DESIGN MEMO

TO: David Charville, P.E., Tetra Tech, Inc.
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Toledo, Ohio 43604

COPY: Christopher Brown, P.E., ODOT District 2, Nicholas Foster, P.E., ODOT District 3 DGE

FROM: Dorothy A. Adams, P.E., ODOT Office of Geotechnical Engineering

DATE: February 20, 2018

SUBJECT: MED-57-01.37 PID 94438 Preliminary Subsurface Exploration Recommendations
Bridge MED-57-0137 over Blockers Run

EXISTING STRUCTURE

TYPE:	Continuous Reinforced Concrete Slab with Capped Pile Piers; Concrete Stub Type Abutments supported on Cast-In Place Piles.
YEAR BUILT:	1966

PROPOSED WORK

TYPE:	Replace existing bridge with a single-span bridge
TOP OF ROCK ELEVATION:	925.4 to 935.8
RECOMMENDED FOUNDATION TYPE:	Driven H-Piles

EXPLORATION SUMMARY

Between the dates of August 8, 2017 and August 9, 2017, six borings, identified as B-001-0-17 through B-006-0-17, were drilled for the project. Borings B-003-0-17 and B-004-0-17 were drilled near the locations of the proposed rear abutment and forward abutment, respectively. The remaining four borings were drilled beyond the bridge for shoulder widening and subgrade design purposes. A boring location plan and the boring logs are attached. Note that the logs for historic borings B-001-0-64 and B-008-0-64 are also attached and were used in developing the foundation recommendations.

The borings encountered between 10 and 17 inches of asphalt pavement at the road surface. Offset borings drilled through the shoulder pavement encountered 7 and 9 inches of asphalt pavement. Beneath the pavement, the borings encountered primarily loose to dense granular soils (A-1-b, A-2-4, A-3, and A-3a) to the completion depths of the subgrade borings or to depths of 13.0 to 17.0 feet in the borings drilled for the bridge (B-003-0-17 and B-004-0-17). A loose Silt (A-4a) was encountered in Boring B-004-0-17 between depths of 8.5 and 11.0 feet. Below the granular layers in Borings B-003-0-17 and B-004-0-17, the cohesive soils consisted primarily of medium stiff to hard Sandy Silt (A-4a), Silt and Clay (A-6a), and Silty Clay (A-6b) to the top of bedrock. Layers of very stiff to hard or medium dense Silt (A-4b) were also encountered in Borings B-003-0-17 and B-004-0-17 below a depth of 17.0 feet. Slightly to moderately organic soil was encountered in Borings B-003-0-17 and B-004-0-17 between depths of 8.5 and 14.0 feet. Boulders were encountered in Boring B-003-0-17 at a depth of 23.5 feet (elevation 961.9).

Borings B-003-0-17, B-004-0-17, and B-008-0-64 encountered bedrock at depths of 50.6 feet (elevation 934.8), 49.5 feet (elevation 935.2), and 40.0 feet (elevation 935.3), respectively. The bedrock was encountered slightly deeper in historic boring B-001-0-64 at a depth of 40.0 feet (elevation 925.4). The bedrock was confirmed in only the historic borings by coring 10 to 14 feet of rock, which consisted of broken shale.

DRIVEN H-PILE FOUNDATIONS

Due to the top of bedrock being relatively close to the ground surface, it is recommended that H-piles driven to bear on top of bedrock be used to support the bridge. Steel points should not be used, in accordance with the ODOT Bridge Design Manual, Section 202.2.3.2.a, due to the shale bedrock. Estimated pile lengths are presented in the table below. These pile lengths apply to all commonly used H-pile sizes. The estimated pile cap elevation was provided by Tetra Tech.

Substructure Unit	Boring ID	Estimated Pile Cap Elev.	Estimated Tip Elev./ Top of Rock	Estimated Length[1]	Order Length
Rear Abutment	B-003-0-17 B-001-0-64	974.0	925.4	55 feet	60 feet
Forward Abutment	B-004-0-17 B-008-0-64	974.0	935.2	45 feet	50 feet

[1] The estimated pile length includes a two-foot embedment into the pile cap.

SCOUR ANALYSIS DATA

Continuous sampling was performed in both borings from the approximate elevation of the channel bottom to a depth 6 feet below the channel bottom in order to obtain soil samples to test for scour analysis. The sample depths and the D50 sizes of each sample as presented in the table below.

Boring Number	Sample Number	Depth	ODOT Classification	D50 (mm)
B-003-0-17	SS-6	11.0’ – 12.5’	A-2-4	0.312
B-003-0-17	SS-7	12.5’ – 14.0;	A-2-4	0.284
B-003-0-17	SS-8	14.0’ - 15.5’	A-4a	0.054
B-003-0-17	SS-9	15.5’ – 17.0’	A-1-b	0.493
B-003-0-17	SS-11	18.5’ – 20.0’	A-4b	0.035
B-004-0-17	SS-6	11.0’ – 12.5’	A-2-4	0.396
B-004-0-17	SS-7A	12.5’ – 13.0’	A-2-4	0.373
B-004-0-17	SS-7B	13.0’ - 14.0’	A-6a	0.004
B-004-0-17	SS-8	14.0’ - 15.5’	A-6a	Est. 0.0017
B-004-0-17	SS-9	15.5’ – 17.0’	A-6b	Est. 0.0001

SUBGRADE RECOMMENDATIONS

Based on preliminary plans, it appears there will be essentially no change to the existing grade so subgrade recommendations were prepared assuming there would be no cut or fill along the SR-57 alignment. It is anticipated

