FINAL REPORT
GEOTECHNICAL EXPLORATION REPORT
DEL-36-0.00
DELAWARE COUNTY, OHIO
PID: 109070

Prepared For:

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NEAS PROJECT 21-0038

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EXECUTIVE SUMMARY

The Ohio Department of Transportation (ODOT) has proposed a roadway rehabilitation project (DEL-42-2.29), PID 109074) along U.S. Route 42 (US-42) just south of the City of Delaware, Delaware County, Ohio. The project limits extend south to north along US-42 from just north of Klondike Road (Rd)/ Riverside Drive (Dr) (Straight Line Mileage (SLM) 2.29) to just south of the US-42 and US-23/Columbus Pike interchange (SLM 6.86). The project excludes the approximate 0.3 miles of concrete pavement that extends north and south of the intersection with South Section Line Rd (SLM 3.09 to SLM 3.39). It is our understanding that the overall project objective is to rehabilitate the project portion of US-42, which has degraded due to age and heavy traffic loading. As part of the proposed rehabilitation project, segments of US-42 are to be widened as well as undergo partial-width full-depth pavement replacement. It is our understanding that for maintenance of traffic (MOT) purposes, full-depth pavement replacement for the project will exclude the center 12 ft of pavement which is planned to be milled and overlaid.

National Engineering & Architectural Services, Inc. (NEAS) has been contracted to perform geotechnical engineering services for the project. The purpose of the geotechnical engineering services was to perform geotechnical explorations within the project limits to obtain information concerning the subsurface soil and groundwater conditions relevant to the design and construction of the project. Between September 18, 2020 and November 6, 2020, NEAS performed the site reconnaissance and exploration program for the project. The subsequent document presents the results of a subgrade and pavement coring exploration for the project portion of US-42 to undergo widening and full-depth pavement replacement. As part of the rehabilitation project, NEAS advanced a total of 14 borings to be utilized for subgrade characterization purposes and obtained a total of 6 pavement cores to be utilized in the evaluation of existing pavement section buildup.

The subsurface profile at the site consists of surficial materials comprised of either topsoil or an existing pavement section (asphalt, concrete and/or granular base) ranging from 12 to 18 inches in thickness which was generally underlain by natural soils consisting of moderately plastic sandy silt and silt/clay combinations. The subgrade soils encountered within the project limits classified as either A-1-b, A-2-4, A-3a, A-4a, A-6a, A-6b, or A-7-6 type soils.

Unstable subgrade conditions that may require stabilization per ODOT's Geotechnical Bulletin 1 (GB1) guidelines were encountered within the extents of the existing US-42 subgrade. With respect to unstable soils along the project portions of US-42, three (3) borings (B-030-0-20, B-038-0-20 and B-039-0-20) encountered soil with a corrected SPT-N (N_{60}) value below 12 blows per foot within 3 feet of proposed top of subgrade. Therefore, with respect to stabilization it is our opinion that global stabilization in not necessary. However; it is recommended that stabilization be performed near these boring locations, with stabilization consisting of 12 inches of Excavate and Replace (Item 204) with geotextile. Excavate and Replace excavations are estimated to extend to a depth as indicated above with the excavated material being replaced with Item 204 - Granular Material Type B or C and underlain with Item 204 Geotextile Fabric. In areas where underdrains are to be provided, Item 204 - Granular Material Type B should be used as replacement material. Stabilization limits should extend 18-inches beyond the edge of the proposed paved roadway, shoulder or median. It is NEAS's opinion that the subgrade soils will provide adequate pavement support assuming it is designed and constructed in accordance with the recommendations provided within this report, as well as all applicable ODOT standards and specifications.

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1. INTRODUCTION

1.1. General

National Engineering & Architectural Services, Inc. (NEAS) presents our Geotechnical Exploration Report for the Ohio Department of Transportation (ODOT) roadway rehabilitation project DEL-36-0.00 (PID 109070) along U.S. Route 36 (US-36) within Delaware County, Ohio. The rehabilitation project extends along US-36 from Straight-Line Mileage (SLM) marker 0.00 to SLM marker 7.26 in Delaware County. It is our understanding that the proposed project is intended to: 1) rehabilitate the existing US-36 pavement which has degraded due to age and heavy traffic loading; and, 2) improve the operations of the project portions of US-36 through various techniques including the widening of existing shoulders. As part of the proposed rehabilitation, segments of US-36 within the project limits are to be widened as well as undergo full-depth pavement replacement. It is also our understanding that a total of four culverts within the project limits witch include full height headwalls are to be either replaced or extended. This report presents a summary of the project encountered surficial and subsurface conditions and our recommendations for: 1) subgrade stabilization, pavement design parameters for the widening and/or full-depth replacement of the project portions of US-36; and, 2) culvert foundation design for four full height headwall culverts within the project limits that are planned to be either replaced or extended. In general, structure analyses and recommendations presented within this report are in accordance with Load and Resistance Factor Design (LRFD) method as set forth in AASHTO's Publication *LRFD Bridge Design Specifications, 9th Edition* (BDS) (AASHTO, 2020) and ODOT's Publication *2020 LRFD Bridge Design Manual* (ODOT, 2021). The pavement subgrade analysis and recommendations presented are in accordance with ODOT's *Geotechnical Bulletin 1* (GB1) (ODOT [1], 2021) and *Pavement Design Manual* (PDM) (ODOT, 2021).

The exploration was conducted in general accordance with NEAS's proposals to Strand Associates, Inc dated March 31, 2021 and March 28, 2022, with the provisions of ODOT's *Specifications for Geotechnical Explorations* (SGE) dated January 2021 (ODOT, 2021).

The scope of work performed by NEAS as part of the referenced project included: 1) a review of published geotechnical information; 2) perform 49 total subgrade test borings; 3) perform 8 total culvert test borings; 4) obtain 25 total pavement cores extending through the existing pavement section to top of subgrade; 5) record and document field and laboratory measurements of the pavement cores obtained; 6) laboratory testing of soil samples in accordance with the SGE; 7) performing geotechnical engineering analysis to assess subgrade stabilization requirements, pavement design parameters, and foundation design including construction considerations; and, 8) the development of this summary report.

2. GEOLOGY AND OBSERVATIONS OF THE PROJECT

2.1. Geology and Physiography

The project site is located within the Central Ohio Clayey Till Plain physiographic region which is characterized as well-defined moraines with intervening flat-lying ground moraine and intermorainal lake basins. The region consists of clayey till at the surface and contains few large streams and limited sand and gravel outwash. Elevations of the region range from 700 to 1,150 ft above mean sea level (amsl), with moderate relief (100 ft). The geology within this region is described as clayey, high-lime Wisconsinan-age till and lacustrine materials over Lower Paleozoic-age carbonate rocks (i.e., limestone or dolostone) and, in the east, shales. Loess in this region is thin to absent (ODGS, 1998).

The geology from about SLM marker 0.00 to Burnt Pond Road (Rd) is mapped as an average of 70-ft of till followed by discontinuous layers of sand and gravel with thickness typically less than 10-ft, underlain by dolomite. From Burnt Pond Rd to the end of project, the geology is mapped as 30-ft to 80-ft of till underlain by Devonian-age limestone. The Wisconsinan-age till mapped throughout the project is described as consisting of an unsorted mix of clay, silt, gravel, and boulders with possible silt, sand, and gravel lenses. The discontinuous layers of Wisconsinan-age sand and gravel is described as consisting of well-sorted, interbedded and intermixed sand and gravel commonly containing thin, discontinuous layers of silt and clay and may locally contain organics.

Based on the Bedrock Geologic Units Map of Ohio (USGS & ODGS, 2005), bedrock is mapped as Columbus Limestone and Dolomite in the project area. Columbus Limestone consists of both limestone and dolomite that can be described as gray to brown in color weathering to brown, massively bedded and fossiliferous in the upper two thirds, and dolomite in the lower one third. The Dolomite at the site can be described as gray, laminated to thin bedded with occasional thin bed and laminae of dark gray shale and anhydrite and/or gypsum. According to the ODNR bedrock topography map of Ohio, bedrock elevations at the project site can be expected to range from 880 ft amsl to 920 ft amsl, putting bedrock at depths between approximately 20 and 90 ft below ground surface (bgs).

The majority of soils directly underlying the project site have been mapped (Web Soil Survey) by the Natural Resources Conservation Service as being Blount silt loam, Glynwood silt loam and Pewamo silt loam. The Blount series is described as very deep, somewhat poorly drained soil that formed in till on wave-worked till plains and near-shore zones. The Pewamo series is described as very deep, very poorly drained soils that formed in till on moraines, near-shore zones and lake plains while the Glynwood series is described as very deep, moderately well drained till formed in a thin layer of loess and the underlying till on ground moraines and end moraines. The various soil series mapped throughout the project area are comprised of predominantly fine-grained (silt and clay) cohesive soils and classify mainly as A-4, A-6 and A-7 type soils according to the AASHTO method of soil classification (USDA, 2015).

2.2. Hydrology/Hydrogeology

The groundwater can be expected at an elevation consistent with that of the Scioto River as it is the most dominant hydraulic influence in the vicinity of the project area. It should be noted that perched groundwater systems may also exist due to the presence of fine-grained soils making it difficult for groundwater to permeate to the natural phreatic surface.

The project site is not located within a Flood Hazard area based on available mapping by the Federal Emergency Management Agency's (FEMA) National Flood Hazard mapping program (FEMA, 2016).

2.3. Mining and Oil/Gas Production

No abandoned mines are noted on ODNR’s Abandoned Underground Mine Locator within the immediate vicinity of the project's boundaries (ODNR [1], 2016).

No oil or gas wells were noted on ODNR’s Ohio Oil & Gas Locator within the immediate vicinity of the project’s boundaries (ODNR [2], 2016).

2.4. Historical Records and Previous Phases of Project Exploration

A historic record search was performed through ODOT's Transportation Information Mapping System (TIMS) and the following report/plans were available for review and evaluation for this report:

- Soil Profile Sheets and Geotechnical Exploration Findings for the Ohio Department of Highways project DEL-36-1.32, prepared by the State of Ohio Department of Highways State Testing Laboratory, submitted on April 11, 1969.
- Soil Profile Sheets and Geotechnical Exploration Findings for the Ohio Department of Highways project DEL-36-4.37, prepared by the State of Ohio Department of Highways State Testing Laboratory, submitted on March 11, 1956.

Historical soil borings associated with the above plans/sheets were reviewed, however, the available information was not utilized for our evaluation of the site. The information was not utilized because the subject project is primarily a pavement replacement/resurfacing projects and boring information of the previous projects subgrade and pavement buildups have a high probability of change between various projects and maintenance over the years. Therefore, this historical information are not referenced or presented within this report.

2.5. Field Reconnaissance

A field reconnaissance visit for the overall project area was conducted between July 14, 2021, and July 15, 2021, along the project portions of US-36 in Delaware County, Ohio. Site conditions, including the exiting pavement conditions, were noted, and photographed during the visit. Photographs of notable pavement distress and a summary of our observations are provided below.

2.5.1. Land Use and Cover

The land use of most of the project area consists of cultivated fields (farms) properties while other land uses of the area surrounding the project included industrial facilities and residential property (i.e., single family houses).

2.5.2. US-36 from County Line Road to North Main Street

In general, the pavement condition along this section of US-36 was observed to be in poor to very poor condition with frequent moderate to high severity longitudinal and transverse cracking, as well as debonding and medium severity raveling (Photograph 1). Occasional moderate severity patching and high severity crack sealing deficiencies were also observed. This segment of US-36 planned for rehabilitation is raised slightly above the surrounding area which is relatively flat. The roadway drains to moderately vegetated open drainage swales on either side. No signs of standing water within the roadway were observed during our site visit.

Photograph 1: Pavement condition of US-36 (County Line Road to North Main Street)

2.5.3. US-36 from North Main Street to Ohio Route 257

In general, the pavement condition along this section of US-36 was observed to be in fair to poor condition with low to high severity longitudinal and transverse cracking, as well as occasional moderate severity patching and high severity crack sealing deficiencies (Photograph 2). Like most of US-36, this segment is planned for rehabilitation and is raised slightly above the surrounding area which is relatively flat. The roadway drains to moderately vegetated open drainage swales on either side. No signs of standing water within the roadway were observed during our site visit.

Photograph 2: Pavement condition of US-36 (North Main Street to Ohio Route 257)

2.5.4. US-36 from Ohio Route 257 to Lehner Woods Boulevard

In general, the pavement condition along this section of US-36 was observed to be in good to fair condition with low to moderate severity longitudinal and transverse cracking, as well as high severity crack sealing deficiencies. Like most of US-36, this segment is planned for rehabilitation and is raised slightly above the surrounding area which is relatively flat. The roadway drains to moderately vegetated open drainage swales on either side. No signs of standing water within the roadway were observed during our site visit.

Photograph 3: Pavement condition of US-36 (Ohio Route 257 to Lehner Woods Boulevard)

3. GEOTECHNICAL EXPLORATION

3.1. Subgrade Exploration Program

The subsurface exploration for the project was conducted by NEAS between August 2, 2021 and November 9, 2022 and included a total of 57 borings. Forty-nine (49) pavement subgrade borings were drilled to depths of 7.5 ft bgs while eight (8) culvert borings were drilled to depths of 25 ft bgs. The boring locations were selected by NEAS in general accordance with the guidelines contained in the SGE with the intent to evaluate subsurface soil and groundwater conditions. Borings were typically located either within existing pavement areas that are planned to undergo full-depth replacement, within areas where widening is planned or in close proximity to project culverts that may require extension or replacement. Target boring locations were located in the field by NEAS prior to drilling utilizing handheld GPS equipment. The boring locations were drilled in areas that were not restricted by underground utilities or dictated by terrain (i.e., steep embankment slopes). Each individual project boring log (included within Appendix B) includes the recorded boring latitude and longitude location (based on the surveyed Ohio State Plane North, NAD83, location) and the corresponding ground surface elevation. The boring locations are depicted on the Boring Location Plan provided in Appendix A.

Borings were drilled using either a CME 55 or CME 45B truck-mounted drilling rig utilizing 3.25-inch (inner diameter) hollow stem augers. Soil samples for pavement subgrade borings were typically recovered continuously to a depth of 7.5 ft bgs, while samples for culvert borings were typically recovered at 2.5-ft intervals, each using an 18-inch split spoon sampler (AASHTO T-206 “Standard Method for Penetration Test and Split Barrel Sampling of Soils.”). The soil samples obtained from the exploration program were visually observed in the field by the NEAS field representative and preserved for review by a Geologist for possible laboratory testing. Standard penetration tests (SPT) were conducted using CME auto hammers that have been calibrated to be between 81.7% and 68.4% efficient with calibration dates of either December 5, 2019, or January 24, 2022 as indicated on the boring logs (Appendix B).

Field boring logs were prepared by drilling personnel and included pavement description (where present), lithological description, SPT results recorded as blows per 6-inch increment of penetration and estimated unconfined shear strength values on specimens exhibiting cohesion (using a hand-penetrometer). Groundwater level observations were recorded both during and after the completion of drilling. These groundwater level observations are included on the individual boring logs (provided in Appendix B). After completing the borings, the boreholes were backfilled with either auger cuttings, bentonite chips, or a combination of these materials and patched accordingly with the cold patch asphalt and/or concrete when drilling through the existing pavement.

3.2. Pavement Coring Exploration Program

The coring exploration program for this project was conducted by NEAS between August 2, 2021 and August 13, 2021, and included a total of twenty-five (25) pavement cores. Pavement cores were performed through the existing pavement at various project boring locations. As described in Section 3.1. of this report, the indicated target boring/coring locations were located in the field by NEAS prior to drilling utilizing handheld GPS equipment in areas that were not restricted by maintenance of traffic efforts or utilities. Measurements, location information, photographs and other details of each core sample can be found in the Pavement Core Logs included within Appendix C. The approximate location for each core is depicted on the Boring Location Plan provided in Appendix A.

Cores were drilled using a portable, truck-mounted, electric powered coring drill with a 4-inch (outer diameter) diamond tipped drill bit and utilizing water as the circulating fluid. Asphalt and concrete thicknesses were measured in the field after the cores were extracted and down-hole measurements were

made. Each core sample was then photographed, logged, and placed in a core box for transportation to NEAS's laboratory. Following field documentation and photographs, the core hole was backfilled to existing grade with either asphalt patch or concrete (where appropriate). Once in the laboratory the cores were: 1) re-measured for thickness verification and photographed; 2) checked for composition; and 3) reviewed for individual layer identification and subsequent measurements.

3.3. Laboratory Testing Program

The laboratory testing program consisted of classification testing, moisture content determinations, unconfined compressive strength of soil testing, and sulfate content testing. Data from the laboratory testing program were incorporated onto the boring logs (Appendix B). Soil samples are retained at the laboratory for 60 days following report submittal, after which time they will be discarded.

3.3.1. Classification Testing

Representative soil samples were selected for index property (Atterberg Limits) and gradation testing for classification purposes on approximately 50% of the samples. At each pavement/subgrade boring location, the upper two samples obtained below the proposed top of subgrade elevation were generally tested while additional samples were selected for testing with the intent of properly classifying the subsurface soil and groundwater conditions within the planned project limits. Soils not selected for testing were compared to laboratory tested samples/strata and classified visually. Moisture content testing was conducted on all samples. The laboratory testing was performed in general accordance with applicable AASHTO specifications and ODOT Supplements.

Final classification of soil strata in accordance with AASHTO M-145 "Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes," as modified by ODOT "Classification of Soils" was made once laboratory test results became available. The results of the soil classification are presented on the boring logs in Appendix B.

3.3.2. Standard Penetration Test Results

Standard Penetration Tests (SPT) and split-barrel (commonly known as split-spoon) sampling of soils were performed at varying intervals (i.e., continuous or 2.5-ft intervals) in the project borings performed. To account for the high efficiency (automatic) hammers used during SPT sampling, field SPT N-values were converted based on the calibrated efficiency (energy ratio) of the specific drill rig's hammer. Field N-values were converted to an equivalent rod energy of 60% (N_{60}) for use in analysis or for correlation purposes. The resulting N_{60} values are shown on the boring logs provided in Appendix B.

3.3.3. Sulfate Testing

Sulfate testing was generally performed on one sample for each subgrade/pavement boring performed for design purposes. The selected samples were tested in accordance with ODOT Supplement 1122, "Determining Sulfate Content in Soils" dated July 17, 2015. In general, the upper most sample (within 3 ft of the proposed subgrade elevation) from each boring was tested when feasible. Testing results are summarized in Table 1 below, and presented on the boring logs within Appendix B.

Table 1: Sulfate Test Summary by Boring

Boring ID	Sample	Depth (ft)	Dilution Ratio	Average Sulfate Content (ppm)	Boring ID	Sample	Depth (ft)	Dilution Ratio	Average Sulfate Content (ppm)
B-001-0-20	SS-1	1.5 - 3.0	20	67	B-026-0-20	SS-1	1.5 - 3.0	20	100
B-002-0-20	SS-1	1.5 - 3.0	20	140	B-027-0-20	SS-2	3.0 - 4.5	20	107
B-003-0-20	SS-1	1.5 - 3.0	20	340	B-028-0-20	SS-1	1.5 - 3.0	20	180
B-004-0-20	SS-1	1.5 - 3.0	20	220	B-029-0-20	SS-1	1.5 - 3.0	20	180
B-005-0-20	SS-1	1.5 - 3.0	20	193	B-030-0-20	SS-1	1.5 - 3.0	20	220
B-006-0-20	SS-1	1.5 - 3.0	20	540	B-031-0-20	SS-1	1.5 - 3.0	20	120
B-007-0-20	SS-1	1.5 - 3.0	20	200	B-032-0-20	SS-1	1.5 - 3.0	20	127
B-008-0-20	SS-1	1.5 - 3.0	20	293	B-033-0-20	SS-1	1.5 - 3.0	20	140
B-009-0-20	SS-1	1.5 - 3.0	20	180	B-034-0-20	SS-1	1.5 - 3.0	20	80
B-010-0-20	SS-1	1.5 - 3.0	20	267	B-035-0-20	SS-1	1.5 - 3.0	20	93
B-011-0-20	SS-1	1.5 - 3.0	20	1027	B-036-0-20	SS-1	1.5 - 3.0	20	113
B-012-0-20	SS-1	1.5 - 3.0	40	1360	B-037-0-20	SS-1	1.5 - 3.0	20	200
B-013-0-20	SS-1	1.5 - 3.0	20	1353	B-038-0-20	SS-1	1.5 - 3.0	20	200
B-014-0-20	SS-1	1.5 - 3.0	40	1093	B-039-0-20	SS-1	1.5 - 3.0	20	220
B-015-0-20	SS-1	1.5 - 3.0	40	1760	B-040-0-20	SS-1	1.5 - 3.0	20	160
B-016-0-20	SS-1	1.5 - 3.0	20	100	B-041-0-20	SS-1	1.5 - 3.0	20	407
B-017-0-20	SS-1	1.5 - 3.0	20	120	B-042-0-20	SS-1	1.5 - 3.0	20	13
B-018-0-20	SS-1	1.5 - 3.0	20	60	B-043-0-20	SS-1	1.5 - 3.0	20	373
B-019-0-20	SS-1	1.5 - 3.0	20	140	B-044-0-20	SS-1	1.5 - 3.0	20	460
B-020-0-20	SS-2	3.0 - 4.5	20	100	B-045-0-20	SS-1	1.5 - 3.0	20	420
B-021-0-20	SS-1	1.5 - 3.0	20	220	B-046-0-20	SS-1	1.5 - 3.0	20	373
B-022-0-20	SS-1	1.5 - 3.0	20	40	B-047-0-20	SS-1	1.5 - 3.0	20	307
B-023-0-20	SS-1	1.5 - 3.0	20	120	B-048-0-20	SS-1	1.5 - 3.0	20	187
B-024-0-20	SS-1	1.5 - 3.0	20	20	B-049-0-20	SS-2	3.0 - 4.5	20	153
B-025-0-20	SS-1	1.5 - 3.0	20	240					

4. FINDINGS

The subsurface conditions encountered during NEAS's explorations are described in the following subsections. The boring logs generated by NEAS represent our interpretation of the subsurface conditions encountered at each boring location based on our site observations, field logs, visual review of the soil samples by NEAS's geologist, and laboratory test results. The lines designating the interfaces between various soil strata on the NEAS boring logs represent the approximate interface location; the actual transition between strata may be gradual and indistinct. The subsurface soil and groundwater characterizations included herein, including summary test data, are based on the subsurface findings from the geotechnical explorations performed by NEAS as part of the referenced project. At the time of the composition of this report, pavement grade information has been assumed to be consistent with the existing pavement grades. It should be noted that for the purposes of this report and our analysis the term 'subgrade' has been assumed to represent soils and/or soil conditions from 1.5 ft below proposed final pavement grades to a depth of 7.5 ft below the proposed pavement grades.

4.1. Core Results

Thickness measurements were obtained for each of the indicated pavement cores performed for the project. A summary of these measurements along with the material encountered is summarized in Table 2. Laboratory photographs and measurements of each of the cores are presented within the Pavement Core Logs included within Appendix C. Locations of the pavement cores or the boring locations where pavement cores were performed are depicted on the Boring Location Plan included within Appendix A.

Table 2: Pavement Core Summary

Boring ID	Core ID	Alignment	Asphalt Thickness (in)	Concrete Thickness (in)	Total Thickness (in)	Boring ID	Core ID	Alignment	Asphalt Thickness (in)	Concrete Thickness (in)	Total Thickness (in)
B-001-0-20	P.C.-1	SR-36	14.50	-	14.50	B-028-0-20	P.C.-14	SR-36	14.00	-	14.00
B-004-0-20	P.C.-2	SR-36	16.00	-	16.00	B-029-0-20	P.C.-15	SR-36	14.50	-	14.50
B-005-0-20	P.C.-3	SR-36	12.00	-	12.00	B-032-0-20	P.C.-16	SR-36	14.50	-	14.50
B-008-0-20	P.C.-4	SR-36	13.00	-	13.00	B-033-0-20	P.C.-17	SR-36	13.50	-	13.50
B-009-0-20	P.C.-5	SR-36	15.00	-	15.00	B-036-0-20	P.C.-18	SR-36	13.25	-	13.25
B-012-0-20	P.C.-6	SR-36	11.50	-	11.50	B-037-0-20	P.C.-19	SR-36	13.75	-	13.75
B-013-0-20	P.C.-7	SR-36	14.50	-	14.50	B-040-0-20	P.C.-20	SR-36	14.50	-	14.50
B-016-0-20	P.C.-8	SR-36	12.50	-	12.50	B-041-0-20	P.C.-21	SR-36	15.00	-	15.00
B-017-0-20	P.C.-9	SR-36	14.75	-	14.75	B-044-0-20	P.C.-22	SR-36	14.00	-	14.00
B-020-0-20	P.C.-10	SR-36	14.50	-	14.50	B-045-0-20	P.C.-23	SR-36	14.00	-	14.00
B-021-0-20	P.C.-11	SR-36	15.75	-	15.75	B-048-0-20	P.C.-24	SR-36	14.25	-	14.25
B-024-0-20	P.C.-12	SR-36	19.00	-	19.00	B-049-0-20	P.C.-25	SR-36	13.00	-	13.00
B-024-0-20	P.C.-13	SR-36	10.25	-	10.25						

4.2. Existing Pavement

The pavement section thicknesses in terms of asphalt, concrete and granular base were measured at representative project subgrade borings during the subsurface exploration for the project and are recorded on the test boring logs provided in Appendix B. A summary of these measurements is provided in Table 3 below.

Table 3: Measured Pavement Thickness at Boring Locations

Boring ID	Proposed Alignment	Drilled Depth (ft)	Asphalt Thickness (in)	Concrete Thickness (in)	Base Thickness (in)	Total Thickness (in)	Boring ID	Proposed Alignment	Drilled Depth (ft)	Asphalt Thickness (in)	Concrete Thickness (in)	Base Thickness (in)	Total Thickness (in)
B-001-0-20	SR-36	7.5	12.0	0.0	6.0	18.0	B-026-0-20	SR-36	7.5	13.0	0.0	5.0	18.0
B-002-0-20	SR-36	7.5	12.0	0.0	6.0	18.0	B-027-0-20	SR-36	7.5	14.0	0.0	5.0	19.0
B-003-0-20	SR-36	26.5	12.0	0.0	6.0	18.0	B-028-0-20	SR-36	7.5	13.0	0.0	5.0	18.0
B-004-0-20	SR-36	7.5	12.0	0.0	6.0	18.0	B-029-0-20	SR-36	7.5	14.0	0.0	5.0	19.0
B-005-0-20	SR-36	7.5	12.0	0.0	6.0	18.0	B-030-0-20	SR-36	7.5	13.0	0.0	5.0	18.0
B-006-0-20	SR-36	7.5	12.0	0.0	6.0	18.0	B-031-0-20	SR-36	7.5	12.0	0.0	6.0	18.0
B-007-0-20	SR-36	7.5	12.0	0.0	6.0	18.0	B-032-0-20	SR-36	7.5	13.0	0.0	5.0	18.0
B-008-0-20	SR-36	7.5	13.0	0.0	5.0	18.0	B-033-0-20	SR-36	7.5	12.0	0.0	6.0	18.0
B-009-0-20	SR-36	7.5	12.0	0.0	6.0	18.0	B-034-0-20	SR-36	7.5	13.0	0.0	5.0	18.0
B-010-0-20	SR-36	7.5	13.0	0.0	5.0	18.0	B-035-0-20	SR-36	26.5	13.0	0.0	5.0	18.0
B-011-0-20	SR-36	7.5	13.0	0.0	5.0	18.0	B-036-0-20	SR-36	26.5	14.0	0.0	4.0	18.0
B-012-0-20	SR-36	7.5	12.0	0.0	6.0	18.0	B-037-0-20	SR-36	26.5	14.0	0.0	4.0	18.0
B-013-0-20	SR-36	7.5	13.0	0.0	5.0	18.0	B-038-0-20	SR-36	26.5	14.0	0.0	4.0	18.0
B-014-0-20	SR-36	7.5	12.0	0.0	5.0	17.0	B-039-0-20	SR-36	26.5	13.0	0.0	5.0	18.0
B-015-0-20	SR-36	7.5	13.0	0.0	5.0	18.0	B-040-0-20	SR-36	26.5	14.0	0.0	4.0	18.0
B-016-0-20	SR-36	7.5	13.0	0.0	5.0	18.0	B-041-0-20	SR-36	7.5	13.0	0.0	5.0	18.0
B-017-0-20	SR-36	7.5	12.0	0.0	6.0	18.0	B-042-0-20	SR-36	7.5	14.0	0.0	4.0	18.0
B-018-0-20	SR-36	6.5	12.0	0.0	7.0	19.0	B-043-0-20	SR-36	7.5	13.0	0.0	5.0	18.0
B-019-0-20	SR-36	7.5	13.0	0.0	6.0	19.0	B-044-0-20	SR-36	7.5	14.0	0.0	4.0	18.0
B-020-0-20	SR-36	7.5	13.0	0.0	5.0	18.0	B-045-0-20	SR-36	7.5	14.0	0.0	4.0	18.0
B-021-0-20	SR-36	7.5	13.0	0.0	5.0	18.0	B-046-0-20	SR-36	7.5	13.0	0.0	5.0	18.0
B-022-0-20	SR-36	7.5	12.0	0.0	6.0	18.0	B-047-0-20	SR-36	7.5	13.0	0.0	5.0	18.0
B-023-0-20	SR-36	7.5	12.0	0.0	6.0	18.0	B-048-0-20	SR-36	7.5	13.0	0.0	5.0	18.0
B-024-0-20	SR-36	7.5	13.0	0.0	5.0	18.0	B-049-0-20	SR-36	7.5	14.0	0.0	5.0	19.0
B-025-0-20	SR-36	7.5	14.0	0.0	5.0	19.0							

4.3. Subgrade Conditions

The subgrade conditions encountered below the existing pavement is relatively consistent and consists of natural soils comprised of moderately plastic sandy silt and silt/clay combinations. These subgrade soils encountered within the project limits classified as either A-4a, A-6a, A-6b, or A-7-6 type soils. With respect to sulfate within the subgrade soil, based on the project laboratory testing program, each subgrade soil

sample tested was determined to have a sulfate content of less than 5,000 parts per million (ppm) (i.e., lower than the level which ODOT considers high and may prevent the use of chemical stabilization).

The following subsections present a brief summary of the subsurface conditions encountered along the project portion of US-36 with problem areas highlighted where present.

4.3.1. US-36 Subgrade Soils

Along US-36, all but one of the 195 samples taken along the roadway were classified as fine-grained cohesive soils and were comprised of: 1) cohesive Sandy Silt (A-4a, 3% of samples); 2) Silt and Clay (A-6a, 39% of samples); 3) Silty Clay (A-6b, 27% of samples); and 4) Clay (A-7-6, 30% of samples). With respect to the consistency of the fine-grained soils, the descriptions varied from soft to hard correlating to converted SPT-N values (N_{60}) between 7 and 37 blows per foot (bpf). Natural moisture contents of these fine-grained subgrade soils ranged from 10 to 20 percent. Based on Atterberg Limit tests performed on representative samples of the fine-grained soils obtained along the project portions of US-36, the liquid and plastic limits ranged from 22 to 56 percent and from 16 to 23 percent, respectively.

