PROJECT NAME: 2nd Addition to East Parking Structure **PROJECT NUMBER:** 075370.00

CLIENT: Midwestern Consulting **PROJECT LOCATION:** Ann Arbor, Michigan

SURFACE ELEVATION: 796.9 FT

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	BLOWS PER SIX INCHES	N-VALUE	REMARKS
30.0–32.0	Fine SAND- Gray- Wet- Dense to Medium Dense (SP) *(continued)*	764.9					
32.0–37.0	Fine to Coarse SAND with Gravel- Gray- Wet- Dense (SP)	759.9	SB9	18	14 18 21	39	
37.0–55.0	Fine to Medium SAND with Silt- Brown- Wet- Dense to Very Dense (SP-SM)	741.9	SB10	18	7 11 19	30	
			SB11	18	12 15 17	32	
			SB12	18	15 17 19	36	
			SB13	18	15 20 33	53	
55.0–60.0	Fine SAND with Silt- Brown- Wet- Very Dense (SP-SM)	736.9	SB14	18	21 23 31	54	

END OF BORING AT 60.0 FEET.

Legend: DRY DENSITY (pcf) – ■ (90 100 110 120); MOISTURE & ATTERBERG LIMITS (%) PL MC LL (10 20 30 40); ▽ HAND PENE. ⊠ TORVANE SHEAR ○ UNC.COMP. ⊡ VANE SHEAR (PK) ✕ VANE SHEAR (REM) ⊕ TRIAXIAL (UU) SHEAR STRENGTH (KSF) (1 2 3 4); N-VALUE – ○ (10 20 30 40)

BORING B2

SME

PROJECT NAME: 2nd Addition to East Parking Structure
PROJECT NUMBER: 075370.00
CLIENT: Midwestern Consulting
PROJECT LOCATION: Ann Arbor, Michigan
DATE STARTED: 1/18/17 **COMPLETED:** 1/18/17
BORING METHOD: Solid-stem Augers
DRILLER: RM **RIG NO.:** 167
LOGGED BY: KJT **CHECKED BY:** KLW

SURFACE ELEVATION: 803 FT

DEPTH (FEET)	ELEVATION (FEET)	PROFILE DESCRIPTION
0 – 2.5	800.5	FILL- Fine to Coarse SAND with Silt- Some Concrete & Brick Fragments- Dark Brown- Moist- Dense (SP-SM/Crushed Concrete)
2.5 – 6.0	797.0	FILL- LEAN CLAY with Sand- Occasional Topsoil Layers- Brown & Black- Hard (CL)
6.0 – 12.0	791.0	Fine SAND with Silt- Occasional Clay Seams- Brown- Medium Dense (SP-SM)
12.0 – 14.0	789.0	LEAN CLAY with Sand- Gray- Hard (CL)
14.0 – 15.0	788.0	Fine SILTY SAND- Gray- Wet- Medium Dense (SM)
15.0 – 30		LEAN CLAY with Sand- Occasional Wet Sand Layers after 21 feet- Gray- Hard to Stiff (CL)

SAMPLE TYPE/NO.	RECOVERY LENGTH (INCHES)	BLOWS PER SIX INCHES	N-VALUE	MOISTURE (%)	HAND PENE. SHEAR STRENGTH (KSF)
SB1	6	18 23 25	48		
SB2	18	7 12 12	24	10	
SB3	18	4 5 5	10		
SB4	18	4 4 6	10		
SB5	18	10 12 10	22	13	4.5+
SB6	18	6 7 9	16	11	4.5+
SB7	18	5 6 8	14	12	
SB8	18	5 6 6	12	14	

REMARKS

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
DURING BORING:	14.0	789.0
AT END OF BORING:	Note 2	

BACKFILL METHOD: Bentonite Chips 15 to 25 feet, Auger Cuttings above 15 feet & below 25 feet

NOTES:
1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Wash water used in hollow-stem augers below a depth of 35 feet, therefore, an accurate groundwater level measurement was not obtained after the completion of drilling activities.

(Continued Next Page)

