FINAL REPORT
GEOTECHNICAL EXPLORATION REPORT
MOT-725-14.41
MONTGOMERY COUNTY, OHIO
PID#: 108619

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NEAS PROJECT 21-0072

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EXECUTIVE SUMMARY

The Ohio Department of Transportation (ODOT) has proposed an interchange improvement project (MOT-725-14.41, PID 108619) for State Route 725 (SR -725) and associated ramps with Interstate Route 75 (IR-75) in Montgomery County, Ohio. The overall project objective is to reduce the congestion and improve safety at the existing interchange at IR-75 and SR 725, as well as adding sidewalk alongside SR725 and upgrading the traffic signal at SR-725 and Byers Rd. The improvements proposed to accomplish this objective include: 1) the reconstruction of SR-725 between Byers Road and Mall Woods Drive; 2) the construction/reconstruction of 4 associated ramps (Ramp A, Ramp B, Ramp C, and Ramp D); and, 3) the construction of three retaining walls along the sidewalk and one retaining wall along Ramp B.

National Engineering & Architectural Services (NEAS). Inc. 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 January 5, 2022, and March 10, 2022, NEAS performed the site reconnaissance and exploration program for the project. The subsequent document presents the results of the subsurface exploration with respect to the proposed roadways and retaining walls. As part of the exploration, NEAS advanced 24 project borings and conducted laboratory testing to characterize the soils for engineering purposes. NEAS also obtained 8 pavement cores through the existing pavement.

The subgrade conditions within the project limits are relatively consistent and are generally comprised of pavement materials underlain by natural soils consisting of primarily cohesive low to moderately plastic sandy silt and silt/clay combinations and minorly granular gravel/stone fragments with sand, silt and clay. The subgrade soils encountered within the project limits are generally classified as either A-1-b, A-2-4, A-2-6, A-4a, A-6a, A-6b and 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 subsurface profile within the proposed project area generally consists of surficial materials comprised of asphalt and base, generally underlain by natural stiff to hard cohesive soils and loose to dense granular soils. The natural stiff to hard cohesive soils encountered at the site of retaining walls consists of Sandy Silt (A-4a), Silt (A-4b) and Silt and Clay (A-6a). The loose to dense granular soils consists of Sandy Silt (A-4a), Silt (A-4b), Course and Fine Sand (A-3a), Gravel and Stone Fragments with Sand (A-1-b), Stone Fragments with Sand and Silt (A-2-4) and Stone Fragments with Sand, Silt and Clay (A-2-6). Bedrock was only encountered in the historical borings near RW 1. In accordance with NEAS's agreement with JMT, dated April 13, 2022, the geotechnical analyses for each wall will be conducted by JMT.

Unstable subgrade conditions that may require stabilization per ODOT's Geotechnical Bulletin 1 (GB1) guidelines were encountered throughout more than 30 percent of the project area. **However, Ramp D has sections of proposed full depth pavement that is narrower than 8 ft width which typical chemical stabilization equipment cannot stabilize, NEAS recommend local stabilization in the form of Excavate and Replace using Item 204 Granular Materials Type C for the selected roadway areas that needs stabilization**. 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

NEAS presents our Geotechnical Exploration Report for the proposed interchange improvement project (MOT-725-14.41, PID 108619) for State Route 725 (SR -725) and associated ramps with Interstate Route 75 (IR-75) in Montgomery County, Ohio. The overall project objective is to reduce the congestion and improve safety at the existing interchange at IR-75 and SR 725, as well as adding sidewalk alongside SR725 and upgrading the traffic signal at SR-725 and Byers Rd. The improvements proposed to accomplish this objective include: 1) the reconstruction of SR-725 between Byers Road and Mall Woods Drive; 2) the construction/reconstruction of 4 associated ramps (Ramp A, Ramp B, Ramp C, and Ramp D); and, 3) the construction of three retaining walls along the sidewalk and one retaining wall along Ramp B. This report presents a summary of the encountered surficial and subsurface conditions in accordance with Load and Resistance Factor Design (LRFD) method as set forth in AASHTO's Publication *LRFD Bridge Design Specifications,9th Edition* with 2020 interim revisions (BDS) (AASHTO, 2020) and *ODOT's 2022 LRFD Bridge Design Manual* (BDM) (ODOT, 2022).

The exploration was conducted in general accordance with National Engineering & Architectural Services Inc. (NEAS) proposal to JMT dated on September 14, 2021, and with the provisions of ODOT's *Specifications for Geotechnical Explorations* (SGE) (ODOT, 2022).

The scope of work performed by NEAS as part of the referenced project included: a review of published geotechnical information; performing 24 test borings and 8 pavement cores; laboratory testing of soil samples in accordance with the SGE; and development of this data summary report.

2. GEOLOGY AND OBSERVATIONS OF THE PROJECT

2.1. Geology and Physiography

The project site is located within the Southern Ohio Loamy Till Plain which is characterized as end and recessional moraines, commonly associated with boulder belts, between relatively flat-lying ground moraine, cut by steep-valleyed large streams with surface soils consisting of loamy till. Buried valleys are common and are generally filled with outwash and alternate between broad floodplains and narrows. Elevations of the region ranges from 530 to 1,150 ft amsl, with moderate relief (200 ft). The geology within this region is described as loamy, high-lime Wisconsinan-age till, outwash and loess over Lower Paleozoic-age carbonate rocks (i.e., limestone or dolostone) and, in the east, shales. (ODGS, 1998).

Based on the Quaternary Geology Map of Ohio (Pavey, et, al, 1999) The geology at the project site is mapped as a late Wisconsinan-age ice-deposited soils of end moraine that occur as hummocky ridges higher than adjacent terrain.

Based on the Bedrock Geologic Units Map of Ohio (USGS & ODGS, 2006), bedrock within the project area consists of shale and limestone, of the Drakes, Whitewater, and Liberty formations, Undivided. This unit is comprised of Ordovician-age interbedded shale, and limestone. The interbedded shale and limestone are described as gray to maroon and weathers yellowish gray, planar to irregular to wavy, and thin to thick bedded. Bedrock rises gently from north to south (ODGS, 2003). Based on the ODNR bedrock topography map of Ohio, bedrock elevations at the project site can be expected to be between about 900 and 950 ft

amsl, putting bedrock at a depth ranging from about 40 ft below ground surface (bgs) to about 75 ft below ground surface (bgs).

The soils at the project site have been mapped (Web Soil Survey) by the Natural Resources Conservation Service (USDA, 2015) as primarily Udorthents. Udorthents are soils that have been disturbed by large amounts of cutting and filling and as such are not rated according to the AASHTO method of soil classification. The soils surrounding the project site are mapped as primarily Miamian silt loam or clay loam and are characterized as very deep, well drained soils that are moderately deep or deep to dense till formed in loess and the underlying loamy till on till plains and moraines. The Miamian series is comprised of primarily fine-grained soils and classifies as cohesive A-4, A-6, and A-7 type soils according to the AASHTO method of soil classification.

2.2. Hydrology/Hydrogeology

According to the Water Well Log (ID# 2040231) groundwater at the project site can be expected at an elevation of about 6 ft bgs in the vicinity of the project's boundaries. The water level presented in the water well log may be generally representative of the local groundwater table. However, it should be noted that perched groundwater systems may be existent in areas due to the presence of fine-grained soils making it difficult for groundwater to permeate to the 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 mines are noted on ODNR's Mines of Ohio Locator in the vicinity of the project site (ODNR [1], 2012).

No oil or gas wells are noted on ODNR's Ohio Oil & Gas Locator in the vicinity of the project site (ODNR [2], 2020).

2.4. Historical Records and Previous Phases of Project Exploration

The following report/plans were available for review and evaluation for this report:

- Project Boring Logs for Structure Foundation Investigation for Project MOT-75-06.035 dated October 23, 1995.
- Project Boring Logs from Geological Report for Project MOT-725-14.10 dated October, 1976.
- Project Boring Logs from Geological Report for Project MOT-25-0374 dated August 4, 1958.

Historical soil borings associated with the above plans were reviewed and attached in the Appendix F. Historic borings were summarized in the Table 1.

Table 1: Historic Boring Summary

Historic Boring Number	Closeby Structure	Latitude	Longitude	Elevation (NGVD 29) (ft)	Elevation (NAVD 88) (ft)	Depth (ft)
B-001-0-76	Retaining Wall #1	39.640652	-84.232594	961.1	-	25.5
B-002-0-76	Retaining Wall #1	39.640387	-84.232651	937.4	-	22.5
B-003-0-76	Retaining Wall #1	39.640124	-84.233082	944.3	-	17.8
B-004-0-76	Retaining Wall #1	39.640691	-84.234549	932.5	-	36.0
B-001-0-58	Retaining Wall #5	39.639188	-84.231203	973.5	-	60.0
B-005-0-76	Retaining Wall #5	39.639167	-84.231497	978.3	-	36.0
B-001-0-95	Retaining Wall #5	39.639119	-84.231410	-	977.7	65.5
B-002-0-95	Retaining Wall #5	39.639320	-84.232005	-	975.7	65.0

2.5. Site Reconnaissance

A field reconnaissance visit for the overall project area was conducted between December 10, 2021, and December 11, 2021, along the SR-725 and IR-75 interchange. Site conditions were noted and photographed during the visit. Photographs of notable geotechnical and drainage observations were taken and a summary of our observations by roadway segment are provided below.

2.5.1. Land Use and Cover

The land use of most of the project area consists of 1) commercial properties; and 2) ODOT ROW.

2.5.2. SR-725

In general, the pavement condition along the project section of SR-725 was observed to be fair with signs of weathering and surface wear. Moderate severity longitudinal and transverse cracking was common along this section, as well as occasional moderate severity wheel track cracking and crack sealing deficiencies (Photograph 1). The roadway in this section is level with the surrounding land in this area and slopes downward from both the east and west to the lowest point being where IR-75 crosses over SR-725. The roadway drained to drainage basins in both shoulders of the roadway as well as basins in the median where the median had a raised curb. The area is lightly vegetated, and signs of standing water were not observed. No signs of geotechnical instability were observed.

Photograph 1: Overall Pavement Condition of Existing SR-725

2.5.3. Ramp A – Exit Ramp from IR-75 SB to SR-725

In general, the pavement condition of the ramp from IR-75 SB to SR-725 was observed to be fair to good with signs of weathering and surface wear. light severity longitudinal cracking was common along this section as well as wheel track cracking and crack sealing deficiencies (Photograph 2). The roadway in this section is below the surrounding land in this area with slopes of about 3V:1H (3 ft vertical to 1 ft horizontal) leading up to the surrounding land to the west. The roadway itself slopes gently upwards from north to south. The roadway drains to drainage ditches past both shoulders of the roadway. The area is moderately vegetated, and signs of standing water such as cattails and heavy vegetation were observed in the area encompassed by the ramp and IR-75 (Photograph 3).

Photograph 2: Overall Pavement Condition of Ramp

Photograph 3: Signs of Standing Water Observed in Area Encompassed by Ramp A and IR-75

2.5.4. Ramp B – Entrance Ramp from SR-725 to IR-75 SB

In general, the pavement condition along Ramp B was observed to be excellent with almost no signs of weathering or surface wear (Photograph 4). The roadway in this section is below the surrounding land in this area with slopes of about 2.5V:1H (2.5 ft vertical to 1 ft horizontal) leading up to the surrounding land to the west. The roadway itself slopes gently downwards from south to north. The roadway drains to drainage ditches past both shoulders of the roadway which lead to underdrains located about halfway along the ramp and at the northern end of the ramp. These under drains carry water to the area encompassed by the ramp and IR-75. The area is moderately vegetated for the most part, and signs of standing water such

cattails were observed in the western drainage ditch and the area encompassed by the ramp and IR-75. Heavy erosion and degradation of the concrete drainage channel was observed leading away from the Red Roof Inn (Photograph 5).

Photograph 4: Overall Pavement Condition of Ramp B

Photograph 5: Drainage Channel leading away from the Red Roof Inn

Photograph 6: Erosion Observed in Drainage Ditch encompassed by Ramp B and IR-75

2.5.5. Ramp C – Exit Ramp from IR-75 NB to SR-725

In general, the pavement condition of the asphalt portion of Ramp C was observed to be good with few signs of weathering or surface wear. light severity longitudinal and transverse cracking was common along this section (Photograph 7). The concrete portion of the ramp was observed to be fair to good with signs of weathering and surface wear. Moderate severity joint spalling was observed as well as moderate severity D-cracking (Photograph 8). The roadway in this section is below the surrounding land in this area with slopes of about 2.5V:1H (2.5 ft vertical to 1 ft horizontal) leading up to the surrounding land to the east. The roadway itself slopes gently downwards from south to north. The roadway drains to drainage ditches past both shoulders of the roadway. Erosion was observed in the drainage ditch past the eastern shoulder of the ramp (Photograph 9). The area is moderately vegetated, and signs of standing water such as cattails were observed in the eastern drainage ditch.

Photograph 7: Overall Pavement Condition of Asphalt Portion of Ramp C

Photograph 8: Overall Condition of Concrete Portion of Ramp C

Photograph 9: Erosion Observed in Drainage Ditch past Eastern Shoulder of Ramp C

2.5.6. Ramp D – Entrance Ramp from SR-725 to IR-75 NB

In general, the pavement condition of the southern portion of Ramp D was observed to be excellent with no signs of weathering or surface wear (Photograph 10). The pavement condition of the northern portion of the ramp was observed to be fair to good with some signs of weathering and surface wear. moderate severity longitudinal and transverse cracking was common along this section as well as wheel track cracking (Photograph 11). The roadway in this section sits on an embankment above the surrounding land in this area with slopes of about 2V:1H (2 ft vertical to 1 ft horizontal). The roadway itself slopes gently upwards from north to south. The roadway drains to drainage ditches past both shoulders of the roadway. The area is moderately vegetated to the west and heavily vegetated to the east. Signs of standing water such as cattails and heavy vegetation were observed past the eastern shoulder of the ramp.

Photograph 10: Pavement Condition of Ramp from SR-725 to where Ramp intersects with IR-75

Photograph 11: Pavement Condition of Ramp D from where Ramp intersects with IR-75 to Northern Termination

3. GEOTECHNICAL EXPLORATION

3.1. Field Exploration Program

The exploration for these walls was conducted by NEAS between February 23, 2022, and March 10, 2022 and included 24 borings drilled to depths between 7.5 ft to 26.5 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 along/near the proposed wall alignment in locations that were not restricted by maintenance of traffic, underground utilities or dictated by terrain (i.e., steep embankment slopes). Each as-drilled project boring location and corresponding ground surface elevation was surveyed in the field by NEAS following drilling. Each individual project boring log (included within Appendix B) includes the recorded boring latitude and longitude location (based on the surveyed Ohio State Plane South, NAD83, location) and the corresponding ground surface elevation. Latitude, longitude, and elevations of the borings are shown on Table 2 below and the boring locations are depicted on the boring plan provided in Appendix A.

Borings were drilled using a CME 45B truck mounted drilling rig utilizing 3.25-inch diameter hollow stem augers. Soil samples were recovered at intervals of 2.5-ft to end of boring using a 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 and possible laboratory testing. Standard penetration tests (SPT) were conducted using a CME auto hammer that has been calibrated to be 72.6% efficient as indicated on the boring logs on January 24, 22.

Field boring logs were prepared by drilling personnel, and included 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. After completing the borings, the boreholes were backfilled with either auger cuttings, bentonite chips, or a combination of these materials.

Table 2: Project Boring Summary

Boring Number	Location (Station /Offset)	Alignment	Latitude	Longitude	Elevation (NAVD 88) (ft)
B-001-0-21	751+28, 1' RT.	EX. SR-725	39.640234	-84.235747	971.5
B-002-0-21 / C-005-0-21	754+31, 45' RT.	EX. SR-725	39.640073	-84.234692	961.2
B-003-0-21	755+83, 39' RT.	EX. SR-725	39.640021	-84.234172	958.1
B-004-0-21	617+97, 11' RT.	PROP. Ramp A East	39.639599	-84.233602	954.0
B-005-0-21 / C-007-0-21	760+55, 48' LT.	EX. SR-725	39.639869	-84.232486	951.6
B-006-0-21	761+34, 42' RT.	EX. SR-725	39.639566	-84.232321	952.5
B-007-0-21	762+71, 39' RT.	EX. SR-725	39.639456	-84.231858	953.7
B-008-0-21	764+84, 40' RT.	EX. SR-725	39.639268	-84.231140	958.1
B-009-0-21	766+26, 40' RT.	EX. SR-725	39.639146	-84.230662	961.7
B-010-0-21	769+93, 55' RT.	EX. SR-725	39.638790	-84.229443	974.2
B-011-0-21	772+20, 50' LT.	EX. SR-725	39.638866	-84.228560	980.8
B-012-0-21 / C-008-0-21	775+42, 41' LT.	EX. SR-725	39.638563	-84.227486	990.1
B-013-0-21	778+84, 30' LT.	EX. SR-725	39.638249	-84.226344	995.4
B-014-0-21	605+63, 22' RT.	PROP. Ramp A East	39.636586	-84.231793	1000.0
B-015-0-21 / C-001-0-21	609+94, 5' LT.	PROP. Ramp A East	39.637589	-84.232618	983.6
B-016-0-21	613+49, 16' RT.	PROP. Ramp A East	39.638467	-84.233175	970.8
B-017-0-21	703+15, 28' RT.	PROP. Ramp B	39.640805	-84.233286	952.2
B-018-0-21 / C-002-0-21	707+07, 16' LT.	PROP. Ramp B	39.641887	-84.233234	945.1
B-019-0-21	806+52, 22' LT.	PROP. Ramp C	39.636790	-84.230610	1000.3
B-020-0-21 / C-003-0-21	810+42, 16' RT.	PROP. Ramp C	39.637849	-84.230370	983.7
B-021-0-21	953+04, 31' LT.	PROP. Ramp D East	39.639969	-84.230209	958.6
B-22-0-21 / C-004-0-21	907+74, 6' RT.	PROP. Ramp D West	39.640962	-84.230697	953.3
B-023-0-21	910+88, 6' RT.	PROP. Ramp D West	39.641666	-84.231336	947.1
B-024-0-21	914+04, 7' RT.	PROP. Ramp D West	39.642484	-84.231661	941.2
C-006-0-21	758+32, 35' RT.	EX. SR-725	39.639846	-84.233330	953.3

3.2. Pavement Coring Exploration Program

The coring exploration program for this project was conducted by NEAS on March 14, 2022 and included a total of eight (8) pavement cores. Pavement cores were obtained at seven (7) project boring locations (B-002-0-21, B-005-0-21, B-012-0-21, B-015-0-21, B-018-0-21, B-020-0-21, and B-022-0-21) performed through the existing pavement. In addition to the cores obtained at the indicated boring locations, one (1) additional cores were taken within the shoulder of SR-725. 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 summarized in Table 2.

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 stored 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 (as 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 and moisture content determinations. Data from the laboratory-testing program were incorporated onto the boring logs (Appendix B). Soil samples are retained at the laboratory until Stage 2 approval, after which time they will be discarded.

3.3.1. Classification Testing

Representative soil samples were selected for index properties (Atterberg Limits) and gradation testing for classification purposes on approximately 36% of the soil samples obtained. At each boring location, samples were selected for testing with the intent of identification and classification of all significant soil units. 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.

A final classification of the soil strata was made in accordance with AASHTO M-145 "Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes," as modified by ODOT "Classification of Soils" 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., 2.5-ft or 5.0-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 equivalent rod energy of 60% (N_{60}) for use in analysis or for correlation purposes. The resulting N_{60} values are presented on the boring logs provided in Appendix B.

4. GEOTECHNICAL FINDINGS

The subsurface conditions encountered during NEAS explorations are described in the following subsections and on each boring log presented in Appendix B. The boring logs represent NEAS 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 geologist, and laboratory test results.

The lines designating the interfaces between various soil strata on the 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, results of historical explorations, and consideration of the geological history of the site.

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 and the associated boring location at which the pavement core was obtained (where applicable) is summarized in Table 3. 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 B.

Table 3: Pavement Core Summary

Core ID	Alignment	Asphalt Thickness (in)	Concrete Thickness (in)	Total Thickness (in)
C-001-0-21	PROP. Ramp A East	11.25	0.00	11.25
C-002-0-21	PROP. Ramp B	12.00	0.00	12.00
C-003-0-21	PROP. Ramp C	0.00	10.00	10.00
C-004-0-21	PROP. Ramp D West	13.25	0.00	13.25
C-005-0-21	EX. SR-725	14.00	0.00	14.00
C-006-0-21	EX. SR-725	13.00	0.00	13.00
C-007-0-21	EX. SR-725	13.50	0.00	13.50
C-008-0-21	EX. SR-725	12.50	0.00	12.50

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 4 below.

Table 4: 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)
B-001-0-21	EX. SR-725	7.5	13.0	0.0	5.0	18.0
B-002-0-21	EX. SR-725	26.5	13.0	0.0	5.0	18.0
B-003-0-21	EX. SR-725	26.5	13.0	0.0	5.0	18.0
B-004-0-21	PROP. Ramp A East	10.0	13.0	0.0	5.0	18.0
B-005-0-21	EX. SR-725	26.5	14.0	0.0	5.0	19.0
B-006-0-21	EX. SR-725	26.5	13.0	0.0	6.0	19.0
B-007-0-21	EX. SR-725	26.5	13.0	0.0	6.0	19.0
B-008-0-21	EX. SR-725	26.5	13.0	0.0	6.0	19.0
B-009-0-21	EX. SR-725	25.5	13.0	0.0	6.0	19.0
B-010-0-21	EX. SR-725	26.5	12.0	0.0	6.0	18.0
B-011-0-21	EX. SR-725	7.5	12.0	0.0	7.0	19.0
B-012-0-21	EX. SR-725	7.5	13.0	0.0	6.0	19.0
B-013-0-21	EX. SR-725	7.5	13.0	0.0	6.0	19.0
B-014-0-21	PROP. Ramp A East	10.0	12.0	0.0	6.0	18.0
B-015-0-21	PROP. Ramp A East	7.5	12.0	0.0	6.0	18.0
B-016-0-21	PROP. Ramp A East	11.5	12.0	0.0	7.0	19.0
B-017-0-21	PROP. Ramp B	11.5	12.0	0.0	6.0	18.0
B-018-0-21	PROP. Ramp B	7.5	12.0	0.0	6.0	18.0
B-019-0-21	PROP. Ramp C	7.5	12.0	0.0	7.0	19.0
B-020-0-21	PROP. Ramp C	7.5	9.5	0.0	7.5	17.0
B-021-0-21	PROP. Ramp D East	7.5	13.0	0.0	6.0	19.0
B-022-0-21	PROP. Ramp D West	7.5	13.0	0.0	7.0	20.0
B-023-0-21	PROP. Ramp D West	7.5	13.0	0.0	6.0	19.0
B-024-0-21	PROP. Ramp D West	7.5	13.0	0.0	6.0	19.0

4.3. Subgrade Conditions

The subgrade conditions within the project limits are relatively consistent and are generally comprised of pavement materials underlain by natural soils consisting of primarily cohesive low to moderately plastic sandy silt and silt/clay combinations and minorly granular gravel/stone fragments with sand, silt and clay. The subgrade soils encountered within the project limits are generally classified as either A-1-b, A-2-4, A-2-6, A-4a, A-6a, A-6b and 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 by ramp/roadway segment with problem areas highlighted where present.

4.3.1. SR-725

The project portions of SR-725 are planned to be reconfigured at the intersection with Byers Rd and add a sidewalk along the eastbound side as well as undergo full depth pavement replacement. The borings performed along this portion of roadway included borings B-001-0-21 through B-003-0-21 and B-005-0-21 through B-013-0-21.

Along SR-725, eighty-one percent (81%) of the soil samples were identified as fine-grained soils and were comprised of: 1) cohesive Sandy Silt (A-4a, 60% of samples); 2) Silt and Clay (A-6a, 13% of samples); and, 3) Clay (A-7-6, 8% of samples). With respect to the consistency of the fine-grained soils, the descriptions varied from medium stiff to hard correlating to converted SPT-N values (N_{60}) between 6 and 28 blows per foot (bpf). Natural moisture contents ranged from 9 to 24 percent. Based on Atterberg Limit

tests performed on representative samples of the fine-grained subgrade soils obtained along the project portions of SR-725, the liquid and plastic limits ranged from 19 to 46 percent and from 13 to 19 percent, respectively.

Nineteen percent (19%) of the samples taken along the proposed roadway were classified as coarse-grained, non-cohesive soils and were comprised of: 1) Gravel with Sand (A-1-b, 10% of samples); and, 2) Gravel and Stone Fragments with Sand and Silt (A-2-4, 8% of samples). With respect to the relative density of the coarse-grained soils, the descriptions varied from very loose to very dense correlating to N_{60} values between 2 and 42 bpf. Natural moisture contents ranged from 5 to 24 percent.

4.3.2. Ramp A

Ramp A is the exit ramp for the IR-75 SB which is planned for full depth pavement replacement. The borings performed along Ramp A included borings B-004-0-21 and B-014-0-21 through B-016-0-21.

Sixty-nine percent (69%) of the soil samples taken along the proposed ramp were identified as fine-grained soils and were comprised of: 1) cohesive Sandy Silt (A-4a, 44% of samples); 2) Silt and Clay (A-6a, 13% of samples); and, 3) Clay (A-7-6, 13% of samples). With respect to the consistency of the fine-grained soils, the descriptions varied from stiff to very stiff correlating to N_{60} values between 10 and 24 bpf. Natural moisture contents ranged from 9 to 22 percent. Based on Atterberg Limit tests performed on representative samples of the fine-grained subgrade soils obtained along the project portion of Ramp A, the liquid and plastic limits ranged from 21 to 43 percent and from 13 to 21 percent, respectively.

Thirty-one percent (31%) of the samples taken along the proposed ramp were classified as coarse-grained, non-cohesive soils and were comprised of: 1) Gravel and Stone Fragments with Sand and Silt (A-2-4, 19% samples); and, 2) Gravel with Sand (A-1-b, 13% of samples). With respect to the relative density of the coarse-grained soils, the soils can be described as medium dense correlating to N_{60} values of 17 and 27 bpf. Natural moisture contents of the non-cohesive samples were determined to be 3 and 10 percent.

4.3.3. Ramp B

Ramp B are the entrance ramp for the IR-75 SB which is planned for full depth pavement replacement. The borings performed along Ramp included borings B-017-0-21 through B-018-0-21.

