FINAL REPORT
ROADWAY EXPLORATION REPORT
SUM 76-8.42/SUM-77-9.77/SUM-8-0.00
SUMMIT COUNTY, OHIO
PID#: 102329

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NEAS PROJECT 19-0002

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National Engineering & Architectural Services Inc.

EXECUTIVE SUMMARY

The Ohio Department of Transportation (ODOT) has proposed a design build interstate rehabilitation project (SUM-76-8.42/SUM-77-9.77/SUM-8-0.00, PID 102329) along portions of Interstate Route 76 (IR-76) and IR-77, part of the Akron Beltway in Akron, Summit County, Ohio. The project portion of the Akron Beltway planned for improvement includes the IR-77 and IR-76 Interchange (NW Interchange) as well as portions of connecting mainline interstates and associated ramps. It is our understanding that the proposed project improvements consist of: 1) the reconstruction and/or widening of portions of IR-76 and IR-77 in the vicinity of the NW Interchange; 2) the reconstruction/realignment of Ramp T, Ramp V and Ramp W; and, 3) the widening/reconstruction Ramp U and Ramp J.

National Engineering & Architectural Services, Inc. (NEAS) has been contracted to perform geotechnical engineering services for the project. The purpose of the geotechnical engineering services was to perform geotechnical explorations within the project limits to obtain information concerning the subsurface soil and groundwater conditions relevant to the design and construction of the project. Between January 14, 2019 and May 1, 2019, NEAS performed the site reconnaissance and exploration program for the project. The subsequent document presents the results of the roadway exploration for IR-76 and IR-77 mainline freeway segments and the associated connecting ramps noted above. As part of the interstate rehabilitation project, NEAS advanced a total of 40 borings which were utilized for roadway and subgrade characterization purposes.

The existing pavement sections encountered varied throughout the project limits, and consisted of asphalt pavement, concrete pavement or a combination of the two, overlying granular base material. Project asphalt pavement only thickness ranged from 5 to 15.5 inches while concrete pavement only thicknesses ranged from 9 to 16 inches. In general, the overall thickness of the project pavements ranged from 8 to 16 inches. Below the existing pavement section, the subgrade conditions in the project area are relatively consistent and are generally comprised of fill soils (i.e., embankment fill, historical/urban fill, etc.) and natural soils consisting of non-cohesive sand, silt and gravel combinations or low to moderately plastic sandy silt, silt, and silt/clay combinations. About thirty-four (34%) percent of the subgrade soils encountered at the site were classified as cohesive/non-cohesive Sandy Silt (A-4a). The remainder of the subgrade soils were generally classified as A-1-a, A-1-b, A-2-4, A-3a, A-4b, A-6a or A-7-6. 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 (i.e., lower than the level which ODOT considers high and may prevent the use of chemical stabilization).

Based on our evaluation of the subsurface conditions and our geotechnical engineering analyses of the proposed improvement project, it is our opinion that subgrade conditions are generally satisfactory and pavement can be designed without the need for extreme levels of remediation. In general, it is recommended that the subgrade soil of project interstates and connecting ramps be globally (chemically) stabilized to a depth of 14 inches utilizing cement as the stabilization chemical. In addition to subgrade stabilization, bedrock was encountered at various locations within two feet of the bottom of the proposed asphalt or concrete pavement and therefore is recommended for remediation. Estimated limits of rock removal are presented within Section 5.4.2. of this report. 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.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

1. INTRODUCTION

1.1. General

National Engineering & Architectural Services, Inc. (NEAS) presents our Roadway Exploration Report for the Ohio Department of Transportation (ODOT) design build project SUM-76-8.42/SUM-77-9.77/SUM-8-0.00 (PID 102329) along portions of Interstate Route 76 (IR-76) and IR-77, part of the Akron Beltway in Akron, Summit County, Ohio. The project portion of the Akron Beltway planned for improvement includes the IR-77 and IR-76 Interchange (NW Interchange) as well as portions of connecting mainline interstates and associated ramps. This report presents a summary of the project encountered surficial and subsurface conditions and our recommendations for subgrade stabilization, embankment construction and pavement design parameters for: 1) the reconstruction and/or widening of portions of IR-76 and IR-77 in the vicinity of the NW Interchange; 2) the reconstruction/realignment of Ramp T, Ramp V, and Ramp W; and, 3) the widening/reconstruction of Ramp U and Ramp J. The analysis performed as part of this report has been performed in accordance with ODOT's *Geotechnical Bulletin 1* (GB1) (ODOT [1], 2019) and *Pavement Design Manual* (PDM) (ODOT PDM, 2019).

The exploration was performed as part of a previous project's scope (Project SUM-76-6.15, PID 100713) and conducted in general accordance with NEAS's proposal to GPD Group (GPD), dated May 22, 2018, while the preparation of this report was conducted in accordance with NEAS's proposal to GPD, dated October 1, 2019. The geotechnical engineering services for the project were completed in accordance with the provisions of ODOT's *Specifications for Geotechnical Explorations* (SGE) (ODOT SGE, 2019).

The scope of work performed by NEAS as part of the SUM-76-8.42/SUM-77-9.77/SUM-8-0.00 design build project (PID 102329) included: a review of published geotechnical information; performing 40 total test borings as part of the roadway exploration; laboratory testing of soil samples in accordance with the SGE; performing geotechnical engineering analysis to assess subgrade stabilization requirements, embankment and pavement design parameters; 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 Akron-Canton Interlobate Plateau physiographic region, part of the Glaciated Allegheny Plateaus (ODGS, 1998). This is a moderate relief, hummocky area between two converging glacial lobes dominated by kames, kame terraces, eskers, kettles, kettle lakes, and bogs/fens. Soils in this region are characteristically Wisconsinan-age sand and older drift over Devonian to Pennsylvanian age sandstones, conglomerates and shales.

The western portion of the project site (IR-77, IR-76) is mapped as 30 ft of Wisconsinan-age sand and gravel, underlain by 150 feet of complexly interbedded deposits of clay, silt, sand, gravel and till. The area which includes the majority of the NW Interchange as well as the eastern portions of the project site is mapped as 160 ft of Wisconsinan-age till above bedrock. A region closely bordering the project site to the southeast is mapped as 20 ft of Wisconsinan-age till overlying bedrock.

Based on the Bedrock Geologic Units Map of Ohio (USGS & ODGS, 2006), bedrock within the majority of the project area consists of shale and siltstone of the Allegheny and Pottsville Groups, Undivided. This unit is comprised of Pennsylvanian-age shale and siltstone locally containing marine fossils, with minor

lithologic constituents of limestone and sandstone. The shale in this formation is described as black, gray and olive in color, clayey to silty, locally contains marine fossils and calcareous in part, while the siltstone is described as gray, greenish and olive in color, clayey to sandy, thin to medium bedded and also locally contains marine fossils. Bedrock within the eastern portion of the project site is mapped as Maxville Limestone of the Rushville, Logan and Cuyhoga formations, undivided. The unit is comprised of Mississippian-age siltstone, shale and sandstone with minor constituents of conglomerate and limestone. The shale in this formation is described as clayey to silty, and locally fossiliferous, while the sandstone is described as silty to granular with local stringers of quartz pebbles. Bedrock is anticipated to be sloping upward from west to east at the project site. Based on the ODNR bedrock topography map of Ohio, bedrock elevations at the project site can be expected to be between elevations of 1050 and 800 ft above mean sea level (amsl), putting bedrock at depths ranging from about 205 ft below ground surface (bgs) to outcropping (above the ground surface) in locations (ODGS, 2003). Bedrock was observed to be relatively shallow in the northern portion of the site as outcropped rock was observed on the eastern side of IR-76 near the East Ave/IR-76 overpass as well as along the northern portion of Ramp V.

The soils at the project site are generally mapped (Web Soil Survey) by the Natural Resources Conservation Service (USDA, 2015) as Udorthents. These soils can be described as soils that have been disturbed by cutting and filling. These soils are not classified according to the AASHTO method of soil classification, but it can be expected that these soils will largely consist of fill soils and often vary in composition. A significant portion of the soils surrounding the project site have been mapped as Canfield-Urban land complex and Bogart loam. Soils in the Canfield series, mapped adjacent to the eastern half of the project area, are characterized as very deep, moderately well drained soils formed in Wisconsinan-age till on plains. Bogart series soils, mapped adjacent to the western half of the project, are characterized as very deep, moderately well drained soils that formed in stratified outwash deposits on terraces, beach ridges, and outwash plains. Based on the Web Soil Survey these surrounding soils are comprised of a mix of both coarse-grained and fine-grained soils, classifying as A-1, A-2, A-4, A-6 or A-7 type soils according to the AASHTO method of soil classification.

2.2. Hydrology/Hydrogeology

Groundwater at the project site can be expected at an elevation consistent with that of Mud Run, located southwest of the project area, as it is the most dominant hydraulic influence in the vicinity of the project's boundaries. However, as there are relatively thin overburden soils at the site and the topography of the site gradually slopes downward to the river's elevation, it is anticipated that a static groundwater table may not be present within the overburden soil. Rather it is anticipated that if encountered, groundwater is likely to be present at the bedrock surface or within the upper few feet of bedrock where the stratum is highly weathered. Furthermore, 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 bedrock surface.

The project site is not located within a special flood hazard area based on available mapping by the Federal Emergency Management Agency's (FEMA) National Flood Hazard mapping program (FEMA, 2019).

2.3. Mining and Oil/Gas Production

No abandoned mines are noted on ODNR's Abandoned Underground Mine Locator in the vicinity of the bridge site (ODNR [1], 2016).

Three (3) active oil and gas wells were mapped on ODNR's Ohio Oil & Gas Locator in the vicinity of the project site (ODNR [2], 2016). One active well is located 230 ft east of S Hawkins Ave and 330 ft north of

Morse St, one active well is located 1360 ft west of East Ave and 315 ft north of Morse St. and one active well is located 350 ft west of Frederick Blvd and 600 ft north of the IR-77/Vernon Odom Blvd overpass. Each of the identified wells were drilled to depths greater than 3900 ft bgs and are currently producing. More information on the identified wells can be found on the ODNR Oil Well reports are included in Appendix F.

2.4. Historical Records and Previous Phases of Project Exploration

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

- Soil Profile Sheets as part of ODOT project SUM-5-10.62, Sheets 1-9, prepared by the State Highway Testing and Research Laboratory dated Sept. 25, 1961.

Historical soil borings associated with the above plans were reviewed, however, were not utilized for our analysis, and therefore, are not referenced or presented within this report.

2.5. Field Reconnaissance

Field reconnaissance visits for the project and adjacent projects were conducted between January 14, 2019 and January 17, 2019, along IR-76, IR-77 and connecting ramps. Site conditions, including the existing pavement conditions, were noted and photographed during the visit. A summary of the land use and pavement conditions by roadway segment including photographs of notable pavement distress are provided and is provided below.

2.5.1. Land Use and Cover

The land use adjacent to most of the project area along IR-76 and IR-77 consists of residential property generally comprised of family homes and apartment buildings, while the land use adjacent to the western portion of the project area consists of a variety of commercial properties.

2.5.2. Interstate Routes

In general, the pavement condition along IR-76 was observed to be fair to good with marginal signs of weathering and surface wear. Low to moderate severity longitudinal and transverse cracking was common along these sections, as well as a few low severity potholes and low severity crack sealing deficiencies (Photograph 1).

The pavement condition of the concrete portion of IR-77 located just north of the NW interchange was observed to be poor with various signs of distress and surface wear. Low severity settlement, high severity longitudinal and transverse cracking as well as spalling were common in this section. Extensive high severity faulting was also apparent (Photograph 2).

The project portion of each interstate appeared to be well drained to storm drains, drainage swales, and/or grassy/vegetated embankment slopes. Ponding water or obvious drainage deficiencies were not observed.

Photograph 1: IR-76 Pavement Wear

Photograph 2: IR-77 Pavement (Concrete)

2.5.3. Connecting Ramps

The pavement condition for the connecting ramps was generally observed to be good with few low severity transverse cracks along the ramps. The exceptions to this was Ramp J which was observed to be in fair condition with moderate severity longitudinal and transverse cracking as well as moderate severity rutting and edge cracking.

3. GEOTECHNICAL EXPLORATION

3.1. Roadway Exploration Program

The subsurface exploration for the NW Interchange as well as portions of connecting mainline interstates and associated ramps was conducted by NEAS between February 19, 2019 and May 1, 2019 and included 40 borings drilled to depths between 2.8 and 42.6 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 within the planned roadway/subgrade improvement areas that were not restricted by underground utilities or dictated by terrain (i.e. steep embankment slopes). Target boring locations were located in the field by NEAS prior to drilling utilizing handheld GPS equipment. Each as-drilled project boring location and corresponding ground surface elevation was surveyed in the field by Northwest Consultants, Inc. (project surveyor) 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 North, NAD83, location) and the corresponding ground surface elevation. The boring locations are depicted in the Soil Profile Sheets provided in Appendix A.

Borings were drilled using either a CME 45B, CME 55T or CME 55X, truck-mounted or track-mounted drilling rigs utilizing 3.25-inch (inner diameter) hollow stem augers. Soil samples for subgrade borings were typically recovered continuously to a depth of 7.5 ft bgs, while samples for embankment/roadway borings were typically recovered at 2.5-ft intervals to varying termination depths, each using an 18-inch split spoon sampler (AASHTO T-206 “Standard Method for Penetration Test and Split Barrel Sampling of Soils.”). The soil samples obtained from the exploration program were visually observed in the field by the NEAS field representative and preserved for review by a Geologist for possible laboratory testing. Standard penetration tests (SPT) were conducted using CME auto hammers that have been calibrated to be between 78.0% and 85.0% efficient (depending on the specific rig used and the calibration date of the hammer) as indicated on the boring logs (Appendix B).

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

3.2. Laboratory Testing Program

The laboratory testing program consisted of classification testing, moisture content determinations, and sulfate content testing. Data from the laboratory testing program were incorporated onto the boring logs (Appendix B), while a summary of the sulfate content testing results can be found in Appendix C. Soil samples are retained at the laboratory for 60 days following report submittal, after which time they will be discarded.

3.2.1. Classification Testing

Representative soil samples were selected for index property (Atterberg Limits) and gradation testing for classification purposes on approximately 48% of the samples. At each boring location, the upper two samples obtained below the proposed top of subgrade elevation were generally tested while additional samples were selected for testing with the intent of properly classifying the subsurface soil and groundwater

conditions within the planned project limits. Soils not selected for testing were compared to laboratory tested samples/strata and classified visually. Moisture content testing was conducted on all samples. The laboratory testing was performed in general accordance with applicable AASHTO specifications and ODOT Supplements.

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

3.2.2. Standard Penetration Test Results

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

3.2.3. Sulfate Testing

Sulfate testing was generally performed on one sample for each roadway boring performed for pavement/subgrade design purposes for the subgrade analyses. 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. Based on the testing results, each subgrade soil sample tested was determined to have a sulfate content of less than 5,000 parts per million (i.e., lower than the level which ODOT considers high and may prevent the use of chemical stabilization). Testing results are summarized in Appendix C.

4. FINDINGS

The subsurface conditions encountered during NEAS's explorations are described in the following subsections and/or 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 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. At the time of the composition of this report, pavement grade information has been assumed to be consistent with project Plan and Profile sheets provided by GPD dated June 25, 2019 and labeled as Option 4. It should be noted that for the purposes of this report and our analysis the term 'subgrade' has been assumed to represent soils and/or soil conditions from 1.5 ft below proposed final pavement grades to a depth of 7.5 ft below the proposed pavement grades.

4.1. Existing Pavement

4.1.1. Pavement Thickness/Buildup Measurements

The pavement section thicknesses in terms of asphalt and/or concrete were measured at subgrade borings where existing pavement was present. Pavement section thicknesses were measured during the subsurface exploration and are recorded on the test boring logs provided in Appendix B. A summary of these measurements are provided in Table 1 below.

Table 1: Measured Pavement Thickness at Boring Locations

Boring ID	Existing Alignment	Depth (ft)	Asphalt thickness (in)	Concrete thickness (in)	Total Thickness (in)
B-001-0-18	IR-77/IR-76	7.5	-	16.0	16.0
B-002-0-18	IR-77/IR-76	7.5	-	11.0	11.0
B-003-0-18	IR-77/IR-76	7.5	-	14.0	14.0
B-004-0-18	IR-77/IR-76	7.5	-	13.0	13.0
B-005-0-18	IR-77/IR-76	7.5	-	13.0	13.0
B-006-0-18	IR-77/IR-76	7.5	-	14.0	14.0
B-039-0-18	IR-77/IR-76	7.5	-	9.0	9.0
B-040-0-18	IR-77/IR-76	7.5	-	13.0	13.0
B-041-0-18	IR-77/IR-76	6.1	14.0	-	14.0
B-042-0-18	IR-77/IR-76	6.5	5.0	-	5.0
B-043-0-18	IR-77/IR-76/Ramp V	7.5	5.0	13.0	18.0
B-044-0-18	IR-77/IR-76	7.5	13.0	-	13.0
B-045-0-18	IR-77/IR-76	11.5	10.0	-	10.0
B-045-1-18	Ramp J	6.7	2.0	13.0	15.0

Boring ID	Existing Alignment	Depth (ft)	Asphalt thickness (in)	Concrete thickness (in)	Total Thickness (in)
B-051-0-18	Ramp T	7.5	8.0	-	8.0
B-053-0-18	Ramp T	7.5	3.0	10.0	13.0
B-054-0-18	Ramp V	7.5	14.0	-	14.0
B-056-0-18	Ramp W	7.5	15.5	-	
B-061-0-18	IR-77/IR-76	7.5	-	14.0	14.0
B-067-0-18	Ramp U	36.5	4.0	8.0	12.0
B-072-0-18	Ramp V	42.6	11.0	-	11.0
B-073-0-18	Ramp V	6.9	13.0	-	13.0
B-074-0-18	Ramp V	10.1	2.5	10.5	13.0
B-077-1-18	Ramp J	7.5	12.0	-	12.0
B-077-2-18	Ramp J	7.5	2.0	10.0	12.0
B-077-3-18	Ramp J	7.5	13.0	-	13.0
B-077-4-18	Ramp J	7.5	12.0	-	12.0

4.2. Subsurface Conditions

The subsurface conditions in the project area are relatively consistent and are generally comprised of fill soils (i.e., embankment fill, historical/urban fill, etc.) and natural soils consisting of non-cohesive sand, silt and gravel combinations or low to moderately plastic sandy silt, silt, and silt/clay combinations. Subgrade soils at the site generally classified as A-1-a, A-1-b, A-2-4, A-3, A-3a, A-4a A-4b, A-6a or A-7-6. 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 (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.

4.2.1. IR-77/IR-76

The project portions of IR-76 and IR-77 adjacent to the NW Interchange are planned for full depth pavement placement.

Along IR-76 and IR-77, fifty-four percent (54%) of the samples taken along the interstate were classified as coarse-grained, non-cohesive soils and were comprised of: 1) Sandy Silt (A-4a, 17% of samples); 2) Gravel with Sand and Silt (A-2-4, 16% of samples); 3) Coarse and Fine Sand (A-3a, 10% of samples), 4) Gravel and/or Stone Fragments (A-1-a, 7% of samples; and, 5) Gravel with Sand (A-1-b, 6% of samples). With respect to the relative density of the coarse-grained soils, the descriptions varied from loose to very dense correlating to converted SPT-N values (N_{60}) values between 6 and 105 blows per foot (bpf). Natural moisture contents ranged from 2 to 21 percent.

Thirty percent (30%) of the soil samples were identified as fine-grained, cohesive soils and were comprised of: 1) cohesive Sandy Silt (A-4a, 20% of samples); and, 2) Silt and Clay (A-6a, 10% of samples). With respect to the consistency of the fine-grained soils, the descriptions varied from soft to hard correlating to N_{60} values between 4 and 95 bpf. Natural moisture contents ranged from 7 to 17 percent.

The remaining ten percent (16%) of the samples were identified as rock generally classified as shale and sandstone.

4.2.2. Ramp J

Ramp J is the IR-77 NB/IR-76 WB ramp to Superior Ave and East Ave. which is planned for full depth pavement replacement.

Twenty percent (20%) of the samples taken along Ramp J were classified as coarse-grained, non-cohesive soils and were comprised of: 1) Coarse and Fine Sand (A-3a, 10% of samples); 2) Gravel with Sand and Silt (A-2-4, 5% of samples); and 3) Gravel with Sand (A-1-b, 5% of samples). With respect to the relative density of the coarse-grained soils, the descriptions varied from loose to very dense correlating to N_{60} values between 9 and 51 bpf. Natural moisture contents ranged from 6 to 10 percent.

Sixty percent (60%) of the samples taken along the ramp were classified as fine-grained soils and were comprised of cohesive Sandy Silt (A-4a, 25% of samples) and Silt (A-4b, 35% of samples). With respect to the consistency of the fine-grained soils, the descriptions varied from medium stiff to hard correlating to N_{60} values between 10 and 22 bpf. Natural moisture contents ranged from 16 to 27 percent.

The remaining twenty percent (20%) of the samples were identified as rock generally classified as shale.

4.2.3. Ramp T

Ramp T is the IR-77 SB ramp to IR-76 WB which is planned for full depth pavement replacement and realignment. Minimal cut and fill is anticipated along this ramp.

Thirty-six percent (36%) of the samples taken along the ramp were classified as coarse-grained, non-cohesive soils that were comprised of Gravel with Sand and Silt (A-2-4, 27% of samples) and Gravel with Sand (A-1-b, 9% of samples). With respect to the relative density of the coarse-grained soils, the descriptions varied from dense to very dense correlating to N_{60} values between 36 and 85 bpf. Natural moisture contents ranged from 6 to 7 percent.

Sixty-four percent (64%) of the soil samples were identified as fine-grained soils that were comprised of cohesive Sandy Silt (A-4a, 7 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 11 and 21 bpf. Natural moisture contents ranged from 10 to 16 percent.

4.2.4. Ramp U

Ramp U is the IR-76 EB ramp to IR-77/IR-76 EB which is planned for full depth pavement replacement.

Thirty-five percent (35%) of the samples taken along the ramp were classified as coarse-grained, non-cohesive soils and were comprised of Gravel with Sand and Silt (A-2-4, 14% of samples) and Gravel with Sand (A-1-b, 21% of samples). With respect to the relative density of the coarse-grained soils, the descriptions varied from medium dense to very dense correlating to N_{60} values between 29 and 77 bpf. Natural moisture contents ranged from 5 to 17 percent.

Thirty-six percent (36%) of the soil samples were identified as fine-grained soils that were comprised of cohesive Sandy Silt (A-4a, 29% of samples) and Clay (A-7-6, 7% of samples). With respect to the consistency of the fine-grained soils, the descriptions varied from stiff to hard correlating to N_{60} values between 12 and 40 bpf. Natural moisture contents ranged from 6 to 16 percent.

The remaining twenty-nine percent (29%) of the samples were identified as rock classified as sandstone.

4.2.5. Ramp V

Ramp V is the IR-77 NB/IR-76 WB ramp to IR-76 WB which is planned for full depth pavement replacement and realignment. Minimal cut and fill is anticipated along this ramp.

Thirty-seven percent (37%) of the samples taken along the ramp were classified as coarse-grained, non-cohesive soils and were comprised of: 1) Gravel with Sand (A-1-b, 16% of samples); 2) Gravel with Sand and Silt (A-2-4, 13% of samples); and, 3) Coarse and Fine Sand (A-3a, 9% of samples). With respect to the relative density of the coarse-grained soils, the descriptions varied from loose to very dense correlating to N_{60} values between 6 and 60 bpf. Natural moisture contents ranged from 2 to 11 percent.

Forty-four percent (44%) of the soil samples were identified as fine-grained soils and were comprised of: 1) Cohesive Sandy Silt (A-4a, 38% of samples); 2) Silt (A-4b, 3% of samples); and, 3) Silt and Clay (A-6a, 3% of samples). With respect to the consistency of the fine-grained soils, the descriptions varied from soft to hard correlating to N_{60} values between 4 and 95 bpf. Natural moisture contents ranged from 5 to 16 percent.

The remaining Nineteen percent (19%) of the samples were identified as rock classified as sandstone.

4.2.6. Ramp W

Ramp W is the IR-76 EB ramp to IR-77 NB which is planned for full depth pavement replacement and realignment. Cut and fills are anticipated to be needed over the length of the proposed new alignment.

Forty-seven percent (47%) of the samples taken along Ramp W were classified as coarse-grained, non-cohesive soils and were comprised of: 1) Coarse and Fine Sand (A-3a, 20% of samples); 2) Gravel with Sand and Silt (A-2-4, 10% of samples); 3) Gravel with Sand (A-1-b, 10% of samples); and, 4) Sandy Silt (A-4a, 7% of samples). With respect to the relative density of the coarse-grained soils, the descriptions varied from loose to very dense correlating to N_{60} values between 6 and 105 bpf. Natural moisture contents ranged from 2 to 11 percent.

Thirty-nine percent (39%) of the soil samples were identified as fine-grained soils that were comprised of cohesive Sandy Silt (A-4a, 36% of samples) and Silt and Clay (A-6a, 3% of samples). With respect to the relative density of the fine-grained soils, the descriptions varied from soft to hard correlating to N_{60} values between 4 and 48 bpf. Natural moisture contents ranged from 9 to 16 percent.

The remaining thirteen percent (13%) of the samples were identified as rock classified as sandstone.

4.2.7. Groundwater

Groundwater measurements were taken during drilling procedures and/or immediately following the completion of each borehole. Groundwater was encountered in 4 of the 40 project borings. Across the project site groundwater was encountered at depths ranging from 3.5 to 25 ft bgs or from elevations ranging from 991.1 to 1011.8 ft amsl. Groundwater was encountered within 7.5 ft (within subgrade portion) of the

ground surface in 2 borings. It should be noted that groundwater is affected by many hydrologic characteristics in the area and may vary.

5. ANALYSES AND RECOMMENDATIONS

We understand that the reconstruction/widening of portions of IR-76 and IR-77 adjacent to the NW Interchange is planned as part of ODOT project SUM-76-8.42/SUM-77-9.77/SUM-8-0.00 (PID 102329). In addition to the mainline interstates, reconstruction, widening and/or realignment of various connecting ramps/roadways are also planned. Ramp T, Ramp V, and Ramp W are planned for realignment and reconstruction, while widening and reconstruction of Ramp J and Ramp U is planned. For this purpose, a roadway exploration and subsequent analysis was completed for the referenced project. 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 July 19, 2019). Input information for the spreadsheet was based on the soil characteristics gathered during NEAS's exploration (i.e., SPT results, laboratory test results, etc.). A GB1 analysis was performed for each of the referenced mainline and ramp segments. Embankment Stability analysis was performed in accordance Load and Resistance Factor Design (LRFD) method as set forth in AASHTO's Publication *LRFD Bridge Design Specifications, 8th Edition* (BDS) (AASHTO, 2017), *ODOT's 2019 LRFD Bridge Design Manual* (BDM) (ODOT, 2019), and ODOT's *Geotechnical Bulletin 2* (GB2) (ODOT [2], 2017).

Based on our evaluation of the subsurface conditions and our geotechnical engineering analyses of the proposed improvement project, it is our opinion that the subgrade conditions encountered are generally satisfactory and pavement can be designed without the need for extreme levels of remediation, especially with the use of global stabilization on interstate projects per the GB1. In general, the subgrade soils throughout the project will be stabilized by global (chemical) stabilization. The following sections provide further detail about the analysis performed and the recommended remediation.

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. The project GB1 analysis spreadsheets are provided in Appendix D.

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

5.1.1. Pavement Design Recommendations

It is our understanding that pavement analysis and design is to be performed to determine the proposed pavement sections for the segments within the project limits to undergo full depth replacement. A GB1 analysis was performed using the subgrade soil data obtained during our field exploration program to evaluate the soil characteristics in order to develop pavement parameters for use in pavement design. The subgrade analysis parameters recommended for use in pavement design are presented in Table 2 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 2: Pavement Design Values

Segment	Maximum N_{60L}	Minimum N_{60L}	Average N_{60L}	Average PI Values	Design CBR
IR-76/IR-77 (NW Interchange)	30	4	20	8	9
Ramp J	30	9	17	7	8
Ramp T	14	11	13	8	7
Ramp U	30	12	25	14	9
Ramp V	30	22	26	7	10
Ramp W	30	11	25	-	12
Entire Project	**30**	**4**	**21**	**8**	**9**

5.1.2. Unsuitable Subgrade

Per ODOT's GB1, 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 referenced interstate improvement project these subgrade conditions are further discussed in the following subsections.

5.1.2.1. Rock

Rock was encountered within the subgrade in ten (10) borings performed within the project roadway limits. In these borings, bedrock was encountered at depths ranging from 0 ft to 3.1 ft below the top of the assumed proposed subgrade elevation. Per ODOT's GB1, if rock is encountered within 24 inches of the bottom of the proposed asphalt or concrete pavement it is to be removed in accordance with 204.05 of the ODOT CMS and replaced with Item 204 Embankment. Of the ten borings in which rock was encountered, remediation is required in five borings (B-041-0-18, B-045-0-18, B-045-1-18, B-057-0-18, and B-070-0-18). A summary of the boring locations where rock was encountered within the proposed subgrade are shown in Table 3 below, per the roadway segment for which they were encountered.

Table 3: Shallow Rock Location Summary

Boring ID	Roadway Segment	Depth Below Proposed Subgrade (ft)	Top of Rock Elevation (ft)
B-041-0-18	IR-77/IR-76	**1.5**	1019.7
B-045-0-18	IR-77/IR-76	**1.0**	1064.4
B-045-1-18	Ramp J	**0.0**	1065.6
B-057-0-18	Ramp W	**1.0**	1009.4
B-058-0-18	Ramp W	**2.8**	1005.1
B-059-0-18	Ramp W	**3.0**	1000.8
B-070-0-18	Ramp U	**1.0**	1034.8
B-073-0-18	Ramp V	**3.0**	1011.8
B-074-0-18	Ramp V	**3.1**	1011.2
B-076-0-18	Ramp V	**2.9**	1030.5

5.1.2.2. Prohibited Soils

Prohibited 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 encountered within the subgrade of the referenced project roadway segments. Soil Type A-4b (Silt) was encountered along portions of Ramp J (B-077-3-18 and B-077-4-18) at depths ranging from 0 to 6 ft below subgrade and along Ramp V (B-075-0-18) between depths of 4 to 6 ft below subgrade. A summary of the boring locations where prohibited soils were encountered and the associated GB1 recommended remediation depths are shown in Tables 4 below, per the roadway segment for which they were encountered.

Table 4: Prohibited Soils Location Summary

Boring ID	Prohibited Soil Type	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: Ramp V					
B-075-0-18	A-4b	4.0 - 6.0	-	-	-
Roadway segment: Ramp J					
B-077-3-18	A-4b	2.0 - 6.0	12	-	14
B-077-4-18	A-4b	0.0 - 6.0	36	-	14

5.1.3. Unstable Subgrade

The GB1 recommends subgrade stabilization for soils 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. For the purposes of this report, the term 'unstable soils' has been assumed to represent subgrade soils of these conditions. 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 an unstable 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 either chemical treatment or excavate and replace at select locations. A summary of the boring locations where unstable soils were encountered and determined to have a potential impact on subgrade performance are shown in Table 5 below, per the roadway segment for which they were encountered. Also included is the associated GB1 recommended remediation depth at that location.

Table 5: Weak Soil Locations Summary

Boring ID	Sample ID	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: IR-77/IR-76							
B-002-0-18	SS-1	7	3	0.0 - 1.5	18	-	14
B-053-0-18	SS-1	11	1	0.0 - 1.5	12	-	12
Roadway Segment: Ramp T							
B-053-0-18	SS-1	11	1	0.0 - 1.5	12	-	12

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

5.1.3.1. High Moisture Content Soils

High moisture content soils are defined by the GB1 as soils that exceed the estimated optimum moisture content (per *Figure A - Optimum Moisture Content* within the GB1) for a given classification by 3 percent or more. Per the GB1, soils determined to be above the identified moisture content levels are a likely indication of the presence of an unstable subgrade and may require some form of subgrade stabilization. Similar to our analysis of 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. A summary of the boring locations where high moisture content conditions were encountered within the limits of each alignment are shown in Table 6 below.

Table 6: High Moisture Content Soils Location Summary

Boring ID	Moisture Content (%)	Optimum Moisture Content (%)	Moisture Above Optimum (%)	Depth Below Subgrade (ft)
Roadway Segment: IR-77/IR-76				
B-002-0-18	17	14	3	0.0 - 1.5
B-053-0-18	16	10	6	1.5 - 3.0
Ramp Segment: Ramp J				
B-077-2-18	17	13	4	1.5 - 3.0
B-077-3-18	18	10	8	2.0 - 3.0
B-077-4-18	22	10	12	1.5 - 3.0
Roadway Segment: Ramp T				
B-053-0-18	16	10	6	2.0-2.3
Roadway Segment: Ramp U				
B-069-0-18	17	10	7	1.1 - 2.6

5.2. Embankment Stability Analysis

For purposes of evaluating stability of the planned roadway embankments and embankment widening proposed as part of the project, NEAS reviewed cross-sections along the length of the project roadway segments to identify sections that were interpreted to represent conditions that posed the greatest potential for slope instability as a result of the planned construction. In general, cross-sections along each of the proposed roadway alignments were reviewed to identify planned alterations that may present a combination of existing subsurface conditions and planned site grading (i.e., cutting and/or filling) that would potentially be critical to the stability of the existing and/or proposed slopes at the site. Based on our review of the available information along the referenced alignments and the associated soil properties, two cross-sections estimated to be most "critical" along the proposed roadways and were analyzed for global stability. The two cross-sections selected to be evaluated include: 1) the cross-section along IR-76 EB at approximate STA. 98+00; and, 2) the cross-section along IR-77 SB/IR-76 EB at approximate STA. 242+00.

For these cross-sections, NEAS developed a representative cross-sectional model to use as the basis for global stability analyses. The model was developed from NEAS's interpretation of the available information which included: 1) the referenced project's proposed Option 4 roadway plans dated June 25, 2019 provided by GPD Group; 2) a live load surcharge of 240 pounds per square foot (psf), accounting for traffic induced loads; and, 3) test borings and laboratory data developed as part of this report.

For analysis purposes, borings performed along or nearby the indicated embankment sections were reviewed and a generalized material profile was developed for analysis to represent worse case conditions at each cross-section location. 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 in analysis (with sited correlation/reference material) is summarized within Tables 7 and 8 below. Each table presents the effective and total stress analysis soil parameters for each of the referenced cross-sections as well as the project borings utilized to estimate the indicated parameters.

Table 7: Soil Profile and Estimated Engineering Properties – IR-76 EB - STA. 98+00

Embankment Stability Analysis, B-055-0-18, B-056-0-18 & B-072-0-18				
Soil Description	**Unit Weight[1] (pcf)**	**Undrained Shear Strength[2] (psf)**	**Effective Cohesion[3] (psf)**	**Effective Friction Angle[3] (degrees)**
Coarse and Fine Sand Elevation (1079.6 ft - 1010.8 ft)	125	-	-	34
Coarse and Fine Sand Elevation (1010.8 ft - 1007.8 ft)	120	-	-	34
Silty Clay Elevation (1007.8 ft - 1003.1 ft)	112	500	50	20
Silty Clay Elevation (1003.1 ft - 987.3 ft)	122	2400	200	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 8: Soil Profile and Estimated Engineering Properties – IR-77 SB/IR-76 EB – STA. 242+00

Embankment Stability Analysis, B-044-0-18				
Soil Description	**Unit Weight[1] (pcf)**	**Undrained Shear Strength[2] (psf)**	**Effective Cohesion[3] (psf)**	**Effective Friction Angle[3] (degrees)**
Silt and Clay Elevation (1079.6 ft - 1052.4 ft)	115	2700	250	26

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.*

The above referenced slope stability models were analyzed for long-term (Effective Stress) and short-term (Total Stress) slope stability utilizing the software entitled *Slide 7.0* by Rocscience, Inc. Specifically, the Modified Bishop and Spencer analysis methods were used to calculate a factor of safety (FOS) for circular and block type slope failures, respectively. The FOS is the ratio of the resisting forces and the driving forces, with the desired safety factor being more than about 1.33 which equates to an AASHTO resistance factor less than 0.75 (per AASHTO's LRFD BDS the specified resistance factors are essentially the inverse of the FOS that should be targeted in slope stability programs). For this analysis, a resistance factor of 0.75 or lower is targeted as the slope does not contain or support a structural element.

Based on our slope stability analyses for the above referenced roadway embankment sections, the minimum slope stability safety factor is about 1.76 (0.57 resistance factor) for the section analyzed along IR-76 EB at STA. 98+00. The graphical output of the slope stability program (cross-sectional model, calculated safety factor, and critical failure plane) for each analyzed section is presented in Appendix E.

5.3. Embankment Construction Recommendations

As indicated above, each of the embankment cross-sections analyzed for slope stability were determined to be stable (i.e., FOS greater than about 1.33) as proposed in the SUM-76-6.15 project's Option 4 roadway plans dated June 25, 2019 provided by GPD Group. Therefore, the proposed embankment slopes can be constructed in accordance with Item 203 "Roadway Excavation and Embankment" of the ODOT CMS.

In areas where additional embankment material is proposed along existing slopes that are steeper than 8 Horizontal to 1 Vertical (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 GB2. For sidehill fills planned on existing slopes steeper than 4H:1V, ODOT's GB2 recommends that *the embankment slopes be constructed utilizing special benching in order to blend the*

new embankment with the existing slope to prevent the development of a weak shear plane at the interface between the proposed fill and existing slope material (ODOT [2], 2017). As the project embankment fill slopes were determined to be stable as-proposed based on our embankment stability analysis, a special benching scheme similar to that shown in Figure 1 of the ODOT GB2 can be used in areas where special benching is recommended. The height and width dimensions of the special benching scheme shown in Figure 1 should be arranged to minimize the required cut and fill quantities, though the height of a single bench shall not exceed 20 ft without a stability analysis and design per OSHA requirements. Additionally, it may be appropriate to adjust the bench slope shown from a 1H:1V to a 1.75H:1V slope if the existing slope is made up of primarily granular materials. The benched material should be replaced with compacted engineered fill per Item 203 of the ODOT CMS, while proper lift thicknesses and material density should be maintained in the proposed fill per Item 203.06 of the ODOT CMS. In situations where it is not practical to extend the final bench through the existing roadway due to maintenance of traffic concerns, a benching scheme similar to that shown in Figure 1a of the ODOT GB2 can be used in order to avoid impacting the existing roadway, guardrail or shoulder. This scheme results in the placement of a temporary over-steepened fill that can later be “shaved-off” to bring the slope to the final proposed grade.

5.4. Stabilization Recommendations

5.4.1. Subgrade Stabilization

Guidance from ODOT's GB1 states that *"For all Interstates and other divided highways with four or more lanes more than 1-mile in project length, the subgrade of the entire project shall be chemically stabilized (global stabilization), except where it is determined that soil is present where a majority of sulfate content values are found to be greater than 3,000 parts per million (ppm), or individual soil samples with sulfate contents greater than 5,000 ppm are present"* and therefore global chemical stabilization is recommended for the proposed improvement project except where otherwise indicated in this report.

The global chemical stabilization of the referenced mainline and ramp subgrade soils included within this project, should be performed to a minimum depth of 14 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.

The unsuitable subgrade conditions encountered along the proposed mainline and roadway/ramp segments include areas of identified "prohibited soils" and "subgrade soils". It is NEAS’s opinion based on: 1) samples obtained from borings performed; 2) the depth and composition of the "prohibited soils" and "weak soils" encountered; and, 3) the relative density (compactness) of overlying soils, that the recommended 14 inches of global chemical stabilization would be sufficient in stabilizing the subgrade at each location.

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

5.4.2. Shallow Bedrock

Guidance from ODOT's GB1 states that, *if rock is encountered within 24 inches of the bottom of the asphalt or concrete pavement it is to be removed*. Based on the borings performed, at the locations where bedrock is encountered within two feet of the bottom of the proposed asphalt or concrete pavement, it is recommended that the rock encountered be excavated in accordance with Item 204.05 "Rock, Shale, or Coal Subgrade" of ODOT's CMS and replaced with Item 204 Embankment. The estimated limits of required rock excavation can be found in Table 9 below.

Table 9: Estimated Limits of Required Rock Excavation

Start Station	End Station	Excavate and Replace (inches)	Unsuitable Subgrade Conditions	Borings Considered
IR-77/IR-76				
222+00	246+00	24	Bedrock	B-059-0-18, B-041-0-18, B-070-0-18, B-045-0-18, B-045-1-18
IR-76 EB				
99+50	104+18	24	Bedrock	B-057-0-18
Ramp J				
0+00[(1)]	6+00[(1)]	24	Bedrock	B-045-1-18
Ramp V				
0+00 (Begin Work)	20+28 (End Work)	24	Bedrock	B-045-1-18, B-074-0-18, B-057-0-18,
Ramp W				
104+18 (Begin Work)	108+50	24	Bedrock	B-057-0-18, B-058-0-18

Notes:
1. Stationing for Ramp J not available at time of the report. Initial 600 ft of Ramp J is estimated to require 24 inches of Excavate and Replace.

6. QUALIFICATIONS

This investigation was performed in accordance with accepted geotechnical engineering practice for the purpose of characterizing the subgrade conditions along the referenced portions of roadways. This report has been prepared for GPD Group, ODOT and their design consultants to be used solely in evaluating the roadway subgrade soils within the project limits and presenting geotechnical engineering recommendations specific to this project. The assessment of general site environmental conditions or the presence of pollutants in the soil, rock and groundwater of the site was beyond the scope of this geotechnical exploration. Our recommendations are based on the results of our field explorations, laboratory 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 occur in the nature, design or location of the proposed pavement rehabilitation work, the conclusions and recommendations contained in this report should not be considered valid until they are reviewed and have been modified or verified in writing by a geotechnical engineer.

It has been a pleasure to be of service to GPD Group in performing this geotechnical exploration for the SUM-76-8.42/SUM-77-9.77/SUM-8-0.00 design build project. Please call if there are any questions, or if we can be of further service.

Respectfully Submitted,

Brendan P. Andrews, P.E.
Project Manager/Senior Geotechnical Engineer

Kevin C. Arens, P.E.
Geotechnical Engineer

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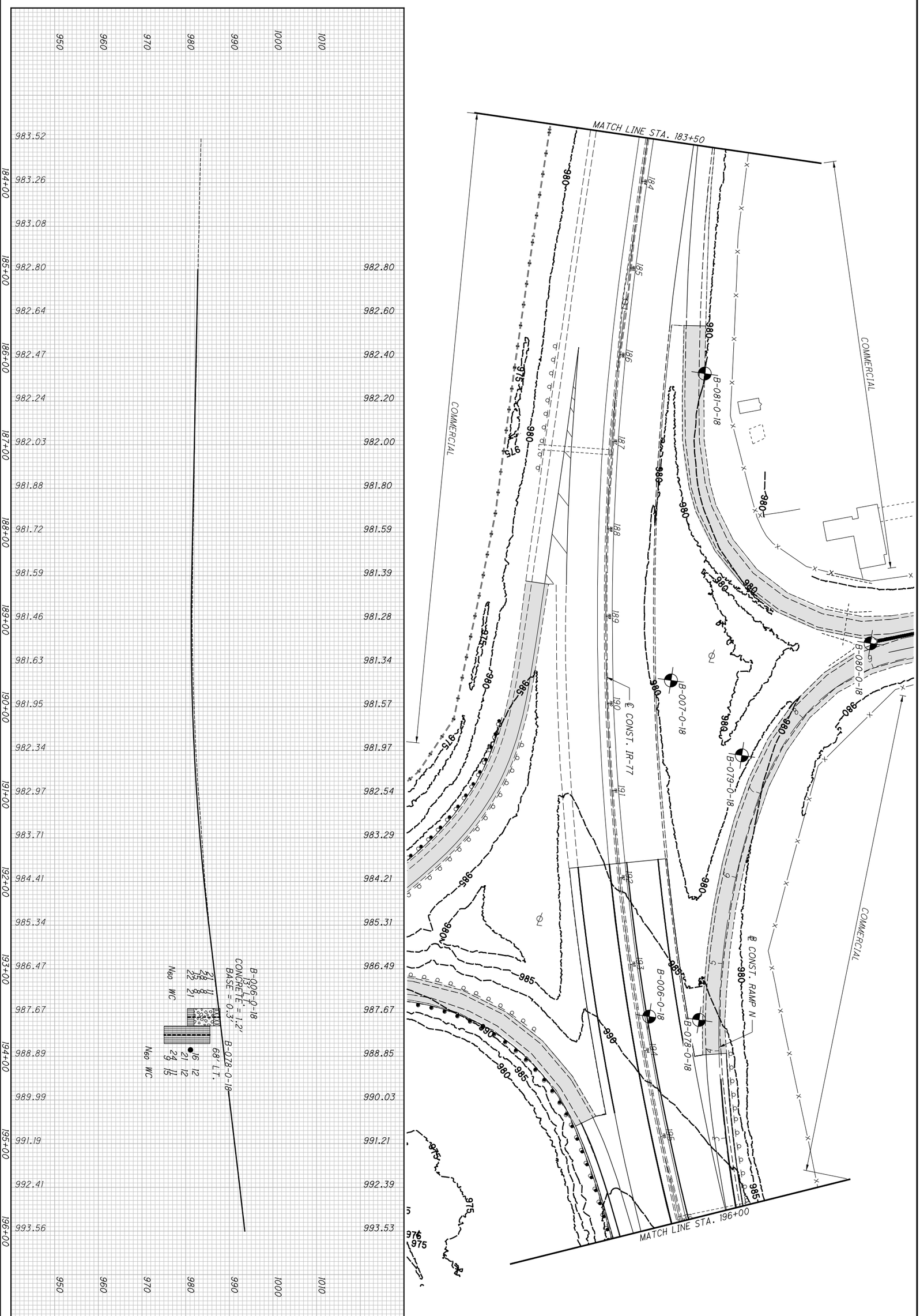
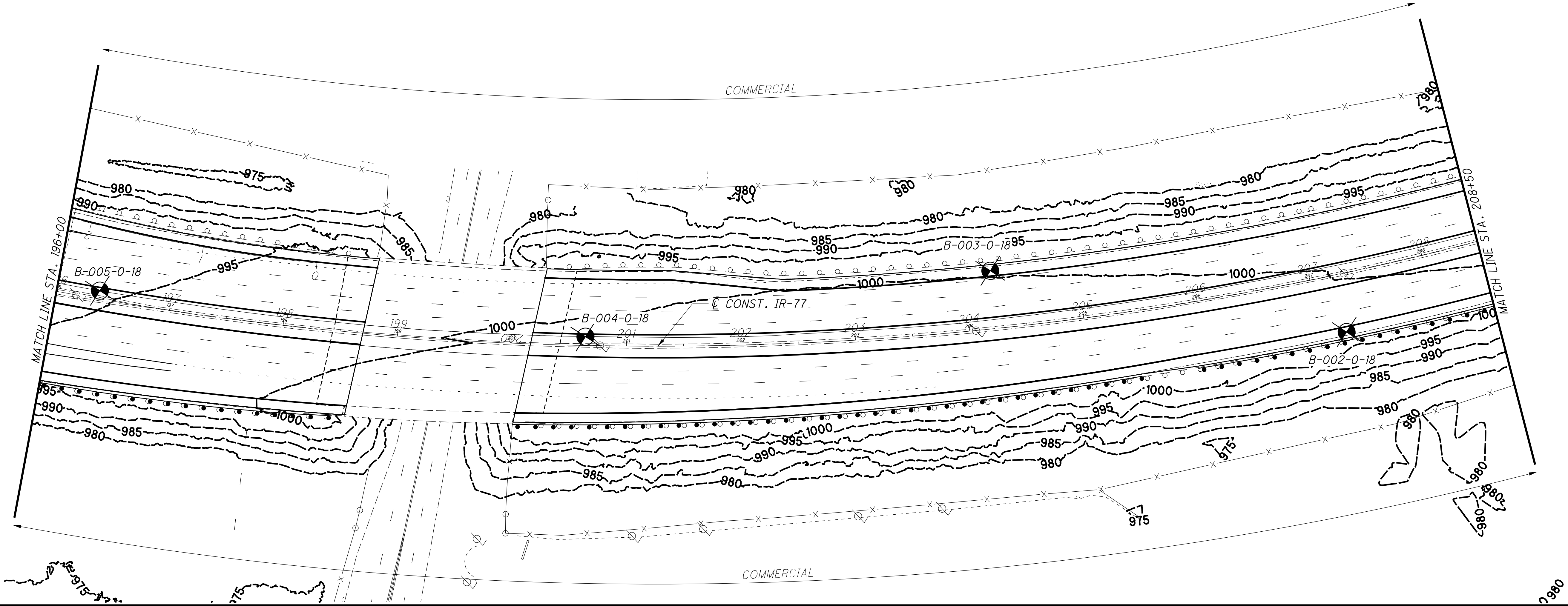
APPENDIX A

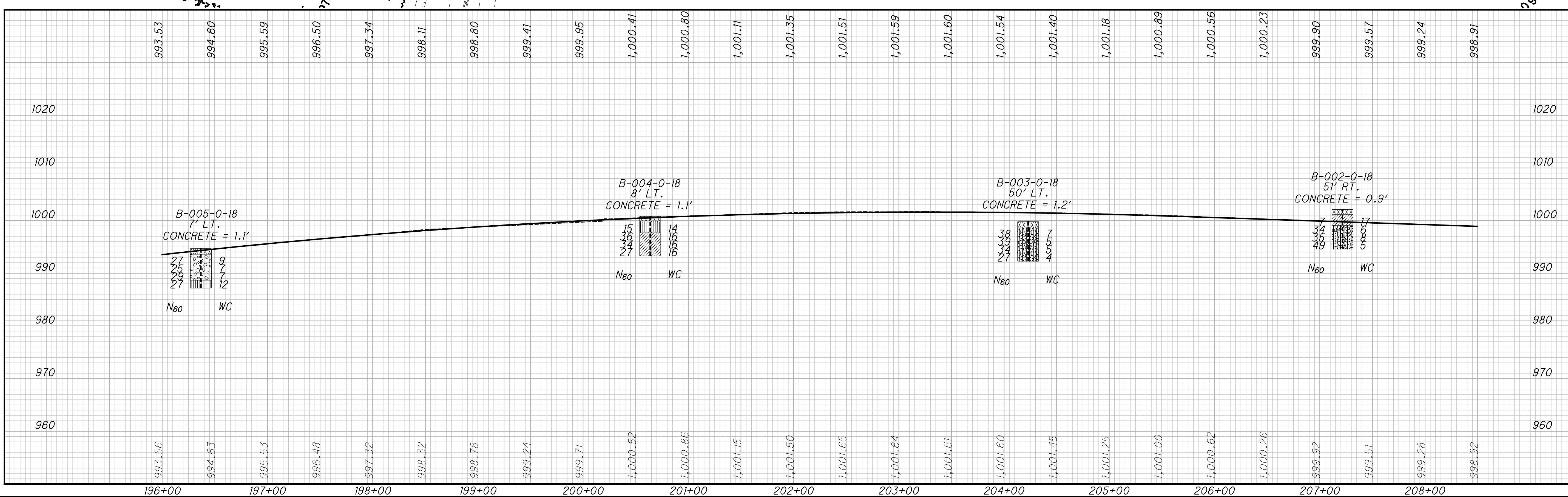
SOIL PROFILE SHEETS

P:\19-0002 (SUM-76-6.15 PID 100713) Kenmore - Part 6 (Roadway)\100713\geotechnical\SUM-76-77_DB_MajorRehab\sheets\100713IP1101.dgn Sheet 5/22/2020 5:28:40 PM karens



	6 / 20	SUM-76-8.42 / SUM-77-9.77 / SUM-8-0.00	SOIL PROFILE STA. 183+50 TO STA. 196+00 I.R. 77	DRAWN KCA CHECKED BPA	0 50 25 100 HORIZONTAL SCALE IN FEET	N





HORIZONTAL SCALE IN FEET

DRAWN KCA

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SOIL PROFILE
STA. 196+00 TO STA. 208+50 I.R. 77

SUM-76-8.42/SUM-77-9.77 / SUM-8-0.00

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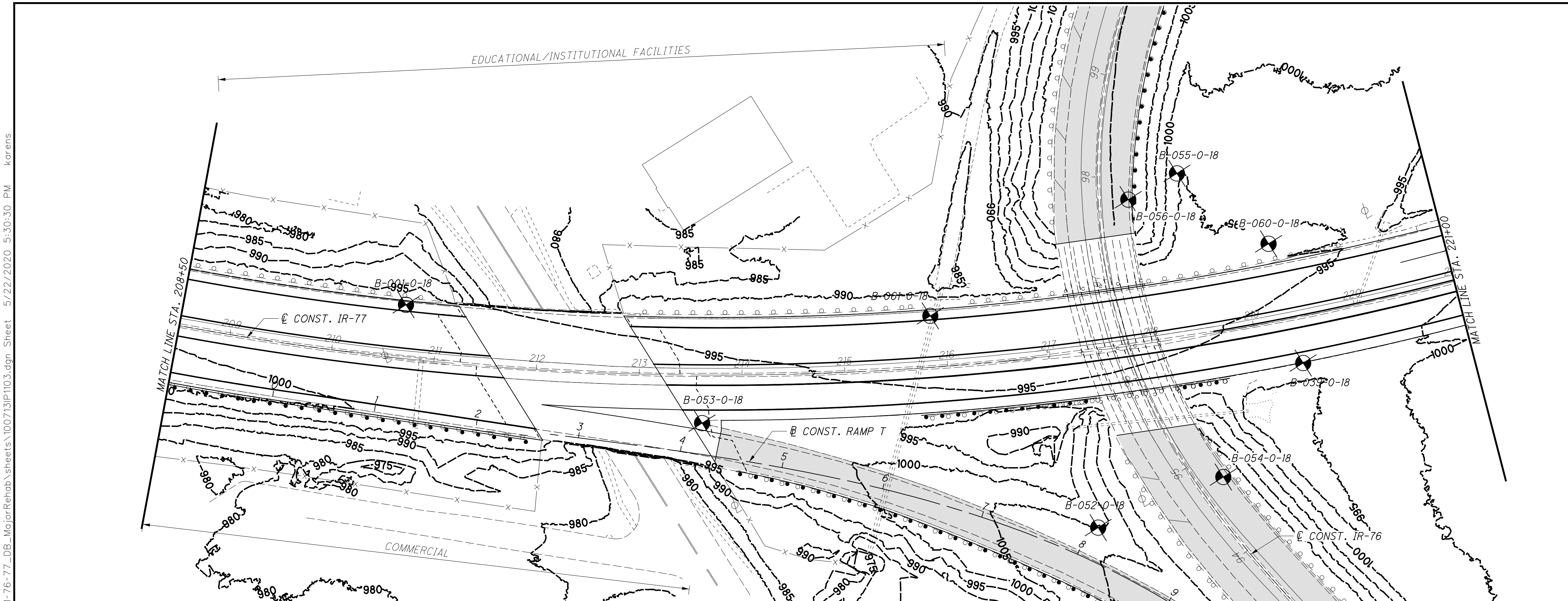

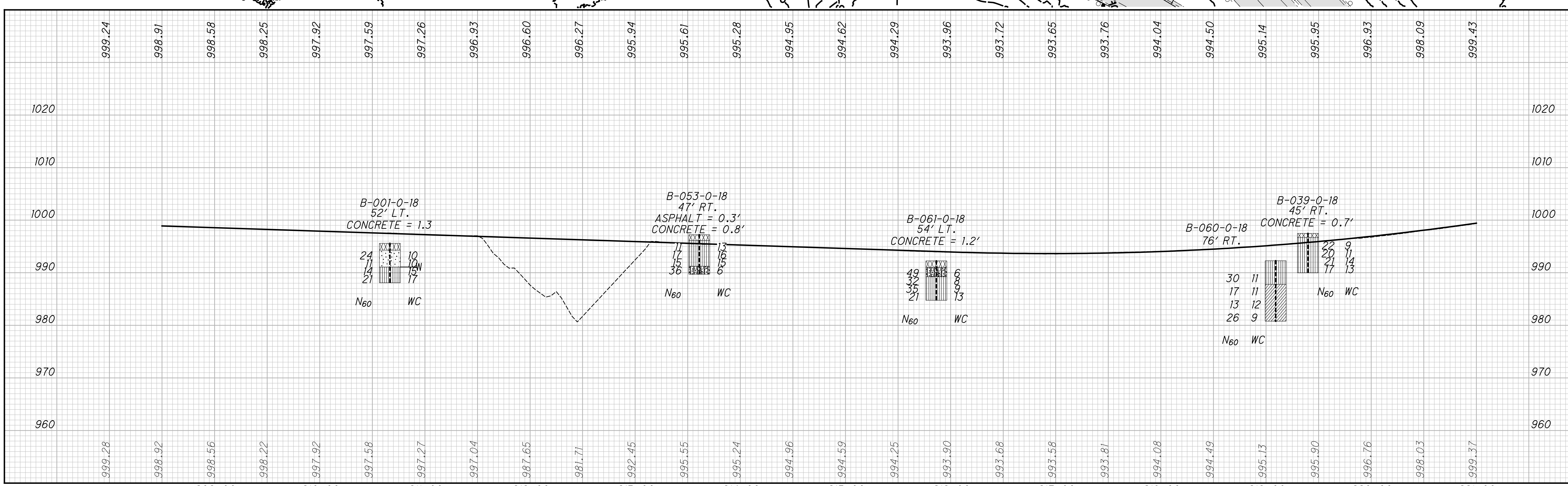

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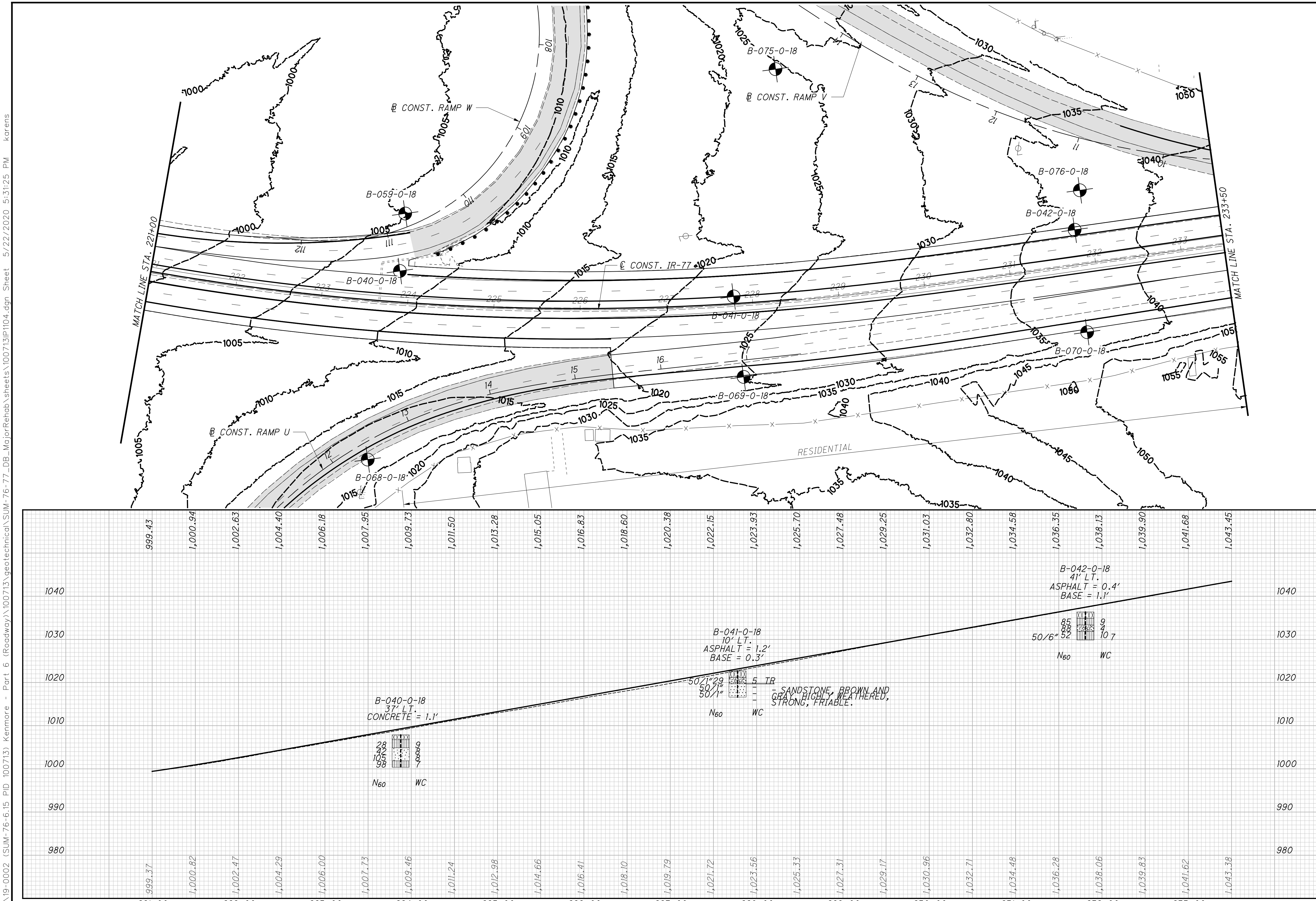
HORIZONTAL SCALE IN FEET

SOIL PROFILE
STA. 208+50 TO STA. 221+00 I.R. 77

SUM-76-8.42/SUM-77-9.77 / SUM-8-0.00



HORIZONTAL SCALE IN FEET

0 25 50 100

DRAWN KCA

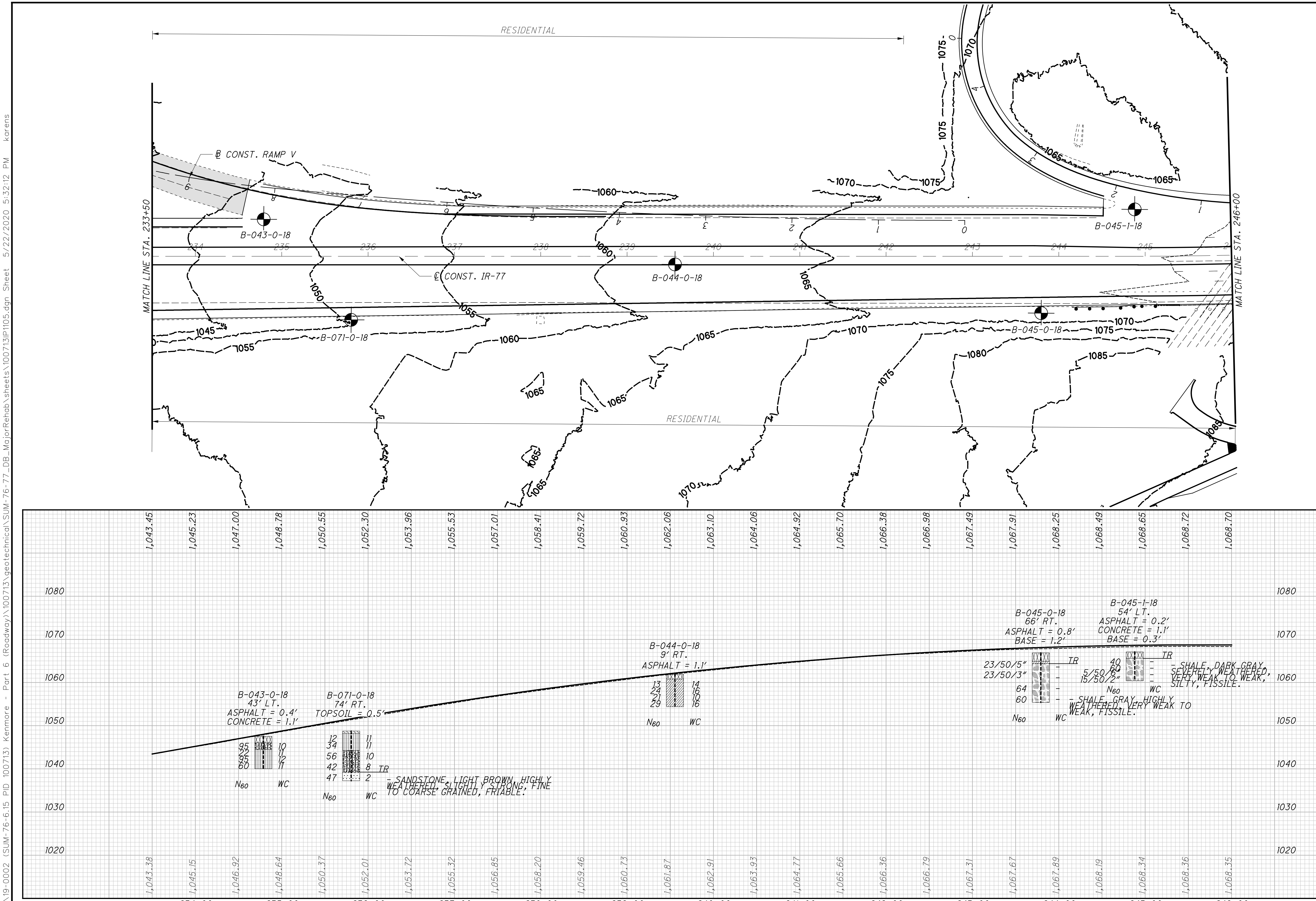
CHECKED BPA

SOIL PROFILE
STA. 221+00 TO STA. 233+50 I.R. 77

SUM-76-8.42/SUM-77-9.77 / SUM-8-0.00

9/20

P:\19-0002 (SUM-76-6.15 PID 100713) Kenmore - Part 6 (Roadway)\100713\geotechnical\SUM-76-77_DB_MajorRehab\sheets\100713IP1104.dgn Sheet 5/22/2020 5:31:25 PM karens



