OHIO TURNPIKE AND
INFRASTRUCTURE COMMISSION

ADDENDUM NO. 1

PROJECT NO. 39-15-02

PROJECT NO. 39-15-02 (PART A)
RIGHT TWO (2) LANES AND SHOULDER RECONSTRUCTION
MILEPOST 216.10 TO MILEPOST 218.60
RECONSTRUCTION OF TWO (2) LANES AND SHOULDERS
MILEPOST 218.60 TO MILEPOST 221.26
TRUMBULL AND MAHONING COUNTIES, OHIO

PROJECT NO. 39-15-02 (PART B)
BRIDGE DECK OVERLAY
TP 216 RAMP BRIDGE OVER THE OHIO TURNPIKE
MILEPOST 216.4
TRUMBULL COUNTY, OHIO

OPENING DATE: 2:00 P.M. (E.S.T), JANUARY 28, 2015

ALL BIDS MUST BE ELECTRONICALLY SUBMITTED

ATTENTION OF BIDDERS IS DIRECTED TO:

MODIFICATIONS TO THE CONTRACT DOCUMENTS
Project No. 39-15-02A, Sheets 4, 19, 20, 22, 207, 209, 217, 218, 219 and 245 of 419
Plan Insert 2 – Sheet 2 of 2

ANSWERS TO QUESTIONS RECEIVED THROUGH 5:00 PM JANUARY 15, 2015

Issued by the Ohio Turnpike and Infrastructure Commission on January 16, 2015. Issuance authorized by Tony Yacobucci, Chief Engineer, and Tommie Jo Marsilio, Director, Contracts Administration and Compliance.

Tony Yacobucci 1/16/15
Tony Yacobucci Date

Tommie Jo Marsilio 1/16/15
Tommie Jo Marsilio Date

OHIO TURNPIKE AND INFRASTRUCTURE COMMISSION
ADDENDUM NO. 1
PROJECT NO. 39-15-02

MODIFICATIONS VIA ADDENDUM NO. 1 TO THE CONTRACT DOCUMENTS FOR PROJECT NO. 39-15-02

Modifications to the Plan Drawings

Additions and deletions on Plan Drawings are indicated with a cloud and revision triangle thus:

The following plan sheet(s) has been updated and the new plan sheet should be substituted for:

Project No. 39-15-02A, Sheets 4, 19, 20, 22, 207, 209, 217, 218, 219 and 245 of 419
Plan Insert 2 – Sheet 2 of 2

Modifications to the Bid Express Bid Form and Excel Worksheet

A new Excel worksheet is provided with this Addendum.

Please note Bids may not be submitted using the Excel Worksheet.

ANSWERS TO QUESTIONS RECEIVED THROUGH 5:00 PM JANUARY 15, 2015

Q#1 Is there a soil report or pavement coring report that was done on this project? If so please make it available.

A#1 Yes, The Subgrade/Base Improvement Report dated January 2015 is attached to this Addendum No. 1.

Q#2 Will the contractor be permitted to use the service drives at MP 119.4 (sic) to access the dump site provided by the OTC?

A#2 Milepost 119.4 is not included in this project. Presuming this is a typographical error, however, the Contractor will be able to utilize the service drives at MP 219.4 during certain Maintenance of Traffic (MOT) Phases as listed below. The Contractor will be restricted to legal loads when traveling over the OTIC Bridges. All access roads shall be returned to the OTIC at the end of the Project in the same condition as prior to the commencement of Construction.

During MOT Phase 1A, 1B, 1C, 1D, 1E and 1F, the Contractor shall be able to utilize the Westbound and Eastbound access drives at MP 219.4 to access the dump site.

During MOT Phases 3 and 3A, the Contractor shall be able to utilize only the Eastbound access drive at MP 219.4 to access the dump site. The Contractor will not be able to utilize the Westbound access drive at MP 219.4 during MOT Phases 3 and 3A .

During MOT Phase 3, the Contractor shall be able to utilize only the Westbound access drive at MP 219.4 to access the dump site. The Contractor will not be able to utilize the Eastbound access drive at MP 219.4 during MOT Phase 3.

Q#3 Is full depth pavement sawing considered incidental to pavement removed? Previous projects had a pay item set up for this activity.

A#3 Via Addendum No. 1, a contingency quantity for Item 252 – Full Depth Pavement Sawing has been added to the plans to address Condition No. 1 as shown on Sheet 15 of 419. The general note for Item 252 – Full Depth Pavement Sawing on Sheet 22 of 419 has been revised to include this contingency quantity.

Q#4 DR-33 on pg. 245 calls for a Manhole #3, please provide invert and grate elevations for this structure since it is not shown on the plans.

A#4 Via Addendum No. 1, the proposed invert and grate elevation information for this Manhole No. 3 has been added to Sheet 245 of 419.

Q#5 The "Step Detail" as shown on the outside edges of the pavement will require additional excavation and embankment in order to build correctly. Previous projects included an additional quantity to perform this work. Is this work considered incidental to excavation? Will the OTC consider adding quantity to pay for this?

A#5 Via Addendum No. 1, plan note 6 and a typical detail have been added to Sheet 4 of 419 which specifies that the additional excavation and embankment necessary for the placement of the aggregate base and asphalt aggregate base edge extensions shall be incidental to the cost of placing these materials.

Q#6 Are there approximate locations for the shallow bedrock that may be encountered as indicated on pg. 20? What kind of bedrock is this material?

A#6 As detailed in the Subgrade/Base Improvement Report dated January 2015, shallow bedrock was encountered in the area of borings B 44-11(MP 218.10) through B 44-13 (MP 218.46), B 44-26 (MP 220.74) and B-44-27 (220.89). Based on the depth of bedrock encountered in the borings and subsequent offset borings performed in the area of borings B-44-11 and B-44-12, the need for bedrock undercuts within these zones is not anticipated. However, given the spacing of the borings near the end of the project limits, there is a potential for encountering areas where weathered bedrock may be encountered during construction. The bedrock was classified as shale.

Via Addendum No. 1, a general note "Item 203 – Rock Excavation for Underdrain Installation, As Per Plan" with contingency quantity on Sheet 19 of 419 was added.

Q#7 Plan note #5 on sheet 20 for Shallow Bedrock Stabilization indicates that the embankment material is to stabilized Per ODOT item 206 with 4% Portland cement @ 10" thick. How is the contractor compensated to do this work?

A#7 In the event bedrock is encountered and the depth of stabilization is reduced, the Contractor will be compensated for the Item 206 - Cement Stabilized Subgrade, 12 inches Deep, As Per Plan. There will be no reduction in payment due to the depth reduction. The Cement will be paid for the actual tons of material used.

Q#8 Please provide quantity calculations for both the lime and cement stabilized subgrade items.

A#8 Via Addendum No. 1, the limits of stabilization and the quantities have been modified in the general note "Item 206 – Chemically Stabilized Subgrade, As Per Plan" on Sheets 19 and 20 of 419. The following table provides the quantity calculation requested:

BEGIN STATION	END STATION	LENGTH (FEET)	CHEMICAL & APPLICATION RATE	DEPTH (IN.)	TREATMENT AREA (SF)	QUICKLIME STABILIZATION AREA (SY)	CEMENT STABILIZATION AREA (SY)	IN-SITU DRY UNIT WEIGHT (PCF)	APPLICATION RATE (LBS/SY)	QUICKLIME (TON)	PORTLAND CEMENT (TON)
528+85	47+00	8233	5% QUICKLIME	14	579,420	64,380	-	110	57.8	1,870	-
47+00	93+60	4660	4% PORTLAND CEMENT	12	393,729	-	43,750	115	41.4	-	910
93+60	204+80	11120	5% QUICKLIME	14	1,001,832	111,320	-	110	57.8	3,220	-
204+80	237+19	3239	4% PORTLAND CEMENT	12	291,510	-	32,390	115	41.4	-	680

Addendum No. 1 to Contract 39-15-02 is hereby acknowledged:

_____
(Firm Name)

_____
(Signature)

_____
(Printed Name)

Date: _____

Resource International, Inc.

GEOTECHNICAL SERVICES FOR THE PAVEMENT REPLACEMENT PROGRAM
MP 216.1 TO MP 221.26
OTIC DESIGN CONTRACT NO. 71-14-08
OTIC CONSTRUCTION CONTRACT NO.39-15-02
TRUMBULL AND MAHONING COUNTY, OHIO

SUBGRADE / BASE IMPROVEMENT REPORT

Prepared For:
The Ohio Turnpike and Infrastructure Commission
682 Prospect Street
Berea, Ohio 44017-2799

Prepared By:
Resource International, Inc.
9885 Rockside Road, Suite 145
Cleveland, Ohio 44125

Rii Project No. N-14-020(2)

January, 2015

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RESOURCE INTERNATIONAL, INC.
ISO 9001:2008
Certified QMS
An ISO 9001:2008 QMS Certified Firm

Planning

Engineering

Construction Management

Technology

January 12, 2015

Mr. Dennis Albrecht, Jr., P.E.
Assistant Chief Engineer
The Ohio Turnpike and Infrastructure Commission
682 Prospect Street
Berea, Ohio 44017-2799

Re: Subgrade / Base Improvement Report
Geotechnical Services for the Pavement Replacement Program
MP 216.1 to MP 221.26
OTIC Design Contract No. 71-14-08
OTIC Construction Contract No. 39-15-02
Trumbull and Mahoning County, Ohio
Rii Project No. N-14-020(2)

Mr. Albrecht:

Resource International, Inc. (Rii) is pleased to submit this subgrade / base improvement 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 pavement reconstruction as part of the Geotechnical Services for the Pavement Replacement Program from Mile Post 216.1 to Mile Post 221.26 in Trumbull and Mahoning County, Ohio.

This report consists of three parts: Part 1: Subgrade Exploration Report; Part II: Cement Stabilization Mix Design Report; and, Part III: Cement Stabilization Specifications and Constructability Report.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the subgrade exploration or this report, do not hesitate to contact us.

Sincerely,

RESOURCE INTERNATIONAL, INC.

Brian R. Trenner, P.E.
Project Manager – Geotechnical Services

Dane P. Redinger, P.E.
Director – Construction Services

Julia A. Miller, P.E.
Project Manager

Enclosure: Subgrade / Base Improvement Report

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PART I: APPENDICES

PART II: APPENDICES

EXECUTIVE SUMMARY

Resource International, Inc. (Rii) has completed a subgrade / base improvement report for the design and construction of the proposed pavement reconstruction as part of the Geotechnical Services for the Pavement Replacement Program in Lorain County, Ohio. The project length is approximately 5.3 miles and encompasses both the eastbound and westbound lanes of the Ohio Turnpike (I-80/I-76) between Mile Post 216.1 and Mile Post 221.26.

Part I: Subgrade Exploration

Exploration and Findings

- Between August 13 and September 4, 2014, a total of twenty-seven (27) test borings were completed within the existing alignment of the Ohio Turnpike (I-80/I-76) at the locations illustrated on the boring plan in Appendix I-B of the full report. The borings were drilled to completion depths ranging from 2.1 to 9.1 feet below the existing ground surface. Pavement cores of 16 inches in diameter were also obtained at each location to allow for adequate bulk samples to be collected for chemical subgrade stabilization design.

- Borings B-44-10 through B-44-13 encountered 16.0 to 17.0 inches of asphalt overlying 7.0 and 5.0 inches of slag base in borings B-44-10 and B-44-12, respectively, at the ground surface and 3.0 inches of aggregate base in boring B-44-13. The remaining borings encountered 2.0 to 7.5 inches of asphalt overlying 5.5 to 16.0 inches of concrete followed by 3.0 to 16.0 inches of slag base at the ground surface, with the exception of boring B-44-09, which encountered 3.0 inches of No. 2 stone beneath the concrete. The origin and composition of the slag base material was further investigated by Rii, and the results are presented in a separate report.

- Underlying the existing pavement materials, natural soils or existing embankment fill were encountered consisting primarily of cohesive soils with intermittent seams of granular material. The cohesive soils were generally described as brownish gray, brown, gray, dark gray and black sandy silt, silt, silt and clay, silty clay and clay (ODOT A-4a, A-4b, A-6a, A-6b, A-7-6). The granular soils were described as brownish gray, light brown and brown gravel, gravel and sand and gravel with sand, silt and clay (ODOT A-1-a, A-1-b, A-2-6), and were typically encountered where shallow bedrock was present. The gravel encountered in boring B-44-13 consisted of pea gravel overlying a geotextile fabric separator between the pea gravel and shale bedrock.

- Bedrock was encountered in borings B-44-11, B-44-12, B-44-13, B-44-26 and B-44-27 at depths ranging from 1.3 to 3.4 feet below the existing ground surface, as determined by split spoon sampler refusal. The bedrock encountered consists of gray, highly weathered shale. Additionally, auger refusal was encountered in borings

B-44-11, B-44-12, B-44-13 and B-44-26 at depths ranging from 3.1 to 4.7 feet below the ground surface. On December 4 and 8, 2014, six (6) offset borings, designated as B-44-10A through B-44-11C, were performed in the vicinity of boring B-44-11, where bedrock was the shallowest, to delineate the depth to bedrock. Based on the conditions encountered in the offset borings, bedrock was not encountered in borings B-44-10A and B-44-10B, and bedrock was encountered in borings B-44-10C through B-44-11C at depths ranging from 3.5 to 4.5 feet below the pavement surface.

- In addition to the traditional soil borings conducted for the current investigation, dynamic cone penetrometer (DCP) tests were also conducted at each location to determine the in-situ subgrade condition. The DCP tests were conducted to depths ranging from 3.35 to 32.83 inches below the existing pavement sections along the project limits. All depth measurements for the DCP are referenced to the top of the subgrade (bottom of slag or aggregate base).

Analysis and Recommendations

- The soil data compiled indicates that the subgrade soil for the proposed pavement along the alignment will consist primarily of medium stiff to hard silt and clay and silty clay (ODOT A-6a, A-6b) with isolated areas of stiff to very stiff sandy silt and clay (ODOT A-4a, A-7-6) and loose to dense gravel and gravel and sand (ODOT A-1-a, A-1-b).

- The ADCP output is a penetration rate (PR) measured in millimeters per blow (mm/blow). The PR observed from the ADCP tests ranged from 4.6 to 40.2 mm/blow, with an average PR for all tests performed of 18.3 mm/blow. These values can be correlated to California bearing ratio (CBR) values for use in the evaluation of the subgrade soils using equations developed by the Army Corps of Engineers. **The correlated CBR from the ADCP ranges from 2 to 12 with an average CBR value of 10.** It should be noted that the CBR obtained from ADCP testing represents the in-situ subsurface conditions at the time of the testing.

- Based on the ODOT Geotechnical Bulletin GB1: Plan Subgrades, the average site parameters from the current investigation are noted in the following table.

Average N_L	Average PI	Average Moisture	Average Optimum Moisture	Average Group Index	Average CBR
15	16	16	15	9.0	6

- A review of the historic data presented in the 2009 investigation was also conducted to verify the current findings and to supplement the current data for the evaluation of the subgrade strength. The overall average CBR of the historic data, consisting of the 1995 correlated CBR values from soil samples and the 2009 DCP and FWD testing, along the project alignment was 8.

- Based on the premise that engineered fill material, where required, will be consistent with the soils encountered in the test borings, **Rii recommends that a CBR of 7 be used in pavement design based on the current and historic subgrade strength data analyzed and reviewed.** A graphical output of the CBR values from all of the historic and current testing along the project length is provided in Appendix I-F of the full report.

- Rii presents two global stabilization options, with Option 1 being the recommended alternative, based on an evaluation of the subgrade using the ODOT GB1 analysis in conjunction with the DCP data collected at each boring location; these options should be evaluated based upon a cost and constructability analysis:

Option 1. ***(Recommended)*** **The subgrade should be chemically stabilized with 12 inches of cement or 14 inches of quicklime, as outlined in the following table and per ODOT Supplement 1120. The recommended application rate for the estimation of the quicklime and cement content required for stabilization is presented in Part II of the full report.**

Begin Station [1]	End Station [1]	Length (feet)	Chemical Type	Stabilization Depth (inches)
528+85 [2]	47+00 [2]	8,233	Quicklime	14
47+00	93+60	4,660	Cement	12
93+60	204+80	11,120	Quicklime	14
204+80	237+19	3,239	Cement	12

1. *Begin and End project limits determined from plan information provided by the OTIC and CT Consultants.*
2. *Sta. 564+18 back = Sta. 0+00 ahead at Trumbull and Mahoning County line.*

Option 2. **The subgrade should be stone stabilized via a 1.0-foot undercut and replacement with Type B, C or D ODOT Item 703.16C granular material installed over ODOT Item 712.09 Geotextile Fabric, Type D as detailed in Section 5.3 of Part I of this report.**

- Shallow bedrock was encountered in the area of borings B-44-11 through B-44-13, B-44-26 and B-44-27. Based on the depth of bedrock encountered in the borings and subsequent offset borings performed in the area of borings B-44-11 and B-44-12, Rii does not anticipate the need for bedrock undercuts within these zones. Please note that given the spacing of the borings near the end of the project limits, there is a potential for encountering areas where the bedrock surface may be encountered during construction. Should bedrock be encountered during construction, the bedrock should be undercut to 1.0 foot below the proposed bottom of pavement section to remove bedrock per ODOT Item 204.05 and replaced with ODOT Item 203 embankment. Following placement of the embankment, the area of undercut should be stabilized to a depth of 10.0 inches using the proposed stabilization chemical noted in the table above for the respective area.

Part II: Portland Cement and Quicklime Stabilization Mix Design

- Between August 14 and September 4, 2014, Rii obtained twenty-four (24) bulk soil samples over the entire length of the project (MP 216.1 to MP 221.25). Bulk samples were not obtained at Borings B-44-11, B-44-13, and B-44-26 where shallow bedrock was encountered.

- Based on the soil types encountered, it is recommended that quicklime or Type I Portland cement be utilized as the soil subgrade stabilization chemical within the station limits outlined in Table 6 of Section 5.1.4 in Part I of this report. The following table shows the samples that were selected for mix design testing.

Sample ID	Station	Soil Type	Sulfate Content (ppm)	Organic Content (%)	Moisture Content (%)	Plasticity Index	ODOT Curve ID	Complete Mix Design Testing Sample ID
B-44-09	51+62	A-1-b	**3,146**	2.8	20	NP	I	CT-1
B-44-16	121+84	A-4a	1,660	5.5	9	14	I	CT-2
B-44-07	33+04	A-6a	520	3.8	15	20	I	CT-3
B-44-27	217+83	A-6a	800	4.4	14	17	L	
B-44-01	541+48	A-6b	687	5.6	17	27	R	CT-4
B-44-05	14+46	A-7-6	**3,680**	4.0	18	27	S	CT-5
B-44-22	172+37	A-7-6	1,493	4.9	18	23	P	CT-6
B-44-10	60+89	A-6b	1,153	1.7	12	18	N	CT-7
B-44-23	180+85	A-7-6	960	2.2	25	23	M	CT-8
B-44-24	190+95	A-7-6	500	1.9	20	21	Q	CT-9

- Soil-lime mix design testing was performed on samples CT-2 through CT-6. These samples were selected to represent the entire project length where cohesive soils were encountered. Soil-lime mix design testing was performed in accordance with ODOT S1120. Soil pH testing was performed at incremental percentages of quicklime (by dry unit weight) on each complete test sample to determine the minimum lime percentage (MLP) to increase the pH of the soil-lime mixture to 12.4, which is provided in the following table. ODOT S1120 requires a minimum average eight-day unconfined compressive strength of 100 psi and a 50 psi increase in the unconfined compressive strength of the untreated soil. The results of the UCS testing are summarized in the following table.

Complete Mix Design Testing Sample ID	Soil Type	Minimum Lime Percentage	Lime Percentage	Average Expansion (+) / Shrinkage (-)	Average 8-day UCS (psi)	Recommended Quicklime Content (%)
CT-2	A-4a	2.0%	0%	-	40	**5.0**
			2%	0.1%	65	
			4%	0.1%	100	
			6%	0.2%	120	
CT-3	A-6a	2.0%	0%	-	50	**4.0**
			2%	0.1%	95	
			4%	0.2%	115	
			6%	0.2%	115	
CT-4	A-6b	3.0%	0%	-	50	**4.0**
			3%	0.1%	105	
			5%	0.2%	135	
			7%	0.2%	130	
CT-5	A-7-6	3.0%	0%	-	45	**4.0**
			3%	0.1%	120	
			5%	0.1%	135	
			7%	0.1%	135	
CT-6	A-7-6	2.0%	0%	-	45	**5.0**
			2%	0.2%	80	
			4%	0.1%	100	
			6%	0.1%	110	

- Based upon the evaluation of the eight-day unconfined compressive strength test data and the minimum lime percentage to increase the pH of the soil-lime mixture to 12.4, it is recommended that **5.0% quicklime content be utilized at an application rate of 57.8 lbs/yd^2** (based on a treatment depth of 14 inches and an in-situ dry unit weight of 110 lbs/ft^3) in all subgrade areas that are to be lime stabilized. The application rate will vary depending on the actual in-situ dry unit weight of the soil, which is dependent on the field conditions encountered at the time of construction.

- Soil-cement mix design testing was performed on sample CT-1 (boring B-44-09) due to the granular subgrade material encountered at this boring location and on samples CT-5, CT-7, CT-8, and CT-9 due to the possible incorporation of the underlying granular stratum in the stabilization process. Soil-cement mix design testing was performed in accordance with ODOT S1120. ODOT S1120 requires an eight-day unconfined compressive strength (UCS) of 100 psi and a 50 psi increase in the unconfined compressive strength of the untreated soil. The results of the UCS testing are summarized in the following table.

Complete Mix Design Testing Sample ID	Soil Type	Untreated UCS (psi)	8-day UCS (psi)			Minimum Required Cement Content (%)
			3% PC	5% PC	7% PC	
CT-1	A-1-b	45	125	180	205	**4.0**
CT-5	A-7-6	45	110	-	165	**4.0**
CT-7	A-6b	50	115	135	170	**4.0**
CT-8	A-7-6	45	120	135	155	**4.0**
CT-9	A-7-6	50	135	150	165	**4.0**

- Based upon the evaluation of the eight-day UCS data, **it is recommended that 4.0% Portland cement content be utilized at an application rate of 41.4 lbs/yd^2** (based on an in-situ dry unit weight of 115 lbs/ft^3 and a treatment depth of 14 inches) in all subgrade areas that are to be cement stabilized. The application rate will vary depending on the in-situ dry unit weight of the soil, which is dependent on the field conditions encountered at the time of construction.

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.

PART I: SUBGRADE EXPLORATION REPORT

1.0 INTRODUCTION

Resource International, Inc. (Rii) has completed a subgrade exploration report for the design and construction of the proposed pavement reconstruction as part of the Geotechnical Services for the Pavement Replacement Program in Lorain County, Ohio. The project length is approximately 5.3 miles and encompasses both the eastbound and westbound lanes of the Ohio Turnpike (I-80/I-76) between Mile Post 216.1 and Mile Post 221.26.

In 2009, Rii conducted an investigation of the entire alignment of the Ohio Turnpike, titled Mainline Pavement Evaluation Master Plan Report (Phase I report) dated September 25, 2009, to evaluate the overall condition of the roadway and subsequently rank individual 5-mile sections based on the priority in which pavement reconstruction should be conducted. The priority was based on several factors including the existing subgrade and pavement condition along with the maintenance history of each section. Also included in the Phase I report was historical data, along with data collected in 2009 in support of the investigation. Historical data presented in the Phase I report consisted of Dynaflect deflection data collected in 1992, which was not collected along the project alignment, and correlated California Bearing Ratio (CBR) values from soil samples obtained from the third lane widening investigation performed in 1995 between MP 216.1 to MP 218.4. Data presented in the report from the 2009 testing consisted of falling weight deflectometer (FWD) and automated dynamic cone penetrometer (ADCP) data collected for the entire project length.

In addition to the 2009 report, historic plan records were also reviewed to verify the continuity of the soil conditions between borings. These records included the soil profile sheets from the Ohio Turnpike and Infrastructure Commission (OTIC) Contract Number 71-95-39, which was performed in 1995.

It is currently proposed to reconstruct the existing pavement along the eastbound and westbound lanes of this portion of the Ohio Turnpike. It should be noted that this project encompasses a large percentage of Section 44 of the 48 sections as prioritized by Rii. This report contains results of the geotechnical investigation performed between August and September 2014, and recommendations for design CBR and subgrade improvement considerations are contained herein.

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.

Physiographically, the site lies within the Killbuck-Glaciated Pittsburgh Plateau Region of the Glaciated Allegheny Plateaus Section. This region consists of a topography containing ridges and flat uplands covered with thin drift dissected by both broad drift-filled valleys and narrow rock-walled valleys. The area is covered by thin to thick ground moraine deposits of clayey till from the Late Wisconsinan glacial stage.

Based on bedrock geology and topography maps, obtained from the Ohio Department of Natural Resources (ODNR), the bedrock underlying the glacial deposits consists primarily of the Middle to Lower Pennsylvanian-aged Allegheny and Pottsville Groups, undifferentiated. The units are undifferentiated because there are no subdivisions of the unit which have been determined. The Allegheny and Pottsville Groups consist of gray and greenish gray to black, interbedded shale, siltstone, sandstone, conglomerate, limestone, underclay, coal and flint. The units commonly intertongue and intergrade and rapidly change rock types both horizontally and vertically. The bedrock unit ranges from non-bedded to massively-bedded and the entire undifferentiated unit ranges between 450 to 620 feet thick.

Along the project alignment, the bedrock surface generally follows the slope of the ground surface, which slopes down to the southeast and east toward Meander Creek Reservoir. A bedrock valley is present below and is generally aligned with the existing Meander Creek Reservoir. The bedrock surface ranges from an approximate elevation of 925 feet mean sea level (msl) near the western project limits, just east of the reservoir crossing under I-76, to an approximate elevation of 1,000 feet msl near the center and eastern project limits. According to bedrock topography mapping, the depth to the bedrock surface along the project alignment ranges from approximately 0 to 55 feet below existing grade. Bedrock was encountered in five (5) of the borings performed for this exploration at depths ranging from 1.3 to 3.4 feet below the pavement surface, which corresponds to elevations ranging from 961.5 to 991.5 feet msl. An illustration of the general geology of Ohio is presented Appendix I-A.

2.2 Existing Conditions

The Ohio Turnpike runs along the northern portion of Ohio, beginning at the border of Indiana near Columbia, Ohio, and extending east to the Pennsylvania border near Hubbard, Ohio. The project section for the current exploration (between MP 216.1 and 221.26), begins just south of the Ellsworth Bailey Road crossing in Trumbull County, approximately 0.5 miles north of the county line, and continues along I-80 into Mahoning County to the interchange with I-76, where the alignment continues southwest along I-76 and I-80 splits off to the east. The project limits are roughly between the Ellsworth Bailey Road crossing over I-80 and the I-76 crossing over the Meander Creek Reservoir. The project alignment traverses through Lordstown Township in Trumbull County and Jackson Township in Mahoning County. The existing I-80 north of the I-76 interchange is a six-lane, divided highway with composite asphalt over concrete pavement. Between approximately MP 217.9 and 218.5, the existing pavement section consists solely of asphalt pavement. The existing I-76, starting at the north end of the

interchange, is a four-lane, divided highway with composite asphalt over concrete pavement. According to project plan and profile information provided by OTIC and CT Consultants, there are nine (9) underpasses/overpasses between Ellsworth Bailey Road overpass and the Meander Creek Reservoir crossing, and approximately sixteen (16) culvert structures for creek/drainageways crossings also occurring between these limits. The terrain along the project alignment is gently rolling and slopes down to the southeast and east toward the Meander Creek Reservoir at the east end of the alignment, with an overall change in elevation along the project alignment of approximately 65 feet.

3.0 EXPLORATION

Between August 13 and September 4, 2014, a total of twenty-seven (27) test borings were completed within the existing alignment of the Ohio Turnpike (I-80/I-76) at the locations illustrated on the boring plan in Appendix I-B. The borings drilled for this investigation were designated as B-44-01 through B-44-27, with the first number indicating the section number of this portion of the Ohio Turnpike used in the priority ranking system and the second number indicating the boring number. The borings were drilled to completion depths ranging from 2.1 to 9.1 feet below the existing ground surface. Pavement cores of 16 inches in diameter were also obtained at each location to allow for adequate bulk samples to be collected for chemical subgrade stabilization design. All borings under the current exploration were performed in general accordance with the Ohio Department of Transportation (ODOT) Specifications for Geotechnical Explorations (SGE) dated July 2014.

Table 1. Summary of Borings

Boring Number	Station	Offset	Mile Post	Northing	Easting	Ground Elevation [1] (feet msl)	Boring Depth (feet)
B-44-01	541+48	51.2' Rt.	216.34	540296.658	2416901.511	996.0	7.9
B-44-02	550+77	50.8' Lt.	216.51	539813.897	2417701.748	1000.3	7.9
B-44-03	558+33	48.1' Rt.	216.66	539276.653	2418242.326	1002.5	7.9
B-44-04	5+17	51.8' Lt.	216.87	538687.089	2419179.155	998.5	7.9
B-44-05	14+46	52.1' Rt.	217.04	538040.665	2419854.420	1003.9	7.8
B-44-06	23+75	51.0' Lt.	217.22	537558.797	2420655.340	1013.2	7.9
B-44-07	33+04	52.7' Rt.	217.39	536912.572	2421330.757	1017.9	7.7
B-44-08	42+33	51.6' Lt.	217.57	536423.233	2422128.748	1009.5	7.9
B-44-09	51+62	52.8' Rt.	217.75	535713.144	2422735.960	991.5	7.5
B-44-10	60+89	60.5' Lt.	217.92	535084.488	2423427.015	981.3	7.9
B-44-11	70+10	17.4' Rt.	218.10	534281.174	2423887.256	982.6	2.1
B-44-12	79+48	63.0' Lt.	218.27	533530.531	2424455.694	994.8	4.0

Boring Number	Station	Offset	Mile Post	Northing	Easting	Ground Elevation [1] (feet msl)	Boring Depth (feet)
B-44-13	89+17	26.7' Rt.	218.46	532663.489	2424896.555	1008.9	3.7
B-44-14	98+06	50.2' Lt.	218.63	531952.166	2425436.045	1013.9	7.9
B-44-15	107+38	29.3' Rt.	218.80	531121.536	2425865.908	1009.8	8.0
B-44-16	121+84	59.4' Lt.	219.08	529945.567	2426712.442	1002.4	7.8
B-44-17	125+87	29.7' Rt.	219.15	529557.468	2426851.902	1000.6	7.9
B-44-18	135+22	50.8' Lt.	219.33	528809.379	2427418.858	995.6	7.9
B-44-19	144+39	29.4' Rt.	219.50	527990.578	2427840.438	990.4	8.0
B-44-20	153+79	51.0' Lt.	219.68	527238.756	2428409.613	983.7	9.1
B-44-21	163+35	50.8' Rt.	219.86	526375.943	2428833.500	972.6	8.2
B-44-22	172+37	50.8' Lt.	220.03	525667.130	2429400.649	962.5	7.9
B-44-23	180+85	50.4' Rt.	220.19	524899.537	2429776.457	952.8	8.3
B-44-24	190+95	51.1' Lt.	220.38	524154.926	2430466.714	958.3	8.0
B-44-25	200+02	50.0' Rt.	220.56	523412.485	2430996.970	971.3	8.5
B-44-26	209+53	51.2' Lt.	220.74	522832.041	2431756.377	974.2	3.8
B-44-27	217+83	51.0' Rt.	220.89	522211.512	2432316.316	964.8	7.8

1. *Elevations determined from plan and profile and cross section information provided by the OTIC and CT Consultants.*

The boring and pavement core locations were determined and field located by Rii representatives following concurrence reviews by the OTIC. Rii utilized a handheld GPS unit to obtain northing and easting coordinates of the boring locations. Ground surface elevations at the boring locations were determined from plan and profile and cross section information provided by the OTIC and CT Consultants.

The borings were advanced using a truck-mounted rotary drilling machine utilizing a 4.5-inch, solid flight auger to advance the holes. In general, standard penetration test (SPT) and split spoon sampling of soils were performed continuously to a depth of 6.0 feet below the existing pavement structure or to auger refusal on bedrock. The SPT, per ASTM 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 blows per 6.0-inch interval of the driving distance. The blows from the second and third intervals are added to obtain the number of blows per foot (bpf). SPT blow counts aid in determining soil properties applicable in pavement system design. Measured blow count (N_m) values are corrected to an equivalent (60%) energy ratio, N_{60}, by the following equation. Both values are represented on boring logs in Appendix I-D.

$$N_{60} = N_m*(ER/60)$$

Where:
N_m = measured N value
ER = drill rod energy ratio, expressed as a percent, for the system used

The hammer for the Mobile B53 truck-mounted drill rig used for this project was calibrated on April 26, 2013, and has a drill rod energy ratio of 77.7 percent.

Upon completion of drilling and sampling, the borings were backfilled with a mixture of soil cuttings and any removed aggregate base material. The remaining void space was filled with Quickrete DOT mix fast-set concrete.

During drilling, field personnel prepared field logs 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 [1]

Laboratory Test	Test Designation	Number of Tests Performed
Natural Moisture Content	ASTM D2216	98
Plastic and Liquid Limits	AASHTO T89, T90	45
Gradation – Hydrometer	AASHTO T88	45

1. *Testing quantities and procedures listed above are for the geotechnical borings and analysis only. Testing quantities and procedures for the mix design are not included in the table above.*

These tests are necessary to classify the soil according to the ODOT classification system. The results are also used to estimate engineering properties of importance in pavement design and soil related construction considerations. Results of the laboratory testing are presented on the boring logs in Appendix I-D. A description of the soil terms used throughout this report is presented in Appendix I-C.

Hand penetrometer readings, which provide a rough estimate of the unconfined compression 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 unconfined 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 to be disturbed and the laboratory determination of their shear strengths may vary from undisturbed conditions.

In addition to the traditional soil borings conducted for the current exploration, dynamic cone penetrometer (DCP) tests were also conducted at each location to determine the in-situ subgrade condition. The DCP tests were performed at each location prior to disturbance of the subgrade soils by the borings. The tests were conducted until the maximum stroke of the drive rods was achieved or until refusal on bedrock was obtained. The DCP, per ASTM D6951, is conducted using a duel mass 17.6-pound manual drop hammer free falling 22.6 inches to drive a ⅝-inch diameter steel drive rod with a 0.79-inch diameter, 60° conical tip a maximum of 54 inches below the pavement surface. The DCP testing was conducted through the existing pavement, by drilling a 1.0-inch diameter hole through the pavement, and then inserting the drive rod and beginning the test. The cumulative penetration depth of the drive rods and number of blows from the hammer were recorded at approximate 5.0 cm intervals and subsequently reduced and presented as detailed in ASTM D6951.

4.0 FINDINGS

Interpreted engineering logs have been prepared based on the field logs, visual examination of samples and laboratory testing. Classification follows the July 2014 version of the ODOT SGE. The following is a summary of what was found in the test borings and what is represented on the boring logs.

4.1 Surficial Material

Table 3 below notes the measured pavement section at each test boring location in order of the locations numbered west to east along the Ohio Turnpike:

Table 3. Summary of Surface Material Profile

Test Boring	Asphalt Thickness (in)	Concrete Thickness (in)	Slag Base Thickness (in)	Test Boring	Asphalt Thickness (in)	Concrete Thickness (in)	Slag Base Thickness (in)
B-44-01	5.0	11.0	7.0	B-44-15	6.0	11.0	7.0
B-44-02	6.0	12.0	5.0	B-44-16	5.0	11.0	6.0
B-44-03	5.0	11.0	7.0	B-44-17	7.0	11.0	5.0
B-44-04	5.0	11.0	7.0	B-44-18	7.0	10.0	6.0
B-44-05	4.0	10.0	8.0	B-44-19	5.0	11.0	8.0
B-44-06	5.0	10.0	8.0	B-44-20	5.0	11.0	10.0
B-44-07	2.0	11.0	7.0	B-44-21	6.0	10.5	9.5
B-44-08	5.0	10.0	8.0	B-44-22	7.0	12.0	3.0
B-44-09	3.0	11.0	3.0 [1]	B-44-23	7.5	10.5	9.0
B-44-10	17.0	-	7.0	B-44-24	6.0	10.0	8.0
B-44-11	16.0	-	-	B-44-25	5.5	16.0	8.5

Test Boring	Asphalt Thickness (in)	Concrete Thickness (in)	Slag Base Thickness (in)	Test Boring	Asphalt Thickness (in)	Concrete Thickness (in)	Slag Base Thickness (in)
B-44-12	17.0	-	5.0	B-44-26	5.0	11.0	16.0
B-44-13	16.0	-	3.0 [1]	B-44-27	4.5	5.5	12.0
B-44-14	6.0	10.0	7.0				

1. Base material consists of No. 2 stone in boring B-44-09 and aggregate base in boring B-44-13.

Borings B-44-10 through B-44-13 encountered 16.0 to 17.0 inches of asphalt overlying 7.0 and 5.0 inches of slag base in borings B-44-10 and B-44-12, respectively, at the ground surface and 3.0 inches of aggregate base in boring B-44-13. The remaining borings encountered 2.0 to 7.5 inches of asphalt overlying 5.5 to 16.0 inches of concrete followed by 3.0 to 16.0 inches of slag base at the ground surface, with the exception of boring B-44-09, which encountered 3.0 inches of No. 2 stone beneath the concrete. The origin and composition of the slag base material was further investigated by Rii, and the results are presented in a separate report.

4.2 Subsurface Soils

Underlying the existing pavement materials, natural soils or existing embankment fill were encountered consisting primarily of cohesive soils with intermittent seams of granular material. The cohesive soils were generally described as brownish gray, brown, gray, dark gray and black sandy silt, silt, silt and clay, silty clay and clay (ODOT A-4a, A-4b, A-6a, A-6b, A-7-6). The granular soils were described as brownish gray, light brown and brown gravel, gravel and sand and gravel with sand, silt and clay (ODOT A-1-a, A-1-b, A-2-6), and were typically encountered where shallow bedrock was present. The gravel encountered in boring B-44-13 consisted of pea gravel overlying a geotextile fabric separator between the pea gravel and shale bedrock.

The shear strength and consistency of the cohesive soils are primarily derived from the hand penetrometer values (HP). The cohesive soils encountered ranged from medium stiff ($0.5 < HP \leq 1.0$ tsf) to hard ($HP > 4.0$ tsf). The unconfined compressive strength of the cohesive soil samples tested, obtained from the hand penetrometer, ranged from 1.0 tsf to over 4.5 tsf (limit of instrument). The relative density of granular soils is primarily derived from SPT blow counts (N_{60}). Based on the SPT blow counts obtained, the granular soils encountered in the borings ranged from loose ($5 \leq N_{60} \leq 10$ blows per foot [bpf]) to dense ($31 \leq N_{60} \leq 50$ bpf). Overall blow counts recorded from the SPT sampling ranged from 5 bpf to split spoon sampler refusal, generally increasing with depth. Split spoon sampler refusal is defined as exceeding 50 blows with less than 6.0 inches of penetration by the split spoon sampler

Natural moisture contents of the soil samples tested ranged from 5 to 29 percent. The natural moisture contents of the soil samples tested for plasticity index ranged from 15 percent below to 5 percent above their corresponding plastic limits. In general, the soils exhibited natural moisture contents estimated to be significantly below to moderately above optimum moisture levels.

Sulfate testing was performed on all bulk samples in accordance with the Texas Department of Transportation test method TEX-145-E in the upper soils of the existing subgrade along the proposed alignment, as outlined in the current ODOT Geotechnical Bulletin GB1: Plan Subgrades (GB1). Based on the results of the testing, the sulfate contents of the subgrade soils range from 60 to 3,680 parts per million (ppm or mg/kg of material).

4.3 Bedrock

Bedrock was encountered in borings B-44-11, B-44-12, B-44-13, B-44-26 and B-44-27 at depths ranging from 1.3 to 3.4 feet below the existing ground surface, as determined by split spoon sampler refusal. The bedrock encountered consists of gray, highly weathered shale. Additionally, auger refusal was encountered in borings B-44-11, B-44-12, B-44-13 and B-44-26 at depths ranging from 3.1 to 4.7 feet below the ground surface. Auger refusal is defined as no or insignificant observable advancement of the augers with the weight of the drill rig driving the augers.

On December 4 and 8, 2014, six (6) offset borings, designated as B-44-10A through B-44-11C, were performed in the vicinity of boring B-44-11, where bedrock was the shallowest, to delineate the horizontal limits and depth of the shallow bedrock. The locations of the offset boring locations are shown on the boring logs in Appendix I-B. Below the pavement materials and slag base material, two continuous 2.0-foot interval split spoon samples were obtained to determine the depth to bedrock. Based on the conditions encountered in the offset borings, bedrock was not encountered in borings B-44-10A and B-44-10B, and bedrock was encountered in borings B-44-10C through B-44-11C at depths ranging from 3.5 to 4.5 feet below the pavement surface.

4.4 Groundwater

Groundwater was not encountered during or at the completion of drilling in any of the borings performed for this exploration. 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 I-D.

4.5 DCP Test Results

DCP tests were conducted to depths ranging from 3.35 to 32.83 inches below the existing pavement sections along the project alignment. Where refusal on bedrock was not encountered, the tests were terminated when the maximum stroke of the drive rods was achieved (which varies based on the existing pavement section at each test location). The cumulative penetration depth of the drive rods and number of blows from the hammer were recorded at approximate 5.0 cm intervals, and these values were reduced to provide a penetration rate (PR) in units of millimeters per blow (mm/blow) of the soil. The PR of the soil for each individual test location was determined based on the average PR of the data set for the respective test. In general, the PR recorded over the project length ranged from 4.6 to 40.2 mm/blow. All depth measurements for the DCP are referenced to the top of the subgrade (bottom of slag or aggregate base). Results of the DCP testing performed for the current investigation are presented in Appendix I-E.

5.0 ANALYSES AND RECOMMENDATIONS

Data obtained from the drilling and testing program have been used to determine pavement support capabilities for the soil encountered at the site. These parameters have been used to provide guidelines for the design of the pavement systems, as well as the construction specifications related to the placement of the pavement systems and general earthwork recommendations, which is discussed in the following paragraphs.

5.1 Pavement Subgrade Recommendations

The soil data compiled indicates that the subgrade soil for the proposed pavement along the alignment will consist primarily of medium stiff to hard silt and clay and silty clay (ODOT A-6a, A-6b) with isolated areas of stiff to very stiff sandy silt and clay (ODOT A-4a, A-7-6) and loose to dense gravel and gravel and sand (ODOT A-1-a, A-1-b). As noted in Section 4.3, shallow bedrock was also encountered in borings B-44-11 through B-44-13, B-44-26 and B-44-27 at depths ranging from 1.3 to 3.4 feet below the existing ground surface.

The moisture content of cohesive soil has a significant effect on the physical properties of the material. It should 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 August 13 and September 4, 2014. 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 DCP Subgrade Analysis

Using the criterion presented in Section 4.5, the PR observed from the DCP tests ranged from 4.6 to 40.2 mm/blow, with an average PR for all tests performed of 18.3 mm/blow. The PR values can be correlated to CBR values for use in the evaluation of the subgrade soils using the Army Corps of Engineers developed equations presented in ASTM D6951/D6951M as follows:

$$CBR = \frac{292}{(DCPI)^{1.12}};$$

$$CBR = \frac{1}{(0.017019 \times DCPI)^{2}} \quad \text{for CL soils with CBR < 10 from above;}$$

Where:

$DCPI$ = PR*(Hammer Factor)

Hammer Factor = 1.0 for a 17.6 lb hammer

Please note that the selection of the appropriate correlation for each test is a matter of professional judgment and was based on a comparison with the soil borings conducted for this exploration. To account for the presence of bedrock and very dense granular seams or hard cohesive soils where low PR and refusal on bedrock were encountered, the correlated CBR value was limited to a maximum value of 12.

The correlated CBR from the DCP ranges from 2 to 12 with an average CBR value of 10. It should be noted that the CBR obtained from DCP testing represents the in-situ subsurface conditions at the time of the testing.

As noted in Section 4.5, DCP tests were conducted to depths ranging from 3.35 to 32.83 inches below the existing pavement sections. In general, the measured PR in upper 12 to 16 inches of the soil subgrade at the test locations was generally higher than the underlying soils. Based on the results of the DCP analysis, 70 percent of the test locations indicated high PR values in the upper 12 inches or less of soil and less than 20 percent indicated high PR values at depths greater than 16 inches. The high PR values are indicative of weak subgrade soils present within these depths.

Previous ADCP data collected in 2009 was also reviewed. In general, the data from the 2009 tests yielded similar trends in PR with depth as those noted in the current tests. As noted above, data obtained from ADCP testing represents the in-situ subsurface conditions at the time of the testing. The tests from the 2009 investigation within the limits of the project were conducted on April 23 and May 21, 2009.

5.1.2 ODOT GB1 Analysis

Based on the soil conditions encountered during the drilling phase, it is estimated that surficial soils (top sample) and the subgrade soils within the upper 6.0 feet of the proposed subgrade surface will require some level of stabilization under ODOT Geotechnical Bulletin GB1: Plan Subgrades. The GB1 subgrade analysis determines the subgrade strength based on the results of laboratory testing for the split spoon soil samples obtained from the soil borings. From the laboratory testing, a group index (GI) value is calculated and a correlated CBR value is obtained based on the respective GI value.

The soil borings performed in support of the proposed pavement reconstruction were tabulated in the GB1 analysis presented in Appendix I-E. The following table notes the average site parameters from the GB1 analysis for the borings conducted for the current exploration.

Table 4. Average Site Parameters from Current Investigation

Average N_L	Average PI	Average Moisture	Average Optimum Moisture	Average Group Index	Average CBR
15	16	16	15	9.0	6

It should be noted that the average CBR listed in Table 4 is based on a limited data set. The current ODOT SGE specifies that soil borings should be conducted at a maximum interval of 400 feet to accurately evaluate the soil subgrade. The soil borings conducted for the current exploration were obtained at an average interval of approximately 925 feet.

5.1.3 Subgrade CBR Considerations

Table 5 lists the average GI of the soil samples from each boring as well as the average PR of the data set for each ADCP test and the correlated CBR values associated for each analysis type.

Table 5. Summary of Soil and ADCP Correlated CBR Values

Test Boring	Station	Offset	GB1 GI	GB1 CBR [1]	ADCP PR (mm/blow)	ADCP CBR [2]
B-44-01	541+48	51.2' Rt.	8	7	21.0	8
B-44-02	550+77	50.8' Lt.	10	6	22.5	7
B-44-03	558+33	48.1' Rt.	10	6	40.2	2

Test Boring	Station	Offset	GB1 GI	GB1 CBR [1]	ADCP PR (mm/blow)	ADCP CBR [2]
B-44-04	5+17	51.8' Lt.	9	6	14.8	12
B-44-05	14+46	52.1' Rt.	9	6	22.6	7
B-44-06	23+75	51.0' Lt.	9	6	23.9	6
B-44-07	33+04	52.7' Rt.	9	6	14.5	12
B-44-08	42+33	51.6' Lt.	8	7	14.9	12
B-44-09	51+62	52.8' Rt.	7	7	14.8	12
B-44-10	60+89	60.5' Lt.	8	7	17.2	12
B-44-11	70+10	17.4' Rt.	0	12	5.2	12
B-44-12	79+48	63.0' Lt.	11	6	12.2	12
B-44-13	89+17	26.7' Rt.	0	12	16.6	12
B-44-14	98+06	50.2' Lt.	10	6	21.5	7
B-44-15	107+38	29.3' Rt.	12	5	18.7	11
B-44-16	121+84	59.4' Lt.	6	7	17.4	12
B-44-17	125+87	29.7' Rt.	11	6	22.8	7
B-44-18	135+22	50.8' Lt.	11	6	17.6	12
B-44-19	144+39	29.4' Rt.	10	6	19.7	10
B-44-20	153+79	51.0' Lt.	12	5	28.7	4
B-44-21	163+35	50.8' Rt.	4	8	22.3	7
B-44-22	172+37	50.8' Lt.	11	6	10.7	12
B-44-23	180+85	50.4' Rt.	8	7	31.3	4
B-44-24	190+95	51.1' Lt.	13	5	13.9	12
B-44-25	200+02	50.0' Rt.	10	6	13.8	12
B-44-26	209+53	51.2' Lt.	0	12	4.6	12
B-44-27	217+83	51.0' Rt.	8	7	11.7	12

1. *CBR value from soil data based the average GI for the samples of the respective boring.*
2. *CBR value from DCP based on the average PR for the data set of the respective test. The correlated CBR value from the DCP testing was limited to a maximum value of 12.*

A review of the historic data presented in the 2009 investigation was also conducted to verify the current findings and to supplement the current data for the evaluation of the subgrade strength. The data presented indicated that CBR values from the 2009 FWD

testing ranged from 5 to 11 over the project length, with the exception of the test performed at MP 218.7 in the westbound direction, which resulted in a CBR value of 22. The overall average CBR of the historic data, consisting of the 1995 correlated CBR values from soil samples and the 2009 DCP and FWD testing, along the project alignment was 8. In general, the subgrade strengths determined from the historic data matched relatively closely with the subgrade strengths determined from the current data.

Rii recommends that a CBR of 7 be used in pavement design based on the current and historic subgrade strength data analyzed and reviewed. A graphical output of the CBR values from all of the historic and current testing along the project length is provided in Appendix I-F.

Please note that the recommended CBR value considers that the materials utilized for the road 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 as represented above.

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.

5.1.4 Global Stabilization

Per GB1 specifications, for all interstates and divided highways with four or more lanes more than 1.0-mile in project length, a global stabilization option is recommended to provide a stable, consistent base along the project alignment. GB1 provides global stabilization recommendations based upon the average site parameters, as noted in Table 4 in Section 5.1.3. Therefore, Rii recommends a global stabilization of the subgrade as outlined below.

The GB1 subgrade analysis indicated chemical stabilization depths ranging from 14 to 16 inches at select locations. Applying the average values presented in Table 4 and referencing Figure B in the ODOT GB1, chemical stabilization consisting of 12 inches of lime or cement, per ODOT Item 206, is recommended as a global stabilization option. It should be noted that the recommended depth of stabilization is based solely on the average site parameters over the entire project length. Significant variation in any of the site parameters at specific locations can skew the average of the respective parameter.

As noted from the DCP results presented in Section 5.1.1 and Appendix I-E, **the PR in upper 12 inches of the soil subgrade at the test locations was generally higher than the underlying soils**, indicating that weak subgrade soils are present within these depths. The depth of weak subgrade soils determined from DCP analysis generally

corresponded with the recommended stabilization depths determined from the ODOT GB1 analysis, which determines the required depth of stabilization based solely on the N_{60} value obtained from the SPT testing for the upper sample of the proposed subgrade.

Rii presents two global stabilization options, with Option 1 being the recommended alternative, based on an evaluation of the subgrade using the ODOT GB1 analysis in conjunction with the DCP data collected at each boring location; these options should be evaluated based upon a cost and constructability analysis:

Option 1. ***(Recommended)*** **The subgrade should be chemically stabilized with 12 inches of cement or 14 inches of quicklime, as outlined in the following table and per ODOT Supplement 1120. The recommended application rate for the estimation of the quicklime and cement content required for stabilization is presented in Part II of this report.**

Table 6. Summary of Chemical Stabilization Limits

Begin Station [1]	End Station [1]	Length (feet)	Chemical Type	Stabilization Depth (inches)
528+85 [2]	47+00 [2]	8,233	Quicklime	14
47+00	93+60	4,660	Cement	12
93+60	204+80	11,120	Quicklime	14
204+80	237+19	3,239	Cement	12

1. Begin and End project limits determined from plan information provided by the OTIC and CT Consultants.
2. Sta. 564+18 back = Sta. 0+00 ahead at Trumbull and Mahoning County line.

Option 2. **The subgrade should be stone stabilized via a 1.0-foot undercut and replacement with Type B, C or D ODOT Item 703.16C granular material installed over ODOT Item 712.09 Geotextile Fabric, Type D as detailed in Section 5.3 of Part I of this report.**

Material identified as gravel and sand and gravel (ODOT A-1-a, A-1-b) was encountered below the pavement and slag base in boring B-44-09, B-44-13 and B-44-22. As noted in Section 4.2, the material encountered below pavement and slag base consisted of pea gravel. These material types will not develop adequate strength for a stabilized subgrade per Supplement 1120 if stabilized using quicklime. On December 8 and 9, 2014, a total of five (5) offset borings, designated as B-44-12A, B-44-13A, B-44-21A, B-44-22A and B-44-22B, were performed in the vicinity of borings B-44-13 and B-44-22 to delineate the extents of the gravel material encountered. Based on the conditions encountered in the offset borings, the gravel material encountered in the original boring locations at B-44-13 and B-44-22 was not encountered in the offset borings. Therefore,

these soil types should be isolated to the area of the original boring locations. Where encountered during construction near these borings, this material should be overexcavated to a depth of 1.5 feet and replaced with ODOT Item 203 embankment and subsequently stabilized using the proposed stabilization method as noted in Table 6.

Please note that material identified as pea gravel (ODOT A-1-a) was encountered below the asphalt pavement and extending to the shale bedrock in boring B-44-13. This type of material is not suitable for pavement support and also cannot be chemically stabilized due to the uniform gradation of the material. Therefore, it is recommended that any pea gravel material encountered during construction be completely removed and replaced with ODOT Item 204 embankment material and subsequently stabilized using quicklime or cement. Based on the conditions encountered in offset borings B-44-12A and B-44-13A, the pea gravel material appears to be localized to the area of boring B-44-13.

As noted in Section 4.3, shallow bedrock was encountered in the area of borings B-44-11 through B-44-13, B-44-26 and B-44-27. Based on the depth of bedrock encountered in the borings and subsequent offset borings performed in the area of borings B-44-11 and B-44-12, Rii does not anticipate the need for bedrock undercuts within these zones. Please note that given the spacing of the borings near the end of the project limits, there is a potential for encountering areas where the bedrock surface may be encountered during construction. Should bedrock be encountered during construction, the bedrock should be undercut to 1.0 foot below the proposed bottom of pavement section to remove bedrock per ODOT Item 204.05 and replaced with ODOT Item 203 embankment. Following placement of the embankment, the area of undercut should be stabilized to a depth of 10.0 inches using the proposed stabilization chemical noted in Table 6 for the respective area.

Per ODOT GB1 requirements, if it is elected to perform global stabilization, the entire subgrade should be stabilized using one of the global stabilization options provided above. Upon completion of the stabilization, the entire subgrade should be proof rolled to verify that stability has been achieved.

The impact of the stabilization options with respect to utility clearances, maintenance of traffic and access during construction, and dust control should be considered prior to selecting the stabilization option.

5.2 Remediation / Reuse of Existing Pavement

The existing pavement materials (existing asphalt and concrete base) are considered suitable for reuse in construction of the proposed pavement. If the existing asphalt is considered for reuse as reclaimed asphalt concrete pavement (RAP), it should be used as described in Part IV of Section SP400 of the OTC Specifications.

If the existing concrete is considered for reuse as crushed aggregate base, it should meet the requirements set forth in Section SP304 of the OTC Specifications with the exception of the sodium sulfate (Na_2SO_4) soundness testing. This test should be replaced with magnesium sulfate ($MgSO_4$) soundness testing, since magnesium sulfate soundness testing is more applicable when testing recycled concrete pavement to be used as crushed aggregate base.

5.3 Construction Considerations

All site work shall conform to the either the latest ODOT Construction and Material Specifications (CMS) or OTIC Specifications including the requirements that all excavation, embankment preparation, and construction follow either ODOT Item 200 (Earthwork) or the equivalent OTIC specification.

Prior to beginning excavation, grading, and/or embankment operations across the site, existing pavement sections, topsoil, or any otherwise unsuitable materials (as determined by a geotechnical engineer or an experienced soil technician), should be stripped and removed from proposed pavement areas prior to excavation.

Cohesive soil, primarily those containing silt, tend to become unstable (i.e., soft and flexing) under repeated loading from heavy rubber-tired vehicles. Therefore, heavy vehicle traffic on subgrades should be limited as much as possible during construction. The subgrade should be closely observed to determine if unstable conditions do develop which will require stabilization as determined by the geotechnical engineer.

The proposed subgrade surfaces should be proofrolled with sufficient proofrolling apparatus (preferably a fully-loaded tandem-axle dump truck), prior to placing engineered fill, where fill is required. A geotechnical engineer or an experienced soil technician should be present during proofrolling to determine if soft soil with inadequate stability exists. Subgrade instability encountered during a proofroll is indicated by deflection, cracking, or rutting of the surface. Soft soil is generally a result of the presence of very moist to wet cohesive soil. Deflecting subgrades may also be due to the presence of subsurface lenses of silt/fine sand, which typically contain water because the soil exhibits a higher porosity than the overlying and/or underlying cohesive soil. Based on the borings drilled, the moisture contents of the cohesive samples tested are considered to be significantly below to moderately above the corresponding optimum moisture contents. Soil in excess of the optimum moisture content creates the possibility of soft or unstable subgrades. It is likely that cohesive subgrade soil exhibiting natural moisture content in excess of its corresponding plastic limit will require some level of stabilization.

The extent/need for subgrade stabilization is entirely dependent on the subgrade conditions (i.e., moisture contents) encountered at the time of construction. If required, the method of stabilization employed is a function of the type of instability encountered, the location (i.e., depth) of the instability and the resources available.

Fine-grained soils, such as silt and fine-grained sand, have the potential to create a frost-susceptible subgrade. During construction, it is recommended that this type of material, if encountered, be over-excavated and completely removed from within 2.0 feet of the proposed finished subgrade elevation. It is recommended that this over-excavation be backfilled with engineered fill in accordance to the following paragraphs. If other areas of the subgrade soil appear fine-grained with very low plasticity, it should be considered to be frost-susceptible silt, and be over-excavated.

Other stabilization options include: 1) scarifying, drying and recompacting, 2) mixing wet soil with dry soil, 3) undercutting unsuitable surficial soil and replacing it with controlled density fill, and 4) a geogrid subgrade reinforcement system. Other methods of subgrade stabilization are available and certainly may be effective (both physically and economically) in stabilizing the soil. The adequacy of any stabilization method should be verified through the construction of a test section. All proposed subgrade surfaces should be shaped to promote positive drainage, with a minimum slope of 2 percent or 0.25 inches per foot. Adequate drainage is necessary for maintaining the stability of the subgrade. Care should be taken during final grading so that no areas of potential ponding or standing water remain at the subgrade surface.

Sources of borrow material, if required, should be designated well in advance of construction. The material should be tested in the laboratory to verify the soil exhibits the minimum design CBR provided in Section 5.1. Note that cohesive soils, primarily types containing silt, tend to become unstable (i.e., soft and flexing) under repeated loading from heavy construction traffic. Therefore, construction traffic within the proposed pavement subgrade should be limited. The proposed subgrade should be closely observed to determine if unstable conditions do develop that would require stabilization as determined by the site geotechnical engineer.

Generally, materials utilized for engineered fill should be free of waste construction debris and other deleterious materials and meet the following requirements:

- Maximum Dry Density per ASTM D 698 > 110 pcf
- Liquid Limit < 40
- Plasticity Index < 15
- Organic Matter < 3 percent
- Maximum Particle Size < 3 inches
- Silt Content (between 0.075 and 0.005 mm) < 45 percent

Compacted granular fill shall meet the above specification and additionally shall have a maximum 35 percent passing the No. 200 sieve.

As previously noted, Rii is performing additional testing on the existing slag base to determine its chemical composition. The results of this study will be presented in a

separate report; however, it is likely that this material will not be considered suitable for reuse as a base material.

The majority of the natural soils encountered on the site are considered suitable for reuse as structural fill for pavement support when compacted at its optimum moisture content. Fill soil placed for pavement support should be placed in loose lifts not to exceed 8.0 inches. **All embankment fill should be placed and compacted in general accordance to Item 203 of the latest ODOT CMS**. Drying wet soil can be expedited by the use of plows, discs, or by other approved methods. The final determination of whether a material is suitable for reuse as fill should be made by Rii or a field representative thereof. Fill soil should not be placed in a frozen condition or on a frozen subgrade.

All trenching and excavation procedures should follow applicable Occupational Safety and Health Administration (OSHA) standards, including adequate safety precautions conforming to OSHA standards for the personnel installing underground lines. Sloping or benching for excavations greater than 20 feet shall be designed by a registered professional engineer, and should be provided by the contractor to the engineer for review and comment.

5.3.1 Groundwater Considerations

Based on the observations made during and after drilling in the borings performed for this exploration, it is anticipated that little to no groundwater seepage will be encountered during construction. Where (if) groundwater is encountered during construction, proper groundwater control should be employed and maintained to prevent disturbance of cohesive subgrade 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. It is anticipated that any seepage or groundwater encountered at this site should be able to be controlled by pumping from temporary sumps. As stated previously, groundwater levels or the presence of groundwater are considered to be dependent on seasonal fluctuations in precipitation. Note that determining and maintaining actual groundwater levels during construction is the responsibility of the contractor.

PART II: PORTLAND CEMENT AND QUICKLIME STABILIZATION MIX DESIGN REPORT

PORTLAND CEMENT AND QUICKLIME STABILIZATION OF SUBGRADE SOILS

Part II of this report provides a recommendation for the quicklime content and Portland cement content (percentage by dry weight) per ODOT Supplement (S) 1120 for OTIC Design Contract No. 71-14-08/OTIC construction Contract No. 39-15-02, as detailed below.

1.0 MIX DESIGN SAMPLING AND TESTING

Between August 14 and September 4, 2014, a total of twenty-four (24) bulk soil samples were obtained over the entire length of the project (MP 216.1 to MP 221.25) where borings were performed, which resulted in obtaining one sample for approximately 5,000 yd^2 of planned stabilized subgrade for the mainline driving lanes. Bulk samples of the soil subgrade were not obtained from boring locations B-44-11, B-44-13 and B-44-26 where shallow bedrock was encountered below the existing pavement structure.

1.1 Untreated Soil Laboratory Testing

Classification testing was performed in general accordance with ASTM D2216, D422 and D4318 and AASHTO M145 to classify the soil according to the ODOT soil classification system. In addition to classification testing, the organic content of the soil was determined in general accordance with ASTM D2974, and a one-point Proctor test was performed in general accordance with AASTHO T272 to determine the ODOT Curve designation for each bulk sample obtained. Sulfate content testing was performed in accordance with TxDOT method TEX-145-E. Results of the laboratory testing on the **untreated** samples are summarized in Table 1 below.

Table 1. Sample Summary

Sample ID	Station	Subgrade Elevation (feet msl)	Soil Type	Sulfate Content (ppm)	Organic Content (%)	Plasticity Index	Moisture Content (%)	ODOT Curve ID
B-44-01	541+48	994.1	A-6b	687	5.6	17	27	R
B-44-02	550+77	998.4	A-6b	213	0.9	17	16	G
B-44-03	558+33	1000.6	A-7-6	653	2.1	23	20	Q
B-44-04	5+17	996.6	A-7-6	500	1.0	21	11	O
B-44-05	14+46	1002.1	A-7-6	3,680	4.0	18	27	S
B-44-06	23+75	1011.3	A-6b	700	1.7	17	16	J
B-44-07	33+04	1016.2	A-6a	520	3.8	15	20	I
B-44-08	42+33	1007.6	A-6b	1,033	2.3	19	14	L
B-44-09	51+62	990.1	A-1-b	3,146	2.8	NP	20	I

Sample ID	Station	Subgrade Elevation (feet msl)	Soil Type	Sulfate Content (ppm)	Organic Content (%)	Plasticity Index	Moisture Content (%)	ODOT Curve ID
B-44-10	60+89	979.3	A-6b	1,153	1.7	18	12	N
B-44-12	79+48	993.0	A-6b	800	2.9	18	13	N
B-44-14	98+06	1012.0	A-7-6	60	1.7	18	22	N
B-44-15	107+38	1007.8	A-6b	540	3.2	19	18	O
B-44-16	121+84	1000.6	A-4a	1,660	5.5	9	14	I
B-44-17	125+87	998.7	A-6b	420	1.0	21	14	L
B-44-18	135+22	993.7	A-7-6	800	1.9	23	20	P
B-44-19	144+39	988.4	A-6b	420	1.9	18	18	I
B-44-20	153+79	981.5	A-7-6	820	5.5	26	21	H
B-44-21	163+35	970.4	A-6a	253	1.6	15	15	I
B-44-22	172+37	960.7	A-7-6	1,493	4.9	18	23	P
B-44-23	180+85	950.6	A-7-6	960	2.2	23	25	M
B-44-24	190+95	956.3	A-7-6	500	1.9	21	20	Q
B-44-25	200+02	968.8	A-6b	407	2.2	19	17	I
B-44-27	217+83	963.0	A-6a	800	4.4	14	17	L

Based on the test results of the untreated soil samples, a total of five (5) Complete Testing (CT) mix design samples were created based on location, classification, organic content, sulfate content and one-point Proctor results for quicklime stabilization. Due to the granular subgrade soil encountered in boring B-44-09, a soil-cement mix design (CT-1) was performed at this location. Additionally, due to the potential incorporation of underlying granular/bedrock strata in the stabilization process, soil-cement mix designs were performed on samples B-44-05 (CT-5), B-44-10 (CT-7), B-44-23 (CT-8), and B-44-24 (CT-9). Table 2 lists the specific samples that were selected for mix design testing, which are considered to be representative of the entire project length.

Table 2. Complete Testing (CT) Mix Design Samples

Sample ID	Station	Soil Type	Sulfate Content (ppm)	Organic Content (%)	Moisture Content (%)	Plasticity Index	ODOT Curve ID	Complete Mix Design Testing Sample ID
B-44-09	51+62	A-1-b	3,146	2.8	20	NP	I	CT-1
B-44-16	121+84	A-4a	1,660	5.5	9	14	I	CT-2
B-44-21	163+35	A-6a	253	1.6	15	15	H	-
B-44-07	33+04	A-6a	520	3.8	15	20	I	CT-3
B-44-27	217+83	A-6a	800	4.4	14	17	L	
B-44-01	541+48	A-6b	687	5.6	17	27	R	CT-4
B-44-02	550+77	A-6b	213	0.9	17	16	G	-
B-44-06	23+75	A-6b	700	1.7	17	16	J	-
B-44-08	42+33	A-6b	1,033	2.3	19	14	L	-
B-44-10	60+89	A-6b	1,153	1.7	18	12	N	CT-7
B-44-12	79+48	A-6b	800	2.9	18	13	N	-
B-44-15	107+38	A-6b	540	3.2	19	18	O	-
B-44-17	125+87	A-6b	420	1.0	21	14	L	-
B-44-19	144+39	A-6b	420	1.9	18	18	I	-
B-44-25	200+02	A-6b	407	2.2	19	17	I	-
B-44-03	558+33	A-7-6	653	2.1	23	20	Q	-
B-44-04	5+17	A-7-6	500	1.0	21	11	O	-
B-44-05	14+46	A-7-6	3,680	4.0	18	27	S	CT-5
B-44-14	98+06	A-7-6	60	1.7	18	22	N	-
B-44-18	135+22	A-7-6	800	1.9	23	20	P	-
B-44-20	153+79	A-7-6	820	5.5	26	21	I	-
B-44-22	172+37	A-7-6	1,493	4.9	18	23	P	CT-6
B-44-23	180+85	A-7-6	960	2.2	23	25	M	CT-8
B-44-24	190+95	A-7-6	500	1.9	21	20	Q	CT-9

1.2 Mix Design Laboratory Testing

Based on the soil types encountered, it is recommended that quicklime or Type I Portland cement be utilized as the soil subgrade stabilization chemical within the station limits outlined in Table 6 of Section 5.1.4 in Part I of this report. Quicklime is a lime chemical conforming to ASTM C977, and Type I Portland cement is a specified chemical conforming to ASTM C150 Standard Specification for Portland cement.

1.2.1 Quicklime Mix Design Laboratory Testing

After completing the untreated soil testing, soil-lime testing was performed in general accordance with AASTHO T272, ASTM D3551, D3877 and D5102 to determine the minimum percentage of quicklime based on the dry weight of soil for the project. Soil pH testing was performed at incremental percentages of quicklime (by dry unit weight) on each complete test sample to determine the minimum lime percentage (MLP) to increase the pH of the soil-lime mixture to 12.4. Soil-lime mixtures do not develop long-term pozzalonic bonds until the pH of the soil-lime mixture is at 12.4. Soil-lime pH testing was performed in general accordance with ASTM D6276. The results are summarized in Table 3.

Table 3: Minimum Lime Percentage (MLP)

Complete Mix Design Testing Sample ID	Soil Type	Minimum Lime Percentage (%)
CT-2	A-4a	2.0
CT-3	A-6a	2.0
CT-4	A-6b	3.0
CT-5	A-7-6	3.0
CT-6	A-7-6	2.0

After confirming the MLP for samples CT-2 through CT-6, one-point Proctor tests were performed at MLP, MLP+2% quicklime, and MLP+4% quicklime. The results were plotted on the ODOT Family of Curves in accordance with ODOT S1015 and AASHTO T272 to determine the maximum dry unit weight and optimum moisture content of each soil-lime mixture. Upon completion of one-point Proctor tests, soil-lime expansion and unconfined compressive strength testing was performed in general accordance with ASTM D2166, D3551, D3877 and D5102 at 0%, MLP, MLP+2% quicklime, and MLP+4% quicklime. Per ODOT S1120, a minimum average eight-day unconfined compressive strength of 100 psi and a 50 psi increase in unconfined compressive strength from the untreated soil is required for all soil types. The results of the UCS testing are summarized in Table 4.

Table 4: Quicklime Unconfined Compressive Strength Summary

Complete Mix Design Testing Sample ID	Soil Type	Minimum Lime Percentage	Lime Percentage	Average Expansion (+) / Shrinkage (-)	Average 8-day UCS (psi)	Recommended Quicklime Content (%)
CT-2	A-4a	2.0%	0%	-	40	**5.0**
			2%	0.1%	65	
			4%	0.1%	100	
			6%	0.2%	120	
CT-3	A-6a	2.0%	0%	-	50	**4.0**
			2%	0.1%	95	
			4%	0.2%	115	
			6%	0.2%	115	
CT-4	A-6b	3.0%	0%	-	50	**4.0**
			3%	0.1%	105	
			5%	0.2%	135	
			7%	0.2%	130	
CT-5	A-7-6	3.0%	0%	-	45	**4.0**
			3%	0.1%	120	
			5%	0.1%	135	
			7%	0.1%	135	
CT-6	A-7-6	2.0%	0%	-	45	**5.0**
			2%	0.2%	80	
			4%	0.1%	100	
			6%	0.1%	110	

Based upon the evaluation of the eight-day unconfined compressive strength test data and the minimum lime percentage to increase the pH of the soil-lime mixture to 12.4, it is recommended that **5.0% quicklime content be utilized at an application rate of 57.8 lbs/yd^2** (based on a treatment depth of 14 inches and an in-situ dry unit weight of 110 lbs/ft^3) in all subgrade areas that are to be lime stabilized, as identified in Table 6 of Section 5.1.4 in Part I of this report. The application rate will vary depending on the actual in-situ dry unit weight of the soil, which is dependent on the field conditions encountered at the time of construction.

1.2.2 Portland Cement Mix Design Laboratory Testing

Soil-cement one-point Proctor tests were performed at 3%, 5% and 7% Portland cement by dry unit weight and plotted on the ODOT Family of Curves in accordance with ODOT S1015 and AASHTO T272 to determine the maximum dry unit weight and optimum moisture content of each soil-cement mixture. Upon completion of the one-point Proctor tests, soil-cement expansion and unconfined compressive strength (UCS) testing was performed in general accordance with ASTM D2166 and D1633 at 0% (untreated), 3%, 5% and 7% Portland cement. Per ODOT S1120, a minimum average eight-day unconfined compressive strength of 100 psi and a minimum 50-psi increase in unconfined compressive strength from the untreated soil is required for all soil types. The results of the UCS testing are summarized in Table 5.

Table 5: Portland Cement Unconfined Compressive Strength Summary

Complete Mix Design Testing Sample ID	Soil Type	Untreated UCS (psi)	8-day UCS (psi)			Minimum Required Cement Content (%)
			3% PC	5% PC	7% PC	
CT-1	A-1-b	45	125	180	205	**4.0**
CT-5	A-7-6	45	110	-	165	**4.0**
CT-7	A-6b	50	115	135	170	**4.0**
CT-8	A-7-6	45	120	135	155	**4.0**
CT-9	A-7-6	50	135	150	165	**4.0**

Based upon the evaluation of the eight-day UCS data, **it is recommended that 4.0% Portland cement content be utilized at an application rate of 41.4 lbs/yd^2** (based on an in-situ dry unit weight of 115 lbs/ft^3 and a treatment depth of 12 inches) in all subgrade areas that are to be cement stabilized, as identified in Table 6 of Section 5.1.4 in Part I of this report. The application rate will vary depending on the in-situ dry unit weight of the soil, which is dependent on the field conditions encountered at the time of construction.

Results of the laboratory testing for both types of chemical stabilization are provided in Appendix II-A through Appendix II-E.

PART III: QUICKLIME AND PORTLAND CEMENT STABILIZATION SPECIFICATIONS AND CONSTRUCTABILITY

STABILIZATION SPECIFICATIONS AND CONSTRUCTABILITY

Part III of this report provides general specifications and constructability of the quicklime and Portland cement stabilization construction process and methodology. All subgrade stabilization shall follow the requirements of the ODOT 2013 CMS unless otherwise noted, as described in the following paragraphs:

1.0 GENERAL

Soil stabilization is the long term physical and chemical alteration of soils to enhance their physical and engineering properties. Stabilization of in place soils by incorporating available additives can increase the shear strength of a soil and/or control the shrink/swell properties of a soil, thus improving the load bearing capacity of a subgrade to support pavements.

1.1 Materials

Quicklime used shall meet the requirements of ASTM C977. *Portland cement* used shall meet requirements of ASTM C150 Type I.

1.2 Special Equipment

Spreaders/Distributors – Spreaders or distributors utilized to apply the chemical being used for soil stabilization shall be cyclone or screw type. Dumping material on site and using a blade to spread the material will not be accepted. The spreaders or distributors utilized shall be able to demonstrate a consistent and accurate application rate, as well as dust control during application.

Mixing Equipment – Only self-propelled, high powered rotary mixers capable of mixing to a minimum depth of 12 inches should be used. The cutting drum should be fitted with cutting teeth capable of trimming earth, aggregate and bituminous mixtures, and so designed that they may be accurately adjusted vertically and held in place. The machine shall not weight less than 25,000 lbs and shall have such strength and rigidity that it will not develop a center deflection of more than 1/8-inch. Disc harrows, bucket teeth and other equipment that does not meet the above requirements are not recommended to be used for soil stabilization.

2.0 CONSTRUCTION REQUIREMENTS

2.1 Chemical Selection and Proportioning

Refer to Part II of this report for the percentages of quicklime and Portland cement required and the recommended application rates.

2.2 Preparation of Subgrade

The area to be treated shall be shaped and graded to the proper grade and cross section so that when the subgrade is mixed with the specified Portland cement and water content and recompacted to the required density, the final subgrade elevation as shown in the plans or as directed by the engineer can be achieved. This may require that, prior to soil stabilization construction operations, the subgrade be graded to minus 1/10 of a foot or lower from plan subgrade. All vegetation and other deleterious material shall be removed from within the limits of the area to be treated. If slurry is used, the area should be scarified prior to spreading the slurry to prevent run off.

No material should be mixed with frozen soil. Soil stabilization construction operations should be done when the air temperature is 35ºF or above. The area of stabilized subgrade constructed shall be limited to that which can be covered by the succeeding pavement layer during the same construction season.

As noted in Part I of the report, shallow bedrock is present along portions of the project alignment where high SPT blow counts and auger refusal was encountered. The stabilization contractor should use caution when operating in the areas identified to avoid damage to the mixing equipment.

2.3 Material Spreading

The specified quantity of material shall be distributed evenly over the surface of the soil using spreading/distributing equipment that meets the requirements in Section 1.2 of this specification. Dumping material on site and using a grading blade to spread the material is not an acceptable spreading method. Application rate should be determined by percent dry weight of soil and inspection of the application rate should be based on the weight of chemical applied per square yard.

2.4 Water Addition

Proper hydration during construction is paramount to the performance of the stabilized layer. Soil types, in-situ moisture content, mixing depth and the chemical being used are all factors that should be considered in determining the amount of water to add during soil stabilization construction operations. Water may be spread using a water truck

operating directly on the subgrade, or it may be injected directly into the mixing drum of the rotary mixer during the mixing operation.

The chemical, soil and water should be thoroughly mixed and blended to the full depth of treatment using mixing equipment set forth in the Section 1.2 of this specification to achieve a homogenous mixture. All chemicals and soils may require different mixing patterns and techniques in order to achieve optimal results.