Eighty-eight percent (88%) of the soil samples taken along the proposed ramp were identified as fine-grained soils and were comprised of: 1) cohesive Sandy Silt (A-4a, 38% of samples); 2) Silt and Clay (A-6a, 38% of samples); and, 3) Silty Clay (A-6b, one sample). With respect to the consistency of the fine-grained soils, the descriptions varied from very stiff to hard correlating to N_{60} values between 16 and 30 bpf. Natural moisture contents ranged from 7 to 21 percent. Based on Atterberg Limit tests performed on representative samples of the fine-grained subgrade soils obtained along the project portion of Ramp B, the liquid and plastic limits ranged from 19 to 36 percent and from 12 to 17 percent, respectively.

Thirteen percent (13%) of the samples taken along the proposed ramp were classified as coarse-grained, non-cohesive soils and were comprised of Gravel with Sand and Silt (A-2-4, one sample). With respect to the relative density of the coarse-grained soils, descriptions was dense correlating to N_{60} value of 40 bpf. Natural moisture content of the non-cohesive samples was 6 percent.

4.3.4. Ramp C

Ramp C are the entrance ramp for the IR-75 NB which is planned for full depth pavement replacement. The borings performed along Ramp included borings B-009-0-21, B-019-0-21 and B-020-0-21.

Ninety-two percent (92%) of the soil samples taken along the proposed ramp were identified as fine-grained soils and were comprised of: 1) cohesive Sandy Silt (A-4a, 58% of samples); and, 2) Silt and Clay (A-6a, 33% of samples). With respect to the consistency of the fine-grained soils, the descriptions varied from very stiff to hard correlating to N_{60} values between 15 and 25 bpf. Natural moisture contents ranged from 9 to 14 percent. Based on Atterberg Limit tests performed on representative samples of the fine-grained subgrade soils obtained along the project portion of Ramp C, the liquid and plastic limits ranged from 18 to 25 percent and from 13 to 15 percent, respectively.

Eight percent (8%) of the samples taken along the proposed ramp were classified as coarse-grained, non-cohesive soils and were comprised of Gravel with Sand and Silt (A-2-4, one sample). With respect to the relative density of the coarse-grained soils, descriptions was medium dense correlating to N_{60} value of 22 bpf. Natural moisture content of the non-cohesive samples was 9 percent.

4.3.5. Ramp D

Ramp D are the exit ramp for the IR-75 nB which is planned for full depth pavement replacement. The borings performed along Ramp included borings B-021-0-21 through B-024-0-21.

Sixty-nine percent (69%) of the soil samples taken along the proposed ramp were identified as fine-grained soils and were comprised of: 1) Silt and Clay (A-6a, 38% of samples); 2) cohesive Sandy Silt (A-4a, 25% of samples); and, 3) Silty Clay (A-6b, one sample). With respect to the consistency of the fine-grained soils, the descriptions varied from very stiff to hard correlating to N_{60} values between 11 and 40 bpf. Natural moisture contents ranged from 9 to 18 percent. Based on Atterberg Limit tests performed on representative samples of the fine-grained subgrade soils obtained along the project portion of Ramp D, the liquid and plastic limits ranged from 23 to 38 percent and from 13 to 19 percent, respectively.

Thirty-one percent (31%) of the samples taken along the proposed ramp were classified as coarse-grained, non-cohesive soils and were comprised of: 1) Gravel with Sand and Silt (A-2-4, 13% of samples); and, 2) Gravel with Sand, Silt and Clay(A-2-6, 19% of samples). With respect to the relative density of the coarse-grained soils, descriptions was medium dense correlating to N_{60} value between 13 and 21 bpf. Natural moisture contents of the non-cohesive samples ranged from 11 to 23 percent.

4.4. Subsurface Conditions at Retaining Wall Locations

The subsurface profile within the proposed project area generally consists of surficial materials comprised of asphalt and base, generally underlain by natural stiff to hard cohesive soils and loose to dense granular soils. The natural stiff to hard cohesive soils encountered at the site of retaining walls consists of Sandy Silt (A-4a), Silt (A-4b) and Silt and Clay (A-6a). The loose to dense granular soils consists of Sandy Silt (A-4a), Silt (A-4b), Course and Fine Sand (A-3a), Gravel and Stone Fragments with Sand (A-1-b), Stone Fragments with Sand and Silt (A-2-4) and Stone Fragments with Sand, Silt and Clay (A-2-6). Bedrock was only encountered in the historical borings near RW 1.

4.4.1. Overburden Soil

At the proposed RW 1 site, no project boring was drilled. Four historical borings drilled nearby in 1976 indicate that the subsurface profile at the RW 1 site is very consistent. Bedrock was encountered in all the four historical borings at the elevation of between 899.0 ft and 938.1 ft. Two soil strata were encountered above bedrock. The cohesive soils were the primary stratum and were classified on the historical boring logs as Sandy Silt (A-4a), Silt and Clay (A-6a) and Silty Clay (A-6b). Those cohesive soils can be described as stiff to hard consistency correlating to converted SPT-N values (N_{60}) between 7 and 56 bpf. Natural

moisture contents ranged from 6% to 28%. Based on Atterberg Limits test performed on representative samples of this material, the liquid limit is between 19 to 34 percent and plastic limit is between 5 to 17 percent. The granular soil stratum consisted of Sandy Silt (A-4a) and Silt (A-4b) was only encountered in one historical boring. Those granular soils can be described as dense to very dense compactness correlating to converted SPT-N values (N_{60}) between 30 and 44 bpf. Natural moisture contents ranged from 11% to 16%.

At the proposed RW 2 site, two project borings (B-002-0-21 and B-003-0-21) were drilled and indicate that the subsurface profile at the RW 2 site is very consistent. Bedrock was not encountered in neither of the two project borings. Two soil strata were encountered and intersected with each other. The cohesive soils were classified on the project boring logs as Sandy Silt (A-4a). Those cohesive soils can be described as stiff to hard consistency correlating to converted SPT-N values (N_{60}) between 8 and 24 bpf. Natural moisture contents ranged from 10% to 14%. Based on Atterberg Limits test performed on representative samples of this material, the liquid limit is between 16 to 21 percent and plastic limit is between 12 to 14 percent. The granular soil stratum consisted of Course and Fine Sand (A-3a), Stone Fragments with Sand and Silt (A-2-4) and Stone Fragments with Sand, Silt and Clay (A-2-6) was encountered and can be described as medium dense compactness correlating to converted SPT-N values (N_{60}) between 12 and 23 bpf. Natural moisture contents ranged from 10% to 17%.

At the proposed RW 3 site, four project borings (B-006-0-21 to B-009-0-21) were drilled and indicate that the subsurface profile at the RW 3 site is very consistent. Bedrock was not encountered in any of the four project borings. Two soil strata were encountered and intersected with each other. The cohesive soils were classified on the project boring logs as Sandy Silt (A-4a), Silt (A-4b) and Silt and Clay (A-6a). Those cohesive soils can be described as stiff to hard consistency correlating to converted SPT-N values (N_{60}) between 6 and 68 bpf. Natural moisture contents ranged from 10% to 15%. Based on Atterberg Limits test performed on representative samples of this material, the liquid limit is between 19 to 25 percent and plastic limit is between 13 to 14 percent. The granular soil stratum was only encountered at the beginning of wall (B-006-0-21 and B-007-0-21) and consisted of Gravel and Stone Fragments with Sand (A-1-b), Gravel with Sand and Silt (A-2-4) and Sandy Silt (A-4a). The granular soils can be described as loose to dense compactness correlating to converted SPT-N values (N_{60}) between 10 and 42 bpf. Natural moisture contents ranged from 5% to 17%. It should be noted that boulder zone was encountered on the boring B-009-0-21 from 22.5 ft bgs to end of boring (from the elevation of 939.2 ft to 936.2 ft).

At the proposed RW 4 site, one project boring (B-010-0-21) was drilled. Bedrock was not encountered in the project boring. One cohesive soil stratum was encountered at the site of RW 4. The cohesive soils were classified on the project boring logs as Sandy Silt (A-4a). Those cohesive soils can be described as stiff to hard consistency correlating to converted SPT-N values (N_{60}) between 7 and 28 bpf. Natural moisture contents ranged from 11% to 14%. Based on Atterberg Limits test performed on representative samples of this material, the liquid limit is between 20 to 23 percent and plastic limit is between 13 to 15 percent.

4.4.2. Groundwater

Groundwater measurements were taken during the boring drilling procedures and immediately following the completion of each borehole. Groundwater was not observed during drilling and upon completion in none of the structure borings performed as part of the referenced project.

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.

5. ANALYSIS AND RECOMMENDATIONS

We understand that reconfiguration the existing interchange at IR-75 and SR-725 as well as adding sidewalk alongside SR-725 are planned as part of the interchange improvement project (MOT-725-14.41, PID 108619). In addition to the roadway reconfiguration, the construction of three retaining walls along SR-725 EB and one retaining wall along IR-75 SB exit ramp is also planned. For this purpose, a geotechnical exploration and subsequent analysis was completed for the referenced project. The analysis completed for the proposed roadway improvements included a subgrade (GB1) analysis as well as the generalized soil profile and soil properties for each wall boring. In accordance with NEAS's agreement with JMT, dated April 13, 2022, the geotechnical analyses for each wall will be conducted by JMT. The subgrade analysis was 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). The noise wall foundation analysis was performed in accordance with *ODOT's 2020 LRFD Bridge Design Manual* (BDM) (ODOT, 2020), specifically utilizing the methodology presented in Section 802.1.2. Input information for our analyses was based on the soil characteristics gathered during NEAS's geotechnical exploration (i.e., SPT results, laboratory test results, etc.).

Based on our evaluation of the subsurface conditions and our geotechnical engineering analyses of the proposed interchange improvement project, it is our opinion that subgrade conditions are generally satisfactory, and pavement can be supported by the underlying subsurface material utilizing 12-inches of undercut and replace or chemical stabilization (global stabilization) per ODOT's GB1. Further detail regarding our subgrade analysis and the recommended remediation are provided in Section 5.1 and Section 5.2 of this report, respectively. The generalized soil profile and soil properties at each boring location are provided in Section 5.3 and Section 5.4.

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. 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 E.

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. 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 parameters recommended for use in pavement design are presented in Table 5 below. Provided in the table are ranges of maximum, minimum and average N_{60L} values for the indicated segments as well as the design CBR value recommended for use in pavement design.

Table 5: Pavement Design Values

Segment	Maximum N_{60L}	Minimum N_{60L}	Average N_{60L}	Average PI Values	Design CBR
SR 725	21	2	10	10	8
Ramp A	10	17	13	11	8
Ramp B	18	8	13	11	7
Ramp C	18	15	17	9	8
Ramp D	30	11	18	13	8
Entire Project	**30**	**2**	**13**	**11**	**8**

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 pavement construction and realignment project these subgrade conditions are further discussed in the following subsections.

5.1.2.1. Rock

Rock was not encountered within the subgrade in any boring performed) within the project roadway limits.

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, and soils with liquid limits greater than 65, were not encountered within the subgrade of the referenced project roadway segments.

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 to 14 inches of chemical treatment, or 12 inches 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 6 below, per the roadway segment for which they were encountered. Also included is the associated GB1 recommended remediation depth at that location.

Table 6: 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)
Roadway Segment: SR-725 East							
B-012-0-21	1.25	-	6	0.0 - 1.5	12	-	14
Roadway Segment: SR-725 West							
B-002-0-21	-	10	0	1.0 - 2.5	12	-	14
B-010-0-21	-	7	4	1.0 - 2.5	15	-	14
B-012-0-21	1.25	-	6	0.0 - 1.5	12	-	14
Roadway Segment: Ramp D							
B-022-0-21	-	11	4	0.5 - 2.0	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 subgrade within the limits of each proposed roadway segment are shown in Table 7 below.

Table 7: High Moisture Content Soils Location Summary

Boring ID	Moisture Content (%)	Optimum Moisture Content (%)	Depth Below Subgrade (ft)
Roadway Segment: SR-725			
B-013-0-21	13	10	0.5 - 3.0
Roadway Segment: Ramp A			
B-015-0-21	22	18	1.5 - 3.0
Roadway Segment: Ramp B			
B-017-0-21	19	16	0.0 - 1.4
Roadway Segment: Ramp C			
B-020-0-21	14	10	0.6 - 2.1
Roadway Segment: Ramp D			
B-023-0-21	23	10	0.0 - 1.5
B-024-0-21	13	10	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 throughout more than 30 percent of the project area. Subgrade soils designated as "unstable" were encountered at the various locations identified in Section 5.1.3 of this report. Guidance from ODOT's GB1 states that *"For all other roadways, if it is determined that 30 percent or more of the subgrade area must*

be stabilized, consideration should be given to stabilizing the entire project (global stabilization)". **However, Ramp D has sections of proposed full depth pavement that is narrower than 8 ft width which typical chemical stabilization equipment cannot stabilize, NEAS recommend local stabilization in the form of Excavate and Replace using Item 204 Granular Materials Type C for the selected roadway areas that needs stabilization**. Our recommended limits for the indicated project subgrade stabilization are provided in Table 8 below.

Table 8: Stabilization Recommendations

Start Station	End Station	Excavate and Replace w/ Item 204[(1)] (inches)	Chemical Stabilization (inches)	Unsuitable Subgrade Conditions	Borings Considered
SR-725 West					
Begin Project	455+04	12	14	N/A	B-002-0-21
468+42	471+45	15	14	N/A	B-010-0-21
Ramp D					
905+76	909+31	12	14	N/A	B-022-0-21

Notes:
1. Excavate and Replace depths for areas where Chemical Stabilization is not feasible.

5.2.2. Chemical Stabilization

Another stabilization option is chemical stabilization utilizing Cement as a stabilization chemical. Designer should perform a cost analysis of the stabilization options using bid tabs. Generally, chemical stabilization is more economical when stabilizing large areas (approximately greater than 1 mile of roadway) per ODOT's GB1.

The local chemical stabilization of the referenced mainline and ramp subgrade soils included within this project, should be performed to a minimum depth of 12 inches utilizing cement as the stabilizing chemical. 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 addition will be 5% using the following formula.

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

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 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. Generalized Soil Profile for Analysis

Each boring log was reviewed, and a generalized material profile was developed for analysis purposes. Utilizing the generalized soil profile, engineering properties for each soil strata were estimated based on the 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 use (with sited correlation/reference material) are summarized within Tables 9 through 16 below.

Table 9: Soil Profile and Estimated Engineering Properties - At Boring B-002-0-21

Retaining Wall: Soil Profile, B-002-0-21						
Soil Description	**Unit Weight[1] (pcf)**	**Moist Unit Weight[1] (pcf)**	**Saturated Unit Weight[1] (pcf)**	**Undrained Shear Strength[2] (psf)**	**Effective Cohesion[3] (psf)**	**Effective Friction Angle[3] (degrees)**
Sandy Silt Elevation (961.2 ft - 954.2 ft)	108	108	118	1,050	100	22
Sandy Silt Elevation (954.2 ft - 944.2 ft)	112	112	122	2,300	150	24
Coarse and Fine Sand Elevation (944.2 ft - 936.7 ft)	115	115	125	-	-	32
Sandy Silt Elevation (936.7 ft - 934.7 ft)	112	112	122	2,850	150	25

Notes:
1. *Values interpreted from Geotechnical Bulletin 7 Table 1.*
2. *Values calculated from Terzaghi and Peck (1967) if $N1_{60}$<52, else Stroud and Butler (1975) was used.*
3. *Values interpreted from Geotechnical Bulletin 7 Table 2.*

Table 10: Soil Profile and Estimated Engineering Properties - At Boring B-003-0-21

Retaining Wall: Soil Profile, B-003-0-21						
Soil Description	**Unit Weight[1] (pcf)**	**Moist Unit Weight[1] (pcf)**	**Saturated Unit Weight[1] (pcf)**	**Undrained Shear Strength[2] (psf)**	**Effective Cohesion[3] (psf)**	**Effective Friction Angle[3] (degrees)**
Gravel with Sand and Silt Elevation (958.1 ft - 953.6 ft)	112	112	122	-	-	32
Sandy Silt Elevation (953.6 ft - 951.1 ft)	108	108	118	950	100	22
Gravel with Sand and Silt Elevation (951.1 ft - 948.6 ft)	115	115	125	-	-	32
Sandy Silt Elevation (948.6 ft - 943.6 ft)	110	110	120	2,150	115	24
Gravel with Sand, Silt and Clay Elevation (943.6 ft - 941.1 ft)	115	115	125	-	-	32
Sandy Silt Elevation (941.1 ft - 931.6 ft)	110	110	120	2,100	115	24

Notes:
1. *Values interpreted from Geotechnical Bulletin 7 Table 1.*
2. *Values calculated from Terzaghi and Peck (1967) if $N1_{60}$<52, else Stroud and Butler (1975) was used.*
3. *Values interpreted from Geotechnical Bulletin 7 Table 2.*

Table 11: Soil Profile and Estimated Engineering Properties - At Boring B-005-0-21

Retaining Wall: Soil Profile, B-005-0-21						
Soil Description	**Unit Weight[1] (pcf)**	**Moist Unit Weight[1] (pcf)**	**Saturated Unit Weight[1] (pcf)**	**Undrained Shear Strength[2] (psf)**	**Effective Cohesion[3] (psf)**	**Effective Friction Angle[3] (degrees)**
Gravel with Sand Elevation (951.6 ft - 944.6 ft)	108	108	118	-	-	28
Silt and Clay Elevation (944.6 ft - 939.6 ft)	112	112	122	2,400	150	25
Sandy Silt Elevation (939.6 ft - 929.6 ft)	118	118	128	4,050	200	26
Sandy Silt Elevation (929.6 ft - 925.1 ft)	125	125	135	-	-	35

Notes:
1. *Values interpreted from Geotechnical Bulletin 7 Table 1.*
2. *Values calculated from Terzaghi and Peck (1967) if $N1_{60}$<52, else Stroud and Butler (1975) was used.*
3. *Values interpreted from Geotechnical Bulletin 7 Table 2.*

Table 12: Soil Profile and Estimated Engineering Properties - At Boring B-006-0-21

Retaining Wall: Soil Profile, B-006-0-21						
Soil Description	**Unit Weight[1] (pcf)**	**Moist Unit Weight[1] (pcf)**	**Saturated Unit Weight[1] (pcf)**	**Undrained Shear Strength[2] (psf)**	**Effective Cohesion[3] (psf)**	**Effective Friction Angle[3] (degrees)**
Gravel with Sand Elevation (952.5 ft - 945.5 ft)	118	118	128	-	-	35
Sandy Silt Elevation (945.5 ft - 926 ft)	115	115	125	3,300	180	25
Notes: *1. Values interpreted from Geotechnical Bulletin 7 Table 1.* *2. Values calculated from Terzaghi and Peck (1967) if $N1_{60}$<52, else Stroud and Butler (1975) was used.* *3. Values interpreted from Geotechnical Bulletin 7 Table 2.*						

Table 13: Soil Profile and Estimated Engineering Properties - At Boring B-007-0-21

Retaining Wall: Soil Profile, B-007-0-21						
Soil Description	**Unit Weight[1] (pcf)**	**Moist Unit Weight[1] (pcf)**	**Saturated Unit Weight[1] (pcf)**	**Undrained Shear Strength[2] (psf)**	**Effective Cohesion[3] (psf)**	**Effective Friction Angle[3] (degrees)**
Gravel with Sand and Silt Elevation (953.7 ft - 946.7 ft)	115	115	125	-	-	33
Sandy Silt Elevation (946.7 ft - 941.7 ft)	115	115	125	3,000	180	25
Sandy Silt Elevation (941.7 ft - 939.2 ft)	115	115	125	-	-	33
Silt Elevation (939.2 ft - 929.2 ft)	115	115	125	3,400	180	25
Sandy Silt Elevation (929.2 ft - 927.2 ft)	118	118	128	-	-	32
Notes: *1. Values interpreted from Geotechnical Bulletin 7 Table 1.* *2. Values calculated from Terzaghi and Peck (1967) if $N1_{60}$<52, else Stroud and Butler (1975) was used.* *3. Values interpreted from Geotechnical Bulletin 7 Table 2.*						

Table 14: Soil Profile and Estimated Engineering Properties - At Boring B-008-0-21

Retaining Wall: Soil Profile, B-008-0-21						
Soil Description	**Unit Weight[1] (pcf)**	**Moist Unit Weight[1] (pcf)**	**Saturated Unit Weight[1] (pcf)**	**Undrained Shear Strength[2] (psf)**	**Effective Cohesion[3] (psf)**	**Effective Friction Angle[3] (degrees)**
Sandy Silt Elevation (958.1 ft - 943.6 ft)	110	110	120	1,550	115	23
Sandy Silt Elevation (943.6 ft - 936.1 ft)	115	115	125	3,050	180	25
Sandy Silt Elevation (936.1 ft - 931.6 ft)	130	130	140	6,650	250	28
Notes: *1. Values interpreted from Geotechnical Bulletin 7 Table 1.* *2. Values calculated from Terzaghi and Peck (1967) if $N1_{60}$<52, else Stroud and Butler (1975) was used.* *3. Values interpreted from Geotechnical Bulletin 7 Table 2.*						

Table 15: Soil Profile and Estimated Engineering Properties - At Boring B-009-0-21

Retaining Wall: Soil Profile, B-009-0-21						
Soil Description	**Unit Weight[1] (pcf)**	**Moist Unit Weight[1] (pcf)**	**Saturated Unit Weight[1] (pcf)**	**Undrained Shear Strength[2] (psf)**	**Effective Cohesion[3] (psf)**	**Effective Friction Angle[3] (degrees)**
Silt and Clay Elevation (961.7 ft - 944.7 ft)	112	112	122	2,550	150	25
Silt and Clay Elevation (944.7 ft - 939.2 ft)	120	120	130	4,300	225	27
Notes: *1. Values interpreted from Geotechnical Bulletin 7 Table 1.* *2. Values calculated from Terzaghi and Peck (1967) if $N1_{60}$<52, else Stroud and Butler (1975) was used.* *3. Values interpreted from Geotechnical Bulletin 7 Table 2.*						

Table 16: Soil Profile and Estimated Engineering Properties - At Boring B-010-0-21

Retaining Wall: Soil Profile, B-010-0-21						
Soil Description	Unit Weight[1] (pcf)	Moist Unit Weight[1] (pcf)	Saturated Unit Weight[1] (pcf)	Undrained Shear Strength[2] (psf)	Effective Cohesion[3] (psf)	Effective Friction Angle[3] (degrees)
Sandy Silt Elevation (974.2 ft - 947.7 ft)	112	112	122	2,400	150	25

Notes:
1. *Values interpreted from Geotechnical Bulletin 7 Table 1.*
2. *Values calculated from Terzaghi and Peck (1967) if $N1_{60}$<52, else Stroud and Butler (1975) was used.*
3. *Values interpreted from Geotechnical Bulletin 7 Table 2.*

5.4. Generalized Soil Parameters for Laterally Loaded Shaft Analysis

Since RW 2 and RW 4 were proposed as soldier pile lagging wall, deep foundation elements will be subjected to lateral loads. Maximum bending moment, maximum shear force and lateral deflection need to be checked whether the foundation element is structurally capable of resisting the lateral loads. For the purpose of evaluating the shaft resistance in the lateral direction, the generalized soil parameters, to be used to analyze the laterally loaded shaft by the p-y curve method using the software entitled Lpile by Ensoft, Inc., are shown in Table 17 below.

Table 17: Generalized Soil Parameters for Laterally Loaded Shaft Analysis

p-y Curve Model	Elevation (ft)	Undrained Shear Strength, S_u (psf)	Soil Modulus Parameter, k (lb/in^3)	Soil Strain Parameter, E_{50}
B-002-0-21				
Stiff Clay w/o Water	961.2 - 954.2	1050	281	0.0088
Stiff Clay w/o Water	954.2 - 944.2	2300	813	0.0056
Sand (Reese)	944.2 - 936.7	-	140	-
Stiff Clay with Water	936.7 - 934.7	2850	1000	0.0051
B-003-0-21				
Sand (Reese)	958.1 - 953.6	-	179	-
Stiff Clay w/o Water	953.6 - 951.1	950	222	0.0095
Sand (Reese)	951.1 - 948.6	-	179	-
Stiff Clay w/o Water	948.6 - 943.6	2150	750	0.0059
Sand (Reese)	943.6 - 941.1	-	140	-
Stiff Clay with Water	941.1 - 931.6	2100	729	0.0060
B-010-0-21				
Stiff Clay with Water	974.2 - 947.7	2400	833	0.0056

6. QUALIFICATIONS

This investigation was performed in accordance with accepted geotechnical engineering practice for the purpose of characterizing the subsurface conditions at the site of Retaining Walls for the MOT-725-14.41 (PID 108619) project. This data report has been prepared for JMT, ODOT and their design consultants to be used solely in evaluating the soils underlying the retaining wall site. 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, and laboratory test results from representative soil samples. 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 in the nature, design or location of the proposed retaining walls is made, 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 JMT in performing this geotechnical exploration for the MOT-725-14.41 project. Please call if there are any questions, or if we can be of further service.

Respectfully Submitted,
National Engineering and Architectural Services Inc.