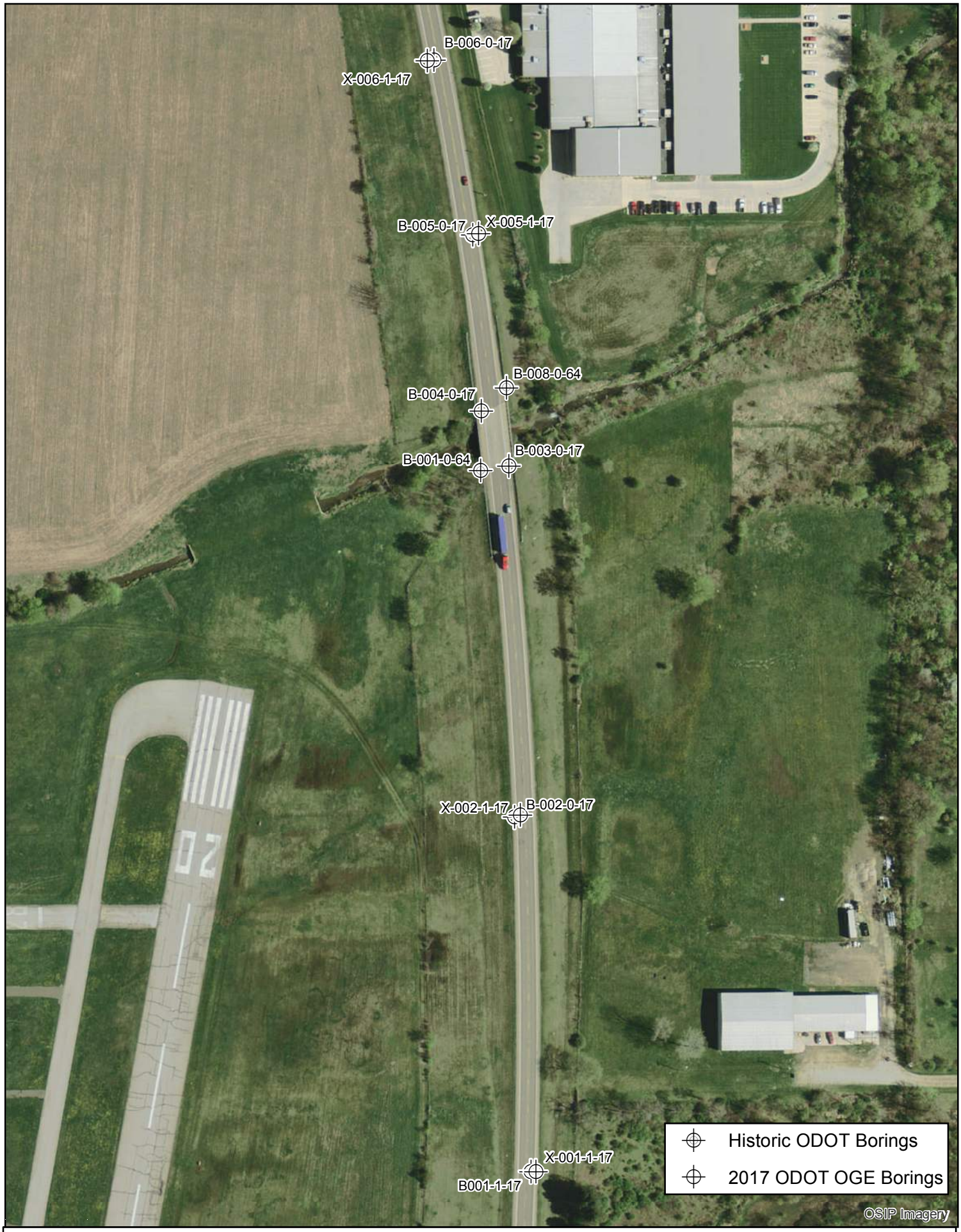
that full-depth replacement will be performed within approximately 100 feet of the bridge. Preliminary plans also indicate that between approximately 580 feet and 1520 feet of shoulder pavement along both sides of the travel lanes will be widened for MOT purposes.

The GB-1 analysis indicated that no global subgrade treatment will be necessary. However, it is estimated that approximately 15 percent of the subgrade may require spot-by-spot undercutting and replacement due to instability. Unstable subgrade should be identified and repaired in accordance with Item 204 Subgrade Compaction and Proof Rolling. It is recommended that Item 204 Type B Granular, 12" deep, with Item 204 Type D fabric at 15 percent coverage be included in the quantities. A CBR of 13 may be used in design of the pavement.

CLOSING REMARKS

If you have any questions regarding these recommendations, or if any changes are made to the design assumptions, please contact me at (614) 275-1356 or Alex Dettloff at (614) 275-1308.

