INTEROFFICE COMMUNICATION

TO: Erika J. Kenzig, PE, PM, PID 122289
FROM: Kyle J. Dohlen, PE, D12, District Geotechnical Engineer
DATE: October 22, 2024
SUBJECT: Geotechnical Pavement Recommendations – PID 122289

Ms. Kenzig,

Executive Summary

This project will consist of the full depth pavement replacement of the existing concrete pavement the Ridge Road entrance ramps to IR 480 EB and IR 480 WB. The proposed pavement for the ramps will be unreinforced concrete. At the time of this report, it is our understanding that there will be no profile changes to the ramps.

Ramp R-2 (Ridge to 480 WB) Encountered Subsurface materials

Pavement comprised of reinforced concrete was encountered in three (3) borings ranging in thickness from 9.25 to 9.5 inches. Asphalt pavement was encountered in one (1) boring (B-9) and the pavement thickness was noted as 17.75 inches. Underlying the pavement, aggregate base was encountered in all the borings ranging from 5.0 to 12.0 inches. Cohesive soils noted as damp, very stiff Silt and Clay (A-6a) were encountered in one boring (B-10). Beneath the aggregate base and cohesive soils, bedrock was encountered in all four borings. The bedrock was described as red, highly to severely weathered, very weak, Shale. The shale was encountered between 1.3 and 2.5 feet below the top of pavement. Groundwater was not encountered in any of the borings.

Ramp R-3 (Ridge Road to 480 EB) Encountered Subsurface materials

Asphalt pavement was encountered in one boring, B-8 and the pavement thickness was noted as 9 inches. Below the asphalt pavement and in the remaining three (3) borings concrete pavement was encountered, the pavement varied in thickness from 8.0 to 9.5 inches. Aggregate base was encountered in all three borings and ranged in thickness from 6.0 to 18.0 inches. Below the pavement and aggregate base cohesive soils comprised of damp, stiff to very stiff Silt and Clay (A-6a) were encountered in two borings, B-7 and B-8. Bedrock was encountered in 2 borings, B-6 and B-7, the bedrock was described as moderately to highly weathered, red and gray Shale. In boring B-6, bedrock was encountered beneath the aggregate base at depth of 1.2’ below the top of pavement. In boring B-7, bedrock was encountered at depth of 2.8’ below the top of the pavement. Groundwater was not encountered in any of the borings.

The subgrade analysis spreadsheets for this project indicated that unstable soils comprised high moisture soils at Ramp R-3 were encountered from approximately Sta. 719+50 to Sta. 723+50. Unsuitable soils comprised of shallow Shale bedrock was encountered in Ramp R-2 from Sta. 710+00 to the Ridge Road intersection and in Ramp R-3 from the Ridge Road intersection to approximately Sta. 719+50. The shale bedrock will be required to be removed to a depth of 6 inches below the final subgrade elevation.

Introduction

This project will consist of the full depth pavement replacement of the existing concrete pavement along the Ridge Road entrance ramps to IR 480 EB and IR 480 WB. The proposed pavement for the ramps will be unreinforced concrete. At the time of this report, it is our understanding that there will be no profile changes to the ramps. The anticipated total length of work for the ramps is as follows: Ramp R-2 approximately 1000' and Ramp R-3 approximately 825'

Geology

This project site is located within the glaciated portion of the state and the Erie Lake Plain physiographic region. This region is characterized as very-low relief Ice Age lake basin separated from modern Lake Erie by shoreline cliffs with major streams in deep gorges. The geology for this region can be characterized by Pleistocene-age lacustrine sand, silt, clay and wave-planed till over Devonian and Mississippian-age shales and sandstones.

Reconnaissance

A field reconnaissance was performed on October 8th, 2024 by ODOT (Kyle Dohlen). The following observations were noted during the reconnaissance.

Ridge to 480 WB (Ramp (R-2)

Existing concrete pavement exhibited numerous open joints which have been filled with asphalt to improve rideability. Adjacent to the traffic island in the northern entrance lane pavement was showing mid-slab cracking near a catch basin. It appears that the cracking was inline with a conduit connecting two catch basins which indicates either material loss over the conduit or damage to the conduit. Overall pavement condition for the ramp is fair to poor with several slabs previously being repaired.

Ridge to 480 EB (Ramp R-3)

Paving overlay performed under a purchase order in calendar year 2024, approximately 1.5" of an asphalt overlay was placed. At the time of the reconnaissance cracks were telegraphing to the surface from the concrete pavement. The asphalt pavement was in good condition. Near the ramp tie in to IR-480 EB, the pavement condition changed to fair, numerous sealed cracks were evident and the outside shoulder pavement was beginning to ravel.

Explorations

Historic borings

Borings were performed in 1978 for the original construction of the IR-480 and Ridge Road intersection. A total of three (3) borings were performed along Ramp R-2 and a total of five (5) borings were performed along Ramp R-3.

Ramp R-2 was built in a cut section with all three borings terminating in weathered shale bedrock. At the proposed profile of the ramp, soils comprised of Gravel with Sand and Silt (A-2-4) and Silt and Clay (A-6a) and shale bedrock were encountered.

