REVISED DRAFT REPORT SUBGRADE EXPLORATION REPORT FRA-071/270-28.27/25.99A SAFETY AND SYSTEM PRESERVATION FRANKLIN COUNTY, OHIO PID#: 105435

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NEAS PROJECT 21-0012

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EXECUTIVE SUMMARY

The Safety and System Preservation project (FRA-071/270-28.27/25.99A) involves increasing the capacity of I-270 Eastbound ramp to I-71 Northbound by adding a ramp lane in the City of Columbus, Franklin County, Ohio. The referenced project also includes replacement of two bridges and concrete bridge deck of ramp bridge, and resurfacing of the existing pavement within the project limits along I-270 Eastbound and I-71 Northbound.

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 April 9, 2021 and April 20, 2021, NEAS performed the site reconnaissance and exploration program for the project. The project included 27 borings drilled to a depth of 7.5 ft below ground surface (bgs) and 7 pavement cores for subgrade characterization purposes.

The subgrade conditions in the project area are relatively consistent and are generally comprised of cohesive natural overburden soils (A-4a, A-6a, A-6b, and A-7-6) and non-cohesive overburden soils (A-1-a, A-1-b, A-2-4). With respect to sulfate within the subgrade soil, based on the project laboratory testing program, two soil samples present a sulfate content value greater than 5,000 ppm within all of the project borings performed. Groundwater was not encountered during drilling and after drilling in all the project borings performed. Bedrock was not encountered in all the project borings within the subgrade depth.

Based on our evaluation of the subsurface conditions and our geotechnical engineering analyses of the proposed intersection 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. Unstable subgrade conditions, including areas of weak soils and high moisture content soils, were encountered throughout 22 percent of the proposed pavement widening area along I-270 EB ramp to I-71 NB. Therefore, NEAS recommends spot stabilization be performed on the unstable subgrade which is identified by performing Item 204 Proof Rolling for the entire project. Spot stabilization should be in the form of Excavate and Replace (Item 204 with Geotextile). Excavations are estimated to extend to the depth of 12 inches, with the excavated material being replaced with material in accordance with Section F "Excavate and Replace (Item 204)" of the ODOT GB1. Stabilization limits should extend 18-inches beyond the edge of the proposed paved roadway, shoulder or median and it is recommended removing any topsoil, existing pavement materials or abandoned structure foundation materials.

High sulfate content soils were encountered at the project site. Three soil samples in Borings B-008-0-21, B-014-0-21 and B-016-0-21 present a sulfate content greater than 3,000 ppm, however, less than 5,000 ppm. Two soil samples in Borings B-009-0-21 and B-010-0-21 present a sulfate content greater than 5,000 ppm. NEAS will discuss our recommendations with the District Geotechnical Engineer.

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

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1. INTRODUCTION

1.1. General

National Engineering & Architectural Services, Inc. (NEAS) presents our Subgrade Exploration Report for the proposed FRA-071/270-28.27/25.99A Safety and System Preservation project, Franklin County, Ohio. The Safety and System Preservation project involves increasing the capacity of I-270 Eastbound (EB) ramp to I-71 Northbound (NB) by adding a ramp lane in addition to replacement of two bridges and concrete bridge deck of ramp bridge. Additionally, the project includes resurfacing of the existing pavement within the project limits along I-270 EB and I-71 NB.

This report presents a summary of the project encountered surficial and subsurface conditions and our recommendations for subgrade stabilization and pavement design parameters for I-270, I-71 and the corresponding ramps. The analysis performed as part of this report has been performed in accordance with ODOT's January 2019 revision of *Geotechnical Bulletin 1* (GB1) (ODOT [1], 2019) and *Pavement Design Manual* (PDM) (ODOT, 2020).

The exploration was conducted in general accordance with NEAS's proposal to TranSystems, dated January 8, 2021, and ODOT's January 2020 revision of *Specifications for Geotechnical Explorations* (SGE) (ODOT, 2020).

The scope of work performed by NEAS as part of the referenced project included: a review of published geotechnical information; performing 27 total test borings (all of which were utilized within this report as part of the subgrade exploration) and 7 pavement cores; laboratory testing of soil samples in accordance with the SGE; performing geotechnical engineering analysis to assess subgrade stabilization requirements and recommended 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 Columbus Lowland Till Plains, a subdivision of the Southern Ohio Loamy Till Plain. This is a moderately low relief (25 ft) lowland surrounded in all directions by relative uplands, having a broad regional slope toward the Scioto Valley, containing many larger streams. Elevations of the region range from 600 to 850 ft above mean sea level (amsl) (950 ft amsl near Powell Moraine). The geology within this region is described as Wisconsinan-age till that is high lime in the west to medium-lime in the east. The geology is also described as containing extensive outwash in Scioto Valley overlying deep Devonian- to Mississippian-age carbonate rocks, shales and siltstones (ODGS, 1998).

Based on the Bedrock Geologic Units Map of Ohio (USGS & ODGS, 2005), bedrock within the project limits is comprised of Devonian-age Ohio Shale. The Devonian-age Ohio Shale is about 359 to 385 million years old, and the sedimentary rocks mainly consist of shale and siltstone with some sandstone. The shale unit at the project site is brownish black to greenish gray, weathers brown, carbonaceous to clayey, laminated to thin bedded, and is fissile parting. This unit is carbonated and/or siderite concretions in lowermost 50 feet, with petroliferous odor and about 250 to 500+ feet thick. Based on the ODNR bedrock topography map of Ohio, bedrock elevations at the project site can be expected to range from 800 to 850 ft amsl, putting bedrock at a depth of 65 to 110 ft below ground surface (bgs).



The soils at the project site have been mapped (Web Soil Survey) by the Natural Resources Conservation Service as being gently rolling Udorthents-Urban land complex (USDA, 2015). The units of the Udorthents-Urban series account for 90% soils with none flood. The units can be classified as A-1-a, A-1-b, A-2-4, A-4a, A-6a, A-6b and A-7-6 soils according to the AASHTO method of soil classification.

2.2. Hydrology/Hydrogeology

Groundwater can be expected at an elevation consistent with that of the major local surface water bodies. A major regional hydraulic influence is the Alum Creek located about 2.0 miles to the east. The Water wells near the project site were noted to have a static water from 23 ft to 95 ft below ground surface.

Local variations in the groundwater table may exist in one of two reasons. First, if there has been extensive groundwater abstraction, water levels may be depressed by tens of feet over significantly large areas. Second, the presence of discontinuous bodies of glacial till provides the opportunity for localized pockets of perched groundwater to form.

The proposed project site is not located within a 0.2% and 1% Annual Chance 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 were noted on ODNR's Abandoned Underground Mine Locator immediately adjacent to the project's boundaries (ODNR [1], 2016).

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

2.4. Historical Records and Previous Phases of Project Exploration

A historic record search was performed through ODOT's Transportation Information Management System (TIMS). Several historic projects were available for review within the limits of the FRA-071/270-28.27/25.99A project.

- FRA-270-24.47, Reconstruction and Widening, 2006
- FRA-270-15.50N, Project No. 011502,1963
- FRA-270-16.65N, Project No. 011503,1964

2.5. Field Reconnaissance

A field reconnaissance visit for the overall project area was conducted on April 9, 2021, inside the project limits. Site conditions, including the existing land conditions and pavement conditions, were noted, and photographed during the visit. Photographs of notable features and a summary of our observations by road segment are provided below.

2.5.1. Land Use and Cover

The land use of most of the project area consists of ODOT ROW (Right of Way), commercial properties (i.e., single family homes, apartments, etc.) and woodland.



2.5.2. IR-270 and Ramp from IR-270 WB to IR-71 NB

In general, the pavement condition along the exit ramp was observed to be good with signs of surface wear. The travel lanes were noted to be in markedly better condition than the shoulders along this section of roadway. Moderate severity longitudinal and transverse cracking was observed along this section as well as crack sealing deficiencies (Photograph 1). The roadway in this section sits atop a small embankment running from level with IR-270 up to the level of the ramp bridge. The embankment slopes are roughly 3H:1V (3 horizontal to one vertical). The roadway is relatively level in this section. The roadway drains to drainage ditches at the bottom of each side of the embankment (Photograph 2). The area is lightly vegetated for the most part with some signs of standing water were observed in the drainage ditches such as heavy vegetation and cattails (Photograph 3). The area appeared to be stable with no signs of geotechnical instability.



Photograph 1: Overall Pavement Condition of Exit Ramp





Photograph 2: Signs of Standing Water in Drainage Ditch

In general, the pavement condition along this section of the project was observed to be good with signs of surface wear. The travel lanes were noted to be in markedly better condition than the shoulders along this section of roadway. Moderate severity longitudinal and transverse cracking was observed along this section as well as crack sealing deficiencies (Photograph 3). The roadway in this section sits in a cut with embankment slopes rising up on either side of the highway to the level of the surrounding land. The embankment slopes are roughly 2H:1V (2 horizontal to one vertical). The roadway is relatively level in this section. The roadway drains to drainage ditches at the bottom of each side of the embankment (Photograph 4). The area is lightly vegetated for the most part with some signs of standing water were observed in the drainage ditches. The area appeared to be stable with no signs of geotechnical instability.





Photograph 3: Overall Pavement Condition of IR-71 NB

The existing bridge carrying the ramp from IR-270 EB to IR-71 NB consists of a five-span, multi-beam bridge with stub type abutments and cap and column type piers (Photograph 5). In the area of the referenced bridge, the terrain is roughly level with the surrounding area which rises very gently from north to south. Signs of instability were not observed during our site visit. The overall bridge structure appeared to be in good condition with few signs of distress observed. The spill-through slopes appeared to be at roughly 2H:1V (2 horizontal to one vertical) slopes and in good condition and protected from



erosion by rip rap. No apparent signs of distress due to geotechnical concerns were noted during our field reconnaissance visit.

The bridge deck and concrete wearing course was observed to be in good condition with minor severity pop-outs being common (Photograph 6). With respect to drainage, the bridge deck and adjacent pavement appeared to be well drained, with no signs of ponding or drainage issues observed during our field visit. The adjacent ramp appeared to drain to drainage ditches that runs parallel to the roadway. The bridge deck drained off of the north side of the bridge at either end of the bridge where the concrete guard rail terminates.



Photograph 5: Cap and Column Bridge Piers

Photograph 6: Bridge Deck Wearing Course





3. GEOTECHNICAL EXPLORATION

3.1. Roadway Exploration Program

The subsurface exploration for the project was conducted by NEAS between April 14, 2021 and April 20, 2021 and included 27 borings drilled to a depth 7.5 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 either within existing pavement areas that are planned to undergo full-depth replacement or within areas where widening is planned. Target boring locations were located in the field by NEAS prior to drilling utilizing handheld GPS equipment and the boring locations were drilled in areas that were not restricted by underground utilities or dictated by terrain (i.e. steep embankment slopes). Each as-drilled project boring location and corresponding ground surface elevation was surveyed in the field following drilling. Each individual project boring log (included within Appendix B) includes the recorded boring latitude and longitude location (based on the surveyed Ohio State Plane South, NAD83, location) and the corresponding ground surface elevation, as summarized in Table 1.

Boring Number	Latitude	Longitude	Elevation (NAVD 88) (ft)	Alignment	Station	Offset	Depth (ft)	Substructure
B-001-0-21	40.110037	-82.977651	913.0	I-71	130+13	34' RT.	7.5	Subgrade
B-002-0-21	40.111052	-82.976900	914.1	I-71	134+39	49' RT.	7.5	Subgrade
B-003-0-21	40.112010	-82.976279	913.7	I-71	138+27	46' RT.	7.5	Subgrade
B-004-0-21	40.112998	-82.975669	911.1	I-71	142+24	49' RT.	7.5	Subgrade
B-005-0-21	40.113975	-82.975211	908.2	I-71	146+00	27' RT.	7.5	Subgrade
B-006-0-21	40.115133	-82.974503	903.0	I-71	150+64	59' RT.	7.5	Subgrade
B-007-0-21	40.116108	-82.974071	899.4	I-71	154+37	56' RT.	7.5	Subgrade
B-008-0-21	40.117174	-82.973656	895.2	I-71	158+41	50' RT.	7.5	Subgrade
B-009-0-21	40.118246	-82.973248	891.0	I-71	162+45	56' RT.	7.5	Subgrade
B-010-0-21	40.119281	-82.972942	887.8	I-71	166+31	50' RT.	7.5	Subgrade
B-011-0-21	40.120386	-82.972642	885.9	I-71	170+40	49' RT.	7.5	Subgrade
B-012-0-21	40.121451	-82.972399	886.8	I-71	174+32	49' RT.	7.5	Subgrade
B-013-0-21	40.122537	-82.972200	889.2	I-71	178+31	48' RT.	7.5	Subgrade
B-014-0-21	40.123658	-82.972045	891.6	I-71	182+40	46' RT.	7.5	Subgrade
B-015-0-21	40.124754	-82.971942	894.1	I-71	186+38	45' RT.	7.5	Subgrade
B-016-0-21	40.125854	-82.971865	896.6	I-71	190+40	44' RT.	7.5	Subgrade
B-017-0-21	40.126945	-82.971739	898.8	I-71	194+38	56' RT.	7.5	Subgrade
B-018-0-21	40.110560	-82.989002	921.6	Ramp M	84+55	17' RT.	7.5	Subgrade
B-019-0-21	40.110619	-82.987640	920.4	Ramp M	88+34	26' LT	7.5	Subgrade
B-020-0-21	40.110342	-82.986326	917.4	Ramp M	92+14	25' RT.	7.5	Subgrade
B-021-0-21	40.109798	-82.985064	918.6	Ramp M	96+33	44' RT.	7.5	Subgrade
B-022-0-21	40.109199	-82.984109	920.6	Ramp M	99+81	43' RT.	7.5	Subgrade
B-023-0-21	40.108675	-82.982948	923.6	Ramp M	103+52	22' LT	7.5	Subgrade
B-024-0-21	40.107974	-82.981926	925.6	Ramp M	107+35	10' LT	7.5	Subgrade
B-025-0-21	40.107701	-82.980661	935.5	Ramp P	1010+99	0' LT	7.5	Subgrade
B-026-0-21	40.108377	-82.978429	928.1	Ramp P	1018+06	17' LT	7.5	Subgrade
B-027-0-21	40.109351	-82.977947	913.7	Ramp P	1022+01	52' LT	7.5	Subgrade

Table 1:Project Boring Summary

Borings were drilled using a CME 45B truck-mounted or track-mounted drilling rig 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, 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 hammer that has been calibrated to be 81.7% 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). Groundwater level observations were recorded both during and after the completion of drilling. These groundwater level observations are included on the individual boring logs (provided in Appendix B). After completing the borings, the boreholes were backfilled with either auger cuttings, bentonite chips, or a combination of these materials and patched accordingly with the cold patch asphalt and/or cement when drilling through the roadway.

3.2. Pavement Coring Exploration Program

The pavement coring investigation program for the project was conducted by NEAS concurrently with the subgrade exploration on April 21, 2021 and included a total of seven (7) pavement cores. As described in Section 3.1. of this report, the indicated target boring locations were located in the field by NEAS prior to drilling utilizing handheld GPS equipment in areas that were not restricted by maintenance of traffic efforts or utilities. Measurements, location information, photographs and other details of each core sample can be found in the Pavement Core Logs included within Appendix B, and are summarized in Table 2 below. The approximate location for each core is depicted on the Boring Location Plan provided in Appendix A.

Cores were drilled using a portable, truck-mounted, electric powered coring drill with a 4-inch (outer diameter) diamond tipped drill bit and utilizing water as the circulating fluid. Asphalt and concrete thicknesses were measured in the field after the cores were extracted and down-hole measurements were made. Each core sample was then photographed, logged, and placed in a core box for transportation to NEAS's laboratory. Following field documentation, photographs and borehole completion, the core hole was backfilled to existing grade with either asphalt patch or quick-set concrete (where appropriate). Once in the laboratory the cores were: 1) re-measured for thickness verification and photographed; 2) checked for composition; and, 3) reviewed for individual layer identification and subsequent measurements.

Pavement Core Number	Latitude	Longitude	Elevation (NAVD 88) (ft)	Alignment	Station	Offset	Length (in)
X-001-0-21	40.107653	-82.979486	912.3	Ramp P	1014+17	46' RT.	18.75
X-002-0-21	40.113628	-82.975595	909.1	I-71	144+42	23' LT.	16.75
X-003-0-21	40.120010	-82.973021	886.2	I-71	168+85	28' LT.	16.50
X-004-0-21	40.125285	-82.972180	895.0	I-71	188+28	33' LT.	17.00
X-005-0-21	40.111052	-82.976900	914.1	I-71	134+39	49' RT.	16.50
X-006-0-21	40.118246	-82.973248	891.0	I-71	162+45	56' RT.	18.00
X-007-0-21	40.125854	-82.971865	896.6	I-71	190+40	44' RT.	14.75

Table 2:Pavement Core Summary



3.3. 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). Soil samples are retained at the laboratory for 60 days following report submittal, after which time they will be discarded.

3.3.1. Classification Testing

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

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

3.3.2. Standard Penetration Test Results

Standard Penetration Tests (SPT) and split-barrel (commonly known as split-spoon) sampling of soils were performed continuously 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% (N₆₀) for use in analysis or for correlation purposes. The resulting N₆₀ values are shown on the boring logs provided in Appendix B.

3.3.3. Sulfate Testing

Sulfate testing was generally performed on one sample for each subgrade or roadway boring performed for pavement/subgrade design purposes. The selected samples were tested in accordance with ODOT Supplement 1122, "Determining Sulfate Content in Soils" dated July 17, 2015. In general, the upper most sample (within 3 ft of the proposed subgrade elevation) from each boring was tested when feasible. Testing results are summarized in ODOT Sulfate Supplement 1122 Table within 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 profile basemap provided by TranSystems dated July 12, 2021. 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

The pavement section thickness in terms of asphalt, concrete, and granular base was measured at representative subgrade borings and pavement cores. Pavement section thicknesses were measured during the subsurface exploration and are recorded on the test boring log and pavement core provided in Appendix B. A summary of these measurements is provided in Table 3 and 4 below.

Boring ID	Alignment	Asphalt Thickness (in)	Concrete Thickness (in)	Base thickness (in)	Total thickness (in)
B-001-0-21	I-71	17.0	-	7.0	24.0
B-002-0-21	I-71	16.0	-	8.0	24.0
B-003-0-21	I-71	16.0	-	8.0	24.0
B-004-0-21	I-71	17.0	-	7.0	24.0
B-005-0-21	I-71	17.0	-	7.0	24.0
B-006-0-21	I-71	19.0	-	7.0	26.0
B-007-0-21	I-71	17.0	-	7.0	24.0
B-008-0-21	I-71	16.0	-	7.0	23.0
B-009-0-21	I-71	18.0	-	7.0	25.0
B-010-0-21	I-71	18.0	-	7.0	25.0
B-011-0-21	I-71	18.0	-	18.0	36.0
B-012-0-21	I-71	18.0	-	6.0	24.0
B-013-0-21	I-71	15.0	-	7.0	22.0
B-014-0-21	I-71	14.0	-	6.0	20.0
B-015-0-21	I-71	15.0	-	7.0	22.0
B-016-0-21	I-71	15.0	-	6.0	21.0
B-017-0-21	I-71	14.5	-	6.0	20.5
B-018-0-21	Ramp M	17.0	-	6.0	23.0
B-019-0-21	Ramp M	16.0	-	7.0	23.0
B-020-0-21	Ramp M	16.0	-	6.0	22.0
B-021-0-21	Ramp M	18.0	-	6.0	24.0
B-022-0-21	Ramp M	18.0	-	7.0	25.0
B-023-0-21	Ramp M	18.0	-	5.0	23.0
B-024-0-21	Ramp M	18.0	-	7.0	25.0
B-025-0-21	Ramp P	17.0	-	8.0	25.0
B-026-0-21	Ramp P	16.0	-	9.0	25.0
B-027-0-21	Ramp P	16.0	-	8.0	24.0

 Table 3:
 Measured Pavement Thicknesses Based on Subgrade Borings



Core ID	Proposed Alignment	Top Layer Asphalt Thickness (in)	Second Layer Asphalt Thickness (in)	Third Layer Asphalt Thickness (in)	Fourth Layer Asphalt Thickness (in)	Total Asphalt Thickness (in)
X-001-0-21	Ramp P	10.00	8.75	-	-	18.75
X-002-0-21	I-71	3.50	3.00	10.25	-	16.75
X-003-0-21	I-71	1.50	15.00	-	-	16.50
X-004-0-21	I-71	3.50	5.00	8.50	-	17.00
X-005-0-21	I-71	1.50	15.00	-	-	16.50
X-006-0-21	I-71	2.00	3.25	4.25	8.50	18.00
X-007-0-21	I-71	3.50	4.50	6.75	-	14.75

 Table 4:
 Measured Pavement Thicknesses Based on Pavement Cores

4.2. Subgrade Conditions

The subgrade conditions in the project area are relatively consistent and are generally comprised of cohesive natural overburden soils (A-4a, A-6a, A-6b, and A-7-6) and non-cohesive overburden soils (A-1-a, A-1-b, A-2-4). With respect to sulfate within the subgrade soil, based on the project laboratory testing program, two soil samples present a sulfate content value larger than 5,000 ppm within all the project borings performed.

The following subsections present a brief summary of the subsurface conditions by ramp/roadway segment with problem areas highlighted where present.

4.2.1. I-71

The subgrade soils encountered along I-71 consisted of 81% cohesive materials and 19% granular materials. Those cohesive materials are: 1) Sandy Silt (A-4a, 50%); 2) Silt and Clay (A-6a, 24% of samples); 3) Silty Clay (A-6b, 4% of samples); and 4) Clay (A-7-6, 3% 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 5 and 41 bpf. Natural moisture contents ranged from 5 to 28 percent. Based on Atterberg Limit tests performed on representative samples of the fine-grained subgrade soils obtained within these pavement widening limits, the liquid and plastic limits ranged from 22 to 39 percent and from 14 to 25 percent, respectively.

Nineteen percent (19%) of the samples taken along the I-71 were classified as non-cohesive soils and were comprised of: 1) Gravel and Stone Fragments with Sand (A-1-b, 13% of samples); 2) Stone Fragments (A-1-a, 4% of samples); and 3) Stone Fragments with Sand and Silt (A-2-4, 3% of samples). With respect to the relative compactness of the coarse-grained soils, the descriptions varied from loose to very dense correlating to converted SPT-N values (N_{60}) values between 7 and 109 blows per foot (bpf). Natural moisture content ranged from 4 to 24 percent.

4.2.2. Ramp M

The subgrade soils encountered along Ramp M consisted of 89% cohesive materials and 11% granular materials. Those cohesive materials are: 1) Silt and Clay (A-6a, 36% of samples); 2) Silty Clay (A-6b, 29% of samples); 3) Clay (A-7-6, 11% of samples) and 4) Sandy Silt (A-4a, 14%). 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 34 bpf. Natural moisture contents ranged from 9 to 27 percent. Based on Atterberg Limit tests performed on representative samples of the fine-grained subgrade soils obtained within these



pavement widening limits, the liquid and plastic limits ranged from 25 to 50 percent and from 16 to 22 percent, respectively.

Twelve percent (11%) of the samples taken along Ramp M were classified as non-cohesive soils and were comprised of: 1) Gravel and Stone Fragments with Sand (A-1-b, 7% of samples); and 2) Stone Fragments (A-1-a, 4% of samples). With respect to the relative compactness of the coarse-grained soils, the descriptions varied from loose to medium dense correlating to converted SPT-N values (N_{60}) values between 10 and 16 blows per foot (bpf). Natural moisture content ranged from 6 to 11 percent.

4.2.1. Ramp P

The subgrade soils encountered along Ramp P consisted of 85% cohesive materials and 15% granular materials. Those cohesive materials are: 1) Sandy Silt (A-4a, 26%); 2) Silt and Clay (A-6a, 30% of samples); and 3) Silty Clay (A-6b, 30% 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 5 and 35 bpf. Natural moisture contents ranged from 10 to 19 percent. Based on Atterberg Limit tests performed on representative samples of the fine-grained subgrade soils obtained within these pavement widening limits, the liquid and plastic limits ranged from 24 to 39 percent and from 15 to 20 percent, respectively.

Six percent (15%) of the samples taken along Ramp P were classified as non-cohesive soils and were comprised of: 1) Stone Fragments with Sand and Silt (A-2-4, 4% of samples); 2) Gravel and Stone Fragments with Sand (A-1-b, 7% of samples); and 3) Stone Fragments (A-1-a, 4% of samples). With respect to the relative compactness of the coarse-grained soils, the description was loose correlating to converted SPT-N values (N_{60}) value between 7 and 16 blows per foot (bpf). Natural moisture content ranged from 6 to 11 percent.

4.2.2. Groundwater

Groundwater was not encountered during drilling and after drilling in all the project borings performed as part of the referenced project. It should be noted that groundwater is affected by many hydrologic characteristics in the area and may vary from those measured at the time of the exploration.