4.3.2. Groundwater

Groundwater was not encountered within the proposed subgrade depths during drilling in any of the borings performed at the site as part of the roadway exploration. It should be noted that groundwater is affected by many hydrologic characteristics in the area and may vary from those measured at the time of the exploration. Groundwater readings are presented on each individual boring log included within Appendix B.

5. ANALYSES AND RECOMMENDATIONS

We understand that partial reconstruction and widening of segments of US-36 is planned as part of the roadway rehabilitation project DEL-36-0.00 (PID 109070). The rehabilitation project extends along US-36 from Straight-Line Mileage (SLM) marker 0.00 to SLM marker 7.26 in Delaware County.

The following sub-sections present the analyses and recommendations for: 1) the subgrade stabilization and pavement design parameters for US-36; 2) proposed embankment alterations and constriction; and, 3) foundation design for four existing culverts with full height headwalls that are planned to be either replaced or extended. In general, structure analyses and recommendations presented within this report are in accordance with Load and Resistance Factor Design (LRFD) method as set forth in AASHTO's Publication *LRFD Bridge Design Specifications, 9th Edition* (BDS) (AASHTO, 2020) and ODOT's Publication *2020 LRFD Bridge Design Manual* (ODOT, 2021). The pavement subgrade analysis included a subgrade (GB1) analysis performed in accordance with ODOT's GB1 criteria utilizing the ODOT provided *GB1: Subgrade Analysis Spreadsheet* (GB1_SubgradeAnalysis.xls, Version 14.5 dated January 18, 2019). Input information for the spreadsheet was based on the soil characteristics gathered during NEAS's subgrade exploration (i.e., SPT results, laboratory test results, etc.).

5.1. Subgrade Analysis

A GB1 analysis was performed to identify the method, location, and dimensions (including depth) of required subgrade stabilization for the project. In addition to identifying stabilization recommendations, pavement design parameters are also determined to aid in pavement section design. Based on our evaluation of the subsurface conditions and our geotechnical engineering analyses of the proposed rehabilitation project, it is our opinion that pavement can be supported by the underlying subsurface material utilizing localized stabilization consisting of typical excavate and replace practices. The subsections below present

the results of our GB1 analysis including pavement design parameters and unsuitable subgrade conditions identified within the project limits. GB1 analysis spreadsheets are provided in Appendix D.

Again, it should be noted that for the purposes of this report and our analysis, the term 'proposed subgrade' has been assumed to represent soils and/or soil conditions from 1.5 ft below proposed final pavement grades to a depth of 7.5 ft below the proposed pavement grades.

5.1.1. Pavement Design Recommendations

It is our understanding that pavement analysis and design is to be performed to determine the proposed pavement sections for the segments within the project limits to undergo full depth replacement and widening. A GB1 analysis was performed using the subgrade soil data obtained during our field exploration program to evaluate the soil characteristics and develop pavement parameters for use in pavement design. The subgrade analysis parameters recommended for use in pavement design are presented in Table 4 below. Provided in the table are ranges of maximum, minimum and average N_{60L} values for the project portion of US-36 as well as the design CBR value recommended for use in pavement design.

Table 4: Pavement Design Values

Segment	Maximum N_{60L}	Minimum N_{60L}	Average N_{60L}	Average PI Values	Design CBR
US-36	27	7	15	18	5

5.1.2. Unsuitable Subgrade

Per ODOT's GB1, the presence of select subgrade conditions (i.e., unsuitable) are prohibited within the subgrade zone for new pavement construction. These unsuitable subgrade conditions generally include the presence of rock and specific soil types. With respect to the proposed rehabilitation project these subgrade conditions are further discussed in the following subsections.

5.1.2.1. Rock

Rock was not encountered within the subgrade of the borings performed within the project limits of US-36. Per ODOT's GB1, if rock is encountered within 24 inches of the bottom of the proposed asphalt or concrete pavement it is to be removed in accordance with 204.05 of the ODOT CMS and replaced with Item 204 Embankment.

5.1.2.2. Unsuitable Soils

Unsuitable soil types per the GB1, which include A-4b, A-2-5, A-5, A-7-5, A-8a, A-8b, were not encountered in the subgrade portion of US-36 within the referenced project limits. Furthermore, soils with a liquid limit greater than 65 were not encountered within the subgrade of the borings performed within the project roadway limits. Per ODOT's GB1, subgrade soils of the indicated types and characteristics should either be removed and replaced to a determined depth or chemically stabilized (depending on the specific soil type encountered).

5.1.3. Unstable Soils

The GB1 recommends subgrade stabilization for soils considered unstable in which the N_{60} value of a particular soil sample (SS) at a referenced boring location is less than 12 bpf and in some cases less than 15 bpf (i.e., where moisture content is greater than optimum plus 3 percent). Based on the specific N_{60} value at the subject boring, *Figure B - Subgrade Stabilization* within the GB1 recommends a depth of subgrade stabilization for ODOT standard stabilization methods. It should be noted that although a soil sample's N_{60}

value may meet the criteria to be considered an unstable soil, the depth in which the unstable soil is encountered in relation to the proposed subgrade is considered when each individual subgrade boring is analyzed. For example, if the GB1 recommends an excavate and replace of 12 inches within a weak soil underlying 18 inches of stable material, it would be unreasonable to recommend the removal of both the stable and unstable material for a total of 30 inches of excavate and replace.

Based on N_{60} values encountered within the project borings, our GB1 analysis suggests the need for 12 inches of excavate and replace at select locations. A summary of the boring locations where unstable soils were encountered and determined to have a potential impact on subgrade performance are shown in Table 5 below. Also included is the associated GB1 recommended remediation depth at that location.

Table 5: Unstable Soil Locations Summary

Boring ID	Average HP (tsf)	N_{60}	Moisture Above Optimum (%)	Depth Below Subgrade (ft)	Remediation Depth (inches)		
					Excavate and Replace (Item 204 w/ Geotextile)	Excavate and Replace (Item 204 w/ Geogrid - SS 861)	Chemical Stabilization (Item 206)
US-36							
B-002-0-21	4.5	9	3	0.0 - 1.5	12	-	12
B-004-0-21	4	7	2	0.0 - 1.5	15	-	12
B-014-0-21	4.25	10	1	0.0 - 1.5	12	-	12
B-023-0-21	2.75	12	3	0.0 - 1.5	12	-	12
B-025-0-21	4.25	14	3	0.0 - 1.5	12	-	12
B-028-0-21	4.5	10	4	0.0 - 1.5	12	-	12
B-042-0-21	4.25	11	2	0.0 - 1.5	12	-	12
B-044-0-21	4.5	12	3	0.0 - 1.5	12	-	12
B-045-0-21	3.5	12	3	0.0 - 1.5	12	-	12
B-046-0-20	3.5	8	2	0.0 - 1.5	12	-	12
B-047-0-20	4.25	11	2	0.0 - 1.5	12	-	12
B-048-0-20	4	11	-	0.0 - 1.5	12	-	12
B-049-0-20	3.5	10	3	0.0 - 1.5	12	-	12

It should be noted that *Figure B - Subgrade Stabilization* does not apply to soil types A-1-a, A-1-b, A-3, or A-3a, nor to soils with N_{60L} values of 15 or more. Per GB1 guidance, *these soils should be reworked to stabilize the subgrade.*

5.1.3.1. High Moisture Content Soils

High moisture content soils are defined by the GB1 as soils that exceed the estimated optimum moisture content (per *Figure A - Optimum Moisture Content* within the GB1) for a given classification by 3 percent or more. Per the GB1, soils determined to be above the identified moisture content levels are a likely indication of the presence of an unstable subgrade and may require some form of subgrade stabilization. Similar to our analysis of unstable soils, although a soil sample's moisture content may meet the criteria to be considered high, the depth in which the high moisture soil is encountered in relation to the proposed subgrade is considered when each individual subgrade boring is analyzed for stabilization recommendations. Summaries of the boring locations where high moisture content conditions were encountered in the top 3 ft of the proposed subgrade within the proposed project limits are shown in Table 6.

Table 6: High Moisture Content Soils Location Summary

Boring ID	Moisture Content (%)	Optimum Moisture Content (%)	Depth Below Subgrade (ft)	Boring ID	Moisture Content (%)	Optimum Moisture Content (%)	Depth Below Subgrade (ft)
US-36				Roadway Segment: Ramp B			
B-002-0-21	17 & 22	14 & 14	0.0 - 3.0	B-034-0-21	19	16	1.5 - 3.0
B-003-0-21	22	18	1.5 - 3.0	B-035-0-21	20	14	1.5 - 3.0
B-004-0-21	23	17	1.5 - 3.0	B-038-0-21	22	16	1.5 - 3.0
B-017-0-21	17	14	1.5 - 3.0	B-040-0-21	26	18	1.5 - 3.0
B-022-0-21	17	14	1.5 - 3.0	B-041-0-21	14	10	1.5 - 3.0
B-024-0-21	24	18	1.5 - 3.0	B-043-0-21	22	18	1.5 - 3.0
B-025-0-21	21 & 23	18 & 20	0.0 - 3.0	B-044-0-21	19 & 23	16 & 16	0.0 - 3.0
B-026-0-21	22	18	0.0 - 1.5	B-045-0-21	17 & 17	14 & 10	0.0 - 3.0
B-028-0-21	18 & 23	14 & 19	0.0 - 3.0	B-047-0-21	22	18	1.5 - 3.0
B-029-0-21	19	14	1.5 - 3.0	B-049-0-21	23	18	1.5 - 3.0

5.2. Stabilization Recommendations

5.2.1. Subgrade Stabilization

Based on the results of our analysis, subgrade soils designated by ODOT's GB1 as "unstable" were present at various locations throughout the project. Subgrade conditions designated as "unstable" that require remediation were encountered within subgrade depths in 13 borings performed as part of our exploration. The 13 borings in which these conditions were encountered were spread throughout the project length; therefore, we recommend that US-36 within the project limits be globally stabilized and that a cost analysis be performed to select the appropriate stabilization method. If chemical stabilization is utilized for the referenced subgrade stabilization included within this project, it should be performed to a minimum depth of 12 inches utilizing either lime or cement as the stabilizing chemical. If Excavate and Replace with geotextile (Item 204) is utilized for the project, it should be performed to a depth of 12 inches.

Excavate and Replace excavations are estimated to extend to a depth as indicated above with the excavated material being replaced with Item 204 - Granular Material Type B or C and underlain with Item 204 Geotextile Fabric. In areas where underdrains are to be provided, Item 204 - Granular Material Type B should be used as replacement material. Stabilization limits should extend 18-inches beyond the edge of the proposed paved roadway, shoulder or median.

If chemical stabilization is selected for use on the referenced proposed subgrade soils, the stabilization efforts should extend a minimum of 18-inches beyond the edge of the paved roadway, shoulder or median. The mix design should be conducted in accordance with ODOT's CMS Supplement 1120 (Mixture Design for Chemically Stabilized Soils). For design purposes it may be assumed that the cement or lime addition will be 5% using the following formula.

$$\text{Cement/Lime: } C = 0.75 \times T \times 115 \times 0.05$$

Where: C = amount of chemical in pounds / square yard and

T = thickness of the treatment zone in inches

A dry density of 115-pounds per cubic foot (pcf) is assumed.

It should also be noted that per ODOT's GB1, *typical chemical stabilization equipment cannot stabilize areas less than 8 ft in width.* If it is anticipated that the project will require multiple maintenance of traffic phases, it is recommended that the roadway work is coordinated with the maintenance of traffic schemes in such a way that an 8-ft minimum width for chemical stabilization exists. If areas of less than 8 ft in width

are anticipated, subgrade soils may be excavated out, mixed with stabilization chemical, and compacted in place, though this method is not practical for large areas.

5.3. Embankment Construction Recommendations

In areas where additional embankment material is proposed along existing slopes (i.e., side-hill sliver fills) that are steeper than 8H:1V but flatter than 4H:1V, it is recommended that the proposed embankment be benched into the existing slopes in accordance with Item 203.05 "Embankment Construction Methods" of the ODOT CMS.

For areas where additional embankment material is proposed along existing slopes that are steeper than 4H:1V, it is recommended that the proposed embankment be designed and constructed in accordance with ODOT's GB2. For sidehill fills planned on existing slopes steeper than 4H:1V, ODOT's GB2 recommends that *the embankment slopes be constructed utilizing special benching in order to blend the new embankment with the existing slope to prevent the development of a weak shear plane at the interface between the proposed fill and existing slope material* (ODOT [2], 2017). A special benching scheme similar to that shown in Figures 1, 2 or 3, as appropriate, of the ODOT GB2 should be used in areas where special benching is recommended. The height and width dimensions of the special benching scheme shown in these figures should be arranged to minimize the required cut and fill quantities, though the height of a single bench shall not exceed 20 ft without a stability analysis and design per OSHA requirements. Additionally, it may be appropriate to adjust the bench slope shown from a 1H:1V to a 1.75H:1V slope if the existing slope is made up of primarily granular materials. The benched material should be replaced with compacted engineered fill per Item 203 of the ODOT CMS, while proper lift thicknesses and material density should be maintained in the proposed fill per Item 203.06 of the ODOT CMS. In situations where it is not practical to extend the final bench through the existing roadway due to maintenance of traffic concerns, a benching scheme similar to that shown in Figure 1a of the ODOT GB2 can be used in order to avoid impacting the existing roadway, guardrail or shoulder. This scheme results in the placement of a temporary over-steepened fill that can later be "shaved-off" to bring the slope to the final proposed grade.

5.4. Culvert Foundation Analysis and Recommendations

5.4.1. US Route 36 Culvert – Culvert US-36-1.158

We understand that the existing culvert known as Culvert US-36-1.158 running from southeast (inlet) to northwest (outlet) is proposed to be replaced. The existing culvert is noted as being18 inches in diameter and approximately 42 ft in length with a full height headwall. Based on the culvert improvement disposition provided by Strand Associates on October 3, 2022, the existing structure US-36-1.158 is assumed to be replaced with a new 18-inch diameter pipe with a ODOT standard Type HW-2.2 half height headwall at both the inlet and outlet. The proposed structure is assumed to be Type A reinforced concrete pipe conduit supported by the natural silt/clay soil through the use of a shallow foundation system. For analysis purposes, it is assumed that the groundwater elevation is above the bearing elevation and appropriate erosion control measures will be implemented to prevent scour of the soil.

To aid in design of the proposed replacement of the project culvert, each boring log was reviewed, and a generalized material profile was developed. Utilizing the generalized soil profile, engineering properties for each soil strata were estimated based on their field (i.e., SPT N_{60} values, hand penetrometer values, etc.) and laboratory (i.e., Atterberg Limits, grain size, etc.) test results using correlations provided in published engineering manuals, research reports and guidance documents. The developed soil profile and estimated engineering soil properties for evaluation of proposed culvert foundations (with sited correlation/reference material) are summarized within Tables 7 and 8, below.

Table 7: Culvert US-36-1.158 - Soil Properties and Estimated Engineering Properties (B-008-1-21)

Culvert US-36-1.158: Foundation Evaluation, B-008-1-21				
Soil Description	**Unit Weight[1] (pcf)**	**Undrained Shear Strength[2] (psf)**	**Effective Cohesion[3] (psf)**	**Effective Friction Angle[3] (degrees)**
Silt and Clay Elevation (950.6 ft - 947.6 ft)	120	1350	150	23
Silty Clay Elevation (947.6 ft - 942.6 ft)	120	1900	200	24
Silt and Clay Elevation (942.6 ft - 930.1 ft)	125	2950	250	25
Silt and Clay Elevation (930.1 ft - 925.6 ft)	120	2150	200	24

Notes:
1. *Values interpreted from Geotechnical Bulletin 7 Table 1.*
2. *Values calculated from Terzaghi and Peck (1967) if N160<52, else Stroud and Butler (1975) was used.*
3. *Values interpreted from Geotechnical Bulletin 7 Table 2 for cohesive soils and Kulhawy & Mayne (1990) for granular soils.*

Table 8: Culvert US-36-1.158 - Soil Properties and Estimated Engineering Properties (B-008-2-21)

Culvert US-36-1.158: Foundation Evaluation, B-008-2-21				
Soil Description	**Unit Weight[1] (pcf)**	**Undrained Shear Strength[2] (psf)**	**Effective Cohesion[3] (psf)**	**Effective Friction Angle[3] (degrees)**
Silt and Clay Elevation (950.6 ft - 947.6 ft)	120	1250	150	23
Clay Elevation (947.6 ft - 945.1 ft)	115	850	100	21
Silt and Clay Elevation (945.1 ft - 932.6 ft)	125	2900	250	25
Silt and Clay Elevation (932.6 ft - 925.6 ft)	125	2750	250	25

Notes:
1. *Values interpreted from Geotechnical Bulletin 7 Table 1.*
2. *Values calculated from Terzaghi and Peck (1967) if N160<52, else Stroud and Butler (1975) was used.*
3. *Values interpreted from Geotechnical Bulletin 7 Table 2 for cohesive soils and Kulhawy & Mayne (1990) for granular soils.*

5.4.1.1. Bearing Resistance Analysis

Based on the referenced culvert standard detail and headwall foundation dimensions consistent with ODOT's HW-2.2 (Half Height Headwalls for Concrete Pipe) dated July 20, 2018 utilizing an 18-inch diameter pipe, the proposed headwall foundation is estimated to bear 2.5 feet below grade (invert elevation). At the estimated bearing elevation, it is anticipated that the footing will bear on silt/clay soils. The soil at this depth was found to exceed the minimum design criteria for bearing soils utilizing the engineering soil properties provided in Tables 7 and 8. Therefore, assuming the backfill and construction techniques at the culvert site are consistent with the recommendations provided in HW-2.2 it is our opinion that the subsurface soils will provide adequate bearing resistance.

5.4.2. US Route 36 Culvert – Culvert US-36-3.640

We understand that the existing culvert known as Culvert US-36-3.640 running from southeast (inlet) to northwest (outlet) is proposed to be replaced. The existing culvert is noted as being 18 inches in diameter and approximately 32 ft in length with full height headwalls. Based on the culvert improvement disposition provided by Strand Associates on October 3, 2022, the existing structure US-36-3.640 is assumed to be replaced with a new 30-inch diameter pipe with a ODOT standard Type HW-2.2 half height headwall at both the inlet and outlet. The proposed structure is assumed to be Type A reinforced concrete pipe conduit supported by the natural silt/clay soil through the use of a shallow foundation system. For analysis purposes, it is assumed that the groundwater elevation is above the bearing elevation and appropriate erosion control measures will be implemented to prevent scour of the soil.

To aid in design of the proposed replacement of the project culvert, each boring log was reviewed, and a generalized material profile was developed. Utilizing the generalized soil profile, engineering properties for each soil strata were estimated based on their field (i.e., SPT N_{60} values, hand penetrometer values, etc.) and laboratory (i.e., Atterberg Limits, grain size, etc.) test results using correlations provided in published engineering manuals, research reports and guidance documents. The developed soil profile and estimated engineering soil properties for evaluation of proposed culvert foundations (with sited correlation/reference material) are summarized within Tables 7 and 8, below.

Table 9: Culvert US-36-3.640 - Soil Properties and Estimated Engineering Properties (B-024-1-21)

Culvert US-36-3.640: Foundation Evaluation, B-024-1-21				
Soil Description	**Unit Weight[1] (pcf)**	**Undrained Shear Strength[2] (psf)**	**Effective Cohesion[3] (psf)**	**Effective Friction Angle[3] (degrees)**
Silty Clay Elevation (971.7 ft - 968.7 ft)	118	850	100	22
Clay Elevation (968.7 ft - 963.7 ft)	120	2250	200	24
Silt and Clay Elevation (963.7 ft - 958.7 ft)	125	3250	250	26
Silt and Clay Elevation (958.7 ft - 946.7 ft)	120	2250	200	25

Notes:
1. *Values interpreted from Geotechnical Bulletin 7 Table 1.*
2. *Values calculated from Terzaghi and Peck (1967) if N160<52, else Stroud and Butler (1975) was used.*
3. *Values interpreted from Geotechnical Bulletin 7 Table 2 for cohesive soils and Kulhawy & Mayne (1990) for granular soils.*

Table 10: Culvert US-36-3.640 - Soil Properties and Estimated Engineering Properties (B-024-2-21)

Culvert US-36-3.640: Foundation Evaluation, B-024-2-21				
Soil Description	**Unit Weight[1] (pcf)**	**Undrained Shear Strength[2] (psf)**	**Effective Cohesion[3] (psf)**	**Effective Friction Angle[3] (degrees)**
Gravel with Sand Elevation (971.6 ft - 969.1 ft)	118	-	-	31
Clay Elevation (969.1 ft - 966.1 ft)	120	850	100	21
Silt and Clay Elevation (966.1 ft - 963.6 ft)	125	2000	200	24
Silty Clay Elevation (963.6 ft - 961.1 ft)	120	2250	200	25
Silt and Clay Elevation (961.1 ft - 958 ft)	115	3000	250	25
Sandy Silt Elevation (958 ft - 956.7 ft)	115	3350	250	27
Silt and Clay Elevation (956.7 ft - 946.6 ft)	112	2100	200	24

Notes:
1. *Values interpreted from Geotechnical Bulletin 7 Table 1.*
2. *Values calculated from Terzaghi and Peck (1967) if N160<52, else Stroud and Butler (1975) was used.*
3. *Values interpreted from Geotechnical Bulletin 7 Table 2 for cohesive soils and Kulhawy & Mayne (1990) for granular soils.*

5.4.2.1. Bearing Resistance Analysis

Based on the referenced culvert standard detail and headwall foundation dimensions consistent with ODOT's HW-2.2 (Half Height Headwalls for Concrete Pipe) dated July 20, 2018 utilizing a 30-inch diameter pipe, the proposed headwall foundation is estimated to bear 2.5 feet below grade (invert elevation). At the estimated bearing elevation, it is anticipated that the footing will bear on silt/clay soils. The soil at this depth was found to exceed the minimum design criteria for bearing soils utilizing the engineering soil properties provided in Tables 9 and 10. Therefore, assuming the backfill and construction techniques at the culvert site are consistent with the recommendations provided in HW-2.2 it is our opinion that the subsurface soils will provide adequate bearing resistance.

5.4.3. US Route 36 Culvert – Culvert US-36-5.350

We understand that the existing culvert known as Culvert US-36-5.350 running from northeast (inlet) to southwest (outlet) is proposed to be replaced. The existing culvert is noted as being 15 inches in diameter and approximately 53 ft in length with a full height headwall. Based on the culvert improvement disposition provided by Strand Associates on October 3, 2022, the existing structure US-36-5.350 is assumed to be replaced with a new 15-inch diameter pipe with a ODOT standard Type HW-2.2 half height headwall at both the inlet and outlet. The proposed structure is assumed to be Type A reinforced concrete pipe conduit supported by the natural silt/clay soil through the use of a shallow foundation system. For analysis purposes, it is assumed that the groundwater elevation is above the bearing elevation and appropriate erosion control measures will be implemented to prevent scour of the soil.

To aid in design of the proposed replacement of the project culvert, each boring log was reviewed, and a generalized material profile was developed. Utilizing the generalized soil profile, engineering properties for each soil strata were estimated based on their field (i.e., SPT N_{60} values, hand penetrometer values, etc.) and laboratory (i.e., Atterberg Limits, grain size, etc.) test results using correlations provided in published engineering manuals, research reports and guidance documents. The developed soil profile and estimated engineering soil properties for evaluation of proposed culvert foundations (with sited correlation/reference material) are summarized within Tables 11 and 12, below.

Table 11: Culvert US-36-5.350 - Soil Properties and Estimated Engineering Properties (B-036-1-21)

Culvert US-36-5.350: Foundation Evaluation, B-036-1-21				
Soil Description	**Unit Weight[1] (pcf)**	**Undrained Shear Strength[2] (psf)**	**Effective Cohesion[3] (psf)**	**Effective Friction Angle[3] (degrees)**
Silt Elevation (923.2 ft - 920.2 ft)	115	600	75	22
Silty Clay Elevation (920.2 ft - 912.7 ft)	115	2250	200	25
Sandy Silt Elevation (912.7 ft - 910.2 ft)	125	3600	300	27
Silt and Clay Elevation (910.2 ft - 907.7 ft)	125	3500	300	26
Gravel with Sand and Silt Elevation (907.7 ft - 905.2 ft)	120	-	-	32
Sandy Silt Elevation (905.2 ft - 900.2 ft)	120	-	-	31
Coarse and Fine Sand Elevation (900.2 ft - 898.2 ft)	125	-	-	34

Notes:
1. *Values interpreted from Geotechnical Bulletin 7 Table 1.*
2. *Values calculated from Terzaghi and Peck (1967) if N160<52, else Stroud and Butler (1975) was used.*
3. *Values interpreted from Geotechnical Bulletin 7 Table 2 for cohesive soils and Kulhawy & Mayne (1990) for granular soils.*

Table 12: Culvert US-36-5.350 - Soil Properties and Estimated Engineering Properties (B-036-2-21)

Culvert US-36-5.350: Foundation Evaluation, B-036-2-21				
Soil Description	**Unit Weight[1] (pcf)**	**Undrained Shear Strength[2] (psf)**	**Effective Cohesion[3] (psf)**	**Effective Friction Angle[3] (degrees)**
Gravel with Sand Elevation (924.6 ft - 922.1 ft)	122	-	-	40
Silt and Clay Elevation (922.1 ft - 919.1 ft)	115	1500	150	23
Clay Elevation (919.1 ft - 914.1 ft)	120	2250	200	24
Silt and Clay Elevation (914.1 ft - 899.6 ft)	120	2850	250	25

Notes:
1. *Values interpreted from Geotechnical Bulletin 7 Table 1.*
2. *Values calculated from Terzaghi and Peck (1967) if N160<52, else Stroud and Butler (1975) was used.*
3. *Values interpreted from Geotechnical Bulletin 7 Table 2 for cohesive soils and Kulhawy & Mayne (1990) for granular soils.*

5.4.3.1. Bearing Resistance Analysis

Based on the referenced culvert standard detail and headwall foundation dimensions consistent with ODOT's HW-2.2 (Half Height Headwalls for Concrete Pipe) dated July 20, 2018 utilizing a 15-inch diameter pipe, the proposed headwall foundation is estimated to bear about 2.5 feet below grade (invert elevation). At the estimated bearing elevation, it is anticipated that the footing will bear on silt/clay soils. The soil at this depth was found to exceed the minimum design criteria for bearing soils utilizing the engineering soil properties provided in Tables 11 and 12. Therefore, assuming the backfill and construction techniques at the culvert site are consistent with the recommendations provided in HW-2.2 it is our opinion that the subsurface soils will provide adequate bearing resistance.

5.4.4. US Route 36 Culvert – Culvert US-36-5.754

We understand that the existing culvert known as Culvert US-36-5.754 running from north (inlet) to south (outlet) is proposed to be replaced. The existing culvert is noted as being 18 inches in diameter and approximately 30 ft in length with a full height headwall. Based on the culvert improvement disposition provided by Strand Associates on October 3, 2022, the existing structure US-36-5.754 is assumed to be replaced with a new 18-inch diameter pipe with a ODOT standard Type HW-2.2 half height headwall at both the inlet and outlet. The proposed structure is assumed to be Type A reinforced concrete pipe conduit supported by the natural silt/clay or gravelly soils through the use of a shallow foundation system. For analysis purposes, it is assumed that the groundwater elevation is above the bearing elevation and appropriate erosion control measures will be implemented to prevent scour of the soil.

To aid in design of the proposed replacement of the project culvert, each boring log was reviewed, and a generalized material profile was developed. Utilizing the generalized soil profile, engineering properties for each soil strata were estimated based on their field (i.e., SPT N_{60} values, hand penetrometer values, etc.) and laboratory (i.e., Atterberg Limits, grain size, etc.) test results using correlations provided in published engineering manuals, research reports and guidance documents. The developed soil profile and estimated engineering soil properties for evaluation of proposed culvert foundations (with sited correlation/reference material) are summarized within Tables 13 and 14, below.

Table 13: Culvert US-36-5.754 - Soil Properties and Estimated Engineering Properties (B-038-1-21)

Culvert US-36-5.754: Foundation Evaluation, B-038-1-21				
Soil Description	**Unit Weight[1] (pcf)**	**Undrained Shear Strength[2] (psf)**	**Effective Cohesion[3] (psf)**	**Effective Friction Angle[3] (degrees)**
Gravel with Sand Elevation (958.2 ft - 956.1 ft)	120	-	-	33
Silt and Clay Elevation (956.1 ft - 942.7 ft)	120	2700	250	25
Silt and Clay Elevation (942.7 ft - 933.2 ft)	120	2300	200	25

Notes:
1. *Values interpreted from Geotechnical Bulletin 7 Table 1.*
2. *Values calculated from Terzaghi and Peck (1967) if N160<52, else Stroud and Butler (1975) was used.*
3. *Values interpreted from Geotechnical Bulletin 7 Table 2 for cohesive soils and Kulhawy & Mayne (1990) for granular soils.*

Table 14: Culvert US-36-5.754 - Soil Properties and Estimated Engineering Properties (B-038-2-21)

Culvert US-36-5.754: Foundation Evaluation, B-038-2-21				
Soil Description	**Unit Weight[1] (pcf)**	**Undrained Shear Strength[2] (psf)**	**Effective Cohesion[3] (psf)**	**Effective Friction Angle[3] (degrees)**
Gravel with Sand and Silt Elevation (957.5 ft - 954.5 ft)	125	-	-	42
Gravel with Sand Elevation (954.5 ft - 952 ft)	120	-	-	32
Silt and Clay Elevation (952 ft - 934.5 ft)	120	3450	250	26
Sandy Silt Elevation (934.5 ft - 932.5 ft)	122	3350	250	27

Notes:
1. *Values interpreted from Geotechnical Bulletin 7 Table 1.*
2. *Values calculated from Terzaghi and Peck (1967) if N160<52, else Stroud and Butler (1975) was used.*
3. *Values interpreted from Geotechnical Bulletin 7 Table 2 for cohesive soils and Kulhawy & Mayne (1990) for granular soils.*

5.4.4.1. Bearing Resistance Analysis

Based on the referenced culvert standard detail and headwall foundation dimensions consistent with ODOT's HW-2.2 (Half Height Headwalls for Concrete Pipe) dated July 20, 2018 utilizing an 18-inch diameter pipe, the proposed headwall foundation is estimated to bear 2.5 feet below grade (invert elevation). At the estimated bearing elevation, it is anticipated that the footing will bear on either silt/clay or gravelly soils. The soil at this depth was found to exceed the minimum design criteria for bearing soils utilizing the engineering soil properties provided in Tables 13 and 14. Therefore, assuming the backfill and construction techniques at the culvert site are consistent with the recommendations provided in HW-2.2 it is our opinion that the subsurface soils will provide adequate bearing resistance.

