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11 December 2014
File: P939

Mr. Akiva Kobre
Fortis Property Group LLC
45 Main Street, Suite 800
Brooklyn, N.Y. 11201
Via e-mail: akobre@fortispropertygroup.com

151-161 Maiden Lane, N.Y., N.Y.
Structural Engineering Peer Review

Dear Akiva:

At the request of Fortis Property Group, Leslie E. Robertson Associates, PLLC has conducted a Structural Peer Review of the design of 151-161 Maiden Lane as required by New York City Building Code Section 1627. This report summarizes the extent and findings of our review.

We have reviewed the plans listed in Appendix A, as well as the available wind tunnel and geotechnical reports, copies of which are attached to this report as Appendix B.

We have reviewed the Structural Design Criteria prepared by WSP Group, dated November 2014 and a copy is attached as Appendix C.

Through our review, we have confirmed the following aspects of the structural design, as required by Section 1627.6.1:

- the design loads conform to the Building Code;
- the design criteria and design assumptions conform to the Building Code;
- the design properly incorporates the recommendations of the geotechnical engineer;
- the structure has a complete load path;
- based on our independent calculations of representative foundations, columns, walls, beams, and slabs, we find that the design of the structure has adequate strength;
- the structural plans are in general conformance with the architectural plans regarding loads and other conditions that affect the structural design; and
- the structural plans are generally complete.

Accordingly, we find the design of the structure to be in general conformance with the structural design provisions of the Building Code.

The opinions expressed in this letter represent our professional view, based on the information made available to us. In developing these opinions, we have exercised a degree of care and skill commensurate with that exercised by professional engineers licensed in the State of New York for similar types of projects. No other warranty, expressed or implied, is made as to the professional advice included in this letter.

Very truly yours,

LESLIE E. ROBERTSON ASSOCIATES, PLLC

STATE OF NEW YORK
WILLIAM JAMES FASCHAN
066872
LICENSED PROFESSIONAL ENGINEER

William J. Faschan
Member

Enclosure

Cc: Mr. P. Chan, WSP, via e-mail: Patrick.Chan@WSPGroup.com

Appendix A

Structural Drawing List

APPENDIX A

151-161 MAIDEN LANE PEER REVIEW

STRUCTURAL DRAWING LIST

DRAWING NUMBER	DRAWING TITLE	REV	DATE
FO-001.00	General Notes	6	11-12-2014
FO-100.00	Foundation Plan	6	11-12-2014
FO-110.00	Foundation Mat Reinforcing Detail	3	11-12-2014
FO-200.00	Foundation Typical Details 1	6	11-12-2014
FO-201.00	Foundation Typical Details 2	6	11-12-2014
S-020.00	2nd Floor Framing Plan	4	11-12-2014
S-030.00	3rd Floor Framing Plan	4	11-12-2014
S-040.00	4th Floor Framing Plan	4	11-12-2014
S-050.00	5th Floor Framing Plan	4	11-12-2014
S-060.00	6th Floor Framing Plan	3	11-12-2014
S-070.00	7th-10th Floor Framing Plan	3	11-12-2014
S-110.00	11th Floor Framing Plan	3	11-12-2014
S-120.00	12th-17th Floor Framing Plan	4	11-12-2014
S-180.00	18th-21st Floor Framing Plan	3	11-12-2014
S-220.00	22nd-24th Floor Framing Plan	3	11-12-2014
S-250.00	25th Floor Framing Plan	4	11-12-2014
S-255.00	25th Floor Mezzanine Framing Plan	4	11-12-2014
S-260.00	26th Floor Framing Plan	4	11-12-2014

DRAWING NUMBER	DRAWING TITLE	REV	DATE
S-270.00	27th-28th Floor Framing Plan	4	11-12-2014
S-290.00	29th Floor Framing Plan	3	11-12-2014
S-300.00	30th Floor Framing Plan	3	11-12-2014
S-310.00	31st Floor Framing Plan	3	11-12-2014
S-320.00	32nd Floor Framing Plan	3	11-12-2014
S-330.00	33rd Floor Framing Plan	3	11-12-2014
S-340.00	34th-35th Floor Framing Plan	3	11-12-2014
S-360.00	36th-38th Floor Framing Plan	3	11-12-2014
S-390.00	39th Floor Framing Plan	3	11-12-2014
S-400.00	40th-46th Floor Framing Plan	3	11-12-2014
S-470.00	47th Floor Framing Plan	4	11-12-2014
S-475.00	47th Floor Mezzanine Framing Plan	4	11-12-2014
S-480.00	48th Floor Framing Plan	4	11-12-2014
S-490.00	49th, 51st Floor Framing Plan	4	11-12-2014
S-500.00	50th Floor Framing Plan	4	11-12-2014
S-520.00	Slosh Tank Floor Framing Plan (Lower)	4	11-12-2014
S-525.00	Slosh Tank Floor Framing Plan (Upper)	4	11-12-2014
S-530.00	Roof Framing Plan	4	11-12-2014
S-940.00	Shearwall Reinforcement Plan @ 1st-3rd Fl.	4	11-12-2014
S-941.00	Shearwall Reinforcement Plan @ 4th-10th Fl.	4	11-12-2014
S-942.00	Shearwall Reinforcement Plan @ 11th-25th Fl.	4	11-12-2014
S-943.00	Shearwall Reinforcement Plan @ 26th Fl. – Slosh Tank Level 2	4	11-12-2014
S-944.00	Link Beam Schedule	4	11-12-2014
S-945.00	Shearwall Elevations 1	4	11-12-2014
S-946.00	Shearwall Elevations 2	4	11-12-2014
S-947.00	Shearwall Elevations 3	4	11-12-2014
S-948.00	Shearwall Elevations 4	4	11-12-2014
S-949.00	Typical Shearwall Details	4	11-12-2014
S-950.00	Column Schedule	4	11-12-2014

Appendix B

Wind Tunnel & Geotechnical Reports

Preliminary Results - Wind-Induced Structural Responses
151 Maiden Lane - New York, NY - RWDI Project #1400899
August 15, 2014

The wind loads provided in this report include the effects of directionality in the local wind climate. These loads do not contain safety or load factors and are to be applied to the building's structural system in the same manner as would wind loads calculated by code analytical methods.

Table 2a: Summary of Predicted Peak Overall Structural Wind Loads
700-Year Strength Loads

Period Ratio	Damping Ratio	Configuration	My (lb-ft)	Mx (lb-ft)	Mz (lb-ft)	Fx (lb)	Fy (lb)
0.8	2.0%	C1	5.93E+08	1.32E+09	2.23E+07	1.41E+06	3.39E+06
		C2	5.60E+08	1.45E+09	2.36E+07	1.46E+06	3.62E+06
	3.0%	C1	5.03E+08	1.18E+09	2.14E+07	1.22E+06	3.11E+06
		C2	5.20E+08	1.29E+09	2.25E+07	1.38E+06	3.28E+06
	4.0%	C1	4.52E+08	1.11E+09	2.10E+07	1.12E+06	2.95E+06
		C2	4.99E+08	1.20E+09	2.20E+07	1.34E+06	3.09E+06
1	2.0%	C1	6.10E+08	1.39E+09	2.40E+07	1.43E+06	3.54E+06
		C2	6.00E+08	1.53E+09	2.46E+07	1.54E+06	3.78E+06
	3.0%	C1	5.19E+08	1.24E+09	2.26E+07	1.24E+06	3.22E+06
		C2	5.52E+08	1.35E+09	2.33E+07	1.44E+06	3.39E+06
	4.0%	C1	4.66E+08	1.15E+09	2.19E+07	1.13E+06	3.04E+06
		C2	5.26E+08	1.25E+09	2.26E+07	1.39E+06	3.18E+06
1.2	2.0%	C1	5.58E+08	1.43E+09	2.59E+07	1.30E+06	3.63E+06
		C2	6.24E+08	1.60E+09	2.60E+07	1.59E+06	3.92E+06
	3.0%	C1	4.75E+08	1.27E+09	2.41E+07	1.16E+06	3.30E+06
		C2	5.71E+08	1.40E+09	2.42E+07	1.48E+06	3.49E+06
	4.0%	C1	4.32E+08	1.18E+09	2.30E+07	1.09E+06	3.11E+06
		C2	5.42E+08	1.29E+09	2.33E+07	1.42E+06	3.26E+06

Notes:

(1) The above loads are the cumulative summation of the wind-induced loads at the Level '1' (ie grade) centered about the reference axis shown in Figure 4, exclusive of combination factors.