4.2.3. Bedrock

Bedrock was not encountered in all the project borings within the subgrade depth.

5. ANALYSES AND RECOMMENDATIONS

We understand that the project FRA-071/270-28.27/25.99A consists of adding a ramp lane along I-270 EB to I-71 NB ramp in addition to replacement of two bridges and concrete bridge deck of ramp bridge. Additionally, the project includes resurfacing of the existing pavement within the project limits along I-270 EB and I-71 NB. For this purpose, a roadway exploration and subsequent analysis was completed for the referenced project. The analysis completed for the proposed project included a subgrade (GB1) analysis. The subgrade analysis was performed in accordance with ODOT's GB1 criteria utilizing the ODOT provided *GB1: Subgrade Analysis Spreadsheet* (GB1_SubgradeAnalysis.xls, Version 14.5 dated January 18, 2019). Input information for the spreadsheet was based on the soil characteristics gathered during NEAS's subgrade exploration (i.e., SPT results, laboratory test results, etc.). A GB1 analysis was performed for each of the referenced pavement widening areas individually.



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, especially with the use of global stabilization per the GB1. In general, the subgrade soils throughout the project will be globally stabilized by either Excavate and Replace (Item 204 with Geotextile) or 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 and/or unstable subgrade conditions if any are identified within the project limits. A GB1 analysis spreadsheet is provided in Appendix C.

5.1.1. Pavement Design Recommendations

A GB1 analysis was performed using the subgrade soil data obtained during our field exploration program to evaluate the soil characteristics and develop pavement parameters for use in pavement design. The subgrade analysis parameters recommended for use in pavement design are presented in Table 5 below. Provided in the table are ranges of maximum, minimum and average N_{60L} values for the indicated segments as well as the design CBR value recommended for use in pavement design.

Section	Maximum N _{60L}	Minimum N _{60L}	Average N _{60L}	Average PI Values	Design CBR
Entire Project	25	5	15	11	7
I-71	25	7	16	10	7
Ramp M	22	10	14	14	6
Ramp P	22	5	12	14	7

Table 5:Pavement Design Values

5.1.2. Unsuitable Subgrade

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

5.1.2.1. Rock

Rock was not encountered in any of the borings performed within the project roadway limits.

5.1.2.2. Prohibited Soils

Unsuitable soil types per the GB1, which include A-4b, A-2-5, A-5, A-7-5, A-8a, A-8b, and soils with liquid limits greater than 65, were not encountered within the subgrade of the referenced project roadway segments.



5.1.3. Unstable Subgrade

The unstable subgrade conditions generally include the presence of weak soil conditions and overly moist soil conditions. With respect to the planned roadway sections, these subgrade conditions are further discussed in the following subsections.

5.1.3.1. Weak Soils

Soils for which the lowest N_{60} (N_{60L}) at the 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), or in which the lowest HP reading at the referenced boring location is less than 1.5 and, in some cases, less than 1.875 (i.e., where moisture content is greater than optimum plus 3 percent), subgrade stabilization depths are recommended per *Figure B* - *Subgrade Stabilization* within the GB1.

It should be noted that for the purposes of this report the term "weak soils" has been assumed to represent subgrade soils of these conditions. A summary of the boring locations where unstable soils were encountered and determined to have a potential impact on subgrade performance are shown in Table 6 below, per the roadway segment for which they were encountered. Also included is the associated GB1 recommended remediation depth with the method of either excavation and replacement or chemical treatment within the project limits.

			Reme	diation Depth (ir	nches)
Boring ID	N _{60L}	Subgrade Depth (ft)	Excavate and Replace (Item 204 w/ Geotextile)	Excavate and Replace (Item 204 w/ Geogrid - SS 861)	Chemical Stabilization (Item 206)
		I-71			
B-002-0-21	11	3.9 - 5.4	12	N/A	12
B-007-0-21	10	2.4 - 5.4	12	N/A	14
B-012-0-21	14	3.9 - 5.4	12	N/A	12
B-013-0-21	12	3.9 - 5.4	12	N/A	12
B-015-0-21	11	2.4 - 5.4	12	N/A	12
B-027-0-21	7	(-)0.6 - 0.9	15	N/A	14
		Ramp	М		
B-018-0-21	10	3.0 - 6.0	12	N/A	14
B-020-0-21	10	2.6 - 5.6	12	N/A	14
B-022-0-21	10	2.5 - 5.5	12	N/A	14
		Ramp	P		
B-022-0-21	10	2.9 - 5.9	12	N/A	14
B-025-0-21	5	0.6 - 5.1	21	15	14
B-026-0-21	5	(-)0.6 - 5.4	21	15	14
B-027-0-21	7	(-)0.2 - 1.3	15	N/A	14
Note: N/A, Not A	pplicable based or	n GB1- Figure B - Sul	ograde Stabilizatio	n	

 Table 6:
 Unstable Soil Locations Summary



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*.

5.1.3.2. 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. High moisture content soils were encountered along I-71 NB and I-270 EB within 3 ft of proposed finished grade of roadway segment. Therefore, remediation is needed for the high moisture content soils encountered at these roadway alignments. Summaries of the boring locations where high moisture content conditions were encountered within the limits of each proposed alignment are shown in Table 7 below.

Boring ID	High MC Soil Type	Moisture Content (%)	Optimum Moisture Content (%)	Subgrade Depth (ft)
		I-71	(76)	I
B-001-0-21	A-6b	21	16	0.9 - 2.4
B-003-0-21	A-1-a	9	6	(-)0.6 - 0.9
B-004-0-21	A-1-b	9	6	(-)0.6 - 0.9
B-004-0-21	A-6a	17	14	0.9 - 2.4
B-012-0-21	A-1-b	10	6	(-)0.6 - 0.9
B-013-0-21	A-1-b	24	6	(-)0.6 - 0.9
B-014-0-21	A-4a	13	10	0.9 - 2.4
B-015-0-21	A-1-b	12	6	(-)0.6 - 0.9
B-016-0-21	A-4a	14	6	(-)0.6 - 0.9
		Ramp M		
B-018-0-21	A-7-6	25	19	1.5 - 3.0
		Ramp P		
B-025-0-21	A-4a	13	10	0.6 - 2.1
B-026-0-21	A-6a	17	14	(-)0.6 - 0.9
D-020-0-21	A-0a	19	14	0.9 - 2.4

Table 7: High Moisture Content Soils Location Summary

5.1.4. High Sulfate Content Soils

High sulfate content soils are defined as soils that exceed 3,000 ppm. Where high sulfate content soils are encountered, the GB1 prohibits the use of chemical stabilization without prior consultation with the District Geotechnical Engineer. Three soil samples in borings B-008-0-21, B-014-0-21 and B-016-0-21 present a sulfate content greater than 3,000 ppm, however, less than 5,000 ppm. Two soil samples in borings B-009-0-21 and B-010-0-21 present a sulfate content greater than 5,000 ppm.



5.2. Stabilization Recommendations

5.2.1. Subgrade Stabilization

Guidance from ODOT's GB1 states that "For all other roadways, if it is determined that 30 percent or more of the subgrade area must be stabilized, consideration should be given to stabilizing the entire project (global stabilization)". Chemical Stabilization is generally more economical when stabilizing large areas (approximately greater than 1 mile of roadway) per ODOT's GB1. Unstable subgrade conditions, including areas of weak soils and high moisture content soils, were encountered throughout 22 percent of the proposed pavement widening area along I-270 EB ramp to I-71 NB. Therefore, NEAS recommends spot stabilization be performed on the unstable subgrade which is identified by performing Item 204 Proof Rolling for the entire project. Spot stabilization should be in the form of Excavate and Replace (Item 204 with Geotextile). Excavations are estimated to extend to the depth of 12 inches, with the excavated material being replaced with material in accordance with Section F "Excavate and Replace (Item 204)" of the ODOT GB1, specifically, Item 204 Granular Material Type B or C. Stabilization limits should extend 18-inches beyond the edge of the proposed paved roadway, shoulder or median and it is recommended removing any topsoil, existing pavement materials or abandoned structure foundation materials.

However, the guidance from ODOT's GB1 states that "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, contact the District Geotechnical Engineer to discuss options including stabilization as needed using excavate and replace methods." NEAS will discuss our recommendations with the District Geotechnical Engineer.

6. QUALIFICATIONS

This investigation was performed in accordance with accepted geotechnical engineering practice for the purpose of characterizing the subsurface conditions along the referenced portions of roadways. This report has been prepared for TranSystems and ODOT to be used solely in evaluating the subgrade soils within the project limits and presenting geotechnical engineering recommendations specific to this project. The assessment of general site environmental conditions or the presence of pollutants in the soil, rock and groundwater of the site was beyond the scope of this geotechnical exploration. Our recommendations are based on the results of our field explorations, laboratory test results from representative soil samples, and geotechnical engineering analyses. The results of the field explorations and laboratory tests, which form the basis of our recommendations, are presented in the appendices as noted. This report does not reflect any variations that may occur between the borings or elsewhere on the site, or variations whose nature and extent may not become evident until a later stage of construction. In the event that any changes occur in the nature, design or location of the proposed improvement 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 TranSystems in performing this geotechnical exploration for the FRA-071/270-28.27/25.99A Safety and System Preservation project. Please call if there are any questions, or if we can be of further service.



Respectfully Submitted,

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

Chunnes

Melina He, Ph.D., P.E. Project Geotechnical Engineer



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APPENDIX A

SOIL BORING LOCATION PLAN





APPENDIX B

BORING LOGS



LEGEND

SYMBOL	DESCRIPTION	ODOT CLASSIFICATION	SYMBOL	DESCRIPTION	ODOT CLASSIFICATION
0000 0000 0000	Gravel and/or Stone Fragments	A-1-a		Shale	Visual
	Gravel and/or Stone Fragments with Sand	A-1-b		Weathered Shale	Visual
FS	Fine Sand	A-3		Sandstone	Visual
	Coarse and Fine Sand	A-3a			
	Gravel and/or Stone Fragmen with Sand and Silt	nts A-2-4 A-2-5		GRADATION (%)	
	Gravel and/or Stone Fragmen with Sand, Silt and Clay	nts A-2-6 A-2-7		CS Coarse Sand MS Medium Sand FS Fine Sand	
	Sandy Silt	A-4a		SI Silt CL Clay (<5 micror)
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	Elastic Silt and Clay	A-5		Shelby Tube	
	Silt and Clay	A-6a		Rock Core	
	Silty Clay	A-6b			
	Elastic Clay	A-7-5		Split Spoon	Sample (SS)
	Clay	A-7-6			Sample Taken
+ + + + + + + +	Organic Silt	A-8a		vvitriin 3 ft of	Proposed Grade
	Organic Clay	A-8b			

ABBREVIATIONS

LL	LIQUID LIMIT (%)	HP	HAND PENETROMETER
PI	PLASTIC INDEX (%0	PID	PHOTOIONIZATION DETECTOR
WC	MOISTURE CONTENT (%)	UC	UNCONFINED COMPRESSION
SPT	STANDARD PENETRATION TEST	ppm	PARTS PER MILLION
NP	NON PLASTIC	W	WATER FIRST ENCOUNTERED
-200	PERCENT PASSING NO. 200 SIEVE		WATER LEVEL UPON COMPLETION
N ₆₀	ADJUSTED SPT RESULT	—	
EOB	END OF BORING		

MATERIAL CLASSIFIED BY VISUAL INSPECTION

Sod and Topsoil Pavement or Base Concrete







Peat, S-Sedimentary W-Woody F-Fibrous L-Loamy & etc

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		12010 12010	ODOT CLASS (GI)		A-1-a (V)	A-1-a (0)	A-6a (7)	A-6a (V)
46' RT	ġ	(<u>MSL)</u> EUB: 7.3 40.112010, 40.112010	MC C		√ 6	4	18	21
138+27	Ň.	112010			•	đ	4	1
	21410	9137 (IVISL) 40112	ATTERBERG LL PL PI		I	đ	18	I
FFSE		1 1			I	₽	32	•
STATION / OFFSET:		ONG:	N (%) SI CL			6	34 29	1
STATIC		LAT / LONG:	GRADATION (%) cs Fs si			5	15 3	
			CS CS			10	ω	1
m	NATIC NE 140	81.7	0 8		I	17	14	I
CME 45B	S		HP (tsf)		-	ı	2.75	2.25
0	CME AUTOMATIC	CALIBRATION DATE: ENERGY RATIO (%):	SAMPLE		SS-1	SS-2	SS-3	SS-4
RIG:	ER: DATIO	GY RA	REC S (%)		56	44	67	33
DRILL RIG:	HAMMER:	ENER	- °° Z		35	30	8	22
ŋ	ري ري		SPT/ RQD		9 14 12	9 10	567	6 7 9
NEAS / J. LONG	NEAS / J. LONG					ν 4		0 ~
EAS /	L / SA	SPT C2.5	DEPTHS					
	Ë	9. <u>7</u>	B					((
DRILLING FIRM / OPERATOR:	GER:		ELEV. 913.7		911.7	909.2		906.2
OPER	, LOG	¦ .' ≩ ₫	년 9 1 9					90 1111
-IRM /	FIRM			\times	\sim			
LING F	SAMPLING FIRM / LOGGER:					1	۶	
DRIL	SAM	SAMI		6		5 	D CLA	
9A		_	PTION	LLERS		щ DAN	TO N	
FRA-071/270-28.27/25.99A		4/20/21	MATERIAL DESCRIPTION AND NOTES	16.0" ASPHALT AND 8.0" BASE (DRILLERS DESCRIPTION)	RAY,	(FILL)	VERY STIFF, BROWN AND GRAY, SILT AND CLAY , SOME SAND, LITTLE GRAVEL, DAMP TO MOIST	
0-28.2	SADE		RIAL DESCR	" BASI			ID GR	
11/27	SUBGRADE		IATER	ID 8.0'		6RA GRA	VN AN E GR	
FRA-0		1ġ	×	LT AN	ISE TO		BROV	
		<u> </u>		(SPHA	M DEN	RESE	STIFF, SAND,	
PROJECT:	ы́.	PIU: START:		16.0" ASPHAL1 DESCRIPTION)		EILL) FILL)	/ERY §	
				NIÐ/A 66				

B-004-0-21	BACK		2 7 V F -	7 V F 7 A Z A 7 V F 7	× × × × × ×	1	
PAG	SO4		1	20	•		
	0DOT CLASS (GI)		A-1-b (V)	A-6a (10)	A - 6a (9)	A-7-6 (V)	
142724, 49 NI. 1-71 SL) EOB: 412008 40 412	70, 4U.		6	17	16	24	
14272 1-71 8L) 1	ERG		1	15	15	I	
			1	19	17	•	
911			1	34	32	•	
ALIGNMENT: ALIGNMENT: ELEVATION: 911.1 AT (1000)	5 (%) (%)		•	33	32	•	
		_	1	4	4 36	1	
<u>, 4 m j</u>	GRADATION (%)		•	8 14	10 14	-	
+3D MATIC 12/5/19		-	•	2	8	•	
CME 4JD CME AUTOMATIC DATE: 12/5/19 0 (0/): 01 7	HP 01./	+ +	-	4.50	3.50	3.50	
	· ·	3)					
	SAMPLE	2	SS-1	SS-2	SS-3	SS-4	
HAMMER: CME A CALIBRATION DATE: CALIBRATION DATE:	REC S	(0)	56	89	100	44	
HAMMER: CALIBRATI		+ +		35 8			
1111 	_		60		0 29 11 29	10 25	
29	SPT/		43 25 19	12 12 12	9 10	°° ∞	
NEAS / J. LONG NEAS / J. LONG .25" HSA			0 0	I	י רי ש גע	0 - 7	
NEAS / J NEAS / J 3.25" HSA	DEPTHS		111				
<u>_</u>	В					U U U U	
					-	9	
		911.1	908.1		905 <u>.</u>	903 . 6	
			\mathcal{F}				
II U U]	\mathbf{i}	
DRILLING FIRM / OFENATOR. SAMPLING FIRM / LOGGER: DRILLING METHOD:			CLA)		-T AN	: SILT	
SA DRI		ş	⊀ACE		ک, SII	SOME	
		17.0" ASPHALT AND 7.0" BASE (DRILLERS DESCRIPTION)	VERY DENSE, GRAY, gravel and stone Fragments with Sand. Little silt. Trace clay	4P	VERY STIFF TO HARD, BROWN AND GRAY, SILT AND CLAY , SOME SAND, TRACE GRAVEL, SS-2 CONTAINS IRON STAINING DAMP	VERY STIFF, BROWN AND GRAY, CLAY, SOME SILT, SOME SAND, TRACE GRAVEL, DAMP	
SUBGRADE SUBGRADE SSPN: Annot Entry Annota	ESCRIF	I (DRI	AND:	DAN	I AND SAVEL		
	RIAL DESCR	BASE	LEL LEL	BASE	N G GR	VEL,	
SUBGRADE		.0.Z	GRA	ILAR	D, BF	GRA	
SFN:		AND ⁻	GRAY	RANL	AND, ST/	RACE	
435	4/20/21	HALT ION	JSE, C	ESG	ME S	Ч Ш Н Г Н Г Г Г Г Г Г Г	
102		ASP		(FILL)	Y STII X, SO TAINS	Y STIF	
	_						

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

2		1 OF 1	BACK FILL		-7 V F 7 - 4 - 7 - 4 - 7 V F 7	VF7 V/7 V/7	× ×	
EXPLORATION ID			SO4 ppm			260	•	ı
	 	3975	ODOT CLASS (GI)		A-1-b (V)	A-4a (4)	A-4a (V)	A-4a (V)
146+00, 27' RT		(<u>MSL)</u> EUB: / 3 40.113975, 40.113975	C MC		8	14 P	15 A	12
46+00,	Ň.	<u>L)</u> E(13975	ଅଧି -		I	ი		
		908.2 (MISL) 40.113	ATTERBERG LL PL PI		ı	17	•	
FSET	000	808.	ATT		•	26	1	ı
STATION / OFFSET:	ENT:		CT %		•	22	•	ı
FATIO	ALIGNMENT:	LAT / LONG:	GRADATION (%) CS FS SI		•	7 34	•	ı
<u>ა</u> 	₹ i 	<u>ک</u> تے ا	RADATIC CS FS			13 17	•	· ·
	LIC S	81./C/21	GR GR			14	•	
CME 45B		δ δ	(tsf)		1	4.50	4.00	4.25
S	CME AUTOMATIC	, :	' <u> </u>		5			
		CALIBRATION UATE: ENERGY RATIO (%):	SAMPLE		SS-1	SS-2	SS-3	SS-4
DRILL RIG:	HAMMER:	ERGY	REC (%)		100	56	22	22
R R	HA		2 ^{ee}		35	9 23	8 20	9 23
DNG	ğ		SPT/ ROD		45 15 9	ω		2
/ J. LO	n. Lo	۲,	0	· · ·	0 0	4	 - 0	
NEAS / J. LONG	NEAS / J. LONG	3.25 TAS	DEPTHS					
 ~		ς. Γ						
RATOF	GER:		ELEV.	4	906.2 905.2			2006
/ OPEI		ġġ	Ξð		6 6 X			ō
FIRM		ME H						
DRILLING FIRM / OPERATOR:	SAMPLING FIRM / LOGGER:	URILLING METHOD: SAMPLING METHOD:			D, ILAR		AINS	
DRIL	SAM	SAM		S	I SANI			
9A		<u>-</u>	MATERIAL DESCRIPTION AND NOTES	ILLER	LES Q		SS-3 (
FRA-071/270-28.27/25.99A		4/20/21	RIAL DESCRI AND NOTES	e (dri	IENTS SEMB			
0-28.2	ADE			' BASI	RAGN ≺, Rē		E GRV	
71/27	SUBGRADE		ATER	ID 7.0'	E CLA			
FRA-0		ΙÈ	Z	LT AN	Υ, ST (TRAC		CLAY, RAG	
		102435		SPHA IPTIOI	GRA SILT,			
PROJECT:	ńi.	H۲.		17.0" ASPHALT AND 7.0" BASE (DRILLERS DESCRIPTION)	DENSE, GRAY, STONE FRAGMENTS WITH SAND , LITTLE SILT, TRACE CLAY, RESEMBLES GRANULAR	ASFI, L ILL)	VERT STIFF TO HARD, BROWN AND GRAT, SANDT SILT, SOME CLAY, LITTLE GRAVEL, SS-3 CONTAINS 1.5" STONE FRAGMENTS, DAMP	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

		1 OF 1	BACK FILL			7 V V V	×	7 4 7 4 7 4 7 4
EXPLORATION ID			SO4 ppm	****	580			1
		<u>/.5 н.</u> 133	ODOT CLASS (GI)		A-4a (5)	A-4a (2)	A-1-b (V)	A-4a (V)
59' RT.		(<u>MSL)</u> EOB: / 5 40 115133, 40 115133			13 A-		9 A-1	10 A-
150+64, 59' RT	Ň.	<u>.)</u> ЕОВ: 15133, 40	PI WC		8	6	- 0,	-
		903.0 (MSL) 40.115	ATTERBERG LL PL PI		16	16		
FSET:		903.0	ATTE		24	25	•	•
N / 0F	ENT		() ()		24	17	•	
STATION / OFFSET:	ALIGNMENT:	ELEVATION: LAT / LONG:	GRADATION (%) CS FS SI		35	3 27	•	•
	<u>ا</u> ا		S FS		13 18	13 16	' 	·
	OLIC	12/5/19 81.7	GRAI GR CS		10	27 1		
CME 45B	TOMA	1/2/21 81.7	(tsf)		4.50	4.50		4.50
CM	CME AUTOMATIC	ЧЕ: (%):					۳.	
		CALIBRATION DATE: ENERGY RATIO (%):	SAMPLE		SS-1	SS-2	SS-3	SS-4
DRILL RIG:	HAMMER:	IBKA I	REC (%)		100	67	4	39
DRII	HAN		Z ⁶⁰		18	8	37	4
GES	SES		SPT/ RQD		8 7 6	10 4 18 18	12 12 15	10 14 16
먼머	P P	∡			2	ω 4		9 2
NEAS / J. HODGES	NEAS / J. HODGES	3.25" HSA SPT	DEPTHS					<u>, 1 1 1</u>
- I		3.2						
DRILLING FIRM / OPERATOR:	GER:		ELEV. 903.0		900.8	898.5	897.0	895.5
/ OPEF	1/ LOG		<u>ш</u> 8	\times	<u></u> б	8		
FIRM.		ME LH			X			
-LING	SAMPLING FIRM / LOGGER:	URILLING METHOU: SAMPLING METHOD:			AY,		Ú	
DRII	SAN	SAN	z	S			H SAN	SOME
99A		21	MATERIAL DESCRIPTION AND NOTES	19.0" ASPHALT AND 7.0" BASE (DRILLERS DESCRIPTION)	HARD, GRAY, SANDY SILT , LITTLE TO SOME CLAY		DENSE, GRAY, STONE FRAGMENTS WITH SAND , LITTLE SILT, TRACE CLAY, DAMP	HARD, GRAY, SANDY SILT , SOME CLAY, SOME GRAVEL, DAMP
FRA-071/270-28.27/25.99A		4/14/21	RIAL DESCRI AND NOTES	SE (DR		AMP	MENT:	OME 0
70-28.	SUBGRADE	 	RIAL L AND I)" BAS	רב, בר ובד, בו	ĒĻ	FRAGI AY, D∕	ILT, S(
071/2	SUBG		MATE	ND 7.(NDY SI	GRAV		NDY S
FRA-		2		ALT A	Y, SAI	SOME	АҮ, S 1 , TRA(,Y, SA I 4MP
CT:		<u> 9</u>		19.0" ASPHAL Description)	, GRA	Е TO	ie, gr e siltt), GRA (EL, D/
PROJECT:	iii d L L L L	PIU: START:		19.0" DESC	HARD	TRAC	DENS	HARD GRAV
			0.771.1.1	NIÐ\∀ 66				

66.35.75.85.075.170.4874/2011 FILES/FRA.71) - OH DOT.GDT - 10/25/31 07:36 - X:/ACTIVE PROJECTS/ACTIVE SOIL PROJECTS/FRA.712.92.028.27.25.99 A/GINT FILES/FRA.717.270.28.27.25.99