2.5 Compaction

When all of the above mixing, gradation and moisture requirements are satisfactorily completed, compaction of the subgrade shall be performed. Prior to the beginning of compaction, the mixture shall be in a loose condition for its full depth and width. The final mixture shall be uniformly compacted until a dry density of not less than 98 percent of the maximum dry density and 1 to 2 percent above the optimum moisture content of the soil-cement mixture is achieved. The project engineer will obtain the maximum dry density for acceptance by using the Ohio Typical Moisture Density Curves. Field density of the compacted material will be determined by nuclear method in the direct transmission mode (ASTM D 6938).

2.6 Finishing and Curing

The treated area should be shaped to the required lines, grades and cross sections and final compaction, by way of smooth drum roller weighing at least 10 tons, and should continue until uniform and adequate compaction is obtained. The surface should be maintained in a moist condition during the curing period by means of sprinkling water. Finished portions of the stabilized subgrade that are traveled on by equipment used in constructing an adjoining section shall be protected in such a manner as to prevent equipment from marring or damaging completed work.

The curing period should be determined by the project engineer based on strength gain of the chemically stabilized subgrade. Typical curing periods for soil stabilization range from 1 to 7 days after final compaction. During the curing period, no traffic shall be permitted on the completed work beyond that required for maintaining moisture for curing. The length of the curing period will depend on the acceptance of the stabilized soil subgrade. The acceptance of the stabilized soil subgrade will be evaluated after 72 hours of curing. Depending on the acceptance of the stabilized soil subgrade, additional curing may be required.

Sufficient protection from freezing shall be provided for the chemically stabilized material for a minimum of seven (7) days following construction or as approved by the engineer.

2.7 Quality Control / Quality Acceptance

A construction materials engineering technician shall observe the stabilization operations and perform related construction materials testing throughout construction. During quicklime or cement stabilization operations, the technician will observe, calculate and document the application rate (in lbs/yd^2) to verify the minimum quicklime or cement percentage is being applied.

During compaction of the soil stabilized subgrade, the technician shall perform compaction testing per ODOT SS 1015 *Compaction Testing of Unbound Materials*. The required compaction for the chemically stabilized soil mixture is stated in Section 2.5 of this specification. Throughout compaction of the chemically stabilized subgrade, the technician shall measure the treatment depth by hand-augering a hole through the treated subgrade and applying phenolphthalein to the side of the hand-augered hole to check for the presence of quicklime or cement. Phenolphthalein will turn the soil-quicklime or soil-cement mixtures purple. A moisture content correction factor will need to be determined during the first day of compaction of the chemically stabilized soil subgrade in order to offset the moisture content reading from the nuclear gauge. The addition of quicklime or Portland cement to soil can cause higher than normal readings with a nuclear density gauge, which needs to be corrected based on laboratory moisture content results performed in conjunction with nuclear density gauge moisture content readings.

Acceptance of the quicklime or cement stabilized soil subgrade shall be performed 72 hours after final compaction. An automatic dynamic cone penetrometer (ADCP) shall be used as the initial acceptance test for the cement stabilized soil subgrade. The ADCP will measure the penetration rate (PR) in mm/blow for the chemically stabilized soil subgrade through the entire treatment depth and into the underlying untreated subgrade. The PR throughout the chemically stabilized soil subgrade must average 8.0 mm/blow for the entire depth of stabilized subgrade at every 200 linear feet of roadway. If the average PR of the chemically stabilized soil subgrade is below 8.0 mm/blow, then the contractor can proceed with construction of the pavement structure. If the average PR of the chemically stabilized soil subgrade is above 8.0 mm/blow, then the chemically stabilized soil subgrade must continue to cure for three (3) additional days, at which time the subgrade shall be proof rolled in accordance with ODOT Item 204.

3.0 CONSTRUCTABILITY AND ACCESSIBILIITY REVIEW

Rii can provide a formal constructability and accessibility review once the plans and specifications have been completed.

LIMITATIONS OF STUDY

The recommendations and mix designs presented in this report are predicated upon construction monitoring and testing by a qualified soil technician under the direct supervision of a professional geotechnical engineer. Adequate testing and monitoring during construction are considered necessary to assure an adequate pavement 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. 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 performed. 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 pavement 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 exploration 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-A

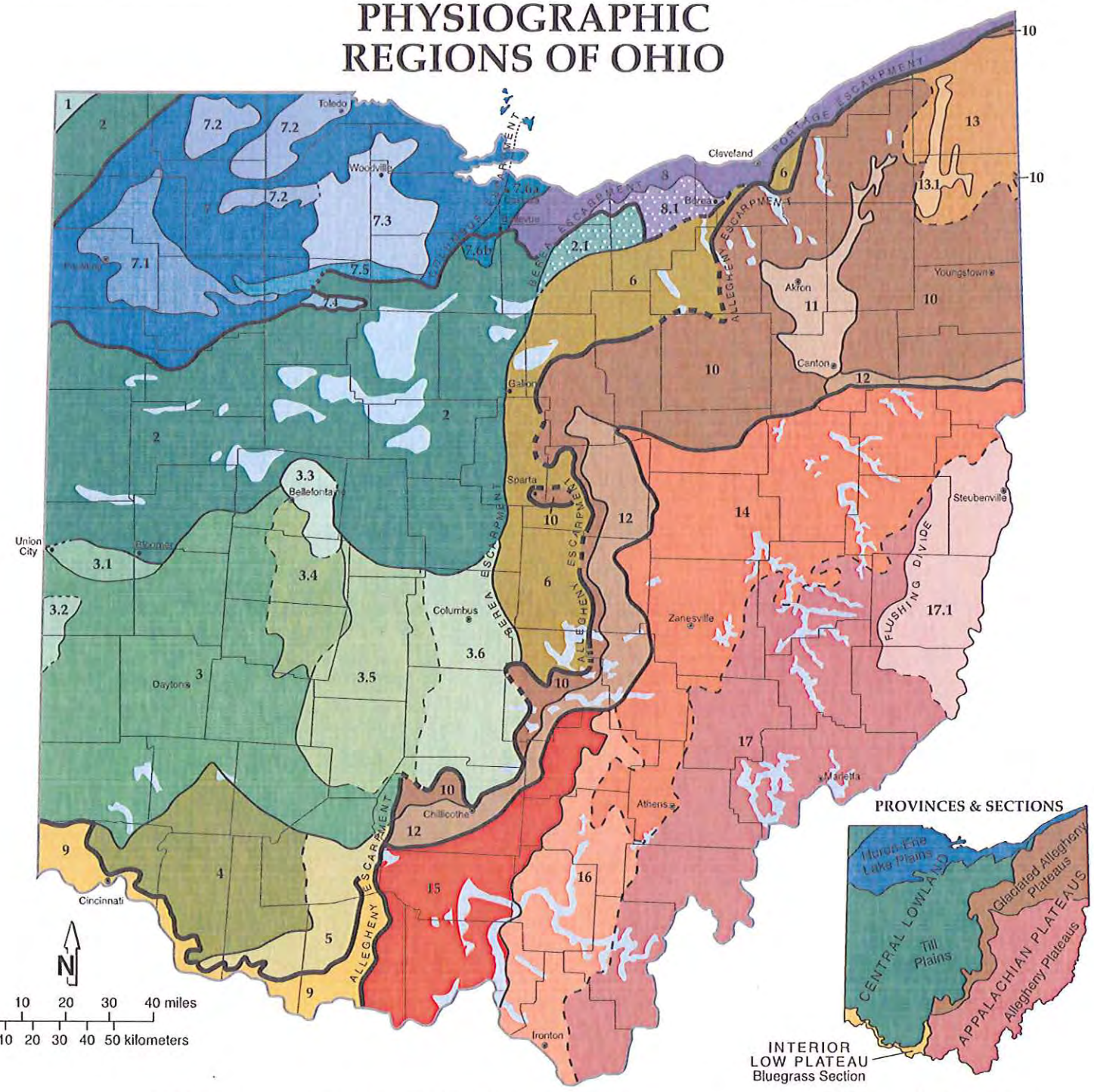
STATE GEOLOGY

STATE OF OHIO
Ted Strickland, Governor

DEPARTMENT OF NATURAL RESOURCES
Sean D. Logan, Director

DIVISION OF GEOLOGICAL SURVEY
Lawrence H. Wickstrom, Chief

PHYSIOGRAPHIC REGIONS OF OHIO



Till Plains

- 1. Steuben Till Plain
- 2. Central Ohio Clayey Till Plain
  - 2.1. Berea Headlands of the Till Plain
- 3. Southern Ohio Loamy Till Plain
  - 3.1. Union City-Bloomer Transitional Terrain
  - 3.2. Whitewater Interlobate Plain
  - 3.3. Bellefontaine Upland
  - 3.4. Mad River Interlobate Plain
  - 3.5. Darby Plain
  - 3.6. Columbus Lowland
- 4. Illinoian Till Plain
- 5. Dissected Illinoian Till Plain
- 6. Galion Glaciated Low Plateau

Transitional boundary

Lake basin/deposits outside Huron-Erie Lake Plains

Huron-Erie Lake Plains

- 7. Maumee Lake Plains
  - 7.1. Paulding Clay Basin
  - 7.2. Maumee Sand Plains
  - 7.3. Woodville Lake-Plain Reefs
  - 7.4. Findlay Embayment
  - 7.5. Fostoria Lake-Plain Shoals
  - 7.6a and 7.6b. Bellevue-Castalia Karst Plain
- 8. Erie Lake Plain
  - 8.1. Berea Headlands of the Erie Lake Plain

Bluegrass Section

- 9. Outer Bluegrass Region

Glaciated Allegheny Plateaus

- 10. Killbuck-Glaciated Pittsburgh Plateau
- 11. Akron-Canton Interlobate Plateau
- 12. Illinoian Glaciated Allegheny Plateau
- 13. Grand River Low Plateau
  - 13.1 Grand River Finger-Lake Plain

Allegheny Plateaus

- 14. Muskingum-Pittsburgh Plateau
- 15. Shawnee-Mississippian Plateau
- 16. Ironton Plateau
- 17. Marietta Plateau
  - 17.1. Little Switzerland Plateau

4/98

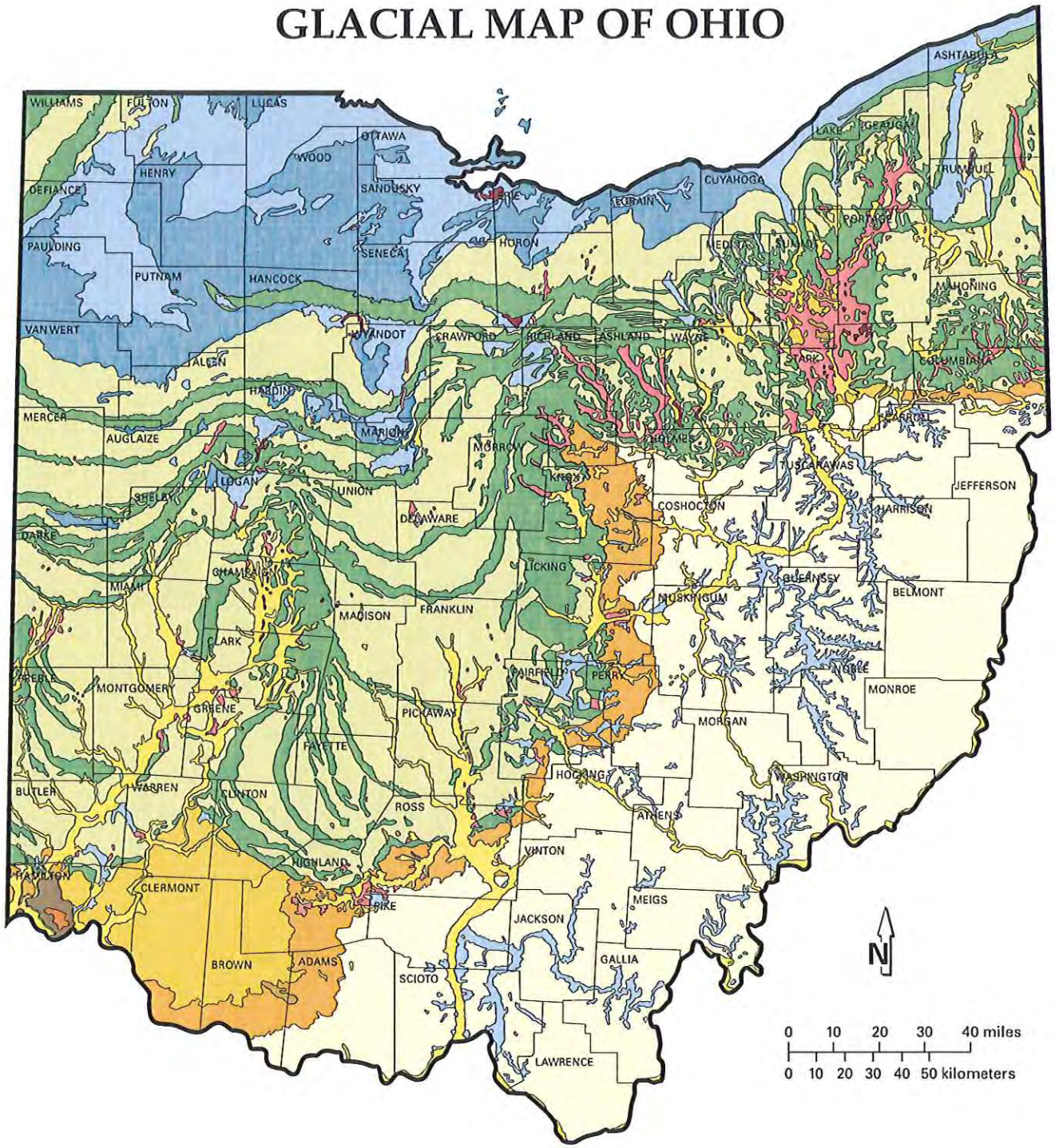
Recommended citation: Ohio Division of Geological Survey, 1998, Physiographic regions of Ohio: Ohio Department of Natural Resources, Division of Geological Survey, page-size map with text, 2 p., scale 1:2,100,00.

STATE OF OHIO
Bob Taft, Governor

DEPARTMENT OF NATURAL RESOURCES
Samuel W. Speck, Director

DIVISION OF GEOLOGICAL SURVEY
Thomas M. Berg, Chief

GLACIAL MAP OF OHIO



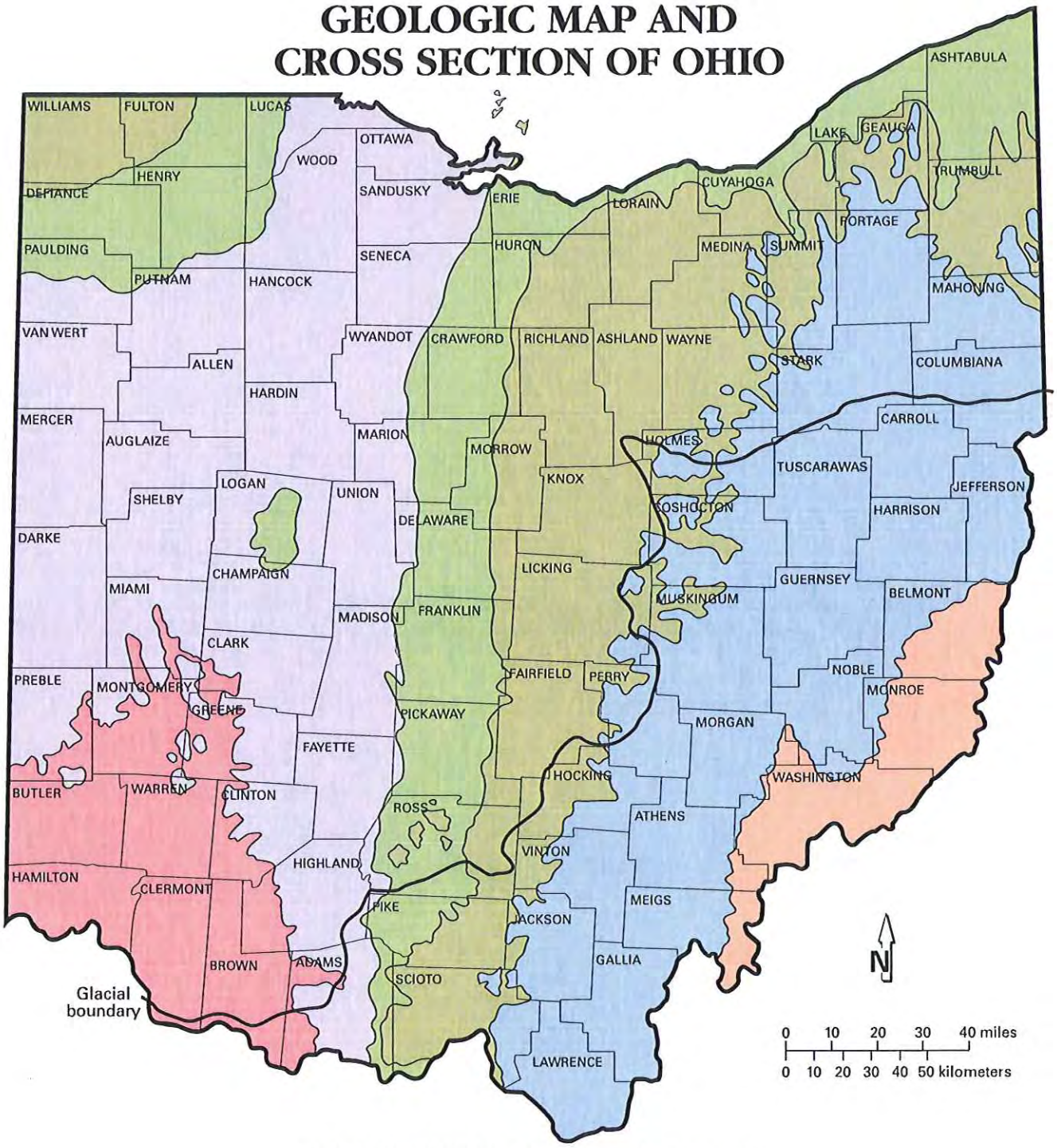
WISCONSINAN (14,000 to 24,000 years old)	ILLINOIAN (130,000 to 300,000 years old)	PRE-ILLINOIAN (older than 300,000 years)	
Ground moraine	Ground moraine	Ground moraine	Kames and eskers
Wave-planed ground moraine	Dissected ground moraine	Dissected ground moraine	Outwash
End moraine	Hummocky moraine		Lake deposits
			Peat
			Colluvium

STATE OF OHIO
Bob Taft, Governor

DEPARTMENT OF NATURAL RESOURCES
Samuel W. Speck, Director

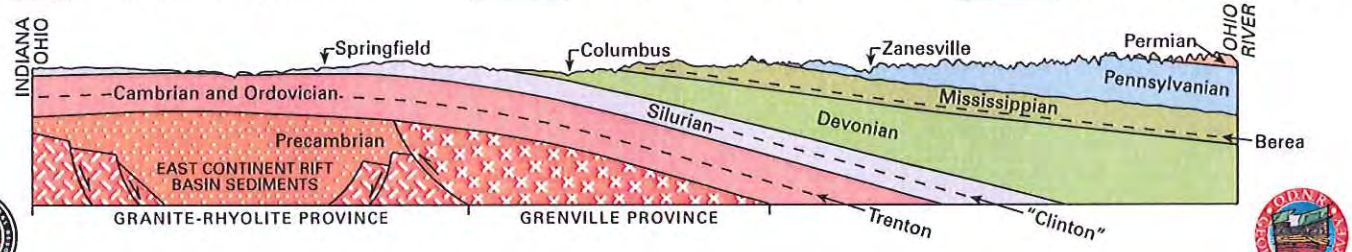
DIVISION OF GEOLOGICAL SURVEY
Thomas M. Berg, Chief

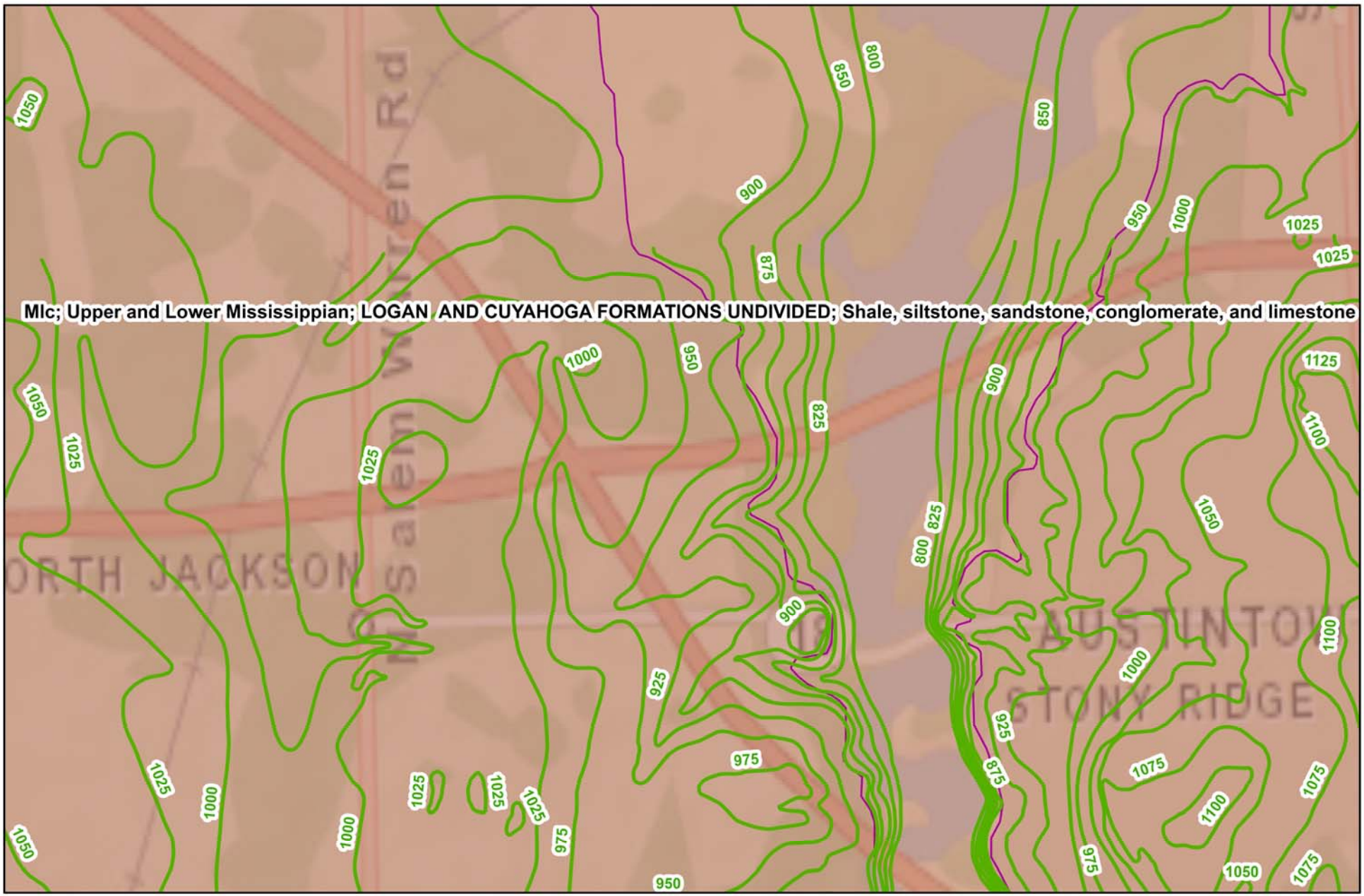
GEOLOGIC MAP AND CROSS SECTION OF OHIO



GEOLOGIC SYSTEM (million years before present)

- Permian (286-245)
- Pennsylvanian (320-286)
- Mississippian (360-320)
- Devonian (408-360)
- Silurian (438-408)
- Ordovician (505-438)

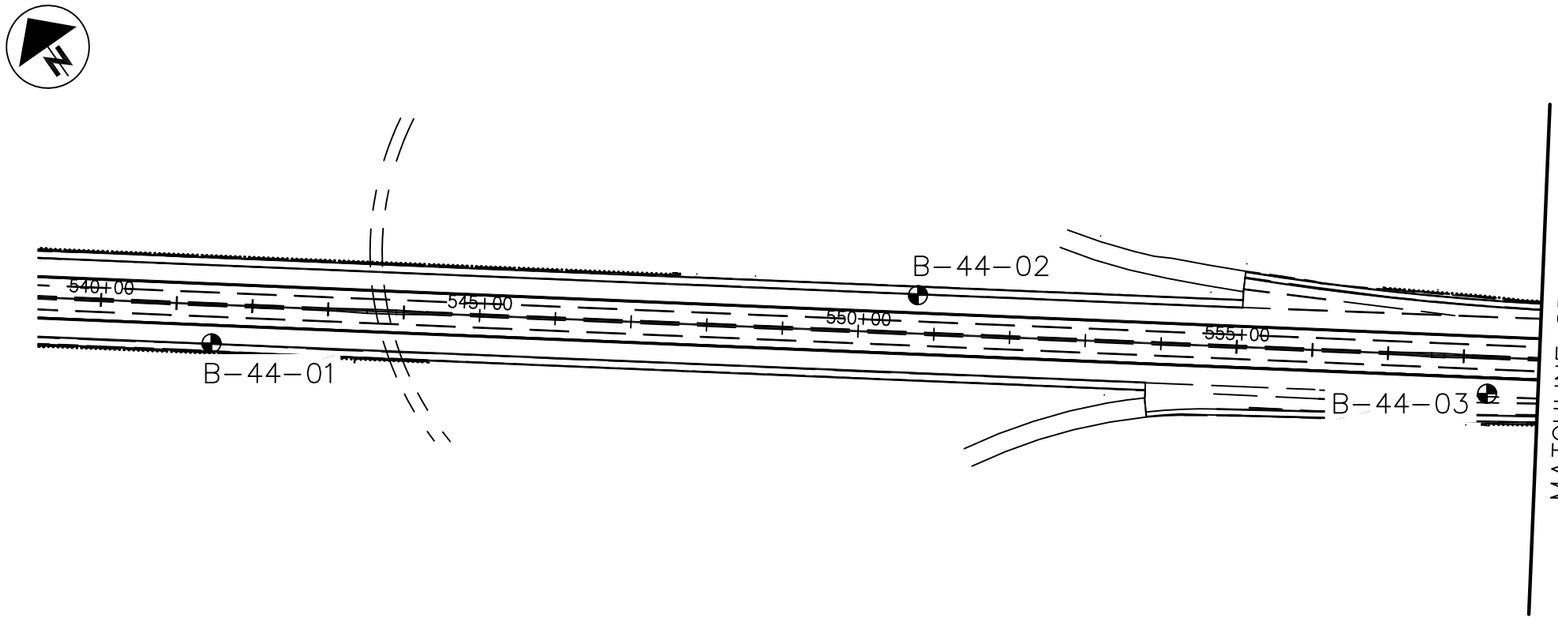


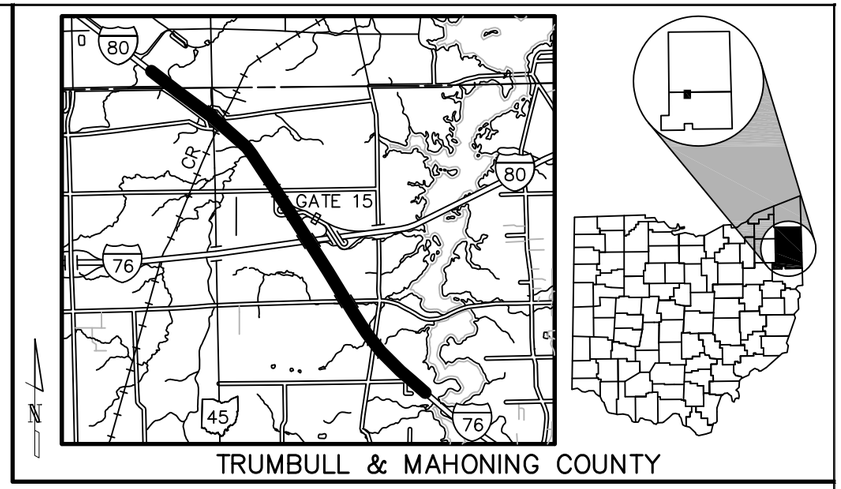


N-14-020(2) OTIC Pavement Replacement
MP 216.25 to MP 221.0
Bedrock Geology and Topography

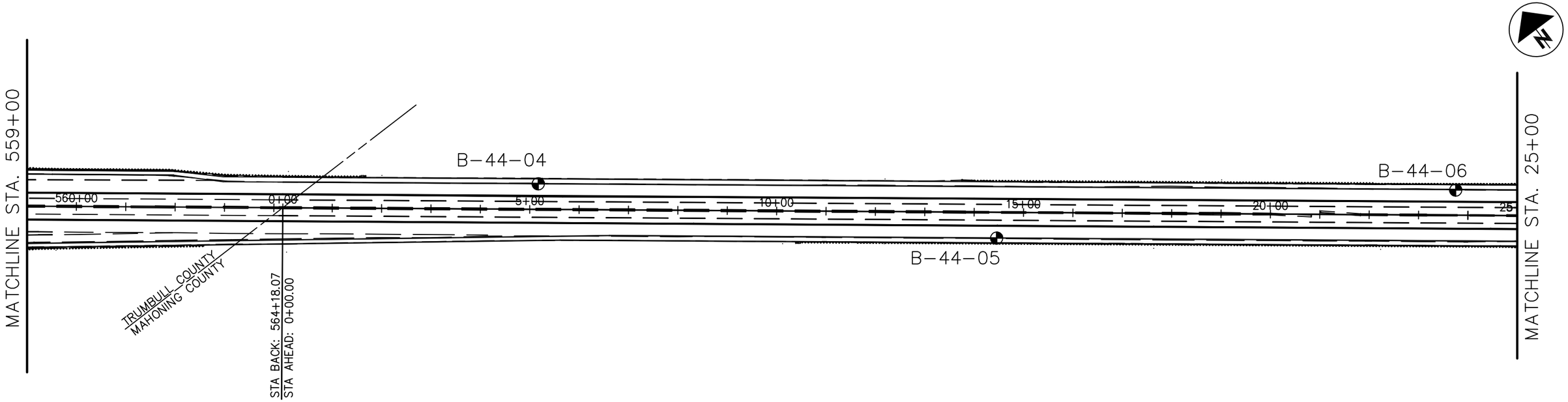
APPENDIX I-B

VICINITY MAP AND BORING PLAN





VICINITY MAP

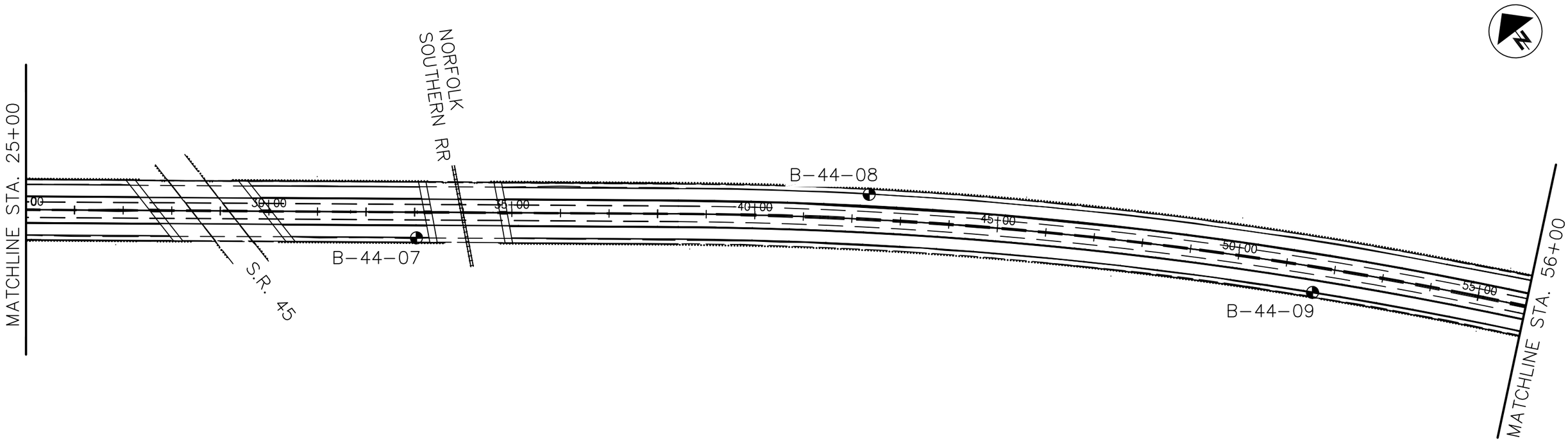


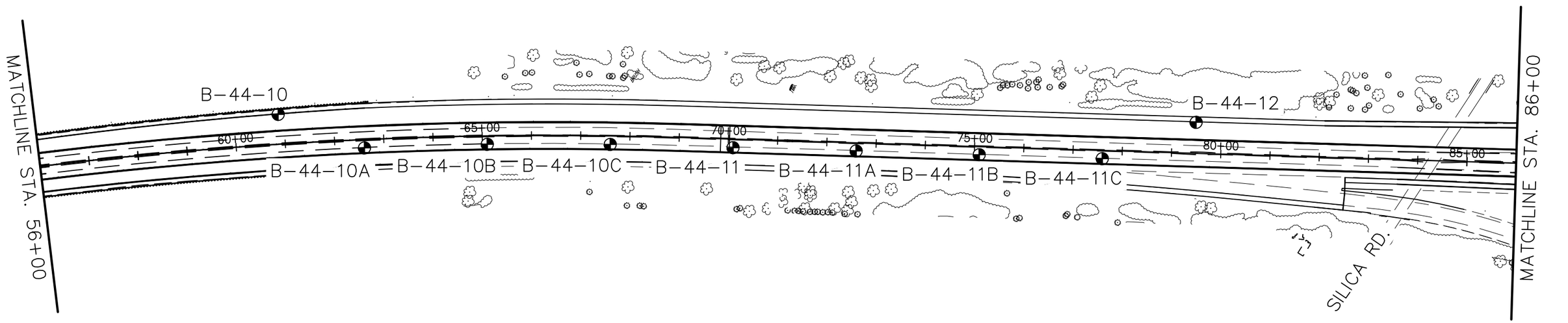
BORING PLAN

GEOTECHNICAL SERVICES FOR THE PAVEMENT REPLACEMENT PROGRAM
OTIC PROJECT NO. 71-14-08 – MP 216.25 TO MP 221.0
TRUMBULL AND MAHONING COUNTY, OHIO

PROJECT NO. Rii # N-14-020(2)	DRAWN RRM
SCALE: 1"=200' (0, 100, 200)	REVIEWED BRT
	DATE 11-28-14

RESOURCE INTERNATIONAL, INC.





BORING PLAN

GEOTECHNICAL SERVICES FOR THE PAVEMENT REPLACEMENT PROGRAM
OTIC PROJECT NO. 71-14-08 - MP 216.25 TO MP 221.0
TRUMBULL AND MAHONING COUNTY, OHIO

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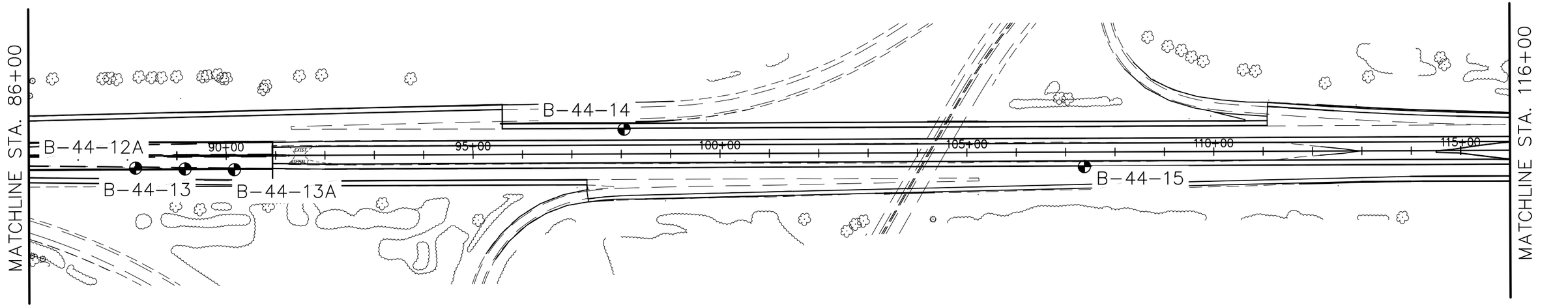

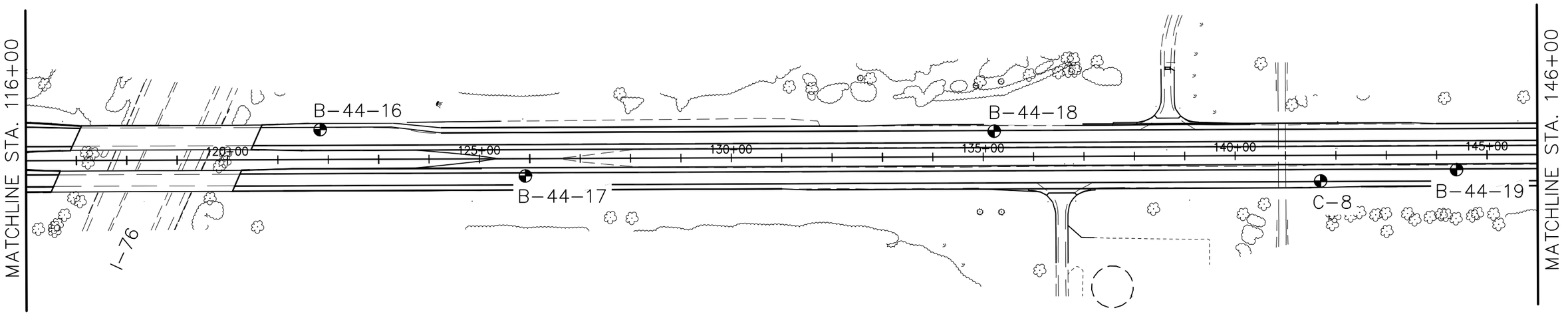

BORING PLAN

GEOTECHNICAL SERVICES FOR THE PAVEMENT REPLACEMENT PROGRAM
OTIC PROJECT NO. 71-14-08 - MP 216.25 TO MP 221.0
TRUMBULL AND MAHONING COUNTY, OHIO

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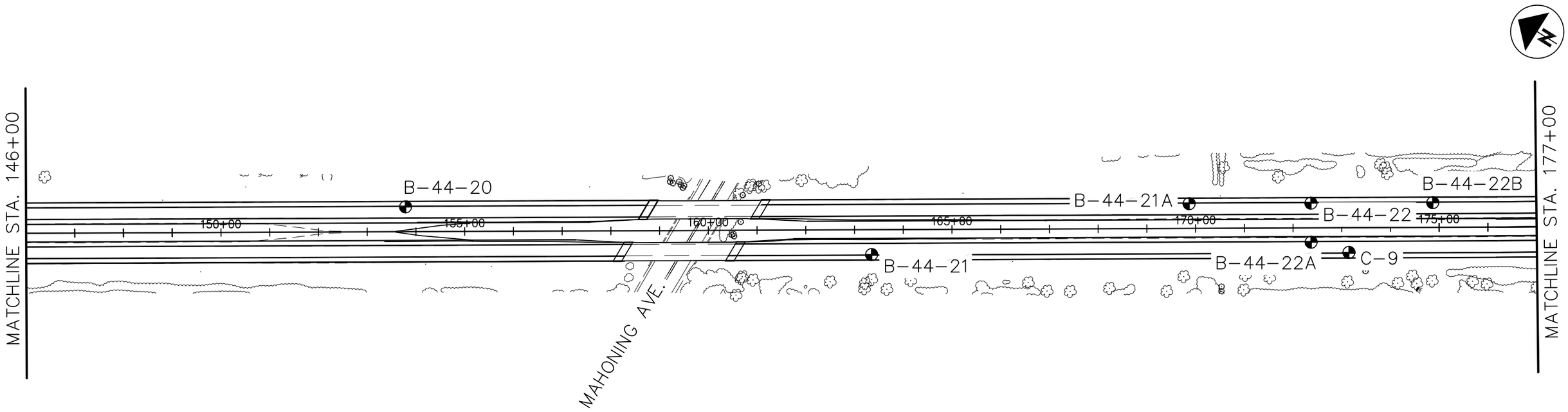
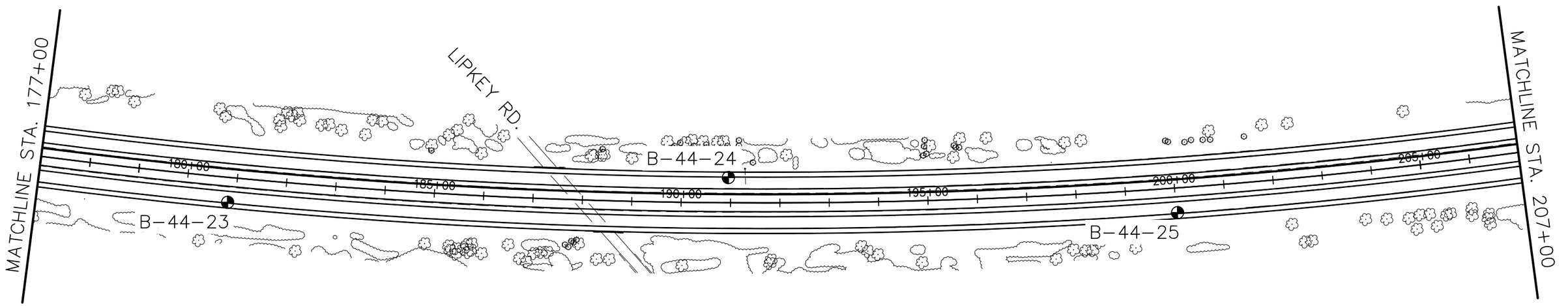
SCALE: 1"=200' (0, 100, 200)	REVIEWED BRT
	DATE 11-28-14

RESOURCE INTERNATIONAL, INC.



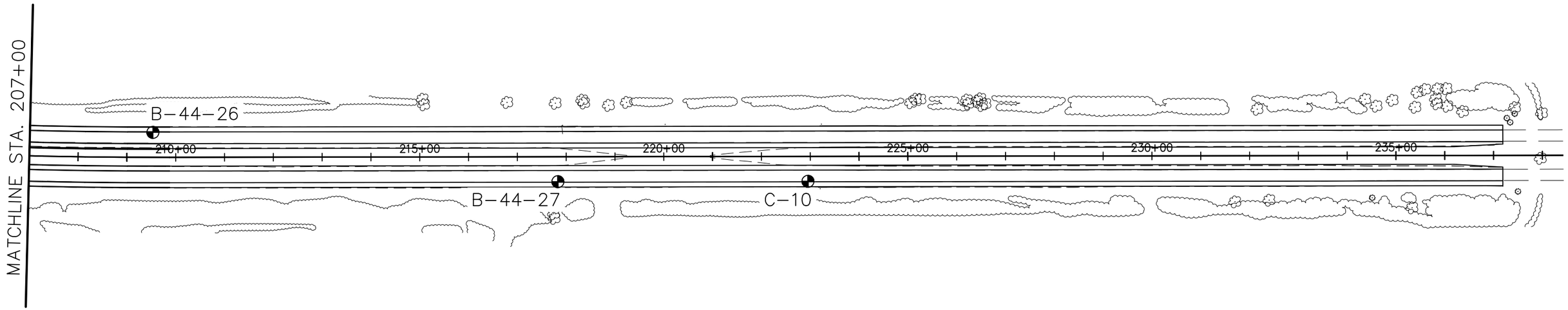


BORING PLAN

GEOTECHNICAL SERVICES FOR THE PAVEMENT REPLACEMENT PROGRAM
OTIC PROJECT NO. 71-14-08 - MP 216.25 TO MP 221.0
TRUMBULL AND MAHONING COUNTY, OHIO

PROJECT NO.	Rii # N-14-020(2)
SCALE:	1"=200' (0, 100, 200)
DRAWN	RRM
REVIEWED	BRT
DATE	11-28-14

RESOURCE INTERNATIONAL, INC.



BORING PLAN

GEOTECHNICAL SERVICES FOR THE PAVEMENT REPLACEMENT PROGRAM
OTIC PROJECT NO. 71-14-08 - MP 216.25 TO MP 221.0
TRUMBULL AND **MAHONING COUNTY, OHIO**

PROJECT NO. Rii # N-14-020(2)	DRAWN RRM
SCALE: 1"=200' (0, 100, 200)	REVIEWED BRT
	DATE 11-28-14

RESOURCE INTERNATIONAL, INC.

APPENDIX I-C

DESCRIPTION OF SOIL TERMS

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)

Description	Blows per foot – SPT (N_{60})		
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

Description	Blows per foot – SPT (N_{60})			Unconfined Compression (tsf)
Very Soft	Below		2	UCS ≤ 0.25
Soft	2	-	4	0.25 < UCS ≤ 0.5
Medium Stiff	5	-	8	0.5 < UCS ≤ 1.0
Stiff	9	-	15	1.0 < UCS ≤ 2.0
Very Stiff	16	-	30	2.0 < UCS ≤ 4.0
Hard	Over		30	UCS > 4.0

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

Soil Fraction		USCS Size	ODOT Size
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:

Term	Range		
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:

Term	Range - USCS	Range - ODOT
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	[3] Liquid Limit	3% below LL to above LL

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

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

Bedrock – The following terms are used to describe bedrock hardness:

Term		Blows per foot – SPT (N)		
Very Soft		Below		50
Soft		50/5”	–	50/6”
Medium Hard		50/3”	–	50/4”
Hard		50/1”	–	50/2”
Very Hard	50/0”			

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	Classifcation		$LL_0/LL \times 100$*	% 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	
F S	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
- Pavement or Base
- Uncontrolled Fill (Describe)
- Bouldery Zone
- Peat, S-Sedimentary W-Woody F-Fibrous L-Loamy & etc

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

APPENDIX I-D

BORING LOGS:

B-44-01 through B-44-27

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)

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:

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

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 (%)

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / T.F.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 541+48 / 51.2' RT	**EXPLORATION ID B-44-01**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 216.34		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 996.0 (MSL) EOB: 7.9 ft.		PAGE 1 OF 1
START: 8/19/14 END: 8/19/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 540296.658 N, 2416901.511 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 996.0	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.4' - ASPHALT (5.0")	995.6																	
0.9' - CONCRETE (11.0")	994.7	1																
0.6' - SLAG BASE (7.0")	994.1																	
STIFF TO VERY STIFF, GRAYISH BROWN TO BROWN **SILT AND CLAY**, TRACE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.	991.1	2	3 5 5	13	33	SS-1	-	-	-	-	-	-	-	-	-	17	A-6a (V)	
		3																
		4	2 3 3	8	56	SS-2	3.25	5	8	10	42	35	32	19	13	16	A-6a (9)	
STIFF, BROWNISH GRAY **SILT**, SOME CLAY, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, WET.	989.6	5	2 3 3	8	72	SS-3	2.00	5	5	10	50	30	31	22	9	29	A-4b (8)	
		6																
STIFF, MOTTLED BROWN AND GRAY **SILT AND CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.	988.1	7	4 4 5	12	100	SS-4	2.00	-	-	-	-	-	-	-	-	17	A-6a (V)	
		EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 385 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / T.F.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 550+77 / 50.8' LT	**EXPLORATION ID B-44-02**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 216.51		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 1000.3 (MSL) EOB: 7.9 ft.	PAGE 1 OF 1	
START: 8/13/14 END: 8/13/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 539813.897 N, 2417701.748 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 1000.3	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.5' - ASPHALT (6.0")	999.8																	
1.0' - CONCRETE (12.0")	998.8	1																
0.4' - SLAG BASE (5.0")	998.4																	
MEDIUM STIFF, MOTTLED GRAY AND BROWN **SILTY CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP TO MOIST.		2	2 2 4	8	44	SS-1	1.00	5	7	11	40	37	33	17	16	16	A-6b (10)	
		3																
		4	2 2 6	10	56	SS-2	1.00	5	6	12	40	37	35	17	18	21	A-6b (11)	
	995.4	5																
VERY STIFF, MOTTLED BROWN AND GRAY **SILTY CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP TO MOIST.			5 5 6	14	67	SS-3	2.25	-	-	-	-	-	-	-	-	22	A-6b (V)	
		6																
-ROOT FIBERS PRESENT IN SS-4		7	4 9 9	23	67	SS-4	3.00	-	-	-	-	-	-	-	-	15	A-6b (V)	
	992.4	EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 385 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / T.F.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 558+33 / 48.1' RT	**EXPLORATION ID B-44-03**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 216.66		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 1002.5 (MSL) EOB: 7.9 ft.	PAGE 1 OF 1	
START: 8/19/14 END: 8/19/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 539276.653 N, 2418242.326 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 1002.5	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.4' - ASPHALT (5.0")	1002.1																	
0.9' - CONCRETE (11.0")	1001.2	1																
0.6' - SLAG BASE (7.0")	1000.6																	
VERY STIFF, MOTTLED BROWN AND GRAY **SILTY CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, MOIST.	999.1	2	1 3 3	8	89	SS-1	2.50	5	6	12	42	35	38	19	19	23	A-6b (12)	
STIFF, GRAY TO BROWN **SILT AND CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, MOIST.	996.1	3 4 5 6	3 3 4	9	67	SS-2	1.25	1	5	11	47	36	34	19	15	23	A-6a (10)	
			3 4 5	12	94	SS-3	1.50	-	-	-	-	-	-	-	-	22	A-6a (V)	
HARD, BROWN **SILT AND CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.	994.6	7 EOB	10 11 17	36	67	SS-4	4.5+	-	-	-	-	-	-	-	-	14	A-6a (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 330 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / T.F.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 5+17 / 51.8' LT	**EXPLORATION ID B-44-04**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 216.87		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 998.5 (MSL) EOB: 7.9 ft.		PAGE 1 OF 1
START: 8/13/14 END: 8/13/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 538687.089 N, 2419179.155 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 998.5	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.4' - ASPHALT (5.0")	998.1																	
0.9' - CONCRETE (11.0")	997.2	1																
0.6' - SLAG BASE (7.0")	996.6																	
HARD, BROWN **SILT AND CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.		2	3 6 6	16	67	SS-1	4.50	3	4	11	43	39	32	17	15	15	A-6a (10)	
		3																
		4	9 9 11	26	78	SS-2	4.5+	8	5	10	42	35	30	17	13	16	A-6a (9)	
	992.1	5																
STIFF, BROWN **SILT**, SOME CLAY, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, MOIST. -SANDSTONE FRAGMENTS PRESENT IN SS-4		6	13 11 10	27	100	SS-3	4.5+	-	-	-	-	-	-	-	-	14	A-6a (V)	
		7	11 9 7	21	33	SS-4	2.00	-	-	-	-	-	-	-	-	22	A-4b (V)	
	990.6	EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 440 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

2013 STD ODOT BORING LOG-TURNPIKE - OH DOT.GDT - 1/12/15 14:29 - U:\GI\PROJECTS\2014\N-14-020 (2).GPJ

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / T.F.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 14+46 / 52.1' RT	**EXPLORATION ID B-44-05**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 217.04		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 1003.9 (MSL) EOB: 7.8 ft.		PAGE 1 OF 1
START: 8/19/14 END: 8/19/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 538040.665 N, 2419854.420 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 1003.9	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.3' - ASPHALT (4.0")	1003.6																	
0.8' - CONCRETE (10.0")	1002.8	1																
0.7' - SLAG BASE (8.0")	1002.1																	
HARD, BROWN **SILT AND CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.	1000.6	2	3 5 7	16	61	SS-1	4.50	6	5	11	43	35	30	17	13	15	A-6a (9)	
HARD, BROWN **SILTY CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.	999.1	3	4 5 7	16	72	SS-2	4.50	4	4	8	34	50	38	20	18	17	A-6b (11)	
VERY STIFF TO HARD, BROWN **SILT AND CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.	996.1	4	8 10 6	21	61	SS-3	4.50	-	-	-	-	-	-	-	-	14	A-6a (V)	
EOB		5	5 7 7	18	100	SS-4	4.00	-	-	-	-	-	-	-	-	15	A-6a (V)	
		6																
		7																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 440 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / T.F.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 23+75 / 51.0' LT	**EXPLORATION ID B-44-06**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 217.22		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 1013.2 (MSL) EOB: 7.9 ft.	PAGE 1 OF 1	
START: 8/13/14 END: 8/13/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 537558.797 N, 2420655.340 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 1013.2	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.4' - ASPHALT (5.0")	1012.8																	
0.8' - CONCRETE (10.0")	1012.0	1																
0.7' - SLAG BASE (8.0")	1011.3																	
VERY STIFF, BROWN **SILT AND CLAY**, SOME COARSE TO FINE SAND, LITTLE FINE GRAVEL, DAMP. -SLAG FRAGMENTS PRESENT IN SS-1	1009.8	2	5 4 5	12	44	SS-1	3.75	16	10	16	34	24	33	19	14	18	A-6a (6)	
VERY STIFF, MOTTLED BROWN AND GRAY **SILTY CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.	1006.8	3 4 5 6	5 5 6	14	56	SS-2	3.25	4	6	11	39	40	35	17	18	17	A-6b (11)	
			6 8 8	21	67	SS-3	2.50	-	-	-	-	-	-	-	-	17	A-6b (V)	
VERY STIFF, MOTTLED BROWN AND GRAY **SILT AND CLAY**, SOME COARE TO FINE SAND, TRACE FINE GRAVEL, DAMP.	1005.3	7 EOB	7 8 11	25	89	SS-4	4.00	-	-	-	-	-	-	-	-	14	A-6a (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 495 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / T.F.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 33+04 / 52.7' RT	**EXPLORATION ID B-44-07**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 217.39		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 1017.9 (MSL) EOB: 7.7 ft.		PAGE 1 OF 1
START: 8/19/14 END: 8/19/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 536912.572 N, 2421330.757 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 1017.9	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.2' - ASPHALT (2.0")	1017.7																	
0.9' - CONCRETE (11.0")	1016.8																	
0.6' - SLAG BASE (7.0")	1016.2																	
VERY STIFF, BROWN **SILT AND CLAY**, LITTLE COARSE TO FINE SAND, LITTLE FINE GRAVEL, DAMP.	1014.7	2	4 7 8	19	50	SS-1	3.50	19	6	11	37	27	29	18	11	12	A-6a (6)	
VERY STIFF, BROWN **CLAY**, SOME SILT, SOME COARSE TO FINE SAND, SOME FINE GRVAEL, DAMP.		4	6 7 8	19	33	SS-2	-	28	18	13	25	16	43	29	14	14	A-7-6 (2)	
-ROCK FRAGMENTS PRESENT THROUGHOUT		5	8 9 9	23	33	SS-3	-	-	-	-	-	-	-	-	-	19	A-7-6 (V)	
		6																
	1010.2	7 EOB	14 11 7	23	33	SS-4	-	-	-	-	-	-	-	-	-	23	A-7-6 (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 385 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

2013 STD ODOT BORING LOG-TURNPIKE - OH DOT.GDT - 1/12/15 14:30 - U:\GI\PROJECTS\2014\N-14-020 (2).GPJ

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / T.F.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 42+33 / 51.6' LT	**EXPLORATION ID B-44-08**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 217.57		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 1009.5 (MSL) EOB: 7.9 ft.	PAGE 1 OF 1	
START: 8/14/14 END: 8/14/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 536423.233 N, 2422128.748 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 1009.5	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.4' - ASPHALT (5.0")	1009.1																	
0.8' - CONCRETE (10.0")	1008.3																	
0.7' - SLAG BASE (8.0")	1007.6																	
HARD, MOTTLED BROWN AND GRAY **SILTY CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.	1006.1		3 4 6	13	67	SS-1	4.50	9	5	10	42	34	32	16	16	15	A-6b (10)	
VERY STIFF TO HARD, DARK GRAY, BROWN AND BLACK **SILT AND CLAY**, SOME FINE GRAVEL, SOME COARSE TO FINE SAND, DRY. -SHALE AND SILTSTONE FRAGMENTS PRESENT IN SS-2	1004.6		6 6 8	18	50	SS-2	4.00	27	16	8	31	18	30	18	12	8	A-6a (3)	
VERY STIFF TO HARD, DARK GRAY, BROWN AND BLACK **SILTY CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP. -SHALE AND SILTSTONE FRAGMENTS PRESENT THROUGHOUT	1001.6	EOB	13 10 10	26	61	SS-3	2.50	-	-	-	-	-	-	-	-	14	A-6b (V)	
			4 6 5	14	72	SS-4	4.50	-	-	-	-	-	-	-	-	16	A-6b (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 385 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / T.F.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 51+62 / 52.8' RT	**EXPLORATION ID B-44-09**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 217.75		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 991.5 (MSL) EOB: 7.5 ft.		PAGE 1 OF 1
START: 8/19/14 END: 8/19/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 535713.144 N, 2422735.960 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 991.5	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.3' - ASPHALT (3.0")	991.2																	
0.9' - CONCRETE (11.0")	990.3																	
0.3' - BASE MATERIAL - #2 STONE (3.0")	990.0																	
LOOSE, BROWN **GRAVEL AND SAND**, TRACE SILT, TRACE CLAY, MOIST.	988.5	1	2 3 4	9	33	SS-1	-	-	-	-	-	-	-	-	-	15	A-1-b (V)	
VERY STIFF TO HARD, BROWN AND GRAY **SILT AND CLAY**, LITTLE TO SOME COARSE TO FINE SAND, TRACE TO LITTLE FINE GRAVEL, DAMP TO MOIST. -SHALE FRAGMENTS PRESENT IN SS-2		2 3 4	4 5 8	17	56	SS-2	3.25	5	7	8	46	34	33	18	15	17	A-6a (10)	
		5	8 11 11	28	61	SS-3	3.50	7	8	10	42	33	32	19	13	19	A-6a (9)	
-SHALE FRAGMENTS PRESENT IN SS-4	984.0	6 7 EOB	9 11 14	32	89	SS-4	4.50	-	-	-	-	-	-	-	-	12	A-6a (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 385 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

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RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / T.F.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 60+89 / 60.5' LT	**EXPLORATION ID B-44-10**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 217.92		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 981.3 (MSL) EOB: 8.0 ft.	PAGE 1 OF 1	
START: 8/14/14 END: 8/14/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 535084.488 N, 2423427.015 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 981.3	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
1.4' - ASPHALT (17.0")																		
	979.9																	
0.6' - SLAG BASE (7.0")																		
	979.3																	
VERY STIFF TO HARD, DARK GRAY TO MOTTLED GRAY AND BROWN **SILT AND CLAY**, LITTLE TO SOME COARSE TO FINE SAND, TRACE TO LITTLE FINE GRAVEL, DAMP TO MOIST.			3 8 6	18	61	SS-1	4.5+	12	12	9	42	25	29	18	11	12	A-6a (7)	
-COAL AND SHALE FRAGMENTS PRESENT IN SS-2			7 8 8	21	39	SS-2	4.5+	-	-	-	-	-	-	-	-	14	A-6a (V)	
			5 6 7	17	67	SS-3	4.5+	4	5	11	46	34	31	16	15	16	A-6a (10)	
			6 6 7	17	72	SS-4	2.75	-	-	-	-	-	-	-	-	17	A-6a (V)	
	973.3	EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 440 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

2013 STD ODOT BORING LOG-TURNPIKE - OH DOT.GDT - 1/12/15 14:30 - U:\GI\PROJECTS\2014\N-14-020 (2).GPJ

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / J.K.	DRILL RIG: CME-55 (SN 386345)	STATION / OFFSET: 62+60 / 17.0' RT	**EXPLORATION ID B-44-10A**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / E.S.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 217.95		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 10/20/13	ELEVATION: 980.7 (MSL) EOB: 6.0 ft.	PAGE 1 OF 1	
START: 12/8/14 END: 12/8/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 92	COORD: 534901.220 N, 2423468.450 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 980.7	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
1.3'- ASPHALT (16.0")	979.4																	
0.5' - SLAG BASE (6.0")	978.9																	
FILL: HARD, BROWNISH GRAY **SILT AND CLAY**, SOME COARSE TO FINE SAND, LITTLE FINE GRAVEL, DAMP. -CINDER AND SLAG FRAGMENTS PRESENT INSS-1	976.7	1 2 3	12 32 13 8	69	100	SS-1	4.5+	-	-	-	-	-	-	-	-	-	A-6a (V)	
VERY STIFF, LIGHT BROWN **SILT**, SOME CLAY, SOME COARSE TO FINE SAND, TRACE FINE GRAVEL, MOIST.	974.7 EOB	4 5 6	9 12 13 23	38	100	SS-2	3.75	-	-	-	-	-	-	-	-	-	A-4b (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / J.K.	DRILL RIG: CME-55 (SN 386345)	STATION / OFFSET: 65+10 / 16.9' RT	**EXPLORATION ID B-44-10B**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / E.S.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 218.00		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 10/20/13	ELEVATION: 980.5 (MSL) EOB: 6.0 ft.	PAGE 1 OF 1	
START: 12/9/14 END: 12/9/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 92	COORD: 534698.650 N, 2423613.940 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 980.5	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
1.3'- ASPHALT (15.0")																		
	979.2																	
0.5' - SLAG BASE (6.0")																		
	978.7																	
HARD, BROWN **SILT AND CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP TO MOIST. -ROOT FIBERS PRESENT IN SS-1		1 2 3 4 5 6	6 6 7 8	20	88	SS-1	4.5+	-	-	-	-	-	-	-	-	-	A-6a (V)	
-SHALE FRAGMENTS PRESENT IN SS-2			6 6 13 10	29	96	SS-2	4.5+	-	-	-	-	-	-	-	-	-	A-6a (V)	
	974.5	EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / J.K.	DRILL RIG: CME-55 (SN 386345)	STATION / OFFSET: 67+60 / 17.4' RT	**EXPLORATION ID B-44-10C**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / E.S.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 218.05		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 10/20/13	ELEVATION: 981.2 (MSL) EOB: 6.0 ft.	PAGE 1 OF 1	
START: 12/8/14 END: 12/8/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 92	COORD: 534491.550 N, 2423753.250 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 981.2	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
1.3'- ASPHALT (15.0")																		
	979.9																	
0.5' - SLAG BASE (6.0")																		
	979.4																	
HARD, BROWN **SILTY CLAY**, LITTLE COARSE TO FINE SAND, LITTLE FINE GRAVEL, DAMP.		1																
		2																
-ROOT FIBERS PRESENT IN SS-1		3	12 20 10 10	46	100	SS-1	4.5+	-	-	-	-	-	-	-	-	-	A-6b (V)	
	976.7	TR 4					-	-	-	-	-	-	-	-	-	-	A-6b (V)	
SHALE : BROWN, HIGHLY WEATHERED.		5	10 16 29 38	69	100	SS-2	-	-	-	-	-	-	-	-	-	-	Rock (V)	
	975.2	EOB 6																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: COMPACTED WITH THE AUGER SOIL CUTTINGS

2013 STD ODOT BORING LOG-TURNPIKE - OH DOT.GDT - 1/12/15 14:30 - U:\GI\PROJECTS\2014\N-14-020 (2).GPJ

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / J.K.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 70+10 / 17.4' RT	**EXPLORATION ID B-44-11**
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 218.10	
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 982.6 (MSL) EOB: 3.1 ft.	PAGE 1 OF 1
START: 8/26/14 END: 8/26/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 534281.174 N, 2423887.256 E	

MATERIAL DESCRIPTION AND NOTES	ELEV. 982.6	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
1.3' - ASPHALT (16.0")																		
	981.3	TR																
SHALE: BROWN, HIGHLY WEATHERED.		1	14 50/4"	-	60	SS-1	-	-	-	-	-	-	-	-	-	17	Rock (V)	
		2																
AUGER REFUSAL @ 3.1'	979.5	EOB 3																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 385 LBS CONCRETE

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / J.K.	DRILL RIG: CME-55 (SN 386345)	STATION / OFFSET: 72+60 / 16.4' RT	**EXPLORATION ID B-44-11A**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / E.S.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 218.14		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 10/20/13	ELEVATION: 985.0 (MSL) EOB: 6.0 ft.	PAGE 1 OF 1	
START: 12/4/14 END: 12/4/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 92	COORD: 534070.280 N, 2424021.500 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 985.0	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
1.3'- ASPHALT (16.0")																		
	983.7																	
0.5' - SLAG BASE (6.0")																		
	983.2																	
HARD, BROWNISH GRAY **SILTY CLAY**, TRACE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.			6 6 8 4	21	100	SS-1	3.00	-	-	-	-	-	-	-	-	-	A-6b (V)	
	980.5	TR					4.5+	-	-	-	-	-	-	-	-	-	A-6b (V)	
SHALE : BLACK, HIGHLY WEATHERED.			10 17 25 38	64	100	SS-2	-	-	-	-	-	-	-	-	-	-	Rock (V)	
	979.0	EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: COMPACTED WITH THE AUGER SOIL CUTTINGS

2013 STD ODOT BORING LOG-TURNPIKE - OH DOT.GDT - 1/12/15 14:30 - U:\GI\PROJECTS\2014\N-14-020 (2).GPJ

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / J.K.	DRILL RIG: CME-55 (SN 386345)	STATION / OFFSET: 75+10 / 16.4' RT	**EXPLORATION ID B-44-11B**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / E.S.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 218.19		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 10/20/13	ELEVATION: 988.1 (MSL) EOB: 6.0 ft.	PAGE 1 OF 1	
START: 12/4/14 END: 12/4/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 92	COORD: 533858.820 N, 2424154.860 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 988.1	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
1.4'- ASPHALT (17.0")																		
	986.7																	
0.5' - SLAG BASE (6.0")																		
	986.2																	
HARD, BROWNISH GRAY **SILT AND CLAY**, LITTLE FINE GRAVEL, TRACE COARSE TO FINE SAND, DAMP.			11 11 25 18	55	83	SS-1	4.5+	-	-	-	-	-	-	-	-	-	A-6a (V)	
-SHALE FRAGMENTS PRESENT IN SS-1	984.6	TR																
SHALE : BLACK, HIGHLY WEATHERED.							-	-	-	-	-	-	-	-	-	-	Rock (V)	
			15 16 18 22	52	100	SS-2	-	-	-	-	-	-	-	-	-	-	Rock (V)	
	982.1	EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / J.K.	DRILL RIG: CME-55 (SN 386345)	STATION / OFFSET: 77+60 / 16.7' RT	**EXPLORATION ID B-44-11C**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / E.S.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 218.24		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 10/20/13	ELEVATION: 991.9 (MSL) EOB: 5.9 ft.	PAGE 1 OF 1	
START: 12/4/14 END: 12/4/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 92	COORD: 533647.180 N, 2424287.950 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 991.9	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
1.3'- ASPHALT (16.0")																		
	990.6																	
0.5' - SLAG BASE (6.0")																		
	990.1																	
HARD, BROWNISH GRAY **SILT AND CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.		1																
		2	12 4 6	15	89	SS-1	4.5+	-	-	-	-	-	-	-	-	-	A-6a (V)	
	987.9	3					-	-	-	-	-	-	-	-	-	-	A-6a (V)	
SHALE : BLACK, HIGHLY WEATHERED.		TR 4	12 34 45	121	100	SS-2	-	-	-	-	-	-	-	-	-	-	Rock (V)	
		5	32 50/4"	-	90	SS-3	-	-	-	-	-	-	-	-	-	-	Rock (V)	
	986.0	EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / J.K.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 79+48 / 63.0' LT	**EXPLORATION ID B-44-12**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 218.27		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 994.8 (MSL) EOB: 5.1 ft.		PAGE 1 OF 1
START: 8/14/14 END: 8/14/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 533530.531 N, 2424455.694 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 994.8	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
1.4' - ASPHALT (17.0")	993.4	1																
0.4' - SLAG BASE (5.0")	993.0																	
HARD, MOTTLED BROWN AND GRAY **SILTY CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, MOIST. -SHALE FRAGMENTS PRESENT IN SS-1	991.5	2	2 4 8	16	33	SS	4.50	7	5	10	46	32	33	16	17	17	A-6b (11)	
SHALE: GRAY, HIGHLY WEATHERED.		TR 3	34 50/2"	-	75	SS	-	-	-	-	-	-	-	-	-	5	Rock (V)	
AUGER REFUSAL @ 5.1'	989.7	EOB 4 5																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 275 LBS CONCRETE

2013 STD ODOT BORING LOG-TURNPIKE - OH DOT.GDT - 1/12/15 14:30 - U:\GI\PROJECTS\2014\N-14-020 (2).GPJ

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / J.K.	DRILL RIG: CME-55 (SN 386345)	STATION / OFFSET: 88+17 / 22.8' RT	**EXPLORATION ID B-44-12A**
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / E.S.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 218.44	
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 10/20/13	ELEVATION: 1007.5 (MSL) EOB: 4.0 ft.	PAGE 1 OF 1
START: 12/8/14 END: 12/8/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 92	COORD: 532749.220 N, 2424845.030 E	

MATERIAL DESCRIPTION AND NOTES	ELEV. 1007.5	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
1.3'- ASPHALT (15.0")	1006.2																	
0.5' - SLAG BASE (6.0")	1005.7																	
HARD, BLACK AND GRAY **SILT AND CLAY**, SOME COARSE TO FINE SAND, SOME FINE GRAVEL, MOIST. -CINDERS PRESENT IN SS-1 -SHALE FRAGMENTS PRESENT FROM 3.8' TO 4.0'	1003.5	1 2 3 EOB 4	14 14 14 9	43	100	SS-1	4.5+	-	-	-	-	-	-	-	-	-	A-6a (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: COMPACTED WITH THE AUGER SOIL CUTTINGS

2013 STD ODOT BORING LOG-TURNPIKE - OH DOT.GDT - 1/12/15 14:30 - U:\GI\PROJECTS\2014\N-14-020 (2).GPJ

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / J.K.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 89+17 / 26.7' RT	**EXPLORATION ID B-44-13**
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 218.46	
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 1008.9 (MSL) EOB: 3.7 ft.	PAGE 1 OF 1
START: 8/28/14 END: 8/28/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 532663.489 N, 2424896.555 E	

MATERIAL DESCRIPTION AND NOTES	ELEV. 1008.9	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
1.3' - ASPHALT (16.0")																		
	1007.6																	
0.3' - AGGREGATE BASE (3.0")	1007.3																	
FILL: GRAY **GRAVEL** (PEA GRAVEL)		1																
		2																
		3	1 2 23	32	44	SS-1	-	-	-	-	-	-	-	-	-	-	A-1-a (V)	
-GEOTEXTILE FABRIC PRESENT @ 3.4'	1005.5																	
SHALE: BLACK, HIGHLY WEATHERED.	1005.2	TR					-	-	-	-	-	-	-	-	-	12	Rock (V)	
AUGER REFUSAL @ 3.7'		EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 330 LBS CONCRETE

2013 STD ODOT BORING LOG-TURNPIKE - OH DOT.GDT - 1/12/15 14:30 - U:\GI\PROJECTS\2014\N-14-020 (2).GPJ

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / J.K.	DRILL RIG: CME-55 (SN 386345)	STATION / OFFSET: 90+17 / 28.5' RT	**EXPLORATION ID B-44-13A**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / E.S.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 218.48		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 10/20/13	ELEVATION: 1010.0 (MSL) EOB: 4.0 ft.	PAGE 1 OF 1	
START: 12/8/14 END: 12/8/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 92	COORD: 532577.940 N, 2424948.360 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 1010.0	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
1.3'- ASPHALT (15.0")	1008.7																	
0.5' - SLAG BASE (6.0")	1008.2																	
HARD, LIGHT BROWN **SILT AND CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.	1007.5	TR					-	-	-	-	-	-	-	-	-	-	A-6a (V)	
SHALE : LIGHT BROWN, HIGHLY WEATHERED.	1006.0	EOB	21 31 29 17	92	100	SS-1	-	-	-	-	-	-	-	-	-	-	Rock (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: COMPACTED WITH THE AUGER SOIL CUTTINGS

2013 STD ODOT BORING LOG-TURNPIKE - OH DOT.GDT - 1/12/15 14:30 - U:\GI\PROJECTS\2014\N-14-020 (2).GPJ

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / T.F.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 98+06 / 50.2' LT	**EXPLORATION ID B-44-14**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 218.63		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 1013.9 (MSL) EOB: 7.9 ft.		PAGE 1 OF 1
START: 8/15/14 END: 8/15/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 531952.166 N, 2425436.045 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 1013.9	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.5' - ASPHALT (6.0")	1013.4																	
0.8' - CONCRETE (10.0")	1012.6																	
0.6' - SLAG BASE (7.0")	1012.0																	
STIFF TO VERY STIFF, MOTTLED GRAY AND BROWN **SILTY CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, MOIST.	1009.0	1 2 3 4 5	WOH 2 3	6	67	SS-1	1.50	5	3	8	48	36	34	16	18	23	A-6b (11)	
			5 6 6	16	44	SS-2	2.50	3	3	9	45	40	34	16	18	23	A-6b (11)	
HARD, MOTTLED BROWN AND GRAY **SILT AND CLAY**, SOME COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.	1006.0	6 7	7 10 9	25	89	SS-3	4.5+	-	-	-	-	-	-	-	-	16	A-6a (V)	
			10 13 13	34	67	SS-4	4.50	-	-	-	-	-	-	-	-	13	A-6a (V)	
		EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 330 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / J.K.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 107+38 / 29.3' RT	**EXPLORATION ID B-44-15**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 218.80		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 1009.8 (MSL) EOB: 8.0 ft.		PAGE 1 OF 1
START: 8/27/14 END: 8/27/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 531121.536 N, 2425865.908 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 1009.8	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.5' - ASPHALT (6.0")	1009.3																	
0.9' - CONCRETE (11.0")	1008.4																	
0.6' - SLAG BASE (7.0")	1007.8																	
VERY STIFF, MOTTLED BROWN AND GRAY **CLAY**, AND SILT, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.	1006.3		3 4 6	13	89	SS-1	3.50	4	4	8	37	47	44	19	25	16	A-7-6 (15)	
VERY STIFF TO HARD, BROWN **SILTY CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.			4 6 8	18	33	SS-2	4.5+	3	4	9	43	41	35	17	18	14	A-6b (11)	
-CINDER AND SLAG FRAGMENTS PRESENT IN SS-3			9 11 12	30	33	SS-3	4.00	-	-	-	-	-	-	-	-	16	A-6b (V)	
			9 14 19	43	67	SS-4	4.50	-	-	-	-	-	-	-	-	13	A-6b (V)	
	1001.8	EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 385 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

2013 STD ODOT BORING LOG-TURNPIKE - OH DOT.GDT - 1/12/15 14:30 - U:\GI\PROJECTS\2014\N-14-020 (2).GPJ

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / T.F.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 121+84 / 59.4' LT	**EXPLORATION ID B-44-16**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-76 MP: 219.08		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 1002.4 (MSL) EOB: 7.8 ft.	PAGE 1 OF 1	
START: 8/15/14 END: 8/15/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 529945.567 N, 2426712.442 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 1002.4	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.4' - ASPHALT (5.0")	1002.0																	
0.9' - CONCRETE (11.0")	1001.1																	
0.5' - SLAG BASE (6.0")	1000.6																	
STIFF TO VERY STIFF, BROWNISH GRAY TO GRAY **SILT AND CLAY**, SOME TO AND COARSE TO FINE SAND, LITTLE FINE GRAVEL, DAMP. -SLAG FRAGMENTS PRESENT IN SS-1		1 2 3 4	5 5 7	16	89	SS-1	2.50	19	12	14	32	23	29	17	12	10	A-6a (5)	
	997.6		7 6 7	17	67	SS-2	2.00	11	21	16	28	24	39	26	13	15	A-6a (5)	
STIFF TO VERY STIFF, BROWNISH GRAY **SILTY CLAY**, SOME COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP. -ORGANICS PRESENT IN SS-4A	995.7	5 6 7	7 6 6	16	61	SS-3	2.50	-	-	-	-	-	-	-	-	17	A-6b (V)	
							1.50	-	-	-	-	-	-	-	-	19	A-6b (V)	
MEDIUM DENSE, BROWNISH GRAY **GRAVEL WITH SAND, SILT, AND CLAY**, MOIST.	994.6		7 10 9	25	33	SS-4	-	-	-	-	-	-	-	-	-	13	A-2-6 (V)	
		EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 440 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / J.K.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 125+87 / 29.7' RT	**EXPLORATION ID B-44-17**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-76 MP: 219.15		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 1000.6 (MSL) EOB: 7.9 ft.		PAGE 1 OF 1
START: 8/27/14 END: 8/27/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 529557.468 N, 2426851.902 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 1000.6	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.6' - ASPHALT (7.0")	1000.0																	
0.9' - CONCRETE (11.0")	999.1	1																
0.4' - SLAG BASE (5.0")	998.7																	
HARD, BROWN **SILTY CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.		2	3 4 6	13	72	SS-1	4.5+	1	3	8	41	47	38	18	20	16	A-6b (12)	
		3																
		4	13 11 7	23	39	SS-2	4.5+	3	4	8	41	44	35	17	18	14	A-6b (11)	
-ROCK FRAGMENTS PRESENT IN SS-3		5	13 14 18	41	39	SS-3	4.5+	-	-	-	-	-	-	-	-	13	A-6b (V)	
		6																
		7	20 20 26	60	100	SS-4	4.5+	-	-	-	-	-	-	-	-	13	A-6b (V)	
	992.7	EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 330 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