(2) The above loads are based on the structural properties as provided on July 28, 2014. The baseline natural building frequencies were as follows:

Mode 1: 0.113 Hz (primarily Y)
Mode 2: 0.202 Hz (primarily X)
Mode 3: 0.599 Hz (primarily torsion)

(3) The above loads correspond to a 700-year return period wind speed (3-second gust) of 115 mph.

Table 3a: Effective Static Floor-by-Floor Wind Loads
Recommended Strength Loads - 700-Year Return Period Wind Speed, 2% Damping, Baseline Perioc

Floor	Height (ft) Above Grade Above Ground Level	Fx (lb)	Fy (lb)	Mz (lb-ft)
1	0	2300	10700	171000
2	12	6500	28000	420000
3	29	8500	34100	466000
4	43	10300	38500	488000
5	59	10100	36800	457000
6	71	9500	33400	403000
7	83	9600	35600	416000
8	95	10700	37800	430000
9	107	11400	38600	428000
10	118	11900	39000	423000
11	129	12200	39400	390000
12	140	11700	37900	295000
13	151	12500	39500	300000
14	162	13300	41200	310000
15	173	14100	42900	316000
16	184	15000	44700	328000
17	195	15800	46400	334000
18	206	16600	48200	344000
19	217	17400	49800	352000
20	228	18000	51200	357000
21	239	19000	53100	368000
22	250	19800	54900	372000
23	261	20600	56700	379000
24	272	21400	58600	386000
25	283	26700	75800	515000
26	303	53300	137900	878000
27	320.5	24500	69200	381000
28	332	21200	58100	313000
29	343.5	22000	59800	322000
30	355	22900	61600	331000
31	366.5	23800	63500	342000
32	378	24700	65500	354000
33	389.5	25700	67500	366000
34	401	26900	69600	387000
35	412.5	27300	70700	395000
36	424	28100	72400	412000
37	436	29600	75800	432000
38	448	30800	78100	445000
39	460	31600	79900	454000
40	472	31900	80400	458000
41	484	32600	81800	469000
42	496	33700	84100	482000
43	508	34800	87000	502000
44	520	35900	89300	517000
45	532	36300	90200	528000
46	544	36500	90700	537000
47	556	44000	113200	736000
48	578	78900	185500	1115000
49	590	40000	98200	543000
50	602	41300	101000	560000
51	614	42400	103700	575000
SLOSH	626	164800	363200	1788000
BULKHEAD	648	43400	104700	522000
SUMS	-	1.43E+06	3.78E+06	2.46E+07

Notes:

(1) The loads given in this table should be used with the load combination factors given in Table 4a.

(2) The loads given in this table are centered about the reference axis shown in Figure 4.

(3) The above loads correspond to a 700-year return period basic wind speed (3-second gust) of 115 mph.

Table 4a: Recommended Wind Load Combination Factors

Load Case	Factor for Simultaneous Application of Loads in Table 3a		
	X Forces (Fx)	Y Forces (Fy)	Torsion (Mz)
1	+100%	+30%	+30%
2	+100%	+30%	-30%
3	+100%	-45%	+30%
4	+100%	-45%	-30%
5	-100%	+50%	+50%
6	-100%	+45%	-30%
7	-100%	-45%	+45%
8	-100%	-45%	-30%
9	+30%	+100%	+55%
10	+30%	+100%	-30%
11	+30%	-90%	+30%
12	+30%	-90%	-35%
13	-50%	+100%	+55%
14	-50%	+100%	-30%
15	-60%	-90%	+30%
16	-60%	-90%	-35%
17	+30%	+60%	+100%
18	+30%	+30%	-75%
19	+30%	-30%	+100%
20	+30%	-40%	-75%
21	-30%	+60%	+100%
22	-60%	+30%	-75%
23	-30%	-30%	+100%
24	-60%	-40%	-75%

Note:
(1) Load combination factors have been produced through consideration of the structure's response to various wind directions, modal coupling, correlation of wind gusts and the directionality of strong winds in the local wind climate.

Preliminary Results - Wind-Induced Structural Responses
151 Maiden Lane - New York, NY - RWDI Project #1400899
August 15, 2014

The wind loads provided in this report include the effects of directionality in the local wind climate. These loads do not contain safety or load factors and are to be applied to the building's structural system in the same manner as would wind loads calculated by code analytical methods.

Table 2b: Summary of Predicted Peak Overall Structural Wind Loads
50-Year Service Loads

Period Ratio	Damping Ratio	Configuration	My (lb-ft)	Mx (lb-ft)	Mz (lb-ft)	Fx (lb)	Fy (lb)
0.9	2.0%	C1	2.59E+08	6.39E+08	1.35E+07	6.17E+05	1.60E+06
		C2	2.56E+08	6.68E+08	1.32E+07	6.71E+05	1.66E+06
	3.0%	C1	2.18E+08	5.75E+08	1.30E+07	5.55E+05	1.48E+06
		C2	2.40E+08	6.16E+08	1.26E+07	6.46E+05	1.56E+06
	3.5%	C1	2.09E+08	5.56E+08	1.28E+07	5.38E+05	1.45E+06
		C2	2.38E+08	5.99E+08	1.25E+07	6.41E+05	1.53E+06
	4.0%	C1	2.03E+08	5.42E+08	1.27E+07	5.27E+05	1.43E+06
		C2	2.37E+08	5.86E+08	1.23E+07	6.37E+05	1.50E+06
1	2.0%	C1	2.80E+08	6.54E+08	1.37E+07	6.64E+05	1.62E+06
		C2	2.60E+08	6.89E+08	1.34E+07	6.74E+05	1.71E+06
	3.0%	C1	2.40E+08	5.86E+08	1.31E+07	5.79E+05	1.50E+06
		C2	2.48E+08	6.32E+08	1.28E+07	6.51E+05	1.59E+06
	3.5%	C1	2.27E+08	5.66E+08	1.30E+07	5.58E+05	1.47E+06
		C2	2.45E+08	6.14E+08	1.26E+07	6.45E+05	1.56E+06
	4.0%	C1	2.16E+08	5.50E+08	1.28E+07	5.43E+05	1.44E+06
		C2	2.42E+08	6.00E+08	1.24E+07	6.41E+05	1.53E+06
1.1	2.0%	C1	2.96E+08	6.57E+08	1.38E+07	6.92E+05	1.63E+06
		C2	2.65E+08	6.92E+08	1.36E+07	6.84E+05	1.71E+06
	3.0%	C1	2.50E+08	5.89E+08	1.32E+07	5.95E+05	1.51E+06
		C2	2.53E+08	6.34E+08	1.29E+07	6.58E+05	1.60E+06
	3.5%	C1	2.35E+08	5.68E+08	1.30E+07	5.67E+05	1.48E+06
		C2	2.49E+08	6.16E+08	1.27E+07	6.51E+05	1.56E+06
	4.0%	C1	2.24E+08	5.53E+08	1.28E+07	5.49E+05	1.45E+06
		C2	2.46E+08	6.01E+08	1.26E+07	6.45E+05	1.53E+06

Notes:

(1) The above loads are the cumulative summation of the wind-induced loads at the Level '1' (ie grade) centered about the reference axis shown in Figure 4, exclusive of combination factors.