	. –	۲ï		745	7 4 6 7	VF7V	1771	74
0-21 PAGF	1 OF 1	BACK FILL	×~~		- 7 Z 7 Z Z 7 Z Z 7 Z Z	× - 7 v > 2 / 7 v	× × ×	
EXPLORATION ID B-007-0-21		SO4 ppm		1147	ı		ı	
	лс./ 108	OT S (GI)		A-1-b (V)	a (1)	a (3)	(V)	
	116	ODOT CLASS (GI)		A-1-I	A-4a (1)	A-4a (3)	A-4a (V)	_
154+37, 56' RT -71 ct >	EUB: 108, 40	к К		S	o	7	12	
154+3 -71	<u>(אכו)</u> 116	ATTERBERG LL PL PI		1	~	00	1	_
• 	899.4 (NSL) 40.11(•	3 16	3 15		_
DFFSI - : 8	1 1			•	15 23	19 23	-	-
STATION / OFFSET: ALIGNMENT:	ELEVATION: LAT / LONG:			•	27 1	31		-
STATI ALIGN	=LE V	GRADATION (%) CS FS SI			15	16	1	-
		cs cs		1	4	13		-
B IATIC	81./2/19	0 8		•	29	21	I	-
CME 45B AUTOMA		HP (tsf)		ı	4.50	4.25	2.25	
CME 45B CME AUTOMATIC	JA I E: (%):	MPLE ID		SS-1	SS-2	SS-3	SS-4	
	CALIBRATION DATE ENERGY RATIO (%):	SA SA		ő	Ж		SS	_
DRILL RIG: HAMMER: CALIEDATI	RGY F	REC (%)		67	83	100	50	
HAN	ENE	2 ⁰⁹		27	20	7	10	
ES		SPT/ RQD	σ	1	3 7 8	m	ω ω 4	4
NEAS / J. HODGES NEAS / J. HODGES				, т Г м м			2 2 2	
	SPT	DEPTHS	_ 1 1 1					_
	ς7.5 Υ.7	Ë						Ф Ч
		> 4	4	4			<u>ہ</u>	
	i j	ELEV. 899.4					891.9	
RM / C								
DRILLING FIRM / OPERATOR: SAMPLING FIRM / LOGGER: DRII I IN/O MITTUOD:	NG N					≻		
DRILLING FIRM / OPERATOF SAMPLING FIRM / LOGGER: DDII 1 IN:0 METUOD:	DRILLING METHOD: SAMPLING METHOD:					SAND		
	<u>א ב</u> 	ION	ERS	D STO TRAC		MP ,5		
FRA-071/270-28.27/25.99A SUBGRADE	4/14/21	CRIPT ES	ORILLI	EL AN	AMP	ND CI		
8.27/2	4/1	MATERIAL DESCRIPTION AND NOTES	17.0" ASPHALT AND 7.0" BASE (DRILLERS DESCRIPTION)	MEDIUM DENSE, BROWN, GRAVEL AND STONE FRAGMENTS WITH SAND TRACE SILT TRACE CLAY	ASE, D	VERY STIFF TO HARD, BROWN AND GRAY, SANDY SILT , SOME GRAVEL, LITTLE CLAY, DAMP		
071/270-28.2 SUBGRADE	END:	ERIAL	0" B/	NN, D	AR B/	BRO		
SUB SUB	5	MAT	AND 7	BRO TH SA	ANUL	HARD VEL,		
25 FR/	۱ <u>ک</u>			ENSE S W	SGR	F TO I		
CT:	<u> </u>		ASPH		, MBLE	SOME		
PROJECT: TYPE: DID: 105	PIU: START:		17.0" DESC	MEDI	RESEN (FILL)	very Sillt ,		
				l r		/0-WUJ/0	010200	07 LOG WI SULFATE3 (8 X 3.8) - 0H DOT.GDT - 10/25/01 - 70/26/21 07:00 HO - (11 X 3.8) 251A3U2 W 901 DO

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH, SHOVELED SOIL CUTTINGS

STRADARD ODOT LOG WI SULFATES (8.5 X 11) - OH DOT GDT - 10/26/21 07:36 - X/ACTIVE PROJECTS/ACTIVE SOIL PROJECTS/FRA-071-270-28, 27-26.99 A/GINT FILES/FRA-071-270-28, 27-26.99

		1 OF 1	BACK FILL		7 V F 7 V		7 V F 7 V - 7 4 7 - 7 7 - 7 4 7 - 7 4 7 - 7 4 7 - 7 4 7 - 7
EXPLORATION ID		<u> </u>	SO4 ppm	×××× • • •	5	· ·	
		7.5 ft 174	ODOT CLASS (GI)			A-4a (o) A-4a (V)	A-4a (V)
0' RT.		117					
158+41, 50' RT	Ň.	EOB: 7174, 40	ې ۲			- 10 - 10 - 10	
158		895.2 (MSL) 40.117	ATTERBERG LL PL PI			<u> </u>	· ·
SET:		895.2				3 '	
STATION / OFFSET:			сг ()		52	' ^ג	•
	ALIGNMENT:	ELEVATION: LAT / LONG:	GRADATION (%) cs fs si			<u>ຄ</u> ່	
<u>_</u>			RADATIC CS FS				· ·
	0 E	12/5/19 81.7	GR GR C			- ·	
CME 45B	AMOTU	12/ 81	(tsf)			4.00	4.25
S	CME AUTOMATIC)ATE: (%): _	SAMPLE				
		CALIBRATION DATE: ENERGY RATIO (%):	SAN				
DRILL RIG:	HAMMER:	LIBRA ERGY	REC (%)		`	8 8	
В	¥ :	S E	2 2 0			7 19 19	6 6
DGES	GES		SPT/ RQD		19 15 9 15	- 4 5	
J. HO	빌	AS .	<u>v</u>	- -	0 0 	1 4 r0	
NEAS / J. HODGES	NEAS / J. HODGES	3.25" HSA SPT	DEPTHS				
1		ε Γ					
DRILLING FIRM / OPERATOR:	SAMPLING FIRM / LOGGER:		ELEV. 895.2	803 3			887.7
I/ OPI	M / LO	I HOD HOD H					
G FIRN	IG FIR	g Met Ig Me					
SILLING	MPLIN	DRILLING METHOD: SAMPLING METHOD:			D GRAY		
<u></u> н	AS	<u> </u>	NO	IRS	'Y AND TEL AN		
5.99A		4/14/21	MATERIAL DESCRIPTION AND NOTES	16.0" ASPHALT AND 7.0" BASE (DRILLERS DESCRIPTION)	VERY STIFF TO HARD, BROWNISH GRAY AND GRAY, SANDY SILT, SOME CLAY, LITTLE GRAVEL AND STONE FRAGMENTS, DAMP		
FRA-071/270-28.27/25.99A	ш	4/1	RIAL DESCRI AND NOTES	ASE (D	WNISH		
270-28	SUBGRADE	ü ÜN EN	ERIAL	7.0" B/	, BRO LAY, L DAMF		
A-071/	SUB	L S	MAT		HARD DME C ENTS,		
ЯË		105435 4/14/21		HALT TION)	LT, SC		
PROJECT:	ńi.	71. 105)" ASP SCRIP1	NE FF		
		PID: START:			S 72 82 0		

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

66 32-72 82-071-10 DDD LOG WI SULFATES (8.6 X 11) - OH DOT GDT - 10/26/21 07:36 - X/ACTIVE PROJECTS/ACTIVE SOIL PROJECTS/FRA-071-270-28.27 - 25.99 A/GINT FILES/FRA-071-270-28.27 - 25.99

	¥.	XXXVF 7	V V 7 V -	7 V F 7 V F	4	
0-21 PAGE 1 OF 1	BACK FILL	×	× × × × × × × × × × × × × × × × × × ×	V V V V V V V V V V V V V V V V V V V	2	
B-009-0-21 ift. PAGE 1 OF 1	SO4 ppm		8000 -			
B7.5 ft.	(G)		(2) (S)	(5)		
<u> -71 -71 -7.5 </u>	ODOT CLASS (GI)		A-4a (V) A-4a (5)	A-4a (5)		
1 EOB: 246, 40	MC .		თ თ	7		
I-71 SL) EOB: 118246.40	ଥି ।		- 6	~		
	ATTERBERG		- 4	15		
			- 54	52	-	
ALIGNMENT: ELEVATION: LAT / LONG:	cr %)		- 53	5	-	
ALIGNMENT ELEVATION: LAT / LONG:	NON (%		3 37	7 37	-	
L I Z	-1∂⊢		- 18	3 17		
7			- 	12 13	-	
OMATIC 12/5/19 81.7			4.50 4.50 1	4.50 1	4	
CME AUTOMATIC DATE: 12/5/19 0 (%): 81.7	۱ <u> </u>				-	
Hammer: <u>Cme a</u> Calibration Date: Energy Ratio (%):	SAMPLE		SS-1 SS-2	SS-3		
Hammer: _ Calibratio Energy ra:	REC (%)		0 0 0 0 0 0	100		
HAMMER: CALIBRAT ENERGY F	2 09 2		, , , , , , , , , , , , , , , , , , ,	14	-	
	SPT/ RQD		4 4 9 12 12		5	
NEAS / J. HODGES 3.25" HSA SPT	52	1	4	0 4		
U HO	Υ	,	ν ω 4	0 2 		
NEAS / J. H 3.25" HSA SPT	DEPTHS				E0B	
GGER	ELEV. 891.0	888 9				
ë ₽ ₽ 2	□ ∞					
METH METH MET						
SAMPLING FIRM / LOGGER: DRILLING METHOD: SAMPLING METHOD:			ζ			
SAMF DRILL SAMF			SAN			
	NOIL	LERS	HARD, BROWNISH GRAY BECOMING GRAY, SANDY SILT , SOME CLAY, LITTLE GRAVEL, DAMP			
4/14/21	MATERIAL DESCRIPTION AND NOTES	18.0" ASPHALT AND 7.0" BASE (DRILLERS DESCRIPTION)	AING EL, D			
	RIAL DESCRI AND NOTES	ASE (ECON GRAV	ĻĻ		
SUBGRADE SFN: END:	ERIAL	7.0" B	ZAY B TLE (STIF		
	MAT		기 미	SEMC		
		IALT		BEC		
<u>ě</u>		ASPH RIPTI	, BRC SOME	@6.0'; SS-4 BECOMES STIFF		
TYPE: PID: 105 START:		18.0" . DESC	HARD Sillt, :	<u> </u>		
					07:36 - X:YOCTIVE PROJECTS/ACTIVE SOIL PRO	

		1 OF 1	BACK FILL	× ***	r7 Vr 1 ^ 7 7 7 Vr	7 V N N	× × × × ×	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
EXPLORATION ID	B-U10-U-21		SO4 ppm		1	5767		ı
			ODOT CLASS (GI)		A-1-a (V)	A-4a (3)	A-4a (V)	A-6a (9)
166+31, 50' RT.		(<u>IMSL)</u> EUB: / 5 40 119281, 40 119281	wc		5	21	4	20
166+31		<u>2L)</u> E 11928			•	ω	•	14
		<u>88/ 8 (NSL)</u> 40 119	ATTERBERG		ı	25	ı	19
DFFSE		1 1			•	33	I	1 33
STATION / OFFSET:	ALIGNMENT:	LAT / LONG:	N (%) SI CL			35 14	•	43 31
STATI		LAT / I	GRADATION (%) cs Fs si		•	19	•	15
			cs IS		•	16	•	2
B	MATIC	81./C/21 81.7	В		ı	16	I	4
CME 45B	5		₽ (fŝ		•	4.50	4.50	3.50
	CME AUTOMATIC	CALIBRATION DATE: ENERGY RATIO (%):	SAMPLE ID		SS-1	SS-2	SS-3	SS-4
DRILL RIG:	AER:	SKA IIC	REC (%)		33	56	44	72
DRILI	HAMMER:		z ^{eo}		52	20	27	26
ES	ES		SPT/ RQD		13 10 28	69	ິຈ	5 6 13
НОВО						ω 4	ا برا ب برا ب برا	
NEAS / J. HODGES	NEAS / J. HODGES	3.25 PCH	DEPTHS					
	NEA	3.2;	DE					
ATOR	GER:		ELEV. 887.8		885.7 884.8		881.8	880.3
OPER	/LOG	¦ ¦ ∃ ⊑			888 ×		88	8 7777
-IRM /	FIRM			\bigotimes	$\mathbb{X}^{\mathcal{L}}$)
DRILLING FIRM / OPERATOR:	SAMPLING FIRM / LOGGER:	DRILLING METHOD: SAMPLING METHOD:						5-
DRIL	SAM	SAMI		S	Ш	DAMP	VEL, AINING	AΥ, SI MOIS
A9		5	MATERIAL DESCRIPTION AND NOTES	18.0" ASPHALT AND 7.0" BASE (DRILLERS DESCRIPTION)	STON	FRAGMENTS, SUME SANU, ITAGE SILI, ITAGE CLAY, CONTAINS ASPHALT FRAGMENTS, DAMP ((FILL)	LITTLE CLAY, CONTAINS TRACE IRON STAINING, DAMP	VERY STIFF, BROWN AND BROWNISH GRAY, SILT AND CLAY, SOME SAND, TRACE GRAVEL, MOIST
27/25.9		4/14/21	RIAL DESCR	e (dri	OWN,	RAGMI		OWNI: CE GF
0-28.2	ZADE		RIAL D AND N	" BAS			SILT, I S TRAC	UD BR
FRA-071/270-28.27/25.99A	SUBGRADE		NATEF	ND 7.0	CKA	ME SA ASPH/		WN AN SAND
FRA-(1È		N)	ВГ Ш		NN, S	, BRO
L L	101	8		ASPH/ RIPTIO	DENS	CONT		STIFF LAY.
PROJECT:	Ц Ц Ц Ц Ц Ц	START:		18.0" / DESCI	VERY	CLAY, FILL)	HARD, LITTLE	VERY AND C
<u> </u>								/*

Τ	~	XXXX V	r 7 Vr	7457	VF7 VF7	v4
PAGE 1 OF 1	BACK	> ***	1 / 7 / 1 / 7 /	L 7 L N 1 N 7 V N 7	2 2 7 7 7 2 2 7	
PAG 1 OF	SO4 ppm		•	440		
≠	ODOT CLASS (GI)	1	A-1-b (V)	A-4a (6)	A-6a (6)	
1203	OD		A-1-	A 4	V Q	
EOB: 386, 40	, CM	-	5	12	13	
<u>ASL)</u> 0.12038	ATTERBERG	-	•	10		
 885.9 (MSL) 40.120			•	3 16	`	
		-	1 1	30 26		
ELEVATION: LAT / LONG:				37 3		
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<u></u> 	GRADATION (%)	-		7		
12/5/19 81 7	U U U U U U	_		ω		
⁰	Ч (st			4.50	4.50	
DATE: 12/5/19 O (%): 81.7		1	SS-1	SS-2	22-3 22-3	
	REC SAMPLE					
CALIBRAT ENERGY F	REC (%)		67	26	78	
<u> </u>	_		78	18	5 16	2
n N	SPT/ ROD		20 25 37	3 6	5 6 6	
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3.25" HSA SPT	DEPTHS					<u>+</u>
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j j	ELEV.		88	881.4		878.4
ETHO AETH						
DRILLING METHOD: SAMPLING METHOD				Ľ.	MP	
DRILLING METHOD: SAMPLING METHOD:				DY SII	JWN, ≡L, DA	
<u>ہ م</u> ا		ERS		SAN	D BRO	
4/14/21	MATERIAL DESCRIPTION	18.0" ASPHALT AND 18.0" BASE (DRILLERS DESCRIPTION)	BAGE	HARD, BROWNISH GRAY AND BROWN, SANDY SILT SOME CLAY, TRACE GRAVEL, DAMP	STIFF TO HARD, BROWNISH GRAY AND BROWN, SILT AND CLAY , SOME SAND, LITTLE GRAVEL, DAMP TO WET	
4/1	RIAL DESCRI	ASE (ULAK	ND BR	H GRA D, LIT	
END ND	AND	3.0"B		AY AN RAVE	VNISF SAN	
SFN: SFN: END:	MATE	ND 1	<u>0</u>	H GR CE G	SOME	
21		ALT A	\$ \$	WNIS , TRA	ARD, I LAY,	
100		SPHJ	03.1	BRO	₽ ₽ ₽	
, I <u>F</u>		8.0" A		ARD, OME	TIFF ILTA OWE	
						T LOG WI SULFATES (8.8, X 11) - OH DOT, GDT - 10/2/3/ 07:36 - X:/YCTIVE PROJECT/2/ 8.8) 21 C PROJECT/2 E OIL PROJECT/2

66.35.75.85.072.10 DDD LOG WI SULFATES (8.57.27.9) OH DOT GDT - 10/25/21 07:36 - X./ACTIVE PROJECTS/RCTIVE SOIL PROJECTS/READING CONCLOG AND CONCLOSED AND CONC

