
**FINAL REPORT
GEOTECHNICAL EXPLORATION
SCI-73-21.02
SCIOTO COUNTY, OHIO
PID#: 119452**

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NEAS PROJECT 25-0024

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EXECUTIVE SUMMARY

The Ohio Department of Transportation (ODOT) has proposed a roadway widening project (SCI-73-21.02 PID: 119452) in West Portsmouth, Scioto County, Ohio. ODOT plans to widen S.R. 73 at Noel Lane as part of this project.

National Engineering & Architectural Services, Inc. (NEAS) was contracted to perform geotechnical engineering services for the project. The purpose of these services was to perform geotechnical explorations within the project limits to obtain information on the subsurface soil and groundwater conditions relevant to the design and construction of the project. The scope of work performed by NEAS as part of the referenced project included reviewing published geotechnical information; conducting 6 test borings for the construction, laboratory testing of soil/rock samples in accordance with the SGE; performing geotechnical engineering analysis to assess subgrade stabilization requirements and pavement design parameters; and developing this summary report.

Subsurface exploration for this project was performed by NEAS between April 16 and April 17, 2025. A total of six soil borings were advanced to depths ranging from 10.5 to 30.0 feet below ground surface (bgs). The subsurface conditions within the proposed project area generally consist of existing pavement sections or topsoil underlain by a combination of granular and cohesive soils. The pavement section includes approximately 12 inches of asphalt, while the topsoil thickness is approximately 6 inches.

Fill materials were encountered in Borings B-001-025, B-004-025, and B-005-025 and are classified as Silt and Clay (A-6a), Stone Fragments with Sand (A-1-b), and Stone Fragments with Sand and Silt (A-2-4). Underlying native soils consist of Stone Fragments with Sand and Silt (A-2-4), Sandy Silt (A-4a), Silt and Clay (A-6a), Silty Clay (A-6b), and Clay (A-7-6).

Bedrock was encountered in Borings B-002-025 and B-003-025 at depths of 19.5 feet and 20.0 feet bgs, corresponding to elevations of approximately 511.8 feet and 511.1 feet, respectively.

A roadway exploration and subgrade analysis were conducted for the referenced project. Boring B-006-025 was excluded from the analysis due to its distance from the project limits. The evaluation indicates that approximately 50 percent of the proposed subgrade consists of unstable and/or high-moisture-content soils. These soils exhibit converted SPT N-values (N_{60}) of less than 12 blows per foot and moisture contents exceeding the optimum by more than 3 percent within 3 feet of the proposed subgrade.

Based on the typical section provided by CMT, approximately 54 percent of the pavement widening area - specifically between Stations 1110+70 and 1114+94 - has a widening width of only 4 feet. Because chemical stabilization typically requires a minimum working width of approximately 8 feet, this method is not feasible in these areas. Therefore, NEAS recommends mitigating the identified subgrade conditions through global stabilization using Item 204, Excavate and Replace with Geotextile, to a depth of 15 inches. The excavated material should be replaced with Item 204, Granular Material Type B, in accordance with Section 608, Excavate and Replace (Item 204), of the ODOT Geotechnical Design Manual (GDM).

NEAS's opinion that the subgrade soils will provide adequate pavement support assuming it is designed and constructed in accordance with the recommendations provided within this report, as well as all applicable ODOT standards and specifications.

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1. INTRODUCTION

1.1. General

National Engineering and Architectural Services Inc. (NEAS) presents our Structure Foundation Exploration Report for the proposed Ohio Department of Transportation (ODOT) project SCI-73-21.02 in Scioto County, Ohio. As part of the referenced project ODOT intends to widen S.R. 73 at Noel Lane in West Portsmouth, Ohio. This report presents: 1) a summary of the encountered surficial and subsurface conditions; 2) our recommendations for structure foundation design and construction for the retaining wall in accordance with the Load and Resistance Factor Design (LRFD) method as set forth in AASHTO's Publication *LRFD Bridge Design Specifications, 10th Edition* (BDS) (AASHTO, 2024) and *ODOT's 2026 LRFD Bridge Design Manual* (BDM) (ODOT, 2026); and, 3) our recommendations for subgrade stabilization and pavement design parameters in accordance with ODOT's *Geotechnical Design Manual* (GDM) (ODOT [1], 2026) and *Pavement Design Manual* (PDM) (ODOT, 2025).

The exploration was conducted in general accordance with NEAS's proposal to Carpenter and Marty Transportation dated March 4, 2025, and with the provisions of ODOT's *Specifications for Geotechnical Explorations* (SGE) (ODOT, 2025).

The scope of work performed by NEAS as part of the referenced project included: a review of published geotechnical information; performing 6 test borings; laboratory testing of soil samples in accordance with the SGE; performing geotechnical engineering analysis to assess foundation design and construction considerations; and development of this summary report.

2. GEOLOGY AND OBSERVATIONS OF THE PROJECT

2.1. Geology and Physiography

The project site is located within the Shawnee-Mississippian Plateau physiographic region. This area is characterized as a highly dissected plateau of high-relief (400 to 800 ft), with coarse and fine grained rock sequences common as well as lacustrine clay-filled Teays Valley remnants. The geology in this region is described as Pleistocene-age sandy outwash in the Scioto River, Teays-age Minford Clay, as well as silt-loam and channery colluvium with Devonian- and Mississippian-age shales, siltstones, and locally thick sandstones (ODGS, 1998).

Based on the Bedrock Geologic Units Map of Ohio (USGS & ODGS, 2006), bedrock within the project area consists of shale and sandstone, of the Sunbury Shale, Berea Sandstone and Bedford Shale formations, Undivided. This formation is comprised of Devonian and/or Mississippian-age shale and sandstone. The shale in this formation is described as black to brown in color, carbonaceous, with thin, planar bedding. The sandstone in this in this formation is described as brown and weathers light brown to reddish brown in color, thin to thick bedded, planar to lenticular bedding with minor shale interbeds. Based on the ODNR bedrock topography map of Ohio, bedrock elevations near the project site can be expected to be between an elevation of 500 ft and 550 ft above mean sea level (amsl).

The soils directly underlying the project site have been mapped (Web Soil Survey) by the Natural Resources Conservation Service (USDA, 2015) as Sardinia silt loam (SaB) series with 1 to 8 percent slopes. Sardinia silt loam (SaB) soils are classified as very deep, moderately well-drained soils formed in loess and underlying stratified silty and loamy outwash or old alluvium. These soils are typically found on terraces and valley trains and primarily found in Southwestern Ohio. Due to the silt loam texture and slopes of 1-

8%, these soils are susceptible to erosion and may require conservation practices to manage runoff. These soils can compact easily when wet. The Sardinia silt loam series is comprised of predominantly fine-grained soils with the presence of coarse-grained soils at the surface. This series is classified as A-4, A-6, and A-7 type soils though can also classify as A-1 and A-2 soils according to the AASHTO method of soil classification.

2.2. Hydrology/Hydrogeology

At the project site, groundwater is anticipated to be near elevations consistent with that of the adjacent Scioto River (between 503 ft amsl and 506 ft amsl, respectively). Although the indicated elevations may be generally representative of the local groundwater table, perched groundwater systems may be existent due to the presence of fine-grained soils making it difficult for groundwater to permeate to the natural phreatic surface.

The project site is located within a Zone AE (Special Flood Hazard) area based on available mapping by the Federal Emergency Management Agency's (FEMA) National Flood Hazard mapping program (FEMA, 2023).

