

**FRA-70-14.05 PROJECT 4B
PID NO. 96053
FRANKLIN COUNTY, OHIO**

ROADWAY EXPLORATION REPORT

***Prepared For:*
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***Prepared By:*
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Rii Project No. W-15-126

July 2022



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July 8, 2022

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**Re: Roadway Exploration Report
FRA-70-14.05 Project 4B
PID No. 96053
Rii Project No. W-15-126**

Mr. Luzier:

Resource International, Inc. (Rii) is pleased to submit this roadway exploration report for the above referenced project. Engineering logs have been prepared and are attached to this report along with the results of laboratory testing. This report includes recommendations for the design and construction of the proposed roadway subgrade for the FRA-70-14.05 Project 4B in Columbus, Ohio.

We sincerely appreciate the opportunity to be of service to you on this project. If you have any questions regarding the roadway exploration or this report, please contact us.

Sincerely,

RESOURCE INTERNATIONAL, INC.

Brian R. Trenner, P.E.
Director – Geotechnical Services

Jonathan P. Sterenberg, P.E.
Vice President – Geotechnical Services

Enclosure: Roadway Exploration Report

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EXECUTIVE SUMMARY

This report is a presentation of the roadway exploration performed for the design and construction of the roadway alignments for FRA-70-14.05. The proposed portion of improvements for I-70/I-71 is located between Sta. 193+00 to approximately Sta. 218+00. The portion of the improvements along Fulton Street is between Sta. 26+00 to Sta. 33+00. It is understood that the proposed subgrade will be within 3.0 feet of the existing grade.

Based on roadway design information provided by GPD GROUP, soil borings with ground surface elevation within three feet of the proposed grade and soil borings located in the areas where cut will be required to reach the proposed grade were used in the GB1 analyses. The subgrade soils along the alignments of the project consisted of both granular and cohesive soils. The granular soils encountered along the alignments were comprised of loose to very dense gravel with sand, coarse and fine sand, gravel with sand and silt (ODOT A-1-b, A-2-4, A-3a). The cohesive material encountered in the subgrade soils were comprised of very stiff to hard silt and clay, silty clay, sandy silt, and silt (ODOT A-6a, A-6b, A-4a, A-4b).

Thirty four (34) borings were utilized in the analysis of the subgrade along I-70 EB/WB and Third Street. Based on GB1 analysis of the subgrade soils, California Bearing Ratio (CBR) values (based on correlation charts) for the entire alignment ranged from 5 to 12 with an average of 9. However, based on experience with similar subgrade soils and conditions, **it is recommended that pavement design be based on a CBR value of 6** with a corresponding resilient modulus, M_R , of 7,200 psi. Correlation charts indicate a modulus of subgrade reaction (K) of 150 pci and a soil support value (SSV) of 4.4.

Based on the borings utilized for this alignment, the subgrade soils along this alignment is in good condition and no chemical stabilization could be recommended per ODOT GB1. **It must be noted however, that boring B-031-0-08 encountered silt soils in the subgrade depths. These soils are prone to frost and heave and per ODOT GB1 is recommended to be excavated and replaced per ODOT Item 204.**

Per ODOT GB1 requirements, if it is elected to perform global stabilization, the entire subgrade should be stabilized. Pavement design should be completed using the average site parameters provided in the table below.

Average Site Parameters

Average N_{60L}	Average PI	Average Moisture	Average Optimum Moisture	Average Group Index	Average CBR
47	9	9	9	3	9

Please note that this executive summary does not contain all the information presented in the report. The unabridged subsurface exploration report should be read in its entirety to obtain a more complete understanding of the information presented.



1.0 INTRODUCTION

The overall purpose of this project is to provide detailed subsurface information and recommendations for the design and construction of the FRA-70-14.05 Project 4B in Columbus, Ohio. The projects represent the central portion of FRA-70-8.93 (PID 77369) I-70/71 South Innerbelt improvements project. The FRA-70-14.05 Project 4B phase will consist of all work associated with the construction of the I-70/I-71 corridor from just east of S. High Street to just west of Grant Avenue, as well as a minimal amount of work Fulton Street and at the intersections of S. Third Street and S. Fourth Street with Livingston Avenue. This project includes the replacement of the FRA-33-1747 (S. Third Street) and FRA-23-1075 (S. Fourth Street) bridge structures over I-70/71, as well as the construction of three (3) new retaining walls along the north side and two (2) new retaining walls along the south side of I-70/71 to accommodate the new configuration.

This report is a presentation of the roadway exploration performed for the design and construction of the roadway alignments for FRA-70-14.05 as shown on the vicinity map and boring plan presented in Appendix I. The proposed portion of improvements for I-70/I-71 is located between Sta. 193+00 to approximately Sta. 218+00. The portion of the improvements along Fulton Street is between Sta. 26+00 to Sta. 33+00. It is understood that the proposed subgrade will be within 3 feet of the existing grade.

2.0 GEOLOGY AND OBSERVATIONS OF THE PROJECT

2.1 Site Geology

Several episodes of ice advanced throughout Ohio during the Pleistocene Epoch. Both the Illinoian and Wisconsinan glaciers advanced over two-thirds of the state, leaving behind glacial features such as moraines, kame deposits, lacustrine deposits and outwash terraces. The glacial and non-glacial regions comprise five physiographic sections grouped by age, depositional process and geomorphic occurrence (physical features or landforms). The project area lies within the Columbus Lowland District of the Till Plains Section. The project area is characterized by flat to gently rolling ground moraine deposits of the Late Wisconsinan age with large alluvium and outwash deposits bordering the Scioto River, its tributaries and floodplain areas. Ground moraines are deposited during the retreat of a glacier, which results in an undifferentiated mixture of clay, silt, sand and gravel. Alluvium and alluvial terrace deposits range from silty clay to cobble sized deposits, usually deposited in present and former floodplain areas. Outwash deposits consist of undifferentiated sand and gravel deposited by meltwater in front of glacial ice.

Based on bedrock geology and topography maps obtained from Ohio Department of Natural Resources (ODNR), the bedrock beneath the project site consists of three formations. The project alignment extends east from the top of the eastern slope of a bedrock valley that generally follows the Scioto River valley, with the youngest formation at the top of the slope and the oldest formation within the bedrock valley. The youngest formation consists of the Upper Devonian-aged Ohio Shale Formation, which consists of three members, from youngest to oldest: the Cleveland, Chagrin, and Huron Members. These members consist of primarily shale with siltstone and very fine-grained sandstone, varying in color from brownish black to greenish gray. The bedding ranges from laminated to thinly bedded and the overall formation ranges between 250 to over 500 feet thick. The Middle Devonian-aged Delaware Limestone formation, which can be present along the slopes of the bedrock valley, consists of bluish-gray, dolomitic limestone, with thin to medium bedding, and contains nodules and layers of chert. The formation ranges between 0 to 45 feet thick and is not present south of Franklin County. The oldest unit, which present within the bedrock valley, is the Middle to Lower Devonian-aged Columbus Limestone Formation, which is further subdivided into four members, two of which are predominant in the central portion of the state, known as the Delhi and Bellepoint Members. The Delhi Member consists of light gray, finely to coarsely crystalline, irregularly bedded, fossiliferous limestone. The Bellepoint Member consists of variable brown, finely crystalline, massively bedded, limy dolomite. Both of these members contain chert nodules, and the entire formation ranges between 0 to 105 feet thick.

The bedrock surface in the vicinity of the site forms a broad valley which roughly follows the present day Scioto River valley. The site lies on a slight plateaued area and slope along the east side of the valley where the underlying bedrock surface lies at an approximate elevation of 625 to 630 feet mean sea level and slopes down toward the west to an approximate elevation of 600 feet msl in the bedrock valley. According to bedrock topography mapping, the depth to the bedrock surface below the site ranges between approximately 105 to 135 feet below existing grade. Shale bedrock was encountered in several of the borings performed along the corridor at elevations ranging from 630 to 650 feet msl, increasing in elevation from west to east across the project alignment.

2.2 Existing Conditions

As stated, this project is located in downtown Columbus, Ohio, primarily along I-70/I-71 east and west bound between South High Street and South Grant Avenue. The existing I-70/I-71 along the proposed portion for improvement is a six-lane, bi-directional, composite asphalt and concrete paved roadway that is generally east-west aligned through downtown Columbus, Ohio. The existing roadway profile is lowered from the surrounding terrain up to 25 to 30 feet below the existing grade of the adjacent streets, as well as the surrounding downtown area. This traffic volume along the project alignment is very high, and the alignment traverses primarily commercial and government properties. The regional topography generally slopes downward to the west and south toward the Scioto River.

3.0 EXPLORATION

Between October 1, 2015 and January 7, 2016, twelve (12) borings were performed along the I-70 EB and WB alignments and Third Street alignment within the proposed area of the roadway improvements and were advanced to completion depths ranging from 55.0 to 80.0 feet below the existing ground surface. These borings were performed primarily for the bridge and retaining wall structures to be constructed in the vicinity, but were utilized to supplement the historic boring information as part of the roadway subgrade evaluation. The boring locations completed to date are shown on the boring plan provided in Appendix I of this report and summarized in Table 1 below.

Table 1. Test Boring Summary

Boring Number	Station	Offset	Alignment	Latitude	Longitude	Ground ¹ Elevation (feet msl)	Boring Depth (feet)
B-030-1-15	194+37	70 ft. Rt.	I-70 EB	39.952814	-82.998014	748.9	59.4
B-030-2-15	195+91	40 ft. Lt.	I-70 WB	39.953401	-82.997585	740.0	54.3
B-032-1-15	197+75	50 ft. Lt.	I-70 WB	39.953517	-82.996945	748.9	65.0
B-032-2-15	197+39	39 ft. Rt.	I-70 EB	39.953042	-82.996969	733.1	60.0
B-032-3-15	198+77	41 ft. Rt.	I-70 EB	39.953103	-82.996483	732.8	75.0
B-032-4-15	1151+80	46 ft. Lt.	Third Street	39.953329	-82.996384	732.5	75.0
B-032-5-15	1151+79	47 ft. Rt.	Third Street	39.953371	-82.996058	731.6	75.0
B-032-6-15	1152+85	45 ft. Rt.	Third Street	39.953656	-82.996128	753.0	80.0
B-033-1-15	201+68	48 ft. Rt.	I-70 EB	39.953222	-82.995459	729.7	60.0
B-033-2-15	202+00	84 ft. Lt.	I-70 WB	39.953812	-82.995473	751.6	70.0
B-033-3-15	203+36	48 ft. Rt.	I-70 EB	39.953302	-82.994869	731.2	69.0
B-037-1-15	208+42	66 ft. Rt.	I-70 EB	39.953492	-82.993082	736.3	60.0

1. Ground surface elevations at the boring locations were interpolated using topographic mapping information provided by GPD GROUP.

The locations for the current exploration borings performed by Rii were determined and located in the field by Rii representatives. Rii utilized a handheld GPS unit to obtain northing and easting coordinates of the boring locations. Ground surface elevations at the boring locations were interpolated using topographic mapping information provided by GPD GROUP.

The borings performed for this exploration were drilled using CME-55 or CME 750X all-terrain vehicle (ATV) mounted rotary drilling machine, utilizing a 3.25-inch inside diameter hollow stem auger to advance the holes. Standard penetration test (SPT) and split spoon sampling were performed variously in each boring. The SPT, per the American Society for Testing and Materials (ASTM) designation D1586, is conducted using a 140-pound hammer falling 30.0 inches to drive a 2.0-inch outside diameter split spoon sampler 18.0 inches. Rii utilized a calibrated automatic drop hammer to generate consistent energy transfer to the sampler. Driving resistance is recorded on the boring logs in terms of blow per 6.0-inch interval of the driving distance. The second and third intervals are added to obtain the number of blows per foot (N). Standard penetration blow counts aid in determining soil properties applicable in foundation system design. Measured blow count (N) values are corrected to an equivalent (60%) energy ratio, N_{60} , by the following equation. Both values are represented on boring logs in Appendix III.

$$N_{60} = N_m \cdot (ER/60)$$

Where:

N_m = measured N value

ER = drill rod energy ratio, expressed as a percent, for the system used

The automatic hammers for the CME 55 and CME 750X drill rigs have drill rod energy ratios of 92.0 and 85.7 percent, respectively.

At the completion of drilling, the borings were backfilled with a mixture of bentonite chips and soil cuttings generated during the drilling process, or sealed with a cement-bentonite grout in accordance with ODOT specifications. For borings performed within the existing roadway, the pavement was patched with either an equivalent thickness of quick set concrete or cold asphalt.

During drilling, field logs were prepared by Rii personnel showing the encountered subsurface conditions. Soil samples obtained from the drilling operation were preserved and sealed in glass jars and delivered to the soil laboratory. In the laboratory, the soil samples were visually classified and select samples were tested, as noted in Table 2.

Table 2. Laboratory Test Schedule

Laboratory Test	Test Designation	Number of Tests Performed
Natural Moisture Content	AASHTO T265	226
Plastic and Liquid Limits	AASHTO T89, T90	95
Gradation – Sieve/Hydrometer	AASHTO T88	95

The tests performed are necessary to classify existing soil according to the Ohio Department of Transportation (ODOT) classification system and to estimate engineering properties of importance in determining foundation and roadway embankment design and construction recommendations. Results of the laboratory testing are presented on the boring logs in Appendix III. A description of the soil terms used throughout this report is presented in Appendix II.

Hand penetrometer readings, which provide a rough estimate of the unconfined compressive strength of the soil, were reported on the boring logs in units of tons per square foot (tsf) and were utilized to classify the consistency of the cohesive soil in each layer. An indirect estimate of the compressive strength of the cohesive split spoon samples can also be made from a correlation with the blow counts (N_{60}). Please note that split spoon samples are considered disturbed and the laboratory determination of their shear strengths may vary from undisturbed conditions.

In addition to the borings performed by Rii, historical borings performed by Rii, DLZ and others (1959, 2008 & 20120 investigations) were utilized in the subgrade analysis. The list of historical test borings are provided in the Table 3.

Table 3. Historical Boring Summary

Boring Number	Station ¹	Offset ¹	Alignment	Latitude ¹	Longitude ¹	Ground ² Elevation (feet msl)	Boring Depth (feet)
B-003-D-59	N/A	N/A	N/A	N/A	N/A	716.1	49.8
B-012-4-59	N/A	N/A	N/A	N/A	N/A	751.2	51.0
B-031-0-08	196+17	33 ft. Rt.	I-70 EB	39.953001	-82.997403	735.6	60.0
B-033-0-08	200+96	3 ft. Lt.	I-70 WB	39.953543	-82.995787	730.5	15.0
B-035-0-08	203+82	33 ft. Rt.	I-70 EB	39.953365	-82.994716	732.3	15.0
B-036-0-08	206+71	61 ft. Rt.	I-70 EB	39.953426	-82.993683	734.7	115.6
B-037-0-08	207+95	29 ft. Lt.	I-70 WB	39.953945	-82.993349	749.1	130.0
B-039-0-08	211+71	63 ft. Rt.	I-70 EB	39.953635	-82.991929	739.5	17.5
B-041-0-08	213+75	76 ft. Lt.	I-70 WB	39.954302	-82.991319	759.7	135.0
B-042-0-08	215+73	1 ft. Lt.	I-70 WB	39.954167	-82.990584	741.7	15.0
B-043-0-08	216+70	56 ft. Rt.	I-70 WB	39.953828	-82.990168	743.1	115.0
B-035-1-10	206+09	52 ft. Lt.	I-70 WB	39.953920	-82.994016	751.7	75.0
B-037-1-10	209+10	47 ft. Lt.	I-70 WB	39.954044	-82.992953	745.5	65.0
B-038-1-10	210+69	49 ft. Lt.	I-70 WB	39.954116	-82.992389	739.5	70.0

Boring Number	Station ¹	Offset ¹	Alignment	Latitude ¹	Longitude ¹	Ground ² Elevation (feet msl)	Boring Depth (feet)
B-039-1-10	212+10	85 ft. Lt.	I-70 WB	39.954269	-82.991907	757.7	75.0
B-040-1-10	213+16	63 ft. Rt.	I-70 EB	39.953687	-82.991419	740.6	30.0
B-041-1-10	215+16	73 ft. Lt.	I-70 WB	39.954344	-82.990817	760.6	79.3
B-043-1-10	216+85	76 ft. Lt.	I-70 WB	39.954411	-82.9902211	762.5	75.0
B-280-0-10	27+22	9 ft. Rt.	CL Fulton St.	39.953560	-82.9977954	761.2	7.5
B-281-0-10	30+32	1 ft. Lt.	CL Fulton St.	39.953713	-82.996707	755.1	9.0

1. The stationing, offset, latitude and longitude for the 2008 and 2010 borings were estimated using boring plan information in conjunction with the project basemapping provided by GPD GROUP.
2. Ground surface elevations at the boring locations were interpolated using topographic mapping information provided by GPD GROUP.

4.0 FINDINGS

Interpreted engineering logs have been prepared based on the field logs, visual examination of samples and laboratory test results. Classification follows the respective version of the ODOT Specifications for Geotechnical Explorations (SGE) at the time the exploration borings were performed. The following is a summary of what was found in the test borings and what is represented on the boring logs.

4.1 Surface Materials

In general, the 2015 borings performed by Rii, encountered between 4.0 to 9.0 inches of asphalt overlying between 6.0 to 12.0 inches of concrete and 4.0 to 26.0 inches of aggregate base. Borings B-032-2-15, B-032-3-15, B-033-1-15 and B-033-3-15, each encountered 3.0 inches of topsoil at the existing ground surface.

It must be noted that, composite pavement was only encountered in borings B-032-6-15, B-033-2-15 and B-037-1-15.

4.2 Subsurface Soils

Beneath the surficial materials, existing embankment fill was encountered in boring B-030-2-15 of the 2015 borings extending to depth of 13.5 feet below the ground surface. The granular material encountered within the existing fill material was generally described as gravel with sand and silt, and gravel (ODOT A-2-24, A-1-a).

Underlying the existing fill in the boring, natural soils were encountered consisting of both granular and cohesive material. The granular soils encountered were generally described as brown to brownish gray and brown gravel, gravel and sand, coarse and fine sand, fine sand, gravel with sand and silt and gravel with sand, silt and clay (ODOT A-1-a, A-1-b, A-3a, A-3, A-2-4, A-2-6). The natural cohesive soils encountered were consisted of brown, dark brown brownish gray to gray silty clay, silt and clay, silt and clay and silt (ODOT A-6b, A-6a, A-4a, A-4b).

The relative density of granular soils is primarily derived from SPT blow counts (N_{60}). Based on the SPT blow counts obtained, the granular soil encountered ranged from very loose ($N_{60} < 5$ blows per foot [bpf]) to very dense ($N_{60} > 50$ bpf). Overall blow counts recorded from the SPT sampling ranged from 3 bpf to split spoon sampler refusal. Split spoon sampler refusal is defined as exceeding 50 blows from the hammer with less than 6.0 inches of penetration by the split spoon sampler. The shear strength and consistency of the cohesive soils are primarily derived from the hand penetrometer values (HP). The cohesive soil encountered ranged from medium stiff ($0.5 < \text{HP} \leq 1.0$ tsf) to hard ($\text{HP} > 4.0$ tsf). The unconfined compressive strength of the cohesive soil samples tested, obtained from the hand penetrometer, ranged from 1.0 to over 4.5 tsf (limit of instrument).

Natural moisture contents of the cohesive soil samples tested ranged from 8 to 23 percent. The natural moisture content of the cohesive soil samples tested for plasticity index ranged from 5 percent below to 2 percent above their corresponding plastic limits. In general, the soil exhibited natural moisture contents considered to be moderately below to at optimum moisture levels.

Historical borings performed in 2010, 2008 and 1959 encountered similar subsurface soils. Existing fill was encountered in borings B-012-4-59, B-031-0-08, B-034-0-08, B-035-1-10, B-039-1-10, B-041-1-10, B-043-1-10, B-280-0-10 and B-281-0-10 at depths ranging from 3.0 to 18.5 feet below the ground surface. The existing fill material were consisted of granular and cohesive soils and were generally described as gravel with sand, gravel with sand and silt, silt and clay, silty clay, sandy silt, silt (ODOT A-1-b, A-2-4, A-6a, A-6b, A-4a, A-4b). In general the granular soils were consisted of brown and gray gravel, gravel with sand, coarse and fine sand, fine sand and gravel with sand and silt (ODOT A-1-a, A-1-b, A-3a, A-3, A-2-4). The cohesive soils encountered were consisted of brown and gray silty clay, silt and clay, sandy silt and silt (ODOT A-6b, A-6a, A-4a, A-4b).

4.3 Bedrock

Bedrock was encountered in historical borings performed by DLZ in borings listed in Table 4 along with a summary of the top of bedrock elevations encountered in each boring.

Table 4. Top of Bedrock Elevations

Boring Number	Ground Elevation (feet msl)	Top of Bedrock		Rock Description
		Depth (feet)	Elevation (feet msl)	
B-030-0-08	736.7	103.5	633.2	Shale
B-034-0-08	751.5	115.0	636.5	Shale
B-036-0-08	734.7	93.5	641.2	Interbedded Shale and limestone
B-037-0-08	749.1	110.0	639.3	Interbedded shale and limestone
B-041-0-08	759.7	115.0	644.7	Shale
B-043-0-08	743.1	93.5	649.6	Shale

The percent recovery and RQD values of the bedrock core runs are summarized in Table 5.

