OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

SUM-76-8.42
102329

Pavement replacement over SUM - I.R. 76 from 8.42 to 10.00. Includes rehabilitation of several structures in the City of Akron, Summit County, Ohio.

ELR

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Date prepared: Friday, August 21, 2020

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NO. OF BORINGS: 30

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-004-0-18	I.R. 76	248+32	8	RT	18 CME 55 404185	87	1067.5	1065.9	1.6 C
2	B-007-0-18	I.R. 76	256+21	10	RT	18 CME 55 404185	87	1049.3	1047.7	1.6 C
3	B-009-1-19	I.R. 76	266+15	64	LT	19 CME 75 079797	84	1012.8	1011.2	1.6 C
4	B-009-2-19	I.R. 76	268+29	65	LT	19 CME 75 079797	84	1006.3	1004.7	1.6 C
5	B-010-0-18	I.R. 76	269+83	6	LT	18 CME 55 404185	87	999.7	998.1	1.6 C
6	B-011-0-18	I.R. 76	275+18	12	RT	18 CME 55 404185	87	981.7	980.1	1.6 C
7	B-012-0-18	I.R. 76	279+12	64	LT	CME45 RENTAL	72	979.3	977.7	1.6 C
8	B-013-0-18	I.R. 76	283+10	56	RT	18 CME 55 404185	87	980.5	978.9	1.6 C
9	B-014-0-20	I.R. 76	287+09	15	LT	18 CME 55 404185	87	986.3	984.7	1.6 C
10	B-014-1-19	I.R. 76	288+90	85	LT	19 CME 75 079797	84	987.4	985.8	1.6 C
11	B-014-2-19	I.R. 76	290+23	98	LT	18 CME 55 404185	87	967.5	965.9	1.6 C
12	B-014-3-19	I.R. 76	293+97	55	LT	19 CME 75 079797	84	993.0	991.4	1.6 C
13	B-014-4-19	I.R. 76	296+07	49	LT	19 CME 75 079797	84	995.2	993.6	1.6 C
14	B-015-0-20	I.R. 76	297+61	52	LT	18 CME 55 404185	87	996.6	995.0	1.6 C
15	B-016-0-20	Ramp W-11	300+99	122	RT	18 CME 55 404185	87	991.6	990.0	1.6 C
16	B-017-0-18	I.R. 76	301+61	51	RT	18 CME 55 404185	87	1001.9	1000.3	1.6 C
17	B-018-0-20	I.R. 76	306+00	53	LT	18 CME 55 404185	87	1007.7	1006.1	1.6 C
18	B-019-0-20	I.R. 76	309+62	6	LT	18 CME 55 404185	87	1011.1	1009.5	1.6 C
19	B-020-0-20	I.R. 76	313+61	7	LT	18 CME 55 404185	87	1012.9	1011.3	1.6 C
20	B-045-1-18 (GPI	Ramp J	1+72	23	LT	CME 55T	78	1067.1	1065.5	1.6 C
21	B-046-0-18 (GPI	IR-76	247+75	52	RT	CME 55T	78	1068.9	1067.3	1.6 C
22	B-047-0-18 (GPI	Ramp L	9+09	36	LT	CME 55T	78	1063.6	1062.0	1.6 C
23	B-048-0-18 (GPI	Ramp L	13+65	12	RT	CME 55T	78	1050.6	1049.0	1.6 C
24	B-049-0-18 (GPI	I.R. 76	260+19	10	RT	CME 45B	84	1035.0	1033.4	1.6 C
25	B-050-0-18 (GPI	I.R. 76	263+62	63	RT	CME 55T	78	1022.1	1020.5	1.6 C
26	B-077-0-18 (GPI	Ramp L	4+68	21	LT	CME 55T	78	1079.5	1077.9	1.6 C
27	B-077-1-18 (GPI	Ramp J	5+19	5	RT	CME 55T	78	1071.4	1069.8	1.6 C
28	B-077-2-18 (GPI	Ramp M	3+27	1	LT	CME 55T	78	1082.8	1081.2	1.6 C
29	B-077-3-18 (GPI	Ramp J	7+95	4	RT	CME 55T	78	1080.4	1078.8	1.6 C