SME

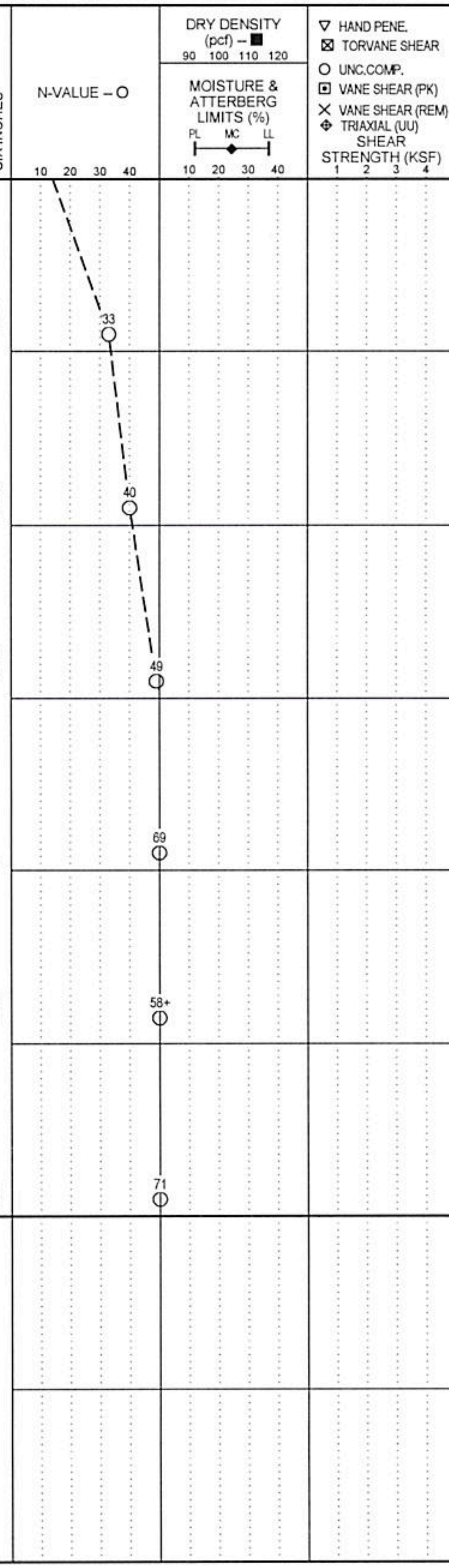
BORING B2

PROJECT NAME: 2nd Addition to East Parking Structure
PROJECT NUMBER: 075370.00
CLIENT: Midwestern Consulting
PROJECT LOCATION: Ann Arbor, Michigan

SURFACE ELEVATION: 803 FT

Depth (feet)	Elevation (feet)	Profile Description	Sample Type/No.	Recovery Length (inches)	Blows per Six Inches	N-Value	Remarks
32.0	771.0						
39.5	763.5	Fine to Coarse SAND- Gray- Wet- Dense (SP)	SB9	6	10 12 21	33	
			SB10	3	14 25 15	40	
48.5	754.5	Fine SAND- Brown- Wet- Dense (SP)	SB11	18	17 18 31	49	
60.0	743.0	Fine SAND with Silt- Brown- Wet- Very Dense to Extremely Dense (SP-SM)	SB12	18	21 31 38	69	
			SB13	12	28 58	58+	
			SB14	18	21 34 37	71	

END OF BORING AT 60.0 FEET.



SME

BORING B3

PROJECT NAME: 2nd Addition to East Parking Structure
PROJECT NUMBER: 075370.00
CLIENT: Midwestern Consulting
PROJECT LOCATION: Ann Arbor, Michigan

DATE STARTED: 1/17/17 **COMPLETED:** 1/17/17
BORING METHOD: Solid-stem Augers
DRILLER: RM **RIG NO.:** 167
LOGGED BY: KJT **CHECKED BY:** KLW

SURFACE ELEVATION: 802.5 FT

Legend: DRY DENSITY (pcf) -- ■ (90 100 110 120); N-VALUE -- O (10 20 30 40); MOISTURE & ATTERBERG LIMITS (%) PL MC LL (10 20 30 40); ▽ HAND PENE.; ⊠ TORVANE SHEAR; O UNC.COMP.; ⊡ VANE SHEAR (PK); ✕ VANE SHEAR (REM); ⊕ TRIAXIAL (UU); SHEAR STRENGTH (KSF) (1 2 3 4); REMARKS

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)
1.0	12 inches of Sandy TOPSOIL- Black	801.5
3.0	Fine CLAYEY SAND- Brown- Moist- Very Loose (SC)	799.5
10.0	LEAN CLAY- Frequent Silt Partings- Occasional Sand Layer from about 8.5 to 9.5 feet- Brown & Gray- Hard (CL)	792.5
14.0	LEAN CLAY- Occasional Wet Sand Layers- Gray- Hard (CL)	788.5
28.0	Fine SAND with Silt- Occasional Clay Layers- Gray- Wet- Medium Dense (SP-SM)	774.5
	LEAN CLAY- Gray- Very Stiff (CL)	

SAMPLE TYPE/NO.	RECOVERY LENGTH (INCHES)	BLOWS PER SIX INCHES	N-VALUE	MOISTURE (%)	SHEAR STRENGTH (KSF)
SB1	18	2 2 2	4	17	
SB2	18	7 9 12	21	9	4.5+
SB3	18	10 11 17	28	14	4.5+
SB4	18	6 30 25	55	14	4.5+
SB5	18	8 10 10	20	21	4.5+
SB6	18	4 4 6	10		
SB7	18	10 12 20	32		
SB8	18	6 8 9	17	23	▽

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ DURING BORING:	12.0	790.5
▼ AT END OF BORING:	Note 2	
▼ 24 HRS AFTER BORING:	12.0	790.5

BACKFILL METHOD: Bentonite Chips 10 to 30 feet, Auger Cuttings above 10 feet & below 30 feet

NOTES: 1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Wash water used in hollow-stem augers below a depth of 20 feet, therefore, an accurate groundwater level measurement was not obtained after the completion of drilling activities.

(Continued Next Page)

BORING B3

SME

PROJECT NAME: 2nd Addition to East Parking Structure
PROJECT NUMBER: 075370.00
CLIENT: Midwestern Consulting
PROJECT LOCATION: Ann Arbor, Michigan

SURFACE ELEVATION: 802.5 FT

DEPTH (FEET)	ELEVATION (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	BLOWS PER SIX INCHES	N-VALUE	REMARKS
30.0–33.0	– 769.5	LEAN CLAY- Gray- Very Stiff (CL) *(continued)*					
33.0–58.0	769.5 – 744.5	Fine to Medium SAND- Occasional Gravel Layer- Brown- Wet- Dense to Very Dense (SP)	SB9	6	15 18 23	41	
			SB10	18	15 21 30	51	
			SB11	18	9 16 31	47	
			SB12	18	10 19 28	47	
			SB13	18	17 18 38	56	
58.0–60.0	744.5 – 742.5	Fine to Coarse SAND with Silt & Gravel- Brown- Wet- Very Dense (SP-SM)	SB14	18	17 28 33	61	

END OF BORING AT 60.0 FEET.