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Geotechnical Engineer

Chunmei (Melinda) He, Ph.D., P.E.
Project Manager/Geotechnical Engineer

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APPENDIX A

BORING LOCATION PLAN

P:\PROPOSALS\MOT-725-14.41\108619\geotechnical\docs\Geotechnical Fee Proposal\Target Boring Plan\Boring_Location_Plan_1.dgn Sheet 8/12/2021 4:57:38 PM mjasiewicz

9 →	MOT-725-14.41	TARGET BORING PLAN SR 725 & RETAINING WALLS	DRAWN MWJ CHECKED EC	0 50 25 100 HORIZONTAL SCALE IN FEET

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6 / 2	MOT-725-14.41	TARGET BORING PLAN SR 725 & RETAINING WALLS	DRAWN MWJ CHECKED EC	0 50 25 100 HORIZONTAL SCALE IN FEET

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3 of 3	MOT-725-14.41	TARGET BORING PLAN RAMP A	DRAWN MWJ CHECKED EC	0 50 25 100 HORIZONTAL SCALE IN FEET

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6 / 4	MOT-725-14.41	TARGET BORING PLAN RAMP B	DRAWN MWJ CHECKED EC	0 50 25 100 HORIZONTAL SCALE IN FEET

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6 / 5	MOT-725-14.41	TARGET BORING PLAN RAMP C	DRAWN MWJ CHECKED EC	0 50 25 100 HORIZONTAL SCALE IN FEET

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6 of 6	MOT-725-14.41	TARGET BORING PLAN RAMP D	DRAWN MWJ CHECKED EC	0 50 25 100 HORIZONTAL SCALE IN FEET

APPENDIX B

BORING LOGS

PROJECT: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 751+28, 1' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: EX. SR-725
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 971.5 (MSL) EOB: 7.5 ft.
START: 3/10/22 END: 3/10/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.640234, -84.235747

EXPLORATION ID B-001-0-21

MATERIAL DESCRIPTION AND NOTES	ELEV. 971.5	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)	970.0	1																	
STIFF TO VERY STIFF, BROWN, **SANDY SILT**, LITTLE GRAVEL, LITTLE CLAY, SS-1 CONTAINS NO INTACT SOIL FOR HP READINGS, DAMP		2	6 6 5	13	56	SS-1	-	16	20	20	31	13	20	13	7	13	A-4a (2)	33	
		3	5 7 7	17	44	SS-2	2.00	19	22	19	28	12	21	14	7	12	A-4a (1)	-	
	966.5	4	4			SS-3A	1.75	-	-	-	-	-	-	-	-	12	A-4a (V)	-	
MEDIUM DENSE, BROWN, **GRAVEL WITH SAND**, TRACE SILT, TRACE CLAY, DAMP	965.5	5	5 4	11	56	SS-3B	-	-	-	-	-	-	-	-	-	7	A-1-b (V)	-	
VERY STIFF, BROWN, **SANDY SILT**, LITTLE CLAY, LITTLE GRAVEL, DAMP	964.0	6	4 5 6	13	50	SS-4	2.75	-	-	-	-	-	-	-	-	11	A-4a (V)	-	
EOB		7																	

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: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 754+31, 45' RT.
TYPE: RETAINING WALL	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: EX. SR-725
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 961.2 (MSL) EOB: 26.5 ft.
START: 3/7/22 END: 3/7/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.640073, -84.234692

EXPLORATION ID B-002-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 961.2	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)	959.7																		
VERY STIFF TO HARD, GRAY, **SANDY SILT**, SOME CLAY, LITTLE GRAVEL, DAMP			3 4 4	10	50	SS-1	4.50	15	12	15	37	21	21	14	7	10	A-4a (5)	540	
			3 3 4	8	28	SS-2	4.25	-	-	-	-	-	-	-	-	11	A-4a (V)	-	
			5 6 8	17	61	SS-3	4.50	-	-	-	-	-	-	-	-	12	A-4a (V)	-	
			4 8 10	22	72	SS-4	4.25	-	-	-	-	-	-	-	-	12	A-4a (V)	-	
			5 6 8	17	78	SS-5	2.75	-	-	-	-	-	-	-	-	12	A-4a (V)	-	
	944.2		7 8 10	22	72	SS-6	2.25	-	-	-	-	-	-	-	-	13	A-4a (V)	-	
MEDIUM DENSE, GRAY, **COARSE AND FINE SAND**, SOME SILT, TRACE GRAVEL, TRACE CLAY, WET TO MOIST			6 8 10	22	78	SS-7	-	-	-	-	-	-	-	-	-	17	A-3a (V)	-	
			6 9 10	23	72	SS-8	-	-	-	-	-	-	-	-	-	13	A-3a (V)	-	
	936.7		6 8 9	21	67	SS-9	-	-	-	-	-	-	-	-	-	11	A-3a (V)	-	
VERY STIFF, GRAY, **SANDY SILT**, SOME CLAY, TRACE GRAVEL, MOIST	934.7	EOB	7 9 11	24	39	SS-10	3.00	3	5	24	43	25	16	12	4	14	A-4a (7)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. BORING OFFSET 12.0' NORTH.

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

PROJECT: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 755+83, 39' RT.
TYPE: RETAINING WALL	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: EX. SR-725
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 958.1 (MSL) EOB: 26.5 ft.
START: 3/7/22 END: 3/8/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.640021, -84.234172

EXPLORATION ID B-003-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 958.1	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)	956.6																		
MEDIUM DENSE, BROWNISH GRAY, **STONE FRAGMENTS WITH SAND AND SILT**, TRACE CLAY, CONTAINS ASPHALT FRAGMENTS, DAMP **(FILL)**	953.6		4 5 5	12	56	SS-1	-	-	-	-	-	-	-	-	-	10	A-2-4 (V)	-	
VERY STIFF, BROWNISH GRAY, **SANDY SILT**, LITTLE CLAY, LITTLE GRAVEL, DAMP	951.1		3 3 4	8	61	SS-2	3.00	11	14	17	39	19	20	13	7	12	A-4a (5)	-	
MEDIUM DENSE, GRAY, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, LITTLE CLAY, MOIST	948.6		7 5 7	15	50	SS-3	-	-	-	-	-	-	-	-	-	15	A-2-4 (V)	-	
STIFF TO VERY STIFF, GRAY, **SANDY SILT**, SOME CLAY, LITTLE GRAVEL, DAMP	943.6		4 6 8	17	56	SS-4	2.00	11	13	18	36	22	21	14	7	13	A-4a (5)	-	
			5 7 9	19	72	SS-5	3.25	-	-	-	-	-	-	-	-	12	A-4a (V)	-	
MEDIUM DENSE, GRAY, **STONE FRAGMENTS WITH SAND, SILT, AND CLAY**, MOIST	941.1		5 6 10	19	28	SS-6	-	-	-	-	-	-	-	-	-	15	A-2-6 (V)	-	
STIFF TO VERY STIFF, GRAY, **SANDY SILT**, LITTLE CLAY, LITTLE GRAVEL, DAMP	931.6		5 5 7	15	56	SS-7	1.75	17	12	16	35	20	19	13	6	12	A-4a (4)	-	
			5 6 7	16	78	SS-8	2.50	-	-	-	-	-	-	-	-	13	A-4a (V)	-	
			6 7 7	17	78	SS-9	3.25	-	-	-	-	-	-	-	-	13	A-4a (V)	-	
		EOB	5 8 10	22	78	SS-10	2.25	-	-	-	-	-	-	-	-	12	A-4a (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. BORING OFFSET 12.0' NORTH.

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

PROJECT: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 617+97, 11' RT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: PROP. RAMP A EAST
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 954.0 (MSL) EOB: 10.0 ft.
START: 2/23/22 END: 2/23/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.639599, -84.233602

EXPLORATION ID B-004-0-21

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
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	954.0																		
HARD, GRAYISH BROWN, **SANDY SILT**, SOME CLAY, LITTLE GRAVEL, DAMP	952.5	1	8 11 9	24	67	SS-1	4.50	20	10	16	33	21	21	13	8	8	A-4a (4)	87	
		2																	
		3																	
		4	6 7 6	16	72	SS-2	4.50	11	10	16	38	25	23	13	10	10	A-4a (6)	-	
		5																	
		6	6 5 4	11	56	SS-3	4.50	-	-	-	-	-	-	-	-	11	A-4a (V)	-	
		7																	
		8																	
		9	4 5 5	12	61	SS-4	4.50	-	-	-	-	-	-	-	-	10	A-4a (V)	-	
	944.0	EOB 10																	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. BORING OFFSET 15.0' WEST.

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

PROJECT: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 760+55, 48' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: EX. SR-725
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 951.6 (MSL) EOB: 26.5 ft.
START: 3/9/22 END: 3/9/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.639869, -84.232486

EXPLORATION ID B-005-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 951.6	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 5.0" BASE (DRILLERS DESCRIPTION)	950.0																		
VERY LOOSE TO LOOSE, BROWNISH GRAY, **GRAVEL WITH SAND**, TRACE TO LITTLE SILT, TRACE CLAY, MOIST TO WET	944.6		4 2 2	5	17	SS-1	-	34	32	19	11	4	NP	NP	NP	11	A-1-b (0)	60	
			2 1 1	2	33	SS-2	-	-	-	-	-	-	-	-	-	24	A-1-b (V)	-	
MEDIUM STIFF TO VERY STIFF, GRAY AND BROWN, **SILT AND CLAY**, SOME SAND, TRACE GRAVEL, MOIST TO DAMP	939.6		4 5 9	17	61	SS-3	1.00	9	11	16	35	29	28	15	13	20	A-6a (7)	-	
			8 8 11	23	72	SS-4	2.25	-	-	-	-	-	-	-	-	13	A-6a (V)	-	
HARD, GRAY, **SANDY SILT**, SOME CLAY, LITTLE GRAVEL, DAMP TO MOIST	929.6		7 10 12	27	61	SS-5	4.50	12	9	15	39	25	19	12	7	12	A-4a (6)	-	
			9 12 13	30	78	SS-6	4.50	-	-	-	-	-	-	-	-	11	A-4a (V)	-	
			10 12 16	34	50	SS-7	4.25	-	-	-	-	-	-	-	-	15	A-4a (V)	-	
			7 14 22	44	56	SS-8	4.25	-	-	-	-	-	-	-	-	14	A-4a (V)	-	
SOFT TO MEDIUM STIFF, GRAY, **SANDY SILT**, SOME CLAY, LITTLE STONE FRAGMENTS, WET	925.1		10 18 27	54	17	SS-9	0.50	-	-	-	-	-	-	-	-	22	A-4a (V)	-	
		EOB	11 17 31	58	11	SS-10	0.75	-	-	-	-	-	-	-	-	22	A-4a (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: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 761+34, 42' RT.
TYPE: RETAINING WALL	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: EX. SR-725
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 952.5 (MSL) EOB: 26.5 ft.
START: 3/8/22 END: 3/8/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.639566, -84.232321

EXPLORATION ID B-006-0-21

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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 6.0" BASE (DRILLERS DESCRIPTION)	952.5																		
MEDIUM DENSE TO DENSE, BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND**, LITTLE SILT, TRACE CLAY, CONTAINS ASPHALT FRAGMENTS, DAMP **(FILL)**	950.9	1																	
		2																	
		3	7 9 8	21	56	SS-1	-	33	32	16	15	4	NP	NP	NP	6	A-1-b (0)	40	
		4																	
		5	10 15 20	42	11	SS-2	-	-	-	-	-	-	-	-	-	5	A-1-b (V)	-	
	945.5	6																	
HARD, GRAY, **SANDY SILT**, LITTLE TO SOME CLAY, LITTLE GRAVEL, DAMP		7																	
		8	4 11 11	27	78	SS-3	4.50	18	10	17	35	20	19	13	6	10	A-4a (4)	-	
		9																	
		10	7 10 12	27	56	SS-4	4.50	-	-	-	-	-	-	-	-	11	A-4a (V)	-	
		11																	
		12	5 10 13	28	78	SS-5	4.50	-	-	-	-	-	-	-	-	12	A-4a (V)	-	
		13																	
		14	6 9 11	24	72	SS-6	4.50	-	-	-	-	-	-	-	-	10	A-4a (V)	-	
		15																	
		16	7 11 12	28	72	SS-7	4.50	-	-	-	-	-	-	-	-	13	A-4a (V)	-	
		17																	
		18	7 10 14	29	78	SS-8	4.50	-	-	-	-	-	-	-	-	13	A-4a (V)	-	
		19																	
		20	8 10 12	27	50	SS-9	4.50	-	-	-	-	-	-	-	-	10	A-4a (V)	-	
		21																	
		22	8 12 14	31	56	SS-10	4.50	-	-	-	-	-	-	-	-	11	A-4a (V)	-	
	926.0	23																	
	EOB	24																	
		25																	
		26																	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. BORING OFFSET 10.0' NORTH.

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

PROJECT: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 762+71, 39' RT.
TYPE: RETAINING WALL	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: EX. SR-725
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 953.7 (MSL) EOB: 26.5 ft.
START: 3/8/22 END: 3/8/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.639456, -84.231858

EXPLORATION ID B-007-0-21

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
13.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	953.7																		
	952.1																		
LOOSE TO MEDIUM DENSE, BROWN, **GRAVEL WITH SAND AND SILT**, TRACE CLAY, DAMP		1																	
		2																	
		3	15 13 10	28	39	SS-1	-	43	20	11	18	8	NP	NP	NP	7	A-2-4 (0)	-	
		4																	
		5	2 3 5	10	50	SS-2	-	-	-	-	-	-	-	-	-	7	A-2-4 (V)	-	
	946.7	6																	
HARD, GRAY, **SANDY SILT**, SOME CLAY, LITTLE GRAVEL, DAMP TO MOIST		7																	
		8	7 10 8	22	78	SS-3	4.50	11	7	15	38	29	22	14	8	11	A-4a (6)	-	
		9																	
		10																	
		11	3 10 13	28	56	SS-4	4.25	-	-	-	-	-	-	-	-	15	A-4a (V)	-	
	941.7	12																	
MEDIUM DENSE, BROWNISH GRAY, **SANDY SILT**, SOME CLAY, TRACE GRAVEL, MOIST		13	5 9 11	24	61	SS-5	-	9	6	23	40	22	NP	NP	NP	16	A-4a (5)	-	
	939.2	14																	
HARD, GRAY AND BROWNISH GRAY, **SILT**, SOME TO "AND" CLAY, LITTLE SAND, TRACE GRAVEL, DAMP TO MOIST		15																	
		16	6 12 13	30	78	SS-6	4.50	4	4	7	50	35	22	14	8	15	A-4b (8)	-	
		17																	
		18	7 11 13	29	72	SS-7	4.25	-	-	-	-	-	-	-	-	14	A-4b (V)	-	
		19																	
		20																	
		21	6 10 12	27	72	SS-8	4.50	-	-	-	-	-	-	-	-	14	A-4b (V)	-	
		22																	
		23	7 11 12	28	67	SS-9	4.50	-	-	-	-	-	-	-	-	15	A-4b (V)	-	
	929.2	24																	
SOFT TO MEDIUM STIFF, GRAY, **SANDY SILT**, SOME CLAY, SOME GRAVEL, MOIST		25																	
	927.2	26	8 10 14	29	50	SS-10	0.50	-	-	-	-	-	-	-	-	17	A-4a (V)	-	
		EOB																	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. BORING OFFSET 10.0' NORTH.

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

PROJECT: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 764+84, 40' RT.
TYPE: RETAINING WALL	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: EX. SR-725
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 958.1 (MSL) EOB: 26.5 ft.
START: 3/9/22 END: 3/9/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.639268, -84.231140

EXPLORATION ID B-008-0-21

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
13.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	958.1																		
	956.5																		
STIFF TO HARD, GRAYISH BROWN BECOMING GRAY, **SANDY SILT**, SOME CLAY, LITTLE GRAVEL, DAMP TO MOIST		1																	
		2																	
		3	5 8 4	15	17	SS-1	4.50	14	11	16	35	24	22	14	8	11	A-4a (5)	-	
		4																	
		5	3 3 2	6	22	SS-2	4.50	-	-	-	-	-	-	-	-	12	A-4a (V)	-	
		6																	
		7	3 5 7	15	33	SS-3	1.75	-	-	-	-	-	-	-	-	10	A-4a (V)	-	
		8																	
		9																	
		10	4 5 10	18	67	SS-4	3.00	15	9	18	36	22	20	13	7	12	A-4a (5)	-	
		11																	
		12																	
		13	3 4 6	12	72	SS-5	2.00	-	-	-	-	-	-	-	-	13	A-4a (V)	-	
		14																	
		15																	
		16	6 8 10	22	61	SS-6	1.50	-	-	-	-	-	-	-	-	15	A-4a (V)	-	
		17																	
		18	7 11 15	31	78	SS-7	4.50	-	-	-	-	-	-	-	-	12	A-4a (V)	-	
		19																	
		20																	
		21	10 6 14	24	61	SS-8	3.00	-	-	-	-	-	-	-	-	14	A-4a (V)	-	
		22																	
		23	15 14 24	46	44	SS-9	2.50	-	-	-	-	-	-	-	-	14	A-4a (V)	-	
		24																	
		25																	
	931.6	26	12 24 32	68	56	SS-10	4.25	-	-	-	-	-	-	-	-	13	A-4a (V)	-	
		EOB																	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. BORING OFFSET 10.0' NORTH.

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

STANDARD ODOT LOG W/ SULFATES (8.5 X 11) - OH DOT.GDT - 4/14/22 15:30 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\MOT-725-14.41\GINT FILES\MOT-725-14.41.GPJ

PROJECT: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 766+26, 40' RT.
TYPE: RETAINING WALL	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: EX. SR-725
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 961.7 (MSL) EOB: 25.5 ft.
START: 3/9/22 END: 3/9/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.639146, -84.230662

EXPLORATION ID B-009-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 961.7	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 6.0" BASE (DRILLERS DESCRIPTION)	960.1																		
HARD, GRAYISH BROWN, **SILT AND CLAY**, SOME SAND, TRACE TO LITTLE GRAVEL, DAMP			10 7 8	18	44	SS-1	4.25	12	11	17	35	25	25	14	11	12	A-6a (5)	-	
			7 9 12	25	56	SS-2	4.50	-	-	-	-	-	-	-	-	11	A-6a (V)	-	
			4 7 10	21	61	SS-3	4.25	-	-	-	-	-	-	-	-	12	A-6a (V)	-	
			4 6 8	17	72	SS-4	4.25	-	-	-	-	-	-	-	-	11	A-6a (V)	-	
			5 8 10	22	56	SS-5	4.25	-	-	-	-	-	-	-	-	10	A-6a (V)	-	
			6 9 12	25	72	SS-6	4.50	-	-	-	-	-	-	-	-	12	A-6a (V)	-	
			11 13 15	34	78	SS-7	4.50	-	-	-	-	-	-	-	-	12	A-6a (V)	-	
			8 12 19	38	50	SS-8	4.25	-	-	-	-	-	-	-	-	12	A-6a (V)	-	
	939.2																		
BOULDERY ZONE			50/1"	-	100	SS-9	-	-	-	-	-	-	-	-	-	2		-	
SS-25 CONTAINS NO RECOVERY	936.2	EOB	50	-	0	SS-10	-	-	-	-	-	-	-	-	-	-		-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. BORING OFFSET 10.0' NORTH.

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

PROJECT: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 769+93, 55' RT.
TYPE: RETAINING WALL	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: EX. SR-725
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 974.2 (MSL) EOB: 26.5 ft.
START: 2/25/22 END: 2/25/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.638790, -84.229443

EXPLORATION ID B-010-0-21

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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)	974.2																		
	972.7																		
STIFF TO HARD, BROWN AND GRAY BECOMING GRAY, **SANDY SILT**, SOME CLAY, TRACE TO LITTLE GRAVEL, SS-1 CONTAINS ROOTS, DAMP		1																	
		2																	
		3	3 2 4	7	67	SS-1	2.00	17	12	17	33	21	23	15	8	14	A-4a (4)	-	
		4																	
		5	5 9 11	24	67	SS-2	4.25	9	12	17	38	24	21	14	7	12	A-4a (5)	-	
		6																	
		7																	
		8	5 10 10	24	78	SS-3	4.50	-	-	-	-	-	-	-	-	12	A-4a (V)	-	
		9																	
		10	6 11 12	28	33	SS-4	4.50	-	-	-	-	-	-	-	-	11	A-4a (V)	-	
		11																	
		12																	
		13	6 10 11	25	56	SS-5	4.25	12	10	18	37	23	20	13	7	11	A-4a (5)	-	
		14																	
		15	5 8 10	22	67	SS-6	4.50	-	-	-	-	-	-	-	-	12	A-4a (V)	-	
		16																	
		17																	
		18	6 6 8	17	72	SS-7	3.25	-	-	-	-	-	-	-	-	13	A-4a (V)	-	
		19																	
		20	6 7 9	19	78	SS-8	3.00	-	-	-	-	-	-	-	-	12	A-4a (V)	-	
		21																	
		22																	
		23	5 7 6	16	50	SS-9	2.25	-	-	-	-	-	-	-	-	13	A-4a (V)	-	
		24																	
		25																	
		26	6 6 9	18	56	SS-10	2.50	-	-	-	-	-	-	-	-	13	A-4a (V)	-	
	947.7	EOB																	

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: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 772+20, 50' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: EX. SR-725
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 980.8 (MSL) EOB: 7.5 ft.
START: 3/1/22 END: 3/1/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.638866, -84.228560

EXPLORATION ID B-011-0-21

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MATERIAL DESCRIPTION AND NOTES	ELEV. 980.8	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 7.0" BASE (DRILLERS DESCRIPTION)	979.2																		
HARD, BROWNISH GRAY BECOMING BROWN MOTTLED WITH GRAY, **SANDY SILT**, SOME CLAY, TRACE TO LITTLE GRAVEL, DAMP			3 4 6	12	56	SS-1	4.50	16	9	16	36	23	20	13	7	9	A-4a (5)	73	
			5 7 8	18	61	SS-2	4.50	-	-	-	-	-	-	-	-	10	A-4a (V)	-	
			6 9 10	23	72	SS-3	4.50	-	-	-	-	-	-	-	-	10	A-4a (V)	-	
	973.3	EOB	7 10 11	25	78	SS-4	4.50	9	13	17	37	24	25	15	10	13	A-4a (5)	-	

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: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 775+42, 41' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: EX. SR-725
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 990.1 (MSL) EOB: 7.5 ft.
START: 3/1/22 END: 3/1/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.638563, -84.227486

EXPLORATION ID B-012-0-21

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MATERIAL DESCRIPTION AND NOTES	ELEV. 990.1	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 6.0" BASE (DRILLERS DESCRIPTION)	988.5	1																	
STIFF TO VERY STIFF, BROWNISH GRAY, **CLAY**, SOME SILT, LITTLE SAND, LITTLE GRAVEL, CONTAINS ASPHALT FRAGMENTS, MOIST		2	4 4 4	10	44	SS-1	1.25	17	6	14	29	34	46	19	27	24	A-7-6 (13)	73	
	985.6	3	4 3 4	8	56	SS-2	2.25	-	-	-	-	-	-	-	-	22	A-7-6 (V)	-	
VERY STIFF, BROWN MOTTLED WITH GRAY, **CLAY**, SOME SILT, SOME SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, MOIST		4 5	4 4 6	12	72	SS-3	2.50	6	6	16	33	39	41	18	23	22	A-7-6 (13)	-	
	982.6	6 7 EOB	4 6 6	15	67	SS-4	3.00	-	-	-	-	-	-	-	-	24	A-7-6 (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: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 778+84, 30' LT.	EXPLORATION ID B-013-0-21
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: EX. SR-725	
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 995.4 (MSL) EOB: 7.5 ft.	PAGE 1 OF 1
START: 3/1/22 END: 3/1/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.638249, -84.226344	

MATERIAL DESCRIPTION AND NOTES	ELEV. 995.4	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 6.0" BASE (DRILLERS DESCRIPTION)	993.8																		
VERY STIFF TO HARD, BROWN, **SANDY SILT**, LITTLE TO SOME CLAY, TRACE TO LITTLE GRAVEL, DAMP		1 2 3 4 5 6 7	5 6 5	13	67	SS-1	4.50	10	12	19	37	22	20	13	7	10	A-4a (5)	53	
			3 5 7	15	72	SS-2	4.25	-	-	-	-	-	-	-	-	13	A-4a (V)	-	
			4 5 7	15	61	SS-3	3.25	12	12	19	37	20	20	13	7	12	A-4a (4)	-	
	987.9	EOB	4 5 6	13	78	SS-4	4.50	-	-	-	-	-	-	-	-	10	A-4a (V)	-	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. BORING OFFSET 3.0' NORTH, OFF SHOULDER.