Table 5. Rock Core Summary

Boring	Core No.	Depth (feet)	Recovery (%)	RQD (%)
B-030-0-08	RC-1	105.0 to 110.0	95	37
	RC-2	110.0 to 111.0	100	42
B-034-0-08	RC-1	115.5 to 120.5	65	55
	RC-2	120.5 to 125.5	88	77
	RC-3	125.5 to 130.5	100	57
	RC-4	130.5 to 135.5	100	85
B-036-0-08	RC-2	100.6 to 105.6	100	83
	RC-3	105.6 to 110.6	100	60
	RC-4	110.6 to 115.6	100	68
B-037-0-08	RC-1	110.0 to 115.0	100	60
	RC-2	115.0 to 120.0	100	83
	RC-3	120.0 to 125.0	100	77
	RC-4	125.0 to 130.0	100	82

Boring	Core No.	Depth (feet)	Recovery (%)	RQD (%)
B-041-0-08	RC-1	115.0 to 120.0	100	80
	RC-2	120.0 to 125.0	100	25
	RC-3	125.0 to 130.0	100	58
B-043-0-08	RC-1	95.0 to 100.0	100	88
	RC-2	100.0 to 105.0	100	82
	RC-3	105.0 to 110.0	100	97
	RC-4	110.0 to 115.0	100	87

It should be noted that bedrock can experience mechanical breaks during the drilling and coring processes. It is anticipated that DLZ attempted to account for fresh, manmade breaks during tabulation of the RQD analysis, per ODOT SGE specifications. The quality of the shale bedrock, according to the RQD values, was poor ($25 \leq \text{RQD} \leq 50\%$) to very good ($90 < \text{RQD} \leq 100\%$).

4.4 Groundwater

Groundwater was encountered in the borings as presented in Table 6.

Table 6. Groundwater Levels

Boring Number	Ground Surface Elevation (feet msl)	Initial Groundwater		Upon Completion ¹	
		Depth (feet)	Elevation (feet msl)	Depth (feet)	Elevation (feet msl)
B-030-0-08	736.7	16.0	720.7	13.6	723.1
B-030-1-15	748.9	28.5	720.4	-	-
B-030-2-15	740.0	17.5	722.5	-	-
B-031-0-08	735.6	9.5	726.1	8.3	727.3
B-032-1-15	748.9	28.0	720.9	-	-
B-032-2-15	733.1	16.0	717.1	-	-
B-032-3-15	732.8	11.5	721.3	-	-
B-032-4-15	732.5	11.5	721.0	-	-
B-032-5-15	731.6	10.5	721.1	-	-
B-032-6-15	753.0	31.0	722.0	-	-

Boring Number	Ground Surface Elevation (feet msl)	Initial Groundwater		Upon Completion ¹	
		Depth (feet)	Elevation (feet msl)	Depth (feet)	Elevation (feet msl)
B-033-0-08	730.5	6.5	724.0	9.2	721.3
B-033-1-15	729.7	8.5	721.2	-	-
B-033-2-15	751.6	33.5	718.1	-	-
B-033-3-15	731.2	11.0	720.2	-	-
B-034-0-08	751.5	5.5	746.0	43.3	708.2
B-035-0-08	732.3	9.2	723.1	9.2	723.1
B-035-1-10	751.7	26.0	725.7	-	-
B-036-0-08	734.7	14.0	720.7	11.8	722.9
B-037-0-08	749.1	21.0	728.1	25.6	723.5
B-037-1-10	745.5	18.5	727.0	-	-
B-037-1-15	736.3	18.5	717.8	-	-
B-038-1-10	739.5	13.5	726.0	-	-
B-039-1-10	757.7	21.0	736.7	-	-
B-040-1-10	740.6	8.5	732.1	12.8	727.8
B-041-0-08	759.7	13.0	746.7	37.1	722.6
B-041-1-10	760.6	3.3	757.3	-	-
B-043-0-08	743.1	37.0	706.1	14.4	728.7
B-043-1-10	762.5	18.5	744.0	-	-

Groundwater was encountered initially during the drilling process in the borings at depths ranging from 3.3 to 37.0 feet below the ground surface, which corresponds to elevations ranging from 706.1 to 757.3 feet msl. At the completion of drilling and prior to removing the augers, groundwater was encountered in the auger stem at the depth ranging from 8.3 feet to 43.3 feet below ground surface, corresponding to elevation ranging from 708.2 to 728.7 feet msl.

Please note that short-term water level readings, especially in cohesive soils, are not necessarily an accurate indication of the actual groundwater level. In addition, groundwater levels or the presence of groundwater are considered to be dependent on seasonal fluctuations in precipitation.

A more comprehensive description of what was encountered during the drilling process may be found on the boring logs in Appendix III.

5.0 ANALYSES AND RECOMMENDATIONS

Data obtained from the drilling and testing program as well as from a review of existing geotechnical information have been used to determine the roadway support capabilities and the settlement potential for the soil encountered at the site. These parameters have been used to provide guidelines for the subject roadways, as well as the construction specifications related to the placement of embankment fills and general earthwork recommendations, which are discussed in the following paragraphs.

5.1 Subgrade Recommendations

Based on roadway design information provided by GPD GROUP, soil borings with ground surface elevation within three feet of the proposed grade and soil borings located in the areas where cut will be required to reach the proposed grade were used in the GB1 analyses. The subgrade soils along the alignments of the project consisted of both granular and cohesive soils. The granular soils encountered along the alignments were comprised of loose to very dense gravel with sand, coarse and fine sand, gravel with sand and silt (ODOT A-1-b, A-2-4, A-3a). The cohesive material encountered in the subgrade soils were comprised of very stiff to hard silt and clay, silty clay, sandy silt, and silt (ODOT A-6a, A-6b, A-4a, and A-4b).

The moisture content of cohesive soil has a significant effect on the physical properties of the material. It must be noted that the moisture contents illustrated on the boring logs and utilized in this analysis represent the conditions during the drilling phase of the project. The referenced borings for subgrade analysis were drilled between 2008 and 2015 with some borings performed in 1959. These soil conditions, especially in the surficial soils, may not coincide with the soil conditions that will be encountered during construction. Consequently, the extent/need for subgrade improvement is entirely dependent on the subgrade conditions (i.e., moisture contents) encountered at the time of construction.

5.1.1 I-70 EB/WB and Third Street

Thirty four (34) borings were utilized in the analysis of the subgrade along I-70 EB/WB and Third Street. A complete GB1 analysis of soils encountered at the proposed subgrade level along these alignments is presented in Appendix IV. Based on GB1 analysis of the subgrade soils, California Bearing Ratio (CBR) values (based on correlation charts) for the entire alignment ranged from 5 to 12 with an average of 9. However, based on experience with similar subgrade soils and conditions, **it is recommended that pavement design be based on a CBR value of 6** with a corresponding resilient modulus, M_R , of 7,200 psi. Correlation charts indicate a modulus of subgrade reaction (K) of 150 pci and a soil support value (SSV) of 4.4.

Based on the borings utilized for this alignment, the subgrade soils along this alignment is in good condition and no chemical stabilization could be recommended per ODOT GB1. **It must be noted however, that boring B-031-0-08 encountered silt soils in the subgrade depths. These soils are prone to frost and heave and per ODOT GB1 is recommended to be excavated and replaced per ODOT Item 204.**

Per ODOT GB1 requirements, if it is elected to perform global stabilization, the entire subgrade should be stabilized using the average site parameters provided in Table 7.

Table 7. Average Site Parameters

Average N _{60L}	Average PI	Average Moisture	Average Optimum Moisture	Average Group Index	Average CBR
47	9	9	9	3	9

Upon completion of the stabilization, the entire subgrade should be proof rolled to verify that stability has been achieved. Please note that the recommended CBR values assume that the materials utilized for the roadway subgrade in fill areas are equivalent to, or better than materials at the existing subgrade elevation. Sources of borrow material should be designated in advance of construction. The material should be tested in the laboratory to verify the soil exhibits a minimum design CBR value of 6.

Pavement design is dependent on the inclusion of adequate surface and subsurface drainage in order to maintain the compacted subgrade near optimum moisture conditions throughout the lifetime of the pavement. If underdrain systems are considered, they should be installed in accordance to the specifications presented in Item 204 of the ODOT Construction and Materials Specifications (CMS).

5.2 Construction Considerations

All site work shall conform to local codes and to the latest ODOT Construction and Materials Specifications (CMS), including that all excavation and embankment preparation and construction should follow ODOT Item 200 (Earthwork).

5.2.1 Excavation Considerations

All excavations should be shored / braced or laid back at a safe angle in accordance to Occupational Safety and Health Administration (OSHA) guidelines. During excavation, if slopes cannot be laid back to OSHA Standards due to adjacent structures or other obstructions, temporary shoring may be required. The following table should be utilized as a general guide for implementing OSHA guidelines when estimating excavation back slopes at the various boring locations. Actual excavation back slopes must be field verified by qualified personnel at the time of excavation in strict accordance with OSHA guidelines.

Table 8. Excavation Back Slopes

Soil	Maximum Back Slope	Notes
Soft to Medium Stiff Cohesive	1.5 : 1.0	Above Ground Water Table and No Seepage
Stiff Cohesive	1.0 : 1.0	Above Ground Water Table and No Seepage
Very Stiff to Hard Cohesive	0.75 : 1.0	Above Ground Water Table and No Seepage
All Granular & Cohesive Soil Below Ground Water Table or with Seepage	1.5 : 1.0	None

5.2.2 Groundwater Considerations

Based on groundwater condition encountered in the borings, groundwater should not be anticipated during construction of the roadway. If/where, however, groundwater was encountered during construction, proper groundwater control should be employed and maintained to prevent disturbance to excavation bottoms consisting of cohesive soil, and to prevent the possible development of a quick or "boiling" condition where soft silts and/or fine sands are encountered. It is preferable that the groundwater level, if encountered, be maintained at least 36 inches below the deepest excavation. Note that determining and maintaining actual groundwater levels during construction is the responsibility of the contractor.

6.0 LIMITATIONS OF STUDY

The above recommendations are predicated upon construction inspection by a qualified soil technician under the direct supervision of a professional geotechnical engineer. Adequate testing and inspection during construction are considered necessary to assure an adequate foundation system and are part of these recommendations.

The recommendations for this project were developed utilizing soil and bedrock information obtained from the test borings that were made at the proposed site for the current investigation. Resource International is not responsible for the data, conclusions, opinions or recommendations made by others during previous investigations at this site. At this time, we would like to point out that soil borings only depict the soil and bedrock conditions at the specific locations and time at which they were made. The conditions at other locations on the site may differ from those occurring at the boring locations.

The conclusions and recommendations herein have been based upon the available soil and bedrock information and the design details furnished by a representative of the owner of the proposed project. Any revision in the plans for the proposed construction from those anticipated in this report should be brought to the attention of the geotechnical engineer to determine whether any changes in the foundation or earthwork recommendations are necessary. If deviations from the noted subsurface conditions are encountered during construction, they should also be brought to the attention of the geotechnical engineer.

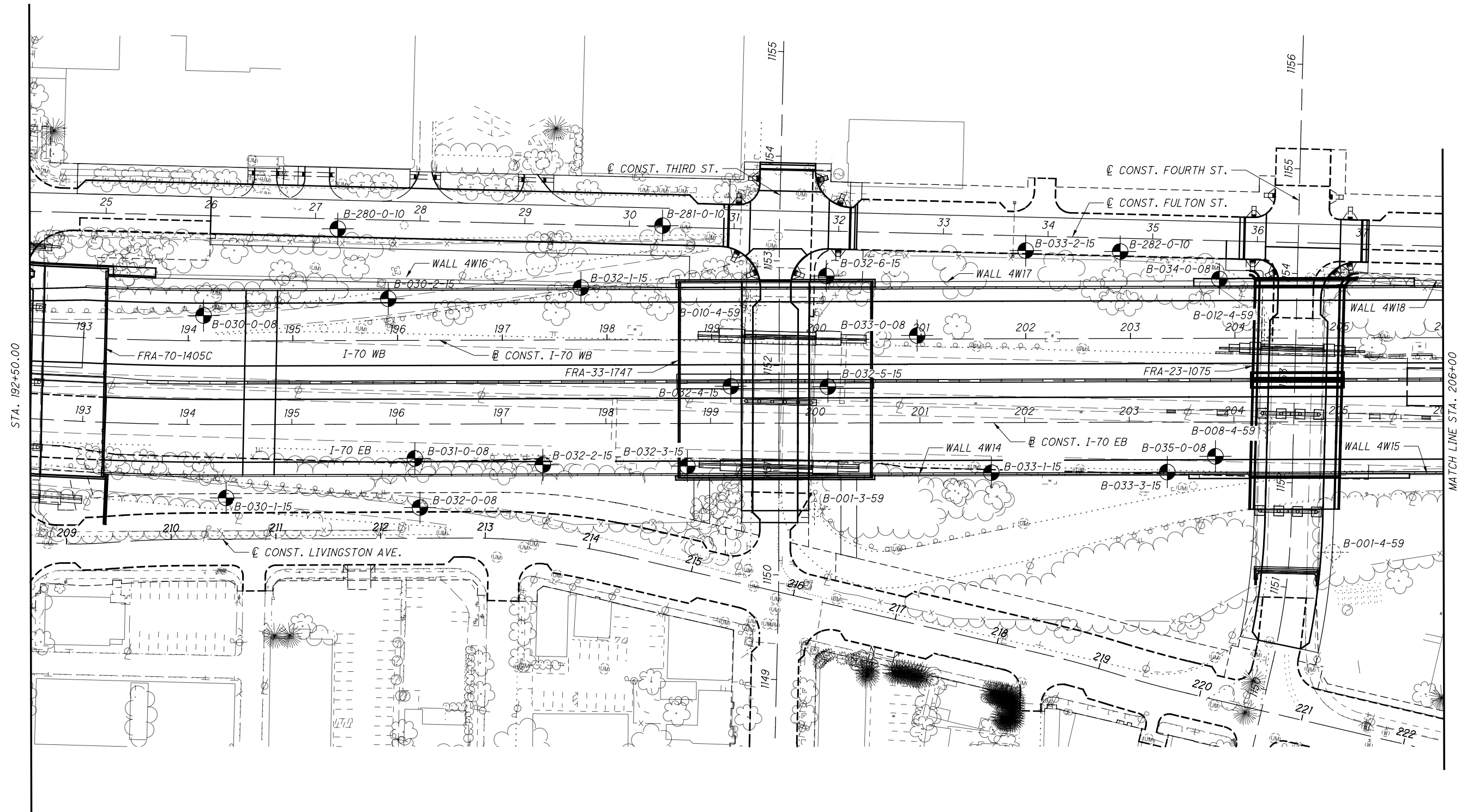
The scope of our services does not include any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in the soil, groundwater or surface water within or beyond the site studied. Any statements in this report or on the test boring logs regarding odors, staining of soils or other unusual conditions observed are strictly for the information of our client.

Our professional services have been performed, our findings obtained and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. Resource International is not responsible for the conclusions, opinions or recommendations made by others based upon the data included.



APPENDIX I

VICINITY MAP AND BORING PLAN



BORING PLAN - I-70 EB STA. 192+50 TO 206+00
FRA-70-14.05
FRANKLIN COUNTY, OHIO

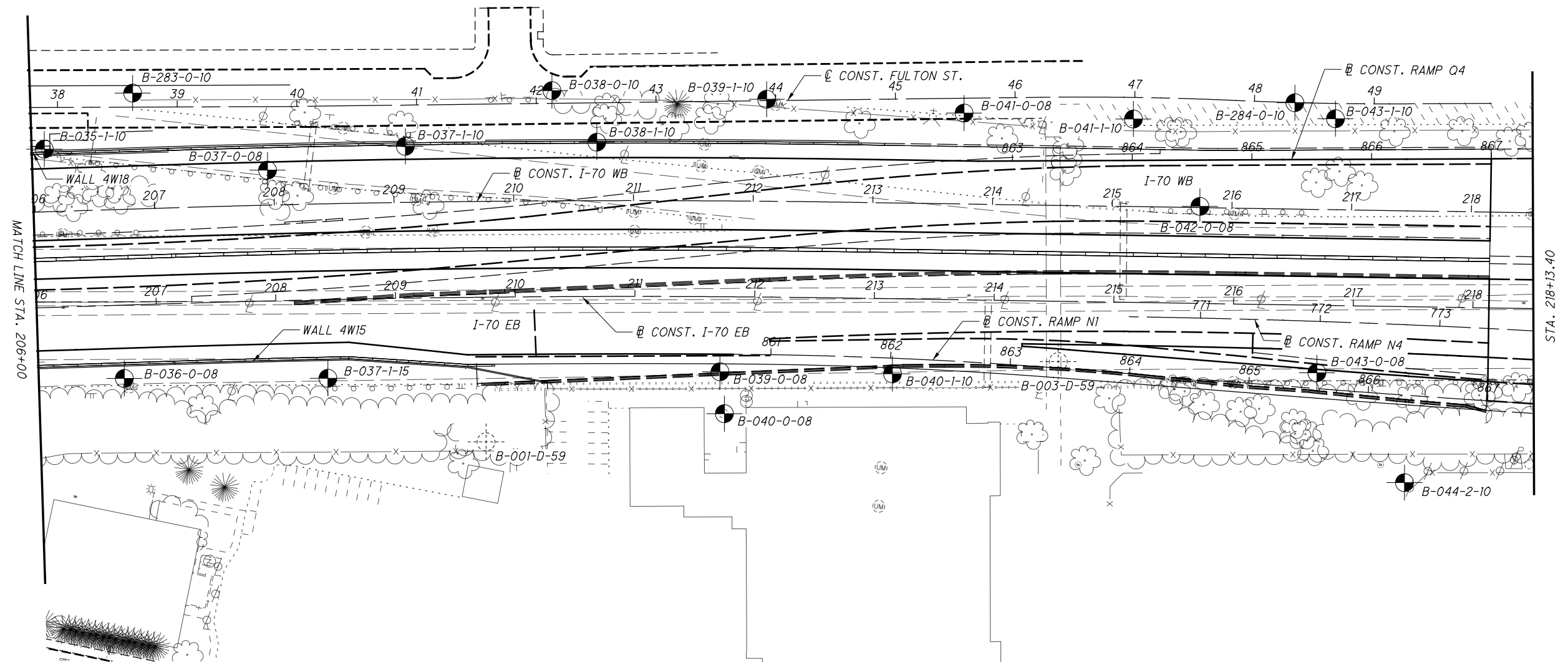
RII PROJECT NO.
W-15-126

SCALE: 1"=50'
0 25 50



DRAWN
JAS
REVIEWED
BRT
DATE
11-26-18





BORING PLAN - I-70 EB STA. 206+00 TO 218+13.40
FRA-70-14.05
FRANKLIN COUNTY, OHIO

RII PROJECT NO.
W-15-126

SCALE: 1"=50'
 0 25 50



DRAWN
JAS
 REVIEWED
BRT
 DATE
11-26-18



APPENDIX II





















DESCRIPTION OF SOIL TERMS



CLASSIFICATION OF SOILS

Ohio Department of Transportation

(The classification of a soil is found by proceeding from top to bottom of the chart.
The first classification that the test data fits is the correct classification.)

SYMBOL	DESCRIPTION	Classification		LL _O /LL x 100*	% Pass #40	% Pass #200	Liquid Limit (LL)	Plastic Index (PI)	Group Index Max.	REMARKS
		AASHTO	OHIO							
	Gravel and/or Stone Fragments	A-1-a			30 Max.	15 Max.		6 Max.	0	Min. of 50% combined gravel, cobble and boulder sizes
	Gravel and/or Stone Fragments with Sand	A-1-b			50 Max.	25 Max.		6 Max.	0	
	Fine Sand	A-3			51 Min.	10 Max.	NON-PLASTIC		0	
	Coarse and Fine Sand	--	A-3a			35 Max.		6 Max.	0	Min. of 50% combined coarse and fine sand sizes
	Gravel and/or Stone Fragments with Sand and Silt	A-2-4				35 Max.	40 Max.	10 Max.	0	
		A-2-5			41 Min.					
	Gravel and/or Stone Fragments with Sand, Silt and Clay	A-2-6				35 Max.	40 Max.	11 Min.	4	
		A-2-7			41 Min.					
	Sandy Silt	A-4	A-4a	76 Min.		36 Min.	40 Max.	10 Max.	8	Less than 50% silt sizes
	Silt	A-4	A-4b	76 Min.		50 Min.	40 Max.	10 Max.	8	50% or more silt sizes
	Elastic Silt and Clay	A-5		76 Min.		36 Min.	41 Min.	10 Max.	12	
	Silt and Clay	A-6	A-6a	76 Min.		36 Min.	40 Max.	11 - 15	10	
	Silty Clay	A-6	A-6b	76 Min.		36 Min.	40 Max.	16 Min.	16	
	Elastic Clay	A-7-5		76 Min.		36 Min.	41 Min.	≤ LL-30	20	
	Clay	A-7-6		76 Min.		36 Min.	41 Min.	> LL-30	20	
	Organic Silt	A-8	A-8a	75 Max.		36 Min.				W/o organics would classify as A-4a or A-4b
	Organic Clay	A-8	A-8b	75 Max.		36 Min.				W/o organics would classify as A-5, A-6a, A-6b, A-7-5 or A-7-6
MATERIAL CLASSIFIED BY VISUAL INSPECTION										
	Sod and Topsoil			Uncontrolled Fill (Describe)			Bouldery Zone			Peat
	Pavement or Base									

* Only perform the oven-dried liquid limit test and this calculation if organic material is present in the sample.