2013 STD ODOT BORING LOG-TURNPIKE - OH DOT.GDT - 1/12/15 14:30 - U:\GI\PROJECTS\2014\N-14-020 (2).GPJ

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / T.F.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 135+22 / 50.8' LT	**EXPLORATION ID B-44-18**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-76 MP: 219.33		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 995.6 (MSL) EOB: 7.9 ft.		PAGE 1 OF 1
START: 8/14/14 END: 8/14/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 528809.379 N, 2427418.858 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 995.6	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.6' - ASPHALT (7.0")	995.0																	
0.8' - CONCRETE (10.0")	994.2	1																
0.5' - SLAG BASE (6.0")	993.7																	
HARD, MOTTLED BROWN AND GRAY TO BROWNISH GRAY **SILTY CLAY**, TRACE TO LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP TO MOIST.		2	2 4 6	13	106	SS-1	4.5+	5	2	7	43	43	40	17	23	21	A-6b (13)	
		3																
		4	6 7 8	19	67	SS-2	4.5+	5	3	9	43	40	36	17	19	14	A-6b (12)	
-SLAG FRAGMENTS PRESENT IN SS-3		5	11 15 15	39	39	SS-3	4.5+	-	-	-	-	-	-	-	-	19	A-6b (V)	
		6																
		7	14 11 10	27	72	SS-4	4.5+	-	-	-	-	-	-	-	-	12	A-6b (V)	
	987.7	EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 330 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / J.K.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 144+39 / 29.4' RT	**EXPLORATION ID B-44-19**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-76 MP: 219.50		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 990.4 (MSL) EOB: 8.0 ft.		PAGE 1 OF 1
START: 8/27/14 END: 8/27/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 527990.578 N, 2427840.438 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 990.4	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.4' - ASPHALT (5.0")	990.0																	
0.9' - CONCRETE (11.0")	989.1	1																
0.7' - SLAG BASE (8.0")	988.4																	
VERY STIFF, BROWNISH GRAY **SILT AND CLAY**, SOME COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP. -SHALE FRAGMENTS PRESENT IN SS-1	986.9	2	2 5 13	23	78	SS-1	3.00	8	10	11	40	31	29	18	11	16	A-6a (8)	
STIFF, BROWN AND GRAY **CLAY**, AND SILT, TRACE COARSE TO FINE SAND, TRACE FINE GRAVEL, MOIST.	985.4	4	6 10 12	28	100	SS-2	2.00	2	3	7	40	48	42	18	24	18	A-7-6 (14)	
VERY STIFF TO HARD, BROWN **SILT AND CLAY**, TRACE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.		5	10 10 12	28	50	SS-3	3.50	-	-	-	-	-	-	-	-	15	A-6a (V)	
-ROCK FRAGMENTS PRESENT IN SS-4	982.4	7	11 11 15	34	100	SS-4	4.5+	-	-	-	-	-	-	-	-	16	A-6a (V)	
EOB		8																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 330 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

2013 STD ODOT BORING LOG-TURNPIKE - OH DOT.GDT - 1/12/15 14:30 - U:\GI\PROJECTS\2014\N-14-020 (2).GPJ

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / T.F.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 153+79 / 51.0' LT	**EXPLORATION ID B-44-20**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-76 MP: 219.68		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 983.7 (MSL) EOB: 9.1 ft.		PAGE 1 OF 1
START: 8/15/14 END: 8/15/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 527238.756 N, 2428409.613 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 983.7	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.4' - ASPHALT (5.0")	983.3																	
0.9' - CONCRETE (11.0")	982.4																	
0.8' - SLAG BASE (10.0")	981.6																	
VERY STIFF, BROWNISH GRAY **SILTY CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP TO MOIST. -PETROLEUM ODOR PRESENT IN SS-1	977.6	1	2 2 3	6	44	SS-1	3.00	2	3	8	40	47	37	19	18	20	A-6b (11)	
VERY STIFF, BROWNISH GRAY **CLAY**, AND SILT, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, MOIST.	976.1	2	6 6 5	14	100	SS-2	4.00	2	4	8	40	46	35	18	17	17	A-6b (11)	
VERY STIFF, BROWNISH GRAY **SILTY CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, MOIST.	974.6	3	6 7 5	16	83	SS-3	3.50	-	-	-	-	-	-	-	-	29	A-6b (V)	
	EOB	4	5 5 5	13	67	SS-4	3.00	-	-	-	-	-	-	-	-	20	A-6b (V)	
		5																
		6																
		7																
		8																
		9																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 385 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

2013 STD ODOT BORING LOG-TURNPIKE - OH DOT.GDT - 1/12/15 14:30 - U:\GI\PROJECTS\2014\N-14-020 (2).GPJ

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / S.B.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 163+35 / 50.8' RT	**EXPLORATION ID B-44-21**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / R.B.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-76 MP: 219.86		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 972.6 (MSL) EOB: 8.2 ft.	PAGE 1 OF 1	
START: 9/4/14 END: 9/4/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 526375.943 N, 2428833.500 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 972.6	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.5' - ASPHALT (6.0")	972.1																	
0.9' - CONCRETE (10.5")	971.2																	
0.8' - SLAG BASE (9.5")	970.4																	
STIFF TO VERY STIFF, BROWN TO GRAY **SANDY SILT**, SOME CLAY, TRACE FINE GRAVEL, DAMP TO MOIST.		1	1 2 5	9	44	SS-1	1.50	7	20	12	29	32	28	18	10	16	A-4a (5)	
		3	5 3 5	10	39	SS-2	2.00	10	27	19	21	23	23	16	7	19	A-4a (2)	
		5	2 4 5	12	39	SS-3	2.25	-	-	-	-	-	-	-	-	16	A-4a (V)	
		7	5 8 9	22	50	SS-4	3.00	-	-	-	-	-	-	-	-	17	A-4a (V)	
	964.4 EOB	8																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING; CAVE-IN DEPTH @ 6.2'

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 385 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / J.K.	DRILL RIG: CME-55 (SN 386345)	STATION / OFFSET: 169+87 / 50.8' LT	**EXPLORATION ID B-44-21A**
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / E.S.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 219.99	
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 10/20/13	ELEVATION: 964.9 (MSL) EOB: 4.0 ft.	PAGE 1 OF 1
START: 12/9/14 END: 12/9/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 92	COORD: 525878.590 N, 2429267.290 E	

MATERIAL DESCRIPTION AND NOTES	ELEV. 964.9	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.5'- ASPHALT (6.0")	964.4																	
1.2' - CONCRETE (14.0")	963.2	1																
1.1' - SLAG BASE (13.0")	962.1	2					-	-	-	-	-	-	-	-	-	-	A-1-b (V)	
HARD, BROWN **SILT AND CLAY**, LITTLE COARSE TO FINE SAND, LITTLE FINE GRAVEL, DAMP.	960.9	3	6 3 9 14	18	100	SS-1	4.5+	-	-	-	-	-	-	-	-	-	A-6a (V)	
		EOB 4																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / T.F.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 172+37 / 50.8' LT	**EXPLORATION ID B-44-22**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-76 MP: 220.03		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 962.5 (MSL) EOB: 7.9 ft.	PAGE 1 OF 1	
START: 8/15/14 END: 8/15/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 525667.130 N, 2429400.649 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 962.5	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.6' - ASPHALT (7.0")	961.9																	
1.0' - CONCRETE (12.0")	960.9	1																
0.3' - SLAG BASE (3.0")	960.6																	
DENSE, LIGHT BROWN **GRAVEL**, TRACE COARSE TO FINE SAND, DAMP. -SANDSTONE FRAGMENTS PRESENT IN SS-1	959.1	2	12 25 13	49	28	SS-1	-	-	-	-	-	-	-	-	-	7	A-1-a (V)	
HARD, BROWN **SILTY CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, MOIST. -CINDERS PRESENT IN SS-2	957.6	3 4	4 5 5	13	89	SS-2	4.5+	6	5	8	32	49	38	18	20	19	A-6b (12)	
VERY STIFF TO HARD, BROWN **CLAY**, SOME SILT, TRACE COARSE TO FINE SAND, TRACE FINE GRAVEL, MOIST.	954.6	5	8 10 13	30	83	SS-3	4.00	1	2	4	24	69	47	20	27	20	A-7-6 (16)	
		6 7	16 20 23	56	100	SS-4	4.5+	-	-	-	-	-	-	-	-	23	A-7-6 (V)	
		EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 385 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / J.K.	DRILL RIG: CME-55 (SN 386345)	STATION / OFFSET: 172+37 / 29.2' RT	**EXPLORATION ID B-44-22A**
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / E.S.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 220.03	
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 10/20/13	ELEVATION: 962.2 (MSL) EOB: 4.0 ft.	PAGE 1 OF 1
START: 12/10/14 END: 12/10/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 92	COORD: 525624.440 N, 2429332.960 E	

MATERIAL DESCRIPTION AND NOTES	ELEV. 962.2	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.5' - ASPHALT (6.0")	961.7																	
1.0' - CONCRETE (12.0")	960.7	1																
1.0' - SLAG BASE (12.0")	959.7	2					-	-	-	-	-	-	-	-	-	-	A-1-b (V)	
VERY STIFF, BROWN **SILTY CLAY**, SOME COARSE TO FINE SAND, LITTLE FINE GRAVEL, MOIST.	958.2	3	8 8 4 6	18	100	SS-1	3.75	-	-	-	-	-	-	-	-	-	A-6a (V)	
		EOB 4																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / J.K.	DRILL RIG: CME-55 (SN 386345)	STATION / OFFSET: 174+87 / 50.8' LT	**EXPLORATION ID B-44-22B**
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / E.S.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-80 MP: 220.08	
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 10/20/13	ELEVATION: 959.4 (MSL) EOB: 4.5 ft.	PAGE 1 OF 1
START: 12/9/14 END: 12/9/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 92	COORD: 525455.670 N, 2429534.010 E	

MATERIAL DESCRIPTION AND NOTES	ELEV. 959.4	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.5' - ASPHALT (6.0")	958.9																	
1.1' - CONCRETE (13.0")	957.8	1																
0.9' - SLAG BASE (11.0")	956.9	2					-	-	-	-	-	-	-	-	-	-	A-1-b (V)	
MEDIUM STIFF, BROWN **SILTY CLAY**, TRACE COARSE TO FINE SAND, TRACE FINE GRAVEL, MOIST.		3	9 2 3 3	8	25	SS-1	-	-	-	-	-	-	-	-	-	-	A-6b (V)	
	954.9 EOB	4	15	-	100	SS-2	0.75	-	-	-	-	-	-	-	-	-	A-6b (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / S.B.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 180+85 / 50.4' RT	**EXPLORATION ID B-44-23**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / R.B.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-76 MP: 220.19		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 952.8 (MSL) EOB: 8.3 ft.	PAGE 1 OF 1	
START: 9/3/14 END: 9/3/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 524899.537 N, 2429776.457 E		

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.6' - ASPHALT (7.5")	952.2																	
0.9' - CONCRETE (10.5")	951.3																	
0.8' - SLAG BASE (9.0")	950.5																	
STIFF TO VERY STIFF, GRAYISH BROWN TO BROWN **SILT AND CLAY**, LITTLE TO SOME COARSE TO FINE SAND, TRACE TO LITTLE FINE GRAVEL, DAMP.		1 2 3 4 5 6 7 8	1 2 2	5	50	SS-1	1.50	7	10	9	32	42	35	21	14	20	A-6a (9)	
			4 4 3	9	33	SS-2	1.50	11	14	12	28	35	33	21	12	18	A-6a (6)	
-COAL FRAGMENTS PRESENT IN SS-3			2 3 4	9	56	SS-3	3.50	-	-	-	-	-	-	-	-	15	A-6a (V)	
			5 6 12	23	72	SS-4	3.00	-	-	-	-	-	-	-	-	15	A-6a (V)	
	944.5	EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 330 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / T.F.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 190+95 / 51.1' LT	**EXPLORATION ID B-44-24**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-76 MP: 220.38		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 958.3 (MSL) EOB: 8.0 ft.		PAGE 1 OF 1
START: 8/15/14 END: 8/15/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 524154.926 N, 2430466.714 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 958.3	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.5' - ASPHALT (6.0")	957.8																	
0.8' - CONCRETE (10.0")	957.0																	
0.7' - SLAG BASE (8.0")	956.3																	
HARD, BROWN **SILTY CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.	954.8		2 5 6	14	67	SS-1	4.5+	3	4	8	37	48	34	18	16	16	A-6b (10)	
HARD, BROWN **CLAY**, SOME SILT, TRACE COARSE TO FINE SAND, DAMP TO MOIST.	951.8		7 9 7	21	61	SS-2	4.50	0	2	5	24	69	45	20	25	19	A-7-6 (15)	
			13 17 17	44	89	SS-3	4.50	-	-	-	-	-	-	-	-	22	A-7-6 (V)	
MEDIUM DENSE, BROWN **SILT**, SOME COARSE TO FINE SAND, TRACE CLAY, WET.	950.3	EOB	13 10 10	26	89	SS-4	-	-	-	-	-	-	-	-	-	24	A-4b (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 495 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / S.B.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 200+02 / 50.0' RT	**EXPLORATION ID B-44-25**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / R.B.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-76 MP: 220.56		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 971.3 (MSL) EOB: 8.5 ft.		PAGE 1 OF 1
START: 9/3/14 END: 9/3/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 523412.485 N, 2430996.970 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 971.3	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.5' - ASPHALT (5.5")	970.8																	
1.3' - CONCRETE (16.0")	969.5																	
0.7' - SLAG BASE (8.5")	968.8																	
HARD, MOTTLED BROWN AND GRAY **SILT AND CLAY**, LITTLE COARSE TO FINE SAND, DAMP.	967.3	3	4 4 8	16	56	SS-1	4.5+	0	5	8	41	46	32	21	11	16	A-6a (8)	
HARD, MOTTLED BROWN AND GRAY TO BROWN **SILTY CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.		4	9 12 15	35	44	SS-2	4.5+	2	6	5	42	45	37	21	16	16	A-6b (10)	
		6	7 10 12	28	67	SS-3	4.5+	-	-	-	-	-	-	-	-	16	A-6b (V)	
		7	12 12 16	36	67	SS-4	4.5+	-	-	-	-	-	-	-	-	16	A-6b (V)	
	962.8	EOB 8																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 385 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / T.F.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 209+53 / 51.2' LT	**EXPLORATION ID B-44-26**
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / J.P.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-76 MP: 220.74	
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 974.2 (MSL) EOB: 4.7 ft.	PAGE 1 OF 1
START: 8/18/14 END: 8/18/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 522832.041 N, 2431756.377 E	

MATERIAL DESCRIPTION AND NOTES	ELEV. 974.2	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.4' - ASPHALT (5.0")	973.8																	
0.9' - CONCRETE (11.0")	972.9	1																
1.3' - SLAG BASE (16.0")	971.6	2																
SHALE: GRAY, HIGHLY WEATHERED.		TR 3	9 26 50/3"	-	80	SS-1	-	-	-	-	-	-	-	-	-	7	Rock (V)	
AUGER REFUSAL @ 4.7'	969.5	4 EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 385 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

2013 STD ODOT BORING LOG-TURNPIKE - OH DOT.GDT - 1/12/15 14:30 - U:\GI\PROJECTS\2014\N-14-020 (2).GPJ

RESOURCE INTERNATIONAL, INC.

PROJECT: PAV. REC. PROG. - MP 216.1-221.25	DRILLING FIRM / OPERATOR: RII / S.B.	DRILL RIG: MOBILE B-53 (SN 624400)	STATION / OFFSET: 217+83 / 51.0' RT	**EXPLORATION ID B-44-27**	
CLIENT: OTIC	SAMPLING FIRM / LOGGER: RII / R.B.	HAMMER: AUTOMATIC	ALIGNMENT: CL I-76 MP: 220.89		
OTP NO.: 71-14-08 RII NO.: N-14-020(2)	DRILLING METHOD: 4.5" - CFA	CALIBRATION DATE: 4/26/13	ELEVATION: 964.8 (MSL) EOB: 7.6 ft.	PAGE 1 OF 1	
START: 9/2/14 END: 9/2/14	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77.7	COORD: 522211.512 N, 2432316.316 E		

MATERIAL DESCRIPTION AND NOTES	ELEV. 964.8	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
0.4' - ASPHALT (4.5")	964.4																	
0.4' - CONCRETE (5.5")	964.0																	
1.0' - SLAG BASE (12.0")	963.0	1																
HARD, BROWN AND BLACK **SILT AND CLAY**, LITTLE COARSE TO FINE SAND, TRACE FINE GRAVEL, DAMP.	961.5	2	5 10 15	32	33	SS-1	-	-	-	-	-	-	-	-	-	12	A-6a (V)	
SHALE: BLACK AND BROWN TO DARK GRAY, HIGHLY WEATHERED.		TR 3																
		4	12 17 30	61	44	SS-2	-	-	-	-	-	-	-	-	-	8	Rock (V)	
		5	20 35 50/5"	-	71	SS-3	-	-	-	-	-	-	-	-	-	8	Rock (V)	
		6																
		7	25 45 50/3"	-	20	SS-4	-	-	-	-	-	-	-	-	-	5	Rock (V)	
	957.2	EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 385 LBS CONCRETE; COMPACTED WITH THE AUGER SOIL CUTTINGS

2013 STD ODOT BORING LOG-TURNPIKE - OH DOT.GDT - 1/12/15 14:30 - U:\GI\PROJECTS\2014\N-14-020 (2).GPJ

APPENDIX I-E

SUBGRADE STABILIZATION AND ADCP SUMMARY

Subgrade Analysis

V. 12.00 12/30/11

Design CBR 6

Global Options		
320	R&R	Option
206	CS	Option
	LS	Option
	LKD	Option
206	Depth	12

Classification Counts by Sample																
R	1a	1b	3	3a	2-4	2-5	2-6	2-7	4a	4b	5	6a	6b	7-5	7-6	8a	8b
7	2	1	0	0	0	0	1	0	4	3	0	36	34	0	10	0	0
7%	2%	1%					1%		4%	3%		37%	35%		10%		
7%	4%								89%								

Surface Class		
2-5	0	
4b	0	
5	0	
7-5	0	
7-6	1	4%
8a	0	
8b	0	
R	2	7%

% Borings	
N_{60L}<= 5	4%
<=10	30%
>=20	19%
M+	52%
R	19%

% Surface	
37%	
7%	30%

UC @ Surface
19.9
27
12

Rig	ER
A	78
B	
C	
D	
E	
F	
G	
H	

Total Borings	27										N_{60}	N_{60L}			PI		Clay		M	M_{OPT}		GI					
PID	71-14-08									Average	25.1	15.1			15.9		37.8		16.2	14.9		9.01					
Location	MP 216.25 to MP 221.00									Maximum	123	30	47	29	27	50	69	93	29	26		16					
										Minimum	5	5	23	16	7	21	16	41	5	6		0					

	Boring					Subgrade		Standard Penetration						Physical Characteristics						Moisture		Class		Comments	Problem		Undercuts		Analysis
#	B #	Boring Location	Depth	To	Cut Fill	Depth	To	n_2	n_3	N	Rig	N_{60}	N_{60L}	LL	PL	PI	% Silt	% Clay	P 200	M	M_{OPT}	Ohio DOT	GI		w/ Class	w/ MN	UC Class	UC MN	
1	B-44-01	Sta. 541+48, 51.2' Rt.	1.9	3.4	-1.9	0.0	1.5	5	5	10	A	13								17	14	6a	8						
	CL I-80		3.4	4.9		1.5	3.0	3	3	6		8		32	19	13	42	35	77	16	14	6a	9	Sulfate Content=		N		18	Avg. GI = 8
	N: 540296.658		4.9	6.4		3.0	4.5	3	3	6		8		31	22	9	50	30	80	29	17	4b	8	687 ppm	4b	N	36	18	CBR = 7
	E: 2416901.511		6.4	7.9		4.5	6.0	4	5	9		12	8							17	14	6a	8						
2	B-44-02	Sta. 550+77, 50.8' Lt.	1.9	3.4	-1.9	0.0	1.5	2	4	6	A	8		33	17	16	40	37	77	16	16	6b	10			N		18	
	CL I-80		3.4	4.9		1.5	3.0	2	6	8		10		35	17	18	40	37	77	21	16	6b	11	Sulfate Content=		N		15	Avg. GI = 10
	N: 539813.897		4.9	6.4		3.0	4.5	5	6	11		14								22	16	6b	10	213 ppm		MN		12	CBR = 6
	E: 2417701.748		6.4	7.9		4.5	6.0	9	9	18		23	8							15	16	6b	10						
3	B-44-03	Sta. 558+33, 48.1' Rt.	1.9	3.4	-1.9	0.0	1.5	3	3	6	A	8		38	19	19	42	35	77	23	16	6b	12			N		18	
	CL I-80		3.4	4.9		1.5	3.0	3	4	7		9		34	19	15	47	36	83	23	14	6a	10	Sulfate Content=		N		16	Avg. GI = 10
	N: 539276.653		4.9	6.4		3.0	4.5	4	5	9		12								22	14	6a	8	653 ppm		MN		12	CBR = 6
	E: 2418242.326		6.4	7.9		4.5	6.0	11	17	28		36	8							14	14	6a	8						
4	B-44-04	Sta. 5+17, 51.8' Lt.	1.9	3.4	-1.9	0.0	1.5	6	6	12	A	16		32	17	15	43	39	82	15	14	6a	10						
	CL I-80		3.4	4.9		1.5	3.0	9	11	20		26		30	17	13	42	35	77	16	14	6a	9	Sulfate Content=					Avg. GI = 9
	N: 538687.089		4.9	6.4		3.0	4.5	11	10	21		27								14	14	6a	8	500 ppm					CBR = 6
	E: 2419179.155		6.4	7.9		4.5	6.0	9	7	16		21	16							22	10	4b			4b	M	36		
5	B-44-05	Sta. 14+46, 52.1' Rt.	1.8	3.3	-1.8	0.0	1.5	5	7	12	A	16		30	17	13	43	35	78	15	14	6a	9						
	CL I-80		3.3	4.8		1.5	3.0	5	7	12		16		38	20	18	34	50	84	17	16	6b	11	Sulfate Content=					Avg. GI = 9
	N: 538040.665		4.8	6.3		3.0	4.5	10	6	16		21								14	14	6a	8	3,680 ppm					CBR = 6
	E: 2419854.420		6.3	7.8		4.5	6.0	7	7	14		18	16							15	14	6a	8						
6	B-44-06	Sta. 23+75, 51.0' Lt.	1.9	3.4	-1.9	0.0	1.5	4	5	9	A	12		33	19	14	34	24	58	18	14	6a	6			MN		12	
	CL I-80		3.4	4.9		1.5	3.0	5	6	11		14		35	17	18	39	40	79	17	16	6b	11	Sulfate Content=					Avg. GI = 9
	N: 537558.797		4.9	6.4		3.0	4.5	8	8	16		21								17	16	6b	10	700 ppm					CBR = 6
	E: 2420655.340		6.4	7.9		4.5	6.0	8	11	19		25	12							14	14	6a	8						
7	B-44-07	Sta. 33+04, 52.7' Rt.	1.7	3.2	-1.7	0.0	1.5	7	8	15	A	19		29	18	11	37	27	64	12	14	6a	6						
	CL I-80		3.2	4.7		1.5	3.0	7	8	15		19		43	29	14	25	16	41	14	26	7-6	2	Sulfate Content=					Avg. GI = 9
	N: 536912.572		4.7	6.2		3.0	4.5	9	9	18		23								19	18	7-6	14	520 ppm					CBR = 6
	E: 2421330.757		6.2	7.7		4.5	6.0	11	7	18		23	19							23	18	7-6	14						
8	B-44-08	Sta. 42+33, 51.6' Lt.	1.9	3.4	-1.9	0.0	1.5	4	6	10	A	13		32	16	16	42	34	76	15	16	6b	10						
	CL I-80		3.4	4.9		1.5	3.0	6	8	14		18		30	18	12	31	18	49	8	14	6a	3	Sulfate Content=					Avg. GI = 8
	N: 536423.233		4.9	6.4		3.0	4.5	10	10	20		26								14	16	6b	10	1,033 ppm					CBR = 7
	E: 2422128.748		6.4	7.9		4.5	6.0	6	5	11		14	13							16	16	6b	10						
9	B-44-09	Sta. 51+62, 52.8' Rt.	1.5	3.0	-1.5	0.0	1.5	3	4	7	A	9								15	6	1b	0			N		---	
	CL I-80		3.0	4.5		1.5	3.0	5	8	13		17		33	18	15	46	34	80	17	14	6a	10	Sulfate Content=					Avg. GI = 7
	N: 535713.144		4.5	6.0		3.0	4.5	11	11	22		28		32	19	13	42	33	75	19	14	6a	9	3,146 ppm					CBR = 7
	E: 2422735.960		6.0	7.5		4.5	6.0	11	14	25		32	9							12	14	6a	8						
10	B-44-10	Sta. 60+89, 60.5' Lt.	2.0	3.5	-2.0	0.0	1.5	8	6	14	A	18		29	18	11	42	25	67	12	14	6a	7						
	CL I-80		3.5	5.0		1.5	3.0	8	8	16		21								14	14	6a	8	Sulfate Content=					Avg. GI = 8
	N: 535084.488		5.0	6.5		3.0	4.5	6	7	13		17		31	16	15	46	34	80	16	14	6a	10	1,153 ppm					CBR = 7
	E: 2423427.015		6.5	8.0		4.5	6.0	6	7	13		17	17							17	14	6a	8						
11	B-44-11	Sta. 70+10, 17.4' Rt.	1.3	3.1	-1.3	0.0	1.8	50		50	A	65								17		R			BR		24		
	CL I-80																												Avg. GI = 0
	N: 534281.174																												CBR = 12
	E: 2423887.256												30																
12	B-44-12	Sta. 79+48, 63.0' Lt.	1.8	3.3	-1.8	0.0	1.5	4	8	12	A	16		33	16	17	46	32	78	17	16	6b	11						
	CL I-80		3.3	5.1		1.5	3.3	50		50		65								5		R		Sulfate Content=	BR		24		Avg. GI = 11
	N: 533530.531																							800 ppm					CBR = 6
	E: 2424455.694												16																
13	B-44-13	Sta. 89+17, 26.7' Rt.	2.2	3.4	-1.6	0.6	1.8	2	23	25	A	32									6	1a	0						
	CL I-80		3.4	3.7		1.8	2.1													12		R			BR		24		Avg. GI = 0
	N: 532663.489																												CBR = 12
	E: 2424896.555												30																

	Boring					Subgrade		Standard Penetration						Physical Characteristics						Moisture		Class		Comments	Problem		Undercuts		Analysis
#	B #	Boring Location	Depth	To	Cut Fill	Depth	To	n_2	n_3	N	Rig	N_{60}	N_{60L}	LL	PL	PI	% Silt	% Clay	P 200	M	M_{OPT}	Ohio DOT	GI		w/ Class	w/ MN	UC Class	UC MN	
14	B-44-14	Sta. 98+06, 50.2' Lt.	1.9	3.4	-1.9	0.0	1.5	2	3	5	A	6		34	16	18	48	36	84	23	16	6b	11			N		24	
		CL I-80	3.4	4.9		1.5	3.0	6	6	12		16		34	16	18	45	40	85	23	16	6b	11	Sulfate Content=		M			Avg. GI = 10
		N: 531952.166	4.9	6.4		3.0	4.5	10	9	19		25								16	14	6a	8	60 ppm					CBR = 6
		E: 2425436.045	6.4	7.9		4.5	6.0	13	13	26		34	6							13	14	6a	8						
15	B-44-15	Sta. 107+38, 29.3' Rt.	2.0	3.5	-2.0	0.0	1.5	4	6	10	A	13		44	19	25	37	47	84	16	18	7-6	15						
		CL I-80	3.5	5.0		1.5	3.0	6	8	14		18		35	17	18	43	41	84	14	16	6b	11	Sulfate Content=					Avg. GI = 12
		N: 531121.536	5.0	6.5		3.0	4.5	11	12	23		30								16	16	6b	10	540 ppm					CBR = 5
		E: 2425865.908	6.5	8.0		4.5	6.0	14	19	33		43	13							13	16	6b	10						
16	B-44-16	Sta. 121+84, 59.4' Lt.	1.8	3.3	-1.8	0.0	1.5	5	7	12	A	16		29	17	12	32	23	55	10	14	6a	5						
		CL I-76	3.3	4.8		1.5	3.0	6	7	13		17		39	26	13	28	24	52	15	21	6a	5	Sulfate Content=					Avg. GI = 6
		N: 529945.567	4.8	6.3		3.0	4.5	6	6	12		16								17	16	6b	10	1,660 ppm					CBR = 7
		E: 2426712.442	6.3	7.8		4.5	6.0	10	9	19		25	16							13	10	2-6	2						
17	B-44-17	Sta. 125+87, 29.7' Rt.	1.9	3.4	-1.9	0.0	1.5	4	6	10	A	13		38	18	20	41	47	88	16	16	6b	12						
		CL I-76	3.4	4.9		1.5	3.0	11	7	18		23		35	17	18	41	44	85	14	16	6b	11	Sulfate Content=					Avg. GI = 11
		N: 529557.468	4.9	6.4		3.0	4.5	14	18	32		41								13	16	6b	10	420 ppm					CBR = 6
		E: 2426851.902	6.4	7.9		4.5	6.0	20	26	46		60	13							13	16	6b	10						
18	B-44-18	Sta. 135+22, 50.8' Lt.	1.9	3.4	-1.9	0.0	1.5	4	6	10	A	13		40	17	23	43	43	86	21	16	6b	13			MN		12	
		CL I-76	3.4	4.9		1.5	3.0	7	8	15		19		36	17	19	43	40	83	14	16	6b	12	Sulfate Content=					Avg. GI = 11
		N: 528809.379	4.9	6.4		3.0	4.5	15	15	30		39								19	16	6b	10	800 ppm					CBR = 6
		E: 2427418.858	6.4	7.9		4.5	6.0	11	10	21		27	13							12	16	6b	10						
19	B-44-19	Sta. 144+39, 29.4' Rt.	2.0	3.5	-2.0	0.0	1.5	5	13	18	A	23		29	18	11	40	31	71	16	14	6a	8						
		CL I-76	3.5	5.0		1.5	3.0	10	12	22		28		42	18	24	40	48	88	18	18	7-6	14	Sulfate Content=					Avg. GI = 10
		N: 527990.578	5.0	6.5		3.0	4.5	10	12	22		28								15	14	6a	8	420 ppm					CBR = 6
		E: 2427840.438	6.5	8.0		4.5	6.0	11	15	26		34	23							16	14	6a	8						
20	B-44-20	Sta. 153+79, 51.0' Lt.	2.1	4.6	-2.1	0.0	2.5	2	3	5	A	6		37	19	18	40	47	87	20	16	6b	11			N		24	
		CL I-76	4.6	6.1		2.5	4.0	6	5	11		14		35	18	17	40	46	86	17	16	6b	11	Sulfate Content=					Avg. GI = 12
		N: 527238.756	6.1	7.6		4.0	5.5	7	5	12		16								29	18	7-6	14	820 ppm		M			CBR = 5
		E: 2428409.613	7.6	9.1		5.5	7.0	5	5	10		13	6							20	16	6b				MN		12	
21	B-44-21	Sta. 163+35, 50.8' Rt.	2.2	3.7	-2.2	0.0	1.5	2	5	7	A	9		28	18	10	29	32	61	16	13	4a	5			N		16	
		CL I-76	3.7	5.2		1.5	3.0	3	5	8		10		23	16	7	21	23	44	19	11	4a	2	Sulfate Content=		N		15	Avg. GI = 4
		N: 526375.943	5.2	6.7		3.0	4.5	4	5	9		12								16	10	4a	5	253 ppm		MN		12	CBR = 8
		E: 2428833.500	6.7	8.2		4.5	6.0	8	9	17		22	9							17	10	4a	5			M			
22	B-44-22	Sta. 172+37, 50.8' Lt.	1.9	3.4	-1.9	0.0	1.5	25	13	38	A	49								7	6	1a	0						
		CL I-76	3.4	4.9		1.5	3.0	5	5	10		13		38	18	20	32	49	81	19	16	6b	12	Sulfate Content=					Avg. GI = 11
		N: 525667.130	4.9	6.4		3.0	4.5	10	13	23		30		47	20	27	24	69	93	20	18	7-6	16	1,493 ppm					CBR = 6
		E: 2429400.649	6.4	7.9		4.5	6.0	20	23	43		56	13							23	18	7-6	14						
23	B-44-23	Sta. 180+85, 50.4' Rt.	2.3	3.8	-2.3	0.0	1.5	2	2	4	A	5		35	21	14	32	42	74	20	16	6a	9			N		27	
		CL I-76	3.8	5.3		1.5	3.0	4	3	7		9		33	21	12	28	35	63	18	16	6a	6	Sulfate Content=		N		16	Avg. GI = 8
		N: 524899.537	5.3	6.8		3.0	4.5	3	4	7		9								15	14	6a	8	960 ppm		N		16	CBR = 7
		E: 2429776.457	6.8	8.3		4.5	6.0	6	12	18		23	5							15	14	6a	8						
24	B-44-24	Sta. 190+95, 51.1' Lt.	2.0	3.5	-2.0	0.0	1.5	5	6	11	A	14		34	18	16	37	48	85	16	16	6b	10						
		CL I-76	3.5	5.0		1.5	3.0	9	7	16		21		45	20	25	24	69	93	19	18	7-6	15	Sulfate Content=					Avg. GI = 13
		N: 524154.926	5.0	6.5		3.0	4.5	17	17	34		44								22	18	7-6	14	500 ppm					CBR = 5
		E: 2430466.714	6.5	8.0		4.5	6.0	10	10	20		26	14							24	10	4b			4b	M	36		
25	B-44-25	Sta. 200+02, 50.0' Rt.	2.5	4.0	-2.5	0.0	1.5	4	8	12	A	16		32	21	11	41	46	87	16	16	6a	8						
		CL I-76	4.0	5.5		1.5	3.0	12	15	27		35		37	21	16	42	45	87	16	16	6b	10	Sulfate Content=					Avg. GI = 10
		N: 523412.485	5.5	7.0		3.0	4.5	10	12	22		28								16	16	6b	10	407 ppm					CBR = 6
		E: 2430996.970	7.0	8.5		4.5	6.0	12	16	28		36	16							16	16	6b	10						
26	B-44-26	Sta. 209+53, 51.2' Lt.	2.6	4.7	-2.6	0.0	2.1	26	50	76	A	98								7		R			BR		24		
		CL I-76																											Avg. GI = 0
		N: 522832.041																											CBR = 12
		E: 2431756.377											30																
27	B-44-27	Sta. 217+83, 51.0' Rt.	1.8	3.3	-1.8	0.0	1.5	10	15	25	A	32								12	14	6a	8						
		CL I-76	3.3	4.8		1.5	3.0	17	30	47		61								8		R		Sulfate Content=	BR		24		Avg. GI = 8
		N: 522211.512	4.8	6.3		3.0	4.5	35	50	85		110								8		R		800 ppm	BR		24		CBR = 7
		E: 2432316.316	6.3	7.8		4.5	6.0	45	50	95		123	30							5		R			BR		24		

6350 Presidential Gateway
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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2) OTC PROJECT No. 71-14-08
ADCP No.	B-44-01
DATE TEST PERFORMED	8/19/2014

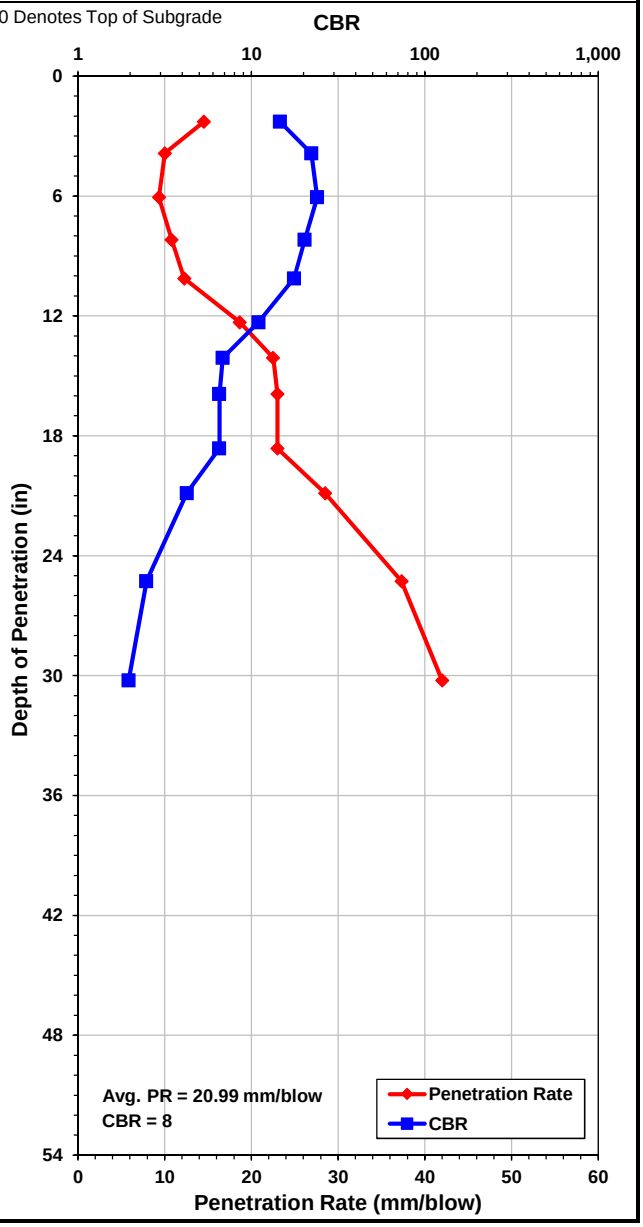
Test Location:	Sta. 541+48, 51.2' Rt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	996 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Garret F.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 23 in	Output File Name:	N/A
Test Elevation:	994.08 ft msl	Termination Depth:	30.24 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
4	2.28	58.00	14.50	14.50	14.6
4	3.86	40.00	10.00	10.00	22.2
6	6.06	56.00	9.33	9.33	23.9
5	8.19	54.00	10.80	10.80	20.3
4	10.12	49.00	12.25	12.25	17.6
3	12.32	56.00	18.67	18.67	11.0
2	14.09	45.00	22.50	22.50	6.8
2	15.91	46.00	23.00	23.00	6.5
3	18.62	69.00	23.00	23.00	6.5
2	20.87	57.00	28.50	28.50	4.3
3	25.28	112.00	37.33	37.33	2.5
3	30.24	126.00	42.00	42.00	2.0

Notes:

Graphical Penetration Rate Plot



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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2) OTC PROJECT No. 71-14-08
ADCP No.	B-44-02
DATE TEST PERFORMED	8/13/2014

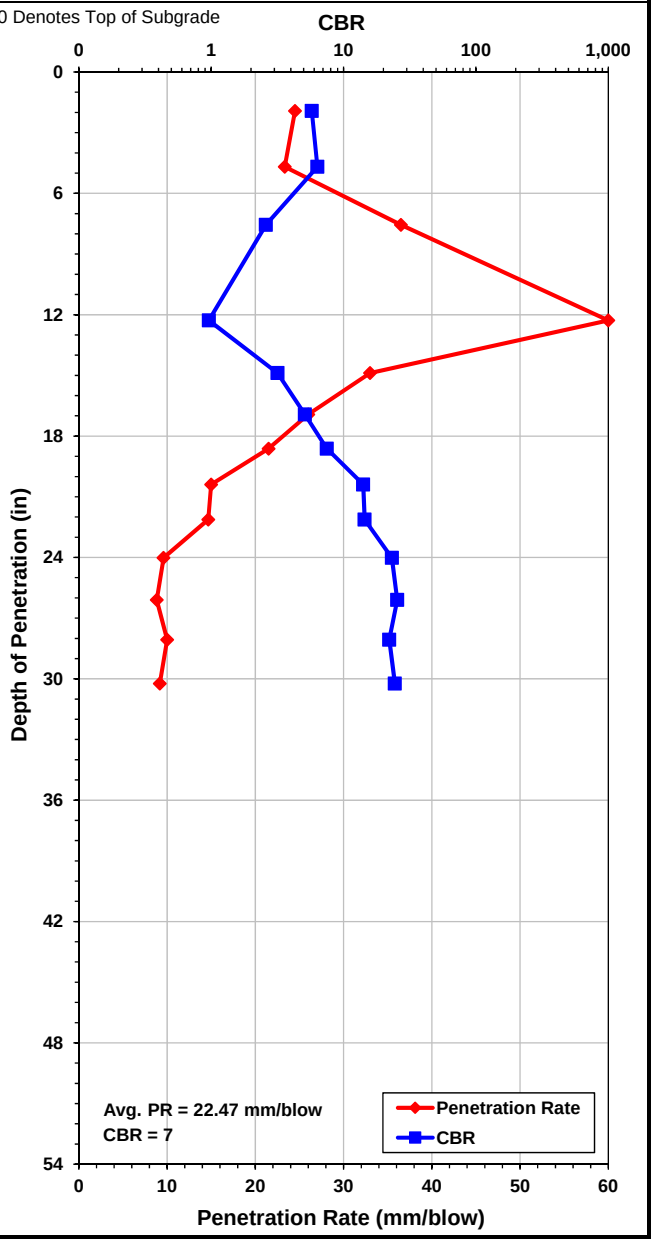
Test Location:	Sta. 550+77, 50.8' Lt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	1000.3 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Garret F.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 23 in	Output File Name:	N/A
Test Elevation:	998.38 ft msl	Termination Depth:	30.24 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
2	1.93	49.00	24.50	24.50	5.8
3	4.69	70.00	23.33	23.33	6.3
2	7.56	73.00	36.50	36.50	2.6
2	12.28	120.00	60.00	60.00	1.0
2	14.88	66.00	33.00	33.00	3.2
2	16.93	52.00	26.00	26.00	5.1
2	18.62	43.00	21.50	21.50	7.5
3	20.39	45.00	15.00	15.00	14.1
3	22.13	44.00	14.67	14.67	14.4
5	24.02	48.00	9.60	9.60	23.2
6	26.10	53.00	8.83	8.83	25.5
5	28.07	50.00	10.00	10.00	22.2
6	30.24	55.00	9.17	9.17	24.4

Notes:

Graphical Penetration Rate Plot



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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2) OTC PROJECT No. 71-14-08
ADCP No.	B-44-03
DATE TEST PERFORMED	8/19/2014

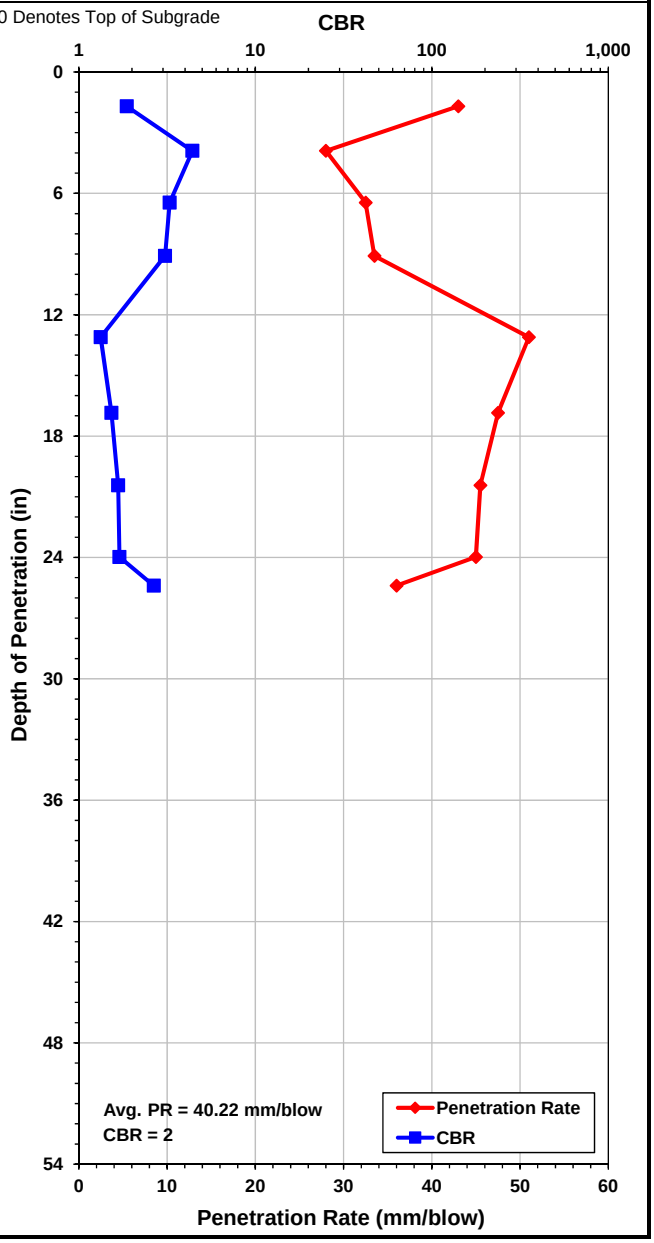
Test Location:	Sta. 558+33, 48.1' Rt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	1002.5 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Garret F.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 23 in	Output File Name:	N/A
Test Elevation:	1000.58 ft msl	Termination Depth:	25.39 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
1	1.69	43.00	43.00	43.00	1.9
2	3.90	56.00	28.00	28.00	4.4
2	6.46	65.00	32.50	32.50	3.3
2	9.09	67.00	33.50	33.50	3.1
2	13.11	102.00	51.00	51.00	1.3
2	16.85	95.00	47.50	47.50	1.5
2	20.43	91.00	45.50	45.50	1.7
2	23.98	90.00	45.00	45.00	1.7
1	25.39	36.00	36.00	36.00	2.7

Notes:

Graphical Penetration Rate Plot



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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2)
OTC PROJECT No.	71-14-08
ADCP No.	B-44-04
DATE TEST PERFORMED	8/13/2014

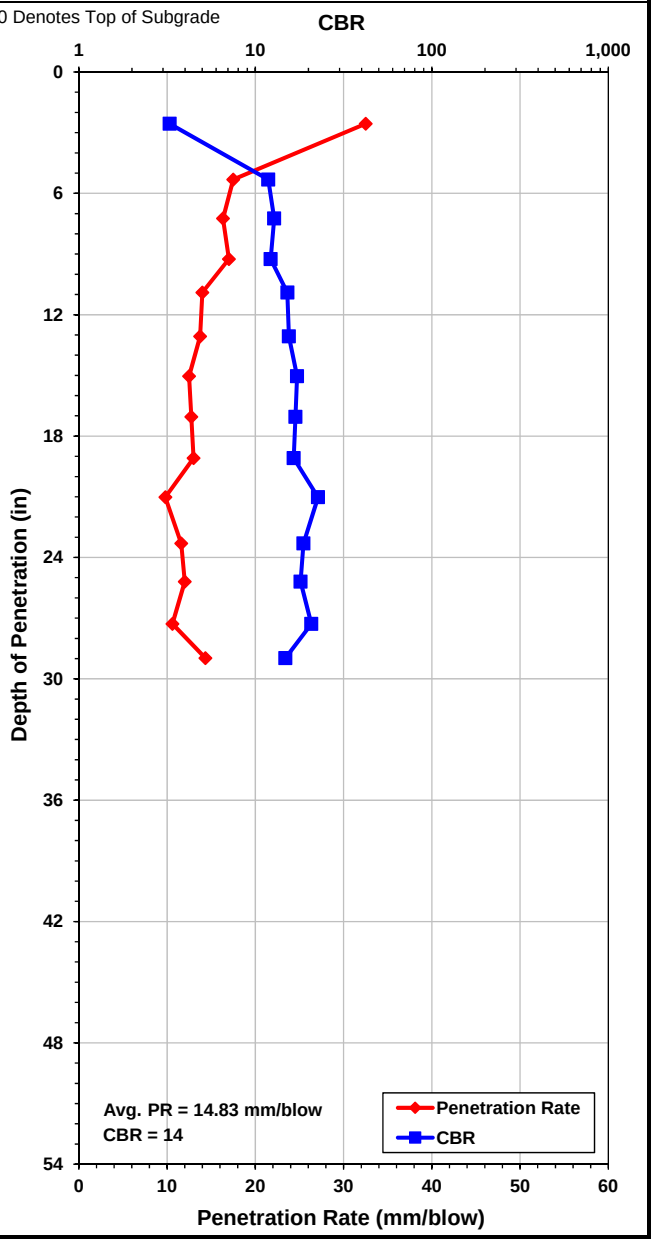
Test Location:	Sta. 5+17, 51.8' Lt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	998.5 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Garret F.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 23 in	Output File Name:	N/A
Test Elevation:	996.58 ft msl	Termination Depth:	28.98 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
2	2.56	65.00	32.50	32.50	3.3
4	5.31	70.00	17.50	17.50	11.8
3	7.24	49.00	16.33	16.33	12.8
3	9.25	51.00	17.00	17.00	12.2
3	10.91	42.00	14.00	14.00	15.2
4	13.07	55.00	13.75	13.75	15.5
4	15.04	50.00	12.50	12.50	17.3
4	17.05	51.00	12.75	12.75	16.9
4	19.09	52.00	13.00	13.00	16.5
5	21.02	49.00	9.80	9.80	22.7
5	23.31	58.00	11.60	11.60	18.8
4	25.20	48.00	12.00	12.00	18.1
5	27.28	53.00	10.60	10.60	20.8
3	28.98	43.00	14.33	14.33	14.8

Notes:

Graphical Penetration Rate Plot



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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2) OTC PROJECT No. 71-14-08
ADCP No.	B-44-05
DATE TEST PERFORMED	8/19/2014

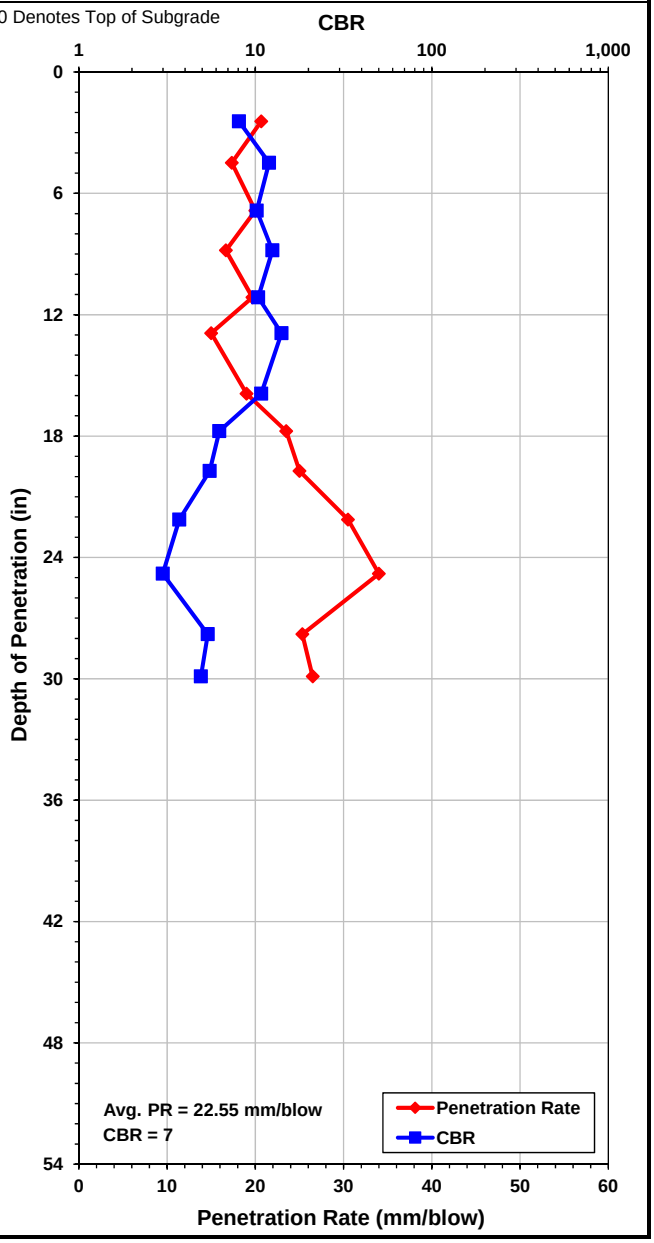
Test Location:	Sta. 14+46, 52.1' Rt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	1003.9 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Garret F.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 22 in	Output File Name:	N/A
Test Elevation:	1002.07 ft msl	Termination Depth:	29.88 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
3	2.44	62.00	20.67	20.67	8.1
3	4.49	52.00	17.33	17.33	12.0
3	6.85	60.00	20.00	20.00	10.2
3	8.82	50.00	16.67	16.67	12.5
3	11.14	59.00	19.67	19.67	10.4
3	12.91	45.00	15.00	15.00	14.1
4	15.91	76.00	19.00	19.00	10.8
2	17.76	47.00	23.50	23.50	6.3
2	19.72	50.00	25.00	25.00	5.5
2	22.13	61.00	30.50	30.50	3.7
2	24.80	68.00	34.00	34.00	3.0
3	27.80	76.00	25.33	25.33	5.4
2	29.88	53.00	26.50	26.50	4.9

Notes:

Graphical Penetration Rate Plot



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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2) OTC PROJECT No. 71-14-08
ADCP No.	B-44-06
DATE TEST PERFORMED	8/13/2014

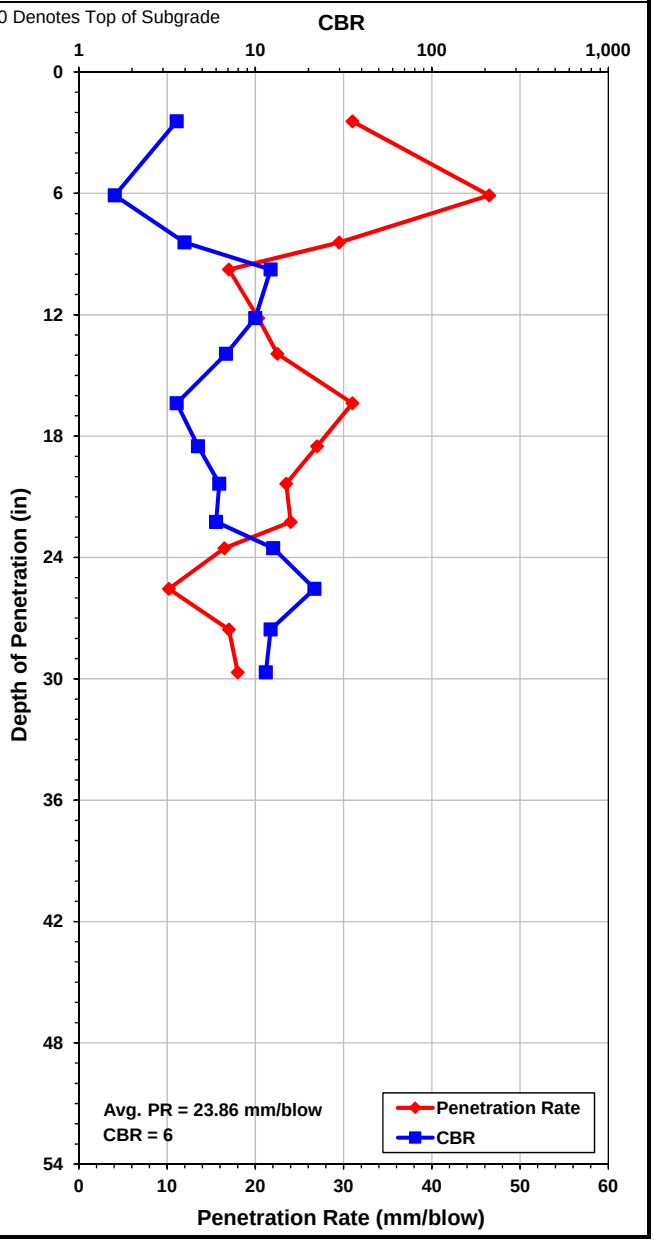
Test Location:	Sta. 23+75, 51.0' Lt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	1013.2 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Garret F.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 23 in	Output File Name:	N/A
Test Elevation:	1011.28 ft msl	Termination Depth:	29.69 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
2	2.44	62.00	31.00	31.00	3.6
2	6.10	93.00	46.50	46.50	1.6
2	8.43	59.00	29.50	29.50	4.0
2	9.76	34.00	17.00	17.00	12.2
3	12.17	61.00	20.33	20.33	10.0
2	13.94	45.00	22.50	22.50	6.8
2	16.38	62.00	31.00	31.00	3.6
2	18.50	54.00	27.00	27.00	4.7
2	20.35	47.00	23.50	23.50	6.3
2	22.24	48.00	24.00	24.00	6.0
2	23.54	33.00	16.50	16.50	12.6
5	25.55	51.00	10.20	10.20	21.7
3	27.56	51.00	17.00	17.00	12.2
3	29.69	54.00	18.00	18.00	11.5

Notes:

Graphical Penetration Rate Plot



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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2) OTC PROJECT No. 71-14-08
ADCP No.	B-44-07
DATE TEST PERFORMED	8/19/2014

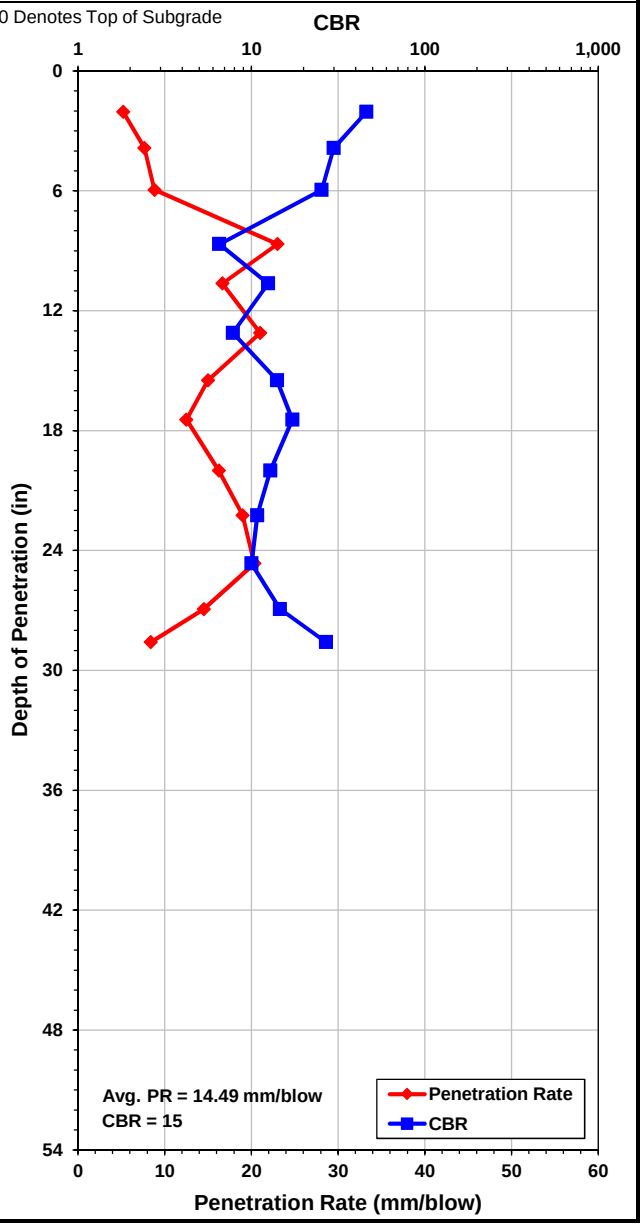
Test Location:	Sta. 33+04, 52.7' Rt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	1017.9 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Garret F.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 20 in	Output File Name:	N/A
Test Elevation:	1016.23 ft msl	Termination Depth:	28.58 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
10	2.05	52.00	5.20	5.20	46.1
6	3.86	46.00	7.67	7.67	29.8
6	5.94	53.00	8.83	8.83	25.5
3	8.66	69.00	23.00	23.00	6.5
3	10.63	50.00	16.67	16.67	12.5
3	13.11	63.00	21.00	21.00	7.8
4	15.47	60.00	15.00	15.00	14.1
4	17.44	50.00	12.50	12.50	17.3
4	20.00	65.00	16.25	16.25	12.9
3	22.24	57.00	19.00	19.00	10.8
3	24.65	61.00	20.33	20.33	10.0
4	26.93	58.00	14.50	14.50	14.6
5	28.58	42.00	8.40	8.40	26.9

Notes:

Graphical Penetration Rate Plot



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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2) OTC PROJECT No. 71-14-08
ADCP No.	B-44-08
DATE TEST PERFORMED	8/14/2014

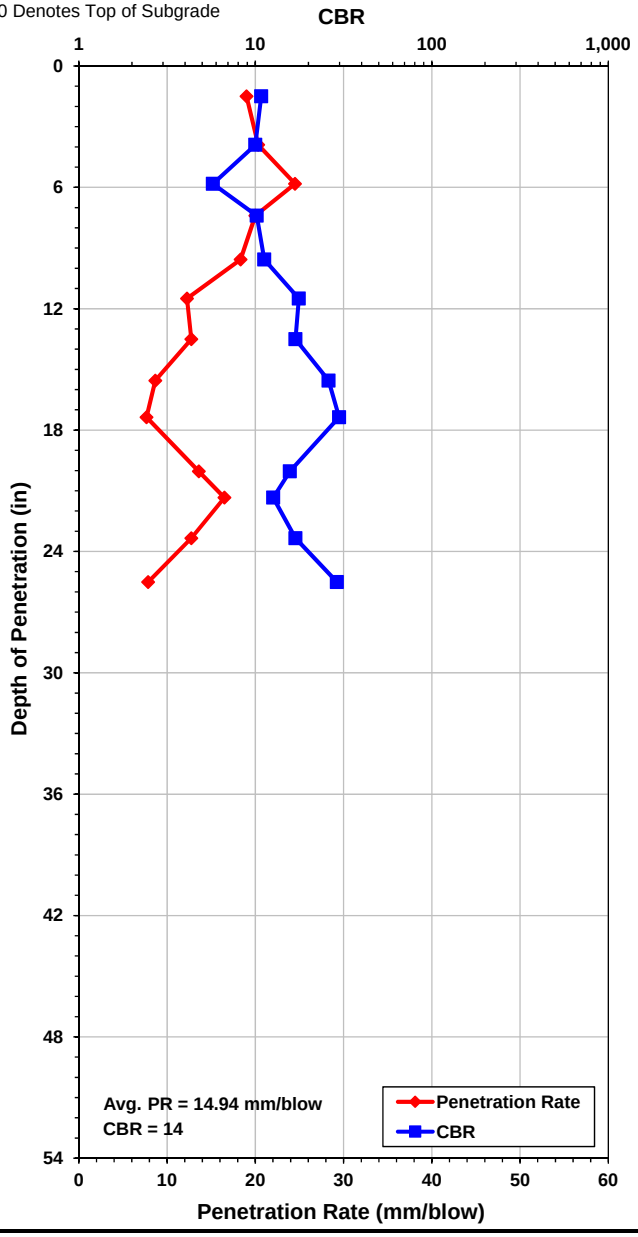
Test Location:	Sta. 42+33, 51.6' Lt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	1009.5 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Garret F.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 23 in	Output File Name:	N/A
Test Elevation:	1007.58 ft msl	Termination Depth:	25.51 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
2	1.50	38.00	19.00	19.00	10.8
3	3.90	61.00	20.33	20.33	10.0
2	5.83	49.00	24.50	24.50	5.8
2	7.40	40.00	20.00	20.00	10.2
3	9.57	55.00	18.33	18.33	11.2
4	11.50	49.00	12.25	12.25	17.6
4	13.50	51.00	12.75	12.75	16.9
6	15.55	52.00	8.67	8.67	26.0
6	17.36	46.00	7.67	7.67	29.8
5	20.04	68.00	13.60	13.60	15.7
2	21.34	33.00	16.50	16.50	12.6
4	23.35	51.00	12.75	12.75	16.9
7	25.51	55.00	7.86	7.86	29.0

Notes:

Graphical Penetration Rate Plot



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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2) OTC PROJECT No. 71-14-08
ADCP No.	B-44-09
DATE TEST PERFORMED	8/19/2014

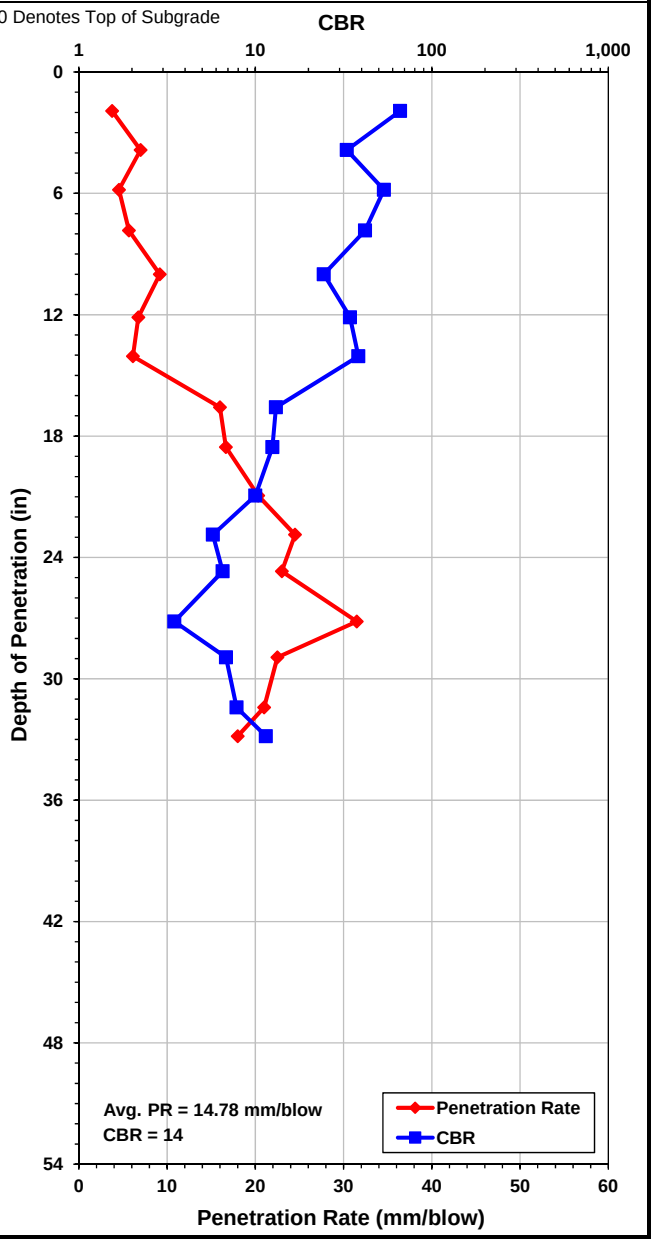
Test Location:	Sta. 51+62, 52.8' Rt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	991.5 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Garret F.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Base, 17 in	Output File Name:	N/A
Test Elevation:	990.08 ft msl	Termination Depth:	32.83 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
13	1.93	49.00	3.77	3.77	66.1
7	3.86	49.00	7.00	7.00	33.0
11	5.83	50.00	4.55	4.55	53.6
9	7.83	51.00	5.67	5.67	41.8
6	10.00	55.00	9.17	9.17	24.4
8	12.13	54.00	6.75	6.75	34.4
8	14.06	49.00	6.12	6.12	38.4
4	16.57	64.00	16.00	16.00	13.1
3	18.54	50.00	16.67	16.67	12.5
3	20.94	61.00	20.33	20.33	10.0
2	22.87	49.00	24.50	24.50	5.8
2	24.69	46.00	23.00	23.00	6.5
2	27.17	63.00	31.50	31.50	3.5
2	28.94	45.00	22.50	22.50	6.8
3	31.42	63.00	21.00	21.00	7.8
2	32.83	36.00	18.00	18.00	11.5

Notes:

Graphical Penetration Rate Plot



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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2)
OTC PROJECT No.	71-14-08
ADCP No.	B-44-10
DATE TEST PERFORMED	8/14/2014

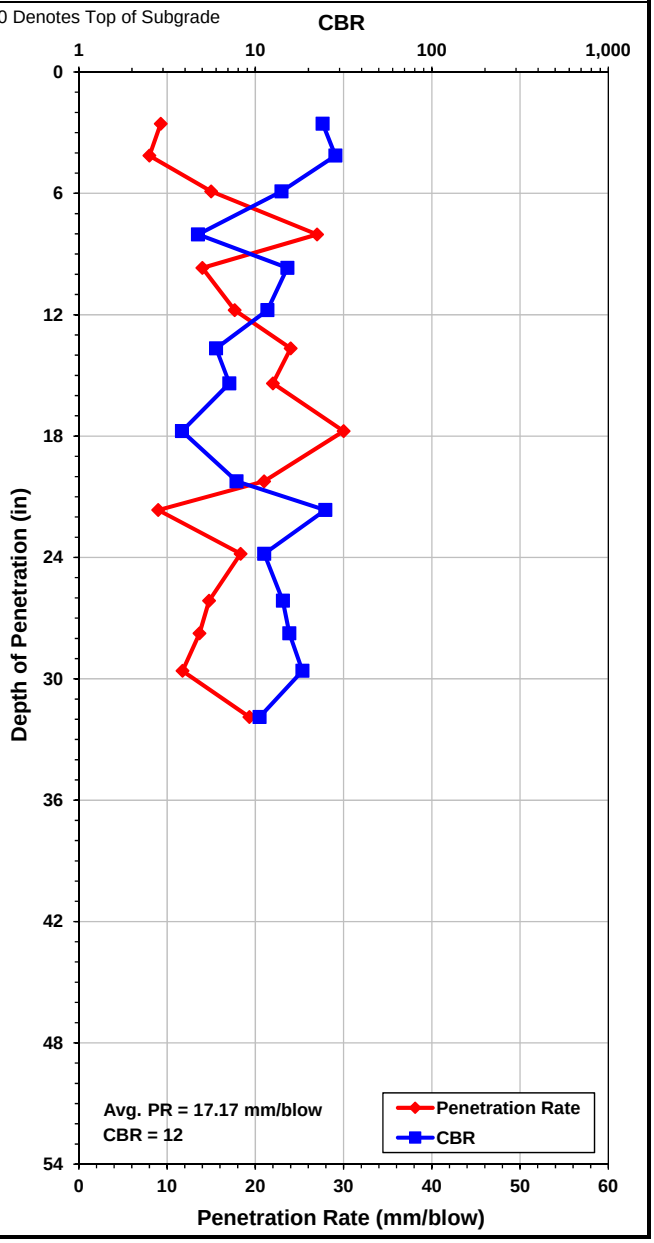
Test Location:	Sta. 60+89, 60.5' Lt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	981.3 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Garret F.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Slag, 24 in	Output File Name:	N/A
Test Elevation:	979.3 ft msl	Termination Depth:	31.89 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
7	2.56	65.00	9.29	9.29	24.1
5	4.13	40.00	8.00	8.00	28.4
3	5.91	45.00	15.00	15.00	14.1
2	8.03	54.00	27.00	27.00	4.7
3	9.69	42.00	14.00	14.00	15.2
3	11.77	53.00	17.67	17.67	11.7
2	13.66	48.00	24.00	24.00	6.0
2	15.39	44.00	22.00	22.00	7.1
2	17.76	60.00	30.00	30.00	3.8
3	20.24	63.00	21.00	21.00	7.8
4	21.65	36.00	9.00	9.00	24.9
3	23.82	55.00	18.33	18.33	11.2
4	26.14	59.00	14.75	14.75	14.3
3	27.76	41.00	13.67	13.67	15.6
4	29.61	47.00	11.75	11.75	18.5
3	31.89	58.00	19.33	19.33	10.6

Notes:

Graphical Penetration Rate Plot



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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2) OTC PROJECT No. 71-14-08
ADCP No.	B-44-11
DATE TEST PERFORMED	8/26/2014

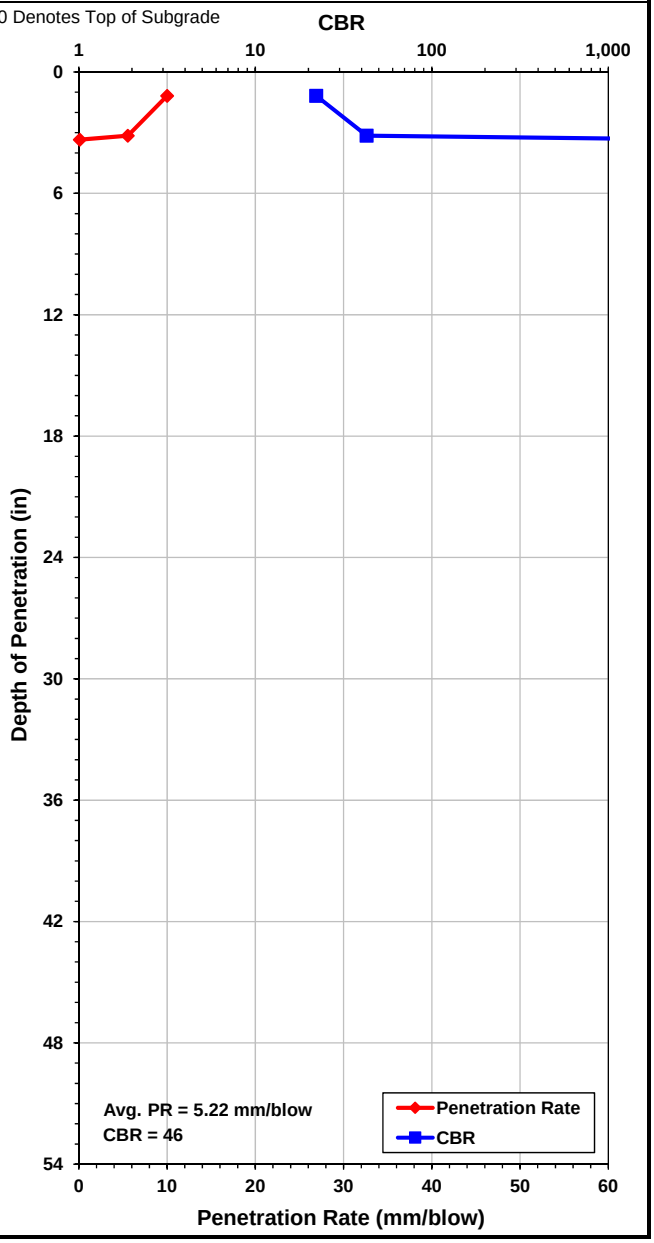
Test Location:	Sta. 70+10, 17.4' Rt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	982.6 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Steve B.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt, 16 in	Output File Name:	N/A
Test Elevation:	981.27 ft msl	Termination Depth:	3.35 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
3	1.18	30.00	10.00	10.00	22.2
9	3.15	50.00	5.56	5.56	42.8
50	3.35	5.00	0.10	0.10	3849.3

Notes: Refusal

Graphical Penetration Rate Plot



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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2)
OTC PROJECT No.	71-14-08
ADCP No.	B-44-12
DATE TEST PERFORMED	8/14/2014