Attachments: Boring Location Plan
Boring Logs
GB1 Spreadsheet
Pavement Core Report



MED-57-1.37
Exploration Plan

0 55 110 220
Feet

PROJECT: MED-57-01.37	DRILLING FIRM / OPERATOR: ODOT / CAREY	DRILL RIG: CME 55 TRUCK	STATION / OFFSET: 62+25, 7' RT.	EXPLORATION ID B-001-0-17
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: ODOT / MCLEISH	HAMMER: CME AUTOMATIC	ALIGNMENT: CENTERLINE OF SR57	
PID: 94438 SFN: 5201802	DRILLING METHOD: 3.25" HSA / NQ2	CALIBRATION DATE: 6/1/17	ELEVATION: 983.6 (MSL) EOB: 10.0 ft.	PAGE 1 OF 1
START: 8/9/17 END: 8/9/17	SAMPLING METHOD: SPT / NQ2	ENERGY RATIO (%): 77	LAT / LONG: 41.004475, -81.752442	

MATERIAL DESCRIPTION AND NOTES	ELEV. 983.6	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
ASPHALT (17")	982.2	1																
DENSE, DARK YELLOWISH BROWN, **FINE SAND**, SOME GRAVEL, TRACE SILT, TRACE CLAY, (FILL), DAMP	980.6	2	11 17 12	37	100	SS-1A	-	28	10	53	6	3	NP	NP	NP	3	A-3 (0)	
LOOSE, BROWN AND GRAY, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, TRACE CLAY, (FILL), DAMP	979.1	3 4	5 2 5	9	100	SS-2A	-	24	17	31	19	9	NP	NP	NP	12	A-2-4 (0)	
LOOSE TO MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, LITTLE SILT, TRACE STONE FRAGMENTS, TRACE CLAY, WITH ASPHALT FRAGMENTS (FILL), DAMP		5 6	2 4 3	9	100	SS-3A	-	-	-	-	-	-	-	-	-	9	A-3a (V)	
		7	3 4 5	12	100	SS-4A	-	7	9	61	17	6	NP	NP	NP	11	A-3a (0)	
@8.5'; VERY LOOSE, DARK BROWN, SOME SILT, MOIST	973.6	8 9 EOB 10	1 1 1	3	78	SS-5A	-	10	16	45	21	8	NP	NP	NP	17	A-3a (0)	

NOTES: HOLE DRY UPON COMPLETION. LAT/LONG/ELEV FROM CONSULTANT SURVEY GRADE INSTRUMENTS.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: AUGER CUTTINGS MIXED WITH 10 LB. BENTONITE CHIPS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 2/20/18 10:37 - X:\GINT\PROJECTS\2017 COMPLETE\600398.GPJ

PROJECT: MED-57-01.37	DRILLING FIRM / OPERATOR: ODOT / CAREY	DRILL RIG: CME 55 TRUCK	STATION / OFFSET: 67+24, 5' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: ODOT / MCLEISH	HAMMER: CME AUTOMATIC	ALIGNMENT: CENTERLINE OF SR57
PID: 94438 SFN: 5201802	DRILLING METHOD: 3.25" HSA / NQ2	CALIBRATION DATE: 6/1/17	ELEVATION: 984.6 (MSL) EOB: 10.0 ft.
START: 8/8/17 END: 8/8/17	SAMPLING METHOD: SPT / NQ2	ENERGY RATIO (%): 77	LAT / LONG: 41.005845, -81.752479

EXPLORATION ID B-002-0-17

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
	984.6																	
ASPHALT (12")	983.6																	
DENSE TO VERY DENSE, DARK YELLOWISH BROWN WITH BLACK, **COARSE AND FINE SAND**, "AND" STONE FRAGMENTS, TRACE SILT, TRACE CLAY, DAMP		1																
		2	27 32 25	73	67	SS-1A	-	36	10	43	7	4	NP	NP	NP	3	A-3a (0)	
@3.0'; TRACE GRAVEL AND STONE FRAGMENTS		3																
		4	11 22 22	56	78	SS-2A	-	8	10	71	6	5	NP	NP	NP	8	A-3a (0)	
	978.6	5	8 12 8	26	100	SS-3A	-	-	-	-	-	-	-	-	-	12	A-3a (V)	
STIFF TO VERY STIFF, GRAYISH BROWN, **SANDY SILT**, SOME CLAY, TRACE GRAVEL AND STONE FRAGMENTS, DAMP		6	3 3 5	10	100	SS-4A	1.50	3	5	19	43	30	26	16	10	15	A-4a (8)	
		7																
	975.3	8																
		9	5 12 11	30	100	SS-5A	2.50	-	-	-	-	-	-	-	-	14	A-4a (V)	
						SS-5B	-	8	7	61	14	10	NP	NP	NP	9	A-3a (0)	
MEDIUM DENSE, DARK YELLOWISH BROWN, **COARSE AND FINE SAND**, LITTLE SILT, LITTLE CLAY, TRACE GRAVEL AND STONE FRAGMENTS, DAMP	974.6	EOB 10																

NOTES: HOLE DRY UPON COMPLETION. LAT/LONG/ELEV FROM CONSULTANT SURVEY GRADE INSTRUMENTS.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: AUGER CUTTINGS MIXED WITH 15 LB. BENTONITE CHIPS

PROJECT: MED-57-01.37	DRILLING FIRM / OPERATOR: ODOT / CAREY	DRILL RIG: CME 55 TRUCK	STATION / OFFSET: 72+12, 15' RT.
TYPE: BRIDGE	SAMPLING FIRM / LOGGER: ODOT / MCLEISH	HAMMER: CME AUTOMATIC	ALIGNMENT: CENTERLINE OF SR57
PID: 94438 SFN: 5201802	DRILLING METHOD: 3.25" HSA / NQ2	CALIBRATION DATE: 6/1/17	ELEVATION: 985.4 (MSL) EOB: 50.7 ft.
START: 8/9/17 END: 8/9/17	SAMPLING METHOD: SPT / NQ2	ENERGY RATIO (%): 77	LAT / LONG: 41.007185, -81.752522