Ramp R-3 was built in a cut and fill section, the three (3) borings in the cut terminated in shale bedrock or auger refusal with no note about encountered material, the two (2) borings in the fill section terminated in shale bedrock. At the proposed profile of the ramp, soils comprised of Clay (A-7-6) and shale bedrock were encountered. The boring performed at STA 721+00 encountered auger refusal at a depth of approximately 8.5 feet below the existing ground surface but there is no note on the field log or soil profile sheet regarding the material encountered at this depth.

Project Borings

Explorations for this project were performed by the District geotechnical sub-surface exploration consultant, SME. The project borings at the Ridge Road entrance ramps under were performed under PID 119642. A total of sixteen (16) borings were performed for this exploration, with seven (7) borings being used for this report. Borings performed on Ramp R-3 (Ridge to 480 EB) are labelled as B-006-0-23 through B-008-0-23 and borings performed on Ramp R-2 (Ridge to 480 WB) are labeled B-009-0-23 through B-012-0-23. These borings will subsequently be referred to as B-6 through B-12. Explorations at these locations were performed between July 27th, 2023 and August 1st, 2023. The borings were performed using a CME 55 truck drill rig using an automatic hammer with an energy transfer ratio of 77% which was calibrated on 8/5/2022. Boring termination depths ranged from 6.03' to 9.0' below the existing pavement subgrade, if encountered.

Findings

Ramp R-2 (Ridge to 480 WB) Subsurface Conditions

Pavement comprised of reinforced concrete was encountered in three (3) borings ranging in thickness from 9.25 to 9.5 inches. Asphalt pavement was encountered in one (1) boring (B-9) and the pavement thickness was noted as 17.75 inches. Underlying the pavement, aggregate base was encountered in all the borings ranging from 5.0 to 12.0 inches. Cohesive soils noted as damp, very stiff Silt and Clay (A-6a) were encountered in one boring (B-10). Beneath the aggregate base and cohesive soils, bedrock was encountered in all four borings. The bedrock was described as red, highly to severely weathered, very weak, Shale. The shale was encountered between 1.3 and 2.5 feet below the top of pavement. Groundwater was not encountered in any of the borings.

Ramp R-3 (Ridge Road to 480 EB) Subsurface Conditions

Asphalt pavement was encountered in one boring, B-8 and the pavement thickness was noted at 9 inches. Below the asphalt pavement and in the remaining three (3) borings, concrete pavement was encountered, the concrete pavement varied in thickness from 8.0 to 9.5 inches. Aggregate base was encountered in all three borings and ranged in thickness from 6.0 to 18.0 inches. Below the pavement and aggregate base cohesive soils comprised of damp, stiff to very stiff Silt and Clay (A-6a) were encountered in two borings, B-7 and B-8. Bedrock was encountered in 2 borings, B-6 and B-7, the bedrock was described as moderately to highly weathered, red and gray Shale. In boring B-6, bedrock was encountered beneath the aggregate base at depth of 1.2' below the top of pavement. In boring B-7, bedrock was encountered at depth of 2.8' below the top of the pavement. Groundwater was not encountered in any of the borings.

Sulfate Testing

Sulfate testing was performed on borings B-6 through B-12. Sulfate test results ranged from 189 ppm to 822 ppm.

Encountered Pavement

A summary of the encountered pavements are identified in Table 1 - Encountered Pavement

Table 1 – Encountered Pavement

Boring Location	Asphalt, in.	Concrete, in.	Aggregate Base, in.
B-006-0-23	*	8	6
B-007-0-23	*	9.5	6
B-008-0-23	9	9	18
B-009-0-23	17.75	*	12
B-010-0-23	*	9.25	6
B-011-0-23	*	9.5	5
B-012-0-23	*	9.5	10

* Not encountered

Recommendations

Pavement Support Parameters

The ODOT subgrade analysis spreadsheet has provided the following CBR and Modulus of Subgrade reaction values for this project.

Table 2 – Pavement Support Parameters

Alignment	CBR, %	Mr, psi
R-2 - Ridge Road to 480 WB	12	14,400
R-3 - Ridge Road to 480 EB	9	10,800

Unsuitable Soils

Unsuitable soils are defined in the ODOT GDM as soils or bedrock of the following classifications: A-4b, A-2-5, A-5, A-7-5, A-8a, A-8b, soils with a Liquid Limit greater than 65 and shallow Rock, Shale or Coal. Only shallow bedrock was encountered during the explorations for this project. When shallow bedrock is encountered, Section 610.5 of the GDM states that 6 inches of the material is to be removed from below the final subgrade elevation.

Shallow bedrock was encountered at or near the subgrade elevation along both the R-2 and R-3 ramps at Ridge Road. Removal limits for the encountered bedrock are identified in Table 2 – Subgrade Remediation. Bedrock removal is noted in the Subgrade Analysis document for Ramp R-2 starting at boring B-9. The pavement encountered in the boring is approximately 17.75 inches thick with a 12 inch aggregate base. With the proposed replacement pavement, bedrock should not be encountered in any excavation for this boring.

Within the limits of the rock undercuts, quantities for Item 605 – Rock Cut Underdrains should be included in the plans.

Unstable Soils

Unstable soils were identified at the R-3 ramp and the subgrade soils were noted to have a high moisture content. These soils should be proof rolled to identify unstable subgrade soils. A contingency quantity of Item 203 Excavation and Item 203 Embankment should be included in the plans. Removal limits for the encountered unstable soils are identified in Table 2 – Subgrade Remediation.