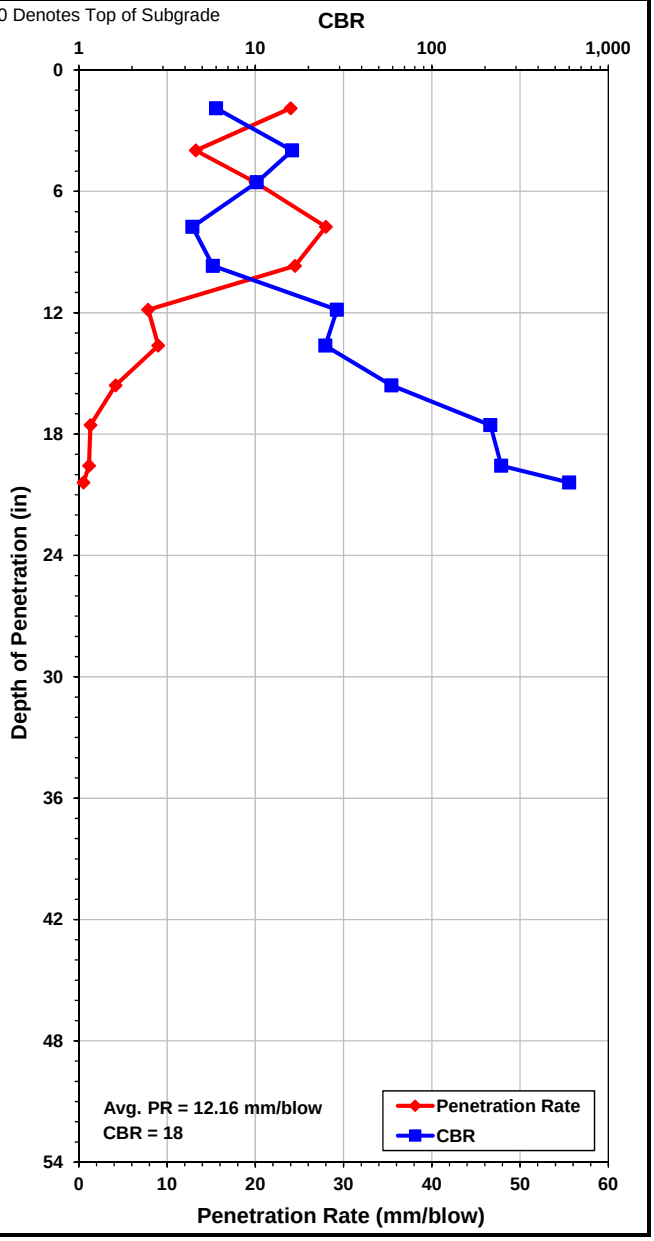
Test Location:	Sta. 79+48, 63.0' Lt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	994.8 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Garret F.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Slag, 22 in	Output File Name:	N/A
Test Elevation:	992.97 ft msl	Termination Depth:	20.39 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
2	1.89	48.00	24.00	24.00	6.0
4	3.98	53.00	13.25	13.25	16.2
2	5.55	40.00	20.00	20.00	10.2
2	7.76	56.00	28.00	28.00	4.4
2	9.69	49.00	24.50	24.50	5.8
7	11.85	55.00	7.86	7.86	29.0
5	13.62	45.00	9.00	9.00	24.9
12	15.59	50.00	4.17	4.17	59.0
38	17.56	50.00	1.32	1.32	214.7
44	19.57	51.00	1.16	1.16	247.5
40	20.39	21.00	0.53	0.53	600.9

Notes:

Graphical Penetration Rate Plot



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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2) OTC PROJECT No. 71-14-08
ADCP No.	B-44-13
DATE TEST PERFORMED	8/28/2014

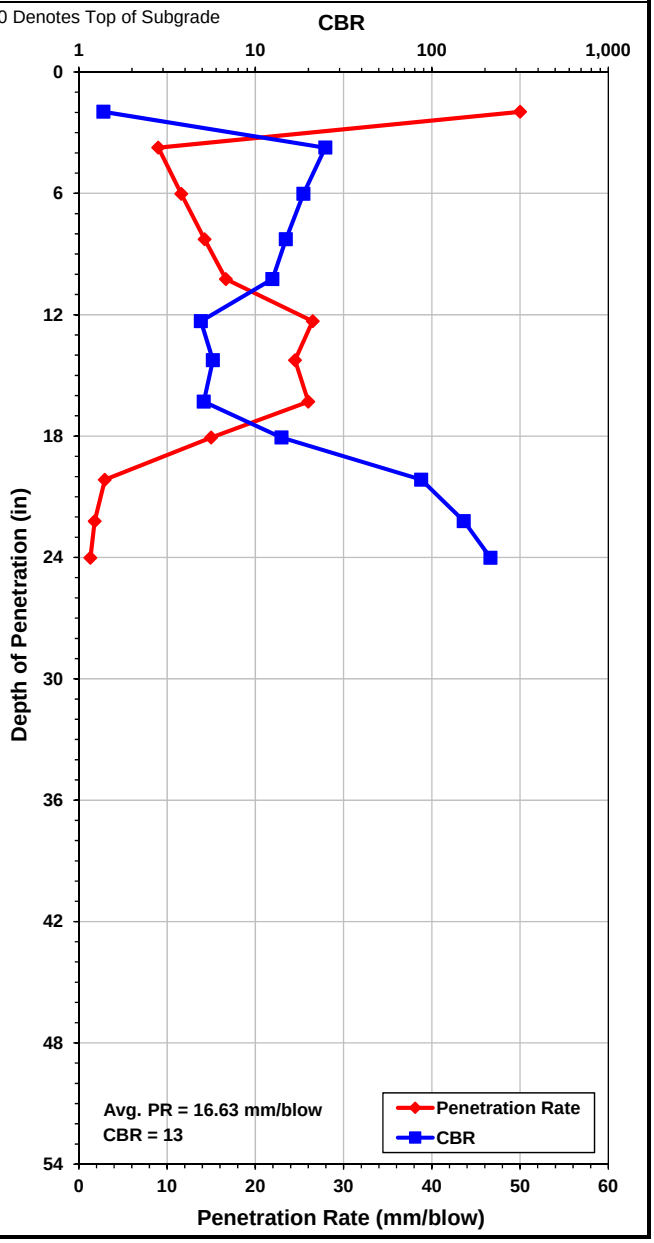
Test Location:	Sta. 89+17, 26.7' Rt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	1008.9 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:		Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Base, 19 in	Output File Name:	N/A
Test Elevation:	1007.32 ft msl	Termination Depth:	24.02 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
1	1.97	50.00	50.00	50.00	1.4
5	3.74	45.00	9.00	9.00	24.9
5	6.02	58.00	11.60	11.60	18.8
4	8.27	57.00	14.25	14.25	14.9
3	10.24	50.00	16.67	16.67	12.5
2	12.32	53.00	26.50	26.50	4.9
2	14.25	49.00	24.50	24.50	5.8
2	16.30	52.00	26.00	26.00	5.1
3	18.07	45.00	15.00	15.00	14.1
18	20.16	53.00	2.94	2.94	87.1
29	22.20	52.00	1.79	1.79	151.8
35	24.02	46.00	1.31	1.31	215.0

Notes:

Graphical Penetration Rate Plot



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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2) OTC PROJECT No. 71-14-08
ADCP No.	B-44-14
DATE TEST PERFORMED	8/15/2014

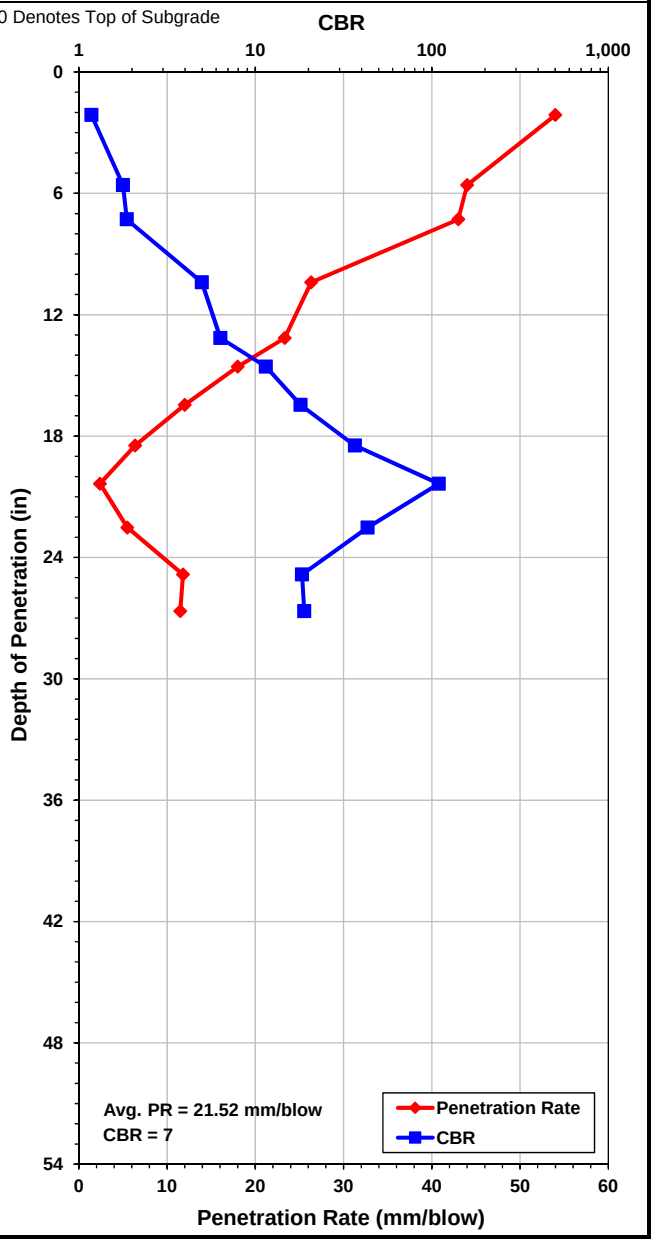
Test Location:	Sta. 98+06, 50.2' Lt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	1013.9 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Garret F.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 23 in	Output File Name:	N/A
Test Elevation:	1011.98 ft msl	Termination Depth:	26.65 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
1	2.13	54.00	54.00	54.00	1.2
2	5.59	88.00	44.00	44.00	1.8
1	7.28	43.00	43.00	43.00	1.9
3	10.39	79.00	26.33	26.33	5.0
3	13.15	70.00	23.33	23.33	6.3
2	14.57	36.00	18.00	18.00	11.5
4	16.46	48.00	12.00	12.00	18.1
8	18.46	51.00	6.38	6.38	36.7
20	20.35	48.00	2.40	2.40	109.5
10	22.52	55.00	5.50	5.50	43.3
5	24.84	59.00	11.80	11.80	18.4
4	26.65	46.00	11.50	11.50	18.9

Notes:

Graphical Penetration Rate Plot



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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2) OTC PROJECT No. 71-14-08
ADCP No.	B-44-15
DATE TEST PERFORMED	8/27/2014

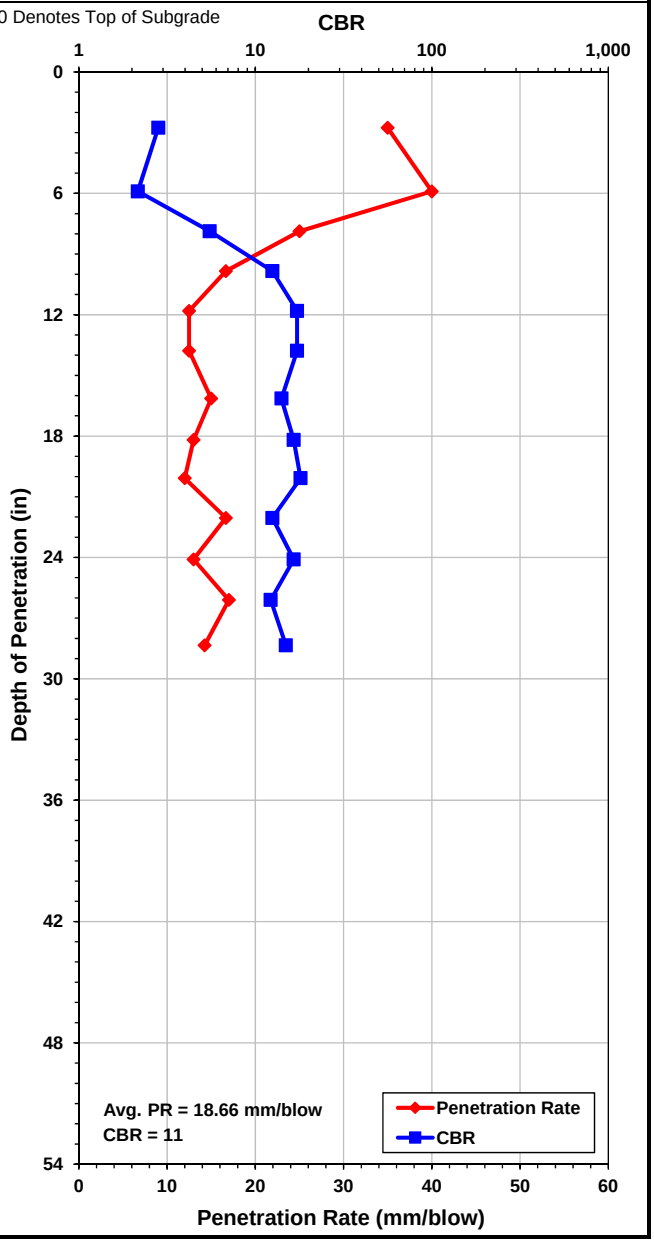
Test Location:	Sta. 107+38, 29.3' Rt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	1009.8 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Steve B.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 24 in	Output File Name:	N/A
Test Elevation:	1007.8 ft msl	Termination Depth:	28.35 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
2	2.76	70.00	35.00	35.00	2.8
2	5.91	80.00	40.00	40.00	2.2
2	7.87	50.00	25.00	25.00	5.5
3	9.84	50.00	16.67	16.67	12.5
4	11.81	50.00	12.50	12.50	17.3
4	13.78	50.00	12.50	12.50	17.3
4	16.14	60.00	15.00	15.00	14.1
4	18.19	52.00	13.00	13.00	16.5
4	20.08	48.00	12.00	12.00	18.1
3	22.05	50.00	16.67	16.67	12.5
4	24.09	52.00	13.00	13.00	16.5
3	26.10	51.00	17.00	17.00	12.2
4	28.35	57.00	14.25	14.25	14.9

Notes:

Graphical Penetration Rate Plot



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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2)
OTC PROJECT No.	71-14-08
ADCP No.	B-44-16
DATE TEST PERFORMED	8/15/2014

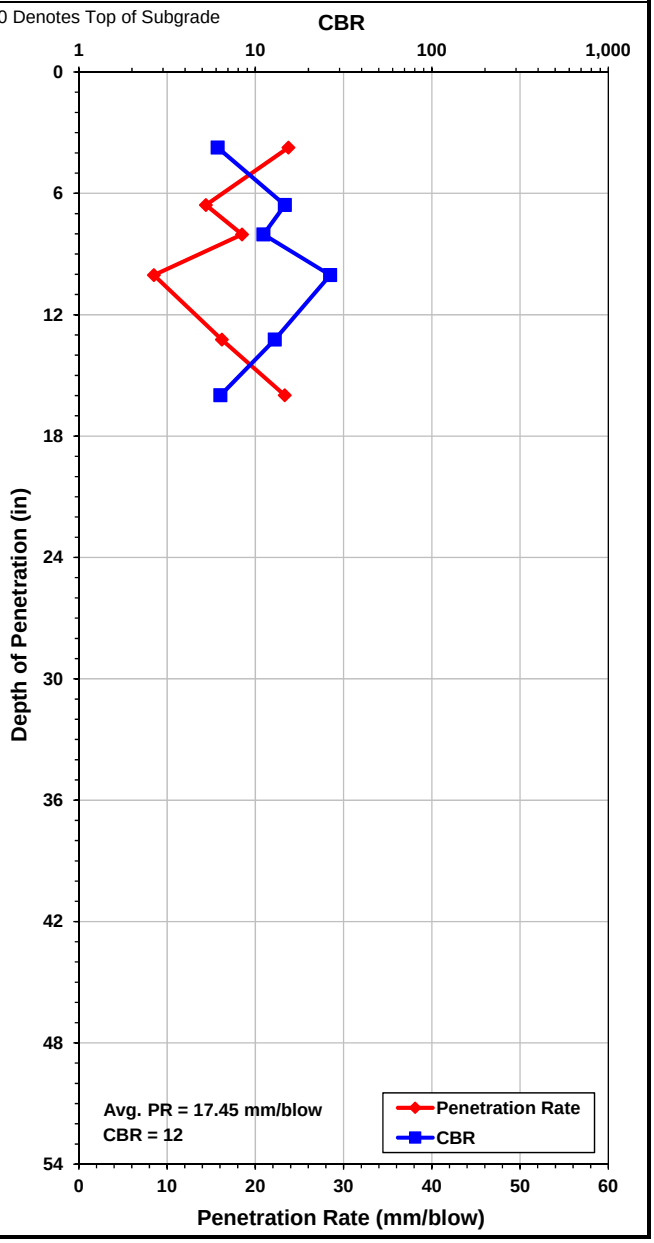
Test Location:	Sta. 121+84, 59.4' Lt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	1002.4 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Garret F.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 22 in	Output File Name:	N/A
Test Elevation:	1000.57 ft msl	Termination Depth:	15.98 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
4	3.74	95.00	23.75	23.75	6.1
5	6.57	72.00	14.40	14.40	14.7
2	8.03	37.00	18.50	18.50	11.1
6	10.04	51.00	8.50	8.50	26.6
5	13.23	81.00	16.20	16.20	12.9
3	15.98	70.00	23.33	23.33	6.3

Notes:

Graphical Penetration Rate Plot



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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2)
OTC PROJECT No.	71-14-08
ADCP No.	B-44-17
DATE TEST PERFORMED	8/27/2014

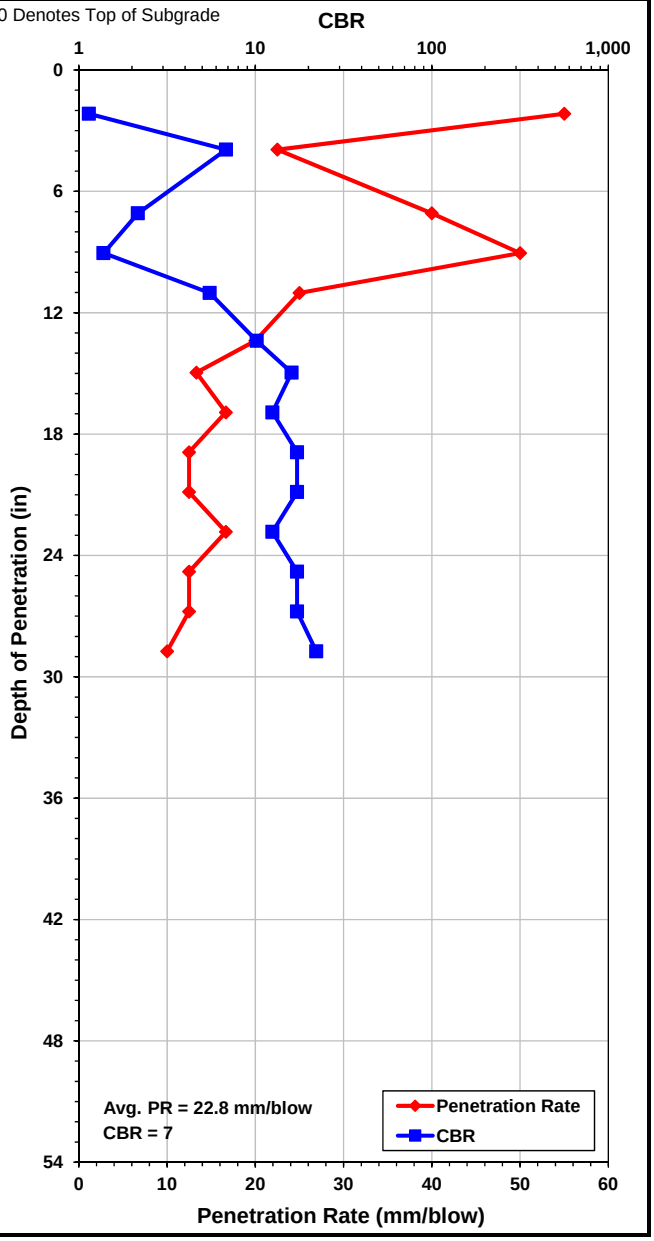
Test Location:	Sta. 125+87, 29.7' Rt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	1000.6 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Steve B.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 23 in	Output File Name:	N/A
Test Elevation:	998.68 ft msl	Termination Depth:	28.74 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
1	2.17	55.00	55.00	55.00	1.1
2	3.94	45.00	22.50	22.50	6.8
2	7.09	80.00	40.00	40.00	2.2
1	9.06	50.00	50.00	50.00	1.4
2	11.02	50.00	25.00	25.00	5.5
3	13.39	60.00	20.00	20.00	10.2
3	14.96	40.00	13.33	13.33	16.0
3	16.93	50.00	16.67	16.67	12.5
4	18.90	50.00	12.50	12.50	17.3
4	20.87	50.00	12.50	12.50	17.3
3	22.83	50.00	16.67	16.67	12.5
4	24.80	50.00	12.50	12.50	17.3
4	26.77	50.00	12.50	12.50	17.3
5	28.74	50.00	10.00	10.00	22.2

Notes:

Graphical Penetration Rate Plot



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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2) OTC PROJECT No. 71-14-08
ADCP No.	B-44-18
DATE TEST PERFORMED	8/14/2014

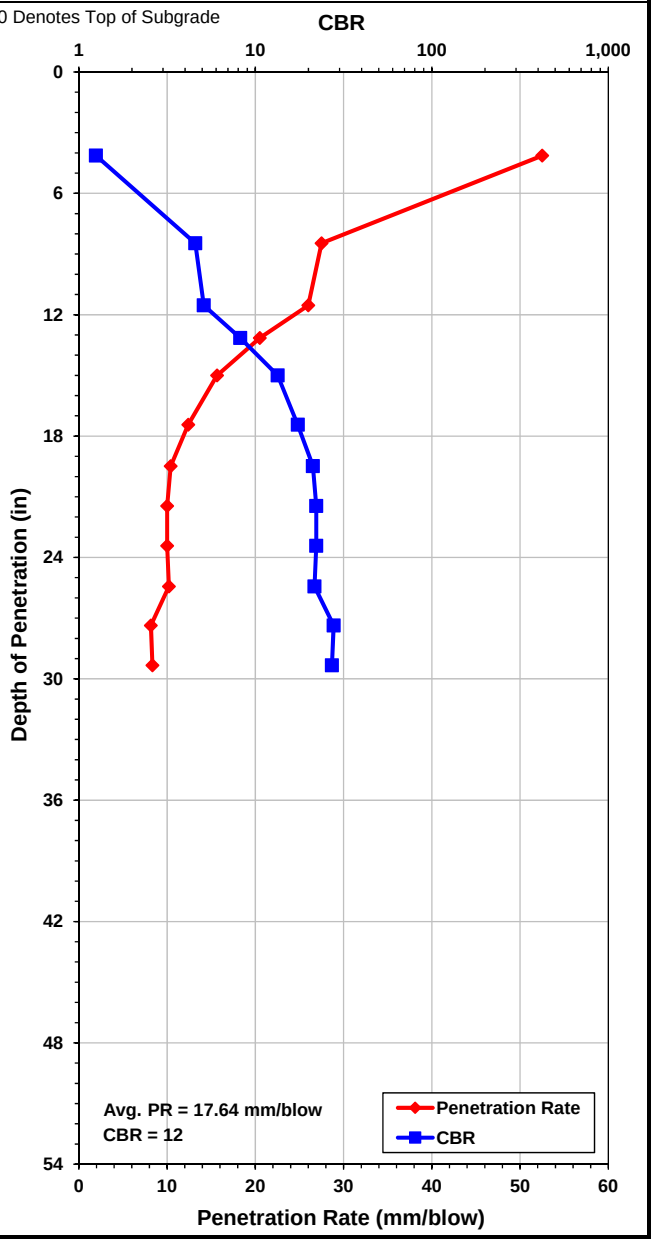
Test Location:	Sta. 135+22, 50.8' Lt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	995.6 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Garret F.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 23 in	Output File Name:	N/A
Test Elevation:	993.68 ft msl	Termination Depth:	29.33 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
2	4.13	105.00	52.50	52.50	1.3
4	8.46	110.00	27.50	27.50	4.6
3	11.54	78.00	26.00	26.00	5.1
2	13.15	41.00	20.50	20.50	8.2
3	15.00	47.00	15.67	15.67	13.4
5	17.44	62.00	12.40	12.40	17.4
5	19.49	52.00	10.40	10.40	21.2
5	21.46	50.00	10.00	10.00	22.2
5	23.43	50.00	10.00	10.00	22.2
5	25.43	51.00	10.20	10.20	21.7
6	27.36	49.00	8.17	8.17	27.8
6	29.33	50.00	8.33	8.33	27.2

Notes:

Graphical Penetration Rate Plot



6350 Presidential Gateway
Columbus, Ohio 43231
Telephone: (614) 823-4949
Fax Number: (614) 823-4990

Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2) OTC PROJECT No. 71-14-08
ADCP No.	B-44-19
DATE TEST PERFORMED	8/27/2014

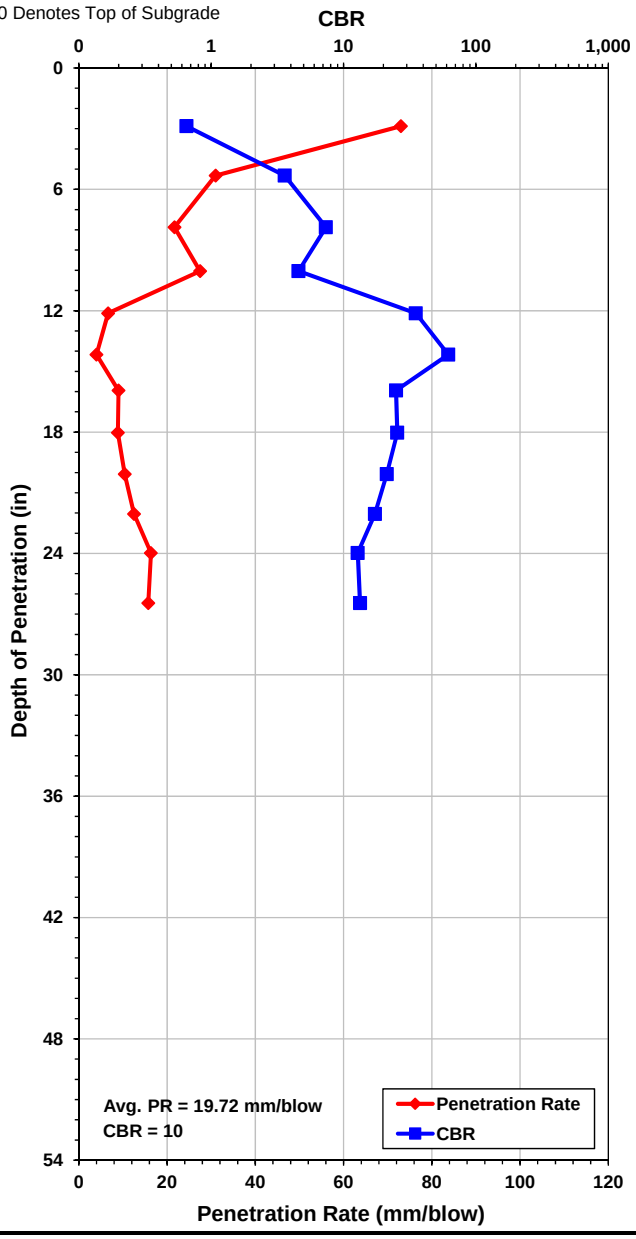
Test Location:	Sta. 144+39, 29.4' Rt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	990.4 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Steve B.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 24 in	Output File Name:	N/A
Test Elevation:	988.4 ft msl	Termination Depth:	26.46 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
1	2.87	73.00	73.00	73.00	0.7
2	5.31	62.00	31.00	31.00	3.6
3	7.87	65.00	21.67	21.67	7.4
2	10.04	55.00	27.50	27.50	4.6
8	12.13	53.00	6.63	6.63	35.1
13	14.17	52.00	4.00	4.00	61.8
5	15.94	45.00	9.00	9.00	24.9
6	18.03	53.00	8.83	8.83	25.5
5	20.08	52.00	10.40	10.40	21.2
4	22.05	50.00	12.50	12.50	17.3
3	23.98	49.00	16.33	16.33	12.8
4	26.46	63.00	15.75	15.75	13.3

Notes:

Graphical Penetration Rate Plot



6350 Presidential Gateway
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Fax Number: (614) 823-4990

Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2) OTC PROJECT No. 71-14-08
ADCP No.	B-44-20
DATE TEST PERFORMED	8/15/2014

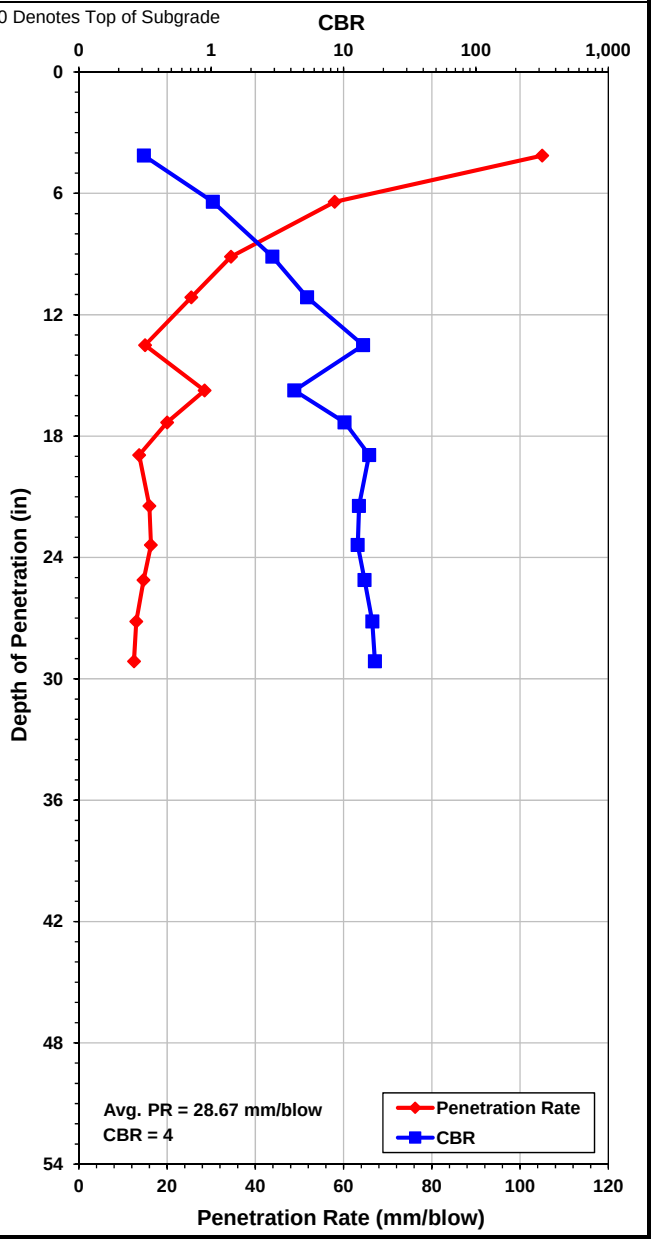
Test Location:	Sta. 153+79, 51.0' Lt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	983.7 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Garret F.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 26 in	Output File Name:	N/A
Test Elevation:	981.53 ft msl	Termination Depth:	29.13 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
1	4.13	105.00	105.00	105.00	0.3
1	6.42	58.00	58.00	58.00	1.0
2	9.13	69.00	34.50	34.50	2.9
2	11.14	51.00	25.50	25.50	5.3
4	13.50	60.00	15.00	15.00	14.1
2	15.75	57.00	28.50	28.50	4.3
2	17.32	40.00	20.00	20.00	10.2
3	18.94	41.00	13.67	13.67	15.6
4	21.46	64.00	16.00	16.00	13.1
3	23.39	49.00	16.33	16.33	12.8
3	25.12	44.00	14.67	14.67	14.4
4	27.17	52.00	13.00	13.00	16.5
4	29.13	50.00	12.50	12.50	17.3

Notes:

Graphical Penetration Rate Plot



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Fax Number: (614) 823-4990

Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2) OTC PROJECT No. 71-14-08
ADCP No.	B-44-21
DATE TEST PERFORMED	9/4/2014

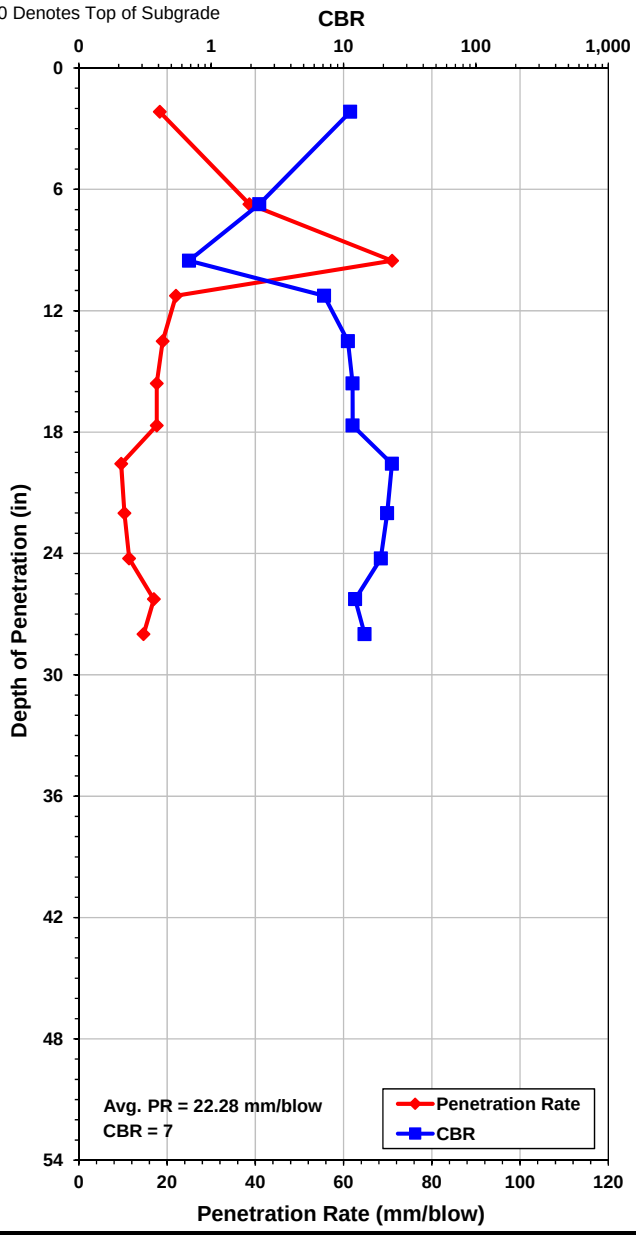
Test Location:	Sta. 163+35, 50.8' Rt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	972.6 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Ryan B.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 26 in	Output File Name:	N/A
Test Elevation:	970.43 ft msl	Termination Depth:	27.99 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
3	2.17	55.00	18.33	18.33	11.2
3	6.73	116.00	38.67	38.67	2.3
1	9.53	71.00	71.00	71.00	0.7
2	11.26	44.00	22.00	22.00	7.1
3	13.50	57.00	19.00	19.00	10.8
3	15.59	53.00	17.67	17.67	11.7
3	17.68	53.00	17.67	17.67	11.7
5	19.57	48.00	9.60	9.60	23.2
6	22.01	62.00	10.33	10.33	21.4
5	24.25	57.00	11.40	11.40	19.1
3	26.26	51.00	17.00	17.00	12.2
3	27.99	44.00	14.67	14.67	14.4

Notes:

Graphical Penetration Rate Plot



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Fax Number: (614) 823-4990

Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2) OTC PROJECT No. 71-14-08
ADCP No.	B-44-22
DATE TEST PERFORMED	8/15/2014

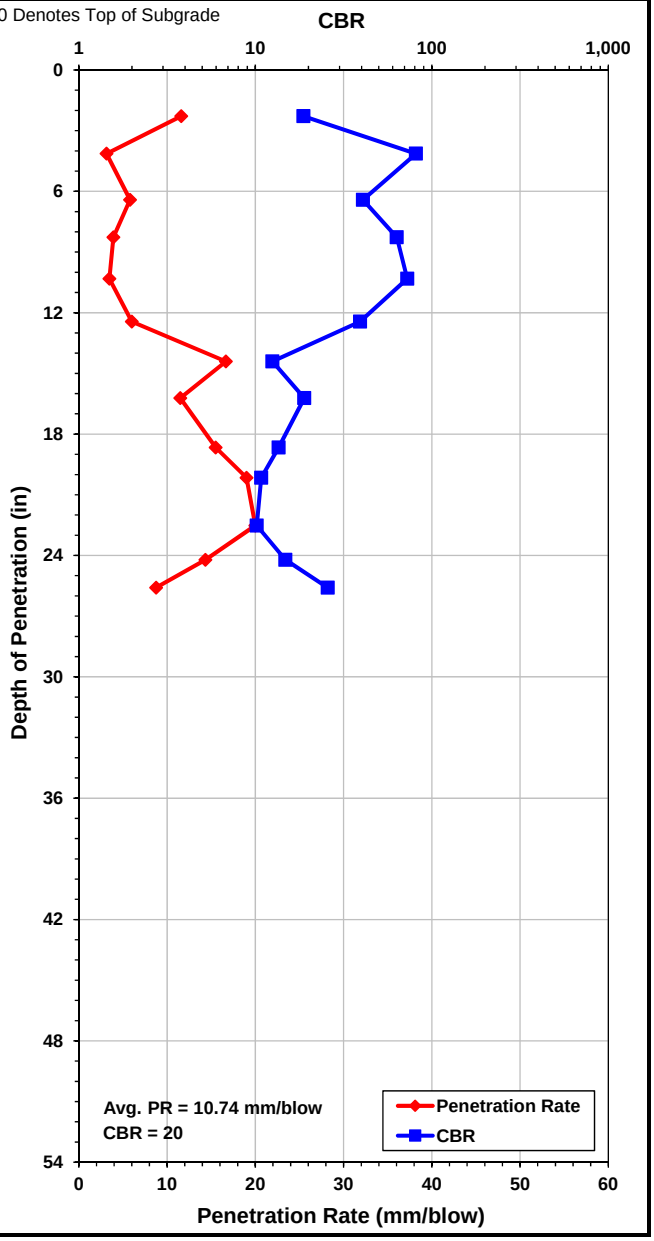
Test Location:	Sta. 172+37, 50.8' Lt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	962.5 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Garret F.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 22 in	Output File Name:	N/A
Test Elevation:	960.67 ft msl	Termination Depth:	25.59 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
5	2.28	58.00	11.60	11.60	18.8
15	4.13	47.00	3.13	3.13	81.3
10	6.42	58.00	5.80	5.80	40.8
12	8.27	47.00	3.92	3.92	63.3
15	10.31	52.00	3.47	3.47	72.6
9	12.44	54.00	6.00	6.00	39.3
3	14.41	50.00	16.67	16.67	12.5
4	16.22	46.00	11.50	11.50	18.9
4	18.66	62.00	15.50	15.50	13.6
2	20.16	38.00	19.00	19.00	10.8
3	22.52	60.00	20.00	20.00	10.2
3	24.21	43.00	14.33	14.33	14.8
4	25.59	35.00	8.75	8.75	25.7

Notes:

Graphical Penetration Rate Plot



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Telephone: (614) 823-4949
Fax Number: (614) 823-4990

Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2) OTC PROJECT No. 71-14-08
ADCP No.	B-44-23
DATE TEST PERFORMED	9/3/2014

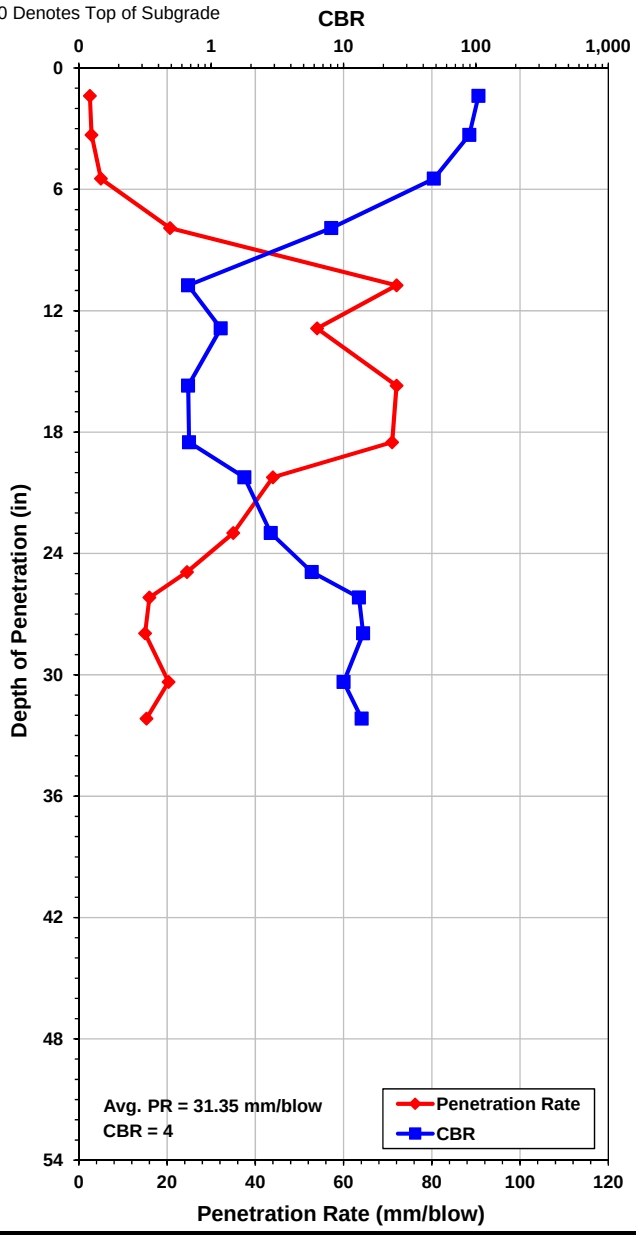
Test Location:	Sta. 180+85, 50.4' Rt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	952.8 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Ryan B.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 27 in	Output File Name:	N/A
Test Elevation:	950.55 ft msl	Termination Depth:	32.17 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
14	1.38	35.00	2.50	2.50	104.6
17	3.31	49.00	2.88	2.88	89.2
11	5.47	55.00	5.00	5.00	48.1
3	7.91	62.00	20.67	20.67	8.1
1	10.75	72.00	72.00	72.00	0.7
1	12.87	54.00	54.00	54.00	1.2
1	15.71	72.00	72.00	72.00	0.7
1	18.50	71.00	71.00	71.00	0.7
1	20.24	44.00	44.00	44.00	1.8
2	22.99	70.00	35.00	35.00	2.8
2	24.92	49.00	24.50	24.50	5.8
2	26.18	32.00	16.00	16.00	13.1
3	27.95	45.00	15.00	15.00	14.1
3	30.35	61.00	20.33	20.33	10.0
3	32.17	46.00	15.33	15.33	13.7

Notes:

Graphical Penetration Rate Plot



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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2)
OTC PROJECT No.	71-14-08
ADCP No.	B-44-24
DATE TEST PERFORMED	8/15/2014

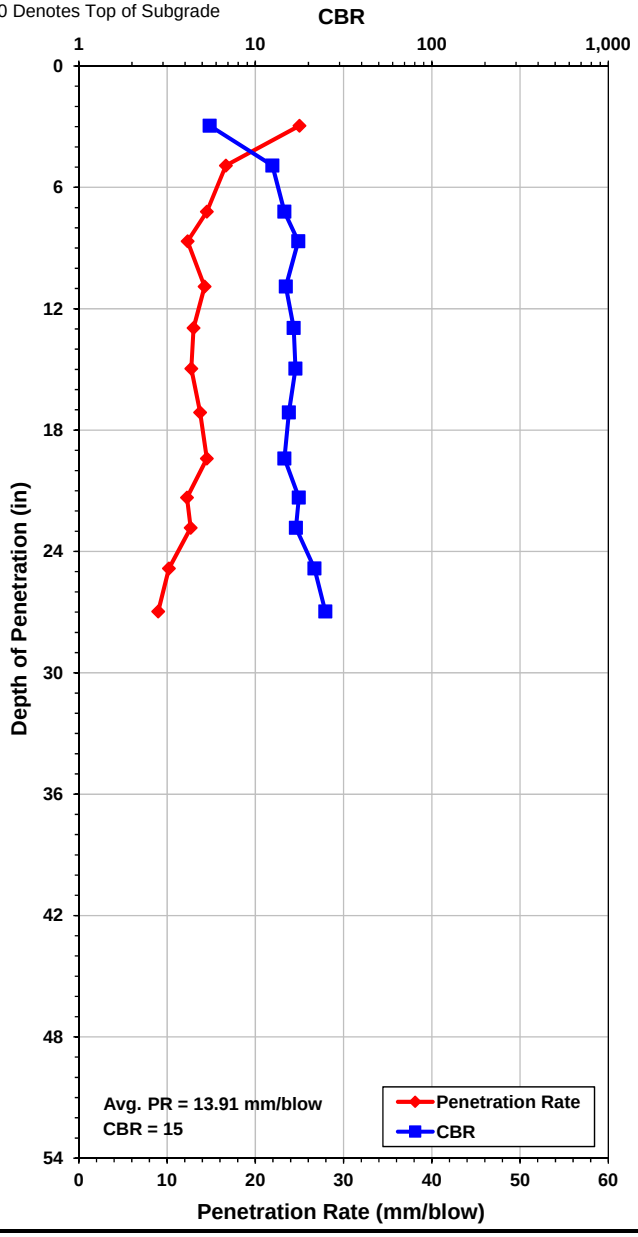
Test Location:	Sta. 190+95, 51.1' Lt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	958.3 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Garret F.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 24 in	Output File Name:	N/A
Test Elevation:	956.3 ft msl	Termination Depth:	26.97 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
3	2.95	75.00	25.00	25.00	5.5
3	4.92	50.00	16.67	16.67	12.5
4	7.20	58.00	14.50	14.50	14.6
3	8.66	37.00	12.33	12.33	17.5
4	10.91	57.00	14.25	14.25	14.9
4	12.95	52.00	13.00	13.00	16.5
4	14.96	51.00	12.75	12.75	16.9
4	17.13	55.00	13.75	13.75	15.5
4	19.41	58.00	14.50	14.50	14.6
4	21.34	49.00	12.25	12.25	17.6
3	22.83	38.00	12.67	12.67	17.0
5	24.84	51.00	10.20	10.20	21.7
6	26.97	54.00	9.00	9.00	24.9

Notes:

Graphical Penetration Rate Plot



6350 Presidential Gateway
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Fax Number: (614) 823-4990

Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2) OTC PROJECT No. 71-14-08
ADCP No.	B-44-25
DATE TEST PERFORMED	9/3/2014

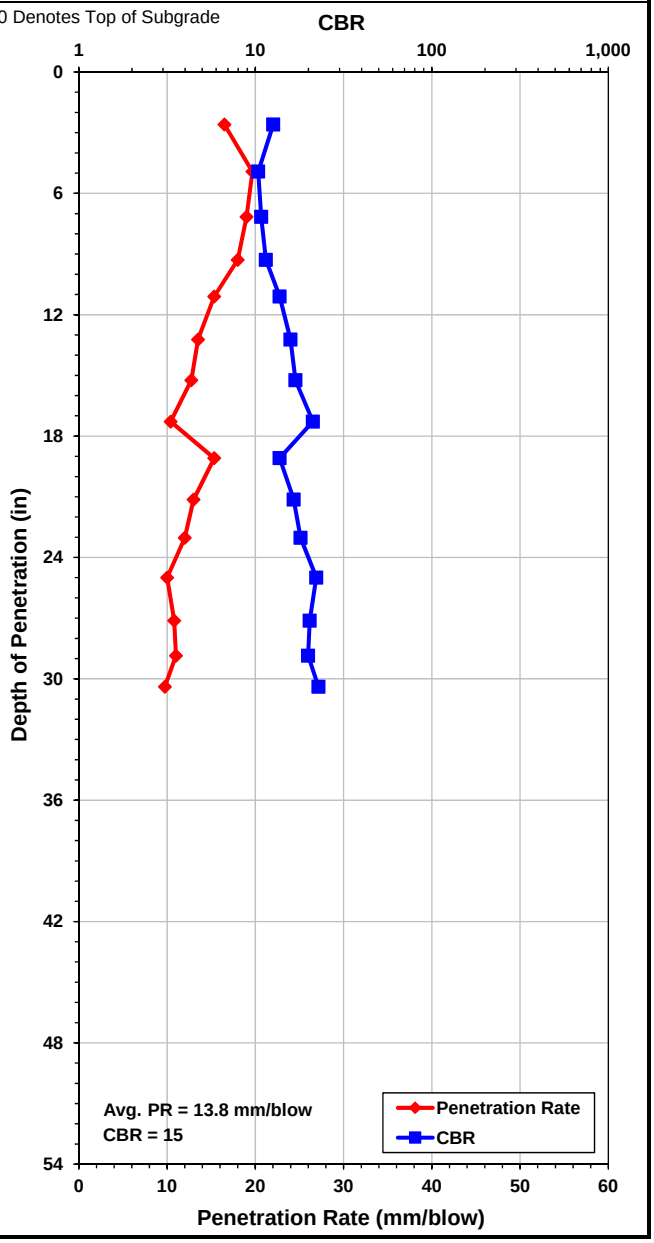
Test Location:	Sta. 200+02, 50.0' Rt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	971.3 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Ryan B.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 30 in	Output File Name:	N/A
Test Elevation:	968.8 ft msl	Termination Depth:	30.39 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
4	2.60	66.00	16.50	16.50	12.6
3	4.92	59.00	19.67	19.67	10.4
3	7.17	57.00	19.00	19.00	10.8
3	9.29	54.00	18.00	18.00	11.5
3	11.10	46.00	15.33	15.33	13.7
4	13.23	54.00	13.50	13.50	15.8
4	15.24	51.00	12.75	12.75	16.9
5	17.28	52.00	10.40	10.40	21.2
3	19.09	46.00	15.33	15.33	13.7
4	21.14	52.00	13.00	13.00	16.5
4	23.03	48.00	12.00	12.00	18.1
5	25.00	50.00	10.00	10.00	22.2
5	27.13	54.00	10.80	10.80	20.3
4	28.86	44.00	11.00	11.00	19.9
4	30.39	39.00	9.75	9.75	22.8

Notes:

Graphical Penetration Rate Plot



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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT	Ohio Turnpike Pavement Replacement Program
LOCATION	Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.	N-14-020(2) OTC PROJECT No. 71-14-08
ADCP No.	B-44-26
DATE TEST PERFORMED	8/18/2014

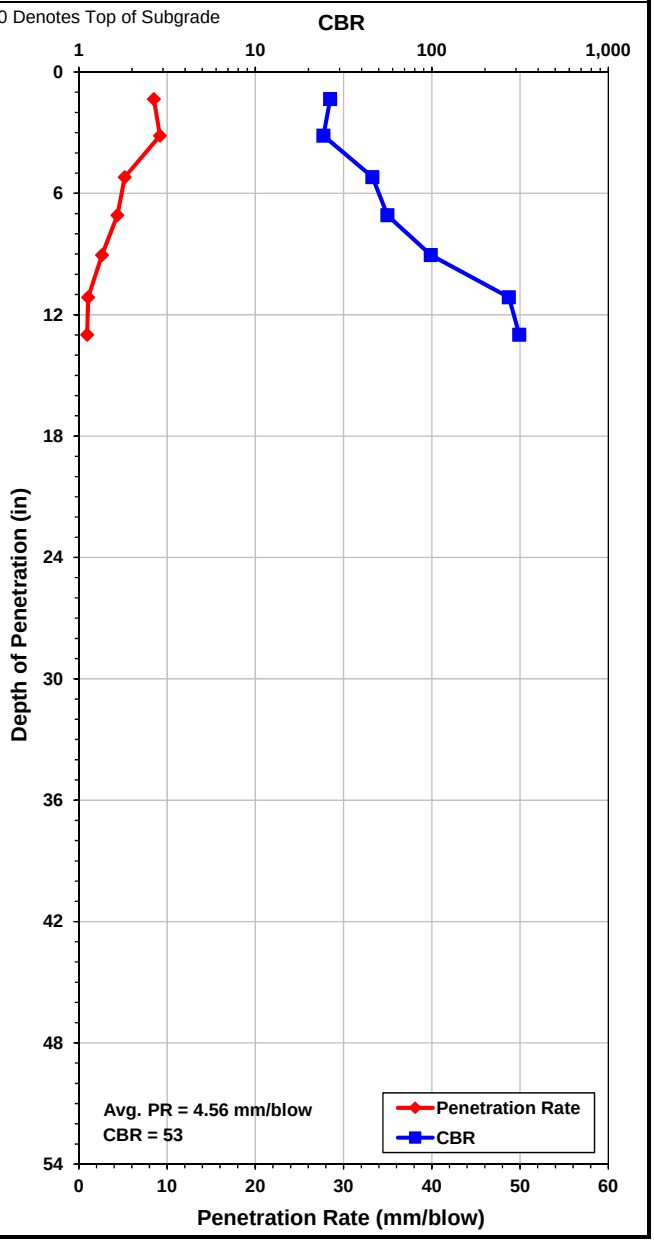
Test Location:	Sta. 209+53, 51.2' Lt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	974.2 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Garret F.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 32 in	Output File Name:	N/A
Test Elevation:	971.53 ft msl	Termination Depth:	12.99 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
4	1.34	34.00	8.50	8.50	26.6
5	3.15	46.00	9.20	9.20	24.3
10	5.20	52.00	5.20	5.20	46.1
11	7.09	48.00	4.36	4.36	56.1
19	9.06	50.00	2.63	2.63	98.8
50	11.14	53.00	1.06	1.06	273.6
50	12.99	47.00	0.94	0.94	313.0

Notes: Refusal

Graphical Penetration Rate Plot



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Automated Dynamic Cone Penetrometer Summary (ASTM D6951)

PROJECT: Ohio Turnpike Pavement Replacement Program
LOCATION: Trumball/Mahoning County, Ohio - MP 216.25 to 221.0
RII JOB No.: N-14-020(2) OTC PROJECT No.: 71-14-08

ADCP No.: B-44-27
DATE TEST PERFORMED: 9/2/2014

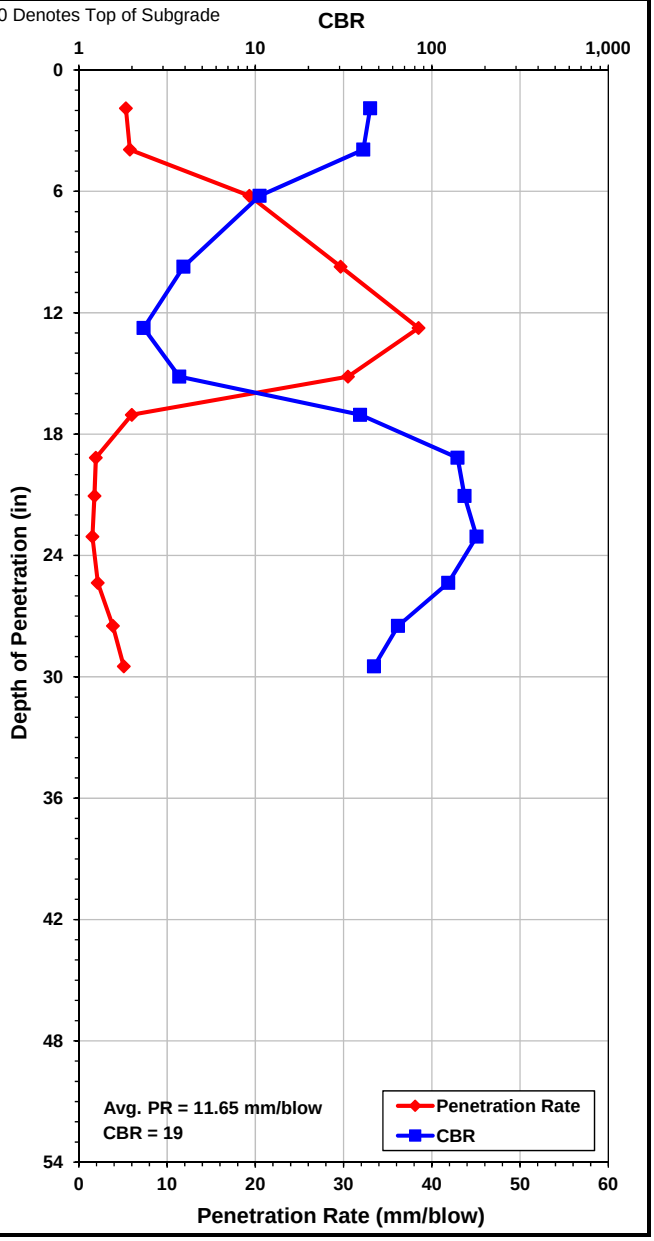
Test Location:	Sta. 217+83, 51.0' Rt.	Hammer Type:	Vertek Trailor Mounted
Surface Elevation:	964.8 ft msl	Hammer Weight:	17.6 lb
Testing Personnel:	Steve B.	Drop Height:	22.6 in
Surface Mat'l / Thick.:	Asphalt/Concrete/Slag, 22 in	Output File Name:	N/A
Test Elevation:	962.97 ft msl	Termination Depth:	29.49 in

ADCP Summary

No. of Blows	Cumulative Penetration (in)	Penetration per Blow Set (mm)	Penetration per Blow (mm/blow)	DCPI (mm/blow)	CBR
9	1.89	48.00	5.33	5.33	44.8
9	3.94	52.00	5.78	5.78	40.9
3	6.22	58.00	19.33	19.33	10.6
3	9.72	89.00	29.67	29.67	3.9
2	12.76	77.00	38.50	38.50	2.3
2	15.16	61.00	30.50	30.50	3.7
8	17.05	48.00	6.00	6.00	39.3
28	19.17	54.00	1.93	1.93	139.9
27	21.06	48.00	1.78	1.78	153.3
33	23.07	51.00	1.55	1.55	179.3
27	25.35	58.00	2.15	2.15	124.0
14	27.48	54.00	3.86	3.86	64.4
10	29.49	51.00	5.10	5.10	47.1

Notes:

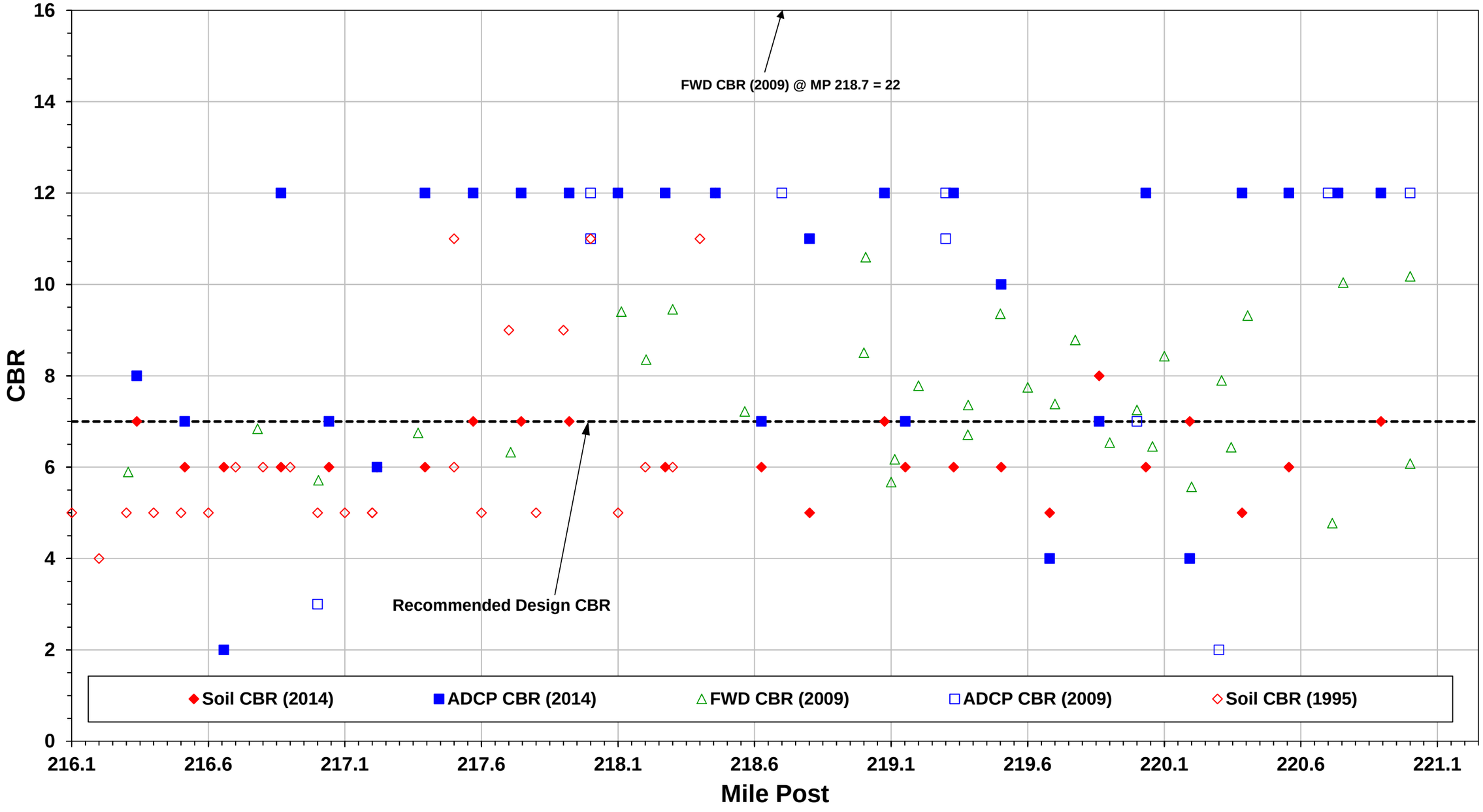
Graphical Penetration Rate Plot



APPENDIX I-F

GRAPHICAL OUTPUT OF HISTORIC AND CURRENT CBR VALUES

Ohio Turnpike Pavement Reconstruction
Mile Post 216.1 to 221.25 - Project Section 44
Historic and Current Exploration Testing and Analysis



APPENDIX II-A

UNCONFINED COMPRESSIVE STRENGTH REPORTS

RESOURCE INTERNATIONAL, INC.
Engineering Consultants

6350 Presidential Gateway
Columbus, Ohio 43231
Telephone: (614) 823-4949
Fax Number: (614) 823-4990

SUMMARY OF SOIL-CEMENT UNCONFINED COMPRESSIVE STRENGTH DATA

ASTM D558, D559, D1633

Client: Ohio Turnpike Commission

Project: ***OTC PR-2***

Date: October 24, 2014

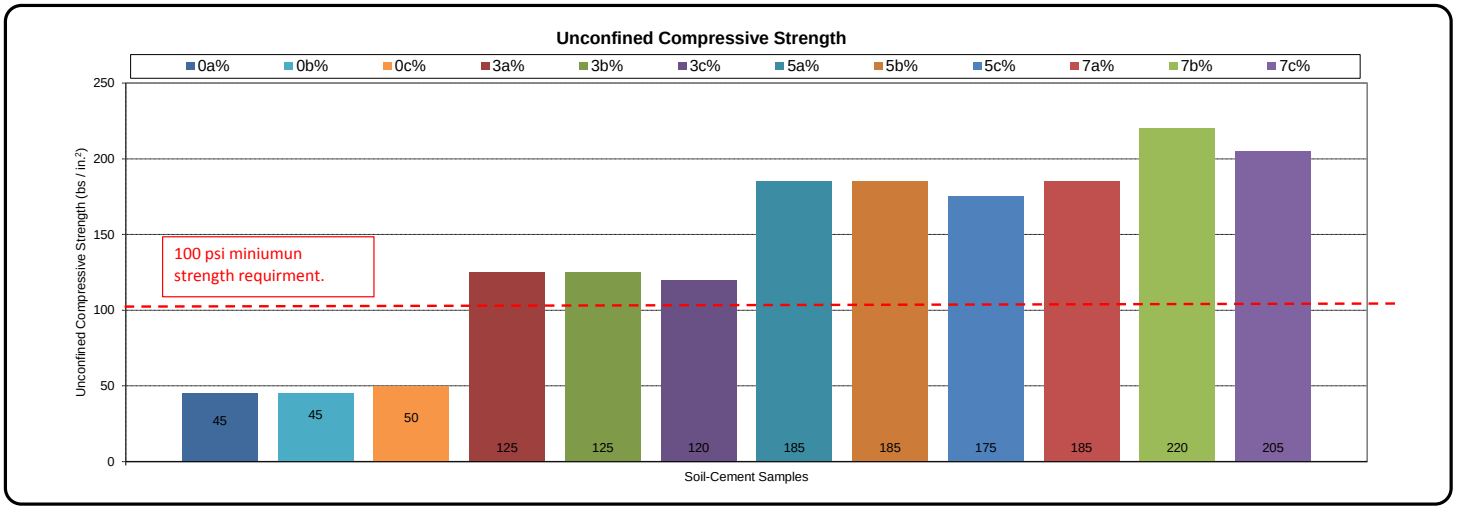
Project No.: N-14-020-2

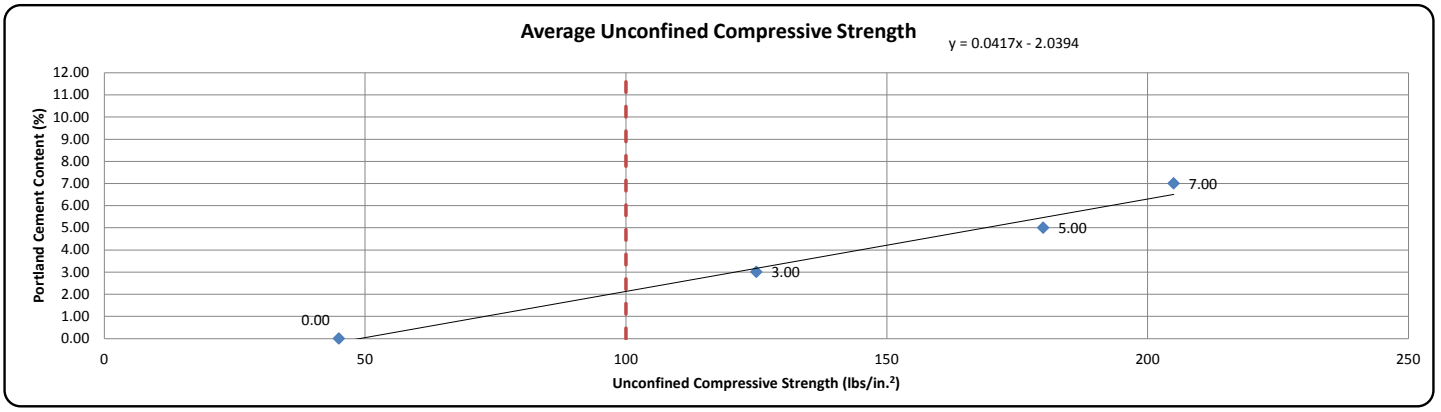
Sample Number: CT-1
ODOT Classification: A-1-b

	0%	3%	5%	7%
Portland Cement Content:				
ODOT Typical Density Curve No.:	K	L	L	L
Maximum Dry Density (pcf):	117.0	114.6	114.6	114.6
Optimum Moisture Content (%):	13.5	14.6	14.6	14.6

Strength Criteria (psi):			Chemical Content Required:	Recommended:
Criterion 1:	Minimum:	100	3.5%	**4.0%**
Criterion 2:	Increase > Untreated:	50	2.5%	

Chemical Content (%)	Age of Strength Testing (days)	Average Diameter (inches)	Average Height (inches)	Area ($in.^2$)	Average Moist-Cured Diameter (inches)	Average Moist-Cured Height (inches)	Moisture Cured Area ($in.^2$)	Percent Expansion (%)	Average Percent Expansion (%)	Dry Unit Weight (lbs/ft^3)	Water Content (%)	Maximum Load (lbf)	Percent Compaction (%)	Unconfined Compressive Strength ($lbs/in.^2$)	Average Unconfined Compressive Strength ($lbs/in.^2$)
0%a	0	4.01	4.56	12.63	-	-	-	-	-	115.4	14.7	580	98.7	45	**45**
0%b	0	4.01	4.56	12.65	-	-	-	-	-	115.3	14.7	590	98.6	45	
0%c	0	4.01	4.56	12.62	-	-	-	-	-	115.5	14.8	600	98.7	50	
3%a	8	4.02	4.55	12.67	4.02	4.55	12.68	0.1	0.1	114.5	15.2	1590	99.9	125	**125**
3%b	8	4.02	4.56	12.69	4.02	4.56	12.68	0.1		114.5	15.2	1570	99.9	125	
3%c	8	4.02	4.56	12.67	4.02	4.56	12.69	0.2		114.1	15.4	1520	99.6	120	
5%a	8	4.02	4.55	12.70	4.02	4.56	12.69	0.1	0.2	114.1	15.6	2340	99.6	185	**180**
5%b	8	4.02	4.56	12.69	4.02	4.56	12.71	0.2		114.2	15.4	2350	99.6	185	
5%c	8	4.02	4.56	12.70	4.02	4.56	12.71	0.2		114.3	15.2	2230	99.7	175	
7%a	8	4.02	4.56	12.67	4.02	4.56	12.72	0.4	0.2	114.4	15.3	2370	99.8	185	**205**
7%b	8	4.02	4.55	12.69	4.02	4.55	12.70	0.1		114.3	15.3	2820	99.7	220	
7%c	8	4.02	4.56	12.68	4.02	4.57	12.69	0.2		114.4	15.2	2630	99.8	205	





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SUMMARY OF SOIL-QUICKLIME UNCONFINED COMPRESSIVE STRENGTH DATA

ASTM D3551 / ASTM D698 / ASTM D5102 / ODOT SS 1015

Client: Ohio Turnpike Commission

Project: ***OTC PR-2***

Date: October 24, 2014

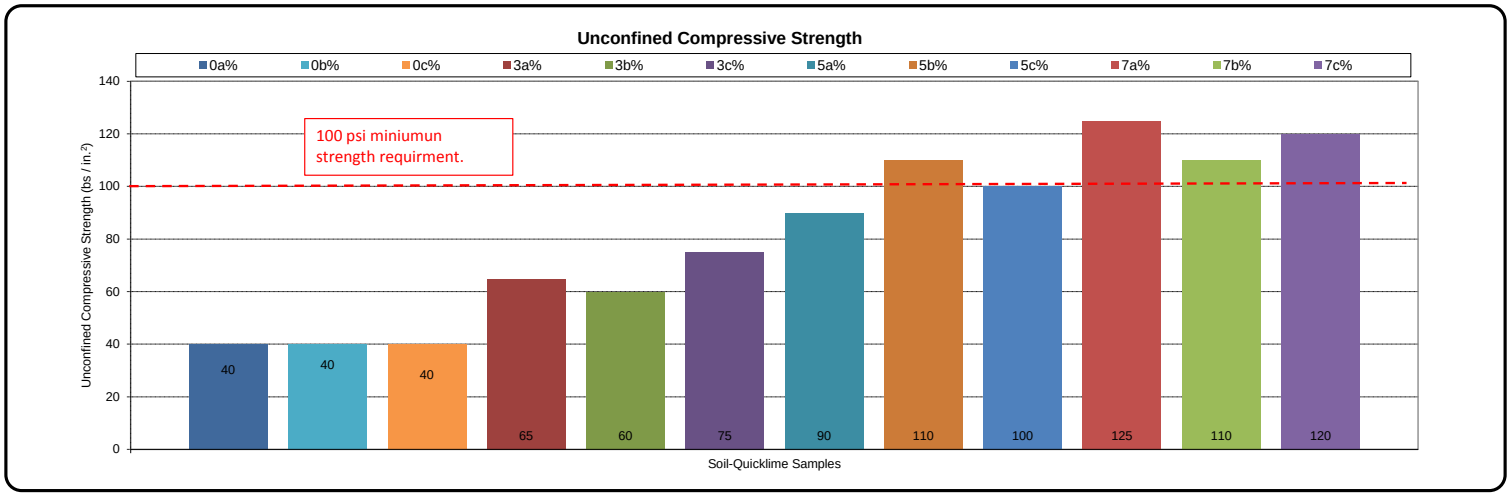
Project No.: N-14-020-2

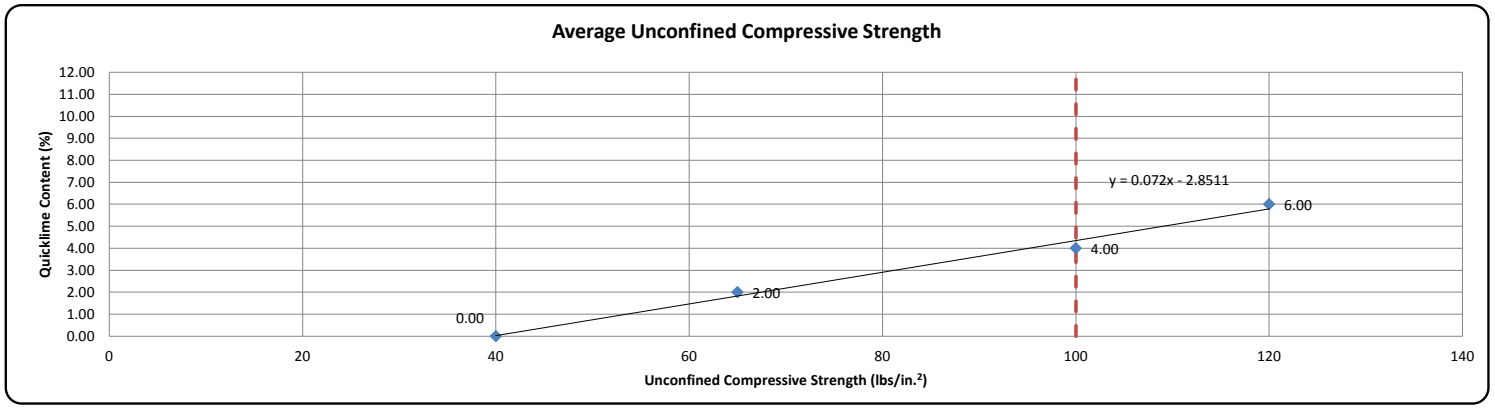
Sample Number: CT-2
ODOT Classification: A-4a

Quicklime Content:	0%	2%	4%	6%
ODOT Typical Density Curve No.:	K	M	M	M
Maximum Dry Density (pcf):	117.00	112.00	112.00	112.00
Optimum Moisture Content (%):	13.50	15.80	15.80	15.80

Strength Criteria (psi):			Chemical Content Required:	Recommended:
Criterion 1:	Minimum:	100	4.5%	**5.0%**
Criterion 2:	Increase > Untreated:	50	4.5%	
Criterion 3:	Eades-Grim Result:	-	2.0%	

Chemical Content (%)	Chemical Content (%)	Age of Strength Testing (days)	Average Diameter (inches)	Average Height (inches)	Area ($in.^2$)	Average Moist-Cured Diameter (inches)	Average Moist-Cured Height (inches)	Moisture Cured Area ($in.^2$)	Percent Expansion (%)	Average Percent Expansion (%)	Dry Unit Weight (lbs/ft^3)	Water Content (%)	Maximum Load (lbf)	Percent Compaction (%)	Unconfined Compressive Strength ($lbs/in.^2$)	Average Unconfined Compressive Strength ($lbs/in.^2$)
0%a	0%	0	4.01	4.56	12.65	-	-	-	-	-	116.8	13.8	520	99.8	40	**40**
0%b		0	4.01	4.56	12.64	-	-	-	-	-	117.3	13.5	530	100.3	40	
0%c		0	4.01	4.56	12.65	-	-	-	-	-	117.5	13.3	520	100.4	40	
2%a	2%	8	4.03	4.56	12.73	4.03	4.56	12.74	0.0	0.1	110.3	17.5	850	98.5	65	**65**
2%b		8	4.02	4.56	12.71	4.02	4.56	12.71	0.0		110.2	17.8	780	98.4	60	
2%c		8	4.02	4.56	12.70	4.02	4.56	12.69	0.1		110.8	17.5	980	98.9	75	
4%a	4%	8	4.02	4.56	12.71	4.02	4.56	12.71	0.1	0.1	110.2	17.7	1160	98.4	90	**100**
4%b		8	4.02	4.57	12.70	4.02	4.57	12.72	0.1		110.8	17.3	1380	98.9	110	
4%c		8	4.02	4.57	12.71	4.02	4.58	12.72	0.2		110.7	17.6	1290	98.8	100	
6%a	6%	8	4.02	4.57	12.69	4.02	4.58	12.70	0.2	0.2	110.7	17.3	1600	98.9	125	**120**
6%b		8	4.02	4.59	12.69	4.02	4.59	12.72	0.2		110.9	17.4	1420	99.0	110	
6%c		8	4.02	4.58	12.68	4.02	4.57	12.67	0.1		110.5	17.5	1490	98.6	120	