2.3. Mining and Oil/Gas Production

No abandoned mines are noted on ODNR's Abandoned Underground Mine Locator within the immediate vicinity of the project's boundaries (ODNR [1], 2023).

No oil or gas wells are noted on ODNR's Ohio Oil & Gas Locator within the immediate vicinity of the project's boundaries (ODNR [2], 2023).

2.4. Historical Records and Previous Phases of Project Exploration

A historic record search was performed through ODOT's Transportation Information Mapping System (TIMS). Two historical projects were found within the project limits for review, as listed below:

- SCI-73-21.23, Job No. 09197, Scioto County, Ohio, 1956
- SCI-73-19.65, Job No. 09639, Scioto County, Ohio, 1972

The historic borings within the project limits were not structure borings. They were reviewed but not used in our analyses or geotechnical exploration sheets.

One landslide was recorded along the east side of SCI-73. The landslide ID is LS00006874 and the landslide extends about 150ft long.

3. GEOTECHNICAL EXPLORATION

3.1. Field Exploration Program

The exploration for this project was conducted by NEAS between April 16 and April 17, 2025, and included 6 borings drilled to depths of 10.5 and 30.0 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 drilled at/near the proposed substructure locations where drilling was not restricted by maintenance of traffic or underground utilities. Each as-drilled project boring location and corresponding ground surface elevation was surveyed in the field by the project

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surveyor following completion. 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. Stationing, offsets and elevations of the borings are shown on Table 1 and the boring locations are depicted the Soil Profile Sheets provided in Appendix A.

Table 1: Project Boring Summary

Boring ID	Latitude	Longitude	Elevation (NAVD 88) (ft)	Alignment	Station and Offset	Depth (ft)	Type
B-001-0-25	38.792810	-83.014670	528.6	SR-73	1110+44, 24' LT.	10.5	Roadway
B-002-0-25	38.792400	-83.014760	531.8	SR-73	1111+90, 19' RT.	30.0	Retaining Wall
B-003-0-25	38.792060	-83.014720	530.6	SR-73	1113+13, 21' RT.	30.0	Retaining Wall
B-004-0-25	38.791640	-83.014610	530.6	SR-73	1114+69, 7' RT.	10.5	Roadway
B-005-0-25	38.790970	-83.014450	530.0	SR-73	1117+16, 11' LT.	10.5	Roadway
B-006-0-25	38.789780	-83.014360	531.9	SR-73	1121+49, 17' RT.	10.5	Roadway
Notes:							
1. As-drilled boring locations and corresponding ground surface elevations were surveyed in the field.							

Borings were drilled using a CME 45B truck mounted drilling rig utilizing 2.25-inch or 3.25-inch diameter hollow stem augers and NQ2 coring equipment. Soil samples were generally recovered using a split spoon sampler (AASHTO T-206 "Standard Method for Penetration Test and Split Barrel Sampling of Soils.") at 2.5-ft intervals to a depth of 15 ft bgs at which time samples were recovered at 5.0-ft intervals until the bedrock was encountered. Samples collected from the subgrade/roadway borings were sampled continuously for subgrade evaluation purposes. 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 79% efficient as indicated on the boring logs. When bedrock was encountered, rock cores were collected in either 5.0-ft or 10-ft runs utilizing an NQ2, triple tube, core barrel with water as the circulating fluid.

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 (estimated by means of 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 and patched with asphalt cold patch and/or quick-set concrete where necessary.

3.2. Laboratory Testing Program

The laboratory testing program consisted of classification testing, grain-size distribution testing, moisture content determinations and unconfined compressive strength of rock core testing. Data from the laboratory testing program was incorporated onto the borings logs (Appendix B).

3.2.1. Classification Testing

Representative soil samples were selected for index properties (Atterberg Limits) and gradation testing for classification purposes. 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.

3.2.2. Standard Penetration Test Results

Standard Penetration Tests and split-barrel (split-spoon) sampling of soils were performed at varying intervals (i.e., continuously, 2.5-ft or 5-ft intervals) in the project borings performed. To account for the high efficiency (automatic) hammers used during SPT sampling, field SPT N-values were converted based on the calibrated efficiency (energy ratio) of the specific drill rig's hammer. Field N-values were converted to an equivalent rod energy of 60% (N_{60}) for use in analysis or for correlation purposes. The resulting N_{60} values are presented on the boring logs provided in Appendix B.

3.2.3. Unconfined Compressive Strength of Rock Cores

Unconfined Compressive Strength of Rock Core Tests were conducted in accordance with ASTM D 7012 "Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens under Varying States of Stress and Temperatures", Method C on two (2) rock core samples obtained during the exploration program. A summary of the Unconfined Compressive Strength of Rock Core Tests including boring ID, rock core ID, depth, rock type, and unconfined compressive strength are shown in Table 2 below. Lab test reports for the unconfined compressive strength of rock core testing performed for the project are provided within Appendix C.

Table 2: Summary of Unconfined Compressive Strength Testing of Rock Core Specimens

Boring ID	Rock Type	Depth (ft)	Elevation (ft)	Unconfined Compressive Strength (psi)	Strain at Failure (%)
B-002-0-25	Shale	20.8 - 21.2	511.0 - 510.6	1571	2.3
B-003-0-25	Shale	25.2 - 25.6	505.4 - 505.0	1933	1.6

3.2.4. Sulfate testing

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

Table 3: Sulfate Test Summary

Boring ID	Sample	Depth (ft)	Dilution Ratio	Average Sulfate Content (ppm)
B-001-0-25	SS-1	1.5 - 3.0	20	160
B-004-0-25	SS-1	1.5 - 3.0	20	1133
B-005-0-25	SS-2	3.0 - 4.5	20	360
B-006-0-25	SS-1	1.5 - 3.0	20	180

4. GEOTECHNICAL FINDINGS

The subsurface conditions encountered during NEAS's explorations are described in the following subsections and on each boring log presented in Appendix B. The boring logs represent NEAS's interpretation of the subsurface conditions encountered at each boring location based on our site observations, field logs, visual review of the soil and rock samples by NEAS's 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 available historical explorations, and consideration of the geological history of the site.

4.1. Existing Pavement

The pavement section thicknesses in terms of asphalt, brick, sand, 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-004-0-25	SR-73	10.5	12.0	-	-	12.0
B-005-0-25	SR-73	10.5	12.0	-	-	12.0

4.2. Subgrade Conditions

Along the proposed section of S.R. 73, five borings were drilled within or near the project site (B-001-0-25 through B-005-0-25). Boring B-006-0-25 was drilled 300 ft south of the project site and was excluded from the roadway analysis.

Sixty percent (60%) of the samples collected were classified as cohesive fine-grained soils, consisting of: 1) Silt and Clay (A-6a, 25% of samples); 2) Silty Clay (A-6b, 20% of samples); and 3) Clay (A-7-6, 15% of samples). The consistency of these cohesive soils ranged from very soft to hard, correlating with converted SPT-N values (N_{60}) from 0 blows per foot (bpf) to 17 bpf. Natural moisture contents varied from 10% to 26%. Atterberg limits tests on representative samples showed liquid limits between 24% and 47%, and plastic limits from 18% to 24%.

Forty percent (40%) of the samples were classified as granular soils, including: 1) Sandy Silt (A-4a, 20% of samples); 2) Gravel with Sand and Silt (A-2-4, 15% of samples); and 3) Stone Fragments with Sand (A-1-b, 5% of samples). The relative compactness of these granular soils ranged from loose to very dense, with converted SPT-N values (N_{60}) between 7 bpf and 34 bpf. The natural moisture content of granular soils ranged from 11% to 13%.