SOIL PROFILE

STA. 233+50 TO STA. 246+00 I.R. 77

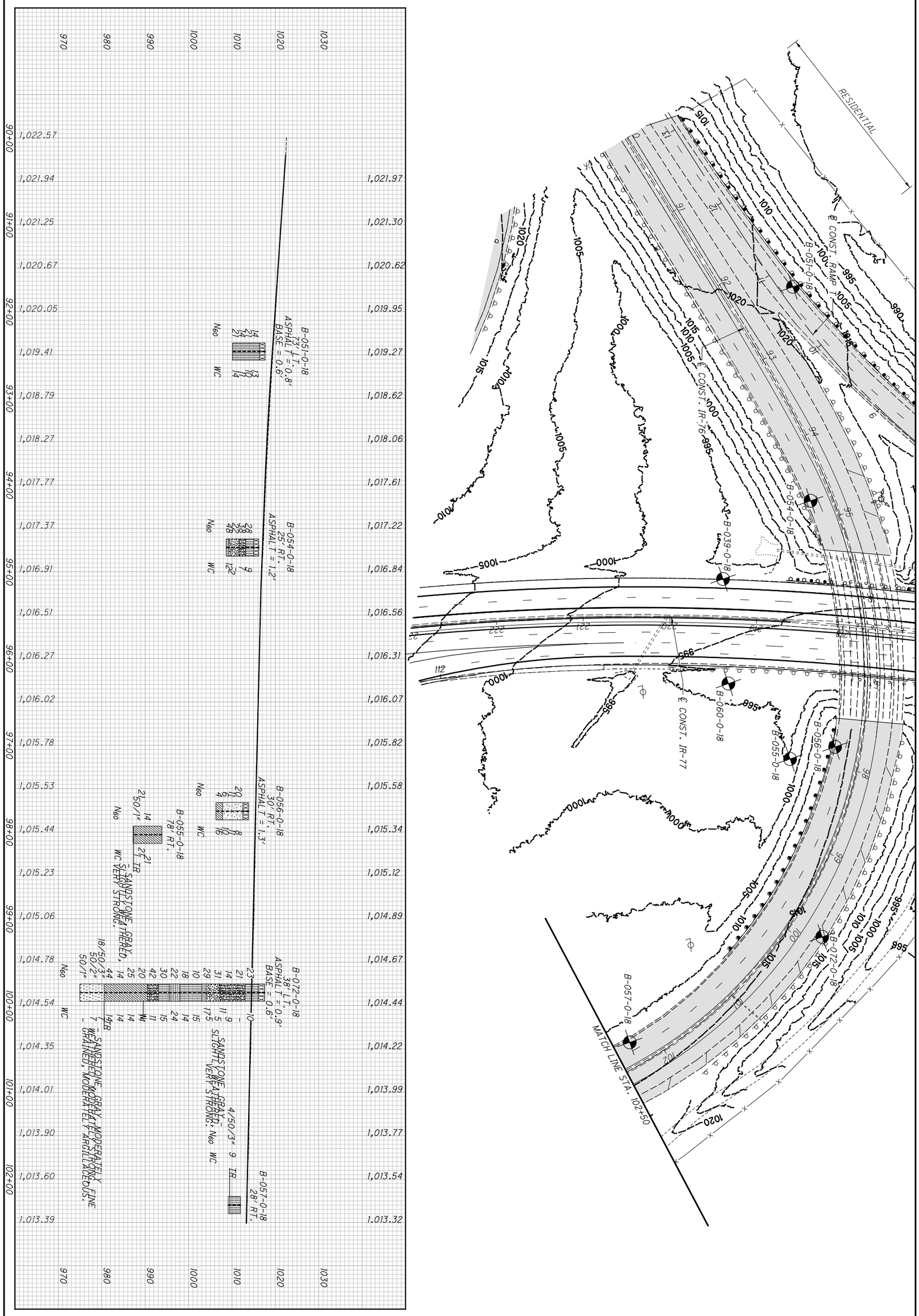
HORIZONTAL SCALE IN FEET: 0 25 50 100

DRAWN KCA | CHECKED BPA

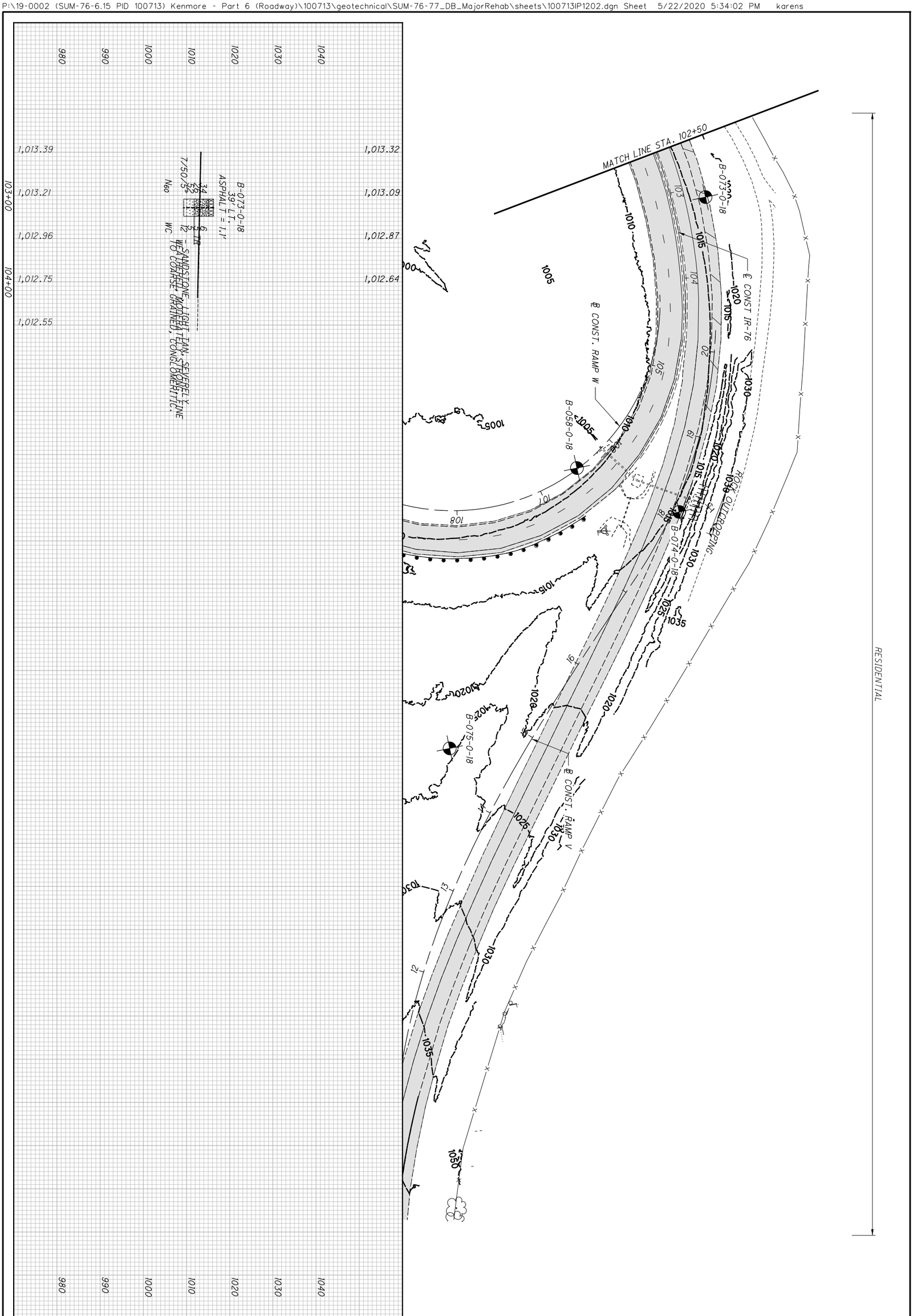
SUM-76-8.42/SUM-77-9.77 / SUM-8-0.00

P:\19-0002 (SUM-76-6.15 PID 100713) Kenmore - Part 6 (Roadway)\100713\geotechnical\SUM-76-77_DB_MajorRehab\sheets\100713IP1105.dgn Sheet 5/22/2020 5:32:12 PM karens

P:\19-0002 (SUM-76-6.15 PID 100713) Kenmore - Part 6 (Roadway)\100713\geotechnical\SUM-76-77_DB_MajorRehab\sheets\100713IP1201.dgn Sheet 5/22/2020 5:33:07 PM karens



	11 / 20	SUM-76-8.42 / SUM-77-9.77 / SUM-8-0.00	SOIL PROFILE STA. 90+00 TO STA. 102+50 I.R. 76	DRAWN KCA CHECKED BPA	0 50 25 100 HORIZONTAL SCALE IN FEET	N



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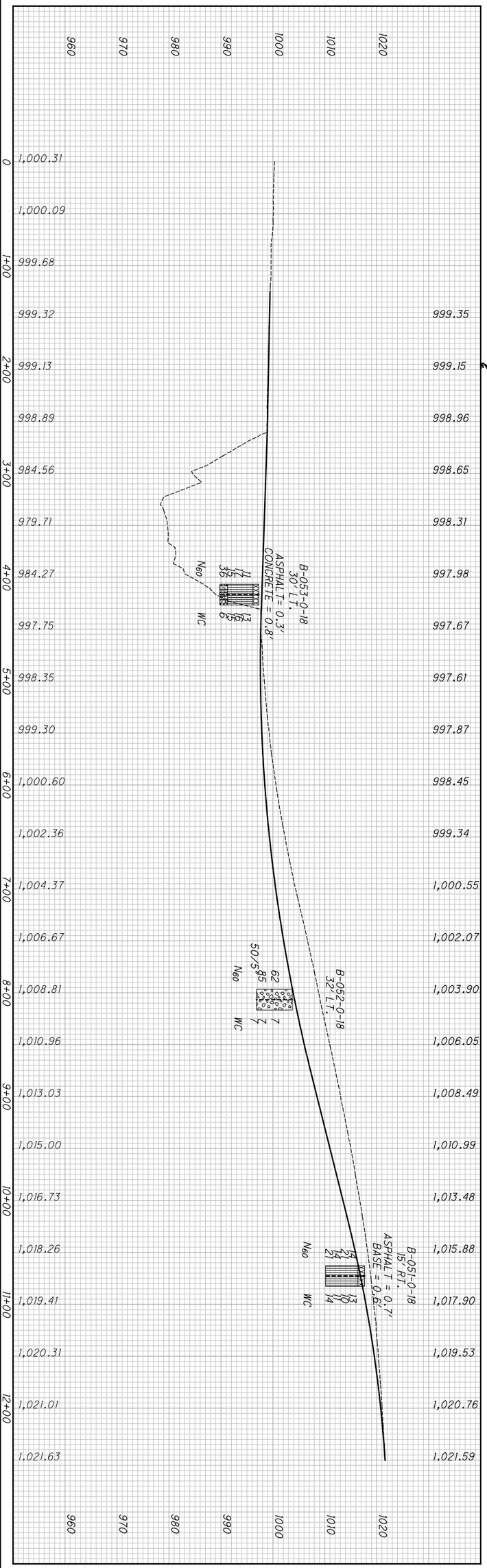
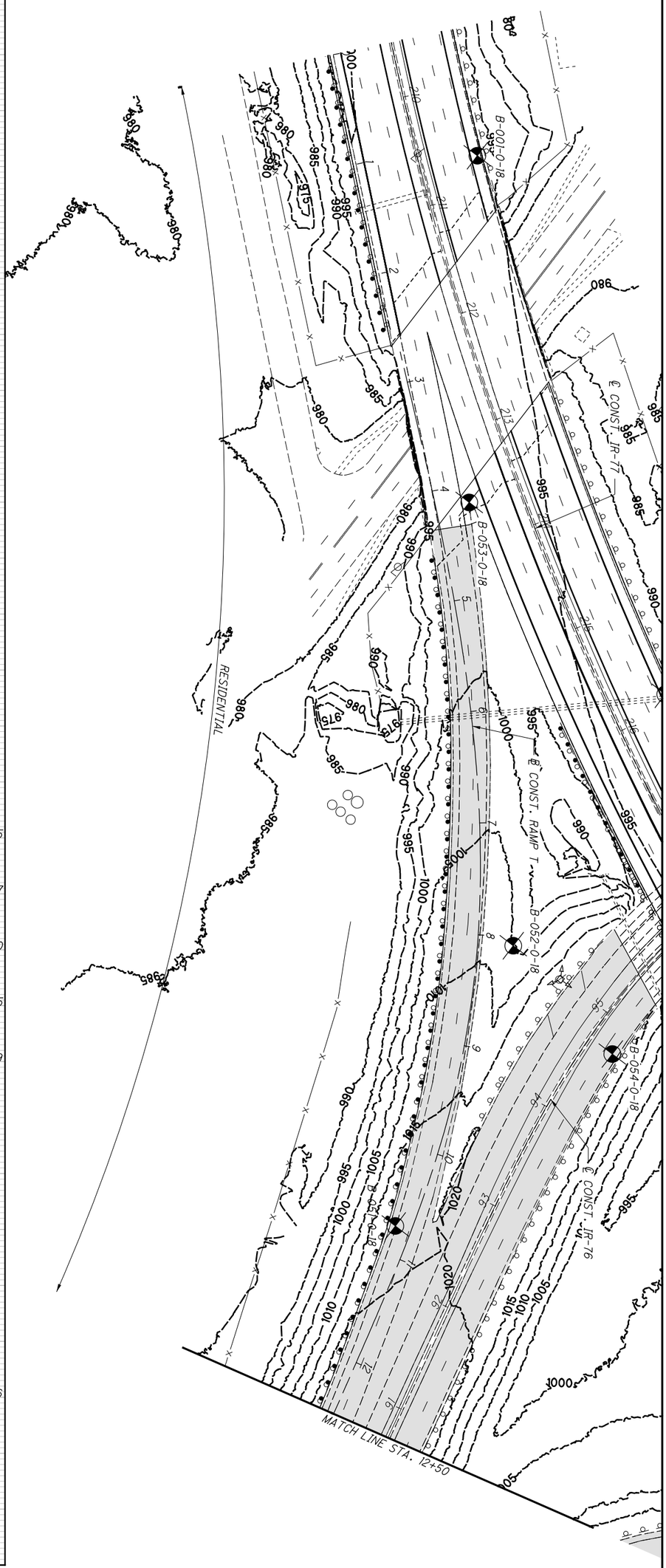
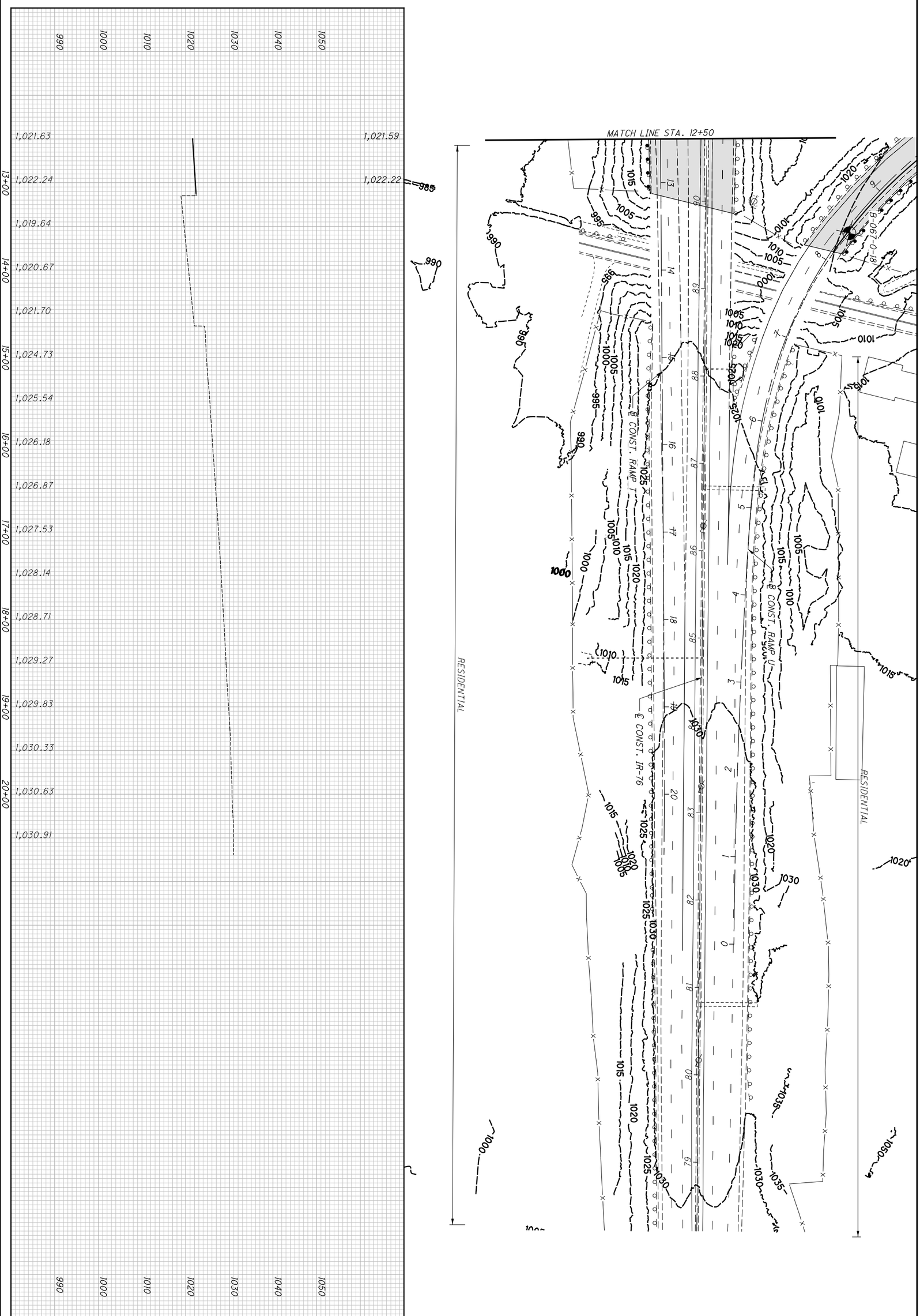




	13/20	SUM-76-8.42/SUM-77-9.77 / SUM-8-0.00	SOIL PROFILE STA. 0+00 TO 12+50 RAMP T	DRAWN KCA	0 50	
				CHECKED BPA	25 100 HORIZONTAL SCALE IN FEET	



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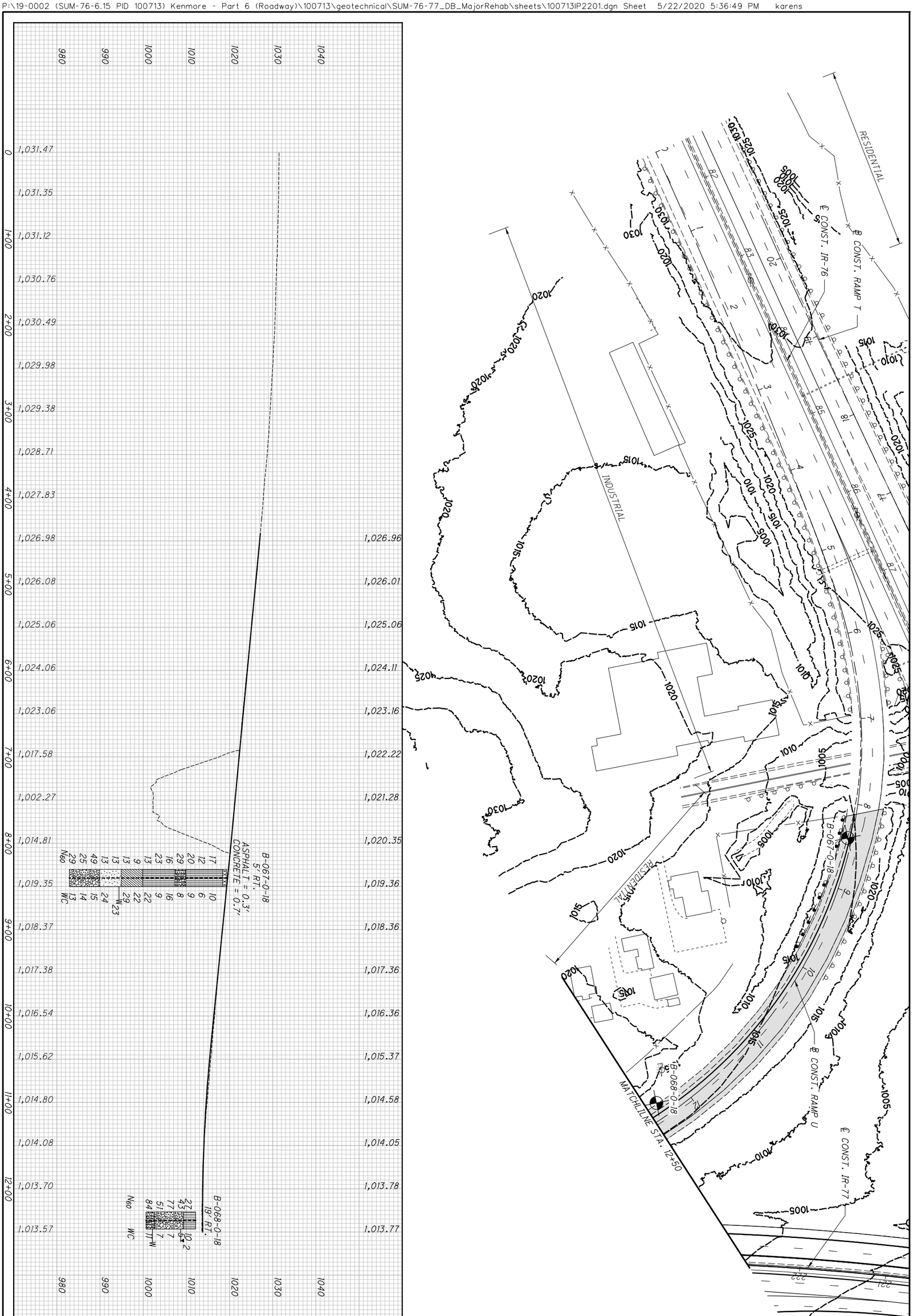
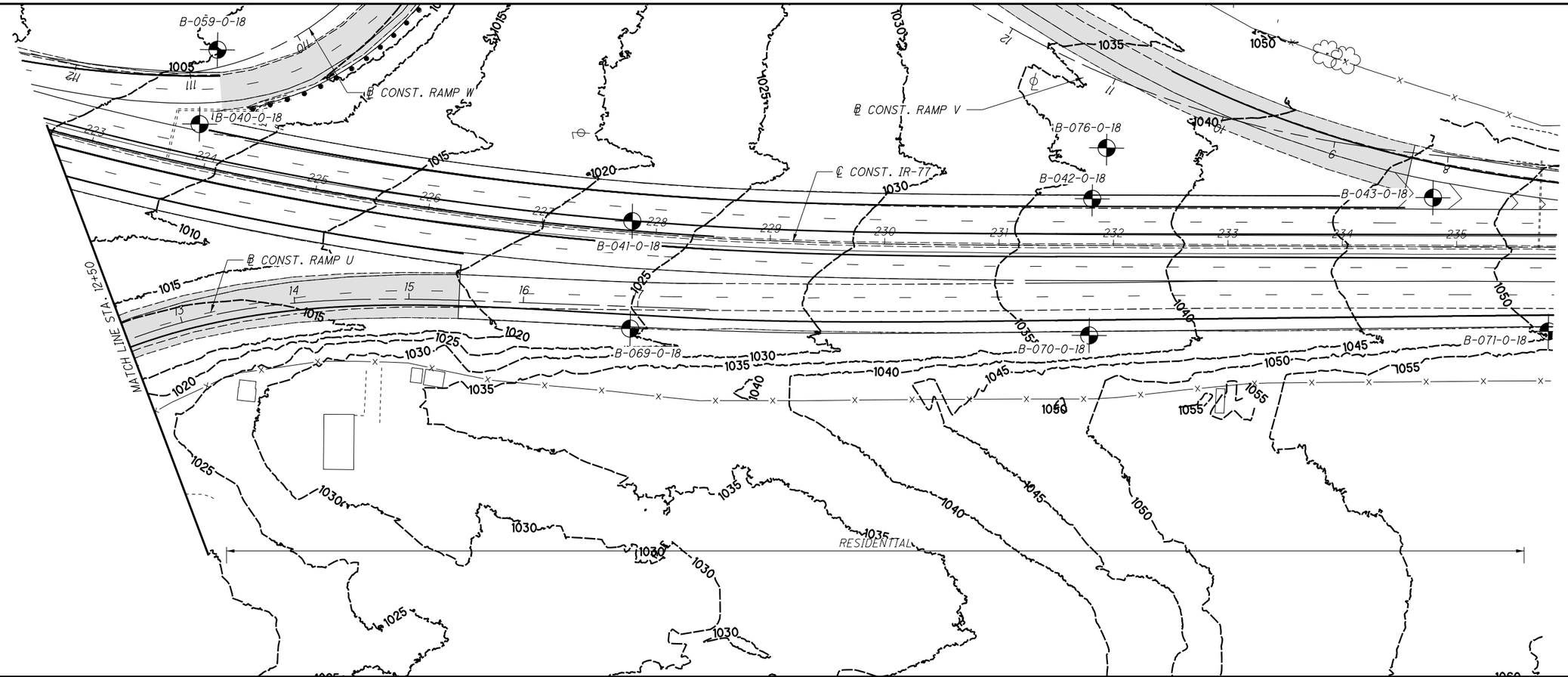
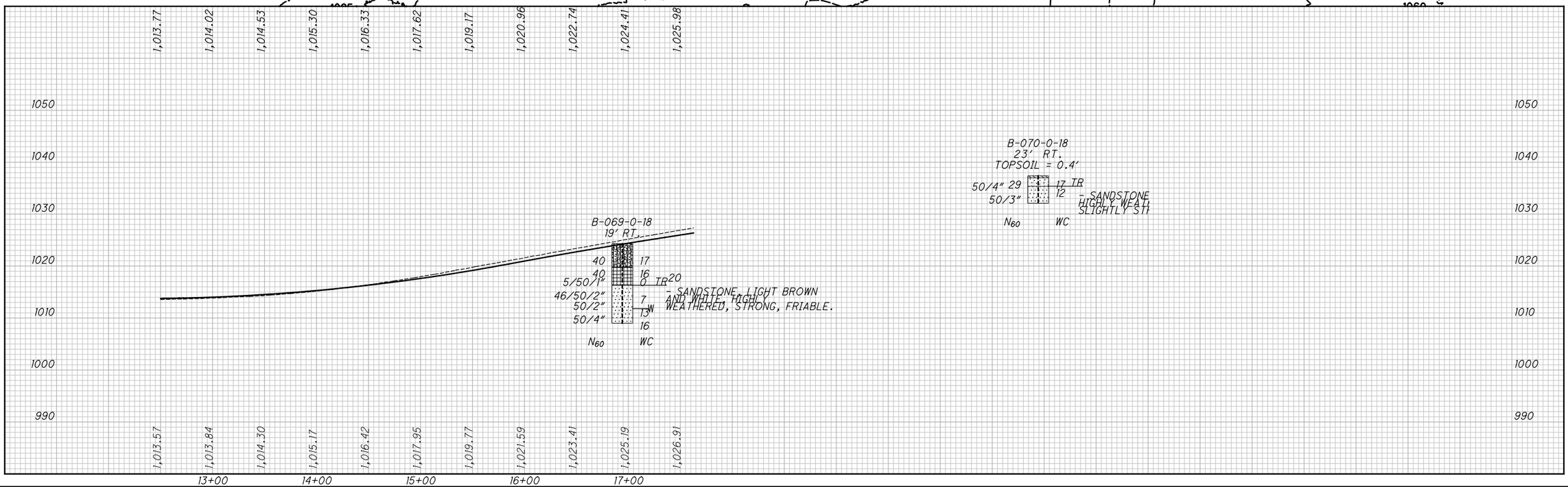


	15 / 20	SUM-76-8.42 / SUM-77-9.77 / SUM-8-0.00	SOIL PROFILE STA. 0+00 TO STA. 12+50 RAMP U	DRAWN KCA CHECKED BPA	0 50 25 100 HORIZONTAL SCALE IN FEET	N





P:\19-0002 (SUM-76-6.15 PID 100713) Kenmore - Part 6 (Roadway)\100713\geotechnical\SUM-76-77_DB_MajorRehab\sheets\100713IP2202.dgn Sheet 5/22/2020 5:37:45 PM karens

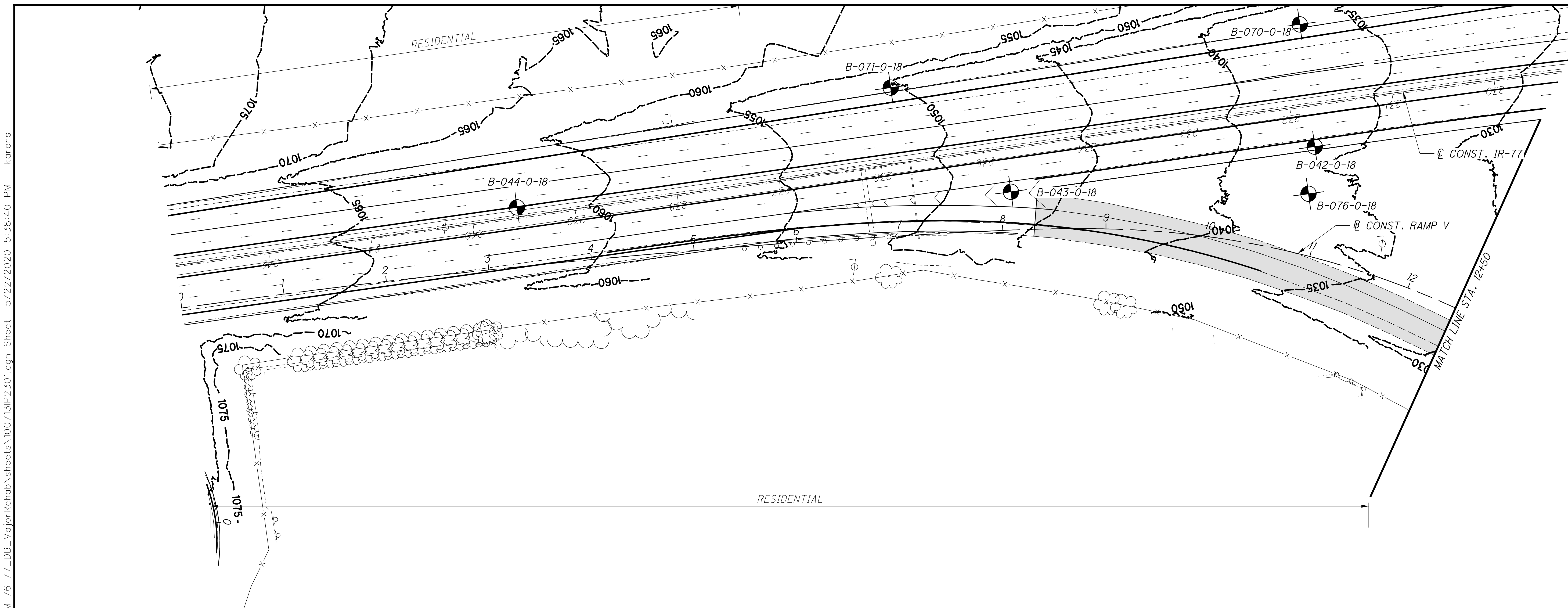
HORIZONTAL SCALE IN FEET
0 25 50 100

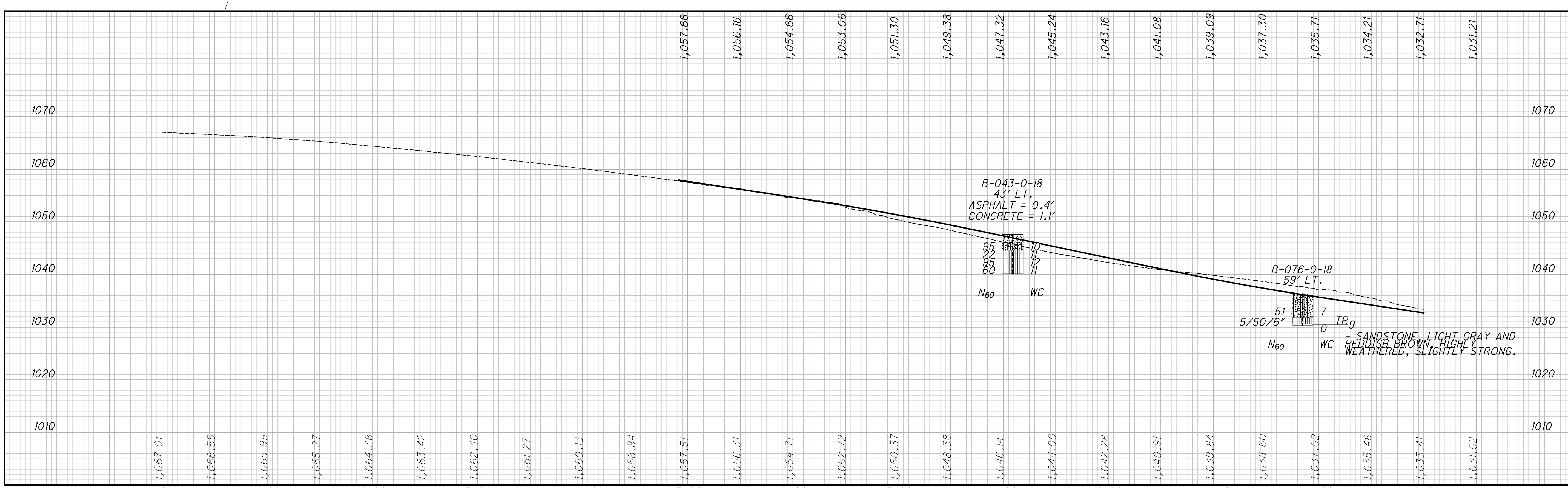
DRAWN KCA
CHECKED BPA

SOIL PROFILE
STA. 12+50 TO 17+63 RAMP U

SUM-76-8.42/SUM-77-9.77
/SUM-8-0.00

16/20





HORIZONTAL SCALE IN FEET

0 25 50 100

DRAWN KCA

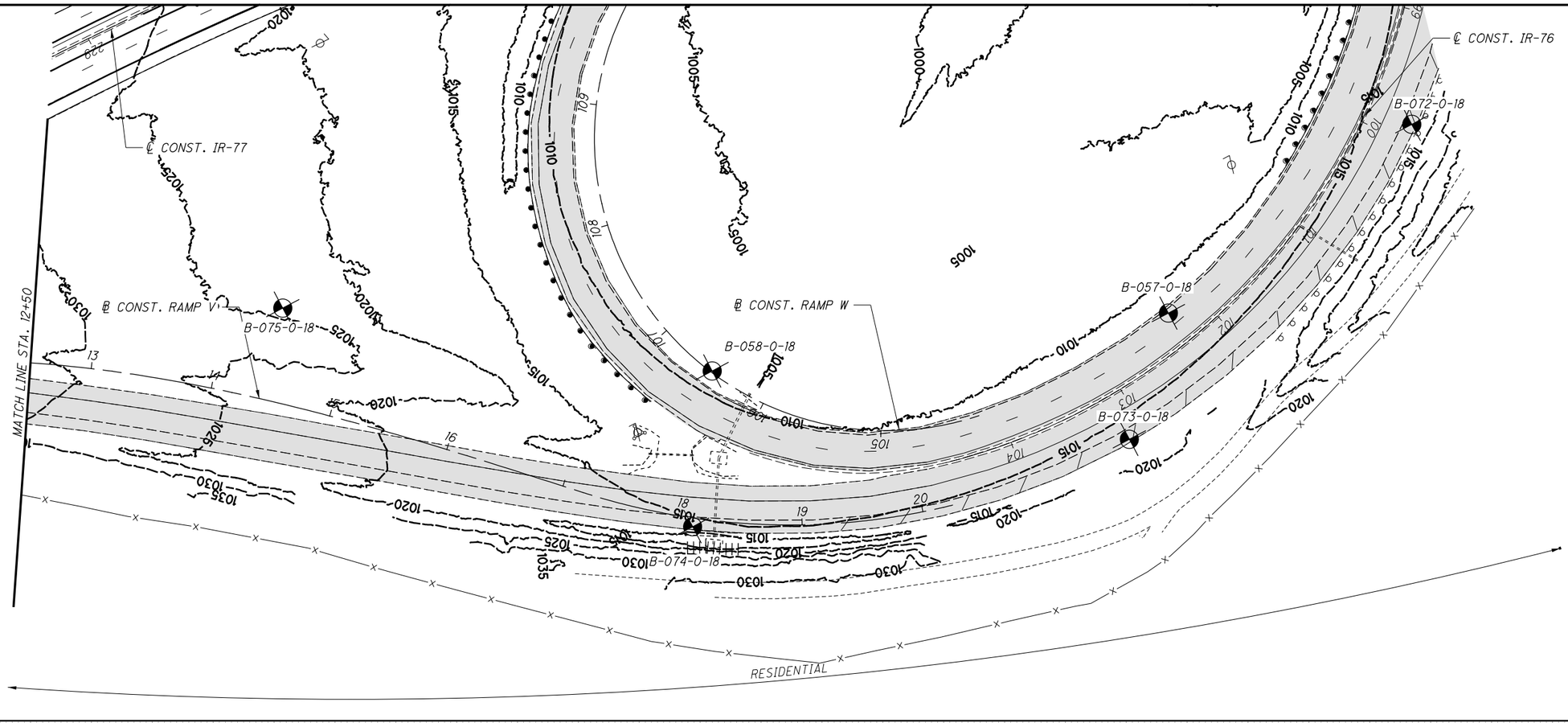
CHECKED BPA

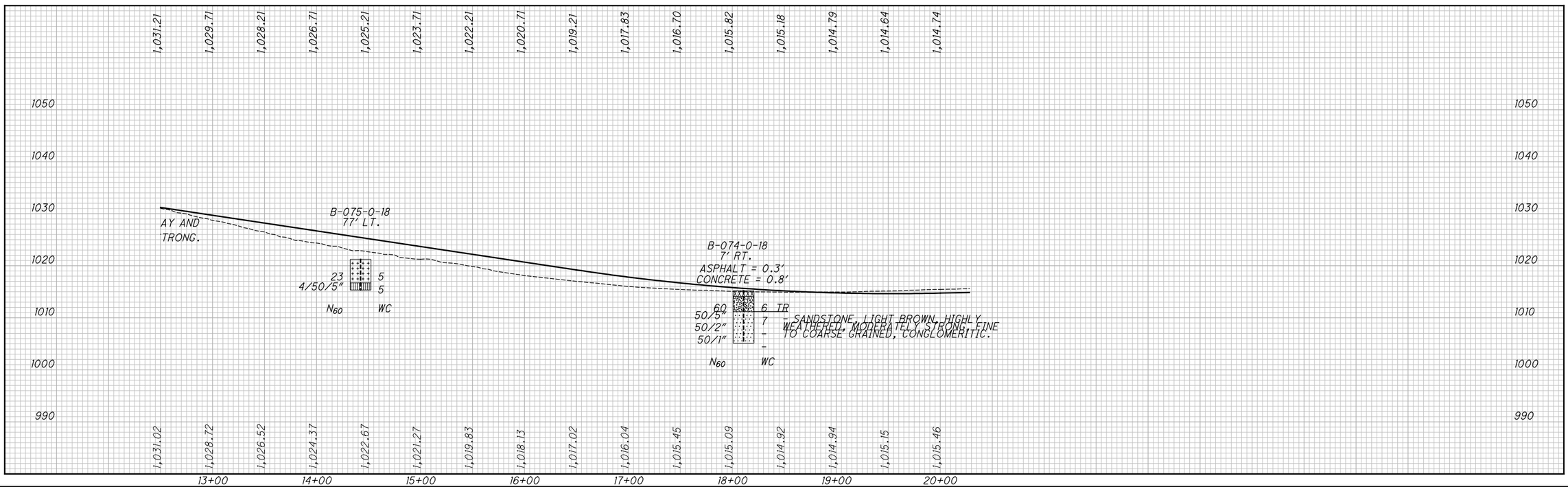
SOIL PROFILE

STA. 0+00 TO STA. 12+50 RAMP V

SUM-76-8.42/SUM-77-9.77 / SUM-8-0.00

P:\19-0002 (SUM-76-6.15 PID 100713) Kenmore - Part 6 (Roadway)\100713\geotechnical\SUM-76-77_DB_MajorRehab\sheets\100713IP2301.dgn Sheet 5/22/2020 5:38:40 PM karens





HORIZONTAL SCALE IN FEET
0 25 50 100

DRAWN KCA
CHECKED BPA

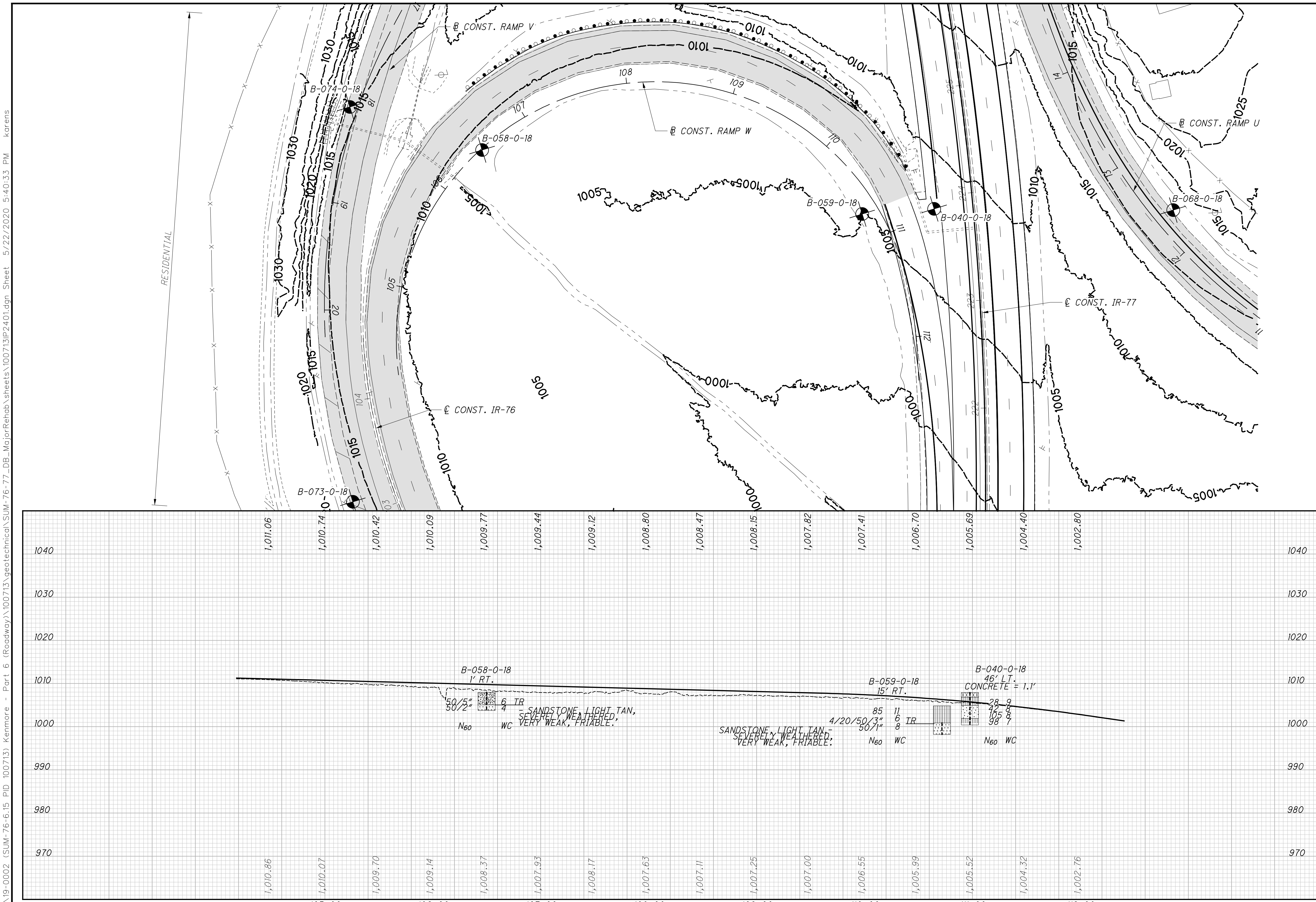
SOIL PROFILE
STA. 12+50 TO STA. 20+28 RAMP V

SUM-76-8.42/SUM-77-9.77
/ SUM-8-0.00

18 / 20

P:\19-0002 (SUM-76-6.15 PID 100713) Kenmore - Part 6 (Roadway)\100713\geotechnical\SUM-76-77_DB_MajorRehab\sheets\100713IP2302.dgn Sheet 5/22/2020 5:47:15 PM karens

P:\19-0002 (SUM-76-6.15 PID 100713) Kenmore - Part 6 (Roadway)\100713\geotechnical\SUM-76-77_DB_MajorRehab\sheets\100713IP2401.dgn Sheet 5/22/2020 5:40:33 PM karens



0 20 40 80
HORIZONTAL SCALE IN FEET

DRAWN KCA
CHECKED BPA

SOIL PROFILE
RAMP W

SUM-76-8.42/SUM-77-9.77/SUM-8-0.00

P:\19-0002 (SUM-76-6.15 PID 100713) Kenmore - Part 6 (Roadway)\100713\geotechnical\SUM-76-77_DB_MajorRehab\sheets\100713IP2801.dgn Sheet 5/22/2020 5:41:16 PM karens

B-077-2-18
℄ CONST. RAMP M
RESIDENTIAL
B-077-3-18
B-077-1-18
B-077-4-18
℄ CONST. RAMP J
℄ CONST. IR-77
B-045-1-18
1090
1085
1080
1075
1070
1065
1060
1055

B-045-1-18
22' LT.
ASPHALT = 0.2'
CONCRETE = 1.1'
BASE = 0.3'
40 50 50
5/50/6"
15/50/2"
N60 WC

B-077-1-18
5' RT.
ASPHALT = 0.2'
21 51 34 44 — 9 7 6 10
N60 WC

B-077-2-18
116' LT.
ASPHALT = 0.2'
CONCRETE = 0.8'
14 18 16 13 — 14 17 16 17
N60 WC

B-077-3-18
4' RT.
ASPHALT = 1.1'
9 10 13 22 — 6 18 19 19
N60 WC

B-077-4-18
8' RT.
ASPHALT = 1.0'
14 21 13 13 — 16 22 22 27
N60 WC

1,110 1,100 1,090 1,080 1,070 1,060 1,050 1,040

1+00 2+00 3+00 4+00 5+00 6+00 7+00 8+00 9+00 10+00 11+00 12+00

HORIZONTAL SCALE IN FEET
0 25 50 100

DRAWN KCA
CHECKED BPA

SOIL PROFILE
BEGIN TO END RAMP J

SUM-76-8.42 / SUM-77-9.77
/ SUM-8-0.00

20 / 20

APPENDIX B

BORING LOGS

PROJECT: SUM-76-06.15
TYPE: SUBGRADE
PID: 100713 SFN:
START: 4/9/19 END: 4/9/19

DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH
SAMPLING FIRM / LOGGER: NEAS / E. ROLLER
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 45B
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 11/21/17
ENERGY RATIO (%): 84

STATION / OFFSET: 210+67, 52' LT.
ALIGNMENT: IR-77 & IR-76
ELEVATION: 995.6 (MSL) EOB: 7.5 ft.
LAT / LONG: 41.061777, -81.570129

EXPLORATION ID B-001-0-18

MATERIAL DESCRIPTION AND NOTES	ELEV. 995.6	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
16" CONCRETE (DRILLERS DESCRIPTION)	994.3																	
MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, SOME GRAVEL, LITTLE SILT, TRACE CLAY, DAMP **(FILL)**	991.1		11 8 9	24	0	SS-1	-	24	21	38	11	6	NP	NP	NP	10	A-3a (0)	
			5 4 4	11	6	SS-2	-	-	-	-	-	-	-	-	-	10	A-3a (V)	
VERY STIFF TO HARD, BROWN MOTTLED WITH GRAY, **SANDY SILT**, SOME CLAY, LITTLE GRAVEL, CONTAINS BRICK FRAGMENTS, DAMP **(FILL)**	988.1	W 991.1	2 4 6	14	56	SS-3	2.25	19	7	13	38	23	28	18	10	15	A-4a (5)	
		EOB	3 6 9	21	50	SS-4	4.25	-	-	-	-	-	-	-	-	17	A-4a (V)	

NOTES: GROUNDWATER ENCOUNTERED AT 4.5' DURING DRILLING. HOLE DID NOT CAVE.

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 45B	STATION / OFFSET: 207+22, 51' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1002.1 (MSL) EOB: 7.5 ft.
START: 4/10/19 END: 4/10/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 84	LAT / LONG: 41.062207, -81.571304

EXPLORATION ID B-002-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 1002.1	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
11.0" CONCRETE (DRILLERS DESCRIPTION)	1001.2																	
MEDIUM STIFF, BROWN MOTTLED ORANGISH BROWN, **SILT AND CLAY**, SOME SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP	999.1	1	3 2 3	7	17	SS-1	0.75	-	-	-	-	-	-	-	-	17	A-6a (V)	
DENSE, LIGHT BROWN MOTTLED WITH ORANGISH BROWN, **GRAVEL WITH SAND AND SILT**, LITTLE CLAY, CONTAINS IRON STAINING, DAMP		2	4 10 14	34	89	SS-2	-	27	9	38	14	12	NP	NP	NP	6	A-2-4 (0)	
		3	7 10 15	35	78	SS-3	-	24	9	36	17	14	19	13	6	8	A-2-4 (0)	
		4	3 11 24	49	89	SS-4	-	-	-	-	-	-	-	-	-	5	A-2-4 (V)	
	994.6	5 EOB																

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 45B	STATION / OFFSET: 204+23, 50' LT.	EXPLORATION ID B-003-0-18
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 999.8 (MSL) EOB: 7.5 ft.	PAGE 1 OF 1
START: 4/10/19 END: 4/10/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 84	LAT / LONG: 41.063006, -81.571741	

MATERIAL DESCRIPTION AND NOTES	ELEV. 999.8	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
14.0" CONCRETE (DRILLERS DESCRIPTION)	998.6																	
MEDIUM DENSE TO DENSE, BROWN AND ORANGISH BROWN, **GRAVEL AND/OR STONE FRAGMENTS WITH SAND AND SILT**, TRACE TO LITTLE CLAY, CONTAINS IRON STAINING, DAMP TO DRY		1	8 8 19	38	100	SS-1	-	30	11	28	18	13	17	13	4	7	A-2-4 (0)	
		2																
		3	5 13 15	39	100	SS-2	-	35	11	31	13	10	NP	NP	NP	5	A-2-4 (0)	
@4.5' TO 7.5'; BECOMES LIGHT BROWN AND ORANGISH BROWN		4																
		5	8 12 12	34	100	SS-3	-	-	-	-	-	-	-	-	-	5	A-2-4 (V)	
		6																
	992.3	7 EOB	12 9 10	27	100	SS-4	-	-	-	-	-	-	-	-	-	4	A-2-4 (V)	

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 45B	STATION / OFFSET: 200+64, 8' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1000.8 (MSL) EOB: 7.5 ft.
START: 4/11/19 END: 4/11/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 84	LAT / LONG: 41.063742, -81.572600

EXPLORATION ID B-004-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 1000.8	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
13.0" CONCRETE (DRILLERS DESCRIPTION)	999.7																	
STIFF, BROWN, **SANDY SILT**, "AND" GRAVEL, LITTLE CLAY, CONTAINS NO INTACT SOIL FOR HP READINGS, DAMP	997.8	1	6 5 6	15	78	SS-1	-	37	8	16	24	15	29	19	10	14	A-4a (1)	
VERY STIFF, BROWN, **SILT AND CLAY**, SOME SAND, TRACE TO LITTLE GRAVEL, CONTAINS NO INTACT SOIL FOR HP READINGS, DAMP		2	12 12 14	36	67	SS-2	-	-	-	-	-	-	-	-	-	16	A-6a (V)	
		3	9 11 13	34	78	SS-3	-	11	7	18	38	26	29	18	11	16	A-6a (6)	
	993.3	4	7 9 10	27	78	SS-4	-	-	-	-	-	-	-	-	-	16	A-6a (V)	
		EOB 5																
		6																
		7																

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15
TYPE: SUBGRADE
PID: 100713 SFN:
START: 4/11/19 END: 4/11/19

DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH
SAMPLING FIRM / LOGGER: NEAS / E. ROLLER
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 45B
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 11/21/17
ENERGY RATIO (%): 84

STATION / OFFSET: 196+37, 7' LT.
ALIGNMENT: IR-77 & IR-76
ELEVATION: 994.7 (MSL) EOB: 7.5 ft.
LAT / LONG: 41.064784, -81.573297

EXPLORATION ID B-005-0-18

MATERIAL DESCRIPTION AND NOTES	ELEV. 994.7	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
13.0" CONCRETE (DRILLERS DESCRIPTION)	993.6																	
MEDIUM DENSE, BROWN, **GRAVEL**, SOME SAND, TRACE SILT, TRACE CLAY, DAMP		1	13 9 10	27	100	SS-1	-	70	11	11	6	2	NP	NP	NP	9	A-1-a (0)	
		2	7 8 10	25	100	SS-2	-	-	-	-	-	-	-	-	-	7	A-1-a (V)	
	988.7	3	8 10 11	29	100	SS-3	-	-	-	-	-	-	-	-	-	7	A-1-a (V)	
VERY STIFF, BROWN, **SANDY SILT**, "AND" GRAVEL, LITTLE CLAY, NO INTACT SOIL FOR HP READINGS, DAMP	987.2	4 5 6 7 EOB	10 10 9	27	100	SS-4	-	42	9	11	24	14	25	18	7	12	A-4a (1)	

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 45B	STATION / OFFSET: 193+62, 13' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 987.9 (MSL) EOB: 7.5 ft.
START: 4/11/19 END: 4/11/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 84	LAT / LONG: 41.065496, -81.573614

EXPLORATION ID B-006-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 987.9	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
14.0" CONCRETE AND 4.0" BASE (DRILLERS DESCRIPTION)	986.4	1																
MEDIUM DENSE, BROWN AND GRAY, **GRAVEL**, SOME SAND, TRACE SILT, TRACE CLAY, DAMP		2	10 7 8	21	100	SS-1	-	62	18	13	5	2	NP	NP	NP	11	A-1-a (0)	
		3	7 9 11	28	100	SS-2	-	-	-	-	-	-	-	-	-	8	A-1-a (V)	
	981.9	4	6 5 6	15	100	SS-3	-	-	-	-	-	-	-	-	-	8	A-1-a (V)	
STIFF, BROWN, **SANDY SILT**, SOME GRAVEL, LITTLE CLAY, CONTAINS NO INTACT SOIL FOR HP READINGS, MOIST	980.4	5	5 8 8	22	100	SS-4	-	22	17	20	21	20	24	17	7	21	A-4a (1)	
		EOB 6																
		7																

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 219+40, 45' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / ASHBAUGH	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 997.5 (MSL) EOB: 7.5 ft.
START: 2/21/19 END: 2/21/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.060352, -81.567580

EXPLORATION ID B-039-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
9.0" CONCRETE (DRILLERS DESCRIPTION)	997.5 996.7																	
VERY STIFF TO HARD, BROWN, **SANDY SILT**, LITTLE TO SOME CLAY, TRACE TO SOME GRAVEL, CONTAINS TRACE IRON STAINING, DAMP		1 2 3 4 5 6 7	4 7 10	22	67	SS-1	4.5+	26	12	25	21	16	23	15	8	9	A-4a (0)	
			5 7 8	20	56	SS-2	4.5+	-	-	-	-	-	-	-	-	11	A-4a (V)	
			4 7 9	21	67	SS-3	4.00	7	12	25	32	24	27	17	10	14	A-4a (4)	
	990.0	EOB	3 4 9	17	89	SS-4	3.50	-	-	-	-	-	-	-	-	13	A-4a (V)	

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15
TYPE: SUBGRADE
PID: 100713 SFN:
START: 4/9/19 END: 4/9/19

DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH
SAMPLING FIRM / LOGGER: NEAS / E. ROLLER
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 45B
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 11/21/17
ENERGY RATIO (%): 84

STATION / OFFSET: 223+88, 37' LT.
ALIGNMENT: IR-77 & IR-76
ELEVATION: 1007.9 (MSL) EOB: 7.5 ft.
LAT / LONG: 41.060208, -81.565940

EXPLORATION ID B-040-0-18

MATERIAL DESCRIPTION AND NOTES	ELEV. 1007.9	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
13.0" CONCRETE (DRILLERS DESCRIPTION)	1006.8	1																
MEDIUM DENSE, LIGHT BROWN AND BROWN, **SANDY SILT**, LITTLE CLAY, TRACE GRAVEL, DAMP	1004.9	2 3	10 9 11	28	6	SS-1	-	-	-	-	-	-	-	-	-	9	A-4a (V)	
DENSE TO VERY DENSE, LIGHT BROWN, **COARSE AND FINE SAND**, LITTLE SILT, LITTLE CLAY, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP	1001.9	4 5	9 14 16	42	100	SS-2	-	5	4	58	19	14	NP	NP	NP	8	A-3a (0)	
			11 31 44	105	100	SS-3	-	-	-	-	-	-	-	-	-	8	A-3a (V)	
VERY DENSE, GRAY, **SANDY SILT**, LITTLE CLAY, TRACE GRAVEL, DAMP	1000.4	6 7 EOB	13 29 41	98	100	SS-4	-	4	4	48	26	18	NP	NP	NP	7	A-4a (2)	

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 45B	STATION / OFFSET: 227+78, 10' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1022.7 (MSL) EOB: 6.1 ft.
START: 4/11/19 END: 4/11/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 84	LAT / LONG: 41.059975, -81.564569

EXPLORATION ID B-041-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
	1022.7																	
14.0" ASPHALT AND 4.0" BASE (DRILLERS DESCRIPTION)	1021.2	1																
MEDIUM DENSE, BROWN AND GRAY, **STONE FRAGMENTS WITH SAND**, TRACE SILT, TRACE CLAY, DAMP	1019.7	2	8 10 11	29	22	SS-1	-	-	-	-	-	-	-	-	-	5	A-1-b (V)	
SANDSTONE, BROWN AND GRAY, HIGHLY WEATHERED, STRONG, FRIABLE.		TR 3	50/1"	-	100	SS-2	-	-	-	-	-	-	-	-	-	-	Rock (V)	
		4	50/1"	-	100	SS-3	-	-	-	-	-	-	-	-	-	-	Rock (V)	
@6.0' TO 6.1'; SS-4 NO RECOVERY	1016.6	EOB 5 6	50/1"	-	0	SS-4	-	-	-	-	-	-	-	-	-	-	Rock (V)	

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15
TYPE: SUBGRADE
PID: 100713 SFN:
START: 4/9/19 END: 4/9/19

DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH
SAMPLING FIRM / LOGGER: NEAS / E. ROLLER
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 45B
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 11/21/17
ENERGY RATIO (%): 84

STATION / OFFSET: 231+81, 41' LT.
ALIGNMENT: IR-77 & IR-76
ELEVATION: 1036.4 (MSL) EOB: 6.5 ft.
LAT / LONG: 41.060028, -81.563111

EXPLORATION ID B-042-0-18

MATERIAL DESCRIPTION AND NOTES	ELEV. 1036.4	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
5.0" ASPHALT AND 13.0" BASE (DRILLERS DESCRIPTION)	1034.9	1																
HARD, BROWN MOTTLED WITH GRAY, **SANDY SILT**, SOME GRAVEL AND STONE FRAGMENTS, LITTLE CLAY, DAMP	1033.4	2	25 30 31	85	89	SS-1	4.5+	28	18	15	23	16	23	16	7	9	A-4a (1)	
VERY DENSE, LIGHT TAN, **STONE FRAGMENTS WITH SAND**, TRACE SILT, TRACE CLAY, DAMP	1031.9	3 4	5 44 19	88	33	SS-2	-	-	-	-	-	-	-	-	-	4	A-1-b (V)	
HARD, GRAY, **SANDY SILT**, SOME CLAY, LITTLE GRAVEL AND STONE FRAGMENTS, DAMP	1029.9	5	20 18 19	52	100	SS-3	4.5+	13	9	17	36	25	23	15	8	10	A-4a (5)	
	EOB	6	50	-	100	SS-4	4.5+	-	-	-	-	-	-	-	-	7	A-4a (V)	

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15
TYPE: SUBGRADE
PID: 100713 SFN:
START: 4/9/19 END: 4/9/19

DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH
SAMPLING FIRM / LOGGER: NEAS / E. ROLLER
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 45B
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 11/21/17
ENERGY RATIO (%): 84

STATION / OFFSET: 234+79, 43' LT.
ALIGNMENT: IR-77 & IR-76
ELEVATION: 1047.6 (MSL) EOB: 7.5 ft.
LAT / LONG: 41.060030, -81.562031

EXPLORATION ID B-043-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 1047.6	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
5.0" ASPHALT AND 13.0" CONCRETE (DRILLERS DESCRIPTION)	1046.1	1																
VERY DENSE, BROWN, **GRAVEL WITH SAND AND SILT**, LITTLE CLAY, CONTAINS TRACE IRON STAINING, DAMP	1044.6	2	31 31 37	95	67	SS-1	-	40	16	15	17	12	23	17	6	10	A-2-4 (0)	
HARD, BROWN MOTTLED WITH ORANGISH BROWN BECOMING GRAY, **SANDY SILT**, SOME CLAY, LITTLE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP		3	2 2 14	22	100	SS-2	4.5+	14	14	19	31	22	25	18	7	11	A-4a (4)	
		4																
		5	18 29 39	95	100	SS-3	4.5+	-	-	-	-	-	-	-	-	12	A-4a (V)	
		6																
	1040.1	7	13 20 23	60	100	SS-4	4.5+	-	-	-	-	-	-	-	-	11	A-4a (V)	
		EOB																

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 45B	STATION / OFFSET: 239+55, 9' RT.	EXPLORATION ID B-044-0-18
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1061.9 (MSL) EOB: 7.5 ft.	PAGE 1 OF 1
START: 4/11/19 END: 4/11/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 84	LAT / LONG: 41.059881, -81.560305	

MATERIAL DESCRIPTION AND NOTES	ELEV. 1061.9	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
13.0" ASPHALT (DRILLERS DESCRIPTION)	1060.8																	
HARD, BROWN AND GRAY, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, SS-3 AND SS-4 CONTAIN IRON STAINING, DAMP		1																
		2	3 4 5	13	56	SS-1	4.5+	-	-	-	-	-	-	-	-	14	A-6a (V)	
		3	5 8 9	24	89	SS-2	4.50	5	7	5	43	40	35	21	14	16	A-6a (10)	
		4	2 5 10	21	56	SS-3	4.5+	7	7	6	45	35	34	23	11	10	A-6a (8)	
		5	5 9 12	29	78	SS-4	4.5+	-	-	-	-	-	-	-	-	16	A-6a (V)	
	1054.4	6 EOB																
		7																

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 243+80, 66' RT.	EXPLORATION ID B-045-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1066.9 (MSL) EOB: 11.5 ft.	PAGE 1 OF 1
START: 4/8/19 END: 4/8/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.059721, -81.558768	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
10.0" ASPHALT AND 14.0" BASE (DRILLERS DESCRIPTION)	1066.9																	
	1064.9																	
STIFF, BROWN, **SILT AND CLAY**, TRACE SAND, TRACE GRAVEL, DAMP, **(DRILLERS DESCRIPTION)**	1064.4	TR																
SHALE, GRAY, HIGHLY WEATHERED, VERY WEAK TO WEAK, FISSILE.		3	23 50/5"	-	82	SS-1	-	-	-	-	-	-	-	-	-	-	Rock (V)	
		5	23 50/3"	-	100	SS-2	-	-	-	-	-	-	-	-	-	-	Rock (V)	
		8	21 22 27	64	100	SS-3	-	-	-	-	-	-	-	-	-	-	Rock (V)	
		11	7 10 36	60	100	SS-4	-	-	-	-	-	-	-	-	-	-	Rock (V)	
	1055.4	EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE CAVED AT 7.0'.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 244+88, 54' LT.	EXPLORATION ID B-045-1-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1067.1 (MSL) EOB: 6.7 ft.	PAGE 1 OF 1
START: 4/17/19 END: 4/17/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.060049, -81.558373	

MATERIAL DESCRIPTION AND NOTES	ELEV. 1067.1	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
2.0" ASPHALT AND 13.0" CONCRETE AND 3.0" BASE (DRILLERS DESCRIPTION)	1065.6	TR																
SHALE, DARK GRAY, SEVERELY WEATHERED, VERY WEAK TO WEAK, SILTY, FISSILE.		1																
		2	2 10 21	40	100	SS-1	-	-	-	-	-	-	-	-	-	-	Rock (V)	
		3																
		4	5 22 24	60	89	SS-2	-	-	-	-	-	-	-	-	-	-	Rock (V)	
		5	5 50	-	100	SS-3	-	-	-	-	-	-	-	-	-	-	Rock (V)	
	1060.4	6 EOB	15 50/2"	-	100	SS-4	-	-	-	-	-	-	-	-	-	-	Rock (V)	

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

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

PROJECT: SUM-76-06.15
TYPE: SUBGRADE
PID: 100713 SFN:
START: 4/10/19 END: 4/10/19

DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH
SAMPLING FIRM / LOGGER: NEAS / E. ROLLER
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 45B
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 11/21/17
ENERGY RATIO (%): 84

STATION / OFFSET: 10+73, 15' RT.
ALIGNMENT: RAMP T
ELEVATION: 1017.6 (MSL) EOB: 7.5 ft.
LAT / LONG: 41.059555, -81.568264

EXPLORATION ID B-051-0-18

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
8.0" ASPHALT AND 7.0" BASE (DRILLERS DESCRIPTION)	1017.6																	
	1016.3	1																
MEDIUM STIFF TO HARD, BROWN MOTTLED WITH GRAY AND TRACE ORANGISH BROWN, **SANDY SILT**, LITTLE TO SOME CLAY, TRACE TO LITTLE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP		2	5 5 5	14	89	SS-1	4.5+	18	11	12	36	23	26	18	8	13	A-4a (5)	
		3	5 8 7	21	78	SS-2	4.5+	8	13	29	30	20	21	14	7	10	A-4a (3)	
		4																
		5	3 5 5	14	89	SS-3	3.75	-	-	-	-	-	-	-	-	11	A-4a (V)	
		6																
	1010.1	7	2 5 10	21	89	SS-4	1.00	-	-	-	-	-	-	-	-	14	A-4a (V)	
		EOB																

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15
TYPE: ROADWAY
PID: 100713 SFN:
START: 3/25/19 END: 3/25/19

DRILLING FIRM / OPERATOR: NEAS / J. HODGES
SAMPLING FIRM / LOGGER: NEAS / E. ROLLER
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 55X
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 11/21/17
ENERGY RATIO (%): 85

STATION / OFFSET: 8+07, 32' LT.
ALIGNMENT: RAMP T
ELEVATION: 1003.7 (MSL) EOB: 6.9 ft.
LAT / LONG: 41.060278, -81.568502

EXPLORATION ID B-052-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 1003.7	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
VERY DENSE, BROWN AND GRAY, **GRAVEL AND STONE FRAGMENTS**, SOME SAND, TRACE SILT, TRACE CLAY, CONTAINS CONCRETE FRAGMENTS, DAMP **(FILL)**		1																
		2																
		3	7 24 20	62	100	SS-1	-	-	-	-	-	-	-	-	-	7	A-1-a (V)	
		4																
		5	4 37 23	85	56	SS-2	-	57	20	13	7	3	NP	NP	NP	7	A-1-a (0)	
@6.5' TO 6.9'; SS-3 STONE FRAGMENTS ARE CONCRETE	996.8	6 EOB	50/5"	-	100	SS-3	-	-	-	-	-	-	-	-	-	7	A-1-a (V)	

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15
TYPE: SUBGRADE
PID: 100713 SFN:
START: 4/10/19 END: 4/10/19

DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH
SAMPLING FIRM / LOGGER: NEAS / E. ROLLER
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 45B
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 11/21/17
ENERGY RATIO (%): 84

STATION / OFFSET: 4+17, 30' LT.
ALIGNMENT: RAMP T
ELEVATION: 997.3 (MSL) EOB: 7.5 ft.
LAT / LONG: 41.061084, -81.569477

EXPLORATION ID B-053-0-18

MATERIAL DESCRIPTION AND NOTES	ELEV. 997.3	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
3" ASPHALT AND 10" CONCRETE (DRILLERS DESCRIPTION)	996.2																	
HARD, LIGHT BROWN BECOMING GRAYISH BROWN, **SANDY SILT**, SOME CLAY, LITTLE GRAVEL, DAMP		1	1 4 4	11	78	SS-1	4.5+	12	7	16	41	24	23	17	6	13	A-4a (6)	
		2	4 6 6	17	89	SS-2	4.5+	-	-	-	-	-	-	-	-	16	A-4a (V)	
	991.3	3	4 4 7	15	78	SS-3	4.5+	11	5	9	43	32	28	19	9	15	A-4a (8)	
DENSE, LIGHT TAN AND BROWN, **GRAVEL AND/OR STONE FRAGMENTS WITH SAND AND SILT**, TRACE CLAY, DAMP	989.8	4 5 6 7 EOB	4 15 11	36	78	SS-4	-	-	-	-	-	-	-	-	-	6	A-2-4 (V)	

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 45B	STATION / OFFSET: 94+72, 25' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR - 76
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1016.2 (MSL) EOB: 7.5 ft.
START: 4/10/19 END: 4/10/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 84	LAT / LONG: 41.060211, -81.568035

EXPLORATION ID B-054-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
14.0" ASPHALT (DRILLERS DESCRIPTION)	1016.2 1015.0	1																
HARD, BROWN MOTTLED WITH GRAY AND ORANGISH BROWN, **SANDY SILT**, SOME GRAVEL, LITTLE CLAY, CONTAINS IRON STAINING, DAMP	1013.2	2	24 10 10	28	89	SS-1	4.5+	32	11	11	29	17	25	18	7	9	A-4a (2)	
DENSE, LIGHT BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, LITTLE CLAY, DAMP	1011.7	3 4	12 13 14	38	78	SS-2	-	39	18	12	19	12	23	17	6	7	A-2-4 (0)	
MEDIUM DENSE, LIGHT BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND**, TRACE SILT, TRACE CLAY, DAMP		5	5 7 9	22	0	SS-3	-	-	-	-	-	-	-	-	-	-		
@4.5' TO 6.0'; SS-3 NO RECOVERY	1009.3	6	5 16 18	48	78	SS-4A	-	-	-	-	-	-	-	-	-	2	A-1-b (V)	
HARD, BROWN AND GRAY, **SANDY SILT**, SOME CLAY, LITTLE GRAVEL AND STONE FRAGMENTS, CONTAINS TRACE WOOD FRAGMENTS AND IRON STAINING, DAMP	1008.7	7 EOB				SS-4B	4.5+	-	-	-	-	-	-	-	-	12	A-4a (V)	

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 98+03, 78' RT.	EXPLORATION ID B-055-0-18
TYPE: EMBANKMENT	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR - 76	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 993.8 (MSL) EOB: 6.6 ft.	PAGE 1 OF 1
START: 3/22/19 END: 3/22/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.060960, -81.567593	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
MEDIUM STIFF TO VERY STIFF, BROWN, **SILT AND CLAY**, LITTLE SAND, LITTLE GRAVEL, CONTAINS IRON STAINING, MOIST	993.8	1																
		2																
		3	5 5 5	14	78	SS-1	1.00	15	5	12	42	26	32	20	12	21	A-6a (7)	
		4																
		5																
	987.3	6	3 6 9	21	100	SS-2	3.50	-	-	-	-	-	-	-	-	21	A-6a (V)	
SANDSTONE, GRAY, SLIGHTLY WEATHERED, VERY STRONG.	987.2	TR3	50/1"	-	100	SS-3	-	-	-	-	-	-	-	-	-	1	Rock (V)	

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15
TYPE: SUBGRADE
PID: 100713 SFN:
START: 4/10/19 END: 4/10/19

DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH
SAMPLING FIRM / LOGGER: NEAS / E. ROLLER
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 45B
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 11/21/17
ENERGY RATIO (%): 84

STATION / OFFSET: 97+76, 30' RT.
ALIGNMENT: IR - 76
ELEVATION: 1013.8 (MSL) EOB: 7.5 ft.
LAT / LONG: 41.060971, -81.567787

EXPLORATION ID B-056-0-18

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
15.5" ASPHALT (DRILLERS DESCRIPTION)	1013.8																	
	1012.5	1																
LOOSE TO MEDIUM DENSE, BROWN MOTTLED WITH ORANGISH BROWN AND GRAY, **COARSE AND FINE SAND**, LITTLE SILT, LITTLE GRAVEL, LITTLE CLAY, CONTAINS IRON STAINING, DAMP		2	15 9 5	20	33	SS-1	-	-	-	-	-	-	-	-	-	8	A-3a (V)	
		3																
		4	4 4 4	11	56	SS-2	-	12	17	39	18	14	17	12	5	11	A-3a (0)	
	1007.8	5	1 1 3	6	78	SS-3	-	16	15	38	17	14	18	12	6	10	A-3a (0)	
STIFF, BROWN MOTTLED WITH ORANGISH BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP	1006.3	6	1 1 2	4	78	SS-4	1.75	-	-	-	-	-	-	-	-	16	A-6a (V)	
	EOB	7																

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 102+30, 28' RT.	EXPLORATION ID B-057-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR - 76	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1011.9 (MSL) EOB: 2.8 ft.	PAGE 1 OF 1
START: 3/22/19 END: 3/22/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.061635, -81.566566	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
	1011.9																	
VERY DENSE, DARK BROWN, **COARSE AND FINE SAND**, SOME STONE FRAGMENTS, LITTLE SILT, TRACE CLAY, CONTAINS ROOTS AND TRACE IRON STAINING, DAMP	1009.4	1 2	4 50/3"	-	44	SS-1A	3.75	22	19	38	13	8	NP	NP	NP	9	A-3a (0)	
SANDSTONE, GRAY, SLIGHTLY WEATHERED, MODERATELY STRONG.	1009.1	TR. EOB				SS-1B	-	-	-	-	-	-	-	-	-	-	Rock (V)	

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 106+50, 1' RT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP W
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1008.0 (MSL) EOB: 4.2 ft.
START: 3/21/19 END: 3/21/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.061258, -81.565290

EXPLORATION ID B-058-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
VERY DENSE, BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND**, TRACE SILT, TRACE CLAY, STONE FRAGMENTS ARE SANDSTONE, DAMP	1008.0																	
	1005.1	TR	50/5"	-	100	SS-1	-	39	17	31	9	4	NP	NP	NP	6	A-1-b (0)	
SANDSTONE, LIGHT TAN, SEVERELY WEATHERED, VERY WEAK, FRIABLE.	1003.8	EOB	50/2"	-	50	SS-2	-	-	-	-	-	-	-	-	-	4	Rock (V)	

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 110+72, 15' RT.	EXPLORATION ID B-059-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP W	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1004.8 (MSL) EOB: 6.6 ft.	PAGE 1 OF 1
START: 3/21/19 END: 3/21/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.060386, -81.565883	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
	1004.8																	
VERY DENSE, BROWN, **SANDY SILT**, LITTLE CLAY, TRACE STONE FRAGMENTS, DAMP		1																
		2																
		3	3 10 50	85	100	SS-1	-	0	1	62	23	14	NP	NP	NP	11	A-4a (0)	
	1000.8	TR 4																
SANDSTONE, LIGHT GRAY, SEVERELY WEATHERED, WEAK TO MODERATELY STRONG, FRIABLE, CONTAINS SILT AND CLAY LENSES.		5																
		6	4 20 50/3"	-	93	SS-2	-	-	-	-	-	-	-	-	-	6	Rock (V)	
	998.2	EOB	50/1"	-	100	SS-3	-	-	-	-	-	-	-	-	-	8	Rock (V)	

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 219+30, 76' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 992.3 (MSL) EOB: 11.5 ft.
START: 3/22/19 END: 3/22/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.060669, -81.567456

EXPLORATION ID B-060-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 992.3	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
VERY STIFF, BROWN, **GRAVEL WITH SAND AND SILT**, LITTLE CLAY, CONTAINS IRON STAINING, DAMP		1																
		2																
		3	3 11 10	30	100	SS-1	2.50	32	11	27	18	12	23	17	6	11	A-2-4 (0)	
	987.8	4																
VERY STIFF TO HARD, GRAY, **SANDY SILT**, LITTLE CLAY, TRACE TO LITTLE GRAVEL, CONTAINS IRON STAINING, DAMP		5	3 6 6	17	100	SS-2	2.50	-	-	-	-	-	-	-	-	11	A-4a (V)	
		6																
		7																
		8	3 3 6	13	78	SS-3	2.50	15	12	25	29	19	22	15	7	12	A-4a (3)	
		9																
		10																
	980.8	11	5 8 10	26	100	SS-4	4.5+	-	-	-	-	-	-	-	-	9	A-4a (V)	
		EOB																

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15
TYPE: SUBGRADE
PID: 100713 SFN:
START: 4/9/19 END: 4/9/19

DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH
SAMPLING FIRM / LOGGER: NEAS / E. ROLLER
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 45B
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 11/21/17
ENERGY RATIO (%): 84

STATION / OFFSET: 215+87, 54' LT.
ALIGNMENT: IR-77 & IR-76
ELEVATION: 992.3 (MSL) EOB: 7.5 ft.
LAT / LONG: 41.060996, -81.568596

EXPLORATION ID B-061-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 992.3	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
14.0" CONCRETE (DRILLERS DESCRIPTION)	991.1	1																
DENSE, LIGHT TAN AND DARK GRAY, **GRAVEL AND/OR STONE FRAGMENTS WITH SAND AND SILT**, LITTLE CLAY, DAMP	989.3	2	18 25 10	49	100	SS-1	-	27	12	33	16	12	NP	NP	NP	6	A-2-4 (0)	
HARD, BROWN AND LIGHT BROWN MOTTLED WITH GRAY, **SANDY SILT**, LITTLE CLAY, LITTLE GRAVEL, DAMP		3	8 11 12	32	100	SS-2	4.5+	12	14	37	22	15	21	15	6	8	A-4a (0)	
		4																
		5	5 12 13	35	100	SS-3	4.5+	-	-	-	-	-	-	-	-	9	A-4a (V)	
		6																
	984.8	7 EOB	8 7 8	21	100	SS-4	4.5+	-	-	-	-	-	-	-	-	13	A-4a (V)	

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 8+40, 5' RT.
TYPE: NOISE WALL	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP U
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1019.4 (MSL) EOB: 36.5 ft.
START: 2/19/19 END: 2/19/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.058936, -81.567209

EXPLORATION ID B-067-0-18

PAGE 1 OF 2

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
4.0" ASPHALT OVER 8.0" CONCRETE (DRILLERS DESCRIPTION)	1019.4																	
VERY STIFF, BROWN, **SANDY SILT**, LITTLE CLAY, LITTLE GRAVEL, SS-2 CONTAINS NO INTACT SOIL FOR HP READINGS, SS-3 CONTAINS IRON STAINING, DAMP	1018.4		7 4 9	17	67	SS-1	3.25	15	10	29	28	18	20	13	7	10	A-4a (2)	
			4 4 5	12	22	SS-2	-	-	-	-	-	-	-	-	-	6	A-4a (V)	
			5 5 10	20	100	SS-3	3.00	-	-	-	-	-	-	-	-	9	A-4a (V)	
MEDIUM DENSE, BROWN AND GRAY, **GRAVEL WITH SAND AND SILT**, LITTLE CLAY, CONTAINS IRON STAINING, DAMP	1009.9		3 9 13	29	78	SS-4	-	19	16	33	19	13	18	13	5	8	A-2-4 (0)	
HARD, BROWN MOTTLED WITH GRAY AND ORANGISH BROWN, **SANDY SILT**, SOME GRAVEL, LITTLE CLAY, CONTAINS IRON STAINING, MOIST TO DAMP	1007.4		2 4 8	16	100	SS-5	4.5+	-	-	-	-	-	-	-	-	16	A-4a (V)	
			3 8 10	23	78	SS-6	4.25	24	11	27	22	16	23	15	8	9	A-4a (1)	
@17.5' TO 19.0'; SS-7 BECOMES STIFF, DARK GRAY, SOME CLAY, TRACE GRAVEL, SLIGHTLY ORGANIC, WET	999.9		3 5 5	13	100	SS-7	1.50	-	-	-	-	-	-	-	-	22	A-4a (V)	
MEDIUM STIFF TO STIFF, GRAYISH BROWN, **SILT AND CLAY**, LITTLE TO SOME SAND, TRACE GRAVEL, CONTAINS IRON STAINING, MOIST	994.9		2 3 4	9	100	SS-8	1.25	4	6	20	45	25	30	19	11	22	A-6a (7)	
			3 4 6	13	100	SS-9	0.75	0	1	14	54	31	35	23	12	29	A-6a (9)	
MEDIUM DENSE, BROWN AND GRAY, **COARSE AND FINE SAND**, TRACE TO SOME GRAVEL, TRACE SILT, TRACE CLAY, CONTAINS IRON STAINING, WET	989.9	W 994.4	2 4 6	13	78	SS-10	-	-	-	-	-	-	-	-	-	23	A-3a (V)	
			3 5 5	13	89	SS-11	-	-	-	-	-	-	-	-	-	24	A-3a (V)	

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:12 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PID: 100713	SFN:	PROJECT: SUM-76-06.15	STATION / OFFSET: 8+40, 5' RT.	START: 2/19/19	END: 2/19/19	PG 2 OF 2	B-067-0-18

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
MEDIUM DENSE TO DENSE, LIGHT BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND**, TRACE TO LITTLE SILT, TRACE CLAY, CONTAINS IRON STAINING, WET *(continued)*	989.4	31	3 5 33	49	67	SS-12	-	-	-	-	-	-	-	-	-	15	A-1-b (V)	
		32																
		33	5 7 12	25	67	SS-13	-	-	-	-	-	-	-	-	-	14	A-1-b (V)	
		34																
		35	8 9 13	29	78	SS-14	-	-	-	-	-	-	-	-	-	13	A-1-b (V)	
	982.9	36 EOB																

NOTES: GROUNDWATER ENCOUNTERED AT 25.0' DURING DRILLING. HOLE DID NOT CAVE.