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SUMMARY OF SOIL-QUICKLIME UNCONFINED COMPRESSIVE STRENGTH DATA

ASTM D3551 / ASTM D698 / ASTM D5102 / ODOT SS 1015

Client: Ohio Turnpike Commission

Project: ***OTC PR-2***

Date: October 24, 2014

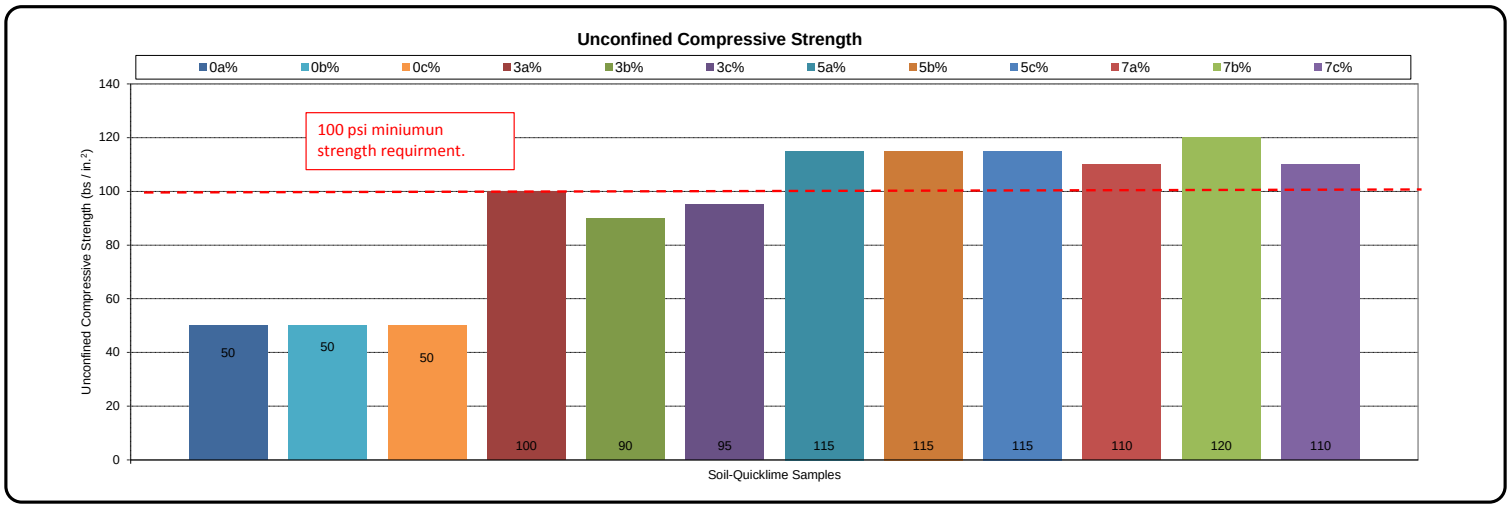
Project No.: N-14-020-2

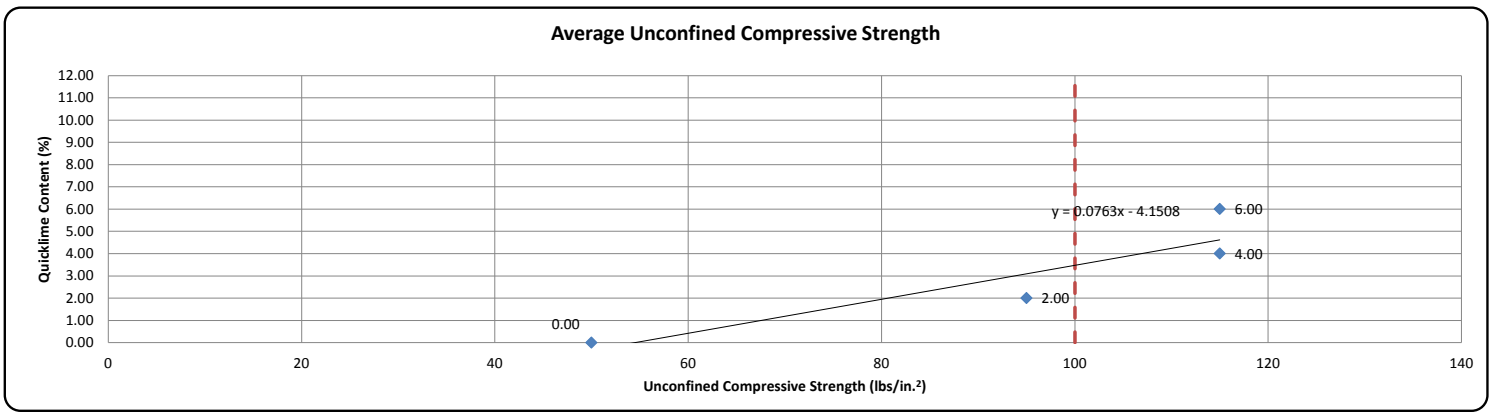
Sample Number: CT-3
ODOT Classification: A-6a

Quicklime Content:	0%	2%	4%	6%
ODOT Typical Density Curve No.:	K	M	M	M
Maximum Dry Density (pcf):	117.00	112.00	112.00	112.00
Optimum Moisture Content (%):	13.50	15.80	15.80	15.80

Strength Criteria (psi):			Chemical Content Required:	Recommended:
Criterion 1:	Minimum:	100	3.5%	**4.0%**
Criterion 2:	Increase > Untreated:	50	3.5%	
Criterion 3:	Eades-Grim Result:	-	2.0%	

Chemical Content (%)	Chemical Content (%)	Age of Strength Testing (days)	Average Diameter (inches)	Average Height (inches)	Area ($in.^2$)	Average Moist-Cured Diameter (inches)	Average Moist-Cured Height (inches)	Moisture Cured Area ($in.^2$)	Percent Expansion (%)	Average Percent Expansion (%)	Dry Unit Weight (lbs/ft^3)	Water Content (%)	Maximum Load (lbf)	Percent Compaction (%)	Unconfined Compressive Strength ($lbs/in.^2$)	Average Unconfined Compressive Strength ($lbs/in.^2$)
0%a	0%	0	4.02	4.57	12.66	-	-	-	-	-	116.4	13.6	610	99.5	50	**50**
0%b		0	4.01	4.56	12.64	-	-	-	-	-	116.8	13.3	630	99.8	50	
0%c		0	4.02	4.56	12.67	-	-	-	-	-	116.7	13.2	620	99.8	50	
2%a	2%	8	4.02	4.57	12.69	4.02	4.58	12.69	0.0	0.1	110.8	17.0	1290	98.9	100	**95**
2%b		8	4.02	4.56	12.67	4.02	4.57	12.70	0.3		109.9	17.8	1170	98.1	90	
2%c		8	4.02	4.57	12.68	4.02	4.57	12.67	0.0		110.0	17.6	1230	98.2	95	
4%a	4%	8	4.02	4.57	12.68	4.02	4.57	12.69	0.1	0.2	110.6	17.2	1440	98.8	115	**115**
4%b		8	4.02	4.58	12.69	4.02	4.58	12.69	0.1		110.3	17.5	1460	98.5	115	
4%c		8	4.02	4.56	12.68	4.02	4.56	12.70	0.3		110.7	17.1	1470	98.9	115	
6%a	6%	8	4.02	4.57	12.69	4.03	4.58	12.72	0.3	0.2	109.7	17.8	1400	98.0	110	**115**
6%b		8	4.02	4.56	12.69	4.02	4.57	12.67	0.1		110.4	17.1	1540	98.6	120	
6%c		8	4.02	4.57	12.68	4.02	4.57	12.70	0.1		109.9	17.8	1410	98.1	110	





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SUMMARY OF SOIL-QUICKLIME UNCONFINED COMPRESSIVE STRENGTH DATA

ASTM D3551 / ASTM D698 / ASTM D5102 / ODOT SS 1015

Client: Ohio Turnpike Commission

Project: ***OTC PR-2***

Date: October 24, 2014

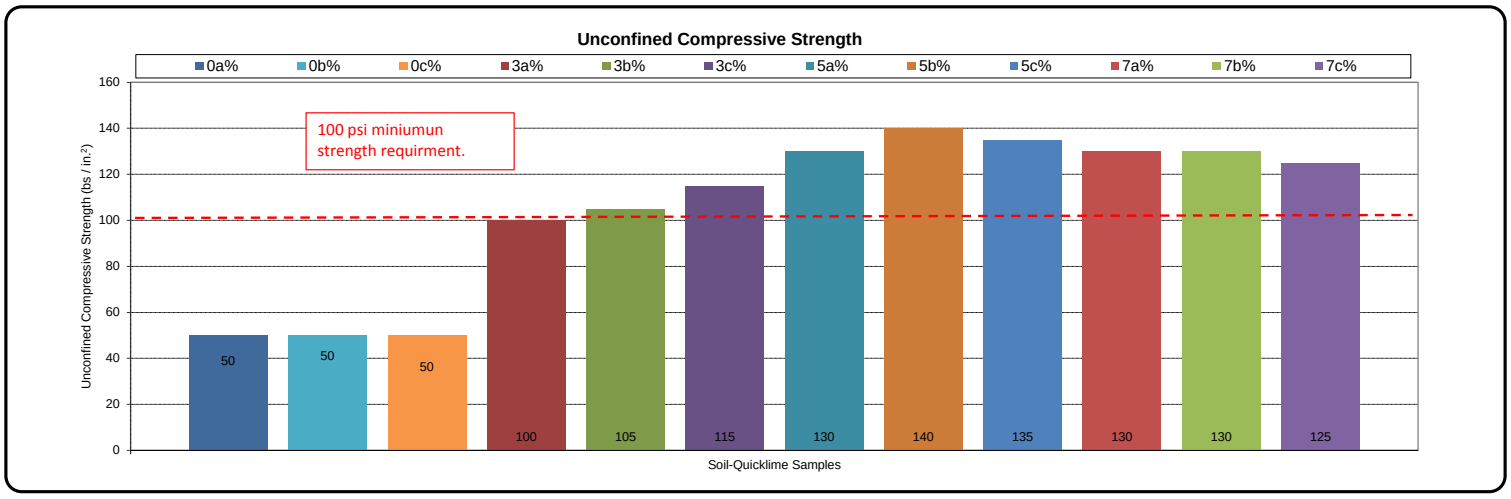
Project No.: N-14-020-2

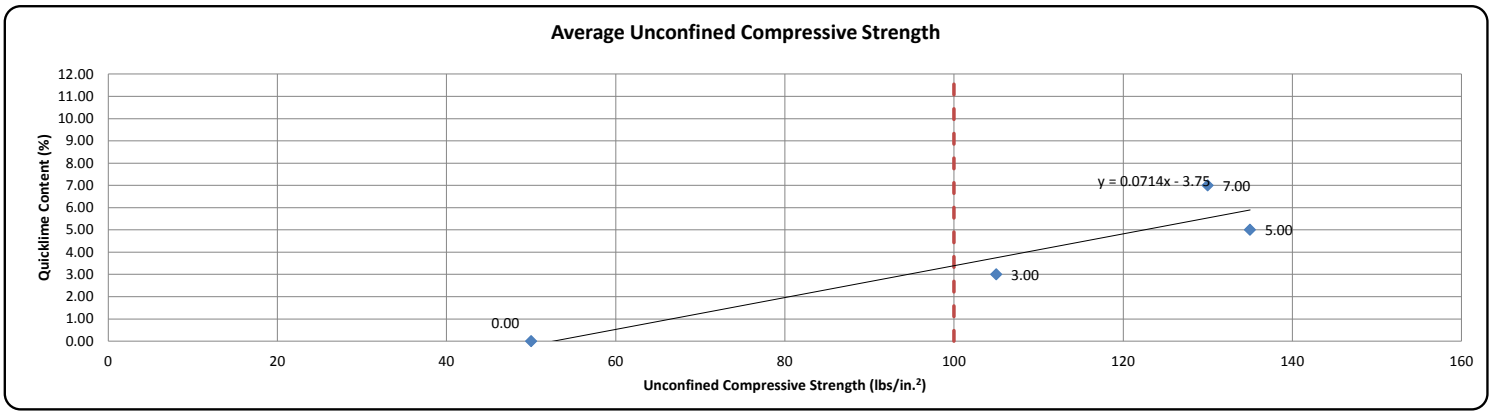
Sample Number: CT-4
ODOT Classification: A-6b

Quicklime Content:	0%	3%	5%	7%
ODOT Typical Density Curve No.:	O	Q	Q	Q
Maximum Dry Density (pcf):	107.10	102.40	102.40	102.40
Optimum Moisture Content (%):	18.10	20.30	20.30	20.30

Strength Criteria (psi):			Chemical Content Required:	Recommended:
Criterion 1:	Minimum:	100	3.5%	**4.0%**
Criterion 2:	Increase > Untreated:	50	2.5%	
Criterion 3:	Eades-Grim Result:	-	3.0%	

Chemical Content (%)	Chemical Content (%)	Age of Strength Testing (days)	Average Diameter (inches)	Average Height (inches)	Area ($in.^2$)	Average Moist-Cured Diameter (inches)	Average Moist-Cured Height (inches)	Moisture Cured Area ($in.^2$)	Percent Expansion (%)	Average Percent Expansion (%)	Dry Unit Weight (lbs/ft^3)	Water Content (%)	Maximum Load (lbf)	Percent Compaction (%)	Unconfined Compressive Strength ($lbs/in.^2$)	Average Unconfined Compressive Strength ($lbs/in.^2$)
0%a	0%	0	4.02	4.56	12.66	-	-	-	-	-	105.7	19.3	640	98.7	50	**50**
0%b		0	4.02	4.57	12.66	-	-	-	-	-	105.6	19.5	630	98.6	50	
0%c		0	4.01	4.56	12.64	-	-	-	-	-	105.5	19.5	640	98.5	50	
3%a	3%	8	4.02	4.56	12.67	4.02	4.57	12.69	0.2	0.1	102.3	22.6	1260	99.9	100	**105**
3%b		8	4.02	4.56	12.68	4.02	4.57	12.69	0.2		101.9	23.1	1360	99.5	105	
3%c		8	4.02	4.55	12.68	4.02	4.55	12.69	0.0		102.1	23.1	1430	99.7	115	
5%a	5%	8	4.02	4.56	12.66	4.02	4.56	12.69	0.3	0.2	102.4	22.1	1640	100.0	130	**135**
5%b		8	4.02	4.56	12.67	4.02	4.56	12.69	0.2		102.6	21.7	1760	100.2	140	
5%c		8	4.02	4.56	12.67	4.02	4.56	12.69	0.3		102.2	22.8	1740	99.8	135	
7%a	7%	8	4.02	4.56	12.70	4.02	4.56	12.72	0.1	0.2	102.2	22.4	1670	99.8	130	**130**
7%b		8	4.02	4.56	12.68	4.02	4.56	12.67	0.0		101.6	23.0	1620	99.2	130	
7%c		8	4.02	4.57	12.66	4.02	4.57	12.70	0.4		101.8	23.0	1600	99.4	125	





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SUMMARY OF SOIL-CEMENT UNCONFINED COMPRESSIVE STRENGTH DATA

ASTM D558, D559, D1633

Client: Ohio Turnpike Commission

Project: ***OTC PR-2***

Date: January 11, 2015

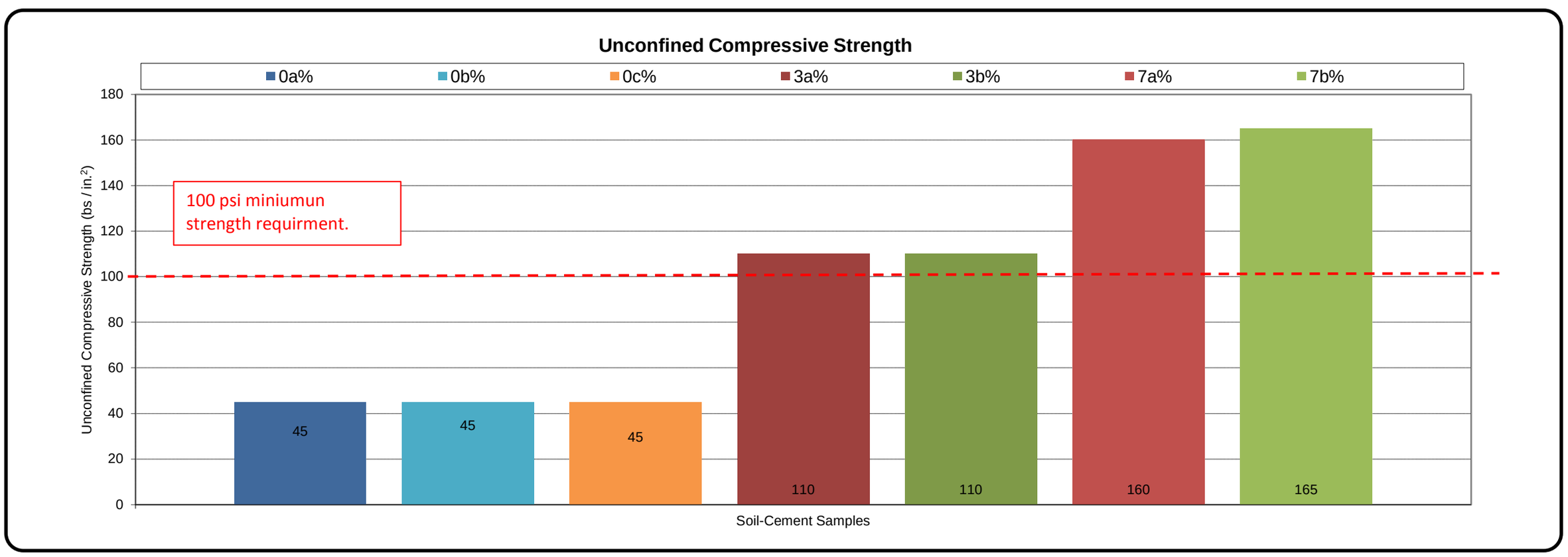
Project No.: N-14-020-2

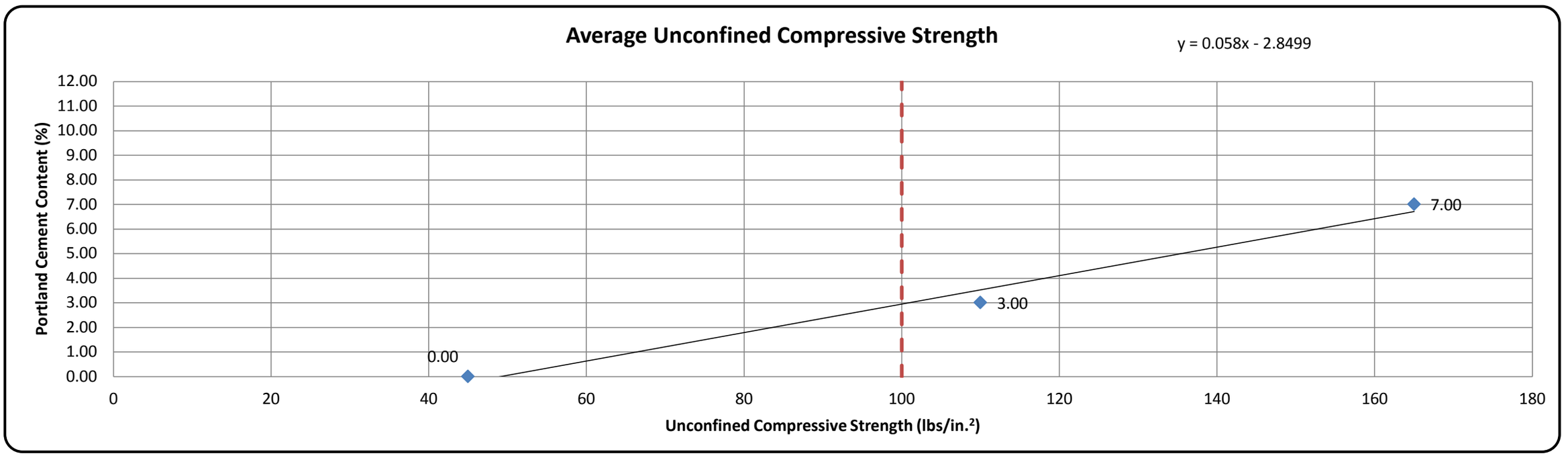
Sample Number: CT-5
ODOT Classification: A-7-6

Portland Cement Content:	0%	3%	7%
ODOT Typical Density Curve No.:	R	N	N
Maximum Dry Density (pcf):	99.9	109.6	109.6
Optimum Moisture Content (%):	21.5	16.9	16.9

Strength Criteria (psi):			Chemical Content Required:	Recommended:
Criterion 1:	Minimum:	100	3.5%	**4.0%**
Criterion 2:	Increase > Untreated:	50	3.5%	

Chemical Content (%)	Age of Strength Testing (days)	Average Diameter (inches)	Average Height (inches)	Area ($in.^2$)	Average Moist-Cured Diameter (inches)	Average Moist-Cured Height (inches)	Moisture Cured Area ($in.^2$)	Percent Expansion (%)	Average Percent Expansion (%)	Dry Unit Weight (lbs/ft^3)	Water Content (%)	Maximum Load (lbf)	Percent Compaction (%)	Unconfined Compressive Strength ($lbs/in.^2$)	Average Unconfined Compressive Strength ($lbs/in.^2$)
0%a	0	4.01	4.56	12.64	-	-	-	-	-	100.4	22.1	560	100.5	45	**45**
0%b	0	4.01	4.55	12.65	-	-	-	-	-	100.5	22.1	580	100.6	45	
0%c	0	4.01	4.56	12.65	-	-	-	-	-	100.9	21.6	580	101.0	45	
3%a	8	4.01	4.61	12.60	4.01	4.61	12.63	0.3	0.3	108.5	18.4	1400	99.0	110	**110**
3%b	8	4.01	4.61	12.60	4.01	4.61	12.62	0.2		108.3	18.5	1400	98.8	110	
7%a	8	4.01	4.61	12.62	4.01	4.61	12.64	0.2	0.2	108.6	18.4	2040	99.1	160	**165**
7%b	8	4.01	4.59	12.62	4.01	4.60	12.62	0.1		108.7	18.1	2090	99.2	165	





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SUMMARY OF SOIL-QUICKLIME UNCONFINED COMPRESSIVE STRENGTH DATA

ASTM D3551 / ASTM D698 / ASTM D5102 / ODOT SS 1015

Client: Ohio Turnpike Commission

Project: ***OTC PR-2***

Date: October 24, 2014

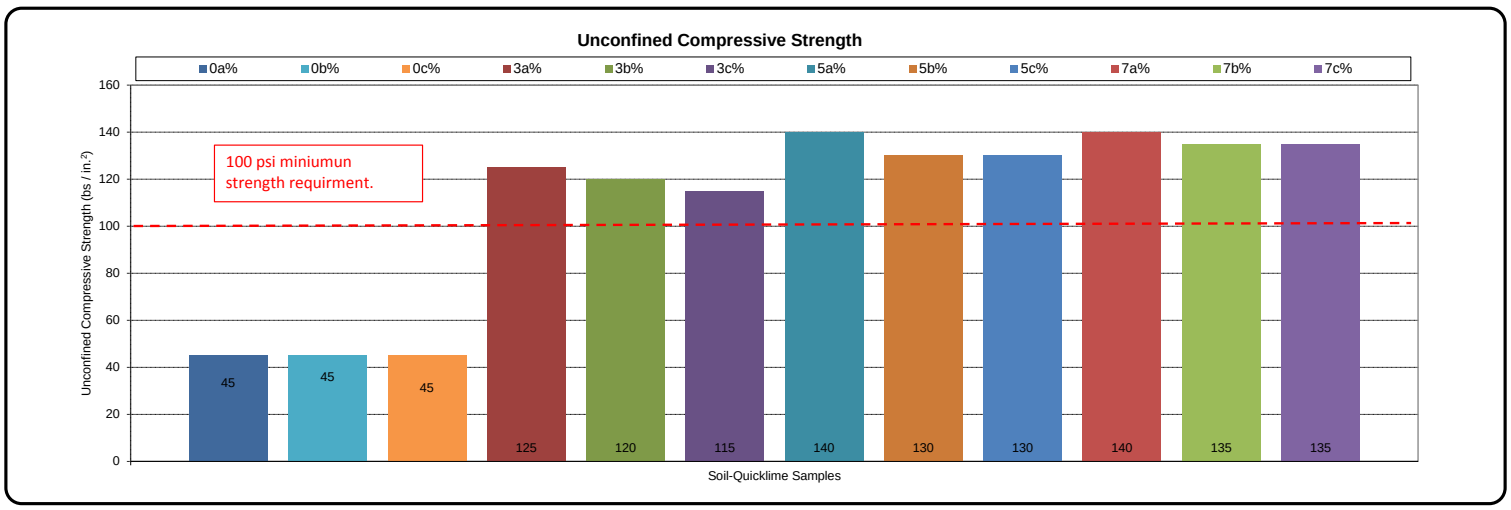
Project No.: N-14-020-2

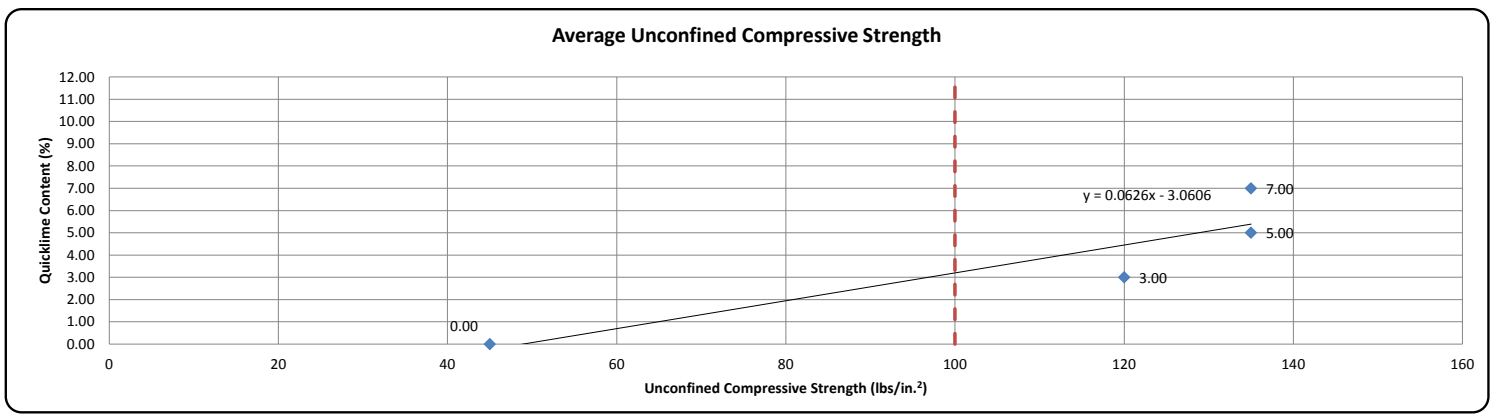
Sample Number: CT-5
ODOT Classification: A-7-6

Quicklime Content:	0%	3%	5%	7%
ODOT Typical Density Curve No.:	R	S	S	S
Maximum Dry Density (pcf):	99.90	97.40	97.40	97.40
Optimum Moisture Content (%):	21.50	22.70	22.70	22.70

Strength Criteria (psi):			Chemical Content Required:	Recommended:
Criterion 1:	Minimum:	100	3.5%	**4.0%**
Criterion 2:	Increase > Untreated:	50	2.5%	
Criterion 3:	Eades-Grim Result:	-	3.0%	

Chemical Content (%)	Chemical Content (%)	Age of Strength Testing (days)	Average Diameter (inches)	Average Height (inches)	Area ($in.^2$)	Average Moist-Cured Diameter (inches)	Average Moist-Cured Height (inches)	Moisture Cured Area ($in.^2$)	Percent Expansion (%)	Average Percent Expansion (%)	Dry Unit Weight (lbs/ft^3)	Water Content (%)	Maximum Load (lbf)	Percent Compaction (%)	Unconfined Compressive Strength ($lbs/in.^2$)	Average Unconfined Compressive Strength ($lbs/in.^2$)
0%a	0%	0	4.01	4.56	12.64	-	-	-	-	-	100.4	22.1	560	100.5	45	**45**
0%b		0	4.01	4.55	12.65	-	-	-	-	-	100.5	22.1	580	100.6	45	
0%c		0	4.01	4.56	12.65	-	-	-	-	-	100.9	21.6	580	101.0	45	
3%a	3%	8	4.02	4.57	12.69	4.02	4.56	12.69	0.0	0.1	97.4	25.2	1590	100.0	125	**120**
3%b		8	4.02	4.57	12.69	4.02	4.57	12.69	0.0		97.2	25.2	1500	99.8	120	
3%c		8	4.02	4.57	12.69	4.02	4.57	12.66	0.2		97.0	25.6	1460	99.6	115	
5%a	5%	8	4.02	4.58	12.70	4.02	4.58	12.70	0.2	0.1	97.5	24.7	1780	100.1	140	**135**
5%b		8	4.02	4.57	12.68	4.02	4.58	12.68	0.1		96.7	25.8	1620	99.3	130	
5%c		8	4.02	4.57	12.68	4.02	4.57	12.70	0.1		97.4	25.1	1620	100.0	130	
7%a	7%	8	4.02	4.57	12.68	4.02	4.57	12.69	0.1	0.1	96.9	24.9	1750	99.5	140	**135**
7%b		8	4.02	4.58	12.69	4.02	4.57	12.70	0.0		96.1	26.0	1710	98.7	135	
7%c		8	4.02	4.58	12.70	4.02	4.58	12.70	0.1		97.0	25.0	1740	99.5	135	





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SUMMARY OF SOIL-QUICKLIME UNCONFINED COMPRESSIVE STRENGTH DATA

ASTM D3551 / ASTM D698 / ASTM D5102 / ODOT SS 1015

Client: Ohio Turnpike Commission

Project: ***OTC PR-2***

Date: October 24, 2014

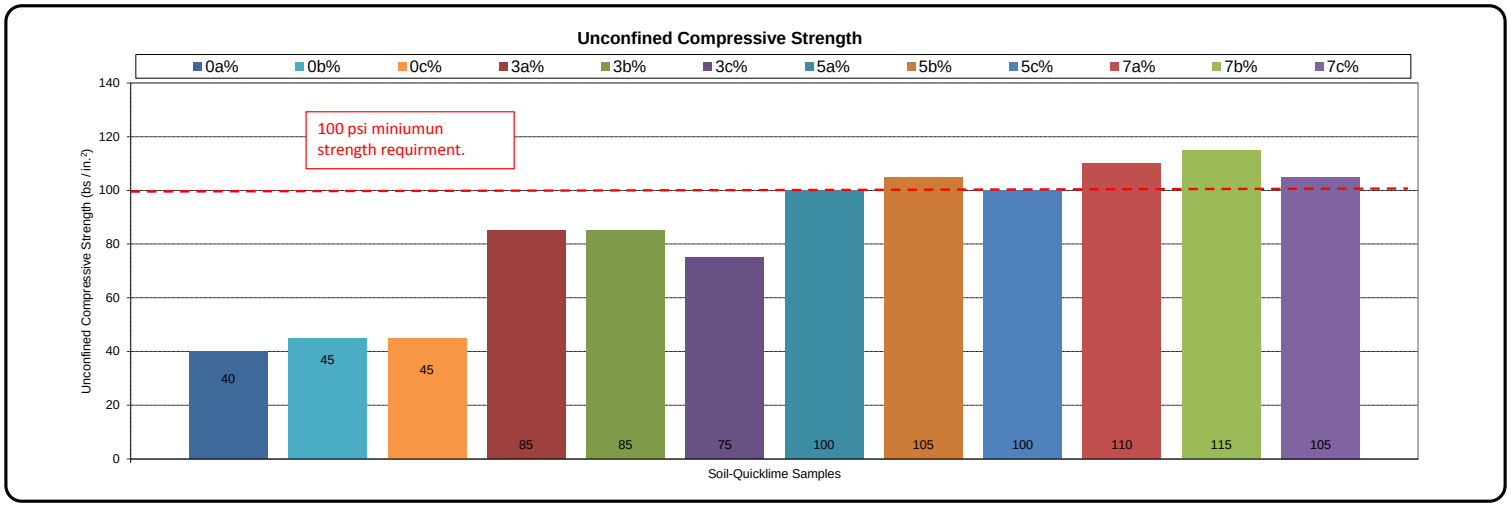
Project No.: N-14-020-2

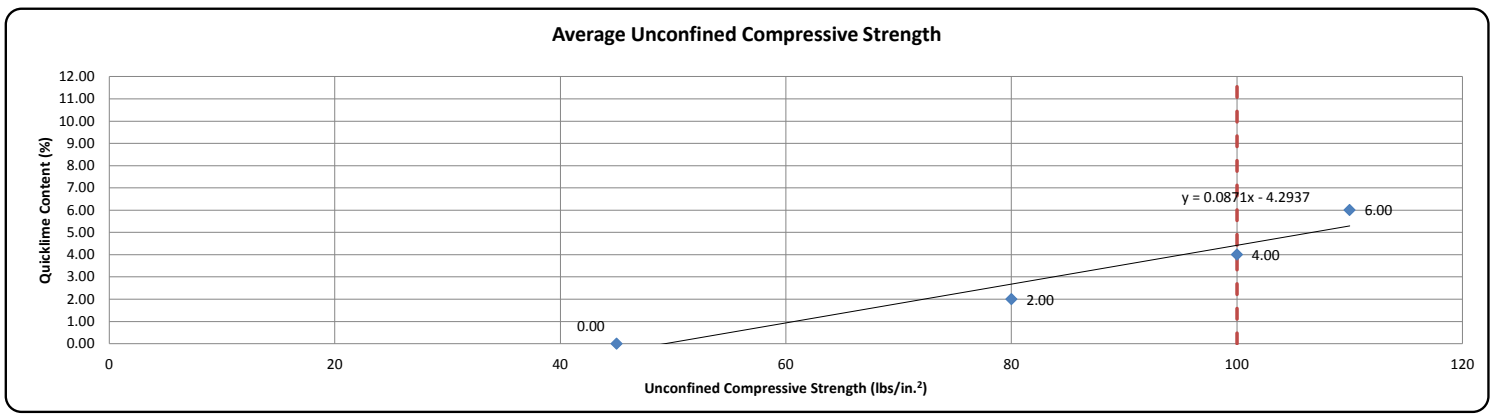
Sample Number: CT-6
ODOT Classification: A-7-6

Quicklime Content:	0%	2%	4%	6%
ODOT Typical Density Curve No.:	P	Q	Q	Q
Maximum Dry Density (pcf):	104.70	102.40	102.40	102.40
Optimum Moisture Content (%):	19.20	20.30	20.30	20.30

Strength Criteria (psi):			Chemical Content Required:	Recommended:
Criterion 1:	Minimum:	100	4.5%	**5.0%**
Criterion 2:	Increase > Untreated:	50	4.5%	
Criterion 3:	Eades-Grim Result:	-	2.0%	

Chemical Content (%)	Chemical Content (%)	Age of Strength Testing (days)	Average Diameter (inches)	Average Height (inches)	Area ($in.^2$)	Average Moist-Cured Diameter (inches)	Average Moist-Cured Height (inches)	Moisture Cured Area ($in.^2$)	Percent Expansion (%)	Average Percent Expansion (%)	Dry Unit Weight (lbs/ft^3)	Water Content (%)	Maximum Load (lbf)	Percent Compaction (%)	Unconfined Compressive Strength ($lbs/in.^2$)	Average Unconfined Compressive Strength ($lbs/in.^2$)
0%a	0%	0	4.01	4.56	12.65	-	-	-	-	-	106.0	18.7	520	101.3	40	**45**
0%b		0	4.01	4.56	12.65	-	-	-	-	-	105.9	18.9	560	101.1	45	
0%c		0	4.01	4.57	12.63	-	-	-	-	-	105.7	18.8	550	101.0	45	
2%a	2%	8	4.02	4.58	12.67	4.02	4.57	12.69	0.1	0.2	102.2	22.0	1070	99.8	85	**80**
2%b		8	4.02	4.57	12.67	4.02	4.57	12.71	0.3		101.7	22.5	1080	99.3	85	
2%c		8	4.02	4.55	12.67	4.02	4.56	12.69	0.3		101.5	22.8	980	99.1	75	
4%a	4%	8	4.02	4.56	12.69	4.02	4.57	12.67	0.1	0.1	101.6	22.2	1250	99.2	100	**100**
4%b		8	4.02	4.57	12.70	4.02	4.58	12.69	0.0		101.0	22.8	1310	98.7	105	
4%c		8	4.02	4.57	12.70	4.02	4.58	12.67	0.1		101.3	22.4	1290	98.9	100	
6%a	6%	8	4.02	4.57	12.70	4.02	4.57	12.70	0.1	0.1	101.8	21.5	1390	99.4	110	**110**
6%b		8	4.02	4.57	12.70	4.02	4.58	12.68	0.1		101.4	22.2	1440	99.0	115	
6%c		8	4.02	4.57	12.69	4.02	4.58	12.70	0.2		101.6	21.9	1360	99.2	105	





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SUMMARY OF SOIL-CEMENT UNCONFINED COMPRESSIVE STRENGTH DATA

ASTM D558, D559, D1633

Client: Ohio Turnpike Commission

Project: ***OTC PR-2***

Date: January 11, 2015

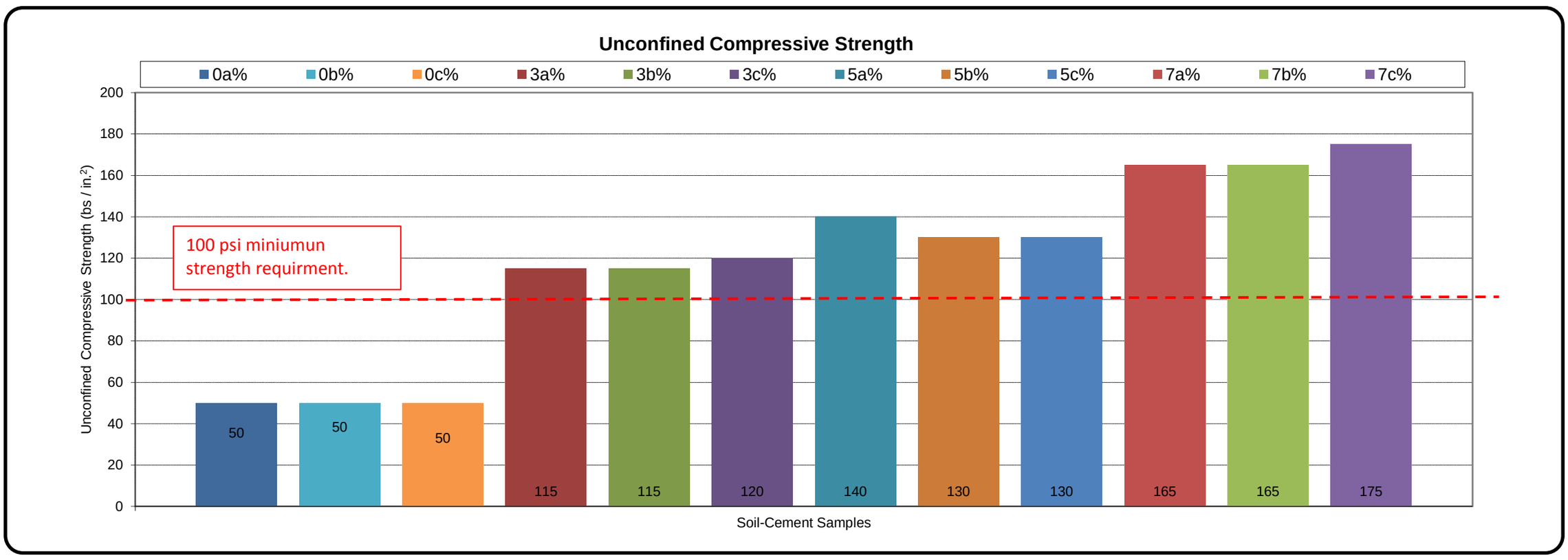
Project No.: N-14-020-2

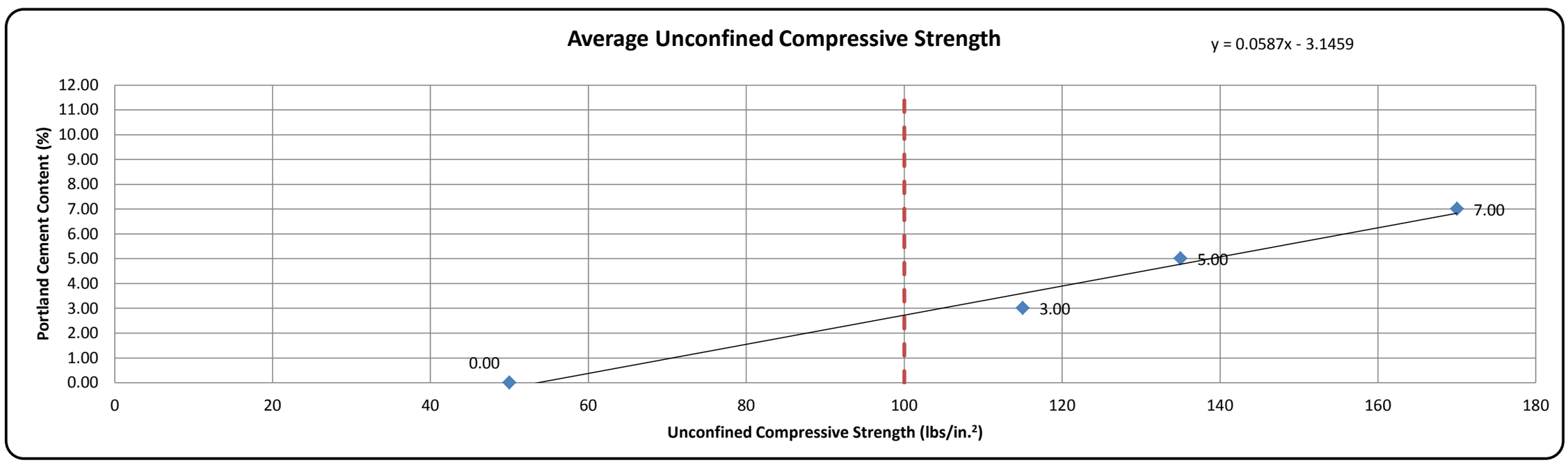
Sample Number: CT-7
ODOT Classification: A-6b

Portland Cement Content:	0%	3%	5%	7%
ODOT Typical Density Curve No.:	K	K	K	K
Maximum Dry Density (pcf):	117.0	117.0	117.0	117.0
Optimum Moisture Content (%):	13.5	13.5	13.5	13.5

Strength Criteria (psi):			Chemical Content Required:	Recommended:
Criterion 1:	Minimum:	100	3.5%	**4.0%**
Criterion 2:	Increase > Untreated:	50	3.5%	

Chemical Content (%)	Age of Strength Testing (days)	Average Diameter (inches)	Average Height (inches)	Area ($in.^2$)	Average Moist-Cured Diameter (inches)	Average Moist-Cured Height (inches)	Moisture Cured Area ($in.^2$)	Percent Expansion (%)	Average Percent Expansion (%)	Dry Unit Weight (lbs/ft^3)	Water Content (%)	Maximum Load (lbf)	Percent Compaction (%)	Unconfined Compressive Strength ($lbs/in.^2$)	Average Unconfined Compressive Strength ($lbs/in.^2$)
0%a	0	4.01	4.60	12.61	-	-	-	-	-	116.5	13.4	640	99.6	50	**50**
0%b	0	4.01	4.59	12.60	-	-	-	-	-	116.1	13.5	620	99.2	50	
0%c	0	4.00	4.60	12.59	-	-	-	-	-	116.7	13.0	640	99.7	50	
3%a	8	4.01	4.61	12.62	4.01	4.62	12.65	0.5	0.4	115.6	14.3	1450	98.8	115	**115**
3%b	8	4.01	4.60	12.64	4.02	4.62	12.66	0.5		115.8	14.3	1480	98.9	115	
3%c	8	4.01	4.61	12.64	4.01	4.62	12.65	0.4		115.2	14.6	1500	98.5	120	
5%a	8	4.01	4.60	12.62	4.01	4.61	12.65	0.4	0.5	115.2	14.6	1740	98.5	140	**135**
5%b	8	4.01	4.60	12.63	4.01	4.62	12.65	0.6		114.9	15.1	1670	98.2	130	
5%c	8	4.01	4.61	12.62	4.01	4.61	12.65	0.5		115.2	14.6	1660	98.5	130	
7%a	8	4.01	4.60	12.63	4.01	4.60	12.65	0.3	0.3	115.1	14.7	2090	98.4	165	**170**
7%b	8	4.01	4.60	12.64	4.01	4.61	12.64	0.3		115.3	14.7	2100	98.5	165	
7%c	8	4.01	4.61	12.64	4.01	4.62	12.65	0.3		115.2	14.8	2190	98.5	175	





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SUMMARY OF SOIL-CEMENT UNCONFINED COMPRESSIVE STRENGTH DATA

ASTM D558, D559, D1633

Client: Ohio Turnpike Commission

Project: ***OTC PR-2***

Date: January 11, 2015

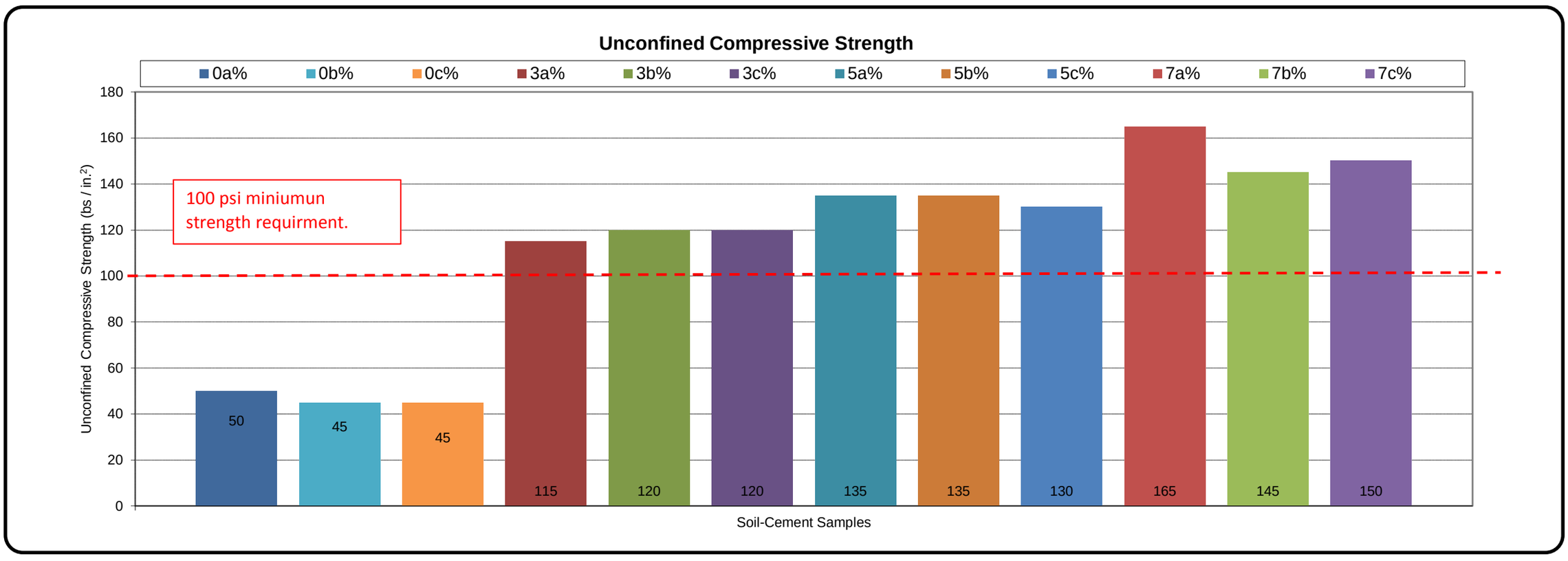
Project No.: N-14-020-2

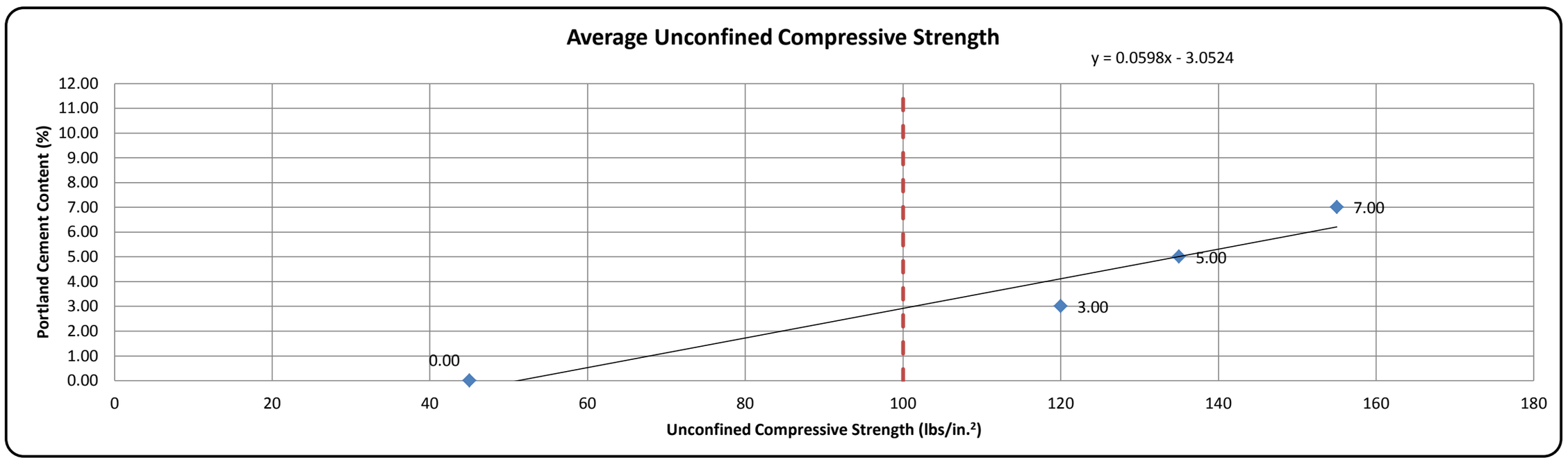
Sample Number: CT-8
ODOT Classification: A-7-6

Portland Cement Content:	0%	3%	5%	7%
ODOT Typical Density Curve No.:	M	M	M	M
Maximum Dry Density (pcf):	112.0	112.0	112.0	112.0
Optimum Moisture Content (%):	15.8	15.8	15.8	15.8

Strength Criteria (psi):			Chemical Content Required:	Recommended:
Criterion 1:	Minimum:	100	3.5%	**4.0%**
Criterion 2:	Increase > Untreated:	50	2.5%	

Chemical Content (%)	Age of Strength Testing (days)	Average Diameter (inches)	Average Height (inches)	Area ($in.^2$)	Average Moist-Cured Diameter (inches)	Average Moist-Cured Height (inches)	Moisture Cured Area ($in.^2$)	Percent Expansion (%)	Average Percent Expansion (%)	Dry Unit Weight (lbs/ft^3)	Water Content (%)	Maximum Load (lbf)	Percent Compaction (%)	Unconfined Compressive Strength ($lbs/in.^2$)	Average Unconfined Compressive Strength ($lbs/in.^2$)
0%a	0	4.00	4.60	12.59	-	-	-	-	-	110.6	17.2	600	98.8	50	**45**
0%b	0	4.01	4.60	12.62	-	-	-	-	-	109.7	17.7	590	98.0	45	
0%c	0	4.01	4.60	12.60	-	-	-	-	-	110.1	17.4	550	98.3	45	
3%a	8	4.01	4.60	12.61	4.01	4.60	12.64	0.2	0.2	110.1	17.8	1480	98.3	115	**120**
3%b	8	4.01	4.60	12.63	4.01	4.60	12.62	0.0		109.7	17.7	1520	97.9	120	
3%c	8	4.01	4.60	12.64	4.01	4.60	12.61	0.2		109.6	17.8	1540	97.9	120	
5%a	8	4.01	4.60	12.62	4.01	4.60	12.63	0.1	0.2	110.2	17.8	1710	98.4	135	**135**
5%b	8	4.01	4.59	12.61	4.01	4.59	12.63	0.1		110.4	17.8	1720	98.5	135	
5%c	8	4.01	4.59	12.61	4.01	4.60	12.62	0.3		110.0	18.1	1630	98.2	130	
7%a	8	4.01	4.60	12.63	4.01	4.60	12.61	0.1	0.2	110.1	17.9	2060	98.3	165	**155**
7%b	8	4.01	4.60	12.62	4.01	4.61	12.62	0.2		110.2	17.9	1810	98.4	145	
7%c	8	4.01	4.61	12.62	4.01	4.62	12.62	0.2		110.2	17.9	1890	98.4	150	





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SUMMARY OF SOIL-CEMENT UNCONFINED COMPRESSIVE STRENGTH DATA

ASTM D558, D559, D1633

Client: Ohio Turnpike Commission

Project: ***OTC PR-2***

Date: January 11, 2015

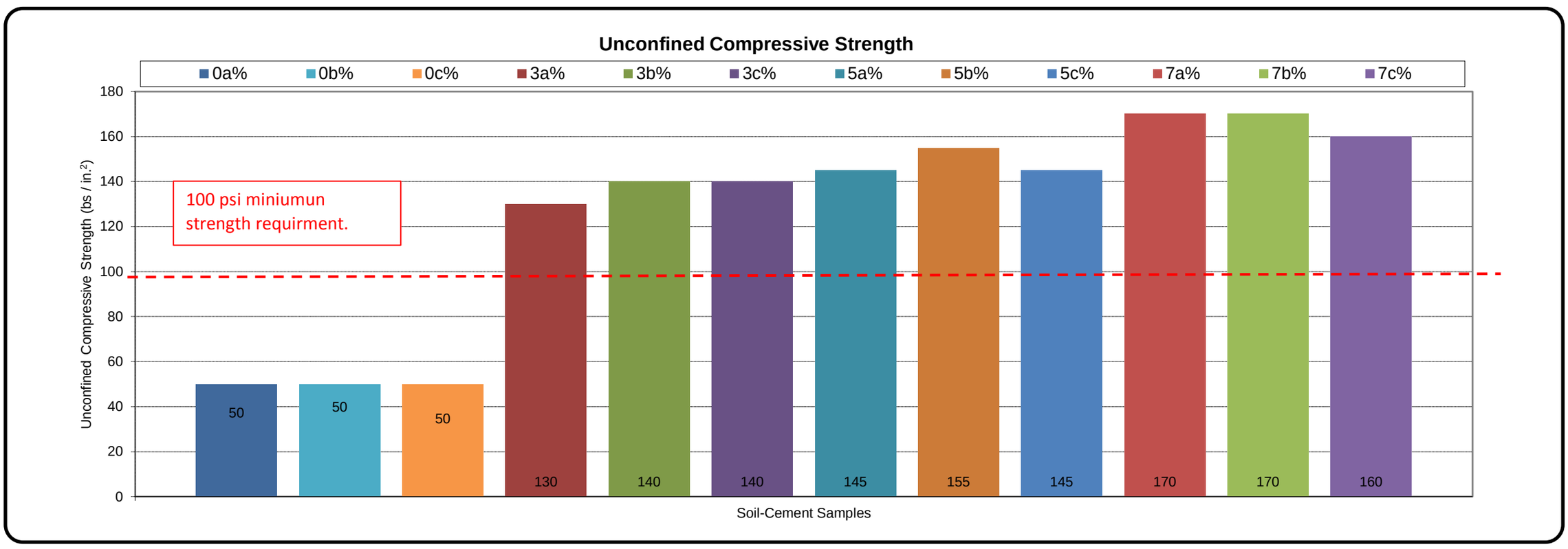
Project No.: N-14-020-2

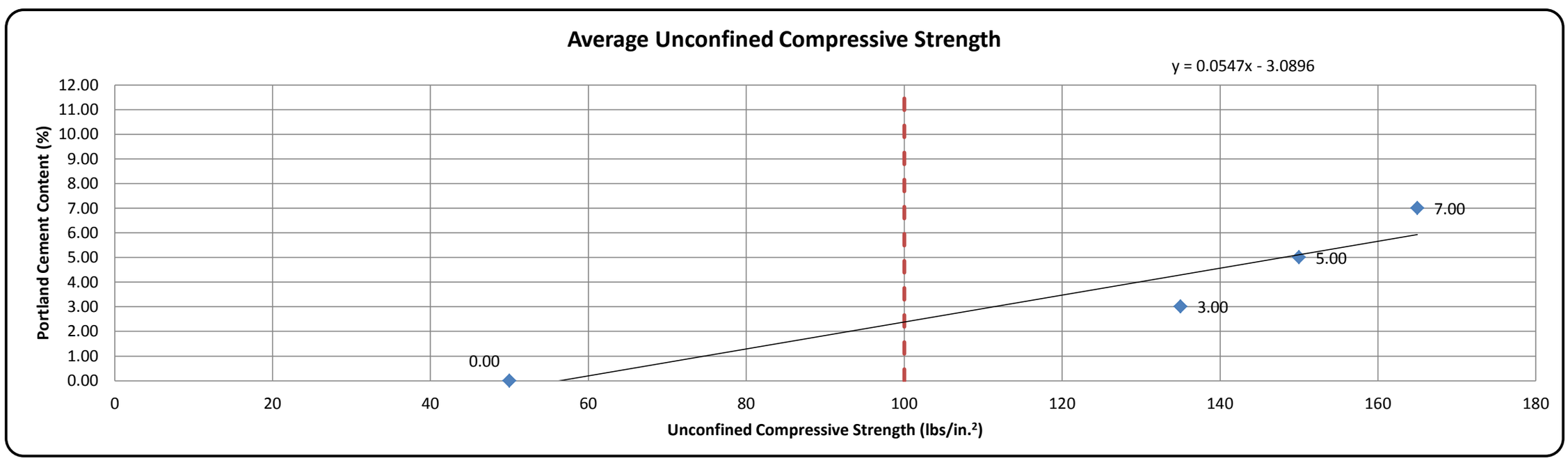
Sample Number: CT-9
ODOT Classification: A-7-6

Portland Cement Content:	0%	3%	5%	7%
ODOT Typical Density Curve No.:	O	N	N	N
Maximum Dry Density (pcf):	107.1	109.6	109.6	109.6
Optimum Moisture Content (%):	18.1	16.9	16.9	16.9

Strength Criteria (psi):			Chemical Content Required:	Recommended:
Criterion 1:	Minimum:	100	2.5%	**3.0%**
Criterion 2:	Increase > Untreated:	50	2.5%	

Chemical Content (%)	Age of Strength Testing (days)	Average Diameter (inches)	Average Height (inches)	Area ($in.^2$)	Average Moist-Cured Diameter (inches)	Average Moist-Cured Height (inches)	Moisture Cured Area ($in.^2$)	Percent Expansion (%)	Average Percent Expansion (%)	Dry Unit Weight (lbs/ft^3)	Water Content (%)	Maximum Load (lbf)	Percent Compaction (%)	Unconfined Compressive Strength ($lbs/in.^2$)	Average Unconfined Compressive Strength ($lbs/in.^2$)
0%a	0	4.01	4.59	12.60	-	-	-	-	-	106.0	19.7	630	99.0	50	**50**
0%b	0	4.00	4.59	12.59	-	-	-	-	-	105.8	19.7	610	98.8	50	
0%c	0	4.01	4.59	12.61	-	-	-	-	-	105.7	19.9	620	98.7	50	
3%a	8	4.00	4.60	12.59	4.01	4.60	12.61	0.1	0.2	106.0	19.9	1670	96.7	130	**135**
3%b	8	4.01	4.59	12.62	4.01	4.60	12.63	0.1		106.1	19.7	1770	96.8	140	
3%c	8	4.01	4.60	12.64	4.01	4.60	12.60	0.3		106.1	20.0	1760	96.8	140	
5%a	8	4.01	4.58	12.62	4.01	4.59	12.62	0.0	0.1	106.3	19.8	1850	97.0	145	**150**
5%b	8	4.01	4.59	12.62	4.01	4.59	12.62	0.0		106.0	20.2	1930	96.8	155	
5%c	8	4.01	4.59	12.62	4.01	4.60	12.62	0.1		105.9	20.0	1860	96.7	145	
7%a	8	4.01	4.59	12.62	4.01	4.60	12.64	0.2	0.2	106.0	20.1	2160	96.7	170	**165**
7%b	8	4.01	4.59	12.60	4.01	4.60	12.62	0.2		106.2	19.7	2120	96.9	170	
7%c	8	4.01	4.59	12.62	4.01	4.59	12.60	0.1		106.6	19.4	2010	97.3	160	





APPENDIX II-B

SULFATE CONTENT TEST RESULTS

RESOURCE INTERNATIONAL, INC.
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DETERMINING SULFATE CONTENT IN SOILS - COLORIMETRIC METHOD

TxDOT Tex-145-E

Project Name: OTPRP 71-14-08 MP 216.25 to 221.0
Project No.: N-14-020(2)
Client: OTIC

Laboratory Technician: Eli Mesko, CET
Test Date: September 4, 2014

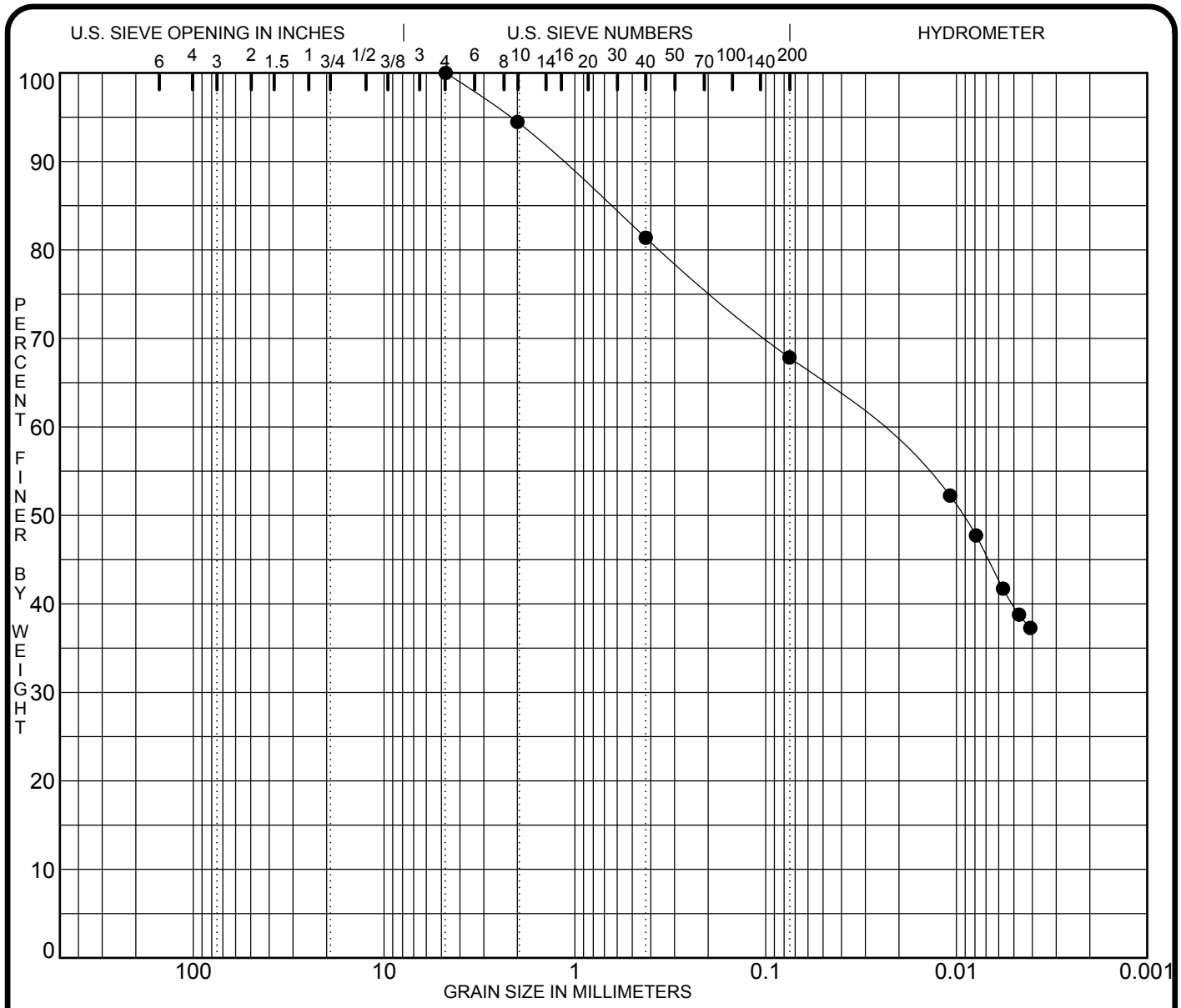
Laboratory Data

Initial Dilution Ratio: 1:20 *1:40 **1:80 ***1:160

Sample ID	Reading 1	Reading 2	Reading 3	Average Reading	Sulfate Concentration (ppm)
B-44-01	33	34	36	34.33	687
B-44-02	11	10	11	10.67	213
B-44-03	31	33	34	32.67	653
B-44-04	25	26	24	25.00	500
B-44-05	48	46	44	46.00	**3,680
B-44-06	34	36	35	35.00	700
B-44-07	25	26	27	26.00	520
B-44-08	49	52	54	51.67	1,033
B-44-09	38	40	40	39.33	**3,146
B-44-10	55	58	60	57.67	1,153
B-44-12	40	38	42	40.00	800
B-44-14	3	3	3	3.00	60
B-44-15	26	28	27	27.00	540
B-44-16	82	83	84	83.00	1,660
B-44-17	20	21	22	21.00	420
B-44-18	40	42	38	40.00	800
B-44-19	21	21	21	21.00	420
B-44-20	42	40	41	41.00	820
B-44-21	12	12	14	12.67	253
B-44-22	73	76	75	74.67	1,493
B-44-23	47	48	49	48.00	960
B-44-24	24	26	25	25.00	500
B-44-25	19	22	20	20.33	407
B-44-27	39	40	41	40.00	800

APPENDIX II-C

BULK SOIL SAMPLE CLASSIFICATION MATRICES



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-01**	**1.0**	**A-6b**	**687**	**5.6**	**27**	**37**	**20**	**17**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-01**	**0.03**	**0.01**			**0.0**	**5.5**	**13.1**	**13.5**	**28.1**	**39.7**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

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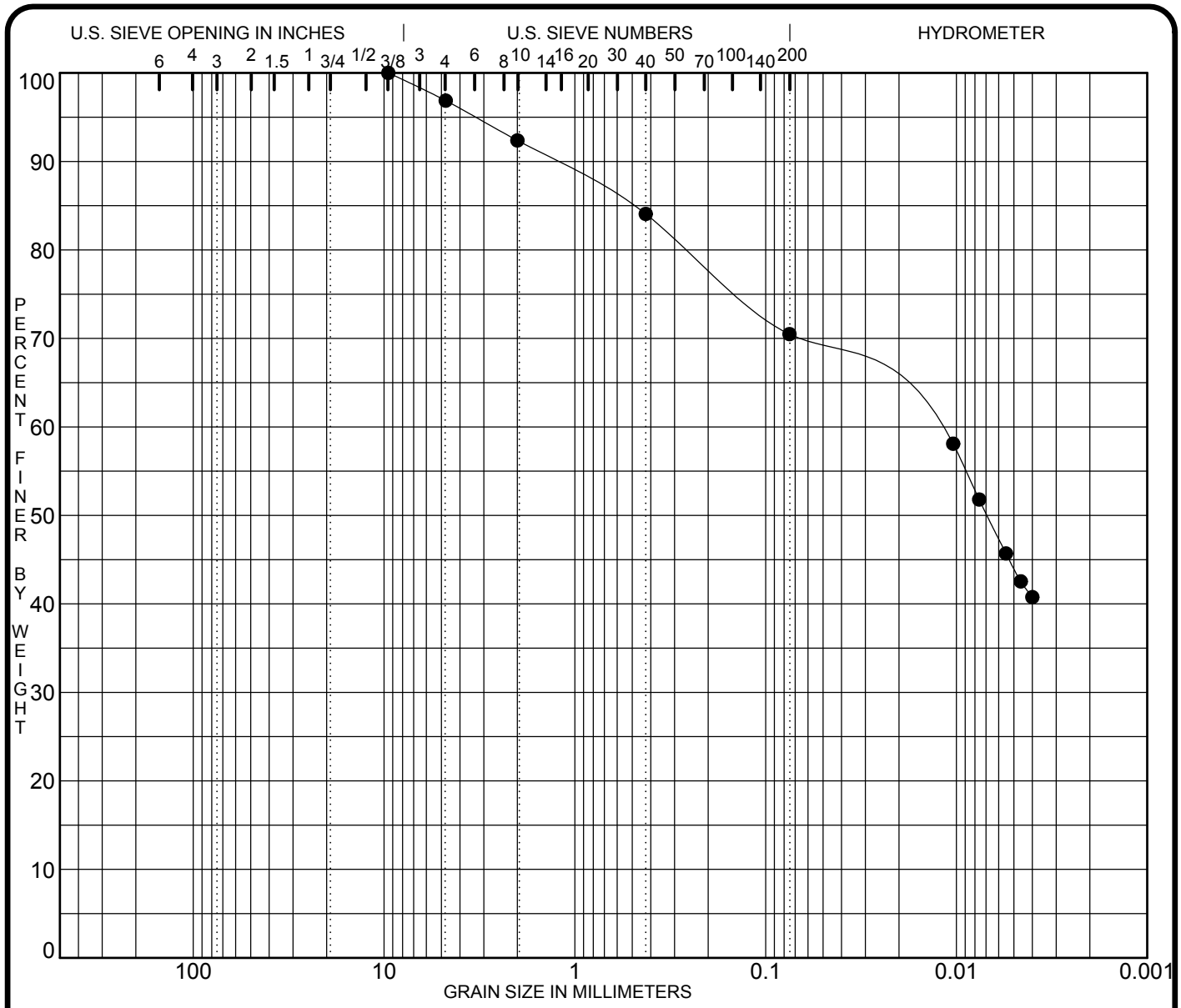


COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

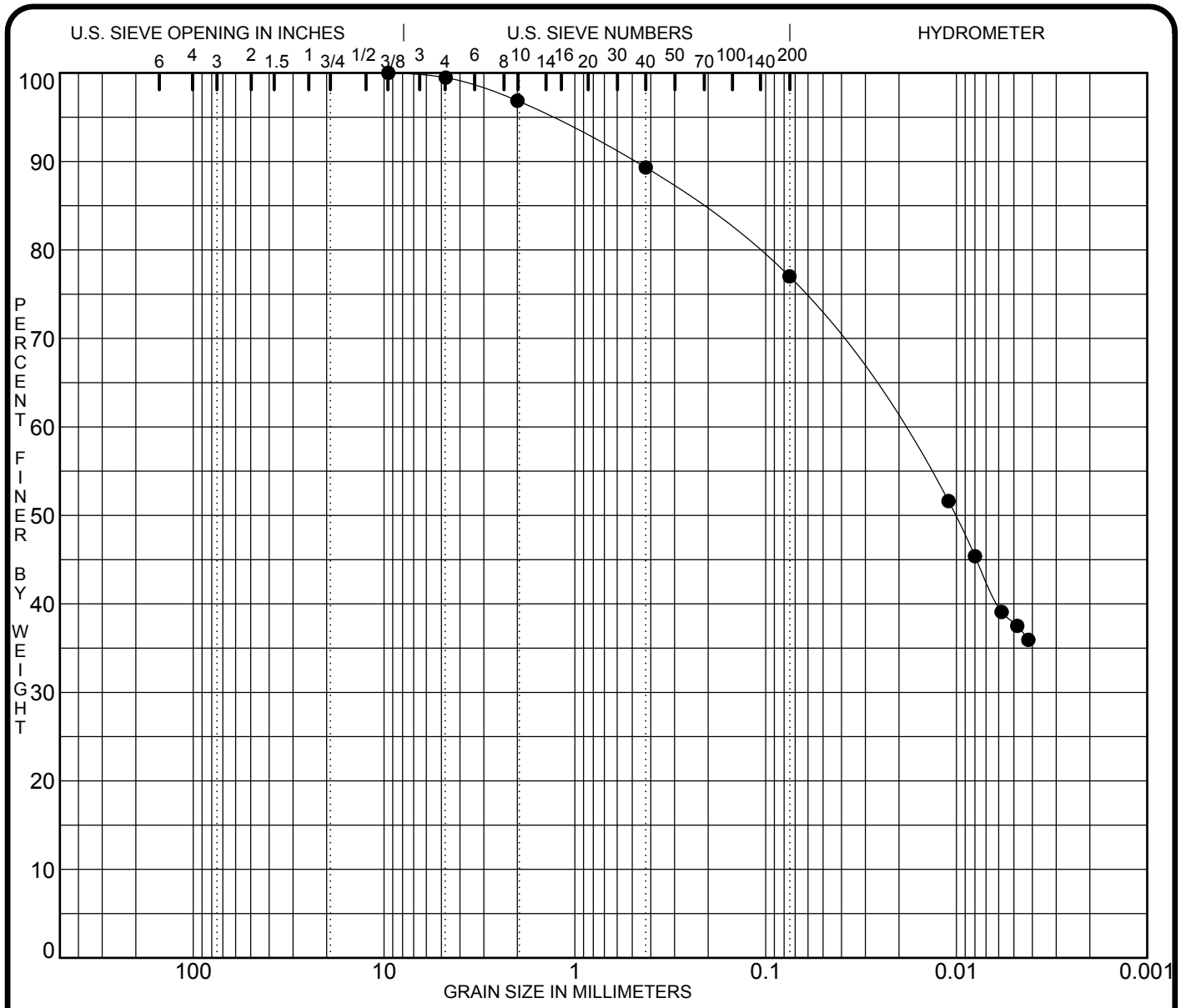
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-02**	**1.0**	**A-6b**	**213**	**0.9**	**16**	**36**	**19**	**17**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-02**	**0.01**	**0.01**			**0.0**	**7.6**	**8.3**	**13.6**	**26.5**	**44.0**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

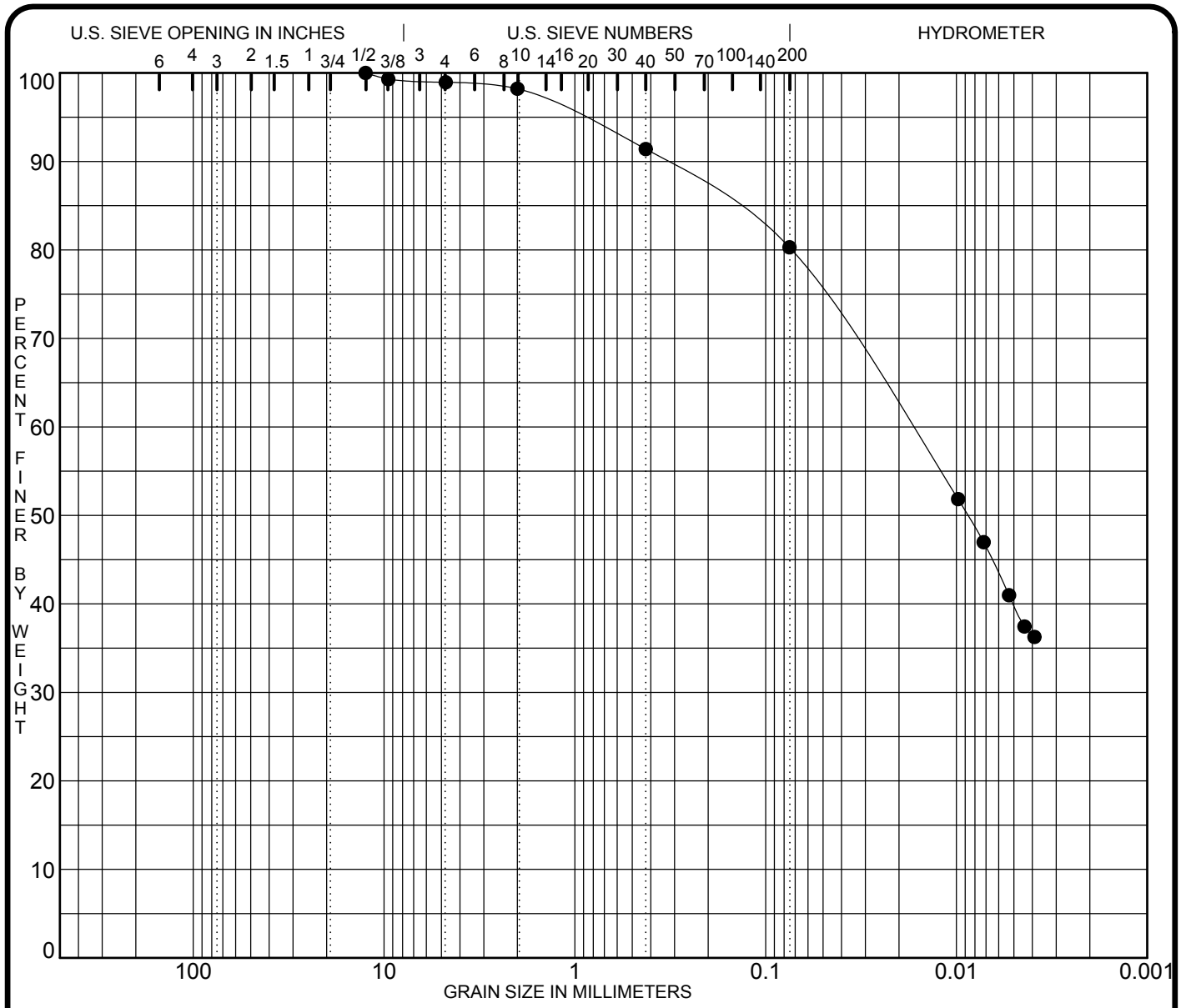
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-03**	**1.0**	**A-7-6**	**653**	**2.1**	**20**	**41**	**18**	**23**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-03**	**0.02**	**0.01**			**0.0**	**3.1**	**7.5**	**12.3**	**39.2**	**37.9**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