4.3. Subsurface Conditions

Subsurface exploration for this project was performed by NEAS between April 16 and April 17, 2025. A total of six soil borings were advanced to depths ranging from 10.5 to 30.0 feet below ground surface (bgs). The subsurface conditions within the proposed project area generally consist of existing pavement sections

or topsoil underlain by a combination of granular and cohesive soils. The pavement section includes approximately 12 inches of asphalt, while the topsoil thickness is approximately 6 inches.

Fill materials were encountered in Borings B-001-025, B-004-025, and B-005-025 and are classified as Silt and Clay (A-6a), Stone Fragments with Sand (A-1-b), and Stone Fragments with Sand and Silt (A-2-4). Underlying native soils consist of Stone Fragments with Sand and Silt (A-2-4), Sandy Silt (A-4a), Silt and Clay (A-6a), Silty Clay (A-6b), and Clay (A-7-6).

Bedrock was encountered in Borings B-002-025 and B-003-025 at depths of 19.5 feet and 20.0 feet bgs, corresponding to elevations of approximately 511.8 feet and 511.1 feet, respectively.

A summary of the subgrade conditions encountered along the project site is provided below.

4.3.1. Overburden Soil

At the proposed project site, two different materials were encountered beneath the existing pavement surface. Generally, these overburden materials consisted of either: 1) man-made fill or possible fill soils; or, 2) natural colluvial soils. These materials and the overall profile are described in detail below.

Fill or possible fill soils were observed in three borings at the site. These fill soils were found immediately below the pavement or at ground level, extending to depths between 3.0 and 4.5 feet below ground surface (bgs), with approximate elevations from 527.0 to 525.6 feet above mean sea level (amsl). Laboratory testing and visual examination of the fill samples indicated that the fill primarily consists of Gravel with Sand (A-1-b), Gravel with Sand and Silt (A-2-4), or Silt and Clay (A-6a). Regarding soil strength, the non-cohesive fill soils are classified as medium dense, with Standard Penetration Test (SPT) N-values (N_{60}) ranging from 11 to 17 blows per foot (bpf). The natural moisture content of the granular fill was approximately 8 percent. For cohesive fill soils, the soils are described as hard, with N_{60} values between 9 and 17 bpf, and an estimated unconfined compressive strength of about 4.5 tons per square foot (tsf), determined via hand penetrometer. The natural moisture content of cohesive fill soils ranged from 13 to 17 percent. Atterberg Limits tests on representative cohesive fill samples showed liquid limits between 32 and 34 percent, and plastic limits between 19 and 22 percent.

Immediately beneath the fill or possible fill layer, the natural overburden soils consisted of both coarse-grained, non-cohesive soils and fine-grained, cohesive colluvium. These soils extended to bedrock or the end of the boring, encountered at depths between 19.5 and 20.0 feet bgs, with approximate elevations from 511.8 to 511.1 feet amsl. The borings' logs classify these soils as Gravel with Sand (A-1-b), Gravel and/or Stone Fragments with Sand and Silt (A-2-4), Sandy Silt (A-4a), Silt and Clay (A-6a), Silty Clay (A-6b), and Clay (A-7-6). The relative compactness of these natural granular soils varies from loose to very dense, with N_{60} values between 7 bpf and refusal. Natural moisture contents ranged from 4 to 15 percent. The cohesive soils within this stratum are described as soft to hard, with N_{60} values from 0 to 24 bpf, and unconfined compressive strengths from 2.25 to 4.5 tsf, estimated via hand penetrometer. The natural moisture content of these cohesive soils ranged from 10 to 26 percent.

4.3.2. Groundwater

Groundwater measurements were recorded during drilling and immediately after completing each borehole. Groundwater was observed in borehole B-003-0-25 at 15 feet depth, at an elevation of 515.6 feet. It is important to note that groundwater levels are influenced by various hydrologic factors in the area and may differ from those measured during exploration. The specific groundwater data are documented in the boring logs found in Appendix B.

4.3.3. *Bedrock*

Bedrock was encountered in two borings, B-002-0-25 and B-003-0-25. Generally, it was found at depths between approximately 19.5 and 20.0 feet below ground surface (bgs), at elevations between 511.1 ft and 511.8 ft. The bedrock consists of interbedded shale and sandstone, with unconfined compressive strength ranging from 1,571 psi to 1,933 psi. Rock coring was performed after auger refusal in both borings. Recovery of bedrock core samples ranged from 74% to 78%, with rock quality designation (RQD) values between 40% and 44%. A summary of the bedrock data is provided in Table 5.

Table 5: Bedrock Summary

Boring ID	Type of Bedrock	Bedrock Elevation (ft)	Bedrock Depth (ft)	Bedrock Recovery (%)	Bedrock RQD (%)	Unconfined Compressive Strength (psi)
B-002-0-25	Interbedded Shale (94%) and Sandstone (6%)	511.8	20.0	74	40	1571
B-003-0-25	Interbedded Shale (82%) and Sandstone (18%)	511.1	19.5	78	44	1933

5. ANALYSES AND RECOMMENDATIONS

NEAS understands that Carpenter and Marty Transportation is collaborating with ODOT to widen SCI-73 at Noel Lane in Scioto County, Ohio. The subgrade exploration and subsequent analyses were completed for the referenced project. The subgrade analysis was performed in accordance with ODOT's GDM criteria utilizing the ODOT provided subgrade analysis spreadsheet (GB1_SubgradeAnalysis.xls, version 14.7 dated July 06, 2025). Input information for the spreadsheet was based on the soil characteristics gathered during NEAS's exploration (i.e., SPT results, laboratory test results, etc.).

5.1. Subgrade Analysis and Recommendations

Subgrade analyses were 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 subgrade analyses including pavement design parameters and unsuitable/unstable subgrade conditions identified within the project limits. Subgrade analysis spreadsheets are provided in Appendix D.

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 extending to a depth of 7.5 ft below the bottom of proposed pavement section (i.e., top of subgrade). Boring B-006-0-25 was drilled 300 ft south of the project site and was excluded from the roadway analysis.

5.1.1. *Pavement Design Recommendations*

It is our understanding that pavement analysis and design is to be performed to determine the proposed pavement section within the project limits to undergo the proposed improvements. A subgrade analysis was performed using the subgrade soil data obtained during our field exploration program to evaluate the soil characteristics to develop pavement parameters for use in pavement design. The subgrade analysis parameters recommended for use in pavement design are presented in Table 6 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 6: Pavement Design Values

Segment	Maximum N _{60L}	Minimum N _{60L}	Average N _{60L}	Average PI Values	Design CBR
SR-73	13	0	7	15	7

5.1.2. Unsuitable Subgrade

Per ODOT's GDM, the presence of select subgrade conditions are prohibited within the subgrade zone for new pavement construction. These prohibited subgrade conditions generally include the presence of rock, specific soil types, and soils with a liquid limit greater than 65 percent. With respect to the proposed improvement project these subgrade conditions are further discussed in the following subsections.

5.1.2.1. Rock

Rock was not encountered within the top 6 inches of the proposed grade in both borings performed; therefore, no specialized remediation efforts are required.

5.1.2.2. Prohibited Soils

Prohibited soil types per the GDM include A-4b, A-2-5, A-5, A-7-5, A-8a, A-8b, and soils with liquid limits greater than 65. No prohibited soils were encountered in any boring along the project limits.