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:12 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 12+37, 19' RT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP U
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1012.1 (MSL) EOB: 11.5 ft.
START: 2/19/19 END: 2/19/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.059630, -81.566188

EXPLORATION ID B-068-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 1012.1	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
HARD, BROWN AND DARK BROWN BECOMING GRAY, **SANDY SILT**, SOME GRAVEL, LITTLE CLAY, CONTAINS IRON STAINING, DAMP	1009.3	1	8 10 11	27	89	SS-1	4.5+	24	16	24	23	13	23	16	7	10	A-4a (0)	
		2																
		3	5			SS-2A	4.5+	-	-	-	-	-	-	-	-	2	A-4a (V)	
DENSE TO VERY DENSE, GRAY, **GRAVEL AND STONE FRAGMENTS WITH SAND**, LITTLE SILT, TRACE CLAY, CONTAINS IRON STAINING, DAMP		▼ 1008.6	15 18	43	78	SS-2B	-	-	-	-	-	-	-	-	-	5	A-1-b (V)	
		4																
		5	13															
		6	30 29	77	89	SS-3	-	-	-	-	-	-	-	-	-	7	A-1-b (V)	
		7																
		8	23 17 22	51	33	SS-4	-	-	-	-	-	-	-	-	-	7	A-1-b (V)	
	1002.6	9																
VERY DENSE, BROWN AND ORANGISH BROWN, **GRAVEL WITH SAND AND SILT**, TRACE CLAY, CONTAINS IRON STAINING, DAMP		▼ 1002.1																
		10																
	1000.6	11	13 21 44	85	67	SS-5	-	-	-	-	-	-	-	-	-	11	A-2-4 (V)	
		EOB																

NOTES: GROUNDWATER ENCOUNTERED AT 10.0' DURING DRILLING, 3.5' AFTER COMPLETION. HOLE CAVED AT 6.0'.

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:12 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 16+94, 19' RT.	EXPLORATION ID B-069-0-18
TYPE: NOISE WALL	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP U	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1024.3 (MSL) EOB: 15.3 ft.	PAGE 1 OF 1
START: 2/19/19 END: 2/19/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.059717, -81.564576	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
DENSE, LIGHT BROWN AND ORANGISH BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, LITTLE CLAY, CONTAINS STONE FRAGMENTS >1.0", TRACE IRON STAINING, MOIST	1024.3																	
	1019.8		5 6 25	40	100	SS-1	-	-	-	-	-	-	-	-	-	17	A-2-4 (V)	
VERY STIFF TO HARD, BROWN MOTTLED WITH ORANGISH BROWN AND GRAY, **CLAY**, SOME SAND, TRACE SILT, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP			8 13 18	40	100	SS-2	4.25	5	8	14	7	66	49	22	27	16	A-7-6 (16)	
	1016.3	TR	5 50/1"	-	86	SS-3A SS-3B	2.50 -	- -	- -	- -	- -	- -	- -	- -	- -	20 0	A-7-6 (V) Rock (V)	
SANDSTONE, LIGHT BROWN AND WHITE, HIGHLY WEATHERED, STRONG, FRIABLE.			46 50/2"	-	100	SS-4	-	-	-	-	-	-	-	-	-	7	Rock (V)	
	W 1011.8		50/2"	-	50	SS-5	-	-	-	-	-	-	-	-	-	13	Rock (V)	
	1009.0	EOB	50/4"	-	100	SS-6	-	-	-	-	-	-	-	-	-	16	Rock (V)	

NOTES: GROUNDWATER ENCOUNTERED AT 12.5' DURING DRILLING. HOLE DID NOT CAVE.

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:12 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 231+79, 79' RT.	EXPLORATION ID B-070-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / ASHBAUGH	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1036.8 (MSL) EOB: 5.3 ft.	PAGE 1 OF 1
START: 2/21/19 END: 2/21/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.059700, -81.563121	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
1036.8																		
5.0" TOPSOIL (DRILLERS DESCRIPTION)	1036.4		4															
MEDIUM DENSE, DARK BROWN, **COARSE AND FINE SAND**, SOME SILT, LITTLE GRAVEL, TRACE CLAY, CONTAINS ROOTS, WET		1	8 14	29	56	SS-1	-	20	16	34	22	8	NP	NP	NP	17	A-3a (0)	
	1034.8	TR 2																
SANDSTONE, LIGHT TAN, HIGHLY WEATHERED, SLIGHTLY STRONG, FRIABLE.		3	50/4"	-	50	SS-2	-	-	-	-	-	-	-	-	-	12	Rock (V)	
		4																
	1031.5	EOB 5	50/3"	-	67	SS-3	-	-	-	-	-	-	-	-	-	8	Rock (V)	

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:12 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 235+80, 74' RT.	EXPLORATION ID B-071-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / ASHBAUGH	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1048.8 (MSL) EOB: 11.5 ft.	PAGE 1 OF 1
START: 2/21/19 END: 2/21/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.059709, -81.561666	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
6.0" TOPSOIL (DRILLERS DESCRIPTION)	1048.8																	
VERY STIFF TO HARD, BROWN AND ORANGISH BROWN, **SANDY SILT**, SOME CLAY, TRACE TO LITTLE GRAVEL, CONTAINS IRON STAINING, DAMP	1048.3	1	1 4 5	12	67	SS-1	2.75	-	-	-	-	-	-	-	-	11	A-4a (V)	
		2																
		3	10 10 16	34	100	SS-2	4.5+	10	9	18	39	24	25	17	8	11	A-4a (6)	
	1044.3	4																
DENSE TO VERY DENSE, BROWN AND ORANGISH BROWN BECOMING GRAY AND BROWN, **GRAVEL WITH SAND AND SILT**, TRACE CLAY, DAMP		5	6 19 24	56	89	SS-3	-	38	14	19	20	9	21	17	4	10	A-2-4 (0)	
		6																
		7																
		8	8 14 18	42	100	SS-4	-	-	-	-	-	-	-	-	-	8	A-2-4 (V)	
	1039.3	9																
SANDSTONE, LIGHT BROWN, HIGHLY WEATHERED, SLIGHTLY STRONG, FINE TO COARSE GRAINED, FRIABLE.		TR 10	10 14 22	47	67	SS-5	-	-	-	-	-	-	-	-	-	2	Rock (V)	
	1037.3	EOB 11																

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:12 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 99+85, 38' LT.	EXPLORATION ID B-072-0-18
TYPE: NOISE WALL	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR - 76	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1017.6 (MSL) EOB: 42.6 ft.	PAGE 1 OF 2
START: 5/1/19 END: 5/1/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.061524, -81.567471	

MATERIAL DESCRIPTION AND NOTES	ELEV. 1017.6	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
11.0" ASPHALT AND 7.0" BASE (DRILLERS DESCRIPTION)	1016.1																	
HARD, BROWN AND GRAY, **SANDY SILT**, LITTLE GRAVEL AND STONE FRAGMENTS, LITTLE CLAY, DAMP **(FILL)**	1013.1		3 7 11	23	89	SS-1	4.5+	18	9	27	29	17	21	15	6	10	A-4a (2)	
MEDIUM DENSE, BROWN MOTTLED WITH GRAY, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, TRACE TO LITTLE CLAY, SS-3 CONTAINS TRACE BRICK FRAGMENTS, DAMP **(FILL)** @5.0' TO 6.5'; SS-2 CONTAINS NO RECOVERY	1007.3		6 7 9	21	0	SS-2	-	-	-	-	-	-	-	-	-	-		
			6 3 8	14	67	SS-3	-	-	-	-	-	-	-	-	-	9	A-2-4 (V)	
MEDIUM DENSE TO DENSE, LIGHT BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND**, TRACE SILT, TRACE CLAY, DAMP	1004.1		3 10 14	31	56	SS-4A	-	-	-	-	-	-	-	-	-	11	A-2-4 (V)	
						SS-4B	-	-	-	-	-	-	-	-	-	5	A-1-b (V)	
MEDIUM STIFF, LIGHT BROWN MOTTLED WITH ORANGISH BROWN, **SILTY CLAY**, SOME GRAVEL, LITTLE SAND, CONTAINS TRACE IRON STAINING, DAMP	1003.1		4 10 12	29	89	SS-5A	-	-	-	-	-	-	-	-	-	5	A-1-b (V)	
						SS-5B	0.75	-	-	-	-	-	-	-	-	17	A-6b (V)	
VERY STIFF TO HARD, DARK GRAY AND OLIVE BROWN, **SANDY SILT**, LITTLE TO SOME CLAY, TRACE TO LITTLE GRAVEL, CONTAINS TRACE ROOT HAIRS, DAMP	998.1		3 4 4	10	100	SS-6	2.75	9	9	39	26	17	21	15	6	15	A-4a (2)	
			3 5 9	18	100	SS-7	4.5+	-	-	-	-	-	-	-	-	14	A-4a (V)	
HARD, BROWN MOTTLED WITH ORANGISH BROWN AND GRAY, **SILTY CLAY**, TRACE TO LITTLE SAND, TRACE GRAVEL, CONTAINS TRACE ROOT HAIRS, MOIST	995.6		4 6 11	22	100	SS-8	4.5+	-	-	-	-	-	-	-	-	24	A-6b (V)	
HARD, BROWN MOTTLED WITH ORANGISH BROWN AND GRAY, **SANDY SILT**, SOME CLAY, LITTLE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP	993.1		5 11 12	30	100	SS-9	4.5+	12	6	20	37	25	26	18	8	15	A-4a (5)	
DENSE, BROWN MOTTLED WITH ORANGISH BROWN AND GRAY, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, LITTLE CLAY, DAMP	990.6		8 15 17	42	89	SS-10	-	-	-	-	-	-	-	-	-	11	A-2-4 (V)	
VERY STIFF TO HARD, GRAY, **SILT AND CLAY**, LITTLE TO SOME SAND, TRACE TO LITTLE GRAVEL, DAMP		W 989.6	11 9 6	20	100	SS-11	4.5+	-	-	-	-	-	-	-	-	14	A-6a (V)	

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:12 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PID: 100713	SFN:	PROJECT: SUM-76-06.15	STATION / OFFSET: 99+85, 38' LT.	START: 5/1/19	END: 5/1/19	PG 2 OF 2	B-072-0-18

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
VERY STIFF TO HARD, GRAY, **SILT AND CLAY**, LITTLE TO SOME SAND, TRACE TO LITTLE GRAVEL, DAMP *(continued)*	987.6	31	12 11 8	25	56	SS-12	4.5+	-	-	-	-	-	-	-	-	14	A-6a (V)	
		32																
		33	8 5 6	14	89	SS-13	4.25	-	-	-	-	-	-	-	-	14	A-6a (V)	
		34																
		35	18 24 10	44	100	SS-14	3.25	-	-	-	-	-	-	-	-	14	A-6a (V)	
	980.6	36																
SANDSTONE, GRAY, MODERATELY WEATHERED, MODERATELY STRONG, FINE GRAINED, MODERATELY ARGILLACEOUS.		37 TR																
		38	18 50/3"	-	11	SS-15	-	-	-	-	-	-	-	-	-	7	Rock (V)	
		39																
		40	50/2"	-	50	SS-16	-	-	-	-	-	-	-	-	-	7	Rock (V)	
		41																
	975.0	42																
@42.5' TO 42.6'; SS-17 CONTAINS NO RECOVERY		EOB	50/1"	-	0	SS-17	-	-	-	-	-	-	-	-	-	-		

NOTES: GROUNDWATER ENCOUNTERED AT 28.0' DURING DRILLING. HOLE DID NOT CAVE.

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:12 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 103+14, 39' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR - 76
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1016.3 (MSL) EOB: 6.9 ft.
START: 5/1/19 END: 5/1/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.061843, -81.566284

EXPLORATION ID B-073-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 1016.3	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
13.0" ASPHALT (DRILLERS DESCRIPTION)	1015.2																	
MEDIUM DENSE TO DENSE, BROWN AND LIGHT BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND**, TRACE TO LITTLE SILT, TRACE CLAY, SS-1 CONTAINS 1.25" STONE FRAGMENTS, DAMP		1 2 3 4	14 15 11	34	78	SS-1	-	49	14	25	7	5	NP	NP	NP	6	A-1-b (0)	
	1011.8		4 10 10	26	56	SS-2	-	40	21	21	11	7	NP	NP	NP	5	A-1-b (0)	
SANDSTONE, LIGHT TAN, SEVERELY WEATHERED, MODERATELY STRONG, FINE TO COARSE GRAINED, CONGLOMERITIC.		TR 5	6 7 33	52	78	SS-3	-	-	-	-	-	-	-	-	-	5	Rock (V)	
@6.0' TO 6.9'; SS-4 CONTAINS A 1.75" SILT AND CLAY SEAM	1009.4	6 EOB	7 50/5"	-	91	SS-4	-	-	-	-	-	-	-	-	-	12	Rock (V)	

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:12 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 45B	STATION / OFFSET: 18+11, 7' RT.	EXPLORATION ID B-074-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP V	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1015.2 (MSL) EOB: 10.1 ft.	PAGE 1 OF 1
START: 5/1/19 END: 5/1/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 84	LAT / LONG: 41.061545, -81.565017	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
1015.2																		
2.5" ASPHALT AND 10.5" CONCRETE (DRILLERS DESCRIPTION)	1014.1																	
VERY DENSE, LIGHT BROWN, **STONE FRAGMENTS WITH SAND**, TRACE SILT, TRACE CLAY, CONTAINS 1.5" STONE FRAGMENTS, DAMP	1011.2	TR	10 17 26	60	56	SS-1	-	48	20	24	5	3	NP	NP	NP	6	A-1-b (0)	
SANDSTONE, LIGHT BROWN, HIGHLY WEATHERED, MODERATELY STRONG, FINE TO COARSE GRAINED, CONGLOMERITIC.			50/5"	-	40	SS-2	-	-	-	-	-	-	-	-	-	7	Rock (V)	
@7.5' TO 9.0'; SS-3 CONTAINS NO RECOVERY			50/2"	-	0	SS-3	-	-	-	-	-	-	-	-	-	-		
	1005.1	EOB	50/1"	-	0	SS-4	-	-	-	-	-	-	-	-	-	-		
@10.0' TO 10.1'; SS-4 CONTAINS NO RECOVERY																		

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:12 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15
TYPE: ROADWAY
PID: 100713 SFN:
START: 3/21/19 END: 3/21/19

DRILLING FIRM / OPERATOR: NEAS / J. HODGES
SAMPLING FIRM / LOGGER: NEAS / E. ROLLER
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 55X
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 11/21/17
ENERGY RATIO (%): 85

STATION / OFFSET: 14+42, 77' LT.
ALIGNMENT: RAMP V
ELEVATION: 1021.2 (MSL) EOB: 5.9 ft.
LAT / LONG: 41.060670, -81.564256

EXPLORATION ID B-075-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
STIFF TO VERY STIFF, GRAY, **SILT**, SOME CLAY, LITTLE SAND, TRACE GRAVEL, NO INTACT SOIL FOR HP READINGS, DRY	1021.2	1 2 3 4	5 7 9	23	100	SS-1	-	1	1	15	57	26	25	16	9	5	A-4b (8)	
HARD, LIGHT TAN, **SANDY SILT**, SOME CLAY, TRACE GRAVEL AND STONE FRAGMENTS, CONTAINS A 1.25" QUARTZITE PEBBLE, NO INTACT SOIL FOR HP READINGS, DRY	1016.7 / 1015.3	5 EOB	4 50/5"	-	73	SS-2	-	10	9	21	37	23	24	15	9	5	A-4a (5)	

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:12 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 10+85, 59' LT.	EXPLORATION ID B-076-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP V	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1036.2 (MSL) EOB: 6.0 ft.	PAGE 1 OF 1
START: 3/21/19 END: 3/21/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.060150, -81.563065	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
VERY DENSE, LIGHT TAN WITH ORANGISH BROWN AND BROWN MOTTLES, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, TRACE CLAY, CONTAINS STONE FRAGMENTS >1.0", DAMP	1036.2	1 2 3 4	11 15 21	51	78	SS-1	-	20	12	37	21	10	NP	NP	NP	7	A-2-4 (0)	
VERY DENSE, BROWN WITH TRACE ORANGISH BROWN MOTTLES, **SANDY SILT**, LITTLE CLAY, LITTLE GRAVEL, DAMP	1031.7	5	5 50	-	100	SS-2A	-	13	14	35	24	14	19	15	4	9	A-4a (1)	
SANDSTONE, LIGHT GRAY AND REDDISH BROWN, HIGHLY WEATHERED, SLIGHTLY STRONG.	1030.5	TR				SS-2B	-	-	-	-	-	-	-	-	-	0	Rock (V)	
	1030.2	EOB 6																

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:12 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 5+19, 5' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP J
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1071.4 (MSL) EOB: 7.5 ft.
START: 4/17/19 END: 4/17/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.060756, -81.558959

EXPLORATION ID B-077-1-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 1071.4	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
12.0" ASPHALT (DRILLERS DESCRIPTION)	1070.4																	
MEDIUM DENSE, BROWN MOTTLED WITH ORANGISH BROWN, **GRAVEL WITH SAND AND SILT**, LITTLE CLAY, CONTAINS IRON STAINING, DAMP	1068.4	1	8 6 10	21	78	SS-1	-	26	20	20	23	11	19	15	4	9	A-2-4 (0)	
DENSE TO VERY DENSE, BROWN MOTTLED WITH ORANGISH BROWN AND GRAY, **COARSE AND FINE SAND**, SOME SILT, SOME GRAVEL, TRACE CLAY, CONTAINS IRON STAINING, DAMP	1065.4	2 3 4	4 20 19	51	56	SS-2	-	21	32	17	21	9	NP	NP	NP	7	A-3a (0)	
		5	3 14 12	34	56	SS-3	-	-	-	-	-	-	-	-	-	6	A-3a (V)	
HARD, GRAY AND ORANGISH BROWN, **SANDY SILT**, SOME CLAY, LITTLE GRAVEL, CONTAINS IRON STAINING, DAMP	1063.9	6 7 EOB	4 13 21	44	78	SS-4	4.5+	-	-	-	-	-	-	-	-	10	A-4a (V)	

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 5/14/20 11:27 - C:\USERS\KARENS\DESKTOP\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 7+15, 116' LT.	EXPLORATION ID B-077-2-18
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP J	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1082.8 (MSL) EOB: 7.5 ft.	PAGE 1 OF 1
START: 4/17/19 END: 4/17/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.061393, -81.558576	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
2.0" ASPHALT AND 10.0" CONCRETE (DRILLERS DESCRIPTION)	1082.8																	
VERY STIFF TO HARD, GRAY MOTTLED WITH ORANGISH BROWN BECOMING BROWN, **SANDY SILT**, SOME CLAY, TRACE TO SOME GRAVEL, CONTAINS IRON STAINING, DAMP	1081.8	1																
		2	7 5 6	14	100	SS-1	4.25	9	4	11	47	29	27	17	10	14	A-4a (8)	
		3	3 7 7	18	89	SS-2	4.25	29	4	8	38	21	26	18	8	17	A-4a (5)	
		4	4 6 6	16	100	SS-3	4.25	-	-	-	-	-	-	-	-	16	A-4a (V)	
		5																
		6	2 5 5	13	100	SS-4	4.00	-	-	-	-	-	-	-	-	17	A-4a (V)	
	1075.3	7 EOB																

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 5/14/20 11:27 - C:\USERS\KARENS\DESKTOP\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 7+95, 4' RT.	EXPLORATION ID B-077-3-18
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP J	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1080.4 (MSL) EOB: 7.5 ft.	PAGE 1 OF 1
START: 4/17/19 END: 4/17/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.061127, -81.558151	

MATERIAL DESCRIPTION AND NOTES	ELEV. 1080.4	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
13" ASPHALT (DRILLERS DESCRIPTION)	1079.3																	
LOOSE, BROWN, **GRAVEL WITH SAND**, TRACE SILT, TRACE CLAY, DAMP	1076.9	1	3 3 4	9	89	SS-1	-	10	55	27	4	4	NP	NP	NP	6	A-1-b (0)	
		2	2 4 4	10	78	SS-2	-	-	-	-	-	-	-	-	-	7	A-1-b (V)	
		3					4.25	-	-	-	-	-	-	-	-	18	A-4b (V)	
VERY STIFF TO HARD, BROWN, **SILT**, SOME SAND, LITTLE CLAY, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP TO MOIST	1072.9	4	3 5 5	13	89	SS-3	4.25	6	4	17	58	15	22	18	4	19	A-4b (8)	
		5																
		6	2 5 12	22	100	SS-4	3.25	-	-	-	-	-	-	-	-	19	A-4b (V)	
		7 EOB																

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 5/14/20 11:27 - C:\USERS\KARENS\DESKTOP\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 10+96, 8' RT.	EXPLORATION ID B-077-4-18
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP J	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1087.2 (MSL) EOB: 7.5 ft.	PAGE 1 OF 1
START: 4/17/19 END: 4/17/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.060741, -81.557344	

MATERIAL DESCRIPTION AND NOTES	ELEV. 1087.2	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
12.0" ASPHALT (DRILLERS DESCRIPTION)	1086.2																	
VERY STIFF TO HARD, BROWN MOTTLED WITH GRAY, **SILT**, SOME CLAY, TRACE TO LITTLE SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP TO MOIST		1	3 5 6	14	100	SS-1	4.25	2	3	9	53	33	29	19	10	16	A-4b (8)	
		2	5 7 9	21	100	SS-2	4.25	-	-	-	-	-	-	-	-	22	A-4b (V)	
		3	3 4 6	13	100	SS-3	4.00	0	1	2	69	28	30	23	7	22	A-4b (8)	
		4	4 4 6	13	100	SS-4	3.75	-	-	-	-	-	-	-	-	27	A-4b (V)	
	1079.7	5 6 7 EOB																

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 5/14/20 11:27 - C:\USERS\KARENS\DESKTOP\SUM-76-6.15 2.GPJ

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:12 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 4+35, 23' LT.	EXPLORATION ID B-078-0-18	
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / CHIPUKAIZER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP N		
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 985.6 (MSL) EOB: 10.5 ft.	PAGE 1 OF 1	
START: 4/30/19 END: 4/30/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.065507, -81.573407		

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
VERY STIFF TO HARD, BROWN BECOMING BROWN MOTTLED WITH REDDISH BROWN AND GRAY, **SANDY SILT**, LITTLE CLAY, LITTLE GRAVEL, DAMP	985.6	1																
		2																
		3	5 5 6	16	56	SS-1	4.5+	12	12	25	32	19	23	16	7	12	A-4a (3)	
		4																
		5	2 6 9	21	78	SS-2	4.5+	12	14	25	31	18	23	15	8	12	A-4a (3)	
		6																
		7																
		8	4 10 7	24	100	SS-3	4.5+	-	-	-	-	-	-	-	-	11	A-4a (V)	
		9																
	975.1	10 EOB	3 2 4	9	100	SS-4	2.00	-	-	-	-	-	-	-	-	15	A-4a (V)	

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

APPENDIX C

SULFATE CONTENT DATA

OHIO DEPARTMENT OF TRANSPORTATION

DETERMINING SULFATE CONTENT IN SOILS

SUPPLEMENT 1122

Project C-R-S:	SUM-76-6.15
PID No:	100713
Report Date:	7/15/2019
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-001-0-18 SS-1	210+67	52 L	41.061777	-81.570129	995.6	18.20	20	25	20	28	20	25	**520**
B-002-0-18 SS-1	207+22	50 R	41.062207	-81.571304	1002.1	19.80	20	20	20	19	20	19	**387**
B-003-0-18 SS-1	204+23	50 L	41.063006	-81.571741	999.8	18.22	20	7	20	7	20	7	**140**
B-004-0-18 SS-1	200+64	8 L	41.063742	-81.572600	1000.8	21.35	20	9	20	7	20	9	**167**
B-005-0-18 SS-1	196+37	7 L	41.064784	-81.573297	994.7	21.35	40	29	40	30	40	36	**1267**
B-006-0-18 SS-1	196+62	13 L	41.065496	-81.573614	987.9	21.37	40	71	40	65	40	63	**2653**
B-007-0-18 SS-1	189+75	74 L	41.066552	-81.573713	976.4	19.83	20	1	20	0	20	0	**7**
B-008-0-18 SS-1	181+94	76 L	41.068655	-81.573829	983.4	19.18	20	12	20	12	20	11	**233**
B-010-0-18 SS-1	173+98	60 L	41.070840	-81.573860	985.0	19.10	20	5	20	4	20	5	**93**
B-011-0-18 SS-1	170+00	60 L	41.071934	-81.573846	984.0	19.05	20	8	20	11	20	8	**180**
B-012-0-18 SS-1	165+85	59 L	41.073072	-81.573836	982.9	19.05	20	1	20	1	20	2	**27**
B-013-0-18 SS-1	161+79	60 L	41.074185	-81.573819	981.8	19.03	20	5	20	4	20	8	**113**
B-014-0-18 SS-2	157+96	60 L	41.075237	-81.573806	982.7	19.08	20	4	20	2	20	3	**60**
B-015-0-18 SS-1	154+04	73 L	41.076317	-81.573749	984.3	18.20	20	4	20	4	20	4	**80**
B-016-0-18 SS-1	150+15	60 L	41.077400	-81.573883	987.4	23.80	20	1	20	2	20	2	**33**
B-017-0-18 ST-1	149+98	94 L	41.077460	-81.573770	980.2	20.95	20	1	20	1	20	1	**20**
B-018-0-18 SS-2	146+83	59 L	41.078313	-81.574111	987.9	23.80	20	64	20	70	20	64	**1320**
B-019-0-18 SS-2	143+71	60 L	41.079148	-81.574449	988.2	19.17	20	0	20	0	20	0	**0**

B-020-0-18 SS-1	43+79	49 L	41.035695	-81.574353	1002.4	21.02	20	25	20	25	20	25	**500**
B-022-0-18 SS-1	47+81	68 L	41.035730	-81.572893	987.7	21.43	20	1	20	2	20	0	**20**
B-023-0-18 SS-1	51+80	49 L	41.035659	-81.571451	977.3	18.82	20	3	20	3	20	3	**60**
B-025-0-18 SS-2	55+67	60 L	41.035672	-81.570045	973.1	18.88	20	9	20	9	20	9	**180**
B-026-0-18 SS-2	58+92	72 L	41.035690	-81.568868	971.4	18.78	20	4	20	4	20	4	**80**
B-027-018 SS-1B	63+44	55 L	41.035623	-81.567231	969.8	21.38	20	3	20	0	20	1	**27**
B-028-0-18 SS-2	65+78	65 R	41.035283	-81.566391	972.9	19.20	20	0	20	0	20	0	**0**
B-029-0-18 SS-2	67+70	66 R	41.035262	-81.564969	973.9	18.90	20	0	20	0	20	1	**7**
B-030-0-18 SS-2	73+70	61 R	41.035256	-81.563520	975.7	18.83	20	0	20	0	20	0	**0**
B-032-0-18 SS-2	77+74	58 R	41.035245	-81.562054	976.8	18.97	20	1	20	1	20	0	**13**
B-033-0-18 SS-1	81+72	68 R	41.035201	-81.560613	976.8	23.82	20	0	20	0	20	0	**0**
B-035-0-18 SS-2	85+67	68 R	41.035183	-81.559182	978.6	17.92	40	28	40	31	40	28	**1160**
B-037-0-18 SS-2B	93+64	62 R	41.035162	-81.556293	983.3	19.17	20	1	20	1	20	1	**20**
B-038-0-18 SS-2	96+70	66 R	41.035125	-81.555196	985.1	18.00	20	17	20	14	20	18	**327**
B-039-0-18 SS-2	219+40	45 R	41.060352	-81.567580	997.5	23.78	20	15	20	13	20	14	**280**
B-040-0-18 SS-2	223+88	37 L	41.060208	-81.565940	1007.9	17.87	20	4	20	4	20	4	**80**
B-041-0-18 SS-1	227+78	10 L	41.059975	-81.564569	1022.7	21.35	20	14	20	19	20	17	**333**
B-042-0-18 SS-1	231+81	41 L	41.060028	-81.563111	1036.4	17.87	20	44	20	43	20	48	**900**
B-043-0-18 SS-2	234+79	43 L	41.060030	-81.562031	1047.6	17.87	20	22	20	18	20	20	**400**
B-044-0-18 SS-2			41.059881	-81.560305	1061.9	21.20	20	6	20	7	20	7	**133**
B-046-0-18 SS-1	247+75	52 R	41.059780	-81.557323	1068.9	17.87	20	57	20	60	20	59	**1173**
B-047-0-18 SS-1	251+65	53 R	41.059884	-81.555900	1063.6	17.87	20	66	20	70	20	73	**1393**
B-048-0-18 SS-1	256+17	70 R	41.060077	-81.554258	1050.6	21.35	20	2	20	3	20	1	**40**
B-049-0-18 SS-2	260+50	10 R	41.060544	-81.552909	1035.1	21.45	40	41	40	35	40	43	**1587**
B-050-0-18 SS-1	263+62	63 R	41.060686	-81.551665	1022.1	18.80	40	41	40	38	40	35	**1520**
B-051-0-18 SS-1	10+73	15 R	41.059555	-81.568264	1017.6	18.24	20	51	20	51	20	46	**987**
B-053-0-18 SS-1	4+17	30 L	41.061084	-81.569477	997.3	19.82	20	14	20	15	20	12	**273**
B-054-0-18 SS-1	94+72	25 R	41.060211	-81.568035	1016.2	17.87	20	21	20	20	20	18	**393**
B-056-0-18 SS-3	97+76	30 R	41.060971	-81.567787	1013.8	21.30	20	12	20	15	20	14	**273**
B-058-0-18 SS-1	106+50	1 R	41.061258	-81.565290	1008.0	18.93	20	1	20	2	20	2	**33**
B-059-0-18 SS-1	110+72	15 R	41.060386	-81.565883	1004.8	18.90	20	2	20	3	20	3	**53**
B-061-0-18 SS-1	215+87	54 L	41.060996	-81.568596	992.3	19.82	20	5	20	3	20	7	**100**
B-062-0-18 SS-1	2+43	28 L	41.034690	-81.567609	973.0	21.45	20	2	20	0	20	1	**20**

B-063-0-18 SS-1	10+02	57 L	41.034019	-81.566973	970.7	21.57	20	4	20	1	20	3	**53**
B-064-0-18 SS-1	14+79	63 L	41.034416	-81.565886	973.3	21.48	20	0	20	0	20	0	**0**
B-066-0-18 SS-2	17+39	30 L	41.035062	-81.565647	991.4	20.97	20	2	20	2	20	2	**40**
B-067-0-18 SS-2	8+40	5 R	41.058936	-81.567209	1019.4	17.42	20	26	20	22	20	23	**473**
B-068-0-18 SS-2B	12+37	19 R	41.059630	-81.566188	1012.1	17.95	40	39	40	39	40	35	**1507**
B-069-0-18 SS-1	16+94	19 R	41.059717	-81.564576	1024.3	17.95	20	0	20	2	20	0	**13**
B-071-0-18 SS-2	235+80	74 R	41.059709	-81.561666	1048.8	21.38	20	17	20	16	20	18	**340**
B-072-0-18 SS-1	99+85	38 L	41.061524	-81.567471	1017.6	21.00	20	4	20	3	20	4	**73**
B-073-0-18 SS-1	103+14	39 L	41.061843	-81.566284	1016.3	17.62	20	0	20	1	20	1	**13**
B-074-0-18 SS-1	18+11	7 R	41.061545	-81.565017	1015.2	17.32	20	0	20	1	20	1	**13**
B-075-0-18 SS-1	14+42	77 L	41.060670	-81.564256	1021.2	21.53	20	1	20	1	20	1	**20**
B-076-0-18 SS-1	10+85	59 L	41.060150	-81.563065	1036.2	21.52	20	56	20	61	20	53	**1133**
B-077-0-18 SS-1	4+70	22 L	41.059466	-81.557415	1079.5	18.80	20	11	20	11	20	11	**220**
B-077-1-18 SS-1			41.060756	-81.558959	1071.4	18.75	20	5	20	5	20	5	**100**
B-077-2-18 SS-1			41.061393	-81.558576	1082.8	18.72	20	11	20	12	20	12	**233**
B-077-3-18 SS-1			41.061127	-81.558151	1080.4	18.75	20	1	20	0	20	1	**13**
B-077-4-18 SS-1			41.060741	-81.557344	1087.2	18.78	20	11	20	9	20	10	**200**
B-078-0-18 SS-1	4+35	23 L	41.065507	-81.573407	985.6	18.23	20	32	20	29	20	33	**627**
B-079-0-18 SS-1	7+31	36 L	41.066348	-81.573379	976.9	19.82	20	3	20	1	20	2	**40**
B-080-0-18 SS-2	9+06	27 L	41.066752	-81.572913	979.3	17.72	20	1	20	2	20	2	**33**
B-081-0-18 SS-1A	5+43	7 R	41.067521	-81.573746	979.6	17.65	20	2	20	2	20	2	**40**

APPENDIX D

GEOTECHNICAL BULLETIN 1 (GB1)
ANALYSIS SPREADSHEETS

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

SUM-76/77 Major Rehab
102329

Subgrade Exlporation for SUM-76/77 NW Interchange Major Rehab Design Build Entire Project

NEAS Inc.

Prepared By: KCA
Date prepared: Thursday, February 20, 2020

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NO. OF BORINGS: 39

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-001-0-18	IR-77/IR-76	210+67	52	Lt	CME 45B	84	995.6	994.1	1.5 C
2	B-002-0-18	IR-77/IR-76	207+22	51	Rt	CME 45B	84	1002.1	1000.6	1.5 C
3	B-003-0-18	IR-77/IR-76	204+23	50	Lt	CME 45B	84	999.8	998.3	1.5 C
4	B-004-0-18	IR-77/IR-76	200+64	8	Lt	CME 45B	84	1000.8	999.3	1.5 C
5	B-005-0-18	IR-77/IR-76	196+37	7	Lt	CME 45B	84	994.7	993.2	1.5 C
6	B-006-0-18	IR-77/IR-76	193+62	13	Lt	CME 45B	84	987.9	986.4	1.5 C
7	B-039-0-18	IR-77/IR-76	219+40	45	Rt	CME 55T	78	997.5	996.0	1.5 C
8	B-040-0-18	IR-77/IR-76	223+88	37	Lt	CME 45B	84	1007.9	1006.4	1.5 C
9	B-041-0-18	IR-77/IR-76	227+78	10	Lt	CME 45B	84	1022.7	1021.2	1.5 C
10	B-042-0-18	IR-77/IR-76	231+81	41	Lt	CME 45B	84	1036.4	1034.9	1.5 C
11	B-043-0-18	IR-77/IR-76	234+79	43	Lt	CME 45B	84	1047.6	1046.1	1.5 C
12	B-044-0-18	IR-77/IR-76	239+55	9	Rt	CME 45B	84	1061.9	1060.4	1.5 C
13	B-045-0-18	IR-77/IR-76	243+80	66	Rt	CME 55T	78	1066.9	1065.4	1.5 C
14	B-045-1-18	IR-77/IR-76	244+88	54	Lt	CME 55T	78	1067.1	1065.6	1.5 C
15	B-051-0-18	Ramp T	10+73	15	Rt	CME 45B	84	1017.6	1015.2	2.4 C
16	B-052-0-18	Ramp T	8+07	32	Lt	CME 55X	85	1003.7	1007.3	3.6 F
17	B-053-0-18	Ramp T	4+17	30	Lt	CME 45B	84	997.3	995.8	1.5 C
18	B-054-0-18	IR-76	94+72	25	Rt	CME 45B	84	1016.2	1014.7	1.5 C
19	B-056-0-18	IR-76	97+76	30	Rt	CME 45B	84	1013.8	1012.3	1.5 C
20	B-057-0-18	IR-76	102+30	28	Rt	CME 55X	85	1011.9	1010.4	1.5 C
21	B-058-0-18	Ramp W	106+50	1	Rt	CME 55X	85	1008.0	1007.9	0.1 C
22	B-059-0-18	Ramp W	110+72	15	Rt	CME 55X	85	1004.8	1003.8	1.0 C
23	B-060-0-18	IR-77/IR-76	219+30	76	Lt	CME 55X	85	992.3	990.8	1.5 C
24	B-061-0-18	IR-77/IR-76	215+87	54	Lt	CME 45B	84	992.3	990.8	1.5 C
25	B-067-0-18	Ramp U	8+40	5	Rt	CME 55T	78	1019.4	1017.9	1.5 C
26	B-068-0-18	Ramp U	12+37	19	Rt	CME 55T	78	1012.1	1012.3	0.2 F
27	B-069-0-18	Ramp U	16+94	19	Rt	CME 55T	78	1024.3	1022.9	1.4 C
28	B-070-0-18	IR-77/IR-76	231+79	79	Rt	CME 55T	78	1036.8	1035.8	1.0 C
29	B-071-0-18	IR-77/IR-76	235+80	74	Rt	CME 55T	78	1048.8	1047.3	1.5 C
30	B-072-0-18	IR-76	99+85	38	Lt	CME 55T	78	1017.6	1016.1	1.5 C
31	B-073-0-18	IR-76	103+14	39	Lt	CME 55T	78	1016.3	1014.8	1.5 C
32	B-074-0-18	Ramp V	18+11	7	Rt	CME 45B	84	1015.2	1014.3	0.9 C
33	B-075-0-18	Ramp V	14+42	77	Lt	CME 55X	85	1021.2	1022.7	1.5 F
34	B-076-0-18	Ramp V	10+85	59	Lt	CME 55X	85	1036.2	1033.4	2.8 C
35	B-077-1-18	Ramp J				CME 55T	78	1071.4	1069.9	1.5 C
36	B-077-2-18	Ramp J				CME 55T	78	1082.8	1081.3	1.5 C
37	B-077-3-18	Ramp J				CME 55T	78	1080.4	1078.9	1.5 C
38	B-077-4-18	Ramp J				CME 55T	78	1087.2	1085.7	1.5 C
39	B-078-0-18	Ramp N	4+35	23	Lt	CME 55X	85	985.6	984.1	1.5 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B	SS-1	1.5	3.0	0.0	1.5	24			NP	NP	NP	11	6	17	10	8	A-3a	0	520					
	001-0	SS-2	3.0	4.5	1.5	3.0	11									10	8	A-3a	0						
	18	SS-3	4.5	6.0	3.0	4.5	14		2.25	28	18	10	38	23	61	15	13	A-4a	5						
		SS-4	6.0	7.5	4.5	6.0	21	11	4.25							17	10	A-4a	8						
2	B	SS-1	1.5	3.0	0.0	1.5	7		0.75							17	14	A-6a	10	387		HP & Mc		18"	
	002-0	SS-2	3.0	4.5	1.5	3.0	34			NP	NP	NP	14	12	26	6	10	A-2-4	0						
	18	SS-3	4.5	6.0	3.0	4.5	35			19	13	6	17	14	31	8	10	A-2-4	0						
		SS-4	6.0	7.5	4.5	6.0	49	7								5	10	A-2-4	0						
3	B	SS-1	1.5	3.0	0.0	1.5	38			17	13	4	18	13	31	7	10	A-2-4	0	140					
	003-0	SS-2	3.0	4.5	1.5	3.0	39			NP	NP	NP	13	10	23	5	10	A-2-4	0						
	18	SS-3	4.5	6.0	3.0	4.5	34									5	10	A-2-4	0						
		SS-4	6.0	7.5	4.5	6.0	27	27								4	10	A-2-4	0						
4	B	SS-1	1.5	3.0	0.0	1.5	15			29	19	10	24	15	39	14	14	A-4a	1	167					
	004-0	SS-2	3.0	4.5	1.5	3.0	36									16	14	A-6a	10						
	18	SS-3	4.5	6.0	3.0	4.5	34			29	18	11	38	26	64	16	14	A-6a	6						
		SS-4	6.0	7.5	4.5	6.0	27	15								16	14	A-6a	10						
5	B	SS-1	1.5	3.0	0.0	1.5	27			NP	NP	NP	6	2	8	9	6	A-1-a	0	1267					
	005-0	SS-2	3.0	4.5	1.5	3.0	25									7	6	A-1-a	0						
	18	SS-3	4.5	6.0	3.0	4.5	29									7	6	A-1-a	0						
		SS-4	6.0	7.5	4.5	6.0	27	25		25	18	7	24	14	38	12	13	A-4a	1						
6	B	SS-1	1.5	3.0	0.0	1.5	21			NP	NP	NP	5	2	7	11	6	A-1-a	0	2653					
	006-0	SS-2	3.0	4.5	1.5	3.0	28									8	6	A-1-a	0						
	18	SS-3	4.5	6.0	3.0	4.5	15									8	6	A-1-a	0						
		SS-4	6.0	7.5	4.5	6.0	22	15		24	17	7	21	20	41	21	12	A-4a	1						
7	B	SS-1	1.5	3.0	0.0	1.5	22		4.5	23	15	8	21	16	37	9	10	A-4a	0						
	039-0	SS-2	3.0	4.5	1.5	3.0	20		4.5							11	10	A-4a	8	280					
	18	SS-3	4.5	6.0	3.0	4.5	21		4	27	17	10	32	24	56	14	12	A-4a	4						
		SS-4	6.0	7.5	4.5	6.0	17	17	3.5							13	10	A-4a	8						
8	B	SS-1	1.5	3.0	0.0	1.5	28									9	10	A-4a	8						
	040-0	SS-2	3.0	4.5	1.5	3.0	42			NP	NP	NP	19	14	33	8	8	A-3a	0	80					
	18	SS-3	4.5	6.0	3.0	4.5	105									8	8	A-3a	0						
		SS-4	6.0	7.5	4.5	6.0	98	28		NP	NP	NP	26	18	44	7	8	A-3a	0						
9	B	SS-1	1.5	3.0	0.0	1.5	29									5	6	A-1-b	0	333					
	041-0	SS-2	3.0	3.1	1.5	1.6	50										0	Rock	0		Rock				
	18	SS-3	4.5	4.6	3.0	3.1	50										0	Rock	0						
		SS-4	6.0	6.1	4.5	4.6	50	29									0	Rock	0						

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
10	B	SS-1	1.5	3.0	0.0	1.5	85		4.5	23	16	7	23	16	39	9	11	A-4a	1	900					
	042-0	SS-2	3.0	4.5	1.5	3.0	88									4	6	A-1-b	0						
	18	SS-3	4.5	6.0	3.0	4.5	52		4.5	23	15	8	36	25	61	10	10	A-4a	5						
		SS-4	6.0	6.5	4.5	5.0	50	30	4.5							7	10	A-4a	8						
11	B	SS-1	1.5	3.0	0.0	1.5	95			23	17	6	17	12	29	10	10	A-2-4	0						
	043-0	SS-2	3.0	4.5	1.5	3.0	22		4.5	25	18	7	31	22	53	11	13	A-4a	4	400					
	18	SS-3	4.5	6.0	3.0	4.5	95		4.5							12	10	A-4a	8						
		SS-4	6.0	7.5	4.5	6.0	60	22	4.5							11	10	A-4a	8						
12	B	SS-1	1.5	3.0	0.0	1.5	56		4.5							14	14	A-6a	10						
	044-0	SS-2	3.0	4.5	1.5	3.0	24		4.5	35	21	14	43	40	83	16	16	A-6a	10	133					
	18	SS-3	4.5	6.0	3.0	4.5	21		4.5	34	23	11	45	35	80	10	18	A-6a	8						
		SS-4	6.0	7.5	4.5	6.0	29	21	4.5							16	14	A-6a	10						
13	B	SS-1	2.5	3.4	1.0	1.9	50										0	Rock	0		Rock		**23"**		
	045-0	SS-2	5.0	5.8	3.5	4.3	50										0	Rock	0						
	18																								
								30																	
14	B	SS-1	1.5	3.0	0.0	1.5	40										0	Rock	0		Rock				
	045-1	SS-2	3.0	4.5	1.5	3.0	60										0	Rock	0		Rock		**36"**		
	18	SS-3	4.5	5.5	3.0	4.0											0	Rock	0						
		SS-4	6.0	6.7	4.5	5.2		30									0	Rock	0						
15	B	SS-1	1.5	3.0	-0.9	0.6	14		4.5	26	18	8	36	23	59	13	13	A-4a	5	987					
	051-0	SS-2	3.0	4.5	0.6	2.1	21		4.5	21	14	7	30	20	50	10	10	A-4a	3						
	18	SS-3	4.5	6.0	2.1	3.6	14		3.75							11	10	A-4a	8						
		SS-4	6.0	7.5	3.6	5.1	21	14	1							14	10	A-4a	8						
16	B	SS-1	2.5	4.0	6.1	7.6	62									7	6	A-1-a							
	052-0	SS-2	5.0	6.5	8.6	10.1	85			NP	NP	NP	7	3	10	7	6	A-1-a							
	18																								
17	B	SS-1	1.5	3.0	0.0	1.5	11		4.5	23	17	6	41	24	65	13	12	A-4a	6	273		N_{60}		**12"**	
	053-0	SS-2	3.0	4.5	1.5	3.0	17		4.5							16	10	A-4a	8			Mc			
	18	SS-3	4.5	6.0	3.0	4.5	15		4.5	28	19	9	43	32	75	15	14	A-4a	8						
		SS-4	6.0	7.5	4.5	6.0	36	11								6	10	A-2-4	0						
18	B	SS-1	1.5	3.0	0.0	1.5	28		4.5	25	18	7	29	17	46	9	13	A-4a	2	393					
	054-0	SS-2	3.0	4.5	1.5	3.0	38			23	17	6	19	12	31	7	10	A-2-4	0						
	18	SS-3	4.5	6.9	3.0	5.4	22									2	6	A-1-b	0						
		SS-4	6.9	7.5	5.4	6.0	48	22	4.5							12	10	A-4a							

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
19	B	SS-1	1.5	3.0	0.0	1.5	20									8	8	A-3a	0						
	056-0	SS-2	3.0	4.5	1.5	3.0	11			17	12	5	18	14	32	11	8	A-3a	0						
	18	SS-3	4.5	6.0	3.0	4.5	6			18	12	6	17	14	31	10	8	A-3a	0	273					
		SS-4	6.0	7.5	4.5	6.0	4	4	1.75							16	14	A-6a	10						
20	B	SS-1A	2.0	2.5	0.5	1.0	30		3.75	NP	NP	NP	13	8	21	9	8	A-3a	0						
	057-0	SS-1B	2.5	2.8	1.0	1.3											0	Rock	0		Rock	N_{60}	16''	0''	
	18																								
								30																	
21	B	SS-1	2.5	2.9	2.4	2.8	50			NP	NP	NP	9	4	13	6	6	A-1-b	0	33					
	058-0	SS-2	4.0	4.2	3.9	4.1	50									4	0	Rock	0						
	18																								
								30																	
22	B	SS-1	2.5	4.0	1.5	3.0	85			NP	NP	NP	23	14	37	11	11	A-4a	0	53					
	059-0	SS-2	5.0	6.3	4.0	5.3										6	0	Rock	0						
	18	SS-3	6.5	6.6	5.5	5.6										8	0	Rock							
								30																	
23	B	SS-1	2.5	4.0	1.0	2.5	30		2.5	23	17	6	18	12	30	11	10	A-2-4	0						
	060-0	SS-2	5.0	6.5	3.5	5.0	17		2.5							11	10	A-4a	8						
	18																								
								17																	
24	B	SS-1	1.5	3.0	0.0	1.5	49			NP	NP	NP	16	12	28	6	10	A-2-4	0	100					
	061-0	SS-2	3.0	4.5	1.5	3.0	32		4.5	21	15	6	22	15	37	8	10	A-4a	0						
	18	SS-3	4.5	6.0	3.0	4.5	35		4.5							9	10	A-4a	8						
		SS-4	6.0	7.5	4.5	6.0	21	21	4.5							13	10	A-4a	8						
25	B	SS-1	2.5	4.0	1.0	2.5	17		3.25	20	13	7	28	18	46	10	10	A-4a	2						
	067-0	SS-2	5.0	6.5	3.5	5.0	12									6	10	A-4a	8	473					
	18	SS-3	7.5	9.0	6.0	7.5	20		3							9	10	A-4a							
								12																	
26	B	SS-1	1.3	2.8	1.5	3.0	27		4.5	23	16	7	23	13	36	10	11	A-4a	0						
	068-0	SS-2	2.8	4.0	3.0	4.2	43									5	6	A-1-b	0	1507					
	18	SS-3	5.0	6.5	5.2	6.7	77									7	6	A-1-b							
								27																	
27	B	SS-1	2.5	4.0	1.1	2.6	40									17	10	A-2-4	0	13		Mc			
	069-0	SS-2	5.0	6.5	3.6	5.1	40		4.25	49	22	27	7	66	73	16	19	A-7-6	16						
	18	SS-3A	7.0	8.1	5.6	6.7	50		2.5							20	18	A-7-6							
								30																	

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
28	B	SS-1	0.0	1.5	-1.0	0.5	29			NP	NP	NP	22	8	30	17	8	A-3a	0						
	070-0	SS-2	2.5	2.9	1.5	1.9	50									12	0	Rock	0		Rock	Mc			
	18	SS-3	5.0	5.3	4.0	4.3										8	0	Rock	0						
								29																	
29	B	SS-1	0.0	1.5	-1.5	0.0	12		2.75							11	10	A-4a	8						
	071-0	SS-2	2.5	4.0	1.0	2.5	34		4.5	25	17	8	39	24	63	11	12	A-4a	6	340					
	18	SS-3	5.0	6.5	3.5	5.0	56			21	17	4	20	9	29	10	10	A-2-4	0						
								30																	
30	B	SS-1	2.5	4.0	1.0	2.5	23		4.5	21	15	6	29	17	46	10	10	A-4a	2	73					
	072-0	SS-2	5.0	6.5	3.5	5.0	21									9	10	A-2-4	0						
	18																								
								21																	
31	B	SS-1	1.5	3.0	0.0	1.5	34			NP	NP	NP	7	5	12	6	6	A-1-b	0	13					
	073-0	SS-2	3.0	4.5	1.5	3.0	26			NP	NP	NP	11	7	18	5	6	A-1-b	0						
	18	SS-3	4.5	6.0	3.0	4.5	52									5	0	Rock	0						
		SS-4	6.0	7.0	4.5	5.5	50	26								12	0	Rock	0						
32	B	SS-1	2.5	4.0	1.6	3.1	60			NP	NP	NP	5	3	8	6	6	A-1-b	0	13					
	074-0	SS-2	5.0	5.4	4.1	4.5										7	0	Rock	0						
	18	SS-3	7.5	7.7	6.6	6.8											0	Rock							
								30																	
33	B	SS-1	2.5	4.0	4.0	5.5	23			25	16	9	57	26	83	5	11	A-4b	8	20					
	075-0	SS-2	5.0	5.9	6.5	7.4				24	15	9	37	23	60	5	10	A-4b							
	18																								
								23																	
34	B	SS-1	2.8	4.0	0.0	1.2	51			NP	NP	NP	21	10	31	7	10	A-2-4	0	1133					
	076-0	SS-2A	5.0	5.7	2.2	2.9	50			19	15	4	24	14	38	9	10	A-4a	1						
	18	SS-2B	5.7	6.0	2.9	3.2										0	0	Rock	0			N_{60}			
								30																	
35	B	SS-1	1.5	3.0	0.0	1.5	21			19	15	4	23	11	34	9	10	A-2-4	0	100					
	077-1	SS-2	3.0	4.5	1.5	3.0	51			NP	NP	NP	21	9	30	7	8	A-3a	0						
	18	SS-3	4.5	6.0	3.0	4.5	34									6	8	A-3a	0						
		SS-4	6.0	7.5	4.5	6.0	44	21	4.5							10	10	A-4a	8						
36	B	SS-1	1.5	3.0	0.0	1.5	14		4.25	27	17	10	47	29	76	14	12	A-4a	8	233					
	077-2	SS-2	3.0	4.5	1.5	3.0	18		4.25	26	18	8	38	21	59	17	13	A-4a	5			Mc			
	18	SS-3	4.5	6.0	3.0	4.5	16		4.25							16	10	A-4a	8						
		SS-4	6.0	7.5	4.5	6.0	13	13	4							17	10	A-4a	8						

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
37	B	SS-1	1.5	3.5	0.0	2.0	9			NP	NP	NP	4	4	8	7	6	A-1-b	0	13					
	077-3	SS-2	3.5	4.5	2.0	3.0	10		4.25							18	10	A-4b	8		A-4b	N_{60} & Mc			
	18	SS-3	4.5	6.0	3.0	4.5	13		4.25	22	18	4	58	15	73	19	13	A-4b	8						
		SS-4	6.0	7.5	4.5	6.0	22	9	3.25							19	10	A-4b	8						
38	B	SS-1	1.5	3.0	0.0	1.5	14		4.25	29	19	10	53	33	86	16	14	A-4b	8	200	A-4b				
	077-4	SS-2	3.0	4.5	1.5	3.0	21		4.25							22	10	A-4b	8		A-4b	Mc	**36"**		
	18	SS-3	4.5	6.0	3.0	4.5	13		4	30	23	7	69	28	97	22	18	A-4b	8						
		SS-4	6.0	7.5	4.5	6.0	13	13	3.75							27	10	A-4b	8						
39	B	SS-1	2.5	4.0	1.0	2.5	16		4.5	23	16	7	32	19	51	12	11	A-4a	3	627					
	078-0	SS-2	5.0	6.5	3.5	5.0	21		4.5	23	15	8	31	18	49	12	10	A-4a	3						
	18																								
								16																	

PID: 102329

County-Route-Section: SUM-76/77 Major Rehab

No. of Borings: 39

Geotechnical Consultant: NEAS Inc.

Prepared By: KCA

Date prepared: 2/20/2020

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

Excavate and Replace Stabilization Options	
Global Geotextile Override(N60L):	18''
Override(HP):	24''
Global Geogrid Override(N60L):	12''
Override(HP):	18''

Design CBR	9

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	1%	HP ≤ 0.5	0%
$N_{60} < 12$	6%	0.5 < HP ≤ 1	2%
$12 \leq N_{60} < 15$	8%	1 < HP ≤ 2	1%
$N_{60} \geq 20$	72%	HP > 2	40%
M+	5%		
Rock	9%		
Unsuitable	22%		

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

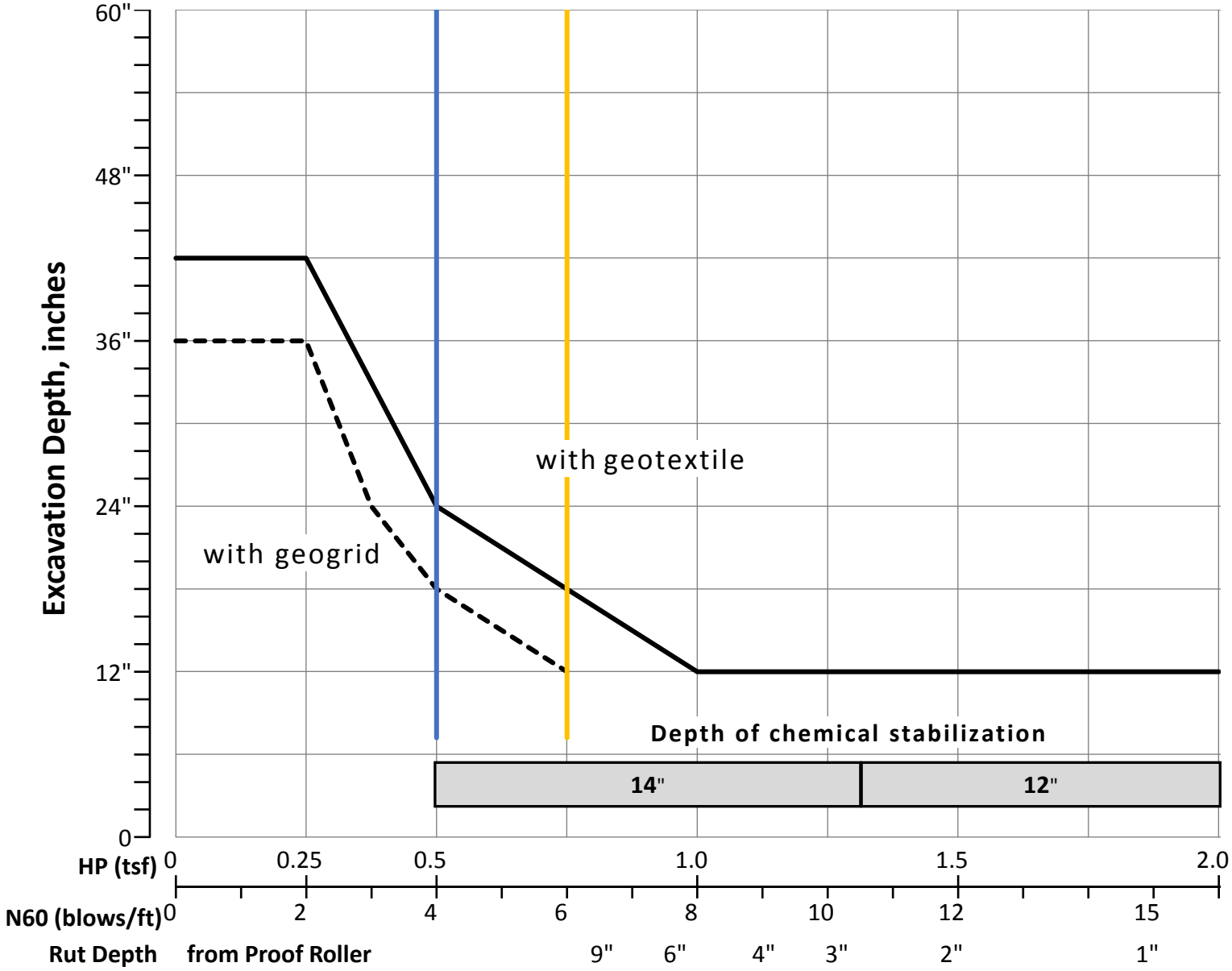
% Proposed Subgrade Surface	
Unstable & Unsuitable	29%
Unstable	15%
Unsuitable	14%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	34	21	3.96	25	17	8	26	17	43	11	9	3
Maximum	105	30	4.50	49	23	27	69	66	97	27	19	16
Minimum	4	4	0.75	17	12	4	4	2	7	0	0	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	20	8	10	17	0	0	0	0	12	44	9	0	9	0	0	2	0	0	131
Percent	15%	6%	8%	13%	0%	0%	0%	0%	9%	34%	7%	0%	7%	0%	0%	2%	0%	0%	100%
% Rock|Granular|Cohesive	15%	69%									15%								100%
Surface Class Count	6	4	7	10	0	0	0	0	8	23	3	0	4	0	0	0	0	0	65
Surface Class Percent	9%	6%	11%	15%	0%	0%	0%	0%	12%	35%	5%	0%	6%	0%	0%	0%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
3.96	0.50	☑ HP
21.47	6.00	☑ N60L

Average HP
Average N_{60L}

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

SUM-76/77 Major Rehab
102329

Subgrade Exlporation for SUM-76/77 NW Interchange Major Rehab Design Build
IR-76/IR-77

NEAS Inc.