(2) The above loads are based on the structural properties as provided on July 28, 2014. The baseline natural building frequencies were as follows:

Mode 1: 0.157 Hz (primarily Y)
Mode 2: 0.243 Hz (primarily X)
Mode 3: 0.625 Hz (primarily torsion)

(3) The above loads correspond to a 50-year return period wind speed (3-second gust) of 90 mph.

Table 3b: Effective Static Floor-by-Floor Wind Loads

Recommended Service Loads - 50-Year Return Period Wind Speed, 2% Damping, Baseline Periods

Floor	Height (ft) Above Grade Above Ground Level	Fx (lb)	Fy (lb)	Mz (lb-ft)
1	0	1900	6500	124000
2	12	4700	16200	303000
3	29	5500	18400	329000
4	43	5900	19300	334000
5	59	5700	18400	312000
6	71	5200	16300	271000
7	83	4800	17000	276000
8	95	5200	17600	282000
9	107	5400	17700	277000
10	118	5600	17500	270000
11	129	5700	17700	246000
12	140	5500	17300	184000
13	151	5800	17800	186000
14	162	6200	18400	190000
15	173	6500	19000	192000
16	184	6900	19700	198000
17	195	7200	20400	200000
18	206	7500	21100	204000
19	217	7800	21700	208000
20	228	8100	22300	210000
21	239	8500	23000	215000
22	250	8800	23800	216000
23	261	9200	24500	219000
24	272	9500	25300	222000
25	283	12100	33600	298000
26	303	22700	57000	484000
27	320.5	11100	30800	219000
28	332	9500	25600	178000
29	343.5	9900	26400	181000
30	355	10300	27200	185000
31	366.5	10700	28100	189000
32	378	11100	29000	194000
33	389.5	11600	30000	199000
34	401	12200	30900	209000
35	412.5	12500	31600	211000
36	424	12900	32500	219000
37	436	13600	34100	228000
38	448	14100	35200	233000
39	460	14600	36100	236000
40	472	14700	36600	237000
41	484	15100	37300	241000
42	496	15700	38400	247000
43	508	16200	39900	256000
44	520	16800	41000	262000
45	532	16900	41600	266000
46	544	17100	42000	270000
47	556	20900	53400	370000
48	578	36200	83800	539000
49	590	18700	45500	267000
50	602	19200	46800	275000
51	614	19800	48100	281000
SLOSH	626	74100	159700	831000
BULKHEAD	648	20200	48600	254000
SUMS	-	6.64E+05	1.71E+06	1.37E+07

Notes:

(1) The loads given in this table should be used with the load combination factors given in Table 4b.

(2) The loads given in this table are centered about the reference axis shown in Figure 4.

(3) The above loads correspond to a 50-year return period basic wind speed (3-second gust) of 90 mph.

Table 4b: Recommended Wind Load Combination Factors

Load Case	Factor for Simultaneous Application of Loads in Table 3b		
	X Forces (Fx)	Y Forces (Fy)	Torsion (Mz)
1	+100%	+30%	+35%
2	+100%	+30%	-30%
3	+100%	-55%	+35%
4	+100%	-55%	-30%
5	-100%	+30%	+35%
6	-100%	+30%	-30%
7	-100%	-55%	+35%
8	-100%	-55%	-30%
9	+30%	+100%	+70%
10	+30%	+100%	-30%
11	+40%	-90%	+50%
12	+40%	-90%	-40%
13	-30%	+100%	+70%
14	-30%	+100%	-30%
15	-45%	-90%	+50%
16	-45%	-90%	-40%
17	+30%	+65%	+100%
18	+30%	+30%	-75%
19	+30%	-30%	+100%
20	+30%	-45%	-75%
21	-30%	+65%	+100%
22	-45%	+30%	-75%
23	-30%	-30%	+100%
24	-45%	-45%	-75%

Note:

(1) Load combination factors have been produced through consideration of the structure's response to various wind directions, modal coupling, correlation of wind gusts and the directionality of strong winds in the local wind climate.

Table 3c: Effective Static Floor-by-Floor Wind Loads
Recommended Service Loads - 50-Year Return Period Wind Speed, 3.5% Damping, Baseline Periods

Floor	Above Ground Level	Fx (lb)	Fy (lb)	Mz (lb-ft)
1	0	4000	6700	131000
2	12	9900	16600	319000
3	29	10800	18700	344000
4	43	10900	19300	345000
5	59	10300	18400	322000
6	71	8900	16200	279000
7	83	7600	16900	283000
8	95	7900	17400	287000
9	107	7800	17300	280000
10	118	7700	17100	272000
11	129	7700	17200	247000
12	140	7500	16900	184000
13	151	7700	17400	184000
14	162	7900	17900	188000
15	173	8000	18400	189000
16	184	8300	19000	194000
17	195	8400	19500	194000
18	206	8600	20100	197000
19	217	8800	20700	200000
20	228	8900	21200	201000
21	239	9200	21800	205000
22	250	9400	22400	205000
23	261	9500	23000	207000
24	272	9800	23700	210000
25	283	13000	31900	284000
26	303	20600	51100	436000
27	320.5	11600	28900	210000
28	332	9600	23700	169000
29	343.5	9800	24400	172000
30	355	10100	25100	175000
31	366.5	10300	25800	178000
32	378	10600	26600	182000
33	389.5	10900	27400	185000
34	401	11500	28100	194000
35	412.5	11600	28700	196000
36	424	11900	29500	202000
37	436	12500	30900	210000
38	448	12800	31800	214000
39	460	13100	32500	216000
40	472	13200	32900	217000
41	484	13400	33600	220000
42	496	13800	34400	224000
43	508	14100	35800	233000
44	520	14500	36800	239000
45	532	14600	37300	242000
46	544	14700	37700	245000
47	556	18800	48900	338000
48	578	28100	72100	466000
49	590	15400	40300	239000
50	602	15800	41400	245000
51	614	16100	42500	250000
SLOSH	626	50800	129500	682000
BULKHEAD	648	16100	42500	227000
SUMS	-	6.45E+05	1.56E+06	1.30E+07

Notes:

(1) The loads given in this table should be used with the load combination factors given in Table 4c.

(2) The loads given in this table are centered about the reference axis shown in Figure 4.

(3) The above loads correspond to a 50-year return period basic wind speed (3-second gust) of 90 mph.

Table 4c: Recommended Wind Load Combination Factors

Load Case	Factor for Simultaneous Application of Loads in Table 3c X Forces (Fx)	Y Forces (Fy)	Torsion (Mz)
1	+85%	+30%	+35%
2	+85%	+30%	-35%
3	+85%	-55%	+35%
4	+85%	-55%	-35%
5	-100%	+35%	+40%
6	-100%	+30%	-30%
7	-100%	-55%	+35%
8	-100%	-55%	-30%
9	+30%	+100%	+75%
10	+30%	+100%	-30%
11	+30%	-90%	+40%
12	+30%	-90%	-35%
13	-35%	+100%	+75%
14	-35%	+100%	-30%
15	-45%	-90%	+40%
16	-45%	-90%	-35%
17	+30%	+70%	+100%
18	+30%	+30%	-75%
19	+30%	-30%	+100%
20	+30%	-50%	-75%
21	-30%	+70%	+100%
22	-55%	+30%	-75%
23	-30%	-30%	+100%
24	-55%	-50%	-75%

Note:
(1) Load combination factors have been produced through consideration of the structure's response to various wind directions, modal coupling, correlation of wind gusts and the directionality of strong winds in the local wind climate.

