

**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****Prepared By:** Kevin Mihalcea  
**Date prepared:** Friday, August 21, 2020**E.L. Robinson Engineering  
1468 West 9th Street, Suite 500  
Cleveland, Ohio 44113****kmihalcea@elrobinson.com  
(216) 452-1890****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

#	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 <sub>60</sub>	N <sub>60L</sub>		LL	PL	PI	% Silt	% Clay	P200	M <sub>c</sub>	M <sub>OPT</sub>	Class		GI	Unsuitable	Unstable	Unsuitable		Unstable	
1	B 004-0 18	SS-1	1.0	2.5	-0.6	0.9	19	19	4.5	NP	NP	NP	7		7	11	6	A-1-b	0	100						
		SS-2	2.5	4.0	0.9	2.4	22		26	17	9	43	25	68	9	12	A-4a	7								
		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		4.5						8	10	A-4a	8								
2	B 007-0 18	SS-1	1.0	2.5	-0.6	0.9	19	4	3.75	29	19	10	26	14	40	7	14	A-4a	1	510						
		SS-2	2.5	4.0	0.9	2.4	19		25	16	9	42	26	68	16	11	A-4a	7			Mc					
		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		3.75						10	16	A-6b	16								
3	B 009-1 19	SS-1	1.0	2.5	-0.6	0.9	6	6				8		8	13								N <sub>60</sub>		18"	
		SS-2	2.5	4.0	0.9	2.4	6		24	18	6	43	18	61	13	13	A-4a	5					N <sub>60</sub>		18"	
		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		16	9	7	41	19	60	11	10	A-4a	5								
4	B 009-2 19	SS-1	1.0	2.5	-0.6	0.9	8	8				22		22	10	8	A-3a	0								
		SS-2	2.5	4.0	0.9	2.4	95							15	10	A-4a	8				Mc					
		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		28	16	12	46	32	78	15	14	A-6a	9								
5	B 010-0 18	SS-1	1.1	2.5	-0.5	0.9	16	12		25	16	9	44	26	70	14	11	A-4a	7	100				Mc		
		SS-2	2.5	4.0	0.9	2.4	91		32	21	11	30	13	43	12	16	A-6a	2								
		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								15	14	A-6a	10								
6	B 011-0 18	SS-1	1.3	2.5	-0.3	0.9	17	17		27	19	8	60	22	82	13	14	A-4b	8	100				A-4b		11"
		SS-2	2.5	4.0	0.9	2.4	19		26	16	10	42	31	73	13	11	A-4a	8								
		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		4.5						14	10	A-4a	8								
7	B 012-0 18	SS-1	1.0	2.5	-0.6	0.9	20	15			NP	NP	5		5	5	6	A-1-a	0	100						
		SS-2	2.5	4.0	0.9	2.4	15		20	16	4	22	14	36	11	11	A-4a	0								
		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		3.75						12	14	A-6a	10								
8	B 013-0 18	SS-1	1.0	2.5	-0.6	0.9	22	22		20	15	5	32	19	51	9	10	A-4a	3	440						
		SS-2	2.5	4.0	0.9	2.4	32		4	25	17	8	48	24	72	12	12	A-4a	7							
		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		4.5						10	10	A-4a	8								
9	B 014-0 20	SS-1	1.5	3.0	-0.1	1.4	9	4		NP	NP	NP	13	10	23	11	8	A-3a	0	100						
		SS-2	3.0	4.5	1.4	2.9	4			NP	NP	NP	28	13	41	14	11	A-4a	1				N <sub>60</sub> & Mc			
		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		4.5						12	10	A-4a	8								