6. QUALIFICATIONS

This investigation was performed in accordance with accepted geotechnical engineering practice for the purpose of characterizing the subsurface conditions along the referenced roadway portion. This report has been prepared for Strand, ODOT and their design consultants to be used solely in evaluating the subgrade soils within the project limits and presenting geotechnical engineering recommendations specific to this project. The assessment of general site environmental conditions or the presence of pollutants in the soil, rock and groundwater of the site was beyond the scope of this geotechnical exploration. Our recommendations are based on the results of our field explorations, laboratory test results from representative soil samples, and geotechnical engineering analyses. The results of the field explorations and laboratory tests, which form the basis of our recommendations, are presented in the appendices as noted. This report does not reflect any variations that may occur between the borings or elsewhere on the site, or variations whose nature and extent may not become evident until a later stage of construction. In the event that any changes occur in the nature, design or location of the proposed rehabilitation work, the conclusions and recommendations contained in this report should not be considered valid until they are reviewed, and have been modified or verified in writing by a geotechnical engineer.

It has been a pleasure to be of service to Strand in performing this geotechnical exploration for the DEL-36-0.00 roadway rehabilitation project. Please call if there are any questions, or if we can be of further service.

Respectfully Submitted,

Brendan P. Andrews, P.E.
Project Geotechnical Engineer

Abdul Saboor Ibrahim Khail, E.I.
Staff Geotechnical Engineer

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APPENDIX A

BORING LOCATION PLAN

DEL-36-0.00

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TARGET BORING LOCATION PLAN

HORIZONTAL SCALE IN FEET
0 100
50 200

DESIGN AGENCY
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REVIEWER
BPA 03-25-21

PROJECT ID
109070

SHEET 1 TOTAL 16

DEL-36-0.00

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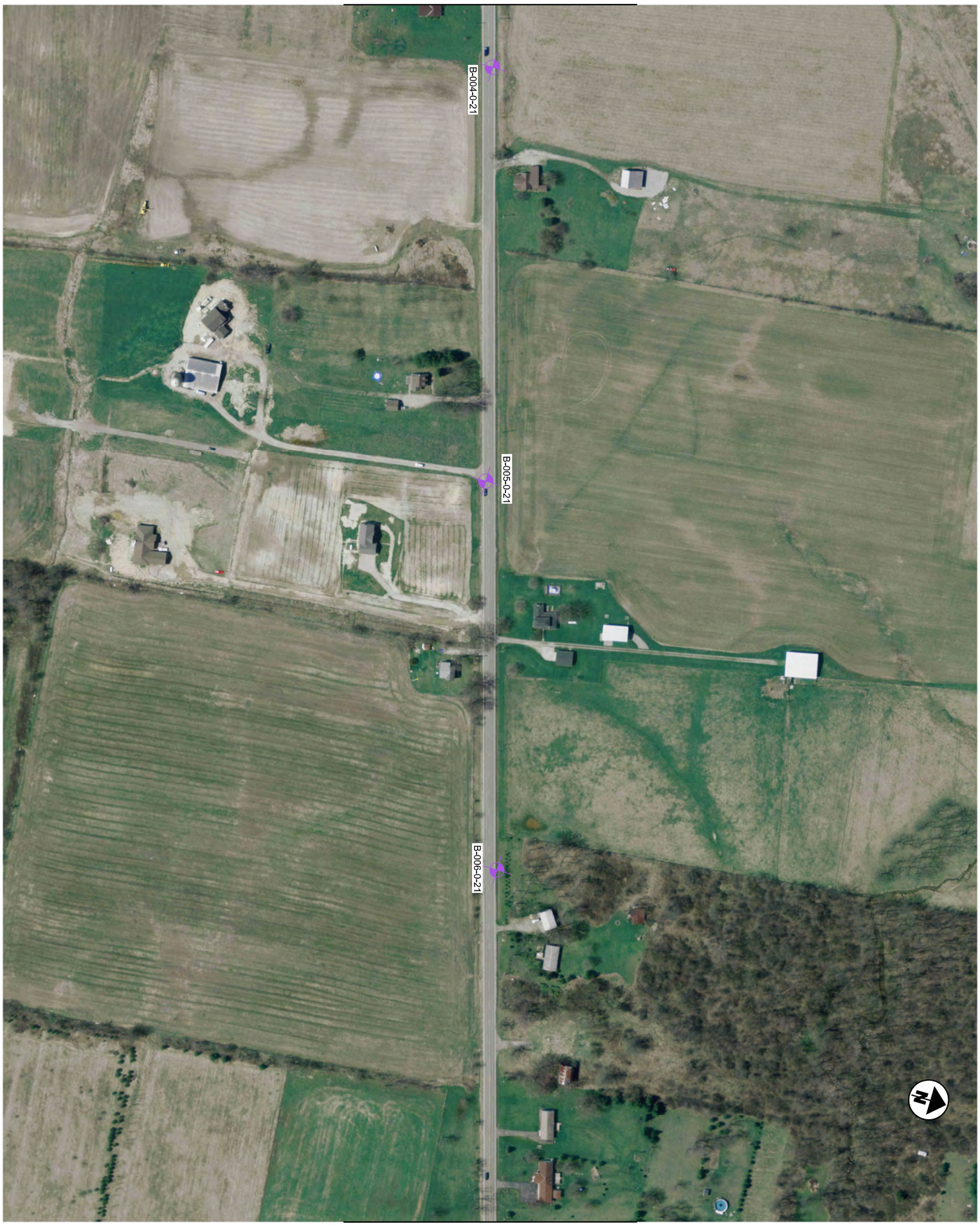

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TARGET BORING LOCATION PLAN

HORIZONTAL SCALE IN FEET
0 100
50 200

DEL-36-0.00

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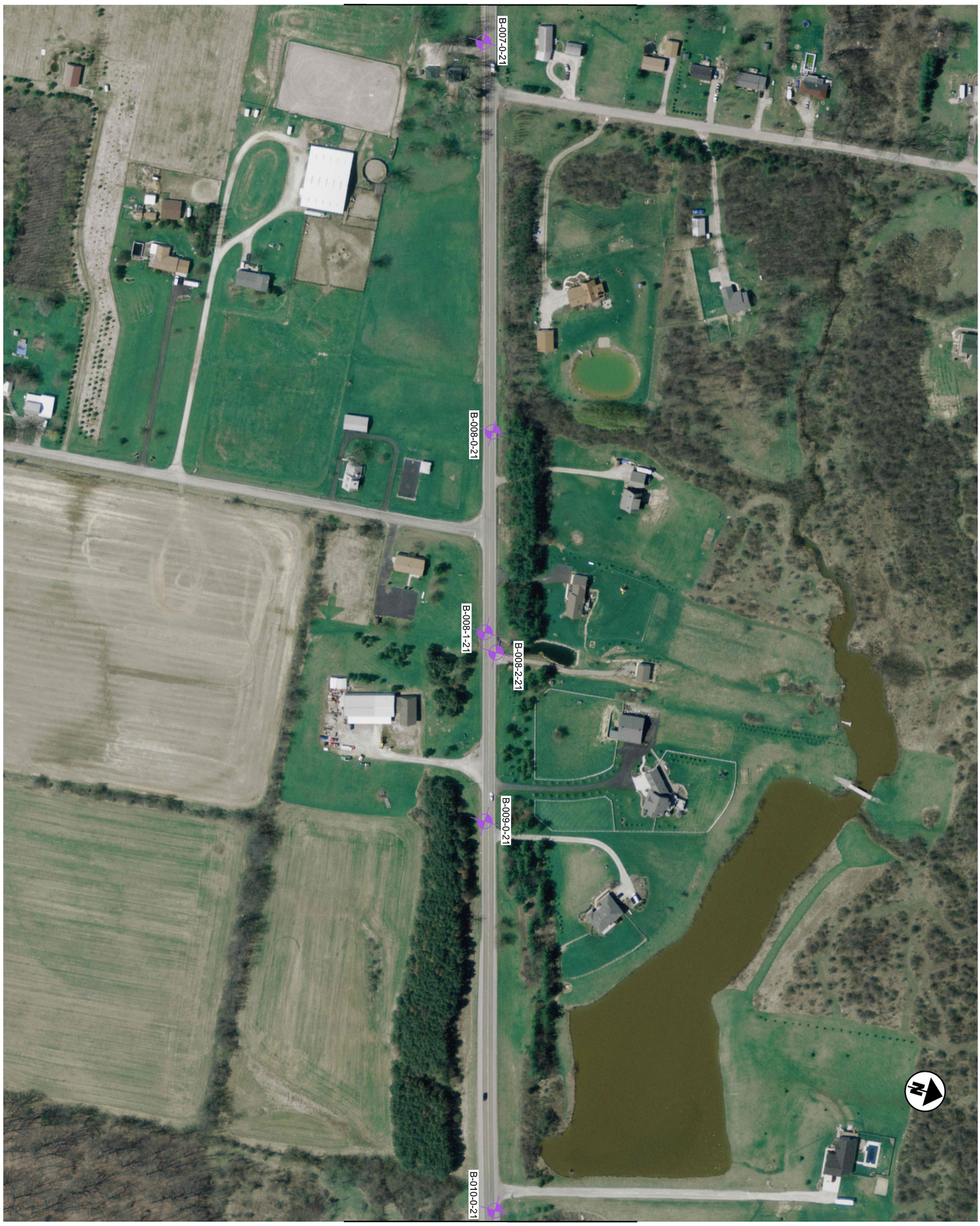

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TARGET BORING LOCATION PLAN

HORIZONTAL SCALE IN FEET
0 100
50 200

DEL-36-0.00

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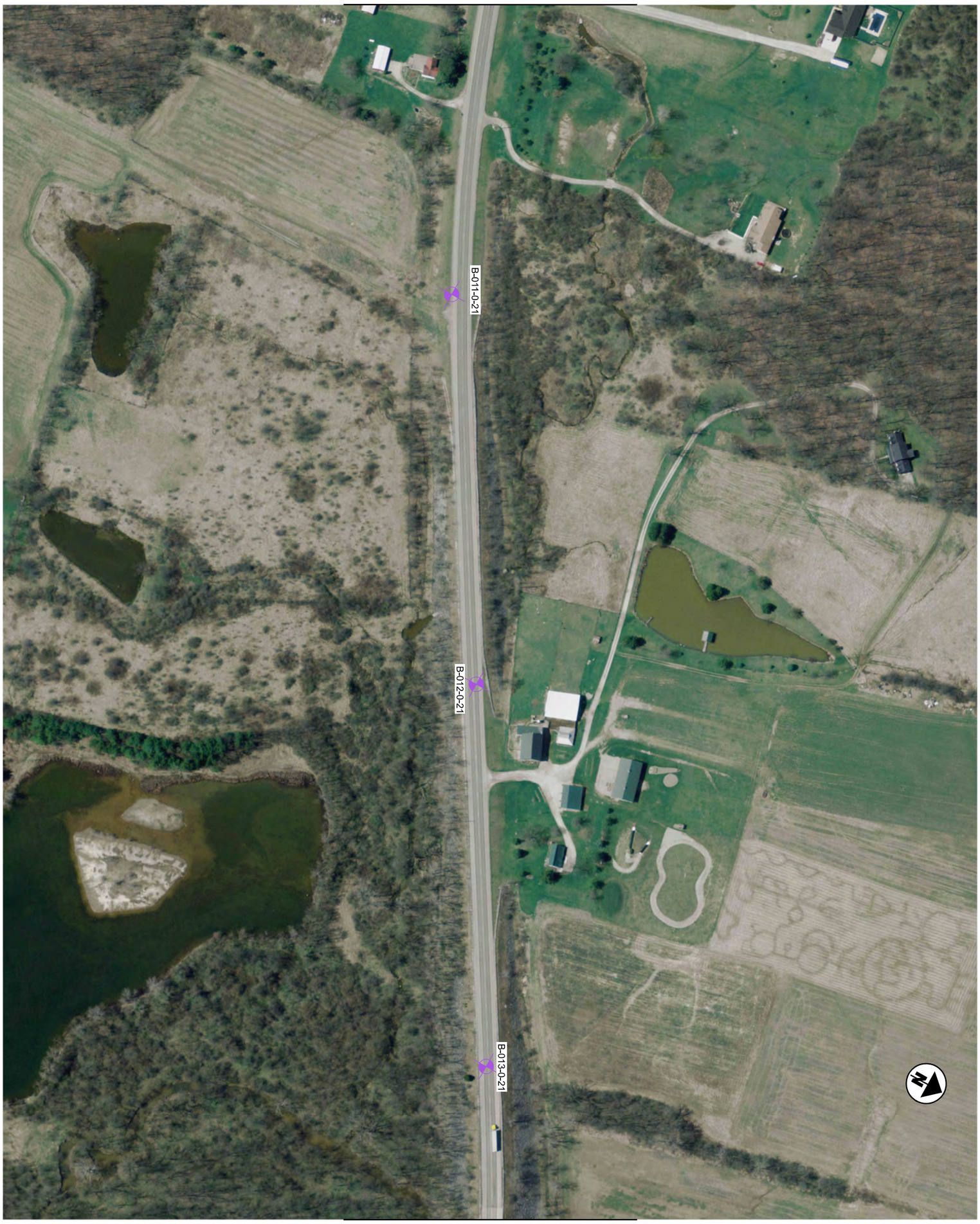

TARGET BORING LOCATION PLAN

HORIZONTAL SCALE IN FEET
0 100
50 200

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DEL-36-0.00

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TARGET BORING LOCATION PLAN

HORIZONTAL SCALE IN FEET
0 100
50 200

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DEL-36-0.00

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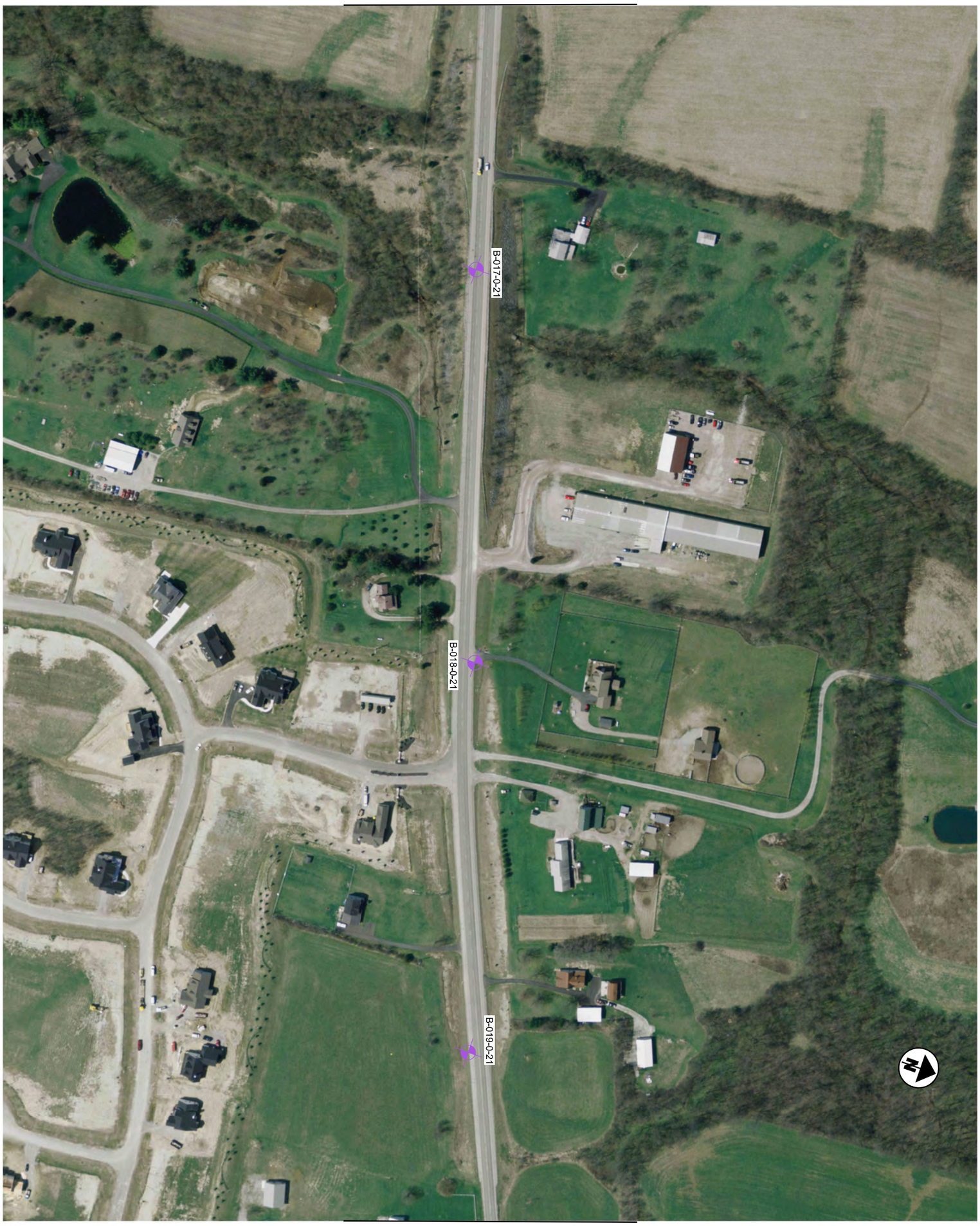

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DEL-36-0.00

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TARGET BORING LOCATION PLAN

HORIZONTAL SCALE IN FEET
0 100
50 200

TARGET BORING LOCATION PLAN

HORIZONTAL SCALE IN FEET
0 50 100 200

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REVIEWER: BPA 03-28-2022

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SHEET 2 | TOTAL 4

DEL-36-0.00

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DEL-36-0.00

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SHEET 9 TOTAL 16

TARGET BORING LOCATION PLAN

HORIZONTAL SCALE IN FEET
0 100
50 200

DEL-36-0.00

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PROJECT ID
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SHEET 10 TOTAL 16

TARGET BORING LOCATION PLAN

HORIZONTAL SCALE IN FEET
0 100
50 200

DEL-36-0.00

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PROJECT ID 109070
SHEET 11 TOTAL 16

TARGET BORING LOCATION PLAN

HORIZONTAL SCALE IN FEET
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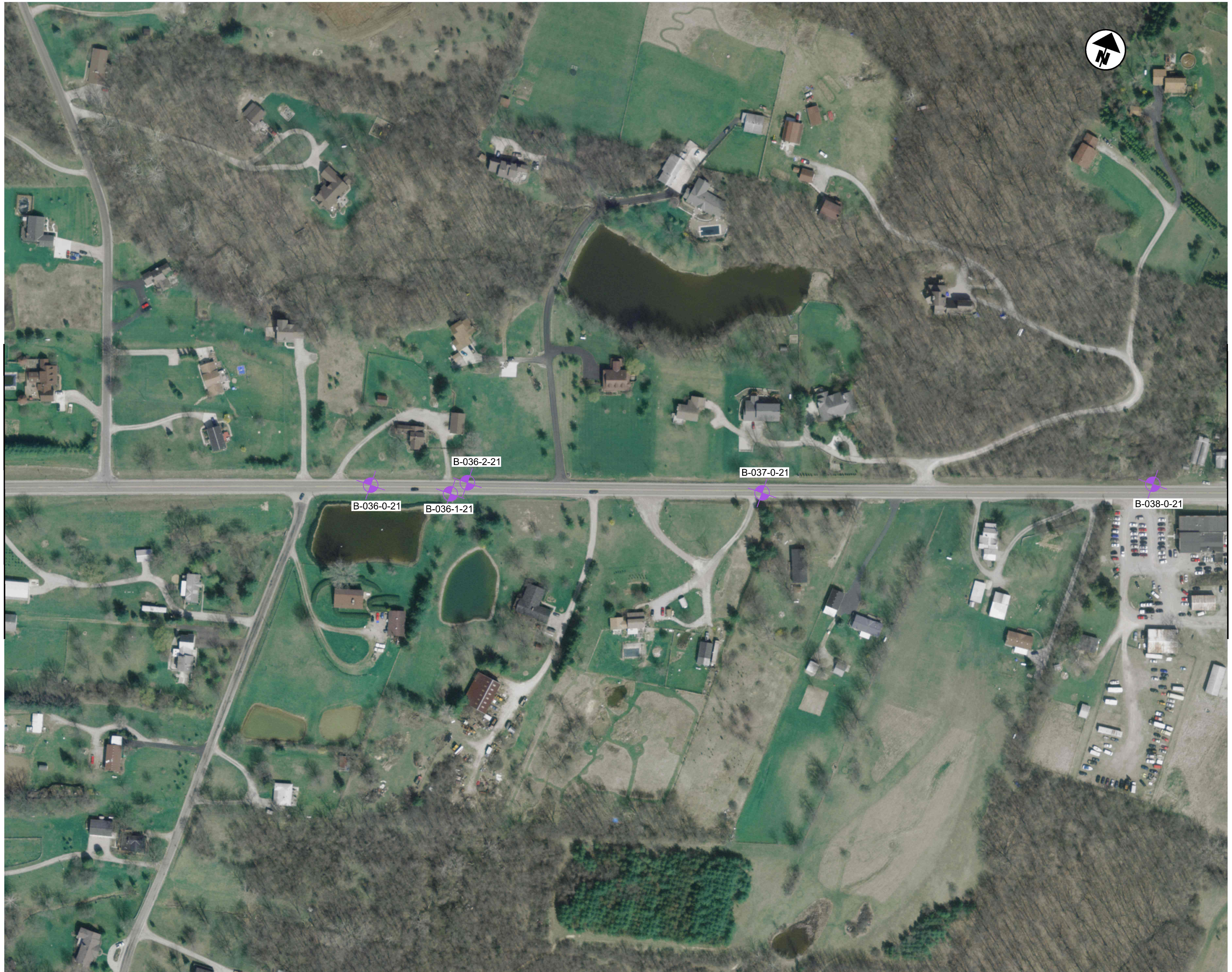
TARGET BORING LOCATION PLAN



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PROJECT ID	109070

SHEET	TOTAL
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DEL-36-0.00

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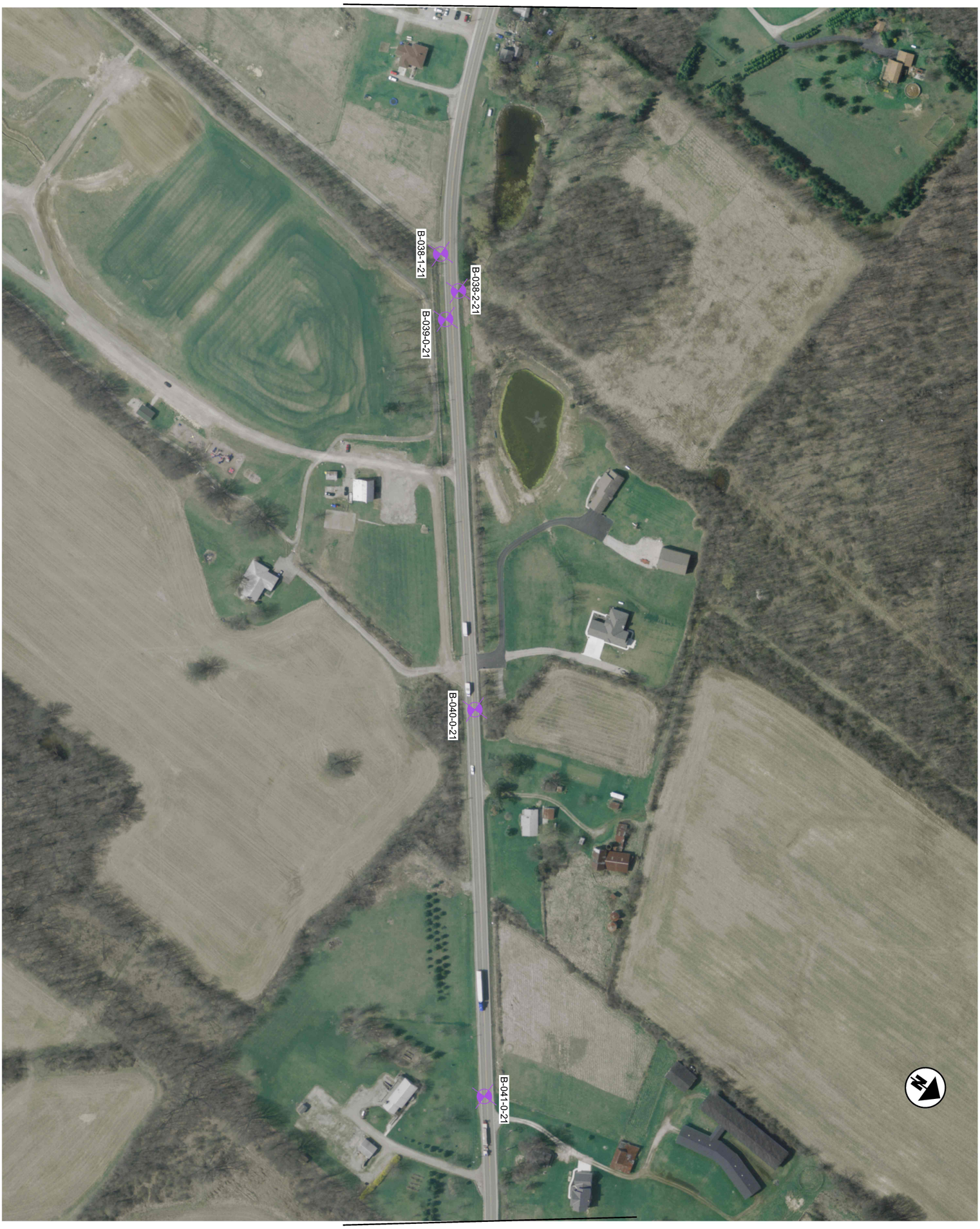

TARGET BORING LOCATION PLAN

HORIZONTAL SCALE IN FEET
0 100
50 200

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DEL-36-0.00

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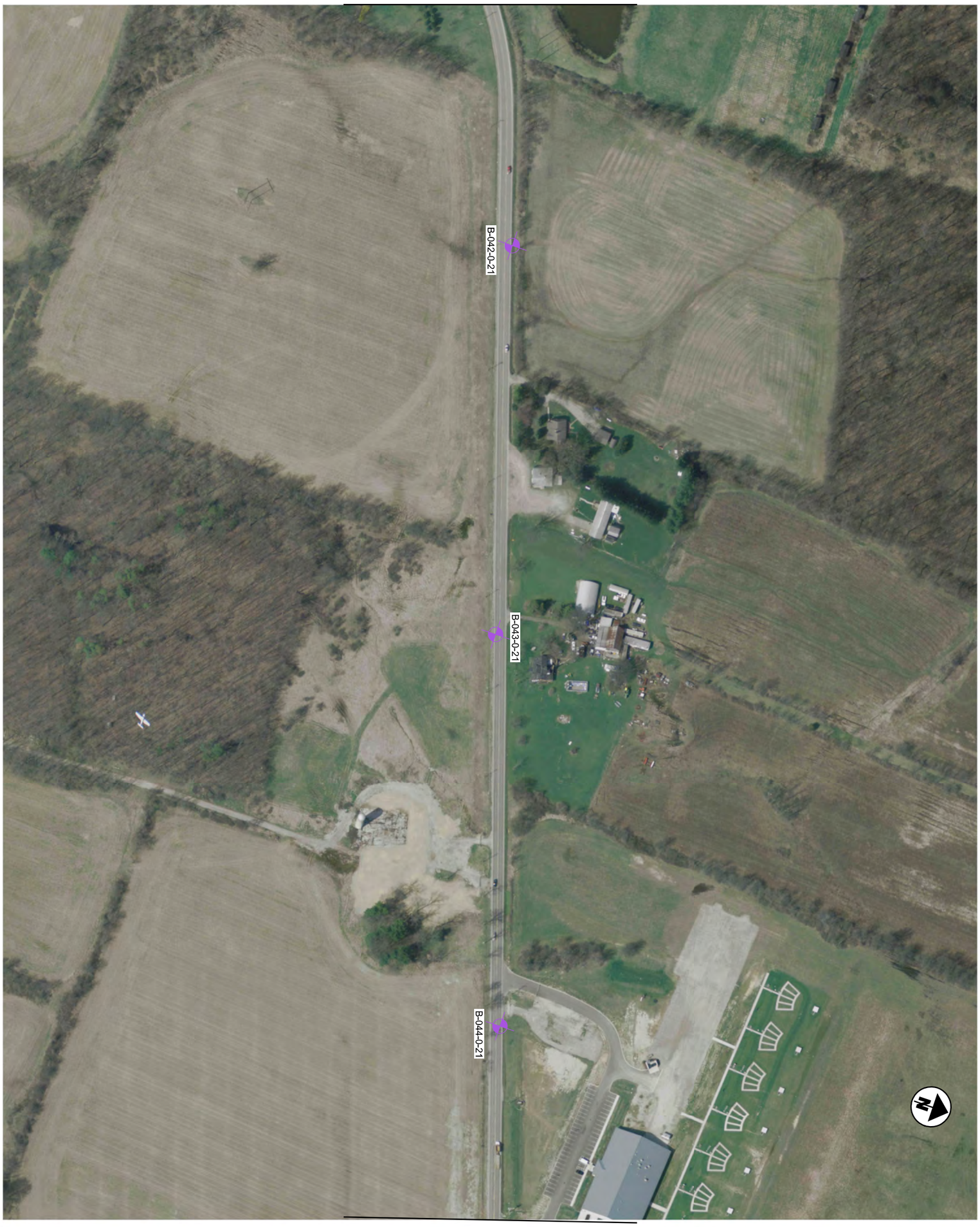

TARGET BORING LOCATION PLAN

HORIZONTAL SCALE IN FEET
0 100
50 200

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BPA 03-25-21

PROJECT ID
109070

SHEET 14 TOTAL 16

DEL-36-0.00

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TARGET BORING LOCATION PLAN

HORIZONTAL SCALE IN FEET
0 100
50 200

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DESIGNER AI
REVIEWER BPA 03-25-21
PROJECT ID 109070
SHEET 15 TOTAL 16