The wind loads provided in this report include the effects of directionality in the local wind climate. These loads do not contain safety or load factors and are to be applied to the building's structural system in the same manner as would wind loads calculated by code analytical methods.

Table 2c: Summary of Predicted Peak Overall Structural Wind Loads
25-Year Service Loads

Period Ratio	Damping Ratio	Configuration	My (lb-ft)	Mx (lb-ft)	Mz (lb-ft)	Fx (lb)	Fy (lb)
0.9	2.0%	C1	2.18E+08	5.48E+08	1.20E+07	5.45E+05	1.36E+06
		C2	2.20E+08	5.77E+08	1.18E+07	5.96E+05	1.44E+06
	3.0%	C1	1.90E+08	4.93E+08	1.16E+07	4.89E+05	1.26E+06
		C2	2.14E+08	5.35E+08	1.13E+07	5.77E+05	1.36E+06
	3.5%	C1	1.81E+08	4.76E+08	1.14E+07	4.72E+05	1.24E+06
		C2	2.12E+08	5.22E+08	1.11E+07	5.72E+05	1.34E+06
	4.0%	C1	1.76E+08	4.64E+08	1.13E+07	4.59E+05	1.22E+06
		C2	2.11E+08	5.12E+08	1.10E+07	5.69E+05	1.32E+06
1	2.0%	C1	2.34E+08	5.61E+08	1.22E+07	5.58E+05	1.38E+06
		C2	2.24E+08	6.00E+08	1.19E+07	5.98E+05	1.49E+06
	3.0%	C1	1.93E+08	5.03E+08	1.17E+07	4.79E+05	1.28E+06
		C2	2.17E+08	5.53E+08	1.14E+07	5.79E+05	1.40E+06
	3.5%	C1	1.85E+08	4.86E+08	1.16E+07	4.64E+05	1.25E+06
		C2	2.15E+08	5.38E+08	1.13E+07	5.75E+05	1.37E+06
	4.0%	C1	1.82E+08	4.73E+08	1.15E+07	4.52E+05	1.23E+06
		C2	2.13E+08	5.26E+08	1.11E+07	5.72E+05	1.34E+06
1.1	2.0%	C1	2.53E+08	5.73E+08	1.24E+07	5.99E+05	1.40E+06
		C2	2.33E+08	6.16E+08	1.21E+07	6.05E+05	1.52E+06
	3.0%	C1	2.09E+08	5.12E+08	1.18E+07	5.05E+05	1.30E+06
		C2	2.25E+08	5.71E+08	1.13E+07	5.86E+05	1.43E+06
	3.5%	C1	1.98E+08	4.93E+08	1.17E+07	4.80E+05	1.27E+06
		C2	2.20E+08	5.50E+08	1.13E+07	5.79E+05	1.39E+06
	4.0%	C1	1.88E+08	4.79E+08	1.15E+07	4.63E+05	1.24E+06
		C2	2.18E+08	5.37E+08	1.12E+07	5.76E+05	1.36E+06

Notes:

(1) The above loads are the cumulative summation of the wind-induced loads at the Level '1' (ie grade) centered about the reference axis shown in Figure 4, exclusive of combination factors.

(2) The above loads are based on the structural properties for the 10-year return period as provided on July 28, 2014. The baseline natural building frequencies were as follows:

Mode 1: 0.162 Hz (primarily Y)
Mode 2: 0.248 Hz (primarily X)
Mode 3: 0.625 Hz (primarily torsion)

(3) The above loads correspond to a 25-year return period wind speed (3-second gust) of 85 mph.

Table 3d: Effective Static Floor-by-Floor Wind Loads

Recommended Service Loads - 50-Year Return Period Wind Speed, 2% Damping, Baseline Periods

Floor	Height (ft) Above Grade Above Ground Level	Fx (lb)	Fy (lb)	Mz (lb-ft)
1	0	1900	5900	115000
2	12	4700	14700	281000
3	29	5100	16600	304000
4	43	5300	17300	307000
5	59	5100	16400	287000
6	71	4600	14500	249000
7	83	4200	15000	253000
8	95	4500	15600	258000
9	107	4700	15600	253000
10	118	4800	15400	246000
11	129	4900	15600	224000
12	140	4800	15200	167000
13	151	5000	15600	169000
14	162	5300	16200	172000
15	173	5500	16700	174000
16	184	5800	17200	179000
17	195	6100	17900	180000
18	206	6400	18400	183000
19	217	6600	19000	186000
20	228	6800	19500	188000
21	239	7200	20100	192000
22	250	7400	20700	193000
23	261	7700	21300	195000
24	272	8000	22100	198000
25	283	10200	29400	267000
26	303	18800	49000	425000
27	320.5	9300	27000	197000
28	332	8000	22300	159000
29	343.5	8300	23000	162000
30	355	8600	23700	165000
31	366.5	8900	24500	169000
32	378	9300	25300	173000
33	389.5	9700	26100	176000
34	401	10200	27000	185000
35	412.5	10400	27500	187000
36	424	10800	28400	194000
37	436	11400	29800	202000
38	448	11800	30700	206000
39	460	12200	31500	208000
40	472	12300	31900	209000
41	484	12600	32500	213000
42	496	13100	33500	217000
43	508	13600	34800	226000
44	520	14000	35800	231000
45	532	14200	36400	234000
46	544	14300	36700	237000
47	556	17600	47000	326000
48	578	30000	72700	466000
49	590	15500	39700	234000
50	602	16000	40900	240000
51	614	16500	42000	245000
SLOSH	626	61100	137100	706000
BULKHEAD	648	16800	42400	222000
SUMS	-	5.58E+05	1.49E+06	1.22E+07

Notes:

(1) The loads given in this table should be used with the load combination factors given in Table 4d.

(2) The loads given in this table are centered about the reference axis shown in Figure 4.

(3) The above loads correspond to a 25-year return period basic wind speed (3-second gust) of 85 mph.

Table 4d: Recommended Wind Load Combination Factors

Load Case	Factor for Simultaneous Application of Loads in Table 3d: X Forces (Fx)	Y Forces (Fy)	Torsion (Mz)
1	+100%	+30%	+40%
2	+100%	+30%	-30%
3	+100%	-55%	+40%
4	+100%	-55%	-30%
5	-100%	+30%	+60%
6	-100%	+30%	-30%
7	-100%	-55%	+60%
8	-100%	-55%	-30%
9	+30%	+100%	+65%
10	+30%	+100%	-30%
11	+40%	-90%	+60%
12	+40%	-90%	-30%
13	-40%	+100%	+65%
14	-40%	+100%	-30%
15	-50%	-90%	+60%
16	-55%	-90%	-35%
17	+30%	+65%	+100%
18	+30%	+30%	-75%
19	+30%	-45%	+100%
20	+30%	-45%	-75%
21	-30%	+65%	+100%
22	-60%	+30%	-75%
23	-35%	-50%	+100%
24	-60%	-45%	-75%

Note:

(1) Load combination factors have been produced through consideration of the structure's response to various wind directions, modal coupling, correlation of wind gusts and the directionality of strong winds in the local wind climate.