NEAS / J. HODGES HAMMER: CME AUTOMATIC ALIGNMENT: I-71 LATION: 3.25° HSA BURGY RATION DATE: 12/5/19 ELEVATION: 386.8 (MSL) EOB: 7.5 ft. 3.27° HSA ENERGY RATIO (%): 81.7 LAT /LONG: 86.8 (MSL) EOB: 7.5 ft. 3.27° HSA ENERGY RATIO (%): 81.7 LAT /LONG: 40.121451, 40.121451 40.121451 DEPTHS SPT No: (%) ID (fsh) RC AMDLE HP ATTENBERG 00071 304 DEPTHS ROD N: (%) ID (fsh) RC AMDLE HP ATTENBERG 00071 304 1 1 1 36 13 17 36 29 28 17 11 14 A-66 (6) 207 5 15 18 SS3 4.50 8 14 18 36 29 28 27 40.6(5) 207 5 5 14		-71	PAGE	-	BACK FILL		r7 Vr 1 / 7 / 1 1 / 7 / 1	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	7 V F 7 - 7 Z A 7 V F 7	× × × × × × × × × × × × × ×	>7 >7 4
CT: Francy Lizro.28,27/25,094 Deluting Frant (OFERT) Tatality (OFERT		EXPLORATION ID B-012-0-21	ш.,		SO4 ppm]
CT. FRA-07127:23:2735.934 DRILING FIRM / DEEXTOR: MEXS/1, HODGES PARMER CME 453 STATION / OFFSET T11 105435 STN: J1521 END J1521431.40. J12431.40. J12431.40. J12431.40. J12431.40. J12431.40. J12431.40. J12431.40. J12431.40. J1141.41 J1141.41 J12431.40. J12431.40. J12431.40. J1141.41 J1141.41 J12431.40. J1141.41 J1141.41 <td< td=""><td>í</td><td></td><td>7.5 ft.</td><td>451</td><td>DDOT ASS (GI)</td><td></td><td>1-b (V)</td><td>6a (6)</td><td>4a (5)</td><td>6a (V</td><td></td></td<>	í		7.5 ft.	451	DDOT ASS (GI)		1-b (V)	6a (6)	4a (5)	6a (V	
CIT. FRAMTIZTO-28.27/25.99A DRILLING FIRM / OFERATOR: NEAS/1, HODGES DRILL RG CME 4156 STATION / OFERATOR 105435 SAMPLUNG FIRM / LOGGER: SAMPLUNG FIRM / LOGGER: SAMPLUNG FIRM / LOGGER: LAGAMER: MALENATIC ALIGNMATIC ALIGNMATIC 105435 SFN: J15/21 SAMPLUNG FIRM / LOGGER: J15/21 SAMPLUNG FIRM / LOGGER: J15/21 LUT/LING LALTANATIC LALTA		49' RT.		40.121						_	_
CT: FRA-071/1270-23.27/25.93A DRILLING FIRM / OPERATOR: Neals / Italian STATION / OFFSET: STATION / OF STATION STATION / OF STATION / OF STATION STATION STATION / OF STATION STATION / OF STATION STATION STATION STATION STATION STATION STATION / OF STATION		4+32, 4 -71		1451,	_					_	-
CT: FRA-071/1270-28.27/25.964 BMMER: DRILING FIRM / LOGER: INEAS / J. HODGES Rand ING STATION / OFF STATIONATIC ALGOMERIT: STATION ALGOMERIT: STATION ALGOMERIT: STATION ALGOMERIT:		174	(MSL)	40.12					_		-
CT: FRA-071/270-28.27/25.99A DRLLING FIRM / OPERATOR: MEAS / J. HODGES DRLL RG: CME 45B STATION / OF SUBGRADE SUBBRADE SUBBRATOR SUBBRATOR SUBBRATOR EAUPLING FIRM / ODGER: NEAS / J. HODGES FLUING FIRM / ODGER: ALIGNMATIC ALIGNMATIC ALIGNMATIC 10533 FIXION anner No 327° HSA EREMONING STATION / OF ALIGNMATIC ALIGNMATIC 415321 END: 41521 END: 41521 END: 4151 ALIGNMATIC 41521 END: 41521 END: 41521 END: 4151 ALIGNMATIC 41521 END: 41521 END: 4152 END: 4151 ALIGNMATIC 41521 END: 4152 END: 416 END: 4161 END: 417.00G 41521 END: 416 52 39 SS-1 - - - - - - - - - - - - - <t< td=""><td></td><td>SET:</td><td>886.8</td><td></td><td></td><td></td><td>•</td><td></td><td>_</td><td></td><td>1</td></t<>		SET:	886.8				•		_		1
CT: FRA-071/127D-28.27/25.99A DRILLING FIRM / OPERATOR: INERS/ J, HODGES DAME HMMER: CME AUTOMATIC: 105435 SIN SINGRADE RAMIDING FIRM / LOGGER: NEAS / J, HODGES HAMMER: CME AUTOMATIC: 125/19 105435 SIN PANULING METHOD: 327" HSA REAL AUTOMATIC: 125/19 81/17 105435 SIN Arrisor REMERANDE RAMULING METHOD: 327" HSA REMERANDING 81/17 41/527 IN MATERAL DESCRIPTION ELEV. BETHS ROD 10/16 12/17 MATERAL DESCRIPTION ELEV. B86.8 DEPTHS ROD No RECOVER AMPICIERS RECOVER AMPICIERS ASPHALT AND 6.0" BASE (DRILLERS B80.8 BARNE H 1		I/ OFF	·				ı	29	24		
CT: FRA-01127D-28.27725.99A DRILLING FIRM / OFERATOR: INEX/1, HODGES DARLING MAMER: CME 436 105435 ST SAMPLING FIRM / LOGGER: NEAS/1, HODGES HAMMER: CME 436 105435 SFN: JATSC1 SAMPLING FIRM / LOGGER: NEAS/1, HODGES HAMMER: CME AUTOMATC 105435 SFN: JATSC1 SAMPLING METHOD: JST AISC SAMPLING METHOD: JST 41521 END: JATSC1 SAMPLING METHOD: JST AISC SAMPLE HP AND NOTES AND NOTES B84.8 P		ATION GNME	EVATION IN CONTRACT				I	36	_		
CT: FRA-071/270-28.27/26.99A DRILLING FIRM / OPERATOR: Ness / 1, HODGES DRILLING: CME 448 106436 SUBGRADE SAMPLING FIRM / ODGER: NESS / 1, HODGES HAMMER: CME AUTONIATT 105436 SIN 4/15/21 SAMPLING METHOD: 3.25'' HSA ELEN 12.61/ 105436 SIN 4/15/21 SAMPLING METHOD: 3.25'' HSA EMERGY MATIO (%): 11.61 4/15/21 SAMPLING METHOD: 3.25'' HSA ELEV 3.57'' HSA EMERGY MATIO (%): 11.61 4/15/21 MATERIAL DESCRIPTION 886.8 ELEV DEPTHS RPDI No (%) (%) 00 MATERIAL DESCRIPTION 886.8 ELEV DEPTHS ROD No (%) 00 (%) 00 00 MATERIAL DESCRIPTION AND MOTES 884.8 ELEV 2 184.8 2 3 5 1 <td>-</td> <td></td> <td><u> </u></td> <td></td> <td>FS FS</td> <td></td> <td>•</td> <td></td> <td></td> <td></td> <td>_</td>	-		<u> </u>		FS FS		•				_
CT: FRA-071/270-28.27/25.99A SUBGRADE DRILLING FIRM / OPERATOR: IEAS / J. HODGES DRILL RIG: CME. 10535 STILING METHOD: 325° HSA CALIBRATION DATE: CALIBRATION DATE: CALIBRATION DATE: CALIBRATION DATE: 141521 SAMPLING FIRM / LOGGER: 325° HSA CALIBRATION DATE: CALIBRATION DATE: CALIBRATION DATE: 141521 BAULING BASE DRILLING METHOD: 325° HSA CALIBRATION DATE: 141521 BAND MOTES SAMPLING METHOD: 325° HSA CALIBRATION DATE: 141521 BAND MOTES B86.8 DEPTHS RECY MATE HI MAID MOTES B86.8 DEPTHS ROD (%) D (%) MAID MOTES BASE (DRILLERS B88.8 2 18 2 31 2 2 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4		0	/19		R CS				_		-
CT: FRA-071/1270-28.27/25.99A DRILLING FIRM / OPERATOR: NEAS / J. HODGES: DRILL RG: 3UBGRADE SAMPLING FIRM / OPERATOR: SAMPLING FIRM / OPEGER: NEAS / J. HODGES: HAMMER: 105435 STN: JATS/J BALLING METHOD: 3.25" HSA CALIBRATION 4/15/21 END: 4/15/21 SAMPLING FIRM / LOGGER: NEAS / J. HODGES HAMMER: 4/15/21 END: 4/15/21 SAMPLING METHOD: 3.25" HSA ECLIBRATION A115/21 END: AMPLING METHOD: 3.25" HSA ECLIBRATION ELEV. DEPTHS RPTION; May MOTES AND MOTES SAPHALT AND 6.0" BASE (DRILLERS 884.8 RA 2 1 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 1 - 1 1 - 1 1 - 1 1 1 - 1 1 - 1 1 - 1 1 - 1 1 1 <t< td=""><td></td><td>E 45B</td><td>12/5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>		E 45B	12/5								
CT: FRA-071/1270-28.27/26.99A DRILLING FIRM / OPERATOR: NEAS / J. HODGES: DRILL RG: 05435 SFN: SAMPLING FIRM / OPEGER: NEAS / J. HODGES: HAMMER: 105435 SFN: DRILLING METHOD: 3.25" HSA CALIBRATION 105435 SFN: A/15/21 END: 4/15/21 END: 3.25" HSA 105435 SFN: A/15/21 END: 4/15/21 END: 3.25" HSA 115/21 END: 4/15/21 END: SPT No REC SA 115/12 END: AND MOTES SAPHALT AND 6.0" BASE (DRILLERS 884.8 1			 ビ :	- 'H-							
CT. FRA-071/1270-28.27/25.99A DRILLING FIRM / LOGGER: NEAS / J. HODGES SUBGRADE SAMPLING FIRM / LOGGER: NEAS / J. HODGES 105435 SFN: DRILLING METHOD: 3.25' H5A 4/15/21 END: 4/15/21 SAMPLING METHOD: 3.25' H5A A115/21 END: 4/15/21 SAMPLING METHOD: 3.25' H5A MATERIAL DESCRIPTION RATERIAL DESCRIPTION RATERIAL DESCRIPTION REPTION) REPTION) CLAR BASE (DRILLERS REPTION) BENSIE GRAY, STONE FRAGMENTS WITH MATERIAL DESCRIPTION CLAR BASE, DAMP ELEV, BASE (DRILLERS B82, B84, B B82, B84, B CLAR, RSCME SAND, B82, B BROWN, SILT, TRACE CLAY, RESEMBLES ULAR BASE, DAMP E GRAVEL, DAMP E GRAVEL, MOIST E GRAVEL, MOIST C C CLAY, STONE SAND, C C C C C C C C C C C C C C C C C C C					SAMP D		SS	:-SS	SS		
CT: FRA-071/270-28.27/26.99A SuBGRADE SAMPLING FIRM / OPERATOR: NEAS / J. HODGES SUBGRADE SAMPLING METHOD: 3.25" HSA 105435 SFN: 3.25" HSA 4/15/21 END: 4/15/21 SAMPLING METHOD: 3.25" HSA 4/15/21 END: 4/15/21 SAMPLING METHOD: 3.25" HSA MIDLING METHOD: 3.25" HSA SAMPLING METHOD: 3.25" HSA MIDLING METHOD: 3.25" HSA REPTON REPTON REPTON REPTON REPTON SIER SAMPLING METHOD: 3.25" HSA MIDLING METHOD: 3.25" HSA S86.8 DEPTHS ROUT REPTON S86.8 DEPTHS ROUT S82.3 BAR A BAS (DRILLERS ROUT SILT, TRACE CLAY, RESEMBLES ULAR BASE, DAMP DENSE, GRAY STONE FRAGMENTS WITH MITLE SILT, TRACE CLAY, RESEMBLES ULAR BASE, DAMP BROWN, SILT, SOME CLAY, RESEMBLES CRAVEL, DAMP BROWN, SILT AND CLAY, SOME SAND, 879.3 EOB E. DAMP E. D		L RIG: MER:	BRATI		КЕС (%)		39	68	78	100	
CT. FRA-071/270-28.27/25.99A DRILLING FIRM / OPERATOR: NEAS / J. HODGI SUBGRADE SAMPLING FIRM / LOGGER: NEAS / J. HODGI 105435 SFN: 3.25° HSA 3.		DRIL			N_{60}				15	14	
CT: FRA-071/1270-28.27/25.99A DRILLING FIRM / OPERATOR: NEAS / J. HODO SUBGRADE SAMPLING METHOD: 325' HSA 105433 SFN: DEPTHS DECRIPTION BRETHOD: 3.25' HSA 4/15/21 END: 4/15/21 SAMPLING METHOD: 3.25' HSA MATERIAL DESCRIPTION BRETHOD: 3.25' HSA MATERIAL DESCRIPTION BREAM MATERIAL DESCRIPTION BREAM MATER		ES			SPT/ RQD		31 18 20	3 5	2 2	<u>ر</u>	2
CT: FRA-071/1270-28.27/25.994 DRILLING FIRM / OPERATOR: JUBGRADE SAMPLING FIRM / LOGGER: J 105435 SFN: DIBGRADE SAMPLING METHOD: A/15/21 END: 4/15/21 END: 4/15/21 END: 4/15/21 END: A/15/21 END: A/15/											
CT: FRA-071/270-28.27/25.99A DRILLING FIRM / OPERATOR: SUBGRADE SAMPLING FIRM / OPERATOR: SUBGRADE SAMPLING METHOD: 4/15/21 END: 4/15/21 SAMPLING METHOD: MATERIAL DESCRIPTION BASE (DRILLERS MATERIAL DESCRIPTION BASE (DRILLERS MATERIAL DESCRIPTION BASE (DRILLERS RIPTION) BASE (DRILLERS REPTION) BASE (DRILLERS BAND NOTES BENOWN SILT AND 6.0" BASE (DRILLERS MATERIAL DESCRIPTION BASE (DRILLERS REPTION) BASE (DRILLERS REPTION) BASE (DRILLERS BASE, DAMP LITTLE SILT, TRACE CLAY, RESEMBLES ULAR BASE, DAMP LITTLE SILT, TRACE CLAY, RESEMBLES ULAR BASE, DAMP BENOWN SILT AND CLAY, RESEMBLES CRAVEL, DAMP BENOWN SILT, SOME CLAY, TRACE EL DAMP BENOWN, SILT AND CLAY, SOME SAND, E GRAVEL, MOIST E GRAVEL E GRAVEL		AS/J.F	HSA	-	PTHS					<u> </u>	-
CT: FR4-071/270-28.27/25.99A SUBGRADE 105435 SFN: 4/15/21 END: 4/15/21 MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION AND NOTES AND NOTES CLAY, RESEMBI ULAR BASE, DAMP DENSE, GRAY, STONE FRAGMENTS ULAR BASE, DAMP DENSE, GRAY, STONE CLAY, RESEMBI CLAR BASE, DAMP E GRAVEL, DAMP STIFF, BROWN, SILT, SOME CLAY, SOME SAI E GRAVEL, MOIST STIFF, BROWN, SILT AND CLAY, SOME		1-	3.25		DEI						-EOB-
CT: FRA-071/270-28.27/25.99A SUBGRADE 105435 SFN:		ATOR: SER:	'		- <		8 8	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		2 <u>.</u>	<u>9.3</u>
CT: FR4-071/270-28.27/25.99A SUBGRADE 105435 SFN: 4/15/21 END: 4/15/21 MATERIAL DESCRIPTION MATERIAL DESCRIPTION AND NOTES AND NOTES CAVEL, DAMP EQAVEL, DAMP EQAVEL, DAMP EQAVEL, MOIST STIFF, BROWN, SILT AND CLAY, SOME SAI EQAVEL, MOIST		OPER.	 2 6		ELI 886	\sim	~ 40			ă Z	7 84
CT: FRA-071/270-28.27/25.99A 105435 SFN: 4/15/21 END: 4/15/21 MATERIAL DESCRIPTION MATERIAL DESCRIPTION M		FIRM /	IETHO			\bigotimes	Xpe A				3
CT: FR4-071/270-28.27/25.99A SUBGRADE 105435 SFN: 4/15/21 END: 4/15/21 MATERIAL DESCRIPTION MATERIAL DESCRIPTION AND NOTES AND NOTES CAVEL, DAMP EQAVEL, DAMP EQAVEL, DAMP EQAVEL, MOIST STIFF, BROWN, SILT AND CLAY, SOME SAI EQAVEL, MOIST			NON							ш	Ő.
CT: FR4-071/270-28.27/25.99A SUBGRADE 105435 SFN: 4/15/21 END: 4/15/21 MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION AND NOTES AND NOTES CLAY, RESEMBI ULAR BASE, DAMP DENSE, GRAY, STONE FRAGMENTS ULAR BASE, DAMP DENSE, GRAY, STONE FRAGMENTS ULAR BASE, DAMP CLAY, RESEMBI ULAR BASE, DAMP EGRAVEL, DAMP EGRAVEL, DAMP STIFF, BROWN, SILT, SOME CLAY, SOME SAI EGRAVEL, MOIST STIFF, BROWN, SILT AND CLAY, SOME EGRAVEL, MOIST		DRILL SAMP	DRILL	SAIMF			MITH E		ÚZ.	TRAC	ME SA
CULECT: FRA-071/270-28.27/25.96 PE: SUBGRADE ART: 4/15/21 END: 4/15/21 ART: 4/15/21 END: 4/15/21 ART: 4/15/21 END: 4/15/21 ARD MOTES ARD ADD CAY, RAND 6.0" BASE (DRIL AND NOTES AND NOTES ARD, BROWN, SILT AND CLAY, RAND ARD, BROWN, SILT AND CLAY, SOM ARD, BROWN, SILT AND CLAY.					NOIL	LERS			AE SAI	CLAY,	Y, SOM
CULECT: FRA-071/270-28.27 PE: SUBGRADE ART: 4/15/21 END: 4 ART: 4/15/21 END: 4 MATERIAL DE MATERIAL DE AND, LITTLE SILT, TRACE CLA AND, SILT AND CLA' SOCIE GRAVEL, DAMP AND, SILT AND CLA' SACE GRAVEL, MOIST AND SILT AND CLA' SACE GRAVEL, MOIST		/25.99		LZ/GL/	SCRIF	(DRIL			r, son	OME 0	CLA
CUECT: FRA-071/270- PE: SUBGR/ ART: 4/15/21 END: ART: 4/15/21 END: MATERI MATERI AND, LITTLE SILT, TRAC RANULAR BASE, DAMP ARD, BROWN, SILT AND ARD, BROWN, SILT AND ARD, BROWN, SILT AND ARD, BROWN, SILT AND ARD, BROWN, SANDY SI RAVEL, DAMP ARD, BROWN, SANDY SI RAVEL, DAMP ARD, BROWN, SILT AND ARD, SILT AND AR		28.27		4	AL DE ND NC	BASE			CLAY	LT, S(T AND
CULECT: FRA-07 PE: SI ART: 4/15/21 M// M// M// M// M// M// M// M// M// ARD, BROWN, SIL ARD, BROWN, SIL		71/270 JBGR	<u> </u> _ i		A		1, STO	DAMP		NDY S	N, SIL DIST
CUJECT: F PE: 105435 ART: 4/15 ART: 4/15 ERY DENSE, AND, LITTLE RANULAR B, AND, LITTLE RANULAR B, AND, LITTLE RANULAR B, AND, LITTLE AND, CARDAR AND,		RA-07	0,2		M	T ANI	GRAV	ASE, D	רא פור ש'ם	N, SAI	BROW EL. MO
PE: 0.0 IEC ART: 1 ART: 1 ART: 1 ART: 1 ARD, I ARD, I ARD, I ARD, I ARD, I ARD, I ARD, I ARD, I ARD, I ART: 1 ART: 1 A			05435	4/15		SPHAL PTION	ENSE	LAR B.	3ROW GRAVI	BROW	TIFF, I GRAVI
		OJEC.		AHI:		3.0" A(ESCR		RANUI	ARD, E	ARD, E RAVEL	ERY S RACE (

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

SEANDARD ODD LOG WI SULFATES (8.5 X 11) - OH DOT GDT - 10/25/21 07:36 - X./ACTIVE PROJECTS/ACTIVE SOIL PROJECTS/FRA.071-270-28.27-25.99 A/GINT FILES/FRA.071-270-28.27-25.99

	EXPLORATION ID B-013-0-21	PAGE	1 OF 1	BACK FILL		-7 Vr - 4 7 Vr	7 V V 7 V V 7 V V	7 V F 7 V - 7 4 5 7 V F 7 V	7 7 7 7 7 7 7 7 7 7 7 7
	B-013-0-21		-	SO4 ppm		I	1433		
		7.5 ft.	, 40.122537	ODOT CLASS (GI)		A-1-b (V)	A-2-4 (0)	A-4a (6)	A-4a (V)
1 18' DT		EOB:	7, 40.1	MC 0		24	<u></u> б	12	15
	<u>178+31,</u> I-71	- -	40.122537	ERG PI		I	~	10	1
		889.2 (MSL)	40	ATTERBERG		I	17	14	
	DFFSE	· .				•	3 24	29 24	•
	STATION / OFFSET: AI IGNMENT [.]	ELEVATION:	LAT / LONG	N (%)		1	21 13	38	•
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				GRAD/	-	I	23	7	1
	15B MATIC	12/5/19	81.7	GR	-	I	28	6	-
	CME 45B CMF ALITOMATIC			E HP (tsf)		ı	•	4.25	2.50
	- MC	CALIBRATION DATE:	ENERGY RATIO (%):	SAMPLE		SS-1	SS-2	SS-3	SS-4
	JFR.	BRATIC 3RATIC	GY R/	REC (%)	×	44	100	100	100
	DRILL RIG: HAMMFR	CALIE	ENER	$N_{_{60}}$		80	33	14	12
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	NEAS / J. HODGES						ν 4 4	2	7
	NEAS / J. HODGES	3 25" HSA	SPT	DEPTHS					
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	ATOR: FR:	' ; į		<u>> <</u>	<u>i</u> -	t 0	7		2
	DPER/	j j	ë	ELEV. 889.2					881
	IRM / C	ETHO	METHC		\bigotimes	×Č			
		NG M	N DNI-			A.		OR	
	DRILLING FIRM / OPERATOR: SAMPI ING FIRM / I OGGFR ⁻	DRILLING METHOD:	SAMPLING METHOD						SOME
		, <u> </u>		NOIL	LERS	TONE TRA		BROWI	SILT, ST
	FRA-071/270-28.27/25.99A SUBGRADF		4/15/21	MATERIAL DESCRIPTION AND NOTES	(DRILI	NND ST	WET	AND E AGME 40 INT	
	<u>28.27/</u> DF		4	RIAL DESCR	BASE		3ASE,	LAY P	MP T(
	071/270-28.		ËND	NTERU AN	7.0"	GRA	JLAR E	TLE C	П, GR D, GR
	RA-07	SFN:		MA		GRAY NTH S	BRANL	Y STIF L ANE T, LIT	DAM DHAR GRAV
		105435	4/15/2		PHAL TION	ENSE,	SLES (NO VER ND SIL	PINGS
	PROJECT: TYPF	i I	START:		15.0" ASPHALT AND 7.0" BASE (DRILLERS DESCRIPTION)	VERY DENSE, GRAY, gravel and stone Fragments with sand. Little silt. Trace clay	reseme (filll)	STIFF TO VERY STIFF, BROWN AND BROWNISH GRAY, GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT, LITTLE CLAY, NO INTACT SOIL FOR	HP READINGS, DAMP VERY STIFF TO HARD, GRAY, SANDY SILT , SOME CLAY. TRACE GRAVEL. DAMP TO MOIST
							\sim	N D D V	<u> </u>

21	PAGE 1 OF 1	BACK		r7 Vr	7 V F 7	×	1 V V 1 V V 1 1 V 7 1 V 7 1
EXPLORATION ID B-014-0-21	<u>а</u> †	SO4		4767	•	•	
	7.5 ft. 3658	ODOT CLASS (GI)		A-4a (4)	A-4a (V)	A-4a (1)	A-4a (V)
46' RT	(MSL) EOB: 75 40 123658 40 123658			5 A	13 A	11 A	11 A.
182+40, I-71	<u>)</u> EC	2 22 22 22	_	10		∞	
	891.6 (MSL) 40.1236		-	17	ı	16	
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N / OF			_	24	ı	16	•
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- ST ALI			-	5 16	•	3 19	•
P	7	GRAI		14 15		14 26	•
CME 45B AUTOMA1	12/5/19 81 7	E 4	_	4.50 1	4.50	4.50 1	4.50
CME 45B CME AUTOMATIC	 逆 (3	' 	<u>ع</u>				
CME	CALIBRATION DATE: ENERGY RATIO (%)	SAMPLE	2	SS-1	SS-2	SS-3	SS-4
Drill Rig: Hammer:	BRATIC RGY R	REC (%)	(%)	100	100	100	100
DRIL HAM	CAL	z Z		34	20	20	23
ES		/LdS		14 11 14	5 7 8	9 8 7	ი დ დ
NEAS / J. HODGES			- -	0 0			0
L/S/	3.25" HSA SPT	DEPTHS					
1-	3.25						
DRILLING FIRM / OPERATOR: SAMPLING FIRM / LOGGER:			091.0 0 0 0	0.0			,
DRILLING FIRM / OPERATOF SAMPLING FIRM / LOGGER:	ë	ELEV					884 <u>.</u> 1
IRM / (ЕТНО						
	DRILLING METHOD: SAMPI ING METHOD:			≺, AINS			
SAMPI	DRILL			CLA			
	<u> </u>		-ERS	HARD, GRAY, SANDY SILT, LITTLE TO SOME CLAY, LITTLE GRAVEL AND STONE FRAGMENTS, CONTAINS	n		
FRA-071/270-28.27/25.99A SUBGRADE	4/15/21		14.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	LE TO	DAM		
28.27// DE		RIAL DESCRI	ASE (LITT.	۲7 TO		
071/270-28.3 SUBGRADE		TERIA	6.0" B	STON	Q D		
SUI		MA	AND.	AND			
Ц	105435 S		HALT IION)	čAΥ, S ZAVEL	-S NO		
PROJECT: TYPE:	١ <u>ě</u>		14.0" ASPHAL DESCRIPTION)	LE GE	CE IR		
PROJE TYPE:	PID:		14.0 DES	HAR	TRA		
1/7-1	10 101		1NI€\¥ 66		70171		

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

-0-21 PAGE 1 OF 1	BACK FILL		-7 VF	7 V 7 V 7 V	7 V	1 ~ 7 7 7 ~ 7 7 7 ~ 7 7
B-015-0-21 ift. PAGE 1 OF 1	SO4 ppm		I	2300	ı	ı
7.5 ft.	ODOT CLASS (GI)		A-1-b (V)	A-4a (3)	A-4a (4)	A-4a (V)
<u> -71</u> MSL) EOB: 7.5 40.124754, 40.124754	C C		12 A	12	11 A	13 A
<u> -71</u> _)E(24754	UN a			10	6	
	ATTERBERG		I	18	16	I
894	ATTA	1	I	28	25	I
L Z Z			I	18	22	I
ALIGNMENT: ELEVATION: 894.1 LAT / LONG:	%) NC	_	1	31	32	I
	- ∩⊢	-	I	19	14	•
19 19	GRAI		•	5 17	3 14	•
DMATIC 12/5/19 81.7			•	0 15	5 18	12
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HAMMER: CALIBRATIC ENERGY R	REC (%)	(01)	33	72	100	100
HAMMER: CALIBRATI ENERGY F	N ₆₀		109	15	11	12
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HSA HSA	원			μ 1 η	2 	° ∼
NEAS / J. H 3.25" HSA SPT	DEPTHS					
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4/15/21	ESCR	DRI DRI	RAGN 4Y, RI			
		BASE	й С Г С		л То М	
SUBGRADE SFN: END:	ATER	.0.7 C	(, STC TRAC	DAMP	а ПП	
SUB SFN: 21 E			GRA) SILT,	ASE, E	D HAF SILT,	
4/43/		PHAL TION)	NSE, TTLE	AR B/	ANDY DAM	
TYPE: PID: 105 START:		15.0" ASPHALT AND 7.0" BASE (DRILLERS DESCRIPTION)	VERY DENSE, GRAY, STONE FRAGMENTS WITH SAND, LITTLE SILT, TRACE CLAY, RESEMBLES	ANUL L)	VERY STIFF TO HARD, BROWNISH GRAY BECOMING GRAY, SANDY SILT , LITTLE TO SOME CLAY, LITTLE GRAVEL, DAMP	
TYPE: PID:	1	15.(DES	SAN SAN	(FILL)	ЩΎΩ	

EXPLORATION ID B-016-0-21	PAGE	-	BACK FILL			7 V V - 7 V V - 7 V V	7 V F 7	× × × × × × × × × × × × × × × × × × ×
B-016-0-21	<u>ш</u> ,		SO4 ppm		I	3767		
	7.5 ft	5854	ODOT CLASS (GI)		A-1-b (V)	A-4a (5)	A-4a (5)	A-4a (V)
2 1	EOB:	40.125854, 40.125854	MC CI		14 A	11	12	13
I-71		25854			` I	ຸ ດ	, б	, ,
	896.6 (MSL)	40.1			I	16	16	
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	· ·	;j	C J		ı	24	24	•
AI IGNMFNT	ELEVATION:				I	36	34	
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0	6		S CKA		1	4	12	•
	12/5/19	81.7	GR		I	9	15	·
UME 45B		- 'H-	F fs		1	4.50	4.50	4.50
CMF	CALIBRATION DATE:	ENERGY RAIIO (%):	SAMPLE		SS-1	SS-2	SS-3	SS-4
UNILL NG. HAMMFR:	RATIC	12	2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3		44	10	100	100
	CALIE		N_{60}		50	18	25	25
NEAS / J. HODGES	3.25" HSA	IdS	DEPTHS SPI/ RQD				$\frac{1}{2}$ 5 $\frac{10}{10}$	$\begin{array}{c} - 6 \\ - 7 \\ - 7 \\ - 7 \\ - 11 \\ - 7 \\ - 11 \\ - 7$
DRILLING FIRM / UPERATOR: SAMPI ING FIRM / LOGGFR:			ELEV 896.6					889 <u>.</u> 1
SAMPI ING FIRM / I OGGFR	DRILLING METHOD:						SILT,	
	105435 SFN:		MATERIAL DESCRIPTION AND NOTES	15.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	DENSE, BROWNISH GRAY, GRAVEL AND STONE EDACMENTS WITH SAND I ITTI E SUIT TDACE CU AV	RESEMBLES GRANULAR BASE, MOIST	HARD, BROWNISH GRAY AND GRAY, SANDY SILT, SOME CLAY, TRACE TO LITTLE GRAVEL, DAMP	

	PAGE		BACK FILL		7 V F	7 V N	× ×		
17-0-/10-9	. ۲	-	SO4 ppm		193			•	
	7.5 ft	945	CLASS (GI)		A - 6a (6)	A-4a (5)	A-6a (V)	A-6a (V)	
		40 126945, 40 126945							
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I-71	(USL)	0.126	ATTERBERG		9 13	6	•	•	
	898.8 (MSL)	4			2 19	6 17	'	-	
	I		CL LL		24 32	23 26	· ·	· ·	
ALIGNMENT:	ATION	UNO NO			33 2	35 2			
	ELEVATION:	LAT / LONG:			16	18		•	
			GRADATION (%) CS FS SI		12	12		•	
CIME AU LOMATIC	12/5/19	81.7	<u>9</u> 8		15	12	•	•	
	12		(tsf)		4.50	4.50	4.50	3.75	
	CALIBRATION DATE:	- 14	SAMPLE		SS-1	SS-2	SS-3 4	SS-4	
- 	ION	ENERGY RATIO (%):	C SAI						
HAMMER:	-IBRA	FRGY	%) %		100	100	100	100	
A H	CAL	_	N ₆₀		53	53	20	6	
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NEAS / J. HODGES						ω 4	ب ب ب		
r / 0	3.25" HSA	SPT	DEPTHS						
Ž Z	3.25	, , , , , , , , , , , , , , , , , , ,	DEF						
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		 ان	ELEV. 898.8	897.1	895.8	894.3		891 <u>.</u> 3	
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	Ц Ц		N	RS		SOME	CLAY		
		51	MATERIAL DESCRIPTION AND NOTES	NLLEF	ZAY, S		AND		
		4/15/21	RIAL DESCRI AND NOTES	ie (DF	SH GI RAVE	S YON	SILT , DAN		
		 ان	AND A	" BAS		≺, SAI	sRAY, SAVEL		
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		4/15/21	ž	LT AN ا)	/N AN SANE	NISH EL, D	TO HA		
	105435	4/1;			NON	3ROM 3RAV	SAND.		
сı.		START:		14.5" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	HARD, BROWN AND BROWNISH GRAY, SILT AND CLAY, SOME SAND, LITTLE GRAVEL, DAMP	HARD, BROWNISH GRAY, SANDY SILT , SOME CLAY LITTLE GRAVEL, DAMP	VERY STIFF TO HARD, GRAY, SILT AND CLAY , LITTLE SAND, LITTLE GRAVEL, DAMP		
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STANDARD ODOT LOG W/ SULFATES (8.5 X 11) - OH DOT GDT - 10/25/21 07:36 - X/ACTIVE PROJECTS/ACTIVE SOIL PROJECTS/FRA-071-270-28,27-26 99 A/GINT FILES/FRA-071-270-28,27-26 99