30	B-077-4-18 (GPI	Ramp J	10+97	8	RT	CME 55T	78	1087.2	1085.6	1.6 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	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	1.0	2.5	-0.6	0.9	19			NP	NP	NP	7		7	11	6	A-1-b	0	100					
	004-0	SS-2	2.5	4.0	0.9	2.4	22			26	17	9	43	25	68	9	12	A-4a	7						
	18	SS-3	4.0	5.5	2.4	3.9	30		4.5							7	10	A-4a	8						
		4A	5.5	6.0	3.9	4.4	160	19	4.5							8	10	A-4a	8						
2	B	SS-1	1.0	2.5	-0.6	0.9	19			29	19	10	26	14	40	7	14	A-4a	1	510					
	007-0	SS-2	2.5	4.0	0.9	2.4	19			25	16	9	42	26	68	16	11	A-4a	7			Mc			
	18	SS-3	4.0	5.5	2.4	3.9	7		2.5							14	10	A-4a	8						
		SS-4	5.5	7.0	3.9	5.4	4	4	3.75							10	16	A-6b	16						
3	B	SS-1	1.0	2.5	-0.6	0.9	6						8		8	13						N_{60}		18"	
	009-1	SS-2	2.5	4.0	0.9	2.4	6			24	18	6	43	18	61	13	13	A-4a	5			N_{60}		18"	
	19	SS-3	4.0	5.5	2.4	3.9	6			22	15	7	36	19	55	12	10	A-4a	4						
		SS-4	5.5	7.0	3.9	5.4	7	6		16	9	7	41	19	60	11	10	A-4a	5						
4	B	SS-1	1.0	2.5	-0.6	0.9	8						22		22	10	8	A-3a	0						
	009-2	SS-2	2.5	4.0	0.9	2.4	95									15	10	A-4a	8			Mc			
	19	SS-3	4.0	5.5	2.4	3.9	17			24	16	8	37	25	62	12	11	A-4a	5						
		SS-4	5.5	7.0	3.9	5.4	11	8		28	16	12	46	32	78	15	14	A-6a	9						
5	B	SS-1	1.1	2.5	-0.5	0.9	16			25	16	9	44	26	70	14	11	A-4a	7	100		Mc			
	010-0	SS-2	2.5	4.0	0.9	2.4	91			32	21	11	30	13	43	12	16	A-6a	2						
	18	SS-3	4.0	5.5	2.4	3.9	30		4.5							14	14	A-6a	10						
		SS-4	5.5	7.0	3.9	5.4	12	12								15	14	A-6a	10						
6	B	SS-1	1.3	2.5	-0.3	0.9	17			27	19	8	60	22	82	13	14	A-4b	8	100	A-4b		11"		
	011-0	SS-2	2.5	4.0	0.9	2.4	19			26	16	10	42	31	73	13	11	A-4a	8						
	18	SS-3	4.0	5.5	2.4	3.9	26		3							15	10	A-4a	8						
		SS-4	5.5	7.0	3.9	5.4	30	17	4.5							14	10	A-4a	8						
7	B	SS-1	1.0	2.5	-0.6	0.9	20				NP	NP	5		5	5	6	A-1-a	0	100					
	012-0	SS-2	2.5	4.0	0.9	2.4	15			20	16	4	22	14	36	11	11	A-4a	0						
	18	SS-3	4.0	5.5	2.4	3.9	19		4.5							13	14	A-6a	10						
		SS-4	5.5	7.0	3.9	5.4	18	15	3.75							12	14	A-6a	10						
8	B	SS-1	1.0	2.5	-0.6	0.9	22			20	15	5	32	19	51	9	10	A-4a	3	440					
	013-0	SS-2	2.5	4.0	0.9	2.4	32		4	25	17	8	48	24	72	12	12	A-4a	7						
	18	SS-3	4.0	5.5	2.4	3.9	28									11	10	A-4a	8						
		SS-4	5.5	7.0	3.9	5.4	28	22	4.5							10	10	A-4a	8						
9	B	SS-1	1.5	3.0	-0.1	1.4	9			NP	NP	NP	13	10	23	11	8	A-3a	0	100					
	014-0	SS-2	3.0	4.5	1.4	2.9	4			NP	NP	NP	28	13	41	14	11	A-4a	1			N_{60} & Mc			
	20	SS-3	4.5	6.0	2.9	4.4	25		2.25	18	13	5	45	11	56	11	10	A-4a	4						
		SS-4	6.0	7.5	4.4	5.9	17	4	4.5							12	10	A-4a	8						