Preliminary Results - Wind-Induced Structural Responses
151 Maiden Lane - New York, NY - RWDI Project #1400899
August 15, 2014

The wind loads provided in this report include the effects of directionality in the local wind climate. These loads do not contain safety or load factors and are to be applied to the building's structural system in the same manner as would wind loads calculated by code analytical methods.

Table 2d: Summary of Predicted Peak Overall Structural Wind Loads
10-Year Service Loads

Period Ratio	Damping Ratio	Configuration	My (lb-ft)	Mx (lb-ft)	Mz (lb-ft)	Fx (lb)	Fy (lb)
0.9	1.5%	C1	1.73E+08	4.55E+08	9.64E+06	4.35E+05	1.09E+06
		C2	1.77E+08	4.81E+08	9.49E+06	4.77E+05	1.19E+06
	2.0%	C1	1.57E+08	4.16E+08	9.36E+06	4.02E+05	1.04E+06
		C2	1.72E+08	4.52E+08	9.18E+06	4.65E+05	1.14E+06
	3.5%	C1	1.37E+08	3.64E+08	8.97E+06	3.63E+05	9.72E+05
		C2	1.67E+08	4.11E+08	8.75E+06	4.51E+05	1.05E+06
	5.0%	C1	1.33E+08	3.46E+08	8.80E+06	3.50E+05	9.40E+05
		C2	1.65E+08	3.91E+08	8.57E+06	4.47E+05	1.02E+06
	6.0%	C1	1.31E+08	3.39E+08	8.74E+06	3.45E+05	9.26E+05
		C2	1.64E+08	3.83E+08	8.51E+06	4.46E+05	1.00E+06
1	1.5%	C1	1.93E+08	4.59E+08	9.84E+06	4.70E+05	1.11E+06
		C2	1.79E+08	4.85E+08	9.66E+06	4.86E+05	1.20E+06
	2.0%	C1	1.70E+08	4.19E+08	9.51E+06	4.29E+05	1.06E+06
		C2	1.74E+08	4.56E+08	9.32E+06	4.73E+05	1.14E+06
	3.5%	C1	1.43E+08	3.70E+08	9.07E+06	3.72E+05	9.82E+05
		C2	1.68E+08	4.13E+08	8.83E+06	4.54E+05	1.06E+06
	5.0%	C1	1.36E+08	3.51E+08	8.87E+06	3.51E+05	9.47E+05
		C2	1.66E+08	3.93E+08	8.63E+06	4.49E+05	1.02E+06
	6.0%	C1	1.33E+08	3.43E+08	8.79E+06	3.46E+05	9.33E+05
		C2	1.65E+08	3.85E+08	8.55E+06	4.46E+05	1.00E+06
1.1	1.5%	C1	2.08E+08	4.68E+08	1.00E+07	4.93E+05	1.12E+06
		C2	1.83E+08	5.04E+08	9.82E+06	4.89E+05	1.24E+06
	2.0%	C1	1.82E+08	4.26E+08	9.66E+06	4.38E+05	1.07E+06
		C2	1.77E+08	4.72E+08	9.44E+06	4.74E+05	1.17E+06
	3.5%	C1	1.46E+08	3.73E+08	9.16E+06	3.68E+05	9.89E+05
		C2	1.70E+08	4.24E+08	8.92E+06	4.56E+05	1.08E+06
	5.0%	C1	1.40E+08	3.53E+08	8.94E+06	3.53E+05	9.52E+05
		C2	1.67E+08	4.02E+08	8.68E+06	4.51E+05	1.04E+06
	6.0%	C1	1.37E+08	3.45E+08	8.86E+06	3.47E+05	9.37E+05
		C2	1.66E+08	3.92E+08	8.59E+06	4.48E+05	1.02E+06

Notes:

(1) The above loads are the cumulative summation of the wind-induced loads at the Level '1' (ie grade) centered about the reference axis shown in Figure 4, exclusive of combination factors.

(2) The above loads are based on the structural properties as provided on July 28, 2014. The baseline natural building frequencies were as follows:

Mode 1: 0.162 Hz (primarily Y)
Mode 2: 0.248 Hz (primarily X)
Mode 3: 0.625 Hz (primarily torsion)

(3) The above loads correspond to a 10-year return period basic wind speed (3-second gust) of 75 mph.

Table 3e: Effective Static Floor-by-Floor Wind Loads
Recommended Service Loads - 10-Year Return Period Wind Speed, 2% Damping, Baseline Periods

Floor	Height (ft) Above Grade Above Ground Level	Fx (lb)	Fy (lb)	Mz (lb-ft)
1	0	3400	4900	93000
2	12	8300	12000	227000
3	29	9000	13500	246000
4	43	8900	14000	247000
5	59	8400	13200	231000
6	71	7300	11600	200000
7	83	6200	12000	203000
8	95	6300	12400	207000
9	107	6200	12300	202000
10	118	6100	12200	196000
11	129	6000	12300	178000
12	140	5900	12000	133000
13	151	6000	12300	134000
14	162	6100	12700	136000
15	173	6100	13100	137000
16	184	6400	13500	141000
17	195	6400	13900	141000
18	206	6500	14300	144000
19	217	6700	14700	146000
20	228	6700	15100	147000
21	239	6900	15500	150000
22	250	7000	16000	151000
23	261	7100	16500	152000
24	272	7300	17000	154000
25	283	9700	22700	208000
26	303	14700	37600	325000
27	320.5	8600	20700	154000
28	332	7100	17100	124000
29	343.5	7200	17600	126000
30	355	7400	18100	128000
31	366.5	7500	18700	131000
32	378	7700	19300	134000
33	389.5	7900	19900	137000
34	401	8400	20500	143000
35	412.5	8400	20900	145000
36	424	8700	21600	150000
37	436	9000	22600	155000
38	448	9200	23300	158000
39	460	9400	23900	160000
40	472	9500	24200	161000
41	484	9600	24700	163000
42	496	9800	25400	166000
43	508	10100	26300	173000
44	520	10300	27100	177000
45	532	10400	27500	180000
46	544	10400	27700	182000
47	556	13600	35500	250000
48	578	19400	54900	350000
49	590	10800	29900	178000
50	602	11100	30900	182000
51	614	11300	31700	186000
SLOSH	626	33500	103700	520000
BULKHEAD	648	11200	31900	169000
SUMS	-	4.73E+05	1.14E+06	9.51E+06

Notes:

(1) The loads given in this table should be used with the load combination factors given in Table 4e.

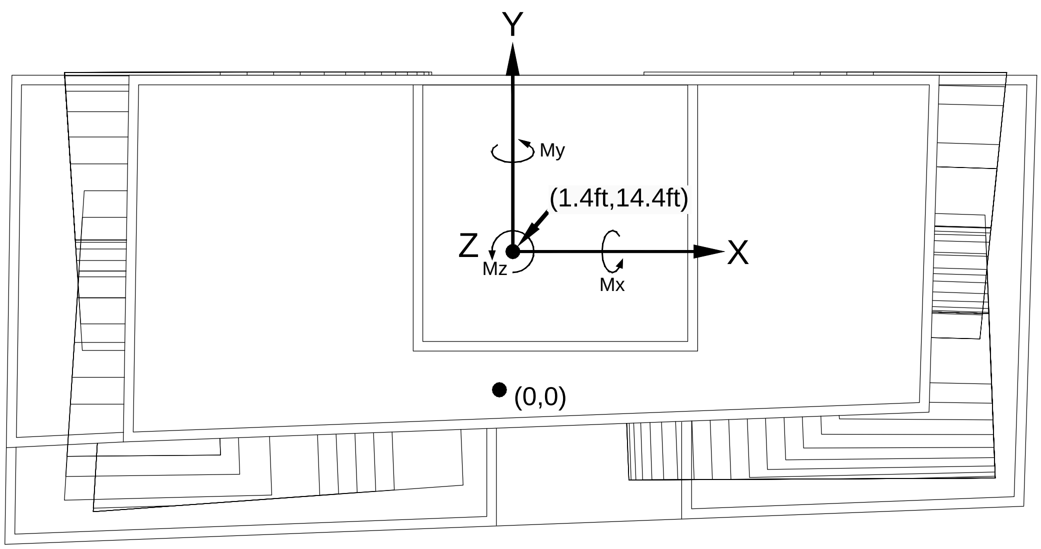
(2) The loads given in this table are centered about the reference axis shown in Figure 4.

