to 7.

Subgrade conditions at County Road 62/Township Road 62 (CR 62/TR 62) and Township Road 65 (TR 65) intersections are indicated to be slightly less favorable as compared to the overall project average design CBR of 6. For each of these intersections, Group Indices for the tested samples varied from 0 to 17, which would correlate with a CBR value of 3 to

12 percent. The higher Group Indices associated with the cohesive soils that were prominent in the borings performed at these intersections would correlate with a CBR value of 3 to 4 percent. Therefore, we recommend design consider a CBR value of 4 percent for the TR 65 and CR 62/TR 62 cul-de-sacs. It should be noted that GB-1 analyses indicate planned 12 inches of undercut and backfill using granular engineered fill based on the boring performed at each of these cul-de-sac locations. If the undercut and backfill with granular engineered fill is made a requirement for these two project intersections, the design CBR value of 5 percent could be utilized.

It should also be noted that the design CBR values are 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.

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.

5.3 Site and Subgrade Preparation

Site and subgrade preparation activities should conform to ODOT Construction and Materials Specifications (CMS) Item 204 specifications. 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.

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 subgrade soil moisture contents were wet of optimum, they were significantly wet of optimum. The encountered granular subgrade soils should be generally conducive for subgrade modification consisting of scarification, aeration, and in-place re-compaction, provided weather conditions and construction schedule will allow for these activities. However, scarification and aeration methods may not be feasible to achieve satisfactory proof rolling and stabilization of the cohesive subgrades.

The GB-1 analysis indicates options for "planned" subgrade modification consisting of global chemical stabilization (typically using lime to depths of 12 to 14 inches), or over-excavation of unsuitable subgrade soils and replacement with new granular engineered fill. This new pavement project includes relatively small areas of new pavement at various widespread intersections. Therefore, we anticipate over-excavation and replacement will be the more economical subgrade stabilization method for this project.

5.4 Groundwater Control

As previously mentioned, groundwater was initially encountered during drilling operations in Borings B-007, B-009 through B-012, B-015, and B-016 depths ranging from less than 1 foot below existing grade to approximately 7 feet. Groundwater was only observed upon completion of drilling in Borings B-007 and B-012. In these two borings, which were performed in the median, ponded water was present at the ground surface. Based on the limited data available, such as the soil characteristics and the groundwater conditions encountered in the borings, it is our opinion that the "normal" groundwater level may be encountered at depths on the order of 4 feet or greater below existing pavement grades. However, for the partial R-cut planned east of State Route 294, in the area of Borings B-010 through B-012, the "normal" water level may approach 2 feet below pavement grade (possibly due to the 8 to 10 feet of cut that was performed for the original US Route 23 construction in this area. It should be noted that "perched" water may be encountered in native granular soil, crushed stone pavement base materials, or granular fill materials that are underlain by relatively impermeable cohesive soils.

Based on the "normal" groundwater level anticipated generally 4 feet or deeper below existing grades at the site, adequate control of seasonal groundwater seepage, perched water, and surface water run-off into shallow temporary excavations extending even a couple feet below the groundwater level in cohesive soils should be achievable by minor dewatering systems, such as pumping from prepared sumps. If excavations extend below the groundwater level in granular soils, installation of multiple point wells would likely be required in addition to pumping from prepared sumps.

5.5 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 may include:

- OSHA Type A soils (cohesive soils with unconfined compressive strengths of 3,000 pounds per square foot (psf) or greater),
- OSHA Type B soils (cohesive soils with unconfined compressive strengths greater than 1,000 psf but less than or equal to 3,000 psf), and
- OSHA Type C soils (existing fill materials and granular soils).

Temporary excavations in Type A, B, and C soils should be constructed no steeper than ¾ horizontal to 1 vertical (¾H:1V), 1H:1V, and 1½H:1V, respectively. For situations where a higher strength soil overlies a lower strength soil, and the excavation extends into the lower strength soil, the slope of the entire excavation is governed by that required for the lower strength soil. In all cases, flatter slopes may be required if lower strength soils or adverse seepage conditions are encountered during construction.

For permanent excavations and slopes, we recommend that grades generally be no steeper than 3H:1V. It should be noted that ODOT routinely uses 2H:1V slopes for roadway embankments. While these steeper slopes may be used, it is our experience that the embankment faces on these slopes are more prone to erosion and sloughing.

5.6 Fill

Material for engineered fill or backfill required to achieve design grades should meet ODOT Item 203 "Embankment Fill" placement and compaction requirements. 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. Additionally, fill utilized to achieve design grades should consist of granular materials similar to, or better than, the on-site soils. Otherwise, a reduced CBR value may be required for pavement design.

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. However, 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 predominantly cohesive existing fill materials and native cohesive soils, although, existing granular fill material and native granular soils were encountered in approximately one third of the borings. For native granular soil, granular fill, or dense-graded aggregate pavement base materials, a vibratory smooth-drum roller would be required to provide effective compaction. For the cohesive soils, a sheepsfoot roller should provide the most effective soil 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

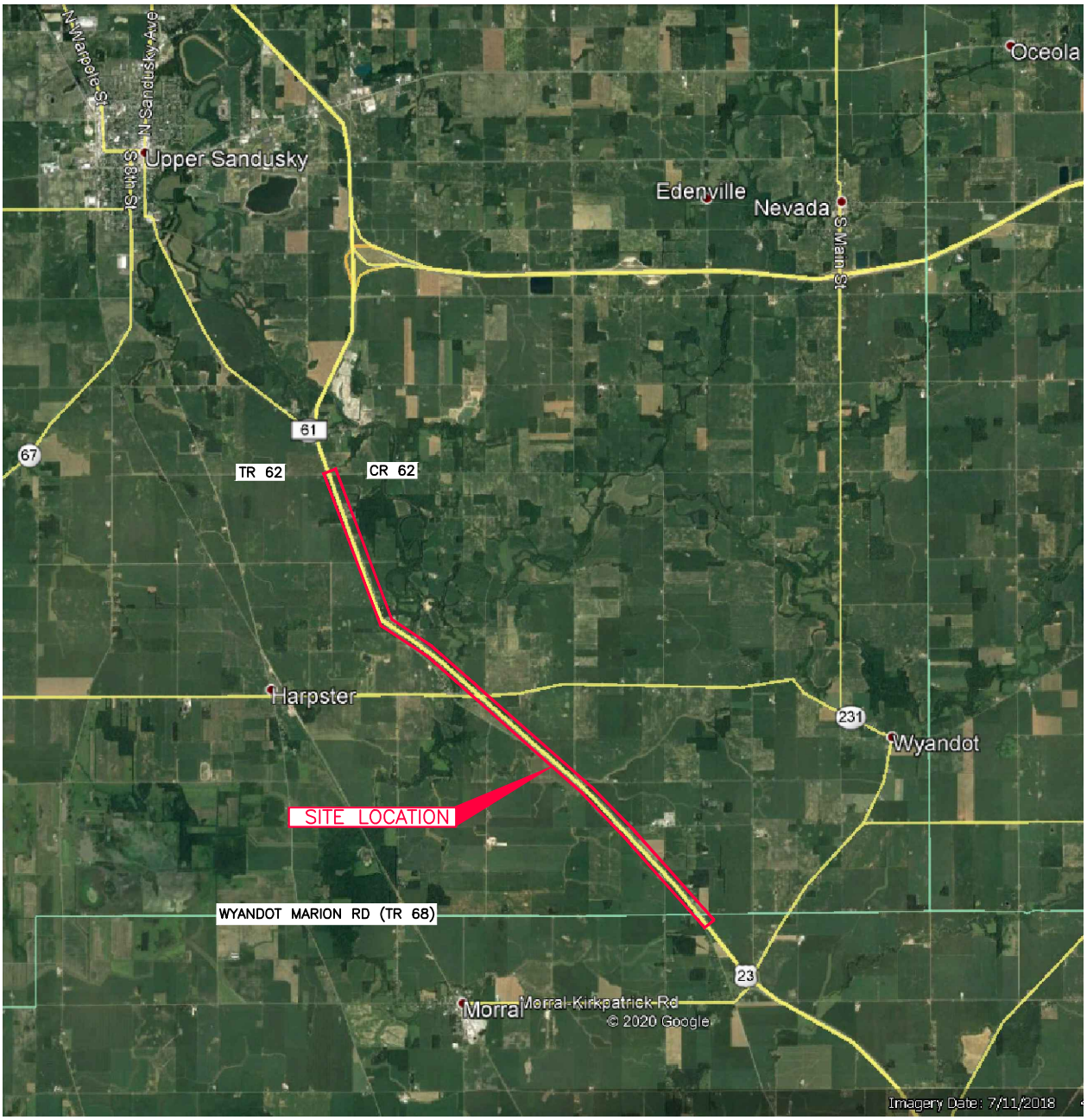
Our evaluation of the pavement design and construction conditions has been based on the data obtained during our field exploration, as well as the criteria in ODOT Geotechnical Bulletin GB-1 "Plan Subgrades" (January 18, 2019). The general subsurface conditions were based on interpretation of the subsurface 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. This is especially true for previously developed sites. Therefore, experienced geotechnical engineers should observe earthwork and pavement construction to confirm that the conditions anticipated in design are noted. Otherwise, TTL 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, TTL 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. TTL 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 10,000 20,000

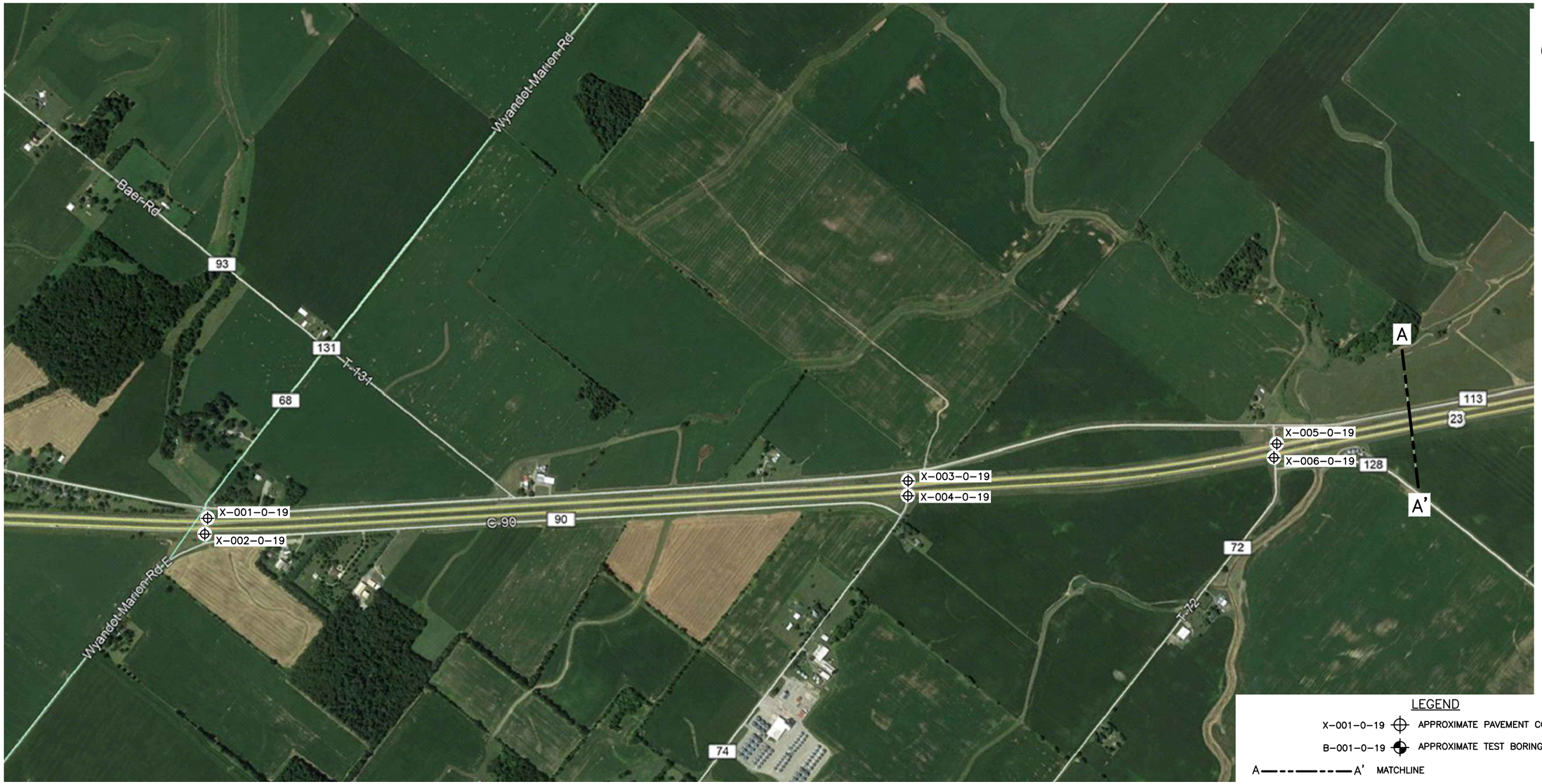
PLATE 1.0
SITE LOCATION MAP

PROPOSED INTERSECTION IMPROVEMENTS
WYA-23-0.04, PID 109362, US ROUTE 23 FROM TR 68 TO TR 62
ANTRIM AND PITT TOWNSHIPS, WYANDOT COUNTY, OHIO

PREPARED FOR
DGL CONSULTING ENGINEERS, LLC
MAUMEE, OHIO

DRAWN	TRR/6-22-20	CHECKED	LGH/7-13-20
REVISED		APPROVED	
JOB NO.	1906601		
DRAWING NUMBER	**1906601-01G**		

TTL associates inc
Environmental, Geotechnical Engineering & Testing



LEGEND

X-001-0-19 ⊕ APPROXIMATE PAVEMENT CORE LOCATION

B-001-0-19 ⊕ APPROXIMATE TEST BORING LOCATION

A ---- A' MATCHLINE

APPROXIMATE SCALE – FEET

0 1,000 2,000

PLATE 2.1
TEST BORING AND CORE LOCATION PLAN

PROPOSED INTERSECTION IMPROVEMENTS
WYA-23-0.04, PID 109362, US ROUTE 23 FROM TR 68 TO TR 62
ANTRIM AND PITT TOWNSHIPS, WYANDOTT COUNTY, OHIO

PREPARED FOR
DGL CONSULTING ENGINEERS, LLC
MAUMEE, OHIO

DRAWN TRR/6-22-20	CHECKED LGH/7-13-20
REVISED	APPROVED
JOB NO. 1906601	
DRAWING NUMBER **1906601-02.1G**	

TTL associates inc
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LEGEND

X-001-0-19 APPROXIMATE PAVEMENT CORE LOCATION

B-001-0-19 APPROXIMATE TEST BORING LOCATION

APPROXIMATE EXISTING BURIED GAS LINE LOCATION

A — — — A' MATCHLINE

B — — — B'

APPROXIMATE SCALE – FEET

0 1,000 2,000

PLATE 2.2
TEST BORING LOCATION PLAN

PROPOSED INTERSECTION IMPROVEMENTS
WYA-23-0.04, PID 109362, US ROUTE 23 FROM TR 68 TO TR 62
ANTRIM AND PITT TOWNSHIPS, WYANDOTT COUNTY, OHIO

PREPARED FOR
DGL CONSULTING ENGINEERS, LLC
MAUMEE, OHIO

DRAWN TRR/6-22-20	CHECKED LGH/7-13-20
REVISED	APPROVED
JOB NO. 1906601	
DRAWING NUMBER 1906601-02.2G	

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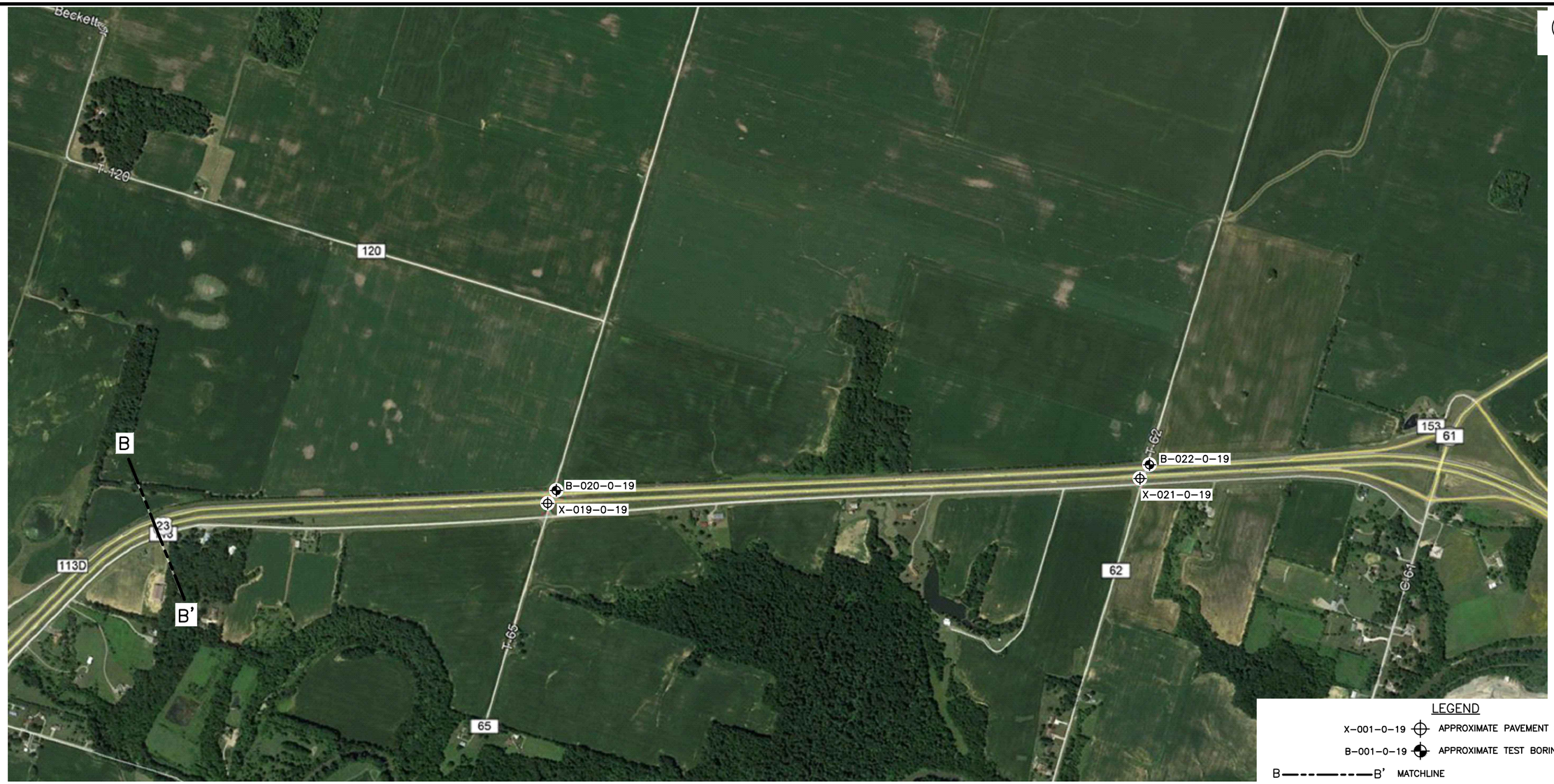

LEGEND

X-001-0-19 APPROXIMATE PAVEMENT CORE LOCATION

B-001-0-19 APPROXIMATE TEST BORING LOCATION

B——————B' MATCHLINE

APPROXIMATE SCALE – FEET

0 1,000 2,000

PLATE 2.3
TEST BORING LOCATION PLAN

PROPOSED INTERSECTION IMPROVEMENTS
WYA-23-0.04, PID 109362, US ROUTE 23 FROM TR 68 TO TR 62
ANTRIM AND PITT TOWNSHIPS, WYANDOTT COUNTY, OHIO

PREPARED FOR
DGL CONSULTING ENGINEERS, LLC
MAUMEE, OHIO

DRAWN TRR/6-22-20	CHECKED LGH/7-13-20
REVISED	APPROVED
JOB NO. 1906601	
DRAWING NUMBER **1906601-02.3G**	

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FIGURES

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 1054+00, 70' LT.	EXPLORATION ID X-001-0-19
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23 (BACK)	
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 940.1 (NAVD88) EOB: 1.3 ft.	PAGE 1 OF 1
START: 5/20/20 END: 5/20/20	SAMPLING METHOD: PAVEMENT CORE	ENERGY RATIO (%): 90*	LAT / LONG: 40.702689, -83.161688	

MATERIAL DESCRIPTION AND NOTES	ELEV. 940.1	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
ASPHALT - 9.5 INCHES	939.3																		
CRUSHED STONE - 5.75 INCHES	938.8	1																	
		EOB																	

NOTES: NONE

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

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 1053+75, 80' RT.	EXPLORATION ID X-002-0-19
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23 (BACK)	
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 940.8 (NAVD88) EOB: 1.3 ft.	PAGE 1 OF 1
START: 5/20/20 END: 5/20/20	SAMPLING METHOD: PAVEMENT CORE	ENERGY RATIO (%): 90*	LAT / LONG: 40.702885, -83.161221	

MATERIAL DESCRIPTION AND NOTES	ELEV. 940.8	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
ASPHALT - 7 INCHES	940.2																		
CRUSHED STONE - 8 INCHES	939.5	1																	
		EOB																	

NOTES: NONE

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

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 68+10, 65' LT.	EXPLORATION ID X-003-0-19
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23	
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 912.2 (NAVD88) EOB: 1.5 ft.	PAGE 1 OF 1
START: 5/21/20 END: 5/21/20	SAMPLING METHOD: PAVEMENT CORE	ENERGY RATIO (%): 90*	LAT / LONG: 40.716232, -83.177680	

MATERIAL DESCRIPTION AND NOTES	ELEV. 912.2	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
ASPHALT - 11.25 INCHES	911.2	1																	
CRUSHED STONE - 6.75 INCHES	910.7	EOB																	

NOTES: NONE

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

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 68+00, 65' RT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 911.7 (NAVD88) EOB: 1.3 ft.
START: 5/20/20 END: 5/20/20	SAMPLING METHOD: PAVEMENT CORE	ENERGY RATIO (%): 90*	LAT / LONG: 40.716442, -83.177270

EXPLORATION ID: X-004-0-19

PAGE: 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 911.7	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
ASPHALT - 9.5 INCHES	910.9																		
CRUSHED STONE - 6 INCHES	910.4	1																	
		EOB																	

NOTES: NONE

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

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 103+25, 65' LT.	EXPLORATION ID X-005-0-19
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23	
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 891.3 (NAVD88) EOB: 1.6 ft.	PAGE 1 OF 1
START: 5/19/20 END: 5/19/20	SAMPLING METHOD: PAVEMENT CORE	ENERGY RATIO (%): 90*	LAT / LONG: 40.723072, -83.186609	

MATERIAL DESCRIPTION AND NOTES	ELEV. 891.3	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
ASPHALT - 13.5 INCHES	890.2	1																	
CRUSHED STONE - 6 INCHES	889.7	EOB																	

NOTES: NONE

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

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 102+95, 65' RT.	EXPLORATION ID X-006-0-19
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23	
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 891.8 (NAVD88) EOB: 1.6 ft.	PAGE 1 OF 1
START: 5/21/20 END: 5/21/20	SAMPLING METHOD: PAVEMENT CORE	ENERGY RATIO (%): 90*	LAT / LONG: 40.723244, -83.186159	

MATERIAL DESCRIPTION AND NOTES	ELEV. 891.8	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
ASPHALT - 12.5 INCHES	890.8	1																	
CRUSHED STONE - 6.5 INCHES	890.2	EOB																	

NOTES: NONE

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

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 180+70, CL	EXPLORATION ID B-007-0-19
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23	
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 881.1 (NAVD88) EOB: 7.5 ft.	PAGE 1 OF 1
START: 5/19/20 END: 5/19/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90*	LAT / LONG: 40.737114, -83.207481	