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
10	B	SS-1	1.5	3.0	-0.1	1.4	7						22		22	8	6	A-1-b	0						
	014-1	SS-2	3.0	4.5	1.4	2.9	6			19	13	6	21	12	33	15	8	A-3a	0						
	19	SS-3	4.5	6.0	2.9	4.4	32			19	14	5	20	14	34	14	10	A-2-4	0						
		SS-4	6.0	7.5	4.4	5.9	15	6		22	13	9	20	17	37	15	10	A-4a	0						
11	B	SS-1	1.0	2.5	-0.6	0.9	7			31	24	7	30	21	51	23	19	A-4a	3			N_{60} & Mc		**15"**	
	014-2	SS-2	3.5	5.0	1.9	3.4	9			23	17	6	24	18	42	15	12	A-4a	1			N_{60} & Mc			
	19	SS-3	6.0	7.5	4.4	5.9	20			NP	NP	NP	11	7	18	7	6	A-1-b	0						
		SS-4	8.5	10.0	6.9	8.4	10	7					7		7	5	6	A-1-b							
12	B	SS-1	1.5	3.0	-0.1	1.4	20			20	14	6	32	16	48	9	10	A-4a	3						
	014-3	SS-2	3.0	4.5	1.4	2.9	29			NP	NP	NP	21	13	34	10	8	A-3a	0						
	19	SS-3	4.5	6.0	2.9	4.4	11			NP	NP	NP	11	7	18	8	8	A-3a	0						
		SS-4	6.0	7.5	4.4	5.9	6	6		NP	NP	NP	19	11	30	10	8	A-3a	0						
13	B	SS-1	1.0	2.5	-0.6	0.9	33						1		1	4	6	A-1-a	0						
	014-4	SS-2	2.5	4.0	0.9	2.4	17						16		16	4	6	A-1-b	0						
	19	SS-3	4.0	5.5	2.4	3.9	13						4		4	3	6	A-1-a	0						
		SS-4	5.5	7.0	3.9	5.4	4	4		20	16	4	12	7	19	53	6	A-1-b	0						
14	B	SS-1	1.0	2.5	-0.6	0.9	29			NP	NP	NP	15	10	25	11	8	A-3a	0	20					
	015-0	SS-2	2.5	4.0	0.9	2.4	20		2	19	14	5	30	15	45	14	10	A-4a	2			Mc			
	20	SS-3	4.0	5.5	2.4	3.9	61			NP	NP	NP	11	8	19	9	8	A-3a	0						
		SS-4	5.5	6.0	3.9	4.4		20																	
15	B	SS-1	1.0	2.5	-0.6	0.9	4		0.5	23	16	7	27	14	41	15	11	A-4a	1	60		HP & Mc		**24"**	
	016-0	SS-2	2.5	4.0	0.9	2.4	15			15	14	1	22	11	33	13	8	A-3a	0						
	20	SS-3	4.0	5.5	2.4	3.9	15									22	10	A-4b	8						
		SS-4	5.5	7.0	3.9	5.4	12	4								15	10	A-4a	8						
16	B	SS-1	1.0	2.5	-0.6	0.9	32			16	13	3	17	11	28	9	8	A-3a	0	190					
	017-0	SS-2	2.5	4.0	0.9	2.4	20			22	14	8	23	19	42	12	10	A-4a	1						
	18	SS-3	4.0	5.5	2.4	3.9	25		4.5							13	10	A-4a	8						
		SS-4	5.5	7.0	3.9	5.4	26	20								12	10	A-4a	8						
17	B	SS-1	1.5	3.0	-0.1	1.4	58		4.5	NP	NP	NP	30	15	45	18	11	A-4a	2	200		Mc			
	018-0	SS-2	3.0	3.5	1.4	1.9										4	6	A-1-a	0						
	20	SS-3	3.5	4.0	1.9	2.4										3	6	A-1-a	0						
								30																	
18	B	SS-1	1.5	3.0	-0.1	1.4	20			NP	NP	NP	17	9	26	10	8	A-3a	0	60					
	019-0	SS-2	3.0	3.5	1.4	1.9										7	8	A-3a	0						
	20	SS-3	3.5	4.0	1.9	2.4										5	6	A-1-b	0						
								20																	