DEL-36-0.00

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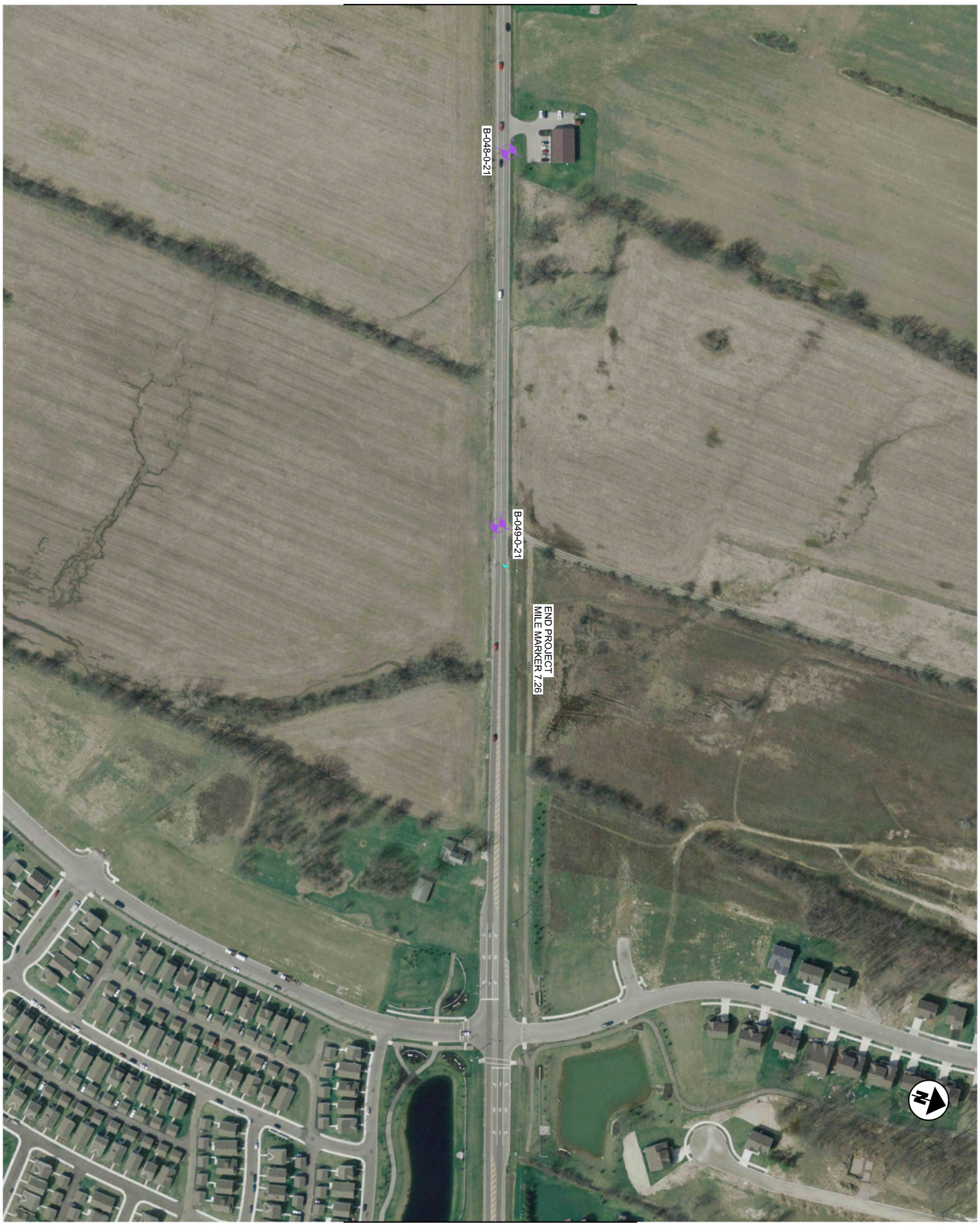

TARGET BORING LOCATION PLAN

HORIZONTAL SCALE IN FEET
0 100
50 200

SHEET	16
TOTAL	16
PROJECT ID	109070
REVIEWER	BPA 03-25-21
DESIGNER	AI

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APPENDIX B

SOIL BORING LOGS & LABORATORY TEST RESULTS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55T	STATION / OFFSET: 0+33, 4' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 991.0 (MSL) EOB: 7.5 ft.
START: 8/13/21 END: 8/13/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 68.4	LAT / LONG: 40.264190, -83.248817

EXPLORATION ID B-001-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 991.0	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
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	989.5																		
HARD, BROWN MOTTLED WITH GRAY, **CLAY**, SOME SILT, SOME SAND, LITTLE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP	988.0		5 5 6	13	61	SS-1	4.25	13	15	10	27	35	41	20	21	15	A-7-6 (10)	67	
HARD, BROWN MOTTLED WITH GRAY, **SILTY CLAY**, SOME SAND, LITTLE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP			3 5 5	11	56	SS-2	4.25	13	13	10	27	37	38	19	19	15	A-6b (9)	-	
			6 7 6	15	67	SS-3	4.50	-	-	-	-	-	-	-	-	15	A-6b (V)	-	
	983.5	EOB	6 7 9	18	67	SS-4	4.50	-	-	-	-	-	-	-	-	15	A-6b (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55T	STATION / OFFSET: 8+05, 16' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 985.0 (MSL) EOB: 7.5 ft.
START: 8/13/21 END: 8/13/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 68.4	LAT / LONG: 40.264849, -83.246188

EXPLORATION ID B-002-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 985.0	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
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	983.5																		
VERY STIFF TO HARD, BROWN, **SILT AND CLAY**, SOME SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP TO MOIST		1	3 4 4	9	61	SS-1	4.50	1	7	14	49	29	31	19	12	17	A-6a (9)	140	
	980.5	2	4 4 4	9	61	SS-2	4.00	-	-	-	-	-	-	-	-	22	A-6a (V)	-	
HARD, BROWN MOTTLED WITH GRAY, **CLAY**, SOME SILT, TRACE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, MOIST		3	4 3 4	8	56	SS-3	4.50	0	2	5	33	60	56	19	37	24	A-7-6 (19)	-	
	977.5	4	4 4 4	9	61	SS-4	4.50	-	-	-	-	-	-	-	-	23	A-7-6 (V)	-	
		EOB 5 6 7																	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55T	STATION / OFFSET: 16+32, 12' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 983.4 (MSL) EOB: 7.5 ft.
START: 8/13/21 END: 8/13/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 68.4	LAT / LONG: 40.265431, -83.243320

EXPLORATION ID B-003-0-21

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
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	983.4																		
STIFF, BROWN, **SILTY CLAY**, SOME SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP	981.9	1	5 5 6	13	61	SS-1	1.75	10	11	10	37	32	34	18	16	16	A-6b (9)	340	
VERY STIFF TO HARD, BROWN MOTTLED WITH GRAY, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, MOIST TO DAMP	980.4	2 3 4	4 5 6	13	61	SS-2	3.25	1	4	11	34	50	44	19	25	22	A-7-6 (15)	-	
		5	4 6 8	16	67	SS-3	4.25	-	-	-	-	-	-	-	-	22	A-7-6 (V)	-	
	975.9	6 7 EOB	6 9 10	22	56	SS-4	4.50	-	-	-	-	-	-	-	-	18	A-7-6 (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55T	STATION / OFFSET: 23+86, 8' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 982.3 (MSL) EOB: 7.5 ft.
START: 8/13/21 END: 8/13/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 68.4	LAT / LONG: 40.266080, -83.240757

EXPLORATION ID B-004-0-21

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
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	982.3 980.8																		
VERY STIFF, BROWNISH GRAY, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP	979.3	1 2 3	3 3 3	7	56	SS-1	4.00	6	9	9	42	34	32	18	14	16	A-6a (10)	220	
STIFF TO VERY STIFF, BROWNISH GRAY, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, MOIST		4 5	4 3 3	7	67	SS-2	2.25	2	4	8	39	47	40	22	18	23	A-6b (11)	-	
		6	3 4 3	8	67	SS-3	1.75	-	-	-	-	-	-	-	-	29	A-6b (V)	-	
	974.8	7 EOB	4 3 4	8	67	SS-4	2.00	-	-	-	-	-	-	-	-	30	A-6b (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55T	STATION / OFFSET: 32+36, 4' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 972.4 (MSL) EOB: 7.5 ft.
START: 8/13/21 END: 8/13/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 68.4	LAT / LONG: 40.266721, -83.237827

EXPLORATION ID B-005-0-21

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MATERIAL DESCRIPTION AND NOTES	ELEV. 972.4	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
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	970.9																		
STIFF TO HARD, BROWN MOTTLED WITH GRAY, **CLAY**, SOME TO "AND" SILT, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP TO MOIST		1 2 3 4 5 6 7	5 6 5	13	39	SS-1	3.75	2	4	11	35	48	46	20	26	20	A-7-6 (16)	193	
			5 7 6	15	56	SS-2	4.50	4	4	12	38	42	41	20	21	18	A-7-6 (13)	-	
			5 6 5	13	56	SS-3	1.50	-	-	-	-	-	-	-	-	22	A-7-6 (V)	-	
	964.9	EOB	5 8 10	21	67	SS-4	4.50	-	-	-	-	-	-	-	-	21	A-7-6 (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55T	STATION / OFFSET: 40+35, 14' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 965.1 (MSL) EOB: 7.5 ft.
START: 8/12/21 END: 8/12/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 68.4	LAT / LONG: 40.267399, -83.235102

EXPLORATION ID B-006-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	965.1 963.6																		
HARD, BROWN MOTTLED WITH GRAY, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP		1 2 3 4 5 6 7	5 6 6	14	56	SS-1	4.50	0	2	9	34	55	48	22	26	18	A-7-6 (16)	540	
			6 7 10	19	28	SS-2	4.50	9	8	11	30	42	41	19	22	17	A-7-6 (12)	-	
			6 9 11	23	67	SS-3	4.50	-	-	-	-	-	-	-	-	15	A-7-6 (V)	-	
	957.6	EOB	6 12 12	27	72	SS-4	4.50	-	-	-	-	-	-	-	-	16	A-7-6 (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55T	STATION / OFFSET: 48+31, 12' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 961.8 (MSL) EOB: 7.5 ft.
START: 8/12/21 END: 8/12/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 68.4	LAT / LONG: 40.267960, -83.232346

EXPLORATION ID B-007-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 961.8	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
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	960.3																		
HARD, BROWN, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP		1 2 3 4 5 6 7	10 7 4	13	67	SS-1	4.50	9	8	10	32	41	40	19	21	15	A-6b (12)	200	
			4 7 8	17	39	SS-2	4.50	2	5	11	39	43	36	18	18	15	A-6b (11)	-	
			6 8 9	19	56	SS-3	4.50	-	-	-	-	-	-	-	-	14	A-6b (V)	-	
	954.3	EOB	9 8 9	19	67	SS-4	4.50	-	-	-	-	-	-	-	-	15	A-6b (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55T	STATION / OFFSET: 56+36, 7' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 954.5 (MSL) EOB: 7.5 ft.
START: 8/12/21 END: 8/12/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 68.4	LAT / LONG: 40.268650, -83.229603

EXPLORATION ID B-008-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 954.5	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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	953.0																		
HARD, BROWN MOTTLED WITH GRAY, **SILTY CLAY**, SOME SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP		1 2 3 4 5 6 7	5 7 6	15	56	SS-1	4.50	2	6	17	32	43	39	19	20	16	A-6b (12)	293	
			7 7 8	17	61	SS-2	4.50	2	6	19	33	40	36	18	18	15	A-6b (11)	-	
			10 10 11	24	50	SS-3	4.50	-	-	-	-	-	-	-	-	15	A-6b (V)	-	
	947.0	EOB	9 12 13	29	56	SS-4	4.50	-	-	-	-	-	-	-	-	16	A-6b (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET:	EXPLORATION ID B-008-1-21
TYPE: CULVERT	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT:	
PID: SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 950.6 (MSL) EOB: 25.0 ft.	PAGE 1 OF 1
START: 11/9/22 END: 11/9/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 40.268932, -83.228147	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
7.0" ASPHALT AND 12.0" BASE (DRILLERS DESCRIPTION)	950.6																	
	949.0		4 5 4	11	56	SS-1	2.50	-	-	-	-	-	-	-	-	19	A-6a (V)	
VERY STIFF, GRAYISH BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, MOIST	947.6																	
VERY STIFF TO HARD, BROWN AND GRAY, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, MOIST TO DAMP			2 3 4	8	44	SS-2	2.75	1	6	12	39	42	34	18	16	21	A-6b (10)	
	942.6		4 7 12	23	56	SS-3	4.50	-	-	-	-	-	-	-	-	17	A-6b (V)	
HARD, BROWN WITH TRACE GRAY MOTTLES, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP			3 7 12	23	56	SS-4	4.50	-	-	-	-	-	-	-	-	16	A-6a (V)	
			5 7 11	22	61	SS-5	4.50	2	5	10	40	43	31	18	13	16	A-6a (9)	
			9 9 12	25	50	SS-6	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	
			7 10 10	24	50	SS-7	4.50	-	-	-	-	-	-	-	-	18	A-6a (V)	
	930.1		5 8 12	24	50	SS-8	4.50	-	-	-	-	-	-	-	-	16	A-6a (V)	
VERY STIFF, GRAY, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, GLACIAL TILL, DAMP			4 7 7	17	56	SS-9	3.25	3	5	9	43	40	29	16	13	16	A-6a (9)	
	925.6	EOB	4 7 8	18	50	SS-10	3.00	-	-	-	-	-	-	-	-	16	A-6a (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. DRILLED AS STAKED.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 11/30/22 09:21 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\DEL-36-0.00\GINT FILES\DEL-36-0.00.GPJ

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET:
TYPE: CULVERT	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT:
PID: SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 950.6 (MSL) EOB: 25.0 ft.
START: 11/9/22 END: 11/9/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 40.268978, -83.228252

EXPLORATION ID B-008-2-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
7.0" ASPHALT AND 12.0" BASE (DRILLERS DESCRIPTION)	950.6																	
	949.0		4 4 4	10	39	SS-1	2.50	-	-	-	-	-	-	-	-	17	A-6a (V)	
VERY STIFF, BROWNISH GRAY, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP	947.6																	
MEDIUM STIFF, BROWNISH GRAY WITH GRAY MOTTLES, **CLAY**, SOME SILT, TRACE SAND, TRACE GRAVEL, MOIST	945.1		2 3 3	7	44	SS-2	1.75	1	1	6	31	61	64	24	40	30	A-7-6 (20)	
HARD, BORWN WITH TRACE GRAY MOTTLES, **SILT AND CLAY**, LITTLE SAND, TRACE TO LITTLE GRAVEL, DAMP TO MOIST			3 6 11	21	50	SS-3	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	
			4 8 11	23	50	SS-4	4.50	3	4	10	40	43	30	18	12	16	A-6a (9)	
			4 9 12	25	50	SS-5	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	
			4 7 11	22	50	SS-6	4.50	-	-	-	-	-	-	-	-	16	A-6a (V)	
	932.6		8 10 11	25	56	SS-7	4.50	-	-	-	-	-	-	-	-	19	A-6a (V)	
VERY STIFF TO HARD, GRAY, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, GLACIAL TILL, DAMP			5 8 12	24	56	SS-8	4.50	3	4	9	42	42	32	18	14	16	A-6a (10)	
			4 6 8	17	67	SS-9	4.00	-	-	-	-	-	-	-	-	16	A-6a (V)	
	925.6	EOB	7 9 12	25	67	SS-10	3.00	-	-	-	-	-	-	-	-	16	A-6a (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. DRILLED AS STAKED.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 11/30/22 09:21 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\DEL-36-0.00\GINT FILES\DEL-36-0.00.GPJ

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55T	STATION / OFFSET: 64+32, 4' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 951.7 (MSL) EOB: 7.5 ft.
START: 8/12/21 END: 8/12/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 68.4	LAT / LONG: 40.269246, -83.226859

EXPLORATION ID B-009-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 951.7	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
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	950.2																		
HARD, BROWN MOTTLED WITH GRAY BECOMING BROWN, **SILT AND CLAY**, LITTLE TO SOME SAND, TRACE TO LITTLE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP		1 2 3 4 5 6 7	7 7 9	18	56	SS-1	4.50	6	5	12	37	40	33	18	15	13	A-6a (10)	180	
			6 5 7	14	44	SS-2	4.50	16	14	14	31	25	28	16	12	11	A-6a (5)	-	
			7 8 9	19	61	SS-3	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	-	
	944.2	EOB	8 10 10	23	67	SS-4	4.50	-	-	-	-	-	-	-	-	14	A-6a (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55T	STATION / OFFSET: 72+42, 25' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 942.7 (MSL) EOB: 7.5 ft.
START: 8/12/21 END: 8/12/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 68.4	LAT / LONG: 40.269967, -83.224117

EXPLORATION ID B-010-0-21

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MATERIAL DESCRIPTION AND NOTES	ELEV. 942.7	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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	941.2	1																	
VERY STIFF TO HARD, BROWN AND GRAY, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP	938.2	2 3 4 5 6	3 5 6	13	61	SS-1	4.50	5	5	10	41	39	30	17	13	13	A-6a (9)	267	
			3 3 4	8	56	SS-2	3.75	-	-	-	-	-	-	-	-	16	A-6a (V)	-	
STIFF TO VERY STIFF, GRAYISH BROWN, **CLAY**, "AND" SILT, LITTLE SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, MOIST TO DAMP	935.2	5 6 7	3 3 3	7	44	SS-3	1.75	1	5	11	39	44	42	22	20	25	A-7-6 (12)	-	
		EOB	3 3 4	8	67	SS-4	2.00	-	-	-	-	-	-	-	-	16	A-7-6 (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55T	STATION / OFFSET: 78+57, 18' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 944.2 (MSL) EOB: 7.5 ft.
START: 8/12/21 END: 8/12/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 68.4	LAT / LONG: 40.270543, -83.222043

EXPLORATION ID B-011-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 944.2	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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	942.7																		
HARD, BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE TO LITTLE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP		1 2 3 4 5 6 7	5 7 9	18	67	SS-1	4.50	5	9	11	40	35	30	17	13	15	A-6a (9)	1027	
			5 6 9	17	67	SS-2	4.50	18	9	10	32	31	30	18	12	12	A-6a (6)	-	
			6 7 6	15	56	SS-3	4.50	-	-	-	-	-	-	-	-	13	A-6a (V)	-	
	936.7	EOB	7 8 10	21	67	SS-4	4.50	-	-	-	-	-	-	-	-	13	A-6a (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55T	STATION / OFFSET: 86+58, 13' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 943.7 (MSL) EOB: 7.5 ft.
START: 8/12/21 END: 8/12/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 68.4	LAT / LONG: 40.271751, -83.219639

EXPLORATION ID B-012-0-21

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MATERIAL DESCRIPTION AND NOTES	ELEV. 943.7	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
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	942.2																		
HARD, BROWN, **SILT AND CLAY**, SOME SAND, TRACE TO LITTLE GRAVEL, DAMP TO MOIST		1	5 10 11	24	44	SS-1	4.50	5	10	12	38	35	28	16	12	11	A-6a (8)	1360	
		2	4 10 9	22	39	SS-2	4.50	19	11	11	32	27	30	16	14	10	A-6a (6)	-	
		3	5 9 8	19	56	SS-3	4.50	-	-	-	-	-	-	-	-	13	A-6a (V)	-	
		4	5 8 8	18	67	SS-4	4.50	-	-	-	-	-	-	-	-	17	A-6a (V)	-	
	936.2	5 EOB																	
		6																	
		7																	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 94+42, RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 945.1 (MSL) EOB: 7.5 ft.
START: 8/10/21 END: 8/10/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.272855, -83.217228

EXPLORATION ID B-013-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 945.1	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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	943.6																		
VERY STIFF TO HARD, GRAYISH BROWN, **SILT AND CLAY**, LITTLE TO SOME SAND, TRACE TO LITTLE GRAVEL, DAMP		1 2 3 4 5 6 7	3 4 7	15	56	SS-1	4.50	4	7	12	40	37	29	16	13	14	A-6a (9)	1353	
			3 5 9	19	56	SS-2	3.50	5	6	12	40	37	30	17	13	14	A-6a (9)	-	
			4 9 10	26	39	SS-3	4.50	-	-	-	-	-	-	-	-	12	A-6a (V)	-	
	937.6	EOB	5 11 12	31	39	SS-4	4.50	-	-	-	-	-	-	-	-	14	A-6a (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 104+08, 17' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 945.3 (MSL) EOB: 7.5 ft.
START: 8/10/21 END: 8/10/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.274076, -83.214156

EXPLORATION ID B-014-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 945.3	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
12.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	943.9																		
HARD, BROWN AND GRAYISH BROWN, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP	942.3		3 3 4	10	56	SS-1	4.25	4	8	10	41	37	37	19	18	17	A-6b (11)	1093	
VERY STIFF TO HARD, BROWN AND GRAYISH BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE TO LITTLE GRAVEL, DAMP			3 4 8	16	50	SS-2	2.50	11	8	11	37	33	32	18	14	16	A-6a (9)	-	
			3 5 9	19	56	SS-3	4.50	-	-	-	-	-	-	-	-	14	A-6a (V)	-	
	937.8	EOB	5 7 10	23	67	SS-4	4.50	-	-	-	-	-	-	-	-	16	A-6a (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 112+00, 19' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 942.9 (MSL) EOB: 7.5 ft.
START: 8/10/21 END: 8/10/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.274633, -83.211406

EXPLORATION ID B-015-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 942.9	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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	941.4																		
HARD, GRAY, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP		1 2 3 4 5 6 7	7 12 13	34	61	SS-1	4.50	5	7	12	40	36	27	16	11	10	A-6a (8)	1760	
			8 11 13	33	67	SS-2	4.50	8	7	10	37	38	29	17	12	11	A-6a (9)	-	
			8 12 12	33	61	SS-3	4.50	-	-	-	-	-	-	-	-	12	A-6a (V)	-	
	935.4	EOB	7 9 11	27	56	SS-4	4.50	-	-	-	-	-	-	-	-	13	A-6a (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 119+98, 10' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 943.7 (MSL) EOB: 7.5 ft.
START: 8/10/21 END: 8/10/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.275358, -83.208707

EXPLORATION ID B-016-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 943.7	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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	942.2	1																	
HARD, BROWN MOTTLED WITH GRAY, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP		2	4 8 11	26	39	SS-1	4.50	4	5	11	37	43	36	18	18	15	A-6b (11)	100	
		3	5 8 13	29	61	SS-2	4.50	3	5	11	38	43	35	19	16	14	A-6b (10)	-	
		4	5 9 11	27	67	SS-3	4.50	-	-	-	-	-	-	-	-	15	A-6b (V)	-	
		5	6 10 16	35	67	SS-4	4.50	-	-	-	-	-	-	-	-	15	A-6b (V)	-	
	936.2	6 EOB																	
		7																	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 128+00, 5' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 943.7 (MSL) EOB: 7.5 ft.
START: 8/10/21 END: 8/10/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.275968, -83.205945

EXPLORATION ID B-017-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 943.7	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
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	942.2																		
VERY STIFF TO HARD, BROWN AND GRAY, **SILT AND CLAY**, LITTLE TO SOME SAND, TRACE GRAVEL, DAMP		1	4 7 8	20	50	SS-1	4.25	4	6	13	39	38	31	18	13	15	A-6a (9)	120	
		2	4 6 7	18	50	SS-2	3.25	2	9	17	36	36	32	17	15	17	A-6a (9)	-	
		3	4 6 8	19	61	SS-3	2.75	-	-	-	-	-	-	-	-	16	A-6a (V)	-	
	936.2	4 5 6 7 EOB	6 8 7	20	67	SS-4	4.25	-	-	-	-	-	-	-	-	16	A-6a (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 136+12, 25' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 942.7 (MSL) EOB: 7.5 ft.
START: 8/10/21 END: 8/10/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.276705, -83.203195

EXPLORATION ID B-018-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 942.7	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
12.0" ASPHALT AND 7.0" BASE (DRILLERS DESCRIPTION)	941.1																		
HARD, BROWN MOTTLED WITH GRAY AND ORANGISH BROWN, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP		1 2 3 4 5 6 7	7 6 8	19	39	SS-1	4.50	2	5	12	35	46	41	21	20	16	A-7-6 (12)	60	
			6 7 9	22	61	SS-2	4.50	1	4	11	35	49	44	20	24	19	A-7-6 (14)	-	
			7 7 10	23	44	SS-3	4.50	-	-	-	-	-	-	-	-	16	A-7-6 (V)	-	
	935.2	EOB	7 10 11	29	33	SS-4	4.50	-	-	-	-	-	-	-	-	20	A-7-6 (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 144+07, 22' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 945.6 (MSL) EOB: 7.5 ft.
START: 8/9/21 END: 8/9/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.277395, -83.200493

EXPLORATION ID B-019-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 945.6	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
13.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	944.0																		
HARD, BROWN AND GRAY, **SILT AND CLAY**, LITTLE TO SOME SAND, TRACE GRAVEL, DAMP		1	7 9 8	23	56	SS-1	4.50	3	5	13	40	39	30	18	12	15	A-6a (9)	140	
		2	7 8 8	22	67	SS-2	4.50	6	8	13	38	35	30	17	13	14	A-6a (9)	-	
		3	8 9 8	23	67	SS-3	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	-	
		4	10 9 11	27	72	SS-4	4.50	-	-	-	-	-	-	-	-	14	A-6a (V)	-	
	938.1	5 EOB																	
		6																	
		7																	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 151+83, 9' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 955.1 (MSL) EOB: 7.5 ft.
START: 8/9/21 END: 8/9/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.278331, -83.197992

EXPLORATION ID B-020-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 955.1	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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	953.6																		
VERY STIFF, BROWN, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, DAMP TO MOIST @1.5'; SS-1 CONTAINS NO RECOVERY		1 2 3	5 7 5	16	0	SS-1	-	-	-	-	-	-	-	-	-	-		-	
		4	11 10 12	30	56	SS-2	2.50	4	6	11	32	47	45	19	26	19	A-7-6 (15)	100	
		5	12 12 10	30	67	SS-3	2.50	4	4	11	32	49	45	19	26	20	A-7-6 (15)	-	
	947.6	6 7 EOB	12 13 10	31	67	SS-4	2.50	-	-	-	-	-	-	-	-	21	A-7-6 (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 160+00, 4' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 961.4 (MSL) EOB: 7.5 ft.
START: 8/9/21 END: 8/9/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.279192, -83.195288

EXPLORATION ID B-021-0-21

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MATERIAL DESCRIPTION AND NOTES	ELEV. 961.4	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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	959.9																		
VERY STIFF, BROWN MOTTLED WITH GRAY, **CLAY**, SOME SILT, SOME SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP	958.4	1	4 5 7	16	50	SS-1	3.00	7	8	13	30	42	46	23	23	20	A-7-6 (14)	220	
VERY STIFF TO HARD, BROWN MOTTLED WITH GRAY, **SILT AND CLAY**, SOME SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP		2	4 5 8	18	50	SS-2	4.00	6	7	14	37	36	32	17	15	14	A-6a (10)	-	
		3	5 5 8	18	56	SS-3	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	-	
	953.9	4	6 7 8	20	56	SS-4	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	-	
		EOB																	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 168+05, 13' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 961.9 (MSL) EOB: 7.5 ft.
START: 8/9/21 END: 8/9/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.280028, -83.192618

EXPLORATION ID B-022-0-21

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MATERIAL DESCRIPTION AND NOTES	ELEV. 961.9	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
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	960.4	1																	
VERY STIFF, BROWN MOTTLED WITH ORANGISH BROWN AND GRAY, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP	958.9	2 3	10 7 8	20	50	SS-1	4.00	2	5	13	39	41	37	18	19	18	A-6b (12)	40	
VERY STIFF TO HARD, BROWN MOTTLED WITH ORANGISH BROWN AND GRAY, **SILT AND CLAY**, SOME SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP		4	6 7 9	22	61	SS-2	4.25	3	8	14	40	35	33	18	15	17	A-6a (10)	-	
		5	6 8 9	23	72	SS-3	4.50	-	-	-	-	-	-	-	-	14	A-6a (V)	-	
	954.4	6 7 EOB	7 10 11	29	61	SS-4	3.75	-	-	-	-	-	-	-	-	17	A-6a (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 176+50, 17' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 972.1 (MSL) EOB: 7.5 ft.
START: 8/9/21 END: 8/9/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.280783, -83.189752

EXPLORATION ID B-023-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 972.1	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
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	970.6																		
VERY STIFF, BROWN AND GRAY, **SILTY CLAY**, SOME SAND, TRACE GRAVEL, DAMP	969.1		6 5 4	12	28	SS-1	2.75	10	13	15	25	37	40	19	21	19	A-6b (10)	120	
VERY STIFF TO HARD, BROWN AND GRAY, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP			6 5 6	15	50	SS-2	2.50	3	4	13	43	37	32	19	13	17	A-6a (9)	-	
			6 6 9	20	67	SS-3	4.50	-	-	-	-	-	-	-	-	14	A-6a (V)	-	
	964.6	EOB	5 7 11	25	61	SS-4	4.50	-	-	-	-	-	-	-	-	14	A-6a (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 184+06, 8' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 972.1 (MSL) EOB: 7.5 ft.
START: 8/9/21 END: 8/9/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.281583, -83.187252

EXPLORATION ID B-024-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 972.1	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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	970.6																		
HARD, GRAY, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP	969.1	1	4 5 5	14	56	SS-1	4.50	1	6	13	46	34	34	18	16	17	A-6b (10)	20	
VERY STIFF TO HARD, GRAY AND ORANGISH BROWN, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, MOIST TO DAMP		2 3 4	4 4 6	14	50	SS-2	3.00	5	8	10	31	46	52	21	31	24	A-7-6 (18)	-	
		5 6	5 6 8	19	50	SS-3	3.00	-	-	-	-	-	-	-	-	23	A-7-6 (V)	-	
	964.6	7 EOB	5 7 11	25	56	SS-4	4.50	-	-	-	-	-	-	-	-	15	A-7-6 (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET:	EXPLORATION ID B-024-1-21
TYPE: CULVERT	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT:	
PID: SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 971.7 (MSL) EOB: 25.0 ft.	PAGE 1 OF 1
START: 11/8/22 END: 11/8/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 40.282291, -83.184548	

MATERIAL DESCRIPTION AND NOTES	ELEV. 971.7	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
7.0" ASPHALT AND 12.0" BASE (DRILLERS DESCRIPTION)	970.1	1																
MEDIUM STIFF, BROWN AND GRAY, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, MOIST	968.7	2	4 3 3	7	44	SS-1	1.75	0	4	11	43	42	39	20	19	24	A-6b (12)	
VERY STIFF TO HARD, BROWN MOTTLED WITH GRAY AND ORANGISH BROWN, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, IRON STAINING, MOIST TO DAMP	963.7	3 4 5 6 7 8	3 4 6	12	50	SS-2	3.25	1	4	13	34	48	47	21	26	22	A-7-6 (16)	
			6 8 12	24	50	SS-3	4.25	-	-	-	-	-	-	-	-	18	A-7-6 (V)	
HARD, BROWN AND GRAY WITH ORANGISH BROWN MOTTLES, **SILT AND CLAY**, LITTLE TO SOME SAND, TRACE GRAVEL, DAMP	958.7	9 10 11 12 13	5 9 15	29	56	SS-4	4.50	3	5	11	39	42	31	18	13	15	A-6a (9)	
			5 7 12	23	61	SS-5	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	
VERY STIFF TO HARD, GRAY, **SILT AND CLAY**, TRACE TO LITTLE SAND, TRACE GRAVEL, GLACIAL TILL, DAMP TO MOIST	946.7	14 15 16 17 18 19 20 21 22 23 24 25 EOB	6 8 10	22	56	SS-6	4.50	4	6	13	39	38	26	15	11	15	A-6a (8)	
			5 6 9	18	67	SS-7	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	
			6 6 9	18	56	SS-8	3.75	-	-	-	-	-	-	-	-	16	A-6a (V)	
			5 7 7	17	61	SS-9	3.50	-	-	-	-	-	-	-	-	17	A-6a (V)	
			4 6 7	16	67	SS-10	3.25	-	-	-	-	-	-	-	-	20	A-6a (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. DRILLED AS STAKED.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET:	EXPLORATION ID B-024-2-21
TYPE: CULVERT	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT:	
PID: SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 971.6 (MSL) EOB: 25.0 ft.	PAGE 1 OF 1
START: 11/8/22 END: 11/8/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 40.282357, -83.184564	