5.1.3. Unstable Subgrade

The GDM recommends subgrade stabilization for soils in which the N₆₀ 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 N₆₀ value at the subject boring, *Figure B - Subgrade Stabilization* within the subgrade analysis recommends a depth of subgrade stabilization for ODOT standard stabilization methods. For the purposes of this report, the term 'weak soils' has been assumed to represent subgrade soils of these conditions. It should be noted that although a soil sample's N₆₀ value may meet the criteria to be considered a weak soil, the depth in which the weak soil is encountered in relation to the proposed subgrade is considered when each individual subgrade boring is analyzed. For example, if the GDM 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.

Information on the boring location where weak soils were encountered and determined to have a potential impact on subgrade performance is shown in Table 7 below.

Table 7: Summary of Unstable Subgrade

Boring ID	N _{60L}	Subgrade Depth (ft)
B-002-0-25	9	2.0 - 3.5
B-003-0-25	4	0.0 - 3.5
B-004-0-25	9	0.0 - 1.5
B-005-0-25	0	1.5 - 3.0

5.1.4. High Moisture Content Soils

High moisture content soils are defined by the GDM as soils that exceed the estimated optimum moisture content (per *Figure 600-1 - Optimum Moisture Content* within the GDM) for a given classification by 3 percent or more. Per the GDM, 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 weak 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. Based on the subsurface exploration performed, high moisture content soils within the proposed subgrade of the project were encountered in borings as shown in Table 8 below.

Table 8: Summary of High Moisture Content Soils

Boring ID	Soil Type	Moisture Content (%)	Optimum Moisture Content (%)	Subgrade Depth(ft)
B-002-0-25	A-6a	18	14	2.0 - 3.5

5.1.5. Stabilization Requirements

According to our subgrade analysis, unstable and high-moisture-content soils were encountered in approximately 50% of the proposed subgrade surface. These soils exhibited converted SPT-N values (N_{60}) below 12 blows per foot (bpf) and/or moisture contents exceeding the optimum moisture content by more than 3 percent within 3 feet of the subgrade.

Based on the typical section provided by CMT, approximately 54 percent of the pavement widening area - specifically between Stations 1110+70 and 1114+94 - has a widening width of only 4 feet. Because chemical stabilization typically requires a minimum working width of approximately 8 feet, this method is not feasible in these areas. Therefore, NEAS recommends mitigating the identified subgrade conditions through global stabilization using Item 204, Excavate and Replace with Geotextile, to a depth of 15 inches. The excavated material should be replaced with Item 204, Granular Material Type B, in accordance with Section 608, Excavate and Replace (Item 204), of the ODOT Geotechnical Design Manual (GDM).

Stabilization limits should extend 18-inches beyond the edge of the proposed paved roadway, shoulder or median and it is recommended removing any topsoil, existing pavement materials or abandoned structure foundation materials.

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.

5.2. Embankment Construction Recommendations

In areas where additional embankment material is proposed along existing slopes (i.e., side-hill sliver fills) that are steeper than 8H:1V but flatter than 4H:1V, it is recommended that the proposed embankment be benched into the existing slopes in accordance with Item 203.05 "Embankment Construction Methods" of the ODOT CMS. For areas where additional embankment material is proposed along existing slopes that are steeper than 4H:1V, it is recommended that the proposed embankment be designed and constructed in accordance with ODOT's GDM Section 800. For sidehill fills planned on existing slopes steeper than 4H:1V, ODOT's GDM recommends special benching to assure the embankment is knitted together. A special benching scheme similar to that shown in Figures 800-1, 800-2 or 800-3, as appropriate, of the ODOT GDM should be used in areas where special benching is recommended. The height and width dimensions of the special benching scheme shown in these figures should be arranged to minimize the required cut and fill quantities, though the height of a single bench shall not exceed 20 ft without a stability analysis and design per OSHA requirements. Additionally, it may be appropriate to adjust the bench slope shown from a 1H:1V to a 1.75H:1V slope if the existing slope is made up of primarily granular materials.

The benched material should be replaced with compacted engineered fill per Item 203 of the ODOT CMS, while proper lift thicknesses and material density should be maintained in the proposed fill per Item 203.06 of the ODOT CMS. In situations where it is not practical to extend the final bench through the existing roadway due to maintenance of traffic concerns, a benching scheme similar to that shown in Figure 1a of the GDM Section 800 can be used in order to avoid impacting the existing roadway, guardrail or shoulder. This scheme results in the placement of a temporary over-steepened fill that can later be “shaved-off” to bring the slope to the final proposed grade.

Where new embankment will be placed overtop existing ditches, excavate the ditch bottom to a nominal depth of 2.0 feet for the width of the ditch.

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 the SCI-73-21.02 project. This preliminary report has been prepared for Carpenter and Marty Transportation, ODOT and their design consultants to be used solely in evaluating the soils underlying the project site and presenting geotechnical engineering recommendations specific to this project. The assessment of general site environmental conditions or the presence of pollutants in the soil, rock and groundwater of the site was beyond the scope of this geotechnical exploration. Our recommendations are based on the results of our field explorations, laboratory tests results from representative soil samples, and geotechnical engineering analyses. The results of the field explorations and laboratory tests, which form the basis of our recommendations, are presented in the appendices as noted. This report does not reflect any variations that may occur between the borings or elsewhere on the site, or variations whose nature and extent may not become evident until a later stage of construction. In the event that any changes in the nature, design or location of the proposed project is made, the conclusions and recommendations contained in this preliminary 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 Carpenter and Marty Transportation in performing this geotechnical exploration for the SCI-73-21.02 project. Please call if there are any questions, or if we can be of further service.

Respectfully Submitted,

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

Zhao Mankoci, Ph.D., P.E.
Geotechnical Engineer

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SCI-73 Boring Plan

SCI-73 Widening @ Noel Lane

Legend

 Geotechnical Boring

 B-001-0-25

 B-002-0-25

 B-003-0-25

 B-004-0-25

 B-005-0-25

 B-006-0-25

Google Earth



500 ft

APPENDIX B

BORING LOGS

STANDARD ODOT LOG W/ SULFATES (8.5 X 11) - OH DOT.GDT - 1/21/26 14:53 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SCI-73-21.02 NOEL LANE\GPI FILES\SCI-73 NOEL LANE.GPJ