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	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	
19	B	SS-1	1.0	2.5	-0.6	0.9	57		4.5	NP	NP	NP	30	15	45	10	11	A-4a	2	640					
	020-0	SS-2	2.5	4.0	0.9	2.4	19			NP	NP	NP	7	5	12	7	8	A-3a	0						
	20	SS-3	4.0	5.5	2.4	3.9	20			19	15	4	35	17	52	15	10	A-4a	3						
		SS-4	5.5	7.0	3.9	5.4	15	15	3.5							22	10	A-4b	8						
20	B	SS-1	1.5	3.0	-0.1	1.4	40										0	Rock	0		Rock				
	045-1	SS-2	3.0	4.5	1.4	2.9	60										0	Rock	0		Rock		35"		
	18	SS-3	4.5	5.5	2.9	3.9											0	Rock	0						
		SS-4	6.0	6.7	4.4	5.1		30									0	Rock	0						
21	B	SS-1	1.5	3.0	-0.1	1.4	18		4.5	24	18	6	47	20	67	8	13	A-4a	6	1173					
	046-0	SS-2	3.0	4.5	1.4	2.9	43									7	8	A-3a	0						
	18	SS-3	4.5	6.0	2.9	4.4	25		4.5	29	18	11	43	23	66	8	14	A-6a	7						
		SS-4	6.0	7.5	4.4	5.9	29	18	4.5							10	14	A-6a	10						
22	B	SS-1	2.5	4.0	0.9	2.4	39		4.5	21	15	6	33	22	55	9	10	A-4a	4	1393					
	047-0	SS-2	5.0	6.5	3.4	4.9	57		4.5	20	15	5	28	20	48	8	10	A-4a	3						
	18	SS-3	7.5	8.3	5.9	6.7											0	Rock							
		SS-4	10.0	10.5	8.4	8.9		30									0	Rock							
23	B	SS-1	0.0	1.5	-1.6	-0.1	10		4.5	23	17	6	31	17	48	11	12	A-4a	3	40					
	048-0	SS-2	2.5	4.0	0.9	2.4	109										0	Rock	0		Rock		29"		
	18	SS-3	5.0	5.8	3.4	4.2											0	Rock	0						
		SS-4	7.5	9.0	5.9	7.4	73	30									0	Rock							
24	B	SS-1	1.5	3.0	-0.1	1.4	21		4.5	23	16	7	35	21	56	10	11	A-4a	4						
	049-0	SS-2	3.0	4.5	1.4	2.9	25		4.5	24	17	7	38	20	58	10	12	A-4a	5	1587					
	18	SS-3	4.5	6.0	2.9	4.4	15		4							15	10	A-4a	8						
		SS-4	6.0	7.5	4.4	5.9	14	14	3.75							13	10	A-4a	8						
25	B	SS-1	2.5	4.0	0.9	2.4	26		4.5	22	15	7	35	17	52	8	10	A-4a	3	1520					
	050-0	SS-2	5.0	6.5	3.4	4.9	17		4.5	27	18	9	55	24	79	14	13	A-4a	8						
	18	SS-3	7.5	9.0	5.9	7.4	36																		
		SS-4	10.0	11.5	8.4	9.9	42	17								9	10	A-4a							
26	B	SS-1	1.5	3.0	-0.1	1.4	25		4.25	25	17	8	33	21	54	13	12	A-4a	4	220					
	077-0	SS-2	3.0	4.5	1.4	2.9	27		4.25							16	10	A-4a	8			Mc			
	18	SS-3	4.5	6.0	2.9	4.4	30		4.5	27	18	9	35	22	57	13	13	A-4a	4						
		SS-4	6.0	7.5	4.4	5.9	17	17	3.25							16	10	A-4a	8						
27	B	SS-1	1.5	3.0	-0.1	1.4	21			19	15	4	23	11	34	9	10	A-2-4	0	100					
	077-1	SS-2	3.0	4.5	1.4	2.9	51			NP	NP	NP	21	9	30	7	8	A-3a	0						
	18	SS-3	4.5	6.0	2.9	4.4	34									6	8	A-3a	0						
		SS-4	6.0	7.5	4.4	5.9	44	21	4.5							10	10	A-4a	8						