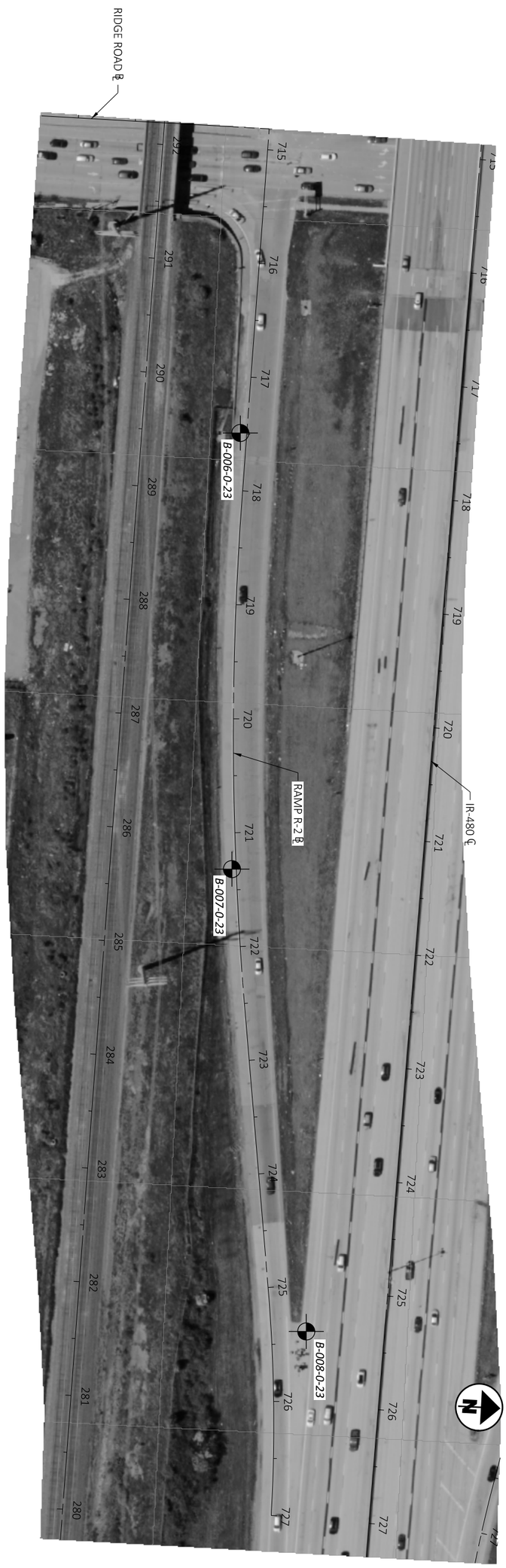
Table 3 – Subgrade Remediation

Alignment	Begin Station	End Station	Subgrade Recommendation	Cause
R-2	710+00	End of Ramp Work	6" Rock Undercut	Unsuitable
R-3	Beginning of Ramp Work	719+50	6" Rock Undercut	Unsuitable
R-3	719+50	723+50	Proof Roll	Unstable Soils

Appendix

CUY-480-13.04 RAMPS

MODEL: Boring Location Plans - Plan 2 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 9/19/2024 TIME: 8:57:13 USER: kdohlen
pw:\\ohiodot-pw.bentley.com:ohiodot-pw-02\Documents\01 Active Projects\District 12\Cuyahoga\119669\400-Engineering\Geotechnical\Sheets\Borling Location Maps.dgn



SHEET	TOTAL
P.1	2

PROJECT ID
122289

REVIEWER

DESIGNER
KJD

DESIGN AGENCY

Boring Location Map
R-2 - Ridge Road to IR-480 EB

HORIZONTAL SCALE IN FEET
0 50
25 100

CUY-480-13.04 RAMPS

MODEL: Boring Location Plans - Plan 1 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 9/19/2024 TIME: 8:59:11 USER: kdohlen
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SHEET	TOTAL
2	2

PROJECT ID: 122298

REVIEWER:

DESIGNER: KJD

DESIGN AGENCY

Boring Location Map
Ramp R-3 - Ridge Road to IR 480 WB

HORIZONTAL SCALE IN FEET

0 50
25 100

Boring Logs

PROJECT: CUY-90-19.77	DRILLING FIRM / OPERATOR: SME / EP/OA	DRILL RIG: CME 55 TRUCK 293	STATION / OFFSET: 717+50, 6' RT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: SME / CW	HAMMER: CME AUTOMATIC	ALIGNMENT: CL
PID: 119642 SFN:	DRILLING METHOD: 4" SSA	CALIBRATION DATE: 8/5/22	ELEVATION: 771.8 (MSL) EOB: 6.03 ft.
START: 7/27/23 END: 7/27/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77	LAT / LONG: 41.421398, -81.733428

EXPLORATION ID B-006-0-23

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 771.8	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
8" CONCRETE	771.1																		
6" AGGREGATE BASE	770.6	TR																	
SHALE, GRAY, HIGHLY TO MODERATELY WEATHERED, VERY WEAK TO WEAK.		1	13 28 40	87	67	SS-1	-	-	-	-	-	-	-	-	-	-	Rock (V)	189	
		2	50/2"	-	100	SS-2	-	-	-	-	-	-	-	-	-	-	Rock (V)	-	
		3																	
		4	50/5"	-	100	SS-3	-	-	-	-	-	-	-	-	-	-	Rock (V)	-	
		5																	
	765.8	EOB 6	50/4"	-	100	SS-4	-	-	-	-	-	-	-	-	-	-	Rock (V)	-	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: ASPHALT PATCH; BACKFILLED WITH AUGER CUTTINGS