MATERIAL DESCRIPTION AND NOTES	ELEV. 881.1	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
TOPSOIL - 4 INCHES	880.8	881.1																	
STIFF, BROWN, **CLAY**, SOME SILT, LITTLE SAND, AND TRACE ORGANICS, MOIST	879.1	1	0 3 3	9	100	SS-1	3.00	0	3	12	27	58	43	19	24	22	A-7-6 (14)	<100	
VERY STIFF, BROWN, **SILTY CLAY**, SOME SAND AND TRACE GRAVEL, MOIST		2	8 8 9	26	100	SS-2	4.25	-	-	-	-	-	-	-	-	20	A-6b (V)	-	
		3																	
		4	9 9 9	27	100	SS-3	4.25	4	13	20	27	36	29	12	17	15	A-6b (8)	-	
		5	8 9 8	26	100	SS-4	4.50	-	-	-	-	-	-	-	-	14	A-6b (V)	-	
		6																	
@6.5': HARD	873.6	7 EOB	8 12 12	36	100	SS-5	4.50	-	-	-	-	-	-	-	-	15	A-6b (V)	-	

NOTES: NONE

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

STANDARD ODOT LOG W/ SULFATES (8.5 X 11) - OH DOT.GDT - 8/4/20 23:30 - S:\PROJECTS\1906601.GPJ

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 182+00, 55' RT.	EXPLORATION ID B-008-0-19
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23	
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 883.1 (NAVD88) EOB: 7.0 ft.	PAGE 1 OF 1
START: 5/19/20 END: 5/19/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90*	LAT / LONG: 40.737477, -83.207712	

MATERIAL DESCRIPTION AND NOTES	ELEV. 883.1	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
ASPHALT - 4.75 INCHES	882.7																		
CRUSHED STONE - 7.25 INCHES	882.1																		
STIFF, TAN/BROWN, **SILTY CLAY**, LITTLE SAND AND CRUSHED STONE, DAMP **FILL**	880.6	1	6 6 3	14	78	SS-1	2.00	-	-	-	-	-	-	-	-	13	A-6b (V)	-	
STIFF, BROWN, **SILTY CLAY**, SOME SAND, MOIST	877.6	2 3	4 4 4	12	89	SS-2	4.00	0	10	15	25	50	39	16	23	21	A-6b (13)	290	
		4 5	4 4 4	12	100	SS-3	2.00	0	7	15	25	53	39	17	22	21	A-6b (13)	-	
HARD, BROWN, **SILTY CLAY**, LITTLE SAND AND TRACE GRAVEL, MOIST	876.1	6	5 5 6	17	100	SS-4	3.00	-	-	-	-	-	-	-	-	18	A-6b (V)	-	
		EOB 7																	

NOTES: NONE

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

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 182+00, 20' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 883.4 (NAVD88) EOB: 8.5 ft.
START: 5/22/20 END: 5/22/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90*	LAT / LONG: 40.737330, -83.207904

EXPLORATION ID B-009-0-19

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 883.4	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
ASPHALT - 7 INCHES	882.8	W 882.8																	
CRUSHED STONE - 19.5 INCHES	881.2	1	8 7 3	15	100	SS-1	NP	-	-	-	-	-	-	-	-	10	A-2-6 (V)	-	
STIFF, BROWN/GRAY, **SILTY CLAY**, SOME SAND AND TRACE GRAVEL, MOIST	880.4	2																	
MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, LITTLE SILT, CLAY, AND TRACE GRAVEL, MOIST	878.7	3	3 4 8	18	100	SS-2	2.25	1	10	15	24	50	32	9	23	17	A-6b (13)	-	
HARD, GRAY/BROWN, **CLAY**, SOME SILT AND LITTLE SAND, MOIST @5.5': SOME SAND	876.9	4 5	8 12 19	47	100	SS-3	3.75	0	6	13	25	56	43	16	27	22	A-7-6 (15)	1500	
HARD, BROWN, **SILTY CLAY**, SOME SAND AND TRACE GRAVEL, MOIST	874.9	6	15 16 17	50	100	SS-4	3.75	-	-	-	-	-	-	-	-	19	A-7-6 (V)	-	
		7	15 15 15	45	100	SS-5	4.50	-	-	-	-	-	-	-	-	16	A-6b (V)	-	
		8 EOB																	

NOTES: "NP" - NON PLASTIC

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

STANDARD ODOT LOG W/ SULFATES (8.5 X 11) - OH DOT.GDT - 8/4/20 23:30 - S:\PROJECTS\1906601.GPJ

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 191+00, 25' RT.	EXPLORATION ID B-010-0-19
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23	
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 874.6 (NAVD88) EOB: 8.5 ft.	PAGE 1 OF 1
START: 5/22/20 END: 5/22/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90*	LAT / LONG: 40.739085, -83.210158	

MATERIAL DESCRIPTION AND NOTES	ELEV. 874.6	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
ASPHALT - 8 INCHES	873.9																		
CRUSHED STONE - 24.5 INCHES	871.9	1	11 8 6	21	100	SS-1	NP	-	-	-	-	-	-	-	-	10	A-1-b (V)	-	
VERY STIFF, GRAY, **SILTY CLAY**, TRACE SAND, MOIST		2																	
@4': BROWN/GRAY, SOME SAND	869.6	3	9 7 9	24	100	SS-2	3.25	0	2	6	24	68	35	12	23	20	A-6b (13)	450	
MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, LITTLE SILT AND CLAY, MOIST	868.6	4																	
VERY STIFF, GRAY, **SILTY CLAY**, LITTLE SAND, MOIST	867.6	5	7 9 9	27	100	SS-3	1.00	-	-	-	-	-	-	-	-	25	A-6b (V)	-	
		6	5 7 9	24	100	SS-4	1.75	-	-	-	-	-	-	-	-	18	A-6b (V)	-	
VERY STIFF, GRAY, **SANDY SILT**, TRACE CLAY, WET	866.1	W 867.6 7 EOB 8	6 10 10	30	100	SS-5	NI	0	5	49	42	4	NP	NP	NP	21	A-4a (2)	-	

NOTES: "NP" - NON PLASTIC "NI" - NOT INTACT

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

STANDARD ODOT LOG W/ SULFATES (8.5 X 11) - OH DOT.GDT - 8/4/20 23:30 - S:\PROJECTS\1906601.GPJ

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 191+00, 55' LT.	EXPLORATION ID B-011-0-19
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23	
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 874.3 (NAVD88) EOB: 8.5 ft.	PAGE 1 OF 1
START: 5/19/20 END: 5/19/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90*	LAT / LONG: 40.738931, -83.210348	

MATERIAL DESCRIPTION AND NOTES	ELEV. 874.3	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
ASPHALT - 2.5 INCHES	874.1																		
VOID - 0.75 INCHES	874.0																		
ASPHALT - 4.5 INCHES	873.6																		
CRUSHED STONE - 16 INCHES	872.3	1	4 3 3	9	100	SS-1	4.50	-	-	-	-	-	-	-	-	15	A-6b (V)	>8000	
MEDIUM STIFF, GRAY, **SILTY CLAY**, TRACE SAND AND GRAVEL, MOIST		2																	
		3	3 3 4	11	100	SS-2	4.25	1	2	3	27	67	35	15	20	18	A-6b (12)	>8000	
		4																	
		5	3 3 5	12	100	SS-3	1.00	0	2	7	23	68	39	12	27	28	A-6b (15)	>8000	
	868.3	W 868.3 6																	
LOOSE, GRAY, **COARSE AND FINE SAND**, SOME SILT AND TRACE GRAVEL, WET			5 3 3	9	100	SS-4	NP	-	-	-	-	-	-	-	-	19	A-3a (V)	-	
		7																	
@7.5': MEDIUM DENSE			3 3 7	15	100	SS-5	NP	-	-	-	-	-	-	-	-	24	A-3a (V)	-	
@8': LITTLE CLAY	865.8	8 EOB																	

NOTES: "NP" - NON PLASTIC

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

STANDARD ODOT LOG W/ SULFATES (8.5 X 11) - OH DOT.GDT - 8/4/20 23:30 - S:\PROJECTS\11906601.GPJ

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 192+50, CL
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 870.5 (NAVD88) EOB: 7.5 ft.
START: 5/20/20 END: 5/20/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90*	LAT / LONG: 40.739335, -83.210640

EXPLORATION ID B-012-0-19

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 870.5	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
TOPSOIL - 3 INCHES	870.2	870.5																	
MEDIUM DENSE, DARK BROWN, **COARSE AND FINE SAND**, SOME SILT AND TRACE CLAY, WET	869.0	1	1 3 4	11	100	SS-1	NP	0	10	55	31	4	NP	NP	NP	21	A-3a (0)	<100	
STIFF, GRAY, **SILTY CLAY**, TRACE SAND, WET	867.3	2 3	4 5 3	12	100	SS-2	1.25	-	-	-	-	-	-	-	-	23	A-6b (V)	-	
STIFF, GRAY, **SILT AND CLAY**, LITTLE SAND, WET	866.0	4	3 3 4	11	100	SS-3	0.75	0	2	11	23	64	25	14	11	24	A-6a (8)	-	
MEDIUM STIFF, GRAY, **SILTY CLAY**, LITTLE SAND, MOIST	864.2	5 6	1 1 3	6	100	SS-4	0.50	-	-	-	-	-	-	-	-	21	A-6b (V)	-	
STIFF, GRAY, **SILTY CLAY**, SOME SAND AND TRACE GRAVEL, MOIST	863.0	7 EOB	3 3 6	14	100	SS-5	2.00	-	-	-	-	-	-	-	-	16	A-6b (V)	-	

NOTES: "NP" - NON PLASTIC

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

STANDARD ODOT LOG W/ SULFATES (8.5 X 11) - OH DOT.GDT - 8/4/20 23:31 - S:\PROJECTS\1906601.GPJ

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 227+05, CL	EXPLORATION ID B-013-0-19
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23	
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 873.9 (NAVD88) EOB: 7.5 ft.	PAGE 1 OF 1
START: 6/11/20 END: 6/11/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90*	LAT / LONG: 40.745739, -83.219786	

MATERIAL DESCRIPTION AND NOTES	ELEV. 873.9	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
TOPSOIL - 3 INCHES	873.6																		
MEDIUM STIFF, BROWN, **SILTY CLAY**, SOME SAND, TRACE GRAVEL, AND ORGANICS, DAMP	872.1	1	2 2 2	6	100	SS-1	>4.5	5	15	12	23	45	40	19	21	18	A-6b (11)	270	
STIFF, BROWN/GRAY, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, AND IRON OXIDE STAIN SEAM, DAMP	870.9	2	4 4 4	12	100	SS-2	>4.5	3	7	9	22	59	35	19	16	15	A-6b (10)	-	
VERY STIFF, BROWN/GRAY, **SILTY CLAY**, LITTLE SAND AND TRACE GRAVEL, DAMP		3	3 5 7	18	100	SS-3	>4.5	-	-	-	-	-	-	-	-	18	A-6b (V)	-	
@4.5': TRACE ORGANICS		4																	
		5	7 7 7	21	100	SS-4	2.75	-	-	-	-	-	-	-	-	16	A-6b (V)	-	
		6																	
	866.4	7 EOB	5 7 8	23	100	SS-5	3.00	-	-	-	-	-	-	-	-	15	A-6b (V)	-	

NOTES: NONE

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

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 228+60, 20' RT.	EXPLORATION ID B-014-0-19
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23	
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 880.1 (NAVD88) EOB: 7.0 ft.	PAGE 1 OF 1
START: 5/19/20 END: 5/19/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90*	LAT / LONG: 40.746118, -83.220100	

MATERIAL DESCRIPTION AND NOTES	ELEV. 880.1	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
ASPHALT - 4 INCHES	879.8																		
CRUSHED STONE - 10 INCHES	878.9																		
STIFF, BROWN, **SILT AND CLAY**, "AND" SAND, MOIST	877.1	1	5 3 3	9	100	SS-1	2.25	0	18	27	26	29	24	11	13	15	A-6a (5)	150	
VERY STIFF, GRAY/BROWN, **SILT AND CLAY**, "AND" SAND, MOIST @4': VERY STIFF, BROWN, TRACE GRAVEL, SHALE FRAGMENTS	875.6	2 3	3 5 6	17	100	SS-2	3.75	0	16	27	25	32	27	14	13	15	A-6a (6)	-	
MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, SOME CLAY AND TRACE GRAVEL, MOIST	873.1	4 5	6 7 11	27	100	SS-3	4.00	-	-	-	-	-	-	-	-	19	A-6a (V)	-	
	EOB	6 7	8 10 10	30	100	SS-4	NP	-	-	-	-	-	-	-	-	12	A-3a (V)	-	

NOTES: "NP" - NON PLASTIC

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

STANDARD ODOT LOG W/ SULFATES (8.5 X 11) - OH DOT.GDT - 8/4/20 23:31 - S:\PROJECTS\1906601.GPJ

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 228+60, 55' LT.	EXPLORATION ID B-015-0-19
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23	
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 879.2 (NAVD88) EOB: 8.5 ft.	PAGE 1 OF 1
START: 5/22/20 END: 5/22/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90*	LAT / LONG: 40.745948, -83.220265	

MATERIAL DESCRIPTION AND NOTES	ELEV. 879.2	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
ASPHALT - 6 INCHES	878.7	W 878.7																	
CRUSHED STONE - 21.25 INCHES	876.9	1	18 11 9	30	89	SS-1	NP	-	-	-	-	-	-	-	-	8	A-1-b (V)	-	
VERY STIFF, GRAY/BROWN, **SILT AND CLAY**, "AND" SAND, TRACE GRAVEL, ORGANICS, MOIST		2																	
		3	6 7 9	24	100	SS-2	3.50	1	21	29	30	19	24	11	13	13	A-6a (4)	-	
@4': GRAY, LITTLE SAND	873.7	4																	
		5	5 8 9	26	100	SS-3	3.25	-	-	-	-	-	-	-	-	20	A-6a (V)	-	
HARD, GRAY, **SILTY CLAY**, SOME SAND AND TRACE GRAVEL, MOIST		6	10 11 11	33	100	SS-4	1.50	1	13	9	25	52	35	9	26	22	A-6b (14)	1500	
@7': DARK BROWN	870.7	7																	
	EOB	8	12 11 11	33	100	SS-5	2.00	-	-	-	-	-	-	-	-	18	A-6b (V)	-	

NOTES: "NP" - NON PLASTIC

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

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 237+60, 25' RT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 881.6 (NAVD88) EOB: 11.5 ft.
START: 5/22/20 END: 5/22/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90*	LAT / LONG: 40.747338, -83.222932

EXPLORATION ID B-016-0-19

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 881.6	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
ASPHALT - 8 INCHES	880.9	W 880.9																	
CRUSHED STONE - 21 INCHES	879.1	1	12 11 11	33	89	SS-1	NP	65	17	7	10	1	NP	NP	NP	4	A-1-a (0)	-	
MEDIUM DENSE, BROWN, **GRAVEL**, SOME SAND,TRACE SILT. AND CLAY, WET **FILL**	876.6	3	7 6 6	18	89	SS-2	NP	-	-	-	-	-	-	-	-	9	A-1-a (V)	-	
		5	6 3 3	9	100	SS-3	2.50	12	11	16	26	35	31	11	20	18	A-6b (9)	1500	
MEDIUM STIFF, BROWN, **SILTY CLAY**, SOME SAND AND LITTLE CRUSHED STONE, MOIST **FILL**	875.3																		
MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, SOME CLAY, LITTLE SILT, AND TRACE GRAVEL, WET		6	4 4 4	12	100	SS-4	NP	-	-	-	-	-	-	-	-	18	A-3a (V)	-	
@7': SOME SILT, LITTLE CLAY	873.1	8	4 4 4	12	100	SS-5	NP	-	-	-	-	-	-	-	-	18	A-3a (V)	-	
LOOSE, BROWN, **COARSE AND FINE SAND**, SOME CLAY, LITTLE SILT, TRACE GRAVEL, WET		9	3 3 3	9	100	SS-6	NP	-	-	-	-	-	-	-	-	16	A-3a (V)	-	
@10': SOME SILT, LITTLE CLAY	870.1	11	2 2 3	8	100	SS-7	NP	-	-	-	-	-	-	-	-	16	A-3a (V)	-	
		EOB																	

NOTES: "NP" - NON PLASTIC

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

STANDARD ODOT LOG W/ SULFATES (8.5 X 11) - OH DOT.GDT - 8/4/20 23:31 - S:\PROJECTS\1906601.GPJ

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 237+60, 55' LT.	EXPLORATION ID B-017-0-19
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23	
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 881.5 (NAVD88) EOB: 7.0 ft.	PAGE 1 OF 1
START: 5/19/20 END: 5/19/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90*	LAT / LONG: 40.747153, -83.223062	

MATERIAL DESCRIPTION AND NOTES	ELEV. 881.5	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
ASPHALT - 5.75 INCHES	881.0																		
CRUSHED STONE - 8.25 INCHES	880.3																		
MEDIUM STIFF, BROWN, **SILTY CLAY**, LITTLE SAND, TRACE CRUSHED STONE, AND ORGANICS, MOIST **FILL**	878.7	1	4 2 2	6	100	SS-1	2.75	-	-	-	-	-	-	-	-	23	A-6b (V)	-	
STIFF, BROWN, **CLAY**, SOME SILT, TRACE SAND, AND GRAVEL, MOIST	877.3	3	3 4 5	14	100	SS-2	4.50	4	4	2	25	65	42	17	25	21	A-7-6 (14)	-	
VERY STIFF, BROWN, **CLAY**, SOME SILT, SAND, AND TRACE GRAVEL, DAMP	876.0	5	5 7 6	20	100	SS-3	2.75	-	-	-	-	-	-	-	-	16	A-7-6 (V)	-	
VERY STIFF, BROWN, **SILT AND CLAY**, SOME SAND AND TRACE GRAVEL, MOIST	874.5	6	6 7 6	20	100	SS-4	4.00	3	13	19	22	43	27	13	14	15	A-6a (8)	380	
		EOB 7																	

NOTES: NONE

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

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 239+00, CL	EXPLORATION ID B-018-0-19
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23	
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 877.1 (NAVD88) EOB: 7.5 ft.	PAGE 1 OF 1
START: 6/11/20 END: 6/11/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90*	LAT / LONG: 40.747474, -83.223451	

MATERIAL DESCRIPTION AND NOTES	ELEV. 877.1	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
TOPSOIL - 4 INCHES	876.8																		
STIFF, BROWN, **SILTY CLAY**, SOME SAND AND LITTLE GRAVEL, MOIST		1	3 3 3	9	100	SS-1	3.25	-	-	-	-	-	-	-	-	20	A-6b (V)	-	
		2	3 4 4	12	100	SS-2	3.25	13	9	12	20	46	36	18	18	21	A-6b (9)	1500	
	874.1	3																	
STIFF, BROWN, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, AND IRON OXIDE STAIN SEAM, MOIST		4	2 4 5	14	100	SS-3	1.50	4	7	12	23	54	34	17	17	26	A-6b (11)	-	
		5	5 5 5	15	100	SS-4	4.25	-	-	-	-	-	-	-	-	17	A-6b (V)	-	
@6.5': VERY STIFF, DAMP		6	5 7 8	23	100	SS-5	4.00	-	-	-	-	-	-	-	-	16	A-6b (V)	-	
	869.6	7 EOB																	

NOTES: NONE

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

STANDARD ODOT LOG W/ SULFATES (8.5 X 11) - OH DOT.GDT - 8/4/20 23:31 - S:\PROJECTS\1906601.GPJ

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 297+05, 60' RT.	EXPLORATION ID X-019-0-19
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23	
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 905.3 (NAVD88) EOB: 1.1 ft.	PAGE 1 OF 1
START: 5/21/20 END: 5/21/20	SAMPLING METHOD: PAVEMENT CORE	ENERGY RATIO (%): 90*	LAT / LONG: 40.760052, -83.234381	

MATERIAL DESCRIPTION AND NOTES	ELEV. 905.3	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
ASPHALT - 2.75 INCHES	905.1																		
CRUSHED STONE - 0.75 INCHES	905.0																		
ASPHALT - 4.5 INCHES	904.6																		
CRUSHED STONE - 5 INCHES	904.2	EOB 1																	

NOTES: NONE

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

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 297+95, 60' LT.	EXPLORATION ID B-020-0-19
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23	
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 904.5 (NAVD88) EOB: 8.5 ft.	PAGE 1 OF 1
START: 5/19/20 END: 5/19/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90*	LAT / LONG: 40.760168, -83.234905	

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)	SO4 ppm	BACK FILL
ASPHALT - 9.25 INCHES	904.5																		
	903.7																		
CRUSHED STONE - 14.75 INCHES		1	5 4 3	11	89	SS-1	1.75	-	-	-	-	-	-	-	-	20	A-7-6 (V)	-	
	902.5	2																	
STIFF, BROWN/BLACK, **CLAY**, SOME SILT, LITTLE SAND, TRACE CRUSHED STONE, AND ORGANICS, MOIST **FILL**		3	4 4 4	12	100	SS-2	2.00	1	3	8	20	68	44	18	26	24	A-7-6 (15)	190	
	901.3																		
STIFF, BROWN/GRAY, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, AND ORGANICS, MOIST	900.5	4																	
VERY STIFF, BROWN/GRAY, **CLAY**, SOME SILT, LITTLE SAND, AND TRACE GRAVEL, MOIST		5	6 5 9	21	100	SS-3	2.50	2	5	8	25	60	44	14	30	22	A-7-6 (17)	-	
@5.5': GRAY/BROWN		6	10 8 8	24	100	SS-4	1.50	-	-	-	-	-	-	-	-	24	A-7-6 (V)	-	
		7	7 6 6	18	100	SS-5	2.50	-	-	-	-	-	-	-	-	24	A-7-6 (V)	-	
	896.0	8 EOB																	

NOTES: NONE

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

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 294+75, 60' RT.	EXPLORATION ID X-021-0-19
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23	
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 893.6 (NAVD88) EOB: 1.5 ft.	PAGE 1 OF 1
START: 5/21/20 END: 5/21/20	SAMPLING METHOD: PAVEMENT CORE	ENERGY RATIO (%): 90*	LAT / LONG: 40.774462, -83.241156	

MATERIAL DESCRIPTION AND NOTES	ELEV. 893.6	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
ASPHALT - 7 INCHES	893.0																		
CONCRETE - 6.5 INCHES	892.5	1																	
CRUSHED STONE - 4 INCHES	892.1	EOB																	

NOTES: NONE

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

PROJECT: WYA-23-00.04	DRILLING FIRM / OPERATOR: TTL / CW	DRILL RIG: GEOPROBE 7822DT	STATION / OFFSET: 295+75, 65' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: TTL / KKC	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: US 23
PID: 109362 SFN:	DRILLING METHOD: 3.5" SSA	CALIBRATION DATE: 11/11/19	ELEVATION: 892.3 (NAVD88) EOB: 8.5 ft.
START: 5/19/20 END: 5/19/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90*	LAT / LONG: 40.774595, -83.241701

EXPLORATION ID B-022-0-19

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 892.3	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
ASPHALT - 6.5 INCHES	891.8																		
CONCRETE - 9.5 INCHES	891.0																		
CRUSHED STONE - 5 INCHES	890.5																		
STIFF, BROWN/BLACK, **SILTY CLAY**, LITTLE SAND, TRACE CRUSHED STONE, AND ORGANICS, MOIST **FILL**	889.8	1	18 3 3	9	67	SS-1	1.50	-	-	-	-	-	-	-	-	22	A-6b (V)	-	
STIFF, BROWN/GRAY, **CLAY**, SOME SILT, TRACE SAND, AND ORGANICS, MOIST	888.0	2	2 3 4	11	100	SS-2	2.75	0	1	2	24	73	48	20	28	27	A-7-6 (17)	-	
LOOSE, BROWN, **COARSE AND FINE SAND**, LITTLE SILT, CLAY, AND GRAVEL, MOIST	887.6	3	3 2 3	8	100	SS-3	1.50	0	2	2	23	73	46	14	32	30	A-7-6 (17)	600	
MEDIUM STIFF, BROWN/GRAY, **CLAY**, SOME SILT, TRACE SAND, AND ORGANICS, MOIST	886.1	4																	
STIFF, GRAY/BROWN, **SILTY CLAY**, LITTLE SAND, MOIST	885.3	5	6 5 5	15	100	SS-4	1.75	-	-	-	-	-	-	-	-	27	A-6b (V)	-	
MEDIUM STIFF, BROWN, **SILTY CLAY**, LITTLE SAND, MOIST	883.8	6	3 2 3	8	100	SS-5	0.75	-	-	-	-	-	-	-	-	30	A-6b (V)	-	
		7																	
		8																	
		EOB																	

NOTES: NONE

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

STANDARD ODOT LOG W/ SULFATES (8.5 X 11) - OH DOT.GDT - 8/4/20 23:33 - S:\PROJECTS\1906601.GPJ

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)


A-1-A: Ohio DOT: A-1-a, gravel and/or stone fragments


A-1-B: Ohio DOT: A-1-b, gravel and/or stone fragments with sand


A-2-6: Ohio DOT: A-2-6, gravel and/or stone fragments with sand, silt and clay


A-3A: Ohio DOT: A-3a, coarse and fine sand


A-4A: Ohio DOT: A-4a, sandy silt


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


VOID: Ohio DOT: Underground Void

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 borings were drilled during the period from May 19 to June 11, 2020., utilizing solid-stem augers. Pavement cores were performed during this period using a nominal 4-inch diameter core barrel.