DESCRIPTION OF SOIL TERMS

The following terminology was used to describe soils throughout this report and is generally adapted from ASTM 2487/2488 and ODOT Specifications for Geotechnical Explorations.

Granular Soils - The relative compactness of granular soils is described as:

ODOT A-1, A-2, A-3, A-4 (non-plastic) or USCS GW, GP, GM, GC, SW, SP, SM, SC, ML (non-plastic)

<u>Description</u>	<u>Blows per foot – SPT (N₆₀)</u>		
Very Loose	Below		5
Loose	5	-	10
Medium Dense	11	-	30
Dense	31	-	50
Very Dense	Over		50

Cohesive Soils - The relative consistency of cohesive soils is described as:

ODOT A-4, A-5, A-6, A-7, A-8 or USCS ML, CL, OL, MH, CH, OH, PT

<u>Description</u>	<u>Unconfined Compression (tsf)</u>		
Very Soft	Less than		0.25
Soft	0.25	-	0.5
Medium Stiff	0.5	-	1.0
Stiff	1.0	-	2.0
Very Stiff	2.0	-	4.0
Hard	Over		4.0

Gradation - The following size-related denominations are used to describe soils:

<u>Soil Fraction</u>	<u>USCS Size</u>	<u>ODOT Size</u>
Boulders	Larger than 12"	Larger than 12"
Cobbles	12" to 3"	12" to 3"
Gravel coarse	3" to ¾"	3" to ¾"
fine	¾" to 4.75 mm (¾" to #4 Sieve)	¾" to 2.0 mm (¾" to #10 Sieve)
Sand coarse	4.75 mm to 2.0 mm (#4 to #10 Sieve)	2.0 mm to 0.42 mm (#10 to #40 Sieve)
medium	2.0 mm to 0.42 mm (#10 to #40 Sieve)	-
fine	0.42 mm to 0.074 mm (#40 to #200 Sieve)	0.42 mm to 0.074 mm (#40 to #200 Sieve)
Silt	0.074 mm to 0.005 mm (#200 to 0.005 mm)	0.074 mm to 0.005 mm (#200 to 0.005 mm)
Clay	Smaller than 0.005 mm	Smaller than 0.005 mm

Modifiers of Components - Modifiers of components are as follows:

<u>Term</u>	<u>Range</u>		
Trace	0%	-	10%
Little	10%	-	20%
Some	20%	-	35%
And	35%	-	50%

Moisture Table - The following moisture-related denominations are used to describe cohesive soils:

<u>Term</u>	<u>Range - USCS</u>	<u>Range - ODOT</u>
Dry	0% to 10%	Well below Plastic Limit
Damp	>2% below Plastic Limit	Below Plastic Limit
Moist	2% below to 2% above Plastic Limit	Above PL to 3% below LL
Very Moist	>2% above Plastic Limit	
Wet	≥ Liquid Limit	3% below LL to above LL

Organic Content – The following terms are used to describe organic soils:

<u>Term</u>	<u>Organic Content (%)</u>
Slightly organic	2-4
Moderately organic	4-10
Highly organic	>10

Bedrock – The following terms are used to describe the relative strength of bedrock:

<u>Description</u>	<u>Field Parameter</u>
Very Weak	Can be carved with knife and scratched by fingernail. Pieces 1 in. thick can be broken by finger pressure.
Weak	Can be grooved or gouged with knife readily. Small, thin pieces can be broken by finger pressure.
Slightly Strong	Can be grooved or gouged 0.05 in deep with knife. 1 in. size pieces from hard blows of geologist hammer.
Moderately Strong	Can be scratched with knife or pick. 1/4 in. size grooves or gouges from blows of geologist hammer.
Strong	Can be scratched with knife or pick with difficulty. Hard hammer blows to detach hand specimen.
Very Strong	Cannot be scratched by knife or pick. Hard repeated blows of geologist hammer to detach hand specimen.
Extremely Strong	Cannot be scratched by knife or pick. Hard repeated blows of geologist hammer to chip hand specimen.

DESCRIPTION OF ROCK TERMS

The following terminology was used to describe the rock throughout this report and is generally adapted from ASTM D5878 and the ODOT Specifications for Geotechnical Explorations.

Weathering – Describes the degree of weathering of the rock mass:

<u>Description</u>	<u>Field Parameter</u>
Unweathered	No evidence of any chemical or mechanical alteration of the rock mass. Mineral crystals have a right appearance with no discoloration. Fractures show little or not staining on surfaces.
Slightly Weathered	Slight discoloration of the rock surface with minor alterations along discontinuities. Less than 10% of the rock volume presents alteration.
Moderately Weathered	Portions of the rock mass are discolored as evident by a dull appearance. Surfaces may have a pitted appearance with weathering "halos" evident. Isolated zones of varying rock strengths due to alteration may be present. 10 to 15% of the rock volume presents alterations.
Highly Weathered	Entire rock mass appears discolored and dull. Some pockets of slightly to moderately weathered rock may be present and some areas of severely weathered materials may be present.
Severely Weathered	Majority of the rock mass reduced to a soil-like state with relic rock structure discernable. Zones of more resistant rock may be present but the material can generally be molded and crumbled by hand pressures.

Strength of Bedrock – The following terms are used to describe the relative strength of bedrock:

<u>Description</u>	<u>Field Parameter</u>
Very Weak	Can be carved with knife and scratched by fingernail. Pieces 1 in. thick can be broken by finger pressure.
Weak	Can be grooved or gouged with knife readily. Small, thin pieces can be broken by finger pressure.
Slightly Strong	Can be grooved or gouged 0.05 in deep with knife. 1 in. size pieces from hard blows of geologist hammer.
Moderately Strong	Can be scratched with knife or pick. 1/4 in. size grooves or gouges from blows of geologist hammer.
Strong	Can be scratched with knife or pick with difficulty. Hard hammer blows to detach hand specimen.
Very Strong	Cannot be scratched by knife or pick. Hard repeated blows of geologist hammer to detach hand specimen.
Extremely Strong	Cannot be scratched by knife or pick. Hard repeated blows of geologist hammer to chip hand specimen.

Bedding Thickness – Description of bedding thickness as the average perpendicular distances between bedding surfaces:

<u>Description</u>	<u>Thickness</u>
Very Thick	Greater than 36 inches
Thick	18 to 36 inches
Medium	10 to 18 inches
Thin	2 to 10 inches
Very Thin	0.4 to 2 inches
Laminated	0.1 to 0.4 inches
Thinly Laminated	Less than 0.1 inches

Fracturing – Describes the degree and condition of fracturing (fault, joint, or shear):

Degree of Fracturing

<u>Description</u>	<u>Spacing</u>
Unfractured	Greater than 10 feet
Intact	3 to 10 feet
Slightly Fractured	1 to 3 feet
Moderately Fractured	

Aperture Width

<u>Description</u>	<u>Width</u>
Open	Greater than 0.2 inches
Narrow	0.05 to 0.2 inches
Tight	Less than 0.05 inches

Surface Roughness

<u>Description</u>	<u>Criteria</u>
Very Rough	Near vertical steps and ridges occur on surface
Slightly Rough	Asperities on the surfaces distinguishable
Slickensided	Surface has smooth, glassy finish, evidence of Striations

RQD – Rock Quality Designation (calculation shown in report) and Rock Quality (ODOT, GB 3, January 13, 2006):

<u>RQD %</u>	<u>Rock Index Property Classification (based on RQD, not slake durability index)</u>
0 – 25%	Very Poor
26 – 50%	Poor
51 – 70%	Fair
71 – 85%	Good
86 – 100%	Very Good

APPENDIX III

BORING LOGS

BORING LOGS

Definitions of Abbreviations

AS	=	Auger sample
GI	=	Group index as determined from the Ohio Department of Transportation classification system
HP	=	Unconfined compressive strength as determined by a hand penetrometer (tons per square foot)
LL _o	=	Oven-dried liquid limit as determined by ASTM D4318. Per ASTM D2487, if LL _o /LL is less than 75 percent, soil is classified as "organic".
LOI	=	Percent organic content (by weight) as determined by ASTM D2974 (loss on ignition test)
PID	=	Photo-ionization detector reading (parts per million)
QR	=	Unconfined compressive strength of intact rock core sample as determined by ASTM D2938 (pounds per square inch)
QU	=	Unconfined compressive strength of soil sample as determined by ASTM D2166 (pounds per square foot)
RC	=	Rock core sample
REC	=	Ratio of total length of recovered soil or rock to the total sample length, expressed as a percentage
RQD	=	Rock quality designation – estimate of the degree of jointing or fracture in a rock mass, expressed as a percentage:

$$\frac{\sum \text{segments equal to or longer than 4.0 inches}}{\text{core run length}} \times 100$$

S	=	Sulfate content (parts per million)
SPT	=	Standard penetration test blow counts, per ASTM D1586. Driving resistance recorded in terms of blows per 6-inch interval while letting a 140-pound hammer free fall 30 inches to drive a 2-inch outer diameter (O.D.) split spoon sampler a total of 18 inches. The second and third intervals are added to obtain the number of blows per foot (N _m).
N ₆₀	=	Measured blow counts corrected to an equivalent (60 percent) energy ratio (ER) by the following equation: N ₆₀ = N _m *(ER/60)
SS	=	Split spoon sample
2S	=	For instances of no recovery from standard SS interval, a 2.5 inch O.D. split spoon is driven the full length of the standard SS interval plus an additional 6.0 inches to obtain a representative sample. Only the final 6.0 inches of sample is retained. Blow counts from 2S sampling are not correlated with N ₆₀ values.
3S	=	Same as 2S, but using a 3.0 inch O.D. split spoon sampler.
TR	=	Top of rock
W	=	Initial water level measured during drilling
▼	=	Water level measured at completion of drilling


Classification Test Data

Gradation (as defined on Description of Soil Terms):

GR	=	% Gravel
SA	=	% Sand
SI	=	% Silt
CL	=	% Clay

Atterberg Limits:


LL	=	Liquid limit
PL	=	Plastic limit
PI	=	Plasticity Index
WC	=	Water content (%)

	PROJECT: FRA-70-14.05 PROJECT 4B	DRILLING FIRM / OPERATOR: RII / S.B.	DRILL RIG: CME 55 (SN 386345)	STATION / OFFSET: 194+37.05 / 70.0' RT	EXPLORATION ID B-030-1-15
	TYPE: ROADWAY	SAMPLING FIRM / LOGGER: RII / C.D.	HAMMER: CME AUTOMATIC	ALIGNMENT: BL CONST. I-70 EB	
	PID: 96053 BR ID: NA	DRILLING METHOD: 3.25" - HSA	CALIBRATION DATE: 10/20/14	ELEVATION: 748.9 (MSL) EOB: 59.4 ft.	PAGE 1 OF 2
	START: 12/2/15 END: 12/3/15	SAMPLING METHOD: SPT	ENERGY RATIO (%): 92	COORD: 39.952814, -82.998014	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	BACK FILL
								GR	CS	FS	SI	CL	LL	PL	PI			
0.5' - ASPHALT (6.0")	748.9																	
1.0' - CONCRETE (12.0")	748.4																	
0.5' - AGGREGATE BASE (6.0")	747.4																	
VERY STIFF, BROWN SANDY SILT , SOME FINE GRAVEL, LITTLE CLAY, DAMP.	746.9																	
DENSE TO VERY DENSE, BROWN TO BROWNISH GRAY GRAVEL WITH SAND AND SILT , TRACE CLAY, MOIST. -COBBLES PRESENT THROUGHOUT	745.4																	
		1																
		2	7															
		3	8 11	29	100	SS-1	4.00	25	16	12	27	20	24	15	9	12	A-4a (2)	
		4	8 12	32	67	SS-2	-	-	-	-	-	-	-	-	-	7	A-2-4 (V)	
		5																
		6	9															
		7	15 16	47	100	SS-3	-	49	21	9	14	7	24	17	7	8	A-2-4 (0)	
		8																
		9	19 20	54	100	SS-4	-	-	-	-	-	-	-	-	-	8	A-2-4 (V)	
		10																
	738.4	11	26 42	119	33	SS-5	4.5+	22	9	12	31	26	26	13	13	9	A-6a (6)	
		12	37															
		13																
		14	10 19	65	0	SS-6	-	-	-	-	-	-	-	-	-	-	A-6a (V)	
		15	24 45	-	100	3S-6A	4.5+	-	-	-	-	-	-	-	-	10	A-6a (V)	
		16																
		17	11 14	47	100	SS-7	4.5+	-	-	-	-	-	-	-	-	10	A-6a (V)	
		18	17															
		19	6 16	-	100	SS-8A	4.5+	12	9	13	38	28	25	13	12	10	A-6a (7)	
	729.2	20	50/3"			SS-8B	-	-	-	-	-	-	-	-	-	5	A-1-b (V)	
		21																
		22																
		23																
		24	22 32	104	100	SS-9	-	23	34	29	9	5	NP	NP	NP	4	A-1-b (0)	
		25	37															
		26																
		27																
		28																
		29	24 31	90	100	SS-10	-	-	-	-	-	-	-	-	-	12	A-1-b (V)	
			29															
VERY DENSE, GRAY TO BROWN GRAVEL AND SAND , TRACE SILT, TRACE CLAY, DAMP TO MOIST. -COBBLES PRESENT @ 22.0' -WATER ADDED TO AUGERS @ 28.5'																		

MATERIAL DESCRIPTION AND NOTES	ELEV. 718.9	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	BACK FILL
								GR	CS	FS	SI	CL	LL	PL	PI			
VERY DENSE, GRAY TO BROWN GRAVEL AND SAND , TRACE SILT, TRACE CLAY, DAMP TO MOIST. <i>(same as above)</i>		31																
		32																
		33																
		34	5 19 30	74	100	SS-11	-	43	26	17	10	4	NP	NP	NP	10		A-1-b (0)
		35																
VERY DENSE, GRAY SILT , "AND" COARSE TO FINE SAND, TRACE CLAY, TRACE FINE GRAVEL, MOIST.	711.9	36																
		37																
		38																
		39	5 25 33	87	100	SS-12	-	1	0	38	54	7	NP	NP	NP	17		A-4b (5)
		40																
HARD, GRAY SANDY SILT , LITTLE FINE GRAVEL, LITTLE CLAY, MOIST.	706.9	41																
		42																
		43																
		44	36 48 50/4"	-	100	SS-13	4.5+	-	-	-	-	-	-	-	-	9		A-4a (V)
		45																
		46																
		47																
		48																
		49	24 50/5"	-	100	SS-14	4.5+	16	13	23	37	11	18	13	5	10		A-4a (3)
		50																
MEDIUM DENSE TO VERY DENSE, GRAY GRAVEL AND SAND , TRACE SILT, TRACE CLAY, MOIST TO WET. -HEAVING SANDS ENCOUNTERED @ 53.5'	696.9	51																
		52																
		53																
		54	1 2 8	15	78	SS-15	-	-	-	-	-	-	-	-	-	17		A-1-b (V)
		55																
		56																
		57																
		58																
		59	14 50/5"	-	100	SS-16	-	33	47	12	6	2	NP	NP	NP	11		A-1-b (0)


NOTES: GROUNDWATER ENCOUNTERED INITIALLY @ 28.5'

	PROJECT: FRA-70-14.05 PROJECT 4B	DRILLING FIRM / OPERATOR: RII / S.B.	DRILL RIG: CME 55 (SN 386345)	STATION / OFFSET: 195+91.21 / 39.9" LT	EXPLORATION ID B-030-2-15
	TYPE: ROADWAY	SAMPLING FIRM / LOGGER: RII / C.D.	HAMMER: CME AUTOMATIC	ALIGNMENT: BL CONST. I-70 WB	
	PID: 96053 BR ID: NA	DRILLING METHOD: 3.25" - HSA	CALIBRATION DATE: 10/20/14	ELEVATION: 740.0 (MSL) EOB: 54.3 ft.	PAGE 1 OF 2
	START: 12/1/15 END: 12/2/15	SAMPLING METHOD: SPT	ENERGY RATIO (%): 92	COORD: 39.953401, -82.997585	

MATERIAL DESCRIPTION AND NOTES	ELEV. 740.0	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	BACK FILL
								GR	CS	FS	SI	CL	LL	PL	PI			
0.5' - ASPHALT (6.0")	739.5																	
1.0' - AGGREGATE BASE (12.0")	738.5																	
FILL: MEDIUM DENSE TO VERY DENSE, DARK BROWN GRAVEL WITH SAND AND SILT, LITTLE CLAY, MOIST. -BRICK FRAGMENTS PRESENT IN SS-1 THROUGH SS-3		1	4	7	24	33	SS-1	-	-	-	-	-	-	-	-	8	A-2-4 (V)	
		2		9														
		3																
		4	4	8	27	61	SS-2	-	34	22	10	19	15	21	15	6	10	A-2-4 (O)
		5		10														
		6	6															
		7	20	14	51	67	SS-3	-	-	-	-	-	-	-	-	8	A-2-4 (V)	
		8																
		9	7	8	20	50	SS-4	-	-	-	-	-	-	-	-	-	A-2-4 (V)	
	729.5	10		5														
FILL: MEDIUM DENSE, GRAY GRAVEL (CONCRETE FRAGMENTS), DAMP.		11	33	7	23	44	SS-5	-	-	-	-	-	-	-	-	6	A-1-a (V)	
		12		8														
	726.5	13																
VERY LOOSE TO MEDIUM DENSE, BROWN GRAVEL, "AND" COARSE TO FINE SAND, TRACE SILT, TRACE CLAY, MOIST TO WET. -MUD ADDED @ 17.5'		14	8	6	17	0	SS-6	-	-	-	-	-	-	-	-	-		
		15	5	5	-	100	3S-6A	-	52	32	5	9	2	NP	NP	NP	9	A-1-a (O)
		16	3	1	3	0	SS-7	-	-	-	-	-	-	-	-	-		
		17	1	1	-	100	3S-7A	-	-	-	-	-	-	-	-	-	13	A-1-a (V)
	721.5	18																
VERY LOOSE, BROWN GRAVEL AND SAND, LITTLE SILT, TRACE CLAY, WET.		19	2	1	3	61	SS-8	-	44	37	6	10	3	NP	NP	NP	21	A-1-b (O)
		20		1														
		21																
	718.0	22																
VERY STIFF, BROWNISH GRAY SANDY SILT, SOME CLAY, TRACE FINE GRAVEL, MOIST.		23																
		24	10	14	44	100	SS-9	4.00	-	-	-	-	-	-	-	-	12	A-4a (V)
		25		15														
		26																
	713.0	27																
VERY DENSE, GRAY COARSE AND FINE SAND, SOME SILT, TRACE CLAY, TRACE FINE GRAVEL, MOIST.		28																
		29	6	14	71	100	SS-10	-	7	26	36	23	8	NP	NP	NP	14	A-3a (O)
				33														