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			From	To	From	To	N <sub>60</sub>	N <sub>60L</sub>		LL	PL	PI	% Silt	% Clay	P200	M <sub>c</sub>	M <sub>OPT</sub>	Class		GI	Unsuitable	Unstable	Unsuitable		Unstable
10	B 014-1 19	SS-1	1.5	3.0	-0.1	1.4	7	6				22		22	8	6	A-1-b	0							
		SS-2	3.0	4.5	1.4	2.9	6			19	13	6	21	12	33	15	8	A-3a	0						
		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			22	13	9	20	17	37	15	10	A-4a	0						
11	B 014-2 19	SS-1	1.0	2.5	-0.6	0.9	7	7		31	24	7	30	21	51	23	19	A-4a	3		N <sub>60</sub> & Mc		15"		
		SS-2	3.5	5.0	1.9	3.4	9			23	17	6	24	18	42	15	12	A-4a	1		N <sub>60</sub> & Mc				
		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	5	6	A-1-b							
12	B 014-3 19	SS-1	1.5	3.0	-0.1	1.4	20	6		20	14	6	32	16	48	9	10	A-4a	3						
		SS-2	3.0	4.5	1.4	2.9	29			NP	NP	NP	21	13	34	10	8	A-3a	0						
		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			NP	NP	NP	19	11	30	10	8	A-3a	0						
13	B 014-4 19	SS-1	1.0	2.5	-0.6	0.9	33	4					1		1	4	6	A-1-a	0						
		SS-2	2.5	4.0	0.9	2.4	17						16		16	4	6	A-1-b	0						
		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			20	16	4	12	7	19	53	6	A-1-b	0						
14	B 015-0 20	SS-1	1.0	2.5	-0.6	0.9	29	20		NP	NP	NP	15	10	25	11	8	A-3a	0	20					
		SS-2	2.5	4.0	0.9	2.4	20			2	19	14	5	30	15	45	14	10	A-4a	2		Mc			
		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																			
15	B 016-0 20	SS-1	1.0	2.5	-0.6	0.9	4	4	0.5	23	16	7	27	14	41	15	11	A-4a	1	60		HP & Mc		24"	
		SS-2	2.5	4.0	0.9	2.4	15				15	14	1	22	11	33	13	8	A-3a	0					
		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								15	10	A-4a	8							
16	B 017-0 18	SS-1	1.0	2.5	-0.6	0.9	32	20		16	13	3	17	11	28	9	8	A-3a	0	190					
		SS-2	2.5	4.0	0.9	2.4	20				22	14	8	23	19	42	12	10	A-4a	1					
		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									12	10	A-4a	8						
17	B 018-0 20	SS-1	1.5	3.0	-0.1	1.4	58	30	4.5	NP	NP	NP	30	15	45	18	11	A-4a	2	200		Mc			
		SS-2	3.0	3.5	1.4	1.9								4	6	A-1-a	0								
		SS-3	3.5	4.0	1.9	2.4								3	6	A-1-a	0								
18	B 019-0 20	SS-1	1.5	3.0	-0.1	1.4	20	20		NP	NP	NP	17	9	26	10	8	A-3a	0	60					
		SS-2	3.0	3.5	1.4	1.9								7	8	A-3a	0								
		SS-3	3.5	4.0	1.9	2.4								5	6	A-1-b	0								

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			From	To	From	To	N <sub>60</sub>	N <sub>60L</sub>		LL	PL	PI	% Silt	% Clay	P200	M <sub>c</sub>	M <sub>OPT</sub>	Class		GI	Unsuitable	Unstable	Unsuitable		Unstable
19	B	SS-1	1.0	2.5	-0.6	0.9	57	15	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		3.5							22	10	A-4b	8						
20	B	SS-1	1.5	3.0	-0.1	1.4	40	30								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										0	Rock	0							
21	B	SS-1	1.5	3.0	-0.1	1.4	18	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		4.5							10	14	A-6a	10						
22	B	SS-1	2.5	4.0	0.9	2.4	39	30	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										0	Rock								
23	B	SS-1	0.0	1.5	-1.6	-0.1	10	30	4.5	23	17	6	31	17	48	11	12	A-4a	3	40		Rock		29"	
		048-0	SS-2	2.5	4.0	0.9	2.4		109								0	Rock	0						
	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									0	Rock								
24	B	SS-1	1.5	3.0	-0.1	1.4	21	14	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		3.75							13	10	A-4a	8						
25	B	SS-1	2.5	4.0	0.9	2.4	26	17	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									9	10	A-4a							
26	B	SS-1	1.5	3.0	-0.1	1.4	25	17	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		3.25							16	10	A-4a	8						
27	B	SS-1	1.5	3.0	-0.1	1.4	21	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		4.5							10	10	A-4a	8						



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			From	To	From	To	N <sub>60</sub>	N <sub>60L</sub>		LL	PL	PI	% Silt	% Clay	P200	M <sub>c</sub>	M <sub>OPT</sub>	Class		GI	Unsuitable	Unstable	Unsuitable		Unstable	
28	B 077-2 18	SS-1	1.5	3.0	-0.1	1.4	14	13	4.25	27	17	10	47	29	76	14	12	A-4a	8	223						
		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				
		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		4							17	10	A-4a	8							
29	B 077-3 18	SS-1	1.5	3.0	-0.1	1.4	9	9		NP	NP	NP	4	4	8	6	6	A-1-b	0	13						
		SS-2	3.0	4.5	1.4	2.9	10		4.25							18	6	A-1-b	0							
		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		3.25							19	10	A-4b	8							
30	B 077-4 18	SS-1	1.5	3.0	-0.1	1.4	14	13	4.25	29	19	10	53	33	86	16	14	A-4b	8	200	A-4b					
		SS-2	3.0	4.5	1.4	2.9	21		4.25							22	10	A-4b	8		A-4b	Mc	35"			
		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		3.75							27	10	A-4b	8							

**PID:** 102329

**County-Route-Section:** SUM-76-8.42

**No. of Borings:** 30

**Geotechnical Consultant:** ELR

**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 Average(N60L):	12"
Average(HP):	0"
Global Geogrid Average(N60L):	0"
Average(HP):	0"