2. These logs are subject to the limitations, conclusions, and recommendations in the report and should not be interpreted separate from the report.

3. Stationing and offsets at the boring locations were estimated to the nearest 5-foot increment based on the site plan provided by DGL. Latitude, Longitude, and ground surface elevations were surveyed by TTL via a hand held GPS. The accuracy from the handheld GPS device was found to be approximately 2 to 6 inches horizontal, and approximately 4 to 12 inches vertical.

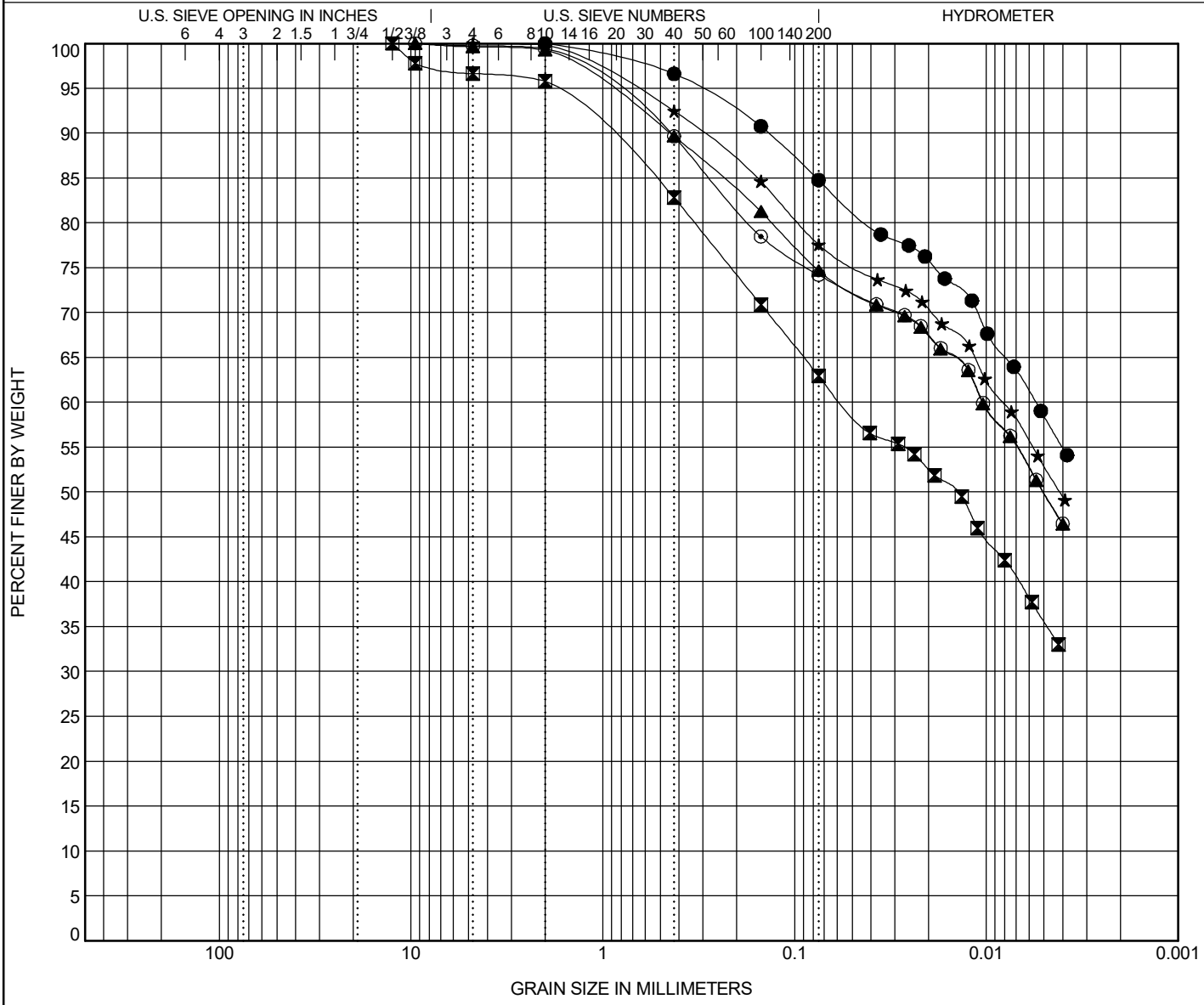
4. HP (tsf):
   Hand Penetrometer Readings.
   NP = Non-Plastic.
   NI = Not Intact

GRAIN SIZE DISTRIBUTION

OHIO DEPARTMENT OF TRANSPORTION
OFFICE OF GEOTECHNICAL ENGINEERING

PROJECT WYA-23-00.04 **PID** 109362

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-007-0-19	0.0	A-7-6 ~ LEAN CLAY with SAND(CL)	43	19	24
⊠	B-007-0-19	3.0	A-6b ~ SANDY LEAN CLAY(CL)	29	12	17
▲	B-008-0-19	2.5	A-6b ~ LEAN CLAY with SAND(CL)	39	16	23
★	B-008-0-19	4.0	A-6b ~ LEAN CLAY with SAND(CL)	39	17	22
⊙	B-009-0-19	2.5	A-6b ~ LEAN CLAY with SAND(CL)	32	9	23

Specimen Identification			D90	D50	D30	D10	%G	%CS	%FS	%M	%C	Cc	Cu
●	B-007-0-19	0.0	0.137				0	3	12	27	58		
⊠	B-007-0-19	3.0	1.001	0.014			4	13	20	27	36		
▲	B-008-0-19	2.5	0.448	0.005			0	10	15	25	50		
★	B-008-0-19	4.0	0.306	0.004			0	7	15	25	53		
⊙	B-009-0-19	2.5	0.449	0.005			1	10	15	24	50		

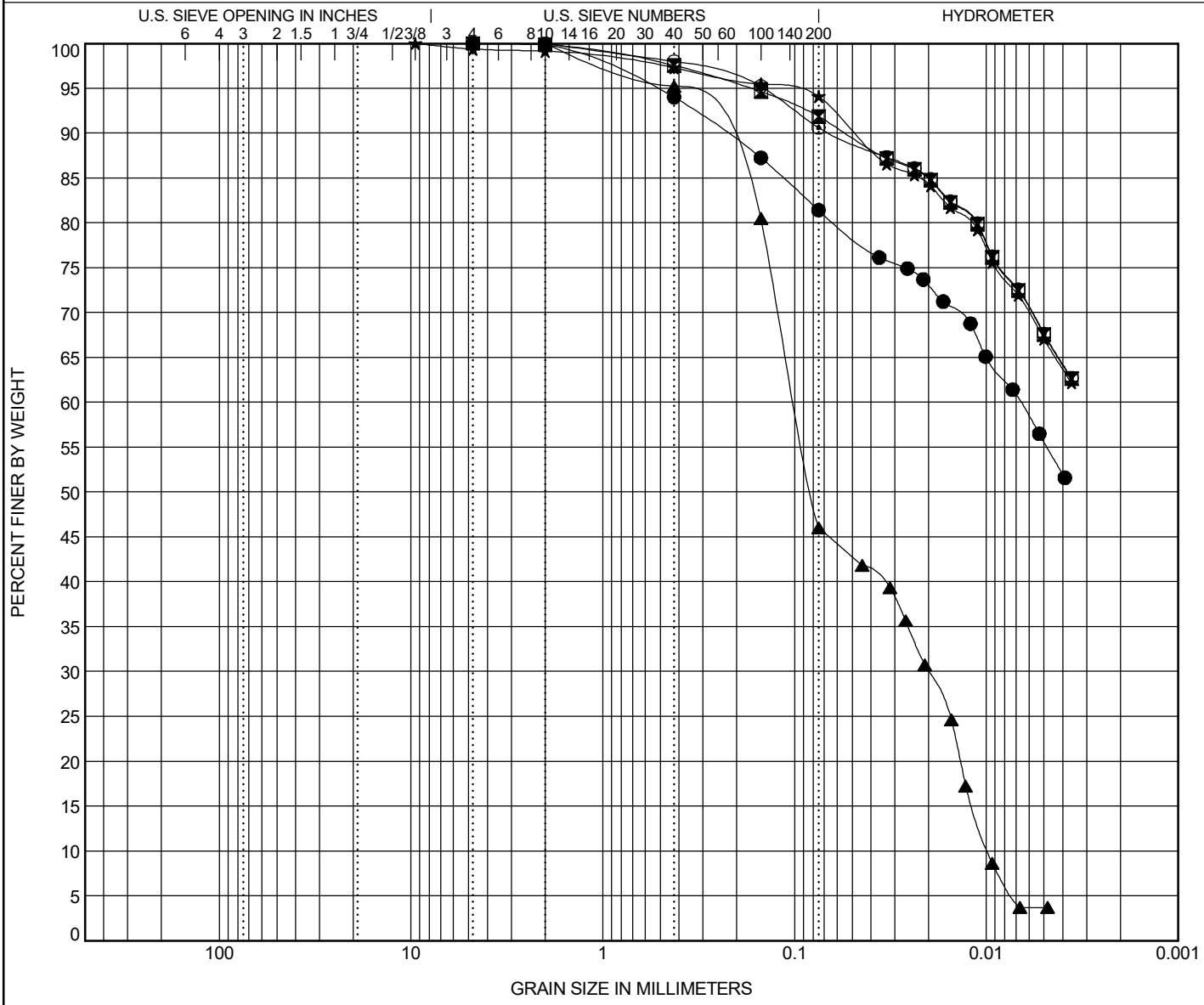
GRAIN SIZE - OH DOT.GDT - 7/27/20 21:07 - S:\PROJECTS\1906601.GPJ

GRAIN SIZE DISTRIBUTION

OHIO DEPARTMENT OF TRANSPORTION
OFFICE OF GEOTECHNICAL ENGINEERING

PROJECT WYA-23-00.04 **PID** 109362

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-009-0-19	4.0	A-7-6 ~ LEAN CLAY with SAND(CL)	43	16	27
⊠	B-010-0-19	2.5	A-6b ~ LEAN CLAY(CL)	35	12	23
▲	B-010-0-19	7.0	A-4a ~ SILTY SAND(SM)	NP	NP	NP
★	B-011-0-19	2.5	A-6b ~ LEAN CLAY(CL)	35	15	20
⊙	B-011-0-19	4.0	A-6b ~ LEAN CLAY(CL)	39	12	27

Specimen Identification			D90	D50	D30	D10	%G	%CS	%FS	%M	%C	Cc	Cu
●	B-009-0-19	4.0	0.229				0	6	13	25	56		
⊠	B-010-0-19	2.5	0.054				0	2	6	24	68		
▲	B-010-0-19	7.0	0.294	0.081	0.02	0.01	0	5	49	42	4	0.42	10.15
★	B-011-0-19	2.5	0.048				1	2	3	27	67		
⊙	B-011-0-19	4.0	0.064				0	2	7	23	68		

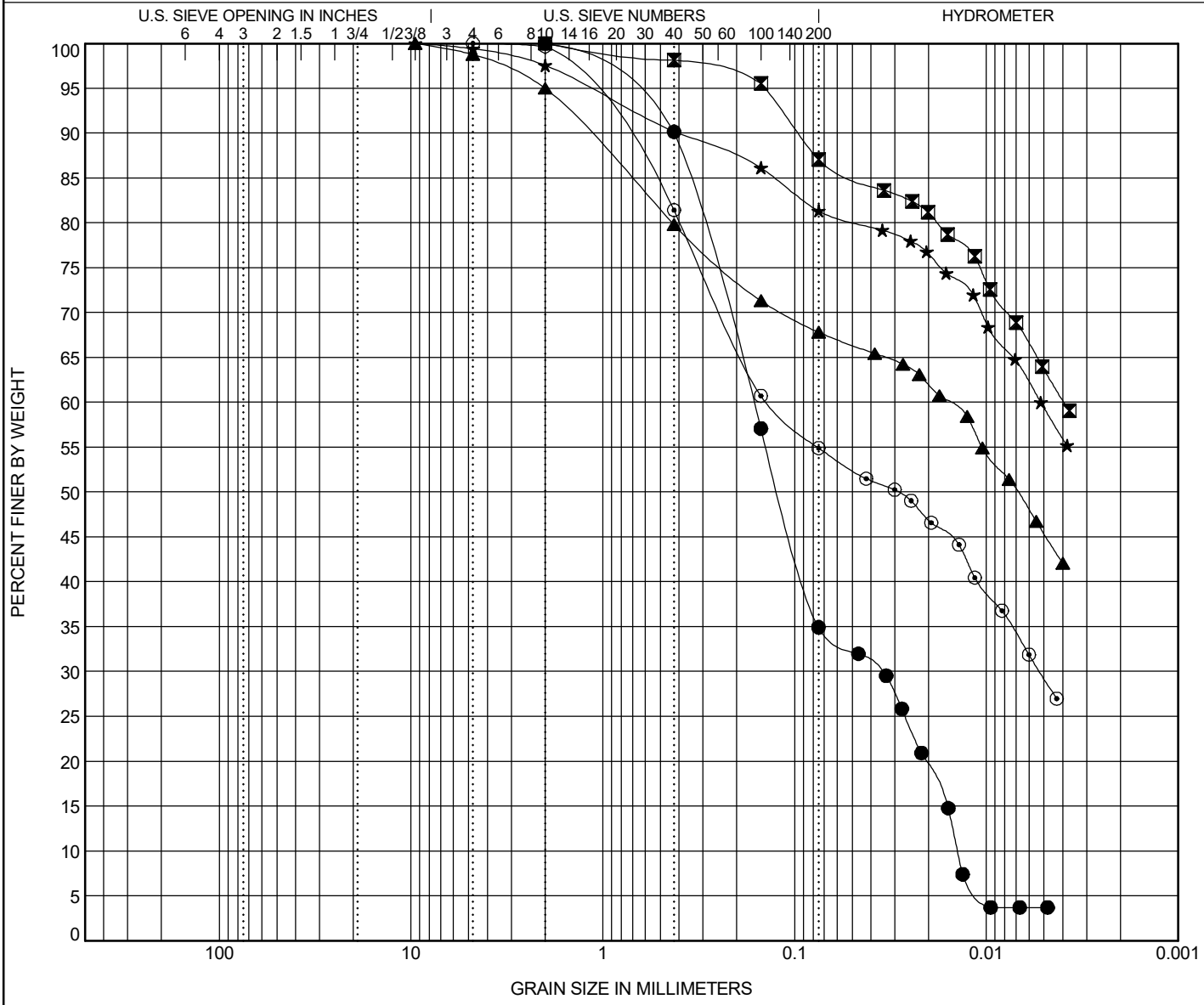
GRAIN SIZE - OH DOT.GDT - 7/27/20 21:07 - S:\PROJECTS\1906601.GPJ

GRAIN SIZE DISTRIBUTION

OHIO DEPARTMENT OF TRANSPORTION
OFFICE OF GEOTECHNICAL ENGINEERING

PROJECT WYA-23-00.04 **PID** 109362

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-012-0-19	0.0	**A-3a ~ SILTY SAND(SM)**	**NP**	**NP**	**NP**
⊠	B-012-0-19	3.0	**A-6a ~ LEAN CLAY(CL)**	**25**	**14**	**11**
▲	B-013-0-19	0.0	**A-6b ~ SANDY LEAN CLAY(CL)**	**40**	**19**	**21**
★	B-013-0-19	1.5	**A-6b ~ LEAN CLAY with SAND(CL)**	**35**	**19**	**16**
⊙	B-014-0-19	1.0	**A-6a ~ SANDY LEAN CLAY(CL)**	**24**	**11**	**13**

Specimen Identification			D90	D50	D30	D10	%G	%CS	%FS	%M	%C	Cc	Cu
●	B-012-0-19	0.0	**0.423**	**0.12**	**0.036**	**0.014**	**0**	**10**	**55**	**31**	**4**	**0.54**	**11.63**
⊠	B-012-0-19	3.0	**0.095**				**0**	**2**	**11**	**23**	**64**		
▲	B-013-0-19	0.0	**1.202**	**0.007**			**5**	**15**	**12**	**23**	**45**		
★	B-013-0-19	1.5	**0.404**				**3**	**7**	**9**	**22**	**59**		
⊙	B-014-0-19	1.0	**0.88**	**0.029**	**0.005**		**0**	**18**	**27**	**26**	**29**		

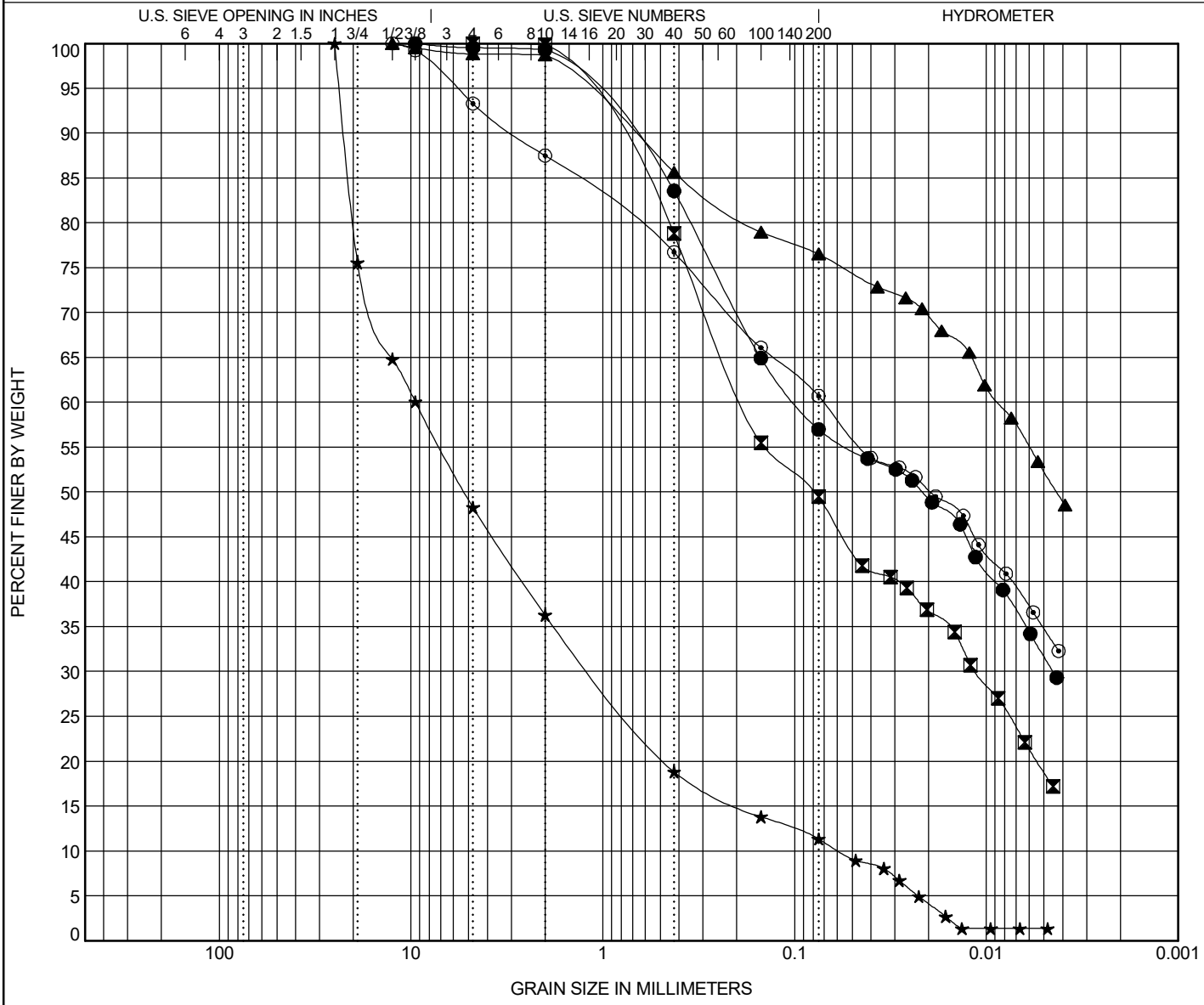
GRAIN SIZE - OH DOT.GDT - 7/27/20 21:07 - S:\PROJECTS\1906601.GPJ

GRAIN SIZE DISTRIBUTION

OHIO DEPARTMENT OF TRANSPORTION
OFFICE OF GEOTECHNICAL ENGINEERING

PROJECT WYA-23-00.04 **PID** 109362

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-014-0-19	2.5	A-6a ~ SANDY LEAN CLAY(CL)	27	14	13
⊠	B-015-0-19	2.5	A-6a ~ CLAYEY SAND(SC)	24	11	13
▲	B-015-0-19	5.5	A-6b ~ LEAN CLAY with SAND(CL)	35	9	26
★	B-016-0-19	1.0	A-1-a ~ WELL-GRADED GRAVEL with SILT and SAND(GW-GM)	NP	NP	NP
⊙	B-016-0-19	4.0	A-6b ~ SANDY LEAN CLAY(CL)	31	11	20

Specimen Identification			D90	D50	D30	D10	%G	%CS	%FS	%M	%C	Cc	Cu
●	B-014-0-19	2.5	0.801	0.022	0.004		0	16	27	25	32		
⊠	B-015-0-19	2.5	0.967	0.08	0.011		1	21	29	30	19		
▲	B-015-0-19	5.5	0.713	0.004			1	13	9	25	52		
★	B-016-0-19	1.0	22.345	5.256	1.146	0.059	65	17	7	10	1	2.37	161.59
⊙	B-016-0-19	4.0	2.904	0.019			12	11	16	26	35		