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

PROJECT: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 605+63, 22' RT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: PROP. RAMP A EAST
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 1000.0 (MSL) EOB: 10.0 ft.
START: 2/23/22 END: 2/23/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.636586, -84.231793

EXPLORATION ID B-014-0-21

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MATERIAL DESCRIPTION AND NOTES	ELEV. 1000.0	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)	998.5																		
MEDIUM DENSE, BROWNISH GRAY, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, LITTLE CLAY, DAMP	994.5	1	5 10 12	27	61	SS-1	-	28	18	22	21	11	NP	NP	NP	7	A-2-4 (0)	60	
		2																	
		3																	
		4	5 6 8	17	78	SS-2	-	-	-	-	-	-	-	-	-	10	A-2-4 (V)	-	
		5																	
HARD, BROWNISH GRAY, **SILT AND CLAY**, TRACE SAND, TRACE GRAVEL, DAMP	992.0	6	6 7 9	19	67	SS-3	4.50	1	2	6	38	53	30	17	13	17	A-6a (9)	-	
		7																	
MEDIUM DENSE, GRAY, **GRAVEL WITH SAND**, LITTLE SILT, TRACE CLAY, DAMP	990.0	8																	
		9	6 8 12	24	72	SS-4	-	-	-	-	-	-	-	-	-	3	A-1-b (V)	-	
		EOB 10																	

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: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 609+94, 5' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: PROP. RAMP A EAST
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 983.6 (MSL) EOB: 7.5 ft.
START: 2/23/22 END: 2/23/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.637589, -84.232618

EXPLORATION ID B-015-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 983.6	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
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	982.1	1																	
MEDIUM DENSE, BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND**, LITTLE SILT, TRACE CLAY, DAMP	980.6	2	5 7 7	17	17	SS-1	-	-	-	-	-	-	-	-	-	8	A-1-b (V)	60	
VERY STIFF, DARK GRAY AND GRAY, **CLAY**, SOME SILT, SOME SAND, TRACE GRAVEL, SLIGHTLY ORGANIC, SS-3 CONTAINS A 1.0" SILT SEAM, MOIST	977.6	3 4 5	5 4 4	10	67	SS-2	3.00	6	5	17	34	38	43	21	22	22	A-7-6 (13)	-	
			6 7 8	18	72	SS-3	3.50	-	-	-	-	-	-	-	-	22	A-7-6 (V)	-	
VERY STIFF, ORANGISH BROWN AND GRAY, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, MOIST	976.1	6 7 EOB	7 8 12	24	67	SS-4	4.00	1	2	14	50	33	27	16	11	20	A-6a (8)	-	

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: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 613+49, 16' RT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: PROP. RAMP A EAST
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 970.8 (MSL) EOB: 11.5 ft.
START: 2/23/22 END: 2/23/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.638467, -84.233175

EXPLORATION ID B-016-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 970.8	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 7.0" BASE (DRILLERS DESCRIPTION)	969.2																		
HARD, BROWN, **SANDY SILT**, SOME GRAVEL, LITTLE CLAY, DAMP	966.3	1 2 3 4	4 7 8	18	56	SS-1	4.50	25	16	16	28	15	21	14	7	9	A-4a (2)	40	
MEDIUM DENSE, GRAY, **GRAVEL WITH SAND AND SILT**, TRACE CLAY, CONTAINS INTERBEDDED SILT SEAMS, DAMP	963.8	5 6 7	5 8 8	19	61	SS-2	-	-	-	-	-	-	-	-	-	10	A-2-4 (V)	-	
VERY STIFF, GRAY, **SANDY SILT**, SOME CLAY, TRACE GRAVEL, DAMP	959.3	8 9 10 11	7 6 6	15	67	SS-3	2.50	7	11	17	37	28	21	13	8	13	A-4a (6)	-	
EOB			5 4 6	12	61	SS-4	2.50	-	-	-	-	-	-	-	-	12	A-4a (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: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 703+15, 28' RT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: PROP. RAMP B
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 952.2 (MSL) EOB: 11.5 ft.
START: 2/25/22 END: 2/25/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.640805, -84.233286

EXPLORATION ID B-017-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 952.2	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
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	950.7																		
VERY STIFF, BROWN, **SILTY CLAY**, SOME SAND, TRACE GRAVEL, CONTAINS IRON STAINING, MOIST	947.7	1 2 3 4	4 6 10	19	61	SS-1	2.50	7	9	17	33	34	36	17	19	19	A-6b (10)	53	
HARD, BROWN, **SILT AND CLAY**, SOME SAND, LITTLE TO SOME GRAVEL, DAMP TO MOIST		5 6 7 8 9	5 6 9	18	78	SS-2	4.50	12	12	20	33	23	25	14	11	12	A-6a (5)	-	
			5 5 10	18	72	SS-3	4.50	-	-	-	-	-	-	-	-	11	A-6a (V)	-	
	940.7	10 11 EOB	4 6 7	16	89	SS-4	4.50	-	-	-	-	-	-	-	-	21	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: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 707+07, 16' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: PROP. RAMP B
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 945.1 (MSL) EOB: 7.5 ft.
START: 2/25/22 END: 2/25/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.641887, -84.233234

EXPLORATION ID B-018-0-21

PAGE 1 OF 1

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
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	943.6																		
DENSE, BROWNISH GRAY, **STONE FRAGMENTS WITH SAND AND SILT**, LITTLE CLAY, DAMP	942.1	1	7 13 20	40	50	SS-1	-	38	16	12	22	12	21	14	7	6	A-2-4 (0)	340	
VERY STIFF TO HARD, BROWNISH GRAY, **SANDY SILT**, LITTLE TO SOME CLAY, LITTLE TO SOME GRAVEL, DAMP		2	7 12 13	30	61	SS-2	4.50	13	15	20	33	19	19	12	7	7	A-4a (3)	-	
		3	7 10 11	25	67	SS-3	4.50	-	-	-	-	-	-	-	-	9	A-4a (V)	-	
	937.6	4	4 3 4	8	89	SS-4	2.25	-	-	-	-	-	-	-	-	12	A-4a (V)	-	
		EOB 5																	
		6																	
		7																	

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: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 806+52, 22' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: PROP. RAMP C
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 1000.3 (MSL) EOB: 7.5 ft.
START: 2/23/22 END: 2/23/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.636790, -84.230610

EXPLORATION ID B-019-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 1000.3	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 7.0" BASE (DRILLERS DESCRIPTION)	998.7	1																	
MEDIUM DENSE, BROWNISH GRAY, **GRAVEL WITH SAND AND SILT**, TRACE CLAY, DAMP	997.3	2	6 7 11	22	72	SS-1	-	21	21	24	24	10	NP	NP	NP	9	A-2-4 (0)	67	
HARD, BROWNISH GRAY, **SANDY SILT**, LITTLE CLAY, LITTLE GRAVEL, DAMP		3	5 7 8	18	78	SS-2	4.50	12	16	22	34	16	18	13	5	9	A-4a (3)	-	
		4	5 8 8	19	67	SS-3	4.50	-	-	-	-	-	-	-	-	10	A-4a (V)	-	
	992.8	5 EOB	7 8 9	21	78	SS-4	4.50	-	-	-	-	-	-	-	-	10	A-4a (V)	-	
		6																	
		7																	

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: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 810+42, 16' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: PROP. RAMP C
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 983.7 (MSL) EOB: 7.5 ft.
START: 2/23/22 END: 2/23/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.637849, -84.230370

EXPLORATION ID B-020-0-21

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
9.5" ASPHALT AND 7.5" BASE (DRILLERS DESCRIPTION)	983.7																		
	982.3																		
VERY STIFF TO HARD, BROWNISH GRAY BECOMING GRAYISH BROWN, **SANDY SILT**, LITTLE TO SOME GRAVEL AND STONE FRAGMENTS, LITTLE TO SOME CLAY, DAMP TO MOIST		1	7 8 5	16	67	SS-1	4.25	35	9	14	28	14	24	15	9	12	A-4a (1)	133	
		2																	
		3	4 5 7	15	72	SS-2	3.50	12	11	17	37	23	22	13	9	14	A-4a (5)	-	
		4																	
		5	5 5 9	17	67	SS-3	4.50	-	-	-	-	-	-	-	-	13	A-4a (V)	-	
		6																	
	976.2	7 EOB	6 9 11	24	89	SS-4	4.50	-	-	-	-	-	-	-	-	11	A-4a (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: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 953+04, 31' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: PROP. RAMP D EAST
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 958.6 (MSL) EOB: 7.5 ft.
START: 3/10/22 END: 3/10/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.639969, -84.230209

EXPLORATION ID B-021-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 958.6	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)	957.0	1																	
HARD, BROWN, **SANDY SILT**, SOME CLAY, TRACE GRAVEL, DAMP	955.6	2	12 15 18	40	56	SS-1	4.50	9	10	17	38	26	23	14	9	9	A-4a (6)	40	
HARD, BROWN, **SILT AND CLAY**, SOME SAND, TRACE TO LITTLE GRAVEL, DAMP		3	5 12 15	33	44	SS-2	4.50	10	12	18	36	24	24	13	11	10	A-6a (5)	-	
		4																	
		5	9 16 13	35	61	SS-3	4.50	-	-	-	-	-	-	-	-	12	A-6a (V)	-	
		6																	
	951.1	7 EOB	7 8 12	24	22	SS-4	4.50	-	-	-	-	-	-	-	-	11	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: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 907+74, 6' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: PROP. RAMP D WEST
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 953.3 (MSL) EOB: 7.5 ft.
START: 2/24/22 END: 2/24/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.640962, -84.230697

EXPLORATION ID B-022-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 953.3	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
13.0" ASPHALT AND 7.0" BASE (DRILLERS DESCRIPTION)	951.6																		
HARD, GRAY, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP	950.3		5 6 5	13	50	SS-1	4.50	3	6	13	47	31	38	19	19	18	A-6b (12)	0	
VERY STIFF TO HARD, GRAY, **SILT AND CLAY**, SOME SAND, TRACE GRAVEL, MOIST	947.3		4 5 4	11	44	SS-2	4.25	9	11	13	42	25	32	17	15	18	A-6a (8)	-	
			5 5 5	12	67	SS-3	3.75	-	-	-	-	-	-	-	-	18	A-6a (V)	-	
MEDIUM DENSE, GRAY, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, TRACE CLAY, DAMP	945.8	EOB	6 5 6	13	39	SS-4	-	-	-	-	-	-	-	-	-	11	A-2-4 (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: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 910+88, 6' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: PROP. RAMP D WEST
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 947.1 (MSL) EOB: 7.5 ft.
START: 2/24/22 END: 2/24/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.641666, -84.231336

EXPLORATION ID B-023-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 947.1	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 6.0" BASE (DRILLERS DESCRIPTION)	945.5	1																	
MEDIUM DENSE, BROWN, **GRAVEL WITH SAND AND SILT**, TRACE CLAY, WET	944.1	2	12 8 5	16	61	SS-1	-	25	30	17	20	8	NP	NP	NP	23	A-2-4 (0)	60	
HARD, BROWNISH GRAY, **SANDY SILT**, LITTLE TO SOME GRAVEL, LITTLE TO SOME CLAY, DAMP		3	5 8 9	21	44	SS-2	4.50	22	10	15	32	21	24	14	10	11	A-4a (4)	-	
		4																	
		5	6 8 11	23	50	SS-3	4.25	-	-	-	-	-	-	-	-	11	A-4a (V)	-	
		6																	
	939.6	7 EOB	7 9 14	28	56	SS-4	4.50	-	-	-	-	-	-	-	-	10	A-4a (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: MOT-725-14.41	DRILLING FIRM / OPERATOR: NEAS / JL	DRILL RIG: CME 45B	STATION / OFFSET: 914+04, 7' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / JL	HAMMER: CME AUTOMATIC	ALIGNMENT: PROP. RAMP D WEST
PID: 108619 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 1/24/22	ELEVATION: 941.2 (MSL) EOB: 7.5 ft.
START: 2/24/22 END: 2/24/22	SAMPLING METHOD: SPT	ENERGY RATIO (%): 72.6	LAT / LONG: 39.642484, -84.231661

EXPLORATION ID B-024-0-21

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 941.2	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 6.0" BASE (DRILLERS DESCRIPTION)	939.6																		
HARD, BROWNISH GRAY, **SILT AND CLAY**, SOME GRAVEL, SOME SAND, DAMP	938.2	1	4 5 7	15	56	SS-1	4.25	35	11	12	26	16	31	17	14	13	A-6a (2)	173	
MEDIUM DENSE, BROWNISH GRAY, **GRAVEL WITH SAND, SILT, AND CLAY**, DAMP TO MOIST		2	6 6 7	16	67	SS-2	-	47	10	11	20	12	26	14	12	13	A-2-6 (0)	-	
		3	7 8 9	21	56	SS-3	-	-	-	-	-	-	-	-	-	15	A-2-6 (V)	-	
	933.7	4	7 7 8	18	33	SS-4	-	-	-	-	-	-	-	-	-	14	A-2-6 (V)	-	
		EOB																	

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

APPENDIX C

PAVEMENT CORES

Core Photo: C-001-0-21

Latitude: 39.637589 **Longitude:** -84.232618
Elevation: 983.6

Core Information				
Core Diameter (in):			**4.00**	
Core Total Length (in):			**11.25**	
Layers	Core Composition & Thickness (in)			Remarks/ Condition
	Asphalt	Concrete	Brick	
1	1.75			Good
2	9.50			Good
3				
4				
Rebar Encountered	N/A			

Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

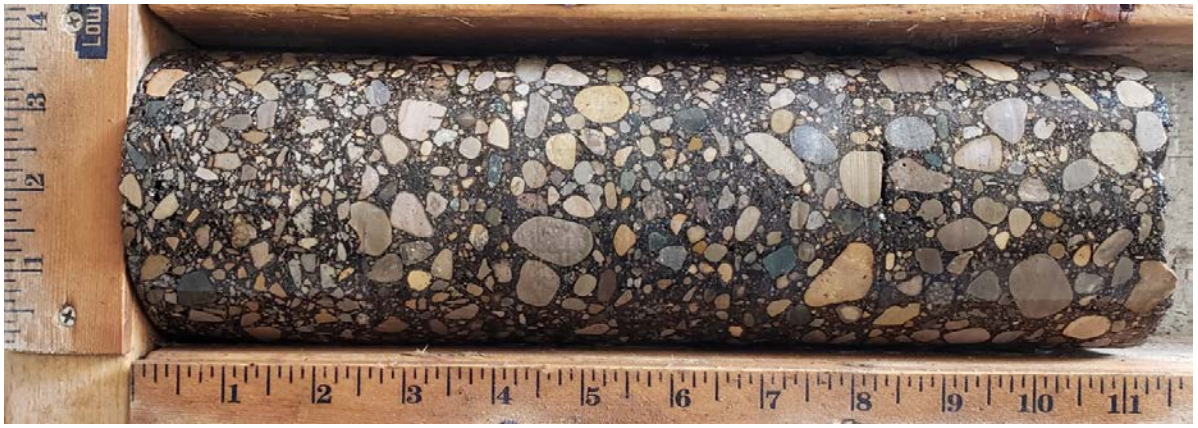
Roadway Project

MOT-725-14.41

ODOT PID# 108619

NEAS Project No.: 21-0072
Date: 3/14/2022
Taken By: LR
Scale: N/A

Core Photo: C-002-0-21



Latitude: 39.641887 **Longitude:** -84.233234
Elevation: 945.1

Core Information				
Core Diameter (in):			**4.00**	
Core Total Length (in):			**12.00**	
Layers	Core Composition & Thickness (in)			Remarks/ Condition
	Asphalt	Concrete	Brick	
1	12.00			Good
2				
3				
4				
Rebar Encountered	N/A			

Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

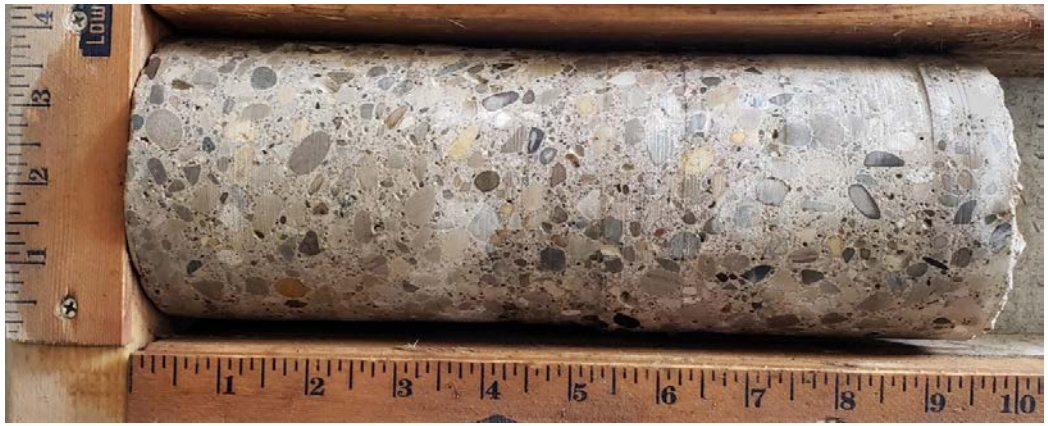
Roadway Project

MOT-725-14.41

ODOT PID# 108619

NEAS Project No.:	21-0072
Date:	3/14/2022
Taken By:	LR
Scale:	N/A

Core Photo: C-003-0-21



Latitude: 39.637849 **Longitude:** -84.230370
Elevation: 983.7

Core Information				
Core Diameter (in):			**4.00**	
Core Total Length (in):			**10.00**	
Layers	Core Composition & Thickness (in)			Remarks/ Condition
	Asphalt	Concrete	Brick	
1		10.00		Good
2				
3				
4				
Rebar Encountered	3/8" diameter at depths of 6.25" and 7.25"			

Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

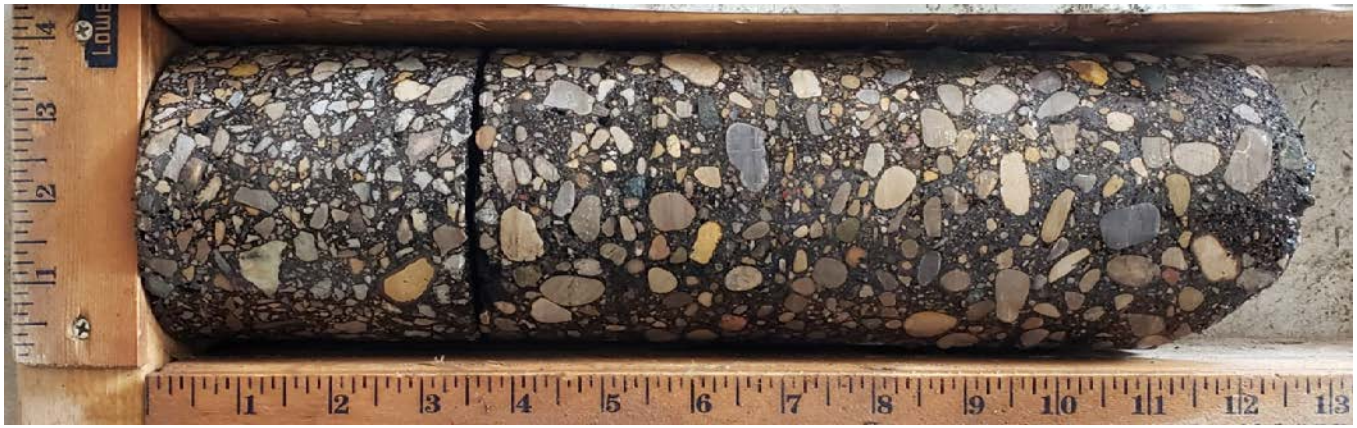
Roadway Project

MOT-725-14.41

ODOT PID# 108619

NEAS Project No.:	21-0072
Date:	3/14/2022
Taken By:	LR
Scale:	N/A

Core Photo: C-004-0-21



Latitude: 39.640962 **Longitude:** -84.230697
Elevation: 953.3

Core Information				
Core Diameter (in):			**4.00**	
Core Total Length (in):			**13.25**	
Layers	Core Composition & Thickness (in)			Remarks/ Condition
	Asphalt	Concrete	Brick	
1	3.50			Good
2	9.75			Good
3				
4				
Rebar Encountered	N/A			

Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project

MOT-725-14.41

ODOT PID# 108619

NEAS Project No.:	21-0072
Date:	3/14/2022
Taken By:	LR
Scale:	N/A

Core Photo: C-005-0-21

Latitude: 39.64007 **Longitude:** -84.234692
Elevation: 960.2

Core Information				
Core Diameter (in):			**4.00**	
Core Total Length (in):			**14.00**	
Layers	Core Composition & Thickness (in)			Remarks/ Condition
	Asphalt	Concrete	Brick	
1	1.50			Good
2	7.00			Good
3	5.50			Good
4				
Rebar Encountered	N/A			

Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

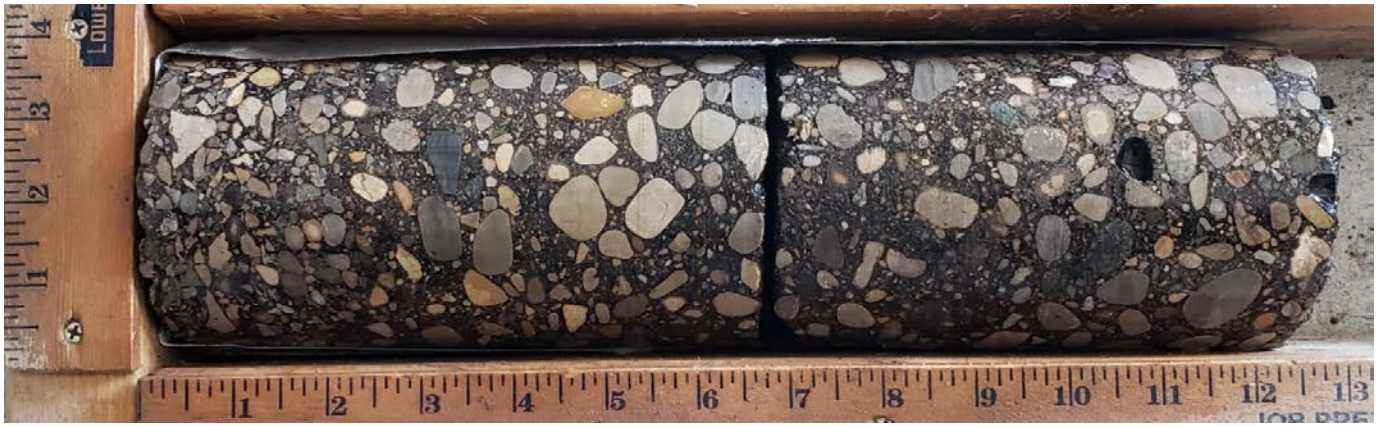
Roadway Project

MOT-725-14.41

ODOT PID# 108619

NEAS Project No.:	21-0072
Date:	3/14/2022
Taken By:	LR
Scale:	N/A

Core Photo: C-006-0-21



Latitude: 39.639840 **Longitude:** -84.233330
Elevation: 953.3

Core Information				
Core Diameter (in):			**4.00**	
Core Total Length (in):			**13.00**	
Layers	Core Composition & Thickness (in)			Remarks/ Condition
	Asphalt	Concrete	Brick	
1	6.75			Good
2	6.25			Good
3				
4				
Rebar Encountered	N/A			

Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

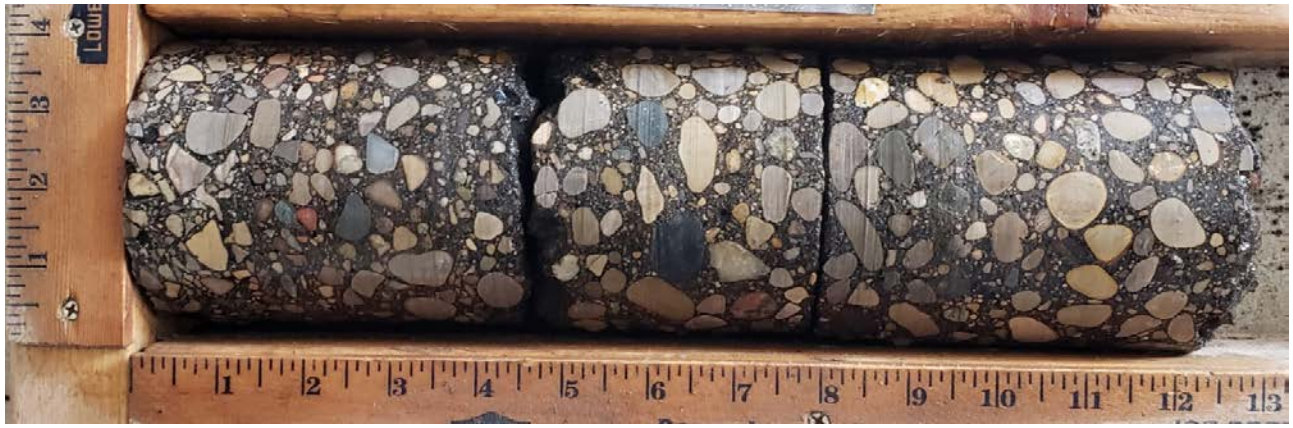
Roadway Project

MOT-725-14.41

ODOT PID# 108619

NEAS Project No.:	21-0072
Date:	3/14/2022
Taken By:	LR
Scale:	N/A

Core Photo: C-007-0-21



Latitude: 39.639869 **Longitude:** -84.232486
Elevation: 951.6

Core Information				
Core Diameter (in):			**4.00**	
Core Total Length (in):			**13.50**	
Layers	Core Composition & Thickness (in)			Remarks/ Condition
	Asphalt	Concrete	Brick	
1	4.50			Good
2	3.50			Good
3	5.50			Good
4				
Rebar Encountered	N/A			

Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

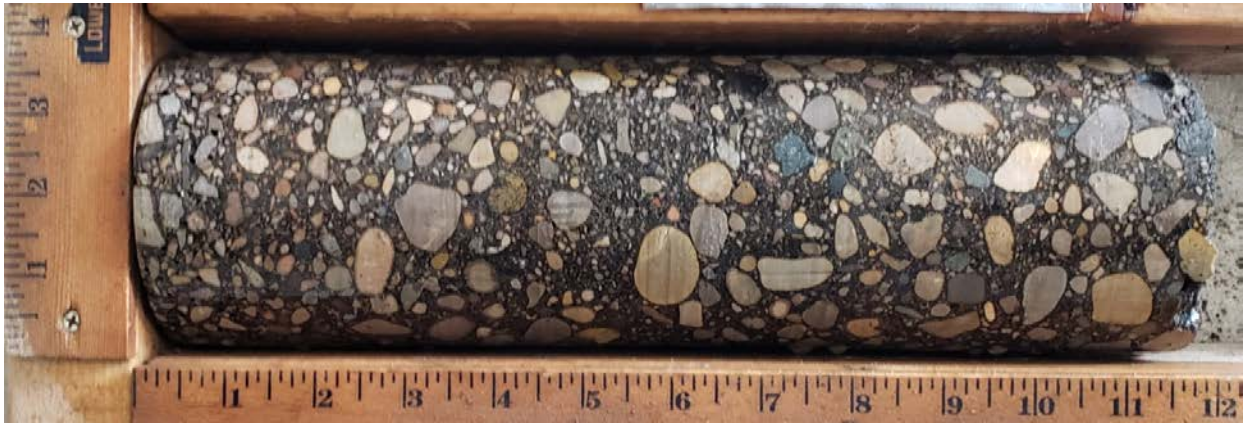
Roadway Project

MOT-725-14.41

ODOT PID# 108619

NEAS Project No.:	21-0072
Date:	3/14/2022
Taken By:	LR
Scale:	N/A

Core Photo: C-008-0-21



Latitude: 39.638563 **Longitude:** -84.227486
Elevation: 990.1

Core Information				
Core Diameter (in):			**4.00**	
Core Total Length (in):			**12.50**	
Layers	Core Composition & Thickness (in)			Remarks/ Condition
	Asphalt	Concrete	Brick	
1	12.50			Good
2				
3				
4				
Rebar Encountered	N/A			

Pavement & Core Photo Log

National Engineering & Architectural Services Inc.

Roadway Project

MOT-725-14.41

ODOT PID# 108619

NEAS Project No.:	21-0072
Date:	3/14/2022
Taken By:	LR
Scale:	N/A

APPENDIX D

SULFATE TESTING RESULTS

OHIO DEPARTMENT OF TRANSPORTATION

DETERMINING SULFATE CONTENT IN SOILS

SUPPLEMENT 1122

Project C-R-S:	MOT-725-14.41
PID No:	108619
Report Date:	4/13/2022
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	751+28	1' R	39.640234	-84.235747	971.5	18.32	20	2	20	1	20	2	**33**
B-002-0-21 SS-1	754+31	45' R	39.640073	-84.234692	961.2	21.1	20	27	20	25	20	29	**540**
B-004-0-21 SS-1	617+97	11' R	39.639599	-84.233602	954.0	18.3	20	4	20	4	20	5	**87**
B-005-0-21 SS-1	760+55	48' L	39.639869	-84.232486	951.6	21.1	20	3	20	3	20	3	**60**
B-006-0-21 SS-1	761+34	42' R	39.639566	-84.232321	952.5	21.1	20	2	20	2	20	2	**40**
B-011-0-21 SS-1	772+20	50' L	39.638866	-84.228560	980.8	18.32	20	3	20	4	20	4	**73**
B-012-0-21 SS-1	775+42	41' L	39.638563	-84.227486	990.1	18.25	20	4	20	5	20	2	**73**
B-013-0-21 SS-1	778+84	30' L	39.638249	-84.226344	995.4	18.3	20	2	20	4	20	2	**53**
B-014-0-21 SS-1	605+63	22' R	39.636586	-84.231793	1000.0	20.6	20	4	20	2	20	3	**60**
B-015-0-21 SS-1	609+94	5' L	39.637589	-84.232618	983.6	18.3	20	3	20	3	20	3	**60**
B-016-0-21 SS-1	613+49	16' R	39.638467	-84.233175	970.8	18.3	20	2	20	2	20	2	**40**
B-017-0-21 SS-1	703+15	28' R	39.640805	-84.233286	952.2	20.8	20	3	20	3	20	2	**53**
B-018-0-21 SS-1	707+07	16' L	39.641887	-84.233234	945.1	20.7	20	17	20	17	20	17	**340**
B-019-0-21 SS-1	806+52	22' L	39.636790	-84.230610	1000.3	20.5	20	3	20	4	20	3	**67**
B-020-0-21 SS-1	810+42	16' R	39.637849	-84.230370	983.7	20.4	20	7	20	6	20	7	**133**
B-021-0-21 SS-1	953+04	31' L	39.639969	-84.230209	958.6	20.4	20	2	20	2	20	2	**40**
B-022-0-21 SS-1	907+74	6' R	39.640962	-84.230697	953.3	20.4	20	0	20	0	20	0	**0**
B-023-0-21 SS-1	910+88	6' R	39.641666	-84.231336	947.1	20.4	20	2	20	4	20	3	**60**
B-024-0-21 SS-1	914+04	7' R	39.642484	-84.231661	941.2	20.4	20	7	20	10	20	9	**173**

APPENDIX E

GB1 SPREADSHEETS

ENTIRE PROJECT

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

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

MOT-725-14.41
108619

Interchange improvement - new ramp alignments, widened pavements, retaining walls and the addition of sidewalks

NEAS, Inc.