Legend: N-VALUE – O; DRY DENSITY (pcf) – ■ (90, 100, 110, 120); MOISTURE & ATTERBERG LIMITS (%) PL, MC, LL (10, 20, 30, 40); ▽ HAND PENE.; ⊠ TORVANE SHEAR; O UNC.COMP.; ⊡ VANE SHEAR (PK); X VANE SHEAR (REM); ⊕ TRIAXIAL (UU); SHEAR STRENGTH (KSF) (1, 2, 3, 4)

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May 12, 2016

Mike Daniels
Daniels Building Company
33900 West Eight Mile Rd
Suite 161
Farmington Hills, Michigan 48335

Via email: mdaniels@danielsbuildingcompany.com (PDF file)

RE: Pile Load Tests
VA Hospital – East Parking Structure Expansion
Ann Arbor, Michigan
SME Project No. 074304.00

Dear Mr. Daniels:

This letter summarizes the results of the compression load tests performed for the referenced project.

PROJECT DESCRIPTION

SME observed compression load tests performed on two test piles on May 11, 2016. The test piles consisted of 16-inch diameter, auger cast-in-place (ACIP) piles extending to about 40 feet (Test Pile #2) and 44 feet (Test Pile #1) beneath the ground surface. The compression load test was based on ASTM D-1143, Standard Test Methods for Deep Foundations Under Static Axial Compressive Load, using the "Quick Test" method. SME observed the installation of the test pile and the four reaction piles for each of the two load tests. Please refer to our Auger Cast Pile Reports for information regarding grout strength and installation observations.

LOAD TEST RESULTS

The allowable compressive capacity for the piles is 200 kips. The maximum test load is twice the allowable capacity or 400 kips. Each load test was performed by positioning a cylindrical hydraulic jack between a reaction frame which was fastened to the 4 reaction piles. The load test was performed by Hardman Construction. The compressive strength of the grout was about 3,700 psi (Test Pile #1) and 3,400 psi (Test Pile #2) at the time of the tests.

During the compression load tests, SME measured the deflection of the piles using 3 independent dial gauges, as well as a mirror/wire system. For the compression test, the piles were loaded in 5 percent increments of the 400 kip maximum test load (about 20 kips each). Each load increment was held for a 4 minute period, except for the maximum load of 400 kips, which was held for 120 minutes. For Test Pile #2, while maintaining the ultimate load of 400 kips, the creep deflection recorded from the 0.5 minute reading to the 120 minute reading was 0.020 inches. The creep deflection for Test Pile #1 during this period was 0.022 inches.

After the ultimate load hold period, the piles were unloaded in five equal increments (about 80 kips each) and the rebound was recorded.

Attached to this letter are graphical representations of the load-deflection curves using the average of the dial gauges for the load tests. For Test Pile #2, the test data indicates that the pile experienced 0.317 inches of deflection at the ultimate load of 400 kips (after the 120 minute hold). After the pile was unloaded, the net settlement was 0.114 inches. For Test Pile #1, the deflection at the ultimate load of 400 kips (after the 120 minute hold) was 0.291 inches. After unloading, the net settlement was 0.109 inches. The load test curves illustrate that the ACIP test piles were suitable for the support of the maximum test load.

Based on the load test results, both of the test piles did not reach their ultimate capacities. Therefore, SME judges the ACIP piles to be suitable for the design allowable capacities, based on a minimum factor of safety of 2.0.

We appreciate the opportunity to be of service. If you have questions regarding this report or if you require additional information, please contact us.