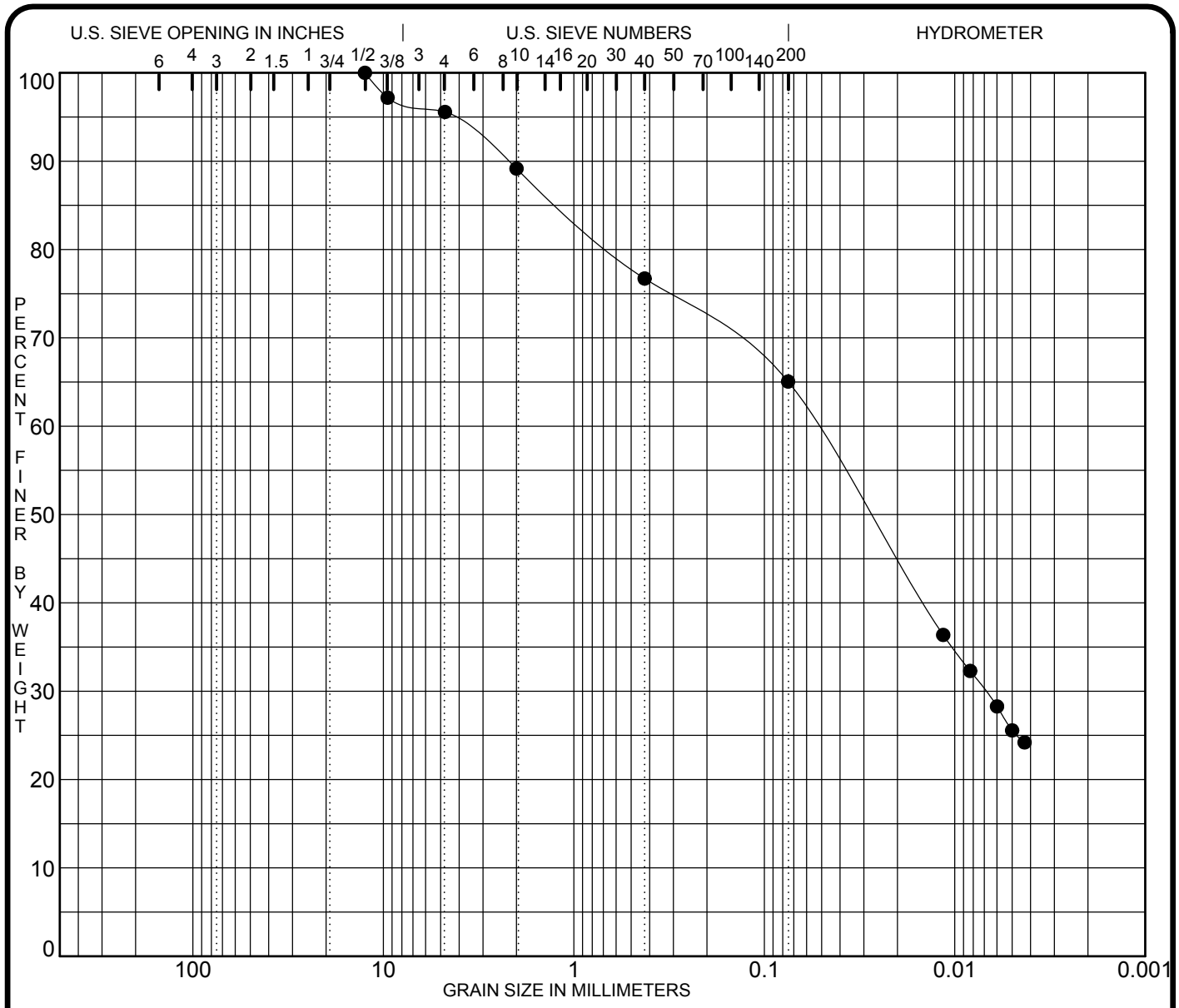
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-04**	**1.0**	**A-7-6**	**500**	**1.0**	**11**	**41**	**20**	**21**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-04**	**0.02**	**0.01**			**0.0**	**1.8**	**6.8**	**11.1**	**40.4**	**39.9**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

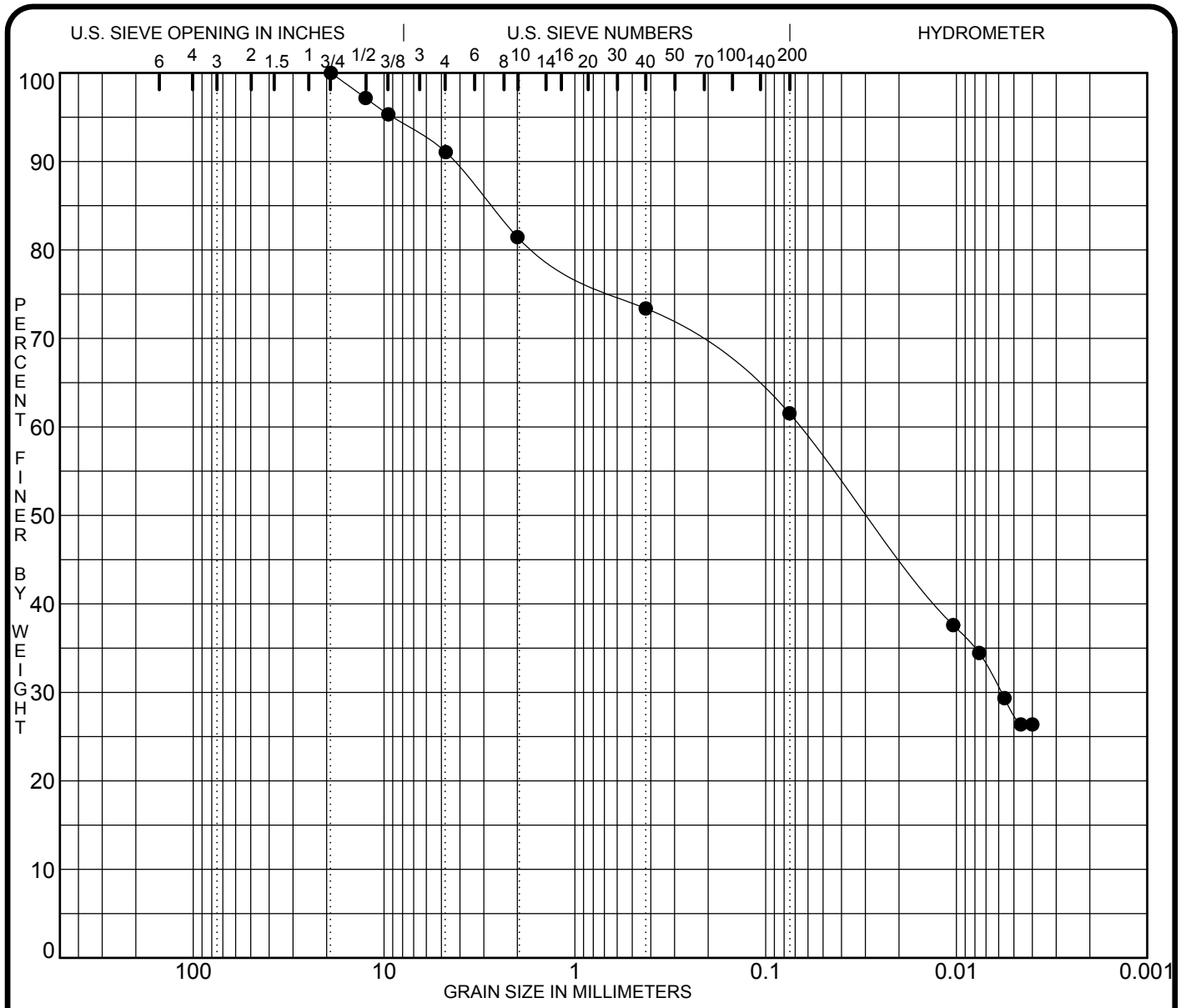
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-05**	**1.0**	**A-7-6**	**3,680**	**4.0**	**27**	**42**	**24**	**18**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-05**	**0.05**	**0.03**	**0.007**		**0.0**	**10.8**	**12.4**	**11.7**	**39.5**	**25.6**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

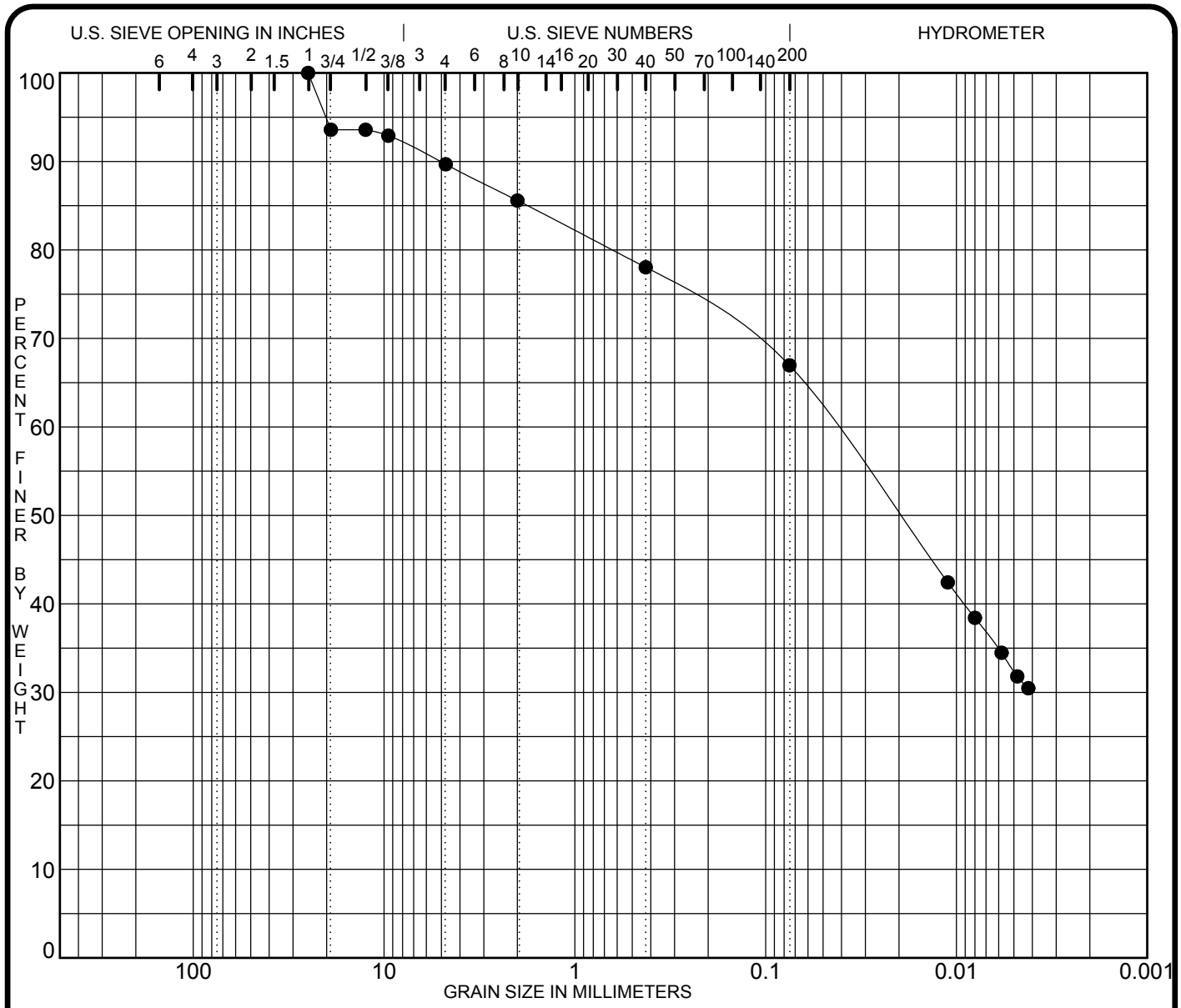
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-06**	**1.0**	**A-6b**	**700**	**1.7**	**16**	**37**	**20**	**17**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-06**	**0.07**	**0.03**	**0.006**		**0.0**	**18.5**	**8.1**	**11.8**	**33.9**	**27.6**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

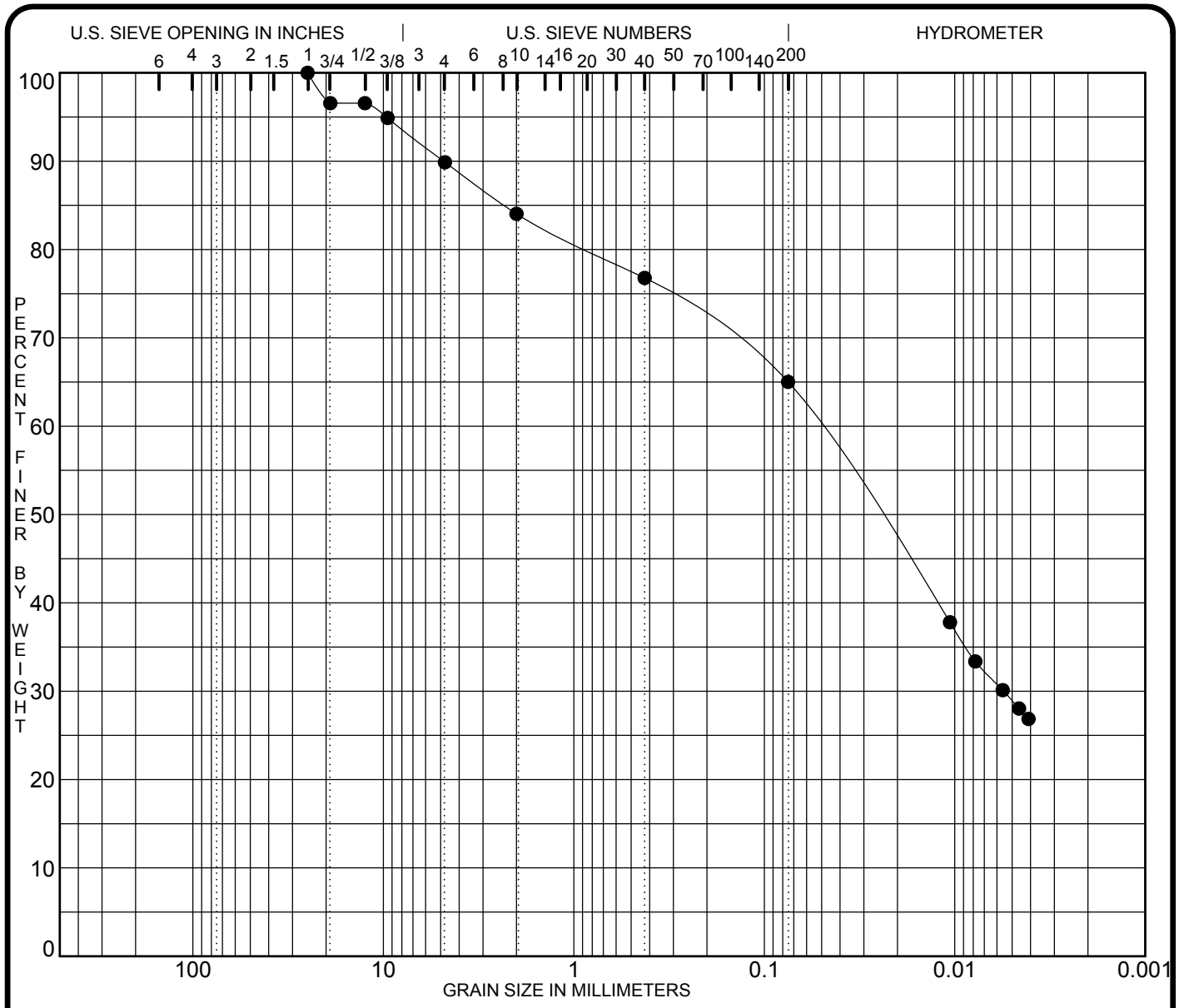
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-07**	**1.0**	**A-6a**	**520**	**3.8**	**20**	**32**	**17**	**15**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-07**	**0.04**	**0.02**			**6.4**	**8.0**	**7.5**	**11.1**	**34.6**	**32.4**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

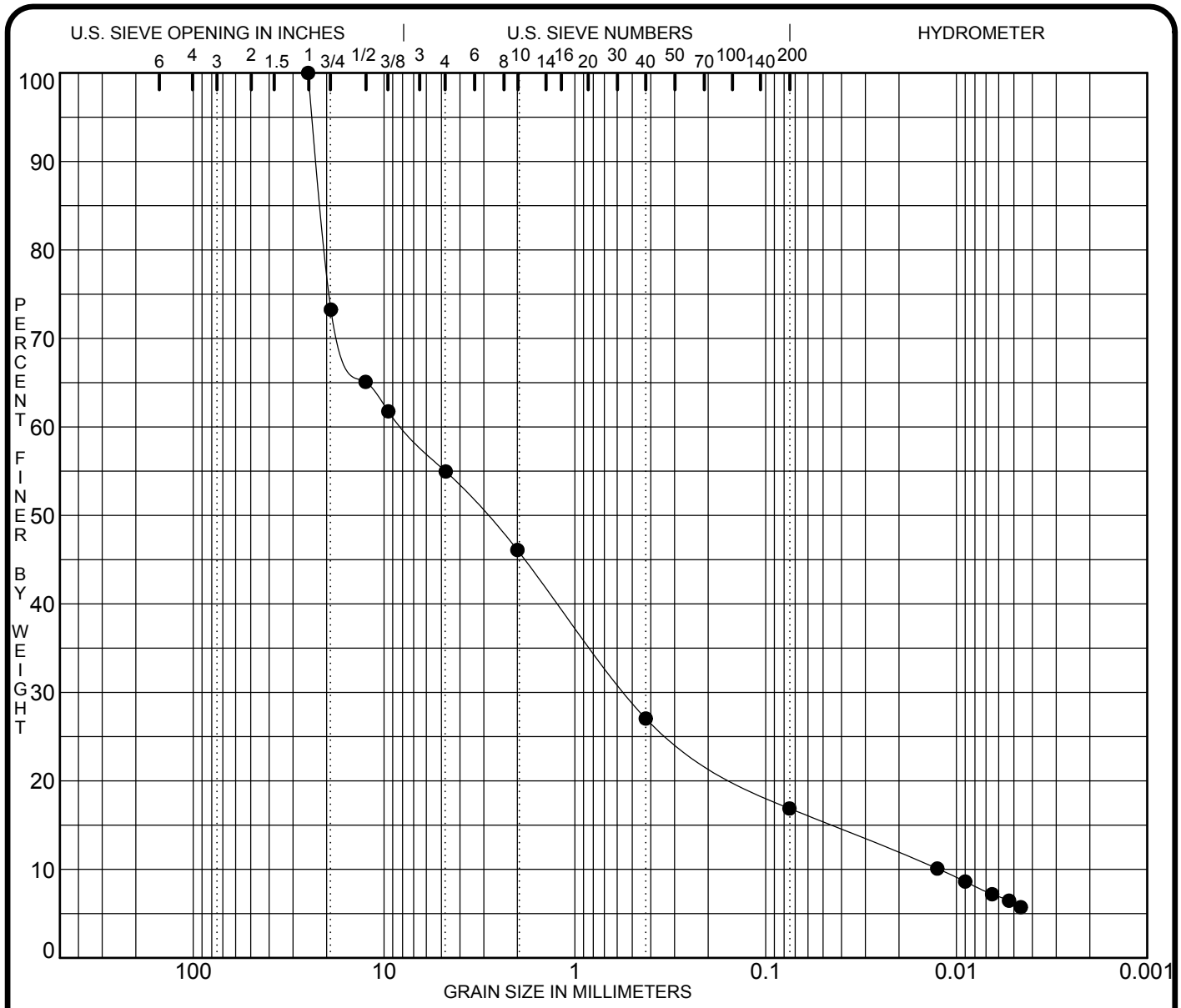
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-08**	**1.0**	**A-6b**	**1033**	**2.3**	**14**	**37**	**18**	**19**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-08**	**0.05**	**0.03**	**0.006**		**3.4**	**12.5**	**7.3**	**11.8**	**36.1**	**28.9**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

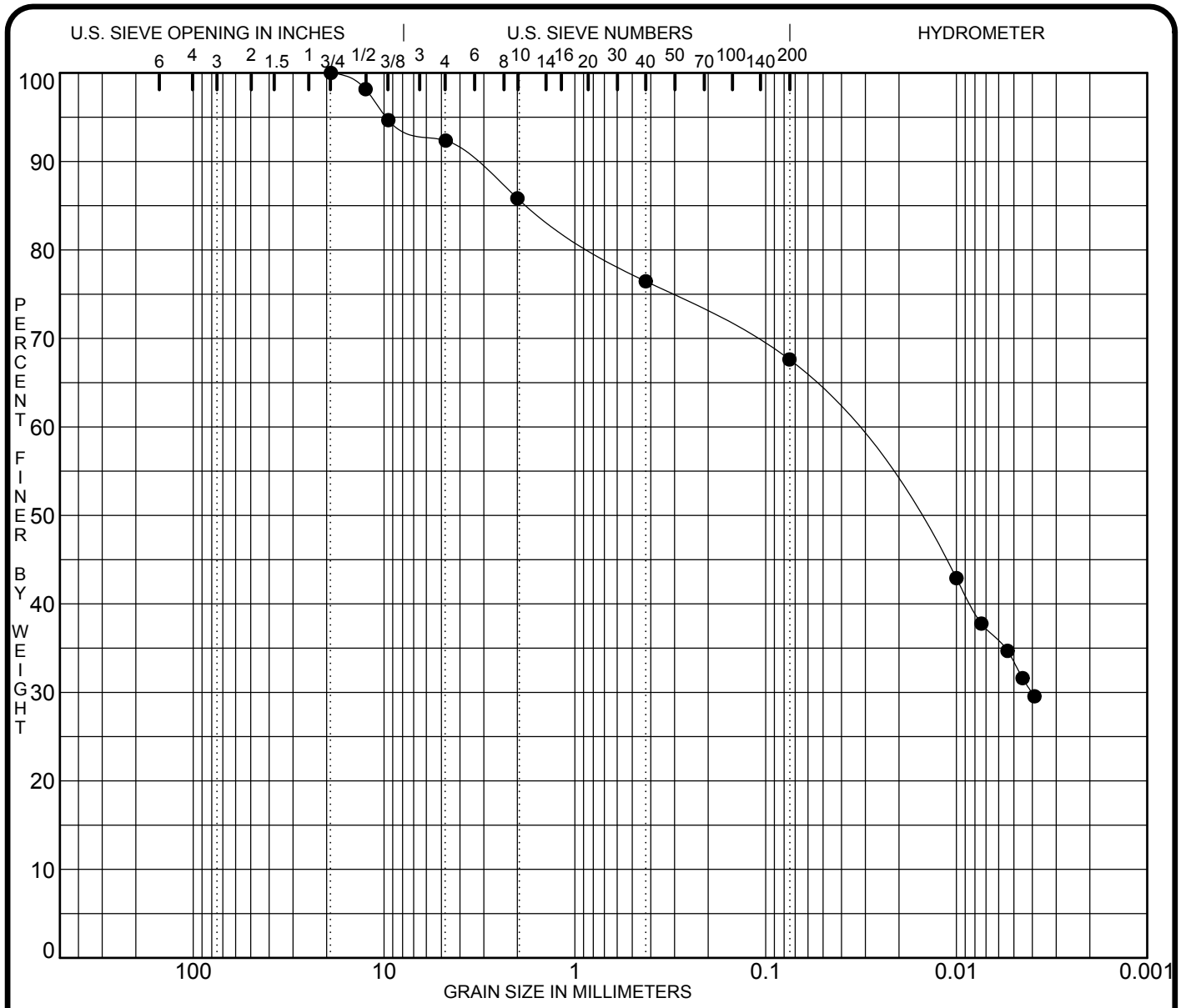
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-09**	**1.0**	**A-1-b**	**3,146**	**2.8**	**20**	**NP**	**NP**	**NP**	**2.98**	**643.5**

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-09**	**7.94**	**2.93**	**0.540**	**0.0123**	**26.7**	**27.2**	**19.0**	**10.2**	**10.7**	**6.2**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

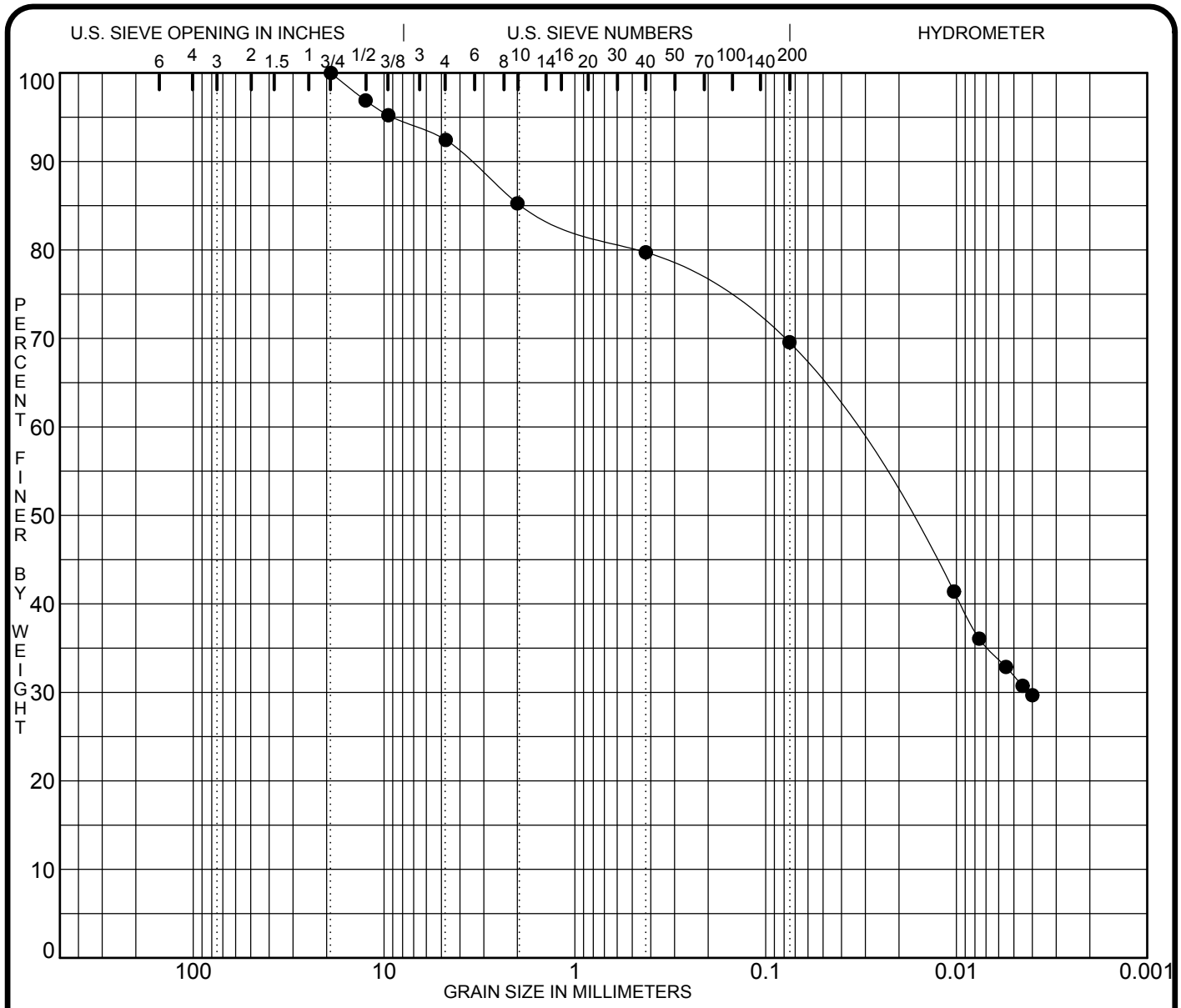
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-10**	**1.0**	**A-6b**	**1153**	**1.7**	**12**	**36**	**18**	**18**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-10**	**0.04**	**0.02**	**0.004**		**0.0**	**14.2**	**9.4**	**8.8**	**34.2**	**33.4**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

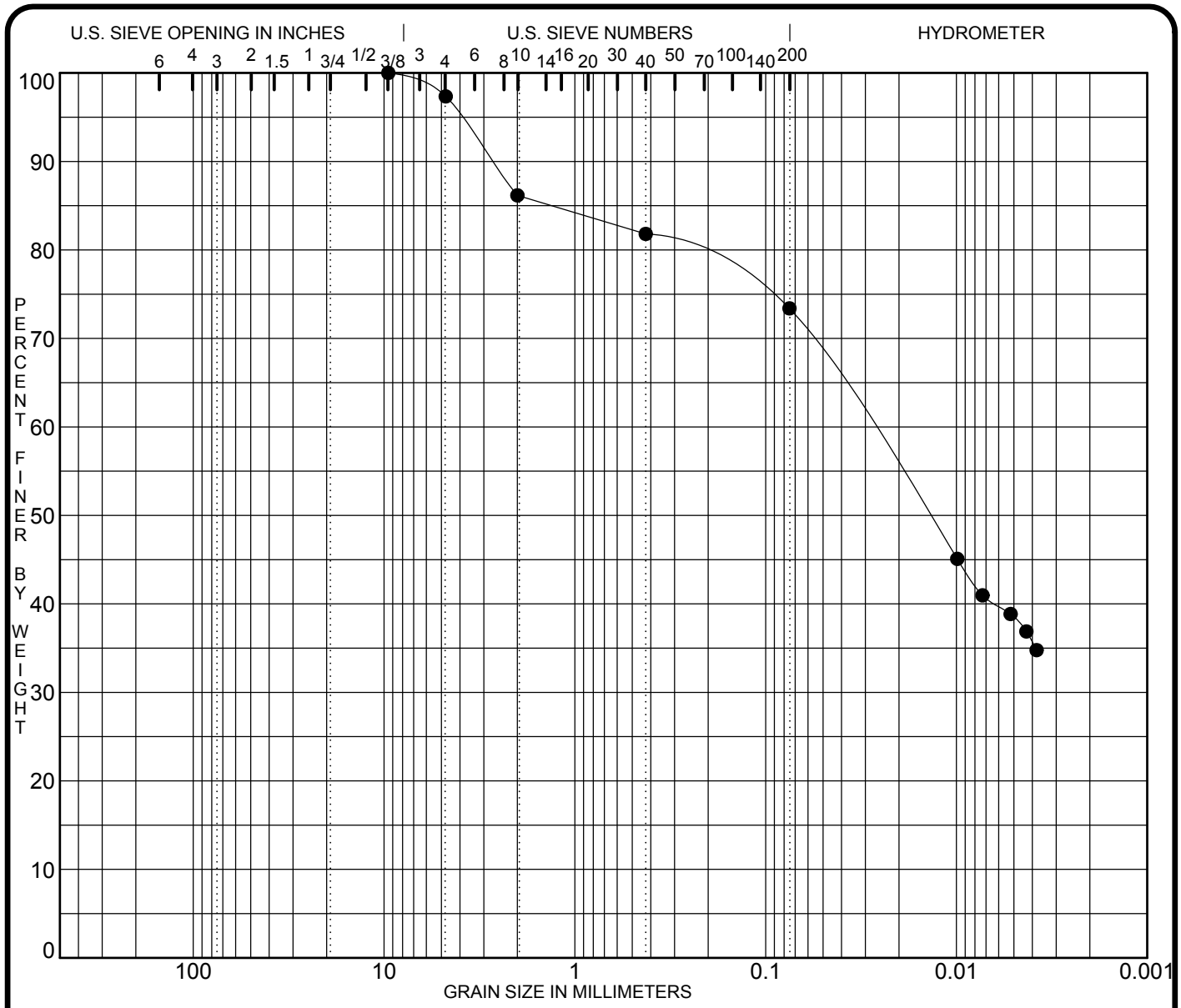
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-12**	**1.0**	**A-6b**	**800**	**2.9**	**13**	**34**	**16**	**18**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-12**	**0.04**	**0.02**	**0.004**		**0.0**	**14.7**	**5.5**	**10.2**	**37.7**	**31.9**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

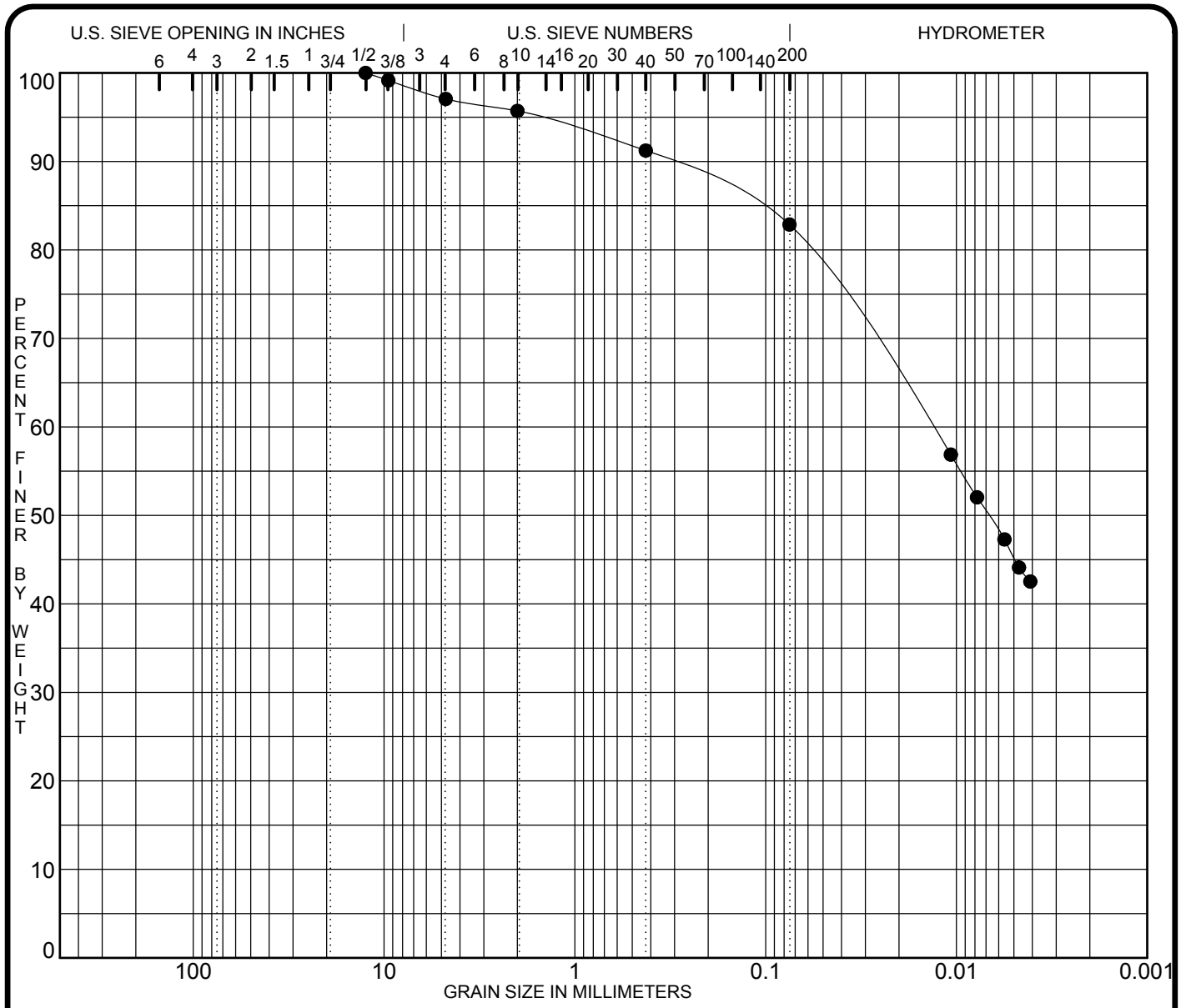
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-14**	**1.0**	**A-7-6**	**60**	**1.7**	**22**	**152**	**7**	**145**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-14**	**0.03**	**0.01**			**0.0**	**13.8**	**4.4**	**8.4**	**34.9**	**38.5**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

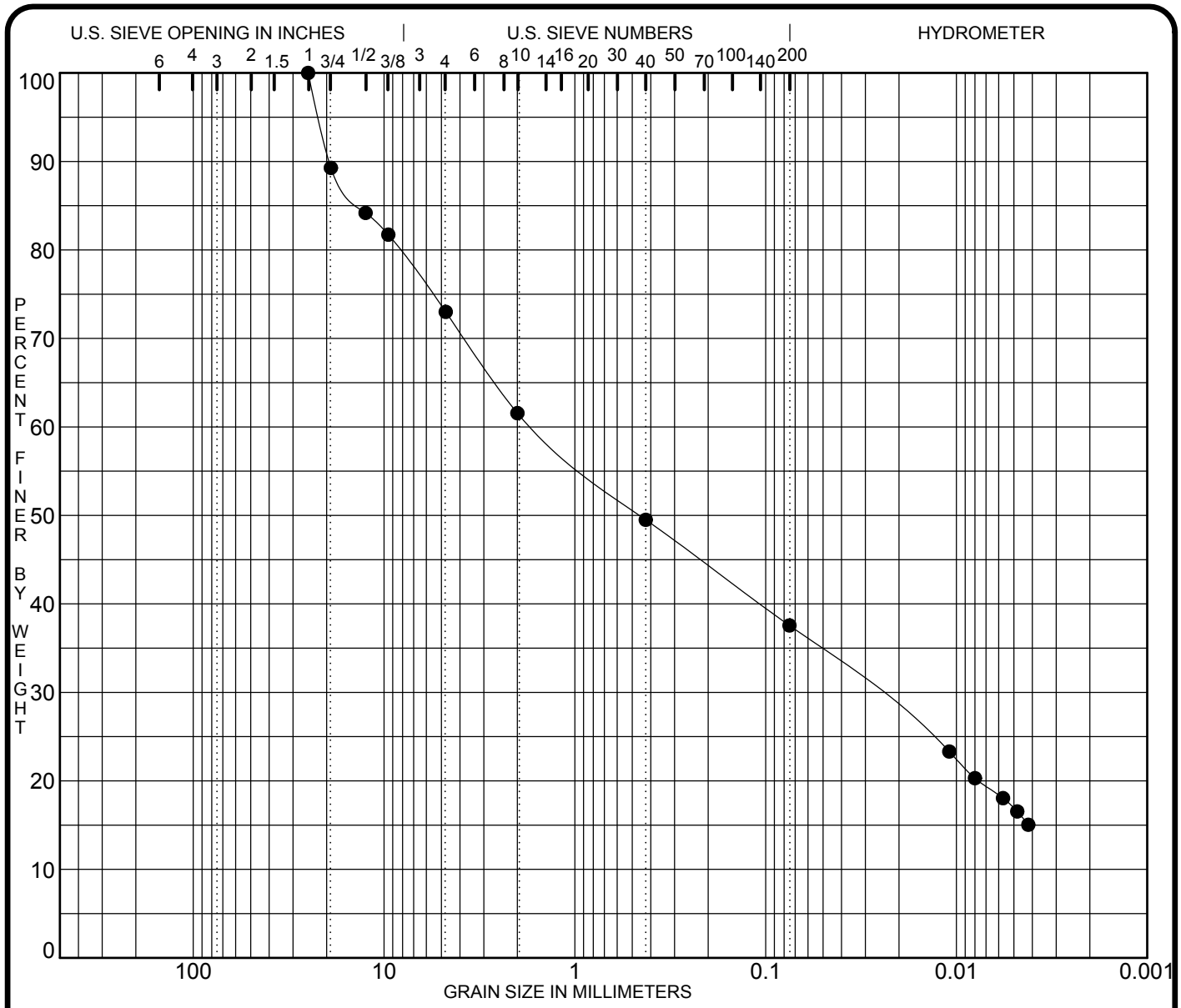
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-15**	**1.0**	**A-6b**	**540**	**3.2**	**18**	**37**	**18**	**19**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-15**	**0.01**	**0.01**			**0.0**	**4.3**	**4.5**	**8.4**	**37.6**	**45.2**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

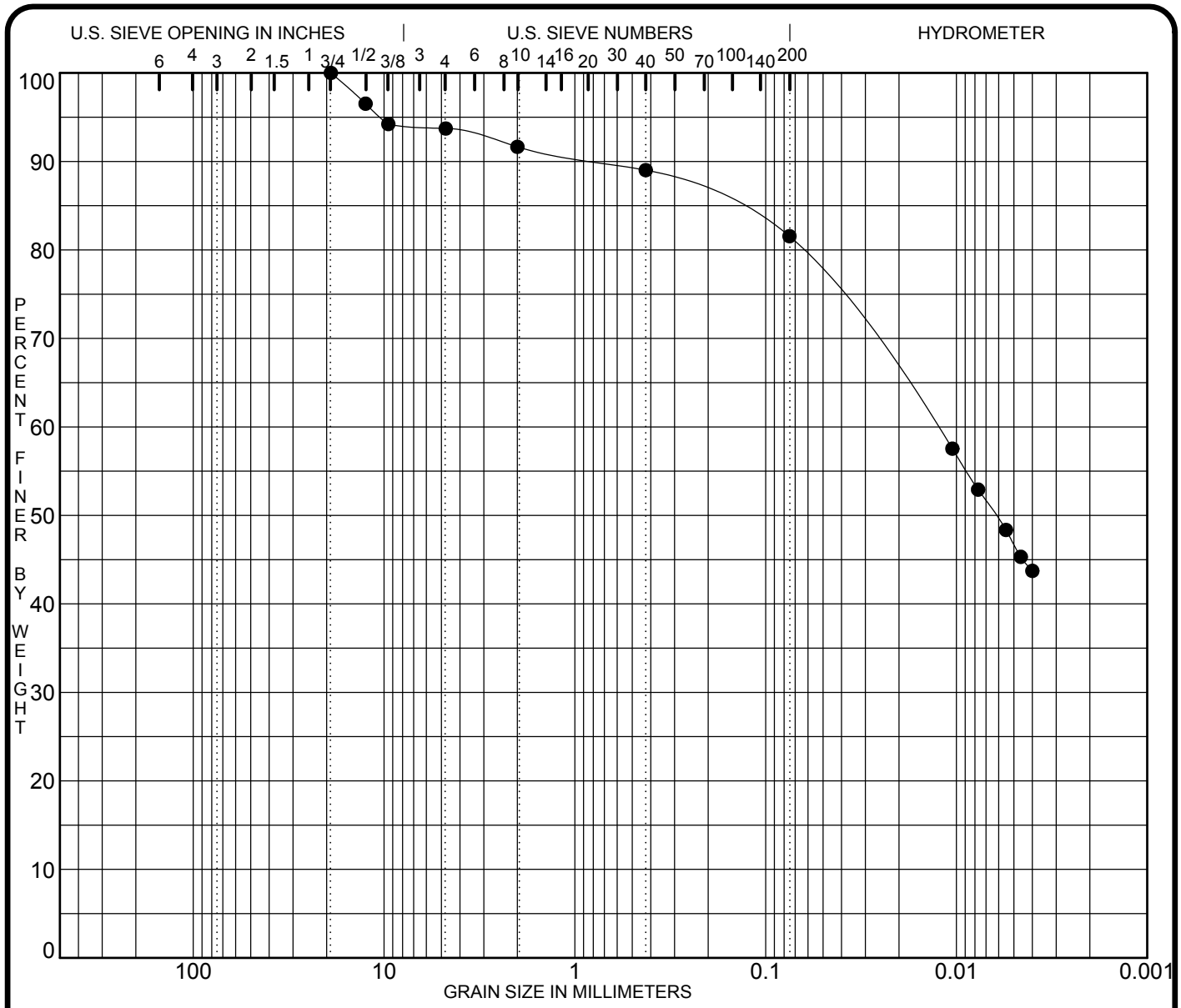
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-16**	**1.0**	**A-4a**	**1660**	**5.5**	**14**	**30**	**21**	**9**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-16**	**1.64**	**0.45**	**0.027**		**10.7**	**27.7**	**12.1**	**11.9**	**20.7**	**16.9**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

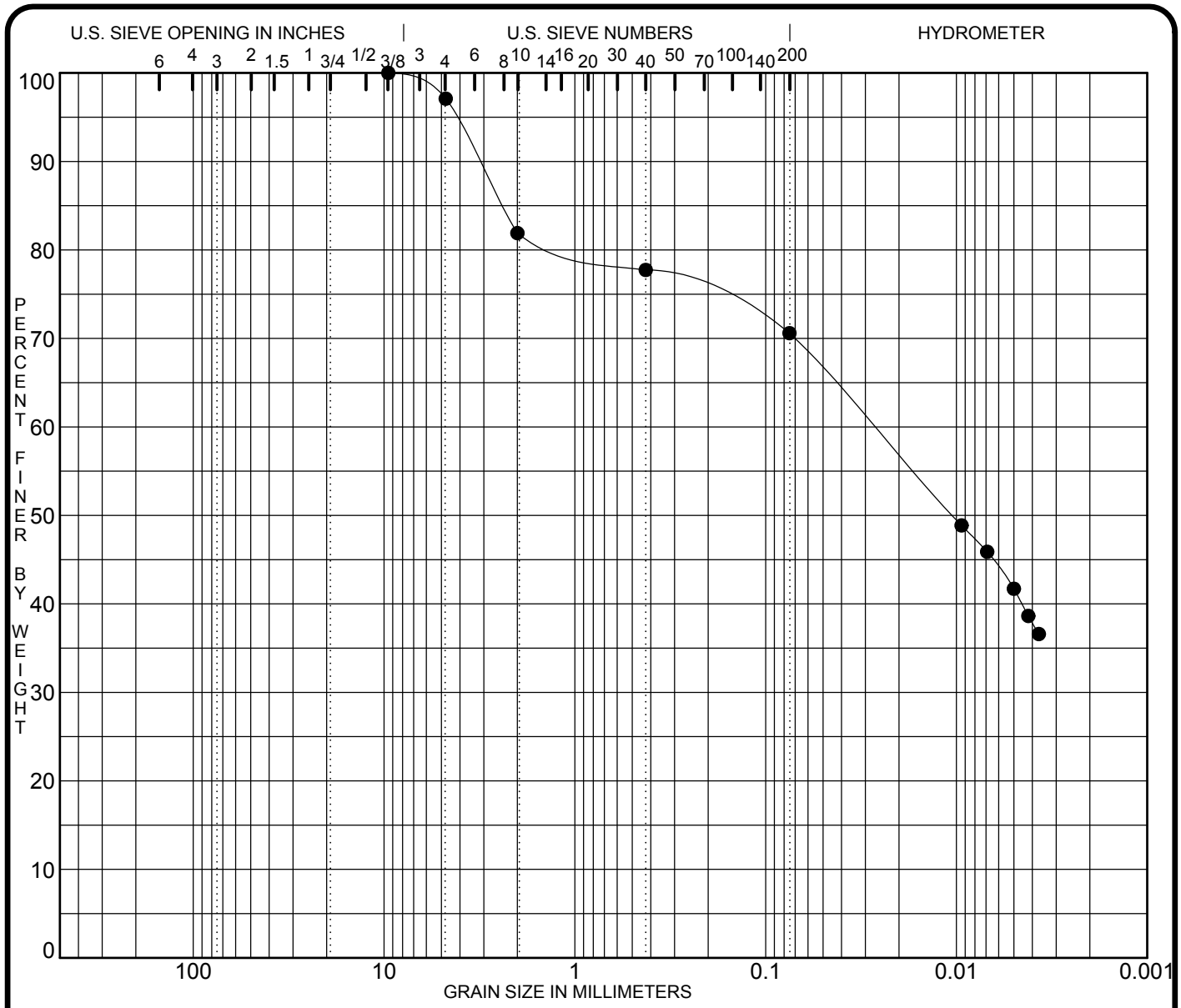
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-17**	**1.0**	**A-6b**	**420**	**1.0**	**14**	**38**	**17**	**21**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-17**	**0.01**	**0.01**			**0.0**	**8.4**	**2.6**	**7.5**	**34.8**	**46.7**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

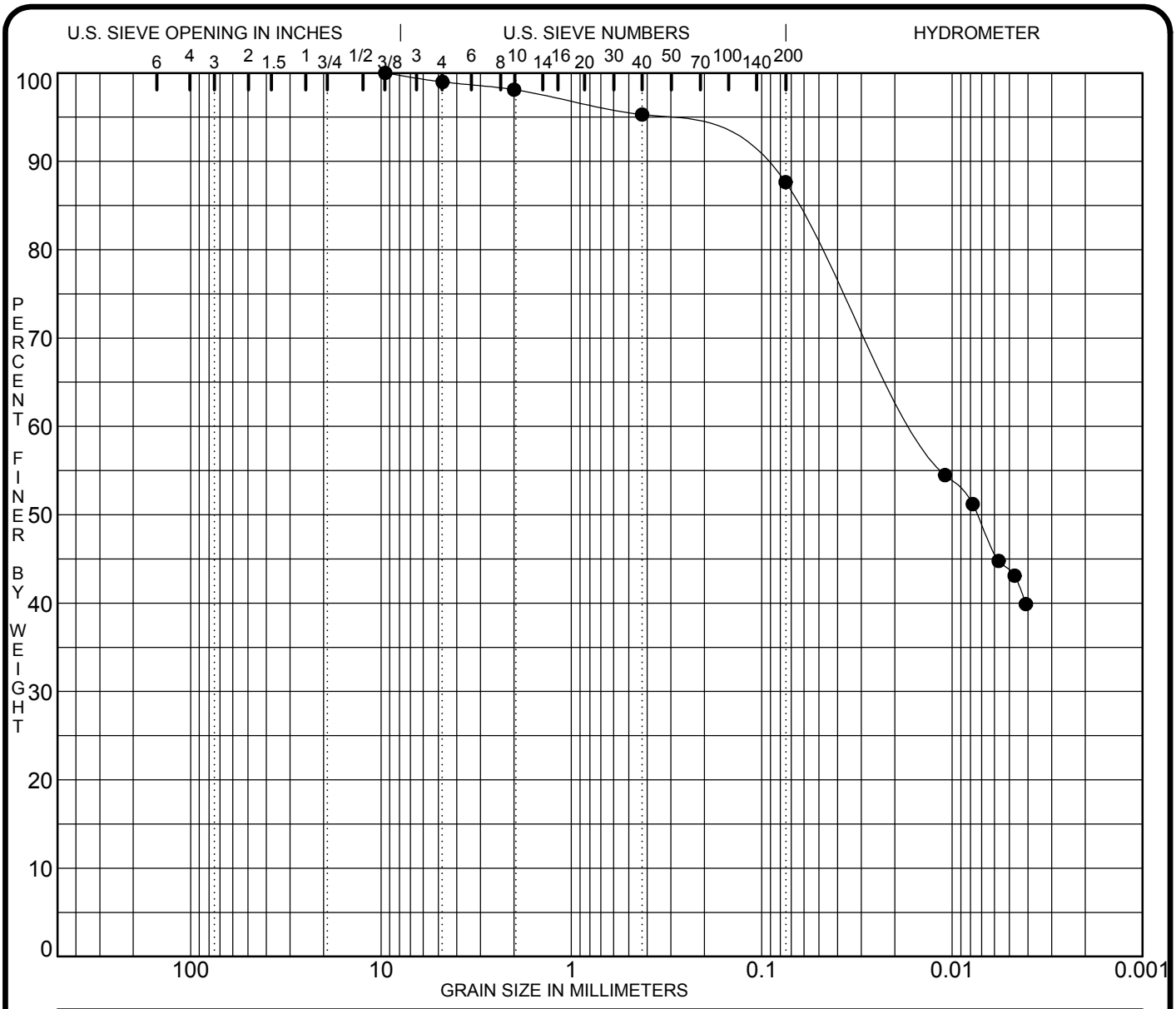
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-18**	**1.0**	**A-7-6**	**800**	**1.9**	**20**	**44**	**21**	**23**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-18**	**0.03**	**0.01**			**0.0**	**18.1**	**4.2**	**7.1**	**28.9**	**41.7**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

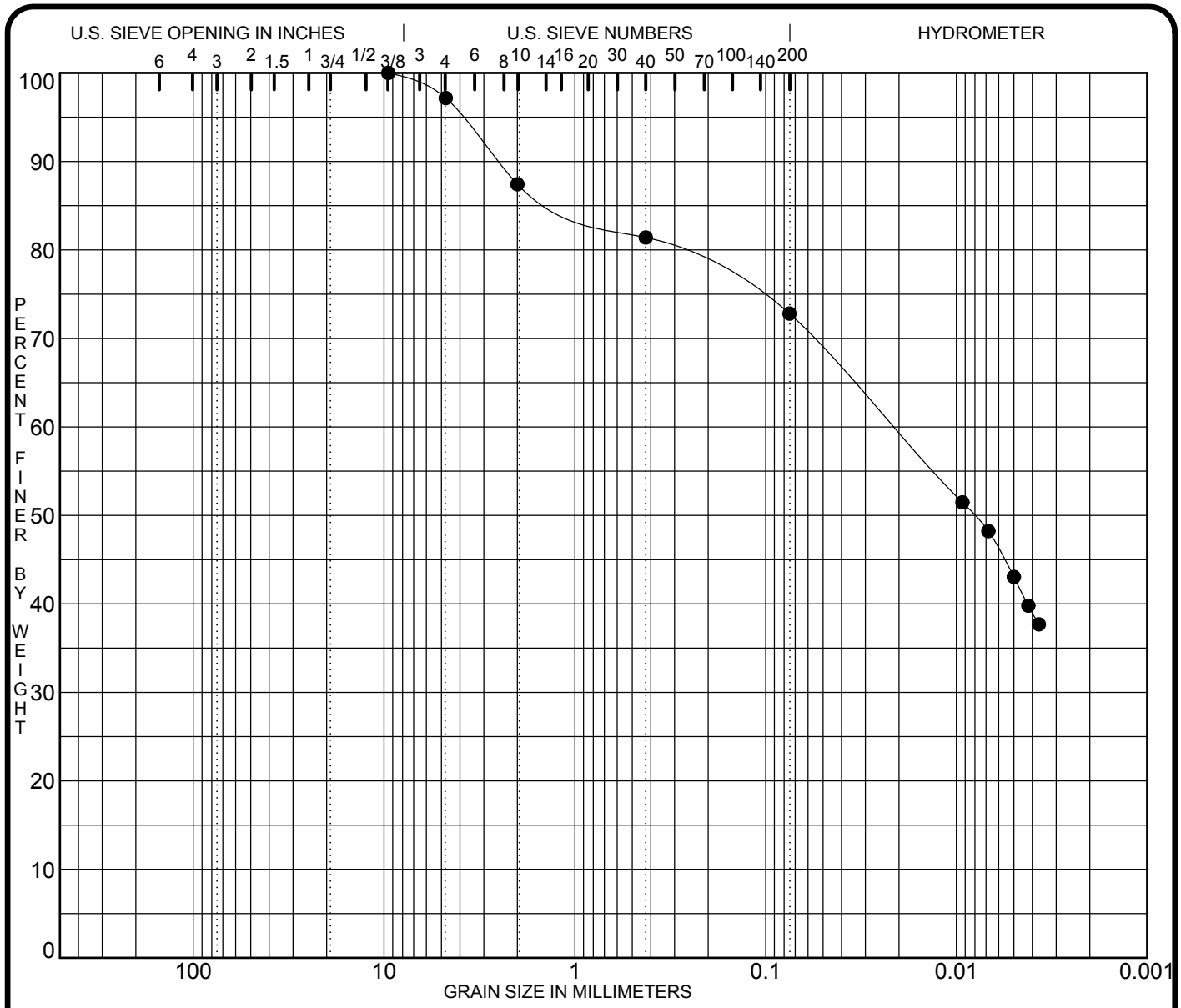
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-19**	**1.0**	**A-6b**	**420**	**1.9**	**18**	**37**	**19**	**18**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-19**	**0.02**	**0.01**			**0.0**	**1.9**	**2.8**	**7.6**	**44.0**	**43.6**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

RESOURCE INTERNATIONAL, INC.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

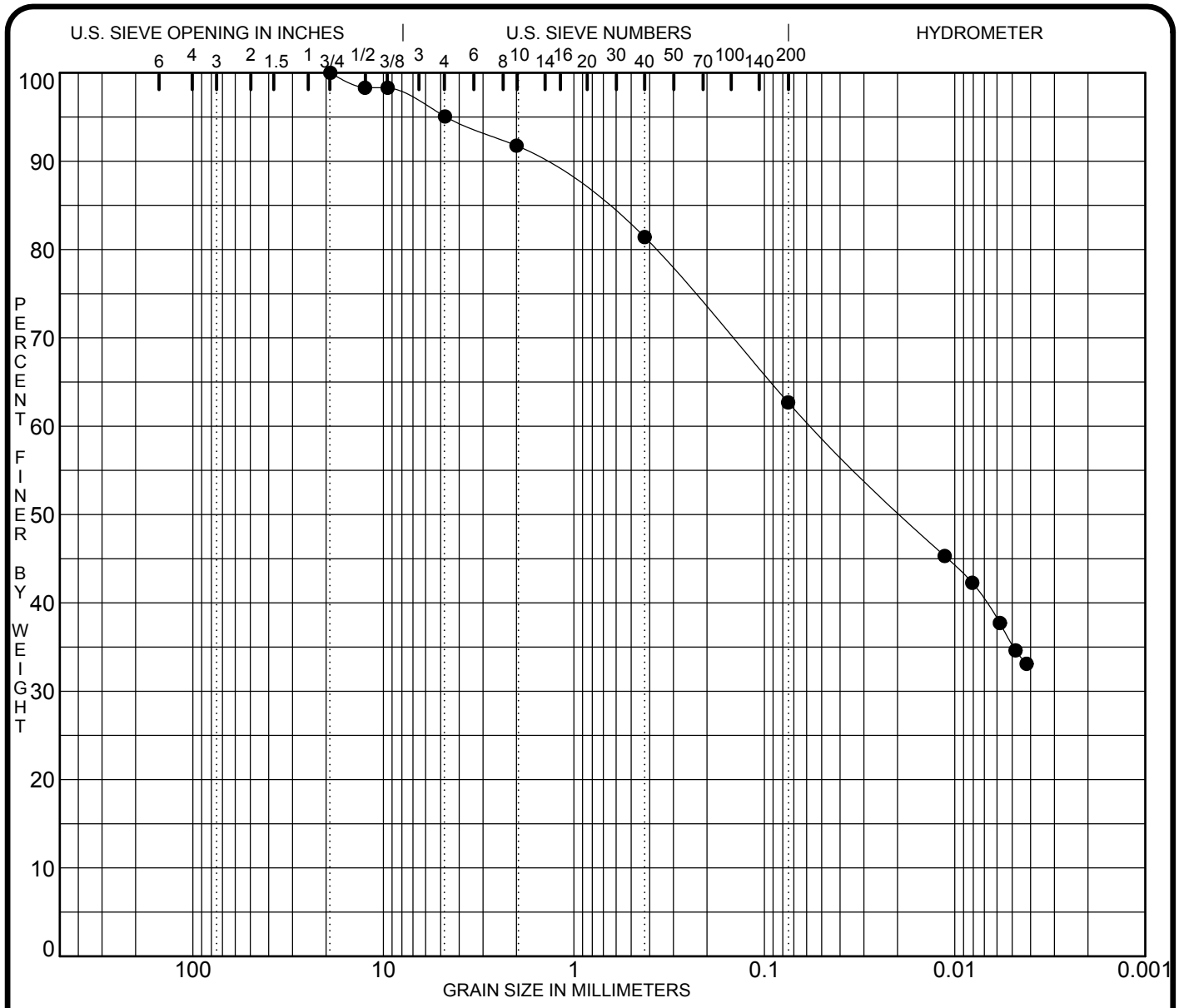
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-20**	**1.0**	**A-7-6**	**820**	**5.5**	**21**	**44**	**18**	**26**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-20**	**0.02**	**0.01**			**0.0**	**12.6**	**6.0**	**8.6**	**29.8**	**43.0**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

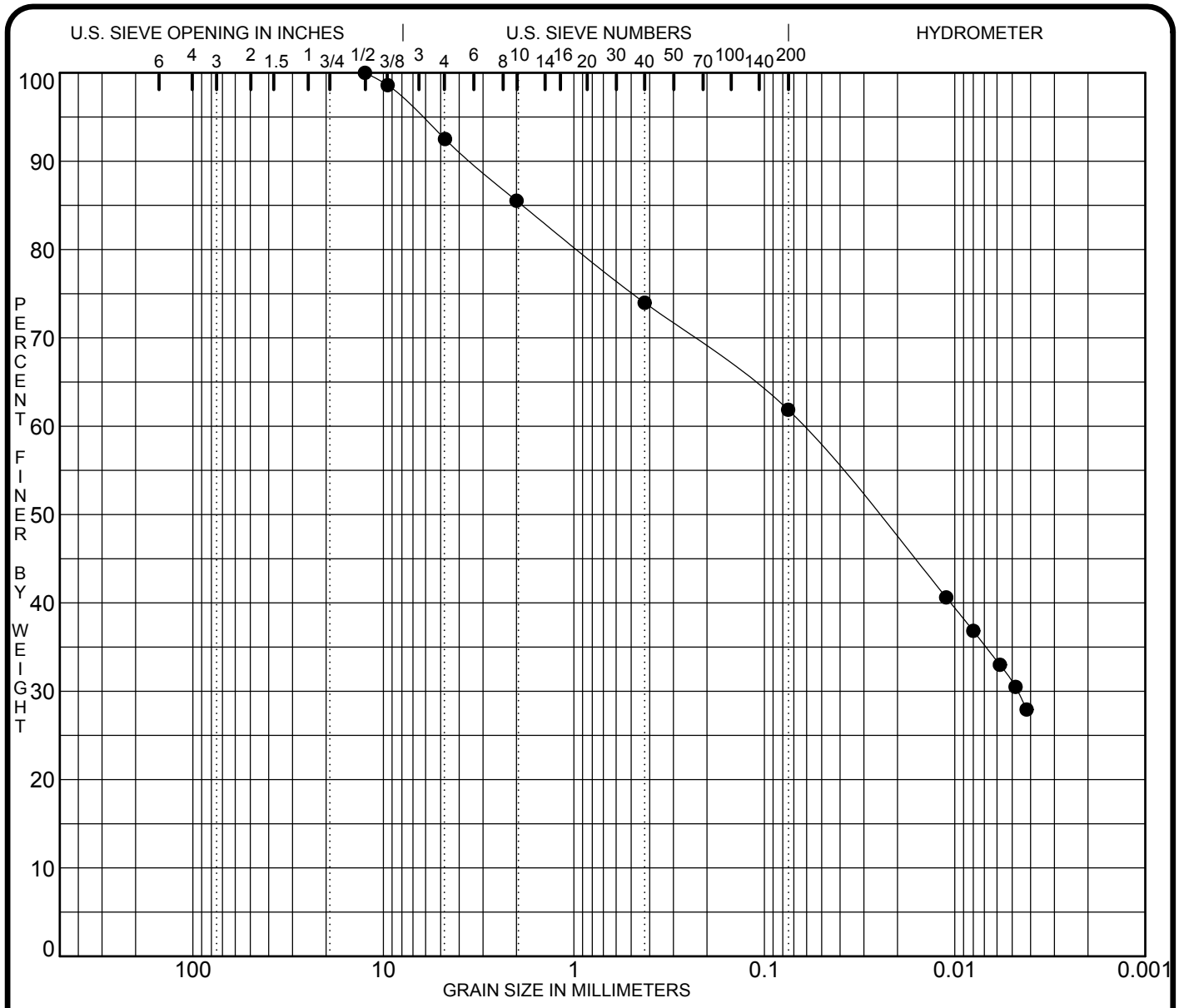
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-21**	**1.0**	**A-6a**	**253**	**1.6**	**15**	**32**	**17**	**15**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-21**	**0.06**	**0.02**			**0.0**	**8.2**	**10.3**	**18.7**	**27.4**	**35.3**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

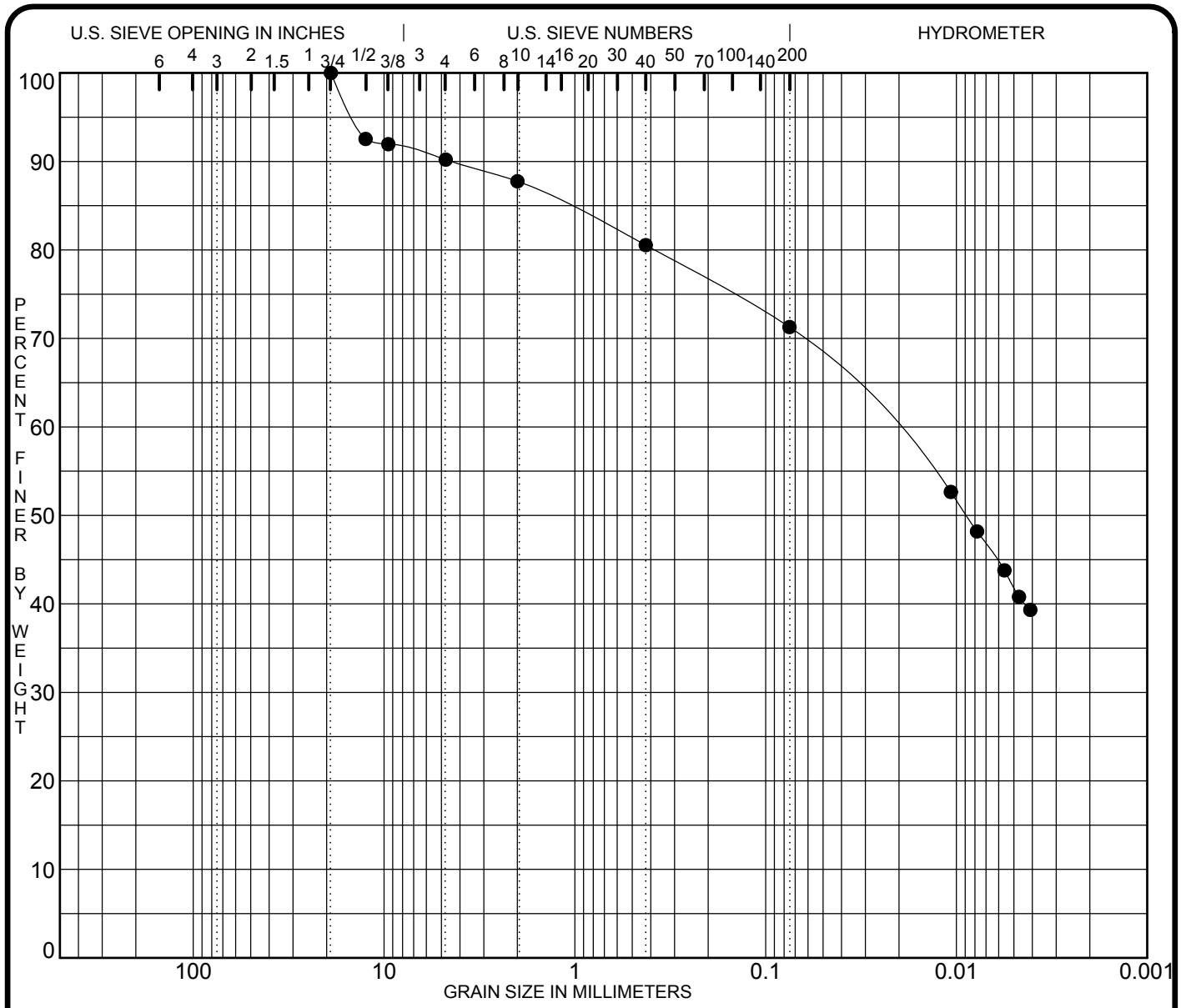
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-22**	**1.0**	**A-7-6**	**1493**	**4.9**	**23**	**42**	**24**	**18**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-22**	**0.06**	**0.03**	**0.005**		**0.0**	**14.5**	**11.5**	**12.1**	**30.8**	**31.0**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

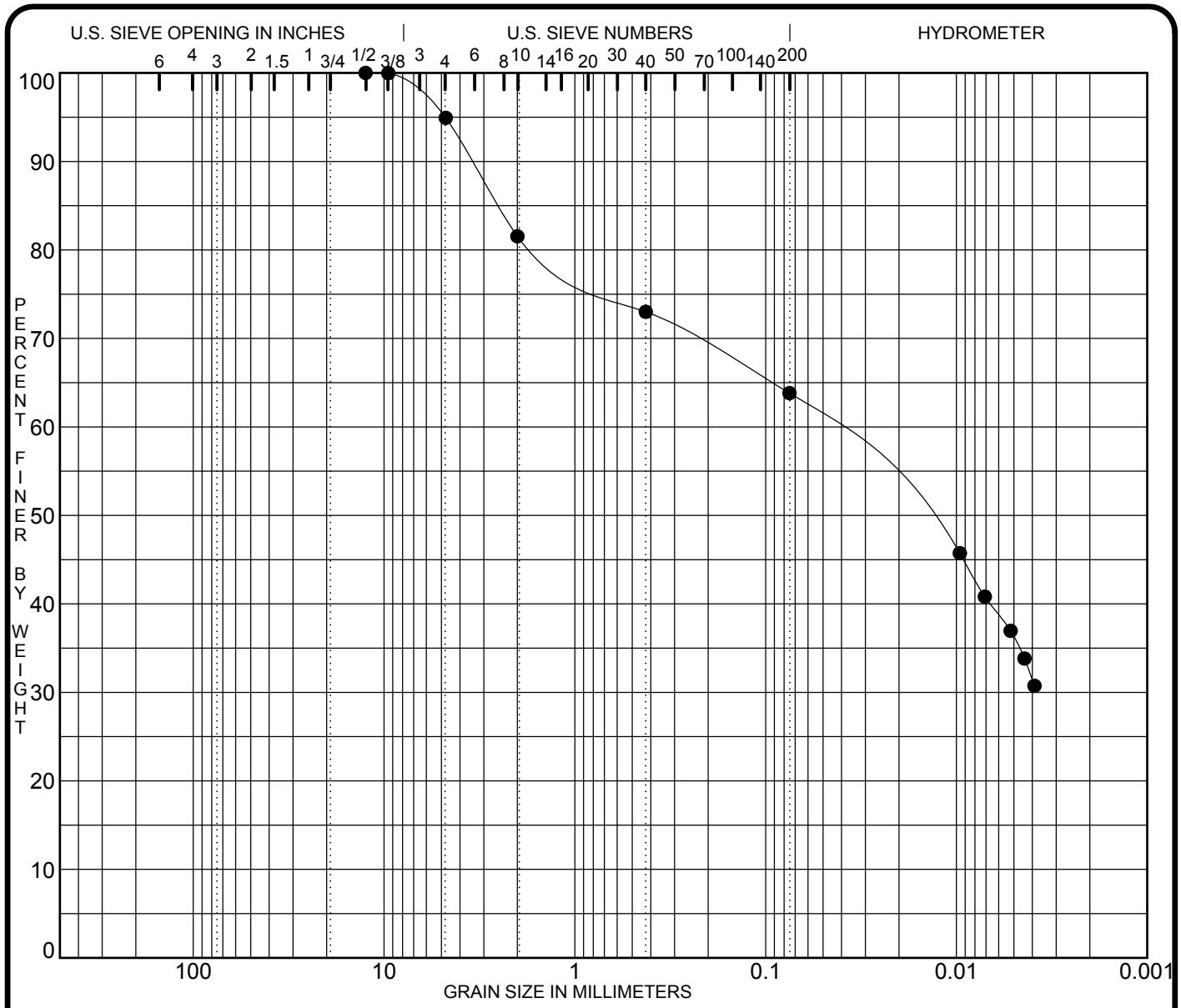
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-23**	**1.0**	**A-7-6**	**960**	**2.2**	**25**	**45**	**22**	**23**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-23**	**0.02**	**0.01**			**0.0**	**12.2**	**7.2**	**9.3**	**29.4**	**41.9**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

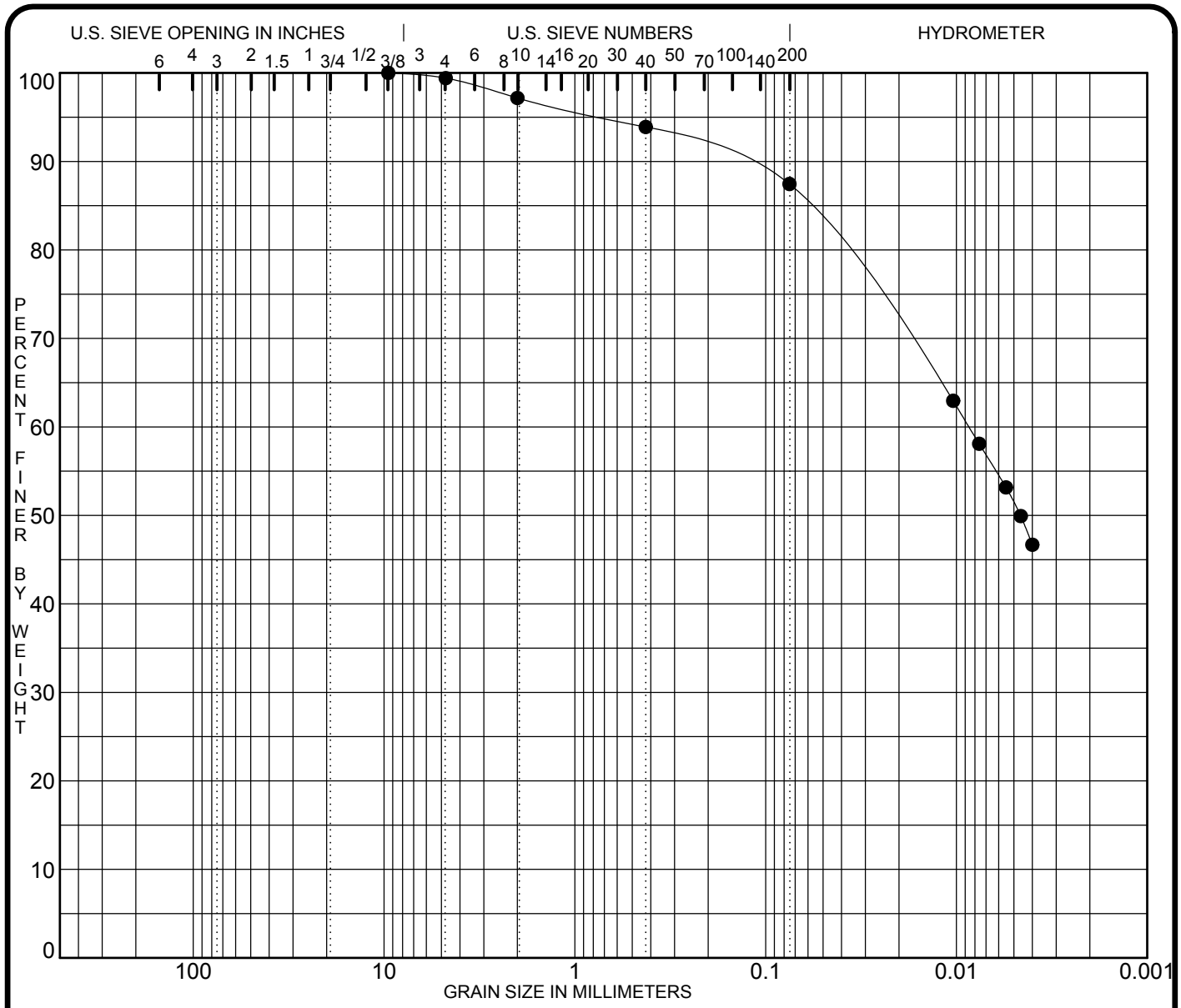
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-24**	**1.0**	**A-7-6**	**500**	**1.9**	**20**	**43**	**22**	**21**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-24**	**0.05**	**0.02**			**0.0**	**18.5**	**8.5**	**9.2**	**27.6**	**36.2**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

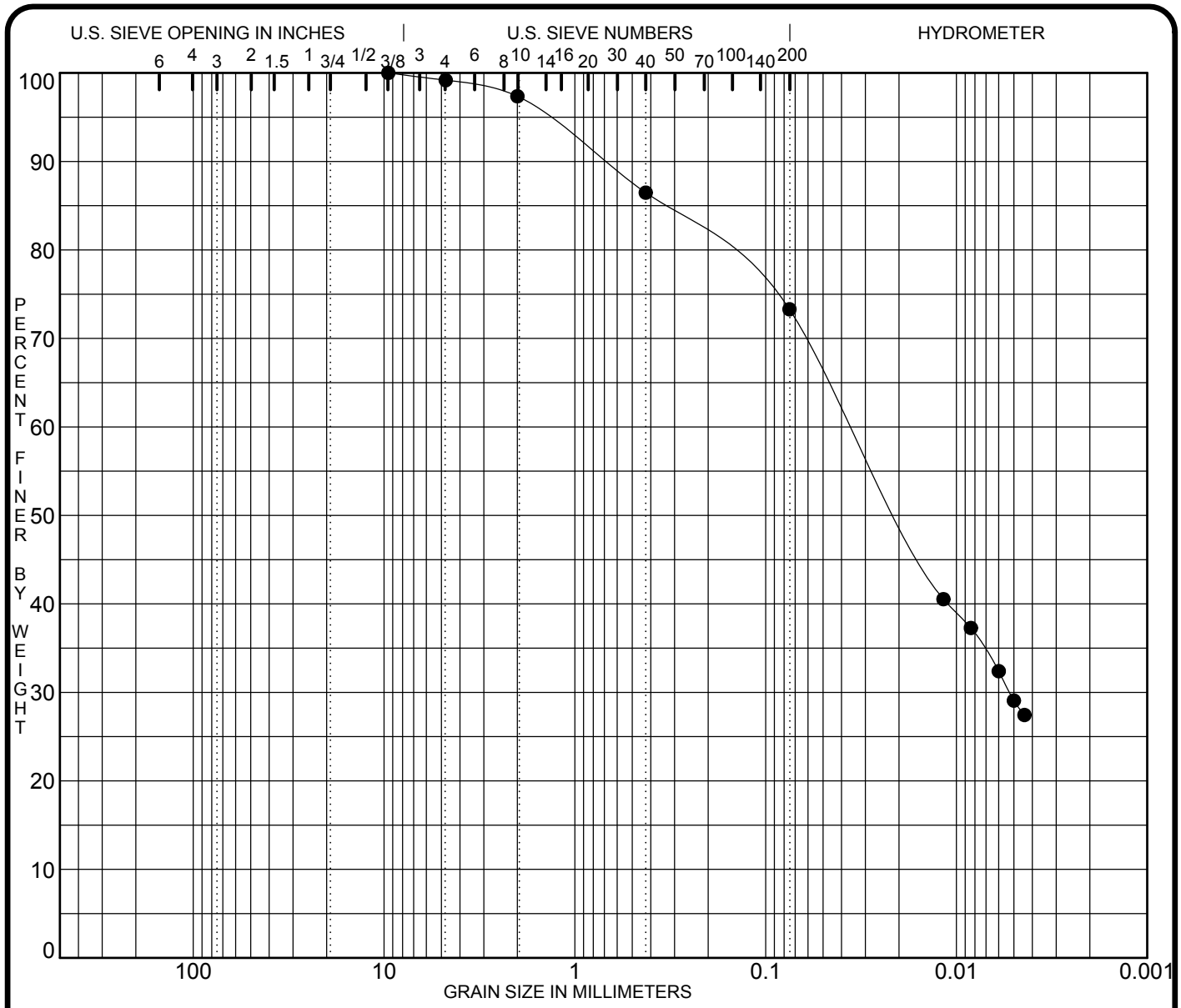
	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-25**	**1.0**	**A-6b**	**407**	**2.2**	**17**	**37**	**18**	**19**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-25**	**0.01**	**0.00**			**0.0**	**2.8**	**3.3**	**6.4**	**36.0**	**51.4**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

Resource International Inc.