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ELECENDE SUMPTING HERRY LOCAGE NAMPLING FERM COLOREATION LATE (1363) FIN 41927 END 237 EXEMPTION LATE (1363) FIN ANAPLING METHOD SPT EXEMPTION LATE EXEMPTION LATE (1363) FIN MANDLOSS END 41927 END 41 (1363) FIN MANDLOSS EVENTION ETEV ETEV END 41 (1361) FIN FIN FIN FIN FIN FIN 41 (131) FIN FIN FIN FIN FIN FIN 41 (131) FIN FIN FIN FIN FIN 41 41 (131) FIN FIN FIN FIN FIN 41 41 41 (141) FOR FIN FIN FIN FIN FIN 41 41 41 41 41 41 41 41 41 41 41 <t< td=""><td><u>2/5/15</u></td><td>81.7</td><td>GR</td><td></td><td></td><td></td><td></td><td></td></t<>	<u>2/5/15</u>	81.7	GR					
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Substrate Samptung Firm / Locger 3 Ti. 4/19/21 Britung METHOD: 3 Ti. 4/19/21 END: 4/19/21 3 Material Description gaid 919,7 919,7 Discretion 318,6 919,7 919,7 919,7 Discretion Samptures 919,7 919,7 919,7 Discretion Samp With Trace GRAY 919,7 919,7 914,1 Electuation Science 918,6 914,1 914,1 Moleting and Mores Sandon Number Constrained 914,1 914,1	V) J. LON		Ŷ) 4 -+	ب ب ا	↓ ∠ →
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E. SUBGRADE 105435 SFN: 105435 SFN: 105435 SFN: All 19/21 END: 4/19/21 MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION AND NOTES SCRIPTION) MATERIAL DESCRIPTION AND FOWN SILTY CLAY, SC MILTY CLAY, SC AND STORE SAND, STORE CAN STIFF, BROWN WITH TRAC TILLES, CLAY, SOME SILT, SOME SAND, AVEL, MOIST TO DAMP AVEL, MOIST TO DAMP	IPLING.	PLINC				ZAY	UH OH	
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E: 105435 RT: 4/19/2 POINE FRAGME AGMENTS AF AVEL, MOIST AVEL, M	SFN:		MA	AND	JD BR ENTS,	RE WI	Υ, SO TO E	
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	1054	<u>5 </u>		ASPI	, GR		TES, ÆL, ₪	
	TYPE: PID:	START:		17.0" DESC	HARD	FRAG STIFF	MOTI SRAV	

FRA-071/1270-28.27/26.99A DRILLING FIRM / OPERATOR: NEAS! J. LONG DRILL RG: CME 44B STATION / OF SET: 28-34. 26 LT. EXPLORATI ENDIGE 3155 SIBGRADE SAMPLING FIRM / LOGGER: NEAS / J. LONG HAMMER: CME 410 225'HSA ELEV DRILLING METHOD: 225'HSA ELEV DRILLING METHOD: 225'HSA ALIGNMENT: RAMP M ELEV PAMPLING PAMPER: CME 410 PAL PAMPER: PAMPER		В	Л 1	BACK FILL		7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	V - Z - Z - Z - Z - Z - Z - Z - Z - Z -	× - 7 ×	
T: FRA-071/270-28.27/26.99A DRILLING FIRM / OPERATOR: NEAS/ J. LONG DRILL RG: CME 4JB STATION / OFFSET: 88+34, 26 LT. RamP M 105435 STN: SUBGRADE SAMPLING FIRM / OPERATOR: NEAS / J. LONG HAMMER: CME AUTOMATIC ALGIONICHT: RAMP M RAMP M 105435 SFN: J19/21 SAMPLING FIRM / LOGGER: NEAS / J. LONG ALGIONICHT: RAMP M ALGIONICHT: <	ORATIC 019-0-2	Δd	<u>-</u>		****				
T: FRA-071/270-28.27/26.99A DRILLING FIRM / OPERATOR: NEAS / J. LONG DRILLING: CME 45B STATION / OFFSET: 88-34, 261 105435 SSMPLING FIRM / LOGGER: NEAS / J. LONG HAMMER: CME 45B ALIGNMENT: RAMP M 105435 STATION MATENTIC 28:17 ALIGNMENT: RAMP M 105435 STATION MATENTIC 20.4 (MS1) EQ06 4/1921 END 4/1921 ALIGNMENT: RAMP M 05435 STATION MATENTIC 125/19 ELEVATION: 20.4 (MS1) EOB 4/1921 END 4/1921 END MATENTIC 125/19 LAT / LONG: 40.110619, 40. 1010 SSPHALT AND 7.0" BASE (DRILLERS MAD MOTES 920.4 10 10 11 11 12 14 13 SPHALT AND 7.0" BASE (DRILLERS MAD MOTES 918.5 P 19 100 SS-1 4.50 11 11 14 13 SPHALT AND 7.0" BASE (DRILLERS MAD MOTES 918.5 19 10 SS-1 4.50 11 11 11	 	75#	619			la (7)	ia (6)	ia (V)	ia (V)
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T: FRA-0711270-28.27125.994 DRILLING FIRM / OPERATOR: MEX CME 45B STATION / OFFSET: SUBGRADE SAMPLING FIRM / LOGGER: NEAS / J. LONG HAMMER: CME 45B STATION / OFFSET: 105435 STN: DRILLING METHOD: 3.25°HSA ALIGNMERT: 226/HSA ALIGNMENT: 105435 STN: DRILLING METHOD: 3.25°HSA ALIGNATION DATE: 12/5/19 ELEVATION: 920.4 MATERIAL DESCRIPTION BRILLING METHOD: SPH1 REC SAMPLING (%): 81.7 LAT / LONG: 20.4 MATERIAL DESCRIPTION BROWN AND BROWNISH GRAY, SILT AND 920.4 DEPTHS RCD (%) ID (rs) GR rs rs rd LAT / LONG: SPHALT AND 7.0" BASE (DRILLERS 918.5 F 1 100 SS-1 4.50 R 11 17 38 25 31 SPHALT AND 7.0" BASE (DRILLERS MAD BROWNISH GRAY, SILT AND 1 1 100 SS-1 4.50 11 17 38 26	H34, 2		0619, 4						
TIT FRA-071/1270-28.27/25.99A DRILLING FIRM / OPERATOR: NEAS / J. LONG DRILLING: STATION / OFI SUBGRADE SAMPLING FIRM / LOGGER: NEAS / J. LONG HAMMER: CME 46B STATION / OFI SUBGRADE SAMPLING FIRM / LOGGER: NEAS / J. LONG HAMMER: CME AUTOMATIC ALIGNMENT: I05435 SFN: DRILLING METHOD: 3.25° HSA CALIBRATION DATE: 12/5/19 ELEVATION: MATERIAL DESCRIPTION SAMPLING METHOD: 3.25° HSA CALIBRATION DATE: 12/5/19 ELEVATION: MATERIAL DESCRIPTION AND NOTES SAMPLING METHOD: 3.25° HSA No (%) ID (#) No ID		(MSL)	40.11	ERBER					
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T: FRA-071/270-28.27/25.99A DRILLING FIRM / OPERATOR: NEAS / J. LONG DRILL RIG: CME 45B SUBGRADE SUBGRADE SAMPLING FIRM / LOGGER: NEAS / J. LONG HAMMER: CME 45B 105435 SFN: BRILLING METHOD: 3.25" HSA CALIBRATION DATE: 12/5/19 4/19/21 END: 4/19/21 END: 3.25" HSA CALIBRATION DATE: 12/5/19 MATERIAL DESCRIPTION SAMPLING METHOD: 3.25" HSA CALIBRATION DATE: 12/5/19 MATERIAL DESCRIPTION SAMPLING METHOD: 3.25" HSA CALIBRATION DATE: 12/5/19 MATERIAL DESCRIPTION BENCIN SPIAL SPTI No. (%) DD (Ist) OR OR MATERIAL DESCRIPTION 918.5 P 1 2 8 19 100 SS-1 4.50 11 SOME SAND, TRACE TO LITTLE GRAVEL, 918.5 P 2 9 19 100 SS-1 4.50 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 <td< td=""><td>N / OF</td><td></td><td>, . DNG:</td><td></td><td></td><td></td><td></td><td>1</td><td>ı</td></td<>	N / OF		, . DNG:					1	ı
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TT: FRA-071/270-28.27/25.99A DRILLING FIRM / OPERATOR: NEAS / J. LONG SUBGRADE SAMPLING FIRM / LOGGER: NEAS / J. LONG I05435 SFN: DRILLING METHOD: 3.25" HSA 4/19/21 END: 4/19/21 SAMPLING METHOD: 3.25" HSA 4/19/21 END: 4/19/21 SAMPLING METHOD: 3.25" HSA MATERIAL DESCRIPTION BELEV. SPT SPT MATERIAL DESCRIPTION 920.4 DEPTHS RQD SPHALT AND 7.0" BASE (DRILLERS 920.4 DEPTHS RQD SPHALT AND 7.0" BASE (DRILLERS 918.5 1 1 1 SOME SAND, TRACE TO LITTLE GRAVEL, 918.5 6 5 6 5 BROWN AND BROWNISH GRAY SILT AND SOME SAND, TRACE TO LITTLE GRAVEL, 5 <td></td> <td></td> <td>Y RATI</td> <td>SA SA</td> <td></td> <td></td> <td></td> <td></td> <td></td>			Y RATI	SA SA					
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T: FRA-071/270-28.27/25.99A DRILLING FIRM / OPERATOR: SUBGRADE SAMPLING FIRM / LOGGER: N SUBGRADE SUBGRADE SAMPLING METHOD: 3. 105435 SFN: BRILLING METHOD: 3. 4/19/21 END: 4/19/21 SAMPLING METHOD: 3. 4/19/21 END: 4/19/21 SAMPLING METHOD: 3. MATERIAL DESCRIPTION BRULLING METHOD: 920.4 D MONDES AND NOTES 920.4 D SPHALT AND 7.0" BASE (DRILLERS 918.5 918.5 BROWN AND BROWNISH GRAY, SILT AND SILT AND 918.5 SOME SAND, TRACE TO LITTLE GRAVEL, 913.5 043.0	I.L / S	ASA.L	F	SH		° ∩ 	4	ري ر ا	o ►
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TT: FRA-071/270-28.27/25.99A SUBGRADE 105435 SFN: 4/19/21 END: 4/19/21 MATERIAL DESCRIPTION MATERIAL DESCRIPTION AND NOTES RIPTION) BROWN AND BROWNISH GRAY, SIL SOME SAND, TRACE TO LITTLE GRA	DERA	ה ככ כ	 Ö	ELE 920	918 818				912.9
TT: FRA-071/270-28.27/25.99A SUBGRADE 105435 SFN: 4/19/21 END: 4/19/21 MATERIAL DESCRIPTION MATERIAL DESCRIPTION AND NOTES RIPTION) BROWN AND BROWNISH GRAY, SIL SOME SAND, TRACE TO LITTLE GRA	IRM / C		METHO						
TT: FRA-071/270-28.27/25.99A SUBGRADE 105435 SFN: 4/19/21 END: 4/19/21 MATERIAL DESCRIPTION MATERIAL DESCRIPTION AND NOTES RIPTION) BROWN AND BROWNISH GRAY, SIL SOME SAND, TRACE TO LITTLE GRA									
PROJECT: FRA-071/270-28.27/25.99A TYPE: SUBGRADE PID: 105435 SFN: START: 4/19/21 END: 4/19/21 MATERIAL DESCRIPTION MATERIAL DESCRIPTION AND NOTES AND NOTES AND NOTES DESCRIPTION) HARD, BROWN AND BROWNISH GRAY, SII CLAY, SOME SAND, TRACE TO LITTLE GRA DAMP	DRILL	DRILL	SAMP			_T AN E ≜VEL,			
PROJECT: FRA-071/270-28.27/25.9 TYPE: SUBGRADE PID: 105435 SFN: 4/19/2 START: 4/19/21 END: 4/19/2 MATERIAL DESCRI MATERIAL DESCRI AND NOTES AND NOTES AND NOTES AND NOTES AND NOTES AND NOTES CLAY, SOME SAND, TRACE TO LITTI DAMP	9A			NOIL	LLERS	AY, SII -E GR/			
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PROJECT: FRA-071/27 TYPE: SUBG PID: 105435 SFN: START: 4/19/21 ENI MATEF MATEF MATEF DESCRIPTION) DESCRIPTION) HARD, BROWN AND BR CLAY, SOME SAND, TRA DAMP	0-28.2	UE V V V V		AND N	" BAS				
PROJECT: FRA- TYPE: JID: 105435 S START: 4/19/21 I6.0" ASPHALT A DESCRIPTION) HARD, BROWN AT CLAY, SOME SAN DAMP	071/27 SLIBG		EN	MATEF	ND 7.0	LD BR			
PROJECT: TYPE: JID: 10542 START: 4/ 16.0" ASPH DESCRIPTIC DESCRIPTIC DESCRIPTIC DESCRIPTIC DAMP	FRA-		1 È		ALT A NN)	WN AN E SAN			
PROJE	CT:	10543			ASPH. RIPTIC	, BRO			
	PROJE		START		16.0" DESC	HARD CLAY			

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. BORING OFFSET 25.0' SOUTH. ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

	PAGE	1 OF 1	BACK FILL			7 7 7 7	7 V F 7 V 7 V F 7 V 7 V F 7 V	
EXPLORATION ID			SO4 ppm	*****	393	1	-	
	ے م	42	ODOT CLASS (GI)		A-4a (5)	A-6a (5)	A-6b (V)	A-6b (V)
5' RT.		110						
92+14, 25'	RAMP M	0342, 4	ې د ري		9 12	11 12	- 13	- 14
92	RAME	40.11	ATTERBERG LL PL PI		17 9	16 1		
FSET:	017 4		ATTE		26	27		ı
N OF			6) (6)		25	25	•	ı
STATION / OFFSET:	ALIGNMENT: ELEVATION:	LAT / LONG:	GRADATION (%) cs Fs si		7 35	5 34	'	
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m	MATIC 12/E/10	81.7	GR GF		б	5		I
CME 45B	UTOM toM		(tsf)		4.50	4.50	3.75	2.25
ō		0 (%):	MPLE ID		SS-1	SS-2	SS-3	SS-4
		ENERGY RATIO (%):	REC SAMPLE (%) ID					
DRILL RIG:			N ₆₀ REC (%)		9 100	3 56	10 44	1 56
	1 C	〕 [0 29 11	23 8	0 4	5 11
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FRA-071/270-28.27/25.99A		4/19/21	MATERIAL DESCRIPTION AND NOTES	(DRIL	H GRA	r, sol	VIE FR	
-28.27	ADE		RIAL DESCRI AND NOTES	BASE	WNISF VEL, C		7 CLA	
71/270	SUBGRADE		ATERI. A.	D 6 <u>.</u> 0"	BRO GRA	TANE	SA2.(, SILT) /FI	Î
FRA-0		1ġ	W	LT AN	<u>IN ANI</u> TRACI	AMP N, SIL	GRAY GRAY	
	105435	3		(SPHA	BROW CLAY,	NG, D	STIFF, STIFF, STIFF,	
PROJECT:	τ Δ Δ	HH:		16.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	HARD, BROWN AND BROWNISH GRAY, SANDY SILT SOME CLAY, TRACE GRAVEL, CONTAINS IRON	ARD,	GRAVEL, CONTAINS A 2.0" STONE FRAGMENT, DAMP VERY STIFF, GRAY, SILTY CLAY , LITTLE TO SOME SAND 1 ITTI F GRAVFI DAMP	
	-				<u>5 92-75 8</u>	/	$\langle $	

		1 OF 1	BACK FILL	7 7 1 2 1		7 V F 7 ^ 7 L A 7 V F 7	V F 7 V F 7 V F 7	
EXPLORATION ID		 	SO4 ppm		293	ı	ı	ı
	; 	7.5 ft. 19798	ODOT CLASS (GI)		A-6a (8)	A-6a (6)	A-6a (V)	A-6a (V)
96+33, 44' RT	5	(<u>MSL)</u> EOB: 7.5 40 109798, 40 109798	c MC		13 /	14	15 /	15 /
96+33,	RAMP M	<u>918 6 (MSL)</u> EOB: 40 109798, 40			4	7		
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FFSE ⁻		1 1			32	29	•	•
STATION / OFFSET:	ALIGNMENT:	ELEVATION: LAT / LONG:	- CL (%)		30	7 28	•	1
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m	ATIC	12/5/19 81.7	0 8		œ	ര		
CME 45B	MOTU	8	(tsf)		4.50	4.50	4.50	4.50
Ð	CME AUTOMATIC	CALIBRATION DATE: ENERGY RATIO (%):	SAMPLE		SS-1	SS-2	SS-3	SS-4
ן <u>מ</u>	; ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;	KATION SY RAT	REC S/ (%)		100	100	100	100
DRILL RIG:	HAMMER:	NERO	ي ق		20	53	, 20	16
NEAS / J. LONG	NEAS / J. LONG	3.25" HSA SPT	DEPTHS SPT/ RQD		-2 -8 5 -3 -3 -10 -10 $-$	-3 -4 -4 -7 -10	2	
DRILLING FIRM / OPERATOR:	SAMPLING FIRM / LOGGER:	DRILLING METHOD: SAMPLING METHOD:	ELEV. 918.6		ME XX 916.6			911.1
FRA-071/270-28.27/25.99A	SUBGRADE	105435 SFN: 4/19/21 END: 4/19/21	MATERIAL DESCRIPTION AND NOTES	18.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	HARD, BROWN AND GRAY, SILT AND CLAY , SOME SAND, TRACE GRAVEL, DAMP			
PROJECT:	Ц Т Ч Б Е	PID: START:		18.0" DESC	HAR	5		

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RAMP M ISL) EO	10919	ERG PI		•	ЧZ	19		
	4	ATTERBERG LL PL PI		•	ďZ	19	•	
				•	ďZ	38	•	
ALIGNMENT: ELEVATION:	LAT / LONG	N (%) SI CL		•	14 4	39 36	-	
	LAT / I	GRADATION (%) cs fs si		1	00	4		
		cs cs		•	20	œ		
0MATIC 12/5/19	81.7	GR		•	54	ო	ı	
		(tsf)		•	ı	4.25	1	
HAMMER: CME AUTOMATIC CALIBRATION DATE: 12/5/19	ENERGY RATIO (%):	SAMPLE		SS-1	SS-2	SS-3	SS-4	
HAMMER	°G∕R	REC (%)		78	89	50	17	
HAMMER: CALIBRATI		N_{60}		16	12	11	10	
NEAS / J. LONG 3.25" HSA	SPT			3 5 3 5 1 6 0		3 4		
SAMPLING FIRM / LOGGER:	Ö	ELEV. 920.6	010 5		016.1		-0-0	
G FIRM , METHO	G METH							
DRILLING METHOD:	SAMPLING METHOD	-	<i>(</i> 0	MEDIUM DENSE, GRAY, GRAVEL AND STONE Fragments with Sand Little SILT TRACE CLAY		OME	CE SAND,	
	4/19/21	MATERIAL DESCRIPTION AND NOTES	18.0" ASPHALT AND 7.0" BASE (DRILLERS DESCRIPTION)	AND ST(DAMP	HARD, BROWN AND GRAY, SILTY CLAY , SOME SAND, TRACE GRAVEL, DAMP	LOOSE, GRAY, STONE FRAGMENTS , TRACE SAND TRACE SILT, TRACE CLAY, MOIST	
出	4	RIAL DESCRI AND NOTES	3ASE (AVEL	ASE, I	MP	MOIS	
SUBGRADE	ËND	TERIA AN	7.0" E	AY, GI	LARB	GRAY EL, DA	JE FR/ CLAY,	
SFN:		MA	r and	E, GR	RANU	I AND GRAVI	STON RACE	
136	4/19/21		PHAL TION)	DENS	LES G	ROWN	GRAY, ILT, Tİ	
TYPE: PID: 105	RT: 		0" ASI SCRIP		SEMB	В Б Н Ш	OSE, (4CE S	
TYPE:	START:		18. DE:	HR 8	RESEV (FILL)	SAN	TR/	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING, HOLE DID NOT CAVE, BORING OFFSET 25.0' NORTH. ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