Very truly yours,

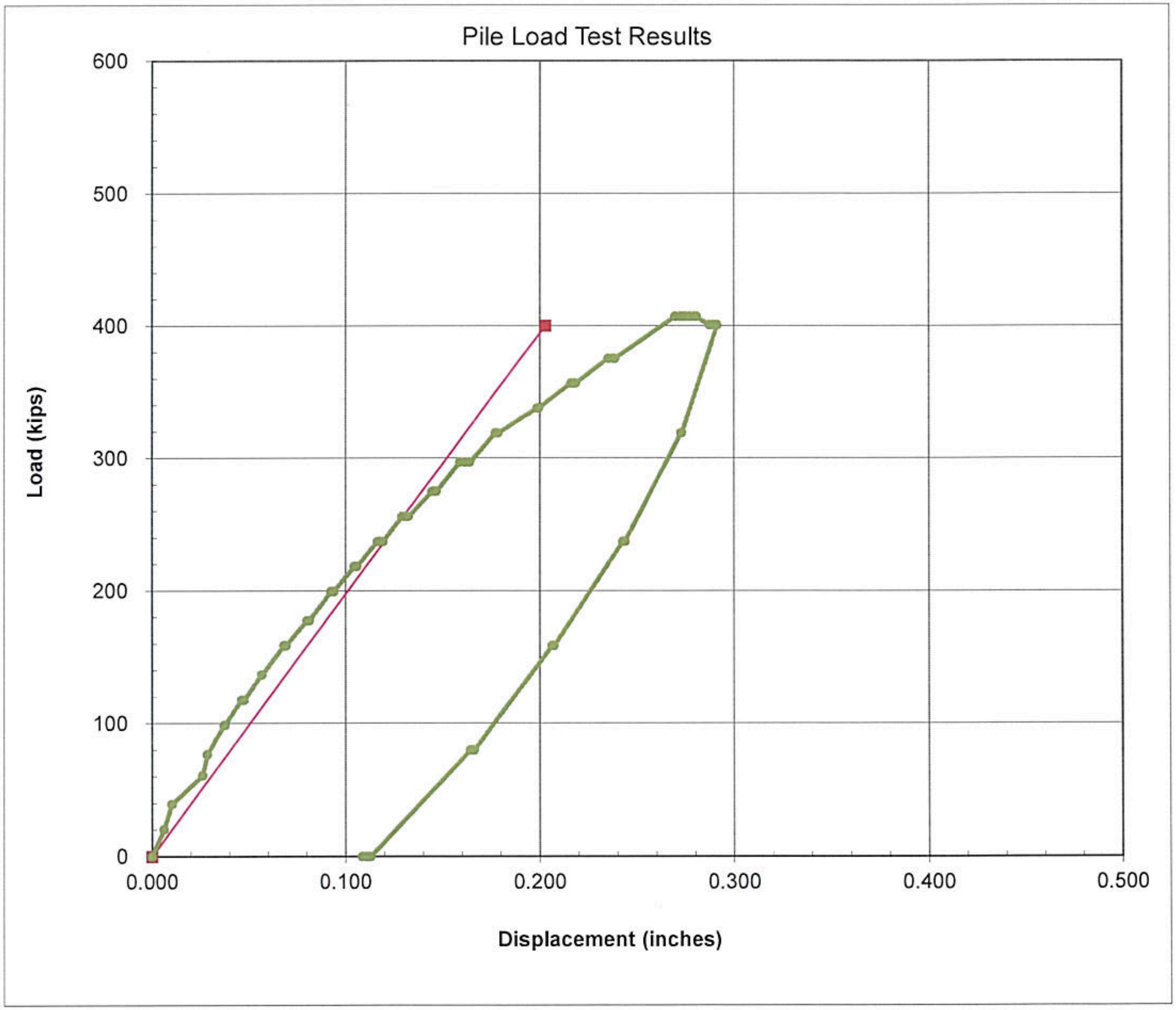
SME

Alex Kuisell, EIT
Senior Staff Engineer

Timothy H. Bedenis, PE
Chief Geotechnical Engineer

Attachments: ACIP Pile Load Test – Graph and Table

Compression Load Test Pile Load Test
Pile Load Test #1 - 5/11/2016



Compression Load Test Pile Load Test Data

Project No.: **74304**
Project Name: **VA Hospital E. Parking Structure Expansion- Ann Arbor, MI**
Jack: **300 ton, Model #14646H**
Pile No. **Test Pile #1**

Date: 5/11/2016
Max. Test Load: 400 kips
Weather: 60-65, partly cloudy

Compression Load Test

Load Increment (%)	Test Load Increment (kips)	Gauge Pressure (psi)	Load Cell Reading (kips)	Time of Day(hr:min)	Time Interval (min)	Gauge 1	Gauge 2	Gauge 3	Avg. Displace (in)	Wire & Mirror*
0	0	0	0	13:20	initial	2.0000	2.0000	2.0000	0.0000	1.6875
10	20.5	300			0.5	1.9890	1.9950	1.9970	0.0063	
(load)	20.5	300			1	1.9890	1.9950	1.9970	0.0063	
	20.5	300			2	1.9890	1.9950	1.9970	0.0063	
	20.5	300		13:25	4	1.9890	1.9950	1.9970	0.0063	
20	39.4	600			0.5	1.9820	1.9920	1.9950	0.0103	
(load)	39.4	600			1	1.9820	1.9920	1.9950	0.0103	
	39.4	600			2	1.9820	1.9920	1.9950	0.0103	
	39.4	600		13:30	4	1.9820	1.9920	1.9950	0.0103	
30.5	61.1	1000			0.5	1.9570	1.9800	1.9840	0.0263	
(load)	61.1	1000			1	1.9570	1.9800	1.9840	0.0263	
	61.1	1000			2	1.9570	1.9800	1.9840	0.0263	
	61.1	1000		13:35	4	1.9570	1.9800	1.9840	0.0263	
38	76.8	1250			0.5	1.9540	1.9780	1.9820	0.0287	
(load)	76.8	1250			1	1.9540	1.9780	1.9820	0.0287	
	76.8	1250			2	1.9540	1.9780	1.9820	0.0287	1.6875
	76.8	1250		13:40	4	1.9540	1.9780	1.9820	0.0287	
49	98.8	1600			0.5	1.9420	1.9720	1.9740	0.0373	
(load)	98.8	1600			1	1.9420	1.9710	1.9740	0.0377	
	98.8	1600			2	1.9420	1.9710	1.9740	0.0377	
	98.8	1600		13:45	4	1.9420	1.9710	1.9740	0.0377	
59	117.7	1900			0.5	1.9310	1.9640	1.9660	0.0463	
(load)	117.7	1900			1	1.9300	1.9640	1.9660	0.0467	
	117.7	1900			2	1.9300	1.9640	1.9660	0.0467	
	117.7	1900		13:50	4	1.9290	1.9630	1.9650	0.0477	
68	136.5	2200			0.5	1.9190	1.9550	1.9560	0.0567	
(load)	136.5	2200			1	1.9180	1.9550	1.9560	0.0570	
	136.5	2200			2	1.9180	1.9550	1.9560	0.0570	1.6250
	136.5	2200		13:55	4	1.9180	1.9550	1.9560	0.0570	
79	158.6	2550			0.5	1.9050	1.9450	1.9450	0.0683	
(load)	158.6	2550			1	1.9040	1.9440	1.9450	0.0690	
	158.6	2550			2	1.9040	1.9440	1.9450	0.0690	
	158.6	2550		14:00	4	1.9040	1.9430	1.9450	0.0693	
89	177.4	2850			0.5	1.8910	1.9340	1.9340	0.0803	
(load)	177.4	2850			1	1.8900	1.9330	1.9330	0.0813	
	177.4	2850			2	1.8900	1.9330	1.9330	0.0813	
	177.4	2850		14:05	4	1.8900	1.9330	1.9330	0.0813	
100	199.4	3200			0.5	1.8760	1.9240	1.9220	0.0927	
(load)	199.4	3200			1	1.8760	1.9240	1.9220	0.0927	1.5625
	199.4	3200			2	1.8750	1.9230	1.9210	0.0937	
	199.4	3200		14:10	4	1.8750	1.9220	1.9210	0.0940	