EXPLORATION ID B-003-0-17

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
ASPHALT (11.5")	985.4																	
	984.4																	
MEDIUM DENSE, DARK BROWN AND REDDISH BROWN, **COARSE AND FINE SAND**, LITTLE GRAVEL, LITTLE SILT, LITTLE SILT, TRACE CLAY, (FILL), DAMP			9 6 7	17	72	SS-1A	-	15	8	57	12	8	NP	NP	NP	11	A-3a (0)	
	982.4																	
MEDIUM DENSE TO DENSE, REDDISH BROWN, **FINE SAND**, SOME GRAVEL AND STONE FRAGMENTS, TRACE SILT, TRACE CLAY, (FILL), DAMP			6 6 11	22	72	SS-2A	-	28	9	53	5	5	NP	NP	NP	8	A-3 (0)	
			7 12 14	33	78	SS-3A	-	-	-	-	-	-	-	-	-	11	A-3 (V)	
			9 11 14	32	94	SS-4A	-	-	-	-	-	-	-	-	-	8	A-3 (V)	
	976.9																	
MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, LITTLE SILT, LITTLE CLAY, LITTLE GRAVEL, MOIST	976.2		4 6 7	17	89	SS-5A	-	14	5	49	16	16	NP	NP	NP	17	A-3a (0)	
						SS-5B	-	28	12	32	18	10	NP	NP	NP	18	A-2-4 (0)	
LOOSE TO MEDIUM DENSE, DARK GRAY, **STONE FRAGMENTS WITH SAND AND SILT**, LITTLE CLAY, MODERATELY ORGANIC (LOI = 4.2%), DAMP																		
@11.0'; SLIGHTLY ORGANIC (LOI = 2.2%)			2 4 2	8	72	SS-6A	-	30	15	31	14	10	NP	NP	NP	16	A-2-4 (0)	
@12.5'; SLIGHTLY ORGANIC (LOI = 2.3%)			4 6 3	12	78	SS-7A	-	31	13	27	18	11	NP	NP	NP	29	A-2-4 (0)	
	971.4																	
STIFF, GRAY, **SANDY SILT**, SOME CLAY, TRACE STONE FRAGMENTS, SLIGHTLY ORGANIC (LOI = 2.7%), MOIST			0 4 12	21	56	SS-8A	1.00	10	4	32	33	21	23	14	9	18	A-4a (4)	
	969.9																	
MEDIUM DENSE, GRAY, **GRAVEL AND STONE FRAGMENTS WITH SAND**, LITTLE SILT, TRACE CLAY, WET			5 5 7	15	67	SS-9A	-	29	24	32	10	5	NP	NP	NP	17	A-1-b (0)	
	968.4																	
MEDIUM DENSE, GRAY, **SILT**, SOME SAND, LITTLE CLAY, TRACE GRAVEL, MOIST			5 5 5	13	61	SS-10A	-	-	-	-	-	-	-	-	-	22	A-4b (V)	
		▼ 966.4	4 9 8	22	61	SS-11A	-	8	3	22	55	12	NP	NP	NP	21	A-4b (6)	
	964.4																	
SOFT, GRAY, **SANDY SILT**, SOME CLAY, SOME GRAVEL, WET			4 5 6	14	33	SS-12A	0.25	-	-	-	-	-	-	-	-	25	A-4a (V)	
@23.5'; MEDIUM STIFF, ENCOUNTERED A BOULDER/COBBLE WHILE SAMPLING			5 8 15	30	56	SS-13A	0.50	22	9	12	31	26	24	17	7	20	A-4a (4)	
	959.4																	
MEDIUM DENSE, GRAY, **SANDY SILT**, LITTLE CLAY, TRACE GRAVEL, WITH THIN CLAY SEAMS, MOIST			4 8 14	28	78	SS-14A	-	9	13	34	29	15	NP	NP	NP	17	A-4a (2)	
			7 6 7	17	67	SS-15A	-	-	-	-	-	-	-	-	-	16	A-4a (V)	

PID: 94438	SFN: 5201802	PROJECT: MED-57-01.37	STATION / OFFSET: 72+12, 15' RT.	START: 8/9/17	END: 8/9/17	PG 2 OF 2	B-003-0-17

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
MEDIUM DENSE, GRAY, **SANDY SILT**, LITTLE CLAY, TRACE GRAVEL, WITH THIN CLAY SEAMS, MOIST *(continued)*	955.4	31 32 33																
VERY STIFF TO HARD, GRAY, **SILT**, SOME CLAY, TRACE SAND, DAMP	951.9	34 35 36 37 38	7 12 17	37	89	SS-16A	4.00	0	0	1	75	24	22	20	2	18	A-4b (8)	
		39 40 41 42 43	5 8 12	26	67	SS-17A	4.00	-	-	-	-	-	-	-	-	19	A-4b (V)	
HARD, GRAY, **SANDY SILT**, SOME STONE FRAGMENTS, SOME CLAY, DAMP TO MOIST	941.9	44 45 46 47 48	4 7 10	22	78	SS-18A	4.00	22	7	14	37	20	21	16	5	17	A-4a (4)	
		49 50	22 27 34	78	100	SS-19A	4.50	-	-	-	-	-	-	-	-	15	A-4a (V)	
SHALE, GRAY, MODERATELY WEATHERED, SLIGHTLY STRONG, ARENACEOUS.	934.8 934.7	TR3	50/2"	-	83	SS-20A	4.50	-	-	-	-	-	-	-	-	12	A-4a (V)	

NOTES: LAT/LONG/ELEV FROM CONSULTANT SURVEY GRADE INSTRUMENTS.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: AUGER CUTTINGS MIXED WITH 50 LB. BENTONITE CHIPS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 2/20/18 10:37 - X:\GINT\PROJECTS\2017 COMPLETE\600398.GPJ