66.35.75.85.075.170.487-725.99 ODD LOG WI SULFATES (8.5.7.1.7.10.487-727.074) SOLE PROJECTS/PROJECTS/PROJECTS/P

Decl: FRA-U/1/1/2/0-28.2/1/2.0-28.2/1/2.0-28.2/1/2.0-28.4 Diametric indication Diametric indiametric indication Diametric indicatio	-21 IC	PAGE	1 OF 1	BACK FILL		7 VF	7 V F 7	VF7 V/7 V/7	× × × ×
T: FRA-071/270-28.27/25.99A DRILLING FIRM / OPERATOR: NEAS / J. LONG DRILL RIG: CME 45B STATION / OFFSET: 103+52, 22' LT. 105435 SI SUBGRADE ALIGNMENT: ALIGNMENT: RAMP M ERAMP ERAMP <td< td=""><td>EXPLORATION ID B-023-0-21</td><td></td><td>-</td><td>SO4 ppm</td><td></td><td>533</td><td></td><td>ı</td><td>ı</td></td<>	EXPLORATION ID B-023-0-21		-	SO4 ppm		533		ı	ı
T: FRA-071/270-28.271/25.09A DRILLING FIRM / OPERATOR: NEAS / J. LONG DRILL RIG: CME 45B STATION / OFFSET: 103+52, 22' SUBGRADE SAMPLING FIRM / LOGGER: NEAS / J. LONG HAMMER: CME 41B ALIGNMENT: RAMP M 105435 SFN: J J J ALIGNMENT: RAMP M RAMP M 105435 SFN: J		7.5 ft.	108675	ODOT CLASS (GI)		A-6b (V)	A-6b (7)	A-6b (V)	A-6a (2)
TTI	5		75, 40.1			14	16	7	ი
TTI	103+(RAME	EL 1	0.1086	BERG		•	9 16	I	41
T: FRA-071/270-28.27/25.99A DRILLING FIRM / OPERATOR: NEAS / J. LONG DRILL RIG: CME 45B STATION / OFF SUBGRADE SAMPLING FIRM / LOGGER: NEAS / J. LONG HAMMER: CME 41B ALIGNMENT: 105435 SFN: DRILLING METHOD: 3.25" HSA CALIBRATION DATE: 12/5/19 ELEVATION: 105435 SFN: MATERIAL DESCRIPTION BRILING METHOD: 3.25" HSA CALIBRATION DATE: 12/5/19 ELEVATION: 4/19/21 END: 4/19/21 END 81.7 LAT / LONG: ELEVATION: MATERIAL DESCRIPTION ELEV. DEPTHS RPT N ₁₀ REC SAMPLE HP GRADATION: MATERIAL DESCRIPTION ELEV. DEPTHS RDD N ₁₀ (%) ID (%) ID (%) ID	SET:	323.6 (1	4				35 19	•	32 18
TT. FRA-071/270-28.27/25.99A DRILLING FIRM / OPERATOR: NEAS / J. LONG DRILL RIG: CME 45B SUBGRADE SAMPLING FIRM / LOGGER: NEAS / J. LONG HAMMER: CME 41B 105435 SFN: DRILLING METHOD: 3.25" HSA CALIBRATION DATE: 12/5/19 4/19/21 END: 4/19/21 SAMPLING METHOD: 3.25" HSA CALIBRATION DATE: 12/5/19 MATERIAL DESCRIPTION ELEV. DEPTHS SPT Nio REC SAMPLE HP GRAD AND NOTES 923.6 DEPTHS ROD 0%0 ID (tst) GR ID GR	/ OFF:	<u>'</u>	ЧС:	ы		ı	27	•	16
TT. FRA-071/270-28.27/25.99A DRILLING FIRM / OPERATOR: NEAS / J. LONG DRILL RIG: CME 45B SUBGRADE SAMPLING FIRM / LOGGER: NEAS / J. LONG HAMMER: CME 41B 105435 SFN: DRILLING METHOD: 3.25" HSA CALIBRATION DATE: 12/5/19 4/19/21 END: 4/19/21 SAMPLING METHOD: 3.25" HSA CALIBRATION DATE: 12/5/19 MATERIAL DESCRIPTION ELEV. DEPTHS SPT Nio REC SAMPLE HP GRAD AND NOTES 923.6 DEPTHS ROD 0%0 ID (tst) GR ID GR		EVATIO	T / LO	NO (%		I	31	I	22
TT. FRA-071/270-28.27/25.99A DRILLING FIRM / OPERATOR: NEAS / J. LONG DRILL RIG: CME 45B SUBGRADE SAMPLING FIRM / LOGGER: NEAS / J. LONG HAMMER: CME 4100 105435 SFN: 3.25° HSA CALIBRATION DATE: 12/5/1 105435 SFN: 3.25° HSA CALIBRATION DATE: 12/5/1 105435 SFN: 3.25° HSA CALIBRATION DATE: 12/5/1 4/19/21 END: 4/19/21 ENECY RATIO (%): 81.7 MATERIAL DESCRIPTION ELEV. DEPTHS SPTI Ne RC SAMPLE P SPHALT AND 5.0" BASE (DRILLERS Y DEPTHS P Y </td <td>ST</td> <td><u> </u> </td> <td>_ LA</td> <td>ADATI s Fs</td> <td></td> <td>י ו</td> <td>16 13</td> <td>•</td> <td>15 7</td>	ST	<u> </u>	_ LA	ADATI s Fs		י ו	16 13	•	15 7
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TT. FRA-071/270-28.27/25.99A DRILLING FIRM / OPERATOR: NEAS / J. LONG DRILL RIG: SUBGRADE SAMPLING FIRM / LOGGER: NEAS / J. LONG HAMMER: 105435 SFN: 3.25" HSA CALIBRATION 4/19/21 END: 4/19/21 SAMPLING METHOD: 3.25" HSA 4/19/21 END: 4/19/21 SAMPLING METHOD: 3.25" HSA MATERIAL DESCRIPTION ELEV. DEPTHS ROD % SPHALT AND 5.0" BASE (DRILLERS Y H RC SAM	ME 45E	12/	òO			4.50	4.50	4.25	
TT. FRA-071/270-28.27/25.99A DRILLING FIRM / OPERATOR: NEAS / J. LONG SUBGRADE SAMPLING FIRM / LOGGER: NEAS / J. LONG 105435 SFN: 3.25" HSA 4/19/21 END: 4/19/21 SAMPLING METHOD: 4/19/21 END: 4/19/21 SPATHOD: ABATERIAL DESCRIPTION ELEV. DEPTHS SPT SAMPLING METHOD: 923.6 DEPTHS RQD		DATE	0 (%): 	MPLE		SS-1	SS-2	SS-3	SS-4
TT. FRA-071/270-28.27/25.99A DRILLING FIRM / OPERATOR: NEAS / J. LONG SUBGRADE SAMPLING FIRM / LOGGER: NEAS / J. LONG 105435 SFN: 3.25" HSA 4/19/21 END: 4/19/21 SAMPLING METHOD: 4/19/21 END: 4/19/21 SPATHOD: ABATERIAL DESCRIPTION ELEV. DEPTHS SPT SAMPLING METHOD: 923.6 DEPTHS RQD	Ü ü		Y RATI	EC SA %)		89 8	100	67 5	44
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TT: FRA-071/270-28.27/25.99A DRILLING FIRM / OPERATOR: SUBGRADE SAMPLING FIRM / LOGGER: T SUBGRADE SAMPLING RETHOD: 3. 105435 SFN: DRILLING METHOD: 4/19/21 END: 4/19/21 AMPLING METHOD: 3. 4/19/21 END: 4/19/21 AMD NOTES 923.6 C SPHALT AND 5.0" BASE (DRILLERS X	EAS / J	5" HSA	SPT	PTHS	_ 1 1 1				
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T: FRA-071/270-28.27/25.99A SUBGRADE 105435 SFN: 4/19/21 4/19/21 END: 4/19/21 MATERIAL DESCRIPTION AND NOTES SPHALT AND 5.0" BASE (DRILLERS			THOD:	шб		» 31111		ര 	6
T: FRA-071/270-28.27/25.99A SUBGRADE 105435 SFN: 4/19/21 4/19/21 END: 4/19/21 MATERIAL DESCRIPTION AND NOTES SPHALT AND 5.0" BASE (DRILLERS	G FIRN	G METI	IG ME		XXX)				S
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)T: FRA 105435 (4/19/21 SPHALT A			S/	lion	ERS	HARD, BROWN AND GRAY, SILTY CLAY , SOME SAND. LITTLE GRAVEL AND STONE FRAGMENTS.	MP		
)T: FRA 105435 (4/19/21 SPHALT A	/25		/19/21	SCRIP	(DRILL	TY CLA	NG, DA		N, SILT ME SAI
)T: FRA 105435 (4/19/21 SPHALT A	-28.27			AL DE ND NC	BASE	X, SILT	STAINI		SROWI S, SOI
)T: FRA 105435 (4/19/21 SPHALT A	71/270	ž Z	END	IATERI A	ID 5.0"	D GRA	RON		
PROJECT:	FRA-0		9/21	W	LT AN	VN AN E GRA	RACE		GRAY E FRAG
PROJE	CT	10543			ASPH/ RIPTIO	BRO	AINST		STIFF
цнцој (*		i i E E	START		18.0" DESC	HARD	CONT		VERY AND

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ON ID 21	PAGE	1 OF 1	BACK FILL	V V V V V V V V V V	7 V F -	7 2 2 7 2 7 2 7 2 7 2 7 2 7 2 7 2 7 2 7	VF7V 7177 VF7V	1 ~ 7 7 ~ 7 7 ~ 7	
EXPLORATION ID B-024-0-21		-	SO4 ppm		ı	1967	I		
BEXPL	75ft				S		(2)	\$	
	~	40 107974, 40 107974	ODOT CLASS (GI)		A-6b (V)	A-4a (5)	A-4a (5)	A-4a (V)	
<u>,</u>	i iii	40.1	NC NC		16	7	10	10	
107+35, 10 ['] RAMP M	925.6 (MSL) EOB:	07974			•	6	თ	•	
	e (MSI	40.1	ATTERBERG			16	16	•	
STATION / OFFSET: ALIGNMENT:	925.0		LL ATT		I	26	25	ı	
N / OF	ž	:ÖNG	CL %)		•	25	22	•	
STATION / OF ALIGNMENT:	ELEVATION:	LAT / LONG:	GRADATION (%) cs fs si		•	3 37	38	•	
S A	: 一 一		RADATIC cs Fs		י ו	11 16	12 16	•	
ATIC .	12/5/19	81.7	GR GR			7	12	1	
CME 45B CME AUTOMATIC	12/	ò	fs)		4.50	4.50	4.50	4.50	
	Ц Ц Ц	(%)							
		ATIO	REC SAMPLE (%) ID		SS-1	SS-2	SS-3	SS-4	
drill rig: Hammer:	CALIBRATION DATE:	ENERGY RATIO (%):	REC (%)		100	100	100	100	
DRILI	CALIE	ENEF	N ₆₀		22	26	29	35	
0			SPT/ RQD	u	15 6 10	8	13 10 11	12 12 14	
								0 7 7	
NEAS / J. LONG NEAS / J. LONG	3.25" HSA	SPT	DEPTHS		1.1				
빌빌	3.25	0,	DEF						
TOR: ER:	 ; 		> º		<u>ი</u> 0			-	
PERA LOGG		ö	ELEV. 925.6		923.5 922.6			918 <u>.</u> 1	
N / MZ	IOHT	IETHO			8111				
DRILLING FIRM / OPERATOR: SAMPLING FIRM / LOGGER:	DRILLING METHOD:	SAMPLING METHOD:]			
orilli Sampl	BILLI	AMPL			ME				
	 	0) 	NOL	ERS	Y, SOI	AND			
25.99A		4/19/21	CRIPI	DRILL	Y CLA	RAY, S			
0E	ļ	4/	RIAL DESCRI AND NOTES	ASE (SILT MP	EL DA			
071/270-28.2 SUBGRADE		ËND	MATERIAL DESCRIPTION AND NOTES	18.0" ASPHALT AND 7.0" BASE (DRILLERS DESCRIPTION)	HARD, BROWN AND GRAY, SILTY CLAY , SOME SAND 11TTI F GRAVEL DAMP	HARD, GRAY AND BROWNISH GRAY, SANDY SILT, SOME CLAY, LITTLE GRAVEL, DAMP			
FRA-071/270-28.27/25.99A SUBGRADE	SFN:	- 1	MA	AND	AND (ND BR			
	435	4/19/21		HALT ION)		× Ar X, LL			
PROJECT: TYPE:	105435	START:		" ASP CRIPT	D, BR	E CH			
PROJE TYPE:		ц		ဂုလ္		ାଝ୍⊇			

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH, SHOVELED SOIL CUTTINGS

66.85-75.85-072-170-A97-105-101 DOI CO HO - (11 X 2.8) AUTOR DO CO HO - (11 X 2.8) AUTOR DO TO CO HO - (11 X 2.8) AUTOR DO AUTOR DO TO CO HO - (11 X 2.8) AUTOR DO AUTOR

EXPLORATION ID	21		5	BACK FILL	×~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	7 V F 7	× 	V F 7 V V F 7 V V F 7 V	717
ORAT	-025-0-		-	SO4 ppm		•	1227	1	1
ЦХЦ		7.5 ft	10	ODOT CLASS (GI)		A-4a (V)	A-4a (5)	A-4a (5)	A-4a (V)
, LT.		; ;;	40.107701,40.107701						
1010+99, LT			101,	PI RG		- 10	10 13	9 13	- 13
Ę	RA	935.5 (MSL)	40.10	ATTERBERG		•	15 1	15	
FSET:		935.5				1	25	24	I
STATION / OFFSEI	IENT:		IJZ Z	%) (%		•	23	24	I
TATIO	ALIGNMENT:	ELEVATION:	LAT / LONG:	GRADATION (%) cs fs si		•	17 39	17 38	1 1
<u>ہ</u>	<	ш. 		RADA1 cs F			1	13 1	•
ш	IATIC	12/5/19	81.7	<u>6</u>		1	10	ω	I
CME 45B	5			(tsf)		4.50	2.50	3.75	4.00
0	CME AUTOMATIC	CALIBRATION DATE:	0 (%):	MPLE ID		SS-1	SS-2	SS-3	SS-4
<u>ö</u>			ENERGY RAIIO (%):	REC SAMPLE (%) ID		100			
DRILL RIG:	HAMMER:	ALIBRV ii I BRV	ERG.	N ₆₀ REC (%)		14 10	5 72	8 44	10 3
ō	Î 	ට i 	-	SPT/ ROD N		m	~	<i>т</i>	4
ONG.	ONG			ч С С С	u		2 7	3 3	3
NEAS / J. LONG	NEAS / J. LONG	AS -		R		∾ 0		یں ر ا	
NEA	NEAS	3.25" HSA	L L L S L L S	DEPTHS					
OR:						•			
PERAT	OGGE		i i	ELEV 935.5	1 20	4.005			928.0
RM / OF	RM / L		ELHO						
NG FIR	NG FI		NG N			Ŋ			
DRILLING FIRM / OPERATOR:	SAMPLING FIRM / LOGGER:	DRILLING METHOD:	SAMPLING METHOD:			COMII AVEL.			
				NOIL	ERS	VERY STIFF TO HARD, BROWNISH GRAY BECOMING GRAY. SANDY SILT. SOME CLAY. TRACE GRAVEL.			
FRA-071/270-28.27/25.99A			4/19/21	MATERIAL DESCRIPTION AND NOTES	17.0" ASPHALT AND 8.0" BASE (DRILLERS DESCRIPTION)	SH GF			
-28.27	ADE		4	RIAL DESCRI AND NOTES	BASE				
71/270	SUBGRADE	! i z i	END:	ATERI. A	D 8.0"	RD, BF			
-RA-0			4/19/21	W	LT AN	TO HAI			
		105435	4/1		SPHAI	SAND			
PROJECT:	άi		SIARI:		7.0" A DESCR	ERY S	AMP		

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

	21	PAGE	1 OF 1	BACK FILL	×× × ×	7 V V 7	V V V V V V V V V V V V V V V V V V V	VF7 2 2 VF7 V 7 7 7	1 L Z Z
ORAT	B-026-0-21	<u>م</u>	-	SO4 ppm		673	ı	ı	ı
		7.5 ft	08377	ODOT CLASS (GI)		A-6a (9)	A-6a (9)	A-6a (V)	A-6a (V)
1018-06 17'IT	5 - -	і Ю	40.108377, 40.108377	wc		17	19	13	17
01010	RAMP P	928.1 (MSL) EOB:	10837			15	14	ı	
		1 (MS	40.	ATTERBERG		17	19	I	ı
		928.		ATT		32	g	I	ı
CTATION / DEFCET.	ALIGNMENT:	NOL	: DNG	сг %)		32	33	'	'
		ELEVATION:	LAT / LONG:	GRADATION (%)		37	88	'	•
5				ADATIC s Fs		9 16	4	'	
	PE	5/19	2	GRAI GR CS		9	6 9	'	-
	CME AUTOMATIC	12/5/19	81.7	(tsf)			3.75	3.50	2.50
		」 ビ	%):						
	0 N	CALIBRATION DATE:		REC SAMPLE (%) ID		SS-1	SS-2	SS-3	SS-4
		RATIC	ENERGY RATIO (%):	REC (%)		83	89	39	44
	HAMMER:	CALIE	ENER	$N_{_{60}}$		8	9	5	5
				SPT/ RQD		en en	о 4	5	2
	NEAS / J. LONG			이면	1			1	
10	1 Γ / S	ASH	F	SH		° ∩	4	ις Ι	0 ~
	NEA	3.25" HSA	SPT	DEPTHS					((
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				ELEV 928 1	0.26.0	920.0			920 <u>.</u> 6
		HOD	THO						
	S FIR	B MET	G ME						
Dell'INC FIEM / OBEDATOD:	SAMPLING FIRM / LOGGER:	DRILLING METHOD:	SAMPLING METHOD:			SILT			
	SAN	R	SAN	N	S	RAY, S LE GF			
V 00			21	MATERIAL DESCRIPTION AND NOTES	16.0" ASPHALT AND 9.0" BASE (DRILLERS DESCRIPTION)	VERY STIFF, BROWN AND BROWNISH GRAY, SILT AND CLAY , SOME SAND, TRACE TO LITTLE GRAVEL,			
7105 0			4/19/21	IOTES	E (DR				
	ADE 3		ö	RIAL DESCRI	" BAS	UD BR			
EDA 071/070 08 07/06 000	SUBGRADE	SFN:	END:	IATER ,	10 9 0	VN AN SAND			
			4/19/21	5	LT AN	BROV			
		105435	4/1		SPHA IPTIO	AY, S			
DDO IECT.	TYPE:		START:		S.0" A	ND CL	AMP		
		ЫĊ							

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE. ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

66.35-72.82-072-170-A97-102-000 MI SULFATES (82-072-170-267-170-267-170-267-102-2010) A CONTOR SOL PROJECTOR SOL PRO

	PAGE	1 OF 1	BACK FILL		7 V V V V V V V V	7 V V 7	7 7 7 7 7 7 7 7 7 7	r 7 V 1 / 7 / 1 / 7 /
EXPLORATION ID		-	SO4 ppm		ı	807	I	ı
	754	09351	ODOT CLASS (GI)		A-2-4 (0)	A-6a (4)	A-6a (V)	A-6a (V)
1022+01, 52' LT	Ь Р FOB:	40.109351, 40.109351	MC 0		10 /	12	16	4
0+220	SL) FO	09351			đ	4	1	ı
	RAMI 913.7 (MSL)	40.1	ATTERBERG LL PL PI		٩	20	ı	I
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IO / N		: SNG:	%) (CL		14	51	1	•
STATION / OFFSET:	ALIGNMENT: FLEVATION:	LAT / LONG:	GRADATION (%) CS FS SI		3 19	8 27	-	
<u>م:</u> ا	₹ ⊡ 		RADATIC CS FS		14 8	14		
	12/5/19	2	GR GR		45 1	30		
CME 45B	CME AUTOMATIC DATE: 12/5/19	81.7	(tsf)		• •	•		1
CM						2	e S	4
		ENERGY RATIO (%):	SAMPLE		SS-1	SS-2	SS-3	SS-4
DRILL RIG:	HAMMER: CALIBRATI	RGY I	REC (%)		28	100	78	56
DR	HAN NO		2 ⁶⁰		2	19	8 /	7 18
Ŋ	υ		SPT/ RQD		л о о	3 7	758	6 6 7
NEAS / J. LONG	NEAS / J. LONG 1.25" HSA				7	ν 4	ں ی ا	0 7
EAS /	3 25" HSA	SPT	DEPTHS		<u> </u>			
	33 J		В					((
DRILLING FIRM / OPERATOR:	GER		ELEV. 913.7	1	911.7 910.7			906.2
OPER	, LOG		년 9 1 1 2					0 0
IRM /	AFTHA METHA	METH						
-ING F	SAMPLING FIRM / LOGGER: DRILLING METHOD:	SAMPLING METHOD					0	
DRILL	SAMF	SAMF			SAND	-	ND"	
A			NOILe	LERS	WITH SPHAS		TO "P	
/25.99A		4/19/21	SCRII	(DRIL			SOME ND, C	i 5
28.27.	ЪП		RIAL DESCRI AND NOTES	BASE			AE SA	
FRA-071/270-28.27/25.	SUBGRADE	END	MATERIAL DESCRIPTION AND NOTES	0.8	NE FR		S, SOM]
RA-07	SFN	/21	Ŵ	T ANI	STO	DAMF	SILT / MENT: DR H	5
	105435	4/19/21			GRAY	ENTS	RAY RAG	
PROJECT:	úi .	HH H		16.0" ASPHALT AND 8.0" BASE (DRILLERS DESCRIPTION)	NOSE,	FRAGMENTS, DAMP	STIFF, GRAY, SILT AND CLAY , SOME TO "AND" STONE FRAGMENTS, SOME SAND, CONTAINS NO INTACT SOIL FOR HD READINGS, DAMP	2
	äd L							



OHIO DEPARTMENT OF TRANSPORTATION

FRA-071/270-28.27	105435	5/12/2021	NEAS Inc.	L. Rosenbeck
Project C-R-S:	PID No:	Report Date:	Consultant:	Technician:

	Sulfate	Content	(mdd)	233	400	100	20	260	580	1147	4267	>8000	5767	440	220	1433	4767	2300	3767	193	213	633	393	293
		3	Reading	12	20	5	1	13	26	62	40	>80	56	22	10	14	45	20	39	8	11	35	20	15
	ngs	ation 3		20	20	20	20	20	20	20	100	100	100	20	20	100	100	100	100	20	20	20	20	20
	Replicate Sample Readings	2	Reading	12	21	5	1	14	29	58	42	>80	56	22	14	15	45	22	35	10	11	32	20	15
	olicate San	2	Dilution	20	20	20	20	20	20	20	100	100	100	20	20	100	100	100	100	20	20	20	20	20
	Rep	1	Reading	11	19	5	1	12	32	52	46	>80	61	22	6	14	53	27	39	11	10	28	19	14
		、 '	Dilution	20	20	20	20	20	20	20	100	100	100	20	20	100	100	100	100	20	20	20	20	20
	Snaking	Time	(hr)	17.1	17.1	17.1	17.1	17.1	18.1	18.2	18.1	16.3	16.3	16.3	16.3	16.3	21.25	21.25	21.25	21.25	21.25	21.25	16.4	16.4
ĺ		Elevation			914.113	913.661	911.111	908.243	902.988	899.363	895.22	890.984	887.8	885.897	886.806	889.171	891.613	894.132	896.565	808.808	921.592	920.357	917.375	918.563
		& Longitude or State	dinates	-82.977651	-82.976900	-82.976279	-82.975669	-82.975211	-82.974503	-82.974071	-82.973656	-82.973248	-82.972942	-82.972642	-82.972399	-82.972200	-82.972045	-82.971942	-82.971865	-82.971739	-82.989002	-82.987640	-82.986326	-82.985064
		Latitude & Longi	Plane Coordinates	40.110037	40.111052	40.112010	40.112998	40.113975	40.115133	40.116108	40.117174	40.118246	40.119281	40.120386	40.121451	40.122537	40.123658	40.124754	40.125854	40.126945	40.110560	40.110619	40.110342	40.109798
		Offset		33.64' RT.	48.74' RT.	46.29' RT	49.14' RT	27.13' RT	59.05' RT	56.17' RT	50.43' RT	55.74' RT	49.53' RT	48.88' RT	48.74' RT	47.78' RT	46.26' RT	44.65' RT	43.68' RT	56.43' RT	16.59' RT	26.22' LT	24.92' RT	43.71' RT
		Station		130+13.45	134+38.61	138+27.06	142+23.72	146+00.36	150+63.61	154+37.05	158+40.65	162+45.49	166+30.55	170+40.03	174+32.33	178+30.59	182+39.72	186+38.44	190+39.61	194+38.28	84+54.58	88+33.68	92+14.25	96+33.42
	Boring ID & Sample #			B-001-0-21 SS-2	B-002-0-21 SS-1	B-003-0-21 SS-3	B-004-0-21 SS-2	B-005-0-21 SS-2	B-006-0-21 SS-1	B-007-0-21 SS-1	B-008-0-21 SS-1	B-009-0-21 SS-1	B-010-0-21 SS-2	B-011-0-21 SS-2	B-012-0-21 SS-2	B-013-0-21 SS-2	B-014-0-21 SS-1	B-015-0-21 SS-2	B-016-0-21 SS-2	B-017-0-21 SS-1	B-018-0-21 SS-1	B-019-0-21 SS-1	B-020-0-21 SS-1	B-021-0-21 SS-1

240	533	1967	1227	673	807
12	27	20	31	33	37
20	20	100	40	20	20
12	27	16	31	33	46
20	20	100	40	20	20
12	26	23	30	35	38
20	20	100	40	20	20
16.4	16.4	16.3	16.4	16.4	16.4
920.637	923.572	925.586	935.545	928.067	913.74
-82.984109	-82.982948	-82.981926	-82.980661	-82.978429	-82.977947
40.109199	40.108675	40.107974	40.107701	40.108377	40.109351
42.93' RT	22.33' LT	9.60' LT	CL	16.63' LT	52.46' LT
99+80.90 42.93' RT	103+52.16	107+35.10	1010+98.56	1018+05.87	1022+01.45
B-022-0-21 SS-3	B-023-0-21 SS-1	B-024-0-21 SS-2	B-025-0-21 SS-2	B-026-0-21 SS-1	B-027-0-21 SS-2

Core Photo: X-001-0-21



		4	18.75	Remarks							
	ion	7	18	ickness (in)	Brick					M/ A	
	Core Information	u):	(in):	Core Composition & Thickness (in)	Concrete					Z	
ζ	CO	Core Diameter (in):	Core Total Length (in):	Core Comp	Asphalt	10	8.75				
		Core	Core 7	Layers		1	2	3	4	Rebar	Encountered

40.107653 -82.979486 Latitude: Longitude

105435 4/21/2021 MJ N/A Taken By: Scale: Date:

NEAS Project No.:

Roadway Project FRA-71/270



Pavement & Core Photo Log

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40.113628	-82.975595
Latitude:	Longitude

105435	4/21/2021	MJ	N/A	
NEAS Project No.:	Date:	Taken By:	Scale:	

Roadway Project FRA-71/270



Pavement & Core Photo Log

Core Photo: X-003-0-21



	4	16.5	Remarks							
u		16	ickness (in)	Brick					NI/ A	A/
Core Information	u):	(in):	Core Composition & Thickness (in)	Concrete					Z	L N
C	Core Diameter (in):	Core Total Length (in):	Core Comp	Asphalt	1.5	15				
	Core	Core 1	Layers		1	2	3	4	Rebar	Encountered

Latitude: 40.120010 Longitude -82.973021

NEAS Project No.: Date: Taken By: Scale:

105435 4/21/2021 MJ N/A

Roadway Project FRA-71/270

Pavement & Core Photo Log



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Core Photo: X-004-0-21



	4	17	Remarks							
u		1	ickness (in)	Brick					N/A	H
Core Information	n):	(in):	Core Composition & Thickness (in)	Concrete						N T
Co	Core Diameter (in):	Core Total Length (in):	Core Comp	Asphalt	3.5	5	8.5			
	Core	Core 1	Layers		1	2	3	4	Rebar	Encountered

40.125285 -82.972180 Longitude _ Latitude:

105435 4/21/2021 MJ N/A Taken By: Scale: Date:

Roadway Project FRA-71/270

NEAS Project No.:



Pavement & Core Photo Log

Core Photo: X-005-0-21



	4	16.5	Remarks							
u		10	ckness (in)	Brick					N/A	
Core Information	u):	(in):	Core Composition & Thickness (in)	Concrete					Z	F 1
C	Core Diameter (in):	Core Total Length (in):	Core Comp	Asphalt	1.5	15				
	Core	Core 1	Layers		1	2	3	4	Rebar	Encountered

 Latitude:
 40.111052

 Longitude
 -82.976900

Pavement & Core Photo Log



Roadway Project

FRA-71/270

NEAS Project No.: 105435 Date: 4/21/2021 Taken By: MJ Scale: N/A

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	4	18	Remarks						
n			ickness (in)	Brick					N/A
Core Information	n):	(in):	Core Composition & Thickness (in)	Concrete					N
Co	Core Diameter (in):	Core Total Length (in):	Core Comp	Asphalt	2	3.25	4.25	8.5	
	Core	Core ⁷	Layers		1	2	3	4	Rebar Encountered

40.118246 -82.973248 Longitude_ Latitude:

105435 4/21/2021 MJ N/A Date: Taken By: Scale:

Roadway Project FRA-71/270

Pavement & Core Photo Log

NEAS Project No.:



Core Photo: X-007-0-21



	4	14.75	Remarks							
u		14,	ickness (in)	Brick					N1/ A	A/
Core Information	u):	(in):	Core Composition & Thickness (in)	Concrete						1
C	Core Diameter (in):	Core Total Length (in):	Core Comp	Asphalt	3.5	4.5	6.75			
	Core	Core 1	Layers		1	2	3	4	Rebar	Encountered

Latitude: 40.125854 Longitude -82.971865

Pavement & Core Photo Log



Roadway Project NEA9 FRA-71/270

NEAS Project No.: 105435 Date: 4/21/2021 Taken By: MJ Scale: N/A

APPENDIX C

GEOTECHNICAL BULLETIN 1 (GB1) ANALYSIS SPREADSHEETS



OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES Geotechnical Bulletin GB1

FRA-071/270-28.27/25.99A

105435

Adding a ramp lane along I-270 Eastbound to I-71 Northbound ramp

NEAS, INC.