MATERIAL DESCRIPTION AND NOTES	ELEV. 971.6	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
7.0" ASPHALT AND 12.0" BASE (DRILLERS DESCRIPTION)	970.0																	
LOOSE, DARK GRAY, **GRAVEL AND STONE FRAGMENTS WITH SAND**, LITTLE SILT, TRACE CLAY, (GRANULAR BASE), DAMP	969.1		2 2 3	6	28	SS-1	-	-	-	-	-	-	-	-	-	3	A-1-b (V)	
STIFF TO VERY STIFF, GRAY MOTTLED WITH ORANGISH BROWN, **CLAY**, SOME SILT, TRACE SAND, TRACE GRAVEL, SLIGHTLY ORGANIC, CONTAINS IRON STAINING, MOIST	966.1		2 3 3	7	56	SS-2	2.00	0	2	7	33	58	56	22	34	27	A-7-6 (19)	
HARD, BROWN AND GRAY, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP	963.6		2 5 8	16	56	SS-3	4.50	4	5	12	37	42	35	20	15	14	A-6a (10)	
VERY STIFF, GRAY MOTTLED WITH ORANGISH BROWN, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, MOIST	961.1		2 5 10	18	50	SS-4	3.50	4	5	10	38	43	36	18	18	19	A-6b (11)	
HARD, GRAY, **SILT AND CLAY**, TRACE SAND, TRACE GRAVEL, MOIST	958.0		4 8 12	24	56	SS-5	4.50	-	-	-	-	-	-	-	-	22	A-6a (V)	
HARD, BROWN, **SANDY SILT**, SOME CLAY, LITTLE GRAVEL, DAMP	956.7		5 10 12	27	56	SS-6	4.50	-	-	-	-	-	-	-	-	14	A-4a (V)	
VERY STIFF, GRAY, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, GLACIAL TILL, DAMP	946.6	EOB	4 7 10	21	56	SS-7	4.00	5	7	12	38	38	27	16	11	14	A-6a (8)	
			5 6 7	16	67	SS-8	3.50	-	-	-	-	-	-	-	-	16	A-6a (V)	
			4 6 7	16	56	SS-9	3.00	-	-	-	-	-	-	-	-	16	A-6a (V)	
			4 5 7	15	67	SS-10	2.75	-	-	-	-	-	-	-	-	15	A-6a (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. DRILLED AS STAKED.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 192+09, 4' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 972.0 (MSL) EOB: 7.5 ft.
START: 8/9/21 END: 8/9/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.282312, -83.184536

EXPLORATION ID B-025-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 972.0	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
14.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	970.4																		
VERY STIFF TO HARD, BROWN MOTTLED WITH GRAY AND ORANGISH BROWN, **CLAY**, "AND" SILT, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP		1 2 3 4 5 6 7	4 4 6	14	44	SS-1	4.25	1	5	11	40	43	43	21	22	21	A-7-6 (13)	240	
			4 5 7	16	61	SS-2	3.75	1	4	10	39	46	47	23	24	23	A-7-6 (15)	-	
			5 7 8	20	72	SS-3	4.00	-	-	-	-	-	-	-	-	22	A-7-6 (V)	-	
	964.5	EOB	5 8 9	23	67	SS-4	4.50	-	-	-	-	-	-	-	-	19	A-7-6 (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 200+07, 11' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 977.5 (MSL) EOB: 7.5 ft.
START: 8/9/21 END: 8/9/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.283102, -83.181867

EXPLORATION ID B-026-0-21

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MATERIAL DESCRIPTION AND NOTES	ELEV. 977.5	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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	976.0																		
HARD, BROWN MOTTLED WITH GRAY AND ORANGISH BROWN, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, MOIST	974.5	1 2 3 4 5 6 7	5 6 7	18	44	SS-1	4.50	1	3	15	32	49	50	21	29	22	A-7-6 (18)	100	
			4 6 9	20	61	SS-2	4.50	2	4	19	37	38	38	19	19	18	A-6b (12)	-	
HARD, BROWN MOTTLED WITH GRAY AND ORANGISH BROWN, **SILTY CLAY**, SOME SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP TO MOIST			4 6 10	22	56	SS-3	4.25	-	-	-	-	-	-	-	-	20	A-6b (V)	-	
	970.0	EOB	5 7 10	23	61	SS-4	4.50	-	-	-	-	-	-	-	-	16	A-6b (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 207+95, 17' RT.	EXPLORATION ID B-027-0-21
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36	
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 979.2 (MSL) EOB: 7.5 ft.	PAGE 1 OF 1
START: 8/6/21 END: 8/6/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.283736, -83.179163	

MATERIAL DESCRIPTION AND NOTES	ELEV. 979.2	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
14.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	977.6																		
VERY STIFF, BROWN, **SILTY CLAY**, SOME SAND, TRACE GRAVEL, SS-1 CONTAINS NO INTACT SOIL FOR HP READINGS, DAMP	974.7		4 5 6	15	17	SS-1	-	-	-	-	-	-	-	-	-	13	A-6b (V)	-	
			4 6 7	18	39	SS-2	3.75	2	7	14	35	42	36	18	18	17	A-6b (11)	107	
HARD, BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP	971.7	EOB	5 8 9	23	44	SS-3	4.50	2	6	13	40	39	30	18	12	12	A-6a (9)	-	
			5 9 9	25	39	SS-4	4.25	-	-	-	-	-	-	-	-	14	A-6a (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 215+92, 8' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 981.6 (MSL) EOB: 7.5 ft.
START: 8/6/21 END: 8/6/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.284505, -83.176486

EXPLORATION ID B-028-0-21

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MATERIAL DESCRIPTION AND NOTES	ELEV. 981.6	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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	980.1	1																	
HARD, BROWN AND BROWNISH GRAY, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP	978.6	2	4 4 3	10	67	SS-1	4.50	1	4	13	50	32	32	18	14	18	A-6a (10)	180	
VERY STIFF TO HARD, BROWN MOTTLED WITH GRAY, **CLAY**, SOME SILT, TRACE TO LITTLE SAND, TRACE GRAVEL, MOIST TO DAMP		3	4 3 4	10	72	SS-2	4.25	0	2	7	35	56	51	22	29	23	A-7-6 (18)	-	
		4	3 3 3	8	67	SS-3	3.25	-	-	-	-	-	-	-	-	24	A-7-6 (V)	-	
	974.1	5	2 4 3	10	78	SS-4	3.50	-	-	-	-	-	-	-	-	20	A-7-6 (V)	-	
		EOB 6																	
		7																	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 223+99, 4' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 977.3 (MSL) EOB: 7.5 ft.
START: 8/6/21 END: 8/6/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.285189, -83.173736

EXPLORATION ID B-029-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 977.3	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
14.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	975.7	1																	
HARD, BROWN AND GRAY, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP	974.3	2	4 5 9	19	61	SS-1	4.50	1	3	13	44	39	35	17	18	17	A-6b (11)	180	
VERY STIFF TO HARD, BROWN MOTTLED WITH GRAY, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP TO MOIST		3	4 5 5	14	67	SS-2	4.50	1	3	12	44	40	33	19	14	19	A-6a (10)	-	
		4																	
		5	5 4 4	11	67	SS-3	3.75	-	-	-	-	-	-	-	-	24	A-6a (V)	-	
	969.8	6																	
	EOB	7	4 3 5	11	44	SS-4	3.50	-	-	-	-	-	-	-	-	21	A-6a (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 232+02, 16' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 967.1 (MSL) EOB: 7.5 ft.
START: 8/5/21 END: 8/5/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.285963, -83.171040

EXPLORATION ID B-030-0-21

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MATERIAL DESCRIPTION AND NOTES	ELEV. 967.1	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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	965.6																		
HARD, BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP	964.1		4 5 7	16	56	SS-1	4.50	3	6	13	38	40	31	16	15	13	A-6a (10)	220	
HARD, GRAYISH BROWN, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP			4 6 9	20	67	SS-2	4.25	5	6	12	36	41	34	17	17	17	A-6b (11)	-	
			4 6 10	22	56	SS-3	4.50	-	-	-	-	-	-	-	-	16	A-6b (V)	-	
	959.6	EOB	5 8 10	25	72	SS-4	4.50	-	-	-	-	-	-	-	-	12	A-6b (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 239+88, 16' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 952.4 (MSL) EOB: 7.5 ft.
START: 8/5/21 END: 8/5/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.286560, -83.168333

EXPLORATION ID B-031-0-21

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
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	952.4																		
	950.9																		
HARD, BROWN AND BROWN MOTTLED WITH GRAY, **SILT AND CLAY**, LITTLE TO SOME SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP		1	4 7 6	18	61	SS-1	4.50	5	6	13	39	37	29	17	12	11	A-6a (9)	120	
		2																	
		3	6 6 7	18	67	SS-2	4.50	4	7	13	38	38	29	17	12	14	A-6a (9)	-	
		4																	
		5	6 7 9	22	61	SS-3	4.25	-	-	-	-	-	-	-	-	15	A-6a (V)	-	
		6																	
	944.9	7 EOB	6 8 11	26	67	SS-4	4.50	-	-	-	-	-	-	-	-	14	A-6a (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 248+04, 7' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 938.7 (MSL) EOB: 7.5 ft.
START: 8/5/21 END: 8/5/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.287193, -83.165529

EXPLORATION ID B-032-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 938.7	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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	937.2	1																	
HARD, BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP		2	4 5 8	18	56	SS-1	4.50	4	5	12	38	41	32	18	14	14	A-6a (10)	127	
	934.2	3	4 4 7	15	67	SS-2	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	-	
VERY STIFF, GRAYISH BROWN, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, MOIST		4 5	5 7 8	20	56	SS-3	3.50	2	5	12	37	44	39	18	21	19	A-6b (12)	-	
	931.2	6 7 EOB	9 10 12	30	56	SS-4	3.75	-	-	-	-	-	-	-	-	20	A-6b (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 256+06, 3' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 911.1 (MSL) EOB: 7.5 ft.
START: 8/5/21 END: 8/5/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.287741, -83.162743

EXPLORATION ID B-033-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 911.1	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
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	909.6																		
HARD, BROWN AND BROWNISH GRAY, **SILT AND CLAY**, LITTLE SAND, TRACE TO SOME GRAVEL, DAMP		1 2 3 4 5 6 7	5 6 9	20	39	SS-1	4.50	21	8	10	31	30	30	18	12	11	A-6a (6)	140	
			5 5 8	18	61	SS-2	4.50	3	7	13	38	39	30	17	13	14	A-6a (9)	-	
			7 10 9	26	44	SS-3	4.25	-	-	-	-	-	-	-	-	15	A-6a (V)	-	
	903.6	EOB	7 12 11	31	44	SS-4	4.50	-	-	-	-	-	-	-	-	14	A-6a (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 263+54, 14' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 882.3 (MSL) EOB: 7.5 ft.
START: 8/5/21 END: 8/5/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.288446, -83.160225

EXPLORATION ID B-034-0-21

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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	882.3																		
	880.8																		
HARD, BROWN AND BROWNISH GRAY, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP		1	7 4 5	12	50	SS-1	4.50	4	7	12	36	41	35	19	16	16	A-6b (10)	80	
		2	4 4 5	12	44	SS-2	4.25	2	6	12	36	44	39	19	20	19	A-6b (12)	-	
		3	4 7 8	20	50	SS-3	4.50	-	-	-	-	-	-	-	-	17	A-6b (V)	-	
		4	5 9 11	27	44	SS-4	4.50	-	-	-	-	-	-	-	-	16	A-6b (V)	-	
	874.8	5																	
		6																	
		7 EOB																	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 271+90, 18' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 882.2 (MSL) EOB: 7.5 ft.
START: 8/5/21 END: 8/5/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.289161, -83.157379

EXPLORATION ID B-035-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 882.2	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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	880.7																		
HARD, BROWN AND BROWNISH GRAY, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP	879.2		4 6 9	20	56	SS-1	4.50	6	6	12	35	41	36	18	18	15	A-6b (11)	93	
HARD, BROWN AND BROWNISH GRAY, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, MOIST TO DAMP			5 7 8	20	61	SS-2	4.50	7	7	12	37	37	32	17	15	20	A-6a (10)	-	
			5 7 9	22	72	SS-3	4.50	-	-	-	-	-	-	-	-	17	A-6a (V)	-	
	874.7	EOB	7 11 13	33	72	SS-4	4.50	-	-	-	-	-	-	-	-	13	A-6a (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 280+05, 8' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 919.7 (MSL) EOB: 7.5 ft.
START: 8/5/21 END: 8/5/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.289990, -83.154662

EXPLORATION ID B-036-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 919.7	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
14.0" ASPHALT AND 4.0" BASE (DRILLERS DESCRIPTION)	918.2																		
HARD, BROWN AND GRAY, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP		1	8 7 10	23	50	SS-1	4.50	2	5	12	37	44	37	18	19	16	A-6b (12)	113	
		2	9 7 12	26	44	SS-2	4.50	2	5	12	39	42	33	17	16	14	A-6b (10)	-	
		3	8 11 14	34	56	SS-3	4.50	-	-	-	-	-	-	-	-	16	A-6b (V)	-	
		4	8 13 14	37	67	SS-4	4.50	-	-	-	-	-	-	-	-	13	A-6b (V)	-	
	912.2	5 EOB																	
		6																	
		7																	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET:
TYPE: CULVERT	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT:
PID: SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 923.2 (MSL) EOB: 25.0 ft.
START: 11/2/22 END: 11/2/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 40.290081, -83.154111

EXPLORATION ID B-036-1-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 923.2	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
7.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	922.2																	
STIFF, GRAYISH BROWN, **SILT**, SOME SAND, SOME CLAY, TRACE GRAVEL, WET	920.2		4 3 1	5	56	SS-1	1.75	3	12	11	50	24	27	19	8	31	A-4b (8)	
VERY STIFF TO HARD, BROWN, **SILTY CLAY**, LITTLE TO SOME SAND, TRACE GRAVEL, MOIST TO DAMP	912.7		3 5 6	13	56	SS-2	3.00	1	4	16	40	39	36	17	19	18	A-6b (12)	
			4 6 8	17	56	SS-3	4.50	-	-	-	-	-	-	-	-	15	A-6b (V)	
			6 8 12	24	56	SS-4	4.50	-	-	-	-	-	-	-	-	15	A-6b (V)	
HARD, BROWN, **SANDY SILT**, SOME CLAY, TRACE GRAVEL, DAMP	910.2		3 9 15	29	61	SS-5	4.50	7	8	23	39	23	22	15	7	14	A-4a (5)	
HARD, BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP	907.7		3 10 13	28	67	SS-6	4.50	4	5	14	41	36	27	16	11	14	A-6a (8)	
MEDIUM DENSE, BROWN, **GRAVEL WITH SAND AND SILT**, TRACE CLAY, MOIST	905.2		4 3 7	12	56	SS-7	-	-	-	-	-	-	-	-	-	13	A-2-4 (V)	
MEDIUM DENSE, BROWN, **SANDY SILT**, LITTLE GRAVEL, TRACE CLAY, DAMP	902.7		4 4 7	13	44	SS-8	-	14	18	20	38	10	NP	NP	NP	13	A-4a (3)	
HARD, BROWN, **SANDY SILT**, SOME CLAY, TRACE GRAVEL, DAMP	900.2	W 901.2	5 4 6	12	56	SS-9	4.50	-	-	-	-	-	-	-	-	15	A-4a (V)	
MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, SOME SILT, LITTLE GRAVEL, TRACE CLAY, WET	898.2	EOB	12 13 8	25	28	SS-10	-	-	-	-	-	-	-	-	-	19	A-3a (V)	

NOTES: GROUNDWATER ENCOUNTERED AT 22.0' DURING DRILLING. HOLE DID NOT CAVE. DRILLED AS STAKED.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET:
TYPE: CULVERT	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT:
PID: SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 924.6 (MSL) EOB: 25.0 ft.
START: 11/2/22 END: 11/2/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 40.290196, -83.153942

EXPLORATION ID B-036-2-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 924.6	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
7.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	923.6																	
MEDIUM DENSE, DARK GRAY, **STONE FRAGMENTS WITH SAND**, LITTLE SILT, TRACE CLAY, (GRANULAR BASE), DAMP	922.1	1	8 12 8	24	22	SS-1	-	-	-	-	-	-	-	-	-	6	A-1-b (V)	
VERY STIFF, GRAYISH BROWN, **SILT AND CLAY**, SOME SAND, TRACE GRAVEL, DAMP	919.1	2 3 4 5	4 4 6	12	44	SS-2	4.00	2	7	23	40	28	30	15	15	15	A-6a (9)	
VERY STIFF TO HARD, DARK BROWN MOTTLED WITH GRAY AND ORANGISH BROWN, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, MODERATELY ORGANIC BECOMING SLIGHTLY ORGANIC, IRON STAINING, MOIST TO DAMP **@6.0' - 7.5'; SS-3 LOI = 4.0%**	914.1	6 7 8 9 10	3 3 6	11	67	SS-3	3.50	2	3	9	30	56	49	22	27	26	A-7-6 (17)	
			3 8 13	25	67	SS-4	4.25	-	-	-	-	-	-	-	-	18	A-7-6 (V)	
HARD, BROWN WITH GRAY MOTTLES, **SILT AND CLAY**, TRACE TO LITTLE SAND, TRACE GRAVEL, DAMP		11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	5 9 13	27	67	SS-5	4.50	1	5	11	40	43	30	17	13	15	A-6a (9)	
			7 9 13	27	61	SS-6	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	
			9 10 15	30	56	SS-7	4.50	-	-	-	-	-	-	-	-	16	A-6a (V)	
			1 5 6	13	56	SS-8	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	
			5 7 10	21	33	SS-9	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	
	899.6 EOB		7 7 10	21	44	SS-10	4.50	-	-	-	-	-	-	-	-	16	A-6a (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. DRILLED AS STAKED.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 11/30/22 09:21 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\DEL-36-0.00\GINT FILES\DEL-36-0.00.GPJ

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 287+73, 5' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 942.9 (MSL) EOB: 7.5 ft.
START: 8/3/21 END: 8/3/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.290644, -83.152044

EXPLORATION ID B-037-0-21

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
14.0" ASPHALT AND 4.0" BASE (DRILLERS DESCRIPTION)	942.9 941.4	1																	
HARD, BROWN AND GRAYISH BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE TO SOME GRAVEL, DAMP		2 3 4 5 6	5 6 8	19	56	SS-1	4.50	20	6	12	34	28	29	16	13	11	A-6a (7)	200	
			4 7 9	22	50	SS-2	4.50	2	5	13	44	36	28	17	11	12	A-6a (8)	-	
			5 7 11	25	67	SS-3	4.50	-	-	-	-	-	-	-	-	14	A-6a (V)	-	
	935.4	7 EOB	5 10 11	29	67	SS-4	4.50	-	-	-	-	-	-	-	-	14	A-6a (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 296+04, 17' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 948.5 (MSL) EOB: 7.5 ft.
START: 8/3/21 END: 8/3/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.291452, -83.149259

EXPLORATION ID B-038-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 948.5	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
14.0" ASPHALT AND 4.0" BASE (DRILLERS DESCRIPTION)	947.0	1																	
VERY STIFF TO HARD, BROWN AND DARK BROWN, **SILTY CLAY**, LITTLE TO SOME SAND, TRACE GRAVEL, DAMP TO MOIST	944.0	2	4 5 6	15	61	SS-1	4.50	6	9	12	34	39	34	18	16	17	A-6b (10)	200	
		3	4 5 5	14	56	SS-2	2.75	-	-	-	-	-	-	-	-	22	A-6b (V)	-	
DENSE, BROWN, **SANDY SILT**, LITTLE GRAVEL, TRACE CLAY, DAMP	942.3	4 5	5 9 14	31	44	SS-3	-	17	23	20	30	10	NP	NP	NP	8	A-4a (1)	-	
VERY STIFF, BROWN, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP	941.0	6	4 7 8	20	61	SS-4	4.00	-	-	-	-	-	-	-	-	18	A-6b (V)	-	
		EOB 7																	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET:	EXPLORATION ID B-038-1-21
TYPE: CULVERT	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT:	
PID: SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 958.2 (MSL) EOB: 25.0 ft.	PAGE 1 OF 1
START: 11/3/22 END: 11/3/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 40.292203, -83.147003	

MATERIAL DESCRIPTION AND NOTES	ELEV. 958.2	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
7.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	957.2																	
LOOSE, DARK GRAY, **STONE FRAGMENTS WITH SAND**, LITTLE SILT, TRACE CLAY, (GRANULAR BASE), DAMP	956.1		5 3 4	8	28	SS-1	-	-	-	-	-	-	-	-	-	4	A-1-b (V)	
HARD, BROWN BECOMING BROWNISH GRAY, **SILT AND CLAY**, TRACE TO LITTLE SAND, TRACE GRAVEL, DAMP			5 7 11	22	33	SS-2	4.50	14	6	12	34	34	32	18	14	14	A-6a (8)	
			2 7 10	21	56	SS-3	4.50	-	-	-	-	-	-	-	-	16	A-6a (V)	
			5 9 13	27	56	SS-4	4.50	3	5	11	41	40	28	17	11	15	A-6a (8)	
			3 6 10	19	61	SS-5	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	
			4 6 10	19	56	SS-6	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	
	942.7																	
VERY STIFF, GRAY, **SILT AND CLAY**, TRACE TO LITTLE SAND, TRACE GRAVEL, GLACIAL TILL, DAMP			5 7 11	22	67	SS-7	4.00	3	6	12	42	37	27	16	11	15	A-6a (8)	
			4 7 8	18	56	SS-8	4.00	-	-	-	-	-	-	-	-	15	A-6a (V)	
			5 4 10	17	61	SS-9	4.00	-	-	-	-	-	-	-	-	16	A-6a (V)	
	933.2	EOB	2 5 10	18	61	SS-10	3.25	-	-	-	-	-	-	-	-	16	A-6a (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. DRILLED AS STAKED.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 11/30/22 09:21 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\DEL-36-0.00\GINT FILES\DEL-36-0.00.GPJ

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET:
TYPE: CULVERT	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT:
PID: SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 957.5 (MSL) EOB: 25.0 ft.
START: 11/4/22 END: 11/4/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 40.292317, -83.146956

EXPLORATION ID B-038-2-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 957.5	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
7.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	956.5																	
DENSE, BROWN AND DARK BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, LITTLE CLAY, DAMP	954.5	1	8 15 11	31	44	SS-1	-	-	-	-	-	-	-	-	-	14	A-2-4 (V)	
LOOSE, DARK BROWN, **STONE FRAGMENTS WITH SAND**, LITTLE SILT, TRACE CLAY, POTENTIAL CAVINGS OF GRANULAR BASE, DAMP	952.0	4	3 3 5	10	33	SS-2	-	-	-	-	-	-	-	-	-	10	A-1-b (V)	
HARD, BROWN, **SILT AND CLAY**, LITTLE TO SOME SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP		7	3 5 10	18	78	SS-3	4.50	3	7	13	40	37	30	18	12	16	A-6a (9)	
		9	4 9 10	23	72	SS-4	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	
		12	5 10 15	30	56	SS-5	4.25	8	6	15	35	36	33	18	15	16	A-6a (9)	
		14	6 11 18	35	61	SS-6	4.50	-	-	-	-	-	-	-	-	16	A-6a (V)	
		17	10 13 16	35	67	SS-7	4.50	-	-	-	-	-	-	-	-	18	A-6a (V)	
		19	7 8 15	28	44	SS-8	4.50	-	-	-	-	-	-	-	-	18	A-6a (V)	
	934.5	22	5 9 12	25	33	SS-9	4.25	-	-	-	-	-	-	-	-	16	A-6a (V)	
HARD, BROWN AND BROWNISH GRAY, **SANDY SILT**, SOME CLAY, TRACE GRAVEL, GLACIAL TILL, DAMP	932.5	24	7 9 13	27	39	SS-10	4.50	-	-	-	-	-	-	-	-	17	A-4a (V)	
		EOB 25																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. DRILLED AS STAKED.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 11/30/22 09:21 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\DEL-36-0.00\GINT FILES\DEL-36-0.00.GPJ

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 304+06, 5' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 959.4 (MSL) EOB: 7.5 ft.
START: 8/3/21 END: 8/3/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.292391, -83.146682

EXPLORATION ID B-039-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 959.4	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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	957.9	1																	
HARD, LIGHT BROWN, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP	956.4	2	6 7 9	22	39	SS-1	4.50	8	7	11	35	39	37	18	19	8	A-6b (11)	220	
STIFF, BROWN, **SANDY SILT**, LITTLE GRAVEL, LITTLE CLAY, CONTAINS ASPHALT FRAGMENTS, NO INTACT SOIL FOR HP READINGS, DAMP	954.9	3 4	4 5 4	12	44	SS-2	-	17	23	13	35	12	22	17	5	11	A-4a (2)	-	
VERY STIFF, BROWN MOTTLED WITH GRAY, **SILTY CLAY**, SOME SAND, TRACE GRAVEL, DAMP TO MOIST	951.9	5 6	5 6 6	16	56	SS-3	2.75	2	10	17	39	32	32	16	16	15	A-6b (10)	-	
	EOB	7	5 8 7	20	61	SS-4	3.50	-	-	-	-	-	-	-	-	21	A-6b (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 312+09, 14' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 980.6 (MSL) EOB: 7.5 ft.
START: 8/3/21 END: 8/3/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.293818, -83.144488

EXPLORATION ID B-040-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 980.6	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
14.0" ASPHALT AND 4.0" BASE (DRILLERS DESCRIPTION)	979.1																		
HARD, BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP	977.6		3 5 6	15	61	SS-1	4.50	3	5	15	45	32	28	17	11	16	A-6a (8)	160	
HARD, BROWN MOTTLED WITH GRAY, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, MOIST TO DAMP			3 6 5	15	61	SS-2	4.50	-	-	-	-	-	-	-	-	26	A-7-6 (V)	-	
			4 7 7	19	61	SS-3	4.50	0	3	9	34	54	51	21	30	20	A-7-6 (18)	-	
	973.1	EOB	5 6 9	20	50	SS-4	4.50	-	-	-	-	-	-	-	-	21	A-7-6 (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 320+02, 1' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 974.1 (MSL) EOB: 7.5 ft.
START: 8/3/21 END: 8/3/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.295133, -83.142222

EXPLORATION ID B-041-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 974.1	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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	972.6																		
STIFF, BROWN AND BROWNISH GRAY, **SANDY SILT**, LITTLE CLAY, TRACE GRAVEL, CONTAINS NO INTACT SOIL FOR HP READINGS, DAMP	969.6	1 2 3 4	6 5 4	12	22	SS-1	-	8	20	20	40	12	22	17	5	13	A-4a (3)	407	
			4 4 6	14	61	SS-2	-	-	-	-	-	-	-	-	-	14	A-4a (V)	-	
HARD, BROWN AND GRAY, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, MOIST TO DAMP	966.6	5 6 7	5 6 7	18	56	SS-3	4.50	4	6	13	37	40	32	17	15	26	A-6a (10)	-	
		EOB	6 6 7	18	61	SS-4	4.50	-	-	-	-	-	-	-	-	14	A-6a (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 327+57, 14' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 967.4 (MSL) EOB: 7.5 ft.
START: 8/3/21 END: 8/3/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.296127, -83.139872

EXPLORATION ID B-042-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 967.4	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
14.0" ASPHALT AND 4.0" BASE (DRILLERS DESCRIPTION)	965.9																		
HARD, BROWNISH GRAY, **SILT AND CLAY**, SOME SAND, TRACE TO LITTLE GRAVEL, CONTAINS IRON STAINING, DAMP	962.9	1	3 4 4	11	67	SS-1	4.25	3	7	15	48	27	31	20	11	17	A-6a (8)	13	
		2																	
		3	3 3 4	10	72	SS-2	4.50	-	-	-	-	-	-	-	-	16	A-6a (V)	-	
		4																	
VERY STIFF, BROWN MOTTLED WITH GRAY, **CLAY**, "AND" SILT, LITTLE SAND, TRACE GRAVEL, MOIST	959.9	5	4 4 3	10	67	SS-3	3.50	0	3	9	41	47	48	21	27	24	A-7-6 (16)	-	
		6																	
		7 EOB	0 2 3	7	61	SS-4	3.25	-	-	-	-	-	-	-	-	28	A-7-6 (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 335+54, 7' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 964.2 (MSL) EOB: 7.5 ft.
START: 8/3/21 END: 8/3/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.296765, -83.137138

EXPLORATION ID B-043-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 964.2	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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	962.7																		
VERY STIFF TO HARD, BROWN MOTTLED WITH GRAY, **CLAY**, SOME SILT, TRACE TO SOME GRAVEL, TRACE TO LITTLE SAND, DAMP TO MOIST		1 2 3 4 5 6 7	6 7 9	22	39	SS-1	3.25	23	3	6	22	46	51	20	31	19	A-7-6 (16)	373	
			4 6 7	18	56	SS-2	2.75	1	2	8	31	58	49	19	30	22	A-7-6 (18)	-	
			4 7 9	22	61	SS-3	4.25	-	-	-	-	-	-	-	-	22	A-7-6 (V)	-	
	956.7	EOB	5 7 11	25	67	SS-4	4.25	-	-	-	-	-	-	-	-	15	A-7-6 (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 343+58, 9' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 969.9 (MSL) EOB: 7.5 ft.
START: 8/2/21 END: 8/2/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.297512, -83.134427

EXPLORATION ID B-044-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 969.9	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
14.0" ASPHALT AND 4.0" BASE (DRILLERS DESCRIPTION)	968.4																		
HARD, BROWN MOTTLED WITH GRAY, **SILTY CLAY**, LITTLE SAND, TRACE TO LITTLE GRAVEL, DAMP TO MOIST		1	4 4 5	12	56	SS-1	4.50	1	3	11	41	44	38	19	19	19	A-6b (12)	460	
		2	4 5 5	14	56	SS-2	4.50	-	-	-	-	-	-	-	-	23	A-6b (V)	-	
		3	4 6 8	19	61	SS-3	4.50	-	-	-	-	-	-	-	-	16	A-6b (V)	-	
		4	5 7 12	26	67	SS-4	4.50	-	-	-	-	-	-	-	-	14	A-6b (V)	-	
	962.4	5																	
		6																	
		7																	
		EOB																	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 351+55, 4' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 963.8 (MSL) EOB: 7.5 ft.
START: 8/2/21 END: 8/2/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.298172, -83.131699