PROJECT: CUY-90-19.77	DRILLING FIRM / OPERATOR: SME / EP/OA	DRILL RIG: CME 55 TRUCK 293	STATION / OFFSET: 721+32, 4' RT.	EXPLORATION ID B-007-0-23
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: SME / CW	HAMMER: CME AUTOMATIC	ALIGNMENT: CL	
PID: 119642 SFN:	DRILLING METHOD: 4" SSA	CALIBRATION DATE: 8/5/22	ELEVATION: 781.1 (MSL) EOB: 6.72 ft.	PAGE 1 OF 1
START: 7/27/23 END: 7/27/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77	LAT / LONG: 41.421435, -81.732044	

MATERIAL DESCRIPTION AND NOTES	ELEV. 781.1	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
9.5" CONCRETE	780.3																		
6" AGGREGATE BASE	779.8	1																	
VERY STIFF, RED AND GRAY, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL (SHALE FRAGMENTS), DAMP	778.3	2	2 3 9	15	100	SS-1	3.25	7	7	9	32	45	33	21	12	19	A-6a (9)	337	
SHALE, RED, SEVERELY TO HIGHLY WEATHERED, VERY WEAK.	775.3	TR 3 4 5	8 16 25	53	67	SS-2	-	-	-	-	-	-	-	-	-	-	Rock (V)	-	
			11 13 17	39	100	SS-3	-	-	-	-	-	-	-	-	-	-	Rock (V)	-	
SHALE, GRAY, HIGHLY TO MODERATELY WEATHERED, WEAK.	774.4	6 EOB	35 50/5"	-	109	SS-4	-	-	-	-	-	-	-	-	-	-	Rock (V)	-	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: ASPHALT PATCH; BACKFILLED WITH AUGER CUTTINGS

PROJECT: CUY-90-19.77	DRILLING FIRM / OPERATOR: SME / EP/OA	DRILL RIG: CME 55 TRUCK 293	STATION / OFFSET: 725+40, 31' LT.	EXPLORATION ID B-008-0-23
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: SME / CW	HAMMER: CME AUTOMATIC	ALIGNMENT: CL	
PID: 119642 SFN:	DRILLING METHOD: 4" SSA	CALIBRATION DATE: 8/5/22	ELEVATION: 790.6 (MSL) EOB: 9.0 ft.	PAGE 1 OF 1
START: 7/28/23 END: 7/28/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77	LAT / LONG: 41.421644, -81.730573	

MATERIAL DESCRIPTION AND NOTES	ELEV. 790.6	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
9" ASPHALT	789.8																		
9" CONCRETE	789.1																		
18" AGGREGATE BASE	787.6																		
VERY STIFF, RED, **SILT AND CLAY**, SOME SAND, TRACE GRAVEL, DAMP	784.6		3 3 8	14	67	SS-1	2.00	8	16	10	27	39	33	20	13	15	A-6a (7)	822	
			11 8 4	15	67	SS-2	2.50	-	-	-	-	-	-	-	-	17	A-6a (V)	-	
STIFF TO VERY STIFF, RED, **SILT AND CLAY**, SOME SAND, TRACE GRAVEL, DAMP	781.6	EOB	2 2 3	6	67	SS-3	1.75	6	12	10	30	42	36	21	15	15	A-6a (9)	-	
			2 2 5	9	33	SS-4	2.50	-	-	-	-	-	-	-	-	15	A-6a (V)	-	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: ASPHALT PATCH; BACKFILLED WITH AUGER CUTTINGS

PROJECT: CUY-90-19.77	DRILLING FIRM / OPERATOR: SME / EP/OA	DRILL RIG: CME 55 TRUCK 293	STATION / OFFSET: 704+09, 25' RT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: SME / CW	HAMMER: CME AUTOMATIC	ALIGNMENT: CL
PID: 119642 SFN:	DRILLING METHOD: 4" SSA	CALIBRATION DATE: 8/5/22	ELEVATION: 781.7 (MSL) EOB: 7.5 ft.
START: 8/1/23 END: 8/1/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77	LAT / LONG: 41.422346, -81.738248

EXPLORATION ID B-009-0-23

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 781.7	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
17.75" ASPHALT																			
	780.2																		
12" AGGREGATE BASE																			
	779.2	TR																	
SHALE, GRAY, HIGHLY TO MODERATELY WEATHERED, WEAK.		3	30 50/6"	-	100	SS-1	-	-	-	-	-	-	-	-	-	-	Rock (V)	286	
		4																	
		5	18 50/6"	-	100	SS-2	-	-	-	-	-	-	-	-	-	-	Rock (V)	-	
		6																	
		7	23 50/6"	-	100	SS-3	-	-	-	-	-	-	-	-	-	-	Rock (V)	-	
	774.2	EOB	50/6"	-	100	SS-4	-	-	-	-	-	-	-	-	-	-	Rock (V)	-	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: ASPHALT PATCH; BACKFILLED WITH AUGER CUTTINGS