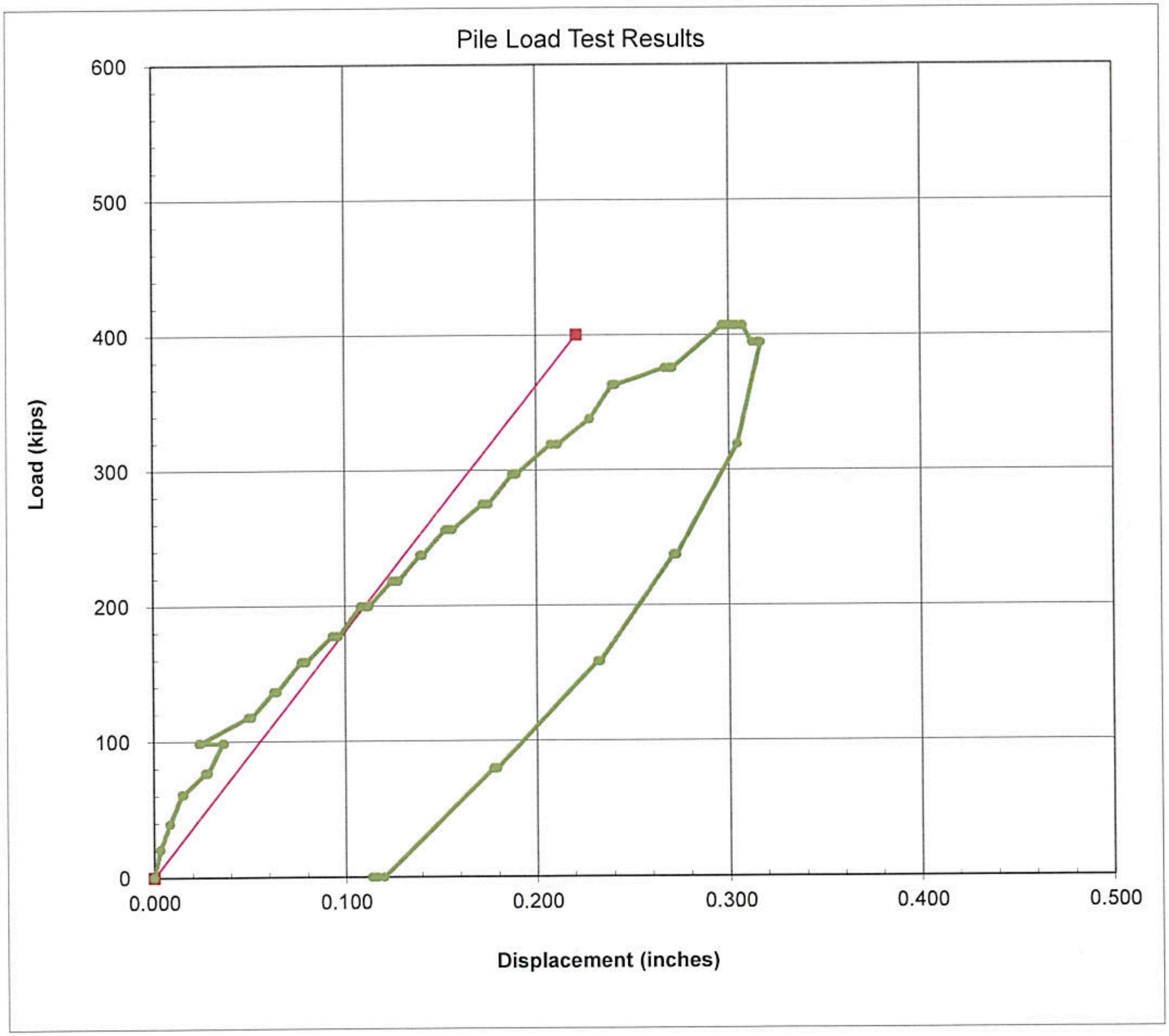
Compression Load Test

Load Increment (%)	Test Load Increment (kips)	Gauge Pressure (psi)	Load Cell Reading (kips)	Time of Day(hr:min)	Time Interval (min)	Gauge 1	Gauge 2	Gauge 3	Avg. Displace (in)	Wire & Mirror*
109	218.3	3500			0.5	1.8630	1.9130	1.9100	0.1047	
(load)	218.3	3500			1	1.8630	1.9120	1.9090	0.1053	
	218.3	3500			2	1.8620	1.9120	1.9090	0.1057	
	218.3	3500		14:15	4	1.8610	1.9120	1.9090	0.1060	
119	237.2	3800			0.5	1.8500	1.9030	1.8970	0.1167	
(load)	237.2	3800			1	1.8490	1.9020	1.8960	0.1177	
	237.2	3800			2	1.8480	1.9010	1.8960	0.1183	
	237.2	3800		14:20	4	1.8470	1.9000	1.8950	0.1193	
128	256.0	4100			0.5	1.8360	1.8910	1.8850	0.1293	1.5313
(load)	256.0	4100			1	1.8340	1.8890	1.8840	0.1310	
	256.0	4100			2	1.8340	1.8890	1.8830	0.1313	
	256.0	4100		14:25	4	1.8320	1.8890	1.8820	0.1323	
137	274.9	4400			0.5	1.8190	1.8770	1.8700	0.1447	
(load)	274.9	4400			1	1.8180	1.8760	1.8690	0.1457	
	274.9	4400			2	1.8180	1.8760	1.8690	0.1457	
	274.9	4400		14:30	4	1.8170	1.8750	1.8680	0.1467	
148	296.9	4750			0.5	1.8040	1.8640	1.8550	0.1590	
(load)	296.9	4750			1	1.8010	1.8620	1.8530	0.1613	
	296.9	4750			2	1.8000	1.8620	1.8530	0.1617	
	296.9	4750		14:35	4	1.7980	1.8580	1.8520	0.1640	
159	318.9	5100			0.5	1.7840	1.8460	1.8380	0.1773	1.4688
(load)	318.9	5100			1	1.7830	1.8460	1.8360	0.1783	
	318.9	5100			2	1.7830	1.8460	1.8360	0.1783	
	318.9	5100		14:40	4	1.7820	1.8460	1.8360	0.1787	
169	337.8	5400			0.5	1.7610	1.8280	1.8150	0.1987	
(load)	337.8	5400			1	1.7600	1.8280	1.8150	0.1990	
	337.8	5400			2	1.7600	1.8270	1.8150	0.1993	
	337.8	5400		14:45	4	1.7600	1.8270	1.8150	0.1993	
178	356.7	5700			0.5	1.7430	1.8110	1.7980	0.2160	1.4375
(load)	356.7	5700			1	1.7420	1.8100	1.7970	0.2170	
	356.7	5700			2	1.7410	1.8100	1.7960	0.2177	
	356.7	5700		14:50	4	1.7400	1.8090	1.7960	0.2183	
188	375.5	6000			0.5	1.7230	1.7930	1.7780	0.2353	
(load)	375.5	6000			1	1.7200	1.7910	1.7760	0.2377	
	375.5	6000			2	1.7200	1.7900	1.7760	0.2380	