EXPLORATION ID B-045-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 963.8	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
14.0" ASPHALT AND 4.0" BASE (DRILLERS DESCRIPTION)	962.3																		
VERY STIFF, BROWN, **SANDY SILT**, SOME CLAY, TRACE GRAVEL, DAMP	959.3	1	3 4 5	12	61	SS-1	3.50	6	11	14	46	23	26	19	7	17	A-4a (7)	420	
		2	4 4 4	11	56	SS-2	3.75	-	-	-	-	-	-	-	-	17	A-4a (V)	-	
VERY STIFF, BROWN MOTTLED WITH GRAY AND ORANGISH BROWN, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, MOIST	956.3	3	4 5 6	15	67	SS-3	3.50	1	2	12	33	52	52	20	32	24	A-7-6 (18)	-	
		4	5 6 6	16	78	SS-4	3.50	-	-	-	-	-	-	-	-	21	A-7-6 (V)	-	
		5 EOB																	
		6																	
		7																	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 359+54, 24' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 957.4 (MSL) EOB: 7.5 ft.
START: 8/2/21 END: 8/2/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.298946, -83.129017

EXPLORATION ID B-046-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 957.4	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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	955.9																		
VERY STIFF, BROWNISH GRAY AND BROWN, **CLAY**, SOME SILT, LITTLE TO SOME SAND, TRACE GRAVEL, DAMP TO MOIST		1 2 3 4 5 6 7	2 3 3	8	67	SS-1	3.50	7	7	10	35	41	42	19	23	20	A-7-6 (14)	373	
			3 4 3	10	67	SS-2	3.25	6	7	14	34	39	44	21	23	20	A-7-6 (14)	-	
			3 4 5	12	50	SS-3	3.50	-	-	-	-	-	-	-	-	21	A-7-6 (V)	-	
	949.9	EOB	0 2 6	11	44	SS-4	3.50	-	-	-	-	-	-	-	-	23	A-7-6 (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 367+57, 22' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 956.4 (MSL) EOB: 7.5 ft.
START: 8/2/21 END: 8/2/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.299525, -83.126237

EXPLORATION ID B-047-0-21

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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	956.4																		
	954.9	1																	
HARD, BROWNISH GRAY AND BROWN BECOMING BROWN AND ORANGISH BROWN, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP TO MOIST		2	2 3 5	11	61	SS-1	4.25	10	4	9	34	43	46	20	26	20	A-7-6 (16)	307	
		3	3 3 6	12	67	SS-2	4.25	2	3	9	35	51	46	21	25	22	A-7-6 (15)	-	
		4	3 5 7	16	67	SS-3	4.50	-	-	-	-	-	-	-	-	17	A-7-6 (V)	-	
		5	4 5 9	19	67	SS-4	4.50	-	-	-	-	-	-	-	-	16	A-7-6 (V)	-	
	948.9	6 EOB																	
		7																	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 375+57, 11' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 961.5 (MSL) EOB: 7.5 ft.
START: 8/2/21 END: 8/2/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.300294, -83.123547

EXPLORATION ID B-048-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 961.5	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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	960.0																		
VERY STIFF, BROWN, **CLAY**, SOME SILT, SOME SAND, TRACE GRAVEL, DAMP	958.5	1	3 4 4	11	61	SS-1	4.00	9	10	11	31	39	46	18	28	18	A-7-6 (15)	187	
HARD, BROWN WITH GRAY MOTTLES, **SILT AND CLAY**, LITTLE TO SOME SAND, TRACE GRAVEL, DAMP TO MOIST		2	4 4 6	14	67	SS-2	4.50	2	4	13	42	39	33	18	15	15	A-6a (10)	-	
		3	4 8 10	25	72	SS-3	4.50	-	-	-	-	-	-	-	-	13	A-6a (V)	-	
	954.0	4	4 7 9	22	56	SS-4	4.50	-	-	-	-	-	-	-	-	22	A-6a (V)	-	
		EOB 5																	
		6																	
		7																	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED .5 BAGS ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: DEL-36-0.00	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 45B	STATION / OFFSET: 383+23, 5' RT.	EXPLORATION ID B-049-0-21
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / J. HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: US-36	
PID: 109070 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 957.4 (MSL) EOB: 7.5 ft.	PAGE 1 OF 1
START: 8/2/21 END: 8/2/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.300895, -83.120916	

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
14.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	957.4																		
	955.8																		
VERY STIFF TO HARD, BROWN WITH GRAY MOTTLES, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, DAMP TO MOIST		1																	
		2	3 3 4	10	33	SS-1	3.50	-	-	-	-	-	-	-	-	15	A-7-6 (V)	-	
		3	3 5 6	15	56	SS-2	3.25	1	2	9	34	54	47	20	27	23	A-7-6 (16)	153	
		4	3 6 10	22	61	SS-3	4.25	2	3	10	34	51	46	18	28	22	A-7-6 (16)	-	
		5	5 7 11	25	67	SS-4	4.50	-	-	-	-	-	-	-	-	18	A-7-6 (V)	-	
	949.9	6																	
		EOB 7																	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

OHIO DEPARTMENT OF TRANSPORTATION

DETERMINING SULFATE CONTENT IN SOILS

SUPPLEMENT 1122

Project C-R-S:	DEL-36-0.00
PID No:	109070
Report Date:	10/15/2021
Consultant:	NEAS Inc.
Technician:	L. Rosenbeck

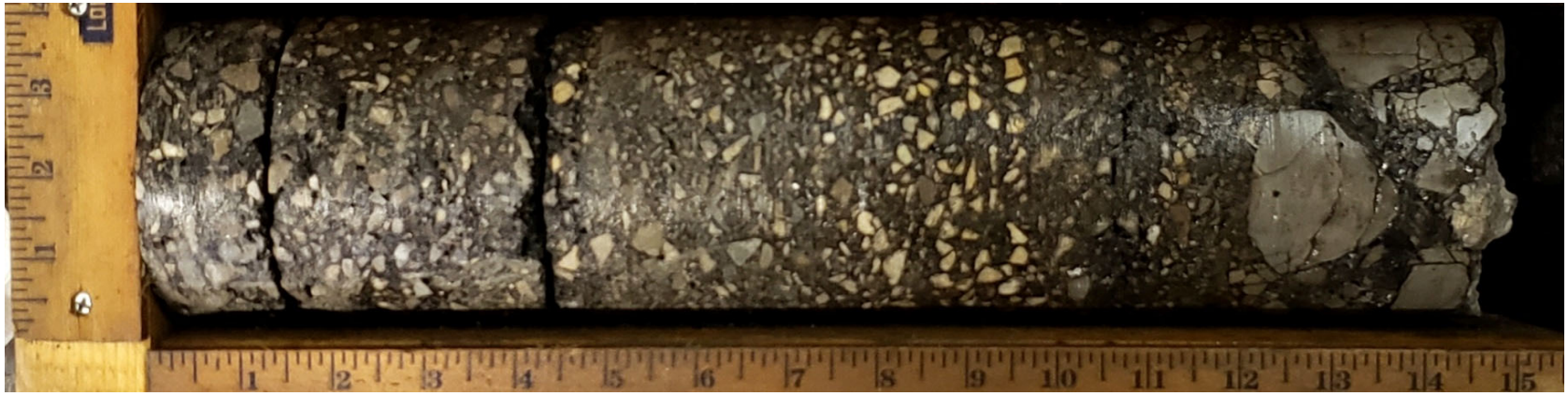
Boring ID & Sample #	Station	Offset	Latitude & Longitude or State Plane Coordinates		Elevation	Soaking Time (hr)	Replicate Sample Readings						Sulfate Content (ppm)
							1		2		3		
							Dilution	Reading	Dilution	Reading	Dilution	Reading	
B-001-0-21 SS-1	0+33.31	4RT	40.264190	-83.248817	991.0	17.7	20	2	20	4	20	4	**67**
B-002-0-21 SS-1	8+05.01	16LT	40.264849	-83.246188	985.0	17.7	20	7	20	7	20	7	**140**
B-003-0-21 SS-1	16+32.38	12RT	40.265431	-83.243320	983.4	17.7	20	17	20	17	20	17	**340**
B-004-0-21 SS-1	23+85.65	8LT	40.266080	-83.240757	982.3	17.7	20	11	20	13	20	9	**220**
B-005-0-21 SS-1	32+35.92	4RT	40.266721	-83.237827	972.4	17.7	20	12	20	10	20	7	**193**
B-006-0-21 SS-1	40+35.20	14LT	40.267399	-83.235102	965.1	17.7	20	25	20	27	20	29	**540**
B-007-0-21 SS-1	48+30.83	12RT	40.267960	-83.232346	961.8	17.7	20	10	20	10	20	10	**200**
B-008-0-21 SS-1	56+36.19	7LT	40.268650	-83.229603	954.5	17.7	20	18	20	12	20	14	**293**
B-009-0-21 SS-1	64+32.15	4RT	40.269246	-83.226859	951.7	17.7	20	7	20	9	20	11	**180**
B-010-0-21 SS-1	72+41.53	25LT	40.269967	-83.224117	942.7	17.7	20	13	20	12	20	15	**267**
B-011-0-21 SS-1	78+56.99	18RT	40.270543	-83.222043	944.2	20.73	20	49	20	55	20	50	**1027**
B-012-0-21 SS-1	86+58.23	13LT	40.271751	-83.219639	943.7	20.72	20	76	20	76	40	26	**1360**
B-013-0-21 SS-1	94+41.93	0RT	40.272855	-83.217228	945.1	20.78	20	65	20	67	20	71	**1353**
B-014-0-21 SS-1	104+07.66	17LT	40.274076	-83.214156	945.3	20.7	40	28	40	24	40	30	**1093**
B-015-0-21 SS-1	111+99.90	19RT	40.274633	-83.211406	942.9	20.75	40	49	40	39	40	44	**1760**
B-016-0-21 SS-1	119+97.53	10LT	40.275358	-83.208707	943.7	20.75	20	5	20	5	20	5	**100**
B-017-0-21 SS-1	127+99.54	5RT	40.275968	-83.205945	943.7	20.75	20	6	20	6	20	6	**120**
B-018-0-21 SS-1	136+12.34	25LT	40.276705	-83.203195	942.7	20.75	20	3	20	3	20	3	**60**
B-019-0-21 SS-1	144+07.03	22RT	40.277395	-83.200493	945.6	20.77	20	7	20	7	20	7	**140**

B-020-0-21 SS-1	151+83.08	9LT	40.278331	-83.197992	955.1	18.5	20	8	20	2	20	5	**100**
B-021-0-21 SS-1	160+00.06	4RT	40.279192	-83.195288	961.4	20.75	20	12	20	9	20	12	**220**
B-022-0-21 SS-1	168+04.91	13LT	40.280028	-83.192618	961.9	17.4	20	2	20	2	20	2	**40**
B-023-0-21 SS-1	176+50.12	17RT	40.280783	-83.189752	972.1	17.4	20	6	20	6	20	6	**120**
B-024-0-21 SS-1	184+05.71	8LT	40.281583	-83.187252	972.1	17.4	20	1	20	1	20	1	**20**
B-025-0-21 SS-1	192+08.63	4RT	40.282312	-83.184536	972.0	17.4	20	13	20	11	20	12	**240**
B-026-0-21 SS-1	200+06.74	11LT	40.283102	-83.181867	977.5	17.4	20	5	20	5	20	5	**100**
B-027-0-21 SS-1	207+95.06	17RT	40.283736	-83.179163	979.2	18.5	20	8	20	3	20	5	**107**
B-028-0-21 SS-1	215+92.37	8LT	40.284505	-83.176486	981.6	18.5	20	13	20	8	20	6	**180**
B-029-0-21 SS-1	223+99.04	4RT	40.285189	-83.173736	977.3	18.5	20	9	20	9	20	9	**180**
B-030-0-21 SS-1	232+02.30	16LT	40.285963	-83.171040	967.1	18.5	20	9	20	11	20	13	**220**
B-031-0-21 SS-1	239+87.94	16RT	40.286560	-83.168333	952.4	18.5	20	8	20	4	20	6	**120**
B-032-0-21 SS-1	248+03.59	7LT	40.287193	-83.165529	938.7	18.5	20	5	20	7	20	7	**127**
B-033-0-21 SS-1	256+06.16	3RT	40.287741	-83.162743	911.1	21	20	7	20	7	20	7	**140**
B-034-0-21 SS-1	263+54.35	14LT	40.288446	-83.160225	882.3	18.5	20	4	20	4	20	4	**80**
B-035-0-21 SS-1	271+89.54	18RT	40.289161	-83.157379	882.2	18.5	20	5	20	4	20	5	**93**
B-036-0-21 SS-1	280+05.00	8LT	40.289990	-83.154662	919.7	18.5	20	9	20	4	20	4	**113**
B-037-0-21 SS-1	287+73.25	5RT	40.290644	-83.152044	942.9	21	20	10	20	10	20	10	**200**
B-038-0-21 SS-1	296+03.70	17LT	40.291452	-83.149259	948.5	21	20	10	20	10	20	10	**200**
B-039-0-21 SS-1	304+06.39	5RT	40.292391	-83.146682	959.4	16.25	20	16	20	5	20	12	**220**
B-040-0-21 SS-1	312+09.23	14LT	40.293818	-83.144488	980.6	16.25	20	6	20	9	20	9	**160**
B-041-0-21 SS-1	320+02.15	1LT	40.295133	-83.142222	974.1	16.25	20	21	20	15	20	25	**407**
B-042-0-21 SS-1	327+56.90	14LT	40.296127	-83.139872	967.4	21	20	0	20	1	20	1	**13**
B-043-0-21 SS-1	335+53.87	7RT	40.296765	-83.137138	964.2	16.25	20	21	20	18	20	17	**373**
B-044-0-21 SS-1	343+57.67	9LT	40.297512	-83.134427	969.9	21	20	23	20	23	20	23	**460**
B-045-0-21 SS-1	351+55.45	4RT	40.298172	-83.131699	963.8	16.25	20	21	20	19	20	23	**420**
B-046-0-21 SS-1	359+54.48	24LT	40.298946	-83.129017	957.4	16.25	20	21	20	16	20	19	**373**
B-047-0-21 SS-1	367+56.83	22RT	40.299525	-83.126237	956.4	21	20	15	20	15	20	16	**307**
B-048-0-21 SS-1	375+57.20	11LT	40.300294	-83.123547	961.5	21	20	9	20	9	20	10	**187**
B-049-0-21 SS-1	383+22.74	5RT	40.300895	-83.120916	957.4	16.25	20	6	20	10	20	7	**153**

APPENDIX C

PAVEMENT CORING LOGS

Core Photo: P.C.-1 (B-001-0-21)



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**14.5**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	1.25			
2	3			
3	7.75			
4	2.5			
5				
6				

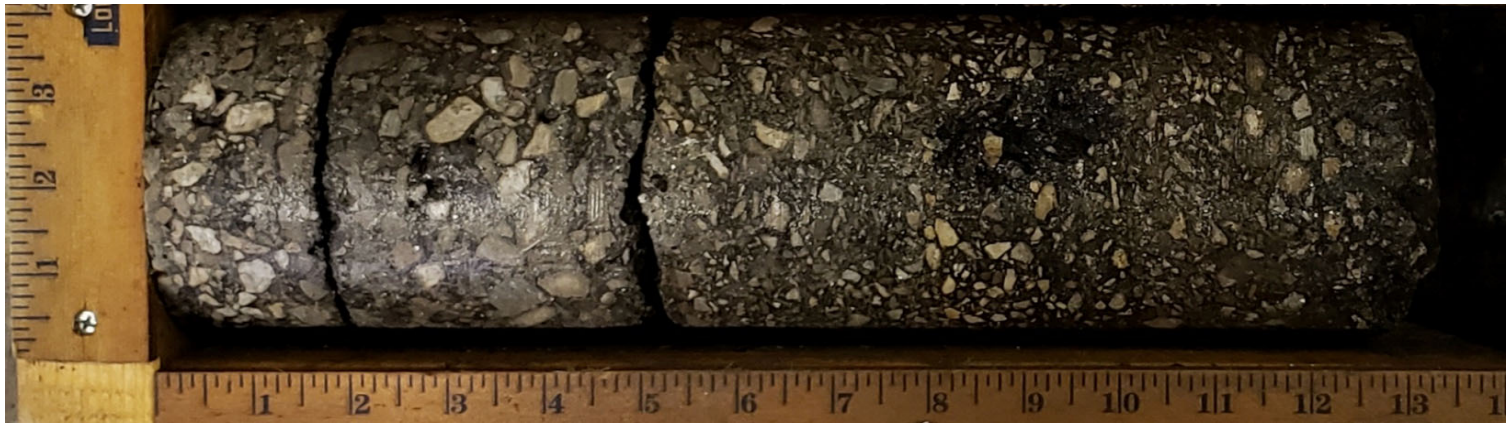
Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-2 (B-009-0-21)



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**16**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	1.75			
2	3.25			
3	8			
4	3			Not intact
5				
6				

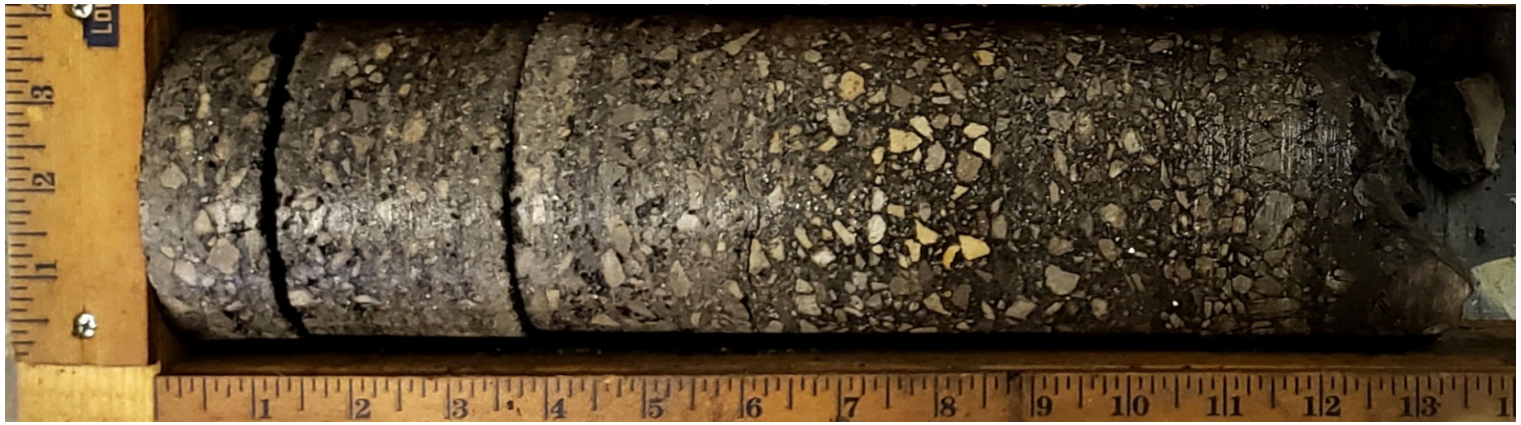
Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-3 (B-005-0-21)



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**12**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	1.25			
2	2.25			
3	5			
4	2.75			
5	0.75			
6				

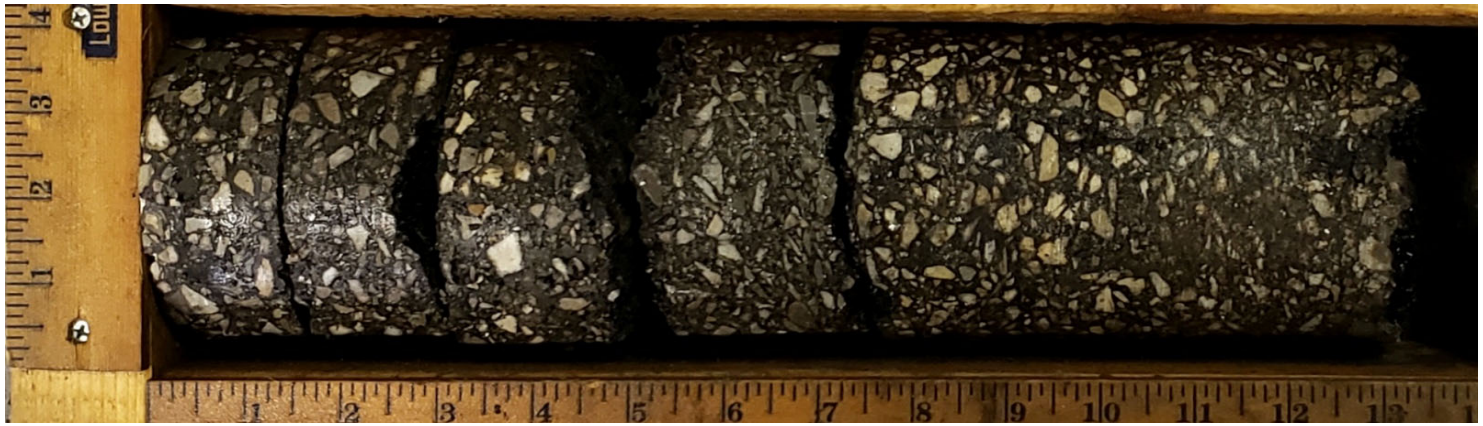
Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-4 (B-008-0-21)



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**13**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	1.5			
2	1.5			
3	2			
4	2.5			
5	5.5			
6				

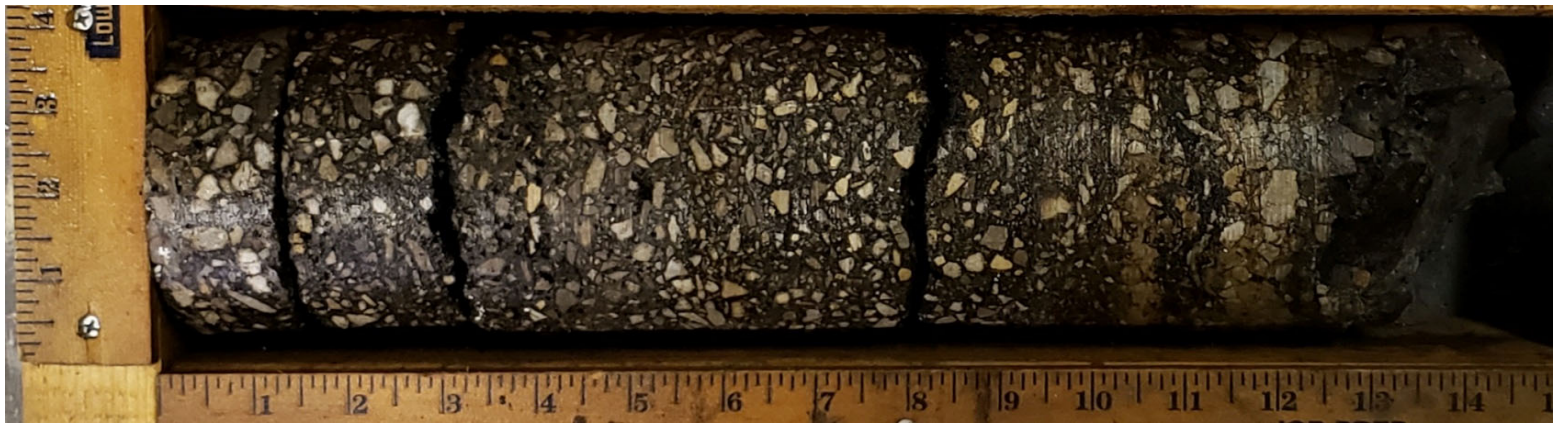
Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-5 (B-009-0-21)



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**15**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	1.25			
2	11.25			
3	2.5			
4				
5				
6				

Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-6 (B-012-0-21)

Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**11.5**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	1.5			
2	6.25			
3	1.75			
4	2			
5				
6				

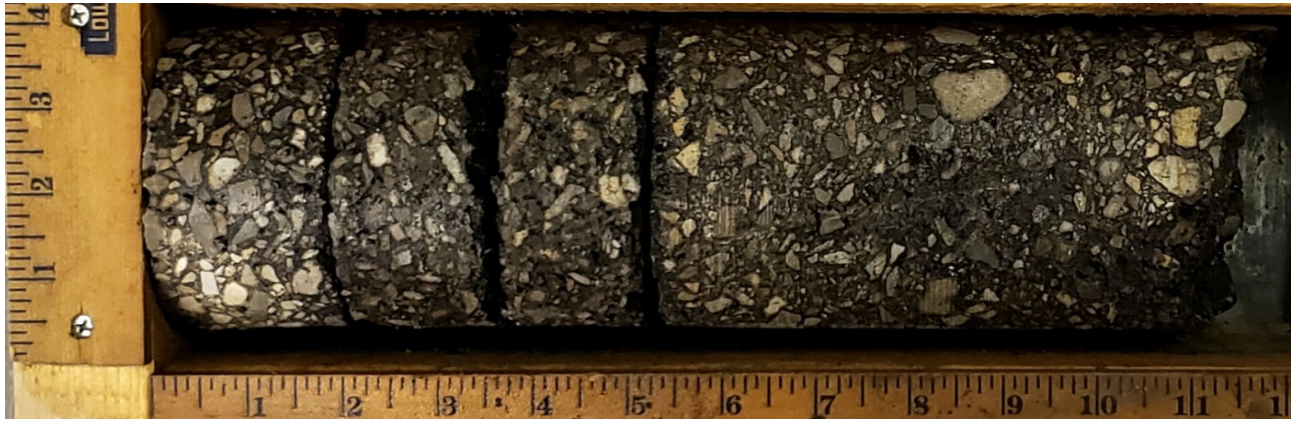
Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-7 (B-013-0-21)



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**14.5**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	1.75			
2	1.75			
3	1.75			
4	5.5			
5	0.25			
6	3.5			Not intact

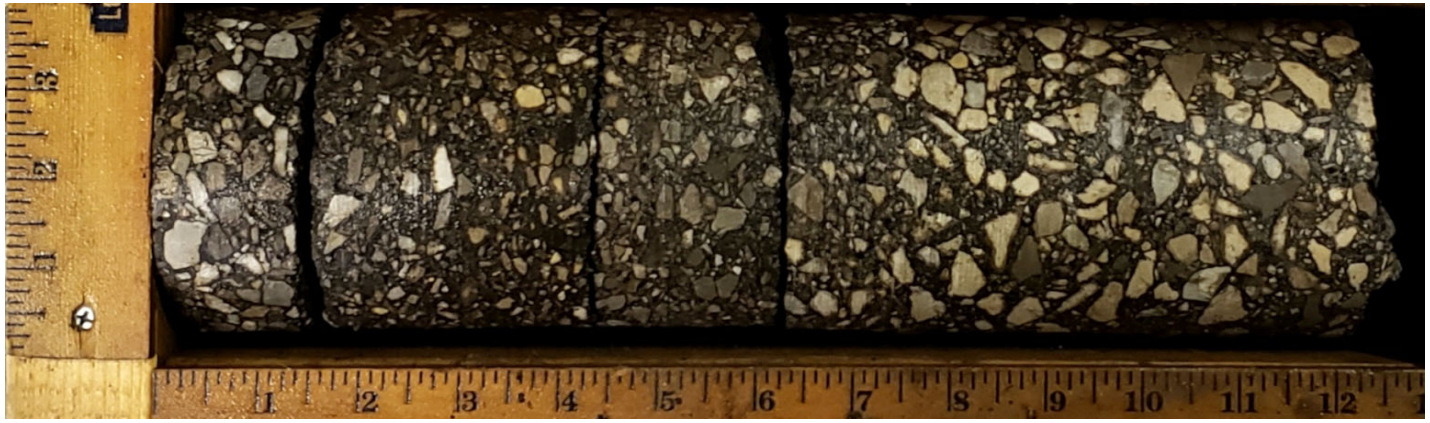
Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-8 (B-016-0-21)



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**12.5**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	1.5			
2	2.75			
3	2			
4	1			
5	5.25			
6				

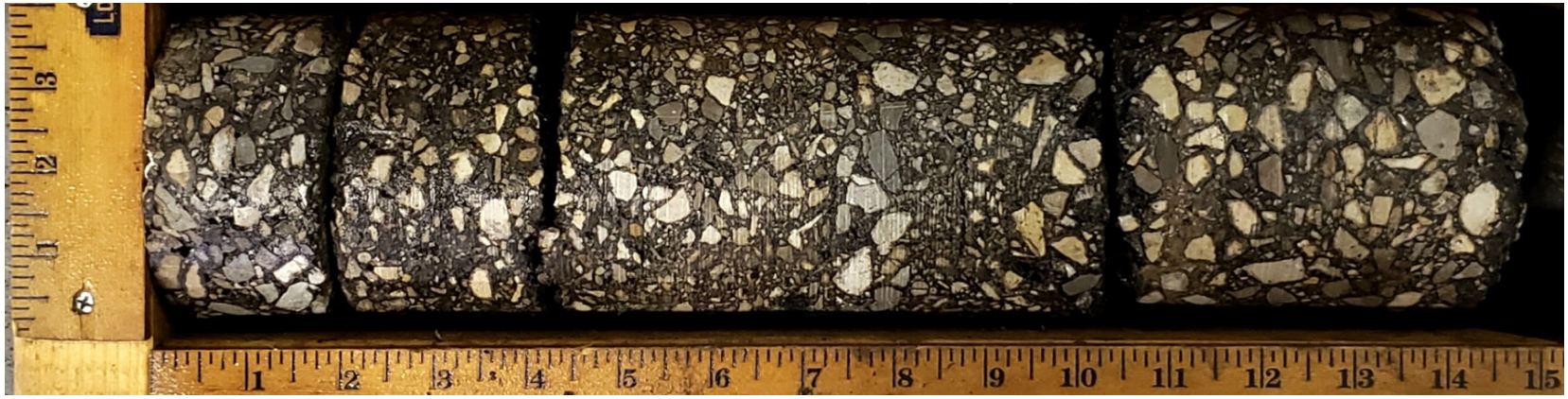
Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-9 (B-017-0-21)



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**14.75**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	2			
2	2.25			
3	6.25			
4	4.25			
5				
6				

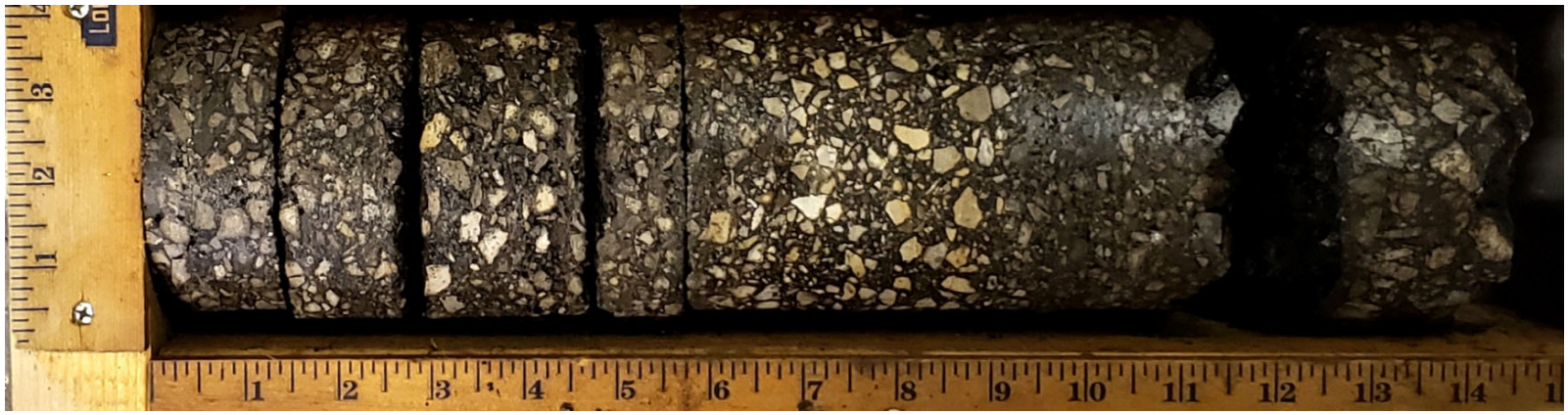
Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-10 (B-020-0-21)