Prepared By: Zhao Mankoci
Date prepared: Thursday, April 28, 2022

Chunmei (Melinda) He, Ph.D, P.E.
2800 Corporate Exchange Drive
Suite 240
Columbus, OH, 43231
614-714-0299
che@neasinc.com

NO. OF BORINGS: 24

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-001-0-21	EX. SR-725	751+28	1	Rt	CME 45B	73	971.5	970.0	1.5 C
2	B-002-0-21	EX. SR-725	754+31	45	Rt	CME 45B	73	961.2	960.1	1.1 C
3	B-003-0-21	EX. SR-725	755+83	39	Rt	CME 45B	73	958.1	956.4	1.7 C
4	B-004-0-21	PROP. Ramp A East	617+97	11	Rt	CME 45B	73	954.0	953.0	1.0 C
5	B-005-0-21	EX. SR-725	760+55	48	Lt	CME 45B	73	951.6	949.1	2.5 C
6	B-006-0-21	EX. SR-725	761+34	42	Rt	CME 45B	73	952.5	949.1	3.4 C
7	B-007-0-21	EX. SR-725	762+71	39	Rt	CME 45B	73	953.7	950.3	3.4 C
8	B-008-0-21	EX. SR-725	764+84	40	Rt	CME 45B	73	958.1	954.7	3.4 C
9	B-009-0-21	EX. SR-725	766+26	40	Rt	CME 45B	73	961.7	959.4	2.3 C
10	B-010-0-21	EX. SR-725	769+93	55	Rt	CME 45B	73	974.2	972.1	2.1 C
11	B-011-0-21	EX. SR-725	772+20	50	Lt	CME 45B	73	980.8	979.0	1.8 C
12	B-012-0-21	EX. SR-725	775+42	41	Lt	CME 45B	73	990.1	988.6	1.5 C
13	B-013-0-21	EX. SR-725	778+84	30	Lt	CME 45B	73	995.4	993.9	1.5 C
14	B-014-0-21	PROP. Ramp A East	605+63	22	Rt	CME 45B	73	1000.0	998.5	1.5 C
15	B-015-0-21	PROP. Ramp A East	609+94	5	Lt	CME 45B	73	983.6	982.1	1.5 C
16	B-016-0-21	PROP. Ramp A East	613+49	16	Rt	CME 45B	73	970.8	968.0	2.8 C
17	B-017-0-21	PROP. Ramp B East	703+15	28	Rt	CME 45B	73	952.2	949.6	2.6 C
18	B-018-0-21	PROP. Ramp B East	707+07	16	Lt	CME 45B	73	945.1	943.6	1.5 C
19	B-019-0-21	PROP. Ramp C West	806+52	22	Lt	CME 45B	73	1000.3	998.8	1.5 C
20	B-020-0-21	PROP. Ramp C West	810+42	16	Rt	CME 45B	73	983.7	981.3	2.4 C
21	B-021-0-21	PROP. Ramp D East	953+04	31	Lt	CME 45B	73	958.6	959.5	0.9 F
22	B-022-0-21	PROP. Ramp D West	907+74	6	Rt	CME 45B	73	953.3	950.8	2.5 C
23	B-023-0-21	PROP. Ramp D West	910+88	6	Rt	CME 45B	73	947.1	945.6	1.5 C
24	B-024-0-21	PROP. Ramp D West	914+04	7	Rt	CME 45B	73	941.2	939.7	1.5 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.6 2/11/2022

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B	SS-1	1.5	3.0	0.0	1.5	13			20	13	7	31	13	44	13	10	A-4a	2	33		N_{60} & Mc		12"	
	001-0	SS-2	3.0	4.5	1.5	3.0	17		2	21	14	7	28	12	40	12	10	A-4a	1						
	21	SS-3A	4.5	5.0	3.0	3.5	11		1.75							12	10	A-4a	8			N_{60}			
		SS-3B	5.0	6.0	3.5	4.5	11	11								7	6	A-1-b	0						
2	B	SS-1	2.5	4.0	1.4	2.9	10		4.5	21	14	7	37	21	58	10	10	A-4a	5	540		N_{60}			
	002-0	SS-2	5.0	6.5	3.9	5.4	8		4.25							11	10	A-4a	8						
	21	SS-3	7.5	9.0	6.4	7.9	17		4.5							12	10	A-4a							
		SS-4	10.0	11.5	8.9	10.4	22	8	4.25							12	10	A-4a							
3	B	SS-1	2.5	4.0	0.8	2.3	12									10	10	A-2-4	0						
	003-0	SS-2	5.0	6.5	3.3	4.8	8		3	20	13	7	39	19	58	12	10	A-4a	5						
	21	SS-3	7.5	9.0	5.8	7.3	15									15	10	A-2-4							
		SS-4	10.0	11.5	8.3	9.8	17	8	2	21	14	7	36	22	58	13	10	A-4a							
4	B	SS-1	1.0	2.5	0.0	1.5	24		4.5	21	13	8	33	21	54	8	10	A-4a	4	87					
	004-0	SS-2	3.5	5.0	2.5	4.0	16		4.5	23	13	10	38	25	63	10	10	A-4a	6						
	21	SS-3	6.0	7.5	5.0	6.5	11		4.5							11	10	A-4a							
		SS-4	8.5	10.0	7.5	9.0	12	11	4.5							10	10	A-4a							
5	B	SS-1	2.5	4.0	0.0	1.5	5			NP	NP	NP	11	4	15	11	6	A-1-b	0	60					
	005-0	SS-2	5.0	6.5	2.5	4.0	2									24	6	A-1-b	0						
	21	SS-3	7.5	9.0	5.0	6.5	17		1	28	15	13	35	29	64	20	14	A-6a							
		SS-4	10.0	11.5	7.5	9.0	23	2	2.25							13	14	A-6a							
6	B	SS-1	2.5	4.0	-0.9	0.6	21			NP	NP	NP	15	4	19	6	6	A-1-b	0	40					
	006-0	SS-2	5.0	6.5	1.6	3.1	42									5	6	A-1-b	0						
	21	SS-3	7.5	9.0	4.1	5.6	27		4.5	19	13	6	35	20	55	10	10	A-4a	4						
		SS-4	10.0	11.5	6.6	8.1	27	21	4.5							11	10	A-4a							
7	B	SS-1	2.5	4.0	-0.9	0.6	28			NP	NP	NP	18	8	26	7	10	A-2-4	0						
	007-0	SS-2	5.0	6.5	1.6	3.1	10									7	10	A-2-4	0			N_{60}			
	21	SS-3	7.5	9.0	4.1	5.6	22		4.5	22	14	8	38	29	67	11	10	A-4a	6						
		SS-4	10.0	11.5	6.6	8.1	28	10	4.25							15	10	A-4a							
8	B	SS-1	2.5	4.0	-0.9	0.6	15		4.5	22	14	8	35	24	59	11	10	A-4a	5						
	008-0	SS-2	5.0	6.5	1.6	3.1	6		4.5							12	10	A-4a	8			N_{60}			
	21	SS-3	7.5	9.0	4.1	5.6	15		1.75							10	10	A-4a	8						
		SS-4	10.0	11.5	6.6	8.1	18	6	3	20	13	7	36	22	58	12	10	A-4a							
9	B	SS-1	2.5	4.0	0.2	1.7	18		4.25	25	14	11	35	25	60	12	14	A-6a	5						
	009-0	SS-2	5.0	6.5	2.7	4.2	25		4.5							11	14	A-6a	10						
	21	SS-3	7.5	9.0	5.2	6.7	21		4.25							12	14	A-6a							
		SS-4	10.0	11.5	7.7	9.2	17	18	4.25							11	14	A-6a							

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.6 2/11/2022

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
10	B	SS-1	2.5	4.0	0.4	1.9	7		2	23	15	8	33	21	54	14	10	A-4a	4			N_{60} & Mc		15"	
	010-0	SS-2	5.0	6.5	2.9	4.4	24		4.25	21	14	7	38	24	62	12	10	A-4a	5						
	21	SS-3	7.5	9.0	5.4	6.9	24		4.5							12	10	A-4a							
		SS-4	10.0	11.5	7.9	9.4	28	7	4.5							11	10	A-4a							
11	B	SS-1	1.5	3.0	-0.3	1.2	12		4.5	20	13	7	36	23	59	9	10	A-4a	5	73					
	011-0	SS-2	3.0	4.5	1.2	2.7	18		4.5							10	10	A-4a	8						
	21	SS-3	4.5	6.0	2.7	4.2	23		4.5							10	10	A-4a	8						
		SS-4	6.0	7.5	4.2	5.7	25	12	4.5	25	15	10	37	24	61	13	10	A-4a	5						
12	B	SS-1	1.5	3.0	0.0	1.5	10		1.25	46	19	27	29	34	63	24	18	A-7-6	13	73		HP & Mc		12"	
	012-0	SS-2	3.0	4.5	1.5	3.0	8		2.25							22	18	A-7-6	16			N_{60} & Mc			
	21	SS-3	4.5	6.0	3.0	4.5	12		2.5	41	18	23	33	39	72	22	18	A-7-6	13						
		SS-4	6.0	7.5	4.5	6.0	15	8	3							24	18	A-7-6	16						
13	B	SS-1	1.5	3.0	0.0	1.5	13		4.5	20	13	7	37	22	59	10	10	A-4a	5	53					
	013-0	SS-2	3.0	4.5	1.5	3.0	15		4.25							13	10	A-4a	8			Mc			
	21	SS-3	4.5	6.0	3.0	4.5	15		3.25	20	13	7	37	20	57	12	10	A-4a	4						
		SS-4	6.0	7.5	4.5	6.0	13	13	4.5							10	10	A-4a	8						
14	B	SS-1	1.0	2.5	-0.5	1.0	27			NP	NP	NP	21	11	32	7	10	A-2-4	0	60					
	014-0	SS-2	3.5	5.0	2.0	3.5	17									10	10	A-2-4	0						
	21	SS-3	6.0	7.5	4.5	6.0	19		4.5	30	17	13	38	53	91	17	14	A-6a	9						
		SS-4	8.5	10.0	7.0	8.5	24	17								3	6	A-1-b							
15	B	SS-1	1.5	3.0	0.0	1.5	17									8	6	A-1-b	0	60					
	015-0	SS-2	3.0	4.5	1.5	3.0	10		3	43	21	22	34	38	72	22	18	A-7-6	13			N_{60} & Mc			
	21	SS-3	4.5	6.0	3.0	4.5	18		3.5							22	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	24	10	4	27	16	11	50	33	83	20	14	A-6a	8						
16	B	SS-1	2.5	4.0	-0.3	1.2	18		4.5	21	14	7	28	15	43	9	10	A-4a	2	40					
	016-0	SS-2	5.0	6.5	2.2	3.7	19									10	10	A-2-4	0						
	21	SS-3	7.5	9.0	4.7	6.2	15		2.5	21	13	8	37	28	65	13	10	A-4a	6						
		SS-4	10.0	11.5	7.2	8.7	12	15	2.5							12	10	A-4a							
17	B	SS-1	2.5	4.0	-0.1	1.4	19		2.5	36	17	19	33	34	67	19	16	A-6b	10	53		Mc			
	017-0	SS-2	5.0	6.5	2.4	3.9	18		4.5	25	14	11	33	23	56	12	14	A-6a	5						
	21	SS-3	7.5	9.0	4.9	6.4	18		4.5							11	14	A-6a	10						
		SS-4	10.0	11.5	7.4	8.9	16	18	4.5							21	14	A-6a							
18	B	SS-1	1.5	3.0	0.0	1.5	40			21	14	7	22	12	34	6	10	A-2-4	0	340					
	018-0	SS-2	3.0	4.5	1.5	3.0	30		4.5	19	12	7	33	19	52	7	10	A-4a	3						
	21	SS-3	4.5	6.0	3.0	4.5	25		4.5							9	10	A-4a	8						
		SS-4	6.0	7.5	4.5	6.0	8	8	2.25							12	10	A-4a	8						

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.6 2/11/2022

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
19	B	SS-1	1.5	3.0	0.0	1.5	22			NP	NP	NP	24	10	34	9	10	A-2-4	0	67					
	019-0	SS-2	3.0	4.5	1.5	3.0	18		4.5	18	13	5	34	16	50	9	10	A-4a	3						
	21	SS-3	4.5	6.0	3.0	4.5	19		4.5							10	10	A-4a	8						
		SS-4	6.0	7.5	4.5	6.0	21	18	4.5							10	10	A-4a	8						
20	B	SS-1	1.5	3.0	-0.9	0.6	16		4.25	24	15	9	28	14	42	12	10	A-4a	1	133					
	020-0	SS-2	3.0	4.5	0.6	2.1	15		3.5	22	13	9	37	23	60	14	10	A-4a	5			Mc			
	21	SS-3	4.5	6.0	2.1	3.6	17		4.5							13	10	A-4a	8						
		SS-4	6.0	7.5	3.6	5.1	24	15	4.5							11	10	A-4a	8						
21	B	SS-1	1.5	3.0	2.4	3.9	40		4.5	23	14	9	38	26	64	9	10	A-4a	6	40					
	021-0	SS-2	3.0	4.5	3.9	5.4	33		4.5	24	13	11	36	24	60	10	14	A-6a	5						
	21	SS-3	4.5	6.0	5.4	6.9	35		4.5							12	14	A-6a							
		SS-4	6.0	7.5	6.9	8.4	24	30	4.5							11	14	A-6a							
22	B	SS-1	1.5	3.0	-1.0	0.5	13		4.5	38	19	19	47	31	78	18	16	A-6b	12	0					
	022-0	SS-2	3.0	4.5	0.5	2.0	11		4.25	32	17	15	42	25	67	18	14	A-6a	8			N_{60} & Mc		**12"**	
	21	SS-3	4.5	6.0	2.0	3.5	12		3.75							18	14	A-6a	10			N_{60} & Mc			
		SS-4	6.0	7.5	3.5	5.0	13	11								11	10	A-2-4	0						
23	B	SS-1	1.5	3.0	0.0	1.5	16			NP	NP	NP	20	8	28	23	10	A-2-4	0	60		Mc			
	023-0	SS-2	3.0	4.5	1.5	3.0	21		4.5	24	14	10	32	21	53	11	10	A-4a	4						
	21	SS-3	4.5	6.0	3.0	4.5	23		4.25							11	10	A-4a	8						
		SS-4	6.0	7.5	4.5	6.0	28	16	4.5							10	10	A-4a	8						
24	B	SS-1	1.5	3.0	0.0	1.5	15		4.25	31	17	14	26	16	42	13	14	A-6a	2	173					
	024-0	SS-2	3.0	4.5	1.5	3.0	16			26	14	12	20	12	32	13	10	A-2-6	0			Mc			
	21	SS-3	4.5	6.0	3.0	4.5	21									15	10	A-2-6	4						
		SS-4	6.0	7.5	4.5	6.0	18	15								14	10	A-2-6	4						

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.6 2/11/2022

PID: 108619

County-Route-Section: MOT-725-14.41
No. of Borings: 24

Geotechnical Consultant: NEAS, Inc.
Prepared By: Zhao Mankoci
Date prepared: 4/28/2022

Chemical Stabilization Options		
320	Rubblize & Roll	Option
206	Cement Stabilization	Option
	Lime Stabilization	No
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	8

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	2%	HP ≤ 0.5	0%
$N_{60} < 12$	20%	0.5 < HP ≤ 1	1%
$12 \leq N_{60} < 15$	11%	1 < HP ≤ 2	6%
$N_{60} \geq 20$	33%	HP > 2	67%
M+	15%		
Rock	0%		
Unsuitable	0%		

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

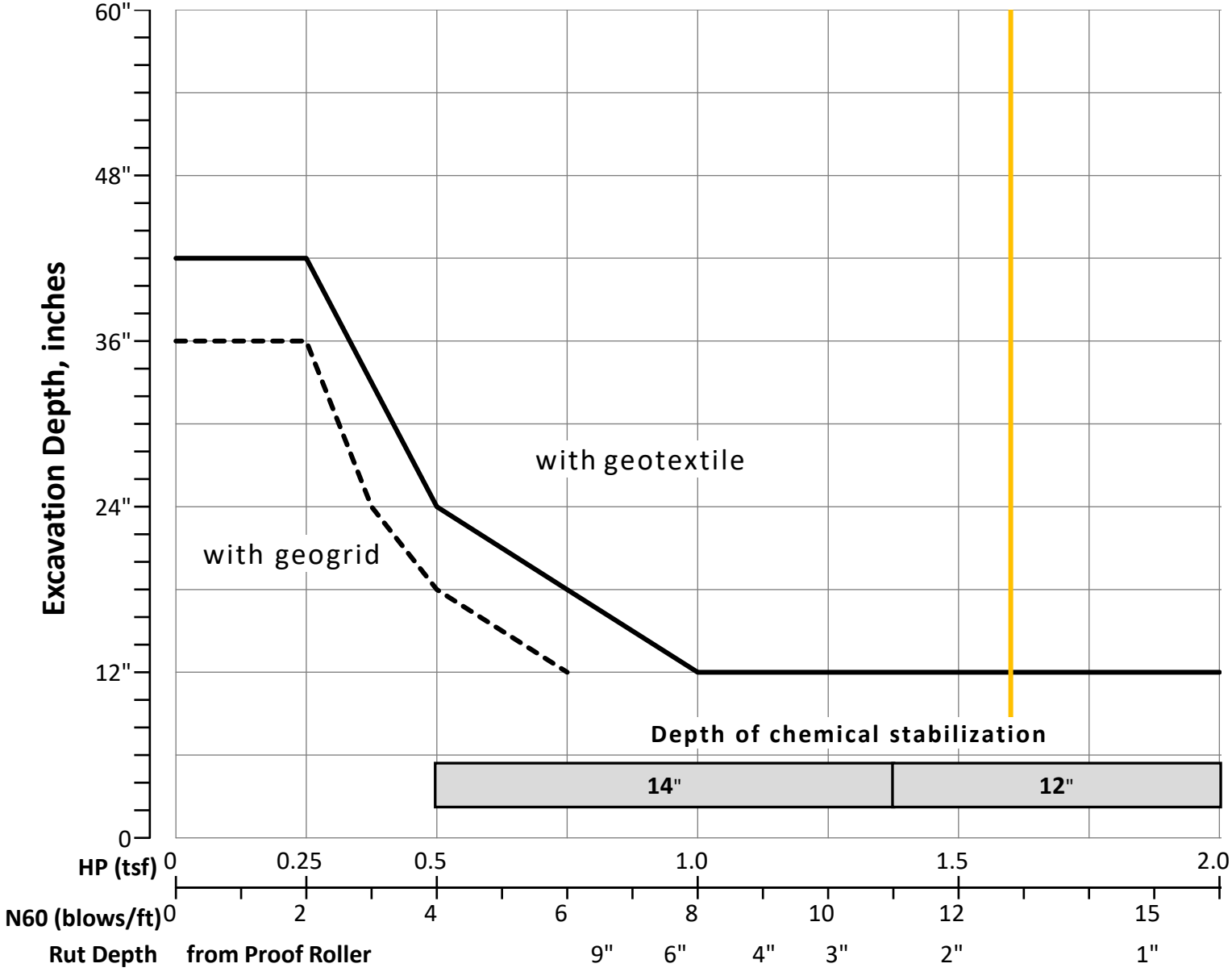
% Proposed Subgrade Surface	
Unstable & Unsuitable	34%
Unstable	34%
Unsuitable	0%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	18	13	3.85	25	15	11	32	22	54	12	11	5
Maximum	42	30	4.50	46	21	27	50	53	91	24	18	16
Minimum	2	2	1.00	18	12	5	11	4	15	3	6	0

Classification Counts by Sample

ODOT Class	Rock	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-3	A-3a	A-4a	A-4b	A-5	A-6a	A-6b	A-7-5	A-7-6	A-8a	A-8b	Totals
Count	0	0	7	11	0	3	0	0	0	50	0	0	17	2	0	6	0	0	96
Percent	0%	0%	7%	11%	0%	3%	0%	0%	0%	52%	0%	0%	18%	2%	0%	6%	0%	0%	100%
% Rock|Granular|Cohesive	0%	74%									26%								100%
Surface Class Count	0	0	5	9	0	1	0	0	0	21	0	0	6	2	0	3	0	0	47
Surface Class Percent	0%	0%	11%	19%	0%	2%	0%	0%	0%	45%	0%	0%	13%	4%	0%	6%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
3.85	0.50	☐ HP
12.83	6.00	☐ N60L

Average HP
Average N_{60L}

SR-725 East

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

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

MOT-725-14.41
108619

Interchange improvement - new ramp alignments, widened pavements, retaining walls and the addition of sidewalks - Prop. SR-725 East

NEAS, Inc.

Prepared By: Nizar Altarawneh
Date prepared: Friday, November 11, 2022

Chunmei (Melinda) He, Ph.D, P.E.
2800 Corporate Exchange Drive
Suite 240
Columbus, OH, 43231
614-714-0299
che@neasinc.com

NO. OF BORINGS: 12

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-001-0-21	EX. SR-725	551+28	11	Lt	CME 45B	73	971.5	970.2	1.3 C
2	B-002-0-21	PROP. SR-725 East	554+31	35	Rt	CME 45B	73	961.2	961.6	0.4 F
3	B-003-0-21	PROP. SR-725 East	555+80	29	Rt	CME 45B	73	958.1	957.9	0.2 C
4	B-005-0-21	PROP. SR-725 East	560+67	0	Rt	CME 45B	73	951.6	950.6	1.0 C
5	B-006-0-21	PROP. SR-725 East	561+46	86	Rt	CME 45B	73	952.5	951.0	1.5 C
6	B-007-0-21	PROP. SR-725 East	562+83	83	Rt	CME 45B	73	953.7	952.2	1.5 C
7	B-008-0-21	PROP. SR-725 East	564+96	84	Rt	CME 45B	73	958.1	956.6	1.5 C
8	B-009-0-21	PROP. SR-725 East	566+29	104	Rt	CME 45B	73	961.7	960.2	1.5 C
9	B-010-0-21	PROP. SR-725 East	570+04	54	Rt	CME 45B	73	974.2	973.6	0.6 C
10	B-011-0-21	PROP. SR-725 East	572+46	48	Lt	CME 45B	73	980.8	980.5	0.3 C
11	B-012-0-21	EX. SR-725	775+42	41	Lt	CME 45B	73	990.1	988.6	1.5 C
12	B-013-0-21	EX. SR-725	778+84	30	Lt	CME 45B	73	995.4	993.9	1.5 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.6 2/11/2022

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B	SS-1	1.5	3.0	0.2	1.7	13			20	13	7	31	13	44	13	10	A-4a	2	33		N_{60} & Mc		12"	
	001-0	SS-2	3.0	4.5	1.7	3.2	17		2	21	14	7	28	12	40	12	10	A-4a	1						
	21	SS-3A	4.5	5.0	3.2	3.7	11		1.75							12	10	A-4a	8						
		SS-3B	5.0	6.0	3.7	4.7	11	11								7	6	A-1-b	0						
2	B	SS-1	2.5	4.0	2.9	4.4	10		4.5	21	14	7	37	21	58	10	10	A-4a	5	540					
	002-0	SS-2	5.0	6.5	5.4	6.9	8		4.25							11	10	A-4a							
	21	SS-3	7.5	9.0	7.9	9.4	17		4.5							12	10	A-4a							
		SS-4	10.0	11.5	10.4	11.9	22	8	4.25							12	10	A-4a							
3	B	SS-1	2.5	4.0	2.3	3.8	12									10	10	A-2-4	0						
	003-0	SS-2	5.0	6.5	4.8	6.3	8		3	20	13	7	39	19	58	12	10	A-4a	5						
	21	SS-3	7.5	9.0	7.3	8.8	15									15	10	A-2-4							
		SS-4	10.0	11.5	9.8	11.3	17	8	2	21	14	7	36	22	58	13	10	A-4a							
4	B	SS-1	2.5	4.0	1.5	3.0	5			NP	NP	NP	11	4	15	11	6	A-1-b	0	60					
	005-0	SS-2	5.0	6.5	4.0	5.5	2									24	6	A-1-b	0						
	21	SS-3	7.5	9.0	6.5	8.0	17		1	28	15	13	35	29	64	20	14	A-6a							
		SS-4	10.0	11.5	9.0	10.5	23	2	2.25							13	14	A-6a							
5	B	SS-1	2.5	4.0	1.0	2.5	21			NP	NP	NP	15	4	19	6	6	A-1-b	0	40					
	006-0	SS-2	5.0	6.5	3.5	5.0	42									5	6	A-1-b	0						
	21	SS-3	7.5	9.0	6.0	7.5	27		4.5	19	13	6	35	20	55	10	10	A-4a							
		SS-4	10.0	11.5	8.5	10.0	27	21	4.5							11	10	A-4a							
6	B	SS-1	2.5	4.0	1.0	2.5	28			NP	NP	NP	18	8	26	7	10	A-2-4	0						
	007-0	SS-2	5.0	6.5	3.5	5.0	10									7	10	A-2-4	0						
	21	SS-3	7.5	9.0	6.0	7.5	22		4.5	22	14	8	38	29	67	11	10	A-4a							
		SS-4	10.0	11.5	8.5	10.0	28	10	4.25							15	10	A-4a							
7	B	SS-1	2.5	4.0	1.0	2.5	15		4.5	22	14	8	35	24	59	11	10	A-4a	5						
	008-0	SS-2	5.0	6.5	3.5	5.0	6		4.5							12	10	A-4a	8						
	21	SS-3	7.5	9.0	6.0	7.5	15		1.75							10	10	A-4a							
		SS-4	10.0	11.5	8.5	10.0	18	6	3	20	13	7	36	22	58	12	10	A-4a							
8	B	SS-1	2.5	4.0	1.0	2.5	18		4.25	25	14	11	35	25	60	12	14	A-6a	5						
	009-0	SS-2	5.0	6.5	3.5	5.0	25		4.5							11	14	A-6a	10						
	21	SS-3	7.5	9.0	6.0	7.5	21		4.25							12	14	A-6a							
		SS-4	10.0	11.5	8.5	10.0	17	18	4.25							11	14	A-6a							
9	B	SS-1	2.5	4.0	1.9	3.4	7		2	23	15	8	33	21	54	14	10	A-4a	4			N_{60} & Mc			
	010-0	SS-2	5.0	6.5	4.4	5.9	24		4.25	21	14	7	38	24	62	12	10	A-4a	5						
	21	SS-3	7.5	9.0	6.9	8.4	24		4.5							12	10	A-4a							
		SS-4	10.0	11.5	9.4	10.9	28	7	4.5							11	10	A-4a							