PROJECT: MED-57-01.37	DRILLING FIRM / OPERATOR: ODOT / CAREY	DRILL RIG: CME 55 TRUCK	STATION / OFFSET: 72+93, 15' LT.
TYPE: BRIDGE	SAMPLING FIRM / LOGGER: ODOT / MCLEISH	HAMMER: CME AUTOMATIC	ALIGNMENT: CENTERLINE OF SR57
PID: 94438 SFN: 5201802	DRILLING METHOD: 3.25" HSA / NQ2	CALIBRATION DATE: 6/1/17	ELEVATION: 984.7 (MSL) EOB: 49.7 ft.
START: 8/8/17 END: 8/8/17	SAMPLING METHOD: SPT / NQ2	ENERGY RATIO (%): 77	LAT / LONG: 41.007397, -81.752658

EXPLORATION ID B-004-0-17

MATERIAL DESCRIPTION AND NOTES	ELEV. 984.7	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
ASPHALT (10")	983.9	1																
DENSE, YELLOWISH BROWN, **COARSE AND FINE SAND**, "AND" GRAVEL AND STONE FRAGMENTS, TRACE SILT, TRACE CLAY, DAMP	981.7	2	31 18 11	37	78	SS-1A	-	38	6	44	9	3	NP	NP	NP	11	A-3a (0)	
LOOSE, REDDISH BROWN, **COARSE AND FINE SAND**, LITTLE SILT, LITTLE CLAY, TRACE GRAVEL AND STONE FRAGMENTS, MOIST		3	5 4 3	9	72	SS-2A	-	7	8	59	15	11	NP	NP	NP	13	A-3a (0)	
@4.5'; VERY LOOSE		4	2 2 1	4	78	SS-3A	-	-	-	-	-	-	-	-	-	13	A-3a (V)	
		5	0 1 0	1	72	SS-4A	-	-	-	-	-	-	-	-	-	15	A-3a (V)	
	976.2	6																
LOOSE, DARK GRAY, **SILT**, LITTLE CLAY, LITTLE SAND, TRACE STONE FRAGMENTS, MODERATELY ORGANIC (LOI = 7.7%) WITH ROOTS, MOIST	973.7	7	2 2 2	5	100	SS-5A	1.50	4	4	10	65	17	NP	NP	NP	26	A-4b (8)	
MEDIUM DENSE, BROWN WITH GRAY, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, TRACE CLAY, MOIST	971.7	8	5 8 6	18	94	SS-6A	-	34	15	32	13	6	NP	NP	NP	17	A-2-4 (0)	
		9	4 2 4	8	100	SS-7A	-	34	14	29	15	8	NP	NP	NP	15	A-2-4 (0)	
VERY STIFF, GRAY AND BROWN MOTTLED, **SILT AND CLAY**, TRACE SAND, MOIST						SS-7B	2.50	0	0	1	46	53	33	19	14	26	A-6a (10)	
@14.0'; GRAY, TRACE GRAVEL AND STONE FRAGMENTS	969.2	10	4 5 6	14	89	SS-8A	3.00	1	1	5	28	65	35	21	14	26	A-6a (10)	
STIFF, GRAY, **SILTY CLAY**, TRACE SAND, TRACE GRAVEL AND STONE FRAGMENTS, DAMP TO MOIST		11	2 3 4	9	89	SS-9A	1.50	1	0	1	19	79	39	23	16	26	A-6b (10)	
		12	1 2 3	6	83	SS-10A	1.50	-	-	-	-	-	-	-	-	29	A-6b (V)	
@18.5'; VERY STIFF		13	2 2 6	10	89	SS-11A	3.00	-	-	-	-	-	-	-	-	23	A-6b (V)	
		14																
		15	3 7 8	19	83	SS-12A	3.00	-	-	-	-	-	-	-	-	24	A-6b (V)	
		16																
@23.5'; STIFF		17	0 2 4	8	11	SS-13A	1.50	-	-	-	-	-	-	-	-	22	A-6b (V)	
	958.7	18																
STIFF, GRAY, **SANDY SILT**, "AND" CLAY, TRACE GRAVEL AND STONE FRAGMENTS, MOIST		19	2 3 5	10	100	SS-14A	1.50	2	1	2	41	54	29	20	9	25	A-4a (8)	
		20																
	955.3	21	3 7 11	23	78	SS-15A	-	-	-	-	-	-	-	-	-	18	A-4a (V)	
						SS-15B	-	56	13	14	11	6	18	16	2	12	A-1-b (0)	

PID: 94438	SFN: 5201802	PROJECT: MED-57-01.37	STATION / OFFSET: 72+93, 15' LT.	START: 8/8/17	END: 8/8/17	PG 2 OF 2	B-004-0-17

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
MEDIUM DENSE, GRAY, **GRAVEL AND STONE FRAGMENTS WITH SAND**, LITTLE SILT, TRACE CLAY, DAMP *(continued)*	954.7	31 32 33																
	951.2																	
VERY STIFF, GRAY, **SILT**, SOME CLAY, TRACE SAND, TRACE GRAVEL, DAMP		34 35 36 37 38	13 15 17	41	78	SS-16A	3.50	2	1	2	69	26	23	19	4	17	A-4b (8)	
		39 40 41 42 43	6 7 10	22	72	SS-17A	4.00	-	-	-	-	-	-	-	-	19	A-4b (V)	
	941.2																	
VERY STIFF, GRAY, **SANDY SILT**, LITTLE CLAY, LITTLE STONE FRAGMENTS, MOIST TO DAMP		44 45 46 47 48	4 6 9	19	78	SS-18A	2.00	17	7	24	35	17	17	14	3	16	A-4a (3)	
	935.2	49	25 39 50/2"	-	97	SS-19A	-	-	-	-	-	-	-	-	-	12	A-4a (V)	
SHALE, GRAY, MODERATELY WEATHERED, SLIGHTLY STRONG, ARENACEOUS.	935.0	EOB TR																