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**14.5**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	1.25			
2	1.5			
3	2			
4	1			
5	3.25			
6	2.5			
7	3			

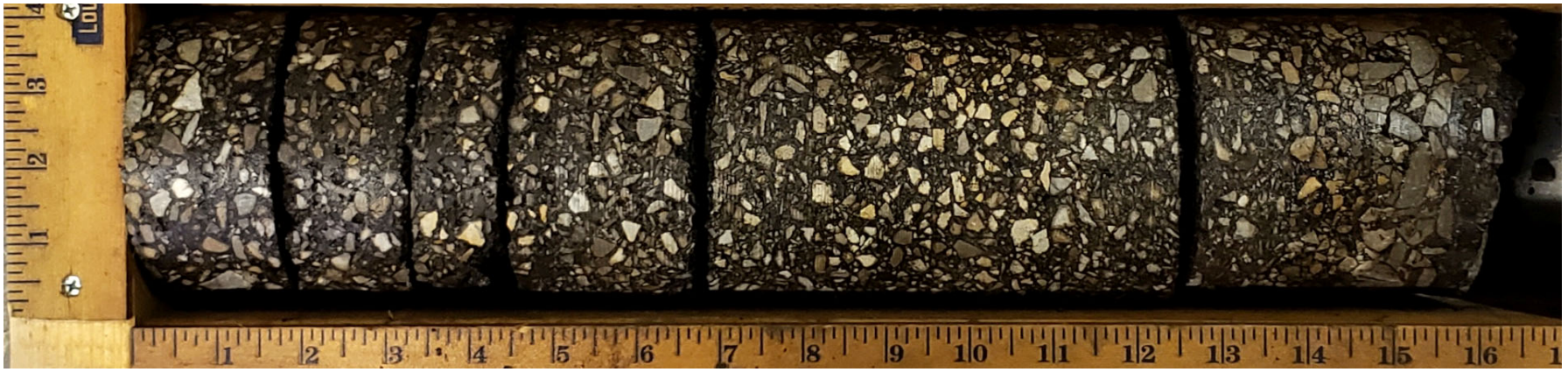
Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-11 (B-021-0-21)



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**15.75**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	1.75			
2	1.5			
3	1			
4	2.5			
5	5.75			
6	2.25			
7	1			

Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-12 (B-024-0-21)

Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**19**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	3			
2	10			
3	6			Not intact
4				
5				
6				

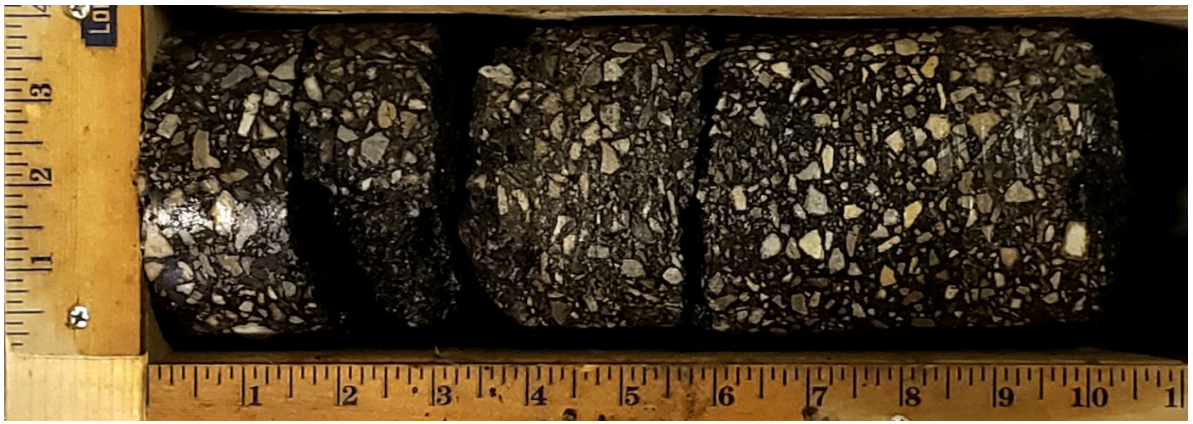
Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-13 (B-025-0-21)



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**10.25+ (see remarks)**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	1.75			
2	1.5			
3	2.5			
4	4.5			
5	Unknown			Not intact
6				

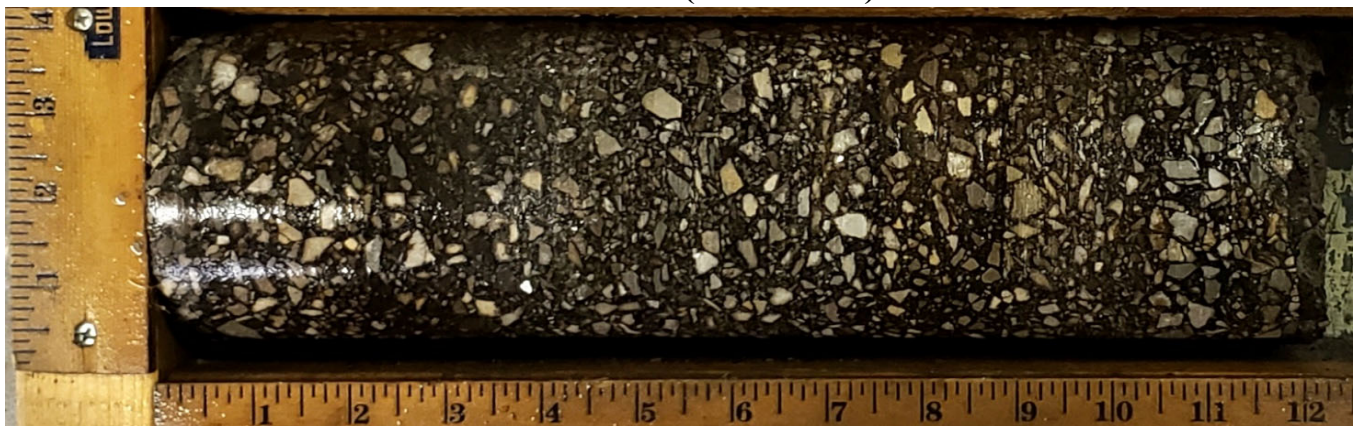
Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-14 (B-028-0-21)



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**14**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	7.5			
2	1.5			Not intact
3	3			
4	2			
5				
6				

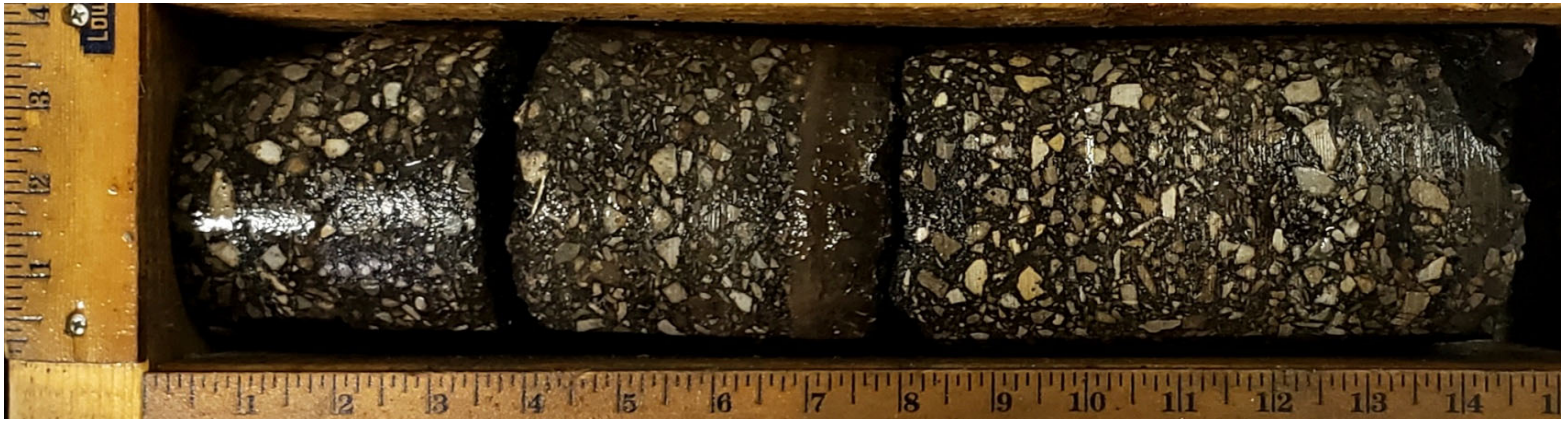
Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-15 (B-029-0-21)



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**14.5**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	1.75			
2	2			
3	4			
4	6.75			
5				
6				

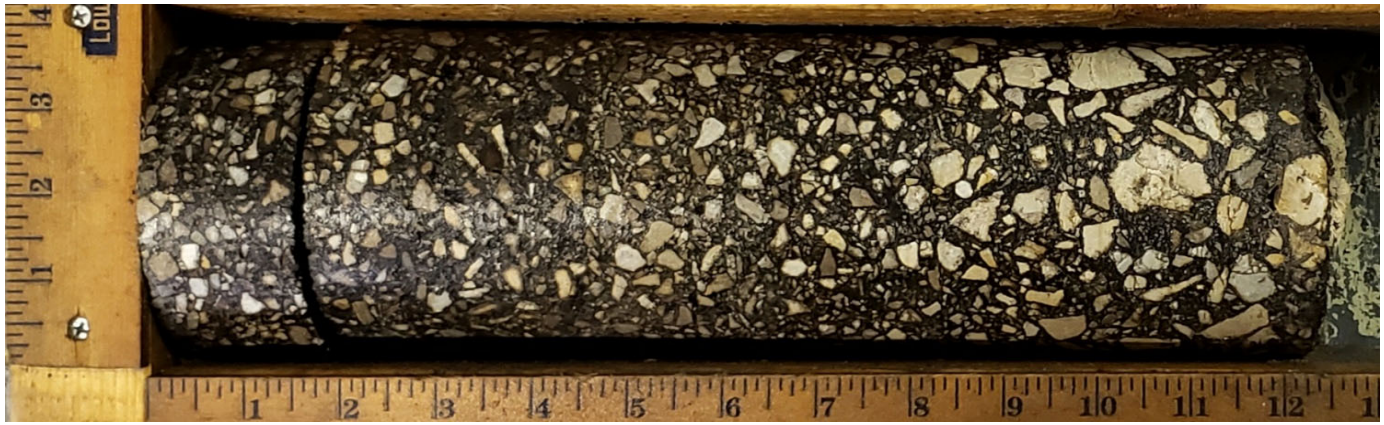
Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-16 (B-032-0-21)



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**14.5**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	1.5			
2	11			
3	2			Not intact
4				
5				
6				

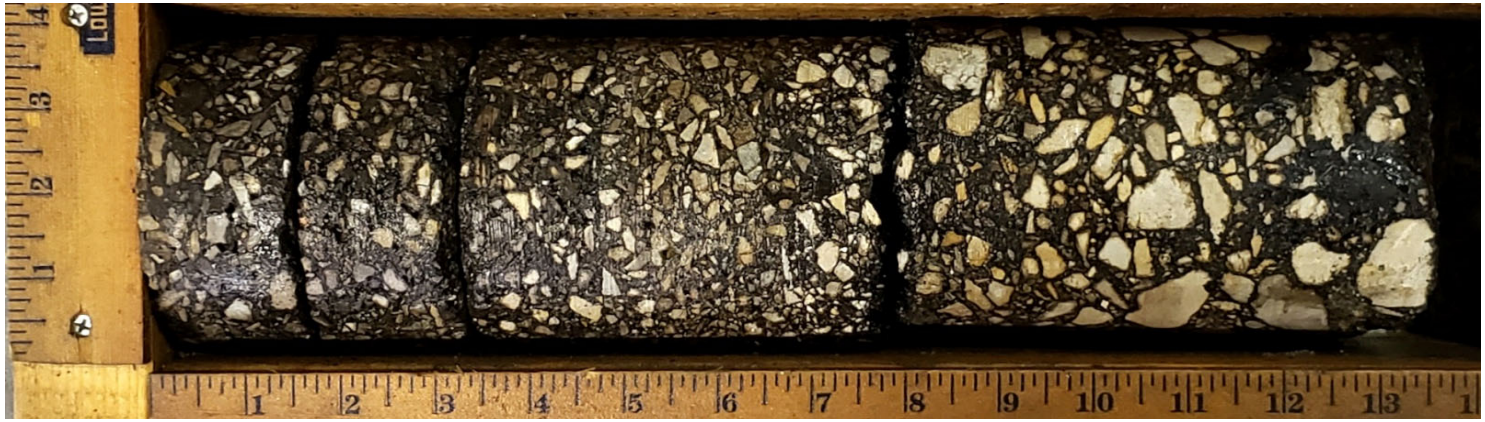
Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-17 (B-033-0-21)



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**13.5**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	1.5			
2	1.75			
3	4.75			
4	5.5			
5				
6				

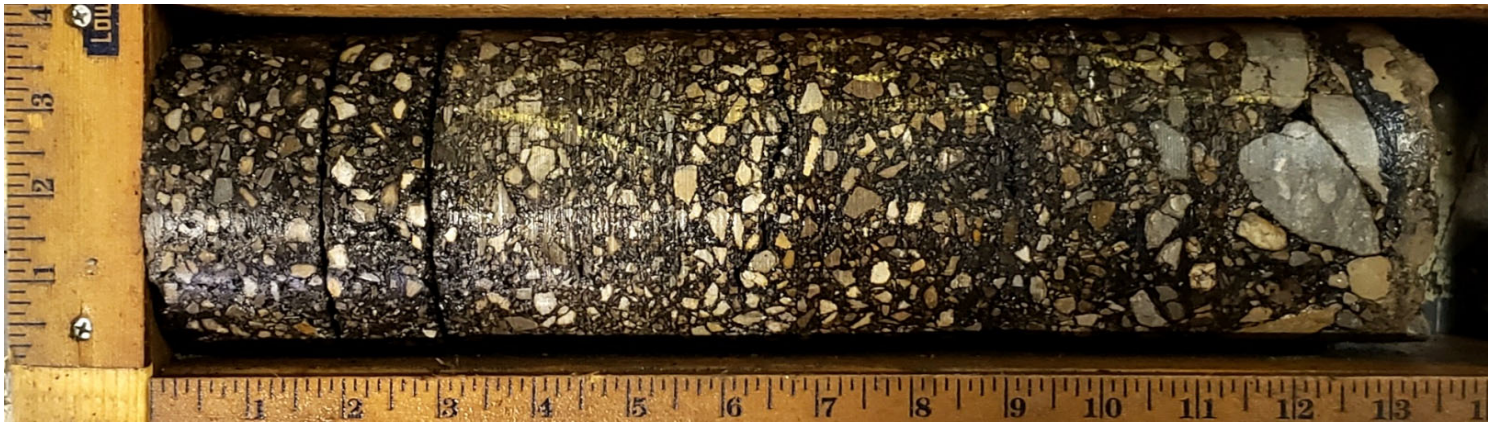
Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-18 (B-036-0-21)



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**13.25**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	1.75			
2	1.25			
3	8.5			
4	1.75			
5				
6				

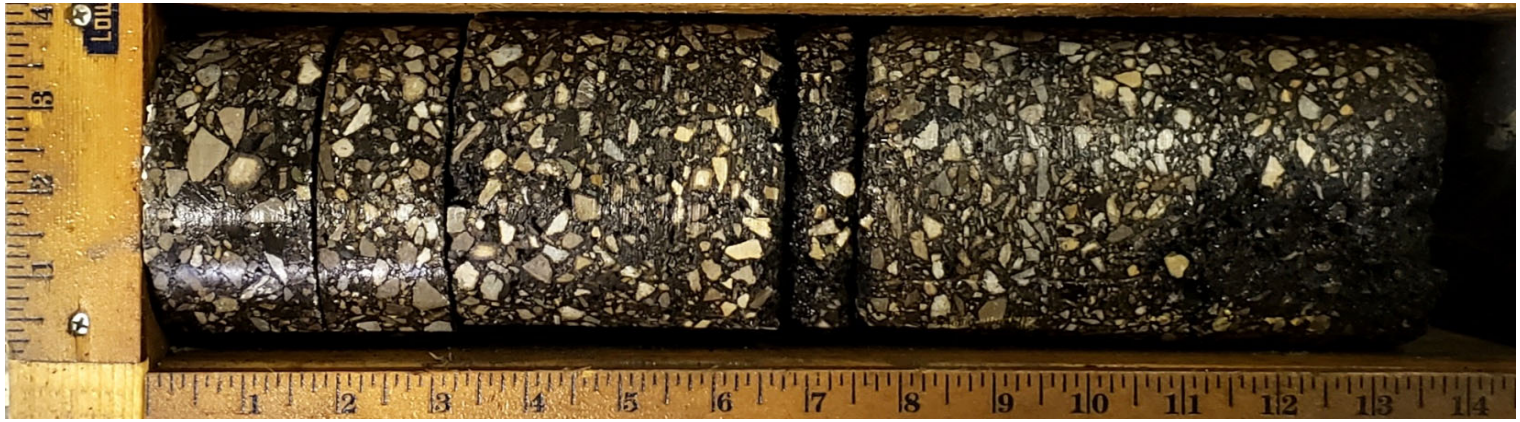
Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-19



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**13.75**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	1.75			
2	1.5			
3	3.5			
4	0.75			
5	6.25			
6				

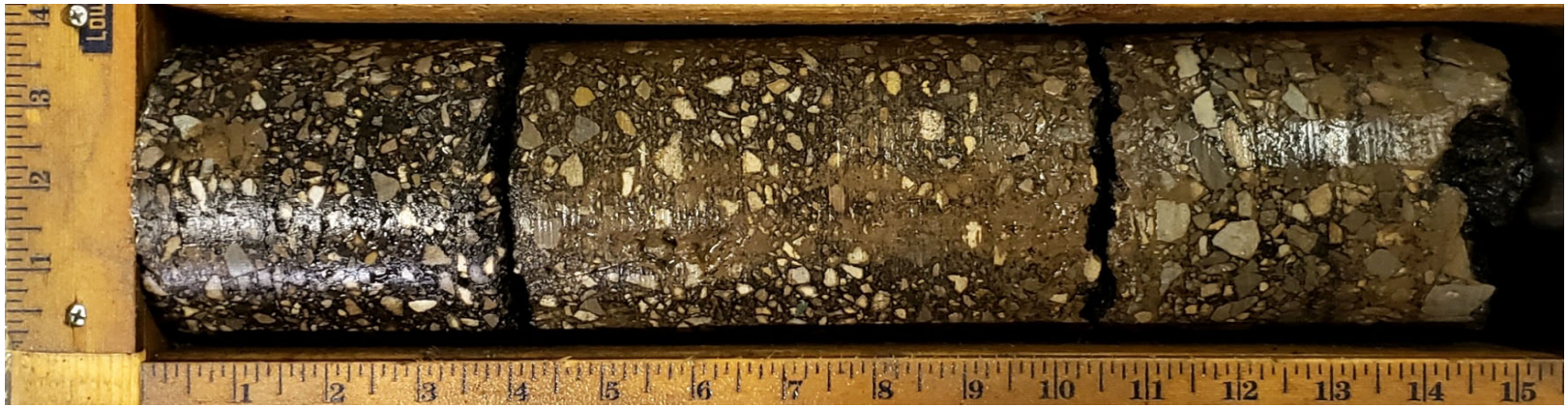
Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-20 (B-040-0-21)



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**14.5**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	4			
2	10.5			
3				
4				
5				
6				

Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-21 (B-041-0-21)

Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**15**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	1.75			
2	9.75			
3	1.5			
4	2			Not intact
5				
6				

Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-22 (B-044-0-21)

Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**14**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	1.5			
2	3.25			
3	9.25			
4				
5				
6				

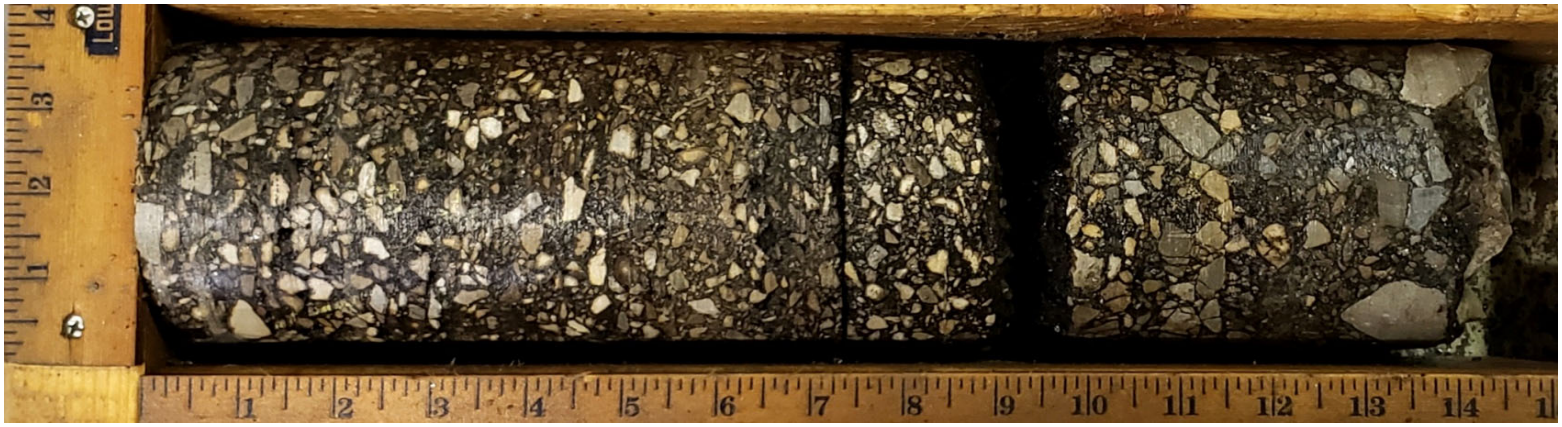
Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-23



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**14**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	7.25			
2	6			
3	0.75			
4				
5				
6				

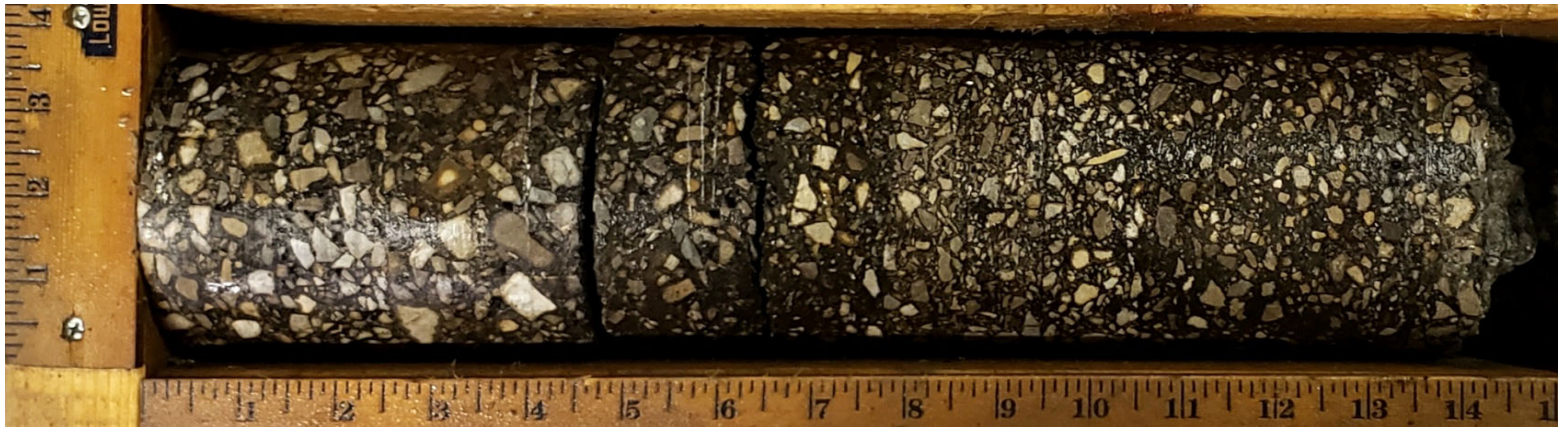
Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-24 (B-048-0-21)



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**14.25**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	7.5			
2	6.75			
3				
4				
5				
6				

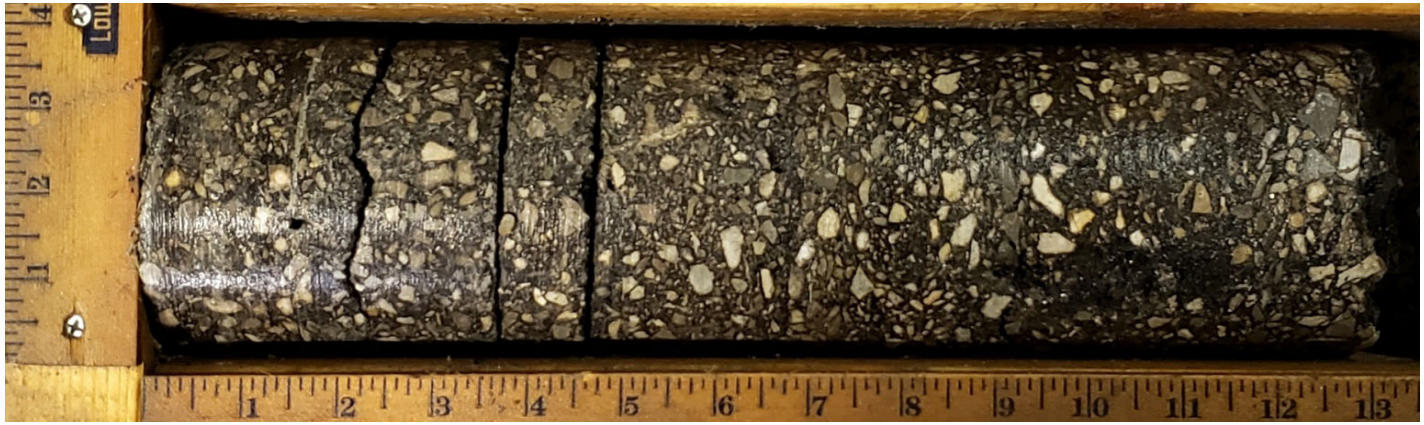
Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

Core Photo: P.C.-25 (B-049-0-21)



Pavement Photo

Core Information				
Core Diameter (in):			**4**	
Core Total Length (in):			**13**	
Layers	Core Composition & Thickness (in)			Remarks
	Asphalt	Concrete	Brick	
1	3.75			
2	1			
3	8.25			
4				
5				
6				

Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project
DEL-36-0.00

PID#: 109070
Date: 8/16/2021
Taken By: MJ
Scale: N/A

APPENDIX D

GEOTECHNICAL BULLETIN 1 (GB1) ANALYSIS SPREADSHEETS

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

DEL-36-0.00
109070

MAJOR REHABILITATION OF APPROXIMATLEY 7.26 MILES OF US 36 FROM SLM MARKER 0.00 TO SLM MARKER 7.26

NEAS INC.