Prepared By: ZM Date prepared: Sunday, October 10, 2021

Chunmei (Melinda) He, Ph.D, P.E. 2800 Corporate Exchange Drive Suite 240 Columbus, OH, 43231

614-714-0299 che@neasinc.com

NO. OF BORINGS:

27

.5	1/1

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-001-0-21	I-71	130+13	34	RT	CME 45B	82	913.0	911.0	2.1 C
2	B-002-0-21	I-71	134+39	49	RT	CME 45B	82	914.1	912.1	2.1 C
3	B-003-0-21	I-71	138+27	46	RT	CME 45B	82	913.7	911.6	2.1 C
4	B-004-0-21	I-71	142+24	49	RT	CME 45B	82	911.1	909.0	2.1 C
5	B-005-0-21	I-71	146+00	27	RT	CME 45B	82	908.2	906.2	2.1 C
6	B-006-0-21	I-71	150+64	59	RT	CME 45B	82	903.0	900.9	2.1 C
7	B-007-0-21	I-71	154+37	56	RT	CME 45B	82	899.4	897.3	2.1 C
8	B-008-0-21	I-71	158+41	50	RT	CME 45B	82	895.2	893.2	2.1 C
9	B-009-0-21	I-71	162+45	56	RT	CME 45B	82	891.0	888.9	2.1 C
10	B-010-0-21	I-71	166+31	50	RT	CME 45B	82	887.8	885.7	2.1 C
11	B-011-0-21	I-71	170+40	49	RT	CME 45B	82	885.9	883.8	2.1 C
12	B-012-0-21	I-71	174+32	49	RT	CME 45B	82	886.8	884.7	2.1 C
13	B-013-0-21	I-71	178+31	48	RT	CME 45B	82	889.2	887.1	2.1 C
14	B-014-0-21	I-71	182+40	46	RT	CME 45B	82	891.6	889.6	2.1 C
15	B-015-0-21	I-71	186+38	45	RT	CME 45B	82	894.1	892.1	2.1 C
16	B-016-0-21	I-71	190+40	44	RT	CME 45B	82	896.6	894.5	2.1 C
17	B-017-0-21	I-71	194+38	56	RT	CME 45B	82	898.8	896.7	2.1 C
18	B-018-0-21	Ramp M	84+55	17	RT	CME 45B	82	921.6	920.0	1.5 C
19	B-019-0-21	Ramp M	88+34	26	LT	CME 45B	82	920.4	917.7	2.6 C
20	B-020-0-21	Ramp M	92+14	25	RT	CME 45B	82	917.4	915.5	1.9 C
21	B-021-0-21	Ramp M	96+33	44	RT	CME 45B	82	918.6	916.0	2.5 C
22	B-022-0-21	Ramp M	99+81	43	RT	CME 45B	82	920.6	918.7	2.0 C
23	B-023-0-21	Ramp M	103+52	22	LT	CME 45B	82	923.6	921.5	2.1 C
24	B-024-0-21	Ramp M	107+35	10	LT	CME 45B	82	925.6	924.7	0.9 C
25	B-025-0-21	Ramp P	1010+99	0	LT	CME 45B	82	935.5	933.1	2.4 C
26	B-026-0-21	Ramp P	1018+06	17	LT	CME 45B	82	928.1	926.0	2.1 C
27	B-027-0-21	Ramp P	1022+01	52	LT	CME 45B	82	913.7	912.0	1.7 C

#	Boring	Sample	Sample Depth	ple th	Subgrade Depth		Standard Penetration		ЧH		Physic	Physical Chara	acteristics	S	ğ	Moisture	Ohio DOT	рот	Sulfate	Problem	ε	Excavate and Replace (Item 204)	ace Recommendation
			From	ToF	From	To	N ₆₀ N	-	(tsf) L	IL PL	Ы	% Silt	% Clay	N P200	0 M _c	М _{орт}	Class	ß	(ppm)	Unsuitable	Unstable	Unsuitable Unstable	
	В	SS-1	1.5				19				_	24	15	39	_	11	A-4a	1					
	001-0	SS-2	3.0	4.5			20	4		39 19	9 20		41	84		16	A-6b	12	233		Mc		
	21	SS-3	4.5	6.0	2.4	3.9	29	4	4.5	_					18 18	16	A-6b	16					
		SS-4	6.0		_	_	26	19 <mark>3</mark> .	3.75						25	16	A-6b	16					
	В	SS-1	1.5	3.0	-0.6	0.9	27	4	4.5 2	27 17	7 10	39	27	99	13	12	A-4a	9	400				
	002-0	SS-2	3.0	4.5	0.9	2.4	19	4	4.5 2	28 17	7 11	35	22	57	11	14	A-6a	5					
	21	SS-3	4.5	6.0	2.4	3.9	15	4	4.5						19	14	A-6a	10					
		SS-4	6.0	7.5		5.4	11	11 <mark>2.</mark>	2.75						21	18	A-7-6	16					
	В	SS-1	1.5	3.0	-0.6	0.9	35		H	_					б	9	A-1-a	0					
	003-0	SS-2	3.0	4.5	0.9	2.4	30		2	NP NP	o NP	9	2	8	4	6	A-1-a	0					
	21	SS-3	4.5	6.0	2.4	3.9	18	2.	2.75 3	32 18	3 14	34	29	63	18	14	A-6a	7	100				
		SS-4	6.0	7.5	3.9	5.4	22	18 <mark>2.</mark>	2.25						21	14	A-6a	10					
	В	SS-1	1.5	3.0	-0.6	0.9	60								6	9	A-1-b	0					
	004-0	SS-2	3.0	4.5	0.9	2.4	35	4	4.5 3	34 19	9 15	40	33	73	17	14	A-6a	10	20		Mc		
	21	SS-3	4.5	6.0	2.4	3.9	29	m	3.5 3	32 17	7 15	36	32	68	16	14	A-6a	6					
		SS-4	6.0	7.5	3.9	5.4	25	25 3	3.5						24	18	A-7-6	16					
	В	SS-1	1.5	3.0	-0.6	0.9	35								∞	9	A-1-b	0					
	005-0	SS-2	3.0	4.5	0.9	2.4	23	4	4.5 2	26 17	6 /	34	22	56	14	12	A-4a	4	260				
	21	SS-3	4.5	6.0	2.4	3.9	20		4						15	10	A-4a	8					
		SS-4	6.0	7.5				20 4.	4.25						12	10	A-4a	8					
	В	SS-1	1.5	3.0	-0.6	0.9	18	4	4.5 2	24 16	∞	35	24	59	13	11	A-4a	5	580				
	0-900	SS-2	3.0	4.5	0.9	2.4	30	4	4.5 2	25 16	6	27	17	44	6	11	A-4a	2					
	21	SS-3	4.5	6.0	_	_	37								6	9	A-1-b	0					
_		SS-4	6.0		_	_	41	18 4	4.5						10	10	A-4a	8					
	В	SS-1	1.5	3.0	-0.6	0.9	27			\square					S	9	A-1-b	0	1147				
	002-0	SS-2	3.0	4.5	0.9	2.4	20	4	4.5 2	23 16	2 2	27	15	42	6	11	A-4a	1					
	21	SS-3	4.5	6.0	2.4	3.9	11	4.	4.25 2	23 15	8	31	19	50	11	10	A-4a	3					
	1	SS-4	6.0	7.5	3.9	5.4	10	10 <mark>2.</mark>	2.25						12	10	A-4a	8					
	В	SS-1	1.5	3.0	-0.6	0.9	41	4	4.5 2	23 16	7	34	22	56	6	11	A-4a	4	4267				
	008-0	SS-2	3.0	4.5	6.0	2.4	19	4	4.5 2	23 15	∞	36	22	58	10	10	A-4a	5					
	21	SS-3	4.5	6.0	2.4	3.9	19		4						12	10	A-4a	8					
		SS-4	6.0	7.5	3.9	5.4	22	19 <mark>4</mark> .	4.25						11	10	A-4a	8					
	В	SS-1	1.5	3.0	-0.6	0.9	33	4	4.5	_					6	10	A-4a	8	>8000				
	0-600	SS-2	3.0	4.5	0.9	2.4	25	4	4.5 2	24 14	t 10	37	23	60	6	10	A-4a	5					
	21	SS-3	4.5	6.0	_				_	22 15	-	37	21	58	11	10	A-4a	5					
		SS-4	6.0	7.5	3.9	5.4	15	12 1.	1.75						13	10	A-4a	~					

Subgrade Analysis

V. 14.5 I/18/2019

OHIO DEPARTMENT OF TRANSPORTATION

Recommendation (Enter denth in	inches)																																			
d Replace 204)	Unstable																																			
Excavate and Replace (Item 204)	Unsuitable																																			
٤	Unstable																		Mc																Mc	
Problem	Unsuitable																																			
Sulfate	(mqq)		5767				440				220				1433			4767					2300				3767			193				213		
ЮТ	IJ	0	ю	∞	6	0	6	9	10	0	6	5	10	0	0	9	8	4	8	1	8	0	e	4	8	0	5	5	∞	9	5	10	10	9	17	16
Ohio DOT	Class	A-1-a	A-4a	A-4a	A-6a	A-1-b	A-4a	A-6a	A-6a	A-1-b	A-6a	A-4a	A-6a	A-1-b	A-2-4	A-4a	A-4a	A-4a	A-4a	A-4a	A-4a	A-1-b	A-4a	A-4a	A-4a	A-1-b	A-4a	A-4a	A-4a	A-6a	A-4a	A-6a	A-6a	A-6b	A-7-6	A-7-6
ture	M _{OPT}	9	20	10	14	9	11	14	14	9	14	11	14	9	10	10	10	12	10	11	10	9	13	11	10	9	11	11	10	14	12	14	14	16	19	18
Moisture	Σ	5	21	12	20	5	12	13	28	10	14	13	22	24	б	12	15	5	13	11	11	12	12	11	13	14	11	12	13	13	11	11	11	12	25	27
	P200		49		74		67	62			65	60			34	67		55		41			49	54			60	58		57	58			55	73	
cteristics	% Clay		14		31		30	27			29	24			13	29		24		16			18	22			24	24		24	23			26	40	
	% Silt		35		43		37	35			36	36			21	38		31		25			31	32			36	34		33	35			29	33	
Physical Chara	Ы%		∞		14		10	11			11	10			7	10		10		8			10	6			6	6		13	6			16	28	
Ρh	Ч		25		19		16	17			17	16			17	14		17		16			18	16			16	16		19	17			20	22	
	н		33		33		26	28			28	26			24	24		27		24			28	25			25	25		32	26			36	50	
ΗР	(tsf)		4.5	4.5	3.5		4.5	4.5	1.5		4.5	4.5	2.5			4.25	2.5	4.5	4.5	4.5	4.5		4.5	3.25	3.25		4.5	4.5	4.5	4.5	4.5	4.5	3.75	4.5	2.25	1.75
Standard Penetration	N _{60L}				20				16				14				12				20				11				18				16			
Stan Penet	N ₆₀	52	20	27	26	78	18	16	18	52	15	15	14	80	33	14	12	34	20	20	23	109	15	11	12	50	18	25	25	23	29	20	16	20	15	10
Subgrade Depth	10	0.9	2.4	3.9	5.4	0.9	2.4	3.9	5.4	0.9	2.4	3.9	5.4	0.9	2.4	3.9	5.4	0.9	2.4	3.9	5.4	0.9	2.4	3.9	5.4	0.9	2.4	3.9	5.4	0.9	2.4	3.9	5.4	1.5	3.0	4.5
Sub D	From	-0.6	0.9	2.4	3.9	-0.6	0.9	2.4	3.9	-0.6	0.9	2.4	3.9	-0.6	0.9	2.4	3.9	-0.6	0.9	2.4	3.9	-0.6	0.9	2.4	3.9	-0.6	0.9	2.4	3.9	-0.6	0.9	2.4	3.9	0.0	1.5	3.0
Sample Depth	To	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0
Sample Depth	From	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5
Sample		SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3												
Boring		8	010-0	21		в	011-0	21		в	012-0	21		в	013-0	21		в	014-0	21		8	015-0	21		8	016-0	21		В	017-0	21		В	018-0	21
		10				11				12				13				14				15				16				17				18		

Subgrade Analysis

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OHIO DEPARTMENT OF TRANSPORTATION

Recommendation (Enter depth in	inches)																																				
nd Replace 204)	Unstable																										21"			12"	12"			15"			
Excavate and Replace (Item 204)	Unsuitable																																				
	Unstable																										N ₆₀ & Mc			N ₆₀ & Mc	N ₆₀ & Mc			N ₆₀			
Problem .	Unsuitable																																				
Sulfate Content	(mdd)	633				393				293						240		533					1967				1227			673					807		
P	G	7	9	10	10	5	5	16	16	8	6	10	10	0	0	12	0	16	7	16	2	16	S	2	1	∞	5	5	8	6	6	10	10	0	4	10	
Ohio DOT	Class	A-6a	A-6a	A-6a	A-6a	A-4a	A-6a	A-6b	A-6b	A-6a	A-6a	A-6a	A-6a	A-1-b	A-1-b	A-6b	A-1-a	A-6b	A-6b	A-6b	A-6a	A-6b	A-4a	A-4a	A-4a	A-4a	A-4a	A-4a	A-4a	A-6a	A-6a	A-6a	A-6a	A-2-4	A-6a	A-6a	
nre	Морт	14	14	14	14 ,	12 /	14	16	16 ,	14	14	14	14 ,	6 /	6 /	16	6 /	16	16 ,	16	14	16 ,	11 ,	11	10	10	10		10 /	14	14	14	14 ,	10 /	15 /	14	
Moisture	μ _c	13	14	16	15	12	12	13	14	13	14	15	15	9	6	18	11	14	16	11	6	16	11	10	10	10	13	13	13	17	19	13	17	10	12	16	
	P200	61	64			60	59			66	65				18	75			58		38		62	60	1	T	62	62		69	71			33	48		ſ
eristics .	% Clay	25	26			25	25			30	28				4	36			27		16		25	22			23	24		32	33			14	21		
Physical Characteristics	% Silt	36	38			35	34			36	37				14	39			31		22		37	38			39	38		37	38			19	27		
iysical .	Ы	14	11			6	11			14	11				NP	19			16		14		10	6	1	1	10	6		15	14			ΝP	14		ſ
2	PL	17	17			17	16			18	18				NP	19			19		18		16	16			15	15		17	19			NP	20		
	E	31	28			26	27			32	29				NP	38			35		32		26	25			25	24		32	33			NP	34		
₽	(tsf)	4.5	4.5	4.5	4.5	4.5	4.5	3.75	2.25	4.5	4.5	4.5	4.5			4.25		4.5	4.5	4.25		4.5	4.5	4.5	4.5	4.5	2.5	3.75	4	ε	3.75	3.5	2.5				
Standard Penetration	N _{60L}				15				10				16				10				18				22				S				5				
Star Pene	N ₆₀	19	19	15	15	29	23	10	11	20	23	20	16	16	12	11	10	20	18	30	34	22	26	29	35	14	2	8	10	∞	10	5	5	7	19	18	
Subgrade Depth	To	0.4	1.9	3.4	4.9	1.1	2.6	4.1		0.5	2.0	3.5	5.0	1.0	2.5	4.0	5.5	0.9	2.4	3.9	5.4	2.1	3.6		-	+	2.1			0.9	2.4	3.9	5.4	1.3	2.8	4.3	1
a a	From	-1.1	0.4	1.9	3.4	-0.4	1.1	2.6	4.1	-1.0	0.5	2.0	3.5	-0.5	1.0	2.5	4.0	-0.6	0.9	2.4	3.9	0.6	2.1	3.6	5.1	-0.9	0.6	2.1	3.6	-0.6	0.9	2.4	3.9	-0.2	1.3	2.8	,
Sample Depth	To	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	ì
Sample Depth	From	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	(
Sample		SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	, , ,
Boring		в	019-0	21		8	020-0	21		В	021-0	21		в	022-0	21		в	023-0	21		8	024-0	21		æ	025-0	21		B	026-0	21		В	027-0	21	-
		19				20				21				22				23			_	24			┨	25				26				27			-

Subgrade Analysis

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PID: 105435

County-Route-Section: FRA-071/270-28.27/25.99A No. of Borings: 27

Geotechnical Consultant:NEAS, INC.Prepared By:ZMDate prepared:10/10/2021

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

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

Design CBR	7
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% Samples within 6 feet of subgrade													
N ₆₀ ≤ 5	3%	HP ≤ 0.5	0%										
N ₆₀ < 12	16%	0.5 < HP ≤ 1	0%										
12 ≤ N ₆₀ < 15	7%	1 < HP ≤ 2	4%										
N ₆₀ ≥ 20	52%	HP > 2	76%										
M+	6%												
Rock	0%												
Unsuitable	0%												

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

% Proposed Subgrade Surface										
Unstable & Unsuitable	10%									
Unstable	10%									
Unsuitable	0%									

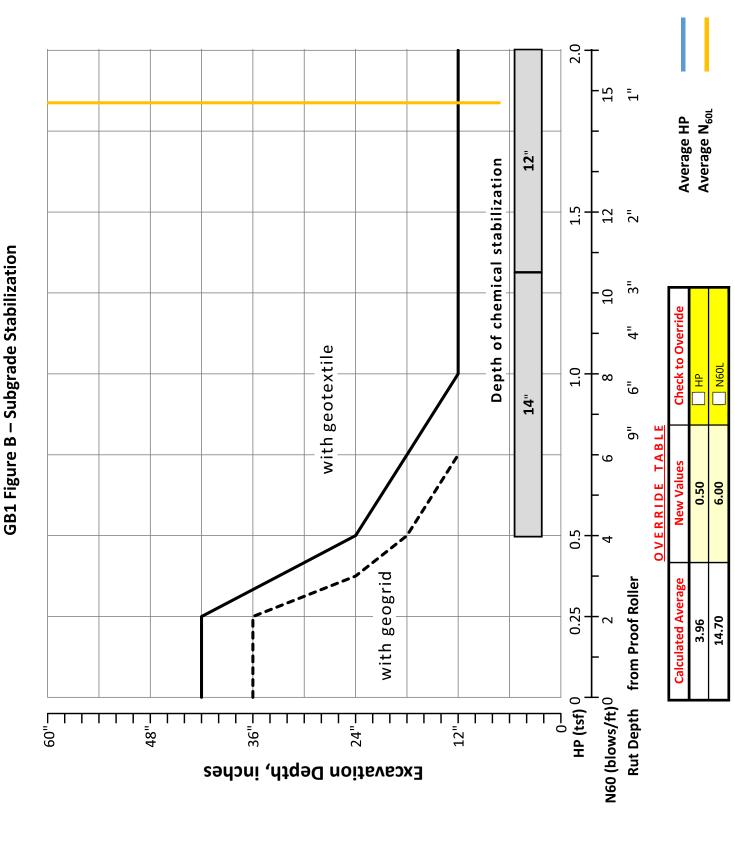
	N ₆₀	N _{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M _c	M _{opt}	GI
Average	23	15	3.96	29	17	11	33	24	57	13	12	7
Maximum	109	25	4.50	50	25	28	43	41	84	28	20	17
Minimum	5	5	1.50	22	14	7	6	2	8	4	6	0

					Class	ificat	ion C	ount	ts by	Sam	ple								
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	4	11	2	0	0	0	0	0	44	0	0	31	11	0	5	0	0	108
Percent	0%	4%	10%	2%	0%	0%	0%	0%	0%	41%	0%	0%	29%	10%	0%	5%	0%	0%	100%
% Rock Granular Cohesive	0%					56%	-		-					44	1%				100%
Surface Class Count	0	3	11	2	0	0	0	0	0	32	0	0	20	9	0	1	0	0	78
Surface Class Percent	0%	4%	14%	3%	0%	0%	0%	0%	0%	41%	0%	0%	26%	12%	0%	1%	0%	0%	100%



1/18/2019

V. 14.5





OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES Geotechnical Bulletin GB1

FRA-071/270-28.27/25.99A

105435

Adding a ramp lane along I-270 Eastbound ramp to I-71 Northbound I-270 Eastbound to I-71 Northbound

NEAS, INC.