-EOB

ABANDONMENT METHODS, MATERIALS, QUANTITIES: COMPACTED WITH THE AUGER 150 LBS BENTONITE CHIPS AND SOIL CUTTINGS

	PROJECT: FRA-70-14.05 PROJECT 4B	DRILLING FIRM / OPERATOR: RII / S.B.	DRILL RIG: CME 55 (SN 386345)	STATION / OFFSET: 197+75.35 / 50.0" LT	EXPLORATION ID B-032-1-15
	TYPE: ROADWAY	SAMPLING FIRM / LOGGER: RII / C.D.	HAMMER: CME AUTOMATIC	ALIGNMENT: BL CONST. I-70 WB	
	PID: 96053 BR ID: NA	DRILLING METHOD: 3.25" - HSA	CALIBRATION DATE: 10/20/14	ELEVATION: 748.9 (MSL) EOB: 65.0 ft.	PAGE 1 OF 3
	START: 11/30/15 END: 12/1/15	SAMPLING METHOD: SPT	ENERGY RATIO (%): 92	COORD: 39.953517, -82.996945	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	BACK FILL
								GR	CS	FS	SI	CL	LL	PL	PI			
0.7' - ASPHALT (8.0")	748.9																	
0.3' - AGGREGATE BASE (4.0")	748.2																	
HARD, BROWN SILT, SOME FINE GRAVEL, LITTLE COARSE TO FINE SAND, LITTLE CLAY, DAMP.	747.9	1	3	26	39	SS-1	4.5+	-	-	-	-	-	-	-	-	12	A-4b (V)	
		2	7 10															
		3																
		4	9	44	100	SS-2	4.5+	21	9	6	50	14	20	15	5	9	A-4b (6)	
		5	15 14															
	743.4	6																
DENSE TO VERY DENSE, GRAY TO BROWNISH GRAY GRAVEL WITH SAND AND SILT, SOME CLAY, DAMP.		7	11	68	100	SS-3	-	-	-	-	-	-	-	-	-	10	A-2-4 (V)	
		8																
		9	13	65	100	SS-4	-	27	23	20	9	21	25	15	10	9	A-2-4 (0)	
		10	19 24															
		11	23															
		12	50/3"	-	89	SS-5	-	-	-	-	-	-	-	-	-	6	A-2-4 (V)	
	735.9	13																
VERY DENSE, BROWNISH GRAY GRAVEL, SOME COARSE TO FINE SAND, TRACE SILT, TRACE CLAY, DAMP.		14	45	-	100	SS-6	-	-	-	-	-	-	-	-	-	4	A-1-a (V)	
		15	50/2"															
	733.4	16																
HARD, GRAY SANDY SILT, LITTLE FINE GRAVEL, LITTLE CLAY, DAMP.		17	10	92	100	SS-7 A	4.5+	16	17	17	39	11	21	15	6	10	A-4a (3)	
	731.9	18	16 45			SS-7B	-	-	-	-	-	-	-	-	-	5	A-1-b (V)	
VERY DENSE, BROWN GRAVEL AND SAND, TRACE SILT, TRACE CLAY, MOIST.		19																
		20	16	86	100	SS-8	-	42	51	3	3	1	NP	NP	NP	4	A-1-b (0)	
		21	25 32															
		22																
		23																
		24	13	63	100	SS-9	-	-	-	-	-	-	-	-	-	5	A-1-b (V)	
		25	20 22															
		26																
	721.9	27																
DENSE TO VERY DENSE, BROWNISH GRAY TO GRAY GRAVEL, "AND" COARSE TO FINE SAND, TRACE SILT, TRACE CLAY, MOIST. -INTRODUCED WATER @ 28.5'		28																
		29	7	33	100	SS-10	-	55	37	4	3	1	NP	NP	NP	9	A-1-a (0)	
			9 13															

[illegible]


	PROJECT: FRA-70-14.05 PROJECT 4B	DRILLING FIRM / OPERATOR: RII / S.B.	DRILL RIG: CME 750X (SN 310218)	STATION / OFFSET: 197+39.71 / 39.1" RT	EXPLORATION ID B-032-2-15	
	TYPE: ROADWAY	SAMPLING FIRM / LOGGER: RII / CD/BW	HAMMER: CME AUTOMATIC	ALIGNMENT: BL CONST. I-70 EB	PAGE	
	PID: 96053 BR ID: NA	DRILLING METHOD: 3.25" - HSA	CALIBRATION DATE: 10/20/14	ELEVATION: 733.1 (MSL) EOB: 60.0 ft.	1 OF 2	
	START: 10/6/15 END: 10/6/15	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85.7	COORD: 39.953042, -82.996969		

MATERIAL DESCRIPTION AND NOTES	ELEV. 733.1	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	BACK FILL
								GR	CS	FS	SI	CL	LL	PL	PI			
0.3' - TOPSOIL (3.0") HARD, BROWN TO GRAY SANDY SILT , SOME CLAY, LITTLE FINE GRAVEL, DAMP.	732.8	1	5	24	100	SS-1	4.5+	11	12	20	34	23	25	15	10	10	A-4a (4)	
-SS-3: SULFATE CONTENT = 907 PPM	720.1	2	6 11															
		3																
		4	8 14 19	47	100	SS-2	4.5+	-	-	-	-	-	-	-	9	A-4a (V)		
		5																
		6	9															
VERY DENSE, GRAY GRAVEL AND SAND , LITTLE SILT, TRACE CLAY, MOIST.	717.6	7	15 19	49	100	SS-3	4.5+	-	-	-	-	-	-	-	8	A-4a (V)		
		8																
MEDIUM DENSE TO VERY DENSE, GRAY COARSE AND FINE SAND , LITTLE SILT, TRACE CLAY, TRACE FINE GRAVEL, MOIST TO WET.	712.6	9	10 17 21	54	100	SS-4	4.5+	-	-	-	-	-	-	-	8	A-4a (V)		
		10																
		11	9 10 18	40	100	SS-5	4.5+	-	-	-	-	-	-	9	A-4a (V)			
HARD, GRAY SANDY SILT , LITTLE CLAY, LITTLE FINE GRAVEL, DAMP.		12																
		13	7 18 32	71	100	SS-6	-	36	25	17	14	8	17	11	6	6	A-1-b (0)	
		14																
		15																
		16	2 3 12	21	100	SS-7	-	5	10	70	12	3	NP	NP	NP	19	A-3a (0)	
		17																
		18																
		19	9 22 38	86	100	SS-8	-	-	-	-	-	-	-	-	-	15	A-3a (V)	
		20																
		21	6 21 35	80	100	SS-9	-	12	16	24	35	13	18	12	6	10	A-4a (3)	
		22																
		23																
		24	11 26 48	106	100	SS-10	4.5+	-	-	-	-	-	-	-	10	A-4a (V)		
		25																
		26																
		27																
		28																
		29	12 47 50/3"	-	100	SS-11	4.5+	13	11	22	38	16	20	11	9	8	A-4a (4)	

[illegible]

NOTES: GROUNDWATER ENCOUNTERED INITIALLY @ 16.0'; CAVE-IN DEPTH @ 17.0'


ABANDONMENT METHODS, MATERIALS, QUANTITIES: COMPACTED WITH THE AUGER 100 LBS BENTONITE CHIPS AND SOIL CUTTINGS

	PROJECT: FRA-70-14.05 PROJECT 4B	DRILLING FIRM / OPERATOR: RII / S.B.	DRILL RIG: CME 750X (SN 310218)	STATION / OFFSET: 198+77.78 / 40.8" RT	EXPLORATION ID B-032-3-15
	TYPE: ROADWAY	SAMPLING FIRM / LOGGER: RII / C.D.	HAMMER: CME AUTOMATIC	ALIGNMENT: BL CONST. I-70 EB	
	PID: 96053 BR ID: FRA-33-1747	DRILLING METHOD: 3.25" - HSA	CALIBRATION DATE: 10/20/14	ELEVATION: 732.8 (MSL) EOB: 75.0 ft.	PAGE 1 OF 3
	START: 10/7/15 END: 10/8/15	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85.7	COORD: 39.953103, -82.996483	


MATERIAL DESCRIPTION AND NOTES	ELEV. 732.8	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	BACK FILL
								GR	CS	FS	SI	CL	LL	PL	PI			
0.3' - TOPSOIL (3.0")	732.5																	
MEDIUM DENSE TO VERY DENSE, BROWN GRAVEL AND SAND , LITTLE SILT, TRACE CLAY, MOIST.		1	4	21	100	SS-1	-	-	-	-	-	-	-	-	-	6	A-1-b (V)	
		2	7															
		3																
		4	8	37	100	SS-2	-	-	-	-	-	-	-	-	-	5	A-1-b (V)	
-ROCK FRAGMENTS PRESENT THROUGHOUT		5																
		6																
		7	11	54	78	SS-3	-	57	21	6	13	3	NP	NP	NP	7	A-1-b (0)	
		8																
-COBBLES PRESENT @ 8.0'		9	14	47	100	SS-4	-	-	-	-	-	-	-	-	-	7	A-1-b (V)	
		10	18															
	722.3	11	9	129	83	SS-5	-	99	1	0	0	0	NP	NP	NP	10	A-1-a (0)	
DENSE TO VERY DENSE, BROWNISH GRAY TO GRAY GRAVEL , AND COARSE TO FINE SAND, TRACE SILT, TRACE CLAY, WET.		12	12															
-MUD ADDED TO AUGERS @ 11.0'		13																
		14	26	57	89	SS-6	-	-	-	-	-	-	-	-	-	11	A-1-a (V)	
		15	20															
		16	7															
-ROCK FRAGMENTS PRESENT THROUGHOUT		17	13	41	100	SS-7	-	61	21	8	7	3	NP	NP	NP	11	A-1-a (0)	
-HEAVING SANDS ENCOUNTERED @ 18.5'		18																
		19	6	36	100	SS-8	-	-	-	-	-	-	-	-	-	9	A-1-a (V)	
-COBBLES PRESENT FROM 18.5' TO 21.0'		20																
		21																
		22	9	34	100	SS-9	-	55	27	9	7	2	NP	NP	NP	12	A-1-a (0)	
		23																
		24	17	46	100	SS-10A	-	-	-	-	-	-	-	-	-	8	A-1-a (V)	
		25	11			SS-10B	4.5+	-	-	-	-	-	-	-	-	11	A-4a (V)	
		26																
		27	16	83	100	SS-11	4.5+	19	11	18	37	15	21	14	7	10	A-4a (3)	
		28																
		29	8	54	100	SS-12	4.5+	-	-	-	-	-	-	-	-	12	A-4a (V)	
			15															
			23															
HARD, GRAY SANDY SILT , LITTLE FINE GRAVEL, LITTLE CLAY, DAMP.	708.3																	

PID: 96053	BR ID: FRA-33-1747	PROJECT: FRA-70-14.05 PROJECT 4B	STATION / OFFSET: 198+77.78 / 40.8' RT					START: 10/7/15		END: 10/8/15		PG 2 OF 3		B-032-3-15							
MATERIAL DESCRIPTION AND NOTES			ELEV. 702.8	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	BACK FILL	
										GR	CS	FS	SI	CL	LL	PL	PI				
HARD, GRAY SANDY SILT , LITTLE FINE GRAVEL, LITTLE CLAY, DAMP. <i>(same as above)</i>			700.8	31																	
VERY DENSE, GRAY SILT , SOME COARSE TO FINE SAND, TRACE CLAY, TRACE FINE GRAVEL, MOIST.			695.8	32																	
				33																	
				34	28 48 50/4"	-	100	SS-13	1.50	5	5	22	61	7	NP	NP	NP	17	A-4b (7)		
				35																	
				36																	
VERY DENSE, DARK GRAY TO GRAY GRAVEL AND SAND , TRACE SILT, TRACE CLAY, WET.			670.8	37																	
				38																	
				39	26 26 36	89	100	SS-14	-	-	-	-	-	-	-	-	14	A-1-b (V)			
				40																	
-COBBLES PRESENT @ 41.0'				41																	
				42																	
				43																	
-HEAVING SANDS ENCOUNTERED @ 43.5'				44	15 47 50/2"	-	100	SS-15	-	-	-	-	-	-	-	-	-	8	A-1-b (V)		
				45																	
				46																	
				47																	
-HEAVING SANDS ENCOUNTERED @ 48.5'				48																	
				49	8 23 38	87	100	SS-16	-	36	28	26	9	1	NP	NP	NP	11	A-1-b (0)		
				50																	
-COBBLES PRESENT @ 50.5'				51																	
			52																		
			53																		
			54	32 30 47	110	100	SS-17	-	44	27	18	9	2	NP	NP	NP	10	A-1-b (0)			
			55																		
			56																		
			57																		
			58																		
			59	10 40 46	123	100	SS-18	-	-	-	-	-	-	-	-	-	15	A-1-b (V)			
			60																		
			61																		

[illegible]



	PROJECT: FRA-70-14.05 PROJECT 4B	DRILLING FIRM / OPERATOR: RII / S.B.	DRILL RIG: CME 55 (SN 386345)	STATION / OFFSET: 1151+80.18 / 46.1" LT	EXPLORATION ID B-032-4-15
	TYPE: ROADWAY	SAMPLING FIRM / LOGGER: RII / C.D.	HAMMER: CME AUTOMATIC	ALIGNMENT: CL CONST. THIRD ST.	
	PID: 96053 BR ID: FRA-33-1747	DRILLING METHOD: 3.25" - HSA	CALIBRATION DATE: 10/20/14	ELEVATION: 732.5 (MSL) EOB: 75.0 ft.	PAGE 1 OF 3
	START: 1/6/16 END: 1/7/16	SAMPLING METHOD: SPT	ENERGY RATIO (%): 92	COORD: 39.953329, -82.996384	

MATERIAL DESCRIPTION AND NOTES	ELEV. 732.5	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	BACK FILL
								GR	CS	FS	SI	CL	LL	PL	PI			
0.8' - ASPHALT (9.0")	731.7																	
0.7' - AGGREGATE BASE (9.0")	731.0																	
DENSE TO VERY DENSE, BROWN, GRAY AND BLACK TO BROWNISH GRAY GRAVEL WITH SAND AND SILT , TRACE CLAY, MOIST.		1																
		2	8	27	78	SS-1	-	-	-	-	-	-	-	-	-	8	A-2-4 (V)	
		3	11															
		4	9	35	100	SS-2	-	-	-	-	-	-	-	-	-	7	A-2-4 (V)	
		5	12															
		6	14	72	61	SS-3	-	96	2	1	0	1	24	17	7	5	A-2-4 (0)	
		7	29															
		8																
		9	17	39	100	SS-4	-	-	-	-	-	-	-	-	-	6	A-2-4 (V)	
		10	14															
		11	20	75	0	SS-5	-	-	-	-	-	-	-	-	-	-		
-INTRODUCED MUD @ 11.5'		12	26															
		13	46	-	100	3S-5A	-	60	20	6	9	5	24	17	7	10	A-2-4 (0)	
		14	14	47	100	SS-6	-	-	-	-	-	-	-	-	-	9	A-2-4 (V)	
		15	15															
		16	12	66	72	SS-7	-	-	-	-	-	-	-	-	-	10	A-2-4 (V)	
		17	26															
	714.5	18																
		19	11	38	100	SS-8	-	39	36	15	5	5	NP	NP	NP	19	A-1-b (0)	
		20	13															
	712.0	21	7	98	67	SS-9	-	-	-	-	-	-	-	-	-	11	A-1-a (V)	
		22	45															
		23	20															
MEDIUM DENSE, BROWNISH GRAY GRAVEL AND SAND , TRACE SILT, TRACE CLAY, WET.		24	50/2"	-	100	SS-10	-	-	-	-	-	-	-	-	-	8	A-1-a (V)	
		25																
		26	7	50	83	SS-11	-	61	22	6	6	5	22	17	5	13	A-1-a (0)	
		27	14															
		28	19															
		29	15	60	94	SS-12	-	-	-	-	-	-	-	-	-	8	A-1-a (V)	
		30	18															
		31	22															
		32																
		33																
		34																
		35																
DENSE TO VERY DENSE, BROWNISH GRAY TO GRAY GRAVEL , LITTLE TO SOME COARSE TO FINE SAND, TRACE SILT, TRACE CLAY, MOIST.		36																
		37																
		38																
		39																
		40																
		41																
		42																
		43																
		44																
		45																
		46																
		47																

	PROJECT: FRA-70-14.05 PROJECT 4B	DRILLING FIRM / OPERATOR: RII / S.B.	DRILL RIG: CME 55 (SN 386345)	STATION / OFFSET: 1151+79.91 / 46.7" RT	EXPLORATION ID B-032-5-15
	TYPE: ROADWAY	SAMPLING FIRM / LOGGER: RII / C.D.	HAMMER: CME AUTOMATIC	ALIGNMENT: CL CONST. THIRD ST.	
	PID: 96053 BR ID: FRA-33-1747	DRILLING METHOD: 3.25" - HSA	CALIBRATION DATE: 10/20/14	ELEVATION: 731.6 (MSL) EOB: 75.0 ft.	PAGE 1 OF 3
	START: 1/4/16 END: 1/5/16	SAMPLING METHOD: SPT	ENERGY RATIO (%): 92	COORD: 39.953371, -82.996058	

MATERIAL DESCRIPTION AND NOTES	ELEV. 731.6	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	BACK FILL
								GR	CS	FS	SI	CL	LL	PL	PI			
0.8' - ASPHALT (9.0")	730.8																	
1.7' - AGGREGATE BASE (21.0")	729.1																	
DENSE, BROWN TO BROWNISH GRAY GRAVEL , SOME COARSE TO FINE SAND, LITTLE SILT, TRACE CLAY, DAMP TO MOIST.	718.6	1	10	27	33	SS-1	-	49	24	12	11	4	17	15	2	5	A-1-b (0)	
		2	9															
		3																
		4	7	41	0	SS-2	-	-	-	-	-	-	-	-	-	-		
		5	11															
		6	16															
		7	18	-	100	3S-2A	-	-	-	-	-	-	-	-	-	10	A-1-a (V)	
		8	8															
		9	12	39	67	SS-3	-	-	-	-	-	-	-	-	-	7	A-1-a (V)	
		10	14															
-INTRODUCED WATER @ 11.0'	712.1	11	8															
		12	10	32	89	SS-4	-	-	-	-	-	-	-	-	-	11	A-1-a (V)	
		13	11															
		14	7	38	100	SS-5	-	54	24	7	11	4	23	17	6	13	A-1-a (0)	
		15	14															
		16	11															
		17	13	41	100	SS-6	-	-	-	-	-	-	-	-	-	8	A-1-b (V)	
		18	14															
		19	11															
		20	12	38	100	SS-7	-	-	-	-	-	-	-	-	-	12	A-1-b (V)	
DENSE TO VERY DENSE, BROWN, GRAY AND BLACK GRAVEL AND SAND , LITTLE SILT, TRACE CLAY, MOIST.	703.6	21	13															
		22	39	57	100	SS-8A	-	44	29	12	11	4	NP	NP	NP	13	A-1-b (0)	
		23	16															
		24	22			SS-8B	4.5+	-	-	-	-	-	-	-	-	10	A-4a (V)	
		25																
		26	35															
		27	46															
		28	50/5"	-	100	SS-9	4.5+	12	11	23	37	17	21	13	8	9	A-4a (4)	
		29																
		30	9															
HARD, BROWNISH GRAY SANDY SILT , LITTLE CLAY, LITTLE FINE GRAVEL, DAMP.	703.6	31	32	113	100	SS-10	4.5+	-	-	-	-	-	-	-	-	9	A-4a (V)	
		32	43															
		33																
		34																
		35	30															
		36	48															
		37	50/3"	-	100	SS-11	4.5+	-	-	-	-	-	-	-	-	10	A-4a (V)	
		38																
		39																
		40	19															
VERY DENSE, GRAY COARSE AND FINE SAND , LITTLE FINE GRAVEL, LITTLE SILT, TRACE CLAY, MOIST.	703.6	41	29	110	100	SS-12	-	-	-	-	-	-	-	-	-	21	A-3a (V)	
		42	44															
		43																
		44																
		45																
		46																
		47																
		48																
		49																
		50																

PID: 96053	BR ID: FRA-33-1747	PROJECT: FRA-70-14.05 PROJECT 4B	STATION / OFFSET: 1151+79.91 / 46.7' RT					START: 1/4/16		END: 1/5/16		PG 2 OF 3		B-032-5-15					
MATERIAL DESCRIPTION AND NOTES		ELEV. 701.6	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	BACK FILL
									GR	CS	FS	SI	CL	LL	PL	PI			
VERY DENSE, GRAY COARSE AND FINE SAND , LITTLE FINE GRAVEL, LITTLE SILT, TRACE CLAY, MOIST. <i>(same as above)</i>		699.6	31																
VERY DENSE, GRAY SANDY SILT , TRACE CLAY, TRACE FINE GRVAEL, MOIST. -HEAVING SANDS ENCOUNTERED @ 33.5'			32																
			33																
			34	11 44 46	135	100	SS-13	-	1	3	59	32	5	NP	NP	NP	14	A-4a (0)	
			35																
		694.6	36																
VERY DENSE, GRAY GRAVEL , SOME COARSE TO FINE SAND, TRACE SILT, TRACE CLAY, MOIST. -HEAVING SANDS ENCOUNTERED @ 38.5'		684.6	37																
			38																
			39	12 45 50/4"	-	100	SS-14	-	-	-	-	-	-	-	-	-	7	A-1-a (V)	
			40																
			41																
			42																
			43																
-HEAVING SANDS ENCOUNTERED @ 43.5'			44	25 50/5"	-	100	SS-15	-	75	16	5	3	1	NP	NP	NP	7	A-1-a (0)	
			45																
		684.6	46																
VERY DENSE, BROWNISH GRAY SANDY SILT , LITTLE CLAY, TRACE FINE GRAVEL, DAMP.		674.6	47																
			48																
			49	50/1"	-	100	SS-16	-	-	-	-	-	-	-	-	-	7	A-4a (V)	
			50																
			51																
			52																
			53																
			54	50/1"	-	0	SS-17	-	-	-	-	-	-	-	-	-			
			55																
		674.6	56																
VERY DENSE, BROWNISH GRAY GRAVEL AND SAND , TRACE SILT, TRACE CLAY, MOIST.			57																
			58																
			59	40 38 28	99	44	SS-18	-	32	30	26	9	3	NP	NP	NP	11	A-1-b (0)	
			60																
				61															