Prepared By: KCA
Date prepared: Thursday, February 20, 2020

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2868 East Kemper Road
Cincinnati, OH 45241

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NO. OF BORINGS: 26

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-006-0-18	IR-77/IR-76	193+62	13	Lt	CME 45B	84	987.9	986.4	1.5 C
2	B-078-0-18	Ramp N	4+35	23	Lt	CME 55X	85	985.6	984.1	1.5 C
3	B-005-0-18	IR-77/IR-76	196+37	7	Lt	CME 45B	84	994.7	993.2	1.5 C
4	B-004-0-18	IR-77/IR-76	200+64	8	Lt	CME 45B	84	1000.8	999.3	1.5 C
5	B-003-0-18	IR-77/IR-76	204+23	50	Lt	CME 45B	84	999.8	998.3	1.5 C
6	B-002-0-18	IR-77/IR-76	207+22	51	Rt	CME 45B	84	1002.1	1000.6	1.5 C
7	B-001-0-18	IR-77/IR-76	210+67	52	Lt	CME 45B	84	995.6	994.1	1.5 C
8	B-053-0-18	Ramp T	4+17	30	Lt	CME 45B	84	997.3	995.8	1.5 C
9	B-061-0-18	IR-77/IR-76	215+87	54	Lt	CME 45B	84	992.3	990.8	1.5 C
10	B-060-0-18	IR-77/IR-76	219+30	76	Lt	CME 55X	85	992.3	990.8	1.5 C
11	B-039-0-18	IR-77/IR-76	219+40	45	Rt	CME 55T	78	997.5	996.0	1.5 C
12	B-040-0-18	IR-77/IR-76	223+88	37	Lt	CME 45B	84	1007.9	1006.4	1.5 C
13	B-041-0-18	IR-77/IR-76	227+78	10	Lt	CME 45B	84	1022.7	1021.2	1.5 C
14	B-070-0-18	IR-77/IR-76	231+79	79	Rt	CME 55T	78	1036.8	1035.3	1.5 C
15	B-042-0-18	IR-77/IR-76	231+81	41	Lt	CME 45B	84	1036.4	1034.9	1.5 C
16	B-071-0-18	IR-77/IR-76	235+80	74	Rt	CME 55T	78	1048.8	1047.3	1.5 C
17	B-043-0-18	IR-77/IR-76	234+79	43	Lt	CME 45B	84	1047.6	1046.1	1.5 C
18	B-044-0-18	IR-77/IR-76	239+55	9	Rt	CME 45B	84	1061.9	1060.4	1.5 C
19	B-045-0-18	IR-77/IR-76	243+80	66	Rt	CME 55T	78	1066.9	1065.4	1.5 C
20	B-045-1-18	IR-77/IR-76	244+88	54	Lt	CME 55T	78	1067.1	1065.6	1.5 C
21	B-051-0-18	Ramp T	10+73	15	Rt	CME 45B	84	1017.6	1016.1	1.5 C
22	B-054-0-18	IR-76	94+72	25	Rt	CME 45B	84	1016.2	1014.7	1.5 C
23	B-056-0-18	IR-76	97+76	30	Rt	CME 45B	84	1013.8	1012.3	1.5 C
24	B-072-0-18	IR-76	99+85	38	Lt	CME 55T	78	1017.6	1016.1	1.5 C
25	B-057-0-18	IR-76	102+30	28	Rt	CME 55X	85	1011.9	1010.4	1.5 C
26	B-073-0-18	IR-76	103+14	39	Lt	CME 55T	78	1016.3	1014.8	1.5 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B	SS-1	1.5	3.0	0.0	1.5	21			NP	NP	NP	5	2	7	11	6	A-1-a	0	2653					
	006-0	SS-2	3.0	4.5	1.5	3.0	28									8	6	A-1-a	0						
	18	SS-3	4.5	6.0	3.0	4.5	15									8	6	A-1-a	0						
		SS-4	6.0	7.5	4.5	6.0	22	15		24	17	7	21	20	41	21	12	A-4a	1						
2	B	SS-1	2.5	4.0	1.0	2.5	16		4.5	23	16	7	32	19	51	12	11	A-4a	3	627					
	078-0	SS-2	5.0	6.5	3.5	5.0	21		4.5	23	15	8	31	18	49	12	10	A-4a	3						
	18																								
								16																	
3	B	SS-1	1.5	3.0	0.0	1.5	27			NP	NP	NP	6	2	8	9	6	A-1-a	0	1267					
	005-0	SS-2	3.0	4.5	1.5	3.0	25									7	6	A-1-a	0						
	18	SS-3	4.5	6.0	3.0	4.5	29									7	6	A-1-a	0						
		SS-4	6.0	7.5	4.5	6.0	27	25		25	18	7	24	14	38	12	13	A-4a	1						
4	B	SS-1	1.5	3.0	0.0	1.5	15			29	19	10	24	15	39	14	14	A-4a	1	167					
	004-0	SS-2	3.0	4.5	1.5	3.0	36									16	14	A-6a	10						
	18	SS-3	4.5	6.0	3.0	4.5	34			29	18	11	38	26	64	16	14	A-6a	6						
		SS-4	6.0	7.5	4.5	6.0	27	15								16	14	A-6a	10						
5	B	SS-1	1.5	3.0	0.0	1.5	38			17	13	4	18	13	31	7	10	A-2-4	0	140					
	003-0	SS-2	3.0	4.5	1.5	3.0	39			NP	NP	NP	13	10	23	5	10	A-2-4	0						
	18	SS-3	4.5	6.0	3.0	4.5	34									5	10	A-2-4	0						
		SS-4	6.0	7.5	4.5	6.0	27	27								4	10	A-2-4	0						
6	B	SS-1	1.5	3.0	0.0	1.5	7		0.75							17	14	A-6a	10	387		HP & Mc		**18"**	
	002-0	SS-2	3.0	4.5	1.5	3.0	34			NP	NP	NP	14	12	26	6	10	A-2-4	0						
	18	SS-3	4.5	6.0	3.0	4.5	35			19	13	6	17	14	31	8	10	A-2-4	0						
		SS-4	6.0	7.5	4.5	6.0	49	7								5	10	A-2-4	0						
7	B	SS-1	1.5	3.0	0.0	1.5	24			NP	NP	NP	11	6	17	10	8	A-3a	0	520					
	001-0	SS-2	3.0	4.5	1.5	3.0	11									10	8	A-3a	0						
	18	SS-3	4.5	6.0	3.0	4.5	14		2.25	28	18	10	38	23	61	15	13	A-4a	5						
		SS-4	6.0	7.5	4.5	6.0	21	11	4.25							17	10	A-4a	8						
8	B	SS-1	1.5	3.0	0.0	1.5	11		4.5	23	17	6	41	24	65	13	12	A-4a	6	273		N_{60}		**12"**	
	053-0	SS-2	3.0	4.5	1.5	3.0	17		4.5							16	10	A-4a	8			Mc			
	18	SS-3	4.5	6.0	3.0	4.5	15		4.5	28	19	9	43	32	75	15	14	A-4a	8						
		SS-4	6.0	7.5	4.5	6.0	36	11								6	10	A-2-4	0						
9	B	SS-1	1.5	3.0	0.0	1.5	49			NP	NP	NP	16	12	28	6	10	A-2-4	0	100					
	061-0	SS-2	3.0	4.5	1.5	3.0	32		4.5	21	15	6	22	15	37	8	10	A-4a	0						
	18	SS-3	4.5	6.0	3.0	4.5	35		4.5							9	10	A-4a	8						
		SS-4	6.0	7.5	4.5	6.0	21	21	4.5							13	10	A-4a	8						

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
10	B	SS-1	2.5	4.0	1.0	2.5	30		2.5	23	17	6	18	12	30	11	10	A-2-4	0						
	060-0	SS-2	5.0	6.5	3.5	5.0	17		2.5							11	10	A-4a	8						
	18																								
								17																	
11	B	SS-1	1.5	3.0	0.0	1.5	22		4.5	23	15	8	21	16	37	9	10	A-4a	0						
	039-0	SS-2	3.0	4.5	1.5	3.0	20		4.5							11	10	A-4a	8	280					
	18	SS-3	4.5	6.0	3.0	4.5	21		4	27	17	10	32	24	56	14	12	A-4a	4						
		SS-4	6.0	7.5	4.5	6.0	17	17	3.5							13	10	A-4a	8						
12	B	SS-1	1.5	3.0	0.0	1.5	28									9	10	A-4a	8						
	040-0	SS-2	3.0	4.5	1.5	3.0	42			NP	NP	NP	19	14	33	8	8	A-3a	0	80					
	18	SS-3	4.5	6.0	3.0	4.5	105									8	8	A-3a	0						
		SS-4	6.0	7.5	4.5	6.0	98	28		NP	NP	NP	26	18	44	7	8	A-3a	0						
13	B	SS-1	1.5	3.0	0.0	1.5	29									5	6	A-1-b	0	333					
	041-0	SS-2	3.0	3.1	1.5	1.6	50										0	Rock	0		Rock				
	18	SS-3	4.5	4.6	3.0	3.1	50										0	Rock	0						
		SS-4	6.0	6.1	4.5	4.6	50	29									0	Rock	0						
14	B	SS-1	0.0	1.5	-1.5	0.0	29			NP	NP	NP	22	8	30	17	8	A-3a	0						
	070-0	SS-2	2.5	2.9	1.0	1.4	50									12	0	Rock	0		Rock	Mc	17"		
	18	SS-3	5.0	5.3	3.5	3.8										8	0	Rock	0						
								30																	
15	B	SS-1	1.5	3.0	0.0	1.5	85		4.5	23	16	7	23	16	39	9	11	A-4a	1	900					
	042-0	SS-2	3.0	4.5	1.5	3.0	88									4	6	A-1-b	0						
	18	SS-3	4.5	6.0	3.0	4.5	52		4.5	23	15	8	36	25	61	10	10	A-4a	5						
		SS-4	6.0	6.5	4.5	5.0	50	30	4.5							7	10	A-4a	8						
16	B	SS-1	0.0	1.5	-1.5	0.0	12		2.75							11	10	A-4a	8						
	071-0	SS-2	2.5	4.0	1.0	2.5	34		4.5	25	17	8	39	24	63	11	12	A-4a	6	340					
	18	SS-3	5.0	6.5	3.5	5.0	56			21	17	4	20	9	29	10	10	A-2-4	0						
								30																	
17	B	SS-1	1.5	3.0	0.0	1.5	95			23	17	6	17	12	29	10	10	A-2-4	0						
	043-0	SS-2	3.0	4.5	1.5	3.0	22		4.5	25	18	7	31	22	53	11	13	A-4a	4	400					
	18	SS-3	4.5	6.0	3.0	4.5	95		4.5							12	10	A-4a	8						
		SS-4	6.0	7.5	4.5	6.0	60	22	4.5							11	10	A-4a	8						
18	B	SS-1	1.5	3.0	0.0	1.5	56		4.5							14	14	A-6a	10						
	044-0	SS-2	3.0	4.5	1.5	3.0	24		4.5	35	21	14	43	40	83	16	16	A-6a	10	133					
	18	SS-3	4.5	6.0	3.0	4.5	21		4.5	34	23	11	45	35	80	10	18	A-6a	8						
		SS-4	6.0	7.5	4.5	6.0	29	21	4.5							16	14	A-6a	10						

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
19	B	SS-1	2.5	3.4	1.0	1.9	50										0	Rock	0		Rock		23"		
	045-0	SS-2	5.0	5.8	3.5	4.3	50										0	Rock	0						
	18																								
								30																	
20	B	SS-1	1.5	3.0	0.0	1.5	40										0	Rock	0		Rock				
	045-1	SS-2	3.0	4.5	1.5	3.0	60										0	Rock	0		Rock		36"		
	18	SS-3	4.5	5.5	3.0	4.0											0	Rock	0						
		SS-4	6.0	6.7	4.5	5.2		30									0	Rock	0						
21	B	SS-1	1.5	3.0	0.0	1.5	14		4.5	26	18	8	36	23	59	13	13	A-4a	5	987					
	051-0	SS-2	3.0	4.5	1.5	3.0	21		4.5	21	14	7	30	20	50	10	10	A-4a	3						
	18	SS-3	4.5	6.0	3.0	4.5	14		3.75							11	10	A-4a	8						
		SS-4	6.0	7.5	4.5	6.0	21	14	1							14	10	A-4a	8						
22	B	SS-1	1.5	3.0	0.0	1.5	28		4.5	25	18	7	29	17	46	9	13	A-4a	2	393					
	054-0	SS-2	3.0	4.5	1.5	3.0	38			23	17	6	19	12	31	7	10	A-2-4	0						
	18	SS-3	4.5	6.9	3.0	5.4	22									2	6	A-1-b	0						
		SS-4	6.9	7.5	5.4	6.0	48	22	4.5							12	10	A-4a							
23	B	SS-1	1.5	3.0	0.0	1.5	20									8	8	A-3a	0						
	056-0	SS-2	3.0	4.5	1.5	3.0	11			17	12	5	18	14	32	11	8	A-3a	0						
	18	SS-3	4.5	6.0	3.0	4.5	6			18	12	6	17	14	31	10	8	A-3a	0	273					
		SS-4	6.0	7.5	4.5	6.0	4	4	1.75							16	14	A-6a	10						
24	B	SS-1	2.5	4.0	1.0	2.5	23		4.5	21	15	6	29	17	46	10	10	A-4a	2	73					
	072-0	SS-2	5.0	6.5	3.5	5.0	21									9	10	A-2-4	0						
	18																								
								21																	
25	B	SS-1A	2.0	2.5	0.5	1.0			3.75	NP	NP	NP	13	8	21	9	8	A-3a	0						
	057-0	SS-1B	2.5	2.8	1.0	1.3											0	Rock	0		Rock	N_{60}	16"	0"	
	18																								
								0																	
26	B	SS-1	1.5	3.0	0.0	1.5	34			NP	NP	NP	7	5	12	6	6	A-1-b	0	13					
	073-0	SS-2	3.0	4.5	1.5	3.0	26			NP	NP	NP	11	7	18	5	6	A-1-b	0						
	18	SS-3	4.5	6.0	3.0	4.5	52									5	0	Rock	0						
		SS-4	6.0	7.0	4.5	5.5	50	26								12	0	Rock	0						

PID: 102329

County-Route-Section: SUM-76/77 Major Rehab

No. of Borings: 26

Geotechnical Consultant: NEAS Inc.

Prepared By: KCA

Date prepared: 2/20/2020

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

Excavate and Replace Stabilization Options	
Global Geotextile Override(N60L):	18''
Override(HP):	24''
Global Geogrid Override(N60L):	12''
Override(HP):	18''

Design CBR	9

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	1%	HP ≤ 0.5	0%
$N_{60} < 12$	7%	0.5 < HP ≤ 1	2%
$12 \leq N_{60} < 15$	3%	1 < HP ≤ 2	1%
$N_{60} \geq 20$	77%	HP > 2	38%
M+	3%		
Rock	13%		
Unsuitable	16%		

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

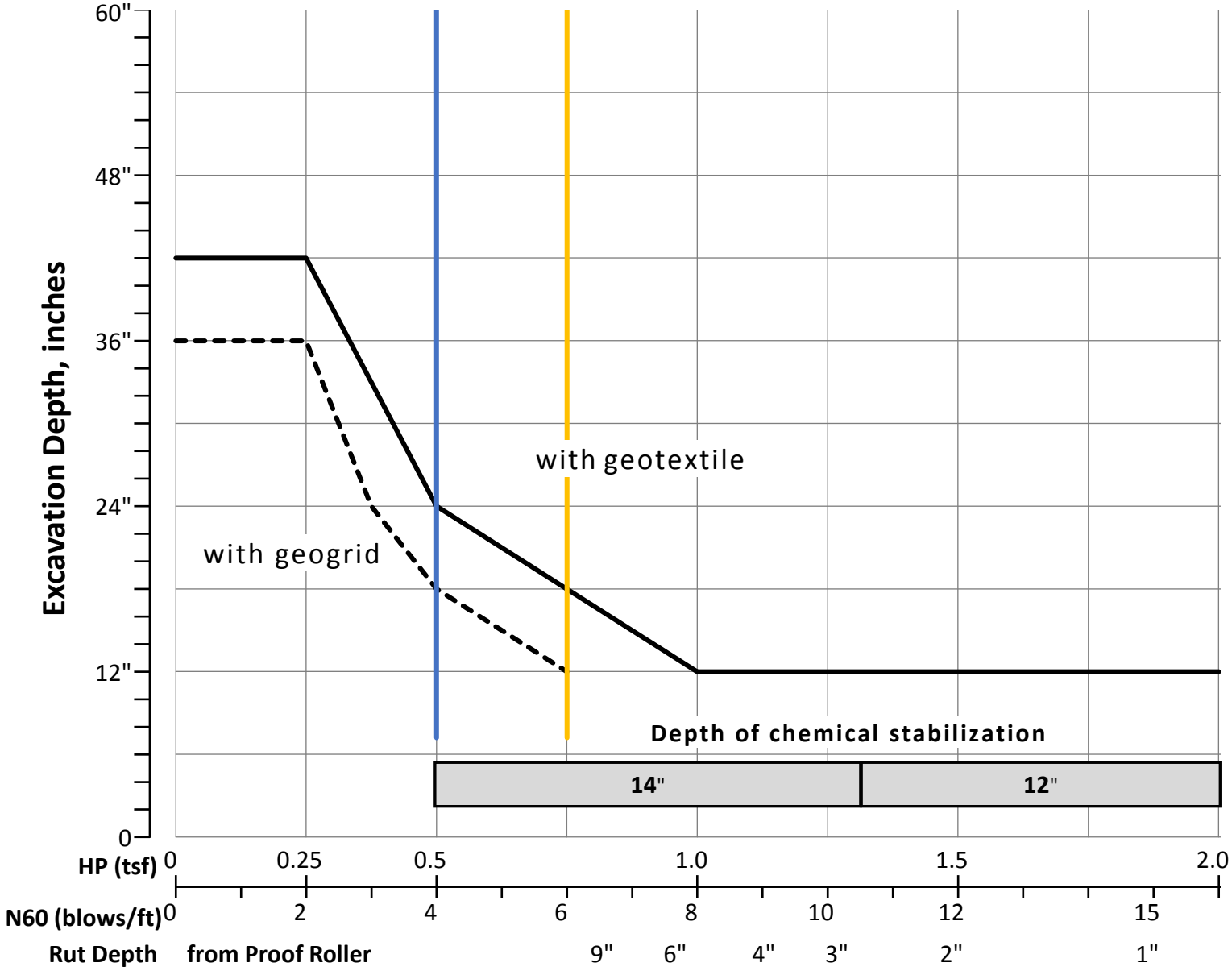
% Proposed Subgrade Surface	
Unstable & Unsuitable	23%
Unstable	10%
Unsuitable	13%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	35	20	3.97	24	17	8	24	17	41	10	9	3
Maximum	105	30	4.50	35	23	14	45	40	83	21	18	10
Minimum	4	0	0.75	17	12	4	5	2	7	2	0	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	14	6	5	14	0	0	0	0	9	33	0	0	9	0	0	0	0	0	90
Percent	16%	7%	6%	16%	0%	0%	0%	0%	10%	37%	0%	0%	10%	0%	0%	0%	0%	0%	100%
% Rock|Granular|Cohesive	16%	74%									10%								100%
Surface Class Count	6	4	4	7	0	0	0	0	7	16	0	0	4	0	0	0	0	0	48
Surface Class Percent	13%	8%	8%	15%	0%	0%	0%	0%	15%	33%	0%	0%	8%	0%	0%	0%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
3.97	0.50	☑ HP
19.96	6.00	☑ N60L

Average HP
Average N_{60L}

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

SUM-76/77 Major Rehab
102329

Subgrade Exlporation for SUM-76/77 NW Interchange Major Rehab Design Build Ramp T

NEAS Inc.

Prepared By: KCA
Date prepared: Thursday, February 20, 2020

Brendan P. Andrews
2868 East Kemper Road
Cincinnati, OH 45241

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

NO. OF BORINGS: 3

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-051-0-18	Ramp T	10+73	15	Rt	CME 45B	84	1017.6	1015.2	2.4 C
2	B-052-0-18	Ramp T	8+07	32	Lt	CME 55X	85	1003.7	1007.3	3.6 F
3	B-053-0-18	Ramp T	4+17	30	Lt	CME 45B	84	997.3	995.8	1.5 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B	SS-1	2.4	3.0	0.0	0.6	14		4.5	26	18	8	36	23	59	13	13	A-4a	5	987					
	051-0	SS-2	3.0	4.5	0.6	2.1	21		4.5	21	14	7	30	20	50	10	10	A-4a	3						
	18	SS-3	4.5	6.0	2.1	3.6	14		3.75							11	10	A-4a	8						
		SS-4	6.0	7.5	3.6	5.1	21	14	1							14	10	A-4a	8						
2	B	SS-1	2.5	4.0	6.1	7.6	62									7	6	A-1-a							
	052-0	SS-2	5.0	6.5	8.6	10.1	85			NP	NP	NP	7	3	10	7	6	A-1-a							
	18																								
3	B	SS-1	1.5	3.0	0.0	1.5	11		4.5	23	17	6	41	24	65	13	12	A-4a	6	273		N_{60}		**12''**	
	053-0	SS-2	3.0	4.5	1.5	3.0	17		4.5							16	10	A-4a	8			Mc			
	18	SS-3	4.5	6.0	3.0	4.5	15		4.5	28	19	9	43	32	75	15	14	A-4a	8						
		SS-4	6.0	7.5	4.5	6.0	36	11								6	10	A-2-4	0						

PID: 102329

County-Route-Section: SUM-76/77 Major Rehab

No. of Borings: 3

Geotechnical Consultant: NEAS Inc.

Prepared By: KCA

Date prepared: 2/20/2020

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

Excavate and Replace Stabilization Options	
Global Geotextile Override(N60L):	18''
Override(HP):	24''
Global Geogrid Override(N60L):	12''
Override(HP):	18''

Design CBR	7

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	0%	HP ≤ 0.5	0%
$N_{60} < 12$	11%	0.5 < HP ≤ 1	11%
$12 \leq N_{60} < 15$	22%	1 < HP ≤ 2	0%
$N_{60} \geq 20$	44%	HP > 2	67%
M+	11%		
Rock	0%		
Unsuitable	0%		

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

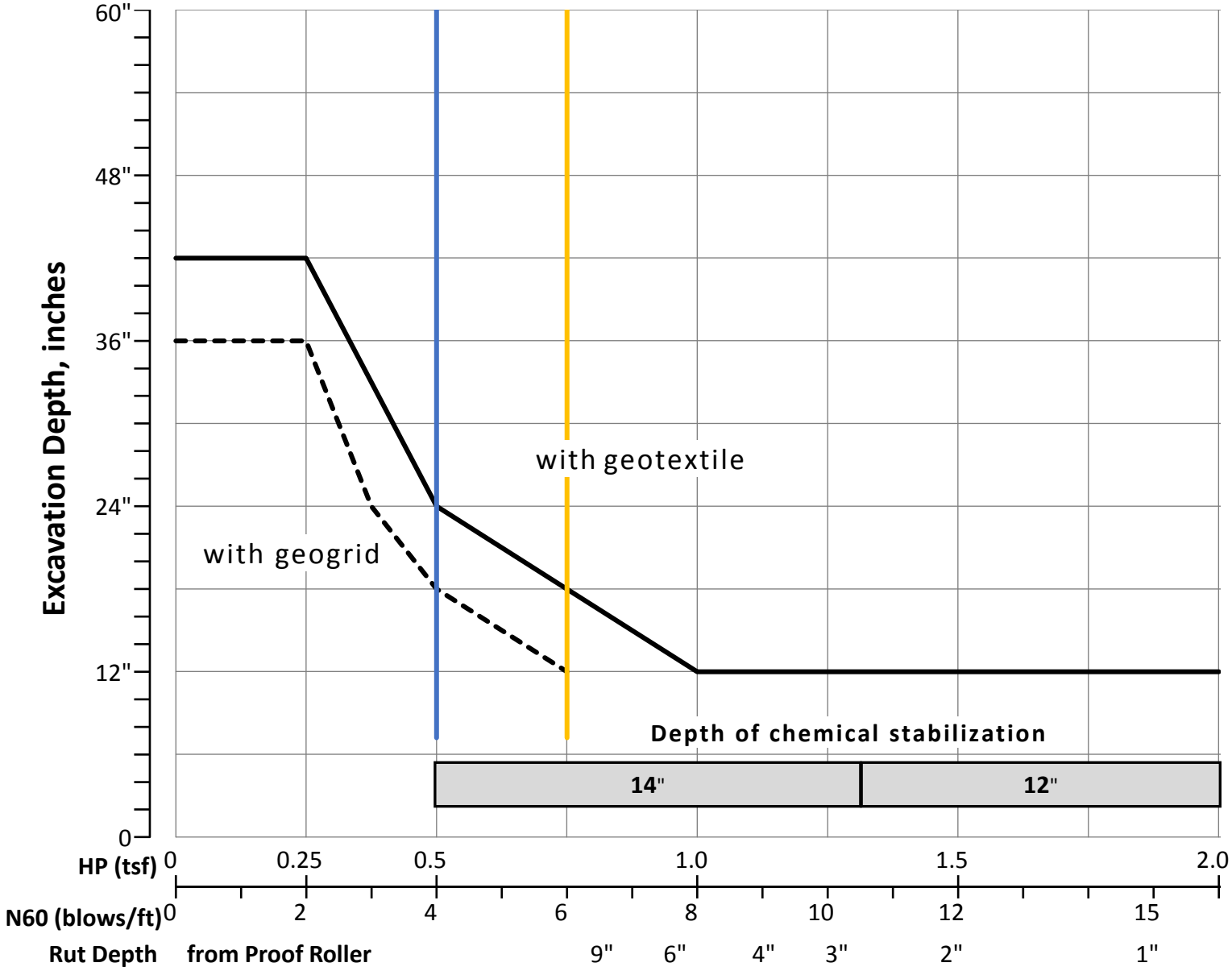
% Proposed Subgrade Surface	
Unstable & Unsuitable	40%
Unstable	40%
Unsuitable	0%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	30	13	3.89	25	17	8	31	20	52	11	10	6
Maximum	85	14	4.50	28	19	9	43	32	75	16	14	8
Minimum	11	11	1.00	21	14	6	7	3	10	6	6	0

Classification Counts by Sample

ODOT Class	Rock	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-3	A-3a	A-4a	A-4b	A-5	A-6a	A-6b	A-7-5	A-7-6	A-8a	A-8b	Totals
Count	0	2	0	1	0	0	0	0	0	7	0	0	0	0	0	0	0	0	10
Percent	0%	20%	0%	10%	0%	0%	0%	0%	0%	70%	0%	0%	0%	0%	0%	0%	0%	0%	100%
% Rock|Granular|Cohesive	0%	100%									0%								100%
Surface Class Count	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	5
Surface Class Percent	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
3.89	0.50	☑ HP
12.50	6.00	☑ N60L

Average HP
Average N_{60L}

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

SUM-76/77 Major Rehab
102329

Subgrade Exlporation for SUM-76/77 NW Interchange Major Rehab Design Build Ramp U

NEAS Inc.

Prepared By: KCA
Date prepared: Thursday, February 20, 2020

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NO. OF BORINGS: 4

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-067-0-18	Ramp U	8+40	5	Rt	CME 55T	78	1019.4	1017.9	1.5 C
2	B-068-0-18	Ramp U	12+37	19	Rt	CME 55T	78	1012.1	1012.3	0.2 F
3	B-069-0-18	Ramp U	16+94	19	Rt	CME 55T	78	1024.3	1022.9	1.4 C
4	B-070-0-18	IR-77/IR-76	231+79	79	Rt	CME 55T	78	1036.8	1035.8	1.0 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B	SS-1	2.5	4.0	1.0	2.5	17		3.25	20	13	7	28	18	46	10	10	A-4a	2						
	067-0	SS-2	5.0	6.5	3.5	5.0	12									6	10	A-4a	8	473					
	18	SS-3	7.5	9.0	6.0	7.5	20		3							9	10	A-4a							
								12																	
2	B	SS-1	1.3	2.8	1.5	3.0	27		4.5	23	16	7	23	13	36	10	11	A-4a	0						
	068-0	SS-2	2.8	4.0	3.0	4.2	43									5	6	A-1-b	0	1507					
	18	SS-3	5.0	6.5	5.2	6.7	77									7	6	A-1-b							
								27																	
3	B	SS-1	2.5	4.0	1.1	2.6	40									17	10	A-2-4	0	13		Mc			
	069-0	SS-2	5.0	6.5	3.6	5.1	40		4.25	49	22	27	7	66	73	16	19	A-7-6	16						
	18	SS-3A	7.0	8.1	5.6	6.7	50		2.5							20	18	A-7-6							
								30																	
4	B	SS-1	1.0	1.5	0.0	0.5	29			NP	NP	NP	22	8	30	17	8	A-3a	0						
	070-0	SS-2	2.0	2.8	1.0	1.8	29									12	0	Rock	0		Rock	Mc	**22"**		
	18	SS-3	5.0	5.2	4.0	4.2	29									8	0	Rock	0						
								29																	

PID: 102329

County-Route-Section: SUM-76/77 Major Rehab

No. of Borings: 4

Geotechnical Consultant: NEAS Inc.

Prepared By: KCA

Date prepared: 2/20/2020

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

Excavate and Replace Stabilization Options	
Global Geotextile Override(N60L):	18''
Override(HP):	24''
Global Geogrid Override(N60L):	12''
Override(HP):	18''

Design CBR	9

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	0%	HP ≤ 0.5	0%
$N_{60} < 12$	0%	0.5 < HP ≤ 1	0%
$12 \leq N_{60} < 15$	8%	1 < HP ≤ 2	0%
$N_{60} \geq 20$	83%	HP > 2	42%
M+	17%		
Rock	20%		
Unsuitable	17%		

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

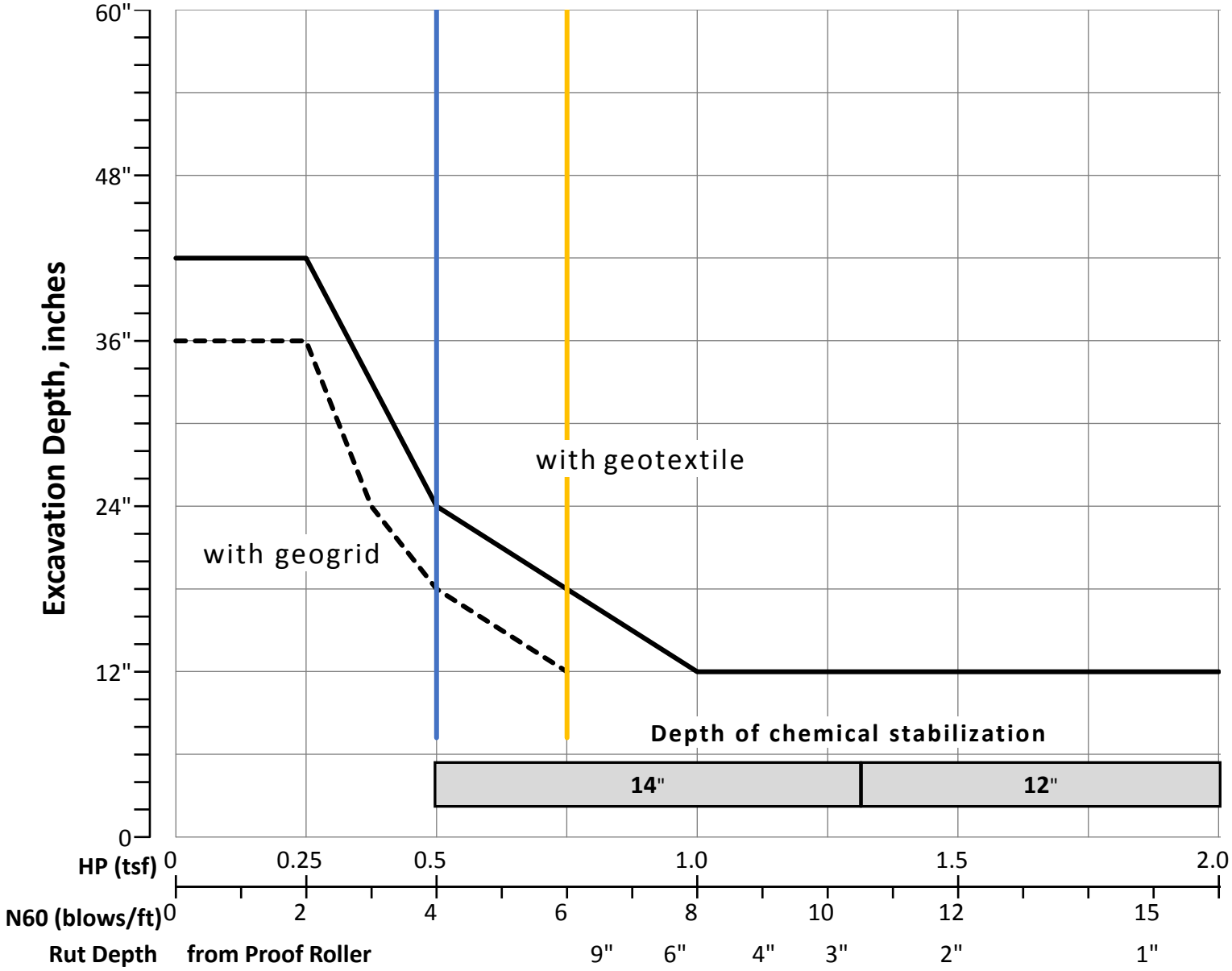
% Proposed Subgrade Surface	
Unstable & Unsuitable	60%
Unstable	40%
Unsuitable	20%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	34	25	3.50	31	17	14	20	26	46	11	9	3
Maximum	77	30	4.50	49	22	27	28	66	73	20	19	16
Minimum	12	12	2.50	20	13	7	7	8	30	5	0	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	2	0	2	1	0	0	0	0	1	4	0	0	0	0	0	2	0	0	12
Percent	17%	0%	17%	8%	0%	0%	0%	0%	8%	33%	0%	0%	0%	0%	0%	17%	0%	0%	100%
% Rock|Granular|Cohesive	17%	67%									17%								100%
Surface Class Count	1	0	0	1	0	0	0	0	1	2	0	0	0	0	0	0	0	0	5
Surface Class Percent	20%	0%	0%	20%	0%	0%	0%	0%	20%	40%	0%	0%	0%	0%	0%	0%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
3.50	0.50	☑ HP
24.50	6.00	☑ N60L

Average HP
Average N_{60L}

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

SUM-76/77 Major Rehab
102329

Subgrade Exlporation for SUM-76/77 NW Interchange Major Rehab Design Build Ramp V

NEAS Inc.

Prepared By: KCA
Date prepared: Thursday, February 20, 2020

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(920) 427-0671
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NO. OF BORINGS: 4

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-043-0-18	Ramp V	8+09	37	Lt	CME 45B	84	1047.6	1047.3	0.3 C
2	B-076-0-18	Ramp V	10+85	59	Lt	CME 55X	85	1036.2	1033.4	2.8 C
3	B-075-0-18	Ramp V	14+42	77	Lt	CME 55X	85	1021.2	1022.7	1.5 F
4	B-074-0-18	Ramp V	18+11	7	Rt	CME 45B	84	1015.2	1014.3	0.9 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B	SS-1	1.5	3.0	1.2	2.7	95			23	17	6	17	12	29	10	10	A-2-4	0						
	043-0	SS-2	3.0	4.5	2.7	4.2	22		4.5	25	18	7	31	22	53	11	13	A-4a	4	400					
	18	SS-3	4.5	6.0	4.2	5.7	95		4.5							12	10	A-4a	8						
		SS-4	6.0	7.5	5.7	7.2	60	22	4.5							11	10	A-4a							
2	B	SS-1	2.8	4.0	0.0	1.2	51			NP	NP	NP	21	10	31	7	10	A-2-4	0	1133					
	076-0	SS-2A	5.0	5.7	2.2	2.9	50			19	15	4	24	14	38	9	10	A-4a	1						
	18	SS-2B	5.7	6.0	2.9	3.2										0	0	Rock	0			N_{60}			
								30																	
3	B	SS-1	2.5	4.0	4.0	5.5	23			25	16	9	57	26	83	5	11	A-4b	8	20					
	075-0	SS-2	5.0	5.9	6.5	7.4				24	15	9	37	23	60	5	10	A-4b							
	18																								
								23																	
4	B	SS-1	2.5	4.0	1.6	3.1	60			NP	NP	NP	5	3	8	6	6	A-1-b	0	13					
	074-0	SS-2	5.0	5.4	4.1	4.5										7	0	Rock	0						
	18	SS-3	7.5	7.7	6.6	6.8											0	Rock							
								30																	

PID: 102329

County-Route-Section: SUM-76/77 Major Rehab

No. of Borings: 4

Geotechnical Consultant: NEAS Inc.

Prepared By: KCA

Date prepared: 2/20/2020

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

Excavate and Replace Stabilization Options	
Global Geotextile Override(N60L):	18''
Override(HP):	24''
Global Geogrid Override(N60L):	12''
Override(HP):	18''

Design CBR	10

% 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%
$N_{60} \geq 20$	80%	HP > 2	30%
M+	0%		
Rock	0%		
Unsuitable	42%		

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

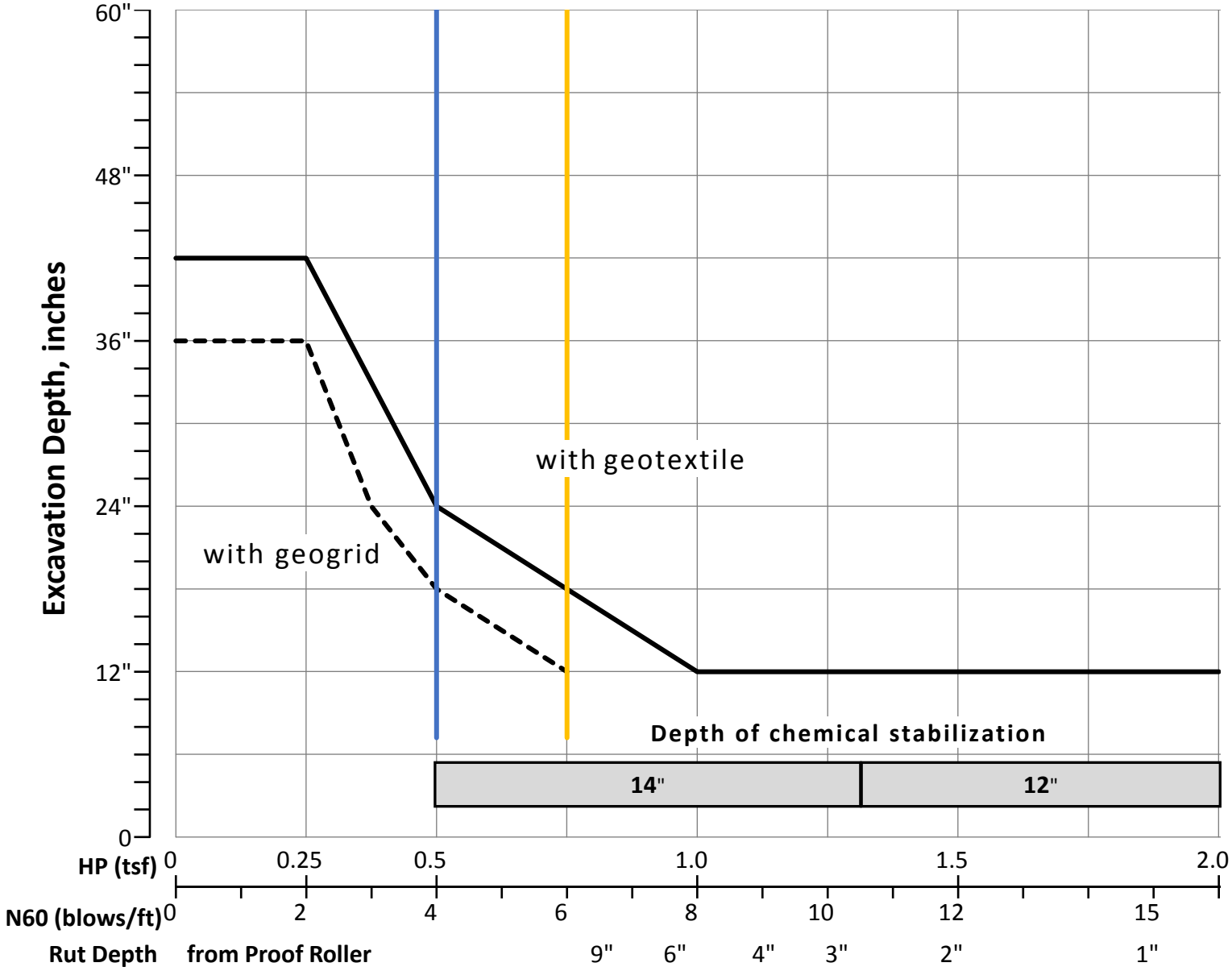
% Proposed Subgrade Surface	
Unstable & Unsuitable	20%
Unstable	20%
Unsuitable	0%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	57	26	4.50	23	16	7	27	16	43	8	8	2
Maximum	95	30	4.50	25	18	9	57	26	83	12	13	8
Minimum	22	22	4.50	19	15	4	5	3	8	0	0	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	3	0	1	2	0	0	0	0	0	4	2	0	0	0	0	0	0	0	12
Percent	25%	0%	8%	17%	0%	0%	0%	0%	0%	33%	17%	0%	0%	0%	0%	0%	0%	0%	100%
% Rock|Granular|Cohesive	25%	58%									17%								100%
Surface Class Count	0	0	1	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	5
Surface Class Percent	0%	0%	20%	40%	0%	0%	0%	0%	0%	40%	0%	0%	0%	0%	0%	0%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
4.50	0.50	☑ HP
26.25	6.00	☑ N60L

Average HP

Average N_{60L}

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

SUM-76/77 Major Rehab
102329

Subgrade Exlporation for SUM-76/77 NW Interchange Major Rehab Design Build Ramp W

NEAS Inc.

Prepared By: KCA
Date prepared: Thursday, February 20, 2020

Brendan P. Andrews
2868 East Kemper Road
Cincinnati, OH 45241

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

NO. OF BORINGS: 4

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-057-0-18	IR-76	102+30	28	Rt	CME 55X	85	1011.9	1010.4	1.5 C
2	B-058-0-18	Ramp W	106+50	1	Rt	CME 55X	85	1008.0	1007.9	0.1 C
3	B-059-0-18	Ramp W	110+72	15	Rt	CME 55X	85	1004.8	1003.8	1.0 C
4	B-040-0-18	IR-76/IR-77	223+88	37	Lt	CME 45B	84	1007.9	1006.4	1.5 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B	SS-1A	2.0	2.5	0.5	1.0	11		3.75	NP	NP	NP	13	8	21	9	8	A-3a	0						
	057-0	SS-1B	2.5	2.8	1.0	1.3	50										0	Rock	0		Rock		16''		
	18																								
								11																	
2	B	SS-1	2.5	2.9	2.4	2.8	50			NP	NP	NP	9	4	13	6	6	A-1-b	0	33					
	058-0	SS-2	4.0	4.2	3.9	4.1	50									4	0	Rock	0						
	18																								
								30																	
3	B	SS-1	2.5	4.0	1.5	3.0	85			NP	NP	NP	23	14	37	11	11	A-4a	0	53					
	059-0	SS-2	5.0	6.3	4.0	5.3										6	0	Rock	0						
	18	SS-3	6.5	6.6	5.5	5.6										8	0	Rock							
								30																	
4	B	SS-1	1.5	3.0	0.0	1.5	28									9	10	A-4a	8						
	040-0	SS-2	3.0	4.5	1.5	3.0	42			NP	NP	NP	19	14	33	8	8	A-3a	0	80					
	18	SS-3	4.5	6.0	3.0	4.5	105									8	8	A-3a	0						
		SS-4	6.0	7.5	4.5	6.0	98	28		NP	NP	NP	26	18	44	7	11	A-4a	2						

PID: 102329

County-Route-Section: SUM-76/77 Major Rehab

No. of Borings: 4

Geotechnical Consultant: NEAS Inc.

Prepared By: KCA

Date prepared: 2/20/2020

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

Excavate and Replace Stabilization Options	
Global Geotextile Override(N60L):	18''
Override(HP):	24''
Global Geogrid Override(N60L):	12''
Override(HP):	18''

Design CBR	12

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	0%	HP ≤ 0.5	0%
$N_{60} < 12$	9%	0.5 < HP ≤ 1	0%
$12 \leq N_{60} < 15$	0%	1 < HP ≤ 2	0%
$N_{60} \geq 20$	73%	HP > 2	9%
M+	0%		
Rock	17%		
Unsuitable	36%		

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

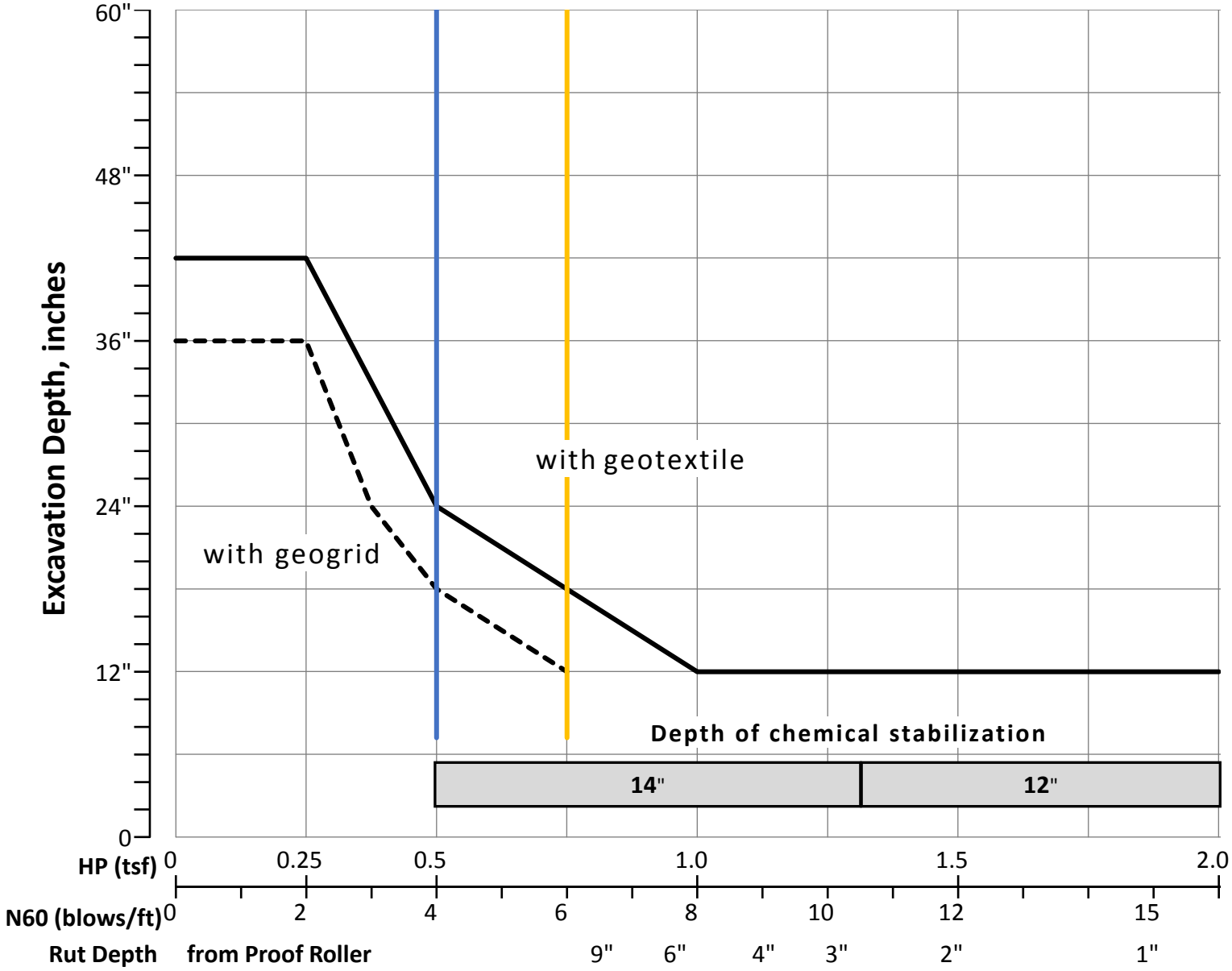
% Proposed Subgrade Surface	
Unstable & Unsuitable	17%
Unstable	0%
Unsuitable	17%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	58	25	3.75				18	12	30	8	6	1
Maximum	105	30	3.75	0	0	0	26	18	44	11	11	8
Minimum	11	11	3.75	0	0	0	9	4	13	4	0	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	4	0	1	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	11
Percent	36%	0%	9%	0%	0%	0%	0%	0%	27%	27%	0%	0%	0%	0%	0%	0%	0%	0%	100%
% Rock|Granular|Cohesive	36%	64%									0%								100%
Surface Class Count	1	0	1	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	6
Surface Class Percent	17%	0%	17%	0%	0%	0%	0%	0%	33%	33%	0%	0%	0%	0%	0%	0%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
3.75	0.50	☑ HP
24.75	6.00	☑ N60L

Average HP
Average N_{60L}

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

SUM-76/77 Major Rehab
102329

Subgrade Exlporation for SUM-76/77 NW Interchange Major Rehab Design Build Ramp J

NEAS Inc.

Prepared By: KCA
Date prepared: Thursday, February 20, 2020

Brendan P. Andrews
2868 East Kemper Road
Cincinnati, OH 45241

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

NO. OF BORINGS: 5

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-045-1-18	IR-76/IR-77	244+88	54	Lt.	CME 55T	78	1067.1	1065.6	1.5 C
2	B-077-1-18	Ramp J				CME 55T	78	1071.4	1069.9	1.5 C
3	B-077-2-18	Ramp J				CME 55T	78	1082.8	1081.3	1.5 C
4	B-077-3-18	Ramp J				CME 55T	78	1080.4	1078.9	1.5 C
5	B-077-4-18	Ramp J				CME 55T	78	1087.2	1085.7	1.5 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B	SS-1	1.5	3.0	0.0	1.5	40										0	Rock	0		Rock					
	045-1	SS-2	3.0	4.5	1.5	3.0	60										0	Rock	0		Rock		**36"**			
	18	SS-3	4.5	5.5	3.0	4.0											0	Rock	0							
		SS-4	6.0	6.7	4.5	5.2		30									0	Rock	0							
2	B	SS-1	1.5	3.0	0.0	1.5	21			19	15	4	23	11	34	9	10	A-2-4	0	100						
	077-1	SS-2	3.0	4.5	1.5	3.0	51			NP	NP	NP	21	9	30	7	8	A-3a	0							
	18	SS-3	4.5	6.0	3.0	4.5	34									6	8	A-3a	0							
		SS-4	6.0	7.5	4.5	6.0	44	21	4.5							10	10	A-4a	8							
3	B	SS-1	1.5	3.0	0.0	1.5	14		4.25	27	17	10	47	29	76	14	12	A-4a	8	233						
	077-2	SS-2	3.0	4.5	1.5	3.0	18		4.25	26	18	8	38	21	59	17	13	A-4a	5			Mc				
	18	SS-3	4.5	6.0	3.0	4.5	16		4.25							16	10	A-4a	8							
		SS-4	6.0	7.5	4.5	6.0	13	13	4							17	10	A-4a	8							
4	B	SS-1	1.5	3.5	0.0	2.0	9			NP	NP	NP	4	4	8	7	6	A-1-b	0	13						
	077-3	SS-2	3.5	4.5	2.0	3.0	10		4.25							18	10	A-4b	8		A-4b	N_{60} & Mc				
	18	SS-3	4.5	6.0	3.0	4.5	13		4.25	22	18	4	58	15	73	19	13	A-4b	8							
		SS-4	6.0	7.5	4.5	6.0	22	9	3.25							19	10	A-4b	8							
5	B	SS-1	1.5	3.0	0.0	1.5	14		4.25	29	19	10	53	33	86	16	14	A-4b	8	200	A-4b					
	077-4	SS-2	3.0	4.5	1.5	3.0	21		4.25							22	10	A-4b	8		A-4b	Mc	**36"**			
	18	SS-3	4.5	6.0	3.0	4.5	13		4	30	23	7	69	28	97	22	18	A-4b	8							
		SS-4	6.0	7.5	4.5	6.0	13	13	3.75							27	10	A-4b	8							

PID: 102329

County-Route-Section: SUM-76/77 Major Rehab

No. of Borings: 5

Geotechnical Consultant: NEAS Inc.

Prepared By: KCA

Date prepared: 2/20/2020

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

Excavate and Replace Stabilization Options	
Global Geotextile Override(N60L):	18''
Override(HP):	24''
Global Geogrid Override(N60L):	12''
Override(HP):	18''

Design CBR	8

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	0%	HP ≤ 0.5	0%
$N_{60} < 12$	10%	0.5 < HP ≤ 1	0%
$12 \leq N_{60} < 15$	30%	1 < HP ≤ 2	0%
$N_{60} \geq 20$	40%	HP > 2	60%
M+	15%		
Rock	20%		
Unsuitable	55%		

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

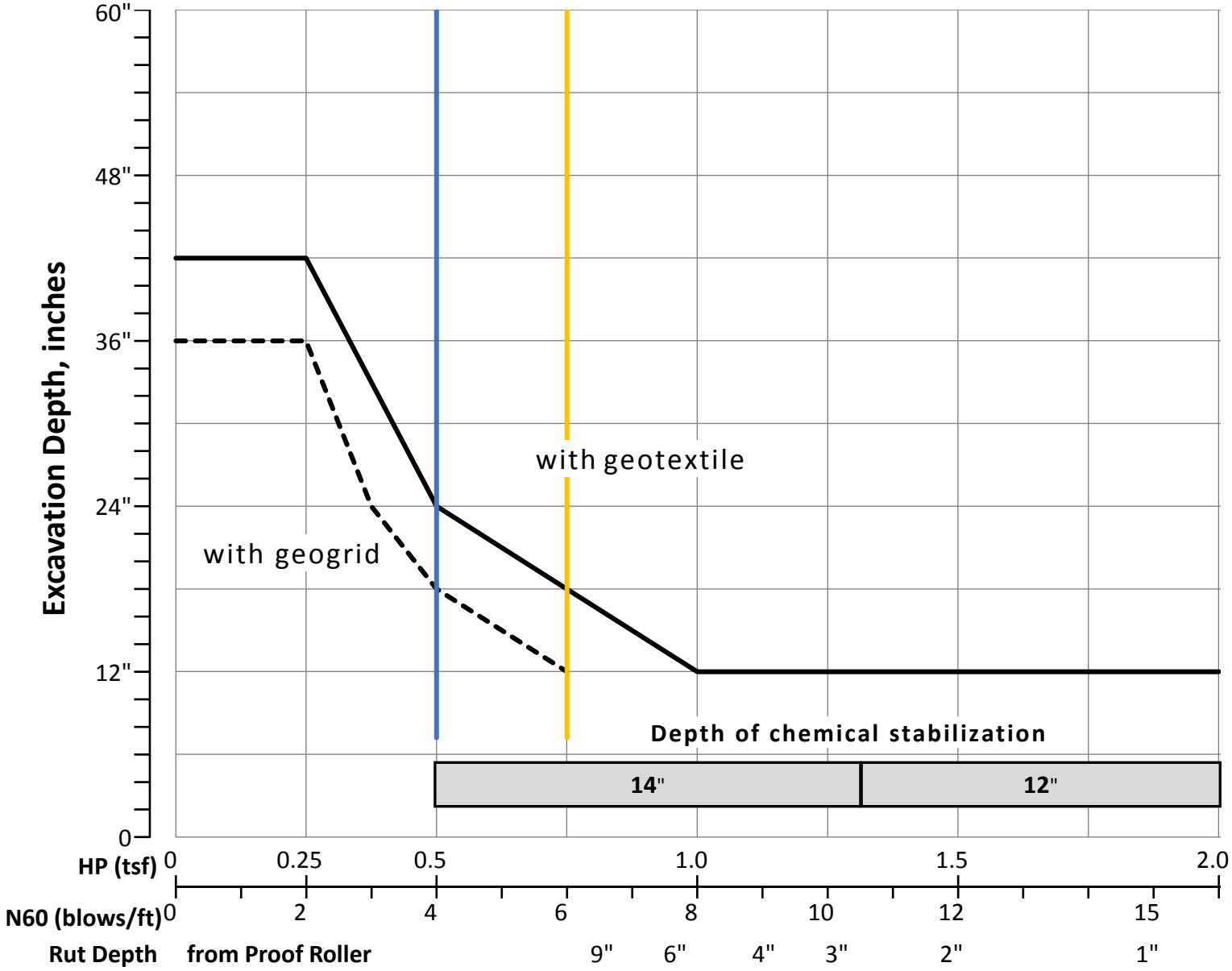
% Proposed Subgrade Surface	
Unstable & Unsuitable	80%
Unstable	30%
Unsuitable	50%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	24	17	4.10	26	18	7	39	19	58	15	9	5
Maximum	60	30	4.50	30	23	10	69	33	97	27	18	8
Minimum	9	9	3.25	19	15	4	4	4	8	6	0	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	4	0	1	1	0	0	0	0	2	5	7	0	0	0	0	0	0	0	20
Percent	20%	0%	5%	5%	0%	0%	0%	0%	10%	25%	35%	0%	0%	0%	0%	0%	0%	0%	100%
% Rock|Granular|Cohesive	20%	45%									35%								100%
Surface Class Count	2	0	1	1	0	0	0	0	1	2	3	0	0	0	0	0	0	0	10
Surface Class Percent	20%	0%	10%	10%	0%	0%	0%	0%	10%	20%	30%	0%	0%	0%	0%	0%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
4.10	0.50	☑ HP
17.20	6.00	☑ N60L

Average HP

Average N_{60L}

The subgrade analysis workbook consists of five worksheets. Each worksheet functions independently. In all of the worksheets the fields are color coded as follows:

- Every yellow highlighted field indicates a field to be entered by the user.
- Every salmon field is to indicate a problem/issue.
- Every gray or green field is a heading/informational field.

IMPORTANT: The sequence of filling out the data needs to be followed as outlined below:

1. Cover Sheet: this worksheet is designed for the purpose of entering the project information. Enter all the following fields:

County-Route-Section	This includes the county, route, section number assigned to the project.
PID	the Project Identification Number
Project Description	See Cover Sheet for list of example details
Geotechnical Consultant	The Geotechnical Consultant performing the analysis.
Prepared By	The preparer of the subgrade analysis
Date prepared	The date the analysis is performed.
Contact Information	Name, address, telephone #, and email address
No. of Borings	Enter the total number of borings within the alignment that is being analyzed.

2. Boring Logs Entry Worksheet: this worksheet has a programming code that will run in the background every time the sheet is activated and will make the sheet unresponsive for less than a minute. The code is designed to read the total number of borings from the cover sheet and generate the needed number of fields.
   a. All yellow highlighted fields are user's entry.
   b. ODOT has developed a text table export from gINT *(GB 1 Borings Log Entry Tab)* that will allow for copy and paste of all highlighted fields with the exception of proposed subgrade elevation. The designer must provide a proposed subgrade elevation in order for the spreadsheet to function properly.
   c. The Cut/Fill field is a calculated field that, based on the difference between the boring elevation and the proposed subgrade elevation, will highlight the cell either gray and adds the letter "C" to the end in a cut situation or highlights the cell in light purple and adds the letter "F" to the end in a fill situation.
   d. Every duplicate boring ID will be highlighted in salmon background and red text.
   e. **IMPORTANT**: After entering all the borings' information, the user must click "Add Subgrade Analysis Entry Fields" button. This will generate all the required fields in the "Subgrade Analysis" Worksheet.

3. Subgrade Analysis Worksheet:
   a. The boring number and boring ID is read from the "Boring Logs Entry Worksheet" excluding every boring that has six feet or more of fill.
   b. All yellow highlighted fields are to be entered by the user and salmon highlighted fields indicates a problem or issue.
   c. Every sample that has a Sulfate Content greater than or equal to 3000 will be highlighted in light salmon background. Every sample that has a Sulfate Content greater than or equal to 8000 will be highlighted in darker salmon background. Note the revised sulfate criteria in GB1 issued July 20, 2018.

d. Unsuitable/Unstable:

i. Unsuitable samples that are within 3 feet of the top of subgrade will be highlighted with salmon background and the class will be showing in this field.

ii. Unstable Samples that are within 3 feet of top of subgrade will be highlighted with salmon background and text to indicate the problem as follows:

Criterion	Stabilization Need Check	Text displayed in the field
A-1-a, A-1-b, A-3, or A-3a Soil Class	No Stabilization is needed	
HP ≥ 1.875	No Stabilization is needed	
N_{60} ≥ 15	No Stabilization is needed	
1.875 ≥ HP ≥ 1.5 and M_c≥ Opt. M_c+3	Unstable Subgrade	HP & Mc
15 ≥ N_{60} ≥ 12 and M_c≥ Opt. M_c+3	Unstable Subgrade	N_{60} & Mc
HP ≤ 1.5	Unstable Subgrade	HP
N_{60} ≤ 12	Unstable Subgrade	N_{60}

iii. The field is formulated to check for HP first and check for N_{60} second.

e. Excavate and Replace (Item 204) is going to be calculated based on the subgrade depth for each sample indicating an unsuitable or unstable problem.

f. Recommendation:

i. Geotextile Option is calculated and rounded to a multiple of 3 inches based on the subgrade depth for every sample indicating an unsuitable or unstable problem.

ii. GEOGRID Option is only offered in case of unstable subgrade problem and if the geotextile option indicates the need to excavate greater than 12 inches.

PLEASE NOTE: The Problem, Excavate & Replace, and Recommendation Fields are the responsibility of the Designer. These fields are being enhanced to attempt to capture the ODOT philosophy regarding the GB1 stabilization chart, but are considered still under development. If there are discrepancies between the spreadsheet output and the GB1 chart - the chart governs in conjunction with engineering judgement. Please contact Steve Taliaferro at stephen.taliaferro@dot.ohio.gov if you have any questions.

PLEASE NOTE: It is the Designer's responsibility to identify the most representative data when samples have been separated into multiple specimen (say 1.5 to 2.3 feet and 2.3 to 3.0 feet). The spreadsheet is not capable at this time of addressing this issue within a direct data export from gINT.

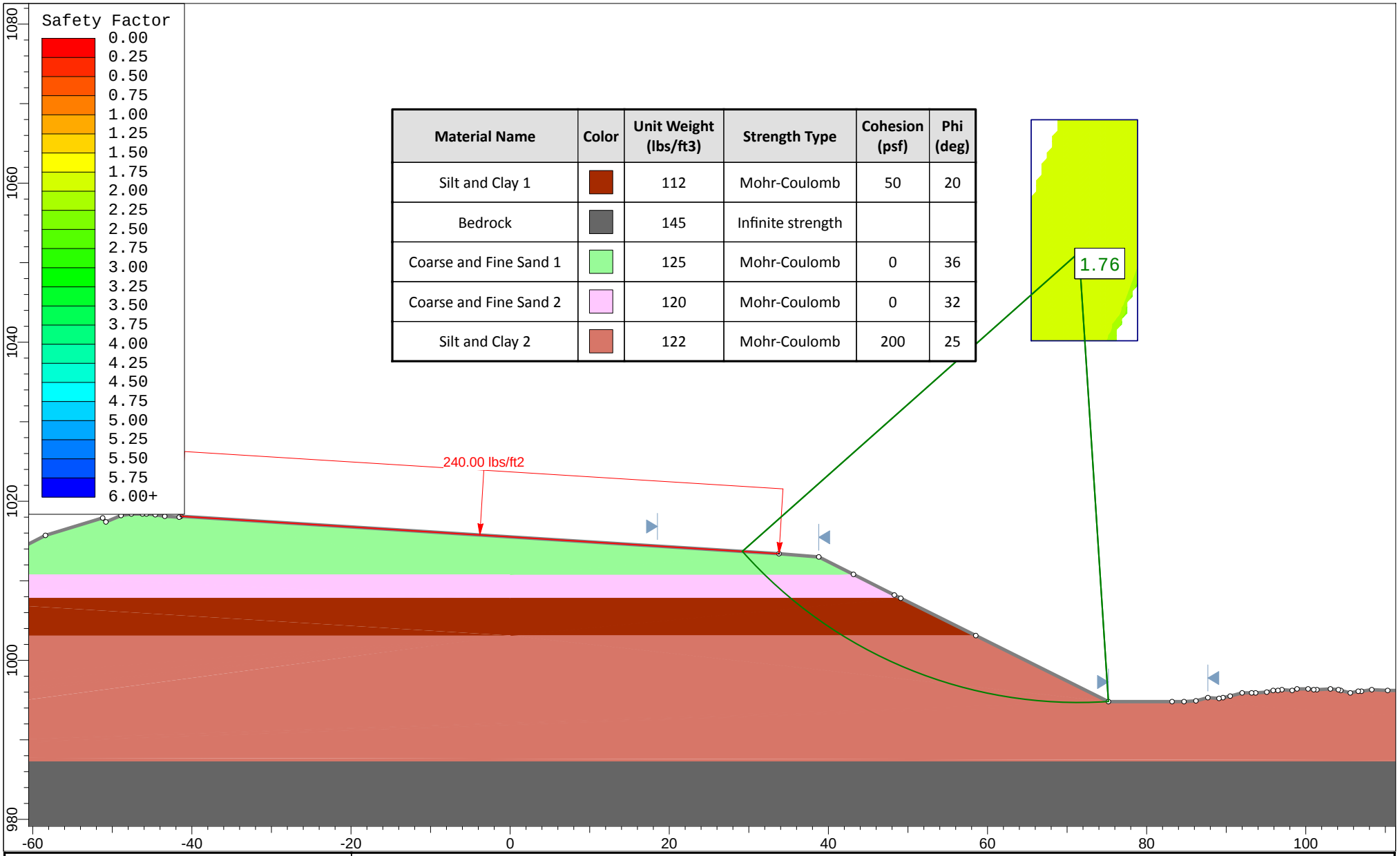
4. Results Summary:
All fields in this sheet are password protected and are either calculated or read from the other worksheets.

5. Graph Worksheet:
This worksheet is designed to read the average N_{60L} and the average HP from the Cover Sheet and plot a blue line for Average HP and orange line for Average N_{60L} on GB1 Figure B – Subgrade Stabilization. The Override Table can be used to enter HP and/or N_{60L} values that are different than the calculated averages. The Override values will change the global undercut recommendation in the Results Summary.