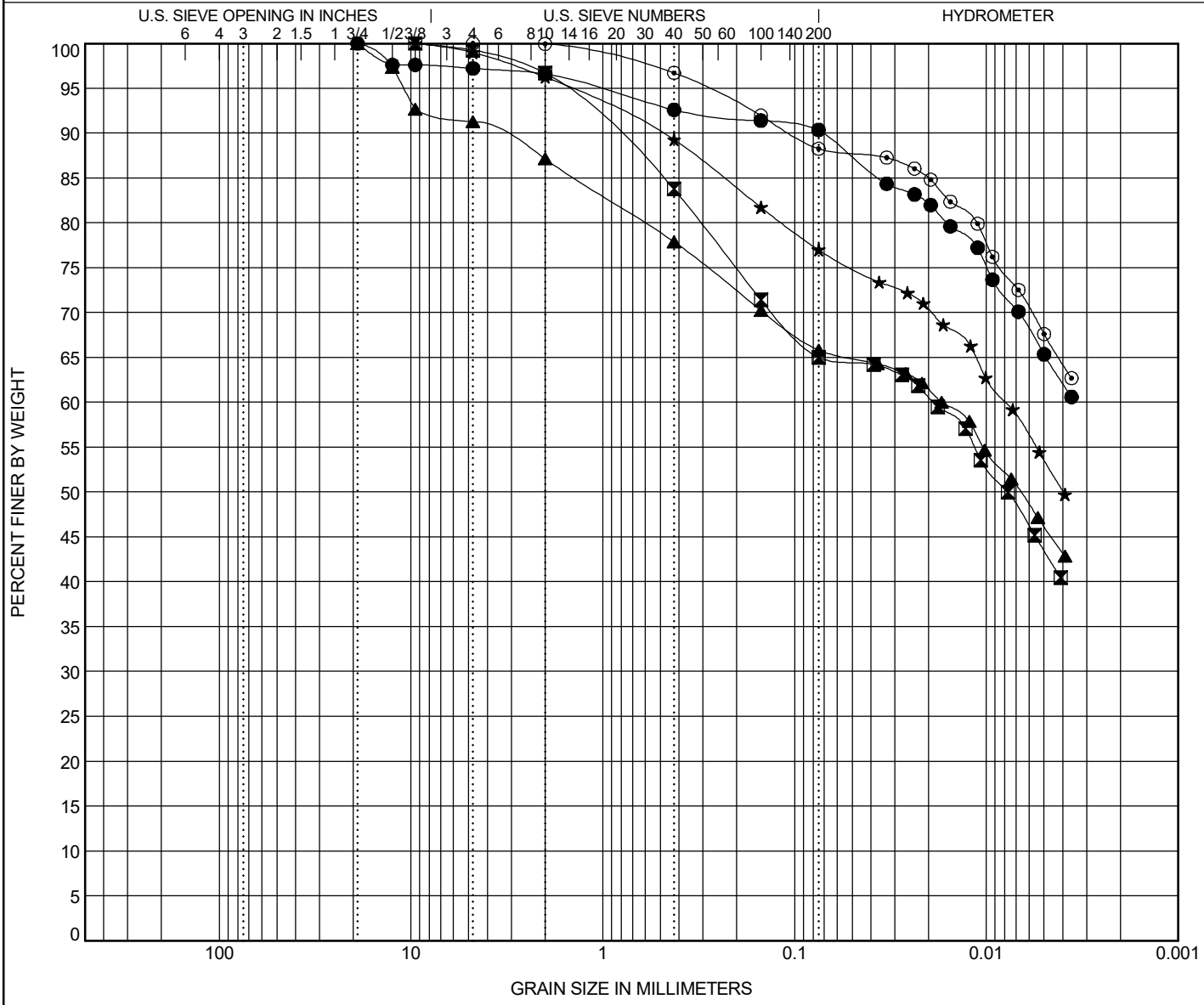
GRAIN SIZE - OH DOT.GDT - 7/27/20 21:08 - S:\PROJECTS\1906601.GPJ

GRAIN SIZE DISTRIBUTION

OHIO DEPARTMENT OF TRANSPORTION
OFFICE OF GEOTECHNICAL ENGINEERING

PROJECT WYA-23-00.04 **PID** 109362

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-017-0-19	2.5	A-7-6 ~ LEAN CLAY(CL)	42	17	25
⊠	B-017-0-19	5.5	A-6a ~ SANDY LEAN CLAY(CL)	27	13	14
▲	B-018-0-19	1.5	A-6b ~ SANDY LEAN CLAY(CL)	36	18	18
★	B-018-0-19	3.0	A-6b ~ LEAN CLAY with SAND(CL)	34	17	17
⊙	B-020-0-19	2.5	A-7-6 ~ LEAN CLAY(CL)	44	18	26

Specimen Identification			D90	D50	D30	D10	%G	%CS	%FS	%M	%C	Cc	Cu
●	B-017-0-19	2.5	0.071				4	4	2	25	65		
⊠	B-017-0-19	5.5	0.896	0.008			3	13	19	22	43		
▲	B-018-0-19	1.5	3.651	0.007			13	9	12	20	46		
★	B-018-0-19	3.0	0.498	0.004			4	7	12	23	54		
⊙	B-020-0-19	2.5	0.104				1	3	8	20	68		

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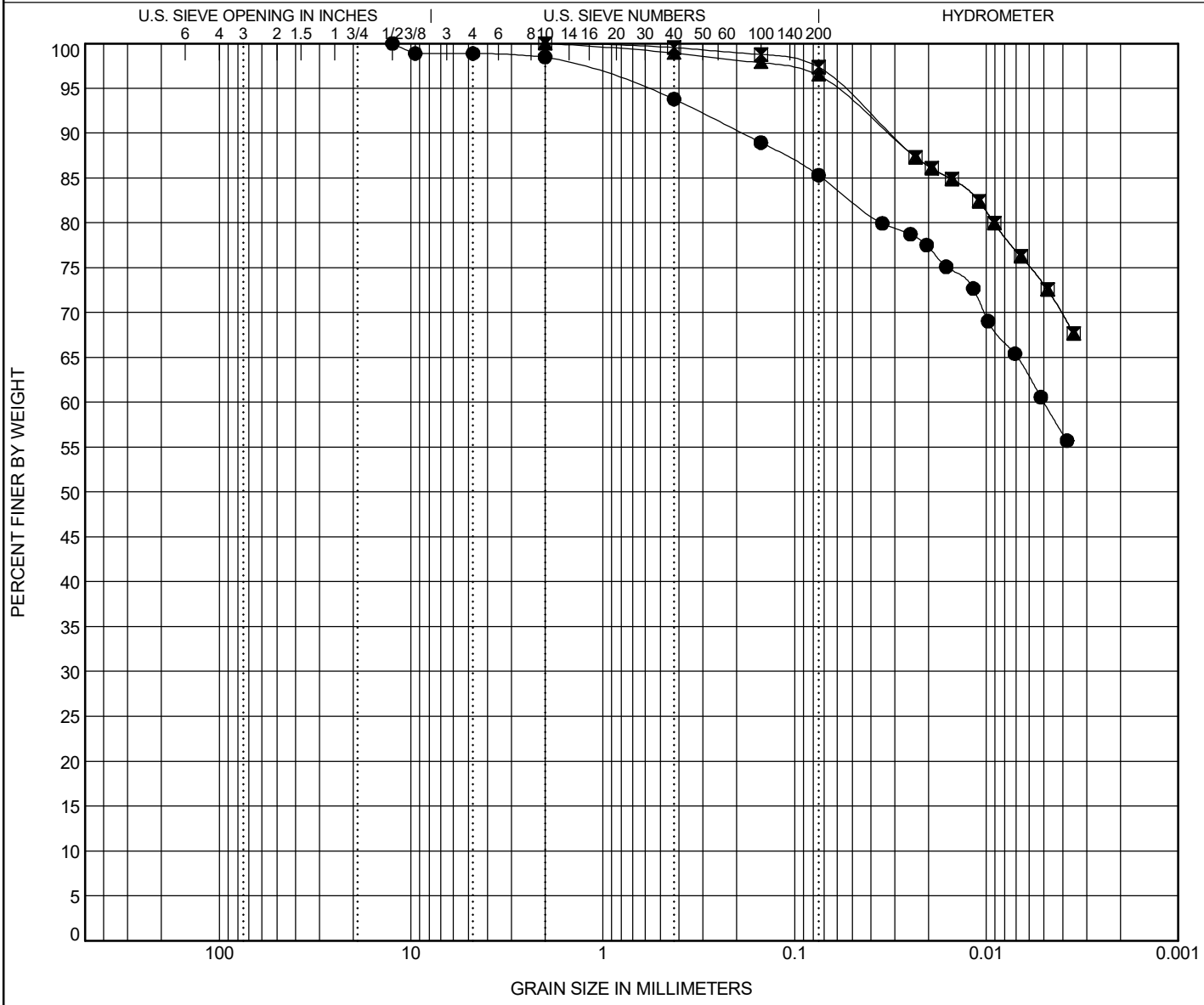
GRAIN SIZE DISTRIBUTION

OHIO DEPARTMENT OF TRANSPORTION
OFFICE OF GEOTECHNICAL ENGINEERING

PROJECT WYA-23-00.04 **PID** 109362

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-020-0-19**	**4.0**	**A-7-6 ~ LEAN CLAY(CL)**	**44**	**14**	**30**
⊠	**B-022-0-19**	**2.5**	**A-7-6 ~ LEAN CLAY(CL)**	**48**	**20**	**28**
▲	**B-022-0-19**	**4.0**	**A-7-6 ~ LEAN CLAY(CL)**	**46**	**14**	**32**

Specimen Identification			D90	D50	D30	D10	%G	%CS	%FS	%M	%C	Cc	Cu
●	**B-020-0-19**	**4.0**	**0.188**				**2**	**5**	**8**	**25**	**60**		
⊠	**B-022-0-19**	**2.5**	**0.032**				**0**	**1**	**2**	**24**	**73**		
▲	**B-022-0-19**	**4.0**	**0.033**				**0**	**2**	**2**	**23**	**73**		

CORE LOG for X-001-0-19

Project: Proposed Intersection Improvements PID 109362

Project Location: WYA-23-0.04, Wyandot County, Ohio

TTL Project No. 1906601

Core Date: May 20, 2020

ASPHALT THICKNESS (in)	=	9.5
STONE THICKNESS (in)	=	5.75
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Core broken at approximately 4 inches below top of pavement.

Apparent delamination at approximately 5 inches.

CORE LOG for X-002-0-19

Project: Proposed Intersection Improvements PID 109362

Project Location: WYA-23-0.04, Wyandot County, Ohio

TTL Project No. 1906601

Core Date: May 20, 2020

ASPHALT THICKNESS (in)	=	7.0
STONE THICKNESS (in)	=	8.0
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Apparent layering at approximately 2.5 inches and 3.5 inches.

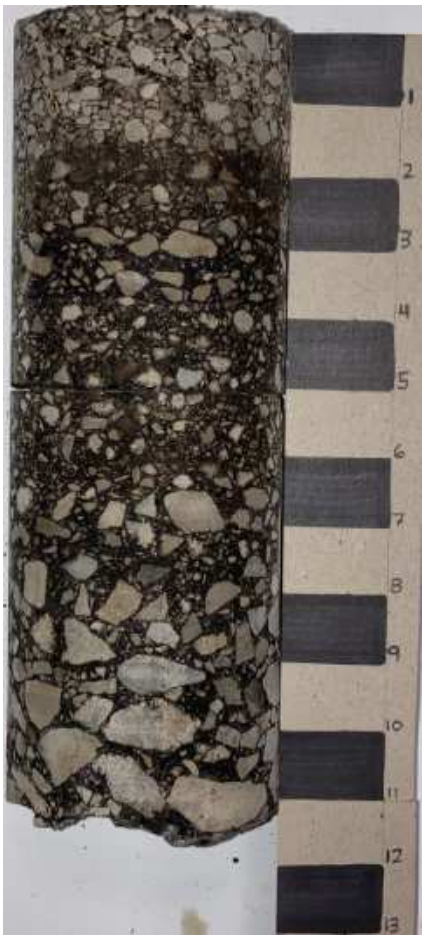
CORE LOG for X-003-0-19

Project: Proposed Intersection Improvements PID 109362

Project Location: WYA-23-0.04, Wyandot County, Ohio

TTL Project No. 1906601

Core Date: May 21, 2020



ASPHALT THICKNESS (in)	=	11.25
STONE THICKNESS (in)	=	6.75
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Apparent layering approximately every inches below top of pavement from 2 inches to 6 with an apparent delamination at approximately 5 inches.

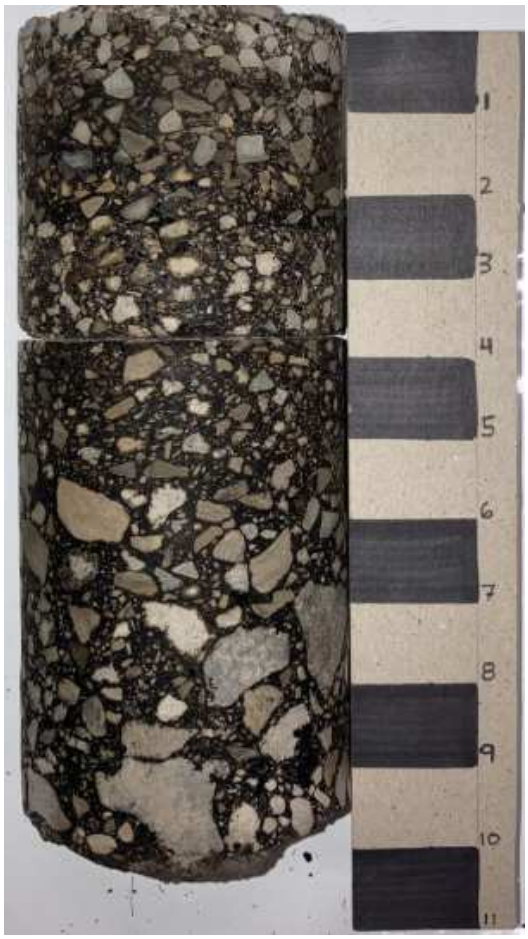
CORE LOG for X-004-0-19

Project: Proposed Intersection Improvements PID 109362

Project Location: WYA-23-0.04, Wyandot County, Ohio

TTL Project No. 1906601

Core Date: May 20, 2020



ASPHALT THICKNESS (in)	=	9.5
STONE THICKNESS (in)	=	6.0
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Apparent delamination at approximately 3.75 inches below top of pavement.

CORE LOG for X-005-0-19

Project: Proposed Intersection Improvements PID 109362

Project Location: WYA-23-0.04, Wyandot County, Ohio

TTL Project No. 1906601

Core Date: May 19, 2020

ASPHALT THICKNESS (in)	=	13.5
STONE THICKNESS (in)	=	6.0
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Apparent delamination at approximately 6.25 inches and 7.5 inches below top of pavement.

CORE LOG for X-006-0-19

Project: Proposed Intersection Improvements PID 109362

Project Location: WYA-23-0.04, Wyandot County, Ohio

TTL Project No. 1906601

Core Date: May 21, 2020

ASPHALT THICKNESS (in)	=	12.5
STONE THICKNESS (in)	=	6.5
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Apparent delamination at approximately 5.5 inches below top of pavement.

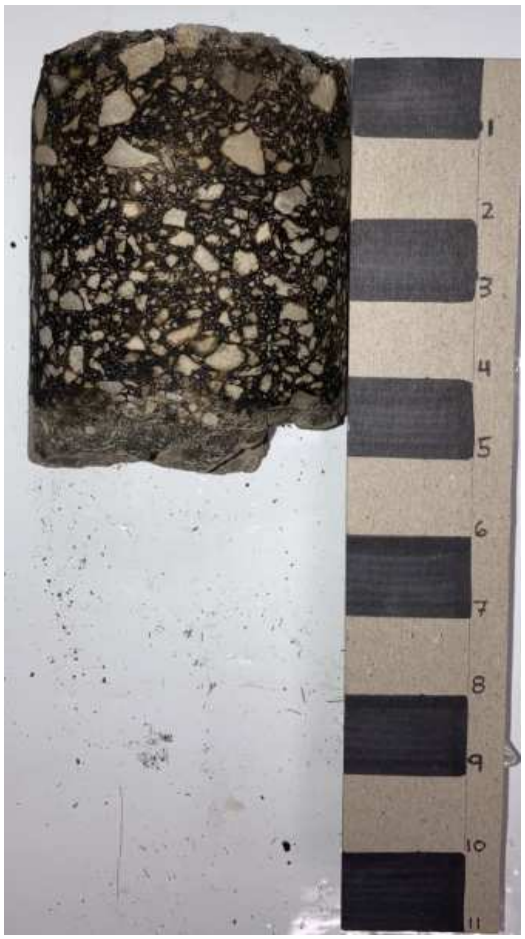
CORE LOG for B-008-0-19

Project: Proposed Intersection Improvements PID 109362

Project Location: WYA-23-0.04, Wyandot County, Ohio

TTL Project No. 1906601

Core Date: May 19, 2020



ASPHALT THICKNESS (in)	=	4.75
STONE THICKNESS (in)	=	7.25
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Pavement core appeared in good condition.

CORE LOG for B-009-0-19

Project: Proposed Intersection Improvements PID 109362

Project Location: WYA-23-0.04, Wyandot County, Ohio

TTL Project No. 1906601

Core Date: May 22, 2020

ASPHALT THICKNESS (in)	=	7.0
STONE THICKNESS (in)	=	19.5
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Only 2.75 inches of the core recovered.

CORE LOG for B-010-0-19

Project: Proposed Intersection Improvements PID 109362

Project Location: WYA-23-0.04, Wyandot County, Ohio

TTL Project No. 1906601

Core Date: May 22, 2020

ASPHALT THICKNESS (in)	=	8.0
STONE THICKNESS (in)	=	24.5
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Apparent delamination at approximately 3 inches and 5.5 inches below top of pavement.

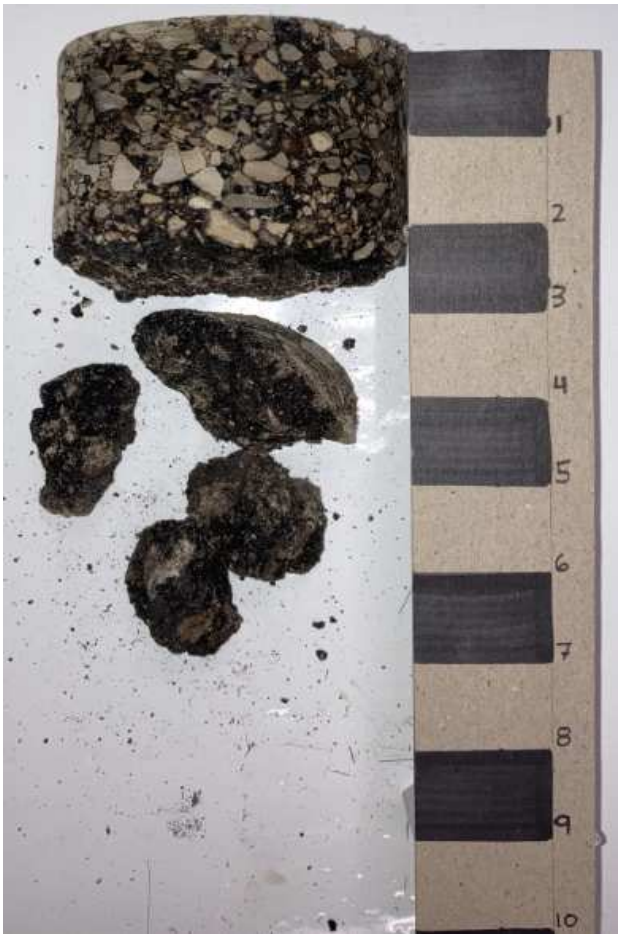
CORE LOG for B-011-0-19

Project: Proposed Intersection Improvements PID 109362

Project Location: WYA-23-0.04, Wyandot County, Ohio

TTL Project No. 1906601

Core Date: May 19, 2020



ASPHALT THICKNESS (in)	=	* 2.5
STONE THICKNESS (in)	=	* -
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Only 2.5 inches of the core recovered. 0.75 inch void underlying the surface asphalt. * Secondary pavement cross section encountered underlying the surface pavement consisting of 4.5 inches of asphalt underlain by 16 inches of stone.

CORE LOG for B-014-0-19

Project: Proposed Intersection Improvements PID 109362

Project Location: WYA-23-0.04, Wyandot County, Ohio

TTL Project No. 1906601

Core Date: May 19, 2020

ASPHALT THICKNESS (in)	=	4.0
STONE THICKNESS (in)	=	10.0
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Pavement core appeared in good condition.

CORE LOG for B-015-0-19

Project: Proposed Intersection Improvements PID 109362

Project Location: WYA-23-0.04, Wyandot County, Ohio

TTL Project No. 1906601

Core Date: May 22, 2020

ASPHALT THICKNESS (in)	=	6.0
STONE THICKNESS (in)	=	21.25
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Apparent layering at approximately 2.5 inches as well as a horizontal fracture at approximately 4.5 inches.

CORE LOG for B-016-0-19

Project: Proposed Intersection Improvements PID 109362

Project Location: WYA-23-0.04, Wyandot County, Ohio

TTL Project No. 1906601

Core Date: May 22, 2020

ASPHALT THICKNESS (in)	=	8.0
STONE THICKNESS (in)	=	21.0
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Pavement core in pieces from 2.5 to 7 inches below top of pavement.

CORE LOG for B-017-0-19

Project: Proposed Intersection Improvements PID 109362

Project Location: WYA-23-0.04, Wyandot County, Ohio

TTL Project No. 1906601

Core Date: May 19, 2020

ASPHALT THICKNESS (in)	=	5.75
STONE THICKNESS (in)	=	8.25
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Pavement core broken at approximately 3.25 inches below top of pavement.

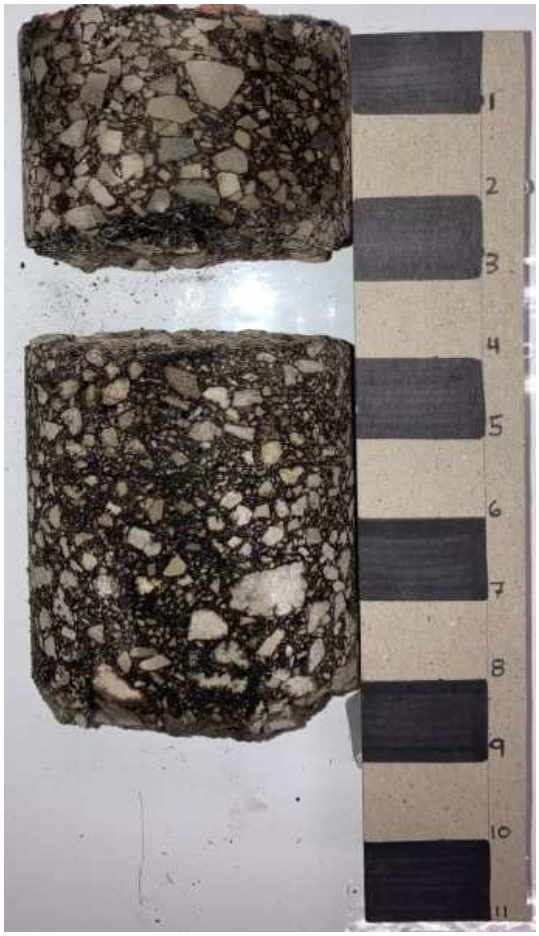
CORE LOG for X-019-0-19

Project: Proposed Intersection Improvements PID 109362

Project Location: WYA-23-0.04, Wyandot County, Ohio

TTL Project No. 1906601

Core Date: May 21, 2020



ASPHALT THICKNESS (in)	=	* 2.75
STONE THICKNESS (in)	=	* 0.75
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

* Secondary pavement cross section encountered underlying the surface pavement consisting of 4.5 inches of asphalt underlain by 5 inches of stone.

CORE LOG for B-020-0-19

Project: Proposed Intersection Improvements PID 109362

Project Location: WYA-23-0.04, Wyandot County, Ohio

TTL Project No. 1906601

Core Date: May 19, 2020

ASPHALT THICKNESS (in)	=	9.25
STONE THICKNESS (in)	=	14.75
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Apparent delamination at approximately 4 inches below top of pavement.

CORE LOG for X-021-0-19

Project: Proposed Intersection Improvements PID 109362

Project Location: WYA-23-0.04, Wyandot County, Ohio

TTL Project No. 1906601

Core Date: May 21, 2020

ASPHALT THICKNESS (in)	=	7.0
CONCRETE THICKNESS (in)	=	6.5
STONE THICKNESS (in)	=	4.0
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Apparent delamination at approximately 4.5 inches and 6 inches below top of pavement. Concrete fragmented into four pieces.

CORE LOG for B-022-0-19

Project: Proposed Intersection Improvements PID 109362

Project Location: WYA-23-0.04, Wyandot County, Ohio

TTL Project No. 1906601

Core Date: May 19, 2020

ASPHALT THICKNESS (in)	=	6.5
CONCRETE THICKNESS (in)	=	9.5
STONE THICKNESS (in)	=	5.0
CORE BARREL DIAMETER (in)	=	4.0

VISUAL DESCRIPTION:

Apparent layering at approximately 3.75 inches below top of pavement.
Only approximately 4.5 inches of the cored concrete recovered.