NOTES: LAT/LONG/ELEV FROM CONSULTANT SURVEY GRADE INSTRUMENTS.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: AUGER CUTTINGS MIXED WITH 50 LB. BENTONITE CHIPS

PROJECT: MED-57-01.37	DRILLING FIRM / OPERATOR: ODOT / CAREY	DRILL RIG: CME 55 TRUCK	STATION / OFFSET: 75+39, 7' RT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: ODOT / MCLEISH	HAMMER: CME AUTOMATIC	ALIGNMENT: CENTERLINE OF SR57
PID: 94438 SFN: 5201802	DRILLING METHOD: 3.25" HSA / NQ2	CALIBRATION DATE: 6/1/17	ELEVATION: 984.8 (MSL) EOB: 10.0 ft.
START: 8/9/17 END: 8/9/17	SAMPLING METHOD: SPT / NQ2	ENERGY RATIO (%): 77	LAT / LONG: 41.008073, -81.752694

EXPLORATION ID B-005-0-17

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 984.8	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
ASPHALT (14")	983.6	1																
MEDIUM DENSE, BROWN AND GRAY, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, TRACE CLAY, DAMP		2	9 12 10	28	89	SS-1A	-	26	10	36	18	10	NP	NP	NP	13	A-2-4 (0)	
		3	7 7 10	22	33	SS-2A	-	37	12	31	14	6	NP	NP	NP	9	A-2-4 (0)	
		4	8 7 9	21	78	SS-3A	-	-	-	-	-	-	-	-	-	8	A-2-4 (V)	
		5	4 7 5	15	100	SS-4A	-	-	-	-	-	-	-	-	-	11	A-2-4 (V)	
	976.3	6																
LOOSE, REDDISH BROWN, **COARSE AND FINE SAND**, LITTLE SILT, TRACE CLAY, TRACE STONE FRAGMENTS, MOIST TO WET	974.8	7	1 2 5	9	89	SS-5A	-	1	7	70	15	7	NP	NP	NP	22	A-3a (0)	
		EOB 8																
		9																
		10																

NOTES: HOLE DRY UPON COMPLETION. LAT/LONG/ELEV FROM CONSULTANT SURVEY GRADE INSTRUMENTS.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: AUGER CUTTINGS MIXED WITH 10 LB. BENTONITE CHIPS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 2/20/18 10:37 - X:\GINT\PROJECTS\2017 COMPLETE\600398.GPJ

PROJECT: MED-57-01.37	DRILLING FIRM / OPERATOR: ODOT / CAREY	DRILL RIG: CME 55 TRUCK	STATION / OFFSET: 77+90, 5' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: ODOT / MCLEISH	HAMMER: CME AUTOMATIC	ALIGNMENT: CENTERLINE OF SR57
PID: 94438 SFN: 5201802	DRILLING METHOD: 3.25" HSA / NQ2	CALIBRATION DATE: 6/1/17	ELEVATION: 983.7 (MSL) EOB: 10.0 ft.
START: 8/8/17 END: 8/8/17	SAMPLING METHOD: SPT / NQ2	ENERGY RATIO (%): 77	LAT / LONG: 41.008748, -81.752885

EXPLORATION ID B-006-0-17

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
ASPHALT (15")	982.4	1																
MEDIUM DENSE, BROWN AND GRAY, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, LITTLE CLAY, DAMP	980.7	2	12 11 11	28	78	SS-1A	-	27	10	37	16	10	NP	NP	NP	12	A-2-4 (0)	
MEDIUM DENSE, REDDSIH BROWN, **GRAVEL AND STONE FRAGMENTS WITH SAND**, LITTLE SILT, TRACE CLAY, DAMP		3	11 8 9	22	100	SS-2A	-	38	19	27	11	5	NP	NP	NP	9	A-1-b (0)	
		4																
		5	8 7 8	19	100	SS-3A	-	-	-	-	-	-	-	-	-	10	A-1-b (V)	
		6																
		7	8 7 6	17	89	SS-4A	-	-	-	-	-	-	-	-	-	9	A-1-b (V)	
	975.2	8																
VERY LOOSE, GRAYISH BROWN, **COARSE AND FINE SAND**, LITTLE STONE FRAGMENTS, LITTLE SILT, TRACE CLAY, MOIST TO WET	973.7	9	0 1 1	3	67	SS-5A	-	18	20	42	12	8	NP	NP	NP	22	A-3a (0)	
		EOB 10																

NOTES: HOLE DRY UPON COMPLETION. LAT/LONG/ELEV FROM CONSULTANT SURVEY GRADE INSTRUMENTS.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: AUGER CUTTINGS MIXED WITH 10 LB. BENTONITE CHIPS

B-001-0-64

LOG OF BORING

Date Started 7-23-64
Date Completed 7-28-64
Boring No. B-1

Sampler Type SS Dia. 1 3/8"
Casing: Length 40' Dia. 3 1/2"
Station & Offset 1366+00, 25' Lt (REAR ABUTMENT)