MATERIAL DESCRIPTION AND NOTES		ELEV.	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	BACK FILL
									GR	CS	FS	SI	CL	LL	PL	PI			
VERY DENSE, BROWNISH GRAY GRAVEL AND SAND, TRACE SILT, TRACE CLAY, MOIST. (same as above)		669.5	FOB	63													<L> <L> <L>		
		64		28 30 41	107	67	SS-19	-	-	-	-	-	-	-	14	A-1-b (V)	<L> <L> <L>		
		65															<L> <L> <L>		
		66															<L> <L> <L>		
		67															<L> <L> <L>		
		68															<L> <L> <L>		
		69		30 50/5"	-	100	SS-20	-	41	27	24	6	2	NP	NP	NP	14	A-1-b (O)	<L> <L> <L>
		70																<L> <L> <L>	
VERY DENSE, GRAY COARSE AND FINE SAND, TRACE SILT, TRACE FINE GRAVEL, DAMP.		659.6	FOB	71													<L> <L> <L>		
		72															<L> <L> <L>		
		73															<L> <L> <L>		
		74		12 28 40	102	100	SS-21	-	-	-	-	-	-	-	-	7	A-3a (V)	<L> <L> <L>	
		656.6	FOB	75													<L> <L> <L>		


NOTES: GROUNDWATER ENCOUNTERED INITIALLY @ 10.5'

[illegible]

[illegible]

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	BACK FILL
								GR	CS	FS	SI	CL	LL	PL	PI			
VERY DENSE, BROWN TO BROWNISH GRAY GRAVEL, SOME COARSE TO FINE SAND, TRACE SILT, TRACE CLAY, MOIST. (same as above)	690.9																	<L> <L> <L>
			63															<L> <L> <L>
			64	5	19	56	100	SS-19	-	-	-	-	-	-	-	16	A-1-a (V)	<L> <L> <L>
			65		20													<L> <L> <L>
			66															<L> <L> <L>
			67															<L> <L> <L>
			68															<L> <L> <L>
			69	12	36	100	100	SS-20	-	57	18	19	4	2	NP	NP	NP	<L> <L> <L>
			70		34													<L> <L> <L>
			71															<L> <L> <L>
-HEAVING SANDS ENCOUNTERED @ 73.5'	673.0		72															<L> <L> <L>
			73															<L> <L> <L>
			74	13	41	-	100	SS-21	-	-	-	-	-	-	-	13	A-1-a (V)	<L> <L> <L>
			75		50/5"													<L> <L> <L>
			76															<L> <L> <L>
			77															<L> <L> <L>
			78															<L> <L> <L>
			79	11	37	114	100	SS-22	-	-	-	-	-	-	-	10	A-1-a (V)	<L> <L> <L>
			80		43													<L> <L> <L>
																		<L> <L> <L>


ABANDONMENT METHODS, MATERIALS, QUANTITIES: COMPACTED WITH THE AUGER 100 LBS BENTONITE CHIPS AND SOIL CUTTINGS

	PROJECT: FRA-70-14.05 PROJECT 4B	DRILLING FIRM / OPERATOR: RII / S.B.	DRILL RIG: CME 750X (SN 310218)	STATION / OFFSET: 201+68.14 / 47.8" RT	EXPLORATION ID B-033-1-15
	TYPE: ROADWAY	SAMPLING FIRM / LOGGER: RII / C.D.	HAMMER: CME AUTOMATIC	ALIGNMENT: BL CONST. I-70 EB	
	PID: 96053 BR ID: NA	DRILLING METHOD: 3.25" - HSA	CALIBRATION DATE: 10/20/14	ELEVATION: 729.7 (MSL) EOB: 60.0 ft.	PAGE 1 OF 2
	START: 10/12/15 END: 10/12/15	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85.7	COORD: 39.953222, -82.995459	

MATERIAL DESCRIPTION AND NOTES	ELEV. 729.7	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	BACK FILL
								GR	CS	FS	SI	CL	LL	PL	PI			
0.3' - TOPSOIL (3.0")	729.4	1																<V>
DENSE TO VERY DENSE, BROWN GRAVEL AND SAND, TRACE SILT, TRACE CLAY, DAMP.		2																<V>
		3																<V>
		4	9	15	51	100	SS-1	-	-	-	-	-	-	-	-	4	A-1-b (V)	<V>
		5	21															<V>
		6																<V>
		7																<V>
		8																<V>
-INTRODUCED MUD @ 8.5'		9	8	16	50	100	SS-2	-	-	-	-	-	-	-	-	12	A-1-b (V)	<V>
		10	19															<V>
		11	11	17	53	100	SS-3A	-	28	31	28	10	3	NP	NP	14	A-1-b (0)	<V>
	717.6	12	20				SS-3B	-	-	-	-	-	-	-	-	21	A-3a (V)	<V>
VERY DENSE, BROWN TO GRAY COARSE AND FINE SAND, SOME FINE GRAVEL, LITTLE SILT, TRACE CLAY, MOIST.		13																<V>
		14	10	18	63	100	SS-4	-	-	-	-	-	-	-	-	13	A-3a (V)	<V>
		15	26															<V>
		16	5	16	53	100	SS-5	-	26	20	33	16	5	NP	NP	14	A-3a (0)	<V>
	711.7	17	21															<V>
VERY DENSE, GRAY GRAVEL AND SAND, TRACE SILT, TRACE CLAY, MOIST.		18																<V>
		19	12	21	73	100	SS-6	-	-	-	-	-	-	-	-	10	A-1-b (V)	<V>
		20	30															<V>
HARD, GRAY SANDY SILT, LITTLE CLAY, LITTLE FINE GRAVEL, DAMP.	709.2	21	20	50/5"	-	100	SS-7	4.5+	13	13	22	32	20	23	14	9	A-4a (3)	<V>
		22																<V>
		23																<V>
		24	11	42	-	100	SS-8	4.5+	-	-	-	-	-	-	-	12	A-4a (V)	<V>
		25	50/4"															<V>
VERY DENSE, GRAY FINE SAND, TRACE SILT, TRACE CLAY, TRACE FINE GRAVEL, WET.	704.2	26	6	22	91	100	SS-9	-	3	10	78	6	3	NP	NP	18	A-3 (0)	<V>
		27	42															<V>
		28																<V>
		29	18	24	84	100	SS-10	-	-	-	-	-	-	-	-	21	A-3 (V)	<V>
			35															<V>


-EOB

ABANDONMENT METHODS, MATERIALS, QUANTITIES: COMPACTED WITH THE AUGER 100 LBS BENTONITE CHIPS AND SOIL CUTTINGS

	PROJECT: FRA-70-14.05 PROJECT 4B	DRILLING FIRM / OPERATOR: RII / S.B.	DRILL RIG: CME 750X (SN 310218)	STATION / OFFSET: 202+00.30 / 84.3" LT	EXPLORATION ID B-033-2-15
	TYPE: ROADWAY	SAMPLING FIRM / LOGGER: RII / C.D.	HAMMER: CME AUTOMATIC	ALIGNMENT: BL CONST. I-70 WB	
	PID: 96053 BR ID: NA	DRILLING METHOD: 3.25" - HSA	CALIBRATION DATE: 10/20/14	ELEVATION: 751.6 (MSL) EOB: 70.0 ft.	PAGE 1 OF 3
	START: 10/1/15 END: 10/2/15	SAMPLING METHOD: SPT	ENERGY RATIO (%): 85.7	COORD: 39.953812, -82.995473	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	BACK FILL
								GR	CS	FS	SI	CL	LL	PL	PI			
0.3' - ASPHALT (4.0")	751.3	1																
0.7' - CONCRETE (8.0")	750.6	2																
0.5' - AGGREGATE BASE (6.0")	750.1	3	3	10	0	SS-1	-	-	-	-	-	-	-	-	-	-		
MEDIUM STIFF, DARK BROWN SILT AND CLAY , LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, MOIST.		4	4		100	SS-1A	1.00	-	-	-	-	-	-	-	-	19	A-6a (V)	
		5	3	13	0	SS-2	-	-	-	-	-	-	-	-	-	-		
	746.1	6	6		50	SS-2A	1.00	-	-	-	-	-	-	-	-	23	A-6a (V)	
STIFF TO HARD, DARK BROWN SILTY CLAY , "AND" COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.		7	2	9	100	SS-3	1.75	6	9	27	26	32	35	16	19	15	A-6b (8)	
		8	3															
		9	3															
		10	6	20	100	SS-4	4.5+	-	-	-	-	-	-	-	-	13	A-6b (V)	
-COBBLES PRESENT @ 10.5'		11	50/5"		0	SS-5	-	-	-	-	-	-	-	-	-	-		
	739.1	12																
VERY STIFF TO HARD, GRAY SANDY SILT , SOME CLAY, LITTLE FINE GRAVEL, DAMP.		13																
		14	8	40	100	SS-6	4.5+	11	11	20	35	23	23	14	9	9	A-4a (5)	
		15																
		16	21															
		17	27	96	0	SS-7	-	-	-	-	-	-	-	-	-	-		
		18	21		100	SS-7A	4.00	-	-	-	-	-	-	-	-	10	A-4a (V)	
		19	8	49	100	SS-8	4.5+	12	12	20	35	21	21	14	7	9	A-4a (4)	
		20	14															
		21	20															
	729.6	22																
DENSE TO VERY DENSE, BROWN GRAVEL AND SAND , TRACE SILT, TRACE CLAY, DAMP TO MOIST.		23																
		24	12	84	100	SS-9	-	-	-	-	-	-	-	-	-	7	A-1-b (V)	
		25	22															
		26	37															
		27																
		28																
-SS-10: SULFATE CONTENT = 7,493 PPM		29	17	84	100	SS-10	-	29	37	22	8	4	NP	NP	NP	13	A-1-b (0)	
		30	29															


0-2018-ODOT BORING LOG RII - OH DOT.GDT - 11/26/18 12:27 - U:\G18\PROJECTS\2015\W-15-126.GPJ

	PROJECT: FRA-70-14.05 PROJECT 4B	DRILLING FIRM / OPERATOR: RII / M.W.	DRILL RIG: CME 55 (SN 386345)	STATION / OFFSET: 203+36.15 / 47.7" RT	EXPLORATION ID B-033-3-15
	TYPE: ROADWAY	SAMPLING FIRM / LOGGER: RII / N.A.	HAMMER: CME AUTOMATIC	ALIGNMENT: BL CONST. I-70 EB	
	PID: 96053 BR ID: NA	DRILLING METHOD: 3.25" - HSA	CALIBRATION DATE: 10/20/14	ELEVATION: 731.2 (MSL) EOB: 69.0 ft.	PAGE 1 OF 3
	START: 10/7/15 END: 10/7/15	SAMPLING METHOD: SPT	ENERGY RATIO (%): 92	COORD: 39.953302, -82.994869	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	BACK FILL
								GR	CS	FS	SI	CL	LL	PL	PI			
0.3' - TOPSOIL (3.0")	731.2																	
VERY STIFF, BROWN SANDY SILT , SOME CLAY, LITTLE FINE GRAVEL, DAMP.	730.9	1	6	24	94	SS-1	4.00	-	-	-	-	-	-	-	-	10	A-4a (V)	
-ORGANICS PRESENT IN SS-1		2	10															
	728.2	3	6															
DENSE, BROWN COARSE AND FINE SAND , LITTLE FINE GRAVEL, TRACE SILT, TRACE CLAY, DAMP.		4	11	47	78	SS-2	-	11	29	48	9	3	NP	NP	NP	4	A-3a (0)	
		5	15															
	725.7	6	11															
DENSE TO VERY DENSE, BROWN AND BROWNISH GRAY GRAVEL AND SAND , TRACE TO LITTLE SILT, TRACE CLAY, MOIST.		7	15	51	100	SS-3	-	-	-	-	-	-	-	-	-	7	A-1-b (V)	
-SS-3 SULFATE CONTENT = 87 PPM		8	19															
		9	6															
		10	17	51	100	SS-4	-	34	30	26	7	3	NP	NP	NP	7	A-1-b (0)	
		11	17															
		12	3															
		13	17	56	100	SS-5	-	-	-	-	-	-	-	-	-	13	A-1-b (V)	
		14	20															
		15	12															
		16	15	50	100	SS-6	-	-	-	-	-	-	-	-	-	13	A-1-b (V)	
		17	18															
		18	11															
		19	17	57	100	SS-7	-	35	33	19	11	2	NP	NP	NP	14	A-1-b (0)	
		20	21															
		21	19															
		22	20	74	100	SS-8	-	-	-	-	-	-	-	-	-	12	A-1-b (V)	
		23	29															
		24																
		25	19															
		26	23	77	100	SS-9	-	23	29	33	13	2	NP	NP	NP	12	A-1-b (0)	
		27	28															
		28																
		29	21															
		30	28	83	78	SS-10A	-	-	-	-	-	-	-	-	-	10	A-1-b (V)	
		31	27															
	701.5																	

[illegible]

PID: 96053		BR ID: NA		PROJECT: FRA-70-14.05 PROJECT 4B		STATION / OFFSET: 203+36.15 / 47.7' RT				START: 10/7/15		END: 10/7/15		PG 3 OF 3		B-033-3-15					
MATERIAL DESCRIPTION AND NOTES				ELEV. 669.1	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	BACK FILL
											GR	CS	FS	SI	CL	LL	PL	PI			
VERY DENSE, GRAY SANDY SILT , LITTLE FINE GRAVEL, TRACE CLAY, MOIST. <i>(same as above)</i>					63 64 65 66 67 68 69	20 35 40	113	100	SS-17	-	-	-	-	-	-	-	-	11	A-4a (V)		
VERY DENSE, GRAY GRAVEL AND SAND , TRACE SILT, TRACE CLAY, MOIST.					664.2 662.2																
				EOB																	
NOTES: GROUNDWATER ENCOUNTERED INITIALLY @ 11.0'																					
ABANDONMENT METHODS, MATERIALS, QUANTITIES: COMPACTED WITH THE AUGER 100 LBS BENTONITE CHIPS AND SOIL CUTTINGS																					

	PROJECT: FRA-70-14.05 PROJECT 4B	DRILLING FIRM / OPERATOR: RII / S.B.	DRILL RIG: CME 55 (SN 386345)	STATION / OFFSET: 208+42.08 / 65.7" RT	EXPLORATION ID B-037-1-15
	TYPE: ROADWAY	SAMPLING FIRM / LOGGER: RII / C.D.	HAMMER: CME AUTOMATIC	ALIGNMENT: BL CONST. I-70 EB	
	PID: 96053 BR ID: NA	DRILLING METHOD: 3.25" - HSA	CALIBRATION DATE: 10/20/14	ELEVATION: 736.3 (MSL) EOB: 60.0 ft.	PAGE 1 OF 2
	START: 12/3/15 END: 12/4/15	SAMPLING METHOD: SPT	ENERGY RATIO (%): 92	COORD: 39.953492, -82.993082	


MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	BACK FILL
								GR	CS	FS	SI	CL	LL	PL	PI			
0.5' - ASPHALT (6.0")	735.8																	
1.0' - CONCRETE (12.0")	734.8	1																
0.5' - AGGREGATE BASE (6.0")	734.3	2																
HARD, BROWN TO GRAY SANDY SILT , SOME CLAY, LITTLE FINE GRAVEL, DAMP.		3																
		4	5	23	100	SS-1	4.5+	-	-	-	-	-	-	-	-	9	A-4a (V)	
		5	6	9														
		6																
		7																
		8																
		9	10	35	100	SS-2	4.5+	17	11	17	34	21	22	13	9	9	A-4a (4)	
		10	9	14														
		11																
		12																
-COBBLES PRESENT FROM 13.5' to 18.0'		13																
		14	50/1"	-	0	SS-3	-	-	-	-	-	-	-	-	-	-		
		15																
		16	50/3"	-	0	SS-4	-	-	-	-	-	-	-	-	-	-		
		17																
		18	50/1"	-	0	SS-4A	-	-	-	-	-	-	-	-	-	-		
	718.3	19	11	72	78	SS-5	-	36	33	15	11	5	NP	NP	NP	11	A-1-b (0)	
		20	26	22														
	715.8	21	50/4"	-	50	SS-6	4.5+	-	-	-	-	-	-	-	-	11	A-4a (V)	
		22																
STIFF TO VERY STIFF, GRAY SANDY SILT , LITTLE CLAY, LITTLE FINE GRAVEL, DAMP.		23																
		24	50/5"	-	80	SS-7	-	16	23	17	26	18	23	13	10	12	A-4a (2)	
		25																
	710.8	26	50/3"	-	100	SS-8	-	-	-	-	-	-	-	-	-	15	A-2-6 (V)	
		27																
		28																
	708.3	29	2	90	89	SS-9	-	54	25	8	9	4	20	14	6	9	A-1-a (0)	
			33	27														
DENSE, GRAY GRAVEL AND/OR STONE FRAGMENTS WITH SAND , LITTLE SILT, TRACE CLAY, MOIST TO WET. -WATER ADDED TO AUGERS @ 18.5'																		
VERY DENSE, GRAY GRAVEL WITH SAND, SILT, AND CLAY , MOIST.																		
VERY DENSE, GRAY GRAVEL , SOME COARSE TO FINE SAND, TRACE SILT, TRACE CLAY, MOIST.																		

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NOTES: GROUNDWATER ENCOUNTERED INITIALLY @ 18.5'

Client: ms consultants						Project: FRA-70-8.93						Job No. 0221-1004.01																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
LOG OF: Boring B-030-0-08						Location: Sta. 194+14.54, 24.17' LT., BL I-70 WB						Date Drilled: 7/20/2008 to 7/23/2008																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery	Sample No.		Hand Penetro- meter (tsf)	WATER OBSERVATIONS: Water seepage at: 16.0' Water level at completion: 13.6' (includes drilling water) FIELD NOTES: Advanced boring using 3.25" diameter hollowstem augers.	Graphic Log	GRADATION						STANDARD PENETRATION (N60) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ / Non-Plastic - NP 10 20 30 40																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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PID: 77370	BR ID:	PROJECT: FRA-70-14.48	STATION / OFFSET: 206+09 / 52.28 LT				START: 8/2/11		END: 8/3/11		PG 3 OF 3		B-035-1-10							
MATERIAL DESCRIPTION AND NOTES			ELEV. 689.6	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG				ODOT CLASS (GI)	BACK FILL
Dense to very dense gray GRAVEL WITH SAND (A-1-b), trace silt; wet. (same as above)																				
				63																
				64	34 50/5"	-	100	SS-23	-	-	-	-	-	-	-	-	11	A-1-b (V)		
				65																
				66																
				67																
				68																
				69	25 37 31	90	28	SS-24	-	-	-	-	-	-	-	-	11	A-1-b (V)		
				70																
				71																
				72																
				73																
74	25 35 48	109	100	SS-25	-	-	-	-	-	-	-	-	10	A-1-b (V)						
			676.7	EOB																
NOTES: SEEPAGE AT 26.0 FEET AND 58.5 FEET; WATER LEVEL PRIOR TO ADDING WATER = 29.4 FEET; FINAL WATER LEVEL INCLUDING DRILLING WATER = 27.2 FEET.																				
ABANDONMENT METHODS, MATERIALS, QUANTITIES: 1 BAG ASPHALT PATCH: 3 BAGS BENTONITE CHIPS: 1 BAG QUICKCRETE																				

Client: ms consultants						Project: FRA-70-8.93						Job No. 0221-1004.01																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
LOG OF: Boring B-036-0-08				Location: Sta. 206+71.43, 61.17' RT., BL I-70 EB						Date Drilled: 7/14/2008 to 7/16/2008																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery	Sample No.		Hand Penetro- meter (tsf)	WATER OBSERVATIONS: Water seepage at: 14.0' Water level at completion: 11.8' (includes drilling water) FIELD NOTES: Advanced boring using 3.25" diameter hollowstem augers.	Graphic Log	GRADATION						STANDARD PENETRATION (N60) Natural Moisture Content, % - ● PL ————— LL Blows per foot - ○ / Non-Plastic - NP 10 20 30 40																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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LOG OF: Boring B-036-0-08				Location: Sta. 206+71.43, 61.17' RT., BL I-70 EB						Date Drilled: 7/14/2008 to 7/16/2008																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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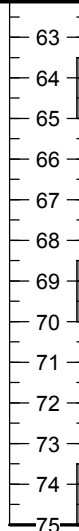
PROJECT: FRA-70-14.48		DRILLING FIRM / OPERATOR: DLZ / K. CONRAD		DRILL RIG: CME 75 TRUCK		STATION / OFFSET: 209+10 / 46.85' LT		EXPLORATION ID B-037-1-10												
TYPE: ROADWAY		SAMPLING FIRM / LOGGER: DLZ / M. EVENER		HAMMER: CME AUTOMATIC		ALIGNMENT: BL I-70 WB		PAGE 1 OF 3												
PID: 77370 BR ID:		DRILLING METHOD: 3.25" HSA		CALIBRATION DATE: 1/7/10		ELEVATION: 745.5 (MSL) EOB: 65.0 ft.														
START: 8/1/11 END: 8/2/11		SAMPLING METHOD: SPT		ENERGY RATIO (%): 79		COORD: 712089.400 N, 1830303.100 E														
MATERIAL DESCRIPTION AND NOTES		ELEV.	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG				ODOT CLASS (GI)	HOLE SEALED	
		745.5							GR	CS	FS	SI	CL	LL	PL	PI	WC			
Asphalt - 7" Concrete = 10"		744.1																		
Hard gray SILT AND CLAY (A-6a), some fine to coarse sand, trace gravel; damp.			1																	
			2	4	7	17	56	SS-1	4.5+	-	-	-	-	-	-	-	10	A-6a (V)		
			3		6															
			4	12	8	26	100	SS-2	4.5+	-	-	-	-	-	-	-	9	A-6a (V)		
			5		12															
			6	8																
			7	11	10	28	44	SS-3	4.5+	7	11	20	33	29	25	14	11	10	A-6a (6)	
			8																	
			9	6	5	18	78	SS-4	4.5+	-	-	-	-	-	-	-	11	A-6a (V)		
			10		9															
			11	16																
			12	18	19	49	11	SS-5	4.5+	-	-	-	-	-	-	-	9	A-6a (V)		
Hard gray SANDY SILT (A-4a), some fine to coarse sand, little gravel; damp.		732.0																		
			13																	
			14	10	10	32	100	SS-6	4.5+	11	10	21	35	23	22	14	8	10	A-4a (5)	
			15		14															
			16	10																
			17	23	20	57	100	SS-7	4.5+	-	-	-	-	-	-	-	10	A-4a (V)		
			18																	
Dense gray FINE SAND (A-3), trace silt; wet.		727.0	W																	
	FS		19	9	14	41	56	SS-8	-	-	-	-	-	-	-	-	15	A-3 (V)		
			20		17															
Hard gray SANDY SILT (A-4a), "and" fine to coarse sand, little gravel; damp.		724.5																		
			21	5																
			22	15	10	33	100	SS-9	4.5+	18	16	23	26	17	20	13	7	8	A-4a (2)	
			23																	
			24	4	12	37	100	SS-10	4.5+	-	-	-	-	-	-	-	9	A-4a (V)		
			25		16															
			26	10																
			27	19	16	46	78	SS-11	4.5+	-	-	-	-	-	-	-	8	A-4a (V)		
			28																	
Medium dense gray GRAVEL WITH SAND (A-1-b), trace silt; wet.		717.0	W																	
			29	3	8	28	72	SS-12	-	38	29	26	-	7	-	NP	NP	NP	13	A-1-b (0)
					13															