PROJECT: SCI-73-21.02		DRILLING FIRM / OPERATOR: NEAS INC. / NS		DRILL RIG: CME 45B		STATION / OFFSET: 1110+44, 24' LT.		EXPLORATION ID												
TYPE: ROADWAY		SAMPLING FIRM / LOGGER: NEAS INC. / NS		HAMMER: CME AUTOMATIC		ALIGNMENT: SR-73		B-001-0-25												
PID: 119452 SFN:		DRILLING METHOD: 2.25 HSA		CALIBRATION DATE: 3/8/24		ELEVATION: 528.6 (MSL) EOB: 10.5 ft.		PAGE												
START: 4/16/25 END: 4/16/25		SAMPLING METHOD: SPT		ENERGY RATIO (%): 79		LAT / LONG: 38.792810, -83.014670		1 OF 1												
MATERIAL DESCRIPTION AND NOTES		ELEV.	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG				ODOT CLASS (GI)	SO4 ppm	BACK FILL
		528.6							GR	CS	FS	SI	CL	LL	PL	PI	WC			
HARD, BROWN, SILT AND CLAY, SOME GRAVEL, LITTLE SAND, DAMP (FILL)			1																	
			2	9																
		525.6		7	17	28	SS-1	4.50	23	6	5	37	29	32	19	13	13	A-6a (7)	160	
HARD, BROWN, SANDY SILT, SOME GRAVEL, LITTLE CLAY, DAMP			3	9																
		524.1		8	17	33	SS-2	4.50	28	16	13	27	16	29	19	10	10	A-4a (2)	-	
HARD, BROWN MOTTLED WITH GRAY, SILT AND CLAY, TRACE SAND, TRACE GRAVEL, DAMP			4	5																
		522.6		3																
			5	4	13	44	SS-3	4.25	0	0	4	60	36	35	21	14	20	A-6a (10)	-	
VERY STIFF, BROWN MOTTLED WITH GRAY, CLAY, "AND" SILT, TRACE SAND, TRACE GRAVEL, TRACE IRON STAINING, DAMP			6	6																
			7	2	16	39	SS-4	3.75	-	-	-	-	-	-	-	-	24	A-7-6 (V)	-	
			8	5																
			9	2	11	56	SS-5	3.50	-	-	-	-	-	-	-	-	23	A-7-6 (V)	-	
			10	3																
		518.1		5	16	61	SS-6	3.50	-	-	-	-	-	-	-	-	22	A-7-6 (V)	-	
				7																
			EOB																	
NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE CAVE IN AT 8.0'. DRILLED AS STAKED.																				
ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS																				

[illegible]

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE CAME IN AT 1.5'. DRILLED AS STAKED.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: POURED 3.0 BAGS HOLE PLUG; SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT GDT - 1/23/26 11:16 - X11ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SCI-73-21-02 NOEL LANE\GINT FILES\SCI-73-21-02 NOEL LANE.GPJ

PROJECT: SCI-73-21.02		DRILLING FIRM / OPERATOR: NEAS INC. / RW		DRILL RIG: CME 45B		STATION / OFFSET: 1113+13, 21' RT.		EXPLORATION ID											
TYPE: RETAINING WALL		SAMPLING FIRM / LOGGER: NEAS INC. / NS		HAMMER: CME AUTOMATIC		ALIGNMENT: SR-73		B-003-0-25											
PID: 119452 SFN:		DRILLING METHOD: 3.25" HSA / NQ2		CALIBRATION DATE: 3/8/24		ELEVATION: 530.6 (MSL) EOB: 30.0 ft.		PAGE											
START: 4/17/25 END: 4/17/25		SAMPLING METHOD: SPT / NQ2		ENERGY RATIO (%): 79		LAT / LONG: 38.792060, -83.014720		1 OF 1											
MATERIAL DESCRIPTION AND NOTES		ELEV.	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG				ODOT CLASS (GI)	BACK FILL
		530.6							GR	CS	FS	SI	CL	LL	PL	PI	WC		
6.0" TOPSOIL (DRILLERS DESCRIPTION)		530.1																	
HARD, BROWN, CLAY, SOME SILT, SOME SAND, TRACE GRAVEL, DAMP			1	3															
			2	4	11	56	SS-1	4.50	6	12	12	35	35	45	22	23	21	A-7-6 (13)	
		527.6	3																
HARD, BROWN, SILTY CLAY, LITTLE SAND, TRACE GRAVEL, DAMP TO MOIST			4	2	4	28	SS-2	4.25	-	-	-	-	-	-	-	-	18	A-6b (V)	
			5	1															
		522.6	6	4															
			7	5	16	72	SS-3	4.25	4	9	9	38	40	39	22	17	23	A-6b (11)	
			8																
MEDIUM DENSE TO VERY DENSE, BROWN BECOMING GRAY, SANDY SILT, SOME TO "AND" STONE FRAGMENTS, TRACE CLAY, DAMP			9	4	21	50	SS-4	-	33	15	13	29	10	NP	NP	NP	13	A-4a (1)	
			10	6	10														
			11	4															
			12	7	22	61	SS-5	-	-	-	-	-	-	-	-	-	15	A-4a (V)	
			13	10															
			14	22	34	39	SS-6	-	-	-	-	-	-	-	-	-	14	A-4a (V)	
		515.6	15	17	9														
			16																
			17																
			18																
@18.5'; SS-7 JAR WAS FOUND TO BE OPEN. WC RESULTS MAY NOT REFLECT INSITU WC.		511.1	19	32	-	77	SS-7	-	-	-	-	-	-	-	-	-	4	A-4a (V)	
			20	29															
			21	50/17															
INTERBEDDED SHALE (82%) AND SANDSTONE (18%), PYRITIC, BEDDING DISCONTINUITIES: LOW ANGLE, JOINT DISCONTINUITIES: HIGH ANGLE FROM 20.0'-20.8', 21.8'-22.8', AND 29.9'-30.0', HIGHLY FRACTURED TO MODERATELY FRACTURED, OPEN TO NARROW, SLIGHTLY ROUGH, BLOCKY, DISINTIGRATED FROM 21.8'-22.8', FAIR TO POOR SURFACE CONDITION, RQD 44%, REC. 78%;			22																
SHALE, GRAY, SLIGHTLY TO MODERATELY WEATHERED, WEAK TO SLIGHTLY STRONG, LAMINATED TO THIN BEDDED, FISSILE;			23																
SANDSTONE, BROWNISH GRAY, SLIGHTLY WEATHERED, STRONG, VERY FINE GRAINED.			24																
@25.2'-25.6'; Qu = 1933 PSI @ 1.6% (SHALE)			25	44		78	NQ2-1											CORE	
			26																
			27																
			28																
		500.6	29																
			EOB																
NOTES: GROUNDWATER ENCOUNTERED AT 15.0' DURING DRILLING. HOLE DID NOT CAVE. DRILLED AS STAKED.																			
ABANDONMENT METHODS, MATERIALS, QUANTITIES: POURED 3.0 BAGS HOLE PLUG; SHOVELED SOIL CUTTINGS																			

[illegible]

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE CAVE IN AT 7.5'. DRILLED AS STAKED.

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

MATERIAL DESCRIPTION AND NOTES		ELEV. 530.0	DEPTHS		SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG				ODOT CLASS (GI)	SO ₄ ppm	BACK FILL	
										GR	CS	FS	SI	CL	LL	PL	PI	WC				
12.0" ASPHALT (DRILLERS DESCRIPTION)		529.0		1																		
MEDIUM DENSE, GRAY, STONE FRAGMENTS WITH SAND AND SILT , TRACE CLAY, DAMP (FILL)		527.0		2		9	8	17	22	SS-1	-	-	-	-	-	-	-	-	-	8	A-2-4 (V)	-
LOOSE, BROWN, GRAVEL WITH SAND AND SILT , TRACE CLAY, DAMP		525.5		3		1	3	7	28	SS-2	-	28	22	16	26	8	NP	NP	NP	8	A-2-4 (0)	360
VERY SOFT, BROWNISH GRAY, SANDY SILT , LITTLE GRAVEL, LITTLE CLAY, CONTAINS NO INTACT SOIL FOR HP READINGS, DAMP		524.0		4		2	0	0	28	SS-3	-	17	25	17	30	11	24	18	6	13	A-4a (1)	-
VERY STIFF, BROWN AND GRAY, SILTY CLAY , LITTLE SAND, TRACE GRAVEL, MOIST		522.5		5		0	0	0	28	SS-3	-	17	25	17	30	11	24	18	6	13	A-4a (1)	-
VERY STIFF, BROWN AND GRAY, SILTY CLAY , LITTLE SAND, TRACE GRAVEL, MOIST		522.5		6		3	5	12	72	SS-4	3.00	-	-	-	-	-	-	-	-	26	A-6b (V)	-
VERY STIFF, BROWN MOTTLED WITH GRAY AND ORANGISH BROWN, CLAY , "AND" SILT, TRACE SAND, TRACE GRAVEL, TRACE IRON STAINING, DAMP		519.5		7		4	2	4	67	SS-5	2.25	-	-	-	-	-	-	-	-	22	A-7-6 (V)	-
		519.5		8		0	2	4	67	SS-5	2.25	-	-	-	-	-	-	-	-	22	A-7-6 (V)	-
		519.5		9		1	1	8	67	SS-6	3.00	-	-	-	-	-	-	-	-	18	A-7-6 (V)	-
		519.5		10		3	3	8	67	SS-6	3.00	-	-	-	-	-	-	-	-	18	A-7-6 (V)	-

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE CAVE IN AT 8.0'. DRILLED AS STAKED.