Appendix A:
Engineering Calculations
(Including GB-1 Spreadsheets)

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

WYA-23-0.04
109362

Proposed Intersection Improvements - US Route 23 from Township Road 68 to Township Road 62

TTL Associates, Inc.

Prepared By: Christopher P. Iott, P.E.
Date prepared: Friday, July 24, 2020

Christopher P. Iott, P.E.
TTL Associates, Inc.
1915 N. 12th Street
Toledo, Ohio 43606
419-214-5020
ciott@ttlassoc.com

NO. OF BORINGS: 14

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-007-0-19	US Route 23	180+70	0	Centerline	Geoprobe 7822DT	90*	881.1	881.6	0.5 F
2	B-008-0-19	US Route 23	182+00	55	Right	Geoprobe 7822DT	90*	883.1	881.6	1.5 C
3	B-009-0-19	US Route 23	182+00	20	Left	Geoprobe 7822DT	90*	883.4	881.9	1.5 C
4	B-010-0-19	US Route 23	191+00	25	Right	Geoprobe 7822DT	90*	874.6	873.1	1.5 C
5	B-011-0-19	US Route 23	191+00	55	Left	Geoprobe 7822DT	90*	874.3	872.8	1.5 C
6	B-012-0-19	US Route 23	192+50	0	Centerline	Geoprobe 7822DT	90*	870.5	873.0	2.5 F
7	B-013-0-19	US Route 23	227+05	0	Centerline	Geoprobe 7822DT	90*	873.9	878.4	4.5 F
8	B-014-0-19	US Route 23	228+60	20	Right	Geoprobe 7822DT	90*	880.1	878.6	1.5 C
9	B-015-0-19	US Route 23	228+60	55	Left	Geoprobe 7822DT	90*	879.2	877.7	1.5 C
10	B-016-0-19	US Route 23	237+60	25	Right	Geoprobe 7822DT	90*	881.6	880.1	1.5 C
11	B-017-0-19	US Route 23	237+60	55	Left	Geoprobe 7822DT	90*	881.5	880.0	1.5 C
12	B-018-0-19	US Route 23	239+00	0	Centerline	Geoprobe 7822DT	90*	877.1	880.1	3.0 F
13	B-020-0-19	US Route 23	297+95	60	Left	Geoprobe 7822DT	90*	904.5	903.0	1.5 C
14	B-022-0-19	US Route 23	295+75	65	Left	Geoprobe 7822DT	90*	892.3	890.8	1.5 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	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-1	0.3	2.0	0.8	2.5	9		3	43	19	24	27	58	85	22	18	A-7-6	14	<100		N_{60} & Mc		12"	3"
	007-0	SS-2	2.0	3.0	2.5	3.5	26		4.25							20	16	A-6b	16			Mc			204 Geotextile
	19	SS-3	3.0	4.5	3.5	5.0	27		4.25	29	12	17	27	36	63	15	16	A-6b	8						
		SS-4	4.5	6.5	5.0	7.0	26	9	4.5							14	16	A-6b	16						
2	B	SS-1	1.0	2.5	-0.5	1.0	14		2							13	16	A-6b	16						
	008-0	SS-2	2.5	4.0	1.0	2.5	12		4	39	16	23	25	50	75	21	16	A-6b	13	290		N_{60} & Mc		12"	
	19	SS-3	4.0	5.5	2.5	4.0	12		2	39	17	22	25	53	78	21	16	A-6b	13						
		SS-4	5.5	7.0	4.0	5.5	17	12	3							18	16	A-6b	16						
3	B	SS-1	0.6	2.2	-0.9	0.7	15		NP							10	10	A-2-6	4						12"
	009-0	SS-2	2.2	3.0	0.7	1.5	9		2.25	32	9	23	24	50	74	17	16	A-6b	13			N_{60}		12"	204 Geotextile
	19	SS-3A	3.0	4.7	1.5	3.2	18		NP								8	A-3a	0						
		SS-3B	4.7	5.5	3.2	4.0	47	9	3.75	43	16	27	25	56	81	22	18	A-7-6	15	1450					
4	B	SS-1	0.7	2.7	-0.8	1.2	21		NP							10	6	A-1-b	0						
	010-0	SS-2	2.7	4.0	1.2	2.5	24		3.25	35	12	23	24	68	92	24	16	A-6b	13	445		Mc			
	19	SS-3A	4.0	5.0	2.5	3.5	27		1							27	16	A-6b	16			HP & Mc			
		SS-3B	5.0	6.0	3.5	4.5	27	21	NP								8	A-3a	0						
5	B	SS-1A	0.7	2.0	-0.8	0.5	9		NP								6	A-1-b	0						12"
	011-0	SS-1B	2.0	2.5	0.5	1.0	9		4.5							15	16	A-6b	16	>8000		N_{60}		12"	204 Geotextile
	19	SS-2	2.5	4.0	1.0	2.5	11		4.25	35	15	20	27	67	94	18	16	A-6b	12	>8000		N_{60}		12"	
		SS-3	4.0	6.0	2.5	4.5	12	9	1	39	12	27	23	68	91	28	16	A-6b	15	>8000					
6	B	SS-1	0.3	1.5	2.8	4.0	11		NP	NP	NP	NP	31	4	35	21	8	A-3a	0	<100					
	012-0	SS-2	1.5	3.2	4.0	5.7	12		1.25							23	14	A-6a	10						
	19	SS-3	3.2	4.5	5.7	7.0	11		0.75	25	14	11	23	64	87	24	16	A-6b							
		SS-4	4.5	6.3	7.0	8.8	6	11	0.5							21	16	A-6b							
7	B	SS-1	0.3	1.8	4.8	6.3	6		4.5	40	19	21	23	45	68	18	16	A-6b	11	270					
	013-0	SS-2	1.8	3.0	6.3	7.5	12		4.5	35	19	16	22	59	81	15	16	A-6b							
	19	SS-3	3.0	4.5	7.5	9.0	18		4.5							18	16	A-6b							
		SS-4	4.5	6.0	9.0	10.5	21	6	2.75							16	16	A-6b							
8	B	SS-1	1.2	3.0	-0.3	1.5	9		2.25	24	11	13	26	29	55	15	14	A-6a	5	150		N_{60}		12"	12"
	014-0	SS-2	3.0	4.0	1.5	2.5	17		3.75	27	14	13	25	32	57	15	14	A-6a	6						204 Geotextile
	19	SS-3	4.0	4.5	2.5	3.0	27		4							19	14	A-6a	10			Mc			
		SS-4	4.5	7.0	3.0	5.5	30	9	NP							12	8	A-3a	0						
9	B	SS-1	0.5	2.3	-1.0	0.8	30		NP							8	6	A-1-b	0						
	015-0	SS-2	2.3	4.0	0.8	2.5	24		3.5	24	11	13	30	19	49	13	14	A-6a	4						
	19	SS-3	4.0	5.5	2.5	4.0	26		3.25							20	14	A-6a	10						
		SS-4	5.5	7.0	4.0	5.5	33	24	1.5	35	9	26	25	52	77	22	16	A-6b	14	1470					

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	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	
10	B	SS-1	0.7	2.5	-0.8	1.0	33		NP	NP	NP	NP	10	1	11	4	6	A-1-a	0						
	016-0	SS-2	2.5	5.0	1.0	3.5	18		NP							9	6	A-1-a	0						
	19	SS-3	5.0	6.3	3.5	4.8	9		2.5	31	11	20	26	35	61	18	16	A-6b	9	1500					
		SS-4&5	6.3	8.5	4.8	7.0	12	9	NP							18	8	A-3a	0						
11	B	SS-1	1.2	2.8	-0.3	1.3	6		2.75							23	16	A-6b	16			N_{60} & Mc		18"	16"
	017-0	SS-2	2.8	4.2	1.3	2.7	14		4.5	42	17	25	25	65	90	21	18	A-7-6	14			N_{60} & Mc			204 Geotextile
	19	SS-3	4.2	5.5	2.7	4.0	20		2.75							16	18	A-7-6	16						
		SS-4	5.5	7.0	4.0	5.5	20	6	4	27	13	14	22	43	65	15	14	A-6a	8	380					
12	B	SS-1	0.3	1.5	3.3	4.5	9		3.25							20	16	A-6b	16						
	018-0	SS-2	1.5	3.0	4.5	6.0	12		3.25	36	18	18	20	46	66	21	16	A-6b	9	1470					
	19	SS-3	3.0	4.5	6.0	7.5	14		1.5	34	17	17	23	54	77	26	16	A-6b							
		SS-4	4.5	6.5	7.5	9.5	15	9	4.25							17	16	A-6b							
13	B	SS-1A	0.8	2.0	-0.7	0.5	11		NP								6	A-1-b	0						12"
	020-0	SS-1B	2.0	3.2	0.5	1.7	11		1.75							20	18	A-7-6	16			N_{60}		12"	204 Geotextile
	19	SS-2	3.2	4.0	1.7	2.5	12		2	44	18	26	20	68	88	24	18	A-7-6	15	190		N_{60} & Mc			
		SS-3	4.0	5.5	2.5	4.0	21	11	2.5	44	14	30	25	60	85	22	18	A-7-6	17						
14	B	SS-1	1.8	2.5	0.3	1.0	9		1.5							22	16	A-6b	16			HP & Mc		12"	12"
	022-0	SS-2	2.5	4.3	1.0	2.8	11		2.75	48	20	28	24	73	97	27	18	A-7-6	17			N_{60} & Mc		12"	204 Geotextile
	19	SS-3A	4.3	4.7	2.8	3.2	8		NP								8	A-3a	0						
		SS-3B	4.7	6.2	3.2	4.7	8	8	1.5	46	14	32	23	73	96	30	18	A-7-6	17	595					

PID: 109362

County-Route-Section: WYA-23-0.04
No. of Borings: 14

Geotechnical Consultant: TTL Associates, Inc.
Prepared By: Christopher P. Iott, P.E.
Date prepared: 7/24/2020

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):	12''
Average(HP):	0''
Global Geogrid Average(N60L):	0''
Average(HP):	0''

Design CBR	6

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	0%	HP ≤ 0.5	0%
$N_{60} < 12$	35%	0.5 < HP ≤ 1	6%
$12 \leq N_{60} < 15$	20%	1 < HP ≤ 2	18%
$N_{60} \geq 20$	35%	HP > 2	51%
M+	22%		
Rock	0%		
Unsuitable	0%		

Excavate and Replace at Surface	
Average	6''
Maximum	16''
Minimum	0''

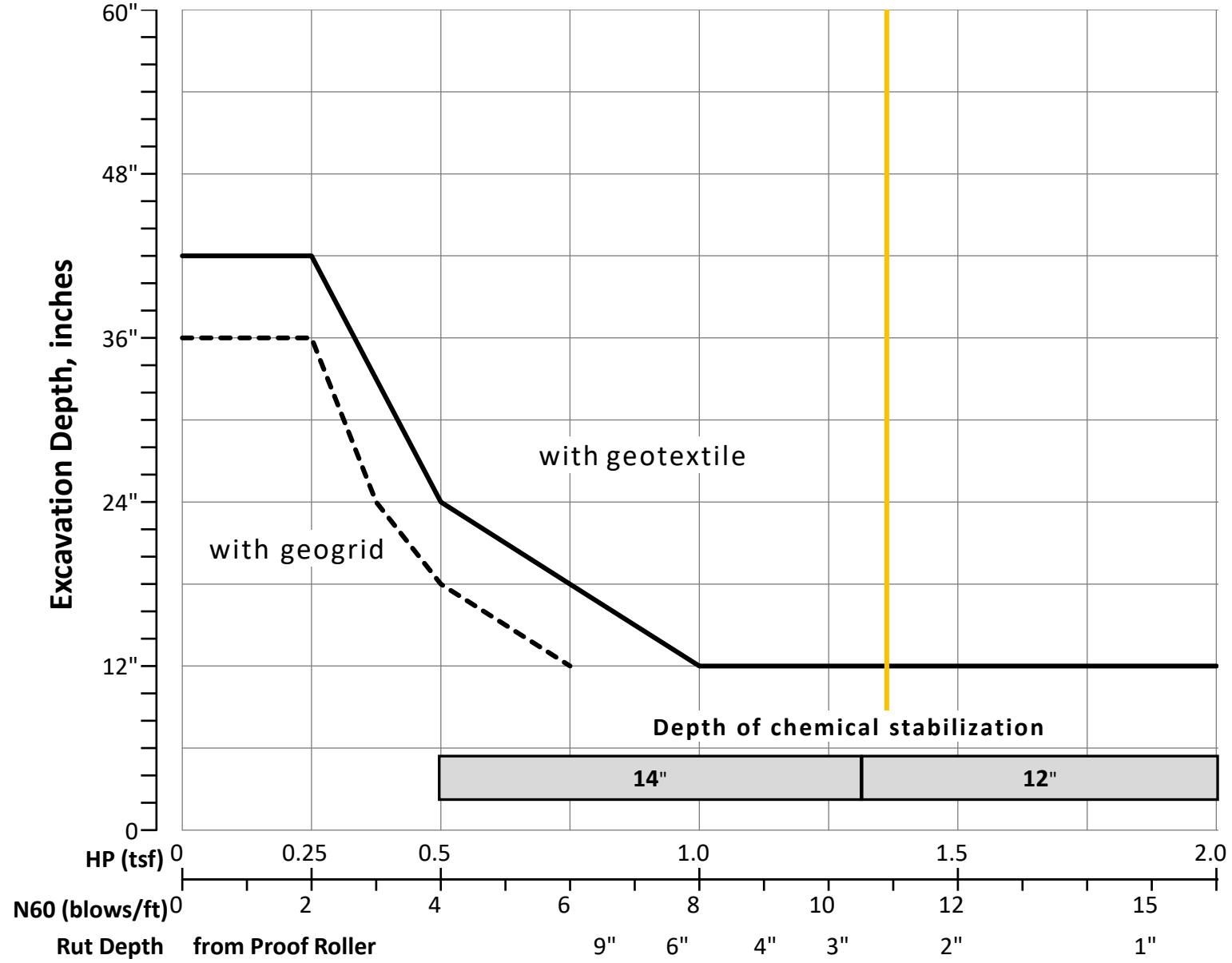
% Proposed Subgrade Surface	
Unstable & Unsuitable	50%
Unstable	50%
Unsuitable	0%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	17	11	2.90	36	15	21	24	49	73	19	14	10
Maximum	47	24	4.50	48	20	32	31	73	97	30	18	17
Minimum	6	6	0.50	24	9	11	10	1	11	4	6	0

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	2	4	0	0	1	0	0	6	0	0	0	7	27	0	9	0	0	56
Percent	0%	4%	7%	0%	0%	2%	0%	0%	11%	0%	0%	0%	13%	48%	0%	16%	0%	0%	100%
% Rock|Granular|Cohesive	0%	23%									77%								100%
Surface Class Count	0	2	4	0	0	1	0	0	1	0	0	0	5	12	0	7	0	0	32
Surface Class Percent	0%	6%	13%	0%	0%	3%	0%	0%	3%	0%	0%	0%	16%	38%	0%	22%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
2.90		☐ HP
10.93		☐ N60L

Average HP
Average N_{60L}

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

WYA-23-0.04
109362

Proposed Intersection Improvements - US Route 23 at State Route 294

TTL Associates, Inc.

Prepared By: Christopher P. Iott, P.E.
Date prepared: Friday, July 24, 2020

Christopher P. Iott, P.E.
TTL Associates, Inc.
1915 N. 12th Street
Toledo, Ohio 43606
419-214-5020
ciott@ttlassoc.com

NO. OF BORINGS: 6

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-007-0-19	US Route 23	180+70	0	Centerline	Geoprobe 7822DT	90*	881.1	881.6	0.5 F
2	B-008-0-19	US Route 23	182+00	55	Right	Geoprobe 7822DT	90*	883.1	881.6	1.5 C
3	B-009-0-19	US Route 23	182+00	20	Left	Geoprobe 7822DT	90*	883.4	881.9	1.5 C
4	B-010-0-19	US Route 23	191+00	25	Right	Geoprobe 7822DT	90*	874.6	873.1	1.5 C
5	B-011-0-19	US Route 23	191+00	55	Left	Geoprobe 7822DT	90*	874.3	872.8	1.5 C
6	B-012-0-19	US Route 23	192+50	0	Centerline	Geoprobe 7822DT	90*	870.5	873.0	2.5 F

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	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-1	0.3	2.0	0.8	2.5	9		3	43	19	24	27	58	85	22	18	A-7-6	14	<100		N_{60} & Mc		12"	3"
	007-0	SS-2	2.0	3.0	2.5	3.5	26		4.25							20	16	A-6b	16			Mc			204 Geotextile
	19	SS-3	3.0	4.5	3.5	5.0	27		4.25	29	12	17	27	36	63	15	16	A-6b	8						
		SS-4	4.5	6.5	5.0	7.0	26	9	4.5							14	16	A-6b	16						
2	B	SS-1	1.0	2.5	-0.5	1.0	14		2							13	16	A-6b	16						
	008-0	SS-2	2.5	4.0	1.0	2.5	12		4	39	16	23	25	50	75	21	16	A-6b	13	290		N_{60} & Mc		12"	
	19	SS-3	4.0	5.5	2.5	4.0	12		2	39	17	22	25	53	78	21	16	A-6b	13						
		SS-4	5.5	7.0	4.0	5.5	17	12	3							18	16	A-6b	16						
3	B	SS-1	0.6	2.2	-0.9	0.7	15		NP							10	10	A-2-6	4						12"
	009-0	SS-2	2.2	3.0	0.7	1.5	9		2.25	32	9	23	24	50	74	17	16	A-6b	13			N_{60}		12"	204 Geotextile
	19	SS-3A	3.0	4.7	1.5	3.2	18		NP								8	A-3a	0						
		SS-3B	4.7	5.5	3.2	4.0	47	9	3.75	43	16	27	25	56	81	22	18	A-7-6	15	1450					
4	B	SS-1	0.7	2.7	-0.8	1.2	21		NP							10	6	A-1-b	0						
	010-0	SS-2	2.7	4.0	1.2	2.5	24		3.25	35	12	23	24	68	92	24	16	A-6b	13	445		Mc			
	19	SS-3A	4.0	5.0	2.5	3.5	27		1							27	16	A-6b	16			HP & Mc			
		SS-3B	5.0	6.0	3.5	4.5	27	21	NP								8	A-3a	0						
5	B	SS-1A	0.7	2.0	-0.8	0.5	9		NP								6	A-1-b	0						12"
	011-0	SS-1B	2.0	2.5	0.5	1.0	9		4.5							15	16	A-6b	16			N_{60}		12"	204 Geotextile
	19	SS-2	2.5	4.0	1.0	2.5	11		4.25	35	15	20	27	67	94	18	16	A-6b	12	>8000		N_{60}		12"	
		SS-3	4.0	6.0	2.5	4.5	12	9	1	39	12	27	23	68	91	28	16	A-6b	15						
6	B	SS-1	0.3	1.5	2.8	4.0	11		NP	NP	NP	NP	31	4	35	21	8	A-3a	0	<100					
	012-0	SS-2	1.5	3.2	4.0	5.7	12		1.25							23	14	A-6a	10						
	19	SS-3	3.2	4.5	5.7	7.0	11		0.75	25	14	11	23	64	87	24	16	A-6b							
		SS-4	4.5	6.3	7.0	8.8	6	11	0.5							21	16	A-6b							

PID: 109362

County-Route-Section: WYA-23-0.04
No. of Borings: 6

Geotechnical Consultant: TTL Associates, Inc.
Prepared By: Christopher P. Iott, P.E.
Date prepared: 7/24/2020

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

Excavate and Replace Stabilization Options	
Global Geotextile Average(N60L):	12"
Average(HP):	0"
Global Geogrid Average(N60L):	0"
Average(HP):	0"

Design CBR	6

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	0%	HP ≤ 0.5	0%
$N_{60} < 12$	30%	0.5 < HP ≤ 1	13%
$12 \leq N_{60} < 15$	22%	1 < HP ≤ 2	13%
$N_{60} \geq 20$	35%	HP > 2	48%
M+	22%		
Rock	0%		
Unsuitable	0%		

Excavate and Replace at Surface	
Average	5"
Maximum	12"
Minimum	0"

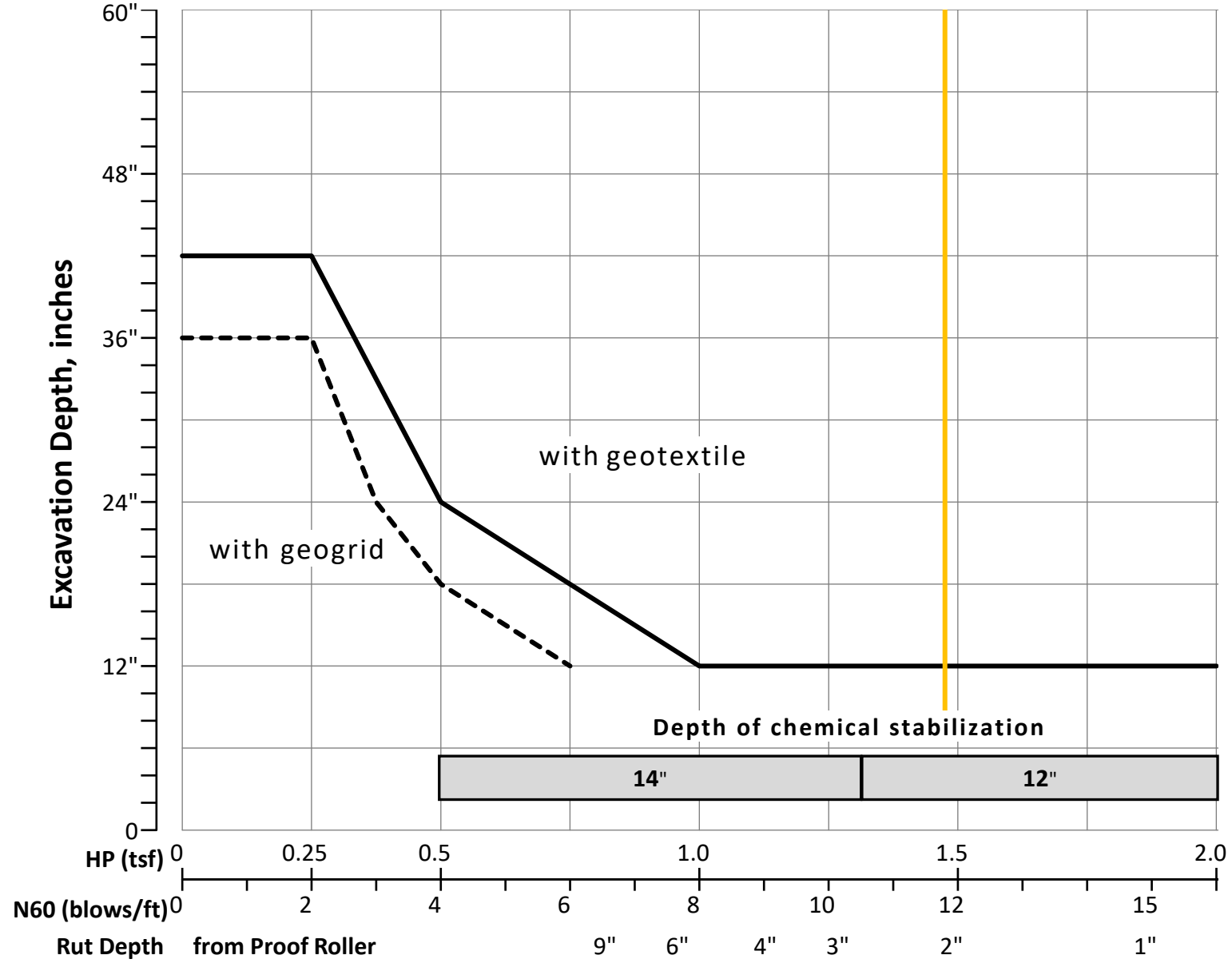
% Proposed Subgrade Surface	
Unstable & Unsuitable	53%
Unstable	53%
Unsuitable	0%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	17	12	2.75	36	14	22	26	52	78	19	14	10
Maximum	47	21	4.50	43	19	27	31	68	94	28	18	16
Minimum	6	9	0.50	25	9	11	23	4	35	10	6	0

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	2	0	0	1	0	0	3	0	0	0	1	15	0	2	0	0	24
Percent	0%	0%	8%	0%	0%	4%	0%	0%	13%	0%	0%	0%	4%	63%	0%	8%	0%	0%	100%
% Rock|Granular|Cohesive	0%	25%									75%								100%
Surface Class Count	0	0	2	0	0	1	0	0	1	0	0	0	0	10	0	1	0	0	15
Surface Class Percent	0%	0%	13%	0%	0%	7%	0%	0%	7%	0%	0%	0%	0%	67%	0%	7%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
2.75		☐ HP
11.83		☐ N60L

Average HP
Average N_{60L}

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

WYA-23-0.04
109362

Proposed Intersection Improvements - US Route 23 at County Road 113 / Township Road 124

TTL Associates, Inc.