APPENDIX E

EMBANKMENT STABILITY ANALYSIS

IR-76 EB – STA. 98+00

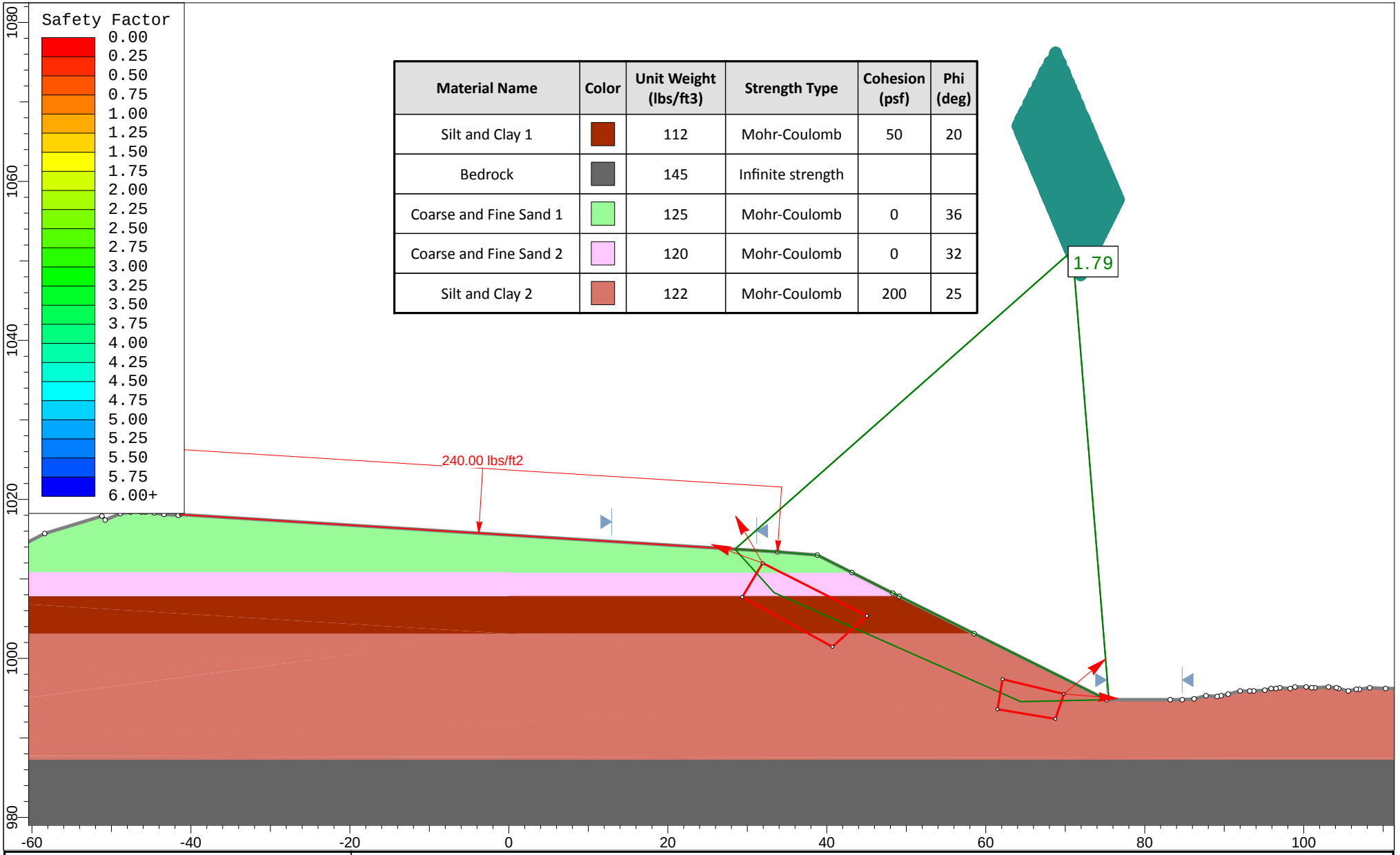


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Silt and Clay 1		112	Mohr-Coulomb	50	20
Bedrock		145	Infinite strength		
Coarse and Fine Sand 1		125	Mohr-Coulomb	0	36
Coarse and Fine Sand 2		120	Mohr-Coulomb	0	32
Silt and Clay 2		122	Mohr-Coulomb	200	25

rocscience

SLIDEINTERPRET 7.038

Project	SUM-76-6.15, PID 100713		
Analysis Description	Embankment Stability - IR-76, STA. 98+00 - Effective Stress - Circular Failure		
Drawn By	KCA	Scale 1:200	Company NEAS Inc.
Date	7/24/2019, 12:12:45 PM		File Name STA98+00_EffectiveCircular.slim

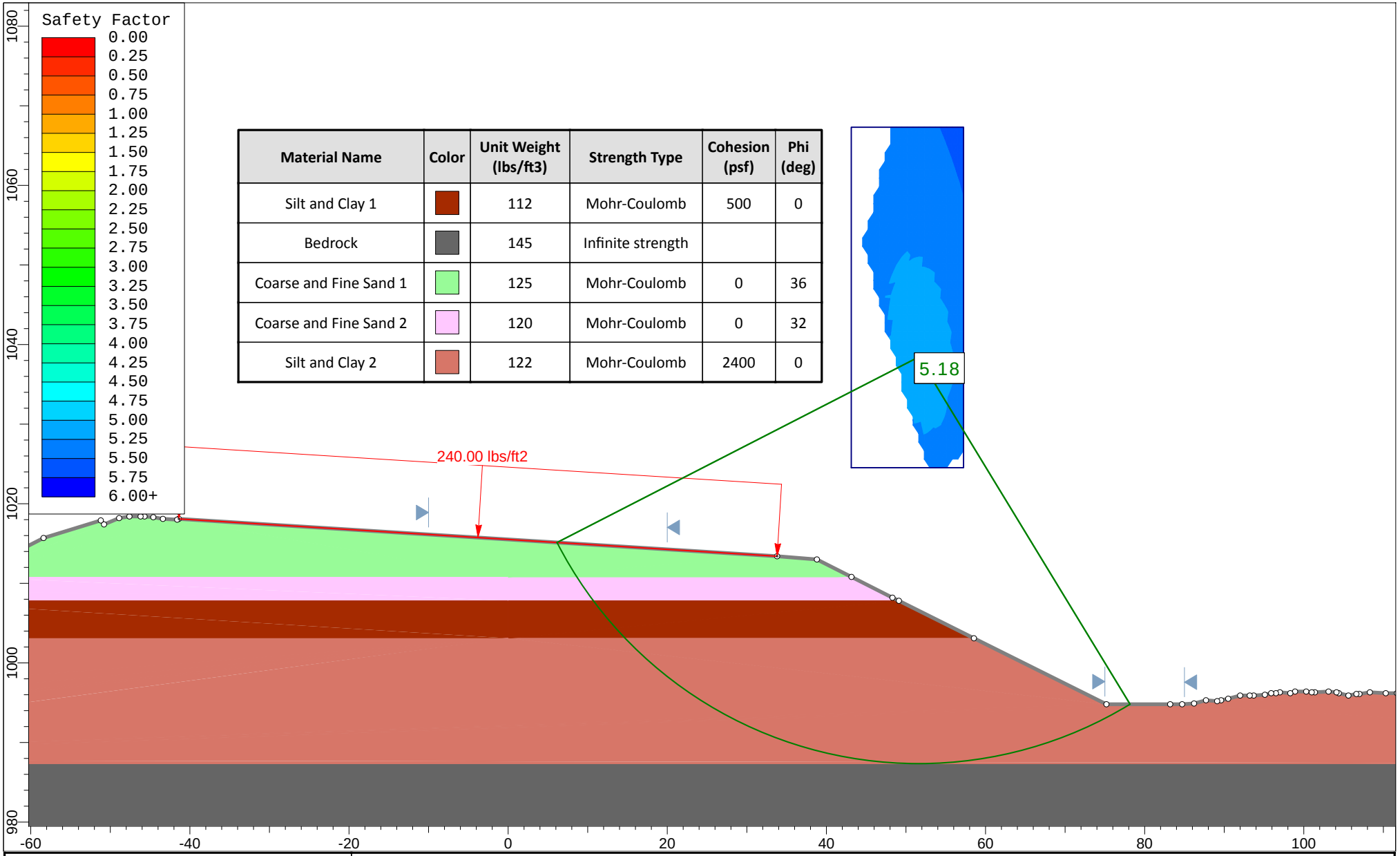


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Silt and Clay 1		112	Mohr-Coulomb	50	20
Bedrock		145	Infinite strength		
Coarse and Fine Sand 1		125	Mohr-Coulomb	0	36
Coarse and Fine Sand 2		120	Mohr-Coulomb	0	32
Silt and Clay 2		122	Mohr-Coulomb	200	25

rocscience

SLIDEINTERPRET 7.038

Project	SUM-76-6.15, PID 100713		
Analysis Description	Embankment Stability - IR-76, STA. 98+00 - Effective Stress - Block Failure		
Drawn By	KCA	*Scale* 1:200	*Company* NEAS Inc.
Date	7/24/2019, 12:12:45 PM		*File Name* STA98+00_EffectiveBlock.slim

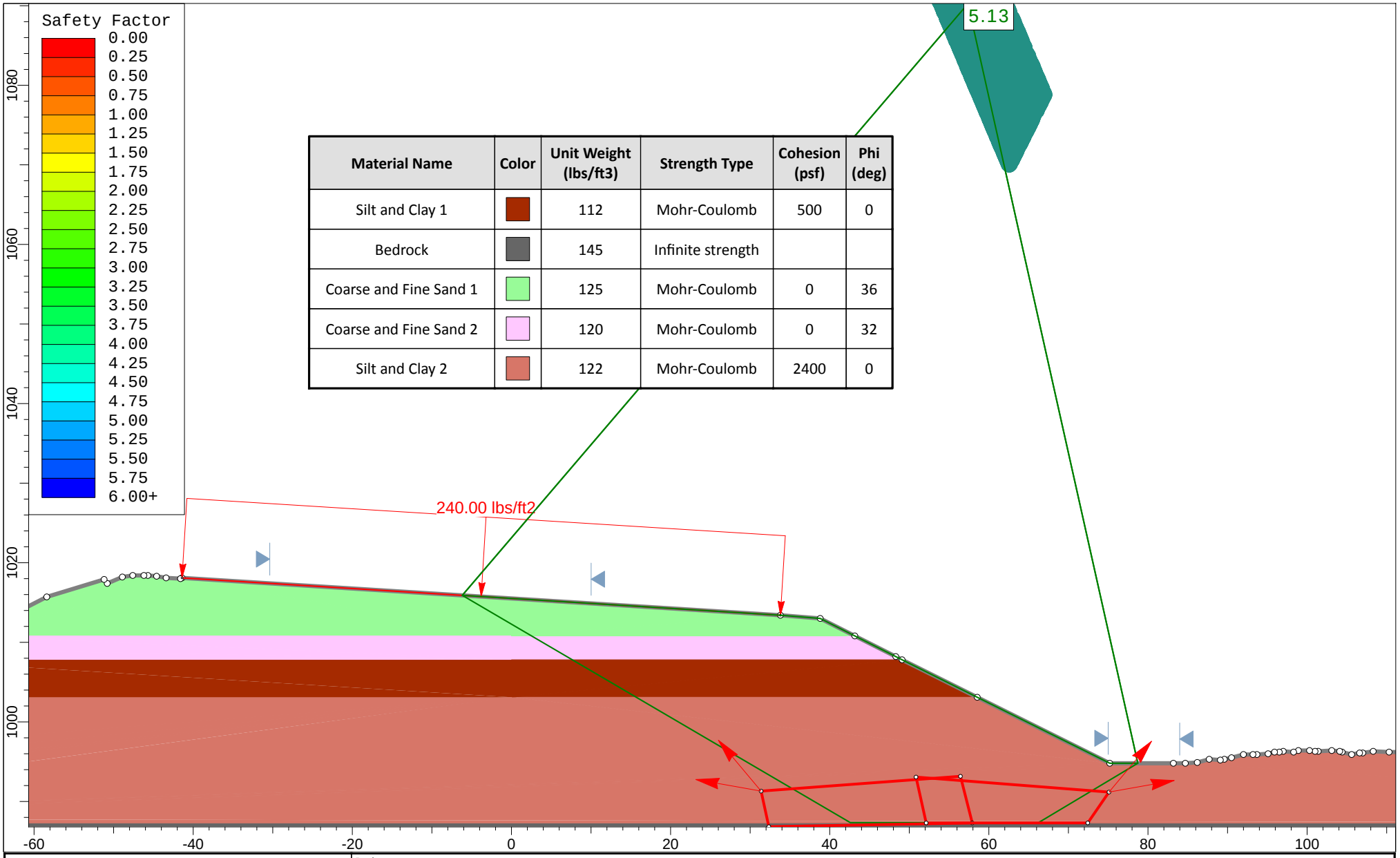


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Silt and Clay 1		112	Mohr-Coulomb	500	0
Bedrock		145	Infinite strength		
Coarse and Fine Sand 1		125	Mohr-Coulomb	0	36
Coarse and Fine Sand 2		120	Mohr-Coulomb	0	32
Silt and Clay 2		122	Mohr-Coulomb	2400	0

rocscience

SLIDEINTERPRET 7.038

Project	SUM-76-6.15, PID 100713		
Analysis Description	Embankment Stability - IR-76, STA. 98+00 - Total Stress - Circular Failure		
Drawn By	KCA	*Scale* 1:200	*Company* NEAS Inc.
Date	7/24/2019, 12:12:45 PM		*File Name* STA98+00_TotalCircular.slim



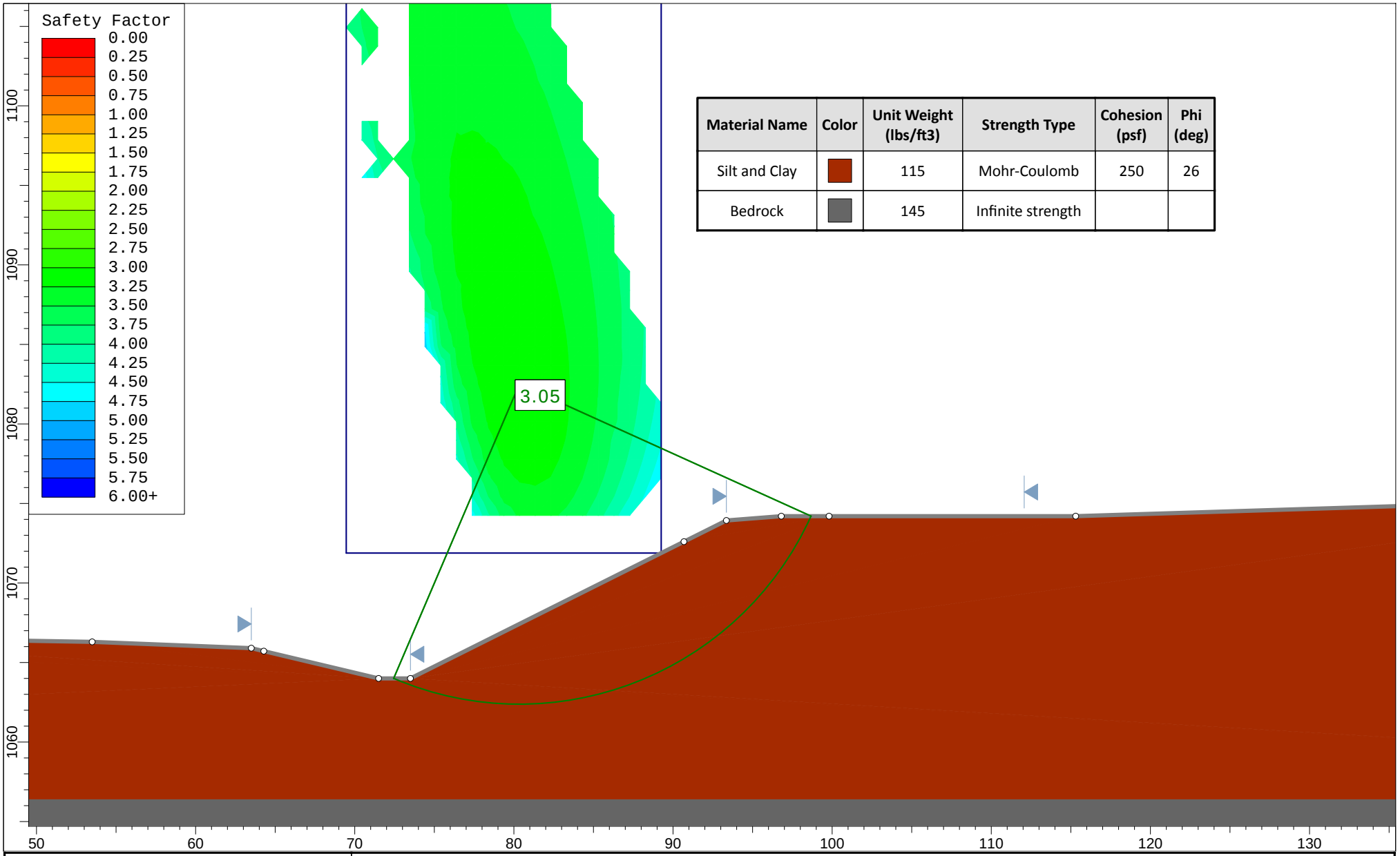
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Silt and Clay 1		112	Mohr-Coulomb	500	0
Bedrock		145	Infinite strength		
Coarse and Fine Sand 1		125	Mohr-Coulomb	0	36
Coarse and Fine Sand 2		120	Mohr-Coulomb	0	32
Silt and Clay 2		122	Mohr-Coulomb	2400	0

rocscience

SLIDEINTERPRET 7.038

Project	SUM-76-6.15, PID 100713		
Analysis Description	Embankment Stability - IR-76, STA. 98+00 - Total Stress - Block Failure		
Drawn By	KCA	Scale 1:200	Company NEAS Inc.
Date	7/24/2019, 12:12:45 PM		File Name STA98+00_TotalBlock.slim

IR-77 SB/IR-76 EB – STA. 242+00

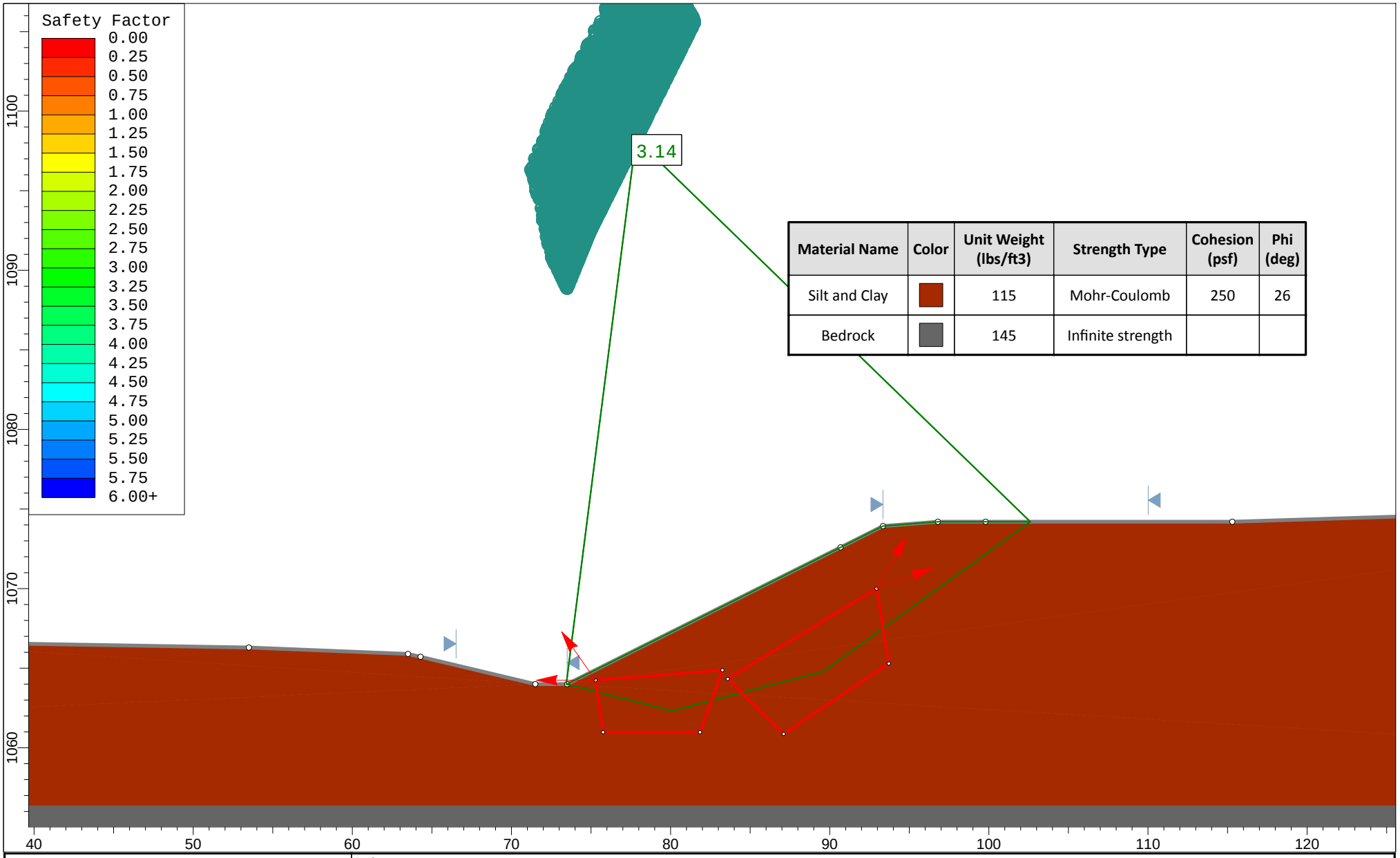


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Silt and Clay		115	Mohr-Coulomb	250	26
Bedrock		145	Infinite strength		

rocscience

SLIDEINTERPRET 7.038

Project	SUM-76-6.15, PID 100713				
Analysis Description	Embankment Stability - IR-77, STA. 242+00 - Effective Stress - Circular Failure				
Drawn By	KCA	*Scale*	1:100	*Company*	NEAS Inc.
Date	7/23/2019, 9:11:24 AM			*File Name*	STA242+00_EffectiveCircular.slim

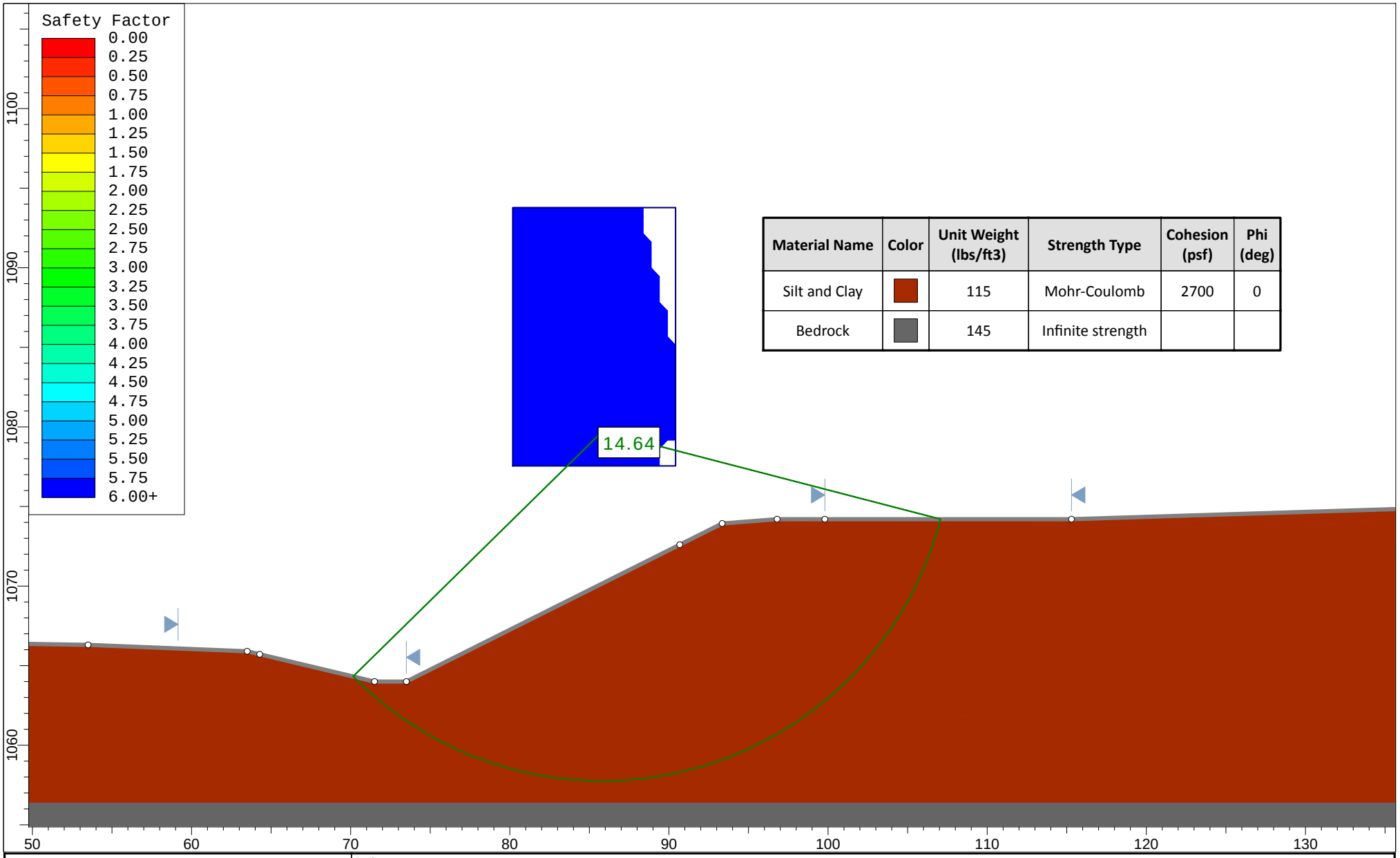


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Silt and Clay		115	Mohr-Coulomb	250	26
Bedrock		145	Infinite strength		

rocscience

SLIDEINTERPRET 7.038

Project	SUM-76-6.15, PID 100713			
Analysis Description	Embankment Stability - IR-77, STA. 242+00 - Effective Stress - Block Failure			
Drawn By	KCA	*Scale*	1:100	*Company* NEAS Inc.
Date	7/23/2019, 9:11:24 AM			*File Name* STA242+00_EffectiveBlock.slim

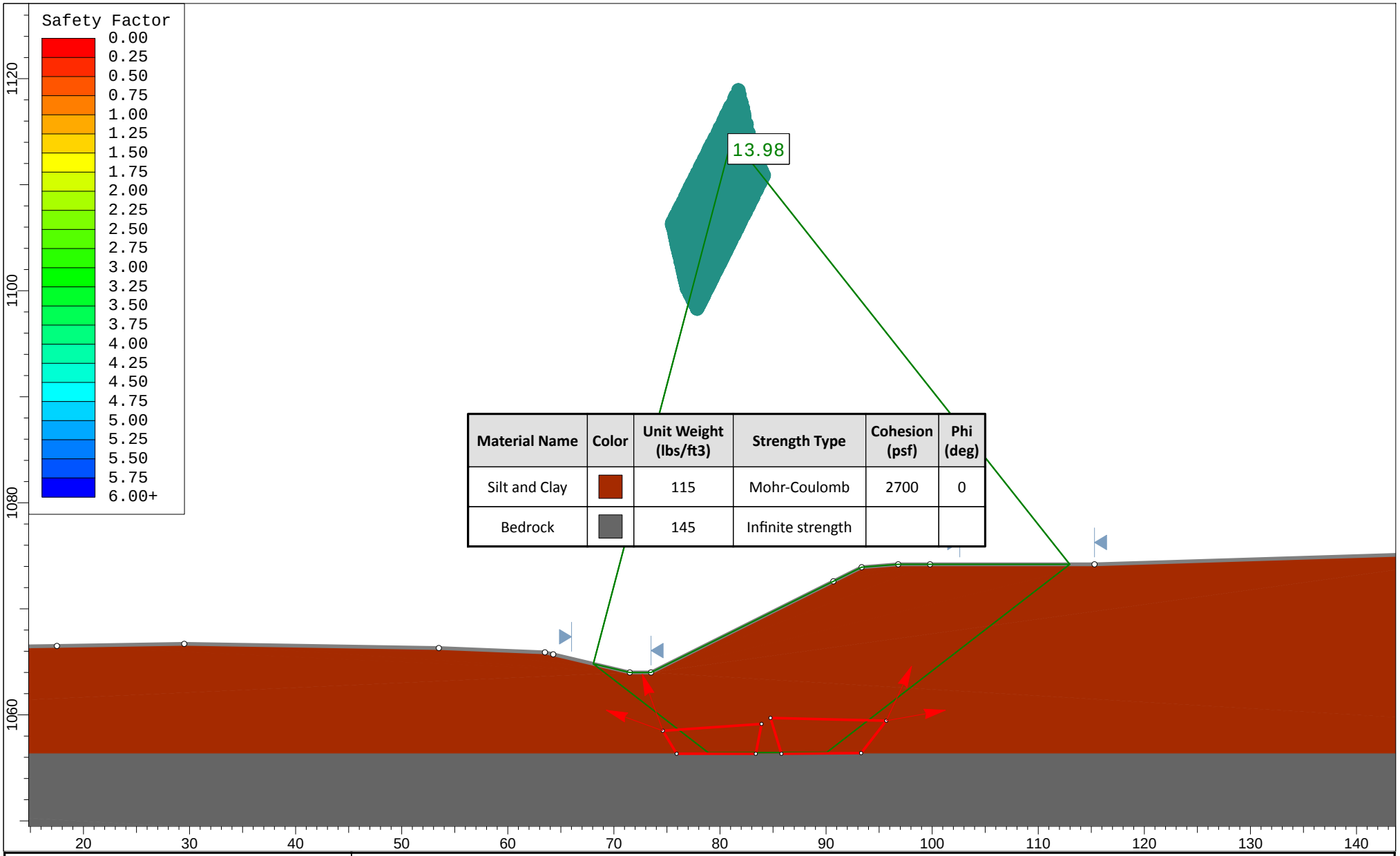


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Silt and Clay		115	Mohr-Coulomb	2700	0
Bedrock		145	Infinite strength		

rocscience

SLIDEINTERPRET 7.038

Project	SUM-76-6.15, PID 100713		
Analysis Description	Embankment Stability - IR-77, STA. 242+00 - Total Stress - Circular Failure		
Drawn By	KCA	*Scale* 1:100	*Company* NEAS Inc.
Date	7/23/2019, 9:11:24 AM	*File Name*	STA242+00_TotalCircular.slim



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Silt and Clay		115	Mohr-Coulomb	2700	0
Bedrock		145	Infinite strength		

rocscience

SLIDEINTERPRET 7.038

Project	SUM-76-6.15, PID 100713		
Analysis Description	Embankment Stability - IR-77, STA. 242+00 - Total Stress - Block Failure		
Drawn By	KCA	*Scale* 1:150	*Company* NEAS Inc.
Date	7/23/2019, 9:11:24 AM	*File Name*	STA242+00_TotalBlock.slim

APPENDIX F

ODNR OIL WELL REPORTS

R KB

R

WELL COMPLETION RECORD (Form 8)

Ohio Department of Natural Resources
Division of Mineral Resources Management
2045 Morse Road, Bldg. H-3, Columbus, OH 43229-6693
Telephone: 614-265-6633 Fax: 614-265-7998

This report is due in duplicate 60 days after completion of the well. If the permit has expired and the well was not drilled, check the box below, sign on reverse side (Back), and return to our office within 30 days after expiration.

☐

1. Owner #: 1639	3. API #: 34-153-2-3145-00-00
2. Owner name, address and telephone numbers: Bass Energy, Inc. 130 Merz Blvd., Akron, OH 44333 330-869-0870	4. Type of Permit: Drill New Well Urban UC2
	5. County: Summit
	6. Civil Township: Conventry
	7. Footage: 135'NL & 5185'WL of Lot 13, Tract 2
8. Type of Well:	
9. X: 2259865 Y: 499315	21. Date drilling commenced: 2/8/2012
10. Quad: AKRON WEST	22. Date drilling completed: 3/20/2012
11. Section: 12. Lot: 13	23. Date put into production: 6/7/2012
13. Fraction: 14. Qtr.Twp:	24. Date plugged if dry:
15. Tract: 2	25. Producing formation: Clinton Sandstone
16. Allot:	26. Deepest formation: Queenston Shale
17. Well #: 1	27. Driller's total depth: 4008'
18. Lease Name: ABINGTON PROPERTIES	28. Logger's total depth: 4000'
19. PTD: 3999' 20. Drilling Unit: 25.33	29. Lost hole at _____ feet.

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MAY 1 6 2013
Division of Oil & Gas
Columbus

30. Type of tools:
- ☐ Cable
- ☐ Fluid Rotary
- ☐ Cable/Air Rotary
- ☐ Cable/Fluid Rotary
- ☐ Air Rotary
- ☑ Air/Fluid Rotary
- ☐ Service Rig
- ☐ Cable/Air Rotary/Fluid Rotary

31. Type of completion:
- ☐ Open Hole
- ☑ Through Casing
- ☐ Slotted Liner

32: Elevation:
- Ground Level: 973
- Derrick Floor:
- Kelly Bushing: 979

33. Perforated intervals and number of shots: 3798' - 3812' with 53 shots

34. Name of Frac Company: Superior Well Service

35. Method of shot, acid, or fracture treatments, production tests, pressures, etc.:

SHOT:	ACID:	FRAC FLUIDS:	SAND:	PRESSURES (psi):
Lbs.	Gals. 500	Water (gals) 70,080	Lbs. 40,000	Breakdown 1475
Qts.	Type HCL	Water (bbl)	Sks.	ATP 1375
Type	Percent 15%	CO2 (tons)		ISIP 1400
		N2 (mscf)		5 min. SIP 1294
				Avg. Rate 26

METHOD OF FLUID CONTAINMENT

FLUIDS:	PIT:	FRAC TANK:
Swab	☐	☑
Flowback	☐	☑

DATE TREATED: 3/20/2012

36. Amount of initial production per day:

		(MCF.)		(Bbls.)		(Bbls.)
Natural:	Gas	0	Oil	0	Brine	0
After Treatment:	Gas	15 MCF	Oil	10 BO	Brine	1
SERC Data:	Number of Tanks:	2	Maximum Storage Capacity of all Tanks (bbls.)			440 BBLS

37. Casing and tubing record: Please indicate which is used (cement or mudding)

Type	Size	Feet Used in Drilling	Amount of Cement or Mud	Feet Left in Well
Conductor/Drive Pipe:	11"	120'	315 sks	120'
Surface:	8 5/8"	451'	240 sks	451'
Intermediate:				
Production:	4 1/2" 11.6#	3984'	175 sks	3984'
Tubing:	1 1/2"	3788'		3788'

Comments:

38. Name of drilling contractor: Poulson Driling

39. Type of electrical and/or radioactivity logs run: *(all logs must be submitted)* Gamma Ray, Neutron, Density, Resistivity & Gamma Ray CCL, VDL Bond, Perforating

40. Name of logging company: Appalachian Well Surveys

DIVISION USE ONLY

Log Submitted: Y / N
Confidential: Y / N

FRAC DATA SUBMITTED:
Pressure/Rate Graph ☐
Record ☐
Invoice ☐

Well Class:

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MAY 1 6 2013
Division of Oil & Gas
Columbus

FORMATION	TOP	BASE	Shows of oil, gas, fresh water, or brine; indicate depth or interval	REMARKS
Freshwater Strata				
Glacial Deposits	0'	20'		
Coal Seams				
1st Cow Run				
Buell Run				
2nd Cow Run				
Salt Sand				
Maxton Sand				
Keener Sand				
Big Injun Sand				
Squaw Sand				
Mississippian Shale	50'	396'		
Weir Sand				
Berea Sand	396'	450'		
Bedford Shale	450'	520'		
2nd Berea				
Ohio Shale	520'	2168'		
Gantz				
Thirty Foot				
Gordon				
Cinnamon				
Marcellus				
Big Lime	2168'	3638'		
Sylvania				
Oriskany	2400'	2540'		
Bass Island	2540'	2554'		
Salina				
Salt Section	2790'	3162'		
Newburg				
Lockport	3360'	3638'		
Little Lime				
Packer Shell	3702'	3758'		
Stray Clinton				
Red Clinton	3794'	3820'		
White Clinton	3869'	3880'		
Medina	3938'	3948'		
Queenston	3948'	T.D.		
Utica				
Trenton				
Black River				
Gull River				
Glenwood Shale				
Knox Unconformity				
Beekmantown				
Rose Run				
Trempealeau/Copper Ridge				
"B" Zone				
Krysik				
Kerbel				
Conasauga				
Rome				
Mt. Simon				
Granite Wash				
Middle Run				
Granite				

I certify that the above information is true and correct, to the best of my knowledge:

William J. Hlavin, Geologist — 3-20-13

(SIGNATURE) (DATE)

William J. Hlavin — Geologist

(NAME typed or printed) (TITLE)

Bass Energy, Inc.

(REPRESENTING)

RECEIVED
MAY 15 2013
Division of Oil & Gas
Columbus

OHIO DIVISION OF GEOLOGICAL SURVEY

PSI:GRN,Cal,D

22792

Permit No. 2792

Permit Issued 08/23/94

County SUMMIT Township COVENTRY Quad. AKRON WEST

Section ____ Lot ____ Tract 2 Twp. Qtr. ____ X Coord. 2256720 Y Coord. 508030

Measured 872'NL & 5500'WL OF TWP. CIN LOT 2, Proposed TD 3950 Class ____ Tool RTAF

Acres 20 TRACT 2>

Landowner FORD-BAKER UNIT Well No. 1 Date Commenced 11-20-94

Operator NORTH AMERICAN PETROLEUM Well No. ____ Date Completed 11-27-94

GL 990 DF 994 KB 996 LTD 3952 DTD 3940 PB Depth ____ Date PB ____

TD Formation Queenston Prod. Formation Clinton

Perforations (9) 3755-63; (7) 3769-75; (4) 3796-99; IP Natural ____ IP AT 50MCFG & 5BO

Stimulation 40M gal wtr, 30M# sand, 500 gal acid; Initial Rock Pressure ____

Casing Record 8 5/8" 501' 200sks, 4½" 3901' 125sks Date Abandoned ____

FORMATION	TOP	BOTTOM	REMARKS	FORMATION	TOP	BOTTOM	REMARKS
COMPLETION 5-24-95							
Date put into production 12/8/94							
Big lime	2107	3594					
Packer shell	3674	3711					
Clinton stray	3725	3734					
Clinton red	3744	3776					
Clinton white	3795	3802					
Queenston	3902						
		3940	DTD; 3952'LTD				

DNR 4808 (Rev. 5-92)

FORMATION	TOP	BOTTOM	REMARKS	FORMATION	TOP	BOTTOM	REMARKS

OHIO DIVISION OF GEOLOGICAL SURVEY

EAST:GRN,Cal,D,CCL

R.I/RL 7-22-95

22803

Permit No. 2803

Permit Issued 12/22/94

County SUMMIT Township (PORTAGE) COVENTRY Quad. AKRON WEST

Section ____ Lot ____ Tract 2 Twp. Qtr. ____ X Coord. (2258150) Y Coord. 508800

Measured (800'NL & 6920'WL OF TWP. CIN LOT 2, Proposed TD 3990 Class POOL Tool RTAF

Acres 21.740 TRACT 2) 800' NL & 7055' WL of twp. Clinton - Pool - Fluid RT

Landowner LANGLEY UNIT Well No. 1 Date Commenced 9-22-95

Operator (VIKING RESOURCES CORP)* 980' Well No. ____ Date Completed 9-28-95

GL (1040) DF ____ KB 986 LTD 3985 DTD 3990 PB Depth ____ Date PB ____

TD Formation Queenston Prod. Formation Clinton

Perforations (4) 3792-95; (7) 3802-08; (4) 3811-14;* IP Natural ____ IP AT 50MCFG & 2BO

Stimulation 250 gal 7½% HCL, 800sks 20/40 sand, 30M gal water; Initial Rock Pressure ____

Casing Record 8 5/8" 480' 175sks, 4½" 3908' 150sks Date Abandoned ____

FORMATION	TOP	BOTTOM	REMARKS	FORMATION	TOP	BOTTOM	REMARKS
COMPLETION 3-21-96				X= 2,258,300			
*(5) 3817-21;				*Whidbey Resources Inc.			
Ohio shale		2116					
Big lime	2134	3628					
Packer shell	3716	3750					
Clinton stray	3772	3778					
Clinton red	3786	3850					
Medina	3930	3944					
		3990	DTD; 3985'LTD				

DNR 4808 (Rev. 5-92)

FORMATION	TOP	BOTTOM	REMARKS	FORMATION	TOP	BOTTOM	REMARKS

OHIO DIVISION OF GEOLOGICAL SURVEY

EAST:GRN,Cal,D

22843

Permit No. 2843

Permit Issued 03/25/96

County SUMMIT Township COVENTRY Quad. AKRON WEST

Section ____ Lot ____ Tract 2 Twp. Qtr. ____ X Coord. 2257000 Y Coord. 507640

Measured 2038'NL & 5790'WL OFTWP CIN LOT 4, Proposed TD 3950 Class POOL Tool RTAF

Acres 20 TRACT 2>

Landowner MARR Well No. 1 Date Commenced 7-13-96

Operator NORTH AMERICAN PETROLEUM Well No. ____ Date Completed 7-19-96

GL 1000 DF ____ KB 1006 LTD 3924 DTD 3921 PB Depth ____ Date PB ____

TD Formation Queenston Prod. Formation Clinton

Perforations (9) 3745-53; (12) 3757-68; (9) 3773-81; IP Natural ____ IP AT 50MCFG & 5BO

Stimulation 72M gal wtr, 50M# 20/40 Ottawa sand; Initial Rock Pressure ____

Casing Record 8 5/8" 314' 200sks, 4½" 3914' 125sks Date Abandoned ____

FORMATION	TOP	BOTTOM	REMARKS	FORMATION	TOP	BOTTOM	REMARKS
COMPLETION 11-21-96							
Big lime	2110	3596					
Packer shell	3675	3707					
Clinton red	3745	3768					
Clinton white	3773	3782					
Queenston	3902						
		3921	DTD; 3924'LTD				

DNR 4808 (Rev. 5-92)

FORMATION	TOP	BOTTOM	REMARKS	FORMATION	TOP	BOTTOM	REMARKS

FINAL REPORT
ROADWAY EXPLORATION REPORT
SUM-76-6.15
SUMMIT COUNTY, OHIO
PID#: 100713

Prepared For:

GPD GROUP
520 South Main Street, Suite 2531
Akron, Ohio 44311

Prepared by:

NATIONAL ENGINEERING AND ARCHITECTURAL SERVICES INC.
2800 Corporate Exchange Drive, Suite 240
Columbus, Ohio 43231

NEAS PROJECT 19-0002

June 15, 2020

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

1. INTRODUCTION

1.1. General

National Engineering & Architectural Services, Inc. (NEAS) presents our Roadway Exploration Report for the Ohio Department of Transportation (ODOT) project SUM-76-6.15 (PID 100713) along portions of Interstate Route 76 (IR-76), IR-77, and IR-277 part of the Akron Beltway in Akron, Summit County, Ohio. The portion of the Akron Beltway for which a roadway exploration was performed is designated as the Kenmore Leg and includes the IR-77 and IR-76 Interchange (NW Interchange), the IR-76 and IR-277 Interchange (SW Interchange), as well as portions of connecting mainline interstates and associated ramps. This report presents a summary of the project encountered surficial and subsurface conditions along the NW Interchange, SW Interchange, portions of mainlines IR-77, IR-76, and IR-277, as well as portions of the associated connecting ramps/roadways (Ramp L, Ramp M, and Ramp N).

The exploration was conducted in general accordance with NEAS's proposal to GPD Group (GPD), dated May 22, 2018 and with the provisions of ODOT's *Specifications for Geotechnical Explorations* (SGE) (ODOT SGE, 2019).

The scope of work performed by NEAS as part of the referenced project presented within this report included: a review of published geotechnical information; performing 42 total test borings as part of the roadway exploration; laboratory testing of soil samples in accordance with the SGE; and, development of this summary report.

2. GEOLOGY AND OBSERVATIONS OF THE PROJECT

2.1. Geology and Physiography

The topography at the project site is relatively flat in the northern and southern portions of the site with sloping grades present in the central portion. In the northern portion of the site the topography gradually slopes upwards from west to east with the peak elevation within this part of the site at an approximate elevation of 1076 ft above mean sea level (amsl) near Ramp J. The central portion of the project site between the NW and SW interchanges generally slopes upward from west to east with a peak elevation of 1033 ft amsl near the East Ave/IR-76 overpass. The south end of the project site slopes very gradually upward from west to east with the peak elevation being approximately 1000 ft amsl at the eastern end of IR-277.

The project site is located within the Akron-Canton Interlobate Plateau physiographic region, part of the Glaciated Allegheny Plateaus (ODGS, 1998). This is a moderate relief, hummocky area between two converging glacial lobes dominated by kames, kame terraces, eskers, kettles, kettle lakes, and bogs/fens. Soils in this region are characteristically Wisconsinan-age sand and older drift over Devonian to Pennsylvanian age sandstones, conglomerates and shales.

The northern portion of the project site (IR-77, IR-76) is mapped as 30 ft of Wisconsinan-age sand and gravel, underlain by 150 feet of complexly interbedded deposits of clay, silt, sand, gravel and till. The area which includes the NW Interchange as well as the eastern portions of IR-76 is mapped as 160 ft of Wisconsinan-age till above bedrock. The portion of the project between the NW and SW Interchanges is mapped as 80 ft of Wisconsinan-age till near the SW interchange thinning out to 20 ft towards the NW interchange. The southern portion of the of project site (IR-277 and IR-76, SW interchange) is mapped as 160 ft of Wisconsinan-age Ice-contact deposits, underlain by 90 feet of Wisconsinan-age sand and gravel.

Small areas of organic deposits were noted on the surficial geology maps southeast of the SW Interchange (ODGS, 2005).

Based on the Bedrock Geologic Units Map of Ohio (USGS & ODGS, 2006), bedrock within the project area consists of shale and siltstone of the Allegheny and Pottsville Groups, Undivided. This unit is comprised of Pennsylvanian-age shale and siltstone locally containing marine fossils, with minor lithologic constituents of limestone and sandstone. The shale in this formation is described as black, gray and olive in color, clayey to silty, and calcareous in part, while the siltstone is described as gray, greenish and olive in color, clayey to sandy, and thin to medium bedded. Bedrock is anticipated to be sloping upward from west to east at the project site. Based on the ODNR bedrock topography map of Ohio, bedrock elevations at the project site can be expected to be between elevations of 1050 and 800 ft amsl (ODGS, 2003), putting bedrock at a depth ranging from about 225 ft below ground surface (bgs) to outcropping (above the ground surface) in locations. Bedrock was observed to be relatively shallow in the northeast portion of the site as outcropped rock was observed on the eastern side of IR-76 near the East Ave/IR-76 crossing as well as along the northern portion of Ramp V.

The soils at the project site are generally mapped (Web Soil Survey) by the Natural Resources Conservation Service (USDA, 2015) as Udorthents. These soils can be described as soils that have been disturbed by cutting and filling. These soils are not classified according to the AASHTO method of soil classification, but it can be expected that these soils will largely consist of fill soils and often vary in composition. A significant portion of the soils surrounding the project site have been mapped as Canfield-Urban land complex, Chili-Urban land complex, Bogart loam and Carlisle Muck. Soils in the Canfield series are characterized as very deep, moderately well drained soils formed in Wisconsinan age till on plains. Soils in the Chili series are characterized as very deep, well drained soils on outwash plains, terraces, kames, and beach ridges while Bogart series soils are characterized a very deep, moderately well drained soils that formed in stratified outwash deposits on terraces, beach ridges, and outwash plains. Soil mapped as Carlisle Muck were encountered near the SW Interchange as well as southeast of the interchange. The Carlisle Muck series are characterized as very deep, very poorly drained soils formed in woody and herbaceous organic materials in depressions within lake plains, outwash plains, till plains, flood plains, and moraines. Based on the Web Soil Survey these surrounding soils are comprised of a mix of both coarse-grained and fine-grained soils, classifying as A-4, A-2, A-6 or A-2-6 type soils according to the AASHTO method of soil classification. The soils mapped as Carlisle Muck and are classified primarily as A-8 according to the AASHTO method of soil classification.

2.2. Hydrology/Hydrogeology

Groundwater at the project site can be expected at an elevation consistent with that of the Tuscarawas River (or tributaries to the Tuscarawas River) as it is the most dominant hydraulic influence in the vicinity of the project's boundaries. The water level of the Tuscarawas River may be generally representative of the local groundwater table. However, as there are relatively thin overburden soils at the site and the topography of the site gradually slopes downward to the river's elevation, it is not anticipated that a static groundwater table will be present within the overburden soil. Rather it is anticipated that if encountered, groundwater is likely to be present at the bedrock surface or within the upper few feet of bedrock where the stratum is highly weathered. Furthermore, 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 bedrock surface. According to historic boring logs and associated groundwater observations, groundwater elevations range from approximately 953 to 997 ft amsl across the project site.

The project site is not located within a special flood hazard area based on available mapping by the Federal Emergency Management Agency's (FEMA) National Flood Hazard mapping program (FEMA, 2019).

2.3. Mining and Oil/Gas Production

No abandoned mines are noted on ODNR's Abandoned Underground Mine Locator in the vicinity of the bridge site (ODNR [1], 2016).

Four (4) active oil or gas wells were mapped on ODNR's Ohio Oil & Gas Locator in the vicinity of the project site (ODNR [2], 2016). Three are located near the NW Interchange while one is located at the southeast end of the project near IR-277. One active well was located 230 ft east of S Hawkins Ave and 330 ft north of Morse St. while a second active well was located 522 ft east of S Hawkins Ave and 615 ft north of Jason St. The third active well was located 490 ft west of Anfield St. and 315 ft north of Morse St. and the fourth active well was located 730 ft east of Gaugler Ave. and 400 ft north of W Waterloo Rd. Each of the identified wells were drilled to depths greater than 3900 ft bgs and are currently producing. More information on the identified wells can be found on the ODNR Oil Well reports included in Appendix D.

2.4. Historical Records and Previous Phases of Project Exploration

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

- Soil Profile Sheets as part of ODOT project SUM-18-6.88, Sheets 1-17, prepared by the State Highway Testing and Research Laboratory dated Nov. 10, 1960;
- Soil Profile Sheets as part of ODOT project SUM-5-10.62, Sheets 1-9, prepared by the State Highway Testing and Research Laboratory dated Sept. 25, 1961;
- Soil Profile Sheets as part of ODOT project SUM-224-5.85 Sheets 1-12, prepared by the State Highway Testing and Research Laboratory dated May 9, 1960;
- Soil Profile Sheets as part of ODOT project SUM-5-9.33 Sheets 1-27, prepared by the State Highway Testing and Research Laboratory dated Oct. 30, 1963; and,
- Soil Profile Sheets as part of ODOT project SUM-18-9.23 Sheets 1-16, prepared by the State Highway Testing and Research Laboratory dated Jan. 6, 1961.

Historical soil borings associated with the above plans were reviewed, however, were not utilized for our analysis, and therefore, are not referenced or presented within this report.

2.5. Field Reconnaissance

Field reconnaissance visits for the overall project area were conducted between January 14, 2019 and January 17, 2019, along IR-76, IR-77, IR-277 and connecting ramps. Site conditions, including the existing pavement conditions, were noted and photographed during the visit. A summary of the land use and pavement conditions by roadway segment including photographs of notable pavement distress are provided and is provided below.

2.5.1. Land Use and Cover

The land use of most of the project area along IR-76 and IR-77 consists of residential property generally comprised of family homes and apartment buildings. Near the SW Interchange and along the project portion of IR-277 the land use is generally open property and wetlands. More minor land uses within the area surrounding the project include: 1) educational/institutional facilities (i.e., high school, middle school,

churches, public works, etc.); 2) commercial property including various small shops and restaurants; and 3) industrial structures.

2.5.2. Interstate Routes

In general, the pavement condition along IR-76 and IR-277 was observed to be fair to good with marginal signs of weathering and surface wear. Low to moderate severity longitudinal and transverse cracking was common along these sections, as well as a few low severity potholes and low severity crack sealing deficiencies (Photograph 1).

The condition of the pavement along IR-77 can be divided into two sections. The pavement condition of the asphalt portion of IR-77 located at the northern end of the project was observed to be fair with minor signs of weathering and surface wear. Low severity longitudinal and lateral joint spalling and patching was observed in this section (Photograph 2). The pavement condition of the concrete portion of IR-77 located just north of the NW interchange was observed to be poor with various signs of distress and surface wear. Low severity settlement as well as high severity longitudinal and transverse cracking as well as spalling was common in this section. Extensive high severity faulting was also apparent (Photograph 3).

The project portion of each interstate appeared to be well drained to storm drains, drainage swales, and/or grassy/vegetated embankment slopes. Ponding water or obvious drainage deficiencies were not observed.

2.5.3. Connecting Ramps

The pavement condition for the connecting ramps was generally observed to be good with few low severity transverse cracks along the ramps. The exceptions to this was Ramp J and Ramp L which were observed to be in fair condition with moderate severity longitudinal and transverse cracking as well as moderate severity rutting and edge cracking (Photograph 4). The concrete portion of Ramp P was also observed to be in poor condition with extensive medium to high severity longitudinal and transverse cracks (Photograph 5).

Photograph 1: IR-76 and IR-277 Pavement Wear

Photograph 2: IR-77 Pavement (Asphalt)

Photograph 3: IR-77 Pavement (Concrete)

Photograph 4: Ramp L Pavement

Photograph 5: Ramp P Concrete Pavement

3. GEOTECHNICAL EXPLORATION

3.1. Roadway Exploration Program

The subsurface exploration was conducted by NEAS between February 26, 2019 and May 1, 2019 and included 42 borings drilled to depths between 7.5 and 36.5 ft below ground surface (bgs). The boring locations were selected by NEAS in general accordance with the guidelines contained in the SGE with the intent to evaluate subsurface soil and groundwater conditions. Borings were typically located either within the existing roadway or just off the existing shoulder of the roadway that were not restricted by underground utilities or dictated by terrain (i.e. steep embankment slopes). Target boring locations were located in the field by NEAS prior to drilling utilizing handheld GPS equipment. Each as-drilled project boring location and corresponding ground surface elevation was surveyed in the field by Northwest Consultants, Inc. (project surveyor) 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 North, NAD83, location) and the corresponding ground surface elevation. Coordinate information and elevations of the borings are shown in Table 1 below and boring locations are depicted in the Boring Location Plan provided in Appendix A.

Table 1: Project Boring Summary

Boring Number	Latitude	Longitude	Elevation (NAVD 88) (ft)	Depth (ft)	Boring Number	Latitude	Longitude	Elevation (NAVD 88) (ft)	Depth (ft)
B-007-0-18	41.066552	-81.573713	976.4	10.5	B-030-0-18	41.035256	-81.563520	975.7	11.5
B-008-0-18	41.068655	-81.573829	983.4	11.5	B-031-0-18	41.035247	-81.562786	976.1	16.5
B-009-0-18	41.069741	-81.573854	984.9	11.5	B-032-0-18	41.035245	-81.562054	976.8	31.5
B-010-0-18	41.070840	-81.573860	985.0	11.5	B-033-0-18	41.035201	-81.560613	976.8	16.5
B-011-0-18	41.071934	-81.573846	984.0	11.5	B-034-0-18	41.035109	-81.559916	972.3	11.5
B-012-0-18	41.073072	-81.573836	982.9	11.5	B-035-0-18	41.035183	-81.559182	978.6	11.5
B-013-0-18	41.074185	-81.573819	981.8	11.5	B-036-0-18	41.035165	-81.557726	981.5	11.5
B-014-0-18	41.075237	-81.573806	982.7	11.5	B-037-0-18	41.035162	-81.556293	983.3	11.5
B-015-0-18	41.076317	-81.573749	984.3	10.5	B-038-0-18	41.035125	-81.555196	985.1	11.5
B-016-0-18	41.077400	-81.573883	987.4	11.5	B-046-0-18	41.059780	-81.557323	1068.9	7.5
B-017-0-18	41.077460	-81.573770	980.2	10.5	B-047-0-18	41.059884	-81.555900	1063.6	10.4
B-018-0-18	41.078313	-81.574111	987.9	11.5	B-048-0-18	41.060077	-81.554258	1050.6	10.8
B-019-0-18	41.079148	-81.574449	988.2	11.5	B-049-0-18	41.060544	-81.552909	1035.1	7.5
B-020-0-18	41.035695	-81.574353	1002.4	36.5	B-050-0-18	41.060686	-81.551665	1022.1	20.1
B-021-0-18	41.035855	-81.573662	976.5	11.5	B-064-0-18	41.034416	-81.565886	973.3	11.5
B-022-0-18	41.035730	-81.572893	987.7	11.5	B-065-0-18	41.035059	-81.565818	973.9	11.5
B-023-0-18	41.035659	-81.571451	977.3	11.5	B-066-0-18	41.035062	-81.565647	991.4	26.5
B-024-0-18	41.035902	-81.571418	998.3	26.5	B-077-0-18	41.059466	-81.557415	1079.5	7.5
B-025-0-18	41.035672	-81.570045	973.1	7.5	B-079-0-18	41.066348	-81.573379	976.9	10.5
B-026-0-18	41.035690	-81.568868	971.4	7.5	B-080-0-18	41.066752	-81.572913	979.3	7.5
B-027-0-18	41.035623	-81.567231	969.8	11.5	B-081-0-18	41.067521	-81.573746	979.6	7.5

Borings were drilled using either a CME 45B, CME 55T or CME 55X, truck-mounted or track-mounted drilling rigs utilizing 3.25-inch (inner diameter) hollow stem augers. Soil samples for subgrade borings were typically recovered continuously to a depth of 7.5 ft bgs, while samples for embankment/roadway borings were typically recovered at 2.5-ft intervals to varying termination depths, each using an 18-inch split spoon sampler (AASHTO T-206 "Standard Method for Penetration Test and Split Barrel Sampling of Soils."). It should be noted that some embankment/roadway borings were planned to potentially be utilized as noise wall borings for future projects. The soil samples obtained from the exploration program were visually observed in the field by the NEAS field representative and preserved for review by a Geologist for possible laboratory testing. Standard penetration tests (SPT) were conducted using CME auto hammers that have been calibrated to be between 78.0% and 85.0% efficient (depending on the specific rig used and the calibration date of the hammer) as indicated on the boring logs (Appendix B).

Field boring logs were prepared by drilling personnel and included pavement description (where present), lithological description, SPT results recorded as blows per 6-inch increment of penetration, and estimated unconfined shear strength values on specimens exhibiting cohesion (using a hand-penetrometer). After completing the borings, the boreholes were backfilled with either auger cuttings, bentonite chips, or a

combination of these materials and patched accordingly with the cold patch asphalt and/or cement when drilling through the roadway.

3.2. Laboratory Testing Program

The laboratory testing program consisted of classification testing, moisture content determinations, sulfate content testing, direct shear testing and loss on ignition testing. The individual laboratory data sheets and results are included in Appendix B while a summary of the sulfate content testing results can be found in Appendix C. Additionally, data from the laboratory testing program was incorporated onto the final borings logs (when possible). Soil samples are retained at the laboratory for 60 days following report submittal, after which time they will be discarded.

3.2.1. Classification Testing

Representative soil samples were selected for index property (Atterberg Limits) and gradation testing for classification purposes on approximately 42% of the samples. At each boring location, the upper two samples obtained below the proposed top of subgrade elevation were generally tested while additional samples were selected for testing with the intent of properly classifying the subsurface soil and groundwater conditions within the planned project limits. Soils not selected for testing were compared to laboratory tested samples/strata and classified visually. Moisture content testing was conducted on all samples. The laboratory testing was performed in general accordance with applicable AASHTO specifications and ODOT Supplements.

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

3.2.2. Standard Penetration Test Results

Standard Penetration Tests (SPT) and split-barrel (commonly known as split-spoon) sampling of soils were performed at varying intervals (i.e., continuous, 2.5, 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 an equivalent rod energy of 60% (N_{60}) for use in analysis or for correlation purposes. The resulting N_{60} values are shown on the boring logs provided in Appendix B.

3.2.3. Sulfate Testing

Sulfate testing was generally performed on one sample for each roadway boring performed for pavement/subgrade design purposes for the subgrade analyses. 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. Based on the testing results, each subgrade soil sample tested was determined to have a sulfate content of less than 5,000 parts per million (i.e., lower than the level which ODOT considers high and may prevent the use of chemical stabilization). Testing results are summarized in Appendix C.

3.2.4. Direct Shear Testing

Direct Shear testing was conducted in accordance with ASTM D 3080, "Direct Shear Test of Soils Under Consolidated Drained Conditions" on one Shelby Tube sample (ST-1) obtained from boring B-017-0-18. The soil tested was classified as hard, brown mottled with orangish brown and gray, Sandy Silt. The results of the Direct Shear test are summarized in Table 2 below and in Appendix B.

Table 2: Direct Shear Testing Summary

Boring Number	Depth of Sample (ft)	Classification	Average Wet Density (1) (pcf)	Average Void Ratio (1)	Cohesion - Effective (psf)	Angle of Friction - Effective (°)
B-017-0-18	2.0 - 4.0	Sandy Silt (A-4a)	129.0	0.521	173	29.5

Notes:
1. Indicated average values were collected prior to Direct Shear testing (i.e., initial readings).

3.2.5. Loss on Ignition Testing

Loss on Ignition testing (LOI) was performed on one Shelby tube sample (ST-2) from boring B-034-0-18 which was performed for embankment/roadway design purposes. The selected sample was tested in accordance with AASHTO T267 "Standard Method of Test for Determination of Organic Content in Soils by Loss on Ignition". The sample was found to have an organic content of 28.4%. Per the SGE, an organic content greater than 10% is considered highly organic. The lab test report of the LOI test is presented in Appendix B.

3.2.6. Unconfined Compressive Strength of Cohesive Soil Testing

An Unconfined Compressive Strength of Cohesive Soils Test was conducted in accordance with ASTM D 2166 "Standard Test Method for Unconfined Compressive Strength of Cohesive Soil" on ST-2 from boring B-034-0-18. In general, the soil was classified as very soft, black with brown, organic silt, highly organic. The Unconfined Compressive Strength of Cohesive Soil Test results are summarized in Table 3 below and provided in Appendix B.

Table 3: Unconfined Compressive Strength Testing Summary

Boring Number	Depth of Sample (ft)	Classification	Wet Density (pcf)	Moisture Content (%)	Unconfined Compressive Strength (psf)	Strain (%)
B-034-0-18	5.0 - 5.5	Organic Silt (A-8a)	73.7	26.2	257	10.0

4. FINDINGS

The subsurface conditions encountered during NEAS's explorations are described in the following subsections and/or 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 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. It should be noted that for the purposes of this report the term 'subgrade' has been assumed to

represent soils and/or soil conditions from 1.5 ft below existing pavement grades to a depth of 7.5 ft below the proposed pavement grades

4.1. Existing Pavement

4.1.1. Pavement Thickness/Buildup Measurements

The pavement section thicknesses in terms of asphalt and/or concrete were measured at subgrade borings where existing pavement was present. Pavement section thicknesses were measured during the subsurface exploration and are recorded on the test boring logs provided in Appendix B. A summary of these measurements are provided in Table 4 below.

Table 4: Measured Pavement Thickness at Boring Locations

Boring ID	Existing Alignment	Boring Depth (ft)	Asphalt thickness (in)	Concrete thickness (in)	Total Thickness (in)
B-020-0-18	IR-277	36.5	3	10	13
B-023-0-18	IR-277	11.5	4	9	13
B-025-0-18	IR-277	7.5	10	7	17
B-026-0-18	IR-277	7.5	13	-	13
B-046-0-18	IR-77/IR-76	7.5	5	-	5
B-047-0-18	IR-77/IR-76/Ramp L	10.4	6	-	6
B-049-0-18	IR-77/IR-76	7.5	14	-	14
B-050-0-18	IR-77/IR-76	20.1	6	-	6
B-066-0-18	Ramp B	26.5	15.5	-	15.5
B-077-0-18	Ramp L	7.5	12	-	12

4.2. Subsurface Conditions

The subsurface conditions in the project area are relatively consistent and are generally comprised of either fill soils (i.e., embankment fill, historical/urban fill, etc.) or natural soils consisting of non-cohesive sand, silt and gravel combinations or low to moderately plastic sandy silt, silt, and silt/clay combinations. About fifty percent of the subgrade soils encountered at the site were classified as either Coarse and Fine Sand (A-3a) or cohesive/non-cohesive Sandy Silt (A-4a). The remainder of the subgrade soils were generally classified as A-1-a, A-1-b, A-2-4, A-3, A-4b or A-6a. The exception to this is the southeast portion of the project where natural organic silts (A-8a) were encountered. 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 (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.

4.2.1. IR-77/IR-76

Along IR-76 EB and IR-77 NB, forty-three percent (43%) of the samples taken along the interstate were classified as coarse-grained, non-cohesive soils and were comprised of: 1) Coarse and Fine Sand (A-3a, 20% of samples), 2) Gravel with Sand and Silt (A-2-4, 7% of samples); 3) Gravel with Sand (A-1-b, 13% of samples); 4) Sandy Silt (A-4a, 1 sample); and, 5) Silt (A-4b, 1 sample). With respect to the relative density of the coarse-grained soils, the descriptions varied from loose to very dense correlating to converted SPT-N values (N_{60}) values between 6 and 60 blows per foot (bpf). Natural moisture contents ranged from 5 to 21 percent.

Forty-eight (48%) of the soil samples were identified as fine-grained soils and were comprised of: 1) cohesive Sandy Silt (A-4a, 43% of samples); and, 2) Silt and Clay (A-6a, 5% of samples). With respect to the consistency of the fine-grained soils, the descriptions varied from medium stiff to hard correlating to N_{60} values between 7 and 42 bpf. Natural moisture contents ranged from 8 to 18 percent.

The remaining ten percent (9%) of the samples were identified as Rock generally classified as shale.

4.2.2. IR-277/IR-76

Seventy-eight percent (78%) of the samples taken along the IR-277 and IR-76 were classified as coarse-grained, non-cohesive soils and were comprised of: 1) Coarse and Fine Sand (A-3a, 35% of samples); 2) Fine Sand (A-3, 17% of samples); 3) Gravel with Sand (A-1-b, 9% of samples); 4) Sandy Silt (A-4a, 7% of samples); and, 5) Silt (A-4b, 11% of samples). With respect to the relative density of the coarse-grained soils, the descriptions varied from very loose to dense correlating to N_{60} values between 0 (weight of hammer) and 35 bpf. Natural moisture contents ranged from 3 to 40 percent.

Twenty-two percent (22%) of the soil samples were identified as fine-grained soils and were comprised of 1) Cohesive Sandy Silt (A-4a, 15% of samples); 2) Silt (A-4b, 4% of samples); and 3) Silt and Clay (A-6a, 4% of samples). With respect to the consistency of the fine-grained soils, the descriptions varied from medium stiff to hard correlating to N_{60} values between 6 and 28 bpf. Natural moisture contents ranged from 12 to 29 percent.

It should also be noted that within the project portion of IR-277 EB (near the SW Interchange and extending east), Organic Silt (A-8a) as well as very loose Sandy Silts (A-4a) and Coarse and Fine Sands (A-3a) were encountered. Organic Silt was encountered in boring B-034-0-18 which was located south of the existing IR-277 EB pavement. The Organic Silt encountered at the site had an organic content of 28.4% (highly organic) and was encountered from 0 to 8 ft bgs. The referenced portion of IR-277 EB also encountered very loose soil (A-3a and A-4a) in five of the borings performed in the area. The very loose and 0 bpf material was encountered below the subgrade at depths between 5 and 27 ft bgs.

4.2.3. Ramp L

Nine percent (9%) of the samples taken along Ramp L were classified as coarse-grained, non-cohesive soils and were comprised of Gravel with Sand (A-1-b, 1 sample). With respect to the relative density of the coarse-grained soil sample, the material can be described as very dense correlating to an N_{60} value of 57 bpf. Natural moisture content of the sample was 5 percent.

Forty-five percent (45%) of the samples taken along the ramp were classified as fine-grained soils and were comprised of cohesive Sandy Silt (A-4a, 5 samples). With respect to the consistency of the fine-grained soils, the descriptions varied from stiff to hard correlating to N_{60} values between 10 and 39 bpf. Natural moisture contents ranged from 9 to 16 percent.

The remaining forty-five percent (45%) of the samples were identified as Rock classified as gray, highly weathered, very weak shale.

4.2.4. Ramps N & M

Seventy-eight percent (78%) of the samples taken along the Ramps N and M were classified as coarse-grained, non-cohesive soils and were comprised of Coarse and Fine Sand (A-3a, 7 samples). With respect to the relative density of the coarse-grained soils, the descriptions varied from loose to dense correlating to N_{60} values between 6 and 44 bpf. Natural moisture contents ranged from 5 to 26 percent.

Twenty-two percent (22%) of the soil samples were identified as fine-grained soils, comprised of Silt and Clay (A-6a, 1 sample); and, 2) Silty Clay (A-6b, 2 samples). With respect to the consistency of the fine-grained soils, the material can be described as stiff correlating to N_{60} values between 10 and 14 bpf. Natural moisture contents ranged from 12 to 21 percent.

4.2.5. Groundwater

Groundwater measurements were taken during the boring drilling procedures and/or immediately following the completion of each borehole. Groundwater was encountered in 15 of the 42 project borings. Across the project site groundwater was encountered at depths ranging from 0 to 28 ft bgs or from elevations ranging from 964.8 to 983.3 ft amsl. Groundwater was encountered within 7.5 ft (within subgrade portion) of the ground surface in 7 borings.

It should be noted that groundwater is affected by many hydrologic characteristics in the area and may vary.

5. QUALIFICATIONS

This geotechnical investigation was performed in accordance with accepted geotechnical engineering practice for the purpose of characterizing the subgrade conditions along the referenced portions of roadways. This report has been prepared for GPD Group, ODOT and their design consultants to be used solely in evaluating the roadway subgrade soils within the project limits and presenting the results of the geotechnical exploration 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. The data presented within this report are based on the results of our field explorations, laboratory tests results from representative soil samples. The results of the field explorations and laboratory tests 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.

It has been a pleasure to be of service to GPD Group in performing this geotechnical exploration for the SUM-76-6.15 project. Please call if there are any questions, or if we can be of further service.