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
28	B	SS-1	1.5	3.0	-0.1	1.4	14		4.25	27	17	10	47	29	76	14	12	A-4a	8	223					
	077-2	SS-2	3.0	4.5	1.4	2.9	18		4.25	26	18	8	38	21	59	17	13	A-4a	5			Mc			
	18	SS-3	4.5	6.0	2.9	4.4	16		4.25							16	10	A-4a	8						
		SS-4	6.0	7.5	4.4	5.9	13	13	4							17	10	A-4a	8						
29	B	SS-1	1.5	3.0	-0.1	1.4	9			NP	NP	NP	4	4	8	6	6	A-1-b	0	13					
	077-3	SS-2	3.0	4.5	1.4	2.9	10		4.25							18	6	A-1-b	0						
	18	SS-3	4.5	6.0	2.9	4.4	13		4.25	22	18	4	58	15	73	19	13	A-4b	8						
		SS-4	6.0	7.5	4.4	5.9	22	9	3.25							19	10	A-4b	8						
30	B	SS-1	1.5	3.0	-0.1	1.4	14		4.25	29	19	10	53	33	86	16	14	A-4b	8	200	A-4b				
	077-4	SS-2	3.0	4.5	1.4	2.9	21		4.25							22	10	A-4b	8		A-4b	Mc	35''		
	18	SS-3	4.5	6.0	2.9	4.4	13		4	30	23	7	69	28	97	22	18	A-4b	8						
		SS-4	6.0	7.5	4.4	5.9	13	13	3.75							27	10	A-4b	8						

PID: 102329

County-Route-Section: SUM-76-8.42
No. of Borings: 30

Geotechnical Consultant: DLZ
Prepared By: Kevin Mihalcea
Date prepared: 8/21/2020

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

Excavate and Replace Stabilization Options	
Global Geotextile Override(N60L):	18''
Override(HP):	24''
Global Geogrid Override(N60L):	12''
Override(HP):	18''

Design CBR	8

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	4%	HP ≤ 0.5	1%
$N_{60} < 12$	18%	0.5 < HP ≤ 1	0%
$12 \leq N_{60} < 15$	9%	1 < HP ≤ 2	1%
$N_{60} \geq 20$	46%	HP > 2	39%
M+	11%		
Rock	4%		
Unsuitable	16%		