	375.5	6000		14:55	4	1.7190	1.7900	1.7750	0.2387	
203	407.0	6500		14:56	0.5	1.6860	1.7600	1.7450	0.2697	1.3750
(load)	407.0	6500			1	1.6830	1.7570	1.7430	0.2723	
	407.0	6500			2	1.6810	1.7570	1.7410	0.2737	
	407.0	6500			4	1.6790	1.7560	1.7400	0.2750	
	407.0	6500			8	1.6760	1.7540	1.7380	0.2773	
	407.0	6500			15	1.6740	1.7520	1.7360	0.2793	
	407.0	6500			30	1.6710	1.7520	1.7350	0.2807	
	400.7	6400			45	1.6640	1.7460	1.7280	0.2873	1.3438
	400.7	6400			60	1.6610	1.7450	1.7270	0.2890	
	400.7	6400			75	1.6600	1.7450	1.7260	0.2897	
	400.7	6400			90	1.6590	1.7450	1.7260	0.2900	
	400.7	6400			105	1.6590	1.7450	1.7260	0.2900	
	400.7	6400		16:56	120	1.6570	1.7440	1.7250	0.2913	1.3438

Compression Load Test

Load Increment (%)	Test Load Increment (kips)	Gauge Pressure (psi)	Load Cell Reading (kips)	Time of Day(hr:min)	Time Interval (min)	Gauge 1	Gauge 2	Gauge 3	Avg. Displace (in)	Wire & Mirror*
159	318.9	5100		16:57	0.5	1.6740	1.7630	1.7440	0.2730	
(unload)	318.9	5100			1	1.6740	1.7630	1.7440	0.2730	
	318.9	5100			2	1.6740	1.7630	1.7440	0.2730	
	318.9	5100		17:02	4	1.6750	1.7630	1.7440	0.2727	
119	237.2	3800			0.5	1.7070	1.7900	1.7720	0.2437	1.4063
(unload)	237.2	3800			1	1.7070	1.7900	1.7730	0.2433	
	237.2	3800			2	1.7070	1.7910	1.7740	0.2427	
	237.2	3800		17:07	4	1.7070	1.7910	1.7740	0.2427	
79	158.6	2550			0.5	1.7460	1.8240	1.8080	0.2073	1.4375
(unload)	158.6	2550			1	1.7470	1.8250	1.8080	0.2067	
	158.6	2550			2	1.7470	1.8250	1.8090	0.2063	
	158.6	2550		17:12	4	1.7470	1.8250	1.8090	0.2063	
40	79.9	1300			0.5	1.7960	1.8610	1.8440	0.1663	1.4688
(unload)	79.9	1300			1	1.7970	1.8620	1.8450	0.1653	
	79.9	1300			2	1.7970	1.8630	1.8450	0.1650	
	79.9	1300		17:17	4	1.7980	1.8630	1.8460	0.1643	
0	0.0	0		17:18	0.5	1.8700	1.9000	1.8910	0.1130	1.5313
(unload)	0.0	0			1	1.8700	1.9020	1.8910	0.1123	
	0.0	0			2	1.8710	1.9020	1.8910	0.1120	
	0.0	0			4	1.8720	1.9030	1.8920	0.1110	
	0.0	0			8	1.8720	1.9040	1.8920	0.1107	
	0.0	0		17:33	15	1.8740	1.9060	1.8940	0.1087	1.5313