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

	Specimen ID / Station	Depth	Classification	SC(ppm)	LBI%	MC%	LL	PL	PI	Cz	Cu
●	**B-44-27**	**1.0**	**A-6a**	**800**	**4.4**	**17**	**38**	**24**	**14**		

	Specimen ID	D60	D50	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand fine	%Silt	%Clay
●	**B-44-27**	**0.04**	**0.02**	**0.005**		**0.0**	**2.6**	**10.9**	**13.2**	**44.2**	**29.1**

PROJECT **MP 216.25-221** PROJECT NO. **N-14-020 (2)**

GRADATION CURVES

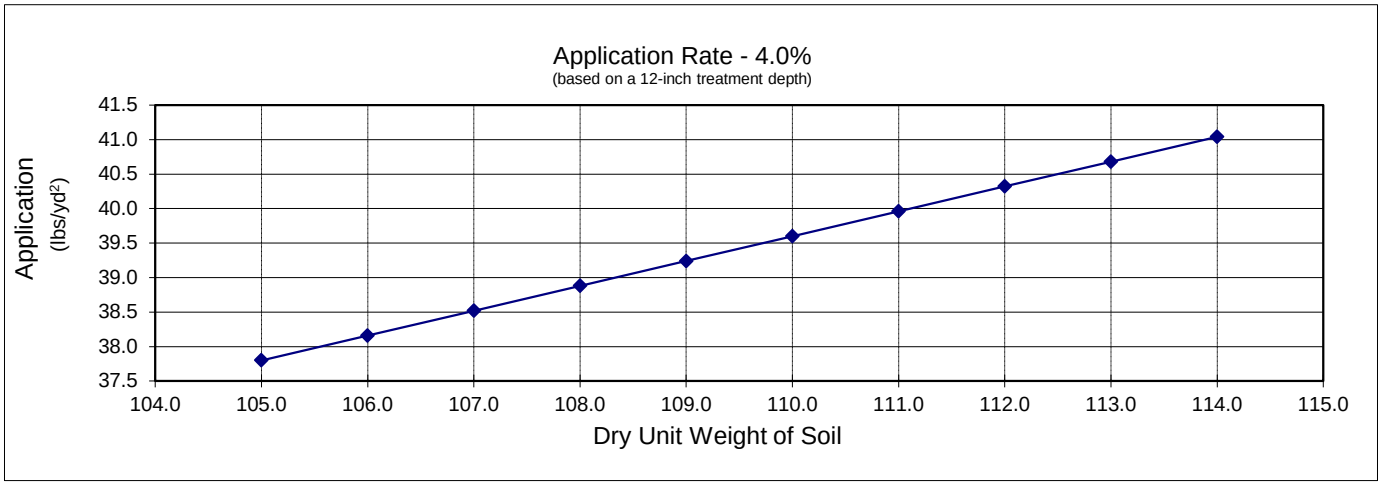
Resource International Inc.

APPENDIX II-D

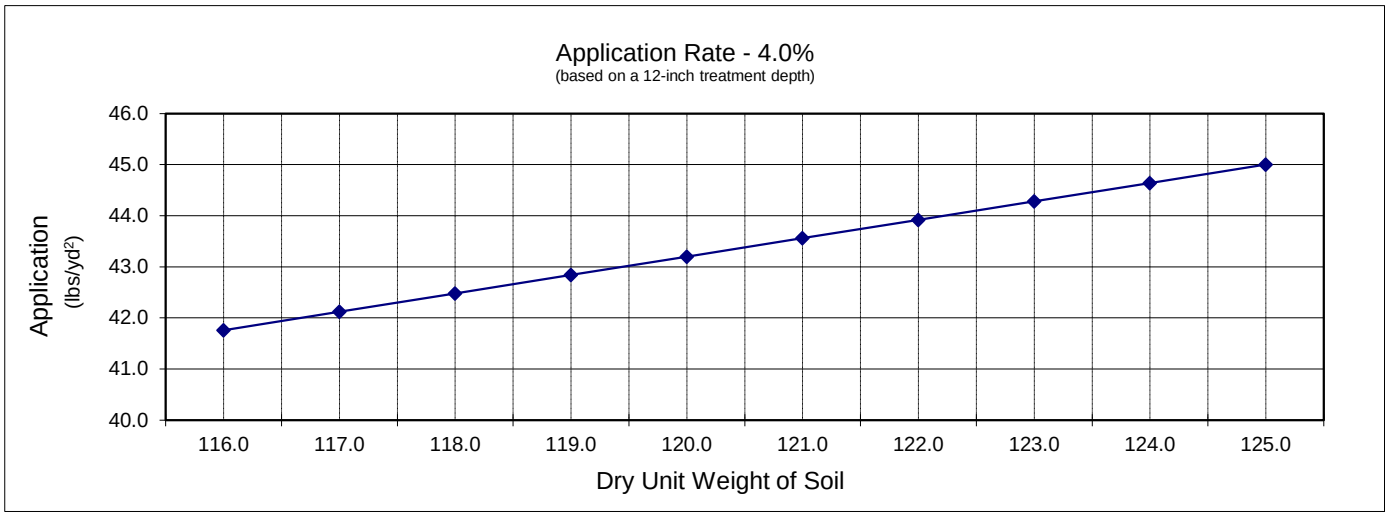
APPLICATION RATE CHARTS

APPLICATION RATE CHARTS - 4.0% PORTLAND CEMENT

DRY UNIT WEIGHTS 105 LBS/FT^3 TO 115 LBS/FT^3											
In-situ Dry Unit Weight (lbs/ft^3)	105.0	106.0	107.0	108.0	109.0	110.0	111.0	112.0	113.0	114.0	115.0
Depth of treatment (inches)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Treatment Area (yd^2)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Treatment Area (ft^2)	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Volume (ft^3)	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Weight of soil per yd^2/depth (lbs)	945.0	954.0	963.0	972.0	981.0	990.0	999.0	1008.0	1017.0	1026.0	1035.0
Cement application rate (%)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Weight of Cement (lbs/yd^2)	37.8	38.2	38.5	38.9	39.2	39.6	40.0	40.3	40.7	41.0	41.4

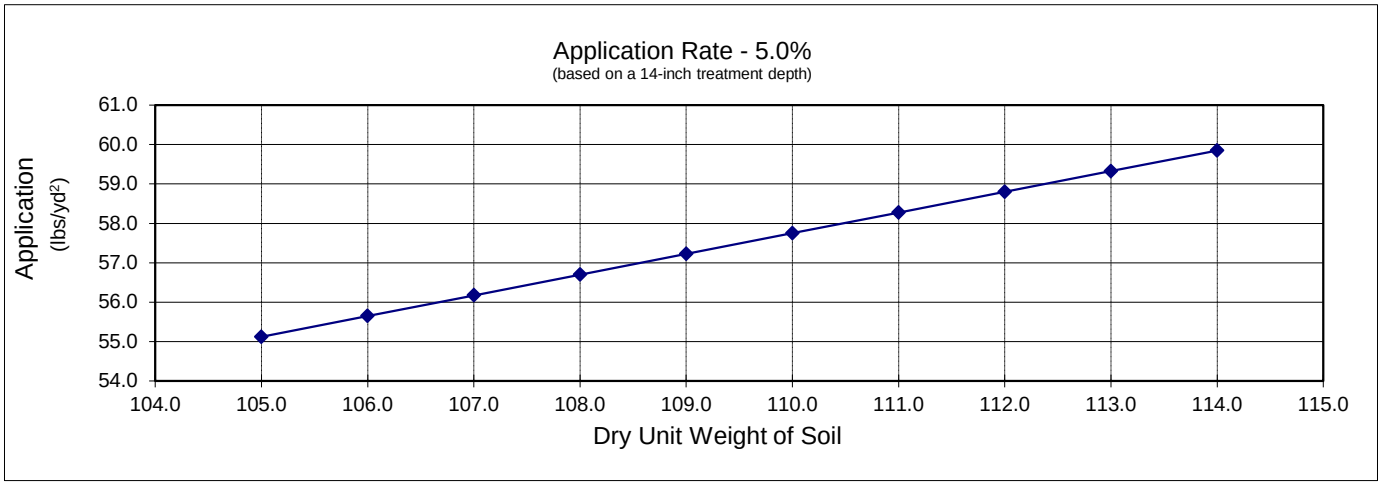


DRY UNIT WEIGHTS 116 LBS/FT^3 TO 126 LBS/FT^3											
In-situ Dry Unit Weight (lbs/ft^3)	116.0	117.0	118.0	119.0	120.0	121.0	122.0	123.0	124.0	125.0	126.0
Depth of treatment (inches)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Treatment Area (yd^2)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Treatment Area (ft^2)	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Volume (ft^3)	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Weight of soil per yd^2/depth (lbs)	1044.0	1053.0	1062.0	1071.0	1080.0	1089.0	1098.0	1107.0	1116.0	1125.0	1134.0
Cement application rate (%)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Weight of Cement (lbs/yd^2)	41.8	42.1	42.5	42.8	43.2	43.6	43.9	44.3	44.6	45.0	45.4

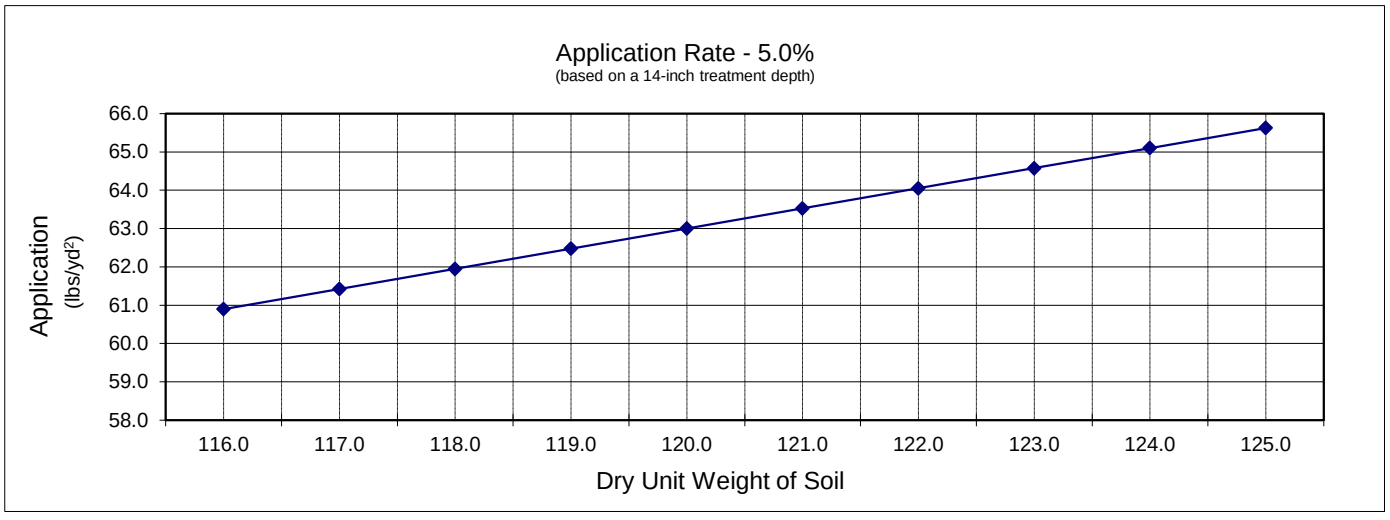


APPLICATION RATE CHARTS - 5.0% QUICKLIME

DRY UNIT WEIGHTS 105 LBS/FT^3 TO 115 LBS/FT^3											
In-situ Dry Unit Weight (lbs/ft^3)	105.0	106.0	107.0	108.0	109.0	110.0	111.0	112.0	113.0	114.0	115.0
Depth of treatment (inches)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Treatment Area (yd^2)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Treatment Area (ft^2)	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Volume (ft^3)	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5
Weight of soil per yd^2/depth (lbs)	1102.5	1113.0	1123.5	1134.0	1144.5	1155.0	1165.5	1176.0	1186.5	1197.0	1207.5
Quicklime application rate (%)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Weight of Cement (lbs/yd^2)	55.1	55.7	56.2	56.7	57.2	57.8	58.3	58.8	59.3	59.9	60.4



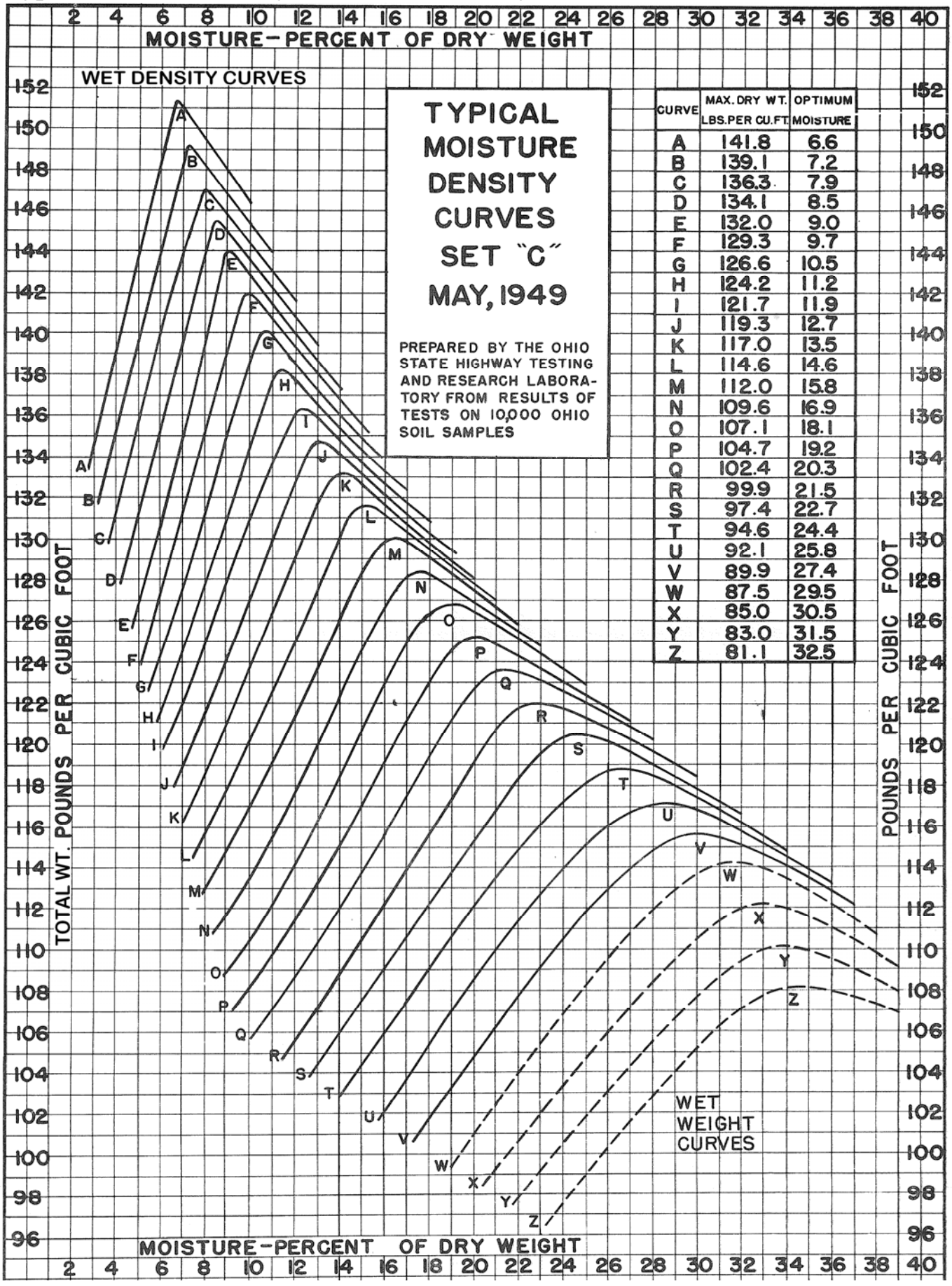
DRY UNIT WEIGHTS 116 LBS/FT^3 TO 126 LBS/FT^3											
In-situ Dry Unit Weight (lbs/ft^3)	116.0	117.0	118.0	119.0	120.0	121.0	122.0	123.0	124.0	125.0	126.0
Depth of treatment (inches)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Treatment Area (yd^2)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Treatment Area (ft^2)	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Volume (ft^3)	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5
Weight of soil per yd^2/depth (lbs)	1218.0	1228.5	1239.0	1249.5	1260.0	1270.5	1281.0	1291.5	1302.0	1312.5	1323.0
Quicklime application rate (%)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Weight of Cement (lbs/yd^2)	60.9	61.4	62.0	62.5	63.0	63.5	64.1	64.6	65.1	65.6	66.2



APPENDIX II-E

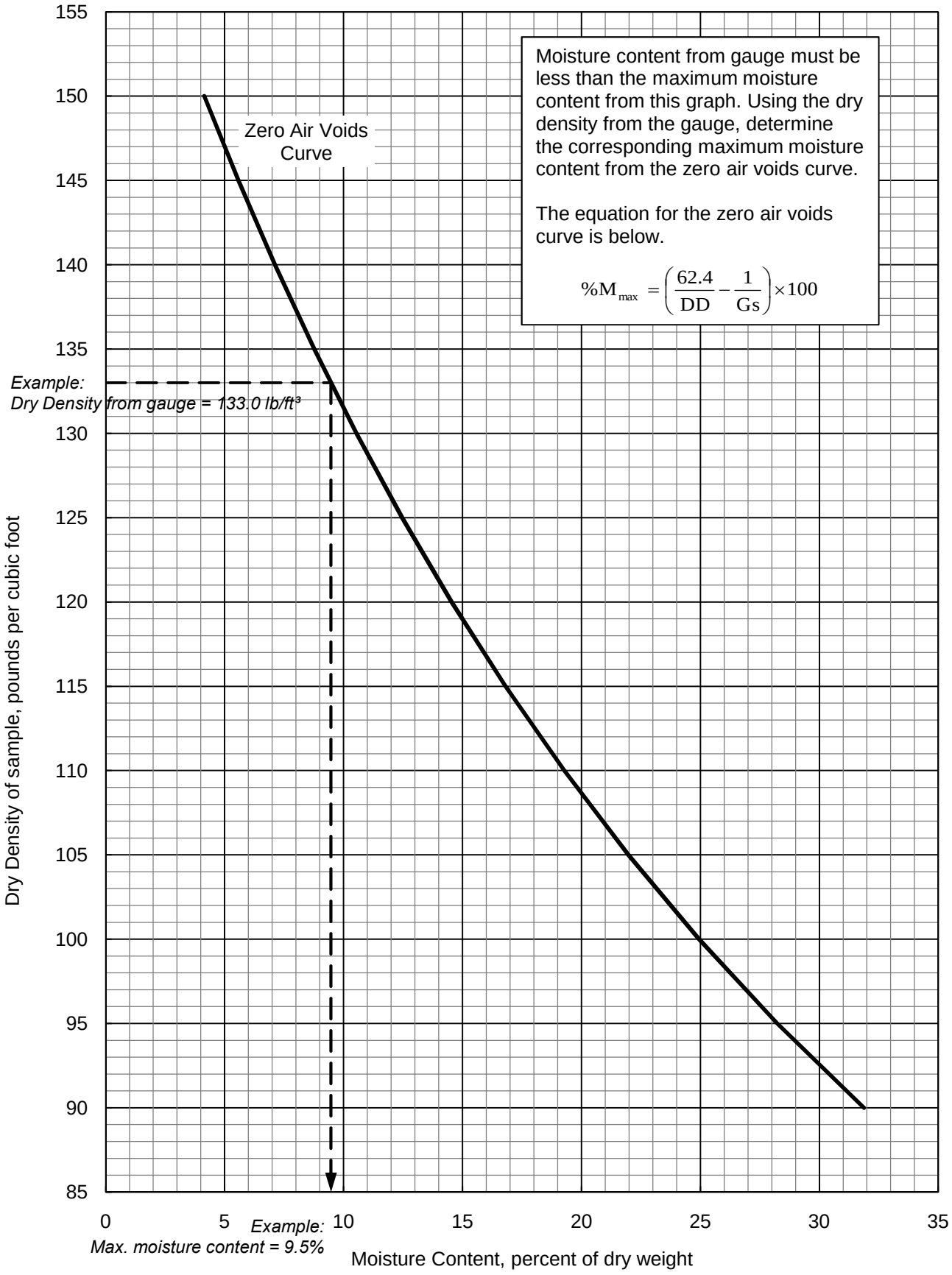
ODOT TYPICAL MOISTURE-DENSITY CURVES

Typical Moisture Density Curves - Set C - May 1949

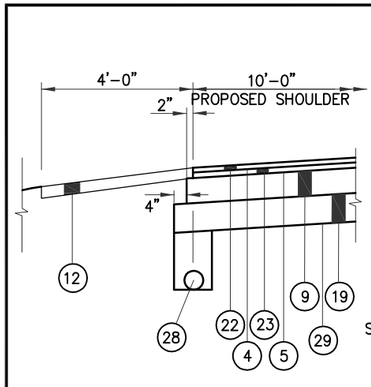


CURVE	MAX. DRY WT. LBS. PER CU. FT.	OPTIMUM MOISTURE
A	141.8	6.6
B	139.1	7.2
C	136.3	7.9
D	134.1	8.5
E	132.0	9.0
F	129.3	9.7
G	126.6	10.5
H	124.2	11.2
I	121.7	11.9
J	119.3	12.7
K	117.0	13.5
L	114.6	14.6
M	112.0	15.8
N	109.6	16.9
O	107.1	18.1
P	104.7	19.2
Q	102.4	20.3
R	99.9	21.5
S	97.4	22.7
T	94.6	24.4
U	92.1	25.8
V	89.9	27.4
W	87.5	29.5
X	85.0	30.5
Y	83.0	31.5
Z	81.1	32.5

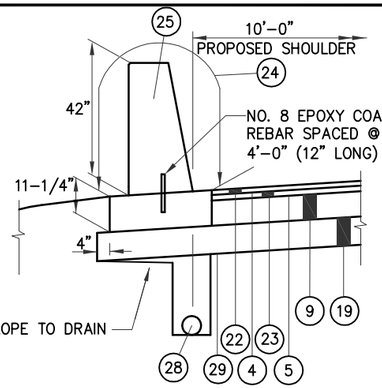
Zero Air Voids Curve



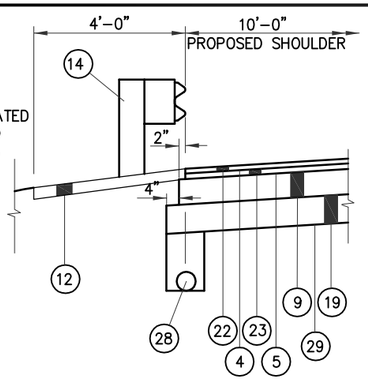
For Zero Air Voids Curve, Specific Gravity, G_s = *2.67*



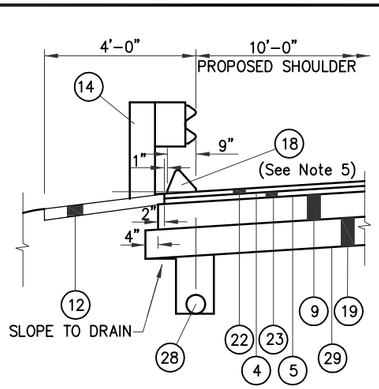
SHOULDER DETAIL
SCALE: 1" = 2'



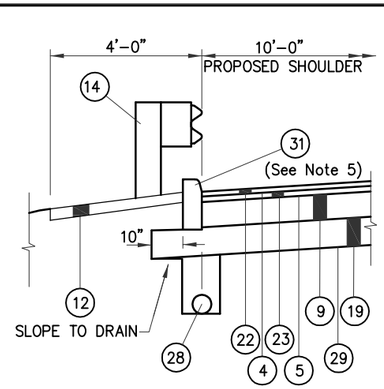
TYPE D SINGLE SLOPE BARRIER DETAIL
SCALE: 1" = 2'



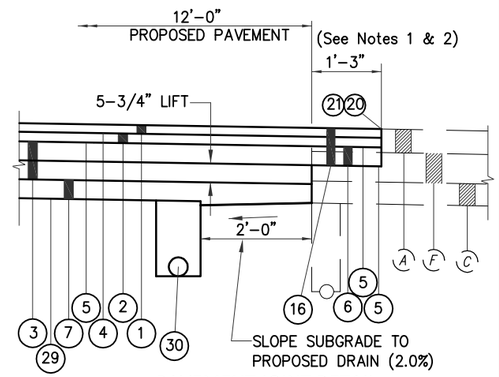
GUARDRAIL SHOULDER DETAIL
SCALE: 1" = 2'



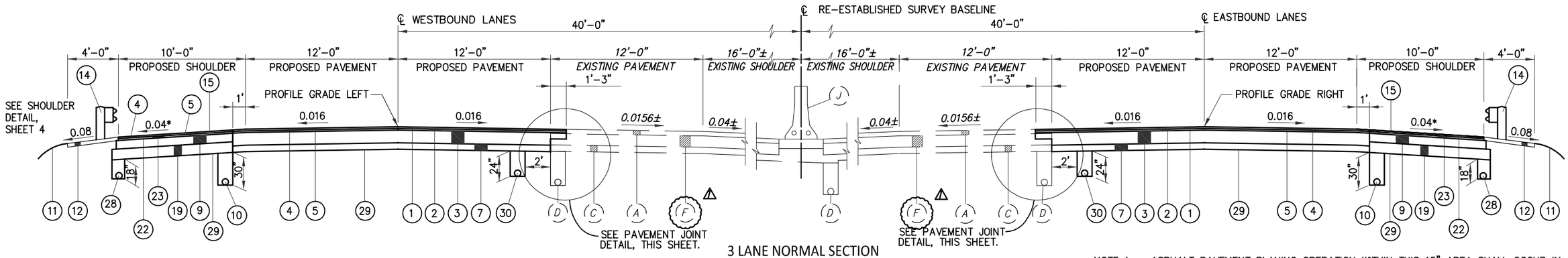
ASPHALT CURB SHOULDER DETAIL
SCALE: 1" = 2'



CONCRETE CURBL, TYPE 4C DETAIL
SCALE: 1" = 4'



PAVEMENT JOINT DETAIL
NOT TO SCALE



3 LANE NORMAL SECTION

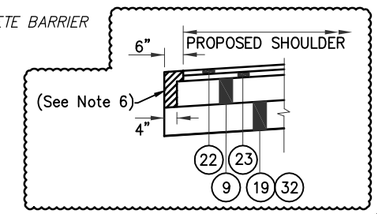
STA. 528+85.00 TO STA. 564+18.07 = 3533.07 L.F.
STA. 0+00.00 TO STA. 27+54.81 = 2754.81 L.F.
STA. 30+05.56 TO STA. 33+19.83 = 314.27 L.F.
STA. 34+90.15 TO STA. 36+17.19 = 127.04 L.F.

ITEM LEGEND

(1) ITEM SP 404 ASPHALT CONCRETE SURFACE COURSE, USING CRUSHED SLAG, PG 70–22 (FR) (1–1/2")
(2) ITEM SP 402 ASPHALT CONCRETE BASE COURSE OR RECYCLED ASPHALT CONCRETE BASE COURSE, PG 70–22 (FR) (1–3/4")
(3) ITEM SP 302 ASPHALT CONCRETE BASE, PG 64–22 (11–1/2") (2 EQUAL LIFTS)
(4) ITEM SP 407 TACK COAT FOR INTERMEDIATE COURSE, AS PER PLAN (APPLIED @ 0.06 GAL./S.Y.), SEE SHEET 22 .
(5) ITEM SP 407 TACK COAT, AS PER PLAN (APPLIED @ 0.075 GAL./S.Y.), SEE SHEET 22 .
(6) ITEM SP 302 ASPHALT CONCRETE BASE, PG 64–22 (5–3/4")
(7) ITEM SP 304 AGGREGATE BASE (6")
(8) ITEM SP 302 ASPHALT CONCRETE BASE, PG 64–22 (10–1/2") (2 EQUAL LIFTS)
(9) ITEM SP 302 ASPHALT CONCRETE BASE, PG 64–22 (T=8") (SHOULDER)
(10) ITEM SP 605 6" SHALLOW PIPE UNDERDRAIN, WITH FABRIC WRAP (30")
(11) ITEM 659 SEEDING AND MULCHING
(12) ITEM 617 COMPACTED AGGREGATE (T=3") (WITHOUT GUARDRAIL)
ITEM SP 627 STONE SHOULDER PROTECTION (T=3") (WITH GUARDRAIL)
(13) ITEM SP 526 CLASS C CONCRETE, APPROACH SLAB, USING TYPE I CEMENT (T=12")
(14) ITEM 606 GUARDRAIL, TYPE MGS
(15) ITEM SPECIAL SONIC NAP ALERT PATTERN (SNAP)
(16) ITEM 254 PAVEMENT PLANING, ASPHALT CONCRETE (9")
(17) ITEM 254 PAVEMENT PLANING, ASPHALT CONCRETE (3–1/4")
(18) ITEM 609 ASPHALT CONCRETE CURB, TYPE 1, PG 64–22
(19) ITEM SP 304 AGGREGATE BASE (9–1/2") (SHOULDER)
(20) ITEM SP 404A JOINT SEALER (APPLIED TO VERTICAL FACE)
(21) ITEM SPECIAL SAW CUT JOINT (DEPTH = 9"±))(SEE NOTE 2)
(22) ITEM SP 404 ASPHALT CONCRETE SURFACE COURSE, USING CRUSHED STONE, PG 64–22 (1–1/2")
(23) ITEM SP 402 ASPHALT CONCRETE BASE COURSE OR RECYCLED ASPHALT CONCRETE BASE COURSE, PG 64–22 (1–3/4")
(24) ITEM SP 536 CONCRETE WEATHER PROOFING, SEE SHEET 19 .
(25) ITEM 622 CONCRETE BARRIER, SINGLE SLOPE, TYPE D, AS PER PLAN
(26) ITEM SP 304 AGGREGATE BASE (12")
(27) ITEM 204 SUBGRADE COMPACTION
(28) ITEM SP 605 6" BASE PIPE UNDERDRAIN, WITH FABRIC WRAP (18")
(29) ITEM 206 CHEMICALLY STABILIZED SUBGRADE, AS PER PLAN
(30) ITEM SP 605 6" SHALLOW PIPE UNDERDRAIN, WITH FABRIC WRAP (24")
(31) ITEM 609 CURB, TYPE 4–C
(32) ITEM SP 304 AGGREGATE BASE (8–1/2") (SHOULDER)

EX. ITEM LEGEND

(A) *ASPHALT CONCRETE (T=5"±)*
(B) *10" REINFORCED CONCRETE PAVEMENT*
(C) *6"± AGGREGATE BASE*
(D) *6" UNDERDRAIN*
(E) *REINFORCED CONCRETE APPROACH SLAB (T=10"±)*
(F) *10"± BITUMINOUS AGGREGATE BASE*
(G) *REINFORCED CONCRETE APPROACH SLAB (T=12"±)*
(H) *GUARDRAIL, TYPE 5*
(I) *CONCRETE BARRIER*



NOTE 1: ASPHALT PAVEMENT PLANING OPERATION WITHIN THIS 15" AREA SHALL OCCUR IN TWO (2) PHASES: FIRST TO THE TOP OF EXISTING CONCRETE DURING ASPHALT PAVEMENT REMOVAL OPERATIONS TO THE PAVEMENT SAW JOINT (SEE NOTE 2); AND SECOND, AFTER PLACEMENT OF THE FIRST LIFT OF ITEM SP 302 (ASPHALT CONCRETE BASE) TO THE SAW CUT JOINT. REQUIREMENTS FOR ASPHALT PLACED WITHIN THIS 15" AREA SHALL BE IN STRICT COMPLIANCE WITH SP 400 (ASPHALT CONCRETE SURFACING).

NOTE 2: SAW CUT JOINT DEPTH TO TOP OF PROPOSED FIRST LIFT OF SP 302 (BITUMINOUS AGGREGATE BASE),

NOTE 3: ALL EXPOSED SUBGRADE WILL HAVE SUBGRADE STABILIZATION PERFORMED USING ITEM 206 – CHEMICALLY STABILIZED SUBGRADE, AS PER PLAN. SEE GENERAL NOTES SHEET 19 .

NOTE 4: FOR ADDITIONAL INFO REGARDING THE PAVEMENT JOINT DETAIL, SEE SHEET 15 .

NOTE 5: CURB TO BE SEALED AS PER THE REQUIREMENTS OF SP 400.

NOTE 6: ADDITIONAL EXCAVATION AND EMBANKMENT NECESSARY FOR THE PLACEMENT OF AGGREGATE BASE AND ASPHALT AGGREGATE BASE EDGE EXTENSIONS SHALL BE INCIDENTAL TO THE COST OF PLACING THESE MATERIALS. ⚠

* TRANSITION SLOPE FROM 0.04 TO 0.016 AT APPROACH SLABS (L=65')
STA. 26+40.60 TO STA. 27+05.60 (LT)
STA. 27+31.05 TO STA. 27+96.05 (RT)
STA. 29+64.21 TO STA. 30+29.21 (LT)
STA. 30+54.26 TO STA. 31+19.26 (RT)

STA. 32+42.51 TO STA. 33+07.51 (LT)
STA. 32+64.67 TO STA. 33+29.67 (RT)
STA. 34+80.10 TO STA. 35+45.10 (LT)
STA. 35+01.80 TO STA. 35+66.80 (RT)

NO.	REVISIONS	BY	DATE
⚠	ADDENDUM NO. 1	DLF	1/14/15

OHIO TURNPIKE AND INFRASTRUCTURE COMMISSION
OHIO TURNPIKE EASTBOUND AND WESTBOUND
RIGHT TWO LANES & SHOULDER RECONSTRUCTION
TYPICAL SECTIONS

CT Consultants
engineers | architects | planners
8310 Sterling Court · Mentor, Ohio 44060
(440) 951-9090 · www.ctconsultants.com

DESIGNED: WDB	CHECKED: JMP	DATE: MAY 2014
DRAWN: MZP	IN CHARGE: WDB	SCALE: NO SCALE

PROJECT 39–15–02A SHEET 4 OF 419

DESIGNED BY: MZP	CHECKED BY:
DATE: 5/24/14	DATE:
DRAWN BY: MZP	REVISED BY:
DATE: 5/24/14	DATE:
CAD FILE NAME: 14138–TYP.DWG	

ITEM SP 536 - CONCRETE WEATHERPROOFING

ALL NEW AND EXPOSED CONCRETE BARRIER SURFACES SHALL RECEIVE A COATING PER SP 536. THE CONCRETE WEATHER PROOFING SHALL ALSO BE USED AS THE CURE COAT. THE FINAL APPEARANCE SHALL BE UNIFORM AND CONSISTENT AND SHALL CONFORM TO ALL PROVISIONS IN SP 536. NO ADDITIONAL PAYMENT SHALL BE MADE IF THE CONTRACTOR IS REQUIRED TO APPLY ADDITIONAL COATINGS TO ACHIEVE A UNIFORM APPEARANCE. THE MATERIAL SHALL BE APPLIED PER THE MANUFACTURER'S RECOMMENDATIONS. ALL LABOR, EQUIPMENT, AND MATERIALS NECESSARY TO COMPLETE THIS WORK SHALL BE INCLUDED IN THE BID PRICE FOR SP 536 - CONCRETE WEATHERPROOFING.

GUARDRAIL REPLACEMENT

NO HAZARD SHALL BE LEFT UNPROTECTED EXCEPT FOR THE ACTUAL TIME NECESSARY TO REMOVE THE EXISTING GUARDRAIL, PREPARE THE SITE, AND INSTALL NEW GUARDRAIL IN A CONTINUOUS OPERATION. THE REMOVAL OF ALL GUARDRAIL SHALL AT ALL TIMES BE AS DIRECTED BY THE CHIEF ENGINEER. NO GUARDRAIL SHALL BE REMOVED UNTIL THE REPLACEMENT MATERIAL IS ON THE SITE, READY FOR INSTALLATION. FAILURE TO COMPLY WITH THIS REQUIREMENT SHALL BE DEEMED SUFFICIENT CAUSE TO ORDER WORK SUSPENDED UNTIL SUCH TIME AS THE CHIEF ENGINEER IS ASSURED OF COMPLIANCE.

GUARDRAIL BEHIND CURBS

WHERE A CURB IS PROVIDED AT THE OUTER EDGE OF THE PAVED SHOULDER, ANY NECESSARY GUARDRAIL SHALL BE POSITIONED SO THAT THE FACE OF THE GUARDRAIL IS LOCATED FLUSH WITH THE FACE OF CURB AND THE TOP OF THE RAIL SHALL BE 31" ABOVE THE GUTTER LINE.

CONNECTION BETWEEN EXISTING AND PROPOSED GUARDRAIL

WHEN IT IS NECESSARY TO SPLICE PROPOSED GUARDRAIL TO EXISTING GUARDRAIL, ONLY THE EXISTING GUARDRAIL SHALL BE CUT, DRILLED, OR PUNCHED. THE CONNECTION SHALL BE MADE USING A 'W-BEAM RAIL SPLICE' AS SHOWN ON ODOT STANDARD CONSTRUCTION DRAWING MGS-1.1. THE TRANSITION IN HEIGHT WILL OCCUR IN THE LAST TWENTY FIVE (25) FEET OF EXISTING GUARDRAIL. PAYMENT SHALL BE INCLUDED IN THE CONTRACT PRICE FOR THE RESPECTIVE GUARDRAIL ITEMS.

AN ITEM FOR TWENTY FIVE (25) FEET OF GUARDRAIL REBUILT HAS BEEN INCLUDED AT EACH LOCATION WHERE THERE IS A CONNECTION TO EXISTING GUARDRAIL.

ITEM 202 - GUARDRAIL REMOVED, AS PER PLAN

THIS ITEM SHALL INCLUDE REMOVAL OF ALL GUARDRAIL, ANCHOR ASSEMBLIES, TERMINAL ASSEMBLIES AND APURTENANCES. THE FOLLOWING PORTIONS OF GUARDRAIL SHALL REMOVED FOR BE SALVAGE:

EXISTING TYPE E (ET-2000PLUS) ANCHOR ASSEMBLY EXTRUDER HEAD, CABLE ANCHOR, ANGLE STRUT, CABLE ASSEMBLY, BEARING PLATE, TWO TUBE SLEEVES, AND THE FIRST TWO 12.5' GUARDRAIL PANELS. THE CONTRACTOR SHALL USE CARE IN THE REMOVAL PROCESS TO MINIMIZE DAMAGE TO THE MATERIALS.

ALL SALVAGED MATERIAL SHALL BE DELIVERED TO THE HIRAM MAINTENANCE BUILDING AT MP 198.6. OTIC WILL PROVIDE A FORKLIFT AND AN OPERATOR AT THE MAINTENANCE FACILITY.

ALL OTHER MATERIALS REMOVED SHALL BE DISPOSED OF BY THE CONTRACTOR IN ACCORDANCE WITH ITEM 202.

ITEM 606 - IMPACT ATTENUATOR, TYPE 1, (BIDIRECTIONAL), AS PER PLAN

THIS ITEM SHALL CONSIST OF FURNISHING AND INSTALLING ONE (1) OF THE FOLLOWING IMPACT ATTEANUATORS FROM THE OFFICE OF ROADWAY ENGINEERING'S APPROVED LIST FOR IMPACT ATTEANUTORS, FROM THE ROADWAY STANDARD'S WEB PAGE FOR ROADWAY STANDARD PRODUCTS:

- BRAKEMASTER 350, BY ENERGY ABSORPTION, INC
- CAT, BY TRINITY INDUSTRIES, INC.

ALL IMPACT ATTENAUTORS SHALL BE SUBMITTED TO THE CHIEF ENGINEER FOR APPROVAL BEFORE INSTALLATION.

INSTALLATION SHALL BE AT THE LOCATIONS SPECIFIED IN THE PLANS IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.

ITEM 203 - ROCK EXCAVATION FOR UNDERDRAIN INTALLATION, AS PER PLAN

BASED ON THE SUBSURFACE INVESTIGATION, THE CONTRACTOR MAY ENCOUNTER BEDROCK BETWEEN MILEPOSTS (MP) 218.10 TO MP 218.46 AND MP 220.74 TO MP 220.89. BEDROCK SHALL BE DEFINED AS SHALE AS DETERMINED BY THE COMMISSION'S REPRESENTATIVE. THE CONTRACTOR IS TO REFER TO THE GEOTECHNICAL REPORT TO REVIEW THE POSSIBLE EXTENT OF ROCK EXCAVATION. THE ROCK EXCAVATION QUANTITY IS PAYMENT FOR THE DIFFERENCE TO EXCAVATE ROCK INSTEAD OF SOIL. THEREFORE, THE CONTRACTOR SHALL BE PAID FOR ITEM SP605 PLUS THE EQUAL NUMBER OF CUBIC YARDS OF ITEM 203 - ROCK EXCAVATION FOR UNDERDRAIN INSTALLATION, APP. THIS PAY ITEM SHALL INCLUDE THE REQUIRED METHOD TO REMOVE THE ROCK TO INSTALL NEW CONSTRUCTION OR TO EXCAVATE TO THE DEPTHS SHOWN ON PLANS. MEASUREMENT FOR PAYMENT SHALL BE PER CUBIC YARD.

THE FOLLOWING ESTIMATED QUANTITY HAS BEEN CARRIED TO THE GENERAL SUMMARY FOR USE AS DIRECTED BY THE ENGINEER THIS WORK.

ITEM 203 - ROCK EXCAVATION FOR UNDERDRAIN INSTALLATION, AS PER PLAN 1,650 CY

ITEM 203 - EXCAVATION, AS PER PLAN

THIS ITEM SHALL CONSIST OF THE REMOVAL AND REPLACEMENT OF THE FULL DEPTH OF ALL SLAG MATERIAL COURSES ENCOUNTERED WITHIN THE LIMITS OF SUBGRADE COMPACTION AREAS WITH MATERIAL CONFORMING TO 203.02. FILL MATERIAL SHALL CONFORM TO 203.02 AND BE PLACED ACCORDING TO 203.06.

APPROXIMATE SLAG EXCAVATION LIMITS (LOCATION AND DEPTH) ARE IDENTIFIED IN THE PAVEMENT LAYER THICKNESS MEASUREMENT INSPECTION REPORT DATED SEPTEMBER 12, 2014.

APPROXIMATE SLAG EXCAVATION AND EMBANKMENT QUANTITIES AS SHOWN IN THE SUB-SUMMARY ARE BASED UPON THIS INSPECTION REPORT.

THE FOLLOWING ADDITIONAL ESTIMATED QUANTITIES HAVE BEEN CARRIED TO THE GENERAL SUMMARY FOR USE AS DIRECTED BY THE ENGINEER FOR REMOVAL AND REPLACEMENT OF THE SLAG MATERIAL COURSE.

ITEM 203 - EXCAVATION, AS PER PLAN	4,000 CY
ITEM 203 - EMBANKMENT	4,000 CY

BENCHING OF SLOPES

ALTHOUGH CROSS-SECTIONS DO NOT INDICATE SPECIFIC DIMENSIONS FOR PROPOSED BENCHING OF THE EMBANKMENT FOUNDATION, NO WAIVER OF THE SPECIFICATIONS IS INTENDED. ALL SLOPED EMBANKMENT AREAS SHALL BE BENCHED AS SET FORTH IN 203.05. NO ADDITIONAL PAYMENT WILL BE MADE FOR BENCHING REQUIRED UNDER THE PROVISIONS OF 203.05. SEE BENCHING DETAIL, SLOPE REPAIR DETAIL INSERT SHEET.

ITEM 206 - CHEMICALLY STABILIZED SUBGRADE, AS PER PLAN

THIS WORK SHALL COMPLY WITH ALL REQUIREMENTS SPECIFIED IN ITEM 206 - CHEMICALLY STABILIZED SUBGRADE OF ODOT 2013 CMS EXCEPT AS NOTED BELOW:

ITEM 206.03 SUBMITTALS: MIXTURE DESIGN FOR CHEMICALLY STABILIZED SOILS IS NOT REQUIRED BY THE CONTRACTOR.

ITEM 206.05 CONSTRUCTION

A. SPREADING - USE AN APPLICATION RATE OF 4% PORTLAND CEMENT BY DRY UNIT WEIGHT FOR SOIL-CEMENT STABILIZAITON AREAS AND 5% QUICKLIME BY DRY UNIT WEIGHT FOR SOIL-LIME STABILIZATION AREAS. THE APPLICATION RATE WILL VARY DEPENDING ON THE IN-SITU DRY UNIT WEIGHT OF THE SOIL. QUANTITIES FOR PORTLAND CEMENT STABILIZATION AREAS ARE BASED ON AN IN-SITU DRY UNIT WEIGHT OF 115 LBS/FT3, AND QUANTITIES FOR QUICKLIME STABILIZATION ARE BASED ON AN IN-SITU DRY UNIT WEIGHT OF 110 LBS/FT3. LIMITS OF THE STABILIZATION AREAS ARE LISTED IN THE FOLLOWING TABLE:

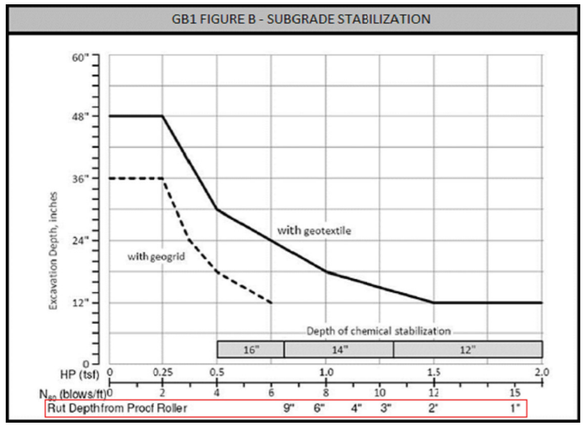
BEGIN STATION	END STATION	LENGTH (FEET)	CHEMICAL & APPLICATION RATE	DEPTH (INCHES)
528+85	47+00	8233	5% QUICKLIME	14
47+00	93+60	4660	4% PORTLAND CEMENT	12
93+60	204+80	11120	5% QUICKLIME	14
~~167+85~~	~~176+60~~	~~8754~~	~~PORTLAND CEMENT~~	~~12~~
~~176+60~~	~~204+80~~	~~28205~~	~~QUICKLIME~~	~~14~~
204+80	237+19	3239	4% PORTLAND CEMENT	12

B. CURING - THE TREATED AREA SHALL BE SHAPED TO THE REQUIRED LINES, GRADES, AND CROSS-SECTION AND FINAL COMPACTION USING A SMOOTH DRUM ROLLER WEIGHING AT LEAST 10 TONS AND SHALL CONTINUE UNTIL UNIFORM AND THE REQUIRED COMPACTION IS OBTAINED. UNIFORMLY APPLY CURING COAT ON THE SURFACE OF THE CHEMICALLY STABILIZED SOIL SUBGRADE. COMPLETED SECTIONS OF THE STABILIZED SUBGRADE THAT ARE USED DURING THE CONSTRUCTION OF ADJOINING SECTIONS SHALL BE PROTECTED TO PREVENT EQUIPMENT FROM MARRING OR DAMAGING THE COMPLETED WORK. THE STABILIZED SOIL SUBGRADE SHALL NOT BE SUBJECTED TO CONSTRUCTION TRAFFIC UNTIL ACCEPTANCE OF THE STABILIZED SOIL SUBGRADE.THE ACCEPTANCE OF THE STABILIZED SOIL SUBGRADE WILL BE EVALUATED AFTER 72 HOURS OF CURING AS DETERMINED IN ITEM (C) - PROOF ROLLING. SUFFICIENT PROTECTION FROM FREEZING SHALL BE GIVEN TO THE CHEMICALLY STABILIZED MATERIAL FOR 7 DAYS AFTER ITS CONSTRUCTION OR AS APPROVED BY THE CHIEF ENGINEER. THE CONTRACTOR SHALL REPAIR ANY STABILIZED SOIL SUBGRADE CAUSED BY CONSTRUCTION TRAFFIC AND OPERATIONS AT THE CONTRACTOR'S OWN COST. THE CONTRACTOR SHALL SUBMIT THE PROPOSED SUBGRADE REPAIR METHOD TO THE CHIEF ENGINEER FOR APPROVAL.

C. PROOF ROLLING - AFTER THE INITIAL 72-HOUR CURE PERIOD AND AT THE CONTRACTOR'S REQUEST, THE COMMISSION'S AGENT WILL USE A DUAL-MASS DYNAMIC CONE PENETROMETER (DCP) TO MEASURE THE PENETRATION RATE (PR) IN MM/BLOW OF THE STABILIZED SOIL SUBGRADE THROUGH THE TOTAL TREATMENT DEPTH. TESTING SHALL BE CONDUCTED EVERY 200 LINEAR FEET.
   1. IF THE AVERAGE PR IS ABOVE 8 MM/BLOW THE CURE PERIOD SHALL BE EXTENDED FOR 2 DAYS FOLLOWED BY TEST ROLLING PER ODOT ITEM 206.
   2. IF THE AVERAGE PR IS 8 MM/BLOW OR LOWER THE CONTRACTOR SHALL PROCEED WITH TEST ROLLING PER ODOT ITEM 206 FOR FINAL ACCEPTANCE OF THE STABILIZED SUBGRADE.

D. PROTECTION - ALL THE PROVISIONS OF 206.05 PARAGRAPH F APPLY AS WELL AS THE FOLLOWING: COMPLETED AND ACCEPTED PORTIONS OF THE STABILIZED SOIL SUBGRADE THAT ARE TRAVELED ON BY EQUIPMENT USED IN CONSTRUCTING ANY OTHER SECTION, OR ANY OTHER WORK, SHALL BE PROTECTED IN SUCH A MANNER AS TO PREVENT EQUIPMENT AND OPERATIONS FROM MARRING OR DAMAGING THE SUBGRADE IN ANY WAY. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ANY DAMAGE AND IS REQUIRED TO REPAIR THE STABILIZED SOIL SUBGRADE THAT ARISES DUE TO HIS OPERATIONS.

E. IN CASES WHERE SUBGRADE STABILITY USING SOIL STABILIZATION IS NOT EFFECTIVE AS DETERMINED BY PROOF ROLLING AND CONCURRENCE BY THE CHIEF ENGINEER, THE AREA SHALL BE UNDERCUT USING THE FOLLOWING CHART FROM ODOT GEOTECHNICAL BULLETIN 1, BASED ON THE RUT DEPTH FROM PROOF ROLLING:
   1. IF THE REPLACEMENT IS LESS THAN 16 INCHES IN DEPTH, PLACE GEOGRID AT THE BOTTOM OF THE EXCAVATION.
   2. IF THE REPLACEMENT IS 16 INCHES OR GREATER, PLACE THE GEOGRID IN THE MIDDLE OF THE GRANULAR MATERIAL AND THE GEOTEXTILE FABRIC ON THE BOTTOM OF THE EXCAVATION.



F. SOIL-STABILIZATION AT CULVERTS
   1. BOX CULVERTS WHERE DEPTH OF COVER IS GREATER THAN 4 FEET:
   CHEMICALLY STABILIZE ACCORDING TO PROJECT DOCUMENTS
   2. BOX CULVERTS WHERE DEPTH OF COVER IS BETWEEN 2-4 FEET:
   EXCAVATE 12 INCHES OF THE EXPOSED SOIL SUBGRADE FROM 20 FEET BEYOND BOTH ENDS OF THE BOX CULVERT AND THE SPREAD THE EXCAVATED SOIL IN THE AREA TO BE CHEMICALLY STABILIZED. PERFORM CHEMICAL STABILIZATION ON THE EXCAVATED SOIL USING THE SAME REQUIREMENTS AS THE ADJACENT SUBGRADE. AFTER CHEMICALLY STABILIZING THE EXCAVATED SOIL, PLACE THE EXCAVATED SOIL BACK IN THE EXCAVATION FROM 20 FEET BEYOND BOTH ENDS OF THE BOX CULVERT AND COMPACT ACCORDING TO THE PROJECT SPECIFICATIONS.

NO.	REVISIONS	BY	DATE
1	ADDENDUM NO. 1	DLF	1/14/15

OHIO TURNPIKE AND INFRASTRUCTURE COMMISSION

OHIO TURNPIKE EASTBOUND AND WESTBOUND
RIGHT TWO LANES & SHOULDER RECONSTRUCTION
GENERAL NOTES

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PROJECT 39-15-02A SHEET 19 OF 419

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ROADWAY (CONTINUED)

ITEM 206 - CHEMICALLY STABILIZED SUBGRADE (CONT'D)

3. BOX CULVERTS WHERE DEPTH OF COVER IS LESS THAN 2 FEET:

EXCAVATE 16 INCHES OF THE EXPOSED SOIL SUBGRADE FROM THE EDGE OF THE BOX CULVERT TO 20 FEET BEYOND THE END OF THE BOX CULVERT AND SPREAD THE EXCAVATED SOIL IN AN AREA TO BE CHEMICALLY STABILIZED. PERFORM CHEMICAL STABILIZATION ON THE EXCAVATED SOIL USING SAME REQUIREMENTS AS THE ADJACENT SUBGRADE. AFTER CHEMICALLY STABILIZING THE EXCAVATED SOIL, PLACE THE EXCAVATED SOIL BACK IN THE EXCAVATION FROM THE EDGE OF THE BOX CULVERT TO 20 FEET BEYOND THE BOX CULVERT AND COMPACT ACCORDING TO PROJECT SPECIFICATIONS.

COMPACT THE EXISTING SUBGRADE MATERIAL OVER THE BOX CULVERT USING A NON-VIBRATORY ROLLER AND TEST FOR PERCENT COMPACTION ACCORDING TO THE PROJECT SPECIFICATIONS. DO NOT PROOF ROLL. IF THE COMPACTED SOIL DOES NOT MEET THE SPECIFICATION REQUIREMENTS FOR DENSITY, THE ENGINEER WILL DELINEATE THE AREA TO BE UNDERCUT AND BACKFILL WITH ITEM SP304 MATERIAL.

FOR ALL SCENARIOS LISTED ABOVE IN AREAS INACCESSIBLE TO THE SPECIFIED COMPACTION EQUIPMENT, THE CONTRACTOR SHALL ENSURE THAT THE SPECIFIED COMPACTION IS OBTAINED USING OTHER SUITABLE EQUIPMENT.

PAYMENT FOR EXCAVATION AND EMBANKMENT REQUIRED TO COMPLETE THE STABILIZATION IN THE AREAS SHALL BE INCLUDED IN AND INCIDENTAL TO ITEMS 206 -CEMENT STABILIZED SUBGRADE, 12 INCHES DEEP, OR 206 - LIME STABILIZED SUBGRADE, 14 INCHES DEEP, AS PER PLAN.

SHALLOW BEDROCK STABILIZATION

THIS WORK SHALL COMPLY WITH ALL REQUIREMENTS SPECIFIED IN ITEM 203 - ROADWAY EXCAVATION AND EMBANKMENT OF ODOT 2013 CMS EXCEPT AS NOTED BELOW:

1. STABILIZE 12 INCHES THROUGH THE SHALLOW BEDROCK AREA UNTIL 12 INCHES OF STABILIZATION CANNOT BE ACHIEVED PER ODOT ITEM 206.
2. EXCAVATE BEDROCK TO A DEPTH OF 12 INCHES BELOW PLAN SUBGRADE ELEVATION.
3. BACKFILL UNDERCUT EXCAVATIONS WITH BORROW SOIL MEETING THE REQUIREMENTS OF 203.02 AND 203.03 AND SHALL HAVE A SULFATE CONTENT LESS THAN 3,000 PPM AS DETERMINED BY TEX-145-E METHOD. FURNISH THE CHIEF ENGINEER WITH BULK SOIL SAMPLES FOR EVERY 2,000 CY OF EACH SOIL TYPE OBTAINED FROM A GIVEN BORROW SITE. ALLOW 7 DAYS FOR CHIEF ENGINEER TO PERFORM SULFATE CONTENT OF PROPOSED BORROW MATERIALS.
4. BACKFILL UNDERCUT EXCAVATIONS ACCORDING TO 203.07
5. CHEMICALLY STABILIZE EMBANKMENT PER ODOT ITEM 206 USING 4% PORTLAND CEMENT BY DRY UNIT WEIGHT AT A TREATMENT DEPTH OF 10 INCHES.

THE FOLLOWING QUANTITIES HAVE BEEN INCLUDED IN THE GENERAL SUMMARY FOR THE WORK DESCRIBED ABOVE FOR THE REMOVAL AND REPLACEMENT OF SHALLOW BEDROCK:

ITEM 203 - ROCK EXCAVATION, AS PER PLAN	18,850 CY
ITEM 203 - EMBANKMENT, AS PER PLAN	18,850 CY

THE FOLLOWING QUANTITIES HAVE BEEN INCLUDED IN THE GENERAL SUMMARY FOR THE WORK UNDER ITEM 206 - CHEMICALLY STABILIZED SUBGRADE, AS PER PLAN:

ITEM 206 - LIME STABILIZED SUBGRADE, 14 INCHES DEEP, AS PER PLAN	175,700 SY
ITEM 206 - LIME	5,090 TON
ITEM 206 - CEMENT STABILIZED SUBGRADE, 12 INCHES DEEP, AS PER PLAN	76,140 SY
ITEM 206 - CEMENT	1,590 TON
ITEM 206 - CURING COAT	15,110 GAL
ITEM 206 - TEST ROLLING	130 HOURS

THE FOLLOWING CONTINGENCY QUANTITIES SHALL BE USED TO UNDERCUT AND REPLACE THE UNSTABLE SUBGRADE SOILS AS DESCRIBED ABOVE. THE FOLLOWING QUANTITIES ARE BASED ON 100 LF X 24 FT WIDE X 2 FT DEEP AREA:

ITEM 204 - EXCAVATION	178 CY
ITEM SP304 - GRANULAR MATERIAL	178 CY
ITEM 204 - SUBGRADE COMPACTION	267 SY
ITEM 204 - GEOTEXTILE FABRIC, 712.09 TYPE D	267 SY
ITEM 861 - GEOGRID FOR SUBGRADE STABILIZATION,AS PER PLAN, TENSAR TRIAX 160 GEOGRID	267 SY

ITEM 209 - DITCH CLEANOUT

THIS ITEM SHALL CONSIST OF FIELD SURVEY, CLEARING, EXCAVATION AND EMBANKMENT AS NECESSARY TO REESTABLISH THE CROSS SECTION OF THE EXISTING DITCHES AS DIRECTED BY THE CHIEF ENGINEER. THIS ITEM SHALL ALSO CONSIST OF THE REPLACEMENT OF ANY EXISTING DITCH CHECKS THAT MAY HAVE BEEN INSTALLED BY THE CONTRACTOR PER THE STORM WATER POLLUTION PREVENTION PLAN PRIOR TO PERFORMANCE OF DITCH CLEANOUT WORK. PAYMENT FOR THIS ITEM WILL BE AT UNIT BID PRICE PER LINEAR FOOT FOR ITEM 209 - DITCH CLEANOUT AND SHALL INCLUDE ALL LABOR, EQUIPMENT AND MATERIALS NECESSARY TO COMPLETE THIS ITEM. ALL MAINTENANCE OF TRAFFIC NECESSARY TO COMPLETE THIS ITEM SHALL BE CONSIDERED INCIDENTAL TO ITEM SP 614 - MAINTAINING TRAFFIC.

THE FOLLOWING CONTINGENCY QUANTITY IS PROVIDED IN THE GENERAL SUMMARY IN ADDITION TO THAT CALLED OUT ELSEWHERE FOR USE AS DIRECTED BY THE ENGINEER.

ITEM 209 - DITCH CLEANOUT	5000 FT

ITEM 606 - ANCHOR ASSEMBLY, MGS TYPE E, AS PER PLAN

THIS ITEM SHALL CONSIST OF FURNISHING AND INSTALLING ANY OF THE GUARDRAIL END TERMINALS FOR TYPE MGS GUARDRAIL AS LISTED ON ODOT ROADWAY ENGINEERING'S WEB PAGE UNDER ROADSIDE SAFETY DEVICES FOR APPROVED GUARDRAIL END TREATMENTS. INSTALLATION SHALL BE AT THE LOCATIONS SPECIFIED IN THE PLANS, IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS. INSTALL THIS ASSEMBLY AT A 25:1 MAXIMUM FLARE RATE SO THAT THE INSIDE EDGE OF THE IMPACT HEAD IS NO CLOSER THAN 6 INCHES FROM THE OUTER EDGE OF THE SHOULDER.

THE COMMISSION SHALL SUPPLY A TYPE G REFLECTIVE SHEETING PER CMS 730.19 MOUNTED ON A PIECE OF ALUMINUM. THE CONTRACTOR SHALL RIVET THE ALUMINUM TO THE FACE OF THE TYPE E IMPACT HEAD.

REFER TO THE MANUFACTURER'S INSTRUCTIONS REGARDING THE INSTALLATION OF, AND THE GRADING AROUND THE FOUNDATION TUBES AND GROUND STRUT. THE TOP OF ANY FOUNDATION TUBE SHOULD BE LESS THAN 4 INCHES ABOVE THE GROUND. THE PLACEMENT OF THE FOUNDATION TUBES SHOULD BE AN APPROPRIATE DEPTH BELOW THE LEVEL LINE IN ORDER TO MAINTAIN THE FINISHED GUARDRAIL HEIGHT OF 31 INCHES FROM THE EDGE OF THE SHOULDER.

ON SITE GRADING IS REQUIRED IF THE TOP OF THE FOUNDATION TUBES OR TOP OF THE GROUND STRUT DOES NOT PROJECT MORE THAN 4 INCHES ABOVE THE GROUND LINE. PAYMENT FOR THE ABOVE WORK SHALL BE MADE AT THE UNIT PRICE BID FOR ITEM 606. ANCHOR ASSEMBLY, MGS TYPE E, AS PER PLAN, AND SHALL INCLUDE ALL LABOR, TOOLS, EQUIPMENT AND MATERIALS NECESSARY TO CONSTRUCT A COMPLETE AND FUNCTIONAL ANCHOR ASSEMBLY SYSTEM, INCLUDING ALL RELATED TRANSITIONS, REFLECTIVE SHEETING, HARDWARE, GRADING, EMBANKMENT AND EXCAVATION NOT SEPARATELY SPECIFIED, AS REQUIRED BY THE MANUFACTURER.

ITEM 617 - SHOULDER PREPARATION, AS PER PLAN

IN ADDITION TO THE REQUIREMENTS OF ITEM 617.04 OF THE SPECIFICATIONS, THE CONTRACTOR SHALL PERFORM THE FOLLOWING:

THE SUBGRADE SHALL BE COMPACTED IN ACCORDANCE WITH ITEM 204 - SUBGRADE COMPACTION IMMEDIATELY PRIOR TO PLACING THE AGGREGATE AND AFTER THE SUBGRADE IS SHAPED OR BLADED TO GIVE A STRAIGHT VERTICAL EDGE WITH THE ADJACENT DIRT. THE ENTIRE THICKNESS OF AGGREGATE SHALL BE SUPPORTED ALONG THE OUTER EDGE WITH TOPSOIL AND FILL DIRT THAT IS CONSISTENT WITH THE FORE SLOPE.

PAYMENT FOR THE ABOVE WORK SHALL BE MADE AT THE UNIT PRICE BID PER SQUARE YARD FOR ITEM 617- SHOULDER WORK PREPARATION, AS PER PLAN, AND SHALL INCLUDE ALL LABOR, TOOLS, EQUIPMENT AND MATERIALS NECESSARY TO COMPLETE THIS WORK.

ITEM SPECIAL - CONCRETE CHANNEL CLEANOUT

THIS WORK SHALL CONSIST OF REMOVING SEDIMENT AND DEBRIS FROM THE EXISTING CONCRETE CHANNEL SPECIFIED IN THE PLANS. ALL MATERIAL REMOVED SHALL BE DISPOSED OF AS PER SP 105. ALL EXISTING CONCRETE CHANNELS SHALL BE CLEANED OUT TO THE SATISFACTION OF THE CHIEF ENGINEER.

CLEANOUT OF THE CONCRETE CHANNEL SHALL BE PAID FOR AT THE UNIT PRICE BID FOR ITEM SPECIAL - CONCRETE CHANNEL CLEANOUT, FOOT. THIS PRICE SHALL INCLUDE THE COST FOR MATERIAL DISPOSAL, EQUIPMENT, LABOR AND ALL INCIDENTALS REQUIRED TO COMPLETE THE CLEANOUT.

ITEM SPECIAL - CHANNEL CLEANOUT

THIS WORK SHALL CONSIST OF REMOVING SEDIMENT AND DEBRIS FROM THE EXISTING CHANNELS SPECIFIED IN THE PLANS. ALL MATERIAL REMOVED SHALL BE DISPOSED OF AS PER SP 105. ALL CHANNELS SPECIFIED SHALL BE CLEANED OUT TO THE SATISFACTION OF THE CHIEF ENGINEER.

CLEANOUT OF THE CHANNEL SHALL BE PAID FOR AT THE UNIT PRICE BID FOR ITEM SPECIAL - CHANNEL CLEANOUT, SQ YD. THIS PRICE SHALL INCLUDE THE COST FOR MATERIAL DISPOSAL, EQUIPMENT, LABOR AND ALL INCIDENTALS REQUIRED TO COMPLETE THE CLEANOUT.

ITEM 202 - FENCE REMOVED
ITEM 607 - FENCE, TYPE 47, AS PER PLAN

CONTINGENCY QUANTITIES FOR FENCE REMOVAL AND REPLACEMENT HAVE BEEN INCLUDED PLANS FOR USE AS DIRECTED BY THE ENGINEER. CLEARING OF BRUSH NECESSARY FOR INSTALLATION SHALL BE INCIDENTAL TO THE COST PER FOOT OF FENCE.

THE FOLLOWING QUANTITIES HAVE BEEN CARRIED TO THE GENERAL SUMMARY:

ITEM 202 - FENCE REMOVED	500 FT
ITEM 607 - FENCE, TYPE 47, AS PER PLAN	500 FT

ITEM 202 - PAVEMENT REMOVED, AS PER PLAN

REMOVAL OF EXISTING ASPHALT CURB SHALL BE CONSIDERED INCIDENTAL TO PAVEMENT REMOVAL.

EROSION CONTROL

SEEDING & MULCHING

THE FOLLOWING QUANTITIES ARE PROVIDED TO PROMOTE GROWTH AND CARE OF PERMANENT SEEDED AREAS:

ITEM 659 - SOIL ANALYSIS TEST	15 EACH
ITEM 659 - TOPSOIL	15,370 CY
ITEM 659 - SEEDING AND MULCHING	138,400 SY
ITEM 659 - REPAIR SEEDING AND MULCHING	6,920 SY
ITEM 659 - INTER-SEEDING	6,920 SY
ITEM 659 - COMMERCIAL FERTILIZER	18.68 TON
ITEM 659 - LIME	28.6 ACRES
ITEM 659 - WATER	750 M GAL

ITEM 659 - TOPSOIL IS ONLY APPLICABLE WHEN TOPSOIL IS PHYSICALLY REMOVED FROM THE SLOPES AND MOVED TO A CONSTRUCTED TOP SOIL STOCK PILE SOLELY FOR THE PURPOSE OF TEMPORARY STORAGE PRIOR TO REUSE. SEEDING AND MULCHING SHALL BE APPLIED TO ALL AREAS OF EXPOSED SOIL BETWEEN THE RIGHT-OF-WAY LINES, AND WITHIN THE CONSTRUCTION LIMITS FOR AREAS OUTSIDE THE RIGHT-OF- WAY LINES COVERED BY WORK AGREEMENT OR SLOPE EASEMENT. QUANTITY CALCULATIONS FOR SEEDING AND MULCHING ARE BASED ON AN ASSUMED LIMIT 10' BEYOND THE EDGE OF THE OUTSIDE SHOULDER FOR THE LENGTH OF THE PROJECT, THE 32' MEDIAN WIDTH, A WIDTH OF 20' PER RUNNING FOOT OF DITCH CLEANOUT, SLOPE REPAIR AREAS, AND ON THE SLOPES WHERE DRAIN PIPE PLACEMENT OCCURS. FOR THE PURPOSES OF THE DRAIN PIPE PLACEMENT AREA CALCULATIONS, A WIDTH OF 30' AND A LENGTH OF 37' WAS ASSUMED FOR EACH OF THE PIPE PLACEMENT AREAS AND A WIDTH OF 10' AND A LENGTH OF 10' WAS ASSUMED FOR EACH OF THE UNDERDRAIN OUTLETS.

ITEM 207 - PERIMETER FILTER FABRIC FENCE

FILTER FABRIC SHALL MEET THE REQUIREMENTS OF ITEM 207.02.

THE BOTTOM OF THE FENCE SHALL BE BURIED 6" BELOW THE GROUND. THE FENCE SHALL BE HIGH ENOUGH TO RETAIN SEDIMENT LADEN WATER AND ADEQUATELY SUPPORTED TO PREVENT COLLAPSE OR BURSTING. THE GROUND ELEVATION OF THE FENCE SHALL BE HELD CONSTANT EXCEPT THAT THE END ELEVATION SHALL BE RAISED TO PREVENT FLOW AROUND THE END OF THE FENCE.

THE FILTER FABRIC SHALL BE MAINTAINED TO BE FUNCTIONAL. THIS SHALL INCLUDE REMOVAL OF TRAPPED SEDIMENT AND REQUIRED CLEANING, REPAIR AND/OR REPLACEMENT OF THE FILTER FABRIC.

THE COST OF ALL MATERIALS, CONSTRUCTION, MAINTENANCE AND REMOVAL REQUIRED SHALL BE PAID FOR UNDER ITEM 207 - PERIMETER FILTER FABRIC FENCE.

NO.	REVISIONS	BY	DATE
⚠	ADDENDUM NO. 1	DLF	1/14/15

OHIO TURNPIKE AND INFRASTRUCTURE COMMISSION

OHIO TURNPIKE EASTBOUND AND WESTBOUND RIGHT TWO LANES & SHOULDER RECONSTRUCTION

GENERAL NOTES

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PROJECT 39-15-02A SHEET 20 OF 419

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PAVEMENT

ITEM SPECIAL - SAW CUT JOINT (9" +/-)

THIS ITEM SHALL CONSIST OF SAW CUTTING WITH A DIAMOND BLADE AT JOINTS WHERE EXISTING ASPHALT AND PROPOSED ASPHALT MEET. THE LOCATION AND DEPTH SHALL BE AS SPECIFIED IN THE PLANS AND AS DIRECTED BY THE CHIEF ENGINEER. PAYMENT FOR THIS ITEM WILL BE AT UNIT BID PRICE PER LINEAR FOOT FOR ITEM SPECIAL - SAW CUT JOINT AND SHALL INCLUDE ALL LABOR, EQUIPMENT AND MATERIALS NECESSARY TO COMPLETE THIS ITEM.

ALL MAINTENANCE OF TRAFFIC NECESSARY TO COMPLETE THIS ITEM SHALL BE CONSIDERED INCIDENTAL TO ITEM SP 614 - MAINTAINING TRAFFIC.

PAVEMENT REPAIRS

THE FOLLOWING QUANTITIES, ARE INCLUDED AS A CONTINGENCY, TO BE USED AS DIRECTED BY THE CHIEF ENGINEER FOR PAVEMENT REPAIR MEASURES TO MAINTAIN TRAFFIC. MAINTENANCE OF TRAFFIC COSTS INCURRED BY THE CONTRACTOR FOR THESE CURRENTLY UNKNOWN AND UNDEFINED PAVEMENT REPAIRS WILL BE COMPENSATED ON A TIME AND MATERIALS BASIS AS APPROVED BY THE CHIEF ENGINEER. DEPTH FOR PARTIAL REMOVAL WILL BE 5" (+/-). REPLACEMENT MATERIALS ARE SPECIFIED IN 251.03 UNIT PRICES BID FOR THE ITEMS IMMEDIATELY BELOW SHALL NOT INCLUDE MAINTENANCE OF TRAFFIC COSTS.

ITEM 251 - PARTIAL DEPTH PAVEMENT REPAIR	300 SY
ITEM 255 - FULL DEPTH PAVEMENT REMOVAL AND RIGID REPLACEMENT	400 SY
ITEM 255 - FULL DEPTH PAVEMENT SAWING	1,500 FT

ITEM SP 407 - TACK COAT, AS PER PLAN
ITEM SP 407 - TACK COAT FOR INTERMEDIATE COURSE, AS PER PLAN

DESCRIPTION: THIS WORK CONSISTS OF PREPARING AND TREATING A PAVED SURFACE WITH NTSS-1HM TRACKLESS TACK PRODUCED BY BLACKLIDGE EMULSIONS, INC., AE-NT NO TRACK TACK PRODUCED BY K-TECH SPECIALTY COATINGS, INC., OR APPROVED EQUAL BY THE CHIEF ENGINEER. THE PRODUCT SHALL MEET ALL REQUIREMENTS OF CONSTRUCTION AND MATERIAL SPECIFICATIONS ITEM 407 TACK COAT EXCEPT AS NOTED BELOW.