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.6 2/11/2022

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
10	B	SS-1	1.5	3.0	1.2	2.7	12		4.5	20	13	7	36	23	59	9	10	A-4a	5	73					
	011-0	SS-2	3.0	4.5	2.7	4.2	18		4.5							10	10	A-4a	8						
	21	SS-3	4.5	6.0	4.2	5.7	23		4.5							10	10	A-4a	8						
		SS-4	6.0	7.5	5.7	7.2	25	12	4.5	25	15	10	37	24	61	13	10	A-4a							
11	B	SS-1	1.5	3.0	0.0	1.5	10		1.25	46	19	27	29	34	63	24	18	A-7-6	13	73		HP & Mc		**12"**	
	012-0	SS-2	3.0	4.5	1.5	3.0	8		2.25							22	18	A-7-6	16			N_{60} & Mc			
	21	SS-3	4.5	6.0	3.0	4.5	12		2.5	41	18	23	33	39	72	22	18	A-7-6	13						
		SS-4	6.0	7.5	4.5	6.0	15	8	3							24	18	A-7-6	16						
12	B	SS-1	1.5	3.0	0.0	1.5	13		4.5	20	13	7	37	22	59	10	10	A-4a	5	53					
	013-0	SS-2	3.0	4.5	1.5	3.0	15		4.25							13	10	A-4a	8			Mc			
	21	SS-3	4.5	6.0	3.0	4.5	15		3.25	20	13	7	37	20	57	12	10	A-4a	4						
		SS-4	6.0	7.5	4.5	6.0	13	13	4.5							10	10	A-4a	8						

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.6 2/11/2022

PID: 108619

County-Route-Section: MOT-725-14.41
No. of Borings: 12

Geotechnical Consultant: NEAS, Inc.
Prepared By: Nizar Altarawneh
Date prepared: 11/11/2022

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

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

Design CBR	8

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	6%	HP ≤ 0.5	0%
$N_{60} < 12$	33%	0.5 < HP ≤ 1	0%
$12 \leq N_{60} < 15$	17%	1 < HP ≤ 2	14%
$N_{60} \geq 20$	28%	HP > 2	61%
M+	14%		
Rock	0%		
Unsuitable	0%		

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

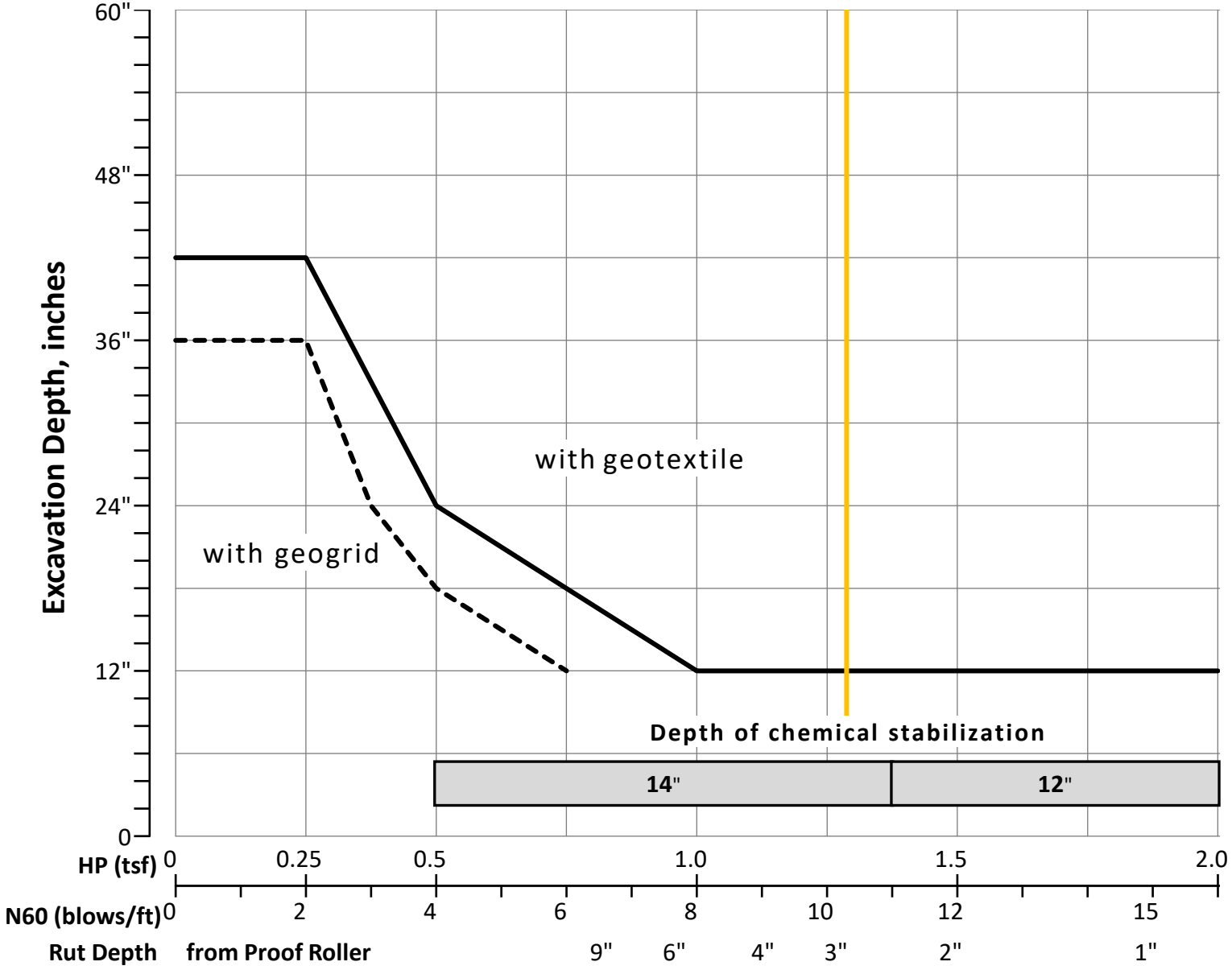
% Proposed Subgrade Surface	
Unstable & Unsuitable	33%
Unstable	33%
Unsuitable	0%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	17	10	3.61	24	14	10	32	21	53	12	11	5
Maximum	42	21	4.50	46	19	27	39	39	72	24	18	16
Minimum	2	2	1.00	19	13	6	11	4	15	5	6	0

Classification Counts by Sample

ODOT Class	Rock	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-3	A-3a	A-4a	A-4b	A-5	A-6a	A-6b	A-7-5	A-7-6	A-8a	A-8b	Totals
Count	0	0	5	4	0	0	0	0	0	29	0	0	6	0	0	4	0	0	48
Percent	0%	0%	10%	8%	0%	0%	0%	0%	0%	60%	0%	0%	13%	0%	0%	8%	0%	0%	100%
% Rock|Granular|Cohesive	0%	79%									21%								100%
Surface Class Count	0	0	2	2	0	0	0	0	0	8	0	0	1	0	0	2	0	0	15
Surface Class Percent	0%	0%	13%	13%	0%	0%	0%	0%	0%	53%	0%	0%	7%	0%	0%	13%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
3.61	0.50	☐ HP
10.33	6.00	☐ N60L

Average HP
Average N_{60L}

SR-725 West

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

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

MOT-725-14.41
108619

Interchange improvement - new ramp alignments, widened pavements, retaining walls and the addition of sidewalks - Prop. SR-725 West

NEAS, Inc.

Prepared By: Nizar Altarawneh
Date prepared: Friday, November 11, 2022

Chunmei (Melinda) He, Ph.D, P.E.
2800 Corporate Exchange Drive
Suite 240
Columbus, OH, 43231
614-714-0299
che@neasinc.com

NO. OF BORINGS: 12

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-001-0-21	PROP. SR-725 West	451+28	8	Rt	CME 45B	73	971.5	970.1	1.4 C
2	B-002-0-21	PROP. SR-725 West	454+33	57	Rt	CME 45B	73	961.2	959.7	1.5 C
3	B-003-0-21	PROP. SR-725 West	455+74	55	Rt	CME 45B	73	958.1	956.6	1.5 C
4	B-005-0-21	PROP. SR-725 West	460+75	80	Lt	CME 45B	73	951.6	950.1	1.5 C
5	B-006-0-21	PROP. SR-725 West	461+54	10	Rt	CME 45B	73	952.5	950.6	1.9 C
6	B-007-0-21	PROP. SR-725 West	462+91	7	Rt	CME 45B	73	953.7	951.8	1.9 C
7	B-008-0-21	PROP. SR-725 West	465+04	8	Rt	CME 45B	73	958.1	956.2	1.9 C
8	B-009-0-21	PROP. SR-725 West	466+47	10	Lt	CME 45B	73	961.7	960.9	0.8 C
9	B-010-0-21	PROP. SR-725 West	470+36	67	Rt	CME 45B	73	974.2	972.7	1.5 C
10	B-011-0-21	PROP. SR-725 West	472+54	44	Lt	CME 45B	73	980.8	980.5	0.3 C
11	B-012-0-21	EX. SR-725	775+42	41	Lt	CME 45B	73	990.1	988.6	1.5 C
12	B-013-0-21	EX. SR-725	778+84	30	Lt	CME 45B	73	995.4	993.9	1.5 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.6 2/11/2022

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B	SS-1	1.5	3.0	0.1	1.6	13			20	13	7	31	13	44	13	10	A-4a	2	33		N_{60} & Mc		12"	
	001-0	SS-2	3.0	4.5	1.6	3.1	17		2	21	14	7	28	12	40	12	10	A-4a	1						
	21	SS-3A	4.5	5.0	3.1	3.6	11		1.75							12	10	A-4a	8						
		SS-3B	5.0	6.0	3.6	4.6	11	11								7	6	A-1-b	0						
2	B	SS-1	2.5	4.0	1.0	2.5	10		4.5	21	14	7	37	21	58	10	10	A-4a	5	540		N_{60}		12"	
	002-0	SS-2	5.0	6.5	3.5	5.0	8		4.25							11	10	A-4a	8						
	21	SS-3	7.5	9.0	6.0	7.5	17		4.5							12	10	A-4a							
		SS-4	10.0	11.5	8.5	10.0	22	8	4.25							12	10	A-4a							
3	B	SS-1	2.5	4.0	1.0	2.5	12									10	10	A-2-4	0						
	003-0	SS-2	5.0	6.5	3.5	5.0	8		3	20	13	7	39	19	58	12	10	A-4a	5						
	21	SS-3	7.5	9.0	6.0	7.5	15									15	10	A-2-4							
		SS-4	10.0	11.5	8.5	10.0	17	8	2	21	14	7	36	22	58	13	10	A-4a							
4	B	SS-1	2.5	4.0	1.0	2.5	5			NP	NP	NP	11	4	15	11	6	A-1-b	0	60					
	005-0	SS-2	5.0	6.5	3.5	5.0	2									24	6	A-1-b	0						
	21	SS-3	7.5	9.0	6.0	7.5	17		1	28	15	13	35	29	64	20	14	A-6a							
		SS-4	10.0	11.5	8.5	10.0	23	2	2.25							13	14	A-6a							
5	B	SS-1	2.5	4.0	0.6	2.1	21			NP	NP	NP	15	4	19	6	6	A-1-b	0	40					
	006-0	SS-2	5.0	6.5	3.1	4.6	42									5	6	A-1-b	0						
	21	SS-3	7.5	9.0	5.6	7.1	27		4.5	19	13	6	35	20	55	10	10	A-4a							
		SS-4	10.0	11.5	8.1	9.6	27	21	4.5							11	10	A-4a							
6	B	SS-1	2.5	4.0	0.6	2.1	28			NP	NP	NP	18	8	26	7	10	A-2-4	0						
	007-0	SS-2	5.0	6.5	3.1	4.6	10									7	10	A-2-4	0						
	21	SS-3	7.5	9.0	5.6	7.1	22		4.5	22	14	8	38	29	67	11	10	A-4a							
		SS-4	10.0	11.5	8.1	9.6	28	10	4.25							15	10	A-4a							
7	B	SS-1	2.5	4.0	0.6	2.1	15		4.5	22	14	8	35	24	59	11	10	A-4a	5						
	008-0	SS-2	5.0	6.5	3.1	4.6	6		4.5							12	10	A-4a	8						
	21	SS-3	7.5	9.0	5.6	7.1	15		1.75							10	10	A-4a							
		SS-4	10.0	11.5	8.1	9.6	18	6	3	20	13	7	36	22	58	12	10	A-4a							
8	B	SS-1	2.5	4.0	1.7	3.2	18		4.25	25	14	11	35	25	60	12	14	A-6a	5						
	009-0	SS-2	5.0	6.5	4.2	5.7	25		4.5							11	14	A-6a	10						
	21	SS-3	7.5	9.0	6.7	8.2	21		4.25							12	14	A-6a							
		SS-4	10.0	11.5	9.2	10.7	17	18	4.25							11	14	A-6a							
9	B	SS-1	2.5	4.0	1.0	2.5	7		2	23	15	8	33	21	54	14	10	A-4a	4			N_{60} & Mc		15"	
	010-0	SS-2	5.0	6.5	3.5	5.0	24		4.25	21	14	7	38	24	62	12	10	A-4a	5						
	21	SS-3	7.5	9.0	6.0	7.5	24		4.5							12	10	A-4a							
		SS-4	10.0	11.5	8.5	10.0	28	7	4.5							11	10	A-4a							

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.6 2/11/2022

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
10	B	SS-1	1.5	3.0	1.2	2.7	12		4.5	20	13	7	36	23	59	9	10	A-4a	5	73					
	011-0	SS-2	3.0	4.5	2.7	4.2	18		4.5							10	10	A-4a	8						
	21	SS-3	4.5	6.0	4.2	5.7	23		4.5							10	10	A-4a	8						
		SS-4	6.0	7.5	5.7	7.2	25	12	4.5	25	15	10	37	24	61	13	10	A-4a							
11	B	SS-1	1.5	3.0	0.0	1.5	10		1.25	46	19	27	29	34	63	24	18	A-7-6	13	73		HP & Mc		**12"**	
	012-0	SS-2	3.0	4.5	1.5	3.0	8		2.25							22	18	A-7-6	16			N_{60} & Mc			
	21	SS-3	4.5	6.0	3.0	4.5	12		2.5	41	18	23	33	39	72	22	18	A-7-6	13						
		SS-4	6.0	7.5	4.5	6.0	15	8	3							24	18	A-7-6	16						
12	B	SS-1	1.5	3.0	0.0	1.5	13		4.5	20	13	7	37	22	59	10	10	A-4a	5	53					
	013-0	SS-2	3.0	4.5	1.5	3.0	15		4.25							13	10	A-4a	8			Mc			
	21	SS-3	4.5	6.0	3.0	4.5	15		3.25	20	13	7	37	20	57	12	10	A-4a	4						
		SS-4	6.0	7.5	4.5	6.0	13	13	4.5							10	10	A-4a	8						

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.6 2/11/2022

PID: 108619

County-Route-Section: MOT-725-14.41
No. of Borings: 12

Geotechnical Consultant: NEAS, Inc.
Prepared By: Nizar Altarawneh
Date prepared: 11/11/2022

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

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

Design CBR	8

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	5%	HP ≤ 0.5	0%
$N_{60} < 12$	31%	0.5 < HP ≤ 1	3%
$12 \leq N_{60} < 15$	15%	1 < HP ≤ 2	13%
$N_{60} \geq 20$	26%	HP > 2	59%
M+	13%		
Rock	0%		
Unsuitable	0%		

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

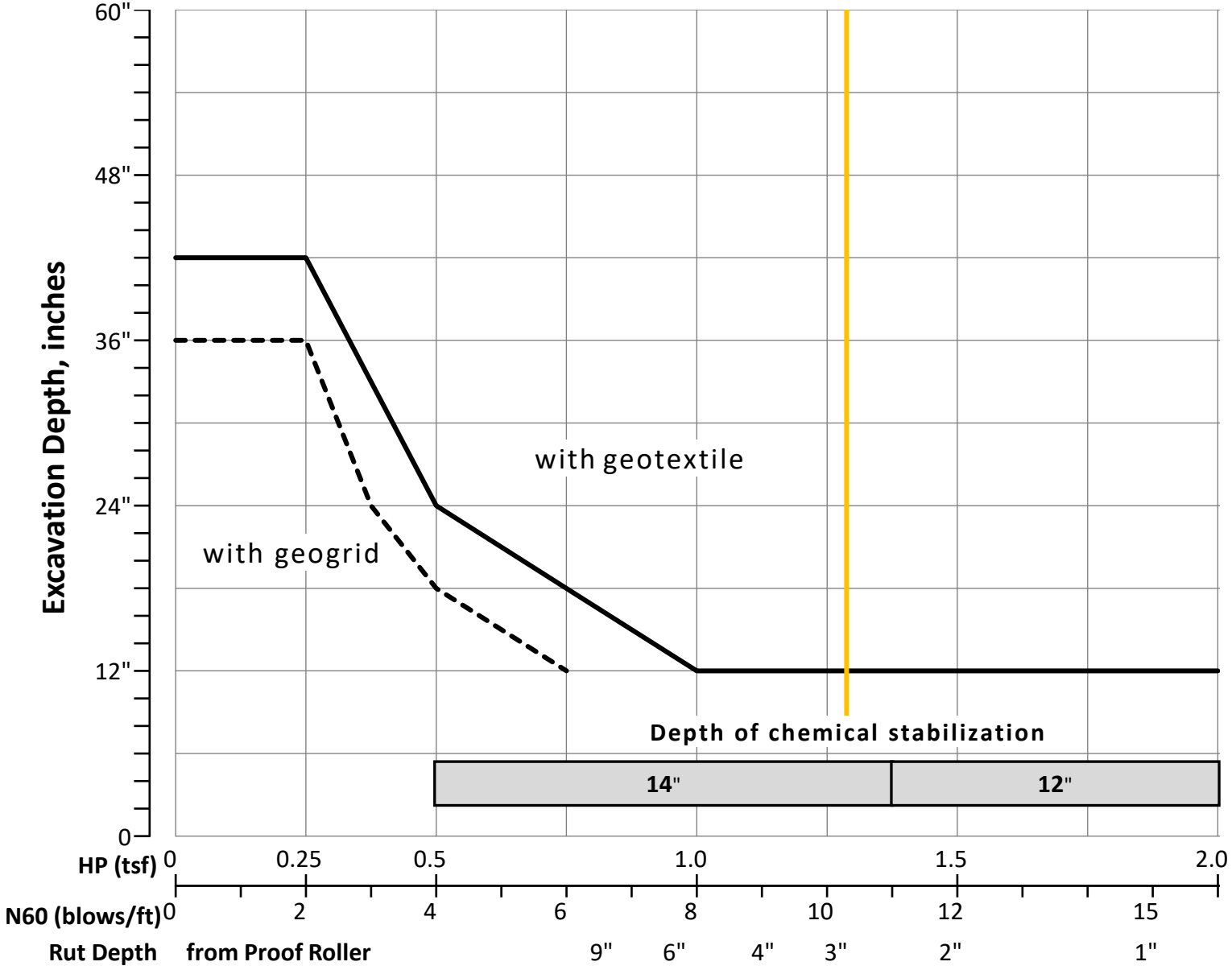
% Proposed Subgrade Surface	
Unstable & Unsuitable	38%
Unstable	38%
Unsuitable	0%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	17	10	3.61	24	14	10	32	21	53	12	11	5
Maximum	42	21	4.50	46	19	27	39	39	72	24	18	16
Minimum	2	2	1.00	19	13	6	11	4	15	5	6	0

Classification Counts by Sample

ODOT Class	Rock	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-3	A-3a	A-4a	A-4b	A-5	A-6a	A-6b	A-7-5	A-7-6	A-8a	A-8b	Totals
Count	0	0	5	4	0	0	0	0	0	29	0	0	6	0	0	4	0	0	48
Percent	0%	0%	10%	8%	0%	0%	0%	0%	0%	60%	0%	0%	13%	0%	0%	8%	0%	0%	100%
% Rock|Granular|Cohesive	0%	79%									21%								100%
Surface Class Count	0	0	2	2	0	0	0	0	0	9	0	0	1	0	0	2	0	0	16
Surface Class Percent	0%	0%	13%	13%	0%	0%	0%	0%	0%	56%	0%	0%	6%	0%	0%	13%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
3.61	0.50	☐ HP
10.33	6.00	☐ N60L

Average HP
Average N_{60L}

RAMP A

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

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

MOT-725-14.41
108619

Interchange improvement - new ramp alignments, widened pavements, retaining walls and the addition of sidewalks - Ramp A

NEAS, Inc.

Prepared By: Zhao Mankoci
Date prepared: Thursday, April 28, 2022

Chunmei (Melinda) He, Ph.D, P.E.
2800 Corporate Exchange Drive
Suite 240
Columbus, OH, 43231
614-714-0299
che@neasinc.com

NO. OF BORINGS: 4

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-014-0-21	PROP. Ramp A East	605+63	22	Rt	CME 45B	73	1000.0	998.5	1.5 C
2	B-015-0-21	PROP. Ramp A East	609+94	5	Lt	CME 45B	73	983.6	982.1	1.5 C
3	B-016-0-21	PROP. Ramp A East	613+49	16	Rt	CME 45B	73	970.8	968.0	2.8 C
4	B-004-0-21	PROP. Ramp A East	617+96	11	Rt	CME 45B	73	954.0	953.0	1.0 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.6 2/11/2022

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B	SS-1	1.0	2.5	-0.5	1.0	27			NP	NP	NP	21	11	32	7	10	A-2-4	0	60					
	014-0	SS-2	3.5	5.0	2.0	3.5	17									10	10	A-2-4	0						
	21	SS-3	6.0	7.5	4.5	6.0	19		4.5	30	17	13	38	53	91	17	14	A-6a	9						
		SS-4	8.5	10.0	7.0	8.5	24	17								3	6	A-1-b							
2	B	SS-1	1.5	3.0	0.0	1.5	17									8	6	A-1-b	0	60					
	015-0	SS-2	3.0	4.5	1.5	3.0	10		3	43	21	22	34	38	72	22	18	A-7-6	13			N_{60} & Mc			
	21	SS-3	4.5	6.0	3.0	4.5	18		3.5							22	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	24	10	4	27	16	11	50	33	83	20	14	A-6a	8						
3	B	SS-1	2.5	4.0	-0.3	1.2	18		4.5	21	14	7	28	15	43	9	10	A-4a	2	40					
	016-0	SS-2	5.0	6.5	2.2	3.7	19									10	10	A-2-4	0						
	21	SS-3	7.5	9.0	4.7	6.2	15		2.5	21	13	8	37	28	65	13	10	A-4a	6						
		SS-4	10.0	11.5	7.2	8.7	12	15	2.5							12	10	A-4a							
4	B	SS-1	1.0	2.5	0.0	1.5	24		4.5	21	13	8	33	21	54	8	10	A-4a	4	87					
	004-0	SS-2	3.5	5.0	2.5	4.0	16		4.5	23	13	10	38	25	63	10	10	A-4a	6						
	21	SS-3	6.0	7.5	5.0	6.5	11		4.5							11	10	A-4a							
		SS-4	8.5	10.0	7.5	9.0	12	11	4.5							10	10	A-4a							

PID: 108619

County-Route-Section: MOT-725-14.41

No. of Borings: 4

Geotechnical Consultant: NEAS, Inc.