Water Elev.
Surface Elev. 977.1'

GSE = 976.4 (NAVD88)

Elev.	Depth	Std. Pen. (N)	Rec. ft.	Loss ft.	Description	Sample No.	Physical Characteristics % Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	W. C.	SHTL Class.
977.1	0														
974.6	2														
	4	10/11			Brown and Gray Silty Sandy Gravel	1	56	10	14	13	7	NP	NP	15	
972.1	6	12/12			Brown and Gray Silty Sandy Gravel	2	48	21	20	11		NP	NP	14	
969.6	8	12/10			Gray Silty Gravel	3	67	6	4	13	10	PI=	19	13	
967.1	10	13/9			Gray and Brown Silty Sandy Gravel	4	48	12	12	18	10	NP	NP	7	
964.6	12														
	14	7/7			Gray Silt	5	0	1	4	80	15	NP	NP	29	
962.1	16	9/13			Gray Gravelly Silt	6	15	3	10	51	21	19	5	18	
959.6	18	8/11			Gray Gravelly Silt	7	20	2	8	41	29	27	8	27	
957.1	20														
	22	8/8			Gray Silt	8	0	9	10	50	31	25	6	21	
	24														
952.1	26	19/18			Gray Silt	9	0	0	1	75	24	NP	NP	23	
	28														
947.1	30	13/11			Gray Silt	10	0	0	0	71	29	23	2	22	
	32														
	34														
942.1	36	24/16			Brown Sandy Gravel	11		V	I	S	U	A	L	10	
	38														
937.1	40	20/25			Gray Sandy Gravelly Silt	12		V	I	S	U	A	L	14	
	42														
	44														
932.1	46	18/26			Brown and Gray Gravelly Silt	13	30	4	7	36	23	7	5	20	
	48				Top of Rock EL = 925.4 (NAVD88)										
927.1	50														
926.1		28/34			Gray and Brown Clay with Shale Fragments	14	27	6	3	32	32	37	14	19	
	52		1.6	3.4	TOP OF ROCK Indurated clay, brown, with shale fragments, badly broken and slightly weathered, soft and crumbly. Core loss 60%.										
923.1	54														
	56														
	58		3.0	2.0	Shale, brown to gray, siliceous, poorly-fissile, with clay seams, broken. Core loss 38%.										
917.1	60				BOTTOM OF BORING										

B-008-0-64

LOG OF BORING

Date Started 7-29-64
Date Completed 7-30-64
Boring No. B-8
Sampler Type SS Dia. 1 3/8"
Casing: Length 40' Dia. 3 1/2"
Station & Offset 1367+12, 24' Rt (FORWARD ABUTMENT)
Water Elev.
Surface Elev. 976.0'

GSE = 975.3 (NAVD88)

Elev.	Depth	Std. Pen. (N)	Rec. ft.	Loss ft.	Description	Sample No.	Physical Characteristics % Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	W.C.	SHTL Class.
976.0	0														
	2														
973.5	4	7/8			Brown and Gray Clayey Sandy Gravel	1		V	I	S	U	A	L	22	
971.0	6	6/9			Gray and Brown Clay	2	0	1	2	25	72	43	24	26	
968.5	8	2/3			Gray Sandy Silt	3	0	1	19	58	22	NP	NP	19	
966.0	10	2/3			Gray Sandy Silt	4	0	1	21	56	22	NP	NP	18	
	12														
963.5	14				No Sample Recovered - Gray Sand (Driller's Description)		V	I	S	U	A	L			
961.0	16	8/13			Gray Silty Sandy Gravel	5	45	21	10	12	12	21	5	18	
958.5	18	7/8			Gray Silt and Clay	6	0	0	1	43	56	33	11	27	
956.0	20	7/9			Gray Clayey Silt	7	0	0	1	43	56	32	8	25	
	22														
	24														
951.0	26	5/6			Gray Silt and Clay	8	0	0	0	45	55	37	13	28	
	28														
946.0	30	6/17			Gray and Brown Sandy Gravelly Silt	9	32	7	9	34	18	21	2	20	
	32														
	34														
941.0	36	21/20			Gray Silty Sand and Stone Fragments	10	66	7	10	10	7	NP	NP	21	
	38														
936.0	40				TOP OF ROCK										
	42		L.7	3.3	Shale, gray, siliceous, firm, with clay seams, broken, non-fissile to poorly-fissile. Core loss 58%.										
	44														
	46		1.2	3.8											
	48														
	50														
	52		3.4	1.6											
	54														
921.0					BOTTOM OF BORING										

Top of Rock EL = 935.3 (NAVD88)

Subgrade Analysis

V. 13.00 01/15/16

Global Options		
320	R&R	No
206	CS	Option
	LS	No
206	Depth	12

Design CBR 13

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
0	0	3	4	10	6	0	0	0	1	0	0	0	0	0	0	0	0
		13%	17%	42%	25%				4%								
0%	96%								4%								

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

% Borings	
N_{60L}<= 5	17%
<=10	50%
>=20	0%
M+	50%
R	0%

% Surface	
0%	
0%	0%

UC @ Surface
0.0
0
0

Rig	ER
A	77
B	
C	
D	
E	
F	
G	
H	

Total Borings	6
PID	94438
Location	MED-57-1.37

	N_{60}	N_{60L}	LL	PL	PI	% Silt	Clay	P 200	M	M_{OPT}	GI
Average	23.3	11.5			10.0		8.2		10.2	8.4	0.00
Maximum	73	17	26	16	10	43	30	73	15	11	0
Minimum	1	1	26	16	10	5	3	9	3	6	0