Compression Load Test Pile Load Test
Pile Load Test #2 - 5/11/2016



Compression Load Test Pile Load Test Data

Project No.: 74304
Project Name: VA Hospital E. Parking Structure Expansion- Ann Arbor, MI
Jack: 300 ton, Model #14646H
Pile No. Test Pile #2

Date: 5/11/2016
Max. Test Load: 400 kips
Weather: 60-65, partly cloudy

Compression Load Test

Load Increment (%)	Test Load Increment (kips)	Gauge Pressure (psi)	Load Cell Reading (kips)	Time of Day(hr:min)	Time Interval (min)	Gauge 1	Gauge 2	Gauge 3	Avg. Displace (in)	Wire & Mirror*
0	0	0	0	8:00	initial	2.0000	2.0000	2.0000	0.0000	1.8125
10	20.5	300			0.5	1.9950	1.9980	1.9970	0.0033	
(load)	20.5	300			1	1.9950	1.9980	1.9970	0.0033	
	20.5	300			2	1.9950	1.9980	1.9970	0.0033	
	20.5	300		8:05	4	1.9950	1.9980	1.9970	0.0033	
20	39.4	600			0.5	1.9890	1.9940	1.9920	0.0083	
(load)	39.4	600			1	1.9890	1.9940	1.9920	0.0083	
	39.4	600			2	1.9890	1.9940	1.9920	0.0083	
	39.4	600		8:10	4	1.9890	1.9940	1.9920	0.0083	
30.5	61.1	1000			0.5	1.9810	1.9880	1.9870	0.0147	
(load)	61.1	1000			1	1.9810	1.9880	1.9870	0.0147	
	61.1	1000			2	1.9800	1.9880	1.9870	0.0150	1.8125
	61.1	1000		8:15	4	1.9800	1.9870	1.9870	0.0153	
38	76.8	1250			0.5	1.9660	1.9770	1.9760	0.0270	
(load)	76.8	1250			1	1.9660	1.9760	1.9760	0.0273	
	76.8	1250			2	1.9650	1.9760	1.9750	0.0280	
	76.8	1250		8:20	4	1.9650	1.9760	1.9740	0.0283	
49	98.8	1600			0.5	1.9560	1.9690	1.9670	0.0360	
(load)	98.8	1600			1	1.9550	1.9680	1.9670	0.0367	
	98.8	1600			2	1.9950	1.9680	1.9660	0.0237	
	98.8	1600		8:25	4	1.9950	1.9670	1.9650	0.0243	
59	117.7	1900			0.5	1.9430	1.9560	1.9530	0.0493	
(load)	117.7	1900			1	1.9420	1.9560	1.9520	0.0500	
	117.7	1900			2	1.9420	1.9550	1.9510	0.0507	
	117.7	1900		8:30	4	1.9410	1.9550	1.9510	0.0510	
68	136.5	2200			0.5	1.9290	1.9440	1.9390	0.0627	
(load)	136.5	2200			1	1.9280	1.9430	1.9380	0.0637	
	136.5	2200			2	1.9270	1.9430	1.9380	0.0640	1.7500
	136.5	2200		8:35	4	1.9270	1.9420	1.9380	0.0643	
79	158.6	2550			0.5	1.9140	1.9300	1.9250	0.0770	
(load)	158.6	2550			1	1.9130	1.9290	1.9230	0.0783	
	158.6	2550			2	1.9130	1.9280	1.9220	0.0790	
	158.6	2550		8:40	4	1.9120	1.9270	1.9220	0.0797	
89	177.4	2850			0.5	1.8980	1.9140	1.9080	0.0933	
(load)	177.4	2850			1	1.8960	1.9120	1.9060	0.0953	
	177.4	2850			2	1.8960	1.9120	1.9050	0.0957	
	177.4	2850		8:45	4	1.8950	1.9110	1.9040	0.0967	
100	199.4	3200			0.5	1.8840	1.8990	1.8920	0.1083	
(load)	199.4	3200			1	1.8810	1.8970	1.8900	0.1107	
	199.4	3200			2	1.8800	1.8970	1.8890	0.1113	
	199.4	3200		8:50	4	1.8790	1.8960	1.8880	0.1123	