(3) The above loads correspond to a 10-year return period basic wind speed (3-second gust) of 75 mph.

Table 4e: Recommended Wind Load Combination Factors

Load Case	Factor for Simultaneous Application of Loads in Table 3e X Forces (Fx)	Y Forces (Fy)	Torsion (Mz)
1	+90%	+30%	+60%
2	+90%	+30%	-30%
3	+90%	-55%	+60%
4	+90%	-55%	-30%
5	-100%	+40%	+50%
6	-100%	+40%	-35%
7	-100%	-50%	+55%
8	-100%	-45%	-35%
9	+30%	+100%	+65%
10	+30%	+100%	-30%
11	+35%	-90%	+60%
12	+35%	-90%	-35%
13	-50%	+100%	+65%
14	-50%	+100%	-30%
15	-55%	-90%	+60%
16	-55%	-90%	-35%
17	+30%	+65%	+100%
18	+30%	+30%	-75%
19	+30%	-45%	+100%
20	+30%	-45%	-75%
21	-30%	+65%	+100%
22	-60%	+30%	-75%
23	-35%	-50%	+100%
24	-60%	-45%	-75%

Note:
(1) Load combination factors have been produced through consideration of the structure's response to various wind directions, modal coupling, correlation of wind gusts and the directionality of strong winds in the local wind climate.

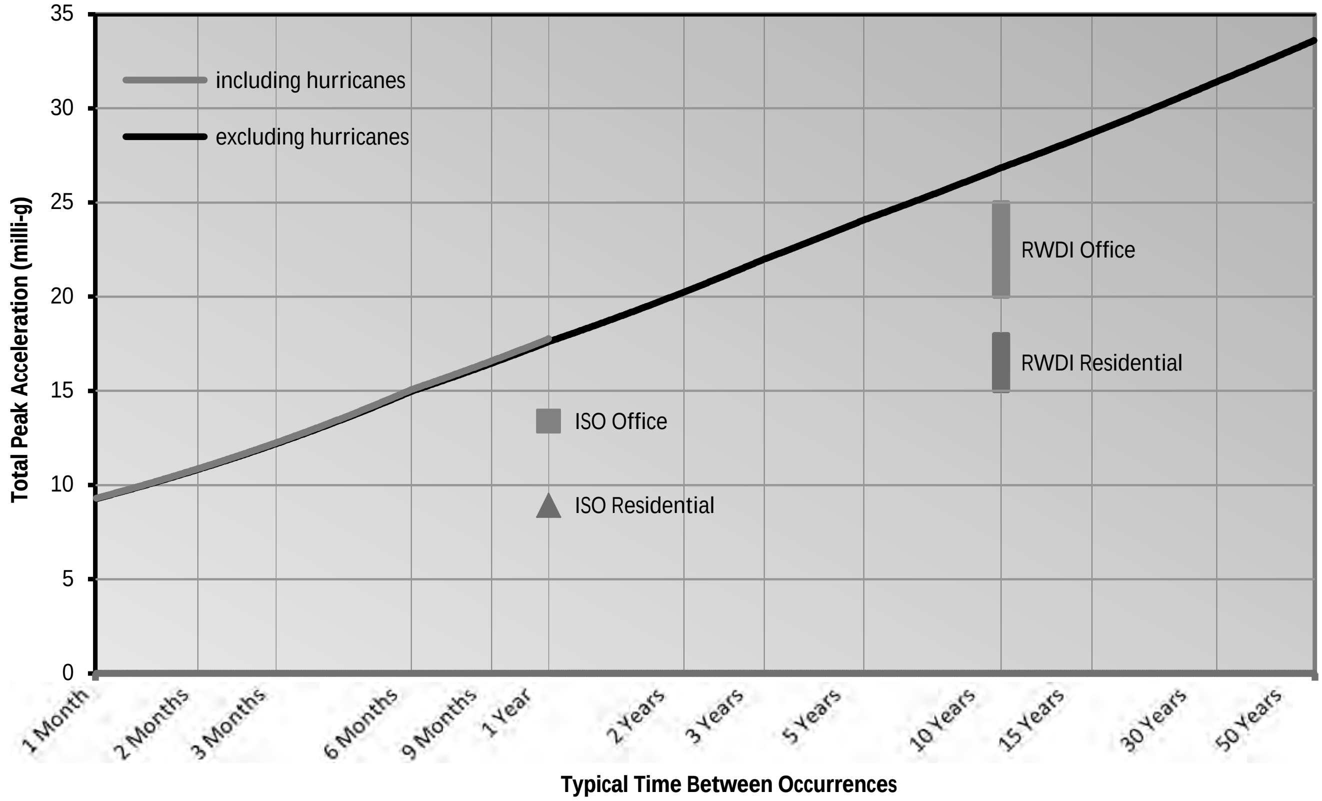


Note:
Point (0,0) indicates co-ordinate origin provided by the structural engineer.

0 10 20ft

Co-ordinate System for Structural Loading	True North	Drawn by: SMR	Figure: 4
		Approx. Scale:	1"=20'
151 Maiden Lane - New York, NY	Project #1400899	Date Revised:	Mar. 16, 2014

RWDI



Return Period (Years)	Peak Accelerations[2] (milli-g) Total - [X, Y and torsional components]		Peak Torsional Velocities (milli-rads/sec)		
	without hurricanes	with [6] hurricanes	without hurricanes	with hurricanes	CTBUH[5] Criteria
1	18 - [6.6, 17, 1.8]	18 - [6.6, 18, 1.8]	0.8	0.8	1.5
5	24 - [9.1, 24, 2.6]	-	1.1	-	-
10	27 - [11, 26, 3.0]	-	1.3	-	3

Notes:

(1) A damping ratio of 1.5% of critical was used, along with frequencies of 0.1621, 0.2481, and 0.6250 Hz.