#	B #	Boring Location		Boring Depth	Boring To	Cut Fill	Subgrade Depth	Subgrade To	n_2	n_3	N	Rig	N_{60}	N_{60L}	LL	PL	PI	% Silt	% Clay	P 200	M	M_{OPT}	Ohio DOT	GI	Problem w/ Class	Problem w/ MN	UC Class	UC MN
1	B-001	Sta. 62+25	7' RT	1.5	3.0	0.0	1.5	3.0	17	12	29	A	37		NP	NP	NP	6	3	9	3	8	3	0				
				3.0	4.5		3.0	4.5	2	5	7		9		NP	NP	NP	19	9	28	12	10	2-4	0		N		12
				4.5	6.0		4.5	6.0	4	3	7		9								9	8	3a	0		N		---
				6.0	7.5		6.0	7.5	4	5	9		12	9	NP	NP	NP	17	6	23	11	8	3a					
2	B-002	Sta. 67+24	5' LT	1.5	3.0	0.0	1.5	3.0	32	25	57	A	73		NP	NP	NP	7	4	11	3	8	3a	0				
				3.0	4.5		3.0	4.5	22	22	44		56		NP	NP	NP	6	5	11	8	8	3a	0				
				4.5	6.0		4.5	6.0	12	8	20		26								12	8	3a	0				
				6.0	7.5		6.0	7.5	3	5	8		10	10	26	16	10	43	30	73	15	11	4a			N		12
3	B-003	Sta. 72+12	15' RT	1.5	3.0	0.0	1.5	3.0	6	7	13	A	17		NP	NP	NP	12	8	20	11	8	3a	0				
				3.0	4.5		3.0	4.5	6	11	17		22		NP	NP	NP	5	5	10	8	8	3	0				
				4.5	6.0		4.5	6.0	12	14	26		33								11	8	3	0				
				6.0	7.5		6.0	7.5	11	14	25		32	17							8	8	3					
4	B-004	Sta. 72+93	15' LT	1.5	3.0	0.0	1.5	3.0	18	11	29	A	37		NP	NP	NP	9	3	12	11	8	3a	0				
				3.0	4.5		3.0	4.5	4	3	7		9		NP	NP	NP	15	11	26	13	8	3a	0		N		---
				4.5	6.0		4.5	6.0	2	1	3		4								13	8	3a	0		N		---
				6.0	7.5		6.0	7.5	1	0	1		1	1							15	8	3a			N		---
5	B-005	Sta. 75+39	7' RT	1.5	3.0	0.0	1.5	3.0	12	10	22	A	28		NP	NP	NP	18	10	28	13	10	2-4	0				
				3.0	4.5		3.0	4.5	7	10	17		22		NP	NP	NP	14	6	20	9	10	2-4	0				
				4.5	6.0		4.5	6.0	7	9	16		21								8	10	2-4	0				
				6.0	7.5		6.0	7.5	7	5	12		15	15							11	10	2-4					
6	B-006	Sta. 77+90	5' LT	1.5	3.0	0.0	1.5	3.0	11	11	22	A	28		NP	NP	NP	16	10	26	12	10	2-4	0				
				3.0	4.5		3.0	4.5	8	9	17		22		NP	NP	NP	11	5	16	9	6	1b	0				
				4.5	6.0		4.5	6.0	7	8	15		19								10	6	1b	0				
				6.0	7.5		6.0	7.5	7	6	13		17	17							9	6	1b					

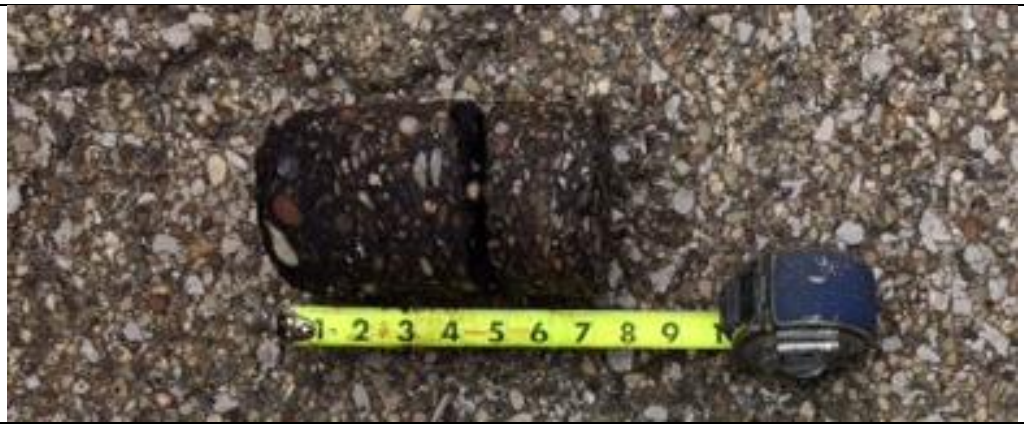
MED-57-01.37 PID 94438 Pavement Cores

Core	Approx. Location	Asphalt Depth (inches)	Notes
X-001-1-17	62+25 14.6' R	9	3 inches of core loss
X-002-1-17	67+22 13.3' L	7	1.5 inches of core loss
X-005-1-17	75+39 15.1' R	7.5	
X-006-1-17	77+90 13.2' L	8.5	2.5 inches of core loss

X-001-1-17

X-002-1-17

MED-57-01.37 PID 94438 Pavement Cores (cont.)



X-005-1-17

X-006-1-17