Compression Load Test

Load Increment (%)	Test Load Increment (kips)	Gauge Pressure (psi)	Load Cell Reading (kips)	Time of Day(hr:min)	Time Interval (min)	Gauge 1	Gauge 2	Gauge 3	Avg. Displace (in)	Wire & Mirror*
109	218.3	3500			0.5	1.8670	1.8840	1.8750	0.1247	
(load)	218.3	3500			1	1.8650	1.8820	1.8730	0.1267	
	218.3	3500			2	1.8640	1.8810	1.8720	0.1277	
	218.3	3500		8:55	4	1.8640	1.8810	1.8710	0.1280	
119	237.2	3800			0.5	1.8530	1.8690	1.8600	0.1393	
(load)	237.2	3800			1	1.8520	1.8690	1.8600	0.1397	
	237.2	3800			2	1.8510	1.8690	1.8600	0.1400	
	237.2	3800		9:00	4	1.8510	1.8680	1.8590	0.1407	
128	256.0	4100			0.5	1.8390	1.8560	1.8470	0.1527	1.6563
(load)	256.0	4100			1	1.8370	1.8550	1.8450	0.1543	
	256.0	4100			2	1.8370	1.8540	1.8450	0.1547	
	256.0	4100		9:05	4	1.8350	1.8530	1.8430	0.1563	
137	274.9	4400			0.5	1.8190	1.8380	1.8270	0.1720	
(load)	274.9	4400			1	1.8180	1.8370	1.8270	0.1727	
	274.9	4400			2	1.8170	1.8370	1.8270	0.1730	
	274.9	4400		9:10	4	1.8160	1.8350	1.8240	0.1750	
148	296.9	4750			0.5	1.8040	1.8220	1.8110	0.1877	
(load)	296.9	4750			1	1.8020	1.8210	1.8100	0.1890	1.6250
	296.9	4750			2	1.8020	1.8210	1.8090	0.1893	
	296.9	4750		9:15	4	1.8020	1.8200	1.8090	0.1897	
159	318.9	5100			0.5	1.7840	1.8020	1.7910	0.2077	
(load)	318.9	5100			1	1.7810	1.8000	1.7870	0.2107	
	318.9	5100			2	1.7800	1.7990	1.7870	0.2113	
	318.9	5100		9:20	4	1.7800	1.7990	1.7870	0.2113	
169	337.8	5400			0.5	1.7630	1.7830	1.7710	0.2277	
(load)	337.8	5400			1	1.7630	1.7830	1.7710	0.2277	
	337.8	5400			2	1.7620	1.7830	1.7710	0.2280	
	337.8	5400		9:25	4	1.7620	1.7830	1.7710	0.2280	
181	363.0	5800			0.5	1.7510	1.7710	1.7590	0.2397	
(load)	363.0	5800			1	1.7500	1.7700	1.7580	0.2407	
	363.0	5800			2	1.7500	1.7700	1.7580	0.2407	
	363.0	5800		9:30	4	1.7490	1.7700	1.7570	0.2413	
188	375.5	6000			0.5	1.7240	1.7440	1.7310	0.2670	
(load)	375.5	6000			1	1.7210	1.7430	1.7280	0.2693	
	375.5	6000			2	1.7200	1.7420	1.7280	0.2700	1.5313
	375.5	6000		9:35	4	1.7190	1.7410	1.7270	0.2710	
203	407.0	6500		9:36	0.5	1.6940	1.7160	1.7000	0.2967	
(load)	407.0	6500			1	1.6930	1.7150	1.7000	0.2973	
	407.0	6500			2	1.6920	1.7130	1.6980	0.2990	
	407.0	6500			4	1.6900	1.7120	1.6970	0.3003	
	407.0	6500			8	1.6880	1.7100	1.6950	0.3023	
	407.0	6500			15	1.6860	1.7080	1.6940	0.3040	
	407.0	6500			30	1.6840	1.7050	1.6900	0.3070	1.5000
	407.0	6500			45	1.6840	1.7040	1.6900	0.3073	
	394.4	6300			60	1.6780	1.6980	1.6870	0.3123	
	394.4	6300			75	1.6760	1.6960	1.6830	0.3150	1.5000
	394.4	6300			90	1.6760	1.6950	1.6830	0.3153	
	394.4	6300			105	1.6740	1.6930	1.6830	0.3167	
	394.4	6300		11:36	120	1.6740	1.6930	1.6830	0.3167	1.4688

Compression Load Test

Load Increment (%)	Test Load Increment (kips)	Gauge Pressure (psi)	Load Cell Reading (kips)	Time of Day(hr:min)	Time Interval (min)	Gauge 1	Gauge 2	Gauge 3	Avg. Displace (in)	Wire & Mirror*
159	318.9	5100		11:37	0.5	1.6870	1.7050	1.6950	0.3043	
(unload)	318.9	5100			1	1.6870	1.7050	1.6950	0.3043	
	318.9	5100			2	1.6870	1.7050	1.6950	0.3043	
	318.9	5100			4	1.6870	1.7050	1.6950	0.3043	
119	237.2	3800		11:42	0.5	1.7190	1.7350	1.7270	0.2730	
(unload)	237.2	3800			1	1.7190	1.7360	1.7270	0.2727	
	237.2	3800			2	1.7200	1.7370	1.7280	0.2717	1.5000
	237.2	3800			4	1.7210	1.7370	1.7280	0.2713	
79	158.6	2550		11:47	0.5	1.7590	1.7740	1.7680	0.2330	
(unload)	158.6	2550			1	1.7600	1.7750	1.7690	0.2320	
	158.6	2550			2	1.7600	1.7750	1.7690	0.2320	
	158.6	2550			4	1.7600	1.7750	1.7700	0.2317	
40	79.9	1300		11:52	0.5	1.8160	1.8240	1.8220	0.1793	1.5625
(unload)	79.9	1300			1	1.8170	1.8250	1.8230	0.1783	
	79.9	1300			2	1.8170	1.8250	1.8240	0.1780	
	79.9	1300			4	1.8180	1.8260	1.8240	0.1773	
0	0.0	0		11:57	0.5	1.8800	1.8800	1.8800	0.1200	
(unload)	0.0	0			1	1.8830	1.8830	1.8840	0.1167	
	0.0	0			2	1.8850	1.8840	1.8850	0.1153	
	0.0	0			4	1.8860	1.8860	1.8870	0.1137	1.6250

APPENDIX B

IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL ENGINEERING REPORT
GENERAL COMMENTS
LABORATORY TESTING PROCEDUES

Important Information about This
Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be,* and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL
BUSINESS
ASSOCIATION

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