[illegible]

0-2018-ODOT BORING LOG DLZ - OH DOT.GDT - 11/28/18 06:43 - U:\GIS\PROJECTS\2015\W-15-126 DLZ 1021-1005.01 FRA-70-14.48 ELI.GPJ

PROJECT: FRA-70-14.48		DRILLING FIRM / OPERATOR: DLZ / K. CONRAD		DRILL RIG: CME 75 TRUCK		STATION / OFFSET: 212+10 / 85.21' LT		EXPLORATION ID B-039-1-10											
TYPE: ROADWAY		SAMPLING FIRM / LOGGER: DLZ / M. EVENER		HAMMER: CME AUTOMATIC		ALIGNMENT: BL I-70 WB		PAGE 1 OF 3											
PID: 77370 BR ID:		DRILLING METHOD: 3.25" HSA		CALIBRATION DATE: 1/7/10		ELEVATION: 757.7 (MSL) EOB: 75.0 ft.													
START: 8/10/11 END: 8/10/11		SAMPLING METHOD: SPT		ENERGY RATIO (%): 79		COORD: 712169.690 N, 1830596.640 E													
MATERIAL DESCRIPTION AND NOTES		ELEV.	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	HOLE SEALED
		757.7							GR	CS	FS	SI	CL	LL	PL	PI			
Asphalt - 4" Concrete - 12"		756.4	1																
FILL: Medium dense gray GRAVEL WITH SAND AND SILT (A-2-4), trace clay; damp.		754.2	2	12 8	22	44	SS-1	-	-	-	-	-	-	-	-	-	5	A-2-4 (V)	
FILL: Very stiff brown SANDY SILT (A-4a), "and" fine to coarse sand, little gravel; damp.		751.7	3																
			4	4 2	7	56	SS-2	3.50	-	-	-	-	-	-	-	-	15	A-4a (V)	
FILL: Very stiff brown SILT AND CLAY (A-6a), some fine to coarse sand, trace to little gravel; damp.			5																
@ 8.5'-10.0', contains occasional 1-inch brick fragments.		746.7	6	2 1	4	100	SS-3	2.25	-	-	-	-	-	-	-	-	13	A-6a (V)	
			7																
			8																
			9	2 6	40	100	SS-4	2.00	10	11	20	34	25	27	16	11	15	A-6a (5)	
			10																
FILL: Brick and slag fragments.			11	12 45	90	56	SS-5	-	-	-	-	-	-	-	-	-	-		
			12																
@ 13.5'-17.5', cuttings contain large, angular gravel fragments with trace to little silty clay.			13																
			14	15 14	38	0	SS-6	-	-	-	-	-	-	-	-	-	-		
			15																
			16	24 25	63	0	SS-7	-	-	-	-	-	-	-	-	-	-		
			17																
Hard gray SANDY SILT (A-4a), some fine to coarse sand, trace to little gravel; damp.		739.2	18																
@ 21.0'-22.5', wet silty sand seam.			19	13 12	33	100	SS-8	4.5+	16	11	20	31	22	23	14	9	9	A-4a (4)	
			20																
			21	28 22	46	6	SS-9	-	-	-	-	-	-	-	-	-	16	A-4a (V)	
			22																
			23																
			24	18 28	82	100	SS-10	4.5+	-	-	-	-	-	-	-	-	8	A-4a (V)	
Hard gray SILT AND CLAY (A-6a), some fine to coarse sand, trace gravel; damp.		732.7	25																
			26																
			27	33 33	97	61	SS-11	4.5+	5	14	20	38	23	26	15	11	8	A-6a (6)	
			28																
			29	20 50/5"	-	100	SS-12	4.5+	-	-	-	-	-	-	-	-	7	A-6a (V)	

PID: 77370	BR ID:	PROJECT: FRA-70-14.48	STATION / OFFSET: 212+10 / 85.21 LT					START: 8/10/11		END: 8/10/11		PG 2 OF 3		B-039-1-10									
MATERIAL DESCRIPTION AND NOTES		ELEV. 727.7	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	HOLE SEALED				
									GR	CS	FS	SI	CL	LL	PL	PI							
Hard gray SILT AND CLAY (A-6a), some fine to coarse sand, trace gravel; damp. (same as above)		724.2	W	31	23	103	100	SS-13	4.5+	-	-	-	-	-	-	-	-	8	A-6a (V)				
				32	35 43					-	-	-	-	-	-	-	-	-		-	-		
				33																			
Hard gray SANDY SILT (A-4a), some fine to coarse sand, trace gravel; damp.		719.2	W	34	28 43	109	100	SS-14	4.5+	7	15	15	39	24	23	14	9	8	A-4a (6)				
				35	43 40																		
				36																			
		716.7	W	37	31 35	101	100	SS-15	4.5+	-	-	-	-	-	-	-	-	10	A-4a (V)				
				38	42																		
				39																			
Hard gray COARSE AND FINE SAND (A-3a), little silty clay, little gravel; wet.		716.7	W	39	43 50/5"	-	100	SS-16	-	-	-	-	-	-	-	-	-	9	A-3a (V)				
				40																			
				41																			
Very stiff to hard gray SANDY SILT (A-4a), some fine to coarse sand, trace gravel; damp.		708.6	W	41	36 50/4"	-	100	SS-17	4.5+	-	-	-	-	-	-	-	-	9	A-4a (V)				
				42	50/4"																		
				43																			
		708.6	W	44	24 29	84	100	SS-18	3.50	5	10	22	38	25	22	14	8	11	A-4a (6)				
				45	35																		
				46																			
		708.6	W	46	23 40	111	100	SS-19	4.5+	-	-	-	-	-	-	-	-	11	A-4a (V)				
				47	44																		
				48																			
@ 48.5'-49.1', some gravel; moist.		708.6	W	48		-	100	SS-20A SS-20B	3.00	-	-	-	-	-	-	-	-	10	A-4a (V) A-1-b (V)				
				49	42 50/4"																		
				50																			
Very dense gray GRAVEL WITH SAND (A-1-b), some silt; wet.		705.7	W	50		-	100	SS-20A SS-20B	3.00	-	-	-	-	-	-	-	-	10	A-4a (V) A-1-b (V)				
				51																			
				52																			
		705.7	W	52		-	100	SS-20A SS-20B	3.00	-	-	-	-	-	-	-	-	10	A-4a (V) A-1-b (V)				
				53																			
				54																			
Very dense gray GRAVEL WITH SAND (A-1-b), trace to little silt; wet.		705.7	W	54	40 49	116	100	SS-21	-	41	25	23	-	11	-	NP	NP	NP	8	A-1-b (0)			
				55	39																		
				56																			
		705.7	W	56		-	100	SS-21	-	-	-	-	-	-	-	-	-	-	A-1-b (0)				
				57																			
				58																			
		705.7	W	58		-	100	SS-21	-	-	-	-	-	-	-	-	-	-	A-1-b (0)				
				59	23 35					88	89	SS-22	-	-	-	-	-	-		-	-	-	15
				60	32																		
		705.7	W	60		-	100	SS-21	-	-	-	-	-	-	-	-	-	-	A-1-b (0)				
				61																			
				62																			

PID: 77370	BR ID:	PROJECT: FRA-70-14.48	STATION / OFFSET: 212+10 / 85.21 LT					START: 8/10/11					END: 8/10/11			PG 3 OF 3		B-039-1-10	
MATERIAL DESCRIPTION AND NOTES		ELEV. 695.6	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	HOLE SEALED
									GR	CS	FS	SI	CL	LL	PL	PI			
Very dense gray GRAVEL WITH SAND (A-1-b), trace to little silt; wet. (same as above)																			
				20 23 22	59	100	SS-23	-	24	44	26	-	6	-	NP	NP	NP	15	A-1-b (0)
				23 28 29	75	100	SS-24	-	-	-	-	-	-	-	-	-	9	A-1-b (V)	
		682.7	EOB																
				27 48 44	121	100	SS-25	-	-	-	-	-	-	-	-	8	A-1-b (V)		
NOTES: SEEPAGE AT 21.0 FEET AND 38.5 FEET; WATER LEVEL PRIOR TO ADDING WATER = 40.3 FEET; FINAL WATER LEVEL INCLUDING DRILLING WATER = 31.7 FEET.																			
ABANDONMENT METHODS, MATERIALS, QUANTITIES: ASPHALT PATCH: 3 BAGS BENTONITE CHIPS: 3 BAGS BENTONITE GROUT: 2 BAGS QUICKCRETE																			

0-2018-ODOT BORING LOG DLZ - OH DOT.GDT - 11/28/18 06:43 - U:\GIS\PROJECTS\2015\W-15-126 DLZ 1021-1005.01 FRA-70-14.48 ELI.GPJ

PROJECT: FRA-70-14.48		DRILLING FIRM / OPERATOR: DLZ / K. CONRAD		DRILL RIG: CME 75 TRUCK		STATION / OFFSET: 213+16 / 62.58' RT		EXPLORATION ID B-040-1-10											
TYPE: ROADWAY		SAMPLING FIRM / LOGGER: DLZ / M. EVENER		HAMMER: CME AUTOMATIC		ALIGNMENT: BL I-70 EB		PAGE 1 OF 1											
PID: 77370 BR ID:		DRILLING METHOD: 3.25" HSA		CALIBRATION DATE: 1/7/10		ELEVATION: 740.6 (MSL) EOB: 30.0 ft.													
START: 1/24/11 END: 1/24/11		SAMPLING METHOD: SPT		ENERGY RATIO (%): 79		COORD: 711957.080 N, 1830732.220 E													
MATERIAL DESCRIPTION AND NOTES		ELEV.	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	HOLE SEALED
									GR	CS	FS	SI	CL	LL	PL	PI			
Asphalt - 9" Concrete - 9"		740.6																	
Loose to medium dense brown GRAVEL WITH SAND (A-1-b), some fine to coarse sand, trace silt; damp.		739.1	1																
			2	9 6	16	22	SS-1	-	-	-	-	-	-	-	9	A-1-b (V)			
			3																
			4	3 2	5	28	SS-2	-	-	-	-	-	-	-	6	A-1-b (V)			
		734.6	5																
Very stiff to hard gray SANDY SILT (A-4a), "and" fine to coarse sand, some gravel; damp.			6	17 23 18	54	100	SS-3	4.50	24	14	22	28	12	20	14	6	7	A-4a (1)	
		732.1	7																
Very dense brown COARSE AND FINE SAND (A-3a), some silt, trace gravel; wet.		731.4	8																
Very stiff to hard gray SANDY SILT (A-4a), some fine to coarse sand, trace to little gravel; damp to moist.			9	29 24 36	79	100	SS-4	-	-	-	-	-	-	-	-	-	14	A-3a (V)	
			10				SS-4	4.5+	-	-	-	-	-	-	-	-	8	A-4a (V)	
			11																
			12	29 44 40	111	100	SS-5	4.5+	-	-	-	-	-	-	-	8	A-4a (V)		
			13																
			14	14 44 38	108	100	SS-6	2.75	11	12	20	37	20	24	14	10	13	A-4a (4)	
			15																
			16	15 50/5"	-	100	SS-7	1.75	-	-	-	-	-	-	-	-	12	A-4a (V)	
			17																
			18																
			19	22 44 48	121	100	SS-8	-	-	-	-	-	-	-	-	-	14	A-4a (V)	
			20																
			21	23 50/5"	-	100	SS-9	4.5+	-	-	-	-	-	-	-	-	8	A-4a (V)	
			22																
			23																
			24	19 31 35	87	100	SS-10	4.5+	8	11	21	39	21	24	14	10	8	A-4a (5)	
	25																		
	26	15 30 44	97	100	SS-11	4.5+	-	-	-	-	-	-	-	-	8	A-4a (V)			
	27																		
	28																		
	29	27 48 40	116	100	SS-12	-	-	-	-	-	-	-	-	-	5	A-3a (V)			
@ 28.5'-30.0', encountered gas pressure.		712.1																	
Very dense gray COARSE AND FINE SAND (A-3a), little gravel, trace silt; damp.		710.6																	
NOTES: SEEPAGE AT 8.5 FEET; FINAL WATER LEVEL = 12.8 FEET.																			
ABANDONMENT METHODS, MATERIALS, QUANTITIES: 1 BAG QUICKGROUT																			


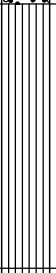
EOB

Client: ms consultants				Project: FRA-70-8.93				Job No. 0221-1004.01										
LOG OF: Boring B-041-0-08				Location:				Date Drilled: 6/23/2008 to 6/25/2008										
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery	Sample No.		Hand Penetro-meter (tsf)	WATER OBSERVATIONS: Water seepage at: 13.0'-15.5', 52.0'-92.0' Water level at completion: 37.1' (includes drilling water) FIELD NOTES: Advanced boring using 4.0" diameter flush joint casing.	Graphic Log	GRADATION						STANDARD PENETRATION (N60) Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○ / Non-Plastic - NP 10 20 30 40			
				Drive	Press / Core				% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay				
77.0	682.7						Very dense black, brown, and gray GRAVEL (A-1-a), little fine to coarse sand, trace silty clay; wet.											
80		6 18 33	4			23	Very dense brown and gray GRAVEL WITH SAND AND SILT (A-2-4); wet.											54
82.0	677.7						Very dense gray COARSE AND FINE SAND (A-3a), some silty clay, trace gravel; possible cobbles; wet.											
85		50/5	3			24												50+
90		37 50/5	11			25			5	17	—	44	—34—	NP				50+
92.0	667.7						Very dense brownish gray SANDY SILT (A-4a), trace gravel; damp.											50+
95		50/5	5			26												50+
100	659.7	33 50/5	11			27			9	8	—	21	42 20					50+

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PROJECT: FRA-70-14.48		DRILLING FIRM / OPERATOR: DLZ / K. CONRAD		DRILL RIG: CME 75 TRUCK		STATION / OFFSET: 215+16 / 73.16' LT		EXPLORATION ID B-041-1-10											
TYPE: ROADWAY		SAMPLING FIRM / LOGGER: DLZ / M. EVENER		HAMMER: CME AUTOMATIC		ALIGNMENT: BL I-70 WB		PAGE 1 OF 3											
PID: 77370 BR ID:		DRILLING METHOD: 3.25" HSA		CALIBRATION DATE: 1/7/10		ELEVATION: 760.6 (MSL) EOB: 79.3 ft.													
START: 8/9/11 END: 8/9/11		SAMPLING METHOD: SPT		ENERGY RATIO (%): 79		COORD: 712195.340 N, 1830902.440 E													
MATERIAL DESCRIPTION AND NOTES		ELEV.	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG				ODOT CLASS (GI)	HOLE SEALED
		760.6							GR	CS	FS	SI	CL	LL	PL	PI	WC		
Asphalt - 10"		759.8																	
POSSIBLE FILL: Very stiff brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; damp.			1	8															
			2	2 3	7	56	SS-1	3.00	-	-	-	-	-	-	-	-	25	A-6b (V)	
			3																
POSSIBLE FILL: Very soft brown SANDY SILT (A-4a), "and" fine to coarse sand, trace gravel; moist.		757.1		5															
			4	3 4	9	33	SS-2	0.25	-	-	-	-	-	-	-	-	21	A-4a (V)	
			5																
@ 6.0'-7.5', contains occasional 1-inch gravel pieces.			6	12															
			7	11 12	30	6	SS-3	-	-	-	-	-	-	-	-	-	-	A-4a (V)	
			8																
Hard gray SANDY SILT (A-4a), some fine to coarse sand, trace to little gravel; damp.		752.1		9															
			9	12 12	32	100	SS-4	4.5+	13	11	20	32	24	23	14	9	9	A-4a (4)	
			10																
			11	10															
			12	9 11	26	100	SS-5	4.5+	-	-	-	-	-	-	-	-	10	A-4a (V)	
			13																
			14	12 13 15	37	28	SS-6	4.5+	-	-	-	-	-	-	-	-	10	A-4a (V)	
			15																
			16	7															
			17	10 11	28	100	SS-7	4.5+	10	10	21	36	23	22	14	8	10	A-4a (5)	
			18																
			19	14 18 18	47	100	SS-8	4.5+	-	-	-	-	-	-	-	-	8	A-4a (V)	
			20																
			21	14															
			22	28 39	88	100	SS-9	4.5+	-	-	-	-	-	-	-	-	7	A-4a (V)	
			23																
			24	14 20 26	61	100	SS-10	4.5+	14	12	18	37	19	22	14	8	8	A-4a (4)	
			25																
			26	10															
			27	23 26	65	100	SS-11	4.5+	-	-	-	-	-	-	-	-	8	A-4a (V)	
			28																
			29	14 29 24	70	100	SS-12	4.5+	13	13	18	35	21	22	13	9	8	A-4a (4)	


[illegible]

MATERIAL DESCRIPTION AND NOTES	ELEV. 698.5	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	HOLE SEALED	
								GR	CS	FS	SI	CL	LL	PL	PI				
Very dense gray GRAVEL WITH SAND (A-1-b), trace silt; wet. (same as above)																			
		63																	
		64	22 27 25	68	61	SS-23	-	6	59	27	-	8	-	NP	NP	NP		13	A-1-b (0)
		65																	
		66																	
		67																	
		68																	
		69	50/5"	-	60	SS-24	-	-	-	-	-	-	-	-	-	-		8	A-1-b (V)
		70																	
		71																	
Hard gray SANDY SILT (A-4a), some fine to coarse sand, trace gravel; damp.		688.6																	
		72																	
		73																	
		74	28 40 50/5"	-	100	SS-25	4.5+	-	-	-	-	-	-	-	-	-	10	A-4a (V)	
		75																	
		76																	
		77																	
		78																	
		79																	
		EOB																	
@ 79.0'-79.1', sand and gravel seam.	682.1																		
Hard gray SANDY SILT (A-4a), some fine to coarse sand, trace gravel; damp.	681.3																		

Client: ms consultants						Project: FRA-70-8.93						Job No. 0221-1004.01							
LOG OF: Boring B-043-0-08				Location: Sta. 215+73.16, 1.06' LT., BL I-70 WB						Date Drilled: 7/16/2008 to 7/20/2008									
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery	Sample No.		Hand Penetro- meter (tsf)	WATER OBSERVATIONS: Water seepage at: 37.0'; 77.0' Water level at completion: 14.4' (includes drilling water) FIELD NOTES: Advanced boring using 3.25" diameter hollowstem augers.	Graphic Log	GRADATION						STANDARD PENETRATION (N60) Natural Moisture Content, % - ● PL LL Blows per foot - ○ / Non-Plastic - NP 				
				Drive	Press / Core				% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay					
	743.1						DESCRIPTION												
1.9	741.2	3					Asphalt Concrete - 9" Portland Cement Concrete - 9" Aggregate Base - 5"												
3.5	739.6	8 13	13			1	Medium dense brown GRAVEL WITH SAND, SILT, AND CLAY (A-2-6), some silty clay; damp.												
5		7	15	10		2	Hard gray SANDY SILT (A-4a), some fine to coarse sand, trace gravel; damp.												
6.0	737.1						Very dense grayish brown SANDY SILT (A-4a), some fine to coarse sand, trace gravel; moist.		13	13	---	26	38	10					
		7	25 30	18		3													
9.0	734.1	7	12 45	1		4	@ 7.5'-9.0', rock blocking sampler.												
10.5	732.6	10	31 46	18		5	Hard gray SANDY SILT (A-4a), some fine to coarse sand, trace gravel; damp.		9	13	---	19	37	22					
		12	40 46	18		6	Hard gray SILT AND CLAY (A-6a), some to "and" fine to coarse sand, trace to little gravel; damp.		7	21	---	19	33	20					
		7	12 24	18		7													
		12	28 49	10		8	@ 13.5'-15.0', contains sand seams.												
15																			
		7	19 39	18		9													
		39	49			10													
20			42	18															
		12	24 42	18		11													
		17	42			12													
25	718.1		42	18					17	12	---	18	33	20					