PROJECT: CUY-90-19.77	DRILLING FIRM / OPERATOR: SME / EP/OA	DRILL RIG: CME 55 TRUCK 293	STATION / OFFSET: 707+80, 20' RT.	EXPLORATION ID B-010-0-23
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: SME / CW	HAMMER: CME AUTOMATIC	ALIGNMENT: CL	
PID: 119642 SFN:	DRILLING METHOD: 4" SSA	CALIBRATION DATE: 8/5/22	ELEVATION: 778.8 (MSL) EOB: 6.22 ft.	PAGE 1 OF 1
START: 7/31/23 END: 7/31/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77	LAT / LONG: 41.422412, -81.736892	

MATERIAL DESCRIPTION AND NOTES	ELEV. 778.8	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
9.25" CONCRETE	778.0																		
6" AGGREGATE BASE	777.5	1																	
VERY STIFF, RED, **SILT AND CLAY**, TRACE SAND, TRACE GRAVEL, DAMP	776.0	2	4 10 15	32	67	SS-1	3.50	3	3	5	36	53	36	21	15	15	A-6a (10)	600	
SHALE, RED, SEVERELY WEATHERED, VERY WEAK.	773.3	TR 3 4	10 16 21	47	100	SS-2	-	-	-	-	-	-	-	-	-	-	Rock (V)	-	
		5	14 27 50/3"	-	80	SS-3	-	-	-	-	-	-	-	-	-	-	Rock (V)	-	
SHALE, GRAY, HIGHLY WEATHERED, WEAK.	772.6	EOB 6	50/5"	-	100	SS-4	-	-	-	-	-	-	-	-	-	-	Rock (V)	-	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: ASPHALT PATCH; BACKFILLED WITH AUGER CUTTINGS

PROJECT: CUY-90-19.77	DRILLING FIRM / OPERATOR: SME / EP/OA	DRILL RIG: CME 55 TRUCK 293	STATION / OFFSET: 711+90, 20' RT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: SME / CW	HAMMER: CME AUTOMATIC	ALIGNMENT: CL
PID: 119642 SFN:	DRILLING METHOD: 4" SSA	CALIBRATION DATE: 8/5/22	ELEVATION: 775.9 (MSL) EOB: 6.2 ft.
START: 7/31/23 END: 7/31/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77	LAT / LONG: 41.422505, -81.735394

EXPLORATION ID B-011-0-23

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
9.5" CONCRETE	775.9																		
	775.1																		
5" AGGREGATE BASE	774.6	TR																	
SHALE, RED, SEVERELY WEATHERED, VERY WEAK.	773.9	1	12 15 13	36	100	SS-1A	-	-	-	-	-	-	-	-	-	-	Rock (V)	212	
						SS-1B	-	-	-	-	-	-	-	-	-	-	Rock (V)	-	
SHALE, GRAY, HIGHLY WEATHERED, VERY WEAK TO WEAK.		2																	
		3	14 25 35	77	100	SS-2	-	-	-	-	-	-	-	-	-	-	Rock (V)	-	
		4	50/6"	-	100	SS-3	-	-	-	-	-	-	-	-	-	-	Rock (V)	-	
		5																	
	769.7	EOB 6	50/6"	-	100	SS-4	-	-	-	-	-	-	-	-	-	-	Rock (V)	-	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: ASPHALT PATCH; BACKFILLED WITH AUGER CUTTINGS

PROJECT: CUY-90-19.77	DRILLING FIRM / OPERATOR: SME / EP/OA	DRILL RIG: CME 55 TRUCK 293	STATION / OFFSET: 713+78, 6' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: SME / CW	HAMMER: CME AUTOMATIC	ALIGNMENT: CL
PID: 119642 SFN:	DRILLING METHOD: 4" SSA	CALIBRATION DATE: 8/5/22	ELEVATION: 775.5 (MSL) EOB: 6.85 ft.
START: 8/1/23 END: 8/1/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 77	LAT / LONG: 41.422622, -81.734740

EXPLORATION ID B-012-0-23

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 775.5	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	BACK FILL
9.5" CONCRETE	774.7																		
10" AGGREGATE BASE	773.9																		
SHALE, RED, HIGHLY WEATHERED, VERY WEAK.	772.4	TR	8 15 18	42	78	SS-1	-	-	-	-	-	-	-	-	-	-	Rock (V)	595	
SHALE, GRAY, HIGHLY WEATHERED, VERY WEAK TO WEAK.			16 25 40	83	100	SS-2	-	-	-	-	-	-	-	-	-	-	Rock (V)	-	
			20 36 50/3"	-	100	SS-3	-	-	-	-	-	-	-	-	-	-	Rock (V)	-	
	768.7	EOB	18 50/3"	-	100	SS-4	-	-	-	-	-	-	-	-	-	-	Rock (V)	-	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: ASPHALT PATCH; BACKFILLED WITH AUGER CUTTINGS

Subgrade Analysis Reports

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Design Manual Section 600

Instructions: Enter data in the shaded cells only.
(Enter state route number, project description,county, consultant's name, prepared by name, and date prepared. This information will be transferred to all other sheets. The date prepared must be entered in the appropriate cell on this sheet to remove these instructions prior to printing.)