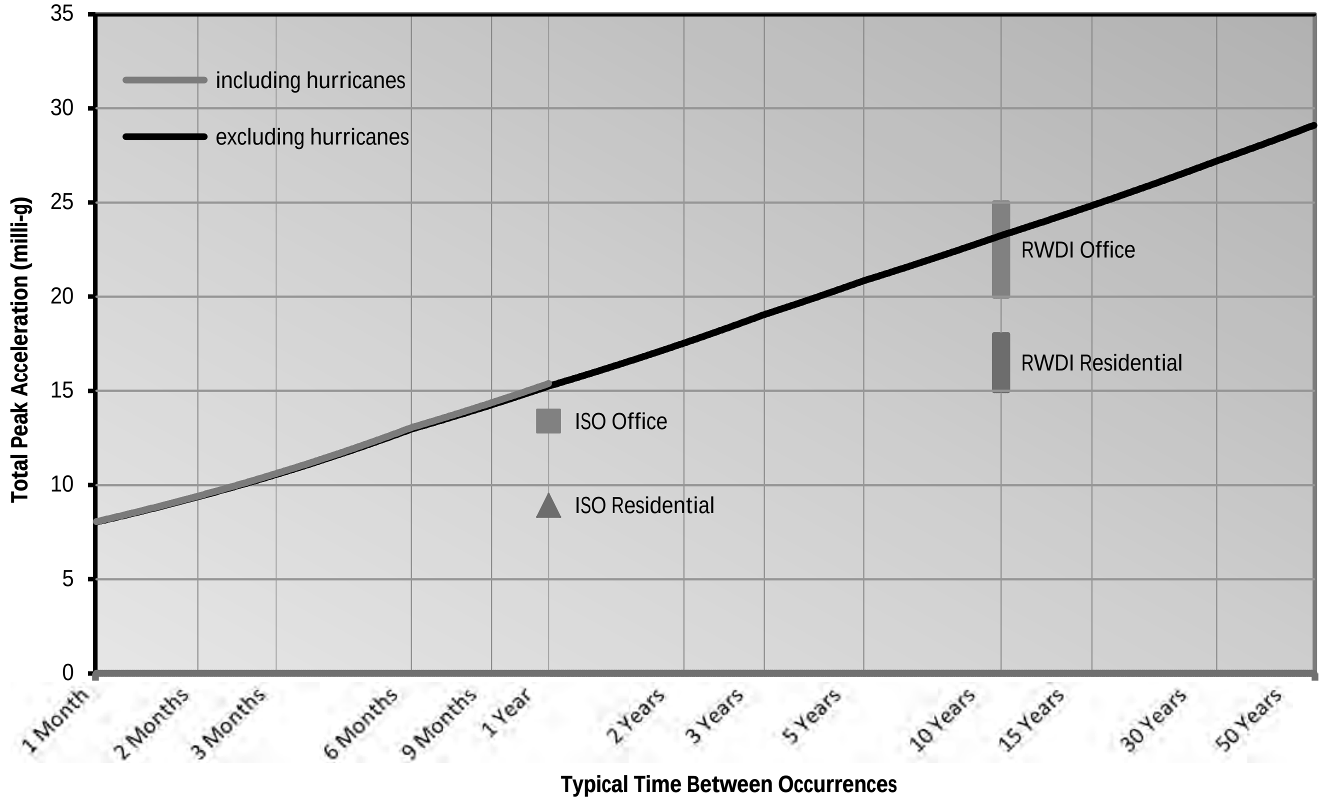
(2) Accelerations are predicted at Structural Level '51' (614 ft above Structural Level '1') at a radial distance of 27.9 ft from the central axis of the tower (given in Figure 4).

(3) ISO is the International Organization for Standardization, and the current standard (ISO 10137:2007) provides acceleration criteria for buildings at the 1-year return period. The criteria plotted on the graph have been generated based on a response-weighted interpretation of the individual modal component of the ISO criteria.

(4) RWDI's criteria for residential and office buildings are based on research, experience and surveys of existing buildings, and is in agreement with general practice in North America.

(5) The Council on Tall Buildings and Urban Habitat (CTBUH) provides tentative torsional velocity criteria for the 1- and 10-year return periods.

(6) With the inclusion of hurricanes, it is not appropriate to consider events beyond the 1-year return period when evaluating occupant comfort. Therefore, longer return period values with hurricanes are not provided.



Return Period (Years)	Peak Accelerations[2] (milli-g) Total - [X, Y and torsional components]		Peak Torsional Velocities (milli-rads/sec)		
	without hurricanes	with [6] hurricanes	without hurricanes	with hurricanes	CTBUH[5] Criteria
1	15 - [5.7, 15, 1.6]	15 - [5.7, 15, 1.6]	0.7	0.7	1.5
5	21 - [7.8, 21, 2.3]	-	1.0	-	-
10	23 - [9.3, 23, 2.6]	-	1.1	-	3

Notes:

(1) A damping ratio of 2% of critical was used, along with frequencies of 0.1621, 0.2481, and 0.6250 Hz.

(2) Accelerations are predicted at Structural Level '51' (614 ft above Structural Level '1') at a radial distance of 27.9 ft from the central axis of the tower (given in Figure 4).

(3) ISO is the International Organization for Standardization, and the current standard (ISO 10137:2007) provides acceleration criteria for buildings at the 1-year return period. The criteria plotted on the graph have been generated based on a response-weighted interpretation of the individual modal component of the ISO criteria.

(4) RWDI's criteria for residential and office buildings are based on research, experience and surveys of existing buildings, and is in agreement with general practice in North America.

(5) The Council on Tall Buildings and Urban Habitat (CTBUH) provides tentative torsional velocity criteria for the 1- and 10-year return periods.

(6) With the inclusion of hurricanes, it is not appropriate to consider events beyond the 1-year return period when evaluating occupant comfort. Therefore, longer return period values with hurricanes are not provided.

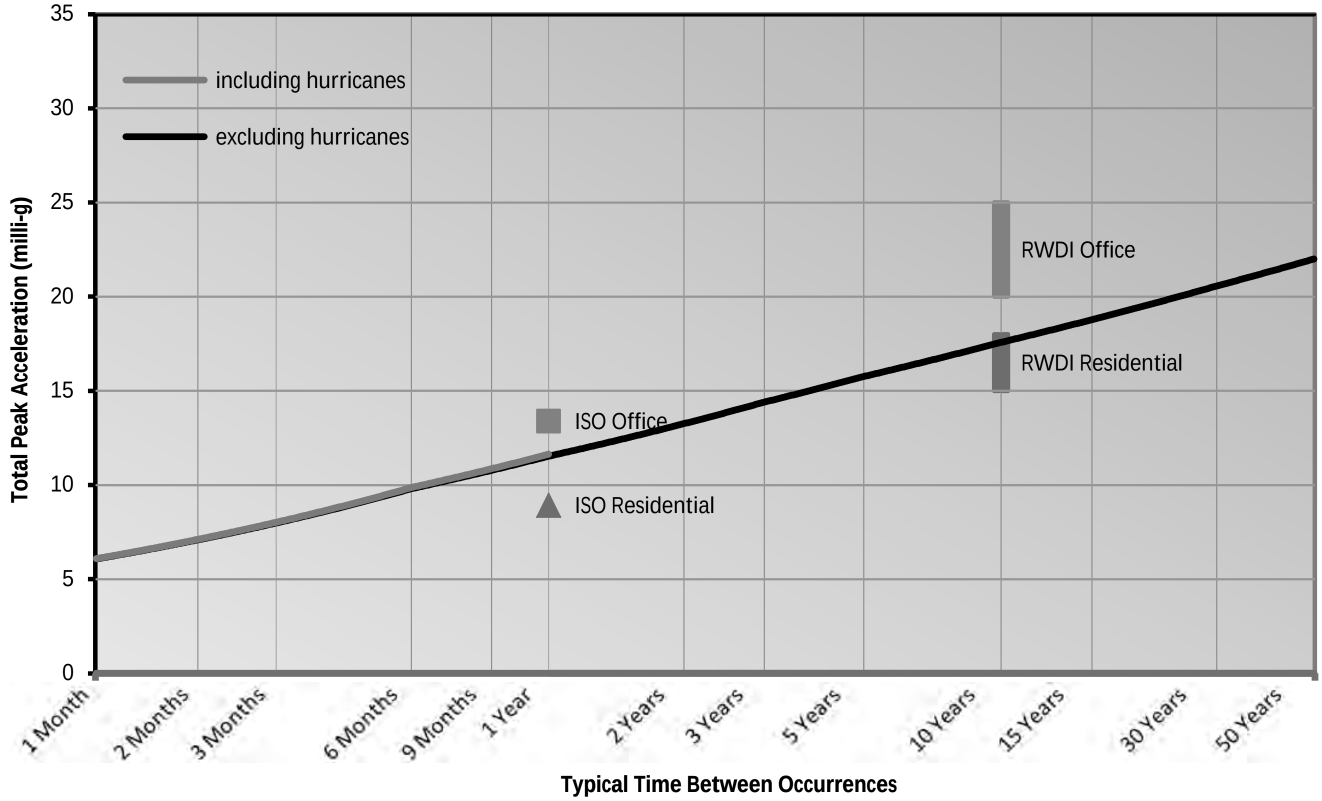
Predicted Peak Accelerations and Torsional Velocities
Worst Case Configuration - 2% Damping