Client: ms consultants				Project: FRA-70-8.93				Job No. 0221-1004.01							
LOG OF: Boring B-043-0-08				Location: Sta. 215+73.16, 1.06' LT., BL I-70 WB				Date Drilled: 7/16/2008 to 7/20/2008							
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery	Sample No.		Hand Penetro- meter (tsf)	WATER OBSERVATIONS: Water seepage at: 37.0', 77.0' Water level at completion: 14.4' (includes drilling water) FIELD NOTES: Advanced boring using 3.25" diameter hollowstem augers.	Graphic Log	GRADATION						STANDARD PENETRATION (N60) Natural Moisture Content, % - ● Blows per foot - ○ / Non-Plastic - NP PL 10 20 30 40 LL
				Drive	Press / Core				% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	
DESCRIPTION															
57.0	693.1	12 12 21	18	19		4.5+	Dense gray GRAVEL (A-1-a), some fine to coarse sand, trace silt; wet. (GEOLOGIST'S DESCRIPTION - sample lost) @ 50.0'-60.0', difficult drilling, possible boulders. @ 55.0'-60.0', encountered gas pockets.								
60	686.1	35 43 50/5	8	20		4.5+	Hard gray SANDY SILT (A-4a), some fine to coarse sand, trace gravel; damp.								
65		50/1	1	21		--	@ 63.5', rock blocking sampler. @ 63.5'-70.0', possible cobbles.								
70		14 33 36	4	22		4.5+			17	19	--	26	28	10	●
75	668.1	17 23 28	18	23		4.5									○

[illegible]

PID: 77370	BR ID:	PROJECT: FRA-70-14.48	STATION / OFFSET: 216+85 / 75.93 LT					START: 8/8/11		END: 8/8/11		PG 3 OF 3		B-043-1-10						
MATERIAL DESCRIPTION AND NOTES			ELEV. 700.4	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG				ODOT CLASS (GI)	HOLE SEALED
<p>Dense to very dense gray COARSE AND FINE SAND (A-3a), little gravel, trace to little silt; wet. (same as above)</p> <p>@ 63.5', 2.5 feet sand heave; washed out with tricone.</p> <p>@ 68.5'-70.0', contains occasional silt seams.</p>				<p>63</p> <p>64</p> <p>65</p> <p>66</p> <p>67</p> <p>68</p> <p>69</p> <p>70</p> <p>71</p> <p>72</p> <p>73</p> <p>74</p> <p>75</p>	30 33 33	87	72	SS-23	-	-	-	-	-	-	-	-	8	A-3a (V)		
			687.5	EOB																
NOTES: SEEPAGE AT 18.5 FEET AND 58.5 FEET; WATER LEVEL PRIOR TO ADDING WATER = 42.5 FEET; FINAL WATER LEVEL INCLUDING DRILLING WATER = 10.6 FEET.																				
ABANDONMENT METHODS, MATERIALS, QUANTITIES: ASPHALT PATCH: 2 BAGS BENTONITE GROUT																				

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PROJECT: <u>FRA-70-14.48</u>		DRILLING FIRM / OPERATOR: <u>DLZ / K. CONRAD</u>		DRILL RIG: <u>CME 75 TRUCK</u>		STATION / OFFSET: <u>27+22 / 9.31' Rt</u>		EXPLORATION ID B-280-0-10	
TYPE: <u>ROADWAY</u>		SAMPLING FIRM / LOGGER: <u>DLZ / S. LARIMER</u>		HAMMER: <u>CME AUTOMATIC</u>		ALIGNMENT: <u>CL FULTON ST.</u>			
PID: <u>77370</u> BR ID: <u></u>		DRILLING METHOD: <u>3.25" HSA</u>		CALIBRATION DATE: <u>1/7/10</u>		ELEVATION: <u>761.2 (MSL)</u> EOB: <u>7.5 ft.</u>		PAGE 1 OF 1	
START: <u>7/24/10</u> END: <u>7/24/10</u>		SAMPLING METHOD: <u>SPT</u>		ENERGY RATIO (%): <u>79</u>		COORD: <u>711920.350 N, 1828944.470 E</u>			

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	BACK FILL
								GR	CS	FS	SI	CL	LL	PL	PI			
Asphalt - 4"	761.2																	
Concrete - 9"																		
Base - 7"	759.5																	
FILL: Hard brown SILT AND CLAY (A-6a), some fine to coarse sand, little gravel; contains brick fragments; moist.	758.2	1	9	16	78	SS-1	4.00	11	13	17	32	27	29	18	11	15	A-6a (5)	<7> <L> <V> <I>
POSSIBLE FILL: Stiff to very stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand; moist.	756.7	2	3	14	100	SS-2	2.00	0	2	6	55	37	29	18	11	22	A-6a (8)	<7> <L> <V> <I>
Very stiff brown SILTY CLAY (A-6b), some fine to coarse sand, trace gravel; moist.	755.2	3	6	16	100	SS-3	3.00	3	9	14	32	42	37	17	20	21	A-6b (12)	<7> <L> <V> <I>
Stiff to very stiff brown SANDY SILT (A-4a), "and" fine to coarse sand, little to some gravel; damp.	753.7	4	4	14	100	SS-4	2.00	20	12	16	31	21	24	16	8	13	A-4a (3)	<7> <L> <V> <I>
		5	6															
		6																
		7	5	14	100	SS-4	2.00	20	12	16	31	21	24	16	8	13	A-4a (3)	<7> <L> <V> <I>
			6															

EOB

NOTES: NO SEEPAGE OR FINAL WATER LEVELS DETECTED.
 ABANDONMENT METHODS, MATERIALS, QUANTITIES: 0.2 BAG ASPHALT PATCH; 0.2 BAG BENTONITE CHIPS; SOIL CUTTINGS

0-2018-ODOT BORING LOG DLZ - OH DOT.GDT - 11/28/18 06:43 - U:\GIS\PROJECTS\2015\W-15-126 DLZ 1021-1005.01 FRA-70-14.48 ELI.GPJ

PROJECT: <u>FRA-70-14.48</u>		DRILLING FIRM / OPERATOR: <u>DLZ / K. CONRAD</u>		DRILL RIG: <u>CME 75 TRUCK</u>		STATION / OFFSET: <u>30+32 / 1.26' Lt</u>		EXPLORATION ID B-281-0-10	
TYPE: <u>ROADWAY</u>		SAMPLING FIRM / LOGGER: <u>DLZ / S. LARIMER</u>		HAMMER: <u>CME AUTOMATIC</u>		ALIGNMENT: <u>CL FULTON ST.</u>			
PID: <u>77370</u> BR ID: <u> </u>		DRILLING METHOD: <u>3.25" HSA</u>		CALIBRATION DATE: <u>1/7/10</u>		ELEVATION: <u>755.1 (MSL)</u> EOB: <u>9.0 ft.</u>		PAGE	
START: <u>7/24/10</u> END: <u>7/24/10</u>		SAMPLING METHOD: <u>SPT</u>		ENERGY RATIO (%): <u>79</u>		COORD: <u>711974.550 N, 1829249.890 E</u>		1 OF 1	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	BACK FILL
								GR	CS	FS	SI	CL	LL	PL	PI			
Asphalt - 4"	755.1																	
Concrete - 10"	753.6																	
Base - 4"																		
FILL: Loose brown GRAVEL WITH SAND (A-1-b), trace silt; damp.																		
@ 4.5'-4.9', concrete fragments.																		
	749.1																	
Medium dense brown GRAVEL WITH SAND AND SILT (A-2-4), little clay; damp.	747.6																	
Stiff to very stiff brown SILT AND CLAY (A-6a), some fine to coarse sand, some gravel; moist.	746.1																	
		EOB																

NOTES: NO SEEPAGE OR FINAL WATER LEVELS DETECTED.
 ABANDONMENT METHODS, MATERIALS, QUANTITIES: 0.2 BAG ASPHALT PATCH; 0.2 BAG BENTONITE CHIPS; SOIL CUTTINGS

STATE OF OHIO
DEPARTMENT OF HIGHWAYS
TESTING LABORATORY

LOG OF BORING

CO., RT. NO., SEC. FRA-40-12.82 BRIDGE NO.
RETAINING WALL-D SOUTH-EAST INNERBELT
 LOCATION: T.H. 1-D STA. 83+46 OFFSET 117' Rt. FED. NO.

ELEV.	DEPTH	NO. BLOWS	SAMPLE NO.	DESCRIPTION
756.3	0			
	2			
	4			
751.3	6	-----	22563	Brown Sandy Gravelly Clay
	8			
746.3	10			
	12	20/25	22564	Brown Sandy Gravelly Silt
	14			
741.3	16	18/30	22565	Brown Sandy Silt
	18			
736.3	20			
	22	15/20	22566	Brown Sandy Gravelly Silt
	24			
731.3	26	18/30	22567	Gray Gravelly Sandy Silt
728.8	28			
	30	20/33	22568	Gray Gravelly Sandy Silt
726.3	32	18/30	22569	Gray Silty Sandy Gravel
723.8	34	50/55	22570	Gray Clayey Sandy Gravel
721.3	36	25/45	22571	Gray Gravelly Sandy Silt

SUMMARY OF SOIL TEST DATA

RC

LOG OF BORING (CONTINUED)

BRIDGE NO. _____ T.H. J-D

ELEV.	DEPTH	NO. BLOWS	SAMPLE NO.	DESCRIPTION
718.8	38	30/45	22572	Gray Gravelly Sandy Silt
716.3	40			
	42	35/60	22573	Gray Silty Sandy Gravel
713.8	44			
711.3	46	32/40	22575	Gray Gravelly Sandy Silt
	48			
706.3	50	35/56	22576	Gray Silty Sandy Gravel
	52			
	54			
701.3	56	*	22577	Gray Sandy Gravel
700.3	58			BOTTOM OF BORING
	60			* Refusal
	62			
	64			
	66			
	68			
	70			
	72			
	74			
	76			
	78			
	80			
	82			

STATE OF OHIO
DEPARTMENT OF HIGHWAYS
TESTING LABORATORY

LOG OF BORING

CO., RT. NO., SEC. FRA-40-12.82 BRIDGE NO. _____
RETAINING WALL-D SOUTH-EAST INNERBELT
 LOCATION: T.H. 3D-B STA. 88+27 OFFSET 50' LT. FED. NO. _____

ELEV.	DEPTH	NO. BLOWS	SAMPLE NO.	DESCRIPTION
761.5	0			
	2			
	4			
756.5	6	18/21	25450	Brown Silty Sandy Gravel
	8			
751.5	10	23/27	25451	Gray Sand
	12			
	14			
746.5	16	58/62	25452	Gray Silty Gravelly Sand
	18			
741.5	20	19/33	25453	Gray Sandy Gravelly Silt
	22			
	24			
736.5	26	67/*	25454	Gray Silty Sandy Gravel
734.0	28	19/77	25455	Gray Silty Gravel
731.5	30	36/34	25456	Gray Gravelly Sandy Silt
729.0	32	57/100	25457	Gray Sandy Silt
	34			
	36			

SUMMARY OF SOIL TEST DATA

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STATE OF OHIO
DEPARTMENT OF HIGHWAYS
TESTING LABORATORY

LOG OF BORING

CO., RT. NO., SEC. FRA-40-12.82 BRIDGE NO. FRA-40-1334
FORWARD ABUTMENT SOUTH INNERBELT UNDER FOURTH STREET
 LOCATION: T.H. 12 B STA. 53+47 OFFSET 33' LT FED. NO. _____

ELEV.	DEPTH	NO. BLOWS	SAMPLE NO.	DESCRIPTION
751.2	0			Sidewalk
	2			
	4			
746.2	6			Fill Material-Brown Clay W/Gravel and Fragments of Stone and Brick
	8			
741.2	10			
	12	15/22	21450	Brownish-Gray Gravelly Sandy Silt W/ Stone Fragments and Brick
738.7	14	18/23	21451	Brownish-Gray Sandy Silt W/Stone Fragments
736.2	16	15/25	21452	Brownish-Gray Sandy Silt W/Stone Fragts
733.7	18	33/70	21453	Gray Silty Sandy Gravel
731.2	20	36/*	21454	Gray Gravel
728.7	22			
	24	25/50	21455	Gray Gravelly Sand
726.2	26	17/50	21456	Gray Gravelly Sand
723.7	28	23/42	21457	Gray Sandy Gravel
721.2	30			
	32	17/56	21458	Gray Sandy Gravel
	34			
716.2	36	27/53	21459	Gray Sandy Gravel

**STATE OF OHIO
DEPARTMENT OF HIGHWAYS
TESTING LABORATORY**

SUMMARY OF SOIL TEST DATA

SAMPLE NUMBER	LABORATORY NUMBER SQ-	PHYSICAL CHARACTERISTICS								WATER CONTENT	CO., RT. NO., SEC. <u>FRANKLIN</u> <u>FRA-40-12.82</u> <u>FRA-40-1334</u> SOUTH <u>INNERBELT UNDER FOURTH STREET</u> SHEET NO. <u>1</u> OF <u>12</u> SHEETS	
		% AGGREGATE RET. # 10	% COARSE SAND 2.0MM - 0.42MM	% FINE SAND 0.42MM - 0.075MM	% SILT 0.075MM - 0.005MM	% CLAY < 0.005MM	LIQUID LIMIT	PLASTICITY INDEX	DESCRIPTION			
											LOG OF WILLIAMS AUGER BORING	
	STA. 52+56, 45' RT SURF. EL. 751.95										DEPTH	
	(78+80, 10' LT)										0.0-0.5 PARKING LOT MATERIAL,	
											GRAVEL & CINDERS	
168	19162	3	7	11	45	34	37	14	25	0.5-4.0	BROWN SANDY CLAY	
169	19163	6	2	9	40	43	39	15	21	4.0-8.0	BROWN SILT AND CLAY	
170	19164	22	12	19	29	18	28	9	20	8.0-12.0	BR. GRAVELLY SANDY SILT	
171	19165	9	11	20	37	23	22	7	9	12.0-15.0	GRAY SANDY SILT	
											REFUSAL	
1	21450	21	11	18	28	22	23	8	12		BR.-GR. GRAVELLY SANDY SILT WITH	
											STONE FRAGMENTS	
2	21451	13	10	19	33	25	25	10	12		BR.-GR. SANDY SILT W/STONE FRAGTS.	
3	21452	13	12	19	33	23	22	5	9		BR.-GR. SANDY SILT W/STONE FRAGTS.	
4	21453	46	26	10	9	9	NP	NP	11		GRAY SILTY SANDY GRAVEL	
5	21454	86	8	4	-2	-	NP	NP	10		GRAY GRAVEL	
6	21455	35	34	25	-6	-	NP	NP	9		GRAY GRAVELLY SAND	
7	21456	44	32	17	-7	-	NP	NP	10		GRAY GRAVELLY SAND	
8	21457	57	27	11	-5	-	NP	NP	12		GRAY SANDY GRAVEL	
9	21458	51	27	14	-8	-	NP	NP	7		GRAY SANDY GRAVEL	
10	21459	58	22	15	-5	-	NP	NP	9		GRAY SANDY GRAVEL	
11	21460	V	I	S	U	AL	NP	NP	21		GRAY GRAVEL	
12	21461	73	6	11	2	8	NP	NP	8		GR. SILTY SANDY GRAVEL WITH STONE-	
											FRAGMENTS	
13	21462	V	I	S	U	A	L		29		GRAY SAND	
14	21463	72		28			43	18	25		GRAY CLAYEY GRAVEL	
15	21464	V	I	S	U	A	L		23		GRAY SAND	

LOG OF BORING (CONTINUED)

SHEET 9

BRIDGE NO. FRA-40-1334T.H. 12 B

ELEV.	DEPTH	NO. BLOWS	SAMPLE NO.	DESCRIPTION
711.2	38	----	21460	Gray Gravel (Wash Sample)
	40	44/78	21461	Gray Silty Sandy Gravel W/Stone Fragts.
	42	-----	21462	Gray Sand (Wash Sample)
706.2	44			
	46	50/*	21463	Gray Clayey Gravel
	48	----	21464	Gray Sand (Wash Sample)
701.2	50			
700.2		44/*	-----	Gray Sandy Gravel
	52			BOTTOM OF BORING
	54			
	56			
	58			*Refusal
	60			
	62			
	64			
	66			
	68			
	70			
	72			
	74			
	76			
	78			
	80			
	82			

LOG OF BORING (CONTINUED)

SHEET 4

BRIDGE NO. _____ T.H. 3D-B _____

ELEV.	DEPTH	NO. BLOWS	SAMPLE NO.	DESCRIPTION
724.0	38	50/*	25458	Gray Gravelly Sandy Silt
721.5	40	50/*	25459	Gray Gravelly Sandy Silt
719.0	42	50/*	25460	Gray Gravelly Sandy Silt
	44			
716.5	46	50/*	25461	Gray Gravelly Sandy Silt
	48			
711.5	50	41/*	25462	Gray Sandy Silt
	52			
	54			
706.5	56	35/*	25463	Gray Gravelly Sandy Silt
705.5				<div> BOTTOM OF BORING </div>
	58			*Refusal
	60			
	62			
	64			
	66			
	68			
	70			
	72			
	74			
	76			
	78			
	80			
	82			

APPENDIX IV

GB1 Subgrade Stabilization Summary

OHIO DEPARTMENT OF TRANSPORTATION**OFFICE OF GEOTECHNICAL ENGINEERING****PLAN SUBGRADES
Geotechnical Bulletin GB1****FRA-70-14.05****<PID>****Subgrade Recommendation for I-70 EB and WB between Sta. 193+00 to Sta. 218+13.4
and section along Fulton St. between Sta. 26+00 to Sta. 36+00****Resource International, Inc.**

Prepared By: Peyman Majidi, E.I.
Date prepared: Tuesday, November 20, 2018

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peymanm@resourceinternational.com

NO. OF BORINGS: 34



#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N ₆₀	N _{60L}		LL	PL	PI	% Silt	% Clay	P200	M _c	M _{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B 030-1 15	5	11.0	12.5	11.0	12.5	119		4.5	26	13	13	31	26	57	9	14	A-6a							
		6	13.5	15.0	13.5	15.0	65		4.5							10	14	A-6a							
		7	16.0	17.5	16.0	17.5	47		4.5							10	14	A-6a							
		8	18.0	19.8	18.0	19.8	60		4.5	25	13	12	38	28	66	10	14	A-6a							
2	B 031-0 08	1	1.0	2.5	0.2	1.7	9		3.75							18	10	A-4b	8		A-4b	N ₆₀ & M _c		12"	
		2	2.5	4.0	1.7	3.2	9		4.5	23	14	9	52	25	77	12	10	A-4b	8		A-4b	N ₆₀	38"		
		3	4.0	5.0	3.2	4.2	50			NP		NP	7	10	17	5	6	A-1-b	0						
		4	5.5	7.0	4.7	6.2	79	9								5	6	A-1-b	0						
3	B 032-2 15	1	1.0	2.5	3.9	5.4	24		4.5	25	15	10	34	23	57	10	10	A-4a	4						
		2	3.5	5.0	6.4	7.9	47		4.5							9	10	A-4a							
		3	6.0	7.5	8.9	10.4	49		4.5							8	10	A-4a							
		4	8.5	10.0	11.4	12.9	54	24	4.5							8	10	A-4a							
4	B 032-3 15	1	1.0	2.5	1.0	2.5	21									6	6	A-1-b	0						
		2	3.5	5.0	3.5	5.0	37									5	6	A-1-b	0						
		3	6.0	7.5	6.0	7.5	54			NP		NP	13	3	16	7	6	A-1-b							
		4	8.5	10.0	8.5	10.0	47	21								7	6	A-1-b							
5	B 032-4 15	1	1.5	3.0	1.5	3.0	27									8	10	A-2-4	0						
		2	3.5	5.0	3.5	5.0	35									7	10	A-2-4	0						
		3	6.0	7.5	6.0	7.5	72			24	17	7	0	1	1	5	10	A-2-4							
		4	8.5	10.0	8.5	10.0	39	27								6	10	A-2-4							
6	B 032-5 15	1	1.0	2.5	1.0	2.5	27			17	15	2	11	4	15	5	6	A-1-b	0						
		2	3.5	5.5	3.5	5.5	41									10	6	A-1-a	0						
		3	6.0	7.5	6.0	7.5	39									7	6	A-1-a							
		4	8.5	10.0	8.5	10.0	32	27								11	6	A-1-a							
7	B 033-1 15	1	3.5	5.0	3.5	5.0	51									4	6	A-1-b	0						
		2	8.5	10.0	8.5	10.0	50									12	6	A-1-b							
		3	11.0	12.5	11.0	12.5	53			NP		NP	10	3	13	14	8	A-3a							
		4	13.5	15.0	13.5	15.0	63	30								21	8	A-3a							
8	B 033-3 15	1	1.0	2.5	1.0	2.5	24		4							10	10	A-4a	8						
		2	3.5	5.0	3.5	5.0	47			NP		NP	9	3	12	4	8	A-3a	0						
		3	6.0	7.5	6.0	7.5	51									7	6	A-1-b							
		4	8.5	10.0	8.5	10.0	51	24		NP		NP	7	3	10	7	6	A-1-b							
9	B 008-4 59	4	20.0	20.5	20.0	20.5	107			NP		NP	7	7	14	10	8	A-3a							
		5	23.0	24.0	23.0	24.0	68			NP		NP	6	5	11	11	8	A-3a							
		6	26.0	26.0	26.0	26.0	65			NP		NP	6	6	12	9	6	A-1-b							
		7	28.0	29.0	28.0	29.0	123			NP		NP	6	5	11	10	6	A-1-b							