Prepared By: Christopher P. Iott, P.E.
Date prepared: Friday, July 24, 2020

Christopher P. Iott, P.E.
TTL Associates, Inc.
1915 N. 12th Street
Toledo, Ohio 43606
419-214-5020
ciott@ttlassoc.com

NO. OF BORINGS: 6

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-013-0-19	US Route 23	227+05	0	Centerline	Geoprobe 7822DT	90*	873.9	878.4	4.5 F
2	B-014-0-19	US Route 23	228+60	20	Right	Geoprobe 7822DT	90*	880.1	878.6	1.5 C
3	B-015-0-19	US Route 23	228+60	55	Left	Geoprobe 7822DT	90*	879.2	877.7	1.5 C
4	B-016-0-19	US Route 23	237+60	25	Right	Geoprobe 7822DT	90*	881.6	880.1	1.5 C
5	B-017-0-19	US Route 23	237+60	55	Left	Geoprobe 7822DT	90*	881.5	880.0	1.5 C
6	B-018-0-19	US Route 23	239+00	0	Centerline	Geoprobe 7822DT	90*	877.1	880.1	3.0 F

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	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-1	0.3	1.8	4.8	6.3	6		4.5	40	19	21	23	45	68	18	16	A-6b	11	270					
	013-0	SS-2	1.8	3.0	6.3	7.5	12		4.5	35	19	16	22	59	81	15	16	A-6b							
	19	SS-3	3.0	4.5	7.5	9.0	18		4.5							18	16	A-6b							
		SS-4	4.5	6.0	9.0	10.5	21	6	2.75							16	16	A-6b							
2	B	SS-1	1.2	3.0	-0.3	1.5	9		2.25	24	11	13	26	29	55	15	14	A-6a	5	150		N_{60}		12"	12"
	014-0	SS-2	3.0	4.0	1.5	2.5	17		3.75	27	14	13	25	32	57	15	14	A-6a	6						204 Geotextile
	19	SS-3	4.0	4.5	2.5	3.0	27		4							19	14	A-6a	10			Mc			
		SS-4	4.5	7.0	3.0	5.5	30	9	NP							12	8	A-3a	0						
3	B	SS-1	0.5	2.3	-1.0	0.8	30		NP							8	6	A-1-b	0						
	015-0	SS-2	2.3	4.0	0.8	2.5	24		3.5	24	11	13	30	19	49	13	14	A-6a	4						
	19	SS-3	4.0	5.5	2.5	4.0	26		3.25							20	14	A-6a	10						
		SS-4	5.5	7.0	4.0	5.5	33	24	1.5	35	9	26	25	52	77	22	16	A-6b	14	1470					
4	B	SS-1	0.7	2.5	-0.8	1.0	33		NP	NP	NP	NP	10	1	11	4	6	A-1-a	0						
	016-0	SS-2	2.5	5.0	1.0	3.5	18		NP							9	6	A-1-a	0						
	19	SS-3	5.0	6.3	3.5	4.8	9		2.5	31	11	20	26	35	61	18	16	A-6b	9	1500					
		SS-4&5	6.3	8.5	4.8	7.0	12	9	NP							18	8	A-3a	0						
5	B	SS-1	1.2	2.8	-0.3	1.3	6		2.75							23	16	A-6b	16			N_{60} & Mc		18"	16"
	017-0	SS-2	2.8	4.2	1.3	2.7	14		4.5	42	17	25	25	65	90	21	18	A-7-6	14			N_{60} & Mc			204 Geotextile
	19	SS-3	4.2	5.5	2.7	4.0	20		2.75							16	18	A-7-6	16						
		SS-4	5.5	7.0	4.0	5.5	20	6	4	27	13	14	22	43	65	15	14	A-6a	8	380					
6	B	SS-1	0.3	1.5	3.3	4.5	9		3.25							20	16	A-6b	16						
	018-0	SS-2	1.5	3.0	4.5	6.0	12		3.25	36	18	18	20	46	66	21	16	A-6b	9	1470					
	19	SS-3	3.0	4.5	6.0	7.5	14		1.5	34	17	17	23	54	77	26	16	A-6b							
		SS-4	4.5	6.5	7.5	9.5	15	9	4.25							17	16	A-6b							

PID: 109362

County-Route-Section: WYA-23-0.04

No. of Borings: 6

Geotechnical Consultant: TTL Associates, Inc.

Prepared By: Christopher P. Iott, P.E.

Date prepared: 7/24/2020

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

Excavate and Replace Stabilization Options	
Global Geotextile Average(N60L):	12''
Average(HP):	0''
Global Geogrid Average(N60L):	0''
Average(HP):	0''

Design CBR	7

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	0%	HP ≤ 0.5	0%
$N_{60} < 12$	25%	0.5 < HP ≤ 1	0%
$12 \leq N_{60} < 15$	20%	1 < HP ≤ 2	10%
$N_{60} \geq 20$	45%	HP > 2	65%
M+	15%		
Rock	0%		
Unsuitable	0%		

Excavate and Replace at Surface	
Average	5''
Maximum	16''
Minimum	0''

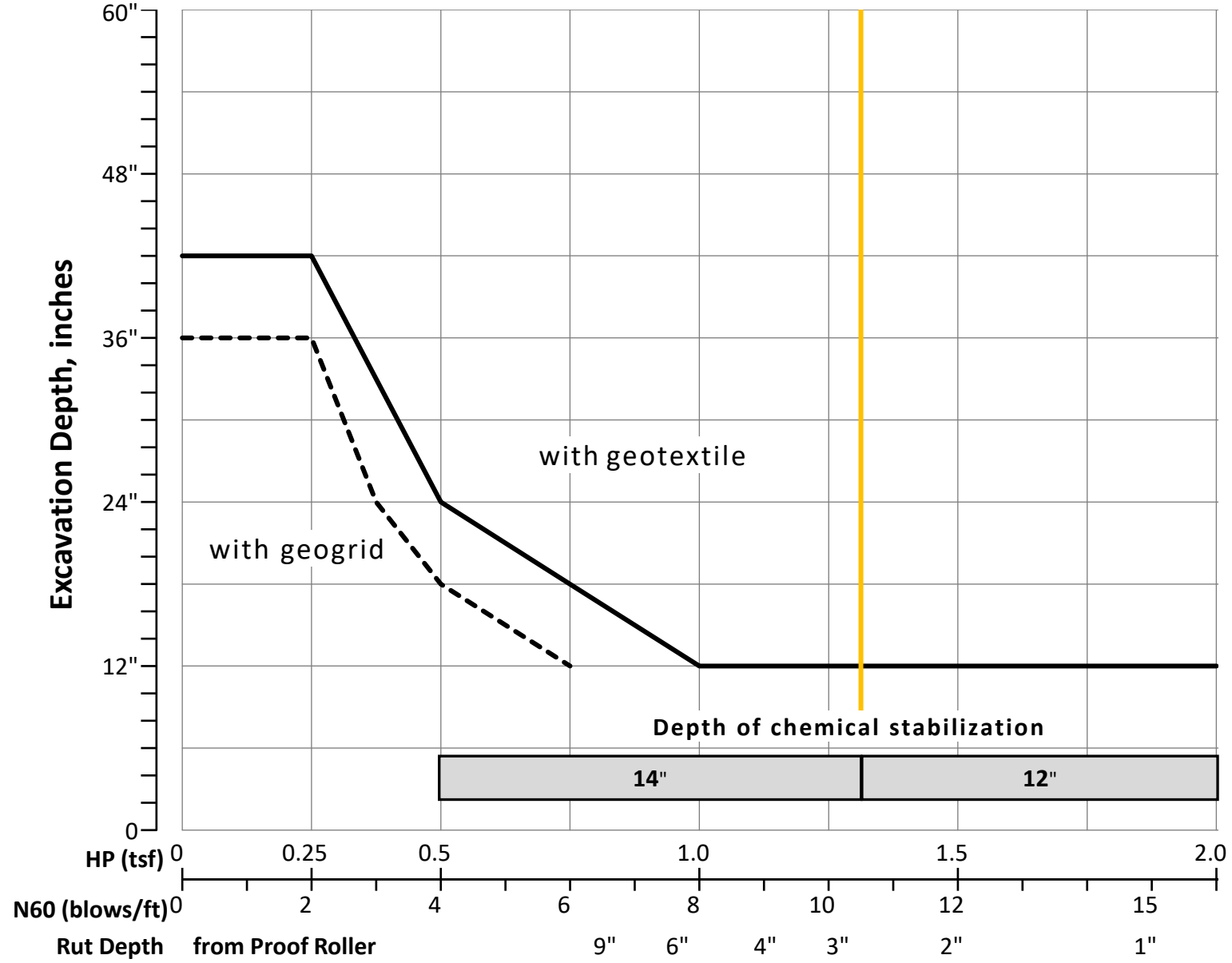
% Proposed Subgrade Surface	
Unstable & Unsuitable	36%
Unstable	36%
Unsuitable	0%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	18	11	3.33	32	14	18	23	40	63	17	14	8
Maximum	33	24	4.50	42	19	26	30	65	90	26	18	16
Minimum	6	6	1.50	24	9	13	10	1	11	4	6	0

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	2	1	0	0	0	0	0	2	0	0	0	6	11	0	2	0	0	24
Percent	0%	8%	4%	0%	0%	0%	0%	0%	8%	0%	0%	0%	25%	46%	0%	8%	0%	0%	100%
% Rock|Granular|Cohesive	0%	21%									79%								100%
Surface Class Count	0	2	1	0	0	0	0	0	0	0	0	0	5	1	0	2	0	0	11
Surface Class Percent	0%	18%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	45%	9%	0%	18%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
3.33		☐ HP
10.50		☐ N60L

Average HP
Average N_{60L}

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

WYA-23-0.04
109362

Proposed Intersection Improvements - US Route 23 at Township Road 65

TTL Associates, Inc.

Prepared By: Christopher P. Iott, P.E.
Date prepared: Friday, July 24, 2020

Christopher P. Iott, P.E.
TTL Associates, Inc.
1915 N. 12th Street
Toledo, Ohio 43606
419-214-5020
ciott@ttlassoc.com

NO. OF BORINGS: 1

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-020-0-19	US Route 23	297+95	60	Left	Geoprobe 7822DT	90*	904.5	903.0	1.5 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	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 020-0 19	SS-1A	0.8	2.0	-0.7	0.5	11		NP								6	A-1-b	0						12" 204 Geotextile
		SS-1B	2.0	3.2	0.5	1.7	11		1.75							20	18	A-7-6	16			N_{60}		12"	
		SS-2	3.2	4.0	1.7	2.5	12		2	44	18	26	20	68	88	24	18	A-7-6	15	190		N_{60} & Mc			
		SS-3	4.0	5.5	2.5	4.0	21	11	2.5	44	14	30	25	60	85	22	18	A-7-6	17						

PID: 109362

County-Route-Section: WYA-23-0.04
No. of Borings: 1

Geotechnical Consultant: TTL Associates, Inc.
Prepared By: Christopher P. Iott, P.E.
Date prepared: 7/24/2020

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

Excavate and Replace Stabilization Options	
Global Geotextile Average(N60L):	12''
Average(HP):	0''
Global Geogrid Average(N60L):	0''
Average(HP):	0''

Design CBR	5

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	0%	HP ≤ 0.5	0%
$N_{60} < 12$	50%	0.5 < HP ≤ 1	0%
$12 \leq N_{60} < 15$	25%	1 < HP ≤ 2	50%
$N_{60} \geq 20$	25%	HP > 2	25%
M+	25%		
Rock	0%		
Unsuitable	0%		

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

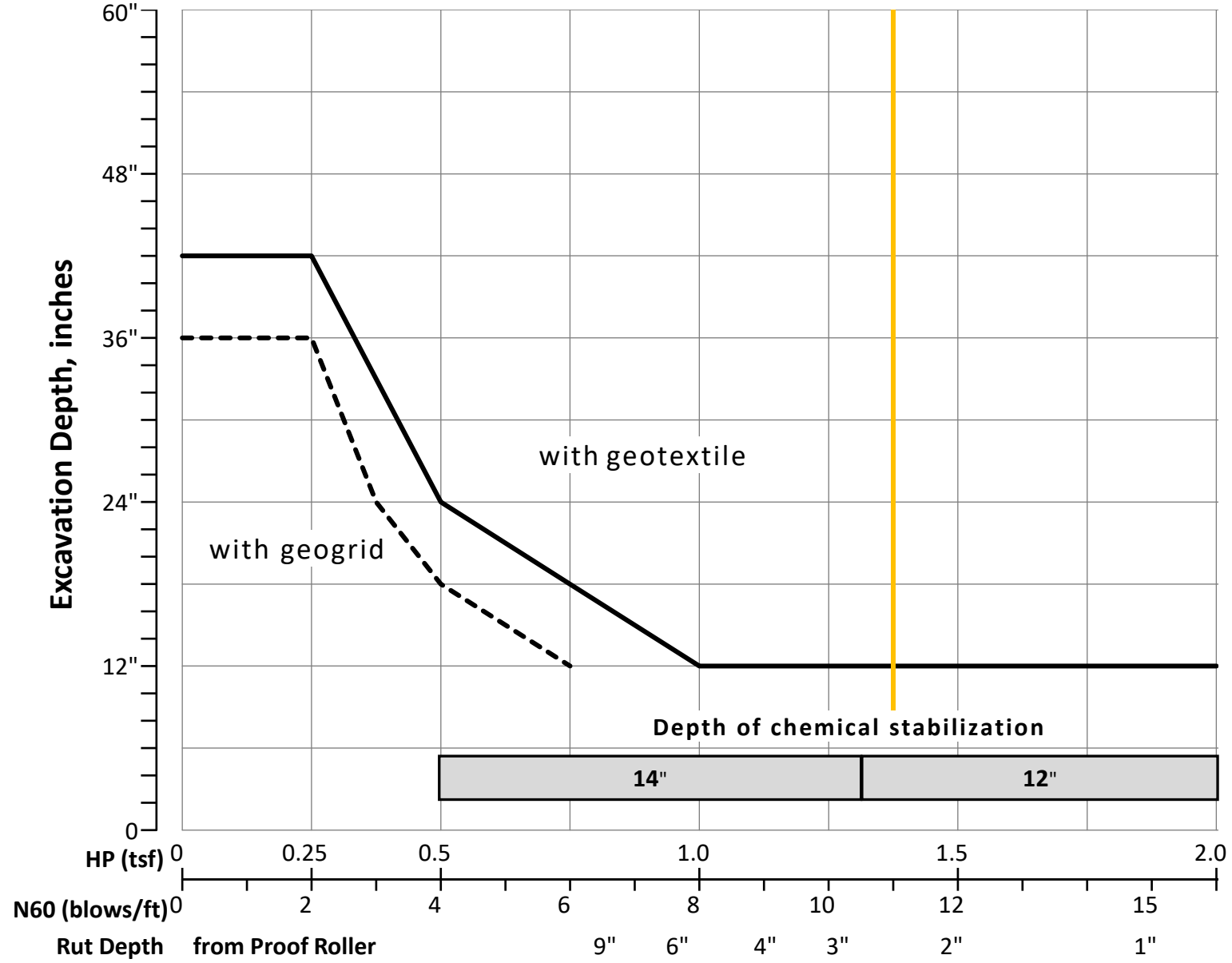
% Proposed Subgrade Surface	
Unstable & Unsuitable	50%
Unstable	50%
Unsuitable	0%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	14	11	2.08	44	16	28	23	64	87	22	15	12
Maximum	21	11	2.50	44	18	30	25	68	88	24	18	17
Minimum	11	11	1.75	44	14	26	20	60	85	20	6	0

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	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	4
Percent	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	75%	0%	0%	100%
% Rock|Granular|Cohesive	0%	25%									75%								100%
Surface Class Count	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	4
Surface Class Percent	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	75%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
2.08		☐ HP
11.00		☐ N60L

Average HP
Average N_{60L}

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

WYA-23-0.04
109362

Proposed Intersection Improvements - US Route 23 at Township Road 62

TTL Associates, Inc.

Prepared By: Christopher P. Iott, P.E.
Date prepared: Friday, July 24, 2020

Christopher P. Iott, P.E.
TTL Associates, Inc.
1915 N. 12th Street
Toledo, Ohio 43606
419-214-5020
ciott@ttlassoc.com

NO. OF BORINGS: 1

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-022-0-19	US Route 23	295+75	65	Left	Geoprobe 7822DT	90*	892.3	890.8	1.5 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	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 022-0 19	SS-1	1.8	2.5	0.3	1.0	9		1.5							22	16	A-6b	16			HP & Mc		12"	12" 204 Geotextile
		SS-2	2.5	4.3	1.0	2.8	11		2.75	48	20	28	24	73	97	27	18	A-7-6	17			N_{60} & Mc		12"	
		SS-3A	4.3	4.7	2.8	3.2	8		NP								8	A-3a	0						
		SS-3B	4.7	6.2	3.2	4.7	8	8	1.5	46	14	32	23	73	96	30	18	A-7-6	17	595					

PID: 109362

County-Route-Section: WYA-23-0.04
No. of Borings: 1

Geotechnical Consultant: TTL Associates, Inc.
Prepared By: Christopher P. Iott, P.E.
Date prepared: 7/24/2020

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):	12"
Average(HP):	12"
Global Geogrid Average(N60L):	0"
Average(HP):	0"

Design CBR	5

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	0%	HP ≤ 0.5	0%
$N_{60} < 12$	100%	0.5 < HP ≤ 1	0%
$12 \leq N_{60} < 15$	0%	1 < HP ≤ 2	50%
$N_{60} \geq 20$	0%	HP > 2	25%
M+	50%		
Rock	0%		
Unsuitable	0%		

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

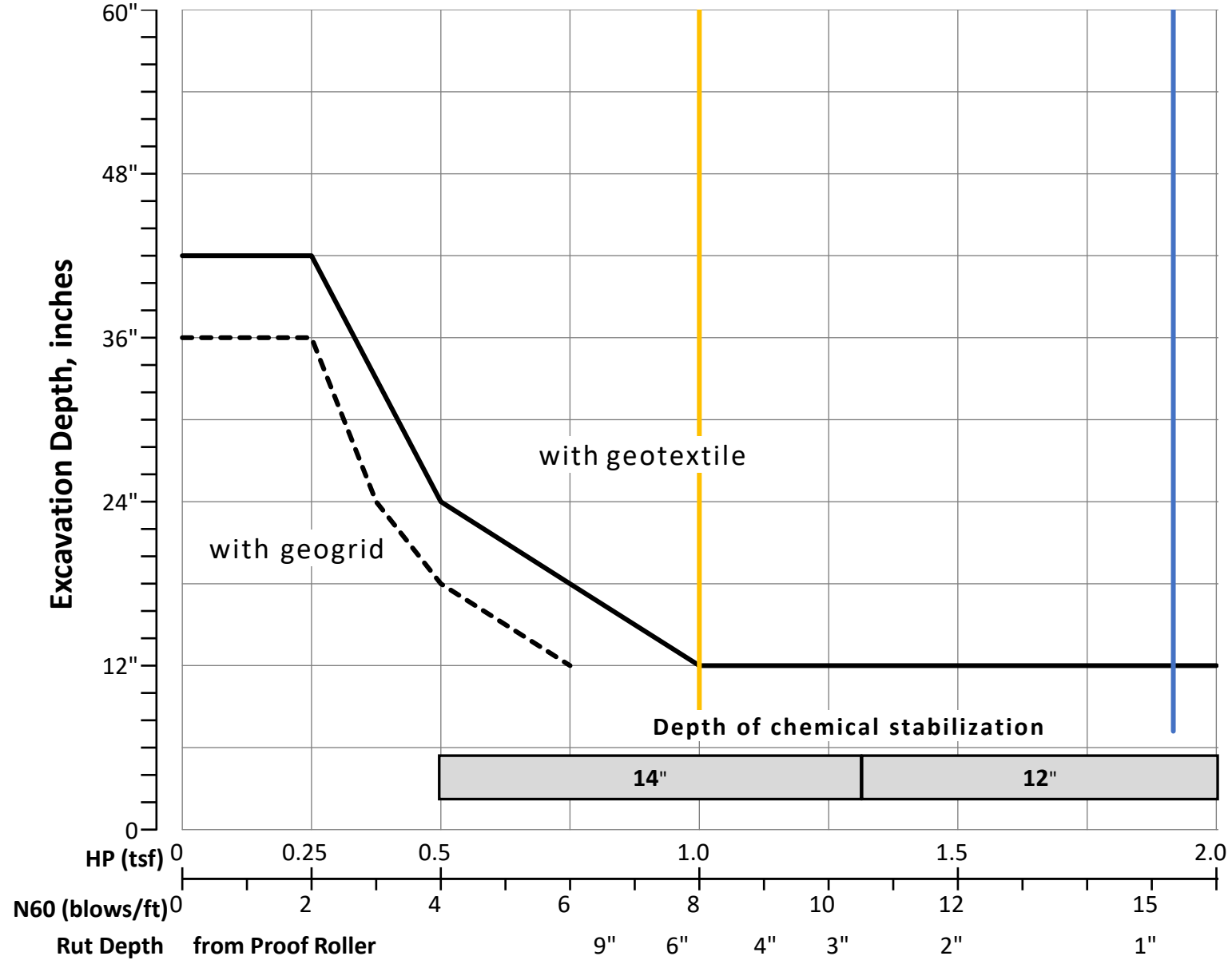
% Proposed Subgrade Surface	
Unstable & Unsuitable	100%
Unstable	100%
Unsuitable	0%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	9	8	1.92	47	17	30	24	73	97	26	15	13
Maximum	11	8	2.75	48	20	32	24	73	97	30	18	17
Minimum	8	8	1.50	46	14	28	23	73	96	22	8	0

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	0	0	0	1	0	0	0	0	1	0	2	0	0	4
Percent	0%	0%	0%	0%	0%	0%	0%	0%	25%	0%	0%	0%	0%	25%	0%	50%	0%	0%	100%
% Rock|Granular|Cohesive	0%	25%									75%								100%
Surface Class Count	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2
Surface Class Percent	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	0%	50%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization

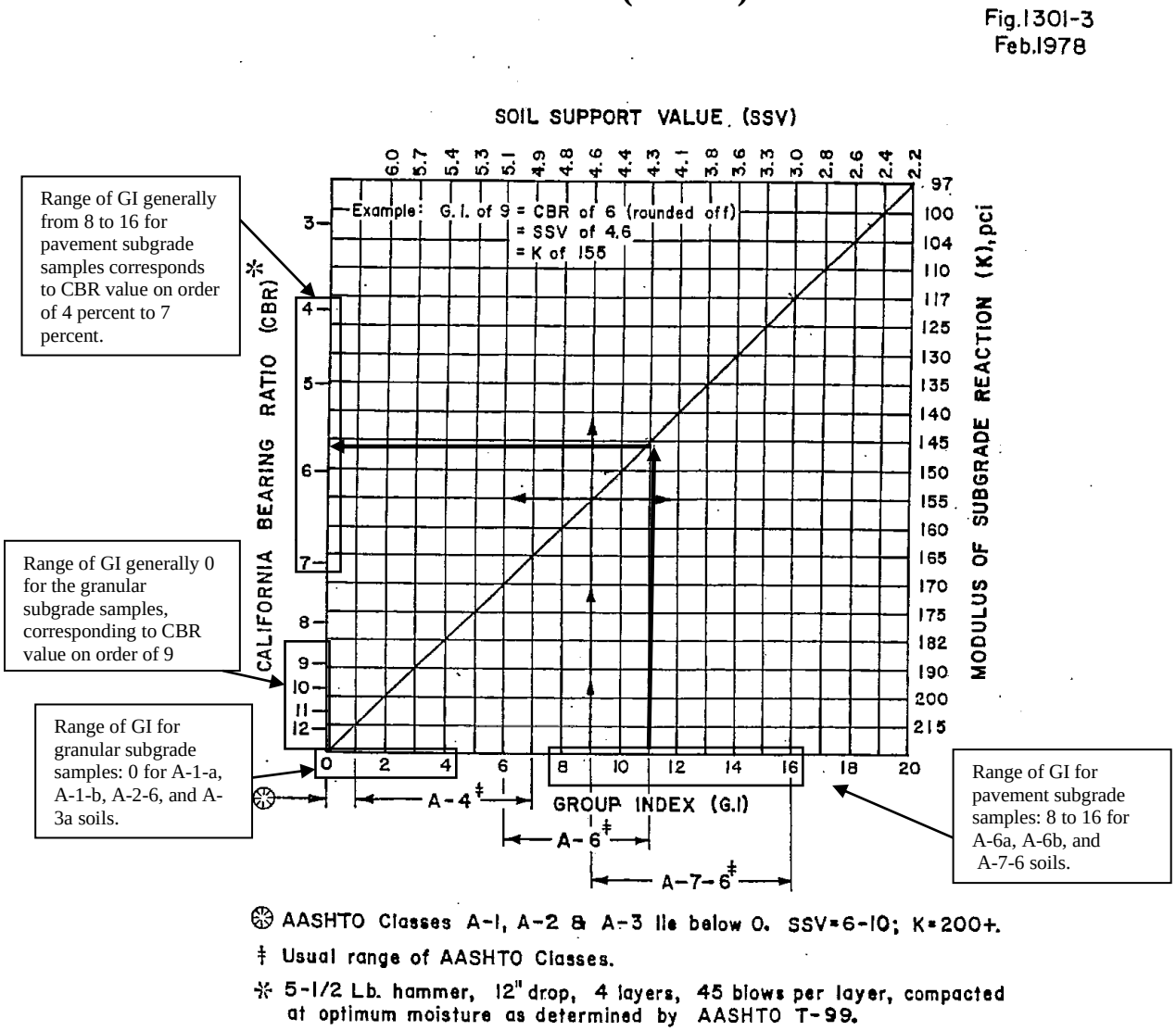


OVERRIDE TABLE

Calculated Average	New Values	Check to Override
1.92		☐ HP
8.00		☐ N60L

Average HP
Average N_{60L}

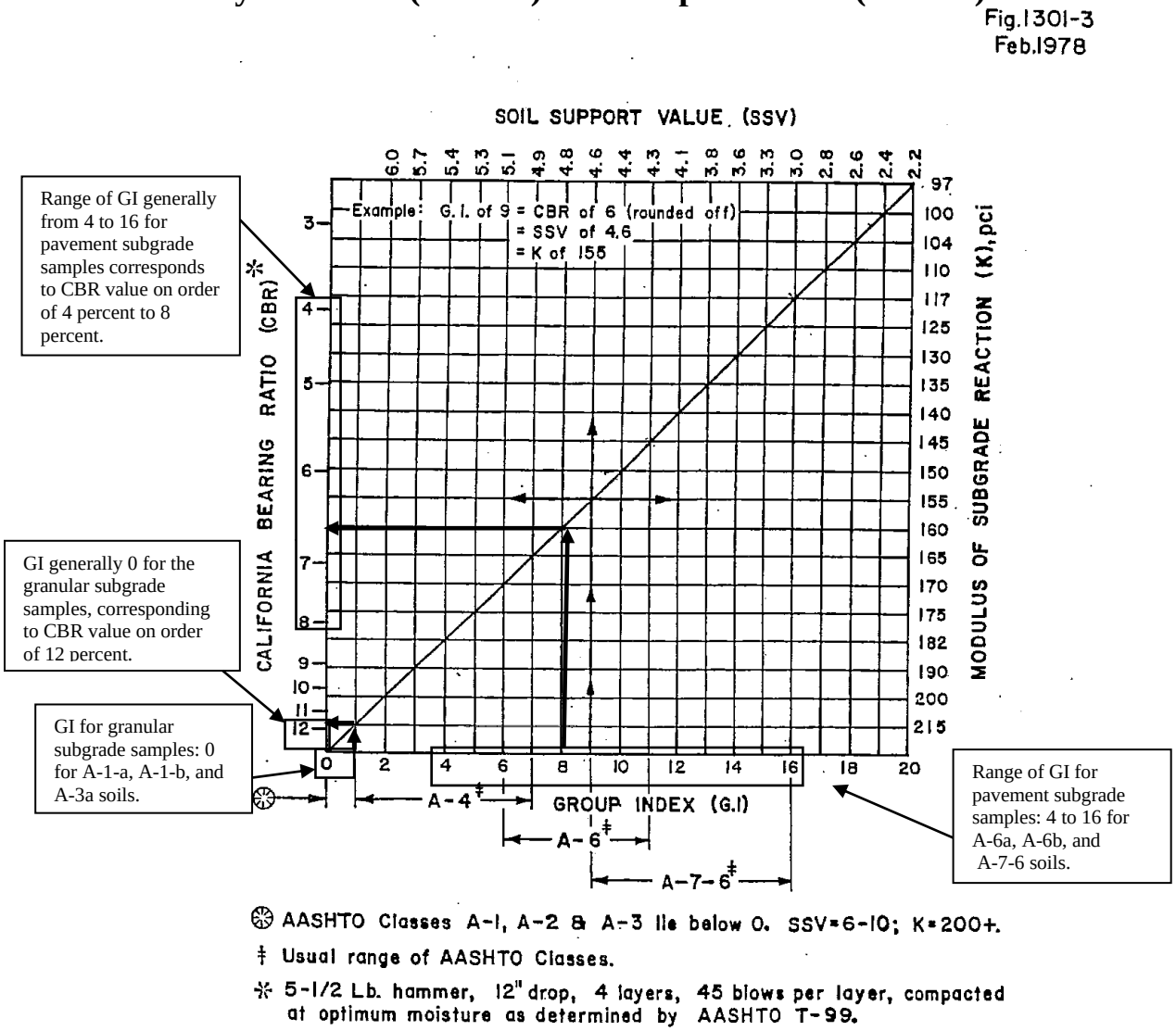
WYA-23-0.04
PID No. 109362
State Route 294 (SR 294) Intersection



CORRELATION CHART FOR
SUBGRADE STRENGTHS

Based on the GB-1 analysis, a design CBR value of 6 percent was determined for the entire project site, including all intersections. GB-1 analysis for the specific subgrade conditions at the SR 294 intersection also indicated a design CBR value of 6 percent. It should be noted that the CBR determination by the GB-1 spreadsheet is based on an **average** Group Index of all the evaluated samples. Group indices for the tested samples varied from 0 to 16, which would correlate with a CBR value of 4 to 12 percent. The higher Group Indices for the cohesive soils correlated with CBR values ranging from 4 to 7 percent. With the presence also of granular subgrade soils and new engineered fill that will be required to achieve design grades in the existing median areas, it does not appear to be unconservative to use the GB-1 design CBR value of 6 percent, based on the average design value calculations from GB-1.

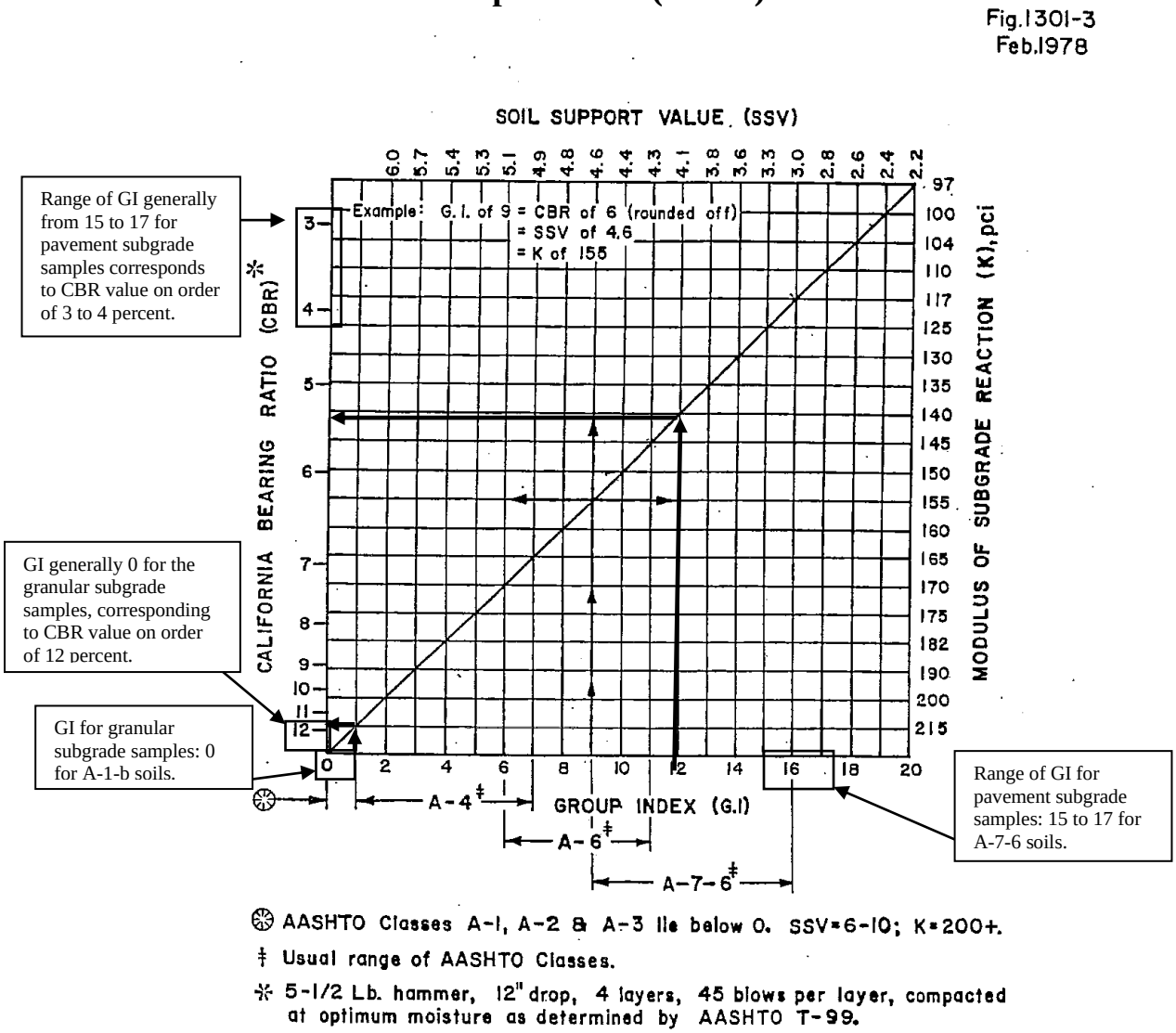
WYA-23-0.04
PID No. 109362
County Road 113 (CR 133)/Township Road 124 (TR 124) Intersection



CORRELATION CHART FOR
SUBGRADE STRENGTHS

Based on the GB-1 analysis, a design CBR value of 6 percent was determined for the entire project site, including all intersections. GB-1 analysis for the specific subgrade conditions at the CR 113 / TR 124 intersection also indicated a design CBR value of 7 percent. It should be noted that the CBR determination by the GB-1 spreadsheet is based on an **average** Group Index of all the evaluated samples. Group indices for the tested samples varied from 0 to 16, which would correlate with a CBR value of 4 to 12 percent. The higher Group Indices for the cohesive soils correlated with CBR values ranging from 4 to 8 percent. With the presence also of granular subgrade soils and new engineered fill that will be required to achieve design grades in the existing median areas, it does not appear to be unconservative to use the GB-1 design CBR value of 7 percent, based on the average design value calculations from GB-1.

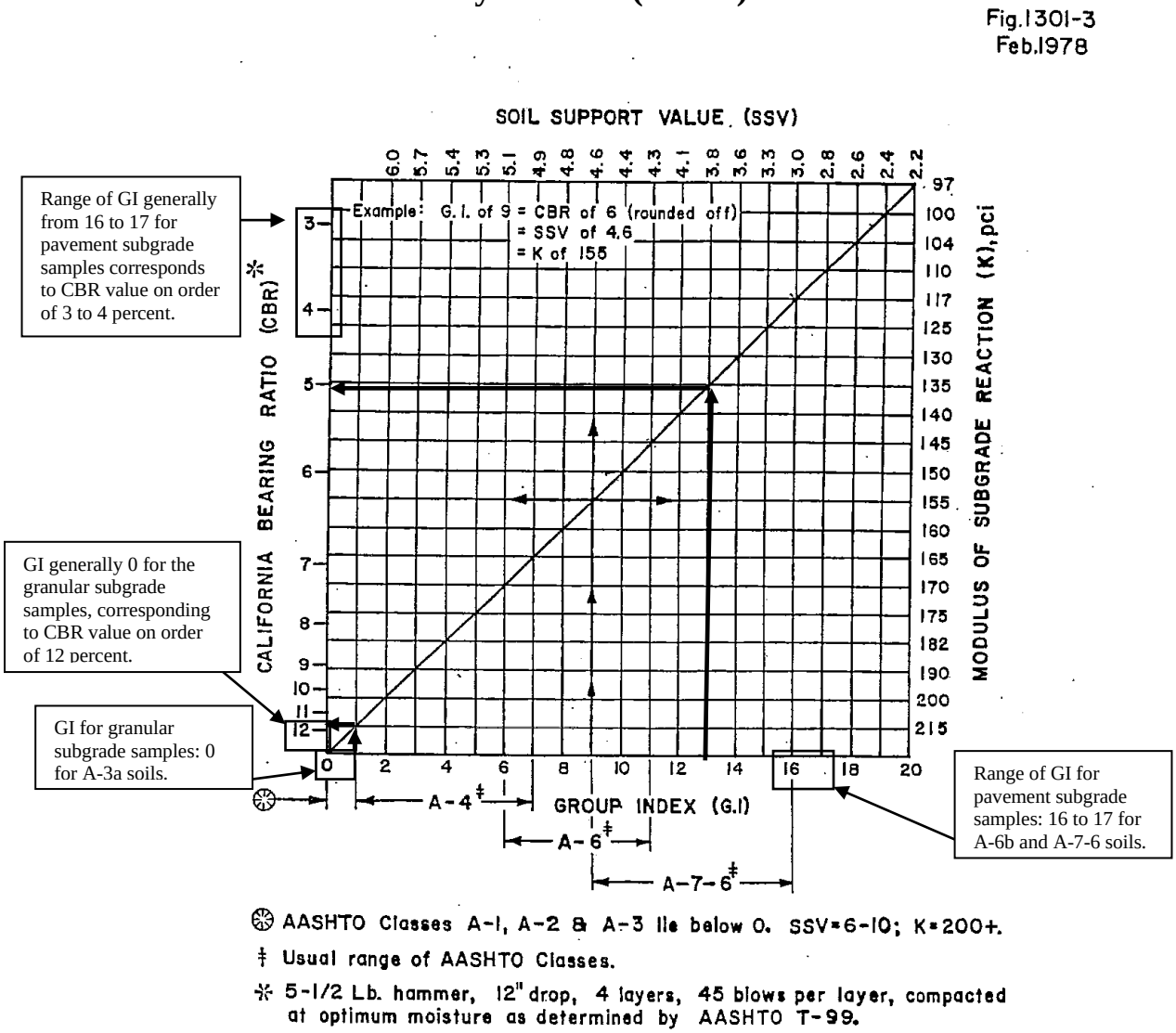
WYA-23-0.04
PID No. 109362
Township Road 65 (TR 65) Intersection



CORRELATION CHART FOR SUBGRADE STRENGTHS

Based on the GB-1 analysis, a design CBR value of 6 percent was determined for the entire project site, including all intersections. GB-1 analysis for the specific subgrade conditions at the TR 65 intersection indicated a slightly lower design CBR value of 5 percent. It should be noted that the CBR determination by the GB-1 spreadsheet is based on an **average** Group Index of all the evaluated samples. Group indices for the tested samples varied from 0 to 17, which would correlate with a CBR value of 3 to 12 percent. The higher Group Indices associated with the cohesive soils that were prominent in the boring performed at this intersection would correlate with a CBR value of 3 to 4 percent. Therefore, we recommend design consider a CBR value of 4 percent for the TR 65 cul-de-sac. It should be noted that GB-1 analyses indicate planned 12 inches of undercut and backfill using granular engineered fill. If the undercut and backfill with granular engineered fill is made a requirement for this intersection, the design CBR value of 5 percent could be utilized.

WYA-23-0.04
PID No. 109362
County Road 62 (CR 62) Intersection



CORRELATION CHART FOR SUBGRADE STRENGTHS

Based on the GB-1 analysis, a design CBR value of 6 percent was determined for the entire project site, including all intersections. GB-1 analysis for the specific subgrade conditions at the TR 62 intersection indicated a slightly lower design CBR value of 5 percent. It should be noted that the CBR determination by the GB-1 spreadsheet is based on an **average** Group Index of all the evaluated samples. Group indices for the tested samples varied from 0 to 17, which would correlate with a CBR value of 3 to 12 percent. The higher Group Indices associated with the cohesive soils that were prominent in the boring performed at this intersection would correlate with a CBR value of 3 to 4 percent. Therefore, we recommend design consider a CBR value of 4 percent for the TR 62 cul-de-sac. It should be noted that GB-1 analyses indicate planned 12 inches of undercut and backfill using granular engineered fill. If the undercut and backfill with granular engineered fill is made a requirement for this intersection, the design CBR value of 5 percent could be utilized.

Appendix B:
Geotechnical Engineering Design Checklists

I. Geotechnical Design Checklists	
Project: WYA-23-0.04	**PDP Path:**
PID: 109362	**Review Stage: 1**

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. Soil Profile VI. D. Geotechnical Reports	✓

II. Reconnaissance and Planning Checklist

C-R-S: WYA-23-0.04	PID: 109362	Reviewer: LGH	Date: 7/29/2020

	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:	N	Replacement bridge to be located at existing bridge location. Therefore, exploration performed in area of existing bridge.
	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	All items noted were at existing bridge crossing of Sandusky River.

	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	No historic borings at project location.
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?	N	Boring location plan is included in this report submittal.
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, probes, 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?	Y	

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)		
	Rockfall (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,b,c)		
	Noise Barrier (Type E4)		
	CCTV & High Mast Lighting Towers (Type E5)		
	Buildings and Salt Domes (Type E6)		

III.C. Subgrade Checklist

C-R-S: WYA-23-0.04	PID: 109362	Reviewer: LGH	Date: 7/29/2020

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 Geotechnical Bulletin 1: Plan Subgrades (GB1)?	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	No gypsum observed in samples.
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	None present.
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 (soil profile), do the plans specify that these materials need to be removed and replaced or chemically stabilized?	X	None present.
a. If these materials are to be removed and replaced, have the station limits, depth, and lateral limits for the planned removal been provided?		
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	None present.
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?		

III.C. Subgrade Checklist

Subgrade	(Y/N/X)	Notes:
4 In accordance with GB1, 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)?	Y	Depth of removal and replacement material specified. Locations associated with borings with respect to proposed replacement pavement was provided. Stationing not pertinent for these partial R-cuts and cul-de-sac replacements. Plans to be prepared by others.
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	Chemical stabilization not anticipated to be economical. Plans to be prepared by others.
Indicate type of chemical 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	This note should be included by plans prepared by others.
6 If drainage or groundwater is an issue with the proposed subgrade, has an appropriate drainage system (e.g., pipe, underdrains) been provided?	X	Plans to be prepared by others.
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.
8 Has a design CBR value been provided?	Y	

VI.B. Geotechnical Reports

C-R-S:	WYA-23-0.04	PID:	109362	Reviewer:	LGH	Date:	7/29/2020

General		(Y/N/X)	Notes:
1	Has an electronic copy of all geotechnical submissions been provided to the District Geotechnical Engineer (DGE)?	X	This submittal is being provided to Prime Consultant, whom will forward to DGE.
2	Has the first complete version of a geotechnical report being submitted been labeled as 'Draft'?	Y	This is the draft submittal.
3	Subsequent to ODOT's review and approval, has the complete version of the revised geotechnical report being submitted been labeled 'Final'?	X	This is the draft submittal.
4	Has the boring data been submitted in a native format that is DIGGS (Data Interchange for Geotechnical and Geoenvironmental) compatable? gINT files may be used for this.	N	For final report submittal, gINT files will be provided.
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 705.1 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 705.2 of the SGE?	Y	
b.	an Introduction as described in Section 705.3 of the SGE?	Y	
c.	a section titled "Geology and Observations of the Project," as described in Section 705.4 of the SGE?	Y	
d.	a section titled "Exploration," as described in Section 705.5 of the SGE?	Y	
e.	a section titled "Findings," as described in Section 705.6 of the SGE?	Y	
f.	a section titled "Analyses and Recommendations," as described in Section 705.7 of the SGE?	Y	
Appendices		(Y/N/X)	Notes:
8	Do all geotechnical reports being submitted contain all applicable Appendices as described in Section 705.8 of the SGE?	Y	
9	Do the Appendices present a site Boring Plan showing all boring locations as described in Section 705.8.1 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 705.8.2 of the SGE?	Y	
11	Do the Appendices include reports of undisturbed test data as described in Section 705.8.3 of the SGE?	Y	
12	Do the Appendices include calculations in a logical format to support recommendations as described in Section 705.8.4 of the SGE?	Y	

Appendix C:
Historic Borings

1964 Year

Job No. 01412

Changes 015820

County Wyan DoT

Project Identification Wya-23-0.00

File No. 18-C-24 FEP-163

Proj. No. _____

Begin Sta. 265418.48 (10+400) End Sta. 323127.93 (293 Tan.) Length 8.56 *Miles

	RECON	AUGER	CORE	DRIVE ROD	RESISTIVITY
By	J.S.M.	A.P. B.D.C.			
Dates	3/17 - 3/20/64	3/30 - 4/7/64			
No. of Holes or Soundings		99			
Footage		946.5			
Samples Tested		227			

Drafting By A.E.S.P.W.

Completion Date 7/6/64

Drafting Hours 103

Topo Sheet

☐ Samples Accounted For

Transmittal Date 7/9/64

No. of Tracings 17 Filed with year 5-2-65

Revisions _____

Remarks FET 182

Refer to _____

DO NOT WRITE IN THIS SPACE

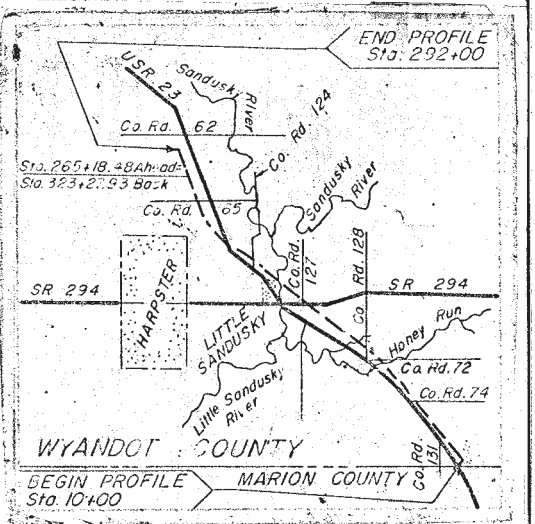
Length	Auger Data			Core Data			Drive Rod Data		Resistivity
	No. of Holes	Footage	Samples	No. of Holes	Footage	Samples	No. of Soundings	Footage	No. of Locations
8.56	99	946.5	227	—	—	—	—	—	—

* See Reverse Side

TOTAL SAMPLES 227					
Samples VOIDED	Auger 3	Drive	Samples USED	Auger 224	Drive

TOTAL MILEAGE

Alignment	Stations From——To	Mileage
MAINLINE	10+00 - 323+10	5.93
	266+00 - 293+00	.49
SR 294	599+00 - 630+00	.59
RAMP A	72+00 - 86+00	.26
RAMP B	83+00 - 99+00	.30
RAMP C	191+00 - 204+00	.25
RAMP D	77+00 - 93+00	.30
Co Rd 127	0+00 - 11+00	.21
SANDUSKY RIVER	11+00 - 23+00	.23



PLACE

015820

FIELD BORING LOG

879.9

County, Route No., Section W/A

Station 181+50 Offset 4' Elev.