CUY-480-7.28/VAR Ramps
122289

Full Depth Replacement of the Ridge to CUY-480 WB Ramp

ODOT - District 12

Prepared By: Kyle J. Dohlen, PE
Date prepared: Wednesday, May 1, 2024

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NO. OF BORINGS: 4

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.7 4/4/2024

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-009-0-23	BL Ramp R-2	704+09	25	Rt.	CME 55 293	77	781.7	780.3	1.4 C
2	B-010-0-23	BL Ramp R-2	707+80	20	Rt.	CME 55 293	77	778.8	777.4	1.4 C
3	B-011-0-23	BL Ramp R-2	711+90	20	Rt.	CME 55 293	77	775.9	774.5	1.4 C
4	B-012-0-23	BL Ramp R-2	713+78	6	Lt.	CME 55 293	77	775.5	774.1	1.4 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.7 4/4/2024

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B	SS-1	2.5	3.5	1.1	2.1	80										0	Rock	0	286	Rock		6''		
	009-0	SS-2	4.0	5.0	2.6	3.6	68										0	Rock	0						
	23	SS-3	5.5	6.5	4.1	5.1	73										0	Rock	0						
		SS-4	7.0	7.5	5.6	6.1	100										0	Rock							
2	B	SS-1	1.3	2.8	-0.1	1.4	32		3.5	36	21	15	36	53	89	15	16	A-6a	10	600					
	010-0	SS-2	2.8	4.3	1.4	2.9	47										0	Rock	0						
	23	SS-3	4.3	5.6	2.9	4.2	100										0	Rock	0						
		SS-4	5.8	6.2	4.4	4.8	60	30									0	Rock	0						
3	B	SS-1	1.3	2.8	-0.1	1.4	36										0	Rock	0	212	Rock		6''		6" Rock Excavation
	011-0	SS-2	2.8	4.3	1.4	2.9	77										0	Rock	0						
	23	SS-3	4.3	4.8	2.9	3.4	100										0	Rock	0						
		SS-4	5.8	6.3	4.4	4.9	100										0	Rock	0						
4	B	SS-1	1.6	3.1	0.2	1.7	42										0	Rock	0	595	Rock		6''		
	012-0	SS-2	3.1	4.6	1.7	3.2	83										0	Rock	0						
	23	SS-3	4.6	5.9	3.2	4.5	100										0	Rock	0						
		SS-4	6.1	6.9	4.7	5.5	100										0	Rock	0						

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.7 4/4/2024

PID: 122289

County-Route-Section: CUY-480-7.28/VAR Ramps
No. of Borings: 4

Geotechnical Consultant: ODOT - District 12
Prepared By: Kyle J. Dohlen, PE
Date prepared: 5/1/2024

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

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

Design CBR	12

% Samples within 3 feet of subgrade			
$N_{60} \leq 5$	0%	HP ≤ 0.5	0%
$N_{60} < 12$	0%	0.5 < HP ≤ 1	0%
$12 \leq N_{60} < 15$	0%	1 < HP ≤ 2	0%
$N_{60} \geq 20$	63%	HP > 2	6%
M+	0%		
Rock	88%		
Unsuitable Soil	0%		

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

% Proposed Subgrade Surface	
Unstable & Unsuitable	38%
Unstable	0%
Unsuitable (Soil & Rock)	38%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	75	30	3.50	36	21	15	36	53	89	15	1	1
Maximum	100	30	3.50	36	21	15	36	53	89	15	16	10
Minimum	32	30	3.50	36	21	15	36	53	89	15	0	0