Prepared By: ZM Date prepared: Monday, October 25, 2021

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

NO. OF BORINGS:

18

#	Boring ID	Alignment	Station	Offcot	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-027-0-21	I-71	127+54		RT	CME 45B	82	913.7	911.7	2.1 C
2	B-001-0-21	I-71	130+13	-	RT	CME 45B	82	913.0	911.0	2.1 C
3	B-002-0-21	I-71	134+39	-	RT	CME 45B	82	914.1	912.1	2.1 C
4	B-002-0-21 B-003-0-21	I-71	134+33	49	RT	CME 45B	82	913.7	911.6	2.1 C
-							-			-
5	B-004-0-21	I-71	142+24		RT	CME 45B	82	911.1	909.0	2.1 C
6	B-005-0-21	I-71	146+00	27	RT	CME 45B	82	908.2	906.2	2.1 C
7	B-006-0-21	I-71	150+64	59	RT	CME 45B	82	903.0	900.9	2.1 C
8	B-007-0-21	I-71	154+37	56	RT	CME 45B	82	899.4	897.3	2.1 C
9	B-008-0-21	I-71	158+41	50	RT	CME 45B	82	895.2	893.2	2.1 C
10	B-009-0-21	I-71	162+45	56	RT	CME 45B	82	891.0	888.9	2.1 C
11	B-010-0-21	I-71	166+31	50	RT	CME 45B	82	887.8	885.7	2.1 C
12	B-011-0-21	I-71	170+40	49	RT	CME 45B	82	885.9	883.8	2.1 C
13	B-012-0-21	I-71	174+32	49	RT	CME 45B	82	886.8	884.7	2.1 C
14	B-013-0-21	I-71	178+31	48	RT	CME 45B	82	889.2	887.1	2.1 C
15	B-014-0-21	I-71	182+40	46	RT	CME 45B	82	891.6	889.6	2.1 C
16	B-015-0-21	I-71	186+38	45	RT	CME 45B	82	894.1	892.1	2.1 C
17	B-016-0-21	I-71	190+40	44	RT	CME 45B	82	896.6	894.5	2.1 C
18	B-017-0-21	I-71	194+38	56	RT	CME 45B	82	898.8	896.7	2.1 C

Excavate and Keplace Recommendation (Item 204) (Enter depth in	Unsuitable Unstable	15"																														
Problem	Unsuitable Unstable	Neo				Mc											Mc												_			
Sulfate Content	(mqq)		807			233			400					0	TUU		20				260		001	280			1147			LJUV	4267	
ТО	פ	0	4 (10	1	12	16	16	9	5	10	16	0	0 1	, ç	9 0	10	6	16	0	4	∞	ωı	۰ 2	0	8	0	1	m	∞ <	4 U	ו
Ohio DOT	Class	A-2-4	A-6a	A-6a	A-4a	A-6b	A-6b	A-6b	A-4a	A-6a	A-6a	A-7-6	A-1-a	A-1-a	P0-P	A-1-b	A-6a	A-6a	A-7-6	A-1-b	A-4a	A-4a	A-4a	A-4a A-4a	A-1-b	A-4a	A-1-b	A-4a	A-4a	A-4a	A-4a	
ture	Морт	10			+	16	16	16	12	14					1 T	+		14	18	9	12		╈	1 1	9	10	9	11			1 0	
Moisture	Σ	10	15	14	10	21	18	25	13	11	19	21	6	4	7 TQ	6	17	16	24	8	14	15	17	51 9	6	10	ъ	6	11	12	μ (
_	P200		48		39	84			66	57		T		∞ {	60	T	73	68		Π	56		ſ	44 44			Π	42	50	<mark>ا</mark>	0 0 0 0 0	5
ristics	% Clay		21		15	41			27	22				2	57		33	32			22		į	24 17				15	19	ç	77	
Physical Characteristics	% Silt %		27		24	43			39	35		1		9	54		40	36			34		i	د د 27	\vdash			27	31		34 26	
ysical (Ы		14		ΝΡ	20			10	11		┥		NP .	1-1-	t	15	15		Η	6			x 6			H	7	∞	- r	 o 	c
Å	Ы		20		NP	19			17	17		1	_	_	9		19	17			17		ļ	16 16				16	15	Ú,	ol f	
	Ľ		34		NP	39			27	28				NP C	32		34	32			26			25 25				23	23		23	
dH M	(tsf)					4.5	4.5	3.75	4.5	4.5	4.5	2.75		L T C	2/.7	C7:7	4.5	3.5	3.5		4.5	4	4.25	4.5 4.5		4.5		4.5	4.25	2.25	4.5 7. R	
standard Penetration	N _{60L}			7				19				11		_	10	9			25				70		_	18				10	_	
Penet	N ₆₀	7	19	18	19	20	29	26	27	19	15	11	35	30	P F	60	35	29	25	35	23	20	73	30 T8	37	41	27	20	11	10	41	
suograde Depth	To	0.9		5.4	0.9	2.4	3.9	5.4	0.9	2.4	3.9	5.4	0.9	2.4	ה ט.ע א ע	t 6.0	2.4	3.9	5.4	0.9	2.4	3.9	_	0.9 2.4	3.9	5.4	0.9	2.4	3.9	5.4	0.4 7 A	
anc B	From	-0.6	0.9	3.9	-0.6	0.9	2.4	3.9	-0.6	0.9	2.4	3.9	-0.6	0.9	2.4 0.0	-0.6	0.9	2.4	3.9	-0.6	0.9	2.4	3.9 7	۰.0- 0.9	2.4	3.9	-0.6	0.9	2.4	3.9	9.7- 0-	
jt pe	То	3.0	4.5 6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	0.0 7 E	3.0	4.5	6.0	7.5	3.0	4.5	6.0	۲./ ۲.	3.U 4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.U	
Depth	From	1.5	3.0 4 5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.0 C	1.5	3.0	4.5	6.0	1.5	3.0	4.5	0.0 1	3.0 3.0	4.5	6.0	1.5	3.0	4.5	6.0 1 F	2.1 2.0	
Sample		SS-1	SS-2 55-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	6-00	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	55-4	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	1-95	1-1-1
Boring		8	027-0		в	001-0	21		æ	002-0	21		<u>م</u>	003-0	77		004-0	21		в	005-0	21	,	900-0	21		æ	007-0	21	-	- 900 - 800	
<u></u>		1	-		2				e			┨	4	-		5				9	-					_	∞			-		

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OHIO DEPARTMENT OF TRANSPORTATION

olace Recommendation																																				
ate and Reg (Item 204)	e Unstable																																			
Excavate and Replace (Item 204)	Unsuitable																																			
ц	Unstable																						Mc													
Problem	Unsuitable																																			
Sulfate	(mqq)	>8000					5767				440				220				1433			4767					2300				3767			193		
ЮТ	Ū	8	5	ъ	8	0	з	∞	6	0	6	6	10	0	6	S	10	0	0	9	8	4	8	1	8	0	m	4	∞	0	5	5	8	9	5	10
Ohio DOT	Class	A-4a	A-4a	A-4a	A-4a	A-1-a	A-4a	A-4a	A-6a	A-1-b	A-4a	A-6a	A-6a	A-1-b	A-6a	A-4a	A-6a	A-1-b	A-2-4	A-4a	A-4a	A-4a	A-4a	A-4a	A-4a	A-1-b	A-4a	A-4a	A-4a	A-1-b	A-4a	A-4a	A-4a	A-6a	A-4a	A-6a
ture	М _{орт}	10	10	10	10	9	20	10	14	9	11	14	14	9	14	11	14	9	10	10	10	12	10	11	10	9	13	11	10	9	11	11	10	14	12	14
Moisture	Σc	6	9	11	13	5	21	12	20	5	12	13	28	10	14	13	22	24	9	12	15	5	13	11	11	12	12	11	13	14	11	12	13	13	11	11
	P200		60	58			49		74		67	62			65	60			34	67		55		41			49	54			60	58		57	58	
cteristics	% Clay		23	21			14		31		30	27			29	24			13	29		24		16			18	22			24	24		24	23	
Characte	% Silt		37	37			35		43	_	37	35			36	36			21	38		31		25			31	32			36	34		33	35	
Physical Chara	Ы		10	7			8		14		10	11			11	10			7	10		10		8			10	6			6	6		13	6	
μ	ΡL		14	15			25		19		16	17			17	16			17	14		17		16			18	16			16	16		19	17	
	F		24	22			33		33		26	28			28	26			24	24		27		24			28	25			25	25		32	26	
	(tsf)	4.5	4.5	4.5	1.75		4.5	4.5	3.5		4.5	4.5	1.5		4.5	4.5	2.5			4.25	2.5	4.5	4.5	4.5	4.5		4.5	3.25	3.25		4.5	4.5	4.5	4.5	4.5	4.5
Standard Penetration	N60L				12				20				16				14				12				20				11				18			
		33	25	12	15	52	20	27		78	18	16	18	52	15	15	14	80	33	14	12	34	20		. 23	109	15	11	12	50	18	25		23	29	20
Subgrade Depth	To	.6 0.9	9 2.4	4 3.9	9 5.4	.6 0.9	9 2.4	4 3.9	9 5.4	.6 0.9	9 2.4	4 3.9	9 5.4	.6 0.9	9 2.4	4 3.9	9 5.4	.6 0.9	9 2.4	4 3.9	9 5.4	.6 0.9	9 2.4	4 3.9	9 5.4	.6 0.9	9 2.4	4 3.9	9 5.4	.6 0.9	9 2.4		9 5.4	.6 0.9	9 2.4	4 3.9
	From	0.6	0.9	2.4	3.9	0.0-	0.9	2.4	3.9	0.0-	0.9	2.4	3.9	0.0-	0.9	2.4	3.9	9.0- 0.6	0.9	2.4	3.9	0.6	0.9	2.4	3.9	9.0-	0.9	2.4	3.9	0.6	6.0	2.4	3.9	9.0-	6.0 5	2.4
Sample Depth	n To	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5		7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	_	3.0	4.5	6.0
	From	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5
Sample		SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3												
Boring		в	0-600	21		В	010-0	21		В	011-0	21		в	012-0	21		В	013-0	21		в	014-0	21		B	015-0	21		В	016-0	21		B	017-0	21
#	+	10				11				12				13				14				15				16				17				18		

V. 14.5 I/18/2019

TRANSPORTATION



PID: 105435

County-Route-Section: FRA-071/270-28.27/25.99A No. of Borings: 18

Geotechnical Consultant:NEAS, INC.Prepared By:ZMDate prepared:10/25/2021

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

Excavate and Repl	ace
Stabilization Option	ons
Global Geotextile	
Average(N60L):	12"
Average(HP):	0"
Global Geogrid	
Average(N60L):	0"
Average(HP):	0"

Design CBR	7
---------------	---

% Sampl	es within	6 feet of subg	rade
N ₆₀ ≤ 5	0%	HP ≤ 0.5	0%
N ₆₀ < 12	7%	0.5 < HP ≤ 1	0%
12 ≤ N ₆₀ < 15	7%	1 < HP ≤ 2	3%
N ₆₀ ≥ 20	<mark>60</mark> %	HP > 2	72%
M+	4%		
Rock	0%		
Unsuitable	0%		

Excavate and Repl at Surface	ace
Average	0"
Maximum	0''
Minimum	0''

% Proposed Subgrade Su	irface
Unstable & Unsuitable	7%
Unstable	7%
Unsuitable	0%

	N ₆₀	N _{60L}	HP	LL	PL	PI	Silt	Clay	P 200	Mc	M _{opt}	GI
Average	26	16	4.00	27	17	10	33	23	56	13	11	6
Maximum	109	25	4.50	39	25	20	43	41	84	28	20	16
Minimum	7	7	1.50	22	14	7	6	2	8	4	6	0

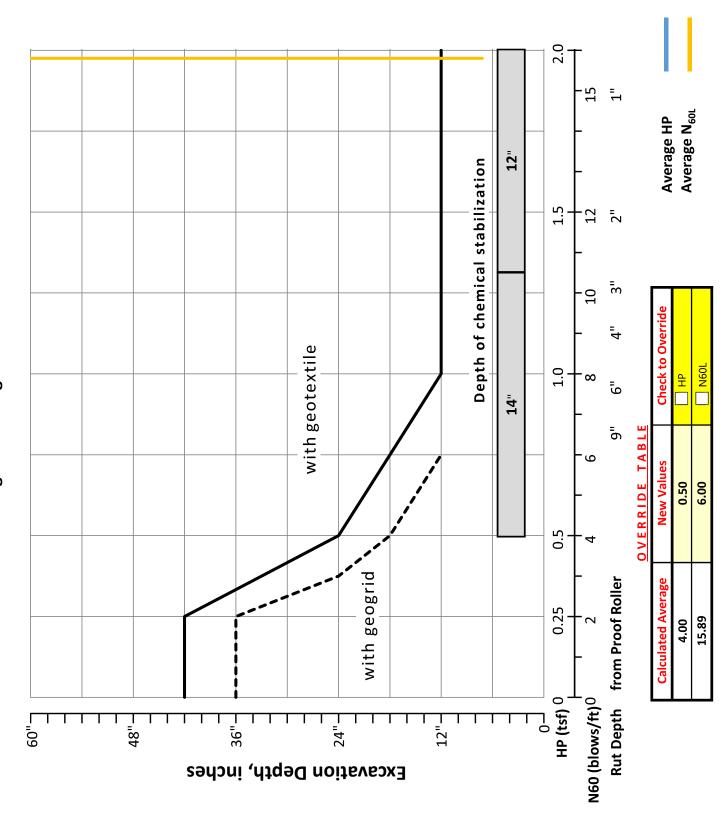
Classification Counts by Sample																			
ODOT Class	Rock	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-3	A-3a	A-4a	A-4b	A-5	A-6a	A-6b	A-7-5	A-7-6	A-8a	A-8b	Totals
Count	0	3	9	2	0	0	0	0	0	36	0	0	17	3	0	2	0	0	72
Percent	0%	4%	% 13% 3% 0% 0% 0% 0% 50% 0% 0% 24% 4% 0% 3% 0% 0%													100%			
% Rock Granular Cohesive	0%					69%							100%						
Surface Class Count	0	3	9	2	0	0	0	0	0	27	0	0	11	2	0	0	0	0	54
Surface Class Percent	0%	6%	17%	4%	0%	0%	0%	0%	0%	50%	0%	0%	20%	4%	0%	0%	0%	0%	100%



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V. 14.5 1/18/2019

GB1 Figure B – Subgrade Stabilization





OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES Geotechnical Bulletin GB1

FRA-071/270-28.27/25.99A

105435

Adding a ramp lane along I-270 Eastbound ramp to I-71 Northbound Ramp M

NEAS, INC.

Prepared By: ZM Date prepared: Monday, October 25, 2021

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

NO. OF BORINGS:

7

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-018-0-21	Ramp M	84+55	17	RT	CME 45B	82	921.6	920.0	1.5 C
2	B-019-0-21	Ramp M	88+34	26	LT	CME 45B	82	920.4	917.7	2.6 C
3	B-020-0-21	Ramp M	92+14	25	RT	CME 45B	82	917.4	915.5	1.9 C
4	B-021-0-21	Ramp M	96+33	44	RT	CME 45B	82	918.6	916.0	2.5 C
5	B-022-0-21	Ramp M	99+81	43	RT	CME 45B	82	920.6	918.7	2.0 C
6	B-023-0-21	Ramp M	103+52	22	LT	CME 45B	82	923.6	921.5	2.1 C
7	B-024-0-21	Ramp M	107+35	10	LT	CME 45B	82	925.6	924.7	0.9 C

Recommendation (Enter depth in	inches)																												
id Replace 204)	Unstable																												
Excavate and Replace (Item 204)	Unsuitable Unstable																												
ε	Unstable		Mc																										
Problem -	Unsuitable																												
Sulfate Content	(mqq)	213				633				393				293						240		533					1967		
ЮТ	ט	6	17	16	16	7	6	10	10	5	5	16	16	8	6	10	10	0	0	12	0	16	7	16	2	16	5	5	
Ohio DOT	Class	A-6b	A-7-6	A-7-6	A-7-6	A-6a	A-6a	A-6a	A-6a	A-4a	A-6a	A-6b	A-6b	A-6a	A-6a	A-6a	A-6a	A-1-b	A-1-b	A-6b	A-1-a	A-6b	A-6b	A-6b	A-6a	A-6b	A-4a	A-4a	A-4a
Moisture	М _{орт}	16	19	18	18	14	14	14	14	12	14	16	16	14	14	14	14	9	6	16	6	16	16	16	14	16	11	11	10
Mois	Σc	12	25	27	22	13	14	16	15	12	12	13	14	13	14	15	15	6	6	18	11	14	16	11	6	16	11	10	10
	P200	55	73			61	64			60	59			66	65				18	75			58		38		62	60	
cteristics	% Clay	26	40			25	26			25	25			30	28				4	36			27		16		25	22	
Physical Charact	% Silt	29	33			36	38			35	34			36	37				14	39			31		22		37	38	
hysica	Ы	16	28			14	11			6	11			14	11				NP	19			16		14		10	6	
	Ы	20	22			17	17			17	16			18	18				NP	19			19		18		16	16	
	, н	5 36	5 50	5	10	5 31	5 28	10	10	5 26	5 27	5	5	5 32	5 29	10	10		NP	5 38		10	5 35	5	32	10	5 26	5 25	10
	N _{60L} (tst)	4.5	2.25	1.75	10 <u>1.5</u>	4.5	4.5	4.5	15 4.5	4.5	4.5	3.75	10 2.25	4.5	4.5	4.5	16 4.5			4.25	10	4.5	4.5	4.25	18	4.5	4.5	4.5	22 4.5
Standard Penetration	N ₆₀ N	20	15	10	12	19	19	15	15	29	23	10	11	20	23	20	16	16	12	11	10	20	18	30	34	22	26	29	35
	To	1.5	3.0	4.5	6.0	0.4	1.9	3.4	4.9	1.1	2.6	4.1	5.6	0.5	2.0	3.5	5.0	1.0	2.5	4.0	5.5	0.9	2.4	3.9	5.4	2.1	3.6	5.1	6.6
Subgrade Depth	From	0.0	1.5	3.0	4.5	-1.1	0.4	1.9	3.4	-0.4	1.1	2.6	4.1	-1.0	0.5	2.0	3.5	-0.5	1.0	2.5	4.0	-0.6	0.9	2.4	3.9	0.6	2.1	3.6	5.1
ء د	To	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5	3.0	4.5	6.0	7.5
Sample Depth	From	1.5	3.0	4.5 (6.0	1.5	3.0	4.5 (6.0	1.5	3.0	4.5 (6.0	1.5	3.0	4.5 (6.0	1.5	3.0	4.5 (6.0	1.5	3.0	4.5 (6.0	1.5	3.0	4.5 (6.0
Sample	ш	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4	SS-1	SS-2	SS-3	SS-4
Boring		В	018-0	21		в	019-0	21		в	020-0	21		в	021-0	21		В	022-0	21		в	023-0	21		в	024-0	21	
4		1				2				m				4				5				9				7			

V. 14.5 I/18/2019





PID: 105435

 County-Route-Section:
 FRA-071/270-28.27/25.99A

 No. of Borings:
 7

Geotechnical Consultant:NEAS, INC.Prepared By:ZMDate prepared:10/25/2021

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

Excavate and Repl	ace									
Stabilization Option	ons									
Global Geotextile										
Average(N60L):	12"									
Average(HP):	0"									
Global Geogrid										
Average(N60L):	0"									
Average(HP):	0"									

Design CBR	6
---------------	---

% Sample	es within	6 feet of subgr	ade
N ₆₀ ≤ 5	0%	HP ≤ 0.5	0%
N ₆₀ < 12	18%	0.5 < HP ≤ 1	0%
12 ≤ N ₆₀ < 15	7%	1 < HP ≤ 2	7%
N ₆₀ ≥ 20	46%	HP > 2	79%
M+	4%		
Rock	0%		
Unsuitable	0%		

Excavate and Repl at Surface	ace
Average	0"
Maximum	0''
Minimum	0"

% Proposed Subgrade Su	rface
Unstable & Unsuitable	5%
Unstable	5%
Unsuitable	0%

	N ₆₀	N _{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M _c	M _{opt}	GI
Average	19	14	4.02	32	18	14	33	25	58	14	14	9
Maximum	35	22	4.50	50	22	28	39	40	75	27	19	17
Minimum	10	10	1.50	25	16	9	14	4	18	6	6	0

					Class	ificat	ion C	Count	ts by	Sam	ple								
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	1	2	0	0	0	0	0	0	4	0	0	10	8	0	3	0	0	28
Percent	0%	4%	7%	0%	0%	0%	0%	0%	0%	14%	0%	0%	36%	29%	0%	11%	0%	0%	100%
% Rock Granular Cohesive	0%					25%							-	100%					
Surface Class Count	0	0	2	0	0	0	0	0	0	2	0	0	7	7	0	1	0	0	19
Surface Class Percent	0%	0%	11%	0%	0%	0%	0%	0%	0%	11%	0%	0%	37%	37%	0%	5%	0%	0%	100%

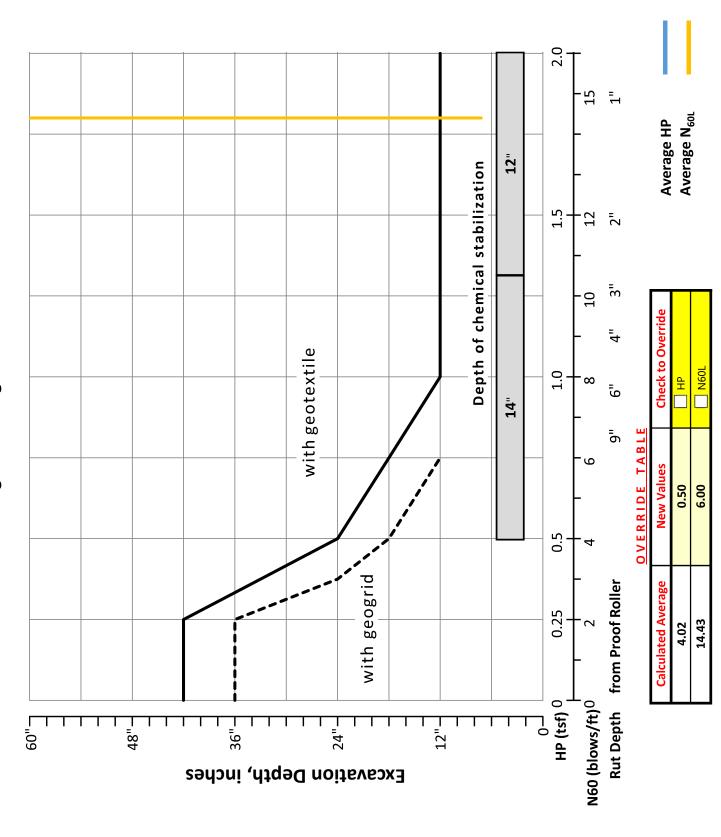


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V. 14.5

1/18/2019

GB1 Figure B – Subgrade Stabilization





OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES Geotechnical Bulletin GB1

FRA-071/270-28.27/25.99A

105435

Adding a ramp lane along I-270 Eastbound ramp to I-71 Northbound Ramp P

NEAS, INC.

Prepared By: ZM Date prepared: Monday, October 25, 2021

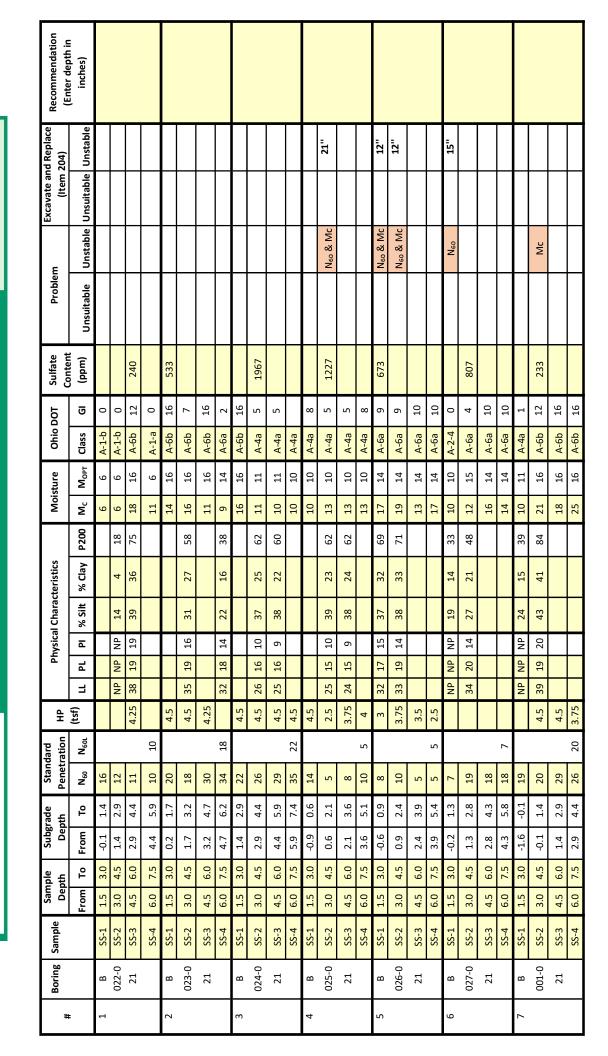
> Chunmei (Melinda) He, Ph.D, P.E. 2800 Corporate Exchange Drive Suite 240 Columbus, OH, 43231

614-714-0299 che@neasinc.com

NO. OF BORINGS:

7

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-022-0-21	Ramp P	999+85	65	RT	CME 45B	82	920.6	919.0	1.6 C
2	B-023-0-21	Ramp P	1003+59	17	RT	CME 45B	82	923.6	922.3	1.3 C
3	B-024-0-21	Ramp P	1007+41	44	RT	CME 45B	82	925.6	925.5	0.1 C
4	B-025-0-21	Ramp P	1010+99	0	LT	CME 45B	82	935.5	933.1	2.4 C
5	B-026-0-21	Ramp P	1018+06	17	LT	CME 45B	82	928.1	926.0	2.1 C
6	B-027-0-21	Ramp P	1022+01	52	LT	CME 45B	82	913.7	912.0	1.7 C
7	B-001-0-21	Ramp P	1024+58	57	LT	CME 45B	82	913.0	909.9	3.1 C



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OHIO DEPARTMENT OF TRANSPORTATION



PID: 105435

 County-Route-Section:
 FRA-071/270-28.27/25.99A

 No. of Borings:
 7

Geotechnical Consultant:NEAS, INC.Prepared By:ZMDate prepared:10/25/2021

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

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

Design CBR 7

% Samples within 6 feet of subgrade									
N ₆₀ ≤ 5	11%	HP ≤ 0.5	0%						
N ₆₀ < 12	37%	0.5 < HP ≤ 1	0%						
12 ≤ N ₆₀ < 15	7%	1 < HP ≤ 2	0%						
N ₆₀ ≥ 20	37%	HP > 2	70%						
M+	15%								
Rock	0%								
Unsuitable	0%								

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

% Proposed Subgrade Surface							
Unstable & Unsuitable	31%						
Unstable	31%						
Unsuitable	0%						

	N ₆₀	N _{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M _c	M _{opt}	GI
Average	17	12	3.99	31	18	14	32	24	57	14	13	8
Maximum	35	22	4.50	39	20	20	43	41	84	25	16	16
Minimum	5	5	2.50	24	15	9	14	4	18	6	6	0

Classification Counts by Sample																			
ODOT Class	Rock	A-1-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	1	2	1	0	0	0	0	0	7	0	0	8	8	0	0	0	0	27
Percent	0%	4%	7%	4%	0%	0%	0%	0%	0%	26%	0%	0%	30%	30%	0%	0%	0%	0%	100%
% Rock Granular Cohesive	0%		41% 59%									100%							
Surface Class Count	0	0	2	1	0	0	0	0	0	4	0	0	4	5	0	0	0	0	16
Surface Class Percent	0%	0%	13%	6%	0%	0%	0%	0%	0%	25%	0%	0%	25%	31%	0%	0%	0%	0%	100%



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1/18/2019 V. 14.5

GB1 Figure B – Subgrade Stabilization