Date 4-6-64 Water Elev.

Crew BC TF JS Equipment CME

Sounding 16

Depth Feet	Field Number	Description
0.0	0-4	Soy beans Top Soil
66	88C 28	BRN & GR SLT/CLAY
5		DENSE CLAY
		Refusal
10		
15		
20		
25		
30		

Use reverse side of this sheet for additional notes.

FIG. 9

FIELD BORING LOG

County, Route No., Section LYN 23 0.00

Station 183+00 Offset ℄ Elev. ℄

Date 4-6-64 Water Elev.

Crew LYONS FAUBER SAFFEN Equipment N.A

Drafting 16

Depth Feet	Field Number	Description
0.0-	0-3	TOPSOIL
	87L	
6b	2a	BRN SILTY CLAY GPL
5		
		RED BROWN CLAY
10		
15		
20		
25		
30		

Use reverse side of this sheet for additional notes.

FIELD BORING LOG

854.5

County, Route No., Section LAKE 22 0.00

Station 188+65 Offset 4 Elev. 8

Date 4-3-64 Water Elev. 14.0

Crew B.L. T.F. J.S. Equipment A16

Drafting 15

Depth Feet	Field Number	Description
0.0	0.3	BLACK MAT
6b	26 81L	BRN SILTY CLAY W/ STONE FRAGS LPL
5		
6aa	15 82L	
10		
6a	23 83L	GR SILTY CLAY STIFF LPL
W 15	4/6 84L	GR FINE SILTY SAND WET
4a	15 85L	
20		GR SILTY CLAY W/ GRAVEL DENSE LPL
25	86L	
4a	14	
30		

Over reverse side of this sheet for additional notes.

FIELD BORING LOG

882.6

County, Route No., Section IMP 25 0.00

Station 183+00 Offset 8 Lt Elev. 2

Date 3-30-64 Water Elev. -13.5'

Crew PONZANI Equipment CMS

SAUNDERS - ZINN

Drafting /

Depth Feet	Field Number	Description
0.0	0.5	Sod
2-6	1-P 25	BR. CLAY SILT ..... Moist
5	2-P	BR CLAY SILT w/ ST PEBS (Loose) Damp
6a	16	
10		
6a	3-P 22	GR. SILT CLAY Damp DENSE
13		(FREE WATER 13.5)
W 4a	4-P 21	BR. SANDY SILT ..... WET
	5-P	GR. SANDY CLAY SILT ..... MOIST
4a 20	14	SOME GRAVEL
		Hole squeezed in at elev. 56.6
25		COMPLETE
		(CLOSED 14.0)
30		

Use reverse side of this sheet for additional notes.

FIELD BORING LOG

869.1

County, Route No., Section WYO-23 0.00

Station 227+00 Offset 8-L Elev. ?

Date 5-31-64 Water Elev. —

Crew AP Equipment 4WD

RS - PE

Drafting 3

Depth Feet	Field Number	Description
0.0	9U6	TOP SOIL
	39-P	DK SANDY SILT MOIST
4a	18	
		REF. S.O
		ST. FLAGS
10		
15		
20		
25		
30		

Use reverse side of this sheet for additional notes.

FIELD BORING LOG

884.2

County, Route No., Section: WYK 23 0.00

Station: 230+70 Offset: 8C Elev.: 9

Date: 3-31-64 Water Elev.:

Crew: HP Equipment: H.A.

RS - PZ

Drafting: 3

Depth Feet	Field Number	Description
0.0-	0.6a	TOP SOIL
	387	BR. SILTY CLAY W/ LITTLE ST. FRAGS - MOIST
6a	19	
5		REF. TO ST. FRAGS
10		
15		
20		
25		
30		

Use reverse side of this sheet for additional notes.

FIELD BORING LOG

8931

County, Route No., Section WYA. 23 0.00

Station 23+80 Offset C Elev. E

Date 4-3-64 Water Elev. —

Crew AP Equipment WMS

RS - PZ

Drafting P

Depth Feet	Field Number	Description
0.0-	0-2	SOD
	99-P	DK. CLAY SILT MOIST
6.6	20	
3.0	98-P	RED-BR. SILT SAND — MOIST
	99-P	BR. SILTY SAND VERY MOIST
11.0	22	
10	00-P	BR. SAND MOIST
16	6	
15		
		~~BOTTOM 15.0~~
20		CAVED 8.0' (COULDN'T PULL AUGER)
25		8931
		8831
30		

Use reverse side of this sheet for additional notes.

FIELD BORING LOG

582.6

County, Route No., Section WYA. 23 0.00

Station 238+40 Offset Elev. 9

Date 4-7-64 Water Elev.

Crew AD Equipment MMS.

RS - PZ Drafting S

Depth Feet	Field Number	Description
00	0.4	SOD
	SPT	DK SANDY CLAY SILT MOIST
66	21	
5	SS-P	DK. SANDY CLAY SILT DAMP
69		ST FRAGS
	15	
8.5		
38	SS-P	BR. SAND - MOIST
		COMPLETE
15		
20		
25		
30		

Use reverse side of this sheet for additional notes.

240+75 A.F. 6/17/64 8643

FIELD BORING LOG

County, ~~Route~~ No., Section WYA 23 — 0.00

Station ~~240+85~~ Offset ? Elev. ?

Date 7-1-64 Water Elev. —

Crew DP Equipment WMS

RS — PZ

Drafting 5

Depth Feet	Field Number	Description
0.0-	~~2.4~~	~~S.O.D.~~
	57-P	DRK BR CLAY SILT MOIST
7-6	27	
5	58-P	BR SILTY CLAY MOIST
7-6	25	
	59-P	OR. SANDY ~~CLAY~~ WET DAMP
4a	14	
10		
	60-P	GR. SILTY SAND WET
4a	21	
15		
	61-P	GR. CLAY SILT MOIST SOME GRAVEL FRAGS
4a	21	
20		
	62-P	GR. SANDY SILT W/GRAVEL DAMP
4b	10	
25		REF. 23.5
		BOULDERS
		(CLOSED 10.0)
30		

Use reverse side of this sheet for additional notes.

Rock

FIELD BORING LOG

902.5

County, Route No., Section WYA. 23 -0.00

Station 217+58 Offset 2 Rt. Elev. 2

Date 4-1-64 Water Elev. —

Crew RP Equipment WMS.

RS - PZ

Drafting 8

Depth Feet	Field Number	Description
0.0-	04	SOD
	93P	BR. SILT CLAY - MOIST
7.6	30	
8.6		
	94P	GR. SILT CLAY DAMP
6.0	19	W/ ST FRAGS
10		
		COMPLETE
15		
20		
25		
30		

Use reverse side of this sheet for additional notes.

SUMMARY OF TESTS ON SOIL PROFILE SAMPLES

County, Rt. No., & Section Wya-23-0.00

Lab. No. So.-	Sample No.	Station	Depth in Feet	Mechanical Analysis					Physical Charact.			Density		SHTL Class	Remarks
				Agg. %	C Sand %	F Sand %	Silt %	Clay %	L.L.	P.I.	Water Cont. %	Opt.	Max. Dry Wt.		
50263	110-P	265+41 ℄	05-5	0	2	7	42	49	36	16	27			A-6b	
4	1	265+41 7SLT	04-4	27	6	8	28	31	36	15	36			A-6a	⊙
5	2	270+21 ℄	04-3	0	3	26	35	36	32	12	27			A-6a	
6	3	"	3-5	28	10	20	20	22	29	9	30			A-4a	⊙
7	4	273+16 ℄	04-4.5	0	3	4	42	51	36	13	26			A-6a	
8	5	279+91 ℄	05-5	0	2	6	33	59	43	19	28			A-7-6	
9	6	279+91 ℄	05-5	12	1	2	41	44	45	24	39			A-7-6	
50270	7	284+91 ℄	05-4	0	1	1	63	35	32	10	27			A-4b	
1	8	"	4-6.5	0	1	2	64	33	31	7	33			A-4b	⊙
2	9	291+91 ℄	05-4	0	0	2	51	47	47	26	29			A-7-6	
50273	120-P	"	4-7	0	1	6	46	47	34	12	30			A-6a	
50286	87-L	183+70 ℄	03-5	13	2	6	35	44	39	16	26			A-6b	
7	88-L	181+50 ℄	04-4	0	3	11	35	51	40	18	28			A-6b	

SO-8

SUMMARY OF TESTS ON SOIL PROFILE SAMPLES

15

County, Rt. No., & Section WYA-23-0.00

Lab. No. So.-	Sample No.	Station	Depth in Feet	Mechanical Analysis					Physical Charact.			Density		SHTL Class	Remarks
				Agg. %	C Sand %	F Sand %	Silt %	Clay %	L.L.	P.I.	Water Cont. %	Opt.	Max. Dry Wt.		
49807	81-L	188+65 ℄	03-5	0	5	8	39	48	39	19	26			A-6b	
8	2	"	5-11	0	1	13	41	45	28	11	15			A-6a	
9	3	"	11-14	0	0	1	42	57	35	14	23			A-6a	
49810	4	"	14-16	0	3	7	79	11	NP		21			A-4b	
1	5	"	16-23	14	8	20	29	29	20	5	15			A-4a	
49812	86	"	23-30	12	8	12	32	36	23	6	14			A-4a	
50257	103-P	313+0 ℄	05-5	0	2	8	39	51	39	19	20			A-6b	
7	4	"	5-10	5	3	8	40	44	32	12	17			A-6a	
8	5	318+0 ℄	04-5	18	5	7	33	37	39	20	24			A-6b	
9	6	"	5-9	0	3	8	49	40	33	13	19			A-6a	
50260	7	"	9-10	0	4	8	48	40	30	11	22			A-6a	
1	8	324+0 ℄	04-5	20	2	5	32	41	35	15	20			A-6a	
2	9	"	5-10	8	4	2	44	42	31	11	17			A-6a	

SO-8

SUMMARY OF TESTS ON SOIL PROFILE SAMPLES

1/18

County, Rt. No., & Section WVA-23-0.00 - (PONZANI)

Lab. No. So.-	Sample No.	Station	Depth in Feet	Mechanical Analysis					Physical Charact.			Density		SHTL Class	Remarks
				Agg. %	C Sand %	F Sand %	Silt %	Clay %	L.L.	P.I.	Water Cont. %	Opt.	Max. Dry Wt.		
49625	1-P	193+0 ℄	0.5-3	0	1	3	30	66	49	26	25			A-7-6	
6	2	"	3'-10	12	5	9	31	43	32	14	16			A6a	
7	3	"	10-13.5	0	0	0	33	67	40	18	22			A6b	
8	4	"	13.5-16	0	10	36	33	21	NP		21			A4a	
9	5	"	16-22	0	7	17	38	38	21	5	14			A-4a	
49630	6	196+0 ℄	0.5-4	0	3	4	35	58	43	21	24			A-7-6	
1	7	"	4-7.5	20	7	14	24	35	31	12	14			A6a	
2	8	"	7.5-13'	12	7	16	30	35	29	11	13			A6a	
3	9	196+25 SOUT	0.6-3	0	2	6	76	16	38	18	24			A6b	
4	10-P	"	3-7	9	9	17	32	33	28	11	15			A6a	
5	1	"	7-12	10	8	15	30	37	25	11	14			A6a	
6	2	197+0 ℄	0.6-3.5	0	3	10	32	55	45	22	28			A-7-6	
7	3	"	3.5-7	8	9	18	31	34	26	11	12			A6a	

SO-8

SUMMARY OF TESTS ON SOIL PROFILE SAMPLES

5

County, Rt. No., & Section WyA - 23 - 0.00

Lab. No. So.-	Sample No.	Station	Depth in Feet	Mechanical Analysis					Physical Charact.			Density		SHTL Class	Remarks
				Agg. %	C Sand %	F Sand %	Silt %	Clay %	L.L.	P.I.	Water Cont. %	Opt.	Max. Dry Wt.		
49677	63-P	237+00 ℄	11-17.5	0	2	3	56	39	26	4	23			A-4-b	○
8	4	238+40 "	0.9-4	14	6	13	27	40	37	16	21			A6b	
9	5	"	4-8.5	15	7	5	40	33	26	11	15			A-6a	
49680	6	"	8.5-10	0	34	32	23	11	NP	NP	5			A-3a	
1	7	240+85 ℄	0.4-4	0	1	5	37	57	46	17	27			A-7-6	
2	8	"	4-7	0	3	11	31	55	45	21	25			A-7-6	
3	9	"	7-10	13	5	21	30	31	29	7	14			A-4a	
4	60-P	"	10-16	0	4	57	28	11	NP	NP	21			A-4a	○
5	1	"	16-20	Gray FSoM					20	4	21			A-4a	●
6	2	"	20-20.3	8	6	4	56	26	19	3	10			A-4-b	
7	3	244+0 ℄	0.4-3	0	0	2	37	61	48	25	26			A-7-6	
8	4	"	3-5	0	1	1	33	65	43	18	22			A-7-6	
9	65-P	"	5-10	0	0	0	12	88	50	24	26			A-7-6	

SD-8

(1)

SUMMARY OF TESTS ON SOIL PROFILE SAMPLES

8

County, Rt. No., & Section WYA - 23 - 0.00

Lab. No. So.-	Sample No.	Station	Depth in Feet	Mechanical Analysis					Physical Charact.			Density		SHTL Class	Remarks
				Agg. %	C Sand %	F Sand %	Silt %	Clay %	L.L.	P.I.	Water Cont. %	Opt.	Max. Dry Wt.		
49716	92-P	290+0 ℄	8.5-10	7	4	1	44	44	27	11	17			A6a	
7	3	297+58 "	04-5.5	0	1	4	24	71	56	32	30			A-7-6	
8	4	"	5.5-10	0	3	9	38	50	31	12	19			A6a	
9	5	302+25 50RH	05-9	0	2	8	52	38	43	21	26			A-7-6	
49720	6	"	9-10	0	4	5	45	46	33	13	17			A6a	
1	7	232+80 ℄	03-3	0	5	17	29	49	36	17	20			A6b	
2	8	"	3-5	0	9	56	1	34	25	8	18			A-3a	
3	9	"	5-8	0	1	16	71	12	N-P		22			A-4b	
4	100-P	"	8-15	1	69	22	8	—	N-P		6			A-1-b	GR
5	1	305+50 ℄	06-5	0	6	19	30	45	33	14	36			A6a	①
49726	102-P	308+0 ℄	05-5	0	4	10	38	48	35	14	28			A6a	
49727	1-L	21+0 ℄	03-4	7	6	15	30	42	33	13	21			A6a	
8	2	"	4-10	0	7	10	45	38	26	11	17			A6a	

SO-8

SOIL PROFILE

8
17

WYANDOT COUNTY
WYA-23-0.00

OHIO STATE HIGHWAY TESTING LABORATORY
1620 W. BROAD ST. COLUMBUS 23, OHIO

℄ Proposed USR 23

℄ Proposed Ramp D

Sta.188+44.17 - ℄ Proposed USR 23
Sta.612+07.19 - ℄ Proposed SR 294

℄ Proposed SR 294

℄ Proposed Ramp A

℄ Proposed Ramp B

℄ Proposed Ramp C

Existing SR 294

Cultivated

Pasture

NOTE: For complete plan-view of SR 294 Interchange, see sheet 14.

Proposed grade, SR 294

TS=0.3'
Refusal (Hand auger)

TS=0.4'
Refusal (Hand auger)

Sod=0.5'

50' Lt.

Hole squeezed in at elev. 868.6'

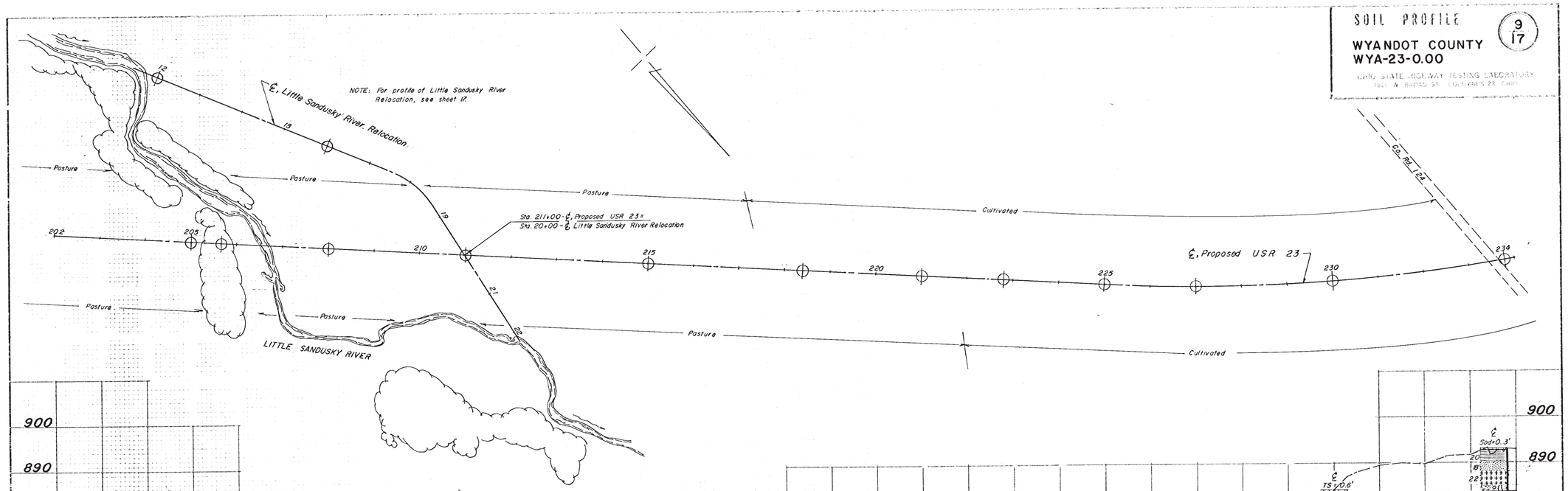
SOIL PROFILE

9
17

WYANDOT COUNTY
WYA-23-0.00

OHIO STATE HIGHWAY TESTING LABORATORY
1615 W. BROAD ST. COLUMBUS 23, OHIO

NOTE: For profile of Little Sandusky River Relocation, see sheet 17.

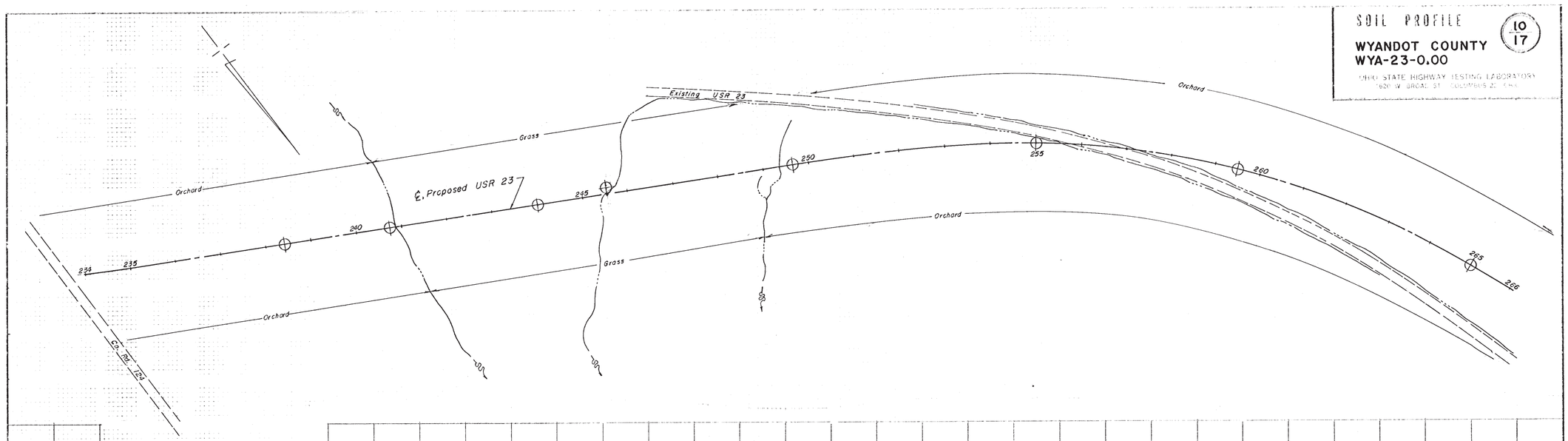


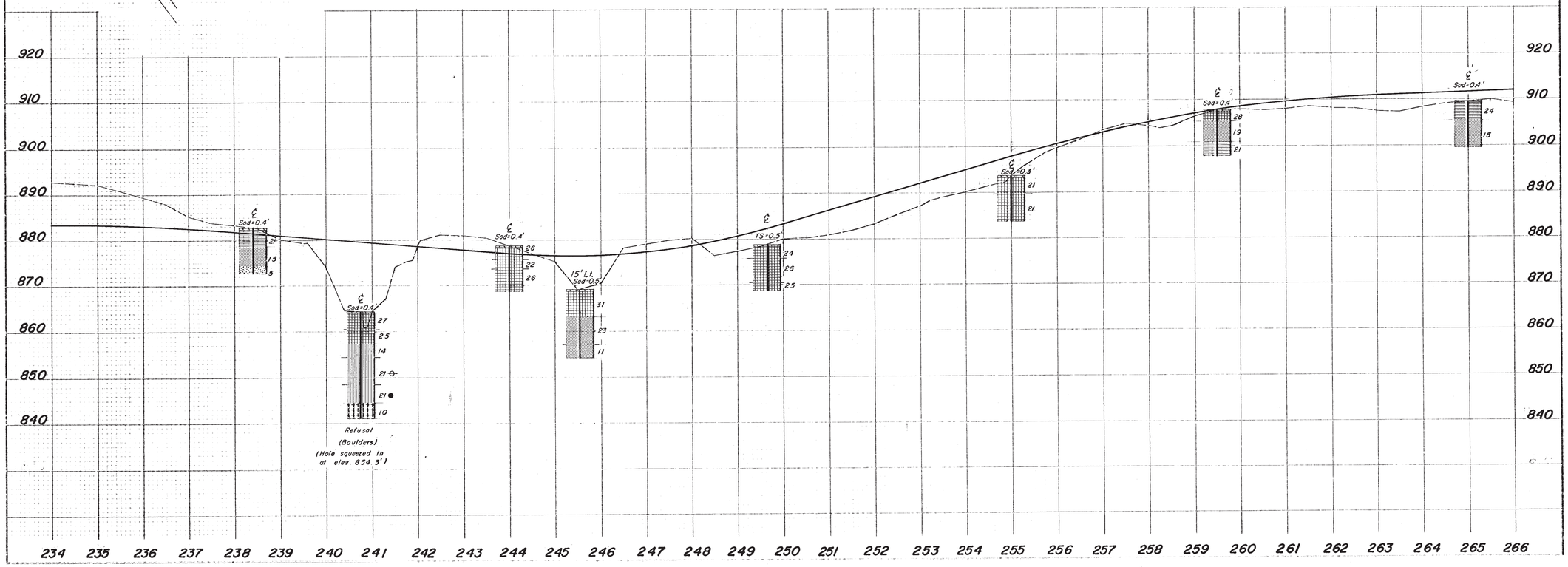
SOIL PROFILE

10/17

WYANDOT COUNTY
WYA-23-0.00

OHIO STATE HIGHWAY TESTING LABORATORY
1620 W. BROAD ST. COLUMBUS 23, OHIO





SOIL PROFILE

11
17

WYANDOT COUNTY
WYA-23-0.00

OHIO STATE HIGHWAY TESTING LABORATORY
1620 W. BROAD ST. COLUMBUS 16, OHIO