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

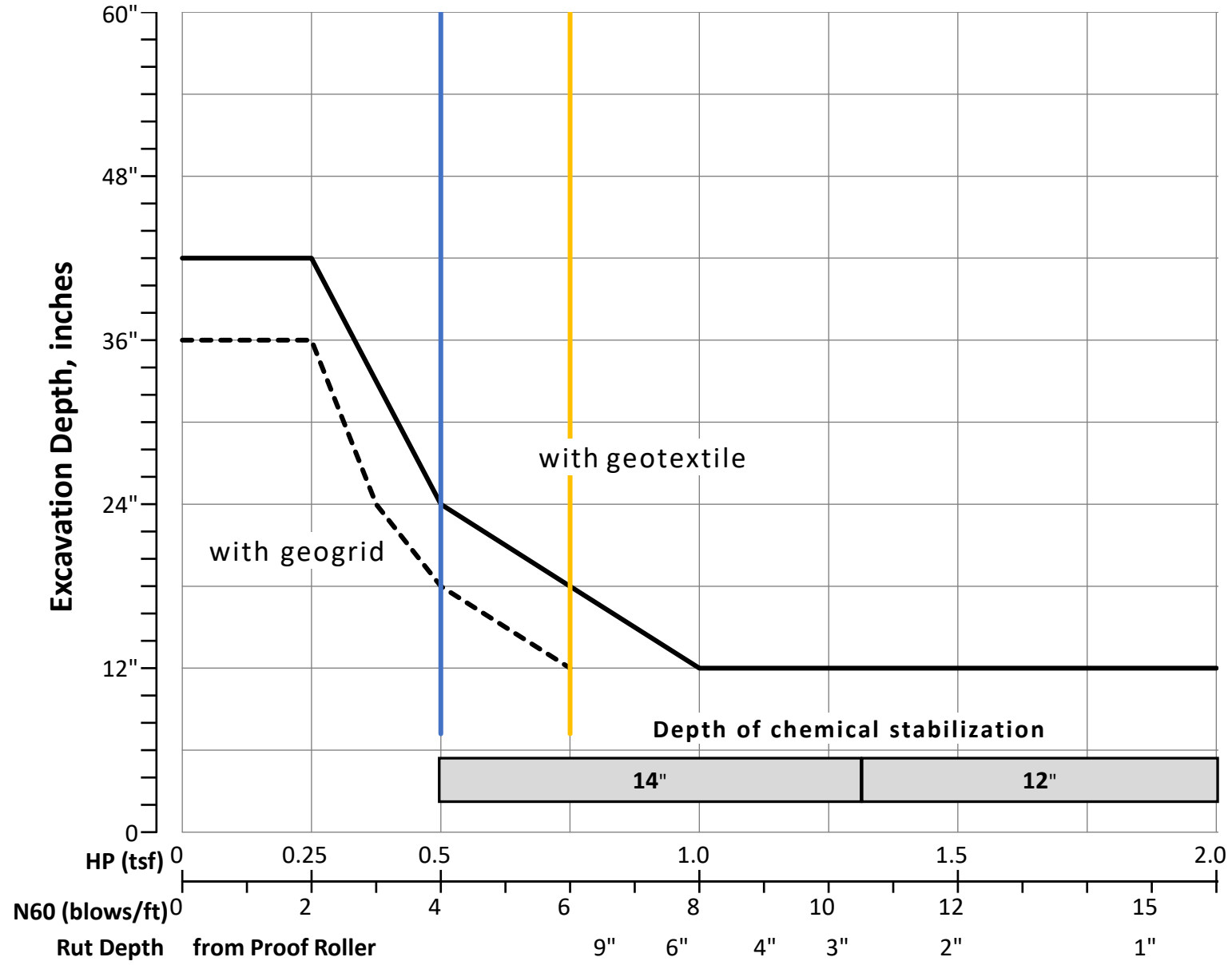
% Proposed Subgrade Surface	
Unstable & Unsuitable	28%
Unstable	19%
Unsuitable	8%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	25	15	4.00	23	16	7	29	17	44	12	9	4
Maximum	160	30	4.50	32	24	12	69	33	97	53	19	16
Minimum	4	4	0.50	15	9	1	1	4	1	3	0	0

Classification Counts by Sample

ODOT Class	Rock	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-3	A-3a	A-4a	A-4b	A-5	A-6a	A-6b	A-7-5	A-7-6	A-8a	A-8b	Totals
Count	9	5	9	2	0	0	0	0	16	55	9	0	8	1	0	0	0	0	114
Percent	8%	4%	8%	2%	0%	0%	0%	0%	14%	48%	8%	0%	7%	1%	0%	0%	0%	0%	100%
% Rock|Granular|Cohesive	8%	76%									16%								100%
Surface Class Count	3	5	6	1	0	0	0	0	13	37	4	0	3	0	0	0	0	0	72
Surface Class Percent	4%	7%	8%	1%	0%	0%	0%	0%	18%	51%	6%	0%	4%	0%	0%	0%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
4.00	0.50	☑ HP
15.03	6.00	☑ N60L

Average HP
Average N_{60L}