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 - 1/21/26 14:53 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SCI-73-21.02 NOEL LANE\GPI

PROJECT: SCI-73-21.02		DRILLING FIRM / OPERATOR: NEAS INC. / RW		DRILL RIG: CME 45B		STATION / OFFSET: 1121+49, 17' RT.		EXPLORATION ID														
TYPE: ROADWAY		SAMPLING FIRM / LOGGER: NEAS INC. / NS		HAMMER: CME AUTOMATIC		ALIGNMENT: SR-73		B-006-0-25														
PID: 119452 SFN:		DRILLING METHOD: 2.25 HSA		CALIBRATION DATE: 3/8/24		ELEVATION: 531.9 (MSL) EOB: 10.5 ft.		PAGE														
START: 4/16/25 END: 4/16/25		SAMPLING METHOD: SPT		ENERGY RATIO (%): 79		LAT / LONG: 38.789780, -83.014360		1 OF 1														
MATERIAL DESCRIPTION AND NOTES		ELEV.	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG				ODOT CLASS (GI)	SO4 ppm	BACK FILL		
		531.9							GR	CS	FS	SI	CL	LL	PL	PI	WC					
VERY STIFF TO HARD, BROWN AND ORANGISH BROWN BECOMING BROWNISH GRAY, SILT AND CLAY , SOME SAND, LITTLE TO SOME GRAVEL, IRON STAINING, DAMP			1																			
			2	6																		
			3	3	12	24	39	SS-1	4.50	18	16	13	33	20	31	18	13	13	A-6a (5)	180		
			4	5	6	14	72	SS-2	4.50	20	18	10	35	17	31	20	11	17	A-6a (4)	-		
			5	2	3	8	56	SS-3	4.50	-	-	-	-	-	-	-	-	13	A-6a (V)	-		
			6	3																		
			7	5	4	12	28	SS-4	4.50	-	-	-	-	-	-	-	-	18	A-6a (V)	-		
			8	2	4	14	28	SS-5	3.50	-	-	-	-	-	-	-	-	19	A-6a (V)	-		
			9	3	7																	
			10	5	4	12	33	SS-6	2.25	-	-	-	-	-	-	-	-	21	A-6b (V)	-		
VERY STIFF, LIGHT BROWN AND BROWN, SILTY CLAY , LITTLE SAND, TRACE GRAVEL, DAMP																						
		522.9																				
		521.4	EOB																			
NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE CAVE IN AT 8.0'. DRILLED AS STAKED.																						
ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS																						

APPENDIX C

LAB TESTING



OHIO DEPARTMENT OF TRANSPORTATION

DETERMINING SULFATE CONTENT IN SOILS

SUPPLEMENT 1122

Project C-R-S: SCI-73-21.02
PID No: 119452
Report Date: 1/20/2026
Consultant: NEAS Inc.
Technician: P. Johnson

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-001-0-25 SS-1	1110+44	24L	38.792810	-83.014670	528.6	21.3	20	8	20	7	20	9	160
B-004-0-25 SS-1	1114+69	7R	38.791640	-83.014610	530.6	21.3	20	59	20	57	20	54	1133
B-005-0-25 SS-2	1117+16	11L	38.790970	-83.014450	530.0	21.3	20	20	20	16	20	18	360
B-006-0-25 SS-1	1121+49	17R	38.789780	-83.014360	531.9	21.2	20	8	20	9	20	10	180

B-002-0-25



ER: NQ2-1
30 0'

Run #:	Depth		Recovery		RQD	
NQ2-1	20.0'	30.0'	88.5/120	74%	48/120	40%
SCI-73-21.02 PID 119452						

B-003-0-25



Run #:	Depth		Recovery		RQD	
NQ2-1	20.0'	30.0'	94/120	78%	53/120	44%
SCI-73-21.02 PID 119452						

Unconfined Compressive Strength of Rock Core (ASTM D7012 Method C)

(Project: SCI-73-21.02, Boring Location: B-002-0-25, NQ2-1, Depth: 20.8 - 21.2ft)

Tested Date: 1/19/2026

Specimen Properties

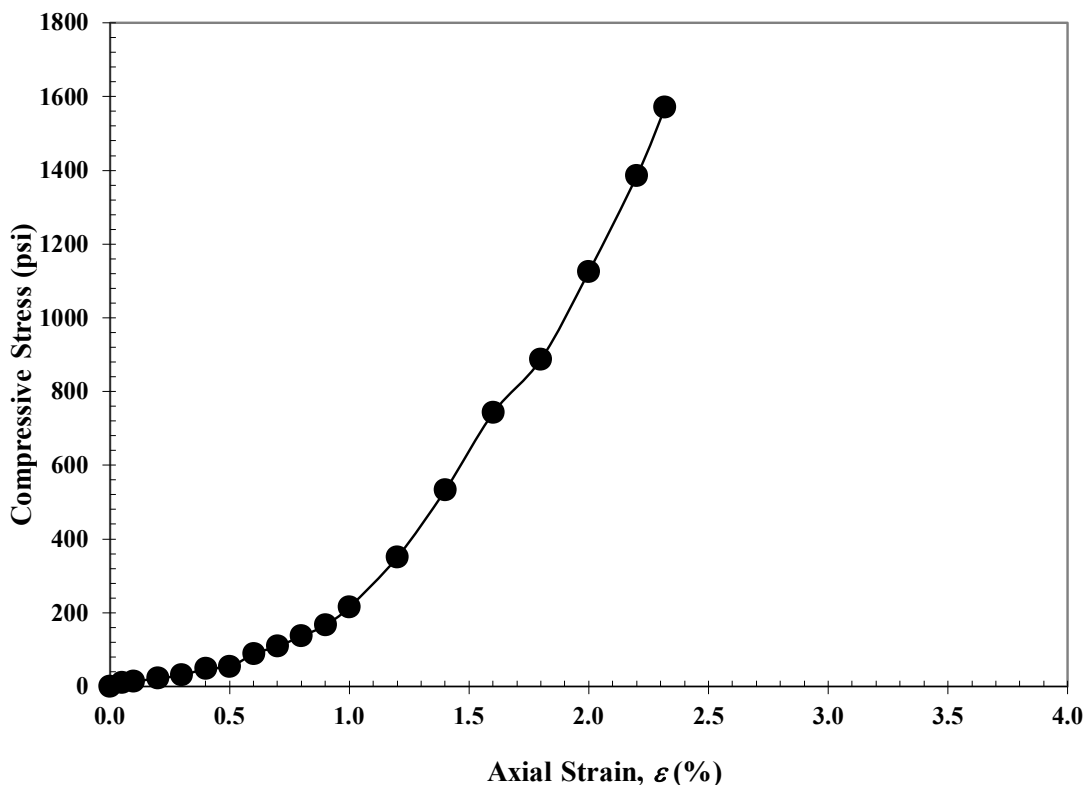
Average Dia., D_{avg} (in):	1.94
Average Height H_{avg} (in):	4.44
Length to Diameter Ratio:	2.29
Area, A (in ²):	2.95
Volume, V (in ³):	13.12
Wet Mass of Specimen (lb):	1.2
Moisture Content (%):	2.0
Dry Mass of Specimen (lb):	1.2
Wet Unit Weight, γ (lb/ft ³):	155.3
Dry Unit Weight, γ_d (lb/ft ³):	152.2

Final Specimen Figure



Results

Unconfined Compressive Strength (psi):	1571	11	(MPa)
Strain (%):	2.3		



Notes: Shale, gray, slightly weathered, slightly strong, fissile, silty.