V. 14.4

10/1/2018

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N ₆₀	N _{60L}		LL	PL	PI	% Silt	% Clay	P200	M _C	M _{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
10	B 035-0 08	1	1.5	3.0	1.5	3.0	42	30								5	8	A-3a	0						
		2	3.0	4.5	3.0	4.5	52									4	6	A-1-b	0						
		3	4.5	6.0	4.5	6.0	53			NP		NP	5	5	10	4	6	A-1-b	0						
		4	6.0	7.5	6.0	7.5	33			NP		NP	4	4	8	5	8	A-3a							
11	B 036-0 8	1	1.0	2.5	1.0	2.5	50	30									6	A-1-b	0						
		2	3.5	5.0	3.5	5.0	50										6	A-1-b	0						
		3	5.0	6.5	5.0	6.5	38			NP		NP	10	7	17	6	6	A-1-b	0						
		4	6.5	7.5	6.5	7.5	63			NP		NP	10	3	13	5	6	A-1-b							
12	B 037-1 15	1	3.5	5.0	3.5	5.0	23	23	4.5							9	10	A-4a	8						
		2	8.5	10.0	8.5	10.0	35		4.5	22	13	9	34	21	55	9	10	A-4a							
		3	13.5	13.6	13.5	13.6	50										10	A-4a							
		4	16.0	16.2	16.0	16.2	50										10	A-4a							
13	B 001-D 59	3	15.0	16.0	15.0	16.0	13			25	16	9	26	23	49	11	11	A-4a							
		4	20.0	21.0	20.0	21.0	8			21	15	6	32	25	57	9	10	A-4a							
		5	25.0	26.0	25.0	26.0	8			22	16	6	35	22	57	8	11	A-4a							
		6	28.0	29.0	28.0	29.0	14			20	14	6	30	20	50	27	6	A-1-b							
14	B 039-0 08	1	1.0	2.5	1.0	2.5	67	23	4.5								10	A-4a	8						
		2	3.5	5.0	3.5	5.0	23		4.5							10	10	A-4a	8						
		3	6.0	7.5	6.0	7.5	28		4.5	21	20	1	30	16	46	10	15	A-4a							
		4	7.5	9.0	7.5	9.0	36		4.5	20	13	7	28	15	43	8	10	A-4a							
15	B 040-1 10	1	1.5	3.0	1.5	3.0	22	22								9	6	A-1-b	0						
		2	3.0	5.0	3.0	5.0	28									6	6	A-1-b	0						
		3	6.0	7.5	6.0	7.5	100		4.5	28	12	16	20	14	34	7	10	A-4a							
		4	8.5	10.0	8.5	10.0	100		4.5							14	10	A-4a							
16	B 003-D 59	4	1.0	2.5	1.0	2.5	52	30		20	13	7	27	18	45	11	10	A-4a	2						
		5	5.0	5.5	5.0	5.5	67			NP		NP	20	10	30	8	10	A-2-4	0						
		6	7.5	9.0	7.5	9.0	96			NP		NP	1	1	2	14	8	A-3a							
		7	9.0	10.5	9.0	10.5	70			19	13	6	33	18	51	12	10	A-4a							
17	B 043-0 08	1	1.9	3.4	1.9	3.4	22	22									10	A-2-6	4						
		2	3.5	5.0	3.5	5.0	23		4.5								10	A-4a	8						
		3	6.0	7.5	6.0	7.5	58			NP		NP	38	10	48	12	11	A-4a							
		4	7.5	9.0	7.5	9.0	60										10	A-4a							
18	B 030-2 15	1	1.0	2.5	1.0	2.5	24	24								8	10	A-2-4	0						
		2	3.5	5.0	3.5	5.0	27			21	15	6	19	15	34	10	10	A-2-4	0						
		3	6.0	7.5	6.0	7.5	51									8	10	A-2-4							
		4	8.5	10.0	8.5	10.0	20										10	A-2-4							



#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics					Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N ₆₀	N _{60L}		LL	PL	PI	% Silt	% Clay	P200	M _C	M _{OPT}	Class		GI	Unsuitable	Unstable	Unsuitable	
19	B 032-1 15	4	8.5	10.0	8.5	10.0	65			25	15	10	9	21	30	9	10	A-2-4						
		5	11.0	11.4	11.0	11.4	50									6	10	A-2-4						
		6	13.5	14.2	13.5	14.2	50									4	10	A-2-4						
		7	16.0	17.5	16.0	17.5	50			21	15	6	39	11	50	10	6	A-1-a						
20	B 033-0 08	1	1.0	2.5	1.0	2.5	17										10	A-4a	8					
		2	3.5	5.0	3.5	5.0	37			NP		NP				5	6	A-1-b	0					
		3	5.0	6.5	5.0	6.5	52			NP		NP	6	5	11	4	6	A-1-b	0					
		4	6.5	8.0	6.5	8.0	37	17		NP		NP	6	7	13	10	6	A-1-b						
21	B 033-2 15	9	23.5	25.0	23.6	25.1	84									7	6	A-1-b						
		10	28.5	30.0	28.6	30.1	84									13	6	A-1-b						
		11	33.5	35.0	33.6	35.1	37									11	6	A-1-b						
		12	38.5	39.7	38.6	39.8	50			NP		NP	7	3	10	11	6	A-1-b						
22	B 012-4 59	5	20.0	21.5	20.0	21.5	75			NP		NP	1	1	2	10	6	A-1-a						
		6	22.0	23.5	22.0	23.5	67			NP		NP	3	3	6	9	6	A-1-b						
		7	24.5	26.0	24.5	26.0	65			NP		NP	3	4	7	10	6	A-1-b						
		8	27.0	28.5	27.0	28.5	73			NP		NP	3	2	5	12	6	A-1-b						
23	B 035-1 10	8	18.5	20.0	18.5	20.0	66		4.5							8	10	A-4a						
		9	21.0	22.5	21.0	22.5	42		4.5							9	10	A-4a						
		10	23.5	25.0	23.5	25.0	96			NP		NP	5	5	10	5	6	A-1-b						
		11	26.0	27.5	26.0	27.5	63			NP		NP				10	6	A-1-b						
24	B 037-0 08	4	8.5	10.0	8.5	10.0	21										14	A-6a						
		5	11.0	12.5	11.0	12.5	63		3.75								14	A-6a						
		6	13.5	15.0	13.5	15.0	34		4.25								10	A-4a						
		7	16.0	17.5	16.0	17.5	24										10	A-4a						
25	B 037-1 10	3	6.0	7.5	6.0	7.5	28		4.5	25	14	11	33	29	62	10	14	A-6a						
		4	8.5	10.0	8.5	10.0	18		4.5							11	14	A-6a						
		5	11.0	12.5	11.0	12.5	49		4.5							9	14	A-6a						
		6	13.5	15.0	13.5	15.0	32	28	4.5	22	14	8	35	23	58	10	10	A-4a						
26	B 038-1 10	1	1.0	2.5	1.0	2.5	21		4.5							11	10	A-4a	8					
		2	3.5	5.0	3.5	5.0	30		4.5							9	10	A-4a	8					
		3	6.0	7.5	6.0	7.5	61		4.5	21	13	8	30	18	48	8	10	A-4a						
		4	8.5	10.0	8.5	10.0	59	21								8	10	A-4a						
27	B 039-1 10	5	11.0	12.5	11.0	12.5	90										6	A-1-a						
		6	13.5	15.0	13.5	15.0	38										6	A-1-a						
		7	16.0	17.5	16.0	17.5	63										6	A-1-a						
		8	18.5	20.0	18.5	20.0	33		4.5	23	14	9	31	22	53	9	10	A-4a						



V. 14.4

10/1/2018

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N ₆₀	N _{60L}		LL	PL	PI	% Silt	% Clay	P200	M _C	M _{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
28	B 041-0 08	10	21.0	22.5	21.0	22.5	50		4.5							10	10	A-4a							
		11	23.5	25.0	23.5	25.0	62		4.5							10	10	A-4a							
		12	26.0	27.5	26.0	27.5	60		4.5							9	10	A-4a							
		13	28.5	30.0	28.5	30.0	80		4.5							11	10	A-4a							
29	B 041-1 10	7	16.0	17.5	16.0	17.5	28		4.5	22	14	8	36	23	59	10	10	A-4a							
		8	18.5	20.0	18.5	20.0	47		4.5							8	10	A-4a							
		9	21.0	22.5	21.0	22.5	88		4.5							7	10	A-4a							
		10	23.0	24.5	23.0	24.5	61		4.5	22	14	8	37	19	56	8	10	A-4a							
30	B 042-0 08	1	1.0	2.5	1.0	2.5	34	29	4.5							9	10	A-4a	8						
		2	3.5	5.0	3.5	5.0	29		4.5	22	13	9	35	19	54	9	10	A-4a	4						
		3	6.0	7.5	6.0	7.5	37		4.5							8	10	A-4a							
		4	7.5	8.5	7.5	8.5	50		4.5	32	13	19	36	22	58	8	10	A-4a							
31	B 043-1 10	9	21.0	22.5	21.0	22.5	50									13	10	A-4a							
		10	23.5	25.0	23.5	25.0	65		4.5	23	14	9	32	20	52	7	10	A-4a							
		11	26.0	27.5	26.0	27.5	66		4.5							8	10	A-4a							
		12	28.5	29.5	28.5	29.5	60		4.5							7	10	A-4a							
32	B 0280- -1	1	1.5	3.0	1.5	3.0	16	14	4	29	18	11	32	27	59	15	14	A-6a	5						
		2	3.0	4.5	3.0	4.5	14		2	29	18	11	55	37	92	22	14	A-6a	8						
		3	4.5	6.0	4.5	6.0	16		3	37	17	20	32	42	74	21	16	A-6b	12						
		4	6.0	7.5	6.0	7.5	14		2	24	16	8	31	21	52	13	11	A-4a							
33	B 0281- -1	1	1.5	3.0	1.5	3.0	8	8		NP		NP	3	3	6	5	6	A-1-b	0						
		2	3.0	5.0	3.0	5.0	9			NP		NP	10	5	15	6	6	A-1-b	0						
		3	6.0	7.5	6.0	7.5	29			30	20	10	21	12	33	12	10	A-2-4							
		4	7.5	9.0	7.5	9.0	26		2							19	14	A-6a							
34	B 032-6 15	1	3.5	5.0	3.5	5.0	16	16								9	14	A-6a	10						
		2	8.5	10.0	8.5	10.0	47			21	17	4	10	4	14	10	6	A-1-a							
		3	13.5	15.0	13.5	15.0	54									4	6	A-1-a							
		4	18.5	20.0	18.5	20.0	36									6	6	A-1-a							

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-030-1-15	CL OF I-70 EB	194+37	70	Rt	CME 55	92	737.6	737.6	0.0
2	B-031-0-08	CL OF I-70 EB	196+17	33	Rt		735	736.8	736.0	0.8 C
3	B-032-2-15	CL OF I-70 EB	197+40	39	RT	CME750x	86	733.1	736.0	2.9 F
4	B-032-3-15	CL OF I-70 EB	198+78	41	RT	CME750X	86	732.4	732.4	0.0
5	B-032-4-15	CL OF Third St.	1151+80	46	LT	CME 55	92	732.5	732.5	0.0
6	B-032-5-15	CL OF Third St.	1151+80	47	Rt	CME55	92	731.6	731.6	0.0
7	B-033-1-15	CL OF I-70 EB	201+68	48	Rt	CME750x	86	730.2	730.2	0.0
8	B-033-3-15	CL OF I-70 EB	203+36	48	RT	CME55	92	731.2	731.2	0.0
9	B-008-4-59	C.L OF I-70 EB	204+35					731.1	731.1	0.0
10	B-035-0-08	CL OF I-70 EB	752+67	73	Rt.			732.3	732.3	0.0
11	B-036-0-8	CL OF I-70 EB	755+56	101	Rt.			734.6	734.6	0.0
12	B-037-1-15	CL OF I-70 EB	206+42	66	Rt	CME 55	92	736.4	736.4	0.0
13	B-001-D-59	CL OF I-70 EB	209+70					737.4	737.4	0.0
14	B-039-0-08	CL OF I-70 EB	760+57	103	Rt			739.0	739.0	0.0
15	B-040-1-10	CL OF I-70 EB	76202	103	Rt	CME 75	79	740.0	740.0	0.0
16	B-003-D-59	CL OF I-70 EB	88+27	50	LT			741.4	741.4	0.0
17	B-043-0-08	CL OF I-70 EB	765+57	96	Rt.			743.4	743.4	0.0
18	B-030-2-15	CL of I-70 WB	195+91	40	LT	CME 55	92	740.0	740.0	0.0
19	B-032-1-15	CL of I-70 WB	197+75	50	LT	CME 55	92	734.6	734.6	0.0
20	B-033-0-08	CL of I-70 WB	201+0					730.5	730.5	0.0
21	B-033-2-15	C.L of I-70 WB	202+0	84	LT	CME 750X	86	729.1	729.2	0.1 F
22	B-012-4-59	CL of I-70 WB	53+47	33	LT			730.0	730.0	0.0
23	B-035-1-10	CL of I-70 WB	754+95	92	LT	CME 75	79	732.5	732.5	0.0
24	B-037-0-08	CL of I-70 WB	756+80	69	Lt			735.6	735.6	0.0
25	B-037-1-10	CL of I-70 WB	40+90	28	RT	CME 75	79	736.5	736.5	0.0
26	B-038-1-10	CL of I-70 WB	759+54	89	LT	CME 75	79	739.5	739.5	0.0
27	B-039-1-10	CL of I-70 WB	43+92	9	LT	CME 75	79	739.2	739.2	0.0
28	B-041-0-08	CL of I-70 WB	762+59	116	Lt			740.5	740.5	0.0
29	B-041-1-10	CL of I-70 WB	46+99	12	RT	CME 75	79	741.5	741.5	0.0
30	B-042-0-08	CL of I-70 WB	764+57	41	Lt			741.7	741.7	0.0
31	B-043-1-10	CL of I-70 WB	48+67	12	RT	CME 75	79	741.5	741.5	0.0
32	B-0280-0-10	CL of Fulton Street	27+21	4	Rt	CME 75	79	761.2	761.2	0.0
33	B-0281-0-10	CL of Fulton Street	30+31	6	LT	CME 75	79	755.1	755.1	0.0
34	B-032-6-15	CL OF Third St.	1152	86	Rt	CME 750x	86	753.0	753.0	0.0

PID: <PID>

County-Route-Section: FRA-70-14.05

No. of Borings: 34

Geotechnical Consultant: Resource International, Inc.

Prepared By: Peyman Majidi, E.I.

Date prepared: 11/20/2018

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

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

Design CBR	9
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% Samples within 6 feet of subgrade			
N ₆₀ ≤ 5	0%	HP ≤ 0.5	0%
N ₆₀ < 12	7%	0.5 < HP ≤ 1	0%
12 ≤ N ₆₀ < 15	3%	1 < HP ≤ 2	3%
N ₆₀ ≥ 20	83%	HP > 2	33%
M+	2%		
Rock	0%		
Unsuitable	1%		

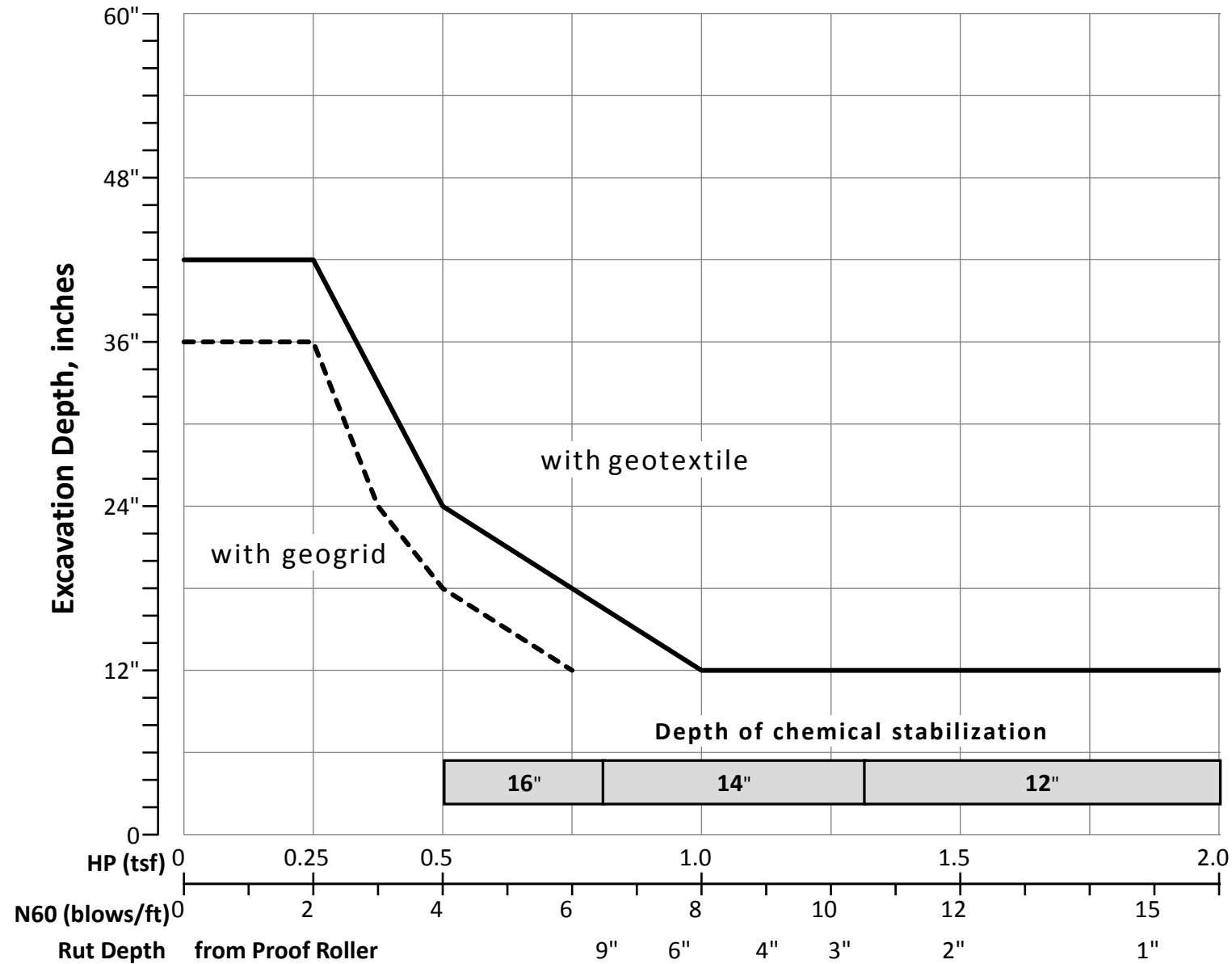
Excavate and Replace at Surface	
Average	0"
Maximum	0"
Minimum	0"

% Proposed Subgrade Surface	
Unstable & Unsuitable	22%
Unstable	11%
Unsuitable	11%

	N ₆₀	N _{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M _C	M _{OPT}	GI
Average	47	23	4.27	24	15	9	20	13	34	9	9	3
Maximum	123	30	4.50	37	20	20	55	42	92	27	16	12
Minimum	8	8	2.00	17	12	1	0	1	1	4	6	0

Classification Counts by Sample																			Totals
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	
Count	0	11	36	13	0	1	0	0	8	51	2	0	13	1	0	0	0	0	136
Percent	0%	8%	26%	10%	0%	1%	0%	0%	6%	38%	1%	0%	10%	1%	0%	0%	0%	0%	100%
% Rock Granular Cohesive	0%	88%										12%							100%
Surface Class Count	0	0	5	2	0	1	0	0	1	6	2	0	1	0	0	0	0	0	18
Surface Class Percent	0%	0%	28%	11%	0%	6%	0%	0%	6%	33%	11%	0%	6%	0%	0%	0%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
4.27	0.50	<input type="checkbox"/> HP
22.68	6.00	<input type="checkbox"/> N60L

Average HP

Average N_{60L}