<b>Design CBR</b>	<b>8</b>
-----------------------	----------

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

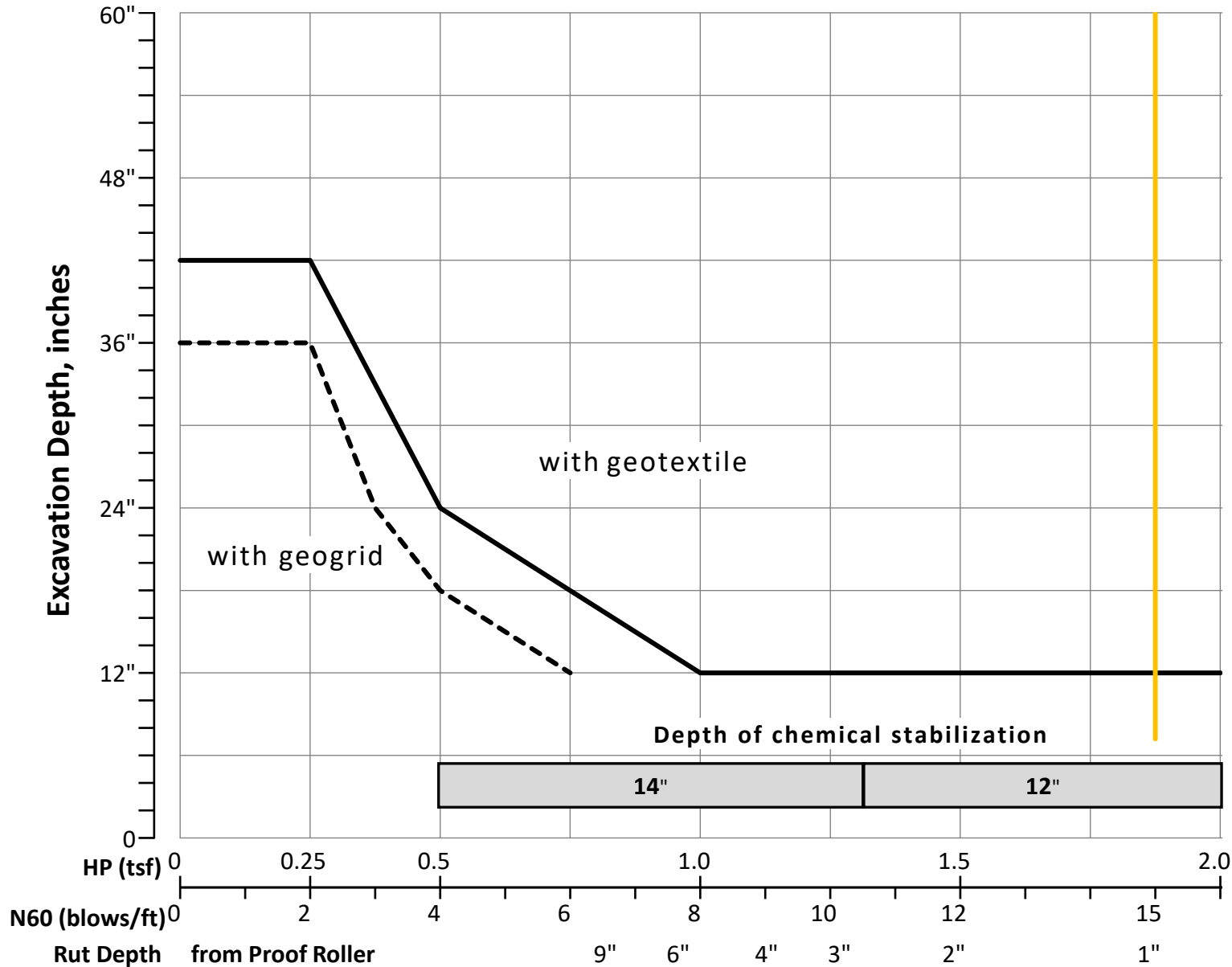
Excavate and Replace at Surface	
Average	0"
Maximum	0"
Minimum	0"

% 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
<b>Average</b>	25	15	4.00	23	16	7	29	17	44	12	9	4
<b>Maximum</b>	160	30	4.50	32	24	12	69	33	97	53	19	16
<b>Minimum</b>	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
<b>Count</b>	9	5	9	2	0	0	0	0	16	55	9	0	8	1	0	0	0	0	114
<b>Percent</b>	8%	4%	8%	2%	0%	0%	0%	0%	14%	48%	8%	0%	7%	1%	0%	0%	0%	0%	100%
<b>% Rock   Granular   Cohesive</b>	8%	76%										16%							100%
<b>Surface Class Count</b>	3	5	6	1	0	0	0	0	13	37	4	0	3	0	0	0	0	0	72
<b>Surface Class Percent</b>	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	<input type="checkbox"/> HP
15.03	6.00	<input type="checkbox"/> N60L

Average HP —  
Average N<sub>60L</sub> —