Prepared By: Zhao Mankoci

Date prepared: 4/28/2022

Chemical Stabilization Options		
320	Rubblize & Roll	Option
206	Cement Stabilization	Option
	Lime Stabilization	No
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	8

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	0%	HP ≤ 0.5	0%
$N_{60} < 12$	15%	0.5 < HP ≤ 1	0%
$12 \leq N_{60} < 15$	0%	1 < HP ≤ 2	0%
$N_{60} \geq 20$	23%	HP > 2	69%
M+	8%		
Rock	0%		
Unsuitable	0%		

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

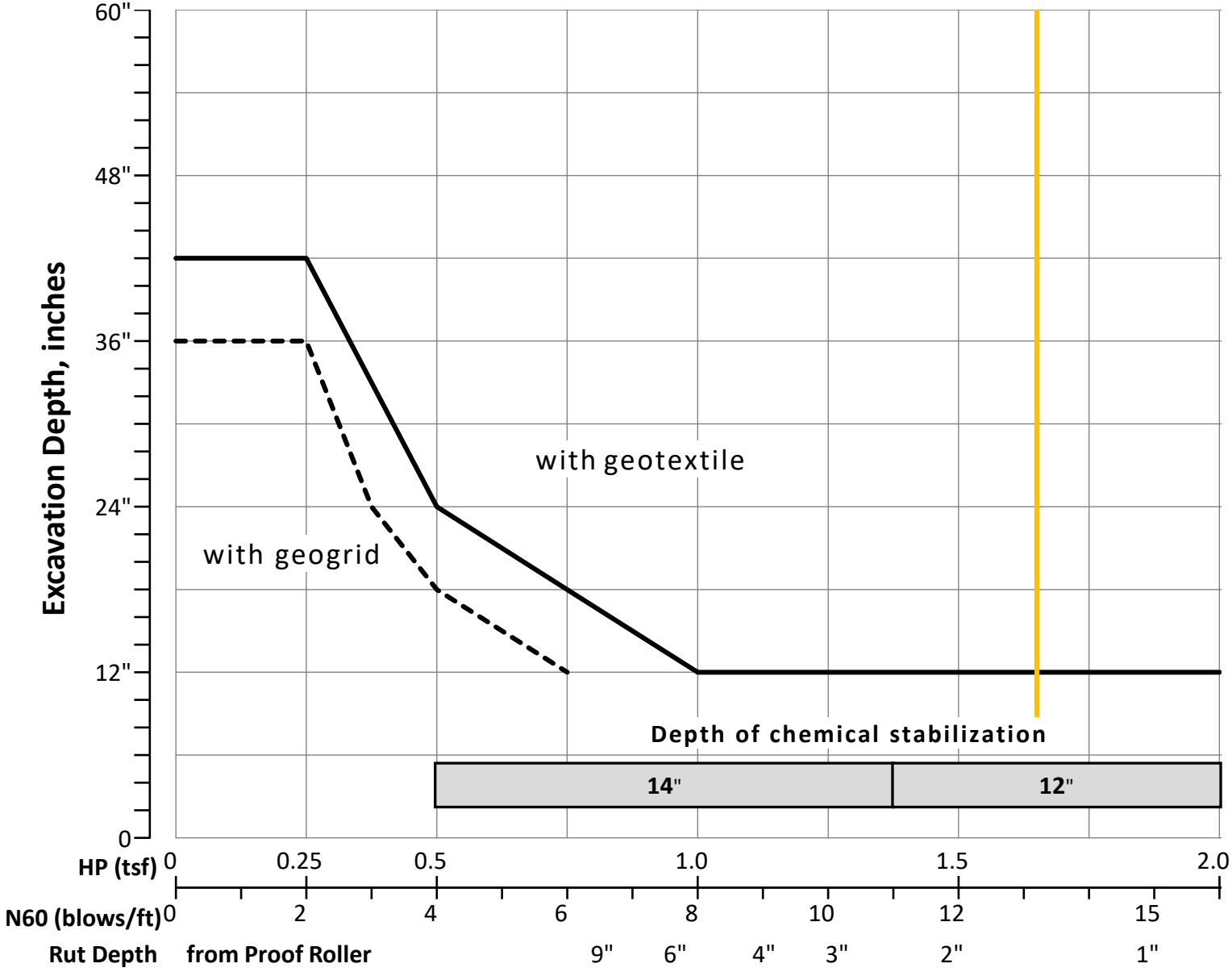
% Proposed Subgrade Surface	
Unstable & Unsuitable	13%
Unstable	13%
Unsuitable	0%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	18	13	3.86	27	15	11	35	28	63	12	11	5
Maximum	27	17	4.50	43	21	22	50	53	91	22	18	16
Minimum	10	10	2.50	21	13	7	21	11	32	3	6	0

Classification Counts by Sample

ODOT Class	Rock	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-3	A-3a	A-4a	A-4b	A-5	A-6a	A-6b	A-7-5	A-7-6	A-8a	A-8b	Totals
Count	0	0	2	3	0	0	0	0	0	7	0	0	2	0	0	2	0	0	16
Percent	0%	0%	13%	19%	0%	0%	0%	0%	0%	44%	0%	0%	13%	0%	0%	13%	0%	0%	100%
% Rock|Granular|Cohesive	0%	75%									25%								100%
Surface Class Count	0	0	1	3	0	0	0	0	0	3	0	0	0	0	0	1	0	0	8
Surface Class Percent	0%	0%	13%	38%	0%	0%	0%	0%	0%	38%	0%	0%	0%	0%	0%	13%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
3.86	0.50	☐ HP
13.25	6.00	☐ N60L

Average HP
Average N_{60L}

RAMP B

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

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MOT-725-14.41
108619

Interchange improvement - new ramp alignments, widened pavements, retaining walls and the addition of sidewalks - Ramp B

NEAS, Inc.

Prepared By: Zhao Mankoci
Date prepared: Thursday, April 28, 2022

Chunmei (Melinda) He, Ph.D, P.E.
2800 Corporate Exchange Drive
Suite 240
Columbus, OH, 43231
614-714-0299
che@neasinc.com

NO. OF BORINGS: 2

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-017-0-21	PROP. Ramp B East	703+15	28	Rt	CME 45B	73	952.2	949.6	2.6 C
2	B-018-0-21	PROP. Ramp B East	707+07	16	Lt	CME 45B	73	945.1	943.6	1.5 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.6 2/11/2022

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B 017-0 21	SS-1	2.5	4.0	-0.1	1.4	19		2.5	36	17	19	33	34	67	19	16	A-6b	10	53		Mc			
		SS-2	5.0	6.5	2.4	3.9	18		4.5	25	14	11	33	23	56	12	14	A-6a	5						
		SS-3	7.5	9.0	4.9	6.4	18		4.5							11	14	A-6a	10						
		SS-4	10.0	11.5	7.4	8.9	16	18	4.5							21	14	A-6a							
2	B 018-0 21	SS-1	1.5	3.0	0.0	1.5	40			21	14	7	22	12	34	6	10	A-2-4	0	340					
		SS-2	3.0	4.5	1.5	3.0	30		4.5	19	12	7	33	19	52	7	10	A-4a	3						
		SS-3	4.5	6.0	3.0	4.5	25		4.5							9	10	A-4a	8						
		SS-4	6.0	7.5	4.5	6.0	8	8	2.25							12	10	A-4a	8						

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.6 2/11/2022

PID: 108619

County-Route-Section: MOT-725-14.41
No. of Borings: 2

Geotechnical Consultant: NEAS, Inc.
Prepared By: Zhao Mankoci
Date prepared: 4/28/2022

Chemical Stabilization Options		
320	Rubblize & Roll	Option
206	Cement Stabilization	Option
	Lime Stabilization	No
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	7

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	0%	HP ≤ 0.5	0%
$N_{60} < 12$	14%	0.5 < HP ≤ 1	0%
$12 \leq N_{60} < 15$	0%	1 < HP ≤ 2	0%
$N_{60} \geq 20$	43%	HP > 2	86%
M+	14%		
Rock	0%		
Unsuitable	0%		

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

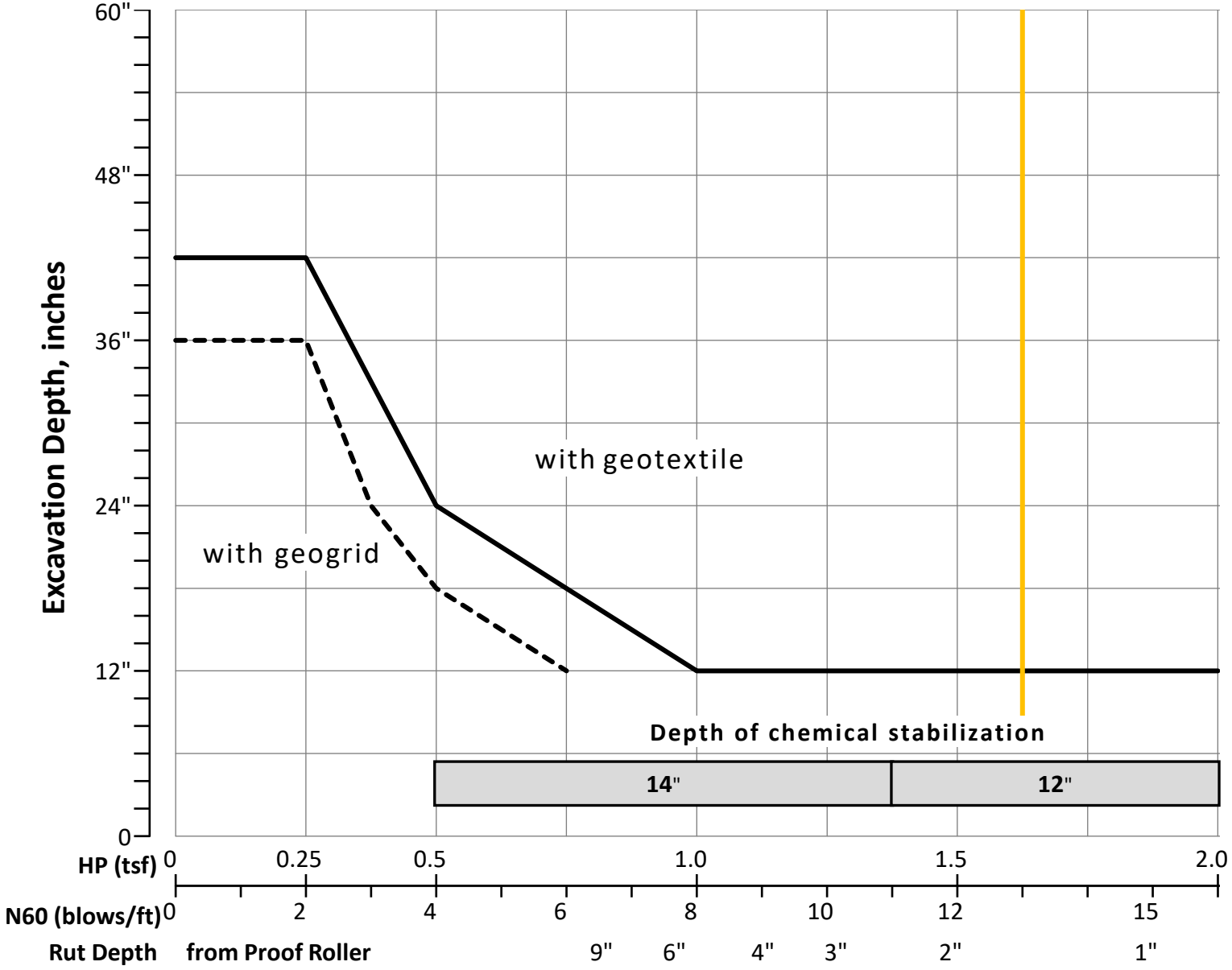
% Proposed Subgrade Surface	
Unstable & Unsuitable	25%
Unstable	25%
Unsuitable	0%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	22	13	3.89	25	14	11	30	22	52	12	12	6
Maximum	40	18	4.50	36	17	19	33	34	67	21	16	10
Minimum	8	8	2.25	19	12	7	22	12	34	6	10	0

Classification Counts by Sample

ODOT Class	Rock	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-3	A-3a	A-4a	A-4b	A-5	A-6a	A-6b	A-7-5	A-7-6	A-8a	A-8b	Totals
Count	0	0	0	1	0	0	0	0	0	3	0	0	3	1	0	0	0	0	8
Percent	0%	0%	0%	13%	0%	0%	0%	0%	0%	38%	0%	0%	38%	13%	0%	0%	0%	0%	100%
% Rock|Granular|Cohesive	0%	50%									50%								100%
Surface Class Count	0	0	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	4
Surface Class Percent	0%	0%	0%	25%	0%	0%	0%	0%	0%	25%	0%	0%	25%	25%	0%	0%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
3.89	0.50	☐ HP
13.00	6.00	☐ N60L

Average HP
Average N_{60L}

RAMP C

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

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

MOT-725-14.41
108619

Interchange improvement - new ramp alignments, widened pavements, retaining walls and the addition of sidewalks - Ramp C

NEAS, Inc.

Prepared By: Zhao Mankoci
Date prepared: Thursday, April 28, 2022

Chunmei (Melinda) He, Ph.D, P.E.
2800 Corporate Exchange Drive
Suite 240
Columbus, OH, 43231
614-714-0299
che@neasinc.com

NO. OF BORINGS: 3

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.6 2/11/2022

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-019-0-21	PROP. Ramp C West	806+52	22	Lt	CME 45B	73	1000.3	998.8	1.5 C
2	B-020-0-21	PROP. Ramp C West	810+42	16	Rt	CME 45B	73	983.7	981.3	2.4 C
3	B-009-0-21	PROP. Ramp C West	815+61	29	Lt	CME 45B	73	961.7	959.4	2.3 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.6 2/11/2022

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B	SS-1	1.5	3.0	0.0	1.5	22			NP	NP	NP	24	10	34	9	10	A-2-4	0	67					
	019-0	SS-2	3.0	4.5	1.5	3.0	18		4.5	18	13	5	34	16	50	9	10	A-4a	3						
	21	SS-3	4.5	6.0	3.0	4.5	19		4.5							10	10	A-4a	8						
		SS-4	6.0	7.5	4.5	6.0	21	18	4.5							10	10	A-4a	8						
2	B	SS-1	1.5	3.0	-0.9	0.6	16		4.25	24	15	9	28	14	42	12	10	A-4a	1	133					
	020-0	SS-2	3.0	4.5	0.6	2.1	15		3.5	22	13	9	37	23	60	14	10	A-4a	5			Mc			
	21	SS-3	4.5	6.0	2.1	3.6	17		4.5							13	10	A-4a	8						
		SS-4	6.0	7.5	3.6	5.1	24	15	4.5							11	10	A-4a	8						
3	B	SS-1	2.5	4.0	0.2	1.7	18		4.25	25	14	11	35	25	60	12	14	A-6a	5						
	009-0	SS-2	5.0	6.5	2.7	4.2	25		4.5							11	14	A-6a	10						
	21	SS-3	7.5	9.0	5.2	6.7	21		4.25							12	14	A-6a							
		SS-4	10.0	11.5	7.7	9.2	17	18	4.25							11	14	A-6a							

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.6 2/11/2022

PID: 108619

County-Route-Section: MOT-725-14.41
No. of Borings: 3

Geotechnical Consultant: NEAS, Inc.
Prepared By: Zhao Mankoci
Date prepared: 4/28/2022

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

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

Design CBR	8

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	0%	HP ≤ 0.5	0%
$N_{60} < 12$	0%	0.5 < HP ≤ 1	0%
$12 \leq N_{60} < 15$	0%	1 < HP ≤ 2	0%
$N_{60} \geq 20$	46%	HP > 2	91%
M+	9%		
Rock	0%		
Unsuitable	0%		

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

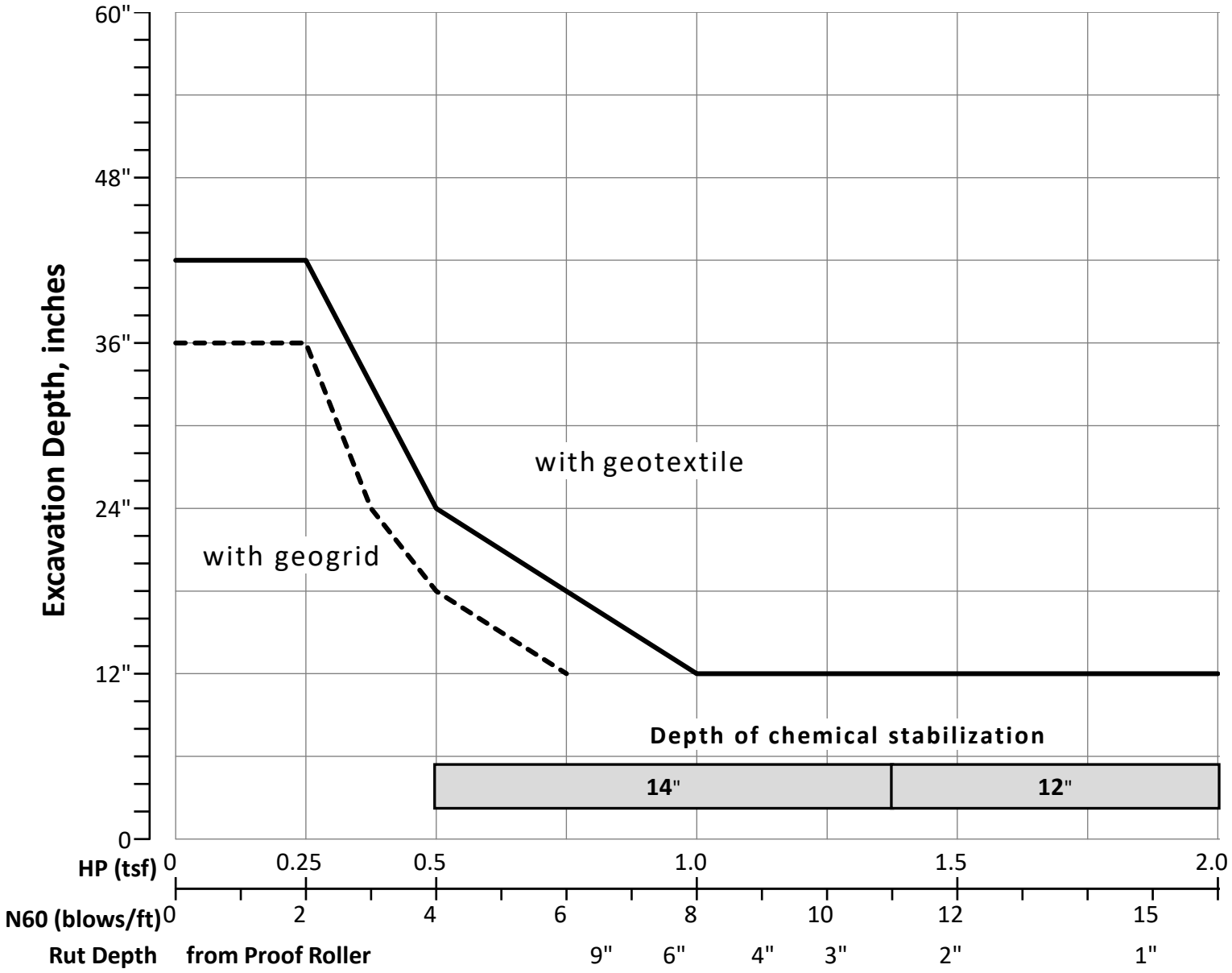
% Proposed Subgrade Surface	
Unstable & Unsuitable	14%
Unstable	14%
Unsuitable	0%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	19	17	4.32	22	14	9	32	18	49	11	11	6
Maximum	25	18	4.50	25	15	11	37	25	60	14	14	10
Minimum	15	15	3.50	18	13	5	24	10	34	9	10	0

Classification Counts by Sample

ODOT Class	Rock	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-3	A-3a	A-4a	A-4b	A-5	A-6a	A-6b	A-7-5	A-7-6	A-8a	A-8b	Totals
Count	0	0	0	1	0	0	0	0	0	7	0	0	4	0	0	0	0	0	12
Percent	0%	0%	0%	8%	0%	0%	0%	0%	0%	58%	0%	0%	33%	0%	0%	0%	0%	0%	100%
% Rock|Granular|Cohesive	0%	67%									33%								100%
Surface Class Count	0	0	0	1	0	0	0	0	0	4	0	0	2	0	0	0	0	0	7
Surface Class Percent	0%	0%	0%	14%	0%	0%	0%	0%	0%	57%	0%	0%	29%	0%	0%	0%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
4.32	0.50	☐ HP
17.00	6.00	☐ N60L

Average HP
Average N_{60L}

RAMP D

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

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

MOT-725-14.41
108619

Interchange improvement - new ramp alignments, widened pavements, retaining walls and the addition of sidewalks - Ramp D

NEAS, Inc.

Prepared By: Zhao Mankoci
Date prepared: Thursday, April 28, 2022

Chunmei (Melinda) He, Ph.D, P.E.
2800 Corporate Exchange Drive
Suite 240
Columbus, OH, 43231
614-714-0299
che@neasinc.com

NO. OF BORINGS: 4

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-021-0-21	PROP. Ramp D East	953+04	31	Lt	CME 45B	73	958.6	959.5	0.9 F
2	B-022-0-21	PROP. Ramp D West	907+74	6	Rt	CME 45B	73	953.3	950.8	2.5 C
3	B-023-0-21	PROP. Ramp D West	910+88	6	Rt	CME 45B	73	947.1	945.6	1.5 C
4	B-024-0-21	PROP. Ramp D West	914+04	7	Rt	CME 45B	73	941.2	939.7	1.5 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.6 2/11/2022

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B	SS-1	1.5	3.0	2.4	3.9	40		4.5	23	14	9	38	26	64	9	10	A-4a	6	40					
	021-0	SS-2	3.0	4.5	3.9	5.4	33		4.5	24	13	11	36	24	60	10	14	A-6a	5						
	21	SS-3	4.5	6.0	5.4	6.9	35		4.5							12	14	A-6a							
		SS-4	6.0	7.5	6.9	8.4	24	30	4.5							11	14	A-6a							
2	B	SS-1	1.5	3.0	-1.0	0.5	13		4.5	38	19	19	47	31	78	18	16	A-6b	12	0					
	022-0	SS-2	3.0	4.5	0.5	2.0	11		4.25	32	17	15	42	25	67	18	14	A-6a	8			N_{60} & Mc		12''	
	21	SS-3	4.5	6.0	2.0	3.5	12		3.75							18	14	A-6a	10			N_{60} & Mc			
		SS-4	6.0	7.5	3.5	5.0	13	11								11	10	A-2-4	0						
3	B	SS-1	1.5	3.0	0.0	1.5	16			NP	NP	NP	20	8	28	23	10	A-2-4	0	60		Mc			
	023-0	SS-2	3.0	4.5	1.5	3.0	21		4.5	24	14	10	32	21	53	11	10	A-4a	4						
	21	SS-3	4.5	6.0	3.0	4.5	23		4.25							11	10	A-4a	8						
		SS-4	6.0	7.5	4.5	6.0	28	16	4.5							10	10	A-4a	8						
4	B	SS-1	1.5	3.0	0.0	1.5	15		4.25	31	17	14	26	16	42	13	14	A-6a	2	173					
	024-0	SS-2	3.0	4.5	1.5	3.0	16			26	14	12	20	12	32	13	10	A-2-6	0			Mc			
	21	SS-3	4.5	6.0	3.0	4.5	21									15	10	A-2-6	4						
		SS-4	6.0	7.5	4.5	6.0	18	15								14	10	A-2-6	4						

PID: 108619

County-Route-Section: MOT-725-14.41
No. of Borings: 4

Geotechnical Consultant: NEAS, Inc.
Prepared By: Zhao Mankoci
Date prepared: 4/28/2022

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

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

Design CBR	8

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	0%	HP ≤ 0.5	0%
$N_{60} < 12$	7%	0.5 < HP ≤ 1	0%
$12 \leq N_{60} < 15$	20%	1 < HP ≤ 2	0%
$N_{60} \geq 20$	47%	HP > 2	67%
M+	27%		
Rock	0%		
Unsuitable	0%		

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

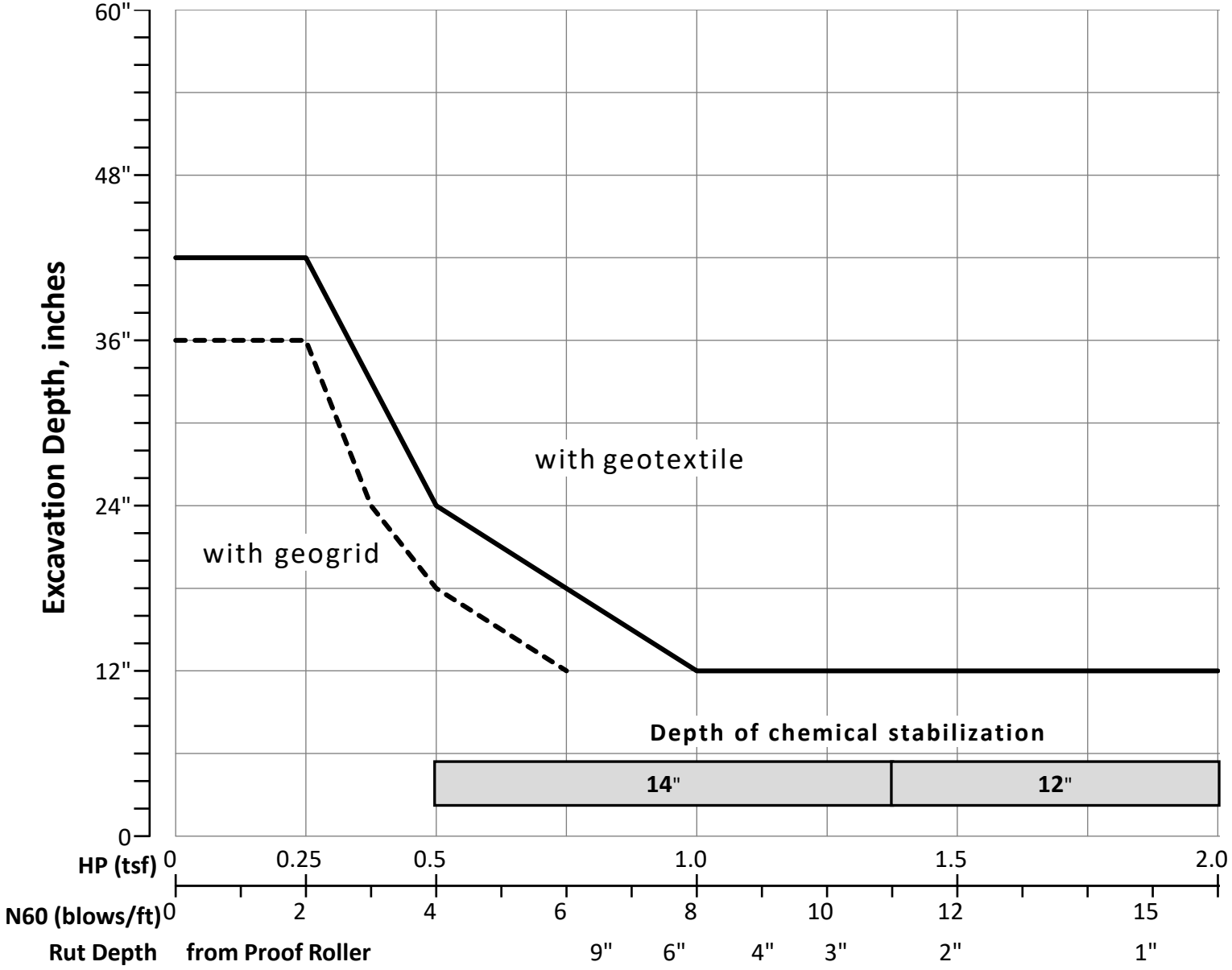
% Proposed Subgrade Surface	
Unstable & Unsuitable	50%
Unstable	50%
Unsuitable	0%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	21	18	4.36	28	15	13	33	20	53	14	12	5
Maximum	40	30	4.50	38	19	19	47	31	78	23	16	12
Minimum	11	11	3.75	23	13	9	20	8	28	9	10	0