Classification Counts by Sample

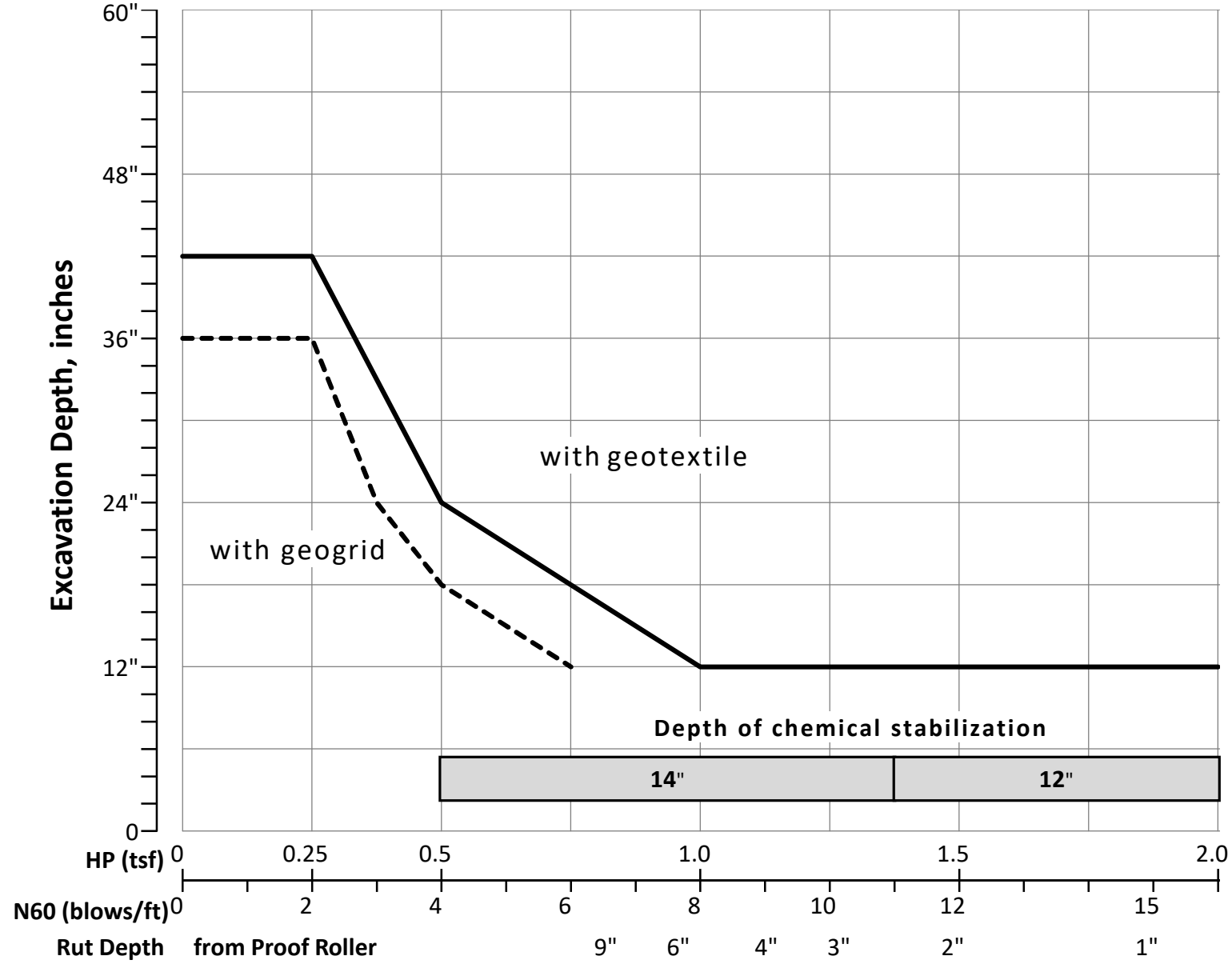
ODOT Class	UCF	Rock	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-3	A-3a	A-4a	A-4b	A-5	A-6a	A-6b	A-7-5	A-7-6	A-8a	A-8b	Totals
Count	0	15	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	16
Percent	0%	94%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%	0%	0%	0%	0%	0%	100%
% Rock|Granular|Cohesive	0%	94%	0%					0%				6%								100%
Surface Class Count	0	7	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	8
Surface Class Percent	0%	88%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	13%	0%	0%	0%	0%	0%	100%

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.7 4/4/2024

Fig. 600-1 – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
3.50	0.50	☐ HP
30.00	6.00	☐ N60L

Average HP

Average N_{60L}

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Design Manual Section 600

Instructions: Enter data in the shaded cells only.
(Enter state route number, project description,county, consultant's name, prepared by name, and date prepared. This information will be transferred to all other sheets. The date prepared must be entered in the appropriate cell on this sheet to remove these instructions prior to printing.)

CUY-480-7.28/VAR Ramps
122289

Full Depth Replacement of Ridge to CUY-480 EB Ramp

ODOT - District 12

Prepared By: Kyle J. Dohlen, PE
Date prepared: Thursday, May 2, 2024

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NO. OF BORINGS: 3

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.7 4/4/2024

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-006-0-23	BL Ramp R-3	717+50	6	Rt.	CME 55 Truck 293	77	771.8	770.4	1.4 C
2	B-007-0-23	BL Ramp R-3	721+32	4	Rt.	CME 55 Truck 293	77	781.1	779.7	1.4 C
3	B-008-0-23	BL Ramp R-3	725+40	31	Lt.	CME 55 Truck 293	77	790.6	789.2	1.4 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.7 4/4/2024

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B	SS-1	1.2	2.7	-0.2	1.3	87										0	Rock	0		Rock		6"		
	006-0	SS-2	2.7	2.9	1.3	1.5	100										0	Rock	0						
	23	SS-3	4.2	4.6	2.8	3.2	100										0	Rock	0						
		SS-4	5.7	6.0	4.3	4.6	100										0	Rock	0						
2	B	SS-1	1.3	2.8	-0.1	1.4	15		3.25	33	21	12	32	45	77	19	16	A-6a	9	337		Mc			
	007-0	SS-2	2.8	4.3	1.4	2.9	53										0	Rock	0						
	23	SS-3	4.3	5.8	2.9	4.4	39										0	Rock	0						
		SS-4	5.8	6.7	4.4	5.3	100	15									0	Rock	0						
3	B	SS-1	3.0	4.5	1.6	3.1	14		2	33	20	13	27	39	66	15	15	A-6a	7	822					
	008-0	SS-2	4.5	6.0	3.1	4.6	15		2.5							17	14	A-6a	10						
	23	SS-3	6.0	7.5	4.6	6.1	6		1.75	36	21	15	30	42	72	15	16	A-6a	9						
		SS-4	7.5	9.0	6.1	7.6	9	6	2.5							15	14	A-6a							

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.7 4/4/2024

PID: 122289

County-Route-Section: CUY-480-7.28/VAR Ramps
No. of Borings: 3

Geotechnical Consultant: ODOT - District 12
Prepared By: Kyle J. Dohlen, PE
Date prepared: 5/2/2024

Chemical Stabilization Options		
320	Rubblize & Roll	No
206	Cement Stabilization	Option
	Lime Stabilization	No
206	Depth	14"