Unconfined Compressive Strength of Rock Core (ASTM D7012 Method C)

(Project: SCI-73-21.02, Boring Location: B-003-0-25, NQ2-1, Depth: 25.2 - 25.6ft)

Tested Date: 1/19/2026

Specimen Properties

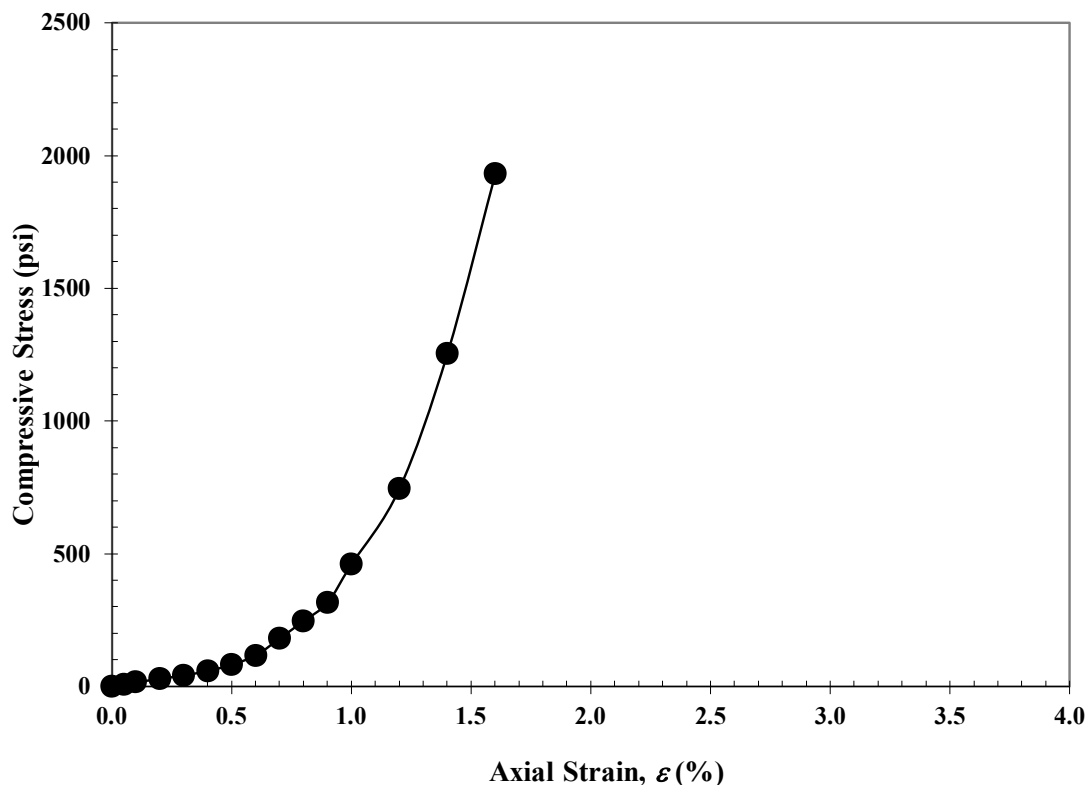
Average Dia., D_{avg} (in):	1.88
Average Height H_{avg} (in):	4.27
Length to Diameter Ratio:	2.28
Area, A (in ²):	2.77
Volume, V (in ³):	11.81
Wet Mass of Specimen (lb):	1.1
Moisture Content (%):	1.9
Dry Mass of Specimen (lb):	1.1
Wet Unit Weight, γ (lb/ft ³):	158.0
Dry Unit Weight, γ_d (lb/ft ³):	155.1

Final Specimen Figure



Results

Unconfined Compressive Strength (psi):	1933	
Strain (%):	1.6	13 (MPa)



Notes: Shale, gray, slightly weathered, slightly strong, fissile, silty.

APPENDIX D

CALCULATIONS



OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES

Geotechnical Design Manual Section 600

**SCI-73 TWLTL Extension @ Noel Lane
119452**

Widen SCI-73 at Noel Lane

NEAS, Inc.

Prepared By: Zhao Mankoci
Date prepared: Wednesday, January 21, 2026

**Chunmei (Melinda) He, Ph.D., P.E.
2800 Corporate Exchange Drive
Suite 240
Columbus, OH 43231
614.714.0299 Ext 111
che@neasinc.com**

NO. OF BORINGS: 5

NO. OF DCPS:



#	Boring ID	Alignment	Station	Add DCP Test Data Worksheets				Boring EL.	Proposed Subgrade EL.	Cut Fill
				Offset	Dir	Drill Rig	ER			
1	B-001-0-25	SR-73	1110+44	24	LT	CME 45B	79	528.6	527.1	1.5 C
2	B-002-0-25	SR-73	1111+90	19	RT	CME 45B	79	531.8	530.3	1.5 C
3	B-003-0-25	SR-73	1113+13	21	RT	CME 45B	79	530.6	529.1	1.5 C
4	B-004-0-25	SR-73	1114+69	7	RT	CME 45B	79	530.6	529.1	1.5 C
5	B-005-0-25	SR-73	1117+16	11	LT	CME 45B	79	530.0	528.5	1.5 C