MATERIAL: CONFORM TO THE FOLLOWING TYPICAL PHYSICAL PROPERTIES:

PARAMETER	TEST METHOD	MIN.	MAX.
SAYBOLT FUROL VISCOSITY, SFS @ 25C	AASHTO T59	15	100
STORAGE STABILITY, 5 DAYS, %	AASHTO T59	--	5
RESIDUE BY DISTILLATION, %	AASHTO T59	50	--
OIL DISTILLATE, %	AASHTO T59	--	1
SIEVE TEST, %	AASHTO T59	--	0.30
TEST ON RESIDUE:			
PENETRATION, @ 25C	AASHTO T49	--	25
SOFTENING POINT RANGE DEG C	AASHTO T53	65	--
SOLUBILITY,%	AASHTO T44	97.5	--

NOTE: PRODUCT SHOULD NOT CONTAIN FILLER SUCH AS CLAY, ETC. KEEP FROM FREEZING. SUPPLY CERTIFIED TEST DATA FROM AN INDEPENDENT LAB TO THE ENGINEER SHOWING THE MATERIAL SUPPLIED WAS TESTED FOR AND MEETS THE ABOVE PROPERTIES.

EQUIPMENT: ALL REQUIREMENTS OF 407.03 APPLY. SEE MANUFACTURER'S REPRESENTATIVE FOR CORRECT DISTRIBUTOR SETTINGS. THOROUGHLY CLEAN ALL EQUIPMENT IF CATIONIC EMULSION WAS PREVIOUSLY USED.

WEATHER LIMITATIONS: ALL REQUIREMENTS OF 407.04 APPLY.

PREPARATION OF SURFACE: ALL REQUIREMENTS OF 407.05 APPLY.

APPLICATION OF ASPHALT MATERIAL: UNIFORMLY APPLY THE ASPHALT MATERIAL WITH A DISTRIBUTOR PER THE REQUIREMENTS OF 407.06 EXCEPT AS NOTED. IF PRODUCT IS STORED FOR AN EXTENDED PERIOD OF TIME, PRIOR TO APPLICATION, AGITATE OR GENTLY CIRCULATE THE MATERIAL. ALL NOZZLES AND SPRAY PATTERNS SHALL BE IDENTICAL TO ONE ANOTHER ALONG THE DISTRIBUTOR SPRAY BAR. THE ANGLE OF THE NOZZLE SHOULD BE A 15 TO 30 DEGREE ANGLE TO THE SPRAY BAR AXIS TO MAXIMIZE OVERLAP OR AS RECOMMENDED BY THE NOZZLE MANUFACTURER. CONTACT THE MANUFACTURER'S REPRESENTATIVE FOR REQUIRED SPRAY NOZZLE SIZE, AND DISTRIBUTOR AND NOZZLE SETTINGS. APPLY AT A RATE OF 0.075 GALLONS PER SQUARE YARD TO ALL MILLED SURFACES AND BITUMINOUS AGGREGATE BASE, AND AT A RATE OF 0.06 GALLONS PER SQUARE YARD TO ALL INTERMEDIATE COURSE SURFACES ~~AND BETWEEN COURSES OF ASPHALT~~. RECOMMENDED APPLICATION TEMPERATURE IS 160F TO 180F. DO NOT EXCEED 180F. DILUTION IS NOT ALLOWED.

THE ENGINEER AND MANUFACTURER'S REPRESENTATIVE WILL APPROVE RATE OF APPLICATION, TEMPERATURE, DISTRIBUTOR SETTINGS, AND AREAS TO BE TREATED BEFORE APPLICATION OF THE TACK COAT. THE ENGINEER WILL DETERMINE THE ACTUAL APPLICATION IN GALLONS PER SQUARE YARD BY A CHECK ON THE PROJECT. THE APPLICATION IS CONSIDERED SATISFACTORY WHEN THE MATERIAL IS APPLIED UNIFORMLY WITH NO VISIBLE EVIDENCE OF STREAKING OR RIDGING AND THE APPLICATION RATE IS ±10% OF THE SPECIFIED RATE.

METHOD OF MEASUREMENT: ALL REQUIREMENTS OF 407.07 APPLY.

BASIS OF PAYMENT: ALL REQUIREMENTS OF 407.08 APPLY.

ITEM 302 - BITUMINOUS AGGREGATE BASE, PG 64-22 (2 EQUAL LIFTS)

THE CONTRACTOR SHALL BE REQUIRED TO CONSTRUCT THIS 302 ITEM IN TWO (2) EQUAL LIFTS. THE CONTRACTOR SHALL ALSO BE REQUIRED TO APPLY ITEM SP 407 - TACK COAT FOR INTERMEDIATE COURSE AS PER PLAN (APPLIED @ 0.075 GAL./SQ.YD.) PRIOR TO CONSTRUCTING THE SECOND LIFT.

ITEM 252 - FULL DEPTH PAVEMENT SAWING

THE FOLLOWING ITEM HAS BEEN CARRIED TO THE GENERAL SUMMARY FOR USE BY THE ENGINEER TO MAKE TRANSVERSE SAW CUTS WHERE PROPOSED FULL DEPTH PAVEMENT WILL MEET EXISTING PAVEMENT AT THE PROJECT LIMITS, INTERCHANGE RAMPS AND EXISTING BRIDGES.

THIS ITEM SHALL ALSO BE USED BY THE ENGINEER TO SAW CUT THE EXISTING MAINLINE PAVEMENT AS OUTLINED IN THE CONDITION NO. 1 ON SHEET 15 OF THE PLANS.

ITEM 252 - FULL DEPTH PAVEMENT SAWING 15,000 FT

TRAFFIC CONTROL

ITEM 642 - PERMANENT PAVEMENT MARKINGS

PERMANENT PAVEMENT MARKING LOCATIONS SHALL BE DETERMINED BY REFERENCING THE BASE PAVEMENT JOINTS, AS SHOWN ON SHEET 15.

ITEM SP621 - RAISED PAVEMENT MARKER

THIS ITEM SHALL BE INSTALLED IN ACCORDANCE WITH SP621 WITH THE SPACING PER STANDARD DRAWING RPM-1.

ITEM SP626 - BARRIER REFLECTORS

FOLLOWING COMPLETION OF THE PROJECT, NEW BARRIER REFLECTORS SHALL BE INSTALLED ON THE EXISTING MEDIAN WALL FROM THE BEGINNING OF THE PROJECT AT MILE POST (MP) 216.10 (STA. 528+85) TO MILE POST (MP) 218.50 (STA. 91+00). BARRIER REFLECTOR SPACING SHALL CONFORM TO SP 626. MATERIAL SPECIFICATIONS SHALL CONFORM TO SP 626.

THE FOLLOWING QUANTITY HAS BEEN CARRIED TO THE TRAFFIC CONTROL GENERAL SUMMARY FOR USE AS DIRECTED BY THE CHIEF ENGINEER:

SP 626 - BARRIER REFLECTOR, TYPE B 255 EACH

OTIC PERMANENT PAVEMENT MARKING OPERATIONS

THE CONTRACTOR WILL PERFORM ANNUAL PAVEMENT MARKING INSTALLATION FOR EACH OF THE TWO (2) CONSTRUCTION SEASONS OF THIS PROJECT. FOR PHASE 2 AND 2A PAVEMENT RECONSTRUCTION WORK, THE CONTRACTOR SHALL INSTALL NEW PAVEMENT MARKINGS FROM MP 216.10 TO MP 218.60 FOR THE WESTBOUND OUTSIDE EDGE LINE AND THE OUTSIDE LANE, AND SHALL INSTALL NEW PAVEMENT MARKINGS FOR THE WESTBOUND TWO LANE SECTION FROM MP 218.50 TO MP 221.26 PRIOR TO THE START OF THE FIRST CONSTRUCTION SEASON. THE CONTRACTOR SHALL INSTALL THE REMAINING LANE LINE AND YELLOW INSIDE EDGE LINE FOR THE WESTBOUND LANES AT THE END OF THE FIRST CONSTRUCTION SEASON. THE CONTRACTOR WILL ALSO INSTALL NEW PAVEMENT MARKINGS IN THE EASTBOUND DIRECTION FROM MP 216.10 TO MP 221.26 AT THE END OF THE FIRST CONSTRUCTION SEASON.

PRIOR TO THE START OF THE SECOND CONSTRUCTION SEASON, THE CONTRACTOR WILL PERFORM THE ANNUAL PAVEMENT MARKING INSTALLATION FROM MP 216.10 TO MP 218.60. FOR PHASE 3 AND 3A THE CONTRACTOR SHALL INSTALL NEW OUTSIDE EDGE LINE AND OUTSIDE LANE, IN THE EASTBOUND DIRECTION, AND SHALL INSTALL NEW PAVEMENT MARKINGS FOR THE EASTBOUND TWO LANE SECTION FROM MP. 218.50 TO MP 221.26 PRIOR TO THE START OF THE SECOND CONSTRUCTION SEASON. THE CONTRACTOR SHALL INSTALL THE REMAINING LANE LINE AND YELLOW INSIDE EDGE LINE FOR THE EASTBOUND LANES AT THE END OF THE SECOND CONSTRUCTION SEASON. THE CONTRACTOR WILL ALSO INSTALL NEW PAVEMENT MARKINGS IN THE WESTBOUND DIRECTION FROM MP 216.10 TO MP 221.26 AT THE END OF THE SECOND CONSTRUCTION SEASON.

ITEM 630 - SIGNING, MISC.: SIGN ERECTED, FLAT SHEET

THIS ITEM SHALL BE AS OUTLINED IN 630 EXCEPT THAT ALL SIGNS AND SUPPORTS TO BE INSTALLED SHALL BE PROVIDED BY THE COMMISSION, THE CONTRACTOR SHALL CONTACT THE CHIEF ENGINEER TO ARRANGE FOR PICKUP OF THE SIGN AND POST MATERIALS FOR THE PROJECT. ALL SIGNS SHALL BE INSPECTED BY THE COMMISSION STAFF IN THE PRESENCE OF THE CONTRACTOR PRIOR TO LOADING OF PROVIDED MATERIALS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFE TRANSPORTATION OF THE MATERIALS PROVIDED TO THE JOB SITE. UPON ARRIVAL AT THE JOB SITE, THE TRANSPORTED SIGNING MATERIALS SHALL BE INSPECTED BY THE COMMISSION PERSONNEL TO ENSURE THAT NO DAMAGE OCCURRED DURING TRANSPORT. COSTS ASSOCIATED WITH THE PICK-UP OF THE SIGNS AND SUPPORTS, THE TRANSPORTATION TO THE PROJECT SITE AND ANY STORAGE COSTS UNTIL ERECTION SHALL BE CONSIDERED INCIDENTAL TO THE ITEM NECESSITATING THE WORK. THIS ITEM SHALL INCLUDE ALL LABOR AND MATERIAL COSTS NECESSARY TO INSTALL THE SIGNS AS SHOWN IN THE PLANS.

ALL COSTS ASSOCIATED WITH THIS ITEM SHALL BE INCLUDED IN THE UNIT BID PRICE FOR ITEM 630 - SIGNING, MISC.: SIGN ERECTED, FLAT SHEET, EACH.

ITEM 630 - SIGNING MISC.: SIGN ERECTED, EXTRUSHEET

THIS ITEM SHALL BE AS OUTLINED IN ITEM 630 EXCEPT THAT ALL EXTRUSHEET SIGNS TO BE REPLACED AS A PART OF THE PROJECT WILL BE PROVIDED BY THE COMMISSION. THE CONTRACTOR SHALL CONTACT THE CHIEF ENGINEER TO ARRANGE FOR A PICK-UP OF THE EXTRUSHEET SIGNS TO BE ERECTED. ALL EXTRUSHEET SIGNS PROVIDED SHALL BE INSPECTED BY THE COMMISSION STAFF IN THE PRESENCE OF THE CONTRACTOR PRIOR TO LOADING OF THE PROVIDED MATERIALS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFE TRANSPORTATION OF THE MATERIALS PROVIDED TO THE JOB SITE. UPON ARRIVAL AT THE JOB SITE, THE TRANSPORTED SIGNING MATERIALS SHALL BE INSPECTED BY THE COMMISSION PERSONNEL TO ENSURE THAT NO DAMAGE OCCURRED DURING TRANSPORT. COSTS ASSOCIATED WITH THE PICK-UP OF THE SIGNS AND SUPPORTS, THE TRANSPORTATION TO THE PROJECT SITE AND ANY STORAGE COSTS UNTIL ERECTION SHALL BE CONSIDERED INCIDENTAL TO THE ITEM NECESSITATING THE WORK.

IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE EXISTING CLEARANCE BETWEEN THE LANES OF THE OHIO TURNPIKE AND THE BOTTOM OF EXISTING SIGNS. ALL NEW SIGNS SHALL BE INSTALLED SUCH THAT A MINIMUM VERTICAL CLEARANCE IS PROVIDED ONCE THE SIGN IS INSTALLED AS SHOWN ON ODOT STANDARD CONSTRUCTION DRAWINGS. THE CONTRACTOR MAY HAVE TO ADJUST SPACING OF 2-BARS BASED ON WIDTH OF NEW SIGNS. GROUND MOUNTED SIGNS SHALL BE INSTALLED AT THE SAME HEIGHT AS EXISTING SIGNS.

THE CONTRACTOR SHALL PROVIDE MOUNTING CLIPS PER 2013 ODOT CONSTRUCTION AND MATERIAL SPECIFICATION ITEM 630, ODOT SUPPLEMENTAL SPECIFICATION 800 (07/19/2013), AND ODOT SUPPLEMENTAL SPECIFICATION 992 (04/18/2014).

THIS ITEM SHALL INCLUDE ALL LABOR AND MATERIAL COSTS NECESSARY TO INSTALL THE SIGNS AS SHOWN IN THE PLANS, AND SHALL INCLUDE BUT NOT BE LIMITED TO ALL LABOR, TEMPORARY TRAFFIC CONTROL, SIGN BACKING ASSEMBLIES, AND HARDWARE NECESSARY TO INSTALL THE SIGNS TO THE NEW OR EXISTING STRUCTURAL BEAM SUPPORTS.

ALL COSTS ASSOCIATED WITH THIS ITEM SHALL BE INCLUDED IN THE UNIT BID PRICE FOR ITEM 630 - SIGNING, MISC.: SIGN ERECTED, OVERHEAD EXTRUSHEET, EACH.

ITEM 631 - REMOVAL MISC.: SIGN LIGHTING AND SIGN SERVICE

THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL SIGN LIGHTING COMPONENTS FROM THE LUMINAIRES DOWN TO THE DISCONNECT SWITCH (INCLUDING THE DISCONNECT SWITCH). ITEMS REMOVED AND DISPOSED OF SHOULD INCLUDE BUT NOT BE LIMITED TO LUMINAIRES AND SUPPORT ARMS, STRUCTURAL STEEL TUBE, AND SIGN WIRING.

TWO WEEKS PRIOR TO REMOVAL OF THE EXISTING SIGN THE CONTRACTOR SHALL CONTACT MIKE BERGSTROM AT 440-821-3368 OR michael.bergstrom@ohioturnpike.org. COMMISSION PERSONNEL WILL REMOVE THE DISCONNECT AND SIGN SERVICE. THEY WILL ALSO REMOVE ANY REMOTE BALLAST AND THEIR HOUSING.

ALL EQUIPMENT, MATERIALS, AND LABOR REQUIRED TO PERFORM THE WORK OUTLINED ABOVE SHALL BE INCLUDED IN THE UNIT BID PRICE OF EACH FOR ITEM 630-REMOVAL MISC.: SIGN LIGHTING AND SIGN SERVICE.

NO.	REVISIONS	BY	DATE
1	ADDENDUM NO. 1	DLF	1/14/15

OHIO TURNPIKE AND INFRASTRUCTURE COMMISSION

OHIO TURNPIKE EASTBOUND AND WESTBOUND
RIGHT TWO LANES & SHOULDER RECONSTRUCTION
GENERAL NOTES

CT Consultants
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8316 Sterling Court Mentor, Ohio 44060
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DESIGNED:	W.D.B.	CHECKED:	W.D.B.	DATE:	AUG, 2014
DRAWN:	M.Z.P.	IN CHARGE:	W.D.B.	SCALE:	N/A

PROJECT 39-15-02A SHEET 22 OF 419

Drawing File: I:\2014\14138\OTIC\DWG\14138GN01.dwg Layout: 22
Date: Jan 12, 2015 Time: 2:39 pm Twist: -1.57079633
Technician: frey

SHEET NUMBER																		ITEM	GRAND TOTAL	UNIT	DESCRIPTION	REF. NO.
18	19	20	21	22		211	213	214	216	219	220	221	222	224	225	279	PIS-1					
																					ROADWAY	
LUMP																		201	1	LUMP	CLEARING AND GRUBBING	18
50																		201	50	EACH	TREE REMOVED, 18" SIZE	
5																		201	5	EACH	TREE REMOVED, 30" SIZE	
							2,462											202	2,462	FT	PIPE REMOVED	
							53											202	53	EACH	CATCH BASIN OR INLET REMOVED	
							1											202	1	EACH	MANHOLE REMOVED	
		500																202	500	FT	FENCE REMOVED	
						27,794												202	27,794	FT	GUARDRAIL REMOVED, AS PER PLAN	19
						1,224												202	1,224	SY	APPROACH SLAB REMOVED	
						760												202	760	FT	CONCRETE BARRIER REMOVED	
						330												202	330	FT	GUTTER REMOVED	
										241,596								202	241,596	SY	PAVEMENT REMOVED, AS PER PLAN	20
										26,748		54,389					20	203	81,157	CY	EXCAVATION	
	4,000											24,281						203	28,281	CY	EXCAVATION, AS PER PLAN	19
		18,850																203	18,850	CY	ROCK EXCAVATION, AS PER PLAN	20
	1,650																	203	1,650	CY	ROCK EXCAVATION FOR UNDERDRAIN INSTALLATION, AS PER PLAN	19
			500									1,038						203	1,538	CY	EXCAVATION FOR SLOPE EROSION PROTECTION	
																	5,641	203	5,641	CY	EXCAVATION INCLUDING EMBANKMENT, AS PER PLAN	PIS-1
	4,000		300									31,388						203	35,688	CY	EMBANKMENT	
		18,850																203	18,850	CY	EMBANKMENT, AS PER PLAN	19, 20
																	10	203	10	CY	GRANULAR EMBANKMENT, AS PER PLAN (NO. 8 AGGREGATE)	PIS-1
																	20	203	20	CY	GRANULAR MATERIAL, TYPE C	
																	2,821	203	2,821	CY	BORROW	
		178																204	178	CY	EXCAVATION	
																	80	204	80	SY	GEOTEXTILE FABRIC, 712.09 TYPE A	
		267																204	267	SY	GEOTEXTILE FABRIC, 712.09 TYPE D	
		267								1,232								204	1,499	SY	SUBGRADE COMPACTION	
		175,700																206	175,700	SY	LIME STABILIZED SUBGRADE, 14 INCHES DEEP, AS PER PLAN	19, 20
		5,090																206	5,090	TON	LIME	
		76,140																206	76,140	SY	CEMENT STABILIZED SUBGRADE, 12 INCHES DEEP, AS PER PLAN	19, 20
		1,590																206	1,590	TON	CEMENT	
		15,110																206	15,110	GAL	CURING COAT	
		130																206	130	HOUR	TEST ROLLING	
		5,000				9,546												209	14,546	FT	DITCH CLEANOUT	
						1,496												SPECIAL	1,496	SY	CHANNEL CLEANOUT	20
						200												SPECIAL	200	FT	CONCRETE CHANNEL CLEANOUT	20
		178																SP304	178	CY	GRANULAR MATERIAL	
								1,220										SP526	1,220	SY	CLASS C CONCRETE, APPROACH SLAB, USING TYPE I CEMENT (T=12")	
								808								129		SP536	937	SY	CONCRETE WEATHERPROOFING, BARRIERS AND PARAPETS	19
								26,225										606	26,225	FT	GUARDRAIL, TYPE MGS, USING LONG STEEL POSTS	
								26										606	26	EACH	ANCHOR ASSEMBLY, MGS TYPE T, USING LONG STEEL POSTS	
								28										606	28	EACH	ANCHOR ASSEMBLY, MGS TYPE E, USING LONG STEEL POSTS, AS PER PLAN	20
								26										606	26	EACH	MGS BRIDGE TERMINAL ASSEMBLY, TYPE 1, USING LONG STEEL POSTS	
								9										606	9	EACH	MGS BRIDGE TERMINAL ASSEMBLY, TYPE 2	
								75										606	75	FT	GUARDRAIL, BARRIER DESIGN, TYPE MGS	
								2										606	2	FT	IMPACT ATTENUATOR, TYPE 1, (BIDIRECTIONAL), AS PER PLAN	19
								25										606	25	FT	GUARDRAIL REBUILT	19
		500																607	500	FT	FENCE, TYPE 47, AS PER PLAN	20
								3,796										609	3,796	FT	ASPHALT CONCRETE CURB, TYPE 1, PG64-22	
								244										609	244	FT	CURB, TYPE 4-C	
								438										622	438	FT	CONCRETE BARRIER, SINGLE SLOPE, TYPE D, AS PER PLAN	18
								240								100		622	340	FT	CONCRETE BARRIER, TYPE B-50, AS PER PLAN	18
								80										622	80	FT	CONCRETE BARRIER, TYPE C-50, AS PER PLAN	18
																152		622	152	FT	PORTABLE CONCRETE BARRIER, 32", AS PER PLAN	23
								317										SP626	317	EACH	BARRIER REFLECTOR, TYPE A	
				255				22								4		SP626	281	EACH	BARRIER REFLECTOR, TYPE B	
		267										861						861	267	SY	GEOGRID FOR SUBGRADE STABILIZATION, AS PER PLAN, TENSAR TRIAX 160 GEOGRID	19, 20
																	2,500	SPECIAL	2,500	CY	LIMESTONE SAND	

NO.	REVISIONS	BY	DATE
1	ADDENDUM NO. 1	DLF	1/14/15

OHIO TURNPIKE AND INFRASTRUCTURE COMMISSION

OHIO TURNPIKE EASTBOUND AND WESTBOUND
RIGHT TWO LANES & SHOULDER RECONSTRUCTION
GENERAL SUMMARY

CT Consultants
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DESIGNED: WDB	CHECKED: JMP	DATE: NOV., 2014	
DRAWN: DLF	IN CHARGE: WDB	SCALE: NONE	

PROJECT 39-15-02A SHEET 207 OF 419

DESIGNED BY: WDB | CHECKED BY:
DATE: 11/2014 | DATE:
DRAWN BY: DLF | REVISED BY:
DATE: 11/2014 | DATE:
CAD FILE NAME: 141386GENERALSUMMARY.DWG

SHEET NUMBER																		ITEM	GRAND TOTAL	UNIT	DESCRIPTION	REF. NO.
18	19	20	21	22		211	213	214	216	219	220	221	222	224	225	279	PIS-1					
																					DRAINAGE (CONTINUED)	
									80,404									SP605	80,404	FT	6" BASE PIPE UNDERDRAIN, WITH FABRIC WRAP (18")	
									46,950									SP605	46,950	FT	6" SHALLOW PIPE UNDERDRAIN, WITH FABRIC WRAP (24")	
									48,208									SP605	48,208	FT	6" SHALLOW PIPE UNDERDRAIN, WITH FABRIC WRAP (30")	
							506											837	506	FT	24" LINER PIPE, AS PER PLAN	370
							195											837	195	FT	30" LINER PIPE, AS PER PLAN	370
							163											837	163	FT	60" LINER PIPE, AS PER PLAN	370
							122											837	122	CY	BACKFILL FOR LINER PIPE	
							16											SPECIAL	16	EACH	12" PRECAST CONCRETE END SECTION	21
							12											SPECIAL	12	EACH	18" PRECAST CONCRETE END SECTION	21
							1											SPECIAL	1	EACH	42" PRECAST CONCRETE END SECTION	21
							1,334											SPECIAL	1,334	FT	PIPE CLEANOUT	370
																					PAVEMENT	
				300	⚠													251	300	⚠ SY	PARTIAL DEPTH PAVEMENT REPAIR	
				15,000														252	15,000	FT	FULL DEPTH PAVEMENT SAWING	
										6,408								254	6,408	SY	PAVEMENT PLANING, ASPHALT CONCRETE (3-1/4")	
										7,297								254	7,297	SY	PAVEMENT PLANING, ASPHALT CONCRETE (9")	
																1,756		254	1,756	SY	PAVEMENT PLANING, ASPHALT CONCRETE (VARIABLE DEPTH)	
				400														255	400	SY	FULL DEPTH PAVEMENT REMOVAL AND RIGID REPLACEMENT, CLASS C	
				1,500														255	1,500	FT	FULL DEPTH PAVEMENT SAWING	
										18,219								SP302	18,219	CY	ASPHALT CONCRETE BASE, PG64-22 (SHOULDER)	
										51,388								SP302	51,388	CY	ASPHALT CONCRETE BASE, PG64-22	
										20,808								SP304	20,808	CY	AGGREGATE BASE (SHOULDER)	
										28,217								SP304	28,217	CY	AGGREGATE BASE	
										4,159								SP402	4,159	CY	ASPHALT CONC. BASE COURSE OR RECYCLED ASPHALT CONC. BASE COURSE, PG64-22	
										8,594								SP402	8,594	CY	ASPHALT CONC. BASE COURSE OR RECYCLED ASPHALT CONC. BASE COURSE, PG70-22 (FR)	
										3,566						74		SP404	3,640	CY	ASPHALT CONCRETE SURFACE COURSE, USING CRUSHED STONE, PG64-22	
										7,369								SP404	7,369	CY	ASPHALT CONCRETE SURFACE COURSE, USING CRUSHED SLAG, PG70-22 (FR)	
										52,463						1,520		SP404A	53,983	FT	JOINT SEALER	
										15,687						106		SP407	15,793	GAL	TACK COAT FOR INTERMEDIATE COURSE, AS PER PLAN	22
										32,107								SP407	32,107	GAL	TACK COAT, AS PER PLAN	22
											29,079							617	29,079	SY	SHOULDER PREPARATION, AS PER PLAN	20
											1,491							617	1,491	CY	COMPACTED AGGREGATE	
											2,047							SP627	2,047	TON	STONE SHOULDER PROTECTION	
										16.09								SPECIAL	16.09	MILE	SONIC NAP ALERT PATTERN (SNAP)	
										24,419						1,520		SPECIAL	25,939	FT	SAW CUT JOINT (9"±)	22

NO.	REVISIONS	BY	DATE
⚠	ADDENDUM NO. 1	DLF	1/14/15

OHIO TURNPIKE AND INFRASTRUCTURE COMMISSION

OHIO TURNPIKE EASTBOUND AND WESTBOUND
RIGHT TWO LANES & SHOULDER RECONSTRUCTION
GENERAL SUMMARY

CT Consultants
engineers | architects | planners
5500 Darding Court Mentor, Ohio 44060
440.951.9000 www.ctconsultants.com

DESIGNED: WDB	CHECKED: JMP	DATE: NOV., 2014	
DRAWN: DLF	IN CHARGE: WDB	SCALE: NONE	

PROJECT 39-15-02A SHEET 209 OF 419

DESIGNED BY: WDB | CHECKED BY:
DATE: 11/2014 | DATE:
DRAWN BY: DLF | REVISED BY:
DATE: 11/2014 | DATE:
CAD FILE NAME: 141306GENERALSUMMARY.DWG

STATION TO STATION		SIDE	LENGTH	PAVEMENT WIDTH (AVG.)	SHOULDER WIDTH	SURFACE AREA	APPROACH SLAB AREA	AREA BY COMPUTER	202 PAVEMENT REMOVED, AS PER PLAN	203 EXCAVATION (T=6-3/4"+/- MAINLINE PAVT, T=15-3/4"+/- SHOULDERS, T=14"+/- APPROACH SLABS) ⚠1	204 SUBGRADE COMPACTION	SPECIAL SAW CUT JOINT (9" +/-)	254 PAVEMENT PLANING, ASPHALT CONCRETE (3-1/4")	254 PAVEMENT PLANING, ASPHALT CONCRETE (9")	SP302 8" ASPHALT CONCRETE BASE, PG 64-22 (SHOULDER)	SP302 10-1/2"" ASPHALT CONCRETE BASE, PG 64-22	SP302 11-1/2"" ASPHALT CONCRETE BASE, PG 64-22	SP302 5-3/4" ASPHALT CONCRETE BASE, PG64-22	SP304 8-1/2" AGGREGATE BASE (SHOULDER)	SP304 9-1/2" AGGREGATE BASE (SHOULDER)	SP304 6" AGGREGATE BASE	SP304 12" AGGREGATE BASE	SP402 1-3/4" ASPHALT CONCRETE BASE COURSE OR RECYCLED ASPHALT CONCRETE BASE COURSE, PG64-22	SP402 1-3/4" ASPHALT CONCRETE BASE COURSE OR RECYCLED ASPHALT CONCRETE BASE COURSE, PG70-22 (FR)	SP404 1-1/2" ASPHALT CONCRETE SURFACE COURSE, USING CRUSHED STONE, PG64-22	SP404 1-1/2" ASPHALT CONCRETE SURFACE COURSE, USING CRUSHED SLAG, PG70-22 (FR)	SP404A JOINT SEALER	SP407 TACK COAT FOR INTERMEDIATE COURSE, AS PER PLAN (0.06 GAL./S.Y.)	SP407 TACK COAT, AS PER PLAN (0.075 GAL./S.Y.)	SPECIAL SONIC NAP ALERT PATTERN (SNAP)
			FT	FT	FT	SF	SF	SF	SY	CY	SY	FT	SY	SY	CY	CY	CY	CY	CY	CY	CY	CY	CY	CY	FT	GAL.	GAL.	MILE
OUTSIDE TWO LANES AND OUTSIDE SHOULDER																												
528+85.0	555+05.9	LT	2620.9	25.00		65522			6989	1438		2621		365			2326	59			1214			372		319	2621	459	1120	
528+85.0	555+05.9	LT	2620.9		9.00	23588			2913	1196					594				731			128		110			158	197	0.50
555+05.9	562+96.8	LT	790.9	42.29				33445	3629	719		791		110			1188	18		620		186		160	791	230	566	
555+05.9	562+96.8	LT	790.9		7.00	5537			704	285					140				174			30		26			37	47	0.15
562+96.8	564+18.1	LT	121.3	25.00		3032			324	67		122		17			108	3		57		18		15	122	22	52	
562+96.8	564+18.1	LT	121.3		9.00	1092			135	56					28				34			6		6			8	10	0.03
00+00.0	27+23.1	LT	2723.1	25.00		68077			7262	1494		2724		379			2417	61		1261		387		331	2724	477	1163	
00+00.0	27+23.1	LT	2723.1		9.00	24508			3026	1243					617				759			133		114			164	205	0.52
27+23.1	27+42.2	LT	19.2				1145			49	128										43								
29+54.6	29+73.8	LT	19.2				1150			50	128										43								
29+73.8	33+11.9	LT	338.1	25.00		8452			902	186		339		47			300	8		157		48		42	339	60	145	
29+73.8	33+11.9	LT	338.1		9.00	3043			376	155	⚠				77				95			17		15			21	26	0.07
33+11.9	33+27.2	LT	15.3				914			39	102										35								
34+67.2	34+82.5	LT	15.3				915			40	102										35								
34+82.5	54+23.4	LT	1940.9	25.00		48524			5176	1065		1941		270			1723	44		899		276		236	1941	340	829	
34+82.5	54+23.4	LT	1940.9		9.00	17469			2157	886					440				541			95		81			117	146	0.37
54+23.4	62+63.4	LT	840.0	31.00		26040			2800	566		840		117			925	19		483		147		126	840	181	443	
54+23.4	62+63.4	LT	840.0		9.00	7560			934	384					191				234			41		35			51	63	0.16
62+63.4	82+09.4	LT	1946.0	37.00		72002			7784	1555		1946		271			2556	44		1334		403		345	1946	497	1221	
62+63.4	82+09.4	LT	1946.0		9.00	17514			2163	888					441				543			95		82			117	146	0.37
82+09.4	83+60.0	LT	150.6	38.50		5799			628	125		151		21			206	4		108		33		28	151	40	99	
82+09.4	83+60.0	LT	150.6		9.00	1356			168	69					35				42			8		7			10	12	0.03
83+60.0	90+93.7	LT	733.7	47.35		34743			3779	745		734		102			1234	17		644		193		166	734	238	587	
83+60.0	90+93.7	LT	733.7		9.00	6604			816	335					167				205			36		31			45	56	0.14
TWO LANES AND INSIDE/OUTSIDE SHOULDER																												
90+93.7	92+00.0	LT	106.3	57.51		6112			656					15		199				114		34		29	107	42	103	
90+93.7	92+00.0	LT	106.3		18.00	1913			213						49				53			11		9			13	16	0.05
92+00.0	95+59.4	LT	359.4	60.41		21711			2333					50		704				403		120		103	360	148	366	
92+00.0	95+59.4	LT	359.4		18.00	6470			719						163				180			35		30			44	54	0.14
95+59.4	111+08.3	LT	1548.9	26.00		40273			4131					216		1306				746		228		196	1549	282	688	
95+59.4	111+08.3	LT	1548.9		18.00	27881			3098						702				773			151		130			186	233	0.59
111+08.3	116+97.3	LT	589.0	48.85		28769			3066					82		933				533		160		137	589	197	486	
111+08.3	116+97.3	LT	589.0		16.00	9424			1178						238				263			51		44			63	79	0.23
120+55.8	123+25.0	LT	269.2	38.00		10231			1077					38		332				190		58		49	270	71	174	
120+55.8	123+25.0	LT	269.2		16.00	4308			539						109				121			24		20			29	36	0.11
123+25.0	124+25.0	LT	100.0	32.00		3200			334					14		104				60		18		16	100	23	55	
123+25.0	124+25.0	LT	100.0		17.00	1700			260						43				48			10		8			12	15	0.04
124+25.0	131+75.0	LT	750.0	26.00		19500			2000					105		632				362		111		95	750	137	333	
124+25.0	131+75.0	LT	750.0		18.00	13500			2500						340				374			73		63			90	113	0.29
131+75.0	158+66.6	LT	2691.6	26.00		69983			7178					374		2268				1296		397		340	2692	489	1195	
131+75.0	158+66.6	LT	2691.6		18.00	48450			5384						1219				1342			262		225			323	404	1.02
158+66.6	158+84.1	LT	17.5				694				78										26								
160+96.4	161+13.9	LT	17.5				696				78										26								
161+13.9	237+19.0	LT	7605.1	26.00		197732			20281					1057		6408				3662		1120		960	7606	1382	3375	
161+13.9	237+19.0	LT	7605.1		18.00	136892			15211						3443				3791			740		634			913	1141	2.89
TOTALS CARRIED TO SHEET 219									122823	13635	616	12209	0	3650	9036	12886	12983	277	6945	3358	14143	208	1946	4309	1670	3693	26232	7716	15999	7.70

⚠1 ADDENDUM NO. 1 — DLF — 1/14/15

NO. | REVISIONS | BY | DATE

OHIO TURNPIKE AND INFRASTRUCTURE COMMISSION

OHIO TURNPIKE EASTBOUND AND WESTBOUND
RIGHT TWO LANES & SHOULDER RECONSTRUCTION
PAVEMENT SUBSUMMARY

CT Consultants
engineers | architects | planners
5500 Sterling Court Mentor, Ohio 44060
440.951.9000 www.ctconsultants.com

DESIGNED: WDB	CHECKED: JMP	DATE: NOV., 2014	
DRAWN: DLF	IN CHARGE: WDB	SCALE: NONE	

PROJECT 39-15-02A SHEET 217 OF 419

DESIGNED BY: WDB | CHECKED BY:
DATE: 11/2014 | DATE:
DRAWN BY: DLF | REVISED BY:
DATE: 11/2014 | DATE:
CAD FILE NAME:14138-ROADWAY-SUBSUMMARIES.DWG

STATION TO STATION		SIDE	LENGTH	PAVEMENT WIDTH	SHOULDER WIDTH	SURFACE AREA	APPROACH SLAB AREA	AREA BY COMPUTER	202	203	204	SPECIAL	254	254	SP302				SP304				SP402		SP404		SP404A	SP407		SPECIAL
									PAVEMENT REMOVED, AS PER PLAN	EXCAVATION (T=6-3/4"+/- MAINLINE PAVT. T=15-3/4"+/-) SHOULDERS T=14"+/- APPROACH SLABS) ⚠	SUBGRADE COMPACTION	SAW CUT JOINT (9" +/-)	PAVEMENT PLANING, ASPHALT CONCRETE (3-1/4")	PAVEMENT PLANING, ASPHALT CONCRETE (9")	8" ASPHALT CONCRETE BASE, PG 64-22 (SHOULDER)	10-1/2"" ASPHALT CONCRETE BASE, PG 64-22	11-1/2"" ASPHALT CONCRETE BASE, PG 64-22	5-3/4" ASPHALT CONCRETE BASE, PG64-22	8-1/2" AGGREGATE BASE (SHOULDER)	9-1/2" AGGREGATE BASE (SHOULDER)	6" AGGREGATE BASE	12" AGGREGATE BASE	1-3/4" ASPHALT CONCRETE BASE COURSE OR RECYCLED ASPHALT CONCRETE BASE COURSE, PG64-22	1-3/4" ASPHALT CONCRETE BASE COURSE OR RECYCLED ASPHALT CONCRETE BASE COURSE, PG70-22 (FR)	1-1/2" ASPHALT CONCRETE SURFACE COURSE, USING CRUSHED STONE, PG64-22	1-1/2" ASPHALT CONCRETE SURFACE COURSE, USING CRUSHED SLAG, PG70-22 (FR)	JOINT SEALER	TACK COAT FOR INTERMEDIATE COURSE, AS PER PLAN (0.06 GAL./S.Y.)	TACK COAT, AS PER PLAN (0.075 GAL./S.Y.)	SONIC NAP ALERT PATTERN (SNAP)
			FT	FT	FT	SF	SF	SF	SY	CY	SY	FT	SY	SY	CY			CY	CY		CY	CY	CY	CY	CY	CY	FT	GAL.	GAL.	MILE
OUTSIDE TWO LANES AND OUTSIDE SHOULDER											⚠																			
528+85.0	553+81.6	RT	2496.6	25.00		62415			6658	1370		2497		347			2216	56			1156			354		304	2497	437	1067	
528+85.0	553+81.6	RT	2496.6		9.00	22470			2774	1140					566					696			122		105			150	188	0.48
553+81.6	564+18.1	RT	1036.5	48.52				50295	5474	1077		1037		144			1786	24			932			279		239	1037	344	850	
553+81.6	564+18.1	RT	1036.5		7.00	7256			922	373					184					228			40		34			49	61	0.20
00+00.0	06+61.5	RT	661.5	31.62				20914	2251	455		662		92			743	15			388			118		101	662	145	356	
00+00.0	06+61.5	RT	661.5		7.00	4631			588	238					118					146			26		22			31	39	0.13
06+61.5	27+86.5	RT	2125.0	25.00		53125			5667	1166		2125		296			1886	48			984			302		259	2125	372	908	
06+61.5	27+86.5	RT	2125.0		9.00	19125			2362	970					481					592			104		89			128	160	0.41
27+86.5	28+05.7	RT	19.2				1146			50	128											43								
30+18.0	30+37.2	RT	19.2				1145			49	128											43								
30+37.2	33+27.4	RT	290.2	25.00		7255			774	160	⚠	291		41			258	7			135			42		36	291	51	124	
30+37.2	33+27.4	RT	290.2		9.00	2612			323	133					66					81			15		13			18	22	0.06
33+27.4	33+42.7	RT	15.3				912			39	102											34								
34+82.5	34+97.7	RT	15.3				911			39	102											34								
34+97.7	70+97.7	RT	3600.0	25.00		89999			9600	1975		3600		500			3195	80			1667			511		438	3600	630	1538	
34+97.7	70+97.7	RT	3600.0		9.00	32400			4000	1643					815					1003			175		150			216	270	0.69
70+97.7	82+53.7	RT	1156.0	39.82				46034	4987	992		1157		161			1634	26			853			257		220	1157	317	780	
70+97.7	82+53.7	RT	1156.0		9.00	10405			1285	528					262					323			57		49			70	87	0.22
82+53.7	83+60.0	RT	106.3	13.00		1382			284	32		107		15			50	3			26			9		8	107	11	25	
82+53.7	83+60.0	RT	106.3		9.00	957			119	49					25					30			6		5			7	8	0.03
83+60.0	90+93.7	RT	733.7	18.24		13384			1957	300		734		102			476	17			248			78		67	734	96	231	
83+60.0	90+93.7	RT	733.7		9.00	6604			816	335					167					205			36		31			45	56	0.14
											⚠																			
TWO LANES AND INSIDE/OUTSIDE SHOULDER																														
90+93.7	92+00.0	RT	106.3	26.00		2764			284					15		90					52			16		14	107	20	48	
90+93.7	92+00.0	RT	106.3		18.00	1913			213						49				53				11		9			13	16	0.05
92+00.0	97+30.3	RT	530.3	26.00		13788			1415					74		447					256			79		67	531	97	236	
92+00.0	97+30.3	RT	530.3		18.00	9546			1061						241				265				52		45			64	80	0.21
97+30.3	113+98.6	RT	1668.3	42.80		71405			7564					232		2315					1323			397		341	1669	490	1208	
97+30.3	113+98.6	RT	1668.3		16.00	26693			2966						673				745				145		124			178	223	0.64
113+98.6	116+59.5	RT	261.0	26.00		6786			696					37		220					126			39		33	261	48	116	
113+98.6	116+59.5	RT	261.0		18.00	4698			290						119				131				26		22			32	40	0.10
120+19.4	158+17.8	RT	3798.4	26.00		98759			10130					528		3201					1829			560		480	3799	691	1686	
120+19.4	158+17.8	RT	3798.4		18.00	68372			7597						1720				1894				370		317			456	570	1.44
158+17.8	158+35.3	RT	17.5				695				78											26								
160+48.4	160+65.9	RT	17.5				695				78											26								
160+65.9	237+19.0	RT	7653.1	26.00		198982			20409					1063		6449					3685			1127		966	7654	1391	3397	
160+65.9	237+19.0	RT	7653.1		18.00	137757			15307						3465				3815				745		638			919	1148	2.90
TOTALS CARRIED TO SHEET 219									118773	13113	616	12210	0	3647	8951	12722	12244	276	6903	3304	13660	206	1930	4168	1653	3573	26231	7516	15538	7.70
											⚠																			

DESIGNED BY: WDB	CHECKED BY:		
DATE: 11/2014	DATE:		
DRAWN BY: DLF	REVISED BY:		
DATE: 11/2014	DATE:		
CAD FILE NAME:14130-ROADWAY-SUBSUMMARIES.DWG			

NO.	REVISIONS	BY	DATE
⚠	ADDENDUM NO. 1	DLF	1/14/15

OHIO TURNPIKE AND INFRASTRUCTURE COMMISSION

OHIO TURNPIKE EASTBOUND AND WESTBOUND
RIGHT TWO LANES & SHOULDER RECONSTRUCTION
PAVEMENT SUBSUMMARY

CT Consultants
engineers | architects | planners
8161 Sterling Court · Mason, Ohio 45040
513.451.1500 · www.ctconsultants.com

DESIGNED: WDB	CHECKED: JMP	DATE: NOV., 2014	
DRAWN: DLF	IN CHARGE: WDB	SCALE: NONE	

PROJECT 39-15-02A SHEET 218 OF 419

STATION TO STATION		SIDE	LENGTH	PAVEMENT WIDTH	SHOULDER WIDTH	SURFACE AREA	APPROACH SLAB AREA	AREA BY COMPUTER	202	203	204	SPECIAL	254	254	SP302				SP304				SP402		SP404		SP404A	SP407		SPECIAL
									PAVEMENT REMOVED, AS PER PLAN	EXCAVATION (T=6-3/4"+/- MAINLINE PAVT. (T=15-3/4"+/- SHOULDERS & T=14"+/- APPROACH SLABS) ⚠	SUBGRADE COMPACTION	SAW CUT JOINT (9" +/-)	PAVEMENT PLANING, ASPHALT CONCRETE (3-1/4")	PAVEMENT PLANING, ASPHALT CONCRETE (9")	8" ASPHALT CONCRETE BASE, PG 64-22 (SHOULDER)	10-1/2"" ASPHALT CONCRETE BASE, PG 64-22	11-1/2"" ASPHALT CONCRETE BASE, PG 64-22	5-3/4" ASPHALT CONCRETE BASE, PG64-22	8-1/2" AGGREGATE BASE (SHOULDER)	9-1/2" AGGREGATE BASE (SHOULDER)	6" AGGREGATE BASE	12" AGGREGATE BASE	1-3/4" ASPHALT CONCRETE BASE COURSE OR RECYCLED ASPHALT CONCRETE BASE COURSE, PG64-22	1-3/4" ASPHALT CONCRETE BASE COURSE OR RECYCLED ASPHALT CONCRETE BASE COURSE, PG70-22 (FR)	1-1/2" ASPHALT CONCRETE SURFACE COURSE, USING CRUSHED STONE, PG64-22	1-1/2" ASPHALT CONCRETE SURFACE COURSE, USING CRUSHED SLAG, PG70-22 (FR)	JOINT SEALER	TACK COAT FOR INTERMEDIATE COURSE, AS PER PLAN (0.06 GAL./S.Y.)	TACK COAT, AS PER PLAN (0.075 GAL./S.Y.)	SONIC NAP ALERT PATTERN (SNAP)
			FT	FT	FT	SF	SF	SF	SY	CY	SY	FT	SY	SY	CY			CY	CY		CY	CY	CY	CY	CY	CY	FT	GAL.	GAL.	MILE
THIRD LANE AND INSIDE SHOULDER RESURFACING																														
26+64.0	27+42.2	LT	78.2	10.75				797					89											5		5		5	7	
26+64.0	27+42.2	LT	78.2		13.25			1105					123										6		6			7	9	0.02
29+93.1	33+16.7	LT	323.6	10.75				3513					391											22		19		23	29	
29+93.1	33+16.7	LT	323.6		13.25			4234					471										23		20			28	35	0.07
34+87.2	35+60.0	LT	72.8	10.75				792					88											5		5		5	7	
34+87.2	35+60.0	LT	72.8		13.25			945					105										6		5			6	8	0.02
83+60.0	90+93.7	LT	733.7	5.50				4051					451											27		24		27	34	
83+60.0	90+93.7	LT	733.7		18.50			13559					1507										74		63			90	113	0.14
26+86.0	27+67.4	RT	81.4	10.75				922					103											6		5		6	8	
26+86.0	27+67.4	RT	81.4		13.25			1012					113										6		5			7	8	0.02
30+18.2	33+22.9	RT	304.7	10.75				3241					361											20		17		22	27	
30+18.2	33+22.9	RT	304.7		13.25			4090					455										23		19			27	34	0.06
34+93.3	35+65.0	RT	71.7	10.75				763					85											5		4		5	6	
34+93.3	35+65.0	RT	71.7		13.25			970					108										6		5			6	8	0.02
83+60.0	90+93.7	RT	733.7	5.50				4051					451											27		24		27	34	
83+60.0	90+93.7	RT	733.7		18.50			13559					1507										74		63			90	113	0.14
OUTSIDE SHOULDER ADDITIONS AND REDUCTIONS																														
543+31.5	543+91.5	LT	60.0		-0.33	-20									-1					5										
18+83.0	27+05.6	LT	822.6		0.83	683									17					21			4		4			5	6	
29+56.2	33+07.5	LT	351.3		0.83	292									8					9			2		2			2	3	
34+82.9	35+11.0	LT	28.1		0.83	23									1					1			1		1			1	1	
104+21.0	105+21.0	LT	100.0		-0.33	-33									-2				7											
120+87.1	121+05.0	LT	17.9		0.83	15									1				1				1		1			1	1	
120+46.8	120+65.0	LT	18.2		-0.17	-3																								
120+65.0	120+83.0	LT	18.0		0.83	15									1				1				1		1			1	1	
132+50.0	144+00.0	LT	1150.0		2.00			2100							52				56				12		10			14	18	
138+05.5	139+28.0	LT	122.5		9.10			1117							28				30				7		6			8	10	
161+27.2	161+41.0	LT	13.8		0.83	11									1				1				1		1			1	1	
161+04.0	161+41.0	LT	37.0		0.83	31									1				1				1		1			1	1	
187+01.5	187+59.5	LT	58.0		-0.33	-19									-1				4											
543+62.0	544+24.0	RT	62.0		-0.33	-20									-1					5										
18+90.0	28+04.0	RT	914.0		0.83	759									19					23			5		4			6	7	
30+54.7	33+28.7	RT	274.0		0.83	227									6					7			2		2			2	2	
35+01.8	47+15.0	RT	1213.2		0.83	1007									25					30			6		5			7	9	
103+33.0	104+33.0	RT	100.0		-0.33	-33									-2				7											
120+46.1	120+63.0	RT	16.9		0.83	14									1				1				1		1			1	1	
120+09.6	120+45.0	RT	35.4		0.83	29									1				1				1		1			1	1	
131+00.0	142+50.0	RT	1150.0		2.00	2300		2100							52				56				12		10			14	18	
135+89.5	137+22.0	RT	132.5		7.10			943							24				25				6		5			7	8	
160+75.6	160+91.0	RT	15.4		0.83	13									1				1				1		1			1	1	
160+52.7	160+91.0	RT	38.3		0.83	32									1				1				1		1			1	1	
188+26.0	188+84.0	RT	58.0		-0.33	-19									-1				4											
CROSS OVER																														
517+46.0	522+66.0	CL	520.0																											0.20
SUBTOTALS FROM THIS SHEET									0	0	0	0	6408	0	232	0	0	0	197	101	0	0	283	117	243	103	0	455	570	0.69
SUBTOTALS FROM SHEET 217									122823	13635	616	12209	0	3650	9036	12886	12983	277	6945	3358	14143	208	1946	4309	1670	3693	26232	7716	15999	7.70
SUBTOTALS FROM SHEET 218									118773	13113	616	12210	0	3647	8951	12722	12244	276	6903	3304	13660	206	1930	4168	1653	3573	26231	7516	15538	7.70
TOTALS CARRIED TO GENERAL SUMMARY									241596	26748	1232	24419	6408	7297	18219	51388			20808		28217		4159	8594	3566	7369	52463	15687	32107	16.09

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NO.	REVISIONS	BY	DATE
⚠	ADDENDUM NO. 1	DLF	1/14/15

OHIO TURNPIKE AND INFRASTRUCTURE COMMISSION

OHIO TURNPIKE EASTBOUND AND WESTBOUND
RIGHT TWO LANES & SHOULDER RECONSTRUCTION
PAVEMENT SUBSUMMARY

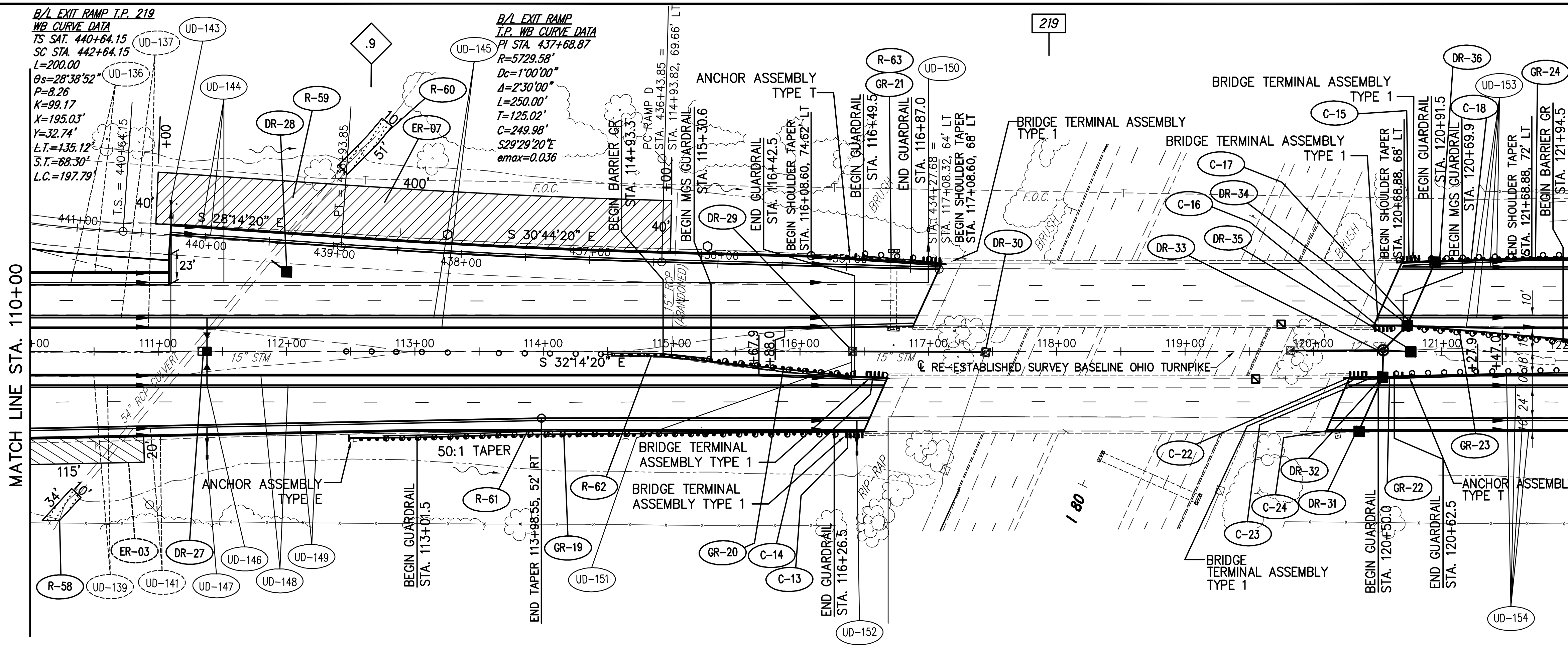
CT Consultants
engineers | architects | planners
8355 Sterling Court · Mentor, Ohio 44060
440.951.9000 · www.ctconsultants.com

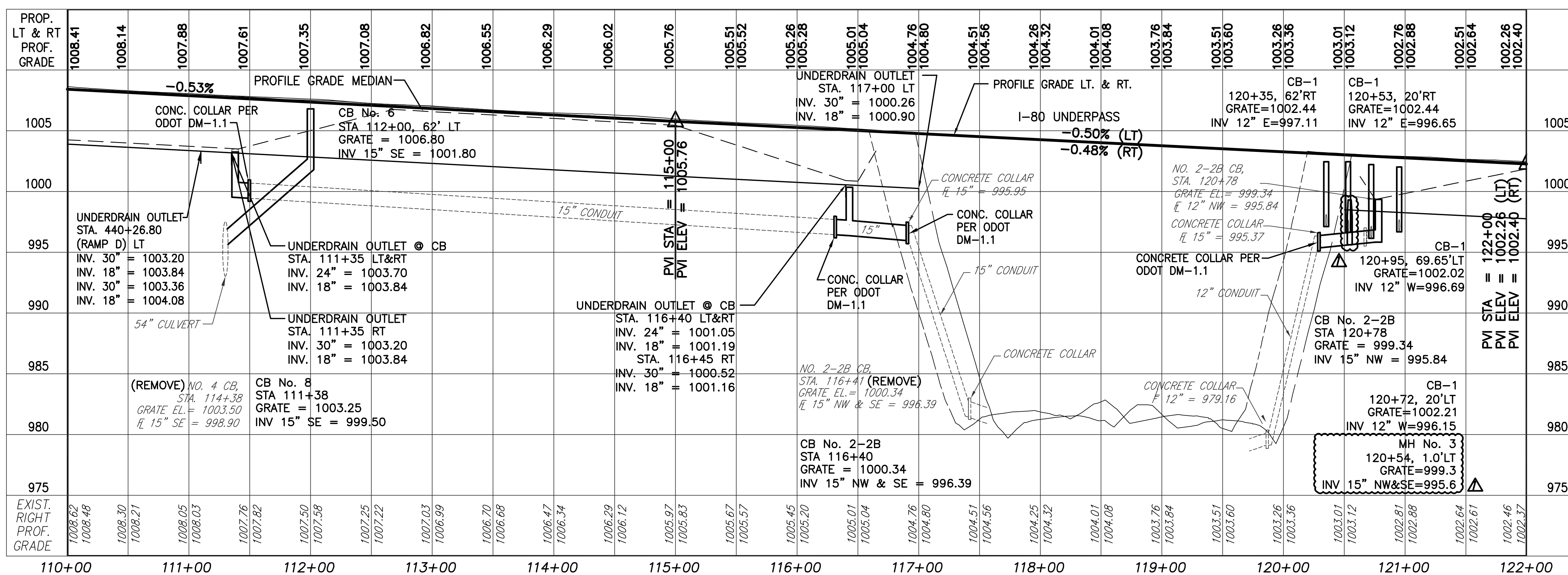
DESIGNED: WDB	CHECKED: JMP	DATE: NOV., 2014	
DRAWN: DLF	IN CHARGE: WDB	SCALE: NONE	

PROJECT 39-15-02A SHEET 219 OF 419

DESIGNED BY: WDB | CHECKED BY:
DATE: 11/2014 | DATE:
DRAWN BY: DLF | REVISED BY:
DATE: 11/2014 | DATE:
CAD FILE NAME: 14138-ROADWAY-SUBSUMMARIES.DWG

NOTE:
FOR PAVEMENT DETAILS, SEE SHEETS 295-304





219 MILEPOST REFERENCE

.9 TENTH OF MILE POST REFERENCE

EROSION IMPROVEMENT AREA
SEE GENERAL NOTES SHEET 21

RESURFACING LIMITS FOR TRANSITION TO APPROACH SLAB

ITEM SPECIAL - CHANNEL CLEANOUT

0 25 50 100
HORIZONTAL SCALE IN FEET

NO.	REVISIONS	BY	DATE
1	ADDENDUM NO. 1	DLF	1/14/15

OHIO TURNPIKE AND INFRASTRUCTURE COMMISSION

OHIO TURNPIKE EASTBOUND AND WESTBOUND
RIGHT TWO LANES & SHOULDER RECONSTRUCTION
PLAN & PROFILE STA. 110+00 TO STA. 122+00

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DESIGNED: WDB	CHECKED: JMP	DATE: MAY 2014
DRAWN: DLF	IN CHARGE: WDB	SCALE: 1"=50'

PROJECT 39-15-02A SHEET 245 OF 419

DESIGNED BY: JMP CHECKED BY:
DATE: 05/27/14 DATE:
DRAWN BY: PSL REVISED BY:
DATE: 05/27/14 DATE:
CAD FILE NAME: 14138-BASE.DWG

TOLL PLAZA 218 WASTE SITE DEDUCT ALTERNATE

THIS DEDUCT ALTERNATE PROVIDES THE CONTRACTOR A WASTE AREA AT TOLL PLAZA 218, AS DETAILED ON THIS SHEET, FOR THE EXCAVATED EMBANKMENT AND CONCRETE PAVEMENT MATERIALS REMOVED FROM THE 39-15-02A PROJECT. ALL WORK DESCRIBED BELOW SHALL BE INCLUDED IN THE TOLL PLAZA 218 WASTE SITE DEDUCT ALTERNATE CREDIT. THIS CREDIT REPRESENTS THE DIFFERENCE BETWEEN THE COSTS TO TRUCK WASTE MATERIAL OFF COMMISSION PROPERTY COMPARED TO WASTING THE MATERIAL AT TOLL PLAZA 218, AS WELL AS ALL REQUIREMENTS DESCRIBED IN THIS NOTE. THE UNIT PRICES BID SHALL NOT REFLECT ANY COSTS WHICH APPLY TO SUCH TEMPORARY CONSTRUCTION, RESTORATION, OR REPAIR WORK, AND SUCH WORK SHALL NOT BE SEPARATELY MEASURED OR PAID FOR, BUT SHALL BE PERFORMED WITHOUT COST TO THE COMMISSION. IN THE EVENT THAT THE CONSTRUCTION OF THE TOLL PLAZA WASTE SITE IS NOT APPROVED BY THE CHIEF ENGINEER, THE CONTRACT SHALL PROCEED AS IF NO REQUEST OR BID HAD BEEN MADE FOR THE CONSTRUCTION THEREOF.

THE SCHEMATIC PLAN ON THIS SHEET PROVIDES ONLY GENERAL DETAILS OF THE ALLOWABLE WASTE SITE AREA, WITH A CAPACITY OF APPROXIMATELY 150,000 CY OF MATERIAL. THE CONTRACTOR AWARDED THIS CONTRACT SHALL PROVIDE A FORMAL PLAN SUBMITTAL FOR REVIEW AND APPROVAL BY THE CHIEF ENGINEER NO LATER THAN TWENTY-ONE (21) DAYS PRIOR TO THE INTENDED WASTE SITE WORK COMMENCEMENT. NO SUBMITTALS ARE DUE WITH THE BID DOCUMENTS. THE WASTE SITE PLAN SUBMITTAL SHALL INCLUDE, AT A MINIMUM:

1. EXISTING AND PROPOSED CONTOURS (ONE-FOOT INTERVALS), RAMPS, SITE ACCESS RAMPS, DRAINAGE, LIGHTING, UTILITIES, AND ALL OTHER DETAILS REQUIRED TO PERFORM THE PROPOSED WORK.
2. APPROXIMATE CUBIC YARDS OF MATERIAL TO BE DISPOSED OF AT THE WASTE SITE.
3. PROPOSED DRAINAGE PLAN DETAILING HOW WATER WILL BE CONVEYED OR CONTROLLED, INCLUDING ANY CHANNELS, DITCHES, SWALES AND/OR DRAINAGE STRUCTURES ALL REQUIRED DRAINAGE ELEMENTS SHALL BE DESIGNED IN ACCORDANCE WITH THE CURRENT ODOT DRAINAGE LOCATION AND DESIGN MANUAL, VOLUME 2.
4. TEMPORARY DITCH CROSSING DETAILS.
5. TEMPORARY SEDIMENT AND EROSION CONTROL BMPS REQUIRED FOR COMPLIANCE UNDER THE CLEAN WATER ACT, OHIO WATER POLLUTION CONTROL ACT, (OWPCA) (ORC CHAPTER 6111) AND THE NPDES PERMIT.

THE WASTE SITE PLAN AND CONSTRUCTION OPERATIONS SHALL ALSO MEET THE FOLLOWING REQUIREMENTS:

1. AS-BUILT DRAWINGS SHALL BE PROVIDED IN AUTOCAD, VERSION 2011 OR NEWER.
2. PRE AND POST TOPOGRAPHIC SURVEY PLAN OF THE ENTIRE AREA AFFECTED BY THE PROPOSED CHANGES SHALL BE STAMPED BY A PROFESSIONAL SURVEYOR LICENSED IN THE STATE OF OHIO.
3. ALL EXISTING TREES AND BRUSH SHALL BE REMOVED AND DISPOSED OF IN ACCORDANCE WITH SP105 AND THE ENDANGERED SPECIES – INDIANA BAT NOTE ON SHEET 16 OF 405 SHALL BE FOLLOWED.
4. FINAL GRADING AND SEEDING:

A. WHEN WASTING PCC, MIX THE PCC WITH AT LEAST 30 PERCENT NATURAL SOIL TO CONSTRUCT AN INNER CORE IN THE WASTE AREA. ALL MATERIAL BEING WASTED SHALL MEET THE STANDARDS FOR CLEAN HARD FILL PER OAC 3745-400-05.) COVER THIS INNER CORE WITH 3 FEET OF NATURAL SOIL ON THE TOP AND ON ALL SIDE SLOPES. PLACE AND COMPACT THE MATERIAL ACCORDING TO ITEM 203.06.D TO PREVENT FUTURE SETTLEMENT AND SLIDING.

B. THE PRESENCE OF A SLAG BASE MATERIAL HAS BEEN VERIFIED UNDER THE EXISTING PAVEMENT AND CAN BE WASTED IN THIS DESIGNATED AREA. MATERIAL CONTAINING SLAG SHALL NOT BE WITHIN THE FIRST 3 FEET ABOVE GRADE.

C. CONTRACTOR SHALL BEGIN FILLING THE WASTE AREA FROM THE WEST SIDE OF THE PROPOSED PILE AREA, THEN FILLING TOWARDS THE EAST.

D. SLOPES SHALL BE CONSTRUCTED AT A 3:1 MAX WITH THE TOP SLOPING FROM THE CENTER WITH 12:1 MINIMUM GRADING.

E. EXISTING TOPSOIL SHALL BE REMOVED, STOCKPILED, AND RE-SPREAD OVER THE ENTIRE INFIELD AREA. A MINIMUM THICKNESS OF 6" OF TOPSOIL SHALL COVER THE ENTIRE WASTE PILE.

F. CONTRACTOR MAY TEST EXISTING SOIL WITHIN THE DESIGNATED WASTE SITE AREA TO VERIFY SUITABILITY FOR USE ON OTHER AREAS OF THE PROJECT. IF THE SOIL IS DETERMINED TO BE SUITABLE FOR OTHER USES, THE CONTRACTOR MAY USE THE WASTE SITE AREA FIRST AS A BORROW AREA. FINAL GRADING SHALL NOT CAUSE THE PONDING OF ANY WATER.

G. THE COMMISSION RESERVES THE RIGHT TO MODIFY FINAL GRADING AND ELEVATIONS AS WORK PROGRESSES.

H. RESTORATION OF ALL DISTURBED AREAS SHALL INCLUDE CLEANUP, SHAPING, REPLACEMENT OF TOPSOIL, AND ESTABLISHMENT OF VEGETATIVE COVER BY SEEDING AND MULCHING IN ACCORDANCE WITH ALL ITEMS 659. ENSURE THE RESTORED AREA IS WELL DRAINED.

5. IF REQUIRED, THE CONTRACTOR SHALL PROVIDE MAINTENANCE OF TRAFFIC CONTROLS IN ACCORDANCE WITH SP 614 AND OTIC STANDARD DRAWINGS, A FLAGGERS SHALL BE STATIONED AT ALL ACCESS POINTS TO CONTROL INGRESS/ EGRESS OF CONSTRUCTION VEHICLES ONTO ACTIVE ROADWAYS.
6. WASTE SITE ACCESS RAMPS:

A. TURNPIKE RAMP TRAFFIC VOLUME MAY RESTRICT OR DICTATE WHEN OFF-ROAD TRUCKS OR CONSTRUCTION VEHICLES MAY CROSS ACTIVE RAMPS.
B. ALL ACCESS POINTS SHALL BE CLOSED WITH BARRELS AND TYPE 3 BARRICADES WHEN NOT IN USE.
C. STANDARD CONSTRUCTION ENTRANCES SHALL BE CONSTRUCTED IN ACCORDANCE WITH SWPPP REQUIREMENTS. ADJACENT TURNPIKE ACTIVE RAMPS PAVEMENT SHALL BE KEPT FREE FROM MUD AND DEBRIS.
D. EARLY WARNING ADVISORY SIGNAGE MAY NEED TO BE PLACED AND ACTIVE WHEN WASTE SITE IS IN USE TO ADVISE TRAFFIC THAT CONSTRUCTION VEHICLES ARE CROSSING, ENTERING AND/OR EXITING.
E. ALL CONSTRUCTION VEHICLES AND TRUCKS TRAVELING ON OR ACROSS ACTIVE TURNPIKE ROADWAYS SHALL COMPLY WITH ALL COMMISSION WEIGHT RESTRICTIONS

0 50 100 200
HORIZONTAL SCALE IN FEET

PLAN INSERT SHEET 2

⚠	ADDENDUM NO. 1	DLF	1/14/15
NO.	REVISIONS	BY	DATE

OHIO TURNPIKE AND INFRASTRUCTURE COMMISSION

OHIO TURNPIKE EASTBOUND AND WESTBOUND
RIGHT TWO LANES & SHOULDER RECONSTRUCTION
TOLL PLAZA 218 WASTE SITE

CT Consultants
engineers | architects | planners
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DESIGNED: JMP	CHECKED: JMP	DATE: NOV 2014	
DRAWN: DLF	IN CHARGE: WDB	SCALE: 1"=100'	

PROJECT 39-15-02A SHEET 2 OF 2

DESIGNED BY: JMP	CHECKED BY:
DATE: 11/27/14	DATE:
DRAWN BY: DLF	REVISED BY:
DATE: 11/27/14	DATE:
CAD FILE NAME: 1413B-WASTE SITE.DWG	

PROJECT NO. 39-15-02 BID FORM

Ref. No.	Item No.	Item Description	Approx. Quantity	Unit	Unit Cost	Extended Bid Amount
		39-15-02 PART A - ROADWAY (Ref. Nos. 1 - 57)				
1	201	CLEARING AND GRUBBING	1	LUMP		
2	201	TREE REMOVED, 18" SIZE	50	EACH		
3	201	TREE REMOVED, 30" SIZE	5	EACH		
4	202	PIPE REMOVED	2,462	FT		
5	202	CATCH BASIN OR INLET REMOVED	53	EACH		
6	202	MANHOLE REMOVED	1	EACH		
7	202	FENCE REMOVED	500	FT		
8	202	GUARDRAIL REMOVED, AS PER PLAN	27,794	FT		
9	202	APPROACH SLAB REMOVED	1,224	SY		
10	202	CONCRETE BARRIER REMOVED	760	FT		
11	202	GUTTER REMOVED	330	FT		
12	202	PAVEMENT REMOVED, AS PER PLAN	241,596	SY		
13	203	EXCAVATION	~~78,286~~ ***81,157***	CY		
14	203	EXCAVATION, AS PER PLAN	28,281	CY		
15	203	ROCK EXCAVATION, AS PER PLAN	18,850	CY		
16	203	EXCAVATION FOR SLOPE EROSION PROTECTION	1,538	CY		
17	203	EXCAVATION INCLUDING EMBANKMENT, AS PER PLAN	5,641	CY		
18	203	EMBANKMENT	35,688	CY		
19	203	EMBANKMENT, AS PER PLAN	18,850	CY		
20	203	GRANULAR EMBANKMENT, AS PER PLAN (NO. 8 AGGREGATE)	10	CY		
21	203	GRANULAR MATERIAL, TYPE C	20	CY		
22	203	BORROW	2,821	CY		
23	204	EXCAVATION	178	CY		
24	204	GEOTEXTILE FABRIC, 712.09 TYPE A	80	SY		
25	204	GEOTEXTILE FABRIC, 712.09 TYPE D	267	SY		
26	204	SUBGRADE COMPACTION	1,499	SY		
27	206*	LIME STABILIZED SUBGRADE, ~~12~~ ***14*** INCHES DEEP, AS PER PLAN	~~172,500~~ ***175,700***	SY		
28	206*	LIME	~~5,000~~ ***5,090***	TON		
29	206*	CEMENT STABILIZED SUBGRADE, 12 INCHES DEEP, AS PER PLAN	~~82,000~~ ***76,140***	SY		
30	206*	CEMENT	~~2,000~~ ***1,590***	TON		
31	206*	CURING COAT	~~15,300~~ ***15,110***	GAL		
32	206*	TEST ROLLING	130	HOUR		
33	209	DITCH CLEANOUT	14,546	FT		
34	SPECIAL	CHANNEL CLEANOUT	1,496	SY		
35	SPECIAL	CONCRETE CHANNEL CLEANOUT	200	FT		
36	SP304	GRANULAR MATERIAL	178	CY		

PROJECT NO. 39-15-02 BID FORM

Ref. No.	Item No.	Item Description	Approx. Quantity	Unit	Unit Cost	Extended Bid Amount
		39-15-02 PART A - ROADWAY Cont'd (Ref. Nos. 1 - 57)				
37	SP526	CLASS C CONCRETE, APPROACH SLAB, USING TYPE I CEMENT (T=12")	1220	SY		
38	SP536	CONCRETE WEATHERPROOFING, BARRIERS AND PARAPETS	937	SY		
39	606*	GUARDRAIL, TYPE MGS, USING LONG STEEL POSTS	26,225	FT		
40	606*	ANCHOR ASSEMBLY, MGS TYPE T, USING LONG STEEL POSTS	26	EACH		
41	606*	ANCHOR ASSEMBLY, MGS TYPE E, USING LONG STEEL POSTS, AS PER PLAN	28	EACH		
42	606*	MGS BRIDGE TERMINAL ASSEMBLY, TYPE 1, USING LONG STEEL POSTS	26	EACH		
43	606*	MGS BRIDGE TERMINAL ASSEMBLY, TYPE 2	9	EACH		
44	606*	GUARDRAIL, BARRIER DESIGN, TYPE MGS	75	FT		
45	606*	IMPACT ATTENUATOR, TYPE 1, (BIDIRECTIONAL), AS PER PLAN	2	FT		
46	606*	GUARDRAIL REBUILT	25	FT		
47	607	FENCE, TYPE 47, AS PER PLAN	500	FT		
48	609	ASPHALT CONCRETE CURB, TYPE 1, PG64-22	3,796	FT		
49	609	CURB, TYPE 4-C	244	FT		
50	622	CONCRETE BARRIER, SINGLE SLOPE, TYPE D, AS PER PLAN	438	FT		
51	622	CONCRETE BARRIER, TYPE B-50, AS PER PLAN	340	FT		
52	622	CONCRETE BARRIER, TYPE C-50, AS PER PLAN	80	FT		
53	622	PORTABLE CONCRETE BARRIER, 32", AS PER PLAN	152	FT		
54	SP626	BARRIER REFLECTOR, TYPE A	317	EACH		
55	SP626	BARRIER REFLECTOR, TYPE B	281	EACH		
56	861	GEOGRID FOR SUBGRADE STABILIZATION, AS PER PLAN, TENSAR TRIAX 160 GEOGRID	267	SY		
57	SPECIAL	LIMESTONE SAND	2,500	CY		
57A	***203***	***ROCK EXCAVATION FOR UNDERDRAIN INSTALLATION, AS PER PLAN***	***1,650***	***CY***		
				TOTAL - 39-15-02 PART A - ROADWAY		

PROJECT NO. 39-15-02 BID FORM

Ref. No.	Item No.	Item Description	Approx. Quantity	Unit	Unit Cost	Extended Bid Amount
		39-15-02 PART A - PAVEMENT (Ref. Nos. 111 - 133)				
111	251	PARTIAL DEPTH PAVEMENT REPAIR	300	SY		
112	252	FULL DEPTH PAVEMENT SAWING	~~1,500~~ ***15,000***	FT		
113	254	PAVEMENT PLANING, ASPHALT CONCRETE (3-1/4")	6,408	SY		
114	254	PAVEMENT PLANING, ASPHALT CONCRETE (9")	7,297	SY		
115	254	PAVEMENT PLANING, ASPHALT CONCRETE (VARIABLE DEPTH)	1,756	SY		
116	255	FULL DEPTH PAVEMENT REMOVAL AND RIGID REPLACEMENT, CLASS C	400	SY		
117	255	FULL DEPTH PAVEMENT SAWING	1,500	FT		
118	SP302	ASPHALT CONCRETE BASE, PG64-22 (SHOULDER)	18,219	CY		
119	SP302	ASPHALT CONCRETE BASE, PG64-22	51,388	CY		
120	SP304	AGGREGATE BASE (SHOULDER)	20,808	CY		
121	SP304	AGGREGATE BASE	28,217	CY		
122	SP402	ASPHALT CONC. BASE COURSE OR RECYCLED ASPHALT CONC. BASE COURSE, PG64-22	4,159	CY		
123	SP402	ASPHALT CONC. BASE COURSE OR RECYCLED ASPHALT CONC. BASE COURSE, PG70-22 (FR)	8,594	CY		
124	SP404	ASPHALT CONCRETE SURFACE COURSE, USING CRUSHED STONE, PG64-22	3,640	CY		
125	SP404	ASPHALT CONCRETE SURFACE COURSE, USING CRUSHED SLAG, PG70-22 (FR)	7,369	CY		
126	SP404A	JOINT SEALER	53,983	FT		
127	SP407	TACK COAT FOR INTERMEDIATE COURSE, AS PER PLAN	15,793	GAL		
128	SP407	TACK COAT, AS PER PLAN	32,107	GAL		
129	617	SHOULDER PREPARATION, AS PER PLAN	29,079	SY		
130	617	COMPACTED AGGREGATE	1,491	CY		
131	SP627	STONE SHOULDER PROTECTION	2,047	TON		
132	SPECIAL	SONIC NAP ALERT PATTERN (SNAP)	16.09	MILE		
133	SPECIAL	SAW CUT JOINT (9"±)	25,939	FT		
				TOTAL - 39-15-02 PART A - PAVEMENT		