Prepared By: Abdul Saboor Ibrahim Khail
Date prepared: Monday, October 18, 2021

Brendan Andrews
2868 East Kemper Road
Cincinnati, OH 45241

(920) 427 - 0671
brendan.andrews@neasinc.com

NO. OF BORINGS: 49

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-001-0-21	US 36	0+33	4	RT.	CME 55T	68	991.0	989.5	1.5 C
2	B-002-0-21	US 36	8+05	16	LT.	CME 55T	68	985.0	983.5	1.5 C
3	B-003-0-21	US 36	16+32	12	RT.	CME 55T	68	983.4	981.9	1.5 C
4	B-004-0-21	US 36	23+86	8	LT.	CME 55T	68	982.3	980.8	1.5 C
5	B-005-0-21	US 36	32+36	4	RT.	CME 55T	68	972.4	970.9	1.5 C
6	B-006-0-21	US 36	40+35	14	LT.	CME 55T	68	965.1	963.6	1.5 C
7	B-007-0-21	US 36	48+31	12	RT.	CME 55T	68	961.8	960.3	1.5 C
8	B-008-0-21	US 36	56+36	7	LT.	CME 55T	68	954.5	953.0	1.5 C
9	B-009-0-21	US 36	64+32	4	RT.	CME 55T	68	951.7	950.2	1.5 C
10	B-010-0-21	US 36	72+42	25	LT.	CME 55T	68	942.7	941.2	1.5 C
11	B-011-0-21	US 36	78+57	18	RT.	CME 55T	68	944.2	942.7	1.5 C
12	B-012-0-21	US 36	86+58	13	LT.	CME 55T	68	943.7	942.2	1.5 C
13	B-013-0-21	US 36	94+42	0	RT.	CME 45B	82	945.1	943.6	1.5 C
14	B-014-0-21	US 36	104+08	17	LT.	CME 45B	82	945.3	943.8	1.5 C
15	B-015-0-21	US 36	112+12	19	RT.	CME 45B	82	942.9	941.4	1.5 C
16	B-016-0-21	US 36	119+98	10	LT.	CME 45B	82	943.7	942.2	1.5 C
17	B-017-0-21	US 36	128+28	5	RT.	CME 45B	82	943.7	942.2	1.5 C
18	B-018-0-21	US 36	136+12	25	LT.	CME 45B	82	942.7	941.2	1.5 C
19	B-019-0-21	US 36	144+07	22	RT.	CME 45B	82	945.6	944.1	1.5 C
20	B-020-0-21	US 36	151+83	9	LT.	CME 45B	82	955.1	953.6	1.5 C
21	B-021-0-21	US 36	160+60	4	RT.	CME 45B	82	961.4	959.9	1.5 C
22	B-022-0-21	US 36	168+05	13	LT.	CME 45B	82	961.9	960.4	1.5 C
23	B-023-0-21	US 36	176+.5	17	RT.	CME 45B	82	972.1	970.6	1.5 C
24	B-024-0-21	US 36	184+06	8	LT.	CME 45B	82	972.1	970.6	1.5 C
25	B-025-0-21	US 36	192+09	4	RT.	CME 45B	82	972.0	970.5	1.5 C
26	B-026-0-21	US 36	200+07	11	LT.	CME 45B	82	977.5	976.0	1.5 C
27	B-027-0-21	US 36	207+95	17	RT.	CME 45B	82	979.2	977.7	1.5 C
28	B-028-0-21	US 36	215+92	8	LT.	CME 45B	82	981.6	980.1	1.5 C
29	B-029-0-21	US 36	223+99	4	RT.	CME 45B	82	977.3	975.8	1.5 C
30	B-030-0-21	US 36	232+02	16	LT.	CME 45B	82	967.1	965.6	1.5 C
31	B-031-0-21	US 36	239+88	16	RT.	CME 45B	82	952.4	950.9	1.5 C
32	B-032-0-21	US 36	248+04	7	LT.	CME 45B	82	938.7	937.2	1.5 C
33	B-033-0-21	US 36	256+06	3	RT.	CME 45B	82	911.1	909.6	1.5 C
34	B-034-0-21	US 36	263+54	14	LT.	CME 45B	82	882.3	880.8	1.5 C
35	B-035-0-21	US 36	271+.9	18	RT.	CME 45B	82	882.2	880.7	1.5 C
36	B-036-0-21	US 36	280+05	8	LT.	CME 45B	82	919.7	918.2	1.5 C
37	B-037-0-21	US 36	287+73	5	RT.	CME 45B	82	942.9	941.4	1.5 C
38	B-038-0-21	US 36	296+04	17	LT.	CME 45B	82	948.5	947.0	1.5 C
39	B-039-0-21	US 36	304+06	5	RT.	CME 45B	82	959.4	957.9	1.5 C
40	B-040-0-21	US 36	312+09	14	LT.	CME 45B	82	980.6	979.1	1.5 C
41	B-041-0-21	US 36	320+02	1	LT.	CME 45B	82	974.1	972.6	1.5 C
42	B-042-0-21	US 36	327+57	14	LT.	CME 45B	82	967.4	965.9	1.5 C
43	B-043-0-21	US 36	335+54	7	RT.	CME 45B	82	964.2	962.7	1.5 C
44	B-044-0-21	US 36	343+58	9	LT.	CME 45B	82	969.9	968.4	1.5 C
45	B-045-0-21	US 36	351+55	4	RT.	CME 45B	82	963.8	962.3	1.5 C
46	B-046-0-21	US 36	359+54	24	LT.	CME 45B	82	957.4	955.9	1.5 C
47	B-047-0-21	US 36	367+57	22	RT.	CME 45B	82	956.4	954.9	1.5 C
48	B-048-0-21	US 36	375+57	11	LT.	CME 45B	82	961.5	960.0	1.5 C
49	B-049-0-21	US 36	383+23	5	RT.	CME 45B	82	957.4	955.9	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	1.5	3.0	0.0	1.5	13		4.25	41	20	21	27	35	62	15	18	A-7-6	10	67					
	001-0	SS-2	3.0	4.5	1.5	3.0	11		4.25	38	19	19	27	37	64	15	16	A-6b	9			N_{60}			
	21	SS-3	4.5	6.0	3.0	4.5	15		4.5							15	16	A-6b	16						
		SS-4	6.0	7.5	4.5	6.0	18	11	4.5							15	16	A-6b	16						
2	B	SS-1	1.5	3.0	0.0	1.5	9		4.5	31	19	12	49	29	78	17	14	A-6a	9	140		N_{60} & Mc		**12"**	
	002-0	SS-2	3.0	4.5	1.5	3.0	9		4							22	14	A-6a	10			N_{60} & Mc			
	21	SS-3	4.5	6.0	3.0	4.5	8		4.5	56	19	37	33	60	93	24	18	A-7-6	19						
		SS-4	6.0	7.5	4.5	6.0	9	8	4.5							23	18	A-7-6	16						
3	B	SS-1	1.5	3.0	0.0	1.5	13		1.75	34	18	16	37	32	69	16	16	A-6b	9	340					
	003-0	SS-2	3.0	4.5	1.5	3.0	13		3.25	44	19	25	34	50	84	22	18	A-7-6	15			N_{60} & Mc			
	21	SS-3	4.5	6.0	3.0	4.5	16		4.25							22	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	22	13	4.5							18	18	A-7-6	16						
4	B	SS-1	1.5	3.0	0.0	1.5	7		4	32	18	14	42	34	76	16	14	A-6a	10	220		N_{60}		**15"**	
	004-0	SS-2	3.0	4.5	1.5	3.0	7		2.25	40	22	18	39	47	86	23	17	A-6b	11			N_{60} & Mc			
	21	SS-3	4.5	6.0	3.0	4.5	8		1.75							29	16	A-6b	16						
		SS-4	6.0	7.5	4.5	6.0	8	7	2							30	16	A-6b	16						
5	B	SS-1	1.5	3.0	0.0	1.5	13		3.75	46	20	26	35	48	83	20	18	A-7-6	16	193					
	005-0	SS-2	3.0	4.5	1.5	3.0	15		4.5	41	20	21	38	42	80	18	18	A-7-6	13						
	21	SS-3	4.5	6.0	3.0	4.5	13		1.5							22	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	21	13	4.5							21	18	A-7-6	16						
6	B	SS-1	1.5	3.0	0.0	1.5	14		4.5	48	22	26	34	55	89	18	19	A-7-6	16	540					
	006-0	SS-2	3.0	4.5	1.5	3.0	19		4.5	41	19	22	30	42	72	17	18	A-7-6	12						
	21	SS-3	4.5	6.0	3.0	4.5	23		4.5							15	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	27	14	4.5							16	18	A-7-6	16						
7	B	SS-1	1.5	3.0	0.0	1.5	13		4.5	40	19	21	32	41	73	15	16	A-6b	12	200					
	007-0	SS-2	3.0	4.5	1.5	3.0	17		4.5	36	18	18	39	43	82	15	16	A-6b	11						
	21	SS-3	4.5	6.0	3.0	4.5	19		4.5							14	16	A-6b	16						
		SS-4	6.0	7.5	4.5	6.0	19	13	4.5							15	16	A-6b	16						
8	B	SS-1	1.5	3.0	0.0	1.5	15		4.5	39	19	20	32	43	75	16	16	A-6b	12	293					
	008-0	SS-2	3.0	4.5	1.5	3.0	17		4.5	36	18	18	33	40	73	15	16	A-6b	11						
	21	SS-3	4.5	6.0	3.0	4.5	24		4.5							15	16	A-6b	16						
		SS-4	6.0	7.5	4.5	6.0	29	15	4.5							16	16	A-6b	16						
9	B	SS-1	1.5	3.0	0.0	1.5	18		4.5	33	18	15	37	40	77	13	14	A-6a	10	180					
	009-0	SS-2	3.0	4.5	1.5	3.0	14		4.5	28	16	12	31	25	56	11	14	A-6a	5						
	21	SS-3	4.5	6.0	3.0	4.5	19		4.5							15	14	A-6a	10						
		SS-4	6.0	7.5	4.5	6.0	23	14	4.5							14	14	A-6a	10						
10	B	SS-1	1.5	3.0	0.0	1.5	13		4.5	30	17	13	41	39	80	13	14	A-6a	9	267					
	010-0	SS-2	3.0	4.5	1.5	3.0	8		3.75							16	14	A-6a	10			N_{60}			
	21	SS-3	4.5	6.0	3.0	4.5	7		1.75	42	22	20	39	44	83	25	19	A-7-6	12						
		SS-4	6.0	7.5	4.5	6.0	8	7	2							16	18	A-7-6	16						

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	
11	B	SS-1	1.5	3.0	0.0	1.5	18		4.5	30	17	13	40	35	75	15	14	A-6a	9	1027					
	011-0	SS-2	3.0	4.5	1.5	3.0	17		4.5	30	18	12	32	31	63	12	14	A-6a	6						
	21	SS-3	4.5	6.0	3.0	4.5	15		4.5							13	14	A-6a	10						
		SS-4	6.0	7.5	4.5	6.0	21	15	4.5							13	14	A-6a	10						
12	B	SS-1	1.5	3.0	0.0	1.5	24		4.5	28	16	12	38	35	73	11	14	A-6a	8	1360					
	012-0	SS-2	3.0	4.5	1.5	3.0	22		4.5	30	16	14	32	27	59	10	14	A-6a	6						
	21	SS-3	4.5	6.0	3.0	4.5	19		4.5							13	14	A-6a	10						
		SS-4	6.0	7.5	4.5	6.0	18	18	4.5							17	14	A-6a	10						
13	B	SS-1	1.5	3.0	0.0	1.5	15		4.5	29	16	13	40	37	77	14	14	A-6a	9	1353					
	013-0	SS-2	3.0	4.5	1.5	3.0	19		3.5	30	17	13	40	37	77	14	14	A-6a	9						
	21	SS-3	4.5	6.0	3.0	4.5	26		4.5							12	14	A-6a	10						
		SS-4	6.0	7.5	4.5	6.0	31	15	4.5							14	14	A-6a	10						
14	B	SS-1	1.5	3.0	0.0	1.5	10		4.25	37	19	18	41	37	78	17	16	A-6b	11	1093		N_{60}		12''	
	014-0	SS-2	3.0	4.5	1.5	3.0	16		2.5	32	18	14	37	33	70	16	14	A-6a	9						
	21	SS-3	4.5	6.0	3.0	4.5	19		4.5							14	14	A-6a	10						
		SS-4	6.0	7.5	4.5	6.0	23	10	4.5							16	14	A-6a	10						
15	B	SS-1	1.5	3.0	0.0	1.5	34		4.5	27	16	11	40	36	76	10	14	A-6a	8	1760					
	015-0	SS-2	3.0	4.5	1.5	3.0	33		4.5	29	17	12	37	38	75	11	14	A-6a	9						
	21	SS-3	4.5	6.0	3.0	4.5	33		4.5							12	14	A-6a	10						
		SS-4	6.0	7.5	4.5	6.0	27	27	4.5							13	14	A-6a	10						
16	B	SS-1	1.5	3.0	0.0	1.5	26		4.5	36	18	18	37	43	80	15	16	A-6b	11	100					
	016-0	SS-2	3.0	4.5	1.5	3.0	29		4.5	35	19	16	38	43	81	14	16	A-6b	10						
	21	SS-3	4.5	6.0	3.0	4.5	27		4.5							15	16	A-6b	16						
		SS-4	6.0	7.5	4.5	6.0	35	26	4.5							15	16	A-6b	16						
17	B	SS-1	1.5	3.0	0.0	1.5	20		4.25	31	18	13	39	38	77	15	14	A-6a	9	120					
	017-0	SS-2	3.0	4.5	1.5	3.0	18		3.25	32	17	15	36	36	72	17	14	A-6a	9			Mc			
	21	SS-3	4.5	6.0	3.0	4.5	19		2.75							16	14	A-6a	10						
		SS-4	6.0	7.5	4.5	6.0	20	18	4.25							16	14	A-6a	10						
18	B	SS-1	1.5	3.0	0.0	1.5	19		4.5	41	21	20	35	46	81	16	18	A-7-6	12	60					
	018-0	SS-2	3.0	4.5	1.5	3.0	22		4.5	44	20	24	35	49	84	19	18	A-7-6	14						
	21	SS-3	4.5	6.0	3.0	4.5	23		4.5							16	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	29	19	4.5							20	18	A-7-6	16						
19	B	SS-1	1.5	3.0	0.0	1.5	23		4.5	30	18	12	40	39	79	15	14	A-6a	9	140					
	019-0	SS-2	3.0	4.5	1.5	3.0	22		4.5	30	17	13	38	35	73	14	14	A-6a	9						
	21	SS-3	4.5	6.0	3.0	4.5	23		4.5							15	14	A-6a	10						
		SS-4	6.0	7.5	4.5	6.0	27	22	4.5							14	14	A-6a	10						
20	B	SS-1	1.5	3.0	0.0	1.5	16																		
	020-0	SS-2	3.0	4.5	1.5	3.0	30		2.5	45	19	26	32	47	79	19	18	A-7-6	15	100					
	21	SS-3	4.5	6.0	3.0	4.5	30		2.5	45	19	26	32	49	81	20	18	A-7-6	15						
		SS-4	6.0	7.5	4.5	6.0	31	16	2.5							21	18	A-7-6	16						

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	
21	B	SS-1	1.5	3.0	0.0	1.5	16		3	46	23	23	30	42	72	20	20	A-7-6	14	220					
	021-0	SS-2	3.0	4.5	1.5	3.0	18		4	32	17	15	37	36	73	14	14	A-6a	10						
	21	SS-3	4.5	6.0	3.0	4.5	18		4.5							15	14	A-6a	10						
		SS-4	6.0	7.5	4.5	6.0	20	16	4.5							15	14	A-6a	10						
22	B	SS-1	1.5	3.0	0.0	1.5	20		4	37	18	19	39	41	80	18	16	A-6b	12	40					
	022-0	SS-2	3.0	4.5	1.5	3.0	22		4.25	33	18	15	40	35	75	17	14	A-6a	10			Mc			
	21	SS-3	4.5	6.0	3.0	4.5	23		4.5							14	14	A-6a	10						
		SS-4	6.0	7.5	4.5	6.0	29	20	3.75							17	14	A-6a	10						
23	B	SS-1	1.5	3.0	0.0	1.5	12		2.75	40	19	21	25	37	62	19	16	A-6b	10	120		N_{60} & Mc		12"	
	023-0	SS-2	3.0	4.5	1.5	3.0	15		2.5	32	19	13	43	37	80	17	14	A-6a	9			Mc			
	21	SS-3	4.5	6.0	3.0	4.5	20		4.5							14	14	A-6a	10						
		SS-4	6.0	7.5	4.5	6.0	25	12	4.5							14	14	A-6a	10						
24	B	SS-1	1.5	3.0	0.0	1.5	14		4.5	34	18	16	46	34	80	17	16	A-6b	10	20					
	024-0	SS-2	3.0	4.5	1.5	3.0	14		3	52	21	31	31	46	77	24	18	A-7-6	18			N_{60} & Mc			
	21	SS-3	4.5	6.0	3.0	4.5	19		3							23	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	25	14	4.5							15	18	A-7-6	16						
25	B	SS-1	1.5	3.0	0.0	1.5	14		4.25	43	21	22	40	43	83	21	18	A-7-6	13	240		N_{60} & Mc		12"	
	025-0	SS-2	3.0	4.5	1.5	3.0	16		3.75	47	23	24	39	46	85	23	20	A-7-6	15			Mc			
	21	SS-3	4.5	6.0	3.0	4.5	20		4							22	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	23	14	4.5							19	18	A-7-6	16						
26	B	SS-1	1.5	3.0	0.0	1.5	18		4.5	50	21	29	32	49	81	22	18	A-7-6	18	100		Mc			
	026-0	SS-2	3.0	4.5	1.5	3.0	20		4.5	38	19	19	37	38	75	18	16	A-6b	12						
	21	SS-3	4.5	6.0	3.0	4.5	22		4.25							20	16	A-6b	16						
		SS-4	6.0	7.5	4.5	6.0	23	18	4.5							16	16	A-6b	16						
27	B	SS-1	1.5	3.0	0.0	1.5	15									13	16	A-6b	16						
	027-0	SS-2	3.0	4.5	1.5	3.0	18		3.75	36	18	18	35	42	77	17	16	A-6b	11	107					
	21	SS-3	4.5	6.0	3.0	4.5	23		4.5	30	18	12	40	39	79	12	14	A-6a	9						
		SS-4	6.0	7.5	4.5	6.0	25	15	4.25							14	14	A-6a	10						
28	B	SS-1	1.5	3.0	0.0	1.5	10		4.5	32	18	14	50	32	82	18	14	A-6a	10	180		N_{60} & Mc		12"	
	028-0	SS-2	3.0	4.5	1.5	3.0	10		4.25	51	22	29	35	56	91	23	19	A-7-6	18			N_{60} & Mc			
	21	SS-3	4.5	6.0	3.0	4.5	8		3.25							24	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	10	8	3.5							20	18	A-7-6	16						
29	B	SS-1	1.5	3.0	0.0	1.5	19		4.5	35	17	18	44	39	83	17	16	A-6b	11	180					
	029-0	SS-2	3.0	4.5	1.5	3.0	14		4.5	33	19	14	44	40	84	19	14	A-6a	10			N_{60} & Mc			
	21	SS-3	4.5	6.0	3.0	4.5	11		3.75							24	14	A-6a	10						
		SS-4	6.0	7.5	4.5	6.0	11	11	3.5							21	14	A-6a	10						
30	B	SS-1	1.5	3.0	0.0	1.5	16		4.5	31	16	15	38	40	78	13	14	A-6a	10	220					
	030-0	SS-2	3.0	4.5	1.5	3.0	20		4.25	34	17	17	36	41	77	17	16	A-6b	11						
	21	SS-3	4.5	6.0	3.0	4.5	22		4.5							16	16	A-6b	16						
		SS-4	6.0	7.5	4.5	6.0	25	16	4.5							12	16	A-6b	16						

#	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	
31	B	SS-1	1.5	3.0	0.0	1.5	18		4.5	29	17	12	39	37	76	11	14	A-6a	9	120					
	031-0	SS-2	3.0	4.5	1.5	3.0	18		4.5	29	17	12	38	38	76	14	14	A-6a	9						
	21	SS-3	4.5	6.0	3.0	4.5	22		4.25							15	14	A-6a	10						
		SS-4	6.0	7.5	4.5	6.0	26	18	4.5							14	14	A-6a	10						
32	B	SS-1	1.5	3.0	0.0	1.5	18		4.5	32	18	14	38	41	79	14	14	A-6a	10	127					
	032-0	SS-2	3.0	4.5	1.5	3.0	15		4.5							15	14	A-6a	10						
	21	SS-3	4.5	6.0	3.0	4.5	20		3.5	39	18	21	37	44	81	19	16	A-6b	12						
		SS-4	6.0	7.5	4.5	6.0	30	15	3.75							20	16	A-6b	16						
33	B	SS-1	1.5	3.0	0.0	1.5	20		4.5	30	18	12	31	30	61	11	14	A-6a	6	140					
	033-0	SS-2	3.0	4.5	1.5	3.0	18		4.5	30	17	13	38	39	77	14	14	A-6a	9						
	21	SS-3	4.5	6.0	3.0	4.5	26		4.25							15	14	A-6a	10						
		SS-4	6.0	7.5	4.5	6.0	31	18	4.5							14	14	A-6a	10						
34	B	SS-1	1.5	3.0	0.0	1.5	12		4.5	35	19	16	36	41	77	16	16	A-6b	10	80					
	034-0	SS-2	3.0	4.5	1.5	3.0	12		4.25	39	19	20	36	44	80	19	16	A-6b	12			N_{60} & Mc			
	21	SS-3	4.5	6.0	3.0	4.5	20		4.5							17	16	A-6b	16						
		SS-4	6.0	7.5	4.5	6.0	27	12	4.5							16	16	A-6b	16						
35	B	SS-1	1.5	3.0	0.0	1.5	20		4.5	36	18	18	35	41	76	15	16	A-6b	11	93					
	035-0	SS-2	3.0	4.5	1.5	3.0	20		4.5	32	17	15	37	37	74	20	14	A-6a	10			Mc			
	21	SS-3	4.5	6.0	3.0	4.5	22		4.5							17	14	A-6a	10						
		SS-4	6.0	7.5	4.5	6.0	33	20	4.5							13	14	A-6a	10						
36	B	SS-1	1.5	3.0	0.0	1.5	23		4.5	37	18	19	37	44	81	16	16	A-6b	12	113					
	036-0	SS-2	3.0	4.5	1.5	3.0	26		4.5	33	17	16	39	42	81	14	16	A-6b	10						
	21	SS-3	4.5	6.0	3.0	4.5	34		4.5							16	16	A-6b	16						
		SS-4	6.0	7.5	4.5	6.0	37	23	4.5							13	16	A-6b	16						
37	B	SS-1	1.5	3.0	0.0	1.5	19		4.5	29	16	13	34	28	62	11	14	A-6a	7	200					
	037-0	SS-2	3.0	4.5	1.5	3.0	22		4.5	28	17	11	44	36	80	12	14	A-6a	8						
	21	SS-3	4.5	6.0	3.0	4.5	25		4.5							14	14	A-6a	10						
		SS-4	6.0	7.5	4.5	6.0	29	19	4.5							14	14	A-6a	10						
38	B	SS-1	1.5	3.0	0.0	1.5	15		4.5	34	18	16	34	39	73	17	16	A-6b	10	200					
	038-0	SS-2	3.0	4.5	1.5	3.0	14		2.75							22	16	A-6b	16			N_{60} & Mc			
	21	SS-3	4.5	6.0	3.0	4.5	31			NP	NP	NP	30	10	40	8	11	A-4a	1						
		SS-4	6.0	7.5	4.5	6.0	20	14	4							18	16	A-6b	16						
39	B	SS-1	1.5	3.0	0.0	1.5	22		4.5	37	18	19	35	39	74	8	16	A-6b	11	220					
	039-0	SS-2	3.0	4.5	1.5	3.0	12			22	17	5	35	12	47	11	12	A-4a	2						
	21	SS-3	4.5	6.0	3.0	4.5	16		2.75	32	16	16	39	32	71	15	16	A-6b	10						
		SS-4	6.0	7.5	4.5	6.0	20	12	3.5							21	16	A-6b	16						
40	B	SS-1	1.5	3.0	0.0	1.5	15		4.5	28	17	11	45	32	77	16	14	A-6a	8	160					
	040-0	SS-2	3.0	4.5	1.5	3.0	15		4.5							26	18	A-7-6	16			Mc			
	21	SS-3	4.5	6.0	3.0	4.5	19		4.5	51	21	30	34	54	88	20	18	A-7-6	18						
		SS-4	6.0	7.5	4.5	6.0	20	15	4.5							21	18	A-7-6	16						

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	
41	B	SS-1	1.5	3.0	0.0	1.5	12			22	17	5	40	12	52	13	12	A-4a	3	407					
	041-0	SS-2	3.0	4.5	1.5	3.0	14									14	10	A-4a	8			N_{60} & Mc			
	21	SS-3	4.5	6.0	3.0	4.5	18		4.5	32	17	15	37	40	77	26	14	A-6a	10						
		SS-4	6.0	7.5	4.5	6.0	18	12	4.5							14	14	A-6a	10						
42	B	SS-1	1.5	3.0	0.0	1.5	11		4.25	31	20	11	48	27	75	17	15	A-6a	8	13		N_{60}		12"	
	042-0	SS-2	3.0	4.5	1.5	3.0	10		4.5							16	14	A-6a	10			N_{60}			
	21	SS-3	4.5	6.0	3.0	4.5	10		3.5	48	21	27	41	47	88	24	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	7	7	3.25							28	18	A-7-6	16						
43	B	SS-1	1.5	3.0	0.0	1.5	22		3.25	51	20	31	22	46	68	19	18	A-7-6	16	373					
	043-0	SS-2	3.0	4.5	1.5	3.0	18		2.75	49	19	30	31	58	89	22	18	A-7-6	18			Mc			
	21	SS-3	4.5	6.0	3.0	4.5	22		4.25							22	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	25	18	4.25							15	18	A-7-6	16						
44	B	SS-1	1.5	3.0	0.0	1.5	12		4.5	38	19	19	41	44	85	19	16	A-6b	12	460		N_{60} & Mc		12"	
	044-0	SS-2	3.0	4.5	1.5	3.0	14		4.5							23	16	A-6b	16			N_{60} & Mc			
	21	SS-3	4.5	6.0	3.0	4.5	19		4.5							16	16	A-6b	16						
		SS-4	6.0	7.5	4.5	6.0	26	12	4.5							14	16	A-6b	16						
45	B	SS-1	1.5	3.0	0.0	1.5	12		3.5	26	19	7	46	23	69	17	14	A-4a	7	420		N_{60} & Mc		12"	
	045-0	SS-2	3.0	4.5	1.5	3.0	11		3.75							17	10	A-4a	8			N_{60} & Mc			
	21	SS-3	4.5	6.0	3.0	4.5	15		3.5	52	20	32	33	52	85	24	18	A-7-6	18						
		SS-4	6.0	7.5	4.5	6.0	16	11	3.5							21	18	A-7-6	16						
46	B	SS-1	1.5	3.0	0.0	1.5	8		3.5	42	19	23	35	41	76	20	18	A-7-6	14	373		N_{60}		12"	
	046-0	SS-2	3.0	4.5	1.5	3.0	10		3.25	44	21	23	34	39	73	20	18	A-7-6	14			N_{60}			
	21	SS-3	4.5	6.0	3.0	4.5	12		3.5							21	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	11	8	3.5							23	18	A-7-6	16						
47	B	SS-1	1.5	3.0	0.0	1.5	11		4.25	46	20	26	34	43	77	20	18	A-7-6	16	307		N_{60}		12"	
	047-0	SS-2	3.0	4.5	1.5	3.0	12		4.25	46	21	25	35	51	86	22	18	A-7-6	15			N_{60} & Mc			
	21	SS-3	4.5	6.0	3.0	4.5	16		4.5							17	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	19	11	4.5							16	18	A-7-6	16						
48	B	SS-1	1.5	3.0	0.0	1.5	11		4	46	18	28	31	39	70	18	18	A-7-6	15	187		N_{60}		12"	
	048-0	SS-2	3.0	4.5	1.5	3.0	14		4.5	33	18	15	42	39	81	15	14	A-6a	10						
	21	SS-3	4.5	6.0	3.0	4.5	25		4.5							13	14	A-6a	10						
		SS-4	6.0	7.5	4.5	6.0	22	11	4.5							22	14	A-6a	10						
49	B	SS-1	1.5	3.0	0.0	1.5	10		3.5							15	18	A-7-6	16			N_{60}		12"	
	049-0	SS-2	3.0	4.5	1.5	3.0	15		3.25	47	20	27	34	54	88	23	18	A-7-6	16	153		Mc			
	21	SS-3	4.5	6.0	3.0	4.5	22		4.25	46	18	28	34	51	85	22	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	25	10	4.5							18	18	A-7-6	16						

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

PID: 109070

County-Route-Section: DEL-36-0.00
No. of Borings: 49

Geotechnical Consultant: NEAS INC.
Prepared By: Abdul Saboor Ibrahim Khail
Date prepared: 10/18/2021

Chemical Stabilization Options		
320	Rubblize & Roll	Option
206	Cement Stabilization	Option
	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%
$N_{60} < 12$	15%	0.5 < HP ≤ 1	0%
$12 \leq N_{60} < 15$	13%	1 < HP ≤ 2	3%
$N_{60} \geq 20$	43%	HP > 2	94%
M+	14%		
Rock	0%		
Unsuitable	0%		

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

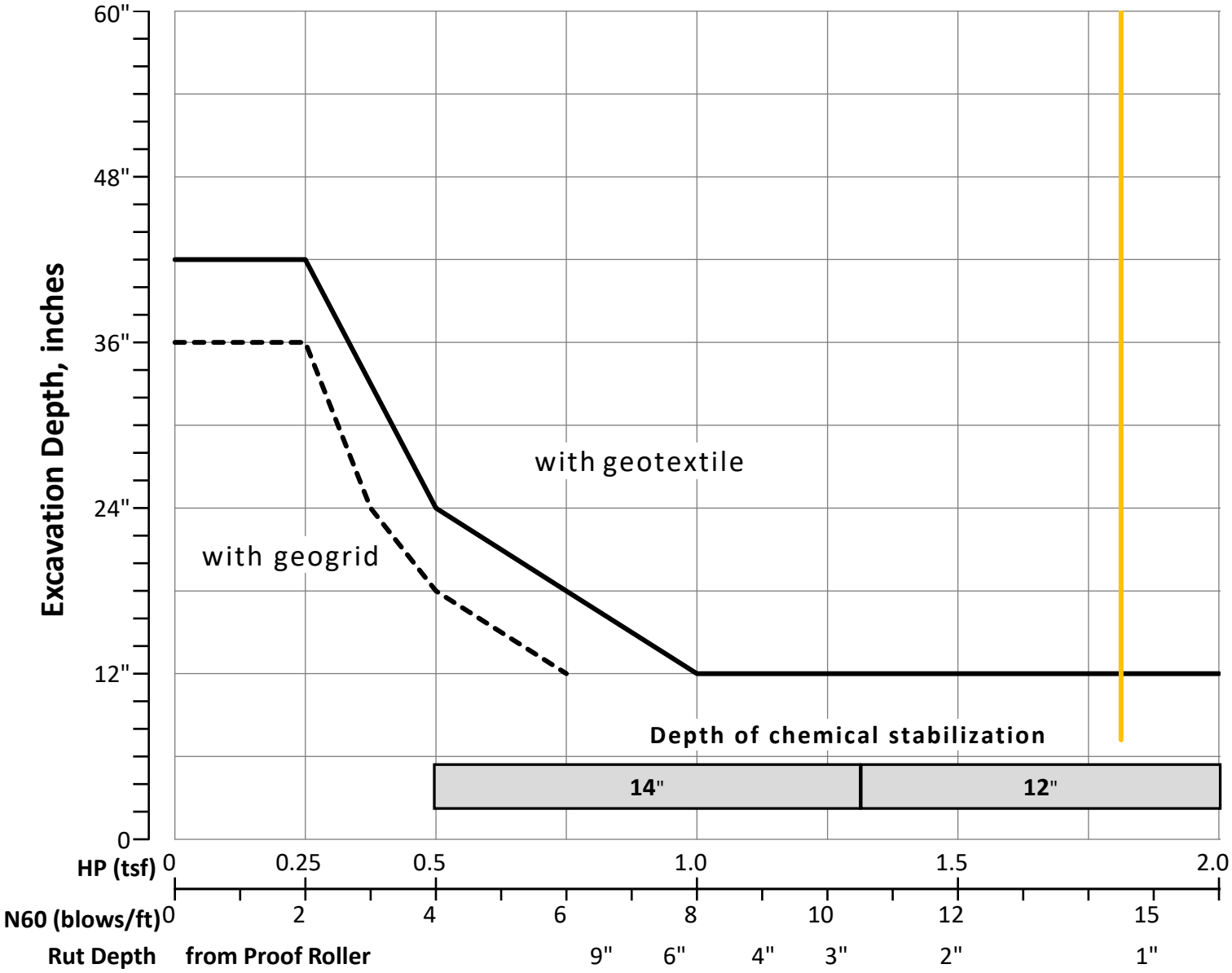
% Proposed Subgrade Surface	
Unstable & Unsuitable	39%
Unstable	39%
Unsuitable	0%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	19	15	4.09	37	19	18	37	40	76	17	16	12
Maximum	37	27	4.50	56	23	37	50	60	93	30	20	19
Minimum	7	7	1.50	22	16	5	22	10	40	8	10	1

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	0	6	0	0	77	53	0	59	0	0	195
Percent	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	39%	27%	0%	30%	0%	0%	100%
% Rock|Granular|Cohesive	0%	3%									97%								100%
Surface Class Count	0	0	0	0	0	0	0	0	0	5	0	0	39	28	0	25	0	0	97
Surface Class Percent	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	40%	29%	0%	26%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
4.09		☐ HP
14.51		☐ N60L

Average HP
Average N_{60L}