Respectfully Submitted,

Brendan P. Andrews, P.E.
Geotechnical Engineer

Kevin C. Arens, P.E.
Geotechnical Engineer

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APPENDIX A

BORING LOCATION PLAN

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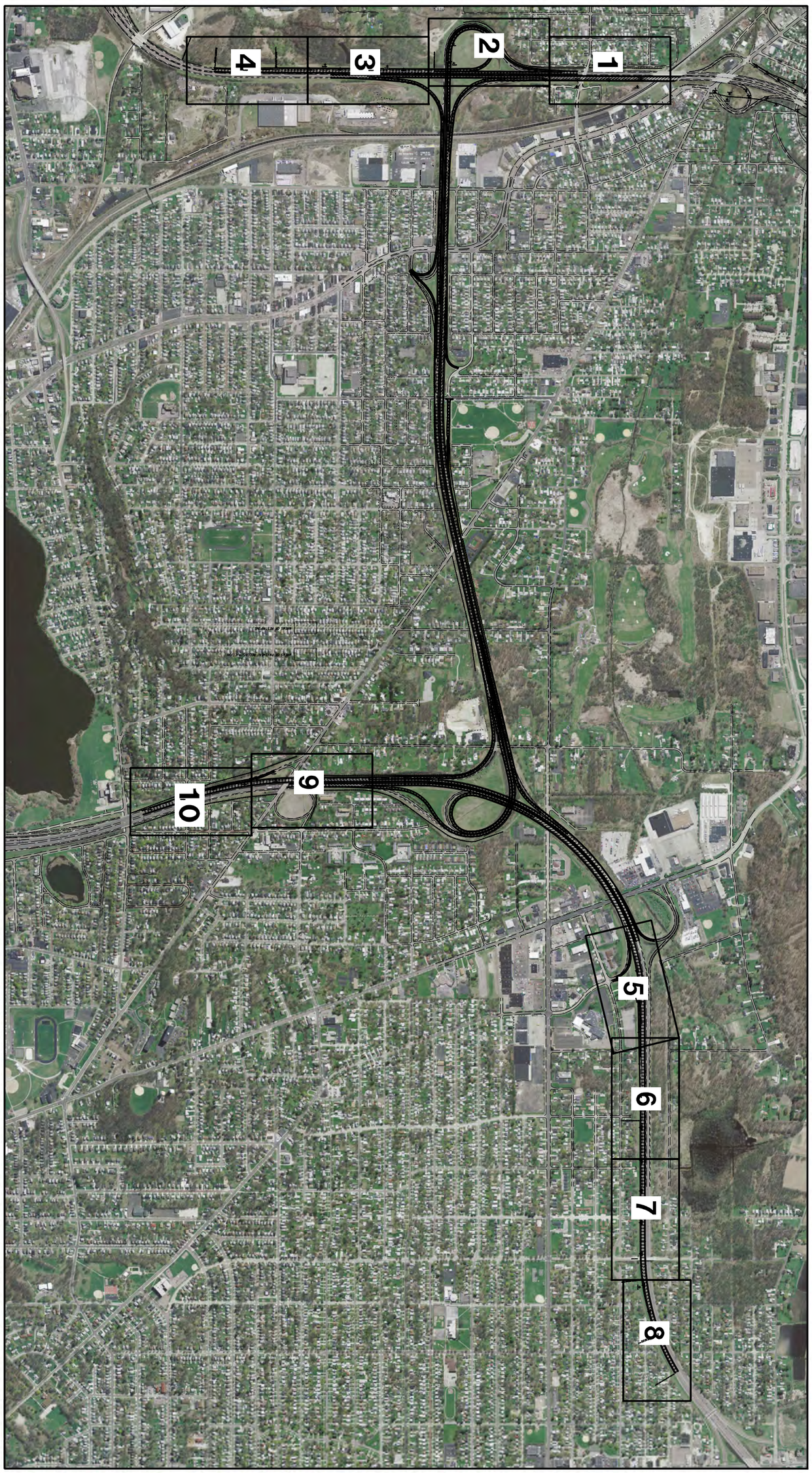

SUM-76-10.95
AKRON BELTWAY

BORING LOCATION PLAN

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HORIZONTAL SCALE IN FEET

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LEGEND

PROJECT BORING LOCATION

HORIZONTAL SCALE IN FEET
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DRAWN KCA
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BORING LOCATION PLAN

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AKRON BELTWAY

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LEGEND

PROJECT BORING LOCATION

HORIZONTAL SCALE IN FEET
0 25 50 100

DRAWN KCA
CHECKED BPA

BORING LOCATION PLAN

SUM-76-10.95
AKRON BELTWAY

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LEGEND

PROJECT BORING LOCATION

HORIZONTAL SCALE IN FEET
0 25 50 100

DRAWN KCA
CHECKED BPA

BORING LOCATION PLAN

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LEGEND

PROJECT BORING LOCATION

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HORIZONTAL SCALE IN FEET

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BORING LOCATION PLAN

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LEGEND

PROJECT BORING LOCATION

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HORIZONTAL SCALE IN FEET

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BORING LOCATION PLAN

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LEGEND

PROJECT BORING LOCATION

BORING LOCATION PLAN

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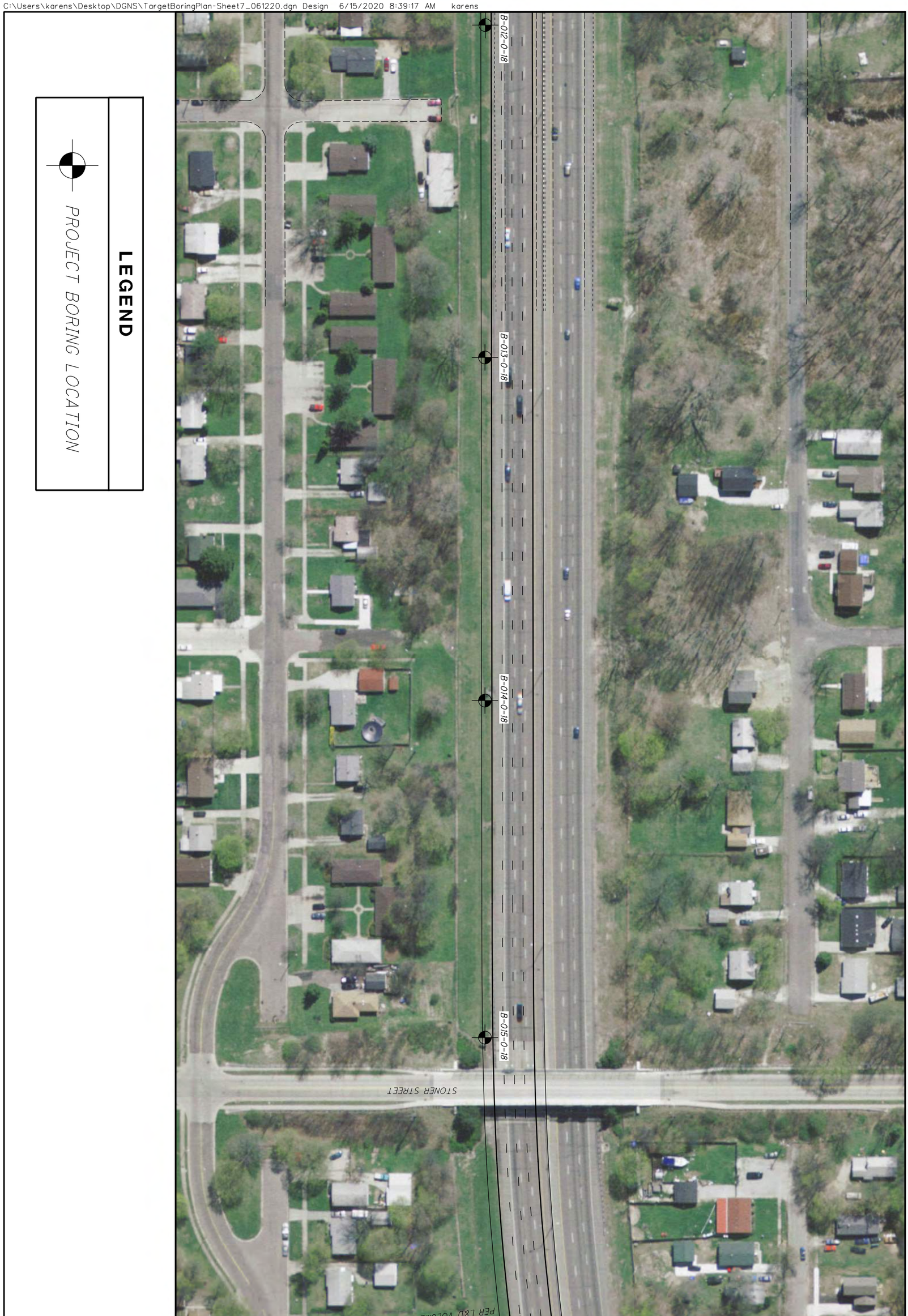

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			CHECKED BPA		

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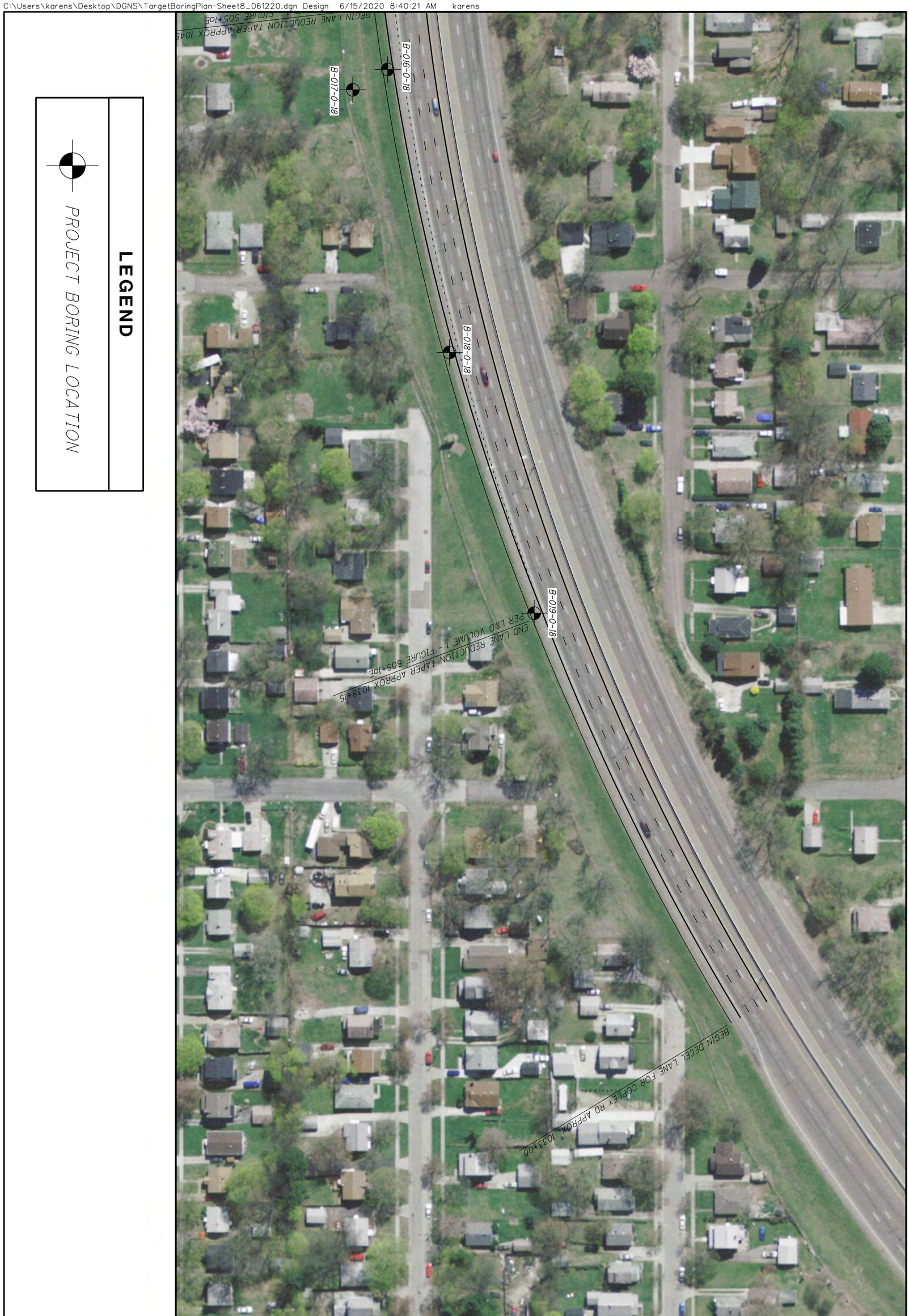

LEGEND

PROJECT BORING LOCATION

8/10	SUM-76-10.95 AKRON BELTWAY	BORING LOCATION PLAN	DRAWN KCA CHECKED BPA	0 50 25 100 HORIZONTAL SCALE IN FEET	N

LEGEND

PROJECT BORING LOCATION

HORIZONTAL SCALE IN FEET 0 25 50 100

DRAWN KCA

CHECKED BPA

BORING LOCATION PLAN

SUM-76-10.95
AKRON BELTWAY

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LEGEND

PROJECT BORING LOCATION

HORIZONTAL SCALE IN FEET
0 25 50 100

DRAWN KCA
CHECKED BPA

BORING LOCATION PLAN

SUM-76-10.95
AKRON BELTWAY

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APPENDIX B

BORING LOGS

PROJECT: SUM-76-06.15
TYPE: ROADWAY
PID: 100713 SFN:
START: 4/30/19 END: 4/30/19

DRILLING FIRM / OPERATOR: NEAS / J. HODGES
SAMPLING FIRM / LOGGER: NEAS / J.HODGES
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 55X
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 11/21/17
ENERGY RATIO (%): 85

STATION / OFFSET: 189+75, 74' LT.
ALIGNMENT: IR-77 & IR-76
ELEVATION: 976.4 (MSL) EOB: 10.5 ft.
LAT / LONG: 41.066552, -81.573713

EXPLORATION ID B-007-0-18

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
LOOSE, BROWN, **COARSE AND FINE SAND**, LITTLE SILT, LITTLE CLAY, TRACE GRAVEL, SS-1 CONTAINS TRACE IRON STAINING, WET	976.4																	
		1																
		2																
		3	2 3 3	9	56	SS-1	-	-	-	-	-	-	-	-	-	14	A-3a (V)	
		4																
		5																
		6	1 2 3	7	100	SS-2	-	8	31	33	17	11	NP	NP	NP	16	A-3a (0)	
		7																
		8	2 3 4	10	56	SS-3	-	-	-	-	-	-	-	-	-	17	A-3a (V)	
	967.4	9																
LOOSE, GRAY, **SILT**, SOME SAND, TRACE CLAY, TRACE GRAVEL, WET	965.9	10	4 4 3	10	56	SS-4	-	3	4	24	61	8	NP	NP	NP	21	A-4b (7)	
		EOB																

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 181+94, 76' LT.	EXPLORATION ID B-008-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 983.4 (MSL) EOB: 11.5 ft.	PAGE 1 OF 1
START: 2/26/19 END: 2/26/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.068655, -81.573829	

MATERIAL DESCRIPTION AND NOTES	ELEV. 983.4	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
MEDIUM DENSE, DARK BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, TRACE TO LITTLE CLAY, CONTAINS TRACE ROOTS, ASPHALT, AND STONE FRAGMENTS >1", DAMP	981.4	1	4 6 8	18	100	SS-1	-	-	-	-	-	-	-	-	-	9	A-2-4 (V)	
VERY STIFF, BROWN MOTTLED WITH GRAY, **SILT AND CLAY**, "AND" SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP	978.9	2 3 4	4 4 6	13	100	SS-2	2.25	7	10	44	22	17	25	14	11	13	A-6a (1)	
HARD, GRAY MOTTLED WITH BROWN AND ORANGISH BROWN, **SANDY SILT**, LITTLE CLAY, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP TO MOIST	973.9	5 6 7	2 4 12	21	100	SS-3	4.5+	-	-	-	-	-	-	-	-	11	A-4a (V)	
		8 9	3 3 6	12	100	SS-4	4.50	3	19	38	24	16	23	15	8	16	A-4a (1)	
MEDIUM DENSE, GRAYISH BROWN, **COARSE AND FINE SAND**, LITTLE SILT, TRACE CLAY, TRACE GRAVEL, MOIST	971.9	10 11 EOB	2 5 8	17	100	SS-5	-	-	-	-	-	-	-	-	-	13	A-3a (V)	

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 177+99, 66' LT.	EXPLORATION ID B-009-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 984.9 (MSL) EOB: 11.5 ft.	PAGE 1 OF 1
START: 2/26/19 END: 2/26/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.069741, -81.573854	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
VERY DENSE, DARK BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, TRACE CLAY, CONTAINS PLASTIC FRAGMENTS, DAMP **(FILL)**	984.9		50/3"	-	100	SS-1	-	-	-	-	-	-	-	-	-	7	A-2-4 (V)	
	982.9	1																
MEDIUM DENSE, LIGHT BROWN AND GRAY, **COARSE AND FINE SAND**, SOME GRAVEL AND STONE FRAGMENTS, LITTLE SILT, LITTLE CLAY, DAMP		2	5 5 7	16	100	SS-2	-	21	11	38	18	12	20	17	3	12	A-3a (0)	
	980.4	3																
VERY STIFF TO HARD, BROWN AND GRAY, **SANDY SILT**, LITTLE CLAY, TRACE GRAVEL, DAMP TO MOIST @5.0' TO 6.5'; SS-3 CONTAINS LIGHT BROWN AND ORANGISH BROWN MOTTLES, TRACE IRON STAINING		4	4 7 6	17	100	SS-3	4.50	6	16	30	29	19	21	14	7	13	A-4a (3)	
		5																
		6																
		7																
		8	3 5 6	14	100	SS-4	2.75	-	-	-	-	-	-	-	-	15	A-4a (V)	
		9																
		10																
	973.4	11	4 6 5	14	100	SS-5	4.5+	-	-	-	-	-	-	-	-	12	A-4a (V)	
		EOB																

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 173+98, 60' LT.	EXPLORATION ID B-010-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 985.0 (MSL) EOB: 11.5 ft.	PAGE 1 OF 1
START: 2/26/19 END: 2/26/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.070840, -81.573860	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
DENSE, BROWN, **GRAVEL WITH SAND AND SILT**, TRACE CLAY, CONTAINS TRACE IRON STAINING, DAMP	985.0	1	7 11 13	31	100	SS-1	-	-	-	-	-	-	-	-	-	12	A-2-4 (V)	
STIFF TO VERY STIFF, BROWN MOTTLED WITH ORANGISH BROWN AND GRAY, **SANDY SILT**, LITTLE CLAY, LITTLE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP	983.0	2 3 4	5 7 7	18	100	SS-2	2.00	11	17	29	26	17	23	16	7	15	A-4a (2)	
MEDIUM DENSE, BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, LITTLE CLAY, DAMP	980.5	5 6 7	5 6 8	18	100	SS-3	-	23	17	28	21	11	22	17	5	14	A-2-4 (0)	
STIFF TO VERY STIFF, GRAY MOTTLED WITH ORANGISH BROWN, **SANDY SILT**, LITTLE CLAY, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP	978.0	8 9 10	4 5 7	16	100	SS-4	3.00	-	-	-	-	-	-	-	-	16	A-4a (V)	
	973.5 EOB	11	5 5 6	14	100	SS-5	2.00	-	-	-	-	-	-	-	-	15	A-4a (V)	

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

PROJECT: SUM-76-06.15
TYPE: ROADWAY
PID: 100713 SFN:
START: 2/26/19 END: 2/26/19

DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH
SAMPLING FIRM / LOGGER: NEAS / E. ROLLER
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 55T
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 11/21/17
ENERGY RATIO (%): 78

STATION / OFFSET: 170+00, 60' LT.
ALIGNMENT: IR-77 & IR-76
ELEVATION: 984.0 (MSL) EOB: 11.5 ft.
LAT / LONG: 41.071934, -81.573846

EXPLORATION ID B-011-0-18

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
VERY STIFF TO HARD, BROWN BECOMING BROWN MOTTLED WITH GRAY AND ORANGISH BROWN, **SANDY SILT**, LITTLE CLAY, LITTLE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP	984.0	1	8 12 14	34	100	SS-1	4.5+	-	-	-	-	-	-	-	-	9	A-4a (V)	
		2																
		3	5 8 10	23	100	SS-2	3.00	12	16	28	29	15	25	19	6	16	A-4a (2)	
		4																
		5																
		6	2 3 4	9	100	SS-3	4.00	15	20	27	22	16	25	16	9	14	A-4a (1)	
		7																
		8	4 4 5	12	100	SS-4	3.25	-	-	-	-	-	-	-	-	16	A-4a (V)	
		9																
		10																
	972.5	EOB 11	5 6 5	14	100	SS-5	4.00	-	-	-	-	-	-	-	-	16	A-4a (V)	

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 165+85, 59' LT.	EXPLORATION ID B-012-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 982.9 (MSL) EOB: 11.5 ft.	PAGE 1 OF 1
START: 2/26/19 END: 2/26/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.073072, -81.573836	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
HARD, DARK BROWN AND LIGHT BROWN, **SANDY SILT**, SOME GRAVEL, LITTLE CLAY, CONTAINS TRACE IRON STAINING, DAMP	982.9	1	8 11 12	30	100	SS-1	4.25	-	-	-	-	-	-	-	-	11	A-4a (V)	
		2																
		3	6 9 9	23	100	SS-2	4.25	24	9	29	23	15	21	14	7	10	A-4a (1)	
	978.4	4																
STIFF TO VERY STIFF, BROWN MOTTLED WITH ORANGISH BROWN AND GRAY, **SANDY SILT**, LITTLE CLAY, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP		5	5 6 7	17	100	SS-3	1.25	8	23	28	27	14	26	20	6	18	A-4a (1)	
		6																
		7																
		8	5 6 6	16	100	SS-4	2.00	-	-	-	-	-	-	-	-	17	A-4a (V)	
		9																
		10																
	971.4	11 EOB	6 6 7	17	100	SS-5	1.50	-	-	-	-	-	-	-	-	17	A-4a (V)	

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 161+79, 60' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 981.8 (MSL) EOB: 11.5 ft.
START: 2/26/19 END: 2/26/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.074185, -81.573819

EXPLORATION ID B-013-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 981.8	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
MEDIUM DENSE TO DENSE, DARK BROWN BECOMING LIGHT TAN AND ORANGISH BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, TRACE CLAY, SS-1 CONTAINS TRACE ROOTS, SS-3 CONTAINS IRON STAINING, MOIST TO DAMP		1	13 10 9	25	100	SS-1	-	-	-	-	-	-	-	-	-	13	A-2-4 (V)	
		2																
		3	7 9 9	23	89	SS-2	-	38	11	37	9	5	NP	NP	NP	7	A-2-4 (0)	
		4																
		5	6 12 16	36	89	SS-3	-	-	-	-	-	-	-	-	-	8	A-2-4 (V)	
	974.8	6																
LOOSE, BROWN AND ORANGISH BROWN, **COARSE AND FINE SAND**, TRACE SILT, TRACE CLAY, TRACE GRAVEL, SS-5 CONTAINS IRON STAINING, WET		7																
	W 972.8	8	4 3 4	9	100	SS-4	-	0	21	65	8	6	NP	NP	NP	17	A-3a (0)	
		9																
		10	2 3 5	10	100	SS-5	-	-	-	-	-	-	-	-	-	27	A-3a (V)	
	970.3	EOB 11																

NOTES: GROUNDWATER ENCOUNTERED AT 9.0' DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15
TYPE: ROADWAY
PID: 100713 SFN:
START: 2/26/19 END: 2/26/19

DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH
SAMPLING FIRM / LOGGER: NEAS / E. ROLLER
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 55T
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 11/21/17
ENERGY RATIO (%): 78

STATION / OFFSET: 157+96, 60' LT.
ALIGNMENT: IR-77 & IR-76
ELEVATION: 982.7 (MSL) EOB: 11.5 ft.
LAT / LONG: 41.075237, -81.573806

EXPLORATION ID B-014-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
STIFF, BROWN, **SANDY SILT**, LITTLE CLAY, TRACE GRAVEL, MOIST	982.7	1	5 5 7	16	100	SS-1	1.25	4	19	28	30	19	25	15	10	16	A-4a (3)	
	980.7	2																
LOOSE TO MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, LITTLE SILT, LITTLE CLAY, TRACE GRAVEL, SS-3 CONTAINS TRACE ROOT HAIRS, MOIST TO WET		3	3 4 4	10	100	SS-2	-	-	-	-	-	-	-	-	-	12	A-3a (V)	
		4																
		5	3 4 5	12	100	SS-3	-	7	39	25	18	11	23	18	5	15	A-3a (0)	
		6																
		7																
W 973.7		8	4 4 5	12	100	SS-4	-	-	-	-	-	-	-	-	-	18	A-3a (V)	
		9																
		10																
	971.2	11 EOB	3 4 4	10	100	SS-5	-	-	-	-	-	-	-	-	-	29	A-3a (V)	

NOTES: GROUNDWATER ENCOUNTERED AT 9.0' DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 154+04, 73' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / CHIPUKAIZER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 984.3 (MSL) EOB: 10.5 ft.
START: 5/1/19 END: 5/1/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.076317, -81.573749

EXPLORATION ID B-015-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
VERY STIFF, BROWN, **SANDY SILT**, LITTLE CLAY, LITTLE GRAVEL, CONTAINS IRON STAINING, DAMP **(FILL)**	984.3		4 6 10	23	100	SS-1	3.00	17	16	27	24	16	25	15	10	13	A-4a (1)	
	977.3		2 2 3	7	56	SS-2	2.50	11	17	26	28	18	27	17	10	15	A-4a (2)	
LOOSE, BROWN, **COARSE AND FINE SAND**, SOME SILT, TRACE CLAY, TRACE GRAVEL, CONTAINS IRON STAINING, SS-4 CONTAINS TRACE PLASTIC DEBRIS, WET **(FILL)**		W 976.8	2 2 2	6	56	SS-3	-	-	-	-	-	-	-	-	-	21	A-3a (V)	
	973.8	EOB	2 2 3	7	56	SS-4	-	-	-	-	-	-	-	-	-	20	A-3a (V)	

NOTES: GROUNDWATER ENCOUNTERED AT 7.5' DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 150+15, 60' LT.	EXPLORATION ID B-016-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 987.4 (MSL) EOB: 11.5 ft.	PAGE 1 OF 1
START: 2/27/19 END: 2/27/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.077400, -81.573883	

MATERIAL DESCRIPTION AND NOTES	ELEV. 987.4	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
MEDIUM DENSE, BROWN, **GRAVEL WITH SAND AND SILT**, LITTLE CLAY, DAMP	985.4	1	3 9 8	22	100	SS-1	-	-	-	-	-	-	-	-	-	11	A-2-4 (V)	
DENSE TO VERY DENSE, LIGHT TAN, **STONE FRAGMENTS WITH SAND**, LITTLE SILT, TRACE CLAY, STONE FRAGMENTS ARE SANDSTONE, DAMP		2 3 4	3 19 20	51	89	SS-2	-	47	7	28	12	6	NP	NP	NP	8	A-1-b (0)	
@5.0' TO 6.5'; SS-3 BECOMES BROWN MOTTLED WITH ORANGISH BROWN AND BLACK, CONTAINS IRON STAINING, WET	977.9	5 6 7	19 22 10	42	89	SS-3	-	48	11	16	16	9	NP	NP	NP	15	A-1-b (0)	
		8 9	21 23 23	60	56	SS-4	-	-	-	-	-	-	-	-	-	7	A-1-b (V)	
LOOSE, BROWN, **COARSE AND FINE SAND**, SOME SILT, TRACE GRAVEL, TRACE CLAY, CONTAINS TRACE IRON STAINING, MOIST	975.9	10 11 EOB	4 4 3	9	100	SS-5	-	-	-	-	-	-	-	-	-	14	A-3a (V)	

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 149+98, 94' LT.	EXPLORATION ID B-017-0-18
TYPE: EMBANKMENT	SAMPLING FIRM / LOGGER: NEAS / CHIPUKAIZER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 980.2 (MSL) EOB: 10.5 ft.	PAGE 1 OF 1
START: 5/1/19 END: 5/1/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.077460, -81.573770	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
HARD, BROWN, **SANDY SILT**, LITTLE TO SOME CLAY, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP	980.2																	
					96	ST-1	4.25	5	13	29	31	22	24	17	7	16	A-4a (4)	
@4.0' TO 8.0'; BECOMES VERY SOFT, WET			2 3 2	7	56	SS-2	0.25	-	-	-	-	-	-	-	-	18	A-4a (V)	
	971.7																	
LOOSE, BROWN, **COARSE AND FINE SAND**, SOME SILT, TRACE CLAY, TRACE GRAVEL, WET	969.7	EOB	1 2 2	6	56	SS-3	0.25	3	15	42	27	13	17	14	3	20	A-4a (1)	
			2 1 3	6	100	SS-4	-	-	-	-	-	-	-	-	-	26	A-3a (V)	

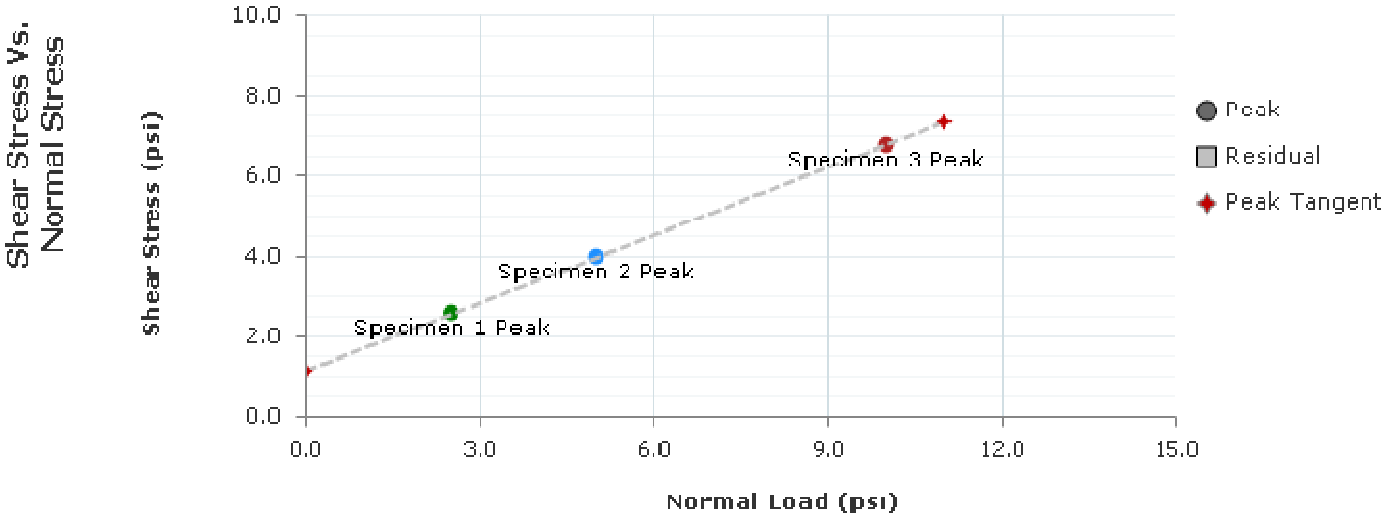
NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

Direct Shear Test

D3080

Project: SUM-76-6.15
Project Number: 100713
Location: B-017-0-18
Client Name:



C (psi): 1.2
Phi (°): 29.5

Residual C (psi): NA
Residual Phi (°): NA

	Specimen Number							
Initial	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Moisture (%):	20.2	17.3	15.6					
Dry Density (pcf):	106.9	110.3	111.6					
Void Ratio:	0.560	0.511	0.493					
Saturation (%):	96.3	90.5	84.5					
Diameter (in):	2.4973	2.4973	2.4973					
Height (in):	1.0033	0.9998	1.0000					
Final	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Moisture (%):	21.9	20.0	17.6					
Dry Density (pcf):	108.9	111.0	113.6					
Void Ratio:	0.531	0.502	0.467					
Saturation (%):	110.2	106.3	100.7					
Height (in):	1.0003	0.9998	0.9901					
Normal Stress (psi):	2.5	5.0	10.0					
Peak Shear Stress (psi):	2.6	4.0	6.8					
Residual Stress (psi):	NA	NA	NA					
Horizontal Deformation (%):	3.3	3.7	4.1					
Rate (in/min):	0.003535	0.003707	0.005000					

Direct Shear Test

D3080

Project: SUM-76-6.15
Project Number: 100713
Sampling Date: 6/19/2019
Sample Number: ST-1
Sample Depth: 2.0-4.0 ft
Location: B-017-0-18
Client Name:
Remarks:

Information Parameters	Specimen Number 1	2	3	4	5	6	7	8
Liquid Limit:	24	24	24					
Plastic Limit:	17	17	17					
Specific Gravity:	2.67	2.67	2.67					
Specific Gravity Method:	ASSUMED	ASSUMED	ASSUMED					
Initial Parameters	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Test Temperature (°C):	21.1	21.1	21.1					
Sample Shape:	ROUND	ROUND	ROUND					
Height (in):	1.0033	0.9998	1.0000					
Diameter (in):	2.4973	2.4973	2.4973					
Area (in²):	4.898	4.898	4.898					
Volume (in³):	4.9146	4.8975	4.8983					
Moisture (%):	20.2	17.3	15.6					
Dry Density (pcf):	106.9	110.3	111.6					
Wet Density (pcf):	128.4	129.4	129.1					
Saturation (%):	96.3	90.5	84.5					
Void Ratio:	0.560	0.511	0.493					
Porosity (%):	35.9	33.8	33.0					
Consolidation Parameters	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Initial Reference Height (in):	1.0033	0.9998	1.0000					
Final Reference Height (in):	1.0003	0.9998	0.9901					
Height (in):	1.0003	0.9998	0.9901					
Final Parameters	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Moisture Content (%)	21.9	20.0	17.6					
Dry Density (pcf):	108.9	111.0	113.6					
Wet Density (pcf):	132.7	133.2	133.6					
Saturation (%):	110.2	106.3	100.7					
Void Ratio:	0.531	0.502	0.467					
Porosity (%):	34.7	33.4	31.8					

Direct Shear Test

D3080

Project:	SUM-76-6.15
Project Number:	100713
Sampling Date:	6/19/2019
Sample Number:	ST-1
Sample Depth:	2.0-4.0 ft
Location:	B-017-0-18
Client Name:	
Remarks:	

Specific Gravity:	2.67	Plastic Limit:	17	Liquid Limit:	24
Type:	ST	Soil Classification:	A-4a		

Specimen Description: Hard, brown mottled with orangish brown and gray, SANDY SILT, some clay, trace gravel, damp.

Specimen 1 Failure Sketch	Specimen 2 Failure Sketch	Specimen 3 Failure Sketch	Specimen 4 Failure Sketch	Specimen 5 Failure Sketch	Specimen 6 Failure Sketch	Specimen 7 Failure Sketch	Specimen 8 Failure Sketch
							

Direct Shear Test

D3080

Specimen 1

Test Description:	D3080		
Other Associated Tests:			
Device Details:	HM-5760		
Test Specification:			
Test Time:	6/20/2019		
Technician:	L. Rosenbeck	Sampling Method:	ST
Specimen Code:	3.4' - 3.5'	Specimen Lab #:	1
Specimen Description:	Hard, brown mottled with orangish brown and gray, SANDY SILT, some clay, trace gravel, damp.		
Specific Gravity:	2.67		
Plastic Limit:	17	Liquid Limit:	24
Test Remarks:			

Specimen 2

Test Description:	D3080		
Other Associated Tests:			
Device Details:	HM-5760		
Test Specification:			
Test Time:	6/20/2019		
Technician:	L. Rosenbeck	Sampling Method:	ST
Specimen Code:	3.6' - 3.7'	Specimen Lab #:	2
Specimen Description:	Hard, brown mottled with orangish brown and gray, SANDY SILT, some clay, trace gravel, damp.		
Specific Gravity:	2.67		
Plastic Limit:	17	Liquid Limit:	24
Test Remarks:			

Direct Shear Test

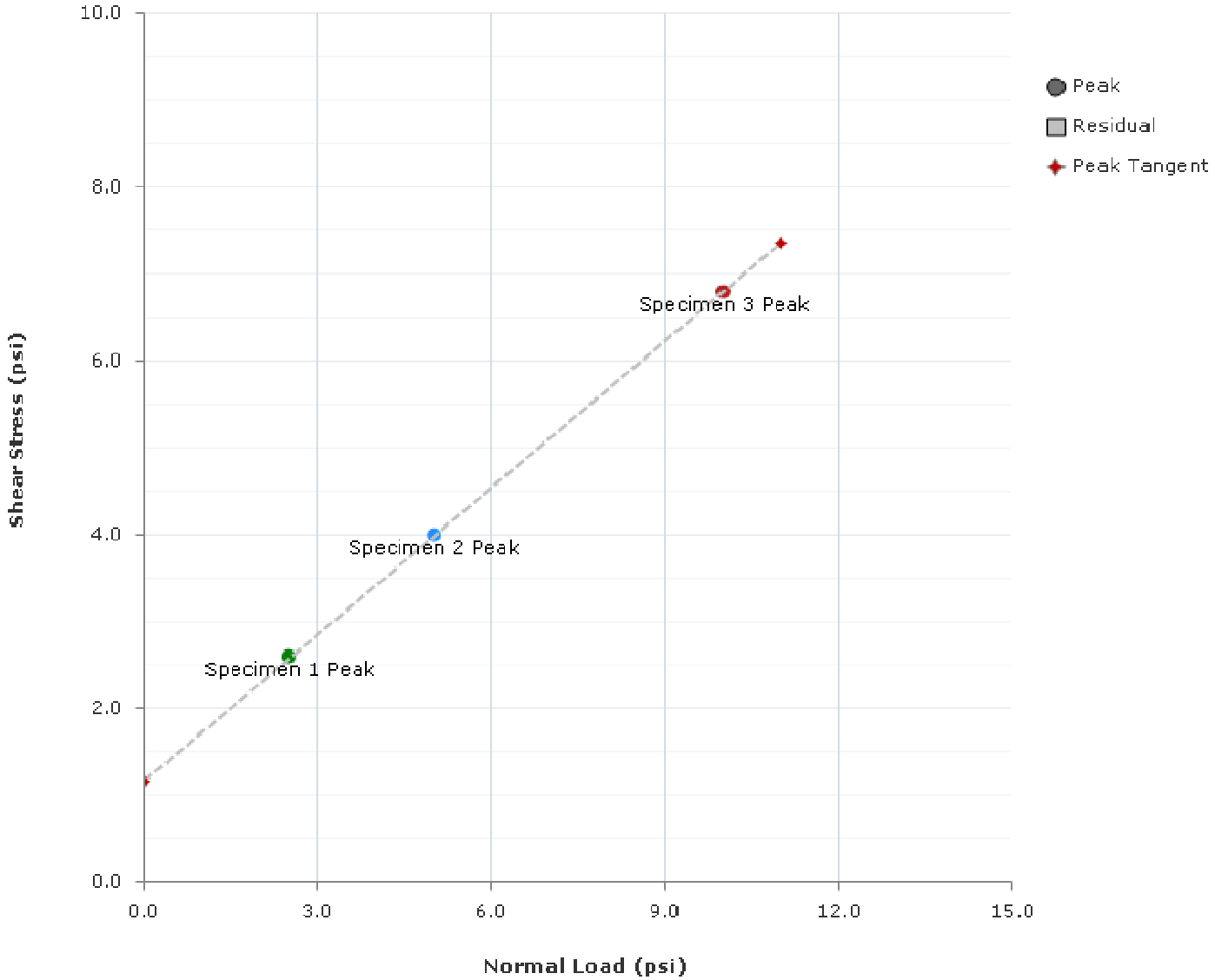
D3080

Specimen 3

Test Description:	D3080		
Other Associated Tests:			
Device Details:	HM-5760		
Test Specification:			
Test Time:	6/21/2019		
Technician:	L. Rosenbeck	Sampling Method:	ST
Specimen Code:	3.8' - 3.9'	Specimen Lab #:	3
Specimen Description:	Hard, brown mottled with orangish brown and gray, SANDY SILT, some clay, trace gravel, damp.		
Specific Gravity:	2.67		
Plastic Limit:	17	Liquid Limit:	24
Test Remarks:			

Direct Shear Test - Shear Stress Vs. Normal Stress

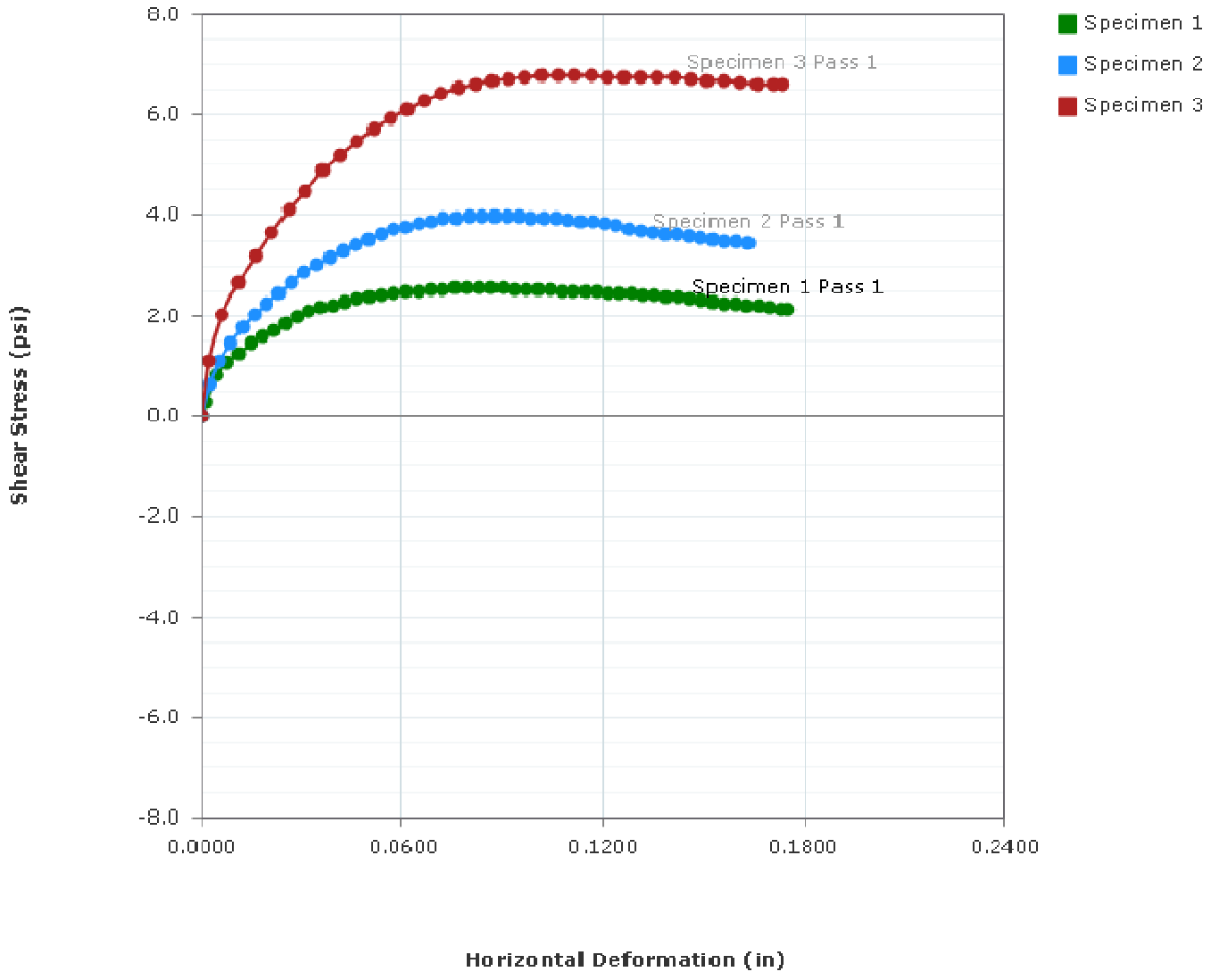
D3080



Tangent Results	C (psi)	Phi (°)
Peak Tangent:	1.2	29.5
Residual Tangent:	NA	NA

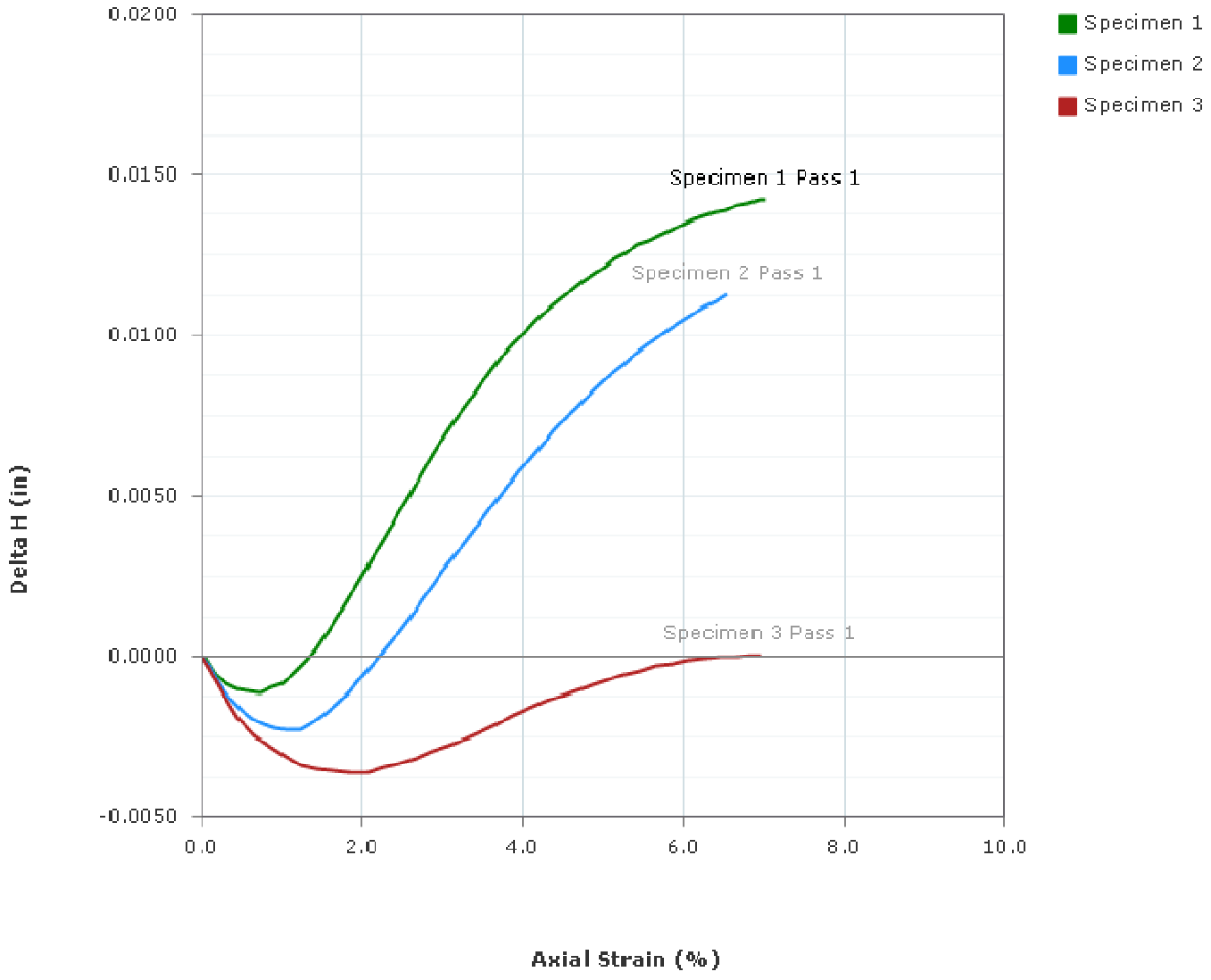
Graph - Stress Deformation

D3080



Graph - Delta H

D3080



Direct Shear Test - Specimen 1 - Consolidation Summary

D3080

Sample Description: Hard, brown mottled with orangish brown and gray, SANDY SILT, some clay, trace gravel, damp.
Project Number: 100713 **Depth:** **Remarks**
Sample Number: ST-1 **Boring Number:** B-017-0-18
Project: SUM-76-6.15
Client:
Location: B-017-0-18

Index	Loading Sequence (psi)	Cummulative Change in Height (ft)	Specimen Height (ft)	Height of Voids (ft)	Vertical Strain (%)	Void Ratio	T90 Fitting Time (Hr)	T50 Fitting Time (Hr)	T90 Cv (in²/Min)	T50 Cv (in²/Min)
0	0.0	0.000	0.084	0.000	0.0	0.56	0.000	0.000	0.00000	0.00000
1	2.5	0.000	0.083	0.030	0.3	0.55	0.034	1.430	0.10442	0.00058

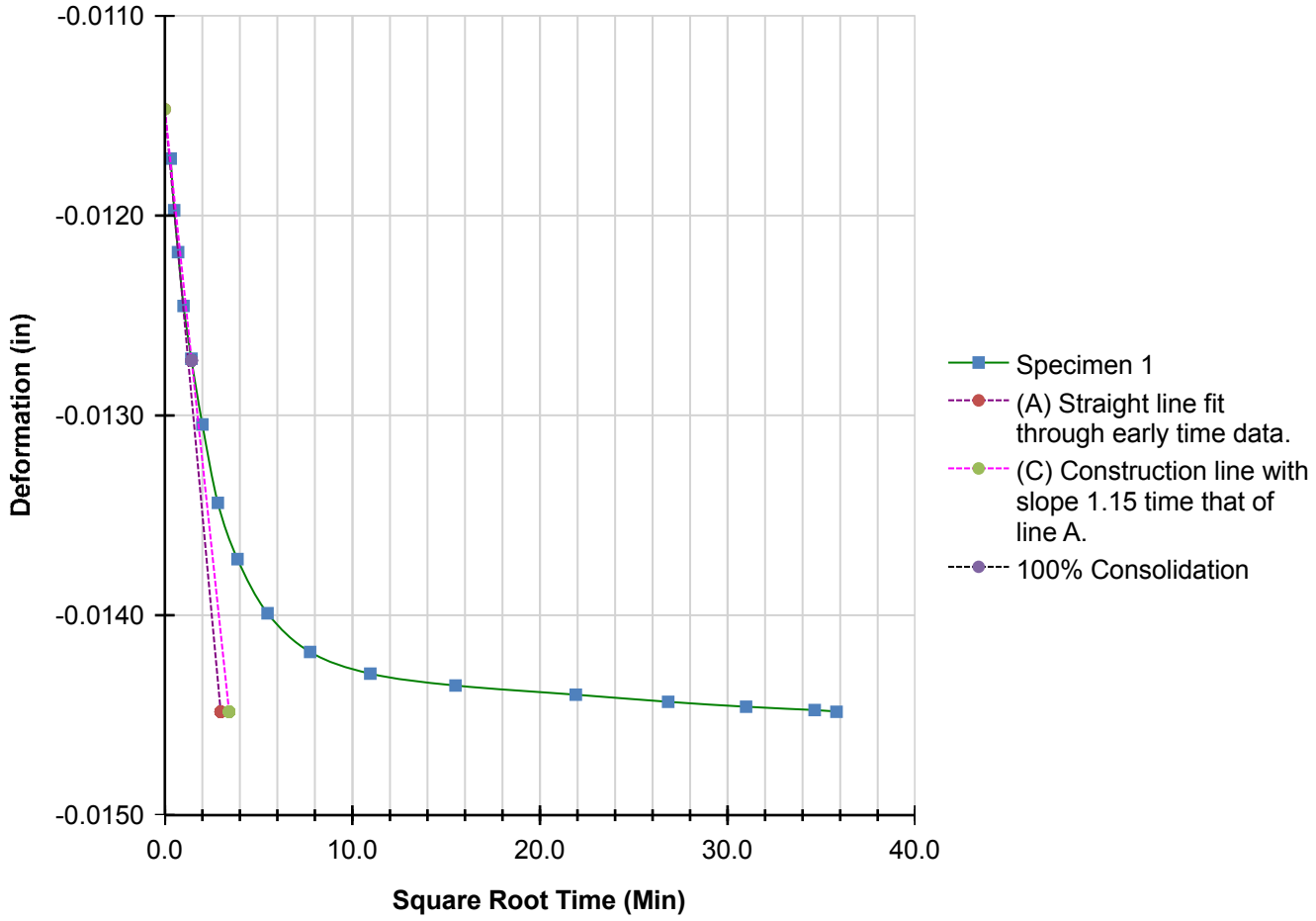
Consol Test - Specimen 1 - Sequence 1 - 2.5 (psi)

D3080 LIMS Code: [TO COME FROM LIMS] LIMS Specimen Code: [TO COME FROM LIMS]

Index	Elapsed Time (hh:mm:ss)	Load (Lbf)	Load (Lbf)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	11.6	-0.0114	0.0000	0.0	0.56
1	00:00:06	11.9	-0.0117	0.0003	0.0	0.56
2	00:00:15	12.2	-0.0120	0.0005	0.1	0.56
3	00:00:30	12.2	-0.0122	0.0007	0.1	0.56
4	00:01:00	12.3	-0.0125	0.0010	0.1	0.56
5	00:02:00	12.2	-0.0127	0.0013	0.1	0.56
6	00:04:00	12.2	-0.0130	0.0016	0.2	0.55
7	00:08:00	12.3	-0.0134	0.0020	0.2	0.55
8	00:15:00	12.2	-0.0137	0.0023	0.2	0.55
9	00:30:00	12.3	-0.0140	0.0025	0.3	0.55
10	01:00:00	12.2	-0.0142	0.0027	0.3	0.55
11	02:00:00	12.2	-0.0143	0.0028	0.3	0.55
12	04:00:00	12.2	-0.0144	0.0029	0.3	0.55
13	08:00:00	12.2	-0.0144	0.0030	0.3	0.55
14	12:00:00	12.3	-0.0144	0.0030	0.3	0.55
15	16:00:00	12.2	-0.0145	0.0030	0.3	0.55
16	20:00:00	12.2	-0.0145	0.0030	0.3	0.55
17	21:21:57	12.2	-0.0145	0.0030	0.3	0.55

Square Root Time - Specimen 1 - Sequence 1 - 2.5 (psi)

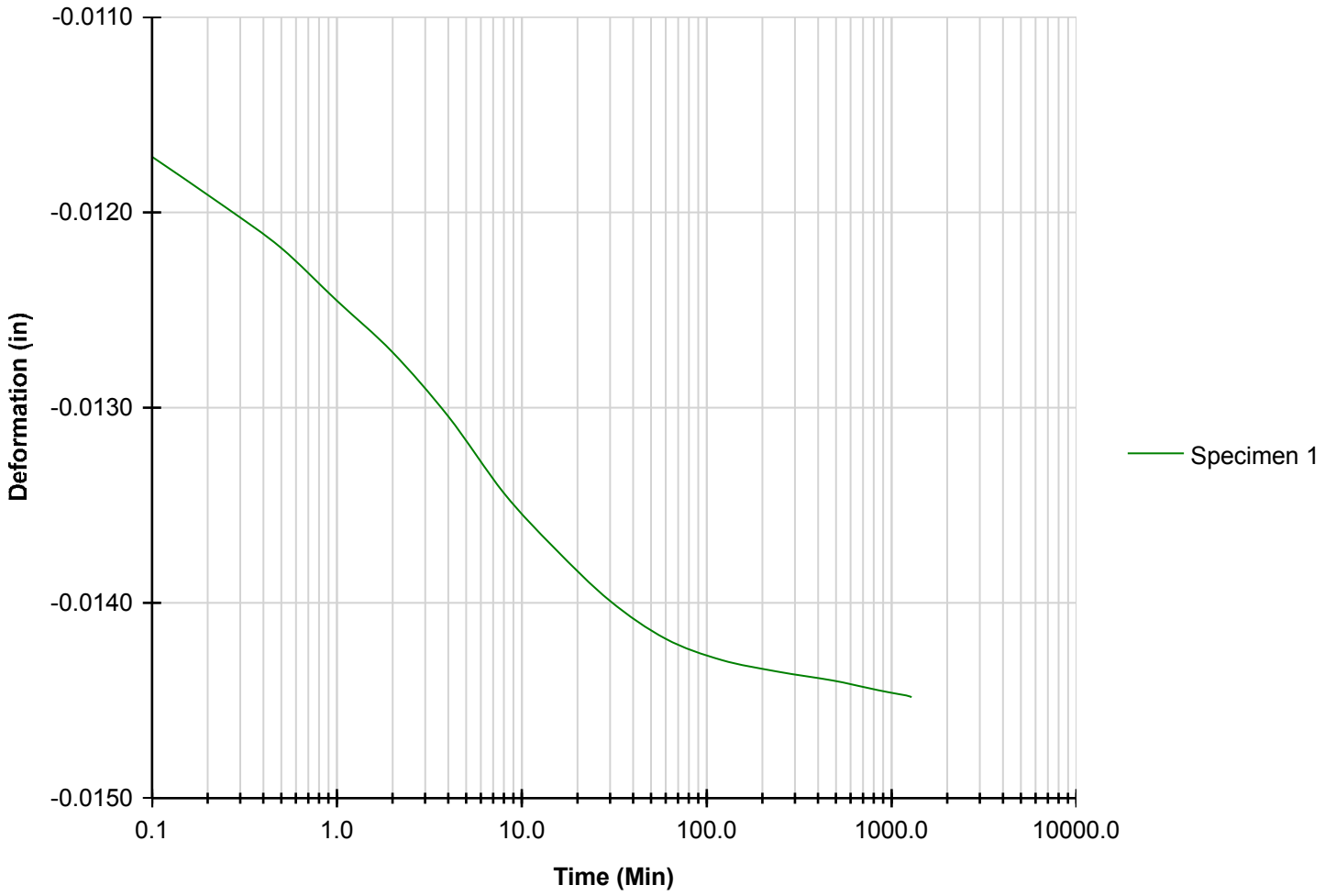
D3080



Tangent Construction Results	
T90 (Min):	2.044
T50 (Min):	1.135
Cv (in²/Min):	0.104

Logarithmic Time - Specimen 1 - Sequence 1 - 2.5 (psi)

D3080 LIMS Code: [TO COME FROM LIMS] LIMS Specimen Code: [TO COME FROM LIMS]



Tangent Construction Results	
T90 (Min):	NA
T50 (Min):	NA
Cv (in²/Min):	NA

Direct Shear Test - Specimen 2 - Consolidation Summary

D3080

Sample Description: Hard, brown mottled with orangish brown and gray, SANDY SILT, some clay, trace gravel, damp.
Project Number: 100713 **Depth:** **Remarks**
Sample Number: ST-1 **Boring Number:** B-017-0-18
Project: SUM-76-6.15
Client:
Location: B-017-0-18

Index	Loading Sequence (psi)	Cummulative Change in Height (ft)	Specimen Height (ft)	Height of Voids (ft)	Vertical Strain (%)	Void Ratio	T90 Fitting Time (Hr)	T50 Fitting Time (Hr)	T90 Cv (in²/Min)	T50 Cv (in²/Min)
0	0.0	0.000	0.083	0.000	0.0	0.51	0.000	0.000	0.00000	0.00000
1	5.0	0.001	0.083	0.027	0.7	0.50	0.032	1.394	0.10913	0.00059

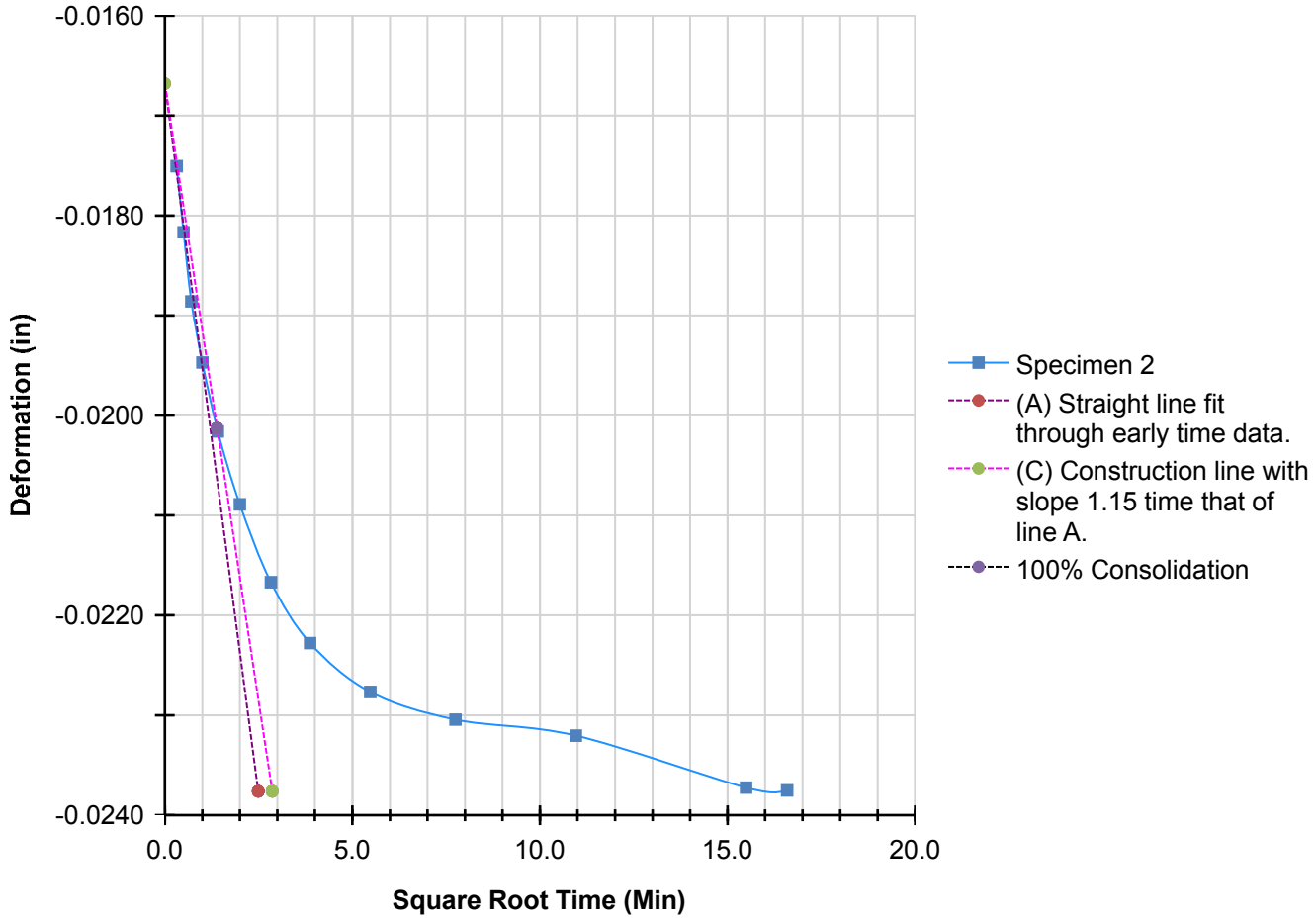
Consol Test - Specimen 2 - Sequence 1 - 5.0 (psi)

D3080 LIMS Code: [TO COME FROM LIMS] LIMS Specimen Code: [TO COME FROM LIMS]

Index	Elapsed Time (hh:mm:ss)	Load (Lbf)	Load (Lbf)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	23.3	-0.0168	0.0000	0.0	0.51
1	00:00:06	23.9	-0.0175	0.0007	0.1	0.51
2	00:00:15	24.5	-0.0182	0.0014	0.1	0.51
3	00:00:30	24.5	-0.0189	0.0021	0.2	0.50
4	00:01:00	24.5	-0.0195	0.0027	0.3	0.50
5	00:02:00	24.6	-0.0202	0.0034	0.3	0.50
6	00:04:00	24.5	-0.0209	0.0041	0.4	0.50
7	00:08:00	24.4	-0.0217	0.0049	0.5	0.50
8	00:15:00	24.4	-0.0223	0.0055	0.6	0.50
9	00:30:00	24.5	-0.0228	0.0060	0.6	0.50
10	01:00:00	24.4	-0.0230	0.0063	0.6	0.50
11	02:00:00	24.3	-0.0232	0.0064	0.6	0.50
12	04:00:00	24.5	-0.0237	0.0070	0.7	0.50
13	04:35:07	24.5	-0.0238	0.0070	0.7	0.50

Square Root Time - Specimen 2 - Sequence 1 - 5.0 (psi)

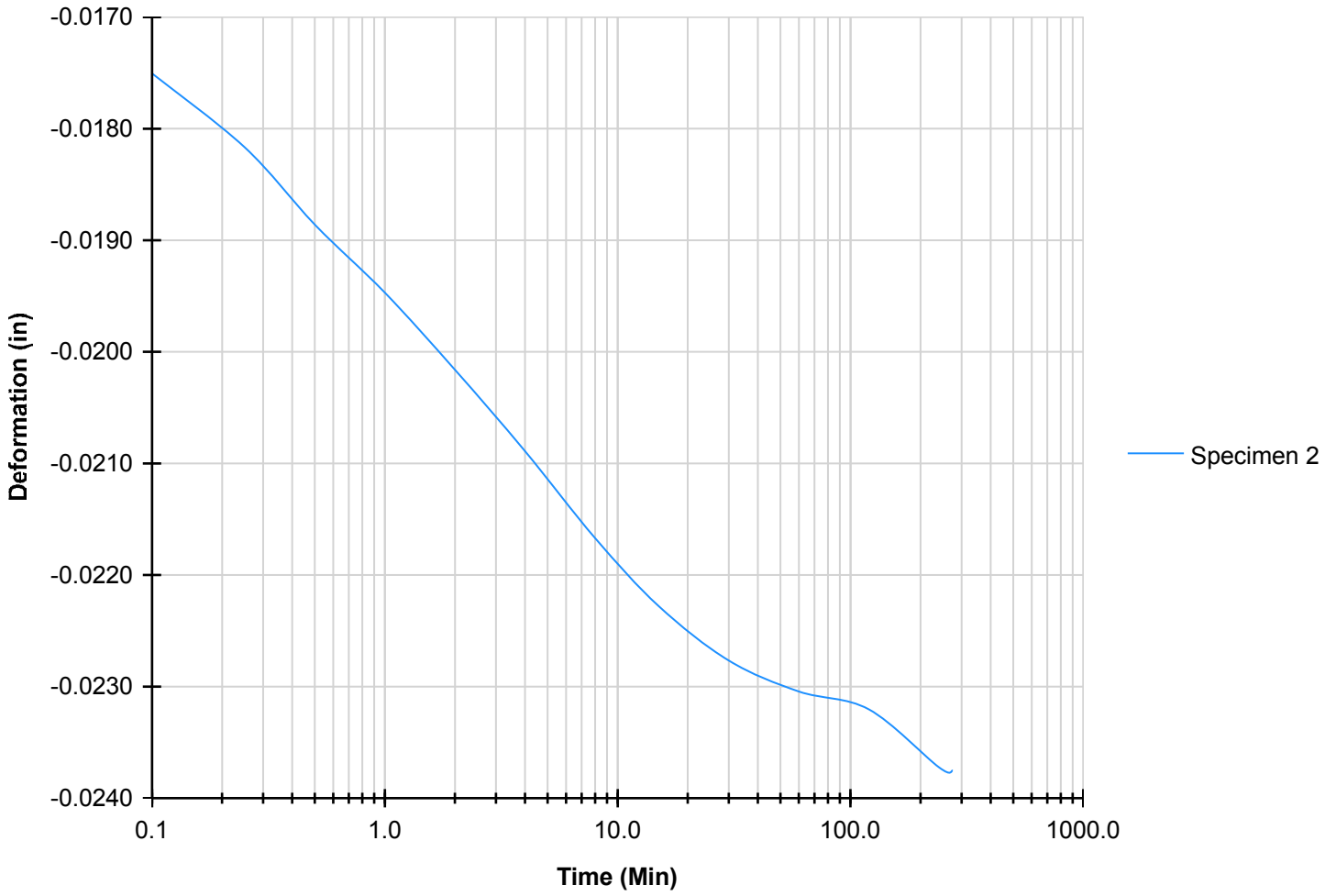
D3080



Tangent Construction Results	
T90 (Min):	1.942
T50 (Min):	1.079
Cv (in²/Min):	0.109

Logarithmic Time - Specimen 2 - Sequence 1 - 5.0 (psi)

D3080 LIMS Code: [TO COME FROM LIMS] LIMS Specimen Code: [TO COME FROM LIMS]



Tangent Construction Results	
T90 (Min):	NA
T50 (Min):	NA
Cv (in²/Min):	NA

Direct Shear Test - Specimen 3 - Consolidation Summary

D3080

Sample Description: Hard, brown mottled with orangish brown and gray, SANDY SILT, some clay, trace gravel, damp.
Project Number: 100713 **Depth:** **Remarks**
Sample Number: ST-1 **Boring Number:** B-017-0-18
Project: SUM-76-6.15
Client:
Location: B-017-0-18

Index	Loading Sequence (psi)	Cummulative Change in Height (ft)	Specimen Height (ft)	Height of Voids (ft)	Vertical Strain (%)	Void Ratio	T90 Fitting Time (Hr)	T50 Fitting Time (Hr)	T90 Cv (in²/Min)	T50 Cv (in²/Min)
0	0.0	0.000	0.083	0.000	0.0	0.49	0.000	0.000	0.00000	0.00000
1	10.0	0.001	0.083	0.027	1.0	0.48	0.024	1.200	0.14722	0.00068