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics					Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)		
			From	To	From	To	N ₆₀	N _{60L}		LL	PL	PI	% Silt	% Clay	P200	M _C	M _{OPT}	Class		GI	Unsuitable	Unstable	Unsuitable		Unstable	
1	B 001-0 25	SS-1	1.5	3.0	0.0	1.5	17	13	4.5	32	19	13	37	29	66	13	14	A-6a	7	160						
		SS-2	3.0	4.5	1.5	3.0	17		4.5	29	19	10	27	16	43	10	14	A-4a	2							
		SS-3	4.5	6.0	3.0	4.5	13		4.25	35	21	14	60	36	96	20	16	A-6a	10							
		SS-4	6.0	7.5	4.5	6.0	16		3.75							24	18	A-7-6	16							
2	B 002-0 25	SS-1	1.0	2.5	-0.5	1.0	13	9	4.5	30	18	12	36	20	56	12	14	A-6a	5							
		SS-2	3.5	5.0	2.0	3.5	9		4.25							18	14	A-6a	10			N ₆₀ & Mc				
		SS-3	6.0	7.5	4.5	6.0	16		4.25	47	24	23	27	60	87	20	21	A-7-6	15							
		SS-4	8.5	10.0	7.0	8.5	34			NP	NP	NP	45	12	57	13	11	A-4a								
3	B 003-0 25	SS-1	1.0	2.5	-0.5	1.0	11	4	4.5	45	22	23	35	35	70	21	19	A-7-6	13			N ₆₀		12"		
		SS-2	3.5	5.0	2.0	3.5	4		4.25							18	16	A-6b	16			N ₆₀				
		SS-3	6.0	7.5	4.5	6.0	16		4.25	39	22	17	38	40	78	23	17	A-6b	11							
		SS-4	8.5	10.0	7.0	8.5	21			NP	NP	NP	29	10	39	13	11	A-4a								
4	B 004-0 25	SS-1	1.5	3.0	0.0	1.5	9	9	4.5	34	22	12	40	22	62	17	17	A-6a	6	1133			N ₆₀		12"	
		SS-2	3.0	4.5	1.5	3.0	11									6	A-1-b	0								
		SS-3	4.5	6.0	3.0	4.5	13		4.5	36	20	16	38	23	61	16	16	A-6b	8							
		SS-4	6.0	7.5	4.5	6.0	13									11	10	A-2-4	0							
5	B 005-0 25	SS-1	1.5	3.0	0.0	1.5	17	0								8	10	A-2-4	0							
		SS-2	3.0	4.5	1.5	3.0	7			NP	NP	NP	26	8	34	8	10	A-2-4	0	360			N ₆₀			
		SS-3	4.5	6.0	3.0	4.5	0			24	18	6	30	11	41	13	13	A-4a	1							
		SS-4	6.0	7.5	4.5	6.0	12		3							26	16	A-6b	16							

PID: 119452

County-Route-Section: SCI-73 TWLTL Extension @ Noel Lane

No. of Borings: 5

Geotechnical Consultant: NEAS, Inc.

Prepared By: Zhao Mankoci

Date prepared: 1/21/2026

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): Average(HP):	15" 0"
Global Geogrid Average(N60L): Average(HP):	0" 0"

Design CBR	7
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% Samples within 3 feet of subgrade			
$N_{60} \leq 5$	11%	$HP \leq 0.5$	0%
$N_{60} < 12$	39%	$0.5 < HP \leq 1$	0%
$12 \leq N_{60} < 15$	17%	$1 < HP \leq 2$	0%
$N_{60} \geq 20$	0%	$HP > 2$	50%
M+	6%		
Rock	0%		
Unsuitable Soil	0%		

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

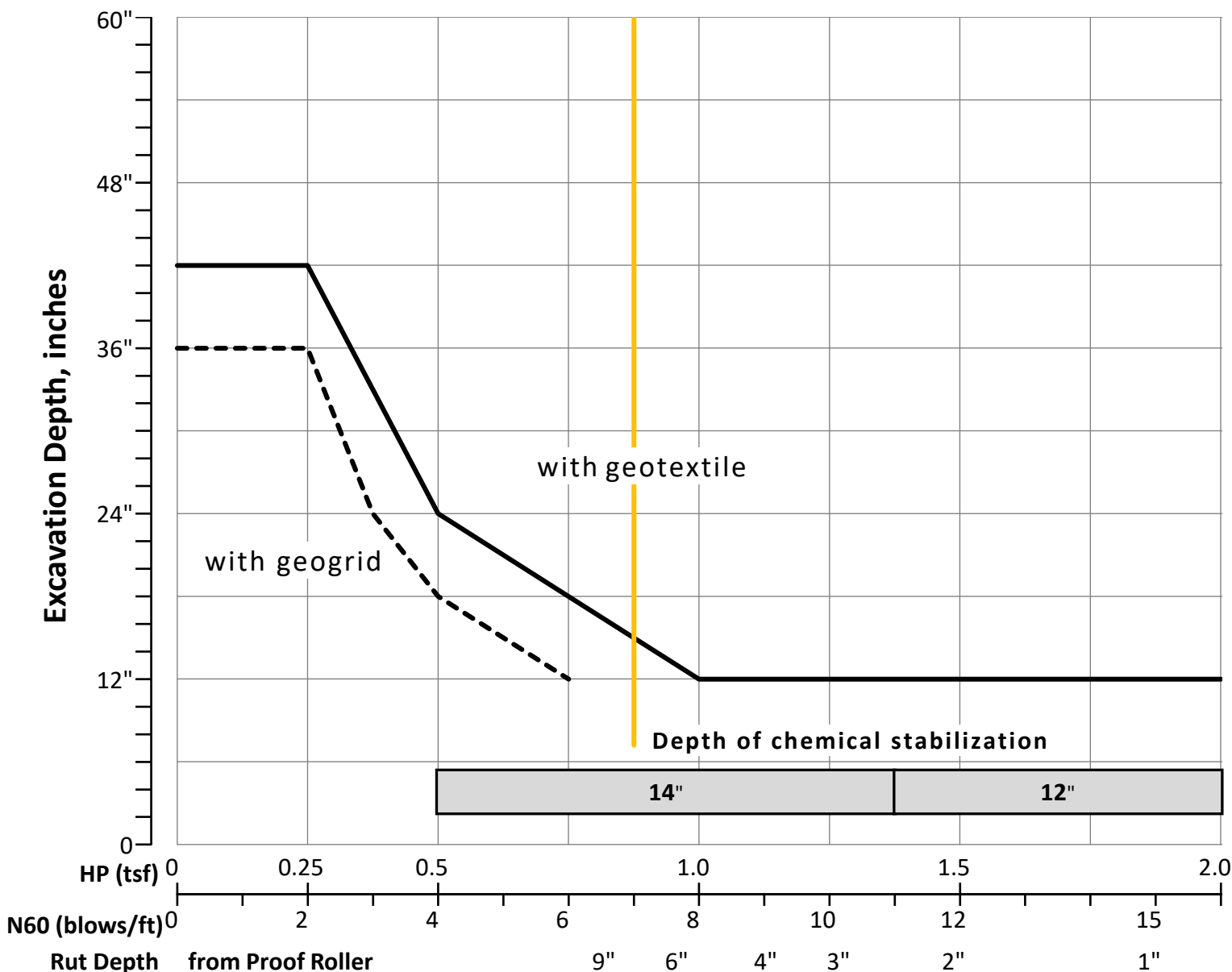
% Proposed Subgrade Surface	
Unstable & Unsuitable	50%
Unstable	50%
Unsuitable (Soil & Rock)	0%

	N ₆₀	N _{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M _C	M _{OPT}	GI
Average	13	7	4.23	35	21	15	36	25	61	16	14	8
Maximum	34	13	4.50	47	24	23	60	60	96	26	21	16
Minimum	0	0	3.00	24	18	6	26	8	34	8	6	0

Classification Counts by Sample																				
ODOT Class	UCF	Rock	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-3	A-3a	A-4a	A-4b	A-5	A-6a	A-6b	A-7-5	A-7-6	A-8a	A-8b	Totals
Count	0	0	0	1	3	0	0	0	0	0	4	0	0	5	4	0	3	0	0	20
Percent	0%	0%	0%	5%	15%	0%	0%	0%	0%	0%	20%	0%	0%	25%	20%	0%	15%	0%	0%	100%
% Rock Granular Cohesive	0%	0%	40%									60%								100%
Surface Class Count	0	0	0	1	2	0	0	0	0	0	1	0	0	4	1	0	1	0	0	10
Surface Class Percent	0%	0%	0%	10%	20%	0%	0%	0%	0%	0%	10%	0%	0%	40%	10%	0%	10%	0%	0%	100%



Fig. 600-1 – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
4.23	0.50	☐ HP
7.00	6.00	☐ N60L

Average HP



Average N_{60L}