Classification Counts by Sample

ODOT Class	Rock	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-3	A-3a	A-4a	A-4b	A-5	A-6a	A-6b	A-7-5	A-7-6	A-8a	A-8b	Totals
Count	0	0	0	2	0	3	0	0	0	4	0	0	6	1	0	0	0	0	16
Percent	0%	0%	0%	13%	0%	19%	0%	0%	0%	25%	0%	0%	38%	6%	0%	0%	0%	0%	100%
% Rock|Granular|Cohesive	0%	56%									44%								100%
Surface Class Count	0	0	0	1	0	1	0	0	0	2	0	0	3	1	0	0	0	0	8
Surface Class Percent	0%	0%	0%	13%	0%	13%	0%	0%	0%	25%	0%	0%	38%	13%	0%	0%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
4.36	0.50	☐ HP
18.00	6.00	☐ N60L

Average HP
Average N_{60L}

APPENDIX F

HISTORIC BORINGS

B-001-0-58

THE H.C.NUTTING CO.
CINCINNATI, OHIO

LABORATORY LOG — SUBSURFACE EXPLORATION

CLIENT Yule, Sticklen, Jordan & McNee PROJECT U. S. Route 25 - Section III
ORDER NO. 3636.1 SITE State Route 725 BORING NO. 1
LOCATION Sta. 197+13, 139.5' Rt. of E. SURFACE ELEV. 973.5 SHEET 1 OF 2

Depth and Elevation in Feet	Casing Blows	Sample Number	Blows per 6" on Sampler	Classification	Summary of Test Results			
					W	L.L.	P.I.	Other
973.0	4	1	1	Topsoil & Brn. Sandy Lean CLAY(CL)	22.5	34.0	16.2	M.A.
	8	2	4-8-7	Brn. Gravelly Lean CLAY (CL)	23.0	49.0	30.6	M.A.
971.0	21							
	38	3	6-11 13	Brn. Sandy Silty CLAY (CL-ML)	15.0	20.2	6.1	M.A.
	42							
	38							
	38							
	17	4	14-15 8	do do do	13.0	18.8	5.7	M.A.
	24							
963.5	27							
	32	S-1		Gray Sandy Silty CLAY (CL-ML)	10.9	19.1	5.5	M.A. UNC. C_v G
	47	5	6-10 17	Gray Sandy Lean CLAY (CL)	13.0	20.9	8.6	M.A.
	58							
	58							
	44							
	41							M.A.
	28	S-2		Gray Sandy Silty CLAY (CL-ML)	11.4	20.2	7.0	UNC. C_v G
	37							
	56	6	6-9-11	do do do	12.7	19.3	5.5	M.A.
		7	6-11 13	do do do	13.6	19.4	5.9	M.A.
		8	7-13 17	Gray Sandy Lean CLAY (CL)	12.6	20.9	8.5	M.A.
31								

916A-2-58

THE H.C.NUTTING CO.
CINCINNATI, OHIO

LABORATORY LOG — SUBSURFACE EXPLORATION

CLIENT Yule, Sticklen, Jordan & McNee PROJECT U. S. Route 25 - Section III
ORDER NO. 3636.1 SITE State Route 725 BORING NO. 1
LOCATION Sta. 197+13, 139.5' Rt. of ℄ SURFACE ELEV. 973.5 SHEET 2 OF 2

Depth and Elevation in Feet	Casing Blows	Sample Number	Blows per 6" on Sampler	Classification	Summary of Test Results			
					W	L.L.	P.I.	Other
32								
34								
36		9	6-12 17	Gray Silty CLAY (CL-ML)	14.3	19.7	7.1	M.A.
38								
40 929.5		10	10-15 19	Gray Lean CLAY (CL)	18.9	29.8	11.8	M.A.
42								
44 929.5		S-3		Gray Sandy Lean CLAY (CL)	13.7	24.8	19.8	M.A. C_V G
		11	13-20 25	do do do	13.2	24.4	8.5	M.A.
46								
48								
50		12	11-12 23	do do do	10.9	19.9	7.6	M.A.
52								
54								
56		Run 1	60/3"	Layered Gray Weathered Shale & Fossiliferous LIMESTONE. (Approx. 15-20% Limestone in 1-2" Layers).				
58								
60 913.5				Bottom of Boring - 60'0"				

B-001-0-76

State of Ohio
Department of Transportation
Division of Highways
Testing Laboratory

HOLLOW STEM LOG OF BORING

Date Started 10/12/76 Sampler: Type AUGER Dia. _____ Water Elev. 938.1'
Date Completed 10/13/76 Casing: Length _____ Dia. _____ 953.1' - 24 HRS.

Project Identification: MONTGOMERY
MOT - 725-14.10
SUBSURFACE INVESTIGATION
LIGHT TOWERS

Boring No. _____ Station & Offset 15+90, 75' RT RAMP A Surface Elev. 961.1'

Elev.	Depth	Std. Pen. (N)	Description	Field No.	Lab. Nos. So.	Physical Characteristics % Agg.	% C.S.	% F.S.	% Silt	% Clay	L.L.	Pl.	W.C.	SHTL Class
961.1	0													
958.6	2													
956.1	4	15/15/16	BROWN & GRAY SANDY CLAYEY SILT	1	01073	5	1	10	62	22	NP	NP	16	A-4B
953.6	6	20/24/32	BROWN & GRAY CLAYEY SILT	2	01074	0	0	9	67	24	NP	NP	15	A-4B
951.1	8	16/16/17	BROWN SANDY CLAYEY SILT WITH STONE FRAGMENTS	3	01075	17	3	21	42	17	NP	NP	14	A-4A
948.6	10													
946.1	12	12/29/19	BROWN CLAYEY SANDY SILT WITH STONE FRAGMENTS	4	01076	27	12	14	28	19	NP	NP	11	A-4A
943.6	14	5/12/18	BROWN & GRAY SANDY CLAYEY SILT WITH STONE FRAMGENTS	5	01077	27	6	9	24	34	24	9	10	A-4A
941.1	16	13/21/24	GRAY CLAYEY SILT	6	01078	2	1	2	44	51	25	9	11	A-4A
938.1	18	5/11/20	GRAY CLAYEY SILT	7	01079	2	1	2	35	60	27	9	13	A-4A
	20													
	22	7/12/23	GRAY CLAYEY SILT	8	01080	8	1	1	32	58	32	10	13	A-4A
	24		▽ TOP OF ROCK											
935.6	26	50(0.5')	GRAY WEATHERED CLAY SHALE	9	01081	12	1	1	31	55	32	11	14	VISUAL
	28		↑ BOTTOM OF BORING											
	30													
	32													
	34													
	36													

Form TE-153 Particle Sizes: Agg.= >2.00mm, Coarse Sand=2.00-0.42mm, Fine Sand=0.42-0.074mm, Silt=0.074-0.005mm, Clay=< 0.005mm

B-002-0-76

State of Ohio
Department of Transportation
Division of Highways
Testing Laboratory

LOG OF BORING

HOLLOW STEM AUGER

Date Started 10/13/76 Sampler: Type ____ Dia. ____ Water Elev 927.0'-17 HRS
Date Completed 10/13/76 Casing: Length ____ Dia. ____

Project Identification: MONTGOMERY
MOT - 725-14.10
SUBSURFACE INVESTIGATION
LIGHT TOWERS

Boring No. ____ Station & Offset 204+35 212' RT Surface Elev. 937.4'

Elev.	Depth	Std. Pen. (N)	Description	Field No.	Lab. Nos.	Physical Characteristics % Agg.	% C.S.	% F.S.	% Silt	% Clay	L.L.	Pl.	W.C.	SHTL. Class
937.4	0													
	2													
	4													
932.4	6	12/10/8	BROWN SANDY SILT AND CLAY WITH STONE FRAGMENTS	1	01110	15	8	18	32	27	26	12	7	A-6A
929.9	8	6/10/17	BROWN SANDY CLAYEY SILT WITH STONE FRAGMENTS	2	01111	21	7	15	30	27	22	8	10	A-4A
927.4	10													
	12	7/9/11	BROWN SANDY CLAYEY SILT WITH STONE FRAGMENTS	3	01112	17	7	16	33	27	24	8	9	A-4A
924.9	14	4/7/11	BROWN SANDY SILT AND CLAY WITH STONE FRAGMENTS	4	01113	12	5	15	28	40	32	16	22	A-6B
922.4	16	4/4/4	BROWN SANDY CLAYEY SILT WITH STONE FRAGMENTS	5	01114	15	9	18	31	27	24	10	11	A-4A
919.9	18	3/4/7	BROWN & GRAY SANDY CLAYEY SILT WITH STONE FRAGMENTS TRACE OF ORGANIC	6	01115	15	7	18	31	29	24	8	13	A-4A
917.4	20	21/14/30(0.4')	BROWN & GRAY SANDY SILT AND CLAY AND ST.FRAGTS.	7	01116	40	7	8	12	33	30	13	16	A-6A
915.4	22	50(0.5')	BROWN - GRAY LIMESTONE AND CLAY SHALE	8	01117	49	6	5	13	27	30	11	18	VISUAL
914.9	24		BOTTOM OF BORING											
	26													
	28													
	30													
	32													
	34													
	36													

TOP OF ROCK

Form TE-153 Particle Sizes: Agg= >2.00mm, Coarse Sand=2.00-0.42mm, Fine Sand=0.42-0.074mm, Silt=0.074-0.005mm, Clay=< 0.005mm

B-003-0-76

State of Ohio
Department of Transportation
Division of Highways
Testing Laboratory

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HOLLOW STEM LOG OF BORING

Date Started 10/15/76 Sampler: Type AUGER Dia. _____ Water Elev 941.3'
Date Completed 10/15/76 Casing: Length _____ Dia. _____

Project Identification: MONTGOMERY
MOT - 725-14.10
SUBSURFACE INVESTIGATION
LIGHT TOWERS

Boring No. _____ Station & Offset 758+70, 85' LT Surface Elev. 944.3'

Elev.	Depth	Std. Pen. (N)	Description	Field No.	Lab Nos.So.	Physical Characteristics % Agg.	% C.S.	% F.S.	% Silt	% Clay	L.L.	Pl.	W.C.	SHTL Class
944.3	0													
941.8	2													
	4	4/3/6	BROWN & GRAY SANDY SILT AND CLAY (TRACE OF ORGANIC AND WOOD)	1	01089	8	4	17	35	36	34	12	28	A-6A
939.3	6	6/10/16	BROWN SANDY SILT AND CLAY, TRACE OF ORGANIC	2	01090	7	6	19	28	40	33	17	24	A-6B
936.8	8	7/10/16	BROWN SANDY CLAYEY SILT WITH STONE FRAGMENTS	3	01091	19	6	13	34	28	21	7	12	A-4A
934.3	10	15/25/20	BROWN SANDY CLAYEY SILT WITH STONE FRAGMENTS	4	01092	17	6	13	35	29	21	6	13	A-4A
931.8	12	13/17/20	BROWN SANDY CLAYEY SILT WITH STONE FRAGMENTS	5	01093	28	5	8	26	33	24	10	13	A-4A
929.3	14	11/21/34	BROWN SANDY CLAYEY SILT WITH STONE FRAGMENTS	6	01094	14	8	13	36	29	20	6	13	A-4A
926.8	16	50(0.3')	GRAY CLAY SHALE	7	01095	19	17	2	12	50	33	14	16	A-6A
926.5	18		BOTTOM OF BORING / TOP OF ROCK											
	20													
	22													
	24													
	26													
	28													
	30													
	32													
	34													
	36													

Form TE-153 Particle Sizes: Agg= >2.00mm, Coarse Sand=2.00-0.42mm, Fine Sand=0.42-0.074mm, Silt=0.074-0.005mm, Clay=< 0.005mm

B-004-0-76

State of Ohio
Department of Transportation
Division of Highways
Testing Laboratory

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HOLLOW STEM LOG OF BORING

Date Started 10/14/76 Sampler: Type AUGER Dia. _____ Water Elev. _____
Date Completed 10/14/76 Casing: Length _____ Dia. _____

Project Identification: MONTGOMERY
MOT - 725-14.10
SUBSURFACE INVESTIGATION
LIGHT TOWERS

Boring No. _____ Station & Offset 209+65, 173' RT Surface Elev. 932.5'

Elev.	Depth	Std. Pen. (N)	Description	Field No.	Lab. Nos.So.	Physical Characteristics % Agg.	% C.S.	% F.S.	% Silt	% Clay	L.L.	Pl.	W.C.	SHTL Class
932.5	0													
	2													
	4													
927.5	6	6/5/14	BROWN SANDY CLAYEY SILT WITH STONE FRAGMENTS	1	01132	13	9	17	35	26	23	8	10	A-4A
	8													
922.5	10													
	12	6/15/15	BROWN CLAYEY SANDY SILT WITH STONE FRAGMENTS	2	01133	27	10	17	28	18	19	5	8	A-4A
	14													
917.5														
	16	5/9/12	BROWN SANDY CLAYEY SILT WITH STONE FRAGMENTS	3	01134	15	8	16	37	24	21	7	9	A-4A
915.0	18													
		5/14/26	BROWN SANDY CLAYEY SILT AND STONE FRAGMENTS	4	01135	40	6	12	20	22	23	7	7	A-4A
912.5	20													
		7/14/12	BROWN SANDY CLAYEY SILT WITH STONE FRAGMENTS	5	01136	15	9	17	31	28	24	10	11	A-4A
910.0	22													
	24	9/12/18	BROWN CLAYEY SANDY SILT WITH STONE FRAGMENTS	6	01137	13	10	20	32	25	22	7	6	A-4A
907.5														
	26	16/11/17	BROWN SANDY CLAYEY SILT WITH STONE FRAGMENTS	7	01138	10	8	19	33	30	21	6	8	A-4A
905.0	28													
		9/19/20	BROWN CLAYEY SANDY SILT AND STONE FRAGMENTS	8	01139	41	8	13	21	17	23	8	10	A-4A
902.5	30													
		20/11/13	BROWN SANDY CLAYEY SILT WITH STONE FRAGMENTS	9	01140	19	7	16	30	28	29	13	24	A-6a
900.0	32													
899.0	34	6/50	BROWN SANDY CLAYEY SILT WITH STONE FRAGMENTS	10	01141	34	9	10	24	23	25	9	10	A-4A
897.5			TOP OF ROCK											
897.3	36	50(0.2')	BROWN & GRAY LIMESTONE AND CLAY SHALE	11	01142	37	13	10	21	19	22	6	4	VISUAL
			BOTTOM OF BORING											

Form TE-163 Particle Sizes: Agg.= >2.00mm, Coarse Sand=2.00-0.42mm, Fine Sand=0.42-0.074mm, Silt=0.074-0.005mm, Clay=< 0.005mm

B-005-0-76

State of Ohio
Department of Transportation
Division of Highways
Testing Laboratory

LOG OF BORING

HOLLOW STEM

Date Started 10/14/76 Sampler: Type AUGER Dia. ____ Water Elev. 959.8'
Date Completed 10/14/76 Casing: Length ____ Dia. ____

Project Identification: MONTGOMERY
MOT - 725-14.10
SUBSURFACE INVESTIGATION
LIGHT TOWERS

Boring No. ____ Station & Offset 764+00, 110' RT Surface Elev. 978.3'

Elev.	Depth	Std. Pen. (N)	Description	Field No.	Lab. Nos. So.	Physical Characteristics % Agg.	% C.S.	% F.S.	% Silt	% Clay	L.L.	Pl.	W.C.	SHTL Class
978.3	0													
	2													
	4													
973.3	6	10/14/16	BROWN & GRAY SANDY CLAYEY SILT WITH STONE FRAGMENTS	1	01061	13	10	19	29	29	22	8	10	A-4A
	8													
968.3	10													
	12	9/10/18	BROWN CLAYEY SANDY SILT WITH STONE FRAGMENTS	2	01062	17	10	17	37	19	19	3	10	A-4A
963.3	14													
	16	7/10/13	BROWN & GRAY SANDY CLAYEY SILT WITH STONE FRAGMENTS	3	01063	19	5	12	39	25	23	9	14	A-4A
	18													
958.3	20													
955.8	22	10/10/13	BROWN & GRAY SANDY CLAYEY SILT WITH STONE FRAGMENTS	4	01064	17	6	14	34	29	22	8	13	A-4A
953.3	24	12/19/25	BROWN SANDY CLAYEY SILT WITH STONE FRAGMENTS	5	01065	13	5	13	34	35	22	7	13	A-4A
	26	11/14/19	BROWN SANDY CLAYEY SILT WITH STONE FRAGMENTS	6	01066	11	5	12	39	33	22	7	14	A-4A
950.8	28	9/15/22	BROWN SANDY CLAYEY SILT WITH STONE FRAGMENTS	7	01067	10	7	16	35	32	21	8	13	A-4A
948.3	30	9/13/18	BROWN & GRAY SANDY CLAYEY SILT WITH STONE FRAGMENTS	8	01068	8	5	13	39	35	22	8	14	A-4A
945.8	32	10/12/19	BROWN & GRAY SANDY CLAYEY SILT WITH STONE FRAGMENTS	9	01069	9	6	13	42	30	20	7	14	A-4A
943.3	34													
	36													

Form TE-153 Particle Sizes: Agg= >2.00mm, Coarse Sand=2.00-0.42mm, Fine Sand=0.42-0.074mm, Silt=0.074-0.005mm, Clay=< 0.005mm

Boring No. _____ Station & Offset 764+00 , 110' RT Surface Elev. 978.3' Project: MDT - 725-14.10

Elev.	Depth	Std. Pen. (N)	Description	Field No.	Lab. Nos. Sc.	Physical Characteristics % Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	W.C.	SHTL Class
940.8	38	9/12/18	BROWN SANDY CLAYEY SILT WITH STONE FRAGMENTS	10	01070	21	5	11	33	30	22	7	11	A-4a
938.3	40	8/13/26	BROWN & GRAY SANDY CLAYEY SILT WITH STONE FRAGMENTS	11	01071	28	6	13	28	25	20	6	11	A-4A
936.8	42	6/11/21	BROWN & GRAY SANDY CLAYEY SILT WITH STONE FRAGMENTS	12	01072	21	5	8	33	33	26	10	14	A-4A
	44		BOTTOM OF BORING											
	46													
	48													
	50													
	52													
	54													
	56													
	58													
	60													
	62													
	64													
	66													
	68													
	70													
	72													
	74													
	76													
	78													
	80													

orm TE-70

B-001-0-95

State of Ohio
Department of Transportation
Office of Materials Management

METRIC PROJECT

12

LOG OF BORING

Date Started 10/23/95 Sampler: Type SS Dia. 34.93 mm Water Elev. - Project Identification: MONTGOMERY
Date completed 10/24/95 APPROX. MOT-75-6.035 km
Boring No. B-1 Station & Offset 5+996.33, 23.7 m RT. (REAR ABUT.) Surface Elev. 298.00 m OVER SR 725
STRUCTURE FOUNDATION INVESTIGATION

Elev.	Depth	Sample No. (N)	Pen. m	Rec. m	Loss m	Description	Sample No.	Physical Characteristics: % Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	W.C.	ODOT Class
298.00	0															
297.73		AUGERED				TOPSOIL										VISUAL
297.24	1.0															
		9/9/14				BROWN SANDY SILT	1	0	9	20	44	27	26	10	19	A-4A
296.48	2.0															
		13/15/15				BROWN SANDY CLAYEY SILT WITH STONE FRAGMENTS	2	-	-	-	-	-	-	-	11	VISUAL
295.71																
	3.0	11/10/11				BROWN SANDY CLAYEY SILT WITH STONE FRAGMENTS	3	-	-	-	-	-	-	-	13	VISUAL
294.95																
		6/9/13				BROWN SANDY SILT	4	0	11	19	44	26	20	6	12	A-4A
294.19	4.0															
		14/19/17				BROWN AND GRAY SANDY SILT	5	0	8	17	50	25	20	6	11	A-4B
293.43																
	5.0	12/12/12				GRAY SANDY SILT	6	0	10	19	47	24	20	6	10	A-4A
292.67																
	6.0	3/19/11				GRAY SANDY SILT	7	0	9	17	48	26	20	6	10	A-4A
291.90																
		8/19/17				GRAY SANDY SILT	8	0	8	20	45	27	22	8	12	A-4A
	7.0															
290.38																
	8.0	11/18/23				GRAY SANDY SILT	9	0	6	14	46	34	20	6	13	A-4A
	9.0															
288.86																
		16/23/29				GRAY SANDY SILT	10	0	8	16	46	30	22	8	10	A-4A
	0.0															
287.33																
	1.0	14/29/33				GRAY SANDY SILT	11	0	9	19	48	24	20	7	11	A-4A

Particle Sizes: Agg= >2.00mm, Coarse Sand= 2.00-0.42mm, Fine Sand= 0.42-0.074mm, Silt= 0.074-0.005mm, Clay= <0.005mm

Form TE-31 Revised 9/88

Boring No. B-1 | Station & Offset 5+996.33, 23.7 m RT. | APPROX. Surface Elev. 298.00 m | Project: MOT-75-6.035 km

Elev.	Depth	Std. Pen. (N)	Rec. %	Loss m	Description	Sample No.	Physical Characteristics % Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	W.C.	ODOT Class
285.81	12.0														
	13.0	12/14/14			GRAY SANDY SILT	12	0	11	21	44	24	19	6	15	A-4A
284.28	14.0	9/14/20			GRAY SILT AND CLAY	13	0	1	2	46	51	29	12	12	A-6A
	15.0														
282.76	16.0	22/30/41			GRAY SILT AND CLAY	14	0	7	11	44	38	27	11	11	A-6A
281.24	17.0	29/38/38			GRAY SILT AND CLAY	15	0	7	11	48	34	29	13	12	A-6A
	18.0				TOP OF ROCK										
279.56		70(.15)			NO RECOVERY	-	-	-	-	-	-	-	-	-	VISUAL
	19.0		1.46	.06	LIMESTONE, BLACK, FIRM, CRYSTALLINE, FOSSILIFEROUS WITH SCATTERED THIN CLAY SEAMS, JOINTED NEAR THE TOP; WITH GRAYISH-GREEN, HARD, HIGHLY CALCAREOUS, WEATHERED IN PART SHALE INTERBEDS (.03 m TO .27 m THICK) THAT COMPRISE 50% OF THE INTERVAL. CORE LOSS 4%.										
278.04	20.0				BOTTOM OF BORING										
	21.0														
	22.0														
	23.0														
	24.0														

B-002-0-95

State of Ohio
Department of Transportation
Office of Materials Management

METRIC PROJECT

LOG OF BORING

Date Started 10/23/95 Sampler: Type SS Dia. 34.93 mm Water Elev. - Project Identification: DI MONTGOMERY
Date completed: 10/24/95 APPROX. MOT-75-6.035 km
Boring No. B-2 Station & Offset 6+018.8, 23.7 m LT. (REAR ABUT.) Surface Elev. 297.40 m OVER SR 725
STRUCTURE FOUNDATION INVESTIGATION

Elev.	Depth	Sample (N)	Pen.	Rec.	Loss	Description	Sample No.	Physical Characteristics: % Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	W.C.	AASHTO Class
297.40	0															
297.25		AUGERED				SOD										VISUAL
296.64	1.0	6/7/8				BROWN SANDY CLAY	1	0	6	16	41	37	39	19	25	A-6B
295.88	2.0	8/8/11				BROWN SILTY CLAY	2	0	1	6	39	54	40	17	25	A-6B
295.11	3.0	5/11/13				BROWN SANDY SILT	3	0	14	20	36	30	20	6	9	A-4A
294.35		8/10/11				BROWN SANDY SILT	4	0	14	25	36	25	19	5	9	A-4A
293.59	4.0	5/11/18				BROWN SANDY SILT	5	0	13	20	47	20	19	6	11	A-4A
292.83	5.0	6/12/19				GRAY SANDY SILT	6	0	10	18	43	29	20	7	11	A-4A
292.07	6.0	16/21/20				GRAY SANDY SILT	7	0	12	22	48	18	19	6	7	A-4A
291.30		8/9/10				GRAY SANDY SILT	8	0	10	19	41	30	21	7	10	A-4A
	7.0															
289.78	8.0	5/12/14				GRAY SANDY SILT	9	0	9	19	37	35	23	9	13	A-4A
288.26	9.0	10/14/24				GRAY SILTY SAND	10	0	22	43	23	12	NP	NP	14	A-3A
	10.0															
286.73	1.0	10/14/18				GRAY SANDY SILT	11	0	11	26	42	21	NP	NP	15	A-4A

Particle Sizes: Agg= >2.00mm, Coarse Sand= 2.00-0.42mm, Fine Sand= 0.42-0.074mm, Silt= 0.074-0.005mm, Clay= <0.005mm

Form TE-5 Revised 9/95

Boring No. B-2 Station & Offset 6+018.8, 23.7 m LT. APPROX. Surface Elev. 297.40m Project: MOT-75-6.035 km (0375 MI) 4/12

Elev.	Depth	Std. Pen. (N)	Rec. m	Loss m	Description	Sample No.	Physical Characteristics								CDOT Class
							% Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	W.C.	
285.21	12.0														
	13.0	5/7/11			GRAY SANDY SILT	12	0	8	12	35	45	25	9	14	A-4A
283.68	14.0	6/11/15			GRAY SANDY CLAY	13	0	9	13	35	43	28	12	14	A-6A
282.16	15.0														
	16.0	7/11/17			GRAY CLAYEY SILT	14	0	7	11	33	49	24	10	13	A-4A
					TOP OF ROCK										
280.64	17.0														
280.19		9/13/60			GRAY SILT AND CLAY	15	0	10	14	30	46	25	15	11	A-6A
279.88					GRAY WEATHERED SHALE (DRILLER'S DESCRIPTION)	-	-	-	-	-	-	-	-	-	VISUAL
	18.0		0.76	0.00											
	19.0		1.49	0.03	WEATHERED SHALE, GRAYISH-GREEN, FIRM TO HARD, HIGHLY CALCAREOUS, WITH CALCAREOUS NODULES, WITH CLAY SEAMS, NON WEATHERED IN PLACES; WITH BLACK, FIRM, CRYSTALLINE, FOSSILIFEROUS, LIMESTONE INTERBEDS (0.03m TO 0.36m THICK) THAT COMPRISE 40% OF THE INTERVAL AND ARE MORE HEAVILY CONCENTRATED IN THE TOP HALF. CORE LOSS 1%.										
277.59	20.0				BOTTOM OF BORING										
	21.0														
	22.0														
	23.0														
	24.0														