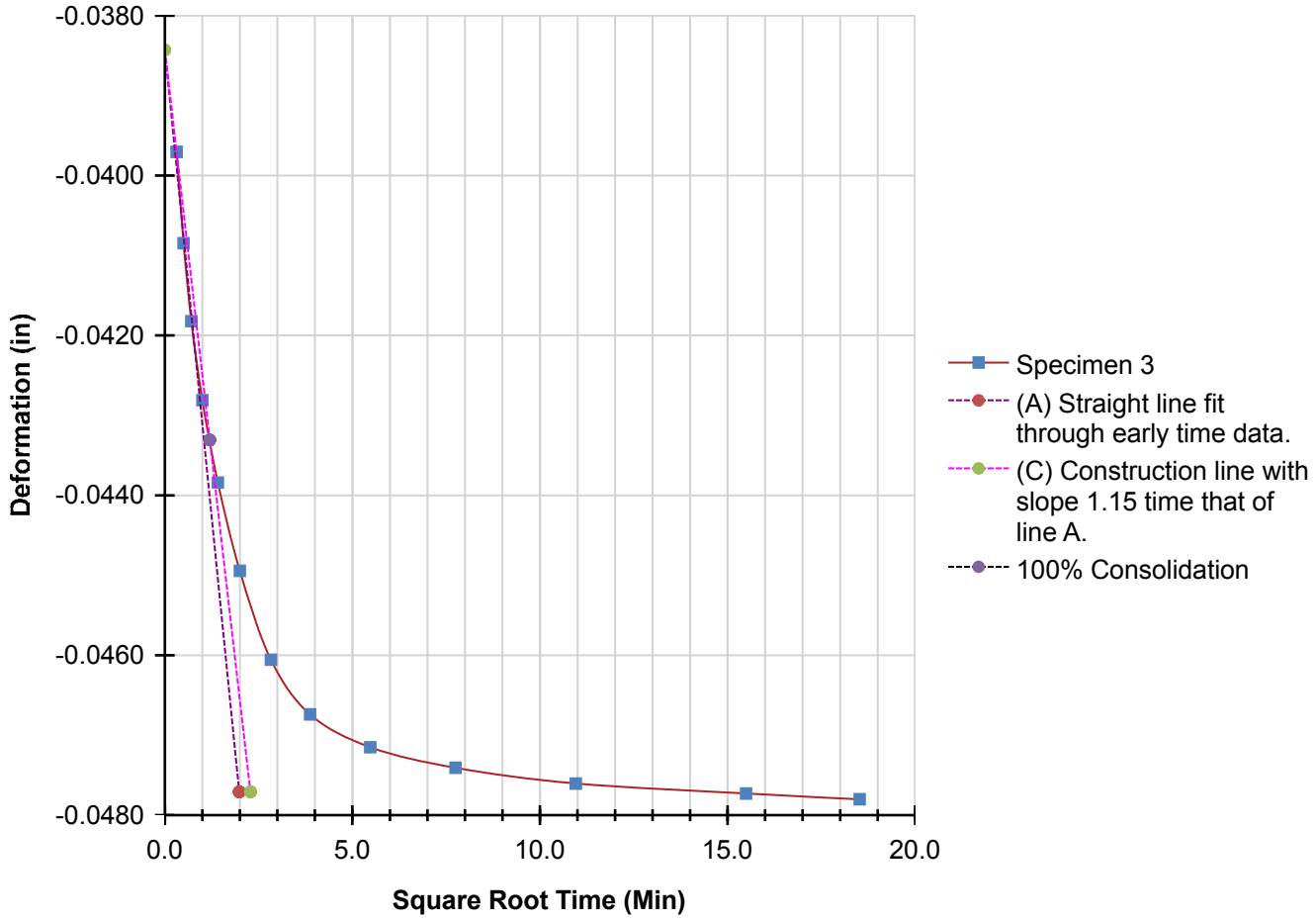
Consol Test - Specimen 3 - Sequence 1 - 10.0 (psi)

D3080 LIMS Code: [TO COME FROM LIMS] LIMS Specimen Code: [TO COME FROM LIMS]

Index	Elapsed Time (hh:mm:ss)	Load (Lbf)	Load (Lbf)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	46.7	-0.0379	0.0000	0.0	0.49
1	00:00:06	48.4	-0.0397	0.0018	0.2	0.49
2	00:00:15	48.8	-0.0408	0.0030	0.3	0.49
3	00:00:30	49.1	-0.0418	0.0040	0.4	0.48
4	00:01:00	49.3	-0.0428	0.0050	0.5	0.48
5	00:02:00	49.1	-0.0438	0.0060	0.6	0.48
6	00:04:00	48.9	-0.0449	0.0071	0.7	0.48
7	00:08:00	49.0	-0.0461	0.0082	0.8	0.48
8	00:15:00	49.1	-0.0467	0.0089	0.9	0.48
9	00:30:00	48.9	-0.0472	0.0093	0.9	0.48
10	01:00:00	49.0	-0.0474	0.0095	1.0	0.48
11	02:00:00	49.0	-0.0476	0.0097	1.0	0.48
12	04:00:00	48.9	-0.0477	0.0099	1.0	0.48
13	05:42:57	49.0	-0.0478	0.0099	1.0	0.48

Square Root Time - Specimen 3 - Sequence 1 - 10.0 (psi)

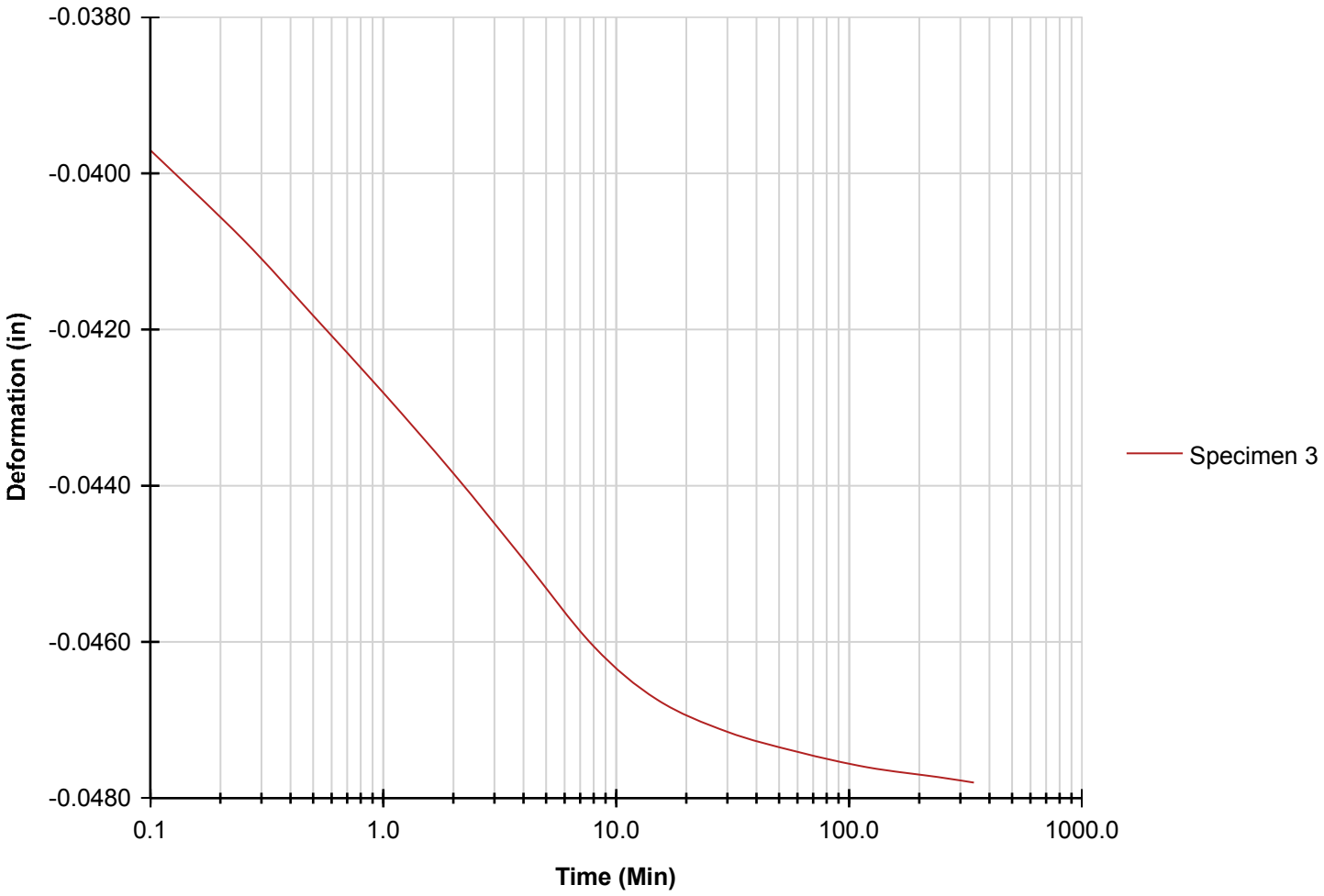
D3080



Tangent Construction Results	
T90 (Min):	1.440
T50 (Min):	0.800
Cv (in²/Min):	0.144

Logarithmic Time - Specimen 3 - Sequence 1 - 10.0 (psi)

D3080 LIMS Code: [TO COME FROM LIMS] LIMS Specimen Code: [TO COME FROM LIMS]



Tangent Construction Results	
T90 (Min):	NA
T50 (Min):	NA
Cv (in²/Min):	NA

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 146+83, 59' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 987.9 (MSL) EOB: 11.5 ft.
START: 2/28/19 END: 2/28/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.078313, -81.574111

EXPLORATION ID B-018-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 987.9	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
MEDIUM DENSE, BROWN, **GRAVEL WITH SAND AND SILT**, LITTLE CLAY, DAMP	985.9	1	12 8 9	22	100	SS-1	-	22	17	31	18	12	20	17	3	9	A-2-4 (0)	
VERY STIFF, BROWN AND DARK BROWN, **SANDY SILT**, SOME CLAY, LITTLE GRAVEL, SS-2 CONTAINS IRON STAINING, DAMP	980.9	2 3 4 5	5 7 12	25	100	SS-2	2.50	-	-	-	-	-	-	-	-	12	A-4a (V)	
		6	6 8 10	23	100	SS-3	3.50	-	-	-	-	-	-	-	-	13	A-4a (V)	
DENSE, LIGHT BROWN AND ORANGISH BROWN, **STONE FRAGMENTS WITH SAND AND SILT**, LITTLE CLAY, STONE FRAGMENTS ARE SANDSTONE, CONTAINS IRON STAINING, DAMP	978.4	7 8 9	9 14 15	38	100	SS-4	-	-	-	-	-	-	-	-	-	9	A-2-4 (V)	
MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, LITTLE SILT, TRACE CLAY, TRACE GRAVEL, DAMP	976.4	10 11 EOB	9 5 5	13	100	SS-5	-	-	-	-	-	-	-	-	-	12	A-3a (V)	

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15
TYPE: ROADWAY
PID: 100713 SFN:
START: 2/28/19 END: 2/28/19

DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH
SAMPLING FIRM / LOGGER: NEAS / E. ROLLER
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 55T
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 11/21/17
ENERGY RATIO (%): 78

STATION / OFFSET: 143+71, 60' LT.
ALIGNMENT: IR-77 & IR-76
ELEVATION: 988.2 (MSL) EOB: 11.5 ft.
LAT / LONG: 41.079148, -81.574449

EXPLORATION ID B-019-0-18

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
	988.2																	
MEDIUM DENSE, BROWN, **GRAVEL WITH SAND AND SILT**, LITTLE CLAY, CONTAINS TRACE IRON STAINING, DAMP	986.2	1	5 7 9	21	100	SS-1	-	23	15	31	19	12	21	16	5	11	A-2-4 (0)	
MEDIUM DENSE TO VERY DENSE, LIGHT BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND**, TRACE SILT, TRACE CLAY, CONTAINS 1.5" SANDSTONE FRAGMENTS, DAMP		2 3	4 13 22	46	100	SS-2	-	-	-	-	-	-	-	-	-	8	A-1-b (V)	
		4 5	9 18 24	55	100	SS-3	-	-	-	-	-	-	-	-	-	6	A-1-b (V)	
@7.5' TO 9.0'; SS-4 CONTAINS LITTLE SILT, LITTLE CLAY	978.7	6 7 8	4 6 9	20	100	SS-4	-	-	-	-	-	-	-	-	-	12	A-1-b (V)	
LOOSE, BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, TRACE CLAY, DAMP	976.7	9 10	5 4 4	10	100	SS-5	-	-	-	-	-	-	-	-	-	13	A-2-4 (V)	
		EOB 11																

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 45B	STATION / OFFSET: 43+79, 49' LT.	EXPLORATION ID B-020-0-18
TYPE: EMBANKMENT	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-277	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1002.4 (MSL) EOB: 36.5 ft.	PAGE 1 OF 2
START: 4/16/19 END: 4/16/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 84	LAT / LONG: 41.035695, -81.574353	

MATERIAL DESCRIPTION AND NOTES	ELEV. 1002.4	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
3.0" ASPHALT OVER 10.0" CONCRETE AND 11.0" BASE (DRILLERS DESCRIPTION)	1000.4																	
VERY STIFF, GRAYISH BROWN AND LIGHT BROWN, **SILT AND CLAY**, TRACE TO SOME SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, MOIST TO DAMP			5 3 3	8	89	SS-1	3.25	4	7	21	34	34	27	16	11	17	A-6a (7)	
			4 3 3	8	56	SS-2	3.00	0	2	4	53	41	35	21	14	20	A-6a (10)	
	994.4		3 4 3	10	100	SS-3A	2.25	-	-	-	-	-	-	-	-	20	A-6a (V)	
						SS-3B	-	-	-	-	-	-	-	-	-	11	A-3a (V)	
LOOSE, BROWN, **COARSE AND FINE SAND**, LITTLE GRAVEL AND STONE FRAGMENTS, TRACE SILT, TRACE CLAY, DAMP	991.7		1 2 3	7	100	SS-4A	-	-	-	-	-	-	-	-	-	9	A-3a (V)	
						SS-4B	4.00	-	-	-	-	-	-	-	-	16	A-4a (V)	
VERY STIFF TO HARD, BROWN AND GRAYISH BROWN, **SANDY SILT**, LITTLE TO SOME GRAVEL, LITTLE TO SOME CLAY, DAMP			3 3 3	8	89	SS-5	2.50	21	21	20	27	11	22	17	5	13	A-4a (1)	
	985.4		3 4 4	11	56	SS-6	2.25	-	-	-	-	-	-	-	-	10	A-4a (V)	
MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, TRACE GRAVEL, TRACE SILT, TRACE CLAY, DAMP	982.9		8 10 6	22	100	SS-7	-	-	-	-	-	-	-	-	-	9	A-3a (V)	
MEDIUM DENSE, BROWN, **FINE SAND**, LITTLE COARSE SAND, TRACE TO LITTLE SILT, TRACE CLAY, TRACE GRAVEL, DAMP			6 7 7	20	100	SS-8	-	-	-	-	-	-	-	-	-	10	A-3 (V)	
F S			3 6 8	20	89	SS-9	-	-	-	-	-	-	-	-	-	7	A-3 (V)	
	975.4		6 7 6	18	100	SS-10	-	-	-	-	-	-	-	-	-	8	A-3 (V)	
HARD, GRAYISH BROWN AND DARK GRAY, **SANDY SILT**, LITTLE GRAVEL, LITTLE CLAY, DAMP		W 974.4	11 10 10	28	89	SS-11	4.5+	19	18	24	23	16	24	16	8	14	A-4a (1)	

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PID: 100713	SFN:	PROJECT: SUM-76-06.15	STATION / OFFSET: 43+79, 49' LT.	START: 4/16/19	END: 4/16/19	PG 2 OF 2	B-020-0-18

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
HARD, GRAYISH BROWN AND DARK GRAY, **SANDY SILT**, LITTLE GRAVEL, LITTLE CLAY, DAMP *(continued)*	972.4	31	8 9 8	24	50	SS-12	4.25	-	-	-	-	-	-	-	-	14	A-4a (V)	
	970.4	32																
MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, TRACE TO LITTLE SILT, TRACE CLAY, TRACE GRAVEL, DAMP		33	4 5 5	14	100	SS-13	-	-	-	-	-	-	-	-	-	9	A-3a (V)	
		34																
		35																
	965.9	36 EOB	6 7 7	20	100	SS-14	-	-	-	-	-	-	-	-	-	10	A-3a (V)	

NOTES: GROUNDWATER ENCOUNTERED AT 28.0' DURING DRILLING. HOLE DID NOT CAVE.

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 45+68, 110' LT.	EXPLORATION ID B-021-0-18
TYPE: EMBANKMENT	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-277	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 976.5 (MSL) EOB: 11.5 ft.	PAGE 1 OF 1
START: 3/19/19 END: 3/19/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.035855, -81.573662	

MATERIAL DESCRIPTION AND NOTES	ELEV. 976.5	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
MEDIUM STIFF, BROWN, **SILT AND CLAY**, "AND" SAND, TRACE GRAVEL, MOIST		1 2 3 4	1 1 1	3	33	SS-1	0.75	5	16	27	28	24	29	17	12	19	A-6a (4)	
	972.0																	
LOOSE, BROWN, **COARSE AND FINE SAND**, SOME SILT, TRACE GRAVEL, TRACE CLAY, DAMP		5 6	2 3 3	9	100	SS-2	-	-	-	-	-	-	-	-	-	11	A-3a (V)	
	969.5	7																
MEDIUM DENSE, BROWN AND GRAY, **GRAVEL WITH SAND AND SILT**, LITTLE CLAY, CONTAINS IRON STAINING, MOIST		8 9	3 4 5	13	100	SS-3	-	6	23	39	17	15	24	15	9	17	A-2-4 (0)	
	967.0																	
MEDIUM DENSE, BROWN, **GRAVEL WITH SAND**, TRACE SILT, TRACE CLAY, CONTAINS IRON STAINING, DAMP		10 11	4 9 7	23	89	SS-4	-	-	-	-	-	-	-	-	-	11	A-1-b (V)	
	965.0	EOB																

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 47+81, 68' LT.	EXPLORATION ID B-022-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-277	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 987.7 (MSL) EOB: 11.5 ft.	PAGE 1 OF 1
START: 3/19/19 END: 3/19/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.035730, -81.572893	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
LOOSE TO MEDIUM DENSE, ORANGISH BROWN, **FINE SAND**, "AND" COARSE SAND, LITTLE GRAVEL, TRACE SILT, TRACE CLAY, DAMP	987.7	1																
		2																
		3	3 4 5	13	100	SS-1	-	12	36	42	7	3	NP	NP	NP	9	A-3 (0)	
		4																
@5.0' TO 11.5'; BECOMES LITTLE COARSE SAND, TRACE GRAVEL		5	3 3 2	7	100	SS-2	-	3	18	72	4	3	NP	NP	NP	10	A-3 (0)	
		6																
@7.5' TO 11.5'; BECOMES LIGHT BROWN		7	3 3 3	9	100	SS-3	-	-	-	-	-	-	-	-	-	8	A-3 (V)	
		8																
		9																
		10	2 3 3	9	100	SS-4	-	-	-	-	-	-	-	-	-	7	A-3 (V)	
	976.2	11 EOB																

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 45B	STATION / OFFSET: 51+80, 49' LT.
TYPE: SIDEHILL CUT SECTION	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-277
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 977.3 (MSL) EOB: 11.5 ft.
START: 4/16/19 END: 4/16/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 84	LAT / LONG: 41.035659, -81.571451

EXPLORATION ID B-023-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 977.3	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
4.0" ASPHALT AND 9.0" CONCRETE	976.2																	
MEDIUM DENSE, BROWN, **GRAVEL WITH SAND**, TRACE SILT, TRACE CLAY, DRY TO DAMP		1																
		2																
		3	6 10 10	28	89	SS-1	-	10	40	38	7	5	NP	NP	NP	3	A-1-b (0)	
		4																
		5	10 9 4	18	100	SS-2	-	9	54	27	7	3	NP	NP	NP	3	A-1-b (0)	
@7.5' TO 11.5'; BECOMES VERY LOOSE TO LOOSE		6																
		7																
		8	2 2 1	4	89	SS-3	-	-	-	-	-	-	-	-	-	3	A-1-b (V)	
		9																
		10																
	965.8	11 EOB	2 2 2	6	100	SS-4	-	-	-	-	-	-	-	-	-	8	A-1-b (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE CAVED AT 6.0 FT.

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 51+87, 138' LT.
TYPE: SIDEHILL CUT SECTION	SAMPLING FIRM / LOGGER: NEAS / CHIPUKAIZER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-277
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 998.3 (MSL) EOB: 26.5 ft.
START: 3/26/19 END: 3/26/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.035902, -81.571418

EXPLORATION ID B-024-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
VERY DENSE, BROWN, **COARSE AND FINE SAND**, LITTLE SILT, LITTLE GRAVEL, TRACE CLAY, DAMP	998.3																	
	993.8	3	6 18 27	64	100	SS-1	-	11	30	31	20	8	NP	NP	NP	7	A-3a (0)	
DENSE, BROWN AND DARK BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, TRACE CLAY, CONTAINS STONE FRAGMENTS >1.0", CONTAINS IRON STAINING, DAMP	991.3	6	4 14 16	43	100	SS-2	-	-	-	-	-	-	-	-	-	8	A-2-4 (V)	
VERY STIFF, BROWN, **SANDY SILT**, LITTLE CLAY, LITTLE GRAVEL, DAMP	990.1	8	3 3 5	11	56	SS-3A	3.00	-	-	-	-	-	-	-	-	12	A-4a (V)	
						SS-3B	-	10	32	32	16	10	20	17	3	9	A-3a (0)	
LOOSE TO MEDIUM DENSE, BROWN AND LIGHT BROWN, **COARSE AND FINE SAND**, TRACE TO LITTLE SILT, TRACE GRAVEL, TRACE CLAY, SS-7 CONTAINS IRON STAINING, DAMP		10			100	ST-4	-	-	-	-	-	-	-	-	-	5	A-3a (V)	
		12	3 4 4	11	56	SS-5	-	-	-	-	-	-	-	-	-	5	A-3a (V)	
		13	4 5 5	14	78	SS-6	-	-	-	-	-	-	-	-	-	7	A-3a (V)	
W 983.3		15	4 7 5	17	100	SS-7	-	-	-	-	-	-	-	-	-	11	A-3a (V)	
	978.8	18	2 2 4	9	100	SS-8	-	-	-	-	-	-	-	-	-	6	A-3a (V)	
MEDIUM DENSE, BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND**, TRACE SILT, TRACE CLAY, DAMP		21	2 3 5	11	39	SS-9	-	-	-	-	-	-	-	-	-	5	A-1-b (V)	
	973.8	23	3 4 4	11	56	SS-10	-	13	51	26	8	2	NP	NP	NP	5	A-1-b (0)	
LOOSE, BROWN, **COARSE AND FINE SAND**, TRACE SILT, TRACE GRAVEL, TRACE CLAY, DAMP	971.8	26	2 3 3	9	61	SS-11	-	-	-	-	-	-	-	-	-	4	A-3a (V)	
		EOB																

NOTES: GROUNDWATER ENCOUNTERED AT 15.0' DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 45B	STATION / OFFSET: 55+67, 60' LT.	EXPLORATION ID B-025-0-18
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-277	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 973.1 (MSL) EOB: 7.5 ft.	PAGE 1 OF 1
START: 4/16/19 END: 4/16/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 84	LAT / LONG: 41.035672, -81.570045	

MATERIAL DESCRIPTION AND NOTES	ELEV. 973.1	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
10" ASPHALT AND 7" CONCRETE	971.7	1																
MEDIUM DENSE TO DENSE, BROWN, **COARSE AND FINE SAND**, LITTLE GRAVEL, LITTLE SILT, TRACE CLAY, SS-2 CONTAINS CONCRETE FRAGMENTS, DRY **(FILL)**		2	13 10 12	31	0	SS-1	-	-	-	-	-	-	-	-	-	-	A-3a (V)	
	968.6	3																
		4	11 8 11	27	89	SS-2	-	15	26	42	13	4	NP	NP	NP	5	A-3a (0)	
MEDIUM DENSE, GRAY, **SILT**, TRACE CLAY, TRACE SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, WET		5	4 9 12	29	100	SS-3	-	1	1	1	89	8	NP	NP	NP	22	A-4b (8)	
	965.6	6																
EOB		7	3 8 11	27	89	SS-4	-	-	-	-	-	-	-	-	-	22	A-4b (V)	

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

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

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 45B	STATION / OFFSET: 58+92, 72' LT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-277
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 971.4 (MSL) EOB: 7.5 ft.
START: 4/16/19 END: 4/16/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 84	LAT / LONG: 41.035690, -81.568868

EXPLORATION ID B-026-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 971.4	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	969.9																	
MEDIUM DENSE, BROWN AND GRAY, **COARSE AND FINE SAND**, LITTLE GRAVEL, LITTLE SILT, TRACE CLAY, MOIST TO WET		1 2 3 4 W 966.4 5 6 7	5 7 6	18	0	SS-1	-	-	-	-	-	-	-	-	-	-	A-3a (V)	
			3 4 4	11	67	SS-2	-	14	22	43	14	7	NP	NP	NP	14	A-3a (0)	
			3 5 7	17	89	SS-3	-	17	27	38	12	6	NP	NP	NP	13	A-3a (0)	
	963.9	EOB	3 4 5	13	89	SS-4	-	-	-	-	-	-	-	-	-	15	A-3a (V)	

NOTES: GROUNDWATER ENCOUNTERED AT 5.0' DURING DRILLING. HOLE DID NOT CAVE.

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 63+44, 55' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-277
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 969.8 (MSL) EOB: 11.5 ft.
START: 3/19/19 END: 3/19/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.035623, -81.567231

EXPLORATION ID B-027-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 969.8	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
STIFF, BROWN WITH ORANGISH BROWN MOTTLES, **SILT AND CLAY**, SOME SAND, TRACE GRAVEL, CONTAINS ROOTS, MOIST	967.0	▼ 966.8	4 5 4	13	89	SS-1A	-	-	-	-	-	-	-	-	-	29	A-4a (V)	
						SS-1B	-	2	8	68	15	7	NP	NP	NP	16	A-3a (0)	
LOOSE TO MEDIUM DENSE, GRAY, **COARSE AND FINE SAND**, TRACE TO SOME GRAVEL, LITTLE SILT, TRACE CLAY, WET	962.8	W 964.8	3 3 3	9	67	SS-2	-	26	18	37	13	6	NP	NP	NP	14	A-3a (0)	
VERY LOOSE TO MEDIUM DENSE, BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND**, TRACE TO LITTLE SILT, TRACE CLAY, CONTAINS TRACE ROOTS, STONE FRAGMENTS >1.0", WET	958.3	EOB	1 1 1	3	44	SS-3	-	-	-	-	-	-	-	-	-	18	A-1-b (V)	
			5 5 3	11	100	SS-4	-	-	-	-	-	-	-	-	-	18	A-1-b (V)	

NOTES: GROUNDWATER ENCOUNTERED AT 5.0' DURING DRILLING, 3.0' AFTER COMPLETION. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15
TYPE: ROADWAY
PID: 100713 SFN:
START: 2/27/19 END: 2/27/19

DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH
SAMPLING FIRM / LOGGER: NEAS / E. ROLLER
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 55T
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 11/21/17
ENERGY RATIO (%): 78

STATION / OFFSET: 73+70, 61' RT.
ALIGNMENT: IR-277
ELEVATION: 975.7 (MSL) EOB: 11.5 ft.
LAT / LONG: 41.035256, -81.563520

EXPLORATION ID B-030-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
LOOSE, DARK BROWN AND BROWN, **COARSE AND FINE SAND**, TRACE TO LITTLE GRAVEL, LITTLE SILT, TRACE CLAY, CONTAINS TRACE ROOTS, WET **(FILL)**	975.7		3 3 5	10	100	SS-1	-	14	17	50	13	6	NP	NP	NP	18	A-3a (0)	
		1																
		2																
		3	2 2 3	7	100	SS-2	-	-	-	-	-	-	-	-	-	19	A-3a (V)	
	971.2	4																
VERY LOOSE TO LOOSE, BROWN, **FINE SAND**, TRACE COARSE SAND, TRACE SILT, TRACE CLAY, TRACE GRAVEL, WET **(FILL)**		5																
		6	1 2 3	7	100	SS-3	-	1	5	85	5	4	NP	NP	NP	21	A-3 (0)	
		7																
		W 967.7 8	1 2 2	5	100	SS-4	-	-	-	-	-	-	-	-	-	25	A-3 (V)	
		9																
		10																
	964.2	11 EOB	WOH 1 1	3	100	SS-5	-	-	-	-	-	-	-	-	-	25	A-3 (V)	

NOTES: GROUNDWATER ENCOUNTERED AT 8.0' DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 75+72, 61' RT.	EXPLORATION ID B-031-0-18
TYPE: EMBANKMENT	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-277	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 976.1 (MSL) EOB: 16.5 ft.	PAGE 1 OF 1
START: 2/26/19 END: 2/26/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.035247, -81.562786	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
VERY STIFF, BROWN MOTTLED WITH ORANGISH BROWN AND GRAY, **SILT**, SOME SAND, LITTLE CLAY, TRACE GRAVEL, CONTAINS TRACE ROOTS AND IRON STAINING, DAMP **(FILL)**	976.1	1	3 4 4	10	100	SS-1	3.75	0	2	29	57	12	22	19	3	18	A-4b (7)	
	974.1	2																
LOOSE, BROWN, **COARSE AND FINE SAND**, TRACE SILT, TRACE CLAY, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, WET **(FILL)**		3	4 3 3	8	100	SS-2	-	5	7	76	7	5	NP	NP	NP	19	A-3a (0)	
	971.6	4																
VERY LOOSE, ORANGISH BROWN, **FINE SAND**, TRACE TO LITTLE SILT, TRACE COARSE SAND, TRACE CLAY, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, WET **(FILL)**	W 970.1	5	1 1 1	3	100	SS-3	-	-	-	-	-	-	-	-	-	24	A-3 (V)	
		6																
		7																
		8	WOH WOH WOH	0	100	SS-4	-	3	5	82	7	3	NP	NP	NP	26	A-3 (0)	
		9																
		10	WOH WOH WOH	0	67	SS-5	-	-	-	-	-	-	-	-	-	27	A-3 (V)	
		11																
		12																
		13	WOH WOH WOH	0	100	SS-6	-	-	-	-	-	-	-	-	-	25	A-3 (V)	
		14																
		15																
	959.6	16 EOB	WOH WOH WOH	0	100	SS-7	-	-	-	-	-	-	-	-	-	30	A-3 (V)	

NOTES: GROUNDWATER ENCOUNTERED AT 6.0' DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 77+74, 58' RT.	EXPLORATION ID B-032-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-277	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 976.8 (MSL) EOB: 31.5 ft.	PAGE 1 OF 2
START: 2/27/19 END: 2/27/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.035245, -81.562054	

MATERIAL DESCRIPTION AND NOTES	ELEV. 976.8	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
VERY LOOSE TO LOOSE, DARK BROWN AND BROWN CHANGING TO BROWN, **COARSE AND FINE SAND**, TRACE TO LITTLE GRAVEL, TRACE TO LITTLE SILT, TRACE CLAY, SS-1 CONTAINS ROOT HAIRS, DAMP TO WET		1	2 3 4	9	100	SS-1	-	16	17	53	10	4	NP	NP	NP	10	A-3a (0)	
		2																
		3	2 3 3	8	100	SS-2	-	-	-	-	-	-	-	-	-	15	A-3a (V)	
		4																
		5	2 2 2	5	100	SS-3	-	-	-	-	-	-	-	-	-	17	A-3a (V)	
		6																
		W 969.8 7																
		8	1 WOH WOH	0	67	SS-4	-	-	-	-	-	-	-	-	-	19	A-3a (V)	
		9																
		10	WOH WOH WOH	0	100	SS-5	-	9	17	59	9	6	NP	NP	NP	21	A-3a (0)	
		11																
		12																
@12.5' TO 14.0'; CONTAINS TRACE ROOT HAIRS		13	WOR WOR WOR	0	33	SS-6	-	-	-	-	-	-	-	-	-	19	A-3a (V)	
		14																
		15	WOH 1 1	3	100	SS-7	-	-	-	-	-	-	-	-	-	20	A-3a (V)	
		16																
		17																
		18	1 WOH WOH	0	100	SS-8	-	-	-	-	-	-	-	-	-	19	A-3a (V)	
		19																
		20	WOR WOR WOR	0	100	SS-9	-	-	-	-	-	-	-	-	-	17	A-3a (V)	
		21																
		22																
@22.5' TO 27.0'; CHANGES TO BROWNISH GRAY		23	WOH WOH WOH	0	100	SS-10	-	-	-	-	-	-	-	-	-	20	A-3a (V)	
		24																
		25	WOR WOR WOR	0	100	SS-11	-	-	-	-	-	-	-	-	-	20	A-3a (V)	
	949.8	26																
VERY SOFT TO SOFT, GRAY, **SILT**, SOME CLAY, TRACE SAND, TRACE GRAVEL, SLIGHTLY ORGANIC, WET		27																
		28	WOH 2 2	5	100	SS-12	0.25	0	0	10	59	31	27	19	8	26	A-4b (8)	
	947.3	29																

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PID: 100713	SFN:	PROJECT: SUM-76-06.15	STATION / OFFSET: 77+74, 58' RT.	START: 2/27/19	END: 2/27/19	PG 2 OF 2	B-032-0-18

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
VERY LOOSE, GRAY, **COARSE AND FINE SAND**, TRACE SILT, TRACE CLAY, TRACE GRAVEL, WET *(continued)*	946.8																	
	945.3	31 EOB	1 1 1	3	100	SS-13	-	-	-	-	-	-	-	-	-	25	A-3a (V)	

NOTES: GROUNDWATER ENCOUNTERED AT 7.0' DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 81+72, 68' RT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / J.HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-277
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 976.8 (MSL) EOB: 16.5 ft.
START: 3/12/19 END: 3/12/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.035201, -81.560613

EXPLORATION ID B-033-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
LOOSE, BROWN, **COARSE AND FINE SAND**, SOME SILT, LITTLE GRAVEL, TRACE CLAY, CONTAINS TRACE ROOTS, MOIST	976.8																	
	972.3	3	2 2 4	9	56	SS-1	-	-	-	-	-	-	-	-	-	19	A-3a (V)	
VERY SOFT TO SOFT, DARK BROWN, **SANDY SILT**, TRACE CLAY, TRACE GRAVEL, MODERATELY ORGANIC, CONTAINS ROOTS, WET		6	1 2 1	4	67	SS-2	0.50	3	8	45	35	9	NP	NP	NP	40	A-4a (2)	
	967.3	8	WOH WOH WOH	0	22	SS-3	0.00	-	-	-	-	-	-	-	-	40	A-4a (V)	
VERY LOOSE, BROWN, **COARSE AND FINE SAND**, TRACE SILT, TRACE CLAY, TRACE GRAVEL, WET	W 966.8	10	WOH WOH WOH	0	50	SS-4	-	3	17	65	9	6	NP	NP	NP	18	A-3a (0)	
		13	WOH WOH WOH	0	3	SS-5	-	-	-	-	-	-	-	-	-	14	A-3a (V)	
	960.3	16	WOH WOH WOH	0	11	SS-6	-	-	-	-	-	-	-	-	-	19	A-3a (V)	
	EOB																	

NOTES: GROUNDWATER ENCOUNTERED AT 10.0' DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:10 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15
TYPE: EMBANKMENT
PID: 100713 SFN:
START: 3/12/19 END: 3/12/19

DRILLING FIRM / OPERATOR: NEAS / J. HODGES
SAMPLING FIRM / LOGGER: NEAS / J.HODGES
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT / ST

DRILL RIG: CME 55X
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 11/21/17
ENERGY RATIO (%): 85

STATION / OFFSET: 83+65, 98' RT.
ALIGNMENT: IR-277
ELEVATION: 972.3 (MSL) EOB: 11.5 ft.
LAT / LONG: 41.035109, -81.559916

EXPLORATION ID B-034-0-18

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
	972.3 W	972.3																
VERY SOFT, BLACK WITH BROWN, **ORGANIC SILT**, SOME TO "AND" SAND, LITTLE CLAY, TRACE GRAVEL, HIGHLY ORGANIC, CONTAINS ROOTS, WET		1																
		2																
		3	1 1 1	3	33	SS-1	0.00	2	5	38	41	14	NP	NP	NP	41	A-8a (4)	
		4																
@5.0' TO 5.5'; 28.4% ORGANIC CONTENT @5.0' TO 5.5'; Qu = 257 PSF		5																
		6			40	ST-2	0.25	1	4	26	53	16	NP	NP	NP	26	A-8a (7)	
		7																
	964.3	8	WOH	16	50	SS-3A	0.00	-	-	-	-	-	-	-	-	28	A-8a (V)	
MEDIUM DENSE, GRAY, **COARSE AND FINE SAND**, LITTLE SILT, TRACE CLAY, TRACE GRAVEL, PETROLIFEROUS ODOR, WET			4 7			SS-3B	-	-	-	-	-	-	-	-	-	34	A-3a (V)	
		9																
		10																
	960.8	11	2 5 3	11	100	SS-4	-	2	6	77	11	4	NP	NP	NP	30	A-3a (0)	
		EOB																

NOTES: GROUNDWATER ENCOUNTERED AT SURFACE. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

National Engineering & Architectural Services Inc.
5710 Westbourne Avenue
Columbus, OH 43213
614.892.0162

Organic Content in Soils by Loss on Ignition (AASHTO T267)

Date of Test: 4/9/2019 Technician: L. Rosenbeck

Project Name: SUM-76-6.15 Kenmore

Boring Number:	B-034-0-18				
Sample Number:	ST-2				
Depth:	5.0-7.0'				
Initial -#10 sample weight:	104.5g				

Moisture Content (if assigned):

Container ID:	HP-9				
Container Empty:	117.48				
Container with Wet Soil:	221.98				
Container with Dry Soil:	200.28				
MC%:	26				
or					
MC from Hydro sheet:					

Organic Content 455+-10°C:

Crucible ID:	A				
Crucible Wt:	62.30				
Crucible and Soil before:	92.23				
Crucible and Soil After:	83.73				
% Organic Content:	**28.4%**				

5710 Westbourne Avenue
Columbus, OH 43213
614-892-0162

Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)

(Project: SUM-76-6.15 Kenmore, Boring Location: B-034-0-18, ST-2, Depth: 5.0 - 5.5ft)

Tested Date: 4/8/2019

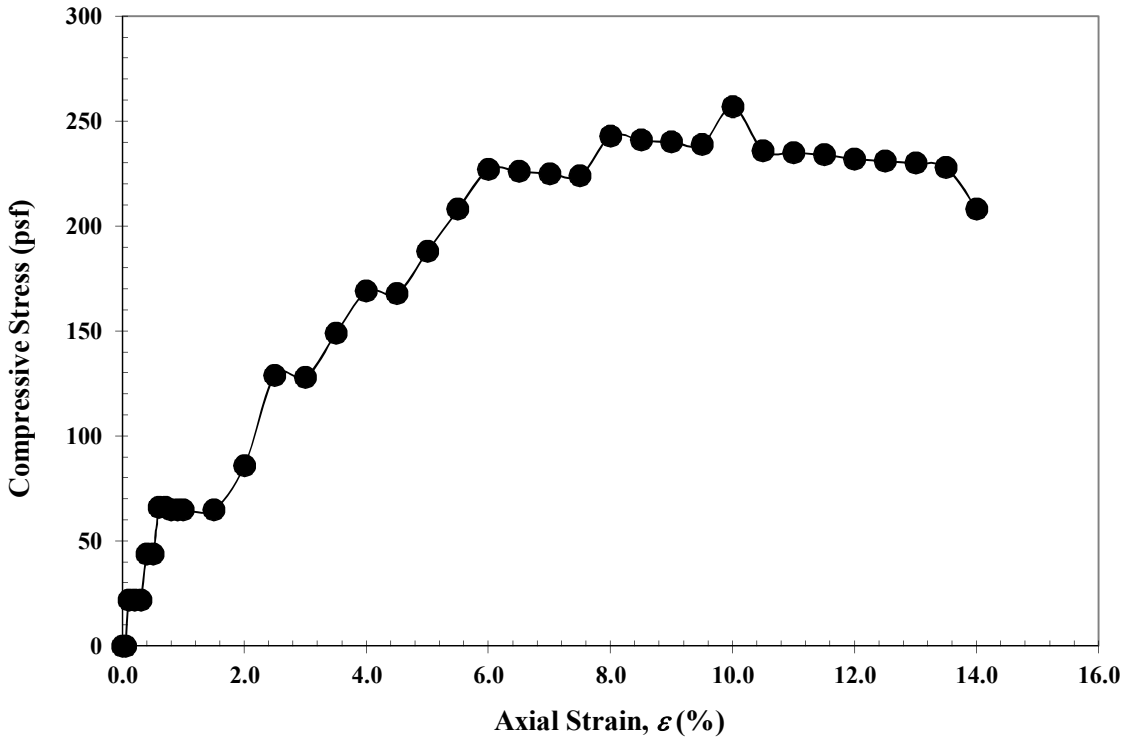
Specimen Properties

Average Dia., D_{avg} (in):	2.89
Average Height, H_{avg} (in):	5.74
Area, A (in^2):	6.55
Volume, V (in^3):	37.58
Wet Mass of Specimen (lb):	1.6
Moisture Content (%):	26.2
Dry Mass of Specimen (lb):	1.3
Wet Unit Weight, γ (lb/ft^3):	73.7
Dry Unit Weight, γ_d (lb/ft^3):	58.4

Final Specimen Figure

Results

Unconfined Compressive Strength (psf):	**257**
Strain (%):	**10.0**



Notes: Very soft, black with brown, ORGANIC SILT, some sand, little clay, trace gravel, wet. Contains 28.4% organic content.

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 85+67, 68' RT.	EXPLORATION ID B-035-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / J.HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-277	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 978.6 (MSL) EOB: 11.5 ft.	PAGE 1 OF 1
START: 3/11/19 END: 3/11/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.035183, -81.559182	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
	978.6																	
MEDIUM DENSE, GRAY MOTTLED WITH ORANGISH BROWN, **SILT**, LITTLE SAND, LITTLE CLAY, TRACE GRAVEL, CONTAINS TRACE ROOT HAIRS, WET	974.1	1–4	3 4 4	11	100	SS-1	-	1	3	14	71	11	NP	NP	NP	24	A-4b (8)	
STIFF TO VERY STIFF, GRAY MOTTLED WITH DARK BROWN AND ORANGISH BROWN, **SANDY SILT**, LITTLE CLAY, TRACE GRAVEL, CONTAINS TRACE ROOT HAIRS, DAMP TO WET	969.1	5–8	2 2 2	6	44	SS-2	2.00	3	5	36	44	12	25	21	4	20	A-4a (4)	
			1 1 2	4	56	SS-3	1.25	-	-	-	-	-	-	-	-	24	A-4a (V)	
MEDIUM DENSE, GRAY, **COARSE AND FINE SAND**, LITTLE SILT, TRACE CLAY, WET	967.1	10–11	2 5 7	17	100	SS-4	-	0	0	75	15	10	NP	NP	NP	16	A-3a (0)	
		EOB																

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 89+69, 67' RT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / J.HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-277
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 981.5 (MSL) EOB: 11.5 ft.
START: 3/11/19 END: 3/11/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.035165, -81.557726

EXPLORATION ID B-036-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
LOOSE TO MEDIUM DENSE, LIGHT BROWN BECOMING ORANGISH BROWN MOTTLED WITH GRAY, **SILT**, LITTLE CLAY, TRACE SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, WET	981.5																	
			2 5 5	14	67	SS-1	-	1	0	5	81	13	NP	NP	NP	29	A-4b (8)	
			1 2 4	9	100	SS-2	-	0	1	8	79	12	NP	NP	NP	27	A-4b (8)	
MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, TRACE TO LITTLE SILT, TRACE CLAY, TRACE GRAVEL, DAMP	974.5																	
			1 5 5	14	100	SS-3	-	-	-	-	-	-	-	-	-	11	A-3a (V)	
	970.3		1 4 6	14	100	SS-4A	-	-	-	-	-	-	-	-	-	7	A-3a (V)	
VERY STIFF, BROWN MOTTLED WITH ORANGISH BROWN, **SANDY SILT**, SOME CLAY, TRACE GRAVEL, MOIST	970.0	EOB				SS-4B	3.00	-	-	-	-	-	-	-	-	21	A-4a (V)	

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 93+64, 62' RT.	EXPLORATION ID B-037-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / J.HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-277	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 983.3 (MSL) EOB: 11.5 ft.	PAGE 1 OF 1
START: 3/12/19 END: 3/12/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.035162, -81.556293	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
DENSE, GRAY, **SILT**, LITTLE CLAY, TRACE SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, WET	983.3	1																
		2																
		3	6 12 13	35	100	SS-1	-	0	0	4	79	17	NP	NP	NP	19	A-4b (8)	
	978.8	4																
MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, LITTLE GRAVEL, LITTLE SILT, TRACE CLAY, CONTAINS TRACE IRON STAINING, DAMP	977.3	5																
		6	3 5 5	14	100	SS-2A	-	-	-	-	-	-	-	-	-	8	A-3a (V)	
						SS-2B	-	-	-	-	-	-	-	-	-	20	A-4a (V)	
MEDIUM DENSE, BROWN, **SANDY SILT**, TRACE CLAY, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, MOIST		7																
		8	4 6 8	20	100	SS-3	-	4	6	31	49	10	NP	NP	NP	17	A-4a (5)	
		9																
		10																
		11	3 8 13	30	100	SS-4	-	-	-	-	-	-	-	-	-	18	A-4a (V)	
	971.8	EOB																

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 96+70, 66' RT.	EXPLORATION ID B-038-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / J.HODGES	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-277	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 985.1 (MSL) EOB: 11.5 ft.	PAGE 1 OF 1
START: 3/12/19 END: 3/12/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.035125, -81.555196	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
VERY STIFF TO HARD, BROWN WITH GRAY MOTTLES, **SANDY SILT**, LITTLE CLAY, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP TO MOIST	985.1	1																
		2																
		3	3 9 11	28	100	SS-1	4.5+	4	7	46	29	14	19	15	4	12	A-4a (2)	
		4																
		5																
		6	2 8 7	21	100	SS-2	3.00	-	-	-	-	-	-	-	-	14	A-4a (V)	
		7																
@7.5' TO 9.0'; SS-3 CONTAINS TRACE ROOTS		8	2 3 3	9	100	SS-3	3.75	-	-	-	-	-	-	-	-	19	A-4a (V)	
	975.6	9																
VERY STIFF, GRAY WITH BROWN AND ORANGISH BROWN MOTTLES, **SILT**, SOME CLAY, TRACE SAND, TRACE GRAVEL, CONTAINS IRON STAINING AND ROOT HAIRS, MOIST	973.6	10																
		11 EOB	2 2 3	7	100	SS-4	2.75	0	0	1	75	24	35	26	9	29	A-4b (8)	

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 247+75, 52' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1068.9 (MSL) EOB: 7.5 ft.
START: 4/8/19 END: 4/8/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.059780, -81.557323

EXPLORATION ID B-046-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
5.0" ASPHALT AND 13.0" BASE (DRILLERS DESCRIPTION)	1068.9																	
	1067.4	1																
HARD, DARK GRAY, **SANDY SILT**, LITTLE CLAY, TRACE GRAVEL, DAMP	1065.9	2	4 5 9	18	100	SS-1	4.5+	10	12	11	47	20	24	18	6	8	A-4a (6)	
DENSE, GRAY, **COARSE AND FINE SAND**, LITTLE GRAVEL, LITTLE SILT, TRACE CLAY, DAMP	1064.4	3	16 18 15	43	89	SS-2	-	-	-	-	-	-	-	-	-	7	A-3a (V)	
HARD, GRAY, **SILT AND CLAY**, LITTLE SAND, LITTLE STONE FRAGMENTS (SHALE), RELIC ROCK STRUCTURE, DAMP		4	8 9 10	25	100	SS-3	4.5+	16	12	6	43	23	29	18	11	8	A-6a (7)	
		5	7 12 10	29	100	SS-4	4.5+	-	-	-	-	-	-	-	-	10	A-6a (V)	
	1061.4	6																
	EOB	7																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE CAVED AT 5.0'.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15
TYPE: ROADWAY
PID: 100713 SFN:
START: 4/8/19 END: 4/8/19

DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH
SAMPLING FIRM / LOGGER: NEAS / E. ROLLER
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 55T
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 11/21/17
ENERGY RATIO (%): 78

STATION / OFFSET: 251+65, 53' RT.
ALIGNMENT: IR-77 & IR-76
ELEVATION: 1063.6 (MSL) EOB: 10.4 ft.
LAT / LONG: 41.059884, -81.555900

EXPLORATION ID B-047-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 1063.6	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
6.0" ASPHALT AND 12.0" BASE (DRILLERS DESCRIPTION)	1062.1																	
HARD, GRAY, **SANDY SILT**, LITTLE TO SOME CLAY, LITTLE GRAVEL AND STONE FRAGMENTS, CONTAINS TRACE IRON STAINING, DAMP		1 2 3 4	12 15 15	39	100	SS-1	4.5+	11	11	23	33	22	21	15	6	9	A-4a (4)	
	1058.2	5	8			SS-2A	4.5+	18	11	23	28	20	20	15	5	8	A-4a (3)	
VERY DENSE, LIGHT GRAY, **STONE FRAGMENTS WITH SAND**, TRACE SILT, TRACE CLAY, DAMP	1056.6	6	27 17	57	100	SS-2B	-	-	-	-	-	-	-	-	-	5	A-1-b (V)	
		TR 7																
SHALE, GRAY, HIGHLY WEATHERED, VERY WEAK TO WEAK.		8	13 50/3"	-	100	SS-3	-	-	-	-	-	-	-	-	-	-	Rock (V)	
	1053.2	9 10 EOB																
			50/5"	-	100	SS-4	-	-	-	-	-	-	-	-	-	-	Rock (V)	

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 256+17, 70' RT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1050.6 (MSL) EOB: 10.8 ft.
START: 4/8/19 END: 4/8/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.060077, -81.554258

EXPLORATION ID B-048-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
HARD, BROWN, **SANDY SILT**, LITTLE CLAY, LITTLE GRAVEL AND STONE FRAGMENTS, DAMP	1050.6		2 4 4	10	67	SS-1	4.5+	14	21	17	31	17	23	17	6	11	A-4a (3)	
	1048.1	TR																
SHALE, GRAY, HIGHLY WEATHERED, VERY WEAK, FISSILE.			12 36 48	109	100	SS-2	-	-	-	-	-	-	-	-	-	-	Rock (V)	
			22 50/4"	-	100	SS-3	-	-	-	-	-	-	-	-	-	-	Rock (V)	
			22 25 31	73	100	SS-4	-	-	-	-	-	-	-	-	-	-	Rock (V)	
	1039.8	EOB	29 50/4"	-	100	SS-5	-	-	-	-	-	-	-	-	-	-	Rock (V)	

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 45B	STATION / OFFSET: 260+50, 10' RT.
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1035.1 (MSL) EOB: 7.5 ft.
START: 4/11/19 END: 4/11/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 84	LAT / LONG: 41.060544, -81.552909

EXPLORATION ID B-049-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 1035.1	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
14.0" ASPHALT AND 4.0" BASE (DRILLERS DESCRIPTION)	1033.6	1																
VERY STIFF TO HARD, GRAY, **SANDY SILT**, LITTLE TO SOME CLAY, LITTLE GRAVEL, DAMP		2	4 7 8	21	67	SS-1	4.5+	18	11	15	35	21	23	16	7	10	A-4a (4)	
		3	4 12 6	25	100	SS-2	4.5+	19	10	13	38	20	24	17	7	10	A-4a (5)	
		4	3 5 6	15	89	SS-3	4.00	-	-	-	-	-	-	-	-	15	A-4a (V)	
		5	3 6 4	14	100	SS-4	3.75	-	-	-	-	-	-	-	-	13	A-4a (V)	
	1027.6	6 EOB																
		7																

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 263+62, 63' RT.
TYPE: NOISE WALL	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: IR-77 & IR-76
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1022.1 (MSL) EOB: 20.1 ft.
START: 4/8/19 END: 4/8/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.060686, -81.551665

EXPLORATION ID B-050-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
6.0" ASPHALT AND 18.0" BASE (DRILLERS DESCRIPTION)	1022.1																	
	1020.1																	
HARD, BROWN AND GRAY, **SANDY SILT**, LITTLE TO SOME CLAY, TRACE TO SOME GRAVEL, SS-1 CONTAINS TRACE PLASTIC FRAGMENTS, DAMP **(FILL)**			7 10 10	26	100	SS-1	4.5+	21	12	15	35	17	22	15	7	8	A-4a (3)	
			5 6 7	17	100	SS-2	4.5+	6	11	15	44	24	27	18	9	14	A-4a (7)	
@7.5' TO 9.0'; SS-3 CONTAINS NO RECOVERY			14 13 15	36	0	SS-3	-	-	-	-	-	-	-	-	-	-		
@10.0' TO 11.5'; SS-4 CONTAINS BRICK FRAGMENTS, NO INTACT SOIL FOR HP READINGS			14 16 16	42	39	SS-4	-	-	-	-	-	-	-	-	-	9	A-4a (V)	
	1010.1																	
VERY STIFF TO HARD, BROWN MOTTLED WITH ORANGISH BROWN, **SANDY SILT**, SOME CLAY, LITTLE TO SOME GRAVEL, CONTAINS IRON STAINING, DAMP			12 14 16	39	100	SS-5	4.25	-	-	-	-	-	-	-	-	15	A-4a (V)	
			5 6 6	16	89	SS-6	2.75	-	-	-	-	-	-	-	-	15	A-4a (V)	
	1004.6	TR																
SANDSTONE, ORANGISH BROWN BECOMING GRAY, HIGHLY WEATHERED, WEAK.			50/5"	-	20	SS-7	-	-	-	-	-	-	-	-	-	-	Rock (V)	
	1002.0	EOB	50/1"	-	100	SS-8	-	-	-	-	-	-	-	-	-	-	Rock (V)	

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:11 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 14+79, 63' LT.	EXPLORATION ID B-064-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP A2	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 973.3 (MSL) EOB: 11.5 ft.	PAGE 1 OF 1
START: 3/20/19 END: 3/20/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.034416, -81.565886	

MATERIAL DESCRIPTION AND NOTES	ELEV. 973.3	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
LOOSE TO MEDIUM DENSE, BROWN, **FINE SAND**, SOME COARSE SAND, TRACE SILT, TRACE CLAY, TRACE GRAVEL, DAMP		1																
		2																
		3	6 5 5	14	100	SS-1	-	1	26	64	7	2	NP	NP	NP	9	A-3 (0)	
		4																
		W 968.3 5																
@5.0' TO 9.0'; BECOMES TRACE COARSE SAND, WET		6	4 3 3	9	100	SS-2	-	-	-	-	-	-	-	-	-	24	A-3 (V)	
		7																
		8	4 4 5	13	100	SS-3	-	1	1	89	6	3	NP	NP	NP	26	A-3 (0)	
	963.8	9																
LOOSE, BROWN, **SILT**, SOME SAND, TRACE CLAY, TRACE GRAVEL, WET		10	2 3 2	7	100	SS-4	-	1	1	28	65	5	NP	NP	NP	30	A-4b (7)	
	961.8	11 EOB																

NOTES: GROUNDWATER ENCOUNTERED AT 5.0' DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:12 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 17+36, 77' LT.	EXPLORATION ID B-065-0-18
TYPE: EMBANKMENT	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP A2	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 973.9 (MSL) EOB: 11.5 ft.	PAGE 1 OF 1
START: 3/20/19 END: 3/20/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.035059, -81.565818	

MATERIAL DESCRIPTION AND NOTES	ELEV. 973.9	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
VERY LOOSE TO MEDIUM DENSE, BROWN, **FINE SAND**, LITTLE COARSE SAND, TRACE SILT, TRACE GRAVEL, TRACE CLAY, SS-4 CONTAINS TRACE IRON STAINING, DAMP			5 4 6	14	100	SS-1	-	5	12	74	6	3	NP	NP	NP	9	A-3 (0)	
		W 968.9																
@5.0' TO 11.5'; BECOMES WET			2 3 3	9	100	SS-2	-	-	-	-	-	-	-	-	-	26	A-3 (V)	
			1 1 1	3	100	SS-3	-	3	11	79	5	2	NP	NP	NP	22	A-3 (0)	
	962.4	EOB	3 6 7	18	100	SS-4	-	-	-	-	-	-	-	-	-	27	A-3 (V)	

NOTES: GROUNDWATER ENCOUNTERED AT 5.0' DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:12 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 45B	STATION / OFFSET: 17+39, 30' LT.	EXPLORATION ID B-066-0-18
TYPE: EMBANKMENT	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP A2	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 991.4 (MSL) EOB: 26.5 ft.	PAGE 1 OF 1
START: 4/17/19 END: 4/17/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 84	LAT / LONG: 41.035062, -81.565647	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
15.5" ASPHALT AND 14.5" BASE (DRILLERS DESCRIPTION)	991.4																	
	988.9																	
MEDIUM DENSE, BROWN, **GRAVEL WITH SAND**, TRACE SILT, TRACE CLAY, DAMP			7 5 5	14	67	SS-1	-	29	37	23	7	4	NP	NP	NP	9	A-1-b (0)	
	986.9																	
VERY LOOSE TO MEDIUM DENSE, BROWN, **FINE SAND**, LITTLE TO SOME COARSE SAND, TRACE SILT, TRACE CLAY, TRACE GRAVEL, CONTAINS IRON STAINING, WET TO DAMP			3 4 5	13	100	SS-2	-	1	13	78	4	4	NP	NP	NP	14	A-3 (0)	
			2 3 3	8	100	SS-3	-	-	-	-	-	-	-	-	-	6	A-3 (V)	
			2 3 4	10	100	SS-4	-	-	-	-	-	-	-	-	-	12	A-3 (V)	
@12.5' TO 14.0'; BECOMES BROWN AND ORANGISH BROWN, CONTAINS IRON STAINING			3 2 2	6	100	SS-5	-	-	-	-	-	-	-	-	-	6	A-3 (V)	
			1 2 1	4	100	SS-6	-	-	-	-	-	-	-	-	-	6	A-3 (V)	
			2 1 2	4	100	SS-7	-	1	24	70	3	2	NP	NP	NP	5	A-3 (0)	
			2 2 3	7	100	SS-8	-	-	-	-	-	-	-	-	-	8	A-3 (V)	
		W 968.9																
@22.5' TO 26.5'; BECOMES WET			3 2 2	6	100	SS-9	-	-	-	-	-	-	-	-	-	23	A-3 (V)	
			2 3 2	7	89	SS-10	-	-	-	-	-	-	-	-	-	21	A-3 (V)	
	964.9	EOB																

NOTES: GROUNDWATER ENCOUNTERED AT 22.5' DURING DRILLING. HOLE DID NOT CAVE.

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:12 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 4+70, 22' LT.	EXPLORATION ID B-077-0-18
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP L	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 1079.5 (MSL) EOB: 7.5 ft.	PAGE 1 OF 1
START: 4/17/19 END: 4/17/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.059466, -81.557415	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
12.0" ASPHALT AND 3.0" BASE (DRILLERS DESCRIPTION)	1079.5																	
	1078.3	1																
VERY STIFF TO HARD, BROWN BECOMING BROWN MOTTLED WITH ORANGISH BROWN AND GRAY, **SANDY SILT**, SOME CLAY, LITTLE TO SOME GRAVEL, CONTAINS IRON STAINING, DAMP		2	7 12 7	25	100	SS-1	4.25	23	10	13	33	21	25	17	8	13	A-4a (4)	
		3																
		4	11 9 12	27	100	SS-2	4.25	-	-	-	-	-	-	-	-	16	A-4a (V)	
		5																
			5 11 12	30	100	SS-3	4.5+	18	12	13	35	22	27	18	9	13	A-4a (4)	
		6																
	1072.0	7 EOB	7 6 7	17	100	SS-4	3.25	-	-	-	-	-	-	-	-	16	A-4a (V)	

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

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

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:12 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 7+31, 36' LT.	EXPLORATION ID B-079-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / CHIPUKAIZER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP N	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 976.9 (MSL) EOB: 10.5 ft.	PAGE 1 OF 1
START: 4/30/19 END: 4/30/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.066348, -81.573379	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
LOOSE, GRAYISH BROWN BECOMING BROWN, **COARSE AND FINE SAND**, LITTLE TO SOME SILT, TRACE TO LITTLE GRAVEL, TRACE CLAY, WET	976.9																	
		1																
		2																
		3	1 2 3	7	56	SS-1	-	-	-	-	-	-	-	-	-	20	A-3a (V)	
		4																
		5																
		6	2 2 3	7	100	SS-2	-	11	25	37	17	10	NP	NP	NP	17	A-3a (0)	
		7																
		8	1 2 2	6	50	SS-3	-	8	23	34	25	10	22	18	4	21	A-3a (0)	
		9																
	966.4	10 EOB	1 2 2	6	100	SS-4	-	-	-	-	-	-	-	-	-	26	A-3a (V)	

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:12 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15
TYPE: SUBGRADE
PID: 100713 SFN:
START: 5/1/16 END: 5/1/19

DRILLING FIRM / OPERATOR: NEAS / J. HODGES
SAMPLING FIRM / LOGGER: NEAS / CHIPUKAIZER
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 55X
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 11/21/17
ENERGY RATIO (%): 85

STATION / OFFSET: 9+06, 27' LT.
ALIGNMENT: RAMP N
ELEVATION: 979.3 (MSL) EOB: 7.5 ft.
LAT / LONG: 41.066752, -81.572913

EXPLORATION ID B-080-0-18

MATERIAL DESCRIPTION AND NOTES	ELEV. 979.3	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
MEDIUM DENSE, DARK GRAY AND BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND**, LITTLE SILT, TRACE CLAY, DAMP	977.8	1	3 8 12	28	56	SS-1	-	26	27	26	13	8	NP	NP	NP	9	A-1-b (0)	
MEDIUM DENSE TO DENSE, BROWN, **COARSE AND FINE SAND**, LITTLE SILT, LITTLE CLAY, TRACE GRAVEL, DAMP		2	5 14 17	44	100	SS-2	-	10	26	34	18	12	NP	NP	NP	9	A-3a (0)	
		3	3 9 14	33	67	SS-3	-	-	-	-	-	-	-	-	-	9	A-3a (V)	
		4																
		5	5 7 9	23	100	SS-4	-	-	-	-	-	-	-	-	-	11	A-3a (V)	
		6																
	971.8	7	3 5 4	13	100	SS-5	-	-	-	-	-	-	-	-	-	13	A-3a (V)	
		EOB																

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:12 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15
TYPE: SUBGRADE
PID: 100713 SFN:
START: 5/1/19 END: 5/1/19

DRILLING FIRM / OPERATOR: NEAS / J. HODGES
SAMPLING FIRM / LOGGER: NEAS / CHIPUKAIZER
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 55X
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 11/21/17
ENERGY RATIO (%): 85

STATION / OFFSET: 5+43, 7' RT.
ALIGNMENT: RAMP M
ELEVATION: 979.6 (MSL) EOB: 7.5 ft.
LAT / LONG: 41.067521, -81.573746

EXPLORATION ID B-081-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 979.6	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, SOME GRAVEL AND STONE FRAGMENTS, TRACE CLAY, DAMP	978.8	1	5 4 5	13	50	SS-1A	-	-	-	-	-	-	-	-	-	5	A-3a (V)	
	978.1					SS-1B	4.5+	15	17	28	21	19	28	16	12	12	A-6a (2)	
HARD, DARK GRAY AND BROWN, **SILT AND CLAY**, "AND" SAND, LITTLE GRAVEL, DAMP		2	4 5 5	14	56	SS-2	3.25	4	14	22	30	30	36	17	19	18	A-6b (9)	
STIFF TO VERY STIFF, BROWN MOTTLED WITH ORANGISH BROWN AND GRAY, **SILTY CLAY**, SOME TO "AND" SAND, TRACE GRAVEL, CONTAINS IRON STAINING, MOIST	973.6	3 4 5	3 3 4	10	100	SS-3	2.75	-	-	-	-	-	-	-	-	21	A-6b (V)	
		6	4 2 3	7	100	SS-4	1.75	-	-	-	-	-	-	-	-	20	A-6b (V)	
MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, LITTLE SILT, TRACE GRAVEL, TRACE CLAY, WET	972.1	7 EOB	3 3 5	11	56	SS-5	-	-	-	-	-	-	-	-	-	19	A-3a (V)	

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 7/29/19 09:12 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\SUM-76-6.15 KENMORE\GINT FILES\SUM-76-6.15 2.GPJ

APPENDIX C

SULFATE CONTENT DATA

OHIO DEPARTMENT OF TRANSPORTATION

DETERMINING SULFATE CONTENT IN SOILS

SUPPLEMENT 1122

Project C-R-S:	SUM-76-6.15
PID No:	100713
Report Date:	7/29/2019
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-007-0-18 SS-1	189+75	74 L	41.066552	-81.573713	976.4	19.83	20	1	20	0	20	0	**7**
B-008-0-18 SS-1	181+94	76 L	41.068655	-81.573829	983.4	19.18	20	12	20	12	20	11	**233**
B-010-0-18 SS-1	173+98	60 L	41.070840	-81.573860	985.0	19.10	20	5	20	4	20	5	**93**
B-011-0-18 SS-1	170+00	60 L	41.071934	-81.573846	984.0	19.05	20	8	20	11	20	8	**180**
B-012-0-18 SS-1	165+85	59 L	41.073072	-81.573836	982.9	19.05	20	1	20	1	20	2	**27**
B-013-0-18 SS-1	161+79	60 L	41.074185	-81.573819	981.8	19.03	20	5	20	4	20	8	**113**
B-014-0-18 SS-2	157+96	60 L	41.075237	-81.573806	982.7	19.08	20	4	20	2	20	3	**60**
B-015-0-18 SS-1	154+04	73 L	41.076317	-81.573749	984.3	18.20	20	4	20	4	20	4	**80**
B-016-0-18 SS-1	150+15	60 L	41.077400	-81.573883	987.4	23.80	20	1	20	2	20	2	**33**
B-017-0-18 ST-1	149+98	94 L	41.077460	-81.573770	980.2	20.95	20	1	20	1	20	1	**20**
B-018-0-18 SS-2	146+83	59 L	41.078313	-81.574111	987.9	23.80	20	64	20	70	20	64	**1320**
B-019-0-18 SS-2	143+71	60 L	41.079148	-81.574449	988.2	19.17	20	0	20	0	20	0	**0**
B-020-0-18 SS-1	43+79	49 L	41.035695	-81.574353	1002.4	21.02	20	25	20	25	20	25	**500**
B-022-0-18 SS-1	47+81	68 L	41.035730	-81.572893	987.7	21.43	20	1	20	2	20	0	**20**
B-023-0-18 SS-1	51+80	49 L	41.035659	-81.571451	977.3	18.82	20	3	20	3	20	3	**60**
B-025-0-18 SS-2	55+67	60 L	41.035672	-81.570045	973.1	18.88	20	9	20	9	20	9	**180**
B-026-0-18 SS-2	58+92	72 L	41.035690	-81.568868	971.4	18.78	20	4	20	4	20	4	**80**
B-027-018 SS-1B	63+44	55 L	41.035623	-81.567231	969.8	21.38	20	3	20	0	20	1	**27**

B-030-0-18 SS-2	73+70	61 R	41.035256	-81.563520	975.7	18.83	20	0	20	0	20	0	**0**
B-032-0-18 SS-2	77+74	58 R	41.035245	-81.562054	976.8	18.97	20	1	20	1	20	0	**13**
B-033-0-18 SS-1	81+72	68 R	41.035201	-81.560613	976.8	23.82	20	0	20	0	20	0	**0**
B-035-0-18 SS-2	85+67	68 R	41.035183	-81.559182	978.6	17.92	40	28	40	31	40	28	**1160**
B-037-0-18 SS-2B	93+64	62 R	41.035162	-81.556293	983.3	19.17	20	1	20	1	20	1	**20**
B-038-0-18 SS-2	96+70	66 R	41.035125	-81.555196	985.1	18.00	20	17	20	14	20	18	**327**
B-046-0-18 SS-1	247+75	52 R	41.059780	-81.557323	1068.9	17.87	20	57	20	60	20	59	**1173**
B-047-0-18 SS-1	251+65	53 R	41.059884	-81.555900	1063.6	17.87	20	66	20	70	20	73	**1393**
B-048-0-18 SS-1	256+17	70 R	41.060077	-81.554258	1050.6	21.35	20	2	20	3	20	1	**40**
B-049-0-18 SS-2	260+50	10 R	41.060544	-81.552909	1035.1	21.45	40	41	40	35	40	43	**1587**
B-050-0-18 SS-1	263+62	63 R	41.060686	-81.551665	1022.1	18.80	40	41	40	38	40	35	**1520**
B-064-0-18 SS-1	14+79	63 L	41.034416	-81.565886	973.3	21.48	20	0	20	0	20	0	**0**
B-066-0-18 SS-2	17+39	30 L	41.035062	-81.565647	991.4	20.97	20	2	20	2	20	2	**40**
B-077-0-18 SS-1	4+70	22 L	41.059466	-81.557415	1079.5	18.80	20	11	20	11	20	11	**220**
B-079-0-18 SS-1	7+31	36 L	41.066348	-81.573379	976.9	19.82	20	3	20	1	20	2	**40**
B-080-0-18 SS-2	9+06	27 L	41.066752	-81.572913	979.3	17.72	20	1	20	2	20	2	**33**
B-081-0-18 SS-1A	5+43	7 R	41.067521	-81.573746	979.6	17.65	20	2	20	2	20	2	**40**

APPENDIX D

ODNR OIL WELL REPORTS

R KB

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WELL COMPLETION RECORD (Form 8)

Ohio Department of Natural Resources
Division of Mineral Resources Management
2045 Morse Road, Bldg. H-3, Columbus, OH 43229-6693
Telephone: 614-265-6633 Fax: 614-265-7998

This report is due in duplicate 60 days after completion of the well. If the permit has expired and the well was not drilled, check the box below, sign on reverse side (Back), and return to our office within 30 days after expiration.