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

Design CBR	9

% Samples within 3 feet of subgrade			
$N_{60} \leq 5$	0%	HP ≤ 0.5	0%
$N_{60} < 12$	0%	0.5 < HP ≤ 1	0%
$12 \leq N_{60} < 15$	8%	1 < HP ≤ 2	8%
$N_{60} \geq 20$	42%	HP > 2	17%
M+	8%		
Rock	67%		
Unsuitable Soil	0%		

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

% Proposed Subgrade Surface	
Unstable & Unsuitable	33%
Unstable	17%
Unsuitable (Soil & Rock)	17%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	53	11	2.40	34	21	13	30	42	72	16	6	3
Maximum	100	15	3.25	36	21	15	32	45	77	19	16	10
Minimum	6	6	1.75	33	20	12	27	39	66	15	0	0

Classification Counts by Sample

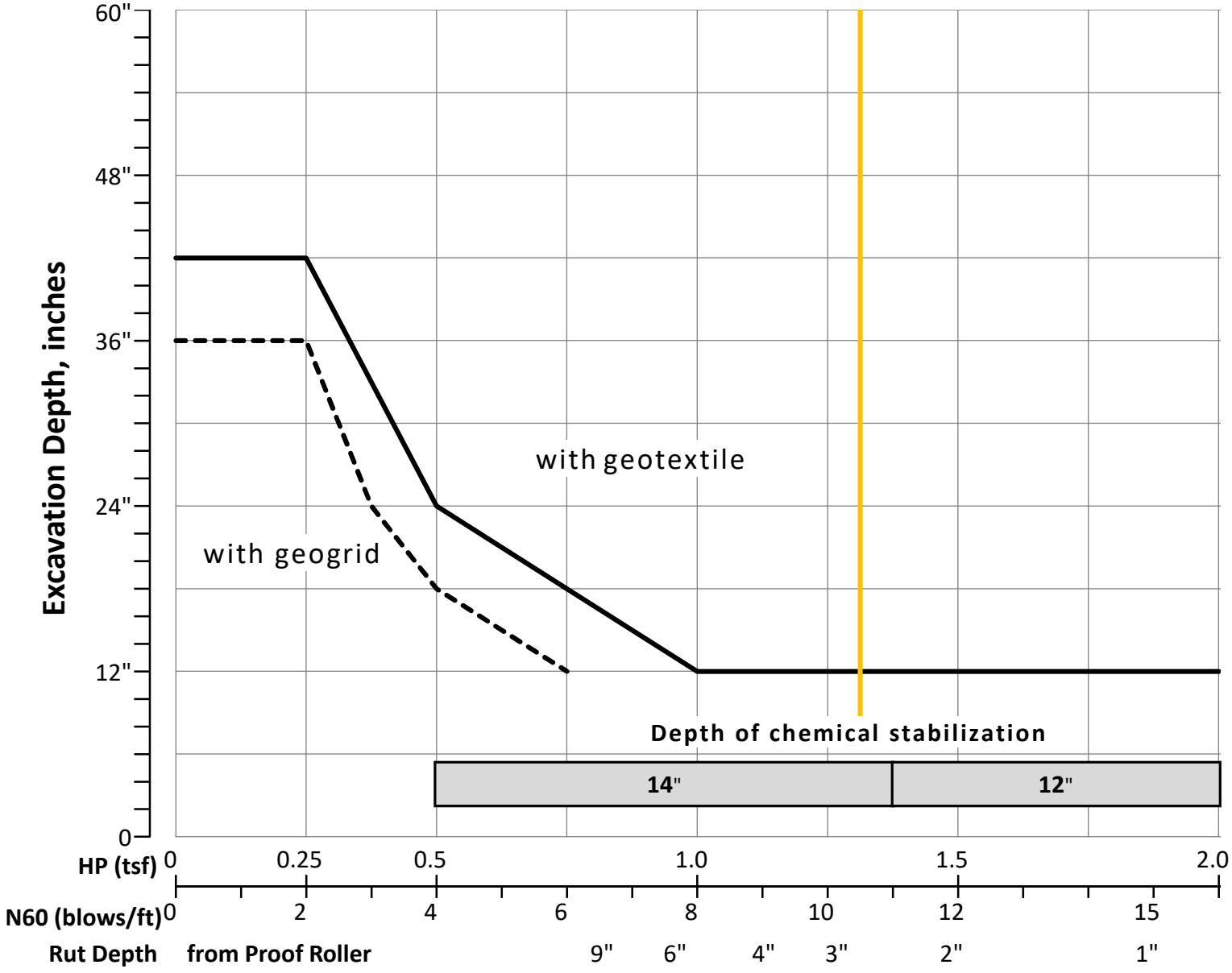
ODOT Class	UCF	Rock	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-3	A-3a	A-4a	A-4b	A-5	A-6a	A-6b	A-7-5	A-7-6	A-8a	A-8b	Totals
Count	0	7	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	12
Percent	0%	58%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	42%	0%	0%	0%	0%	0%	100%
% Rock|Granular|Cohesive	0%	58%	0%					0%				42%								100%
Surface Class Count	0	4	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	6
Surface Class Percent	0%	67%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%	0%	0%	0%	0%	100%

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.7 4/4/2024

Fig. 600-1 – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
2.40	0.50	☐ HP
10.50	6.00	☐ N60L

Average HP

Average N_{60L}