☐

1. Owner #: 1639	3. API #: 34-153-2-3145-00-00
2. Owner name, address and telephone numbers: Bass Energy, Inc. 130 Merz Blvd., Akron, OH 44333 330-869-0870	4. Type of Permit: Drill New Well Urban UC2
	5. County: Summit
	6. Civil Township: Conventry
	7. Footage: 135'NL & 5185'WL of Lot 13, Tract 2
8. Type of Well:	
9. X: 2259865 Y: 499315	21. Date drilling commenced: 2/8/2012
10. Quad: AKRON WEST	22. Date drilling completed: 3/20/2012
11. Section: 12. Lot: 13	23. Date put into production: 6/7/2012
13. Fraction: 14. Qtr.Twp:	24. Date plugged if dry:
15. Tract: 2	25. Producing formation: Clinton Sandstone
16. Allot:	26. Deepest formation: Queenston Shale
17. Well #: 1	27. Driller's total depth: 4008'
18. Lease Name: ABINGTON PROPERTIES	28. Logger's total depth: 4000'
19. PTD: 3999' 20. Drilling Unit: 25.33	29. Lost hole at _____ feet.

RECEIVED
MAY 1 6 2013
Division of Oil & Gas
Columbus

30. Type of tools:
- ☐ Cable
- ☐ Fluid Rotary
- ☐ Cable/Air Rotary
- ☐ Cable/Fluid Rotary
- ☐ Air Rotary
- ☑ Air/Fluid Rotary
- ☐ Service Rig
- ☐ Cable/Air Rotary/Fluid Rotary

31. Type of completion:
- ☐ Open Hole
- ☑ Through Casing
- ☐ Slotted Liner

32: Elevation:
- Ground Level: 973
- Derrick Floor:
- Kelly Bushing: 979

33. Perforated intervals and number of shots: 3798' - 3812' with 53 shots

34. Name of Frac Company: Superior Well Service

35. Method of shot, acid, or fracture treatments, production tests, pressures, etc.:

SHOT:	ACID:	FRAC FLUIDS:	SAND:	PRESSURES (psi):
Lbs.	Gals. 500	Water (gals) 70,080	Lbs. 40,000	Breakdown 1475
Qts.	Type HCL	Water (bbl)	Sks.	ATP 1375
Type	Percent 15%	CO2 (tons)		ISIP 1400
		N2 (mscf)		5 min. SIP 1294
				Avg. Rate 26

METHOD OF FLUID CONTAINMENT

FLUIDS:	PIT:	FRAC TANK:
Swab	☐	☑
Flowback	☐	☑

DATE TREATED: 3/20/2012

36. Amount of initial production per day:

		(MCF.)		(Bbls.)		(Bbls.)
Natural:	Gas	0	Oil	0	Brine	0
After Treatment:	Gas	15 MCF	Oil	10 BO	Brine	1
SERC Data:	Number of Tanks:	2	Maximum Storage Capacity of all Tanks (bbls.)			440 BBLS

37. Casing and tubing record: Please indicate which is used (cement or mudding)

Type	Size	Feet Used in Drilling	Amount of Cement or Mud	Feet Left in Well
Conductor/Drive Pipe:	11"	120'	315 sks	120'
Surface:	8 5/8"	451'	240 sks	451'
Intermediate:				
Production:	4 1/2" 11.6#	3984'	175 sks	3984'
Tubing:	1 1/2"	3788'		3788'

Comments:

38. Name of drilling contractor: Poulson Driling

39. Type of electrical and/or radioactivity logs run: *(all logs must be submitted)* Gamma Ray, Neutron, Density, Resistivity & Gamma Ray CCL, VDL Bond, Perforating

40. Name of logging company: Appalachian Well Surveys

DIVISION USE ONLY

Log Submitted: Y / N
Confidential: Y / N

FRAC DATA SUBMITTED:
Pressure/Rate Graph ☐
Record ☐
Invoice ☐

Well Class:

RECEIVED
MAY 1 6 2013
Division of Oil & Gas
Columbus

FORMATION	TOP	BASE	Shows of oil, gas, fresh water, or brine; indicate depth or interval	REMARKS
Freshwater Strata				
Glacial Deposits	0'	20'		
Coal Seams				
1st Cow Run				
Buell Run				
2nd Cow Run				
Salt Sand				
Maxton Sand				
Keener Sand				
Big Injun Sand				
Squaw Sand				
Mississippian Shale	50'	396'		
Weir Sand				
Berea Sand	396'	450'		
Bedford Shale	450'	520'		
2nd Berea				
Ohio Shale	520'	2168'		
Gantz				
Thirty Foot				
Gordon				
Cinnamon				
Marcellus				
Big Lime	2168'	3638'		
Sylvania				
Oriskany	2400'	2540'		
Bass Island	2540'	2554'		
Salina				
Salt Section	2790'	3162'		
Newburg				
Lockport	3360'	3638'		
Little Lime				
Packer Shell	3702'	3758'		
Stray Clinton				
Red Clinton	3794'	3820'		
White Clinton	3869'	3880'		
Medina	3938'	3948'		
Queenston	3948'	T.D.		
Utica				
Trenton				
Black River				
Gull River				
Glenwood Shale				
Knox Unconformity				
Beekmantown				
Rose Run				
Trempealeau/Copper Ridge				
"B" Zone				
Krysik				
Kerbel				
Conasauga				
Rome				
Mt. Simon				
Granite Wash				
Middle Run				
Granite				

I certify that the above information is true and correct, to the best of my knowledge:

William J. Hlavin, Geologist — 3-20-13

(SIGNATURE) (DATE)

William J. Hlavin — Geologist

(NAME typed or printed) (TITLE)

Bass Energy, Inc.

(REPRESENTING)

RECEIVED
MAY 15 2013
Division of Oil & Gas
Columbus

OHIO DIVISION OF GEOLOGICAL SURVEY

PSI:GRN,Cal,D

22792

Permit No. 2792

Permit Issued 08/23/94

County SUMMIT Township COVENTRY Quad. AKRON WEST

Section ____ Lot ____ Tract 2 Twp. Qtr. ____ X Coord. 2256720 Y Coord. 508030

Measured 872'NL & 5500'WL OF TWP. CIN LOT 2, Proposed TD 3950 Class ____ Tool RTAF

Acres 20 TRACT 2>

Landowner FORD-BAKER UNIT Well No. 1 Date Commenced 11-20-94

Operator NORTH AMERICAN PETROLEUM Well No. ____ Date Completed 11-27-94

GL 990 DF 994 KB 996 LTD 3952 DTD 3940 PB Depth ____ Date PB ____

TD Formation Queenston Prod. Formation Clinton

Perforations (9) 3755-63; (7) 3769-75; (4) 3796-99; IP Natural ____ IP AT 50MCFG & 5BO

Stimulation 40M gal wtr, 30M# sand, 500 gal acid; Initial Rock Pressure ____

Casing Record 8 5/8" 501' 200sks, 4½" 3901' 125sks Date Abandoned ____

FORMATION	TOP	BOTTOM	REMARKS	FORMATION	TOP	BOTTOM	REMARKS
COMPLETION 5-24-95							
Date put into production 12/8/94							
Big lime	2107	3594					
Packer shell	3674	3711					
Clinton stray	3725	3734					
Clinton red	3744	3776					
Clinton white	3795	3802					
Queenston	3902						
		3940	DTD; 3952'LTD				

DNR 4808 (Rev. 5-92)

FORMATION	TOP	BOTTOM	REMARKS	FORMATION	TOP	BOTTOM	REMARKS

OHIO DIVISION OF GEOLOGICAL SURVEY

EAST:GRN,Cal,D,CCL

R.I/RL 7-22-95

22803

Permit No. 2803

Permit Issued 12/22/94

County SUMMIT Township (PORTAGE) COVENTRY Quad. AKRON WEST

Section ____ Lot ____ Tract 2 Twp. Qtr. ____ X Coord. (2258150) Y Coord. 508800

Measured (800'NL & 6920'WL OF TWP. CIN LOT 2, Proposed TD 3990 Class POOL Tool RTAF

Acres 21.740 TRACT 2) 800' NL & 7055' WL of twp. Clinton - Pool - Fluid RT

Landowner LANGLEY UNIT Well No. 1 Date Commenced 9-22-95

Operator (VIKING RESOURCES CORP)* 980' Well No. ____ Date Completed 9-28-95

GL (1040) DF ____ KB 986 LTD 3985 DTD 3990 PB Depth ____ Date PB ____

TD Formation Queenston Prod. Formation Clinton

Perforations (4) 3792-95; (7) 3802-08; (4) 3811-14;* IP Natural ____ IP AT 50MCFG & 2BO

Stimulation 250 gal 7½% HCL, 800sks 20/40 sand, 30M gal water; Initial Rock Pressure ____

Casing Record 8 5/8" 480' 175sks, 4½" 3908' 150sks Date Abandoned ____

FORMATION	TOP	BOTTOM	REMARKS	FORMATION	TOP	BOTTOM	REMARKS
COMPLETION 3-21-96				X= 2,258,300			
*(5) 3817-21;				*Whidbey Resources Inc.			
Ohio shale		2116					
Big lime	2134	3628					
Packer shell	3716	3750					
Clinton stray	3772	3778					
Clinton red	3786	3850					
Medina	3930	3944					
		3990	DTD; 3985'LTD				

DNR 4808 (Rev. 5-92)

FORMATION	TOP	BOTTOM	REMARKS	FORMATION	TOP	BOTTOM	REMARKS

OHIO DIVISION OF GEOLOGICAL SURVEY

EAST:GRN,Cal,D

22843

Permit No. 2843

Permit Issued 03/25/96

County SUMMIT Township COVENTRY Quad. AKRON WEST

Section ____ Lot ____ Tract 2 Twp. Qtr. ____ X Coord. 2257000 Y Coord. 507640

Measured 2038'NL & 5790'WL OFTWP CIN LOT 4, Proposed TD 3950 Class POOL Tool RTAF

Acres 20 TRACT 2>

Landowner MARR Well No. 1 Date Commenced 7-13-96

Operator NORTH AMERICAN PETROLEUM Well No. ____ Date Completed 7-19-96

GL 1000 DF ____ KB 1006 LTD 3924 DTD 3921 PB Depth ____ Date PB ____

TD Formation Queenston Prod. Formation Clinton

Perforations (9) 3745-53; (12) 3757-68; (9) 3773-81; IP Natural ____ IP AT 50MCFG & 5BO

Stimulation 72M gal wtr, 50M# 20/40 Ottawa sand; Initial Rock Pressure ____

Casing Record 8 5/8" 314' 200sks, 4½" 3914' 125sks Date Abandoned ____

FORMATION	TOP	BOTTOM	REMARKS	FORMATION	TOP	BOTTOM	REMARKS
COMPLETION 11-21-96							
Big lime	2110	3596					
Packer shell	3675	3707					
Clinton red	3745	3768					
Clinton white	3773	3782					
Queenston	3902						
		3921	DTD; 3924'LTD				

DNR 4808 (Rev. 5-92)

FORMATION	TOP	BOTTOM	REMARKS	FORMATION	TOP	BOTTOM	REMARKS

DRAFT REPORT
SUBGRADE EXPLORATION REPORT
SUM-76-6.40
SUMMIT COUNTY, OHIO
PID#: 111218

Prepared For:

GPD GROUP
520 South Main Street, Suite 2531
Akron, Ohio 44311

Prepared by:

NATIONAL ENGINEERING AND ARCHITECTURAL SERVICES INC.
2800 Corporate Exchange Drive, Suite 240
Columbus, Ohio 43231

NEAS PROJECT 19-0080

February 26, 2020

National Engineering & Architectural Services Inc.

EXECUTIVE SUMMARY

The Ohio Department of Transportation (ODOT) has proposed a ramp replacement and widening project (SUM-76-6.40, PID 111218) along the ramp, designated as Ramp B, carrying Interstate Route 76 (IR-76) westbound (WB) to IR-277 eastbound (EB) in the City of Akron, Summit County, Ohio. The overall project limits extend from the beginning of Ramp B (STA. 0+00) to approximate STA. 10+58.

National Engineering & Architectural Services, Inc. (NEAS) has been contracted to perform geotechnical engineering services for the project. The purpose of the geotechnical engineering services was to perform geotechnical explorations within the project limits to obtain information concerning the subsurface soil and groundwater conditions relevant to the design and construction of the project. Between January 14, 2019 and March 20, 2019, NEAS performed the site reconnaissance and exploration program for the project. The subsequent document presents the results of the roadway exploration for the proposed Ramp B as noted above. As part of the project, NEAS advanced a total of 4 borings which were utilized for roadway and subgrade characterization purposes.

The subgrade conditions in the project area are relatively consistent and are generally comprised of either fill soils (i.e., embankment fill, historical/urban fill, etc.) or natural soils consisting of non-cohesive sand, silt and gravel combinations. The soils encountered at the site generally classified as either Fine Sand (A-3), Coarse and Fine Sand (A-3a), or non-cohesive Sandy Silt (A-4a). 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 (i.e., lower than the level which ODOT considers high and may prevent the use of chemical stabilization).

Based on our evaluation of the subsurface conditions and our geotechnical engineering analyses of the proposed project, it is our opinion that subgrade conditions are generally satisfactory, and pavement can be designed without the need for extreme levels of remediation. In general, it is recommended that the subgrade soil of the proposed Ramp B be “reworked” and prepared in accordance with typical Subgrade Compaction and Proof Rolling (Item 204) procedures and specifications. 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.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

1. INTRODUCTION

1.1. General

National Engineering & Architectural Services, Inc. (NEAS) presents our Subgrade Exploration Report for the Ohio Department of Transportation (ODOT) project SUM-76-6.40 (PID 111218) along the interchange ramp), designated as Ramp B, carrying Interstate Route 76 (IR-76) west bound (WB) to IR-277 east bound (EB part of the Akron Beltway in the City of Akron, Summit County, Ohio. The project portion of Ramp B planned for replacement extends from STA. 0+00 to approximate STA. 10+58 (proposed Ramp B alignment). This report presents a summary of the project encountered surficial and subsurface conditions, our recommendations for subgrade stabilization, and pavement design parameters for the planned reconstruction of Ramp B. The analysis performed as part of this report has been performed in accordance with ODOT's *Geotechnical Bulletin 1* (GB1) (ODOT [1], 2019) and *Pavement Design Manual* (PDM) (ODOT PDM, 2019).

The exploration was performed as part of a previous project's scope (Project SUM-76-6.15, PID 100713) and conducted in general accordance with NEAS's proposal to GPD Group (GPD), dated May 22, 2018, while the preparation of this report was conducted in accordance with NEAS's proposal to GPD, dated September 24, 2019. The geotechnical engineering services for the project were completed in accordance with the provisions of ODOT's *Specifications for Geotechnical Explorations* (SGE) (ODOT SGE, 2019).

The scope of work performed by NEAS as part of project SUM-76-6.40 (PID 111218) included: a review of published geotechnical information; performing 4 total test borings as part of the subgrade exploration; laboratory testing of soil samples in accordance with the SGE; performing geotechnical engineering analysis to assess subgrade stabilization requirements and pavement design parameters; 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 Akron-Canton Interlobate Plateau physiographic region, part of the Glaciated Allegheny Plateaus (ODGS, 1998). This is a moderate relief, hummocky area between two converging glacial lobes dominated by kames, kame terraces, eskers, kettles, kettle lakes, and bogs/fens. Soils in this region are characteristically Wisconsinan-age sand and older drift over Devonian to Pennsylvanian age sandstones, conglomerates and shales.

The soils at the project site are mapped as 160 ft of Wisconsinan-age ice-contact deposits, over 90 feet of Wisconsinan-age sand and gravel underlain by Mississippian-age sandstone and shale. Small areas of organic deposits were noted on the surficial geology maps southeast of the project site (ODGS, 2005). The ice-contact deposits are described as highly variable deposits of poorly sorted gravel and sand with inclusions of silt, clay and till lenses common. The sand and gravel mapped at the project site is described as interbedded sand and gravel commonly containing thin, discontinuous layers of silt and clay.

Based on the Bedrock Geologic Units Map of Ohio (USGS & ODGS, 2006), bedrock within the project area consists of shale, siltstone and sandstone of the Rushville, Logan and Cuyhoga Formations, with minor lithologic constituents of limestone of the Maxville Limestone Formation. The shale in this formation is described as medium to dark gray in color, clayey to silty, locally fossiliferous and thin to thick bedded

with limestone, while the sandstone is described as gray weathering yellow to brown, silty to granular with local stringers of quartz pebbles. The limestone in the Maxville Limestone Formation is described as medium to dark gray in color and thin to thick bedded. Based on the ODNR bedrock topography map of Ohio, bedrock elevations at the project site can be expected to be at an elevation of about 850 ft above mean sea level (amsl) (ODGS, 2003), putting bedrock at a depth of about 125 ft below ground surface (bgs).

The soils at the project site are generally mapped (Web Soil Survey) by the Natural Resources Conservation Service (USDA, 2015) as Udorthents. These soils can be described as soils that have been disturbed by cutting and filling. These soils are not classified according to the AASHTO method of soil classification, but it can be expected that these soils will largely consist of fill soils and often vary in composition. A portion of the soils within the project area has been mapped as Chili loam. Soils in the Chili series are characterized as very deep, well drained soils on outwash plains, terraces, kames, and beach ridges. Based on the Web Soil Survey the Chili series soils are comprised of predominantly coarse- and fine-grained non-cohesive soils, classifying as A-1, A-2 and A-4 type soils according to the AASHTO method of soil classification.

2.2. Hydrology/Hydrogeology

Groundwater at the project site can be expected at an elevation consistent with that of the Tuscarawas River (or tributaries to the Tuscarawas River) as it is the most dominant hydraulic influence in the vicinity of the project's boundaries. The water level of the Tuscarawas River 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 wetlands and/or fine-grained soils making it difficult for groundwater to permeate to the natural phreatic surface. According to historic boring logs and associated groundwater observations, groundwater elevations range from approximately 962 to 970 ft amsl across the project site.

The project site is not located within a special flood hazard area based on available mapping by the Federal Emergency Management Agency's (FEMA) National Flood Hazard mapping program (FEMA, 2019).

2.3. Mining and Oil/Gas Production

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

No active oil or gas wells are noted on ODNR's Ohio Oil & Gas Locator in the vicinity of the project site (ODNR [2], 2016).

2.4. Historical Records and Previous Phases of Project Exploration

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

- Soil Profile Sheets as part of ODOT project SUM-224-5.85 Sheets 1-12, prepared by the State Highway Testing and Research Laboratory dated May 9, 1960; and,
- Soil Profile Sheets as part of ODOT project SUM-5-9.33 Sheets 1-27, prepared by the State Highway Testing and Research Laboratory dated Oct. 30, 1963; and,

Historical soil borings associated with the above plans were reviewed, however, were not utilized for our analysis, and therefore, are not referenced or presented within this report.

2.5. Field Reconnaissance

Field reconnaissance visits for this project and adjacent projects were conducted between January 14, 2019 and January 17, 2019, along IR-76, IR-77, IR-277 and connecting ramps. Site conditions, including the existing pavement conditions, were noted and photographed during the visits. A summary of the land use and pavement conditions for the project along Ramp B are provided and is provided below.

The land use in the immediate vicinity of the Ramp B project area consists of interstate highway within the ODOT right-of-way. Further outside the ODOT right-of-way land use consists of mostly woodlands and wetlands with residential property to the southwest and industrial property to the northeast. The pavement condition along the ramp was generally observed to be good with few low severity transverse cracks along the ramp. Pavement was observed to be well-drained with no signs of ponding or standing water observed at the time of our reconnaissance visit.

3. GEOTECHNICAL EXPLORATION

3.1. Roadway Exploration Program

The subsurface exploration was conducted by NEAS between February 27, 2019 and March 20, 2019 and included 4 borings drilled to depths between 11.5 and 16.5 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 within the planned roadway/subgrade improvement area that was not restricted by underground utilities or dictated by terrain (i.e. steep embankment slopes). Target boring locations were located in the field by NEAS prior to drilling utilizing handheld GPS equipment. Each as-drilled project boring location and corresponding ground surface elevation was surveyed in the field by Northwest Consultants, Inc. (project surveyor) 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 North, NAD83, location) and the corresponding ground surface elevation. The boring locations are depicted in the Soil Profile Sheets provided in Appendix A.

Borings were drilled using either a CME 55T or CME 55X, truck-mounted or track-mounted drilling rigs utilizing 3.25-inch (inner diameter) hollow stem augers. Soil samples for subgrade borings were recovered at 2.5-ft intervals to termination depth, each using an 18-inch split spoon sampler (AASHTO T-206 “Standard Method for Penetration Test and Split Barrel Sampling of Soils.”). The soil samples obtained from the exploration program were visually observed in the field by the NEAS field representative and preserved for review by a Geologist for possible laboratory testing. Standard penetration tests (SPT) were conducted using CME auto hammers that have been calibrated to be between 78.0% and 85.0% efficient (depending on the specific rig used and the calibration date of the hammer) as indicated on the boring logs (Appendix B).

Field boring logs were prepared by drilling personnel and included pavement description (where present), lithological description, and SPT results recorded as blows per 6-inch increment of penetration. After completing the borings, the boreholes were backfilled with either auger cuttings, bentonite chips, or a combination of these materials.

3.2. Laboratory Testing Program

The laboratory testing program consisted of classification testing, moisture content determinations and sulfate content testing. The individual laboratory data sheets and results are included in Appendix B while a summary of the sulfate content testing results can be found in Appendix C. Additionally, data from the laboratory testing program was incorporated onto the final borings logs (when possible). Soil samples are retained at the laboratory for 60 days following report submittal, after which time they will be discarded.

3.2.1. Classification Testing

Representative soil samples were selected for index property (Atterberg Limits) and gradation testing for classification purposes on approximately 35% of the samples. At each boring location, the uppermost sample obtained below the proposed top of subgrade elevation was generally tested while additional samples were selected for testing with the intent of properly classifying the subsurface soil and groundwater conditions within the planned project limits. Soils not selected for testing were compared to laboratory tested samples/strata and classified visually. Moisture content testing was conducted on all samples. The laboratory testing was performed in general accordance with applicable AASHTO specifications and ODOT Supplements.

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

3.2.2. Standard Penetration Test Results

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

3.2.3. Sulfate Testing

Sulfate testing was generally performed on one sample for each roadway boring performed for pavement/subgrade design purposes for the subgrade analyses. 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. Based on the testing results, each subgrade soil sample tested was determined to have a sulfate content of less than 5,000 parts per million (i.e., lower than the level which ODOT considers high and may prevent the use of chemical stabilization). Testing results are summarized in Appendix C.

4. FINDINGS

The subsurface conditions encountered during NEAS’s explorations are described in the following subsections and/or 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 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. At the time of the composition of this report, pavement grade information has been assumed to be consistent with project Plan and Profile sheets provided by GPD dated June 25, 2019 and labeled as Option 4. It should be noted that for the purposes of this report and our analysis, the term 'subgrade' has been assumed to represent soils and/or soil conditions from 1.5 ft below proposed final pavement grades to a depth of 7.5 ft below the proposed pavement grades.

4.1. Subsurface Conditions

The subsurface conditions in the project area are relatively consistent and are generally comprised of either fill soils (i.e., embankment fill, historical/urban fill, etc.) or natural soils consisting of non-cohesive sand, silt and gravel combinations. The soils encountered at the site generally classified as either Fine Sand (A-3), Coarse and Fine Sand (A-3a), or non-cohesive Sandy Silt (A-4a). 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 (i.e., lower than the level which ODOT considers high and may prevent the use of chemical stabilization).

The following subsection presents a brief summary of the subsurface conditions encountered at the project site.

4.1.1. Subgrade Conditions

The IR-76 WB ramp to IR-277 EB (i.e., Ramp B), is planned for full depth pavement replacement and widening as part of the proposed project.

One-hundred percent (100%) of the samples taken along the ramp were classified as coarse- or fine-grained, non-cohesive soils and were comprised of: 1) Fine Sand (A-3, 33% of samples); 2) Coarse and Fine Sand (A-3a, 60% of samples); and, 3) Sandy Silt (A-4a, 7% of samples). With respect to the relative density of the non-cohesive soils encountered, the descriptions varied from very loose to medium dense correlating to N_{60} values between 0 and 27 blows per foot (bpf). Natural moisture contents ranged from 8 to 35 percent.

4.1.2. Groundwater

Groundwater measurements were taken during drilling procedures and/or immediately following the completion of each borehole. Groundwater was encountered in 2 of the 4 project borings. Across the Ramp B site, groundwater was encountered at depths ranging from 6 to 8 ft bgs or from elevations ranging from 962.7 to 966.9 ft amsl. Groundwater was encountered within 7.5 ft (within subgrade depths) of the ground surface in 1 boring (B-028-0-18).

It should be noted that groundwater is affected by many hydrologic characteristics in the area and may vary from measurements taken at the time of the exploration.

5. ANALYSES AND RECOMMENDATIONS

We understand that the reconstruction/widening of the ramp from IR-76 WB to IR-277 EB designated as Ramp B is planned as part of ODOT project SUM-76-6.40 (PID 111218). For this purpose, a roadway exploration and subsequent analysis was completed for the referenced project. 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 July 19, 2019). Input information for the spreadsheet was based on the soil characteristics gathered during NEAS's 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 project, it is our opinion that the subgrade conditions encountered are generally satisfactory and pavement can be designed without the need for extreme levels of remediation. In general, the subgrade soils throughout the project can be stabilized by reworking and following typical Subgrade Compaction and Proof Rolling (Item 204) procedures and specifications. The following sections provide further detail about the analysis performed and the recommended remediation.

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. The project GB1 analysis spreadsheet is provided in Appendix D.

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

5.1.1. Pavement Design Recommendations

It is our understanding that pavement analysis and design is to be performed to determine the proposed Ramp B pavement sections. A GB1 analysis was performed using the subgrade soil data obtained during our field exploration program to evaluate the soil characteristics in order to develop pavement parameters for use in pavement design. The subgrade analysis parameters recommended for use in pavement design are presented in Table 1 below. Provided in the table are ranges of maximum, minimum and average N_{60L} values for the proposed ramp as well as the design CBR value recommended for use in pavement design.

Table 1: Pavement Design Values

Segment	Maximum N_{60L}	Minimum N_{60L}	Average N_{60L}	Average PI Values	Design CBR
Ramp B	7	0	3	NP	13

5.1.2. Unsuitable Subgrade

Per ODOT's GB1, 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. Based on the borings performed for the project, unsuitable subgrade materials were not encountered within the subgrade depths along the project roadway limits.

5.1.3. Unstable Subgrade

The GB1 recommends subgrade stabilization for soils 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. For the purposes of this report the term 'unstable soils' has been assumed to represent subgrade soils of these conditions. 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 an unstable 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, unstable soils requiring some form of remediation were not encountered within the subgrade of the referenced project roadway limits. 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 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. High moisture content conditions were encountered in 1 of the 4 borings (B-028-0-18) performed within the proposed Ramp B area. Sample SS-1 within boring B-028-0-18 was determined to have a moisture content of about 16 percent, 5 percent higher than the optimum moisture content for the specific soil type.

5.2. Stabilization Recommendations

5.2.1. Subgrade Stabilization

As mentioned in Section 4.1.1. of this report, the soils underlying the project roadway segment are predominantly made up of coarse-grained non-cohesive soils classifying as A-3 and A-3a. Per ODOT's GB1, soil types A-1-a, A-1-b, A-3 and A-3a, as well as soils with an N_{60L} of 15 bpf or more do not require specialized remediation efforts and can be "reworked to stabilize the subgrade". Because the subgrade soils encountered along the Ramp B alignment consist of either the indicated soil types or have an N_{60L} greater than 15, it is recommended that the subgrade soils of Ramp B be "reworked" and prepared in accordance with typical Subgrade Compaction and Proof Rolling (Item 204) procedure and specifications.

6. QUALIFICATIONS

This investigation was performed in accordance with accepted geotechnical engineering practice for the purpose of characterizing the subgrade conditions along the referenced portion of Ramp B. This report has been prepared for GPD Group, ODOT and their design consultants to be used solely in evaluating the roadway subgrade soils within the project limits and presenting geotechnical engineering recommendations specific to this project. The assessment of general site environmental conditions or the presence of

pollutants in the soil, rock and groundwater of the site was beyond the scope of this geotechnical exploration. Our recommendations are based on the results of our field explorations, laboratory 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 occur in the nature, design or location of the proposed pavement rehabilitation work, the conclusions and recommendations contained in this report should not be considered valid until they are reviewed and have been modified or verified in writing by a geotechnical engineer.

It has been a pleasure to be of service to GPD Group in performing this geotechnical exploration for the SUM-76-6.15 project. Please call if there are any questions, or if we can be of further service.

Respectfully Submitted,

Brendan P. Andrews, P.E.
Project Manager/ Senior Geotechnical Engineer

Kevin C. Arens, P.E.
Geotechnical Engineer

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APPENDIX A

SOIL PROFILE SHEETS

PROJECT DESCRIPTION

THE PROJECT INCLUDES THE RECONSTRUCTION AND WIDENING OF THE RAMP DESIGNATED AS RAMP B CARRYING IR-76 WB TO IR-277 EB.

HISTORIC RECORDS

THE FOLLOWING REPORT/PLANS WERE AVAILABLE FOR REVIEW AND EVALUATION FOR THE PROJECT:

-SOIL PROFILE SHEETS AS PART OF ODOT PROJECT SUM-224-5.85 SHEETS 1-12, PREPARED BY THE STATE HIGHWAY TESTING AND RESEARCH LABORATORY DATED MAY 9, 1960; AND,
-SOIL PROFILE SHEETS AS PART OF ODOT PROJECT SUM-5-9.33 SHEETS 1-27, PREPARED BY THE STATE HIGHWAY TESTING AND RESEARCH LABORATORY DATED OCT. 30, 1963;

HISTORICAL SOIL BORINGS ASSOCIATED WITH THE ABOVE PLANS WERE REVIEWED, HOWEVER, WERE NOT UTILIZED FOR OUR ANALYSIS, AND THEREFORE, ARE NOT REFERENCED OR PRESENTED WITHIN THE SOIL PROFILE SHEETS.

GEOLOGY

THE PROJECT SITE IS LOCATED WITHIN THE AKRON-CANTON INTERLOBATE PLATEAU PHYSIOGRAPHIC REGION, PART OF THE GLACIATED ALLEGHENY PLATEAUS. THIS IS A MODERATE RELIEF, HUMMOCKY AREA BETWEEN TWO CONVERGING GLACIAL LOBES DOMINATED BY KAMES, KAME TERRACES, ESKERS, KETTLES, KETTLE LAKES, AND BOGS/FENS. SOILS IN THIS REGION ARE CHARACTERISTICALLY WISCONSINAN-AGE SAND AND OLDER DRIFT OVER DEVONIAN TO PENNSYLVANIAN AGE SANDSTONES, CONGLOMERATES AND SHALES.

THE SOILS AT THE PROJECT SITE ARE MAPPED AS 160 FT OF WISCONSINAN-AGE ICE-CONTACT DEPOSITS, OVER 90 FEET OF WISCONSINAN-AGE SAND AND GRAVEL UNDERLAIN BY MISSISSIPPIAN-AGE SANDSTONE AND SHALE. SMALL AREAS OF ORGANIC DEPOSITS WERE NOTED ON THE SURFICIAL GEOLOGY MAPS SOUTHEAST OF THE PROJECT SITE. THE ICE-CONTACT DEPOSITS ARE DESCRIBED AS HIGHLY VARIABLE DEPOSITS OF POORLY SORTED GRAVEL AND SAND WITH INCLUSIONS OF SILT, CLAY AND TILL LENSES COMMON. THE SAND AND GRAVEL MAPPED AT THE PROJECT SITE IS DESCRIBED AS INTERBEDDED SAND AND GRAVEL COMMONLY CONTAINING THIN, DISCONTINUOUS LAYERS OF SILT AND CLAY.

BASED ON THE BEDROCK GEOLOGIC UNITS MAP OF OHIO, BEDROCK WITHIN THE PROJECT AREA CONSISTS OF SHALE, SILTSTONE AND SANDSTONE OF THE RUSHVILLE, LOGAN AND CUYHOGA FORMATIONS, WITH MINOR LITHOLOGIC CONSTITUENTS OF LIMESTONE OF THE MAXVILLE LIMESTONE FORMATION. THE SHALE IN THIS FORMATION IS DESCRIBED AS MEDIUM TO DARK GRAY IN COLOR, CLAYEY TO SILTY, LOCALLY FOSSILIFEROUS AND THIN TO THICK BEDDED WITH LIMESTONE, WHILE THE SANDSTONE IS DESCRIBED AS GRAY WEATHERING YELLOW TO BROWN, SILTY TO GRANULAR WITH LOCAL STRINGERS OF QUARTZ PEBBLES. THE LIMESTONE IN THE MAXVILLE LIMESTONE FORMATION IS DESCRIBED AS MEDIUM TO DARK GRAY IN COLOR AND THIN TO THICK BEDDED. BASED ON THE ODNR BEDROCK TOPOGRAPHY MAP OF OHIO, BEDROCK ELEVATIONS AT THE PROJECT SITE CAN BE EXPECTED TO BE AT AN ELEVATION OF ABOUT 850 FT AMSL, PUTTING BEDROCK AT A DEPTH OF ABOUT 125 FT BELOW GROUND SURFACE (BGS).

THE SOILS AT THE PROJECT SITE ARE GENERALLY MAPPED (WEB SOIL SURVEY) BY THE NATURAL RESOURCES CONSERVATION SERVICE AS UDORTHENTS. THESE SOILS CAN BE DESCRIBED AS SOILS THAT HAVE BEEN DISTURBED BY CUTTING AND FILLING. THESE SOILS ARE NOT CLASSIFIED ACCORDING TO THE AASHTO METHOD OF SOIL CLASSIFICATION, BUT IT CAN BE EXPECTED THAT THESE SOILS WILL LARGELY CONSIST OF FILL SOILS AND OFTEN VARY IN COMPOSITION. A PORTION OF THE SOILS WITHIN THE PROJECT AREA HAS BEEN MAPPED AS CHILI LOAM. SOILS IN THE CHILI SERIES ARE CHARACTERIZED AS VERY DEEP, WELL DRAINED SOILS ON OUTWASH PLAINS, TERRACES, KAMES, AND BEACH RIDGES. BASED ON THE WEB SOIL SURVEY THE CHILI SERIES SOILS ARE COMPRISED OF PREDOMINANTLY COARSE- AND FINEGRAINED NON-COHESIVE SOILS, CLASSIFYING AS A-1, A-2 AND A-4 TYPE SOILS ACCORDING TO THE AASHTO METHOD OF SOIL CLASSIFICATION.

RECONNAISSANCE

THE FIELD RECONNAISSANCE VISITS FOR THE PROJECT WERE CONDUCTED BETWEEN JANUARY 14, 2019 AND JANUARY 17, 2019, ALONG IR-76, IR-77, IR-277 AND CONNECTING RAMPS. SITE CONDITIONS, INCLUDING THE EXISTING PAVEMENT CONDITIONS, WERE NOTED AND PHOTOGRAPHED DURING THE VISIT. A SUMMARY OF THE LAND USE AND PAVEMENT CONDITIONS BY ROADWAY SEGMENT INCLUDING PHOTOGRAPHS OF NOTABLE PAVEMENT DISTRESS ARE PROVIDED AND IS PROVIDED BELOW.

THE LAND USE IN THE IMMEDIATE VICINITY OF THE PROJECT AREA CONSISTS OF INTERSTATE HIGHWAY WITHIN THE ODOT RIGHT-OF-WAY. FURTHER OUTSIDE THE ODOT RIGHT-OF-WAY LAND USE CONSISTS OF MOSTLY WOODLANDS AND WETLANDS WITH RESIDENTIAL PROPERTY TO THE SOUTHWEST AND INDUSTRIAL PROPERTY TO THE NORTHEAST. THE PAVEMENT CONDITION ALONG THE RAMP WAS GENERALLY OBSERVED TO BE GOOD WITH FEW LOW SEVERITY TRANSVERSE CRACKS ALONG THE RAMPS. PAVEMENT WAS OBSERVED TO BE WELL-DRAINED WITH NO SIGNS OF PONDING OR STANDING WATER OBSERVED AT THE TIME OF OUR RECONNAISSANCE VISIT.

SUBSURFACE EXPLORATION

THE SUBSURFACE EXPLORATION WAS CONDUCTED BY NEAS BETWEEN FEBRUARY 27, 2019 AND MARCH 20, 2019 AND INCLUDED 4 BORINGS DRILLED TO DEPTHS BETWEEN 11.5 AND 16.5 FT BELOW GROUND SURFACE.

BORINGS WERE DRILLED USING EITHER A CME 55T OR CME 55X, TRUCK-MOUNTED

LEGEND

		ODOT CLASS	CLASSIFIED MECH./VISUAL	
	FINE SAND	*A-3*	*2*	*6*
	COARSE AND FINE SAND	*A-3a*	*5*	*9*
	SANDY SILT	*A-4a*	*1*	*0*
		TOTAL	*8*	*15*

EXPLORATION LOCATION - PLAN VIEW

DRIVE SAMPLE AND/OR ROCK CORE BORING PLOTTED TO VERTICAL SCALE ONLY. HORIZONTAL BAR INDICATES A CHANGE IN STRATIGRAPHY.

WC INDICATES WATER CONTENT IN PERCENT.

W— INDICATES FREE WATER ELEVATION.

N_{60} INDICATES STANDARD PENETRATION RESISTANCE NORMALIZED TO 60% DRILL ROD ENERGY RATIO.

INDICATES A NON-PLASTIC MATERIAL WITH A MOISTURE CONTENT GREATER THAN 25 % OR GREATER THAN 19 % WITH A WET APPEARANCE.

SS INDICATES A SPLIT-SPOON SAMPLE.

NP INDICATES A NON-PLASTIC SAMPLE.

SUBSURFACE EXPLORATION (CONTINUED)

OR TRACK-MOUNTED DRILLING RIG UTILIZING 3.25-INCH DIAMETER HOLLOW STEM AUGERS. STANDARD PENETRATION TESTS WERE CONDUCTED USING CME AUTO HAMMERS CALIBRATED NOVEMBER 21, 2017 AS 78.0% AND 85.0% EFFICIENT, RESPECTIVELY.

DISTURBED SOIL SAMPLE WERE OBTAINED IN ACCORDANCE WITH THE STANDARD PENETRATION TEST (SPT)(AASHTO T206). SOIL SAMPLES FOR PROJECT BORINGS WERE TYPICALLY RECOVERED AT 2.5-FT INTERVALS TO VARYING TERMINATION DEPTHS.

SPLIT SPOON SAMPLES COLLECTED AS PART OF THE SPT WERE PLACED IN SEALED GLASS CONTAINERS AND TRANSPORTED TO NEAS'S GEOTECHNICAL LABORATORY IN COLUMBUS, OH. AFTER COMPLETING THE BORINGS, THE BOREHOLES WERE BACKFILLED WITH EITHER AUGER CUTTINGS, BENTONITE CHIPS, OR A COMBINATION OF THESE MATERIALS. FIELD BORING LOGS WERE PREPARED BY DRILLING PERSONNEL AND INCLUDED PAVEMENT DESCRIPTION (WHERE PRESENT), LITHOLOGICAL DESCRIPTION, AND SPT RESULTS RECORDED AS BLOWS PER 6-INCH INCREMENT OF PENETRATION. GROUNDWATER RELATED OBSERVATIONS WERE RECORDED AS APPROPRIATE.

EXPLORATION FINDINGS

THE SUBSURFACE CONDITIONS IN THE PROJECT AREA ARE RELATIVELY CONSISTENT AND ARE GENERALLY COMPRISED OF EITHER FILL SOILS (I.E., EMBANKMENT FILL, HISTORICAL/URBAN FILL, ETC.) OR NATURAL SOILS CONSISTING OF NON-COHESIVE SAND, SILT AND GRAVEL COMBINATIONS. THE SOILS ENCOUNTERED AT THE SITE GENERALLY CLASSIFIED AS EITHER FINE SAND (A-3), COARSE AND FINE SAND (A-3A), OR NON-COHESIVE SANDY SILT (A-4A). 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 (I.E., LOWER THAN THE LEVEL WHICH ODOT CONSIDERS HIGH AND MAY PREVENT THE USE OF CHEMICAL STABILIZATION).

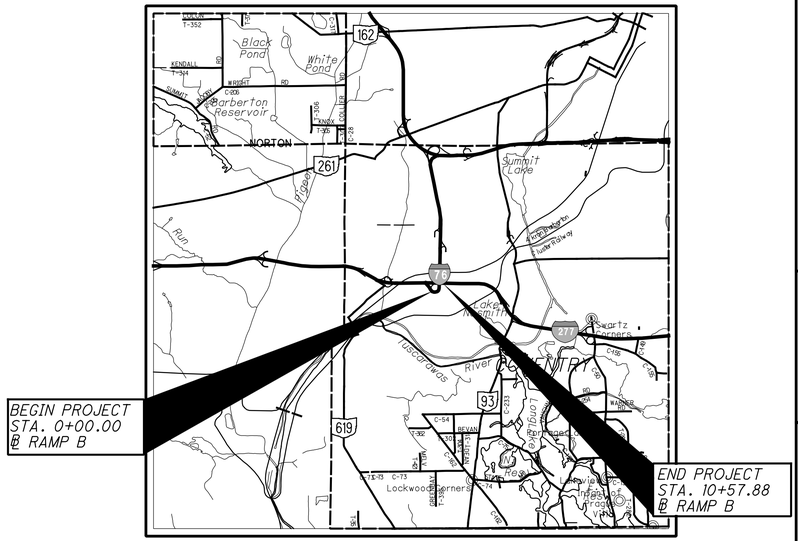
A BRIEF SUMMARY OF THE SUBSURFACE CONDITIONS ALONG THE RAMP B ALIGNMENT IS PRESENTED BELOW.

SUBGRADE CONDITIONS

ONE-HUNDRED PERCENT (100%) OF THE SAMPLES TAKEN ALONG THE RAMP WERE CLASSIFIED AS COARSE OR FINEGRAINED, NONCOHESIVE SOILS AND WERE COMPRISED OF: 1) FINE SAND (A-3, 33% OF SAMPLES); 2) COARSE AND FINE SAND (A-3A, 60% OF SAMPLES); AND, 3) SANDY SILT (A-4A, 7% OF SAMPLES). WITH RESPECT TO THE RELATIVE DENSITY OF THE NON-COHESIVE SOILS ENCOUNTERED, THE DESCRIPTIONS VARIED FROM VERY LOOSE TO MEDIUM DENSE CORRELATING TO N_{60} VALUES BETWEEN 0 AND 27 BPF. NATURAL MOISTURE CONTENTS RANGED FROM 8 TO 35 PERCENT.

GROUNDWATER

GROUNDWATER MEASUREMENTS WERE TAKEN DURING THE BORING DRILLING PROCEDURES AND/OR IMMEDIATELY FOLLOWING THE COMPLETION OF EACH BOREHOLE. GROUNDWATER WAS ENCOUNTERED IN 2 OF THE 4 PROJECT BORINGS. ACROSS THE RAMP B SITE GROUNDWATER WAS ENCOUNTERED AT DEPTHS RANGING FROM 6 TO 8 FT BGS OR FROM ELEVATIONS RANGING FROM 962.7 TO 966.9 FT AMSL. GROUNDWATER WAS ENCOUNTERED WITHIN 7.5 FT (WITHIN SUBGRADE PORTION) OF THE GROUND SURFACE IN 1 BORING (B-028-0-18). IT SHOULD BE NOTED THAT GROUNDWATER IS AFFECTED BY MANY HYDROLOGIC CHARACTERISTICS IN THE AREA AND MAY VARY FROM MEASUREMENTS TAKEN AT THE TIME OF THE EXPLORATION.



LOCATION MAP

SCALE IN MILES

0 1 2 3 4

PARTICLE SIZE DEFINITIONS

12"	3"	2.0 mm	0.42 mm	0.074 mm	0.005 mm
BOULDERS	COBBLES	GRAVEL	COARSE SAND	FINE SAND	SILT	CLAY
		No. 10 SIEVE	No. 40 SIEVE	No. 200 SIEVE	

SPECIFICATIONS

THIS GEOTECHNICAL EXPLORATION WAS PERFORMED IN ACCORDANCE WITH THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, OFFICE OF GEOTECHNICAL ENGINEERING, SPECIFICATIONS FOR GEOTECHNICAL EXPLORATIONS, DATED JANUARY 2019.

AVAILABLE INFORMATION

ALL AVAILABLE SOIL AND BEDROCK INFORMATION THAT CAN BE CONVENIENTLY SHOWN ON THE GEOTECHNICAL EXPLORATION SHEETS HAS BEEN SO REPORTED. ADDITIONAL EXPLORATIONS MAY HAVE BEEN MADE TO STUDY SOME SPECIAL ASPECT OF THE PROJECT. COPIES OF THIS DATA, IF ANY, MAY BE INSPECTED IN THE DISTRICT DEPUTY DIRECTOR'S OFFICE, THE OFFICE OF GEOTECHNICAL ENGINEERING AT 1980 WEST BROAD STREET.

INDEX OF SHEETS

LOCATION FROM STA.	TO STA.	PLAN VIEW SHEET	PROFILE SHEET	CUT MAX.	FILL EMB. MAX.
RAMP B		3	3	<1 FT	<1 FT

SUM-76-6.40		
BORING ID	*PLAN VIEW*	*PROFILE VIEW SHEET*
B-028-0-18	*3*	*3*
B-029-0-18	*3*	*3*
B-062-0-18	*3*	*3*
B-063-0-18	*3*	*3*

RECON. - 01/14/2019 - 01/17/2019
DRILLING - 02/19/2019 - 05/11/2019
DRAWN - KA, 10/2019
REVIEWED - BPA, 10/2019

DESIGN AGENCY
NEAS, INC.
2800 CORPORATE EXCHANGE DR., STE 240
COLUMBUS, OH 43231
(614) 714-0270 FAX (614) 714-0323

PID NO. 100713

SOIL PROFILE

SUM-76-6.40

P:\19-0002 (SUM-76-6.15 PID 100713) Kenmore - Part 6 (Roadway)\100713\geotechnical\Ramp B\sheets\111218IC001.dgn 9/23/2019 3:15:48 PM karens

SUMMARY OF SOIL TEST DATA
PROJECT BORINGS

B-028-0-18	02.50	- 04.00	SS-1	27	100	-	2	3	53	35	7	NP	NP	NP	16	A-4a (1)	
STA. 10+53, 12' RT	05.00	- 06.50	SS-2	8	100	-				SAME AS SS-3					26	A-3 (VISUAL)	
LATITUDE = 41.035283	07.50	- 09.00	SS-3	3	78	-	1	4	86	6	3	NP	NP	NP	27	A-3 (0)	7
LONGITUDE = -81.566391	10.00	- 11.50	SS-4	4	78	-				SAME AS SS-3					29	A-3 (VISUAL)	
	12.50	- 14.00	SS-5	3	100	-				SAME AS SS-3					23	A-3 (VISUAL)	
	15.00	- 16.50	SS-6	6	100	-				SAME AS SS-3					23	A-3 (VISUAL)	
B-029-0-18	00.00	- 01.50	SS-1	10	100	-	11	15	56	12	6	NP	NP	NP	11	A-3a (0)	
STA. 6+60, 2' RT	02.50	- 04.00	SS-2	16	67	-				SAME AS SS-1					8	A-3a (VISUAL)	0
LATITUDE = 41.035262	05.00	- 06.50	SS-3	10	100	-	0	0	93	3	4	NP	NP	NP	25	A-3 (0)	
LONGITUDE = -81.564969	07.50	- 09.00	SS-4	6	89	-				SAME AS SS-3					35	A-3 (VISUAL)	
	10.00	- 11.50	SS-5	8	100	-				SAME AS SS-3					32	A-3 (VISUAL)	
B-062-0-18	02.50	- 04.00	SS-1	7	100	-	14	17	43	18	8	NP	NP	NP	13	A-3a (0)	20
STA. 2+43, 28' LT	05.00	- 06.50	SS-2	14	78	-				SAME AS SS-1					12	A-3a (VISUAL)	
LATITUDE = 41.03469	07.50	- 09.00	SS-3	0	33	-				SAME AS SS-1					14	A-3a (VISUAL)	
LONGITUDE = -81.567609	10.00	- 11.50	SS-4	0	100	-	10	20	35	25	10	NP	NP	NP	14	A-3a (0)	
	12.50	- 14.00	SS-5	0	100	-				SAME AS SS-3					15	A-3a (VISUAL)	
	15.00	- 16.50	SS-6	0	100	-				SAME AS SS-3					16	A-3a (VISUAL)	
B-063-0-18	02.50	- 04.00	SS-1	14	56	-	20	21	33	17	9	NP	NP	NP	13	A-3a (0)	53
OFF CHAIN	05.00	- 06.50	SS-2	4	17	-				SAME AS SS-1					13	A-3a (VISUAL)	
LATITUDE = 41.034019	07.50	- 09.00	SS-3	0	83	-				SAME AS SS-1					18	A-3a (VISUAL)	
LONGITUDE = -81.566973	10.00	- 11.50	SS-4	1	28	-	13	17	36	24	10	NP	NP	NP	15	A-3a (0)	
	12.50	- 14.00	SS-5	3	78	-				SAME AS SS-4					14	A-3a (VISUAL)	
	15.00	- 16.50	SS-6	3	78	-				SAME AS SS-4					16	A-3a (VISUAL)	

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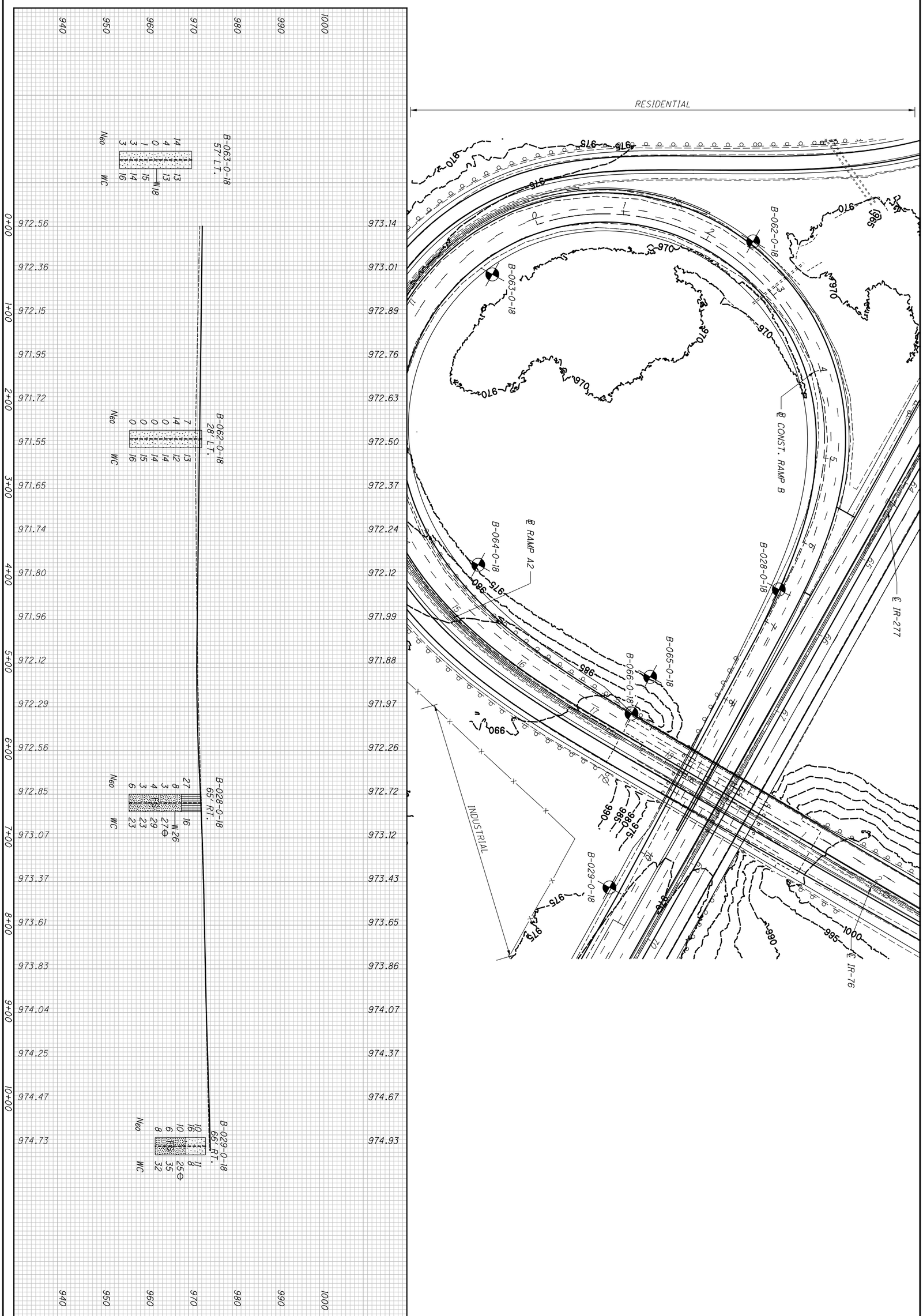


3/3	SUM-76-6.40	SOIL PROFILE RAMP B	DRAWN KA CHECKED BPA	0 50 25 100 HORIZONTAL SCALE IN FEET	N

APPENDIX B

BORING LOGS

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 6+60, 2' RT.	EXPLORATION ID B-028-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP B	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 972.9 (MSL) EOB: 16.5 ft.	PAGE 1 OF 1
START: 3/19/19 END: 3/19/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.035283, -81.566391	

MATERIAL DESCRIPTION AND NOTES	ELEV. 972.9	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
MEDIUM DENSE, BROWN WITH ORANGISH BROWN MOTTLES, **SANDY SILT**, TRACE CLAY, TRACE GRAVEL, CONTAINS IRON STAINING, MOIST			3 10 9	27	100	SS-1	-	2	3	53	35	7	NP	NP	NP	16	A-4a (1)	
	968.4																	
VERY LOOSE TO LOOSE, BROWN, **FINE SAND**, TRACE SILT, TRACE COARSE SAND, TRACE CLAY, TRACE GRAVEL, CONTAINS IRON STAINING, WET		W 966.9	5 3 3	9	100	SS-2	-	-	-	-	-	-	-	-	-	26	A-3 (V)	
			3 1 1	3	78	SS-3	-	1	4	86	6	3	NP	NP	NP	27	A-3 (0)	
			1 1 2	4	78	SS-4	-	-	-	-	-	-	-	-	-	29	A-3 (V)	
			1 1 1	3	100	SS-5	-	-	-	-	-	-	-	-	-	23	A-3 (V)	
	956.4	EOB	1 2 2	6	100	SS-6	-	-	-	-	-	-	-	-	-	23	A-3 (V)	

NOTES: GROUNDWATER ENCOUNTERED AT 6.0' DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/23/19 15:30 - C:\USERS\KARENS\DESKTOP\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / ASHBAUGH	DRILL RIG: CME 55T	STATION / OFFSET: 10+53, 12' RT.	EXPLORATION ID B-029-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP B	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 973.9 (MSL) EOB: 11.5 ft.	PAGE 1 OF 1
START: 2/27/19 END: 2/27/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 78	LAT / LONG: 41.035262, -81.564969	

MATERIAL DESCRIPTION AND NOTES		ELEV. 973.9	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
LOOSE TO MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, LITTLE SILT, TRACE TO LITTLE GRAVEL, TRACE CLAY, CONTAINS TRACE ROOT HAIRS, MOIST TO DAMP **(FILL)**			1	2 3 5	10	100	SS-1	-	11	15	56	12	6	NP	NP	NP	11	A-3a (0)	
			2																
			3	4 6 6	16	67	SS-2	-	-	-	-	-	-	-	-	-	8	A-3a (V)	
		969.4	4																
LOOSE, BROWN AND ORANGISH BROWN, **FINE SAND**, TRACE CLAY, TRACE SILT, TRACE COARSE SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, WET **(FILL)**	FS		5	3 4 4	10	100	SS-3	-	0	0	93	3	4	NP	NP	NP	25	A-3 (0)	
			6																
			7	4 2 3	7	89	SS-4	-	-	-	-	-	-	-	-	-	35	A-3 (V)	
			8																
			9																
		962.4	10	2 3 3	8	100	SS-5	-	-	-	-	-	-	-	-	-	32	A-3 (V)	
			EOB 11																

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/23/19 15:30 - C:\USERS\KARENS\DESKTOP\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 2+43, 28' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP B
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 973.0 (MSL) EOB: 16.5 ft.
START: 3/20/19 END: 3/20/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.034690, -81.567609

EXPLORATION ID B-062-0-18

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 973.0	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
LOOSE TO MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, LITTLE TO SOME SILT, TRACE TO LITTLE GRAVEL, TRACE CLAY, MOIST TO WET		1																
		2																
		3	3 2 3	7	100	SS-1	-	14	17	43	18	8	NP	NP	NP	13	A-3a (0)	
		4																
		5	5 4 6	14	78	SS-2	-	-	-	-	-	-	-	-	-	12	A-3a (V)	
		6																
@7.5' TO 16.5'; BECOMES VERY LOOSE		7																
		8	WOH WOH WOH	0	33	SS-3	-	-	-	-	-	-	-	-	-	14	A-3a (V)	
		9																
		10	WOH WOH WOH	0	100	SS-4	-	10	20	35	25	10	NP	NP	NP	14	A-3a (0)	
		11																
		12																
		13	WOH WOH WOH	0	100	SS-5	-	-	-	-	-	-	-	-	-	15	A-3a (V)	
		14																
		15																
		16	WOH WOH WOH	0	100	SS-6	-	-	-	-	-	-	-	-	-	16	A-3a (V)	
	956.5	EOB																

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

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/23/19 15:31 - C:\USERS\KAREN\DESKTOP\SUM-76-6.15 2.GPJ

PROJECT: SUM-76-06.15	DRILLING FIRM / OPERATOR: NEAS / J. HODGES	DRILL RIG: CME 55X	STATION / OFFSET: 27' RT.	EXPLORATION ID B-063-0-18
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: NEAS / E. ROLLER	HAMMER: CME AUTOMATIC	ALIGNMENT: RAMP B	
PID: 100713 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/21/17	ELEVATION: 970.7 (MSL) EOB: 16.5 ft.	PAGE 1 OF 1
START: 3/20/19 END: 3/20/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85	LAT / LONG: 41.034019, -81.566973	

MATERIAL DESCRIPTION AND NOTES	ELEV. 970.7	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, LITTLE TO SOME SILT, LITTLE GRAVEL, TRACE CLAY, CONTAINS STONE FRAGMENTS >1.0", MOIST TO WET																		
			3 5 5	14	56	SS-1	-	20	21	33	17	9	NP	NP	NP	13	A-3a (0)	
@5.0' TO 16.5'; BECOMES VERY LOOSE			1 1 2	4	17	SS-2	-	-	-	-	-	-	-	-	-	13	A-3a (V)	
		W 962.7	WOH WOH WOH	0	83	SS-3	-	-	-	-	-	-	-	-	-	18	A-3a (V)	
			WOH WOH 1	1	28	SS-4	-	13	17	36	24	10	NP	NP	NP	15	A-3a (0)	
			WOH 1 1	3	78	SS-5	-	-	-	-	-	-	-	-	-	14	A-3a (V)	
	954.2	EOB	WOH 1 1	3	78	SS-6	-	-	-	-	-	-	-	-	-	16	A-3a (V)	

NOTES: GROUNDWATER ENCOUNTERED AT 8.0' DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/23/19 15:31 - C:\USERS\KAREN\DESKTOP\SUM-76-6.15 2.GPJ

APPENDIX C

SULFATE CONTENT DATA

OHIO DEPARTMENT OF TRANSPORTATION

DETERMINING SULFATE CONTENT IN SOILS

SUPPLEMENT 1122

Project C-R-S:	SUM-76-6.40
PID No:	111218
Report Date:	7/29/2019
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-028-0-18 SS-2	65+78	65 R	41.035283	-81.566391	972.9	19.20	20	0	20	0	20	0	**0**
B-029-0-18 SS-2	67+70	66 R	41.035262	-81.564969	973.9	18.90	20	0	20	0	20	1	**7**
B-062-0-18 SS-1	2+43	28 L	41.034690	-81.567609	973.0	21.45	20	2	20	0	20	1	**20**
B-063-0-18 SS-1	10+02	57 L	41.034019	-81.566973	970.7	21.57	20	4	20	1	20	3	**53**

APPENDIX D

GEOTECHNICAL BULLETIN 1 (GB1)
ANALYSIS SPREADSHEETS

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

SUM-76-6.40
111218

Subgrade Explorationfor Ramp from IR-76 WB to IR-277 EB (Ramp B)

NEAS inc

Prepared By: Kevin C. Arens
Date prepared: Monday, September 23, 2019

Brendan P. Andrews
2868 East Kemper Road
Cincinnati, OH 45241

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

NO. OF BORINGS: 4

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-029-0-18	Ramp B	10+53	12	Rt	CME 55T		0.0	-1.5	1.5 C
2	B-028-0-18	Ramp B	6+60	3	Rt	CME 55X		0.0	-1.5	1.5 C
3	B-062-0-18	Ramp B	2+43	28	Lt	CME 55X		0.0	-1.5	1.5 C
4	B-063-0-18	Ramp A2	10+02	57	Lt	CME 55X		0.0	-1.5	1.5 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B	SS-1	0.0	1.5	-1.5	0.0	10			NP	NP	NP	12	6	18	11	8	A-3a	0						
	029-0	SS-2	2.5	4.0	1.0	2.5	16									8	8	A-3a	0	7					
	18	SS-3	5.0	6.5	3.5	5.0	10			NP	NP	NP	3	4	7	25	8	A-3	0						
		SS-4	7.5	9.0	6.0	7.5	7	7								35	8	A-3							
2	B	SS-1	2.5	4.0	1.0	2.5	27			NP	NP	NP	35	7	42	16	11	A-4a	1			Mc			
	028-0	SS-2	5.0	6.5	3.5	5.0	9									26	8	A-3	0	0					
	18	SS-3	7.5	9.0	6.0	7.5	3			NP	NP	NP	6	3	9	27	8	A-3							
		SS-4	10.0	11.5	8.5	10.0	4	3								29	8	A-3							
3	B	SS-1	2.5	4.0	1.0	2.5	7			NP	NP	NP	18	8	26	13	8	A-3a	0	20					
	062-0	SS-2	5.0	6.5	3.5	5.0	14									12	8	A-3a	0						
	18	SS-3	7.5	9.0	6.0	7.5	0									14	8	A-3a							
		SS-4	10.0	11.5	8.5	10.0	0	0		NP	NP	NP	25	10	35	14	8	A-3a							
4	B	SS-1	2.5	4.0	1.0	2.5	14			NP	NP	NP	17	9	26	13	8	A-3a	0	53					
	063-0	SS-2	5.0	6.5	3.5	5.0	4									13	8	A-3a	0						
	18	SS-3	7.5	9.0	6.0	7.5	0									18	8	A-3a							
		SS-4	10.0	11.5	8.5	10.0	1	0		NP	NP	NP	24	10	34	15	8	A-3a							

PID: 111218

County-Route-Section: SUM-76-6.40
No. of Borings: 4

Geotechnical Consultant: NEAS inc
Prepared By: Kevin C. Arens
Date prepared: 9/23/2019

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

Excavate and Replace Stabilization Options	
Global Geotextile Average(N60L): Average(HP):	#N/A
Global Geogrid Average(N60L): Average(HP):	#N/A

Design CBR	13

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	33%	HP ≤ 0.5	0%
$N_{60} < 12$	67%	0.5 < HP ≤ 1	0%
$12 \leq N_{60} < 15$	17%	1 < HP ≤ 2	0%
$N_{60} \geq 20$	8%	HP > 2	0%
M+	8%		
Rock	0%		
Unsuitable	0%		

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

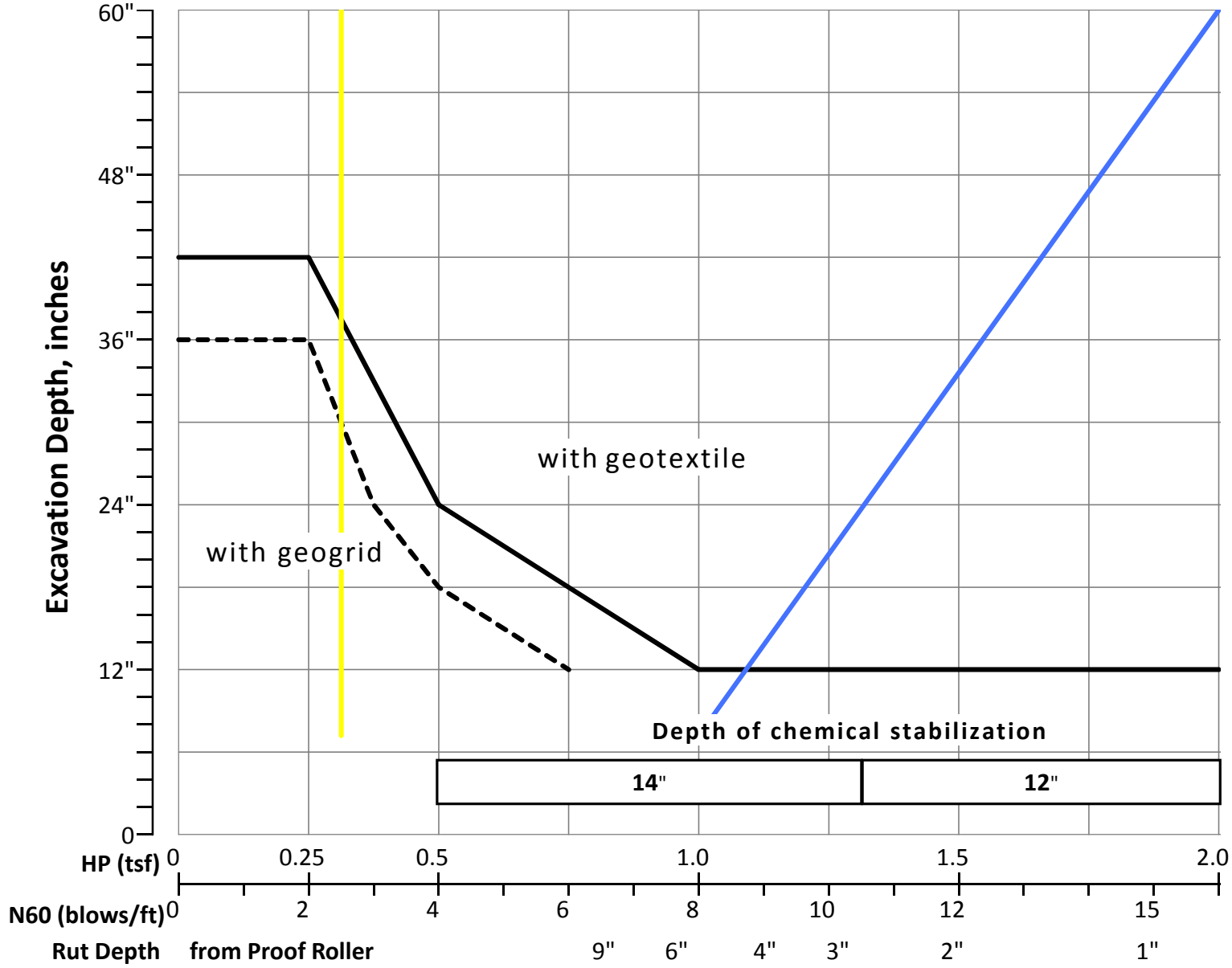
% Proposed Subgrade Surface	
Unstable & Unsuitable	20%
Unstable	20%
Unsuitable	0%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	8	3					18	7	26	19	8	0
Maximum	27	7	0.00	0	0	0	35	10	42	35	11	1
Minimum	0	0	0.00	0	0	0	3	3	7	8	8	0

Classification Counts by Sample

ODOT Class	Rock	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-3	A-3a	A-4a	A-4b	A-5	A-6a	A-6b	A-7-5	A-7-6	A-8a	A-8b	Totals
Count	0	0	0	0	0	0	0	5	9	1	0	0	0	0	0	0	0	0	15
Percent	0%	0%	0%	0%	0%	0%	0%	33%	60%	7%	0%	0%	0%	0%	0%	0%	0%	0%	100%
% Rock|Granular|Cohesive	0%	100%									0%								100%
Surface Class Count	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	0	0	0	5
Surface Class Percent	0%	0%	0%	0%	0%	0%	0%	0%	80%	20%	0%	0%	0%	0%	0%	0%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
		☐ HP
2.50		☐ N60L

Average HP
Average N_{60L}