Figure No. 6b

151 Maiden Lane - New York, NY

Project #1400899

Date: August 14, 2014



Return Period (Years)	Peak Accelerations[2] (milli-g) Total - [X, Y and torsional components]		Peak Torsional Velocities (milli-rads/sec)		
	without hurricanes	with [6] hurricanes	without hurricanes	with hurricanes	CTBUH[5] Criteria
1	12 - [4.3, 11, 1.2]	12 - [4.3, 11, 1.2]	0.5	0.5	1.5
5	16 - [5.9, 16, 1.7]	-	0.7	-	-
10	18 - [7.0, 17, 2.0]	-	0.8	-	3

Notes:

(1) A damping ratio of 3.5% of critical was used, along with frequencies of 0.1621, 0.2481, and 0.6250 Hz.

(2) Accelerations are predicted at Structural Level '51' (614 ft above Structural Level '1') at a radial distance of 27.9 ft from the central axis of the tower (given in Figure 4).

(3) ISO is the International Organization for Standardization, and the current standard (ISO 10137:2007) provides acceleration criteria for buildings at the 1-year return period. The criteria plotted on the graph have been generated based on a response-weighted interpretation of the individual modal component of the ISO criteria.

(4) RWDI's criteria for residential and office buildings are based on research, experience and surveys of existing buildings, and is in agreement with general practice in North America.

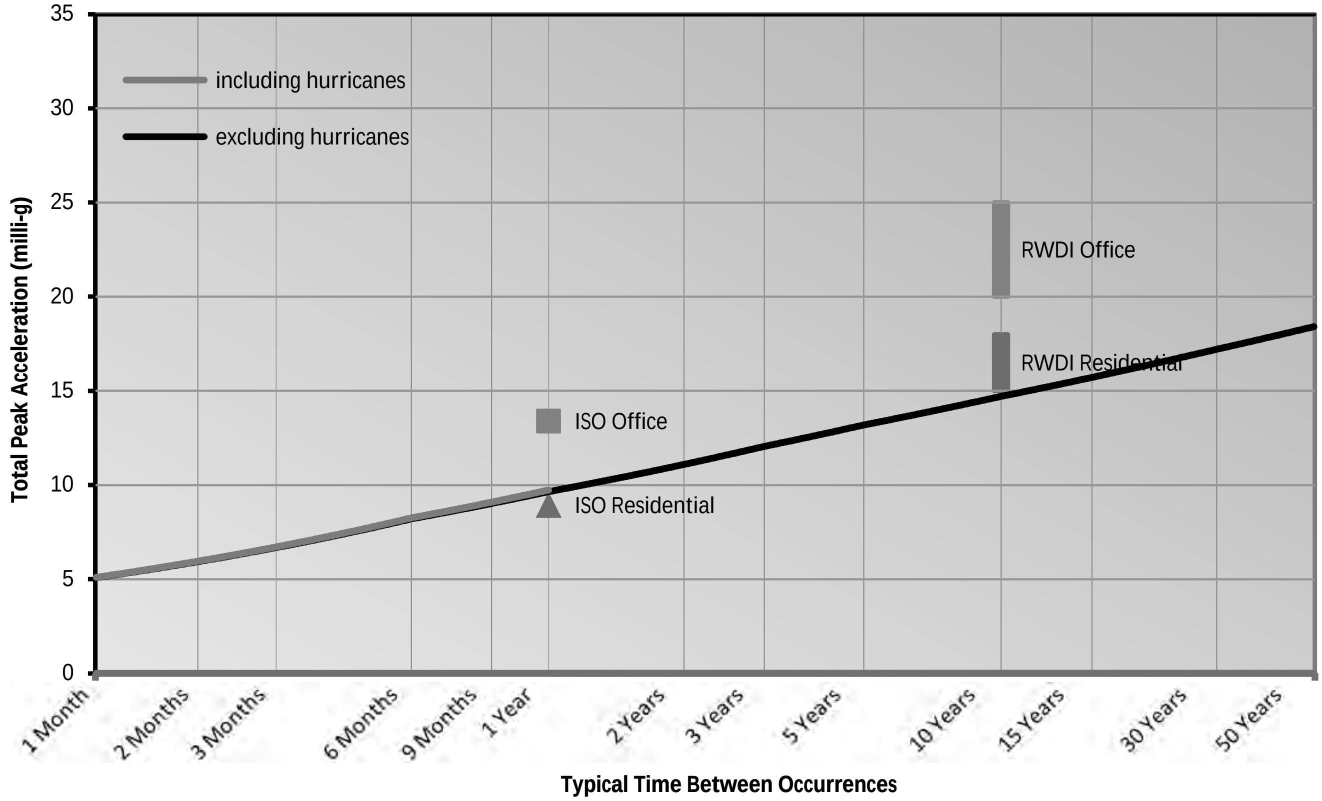
(5) The Council on Tall Buildings and Urban Habitat (CTBUH) provides tentative torsional velocity criteria for the 1- and 10-year return periods.

(6) With the inclusion of hurricanes, it is not appropriate to consider events beyond the 1-year return period when evaluating occupant comfort. Therefore, longer return period values with hurricanes are not provided.

Predicted Peak Accelerations and Torsional Velocities
Worst Case Configuration - 3.5% Damping

Figure No. 6c

151 Maiden Lane - New York, NY | Project #1400899 | Date: August 14, 2014



Return Period (Years)	Peak Accelerations(2) (milli-g) Total - [X, Y and torsional components]		Peak Torsional Velocities (milli-rads/sec)		
	without hurricanes	with (6) hurricanes	without hurricanes	with hurricanes	CTBUH(5) Criteria
1	9.6 - [3.6, 9.5, 1.0]	9.7 - [3.6, 9.6, 1.0]	0.4	0.4	1.5
5	13 - [5.0, 13, 1.4]	-	0.6	-	-
10	15 - [5.9, 14, 1.6]	-	0.7	-	3

Notes:

(1) A damping ratio of 5% of critical was used, along with frequencies of 0.1621, 0.2481, and 0.6250 Hz.

(2) Accelerations are predicted at Structural Level '51' (614 ft above Structural Level '1') at a radial distance of 27.9 ft from the central axis of the tower (given in Figure 4).

(3) ISO is the International Organization for Standardization, and the current standard (ISO 10137:2007) provides acceleration criteria for buildings at the 1-year return period. The criteria plotted on the graph have been generated based on a response-weighted interpretation of the individual modal component of the ISO criteria.

(4) RWDI's criteria for residential and office buildings are based on research, experience and surveys of existing buildings, and is in agreement with general practice in North America.

(5) The Council on Tall Buildings and Urban Habitat (CTBUH) provides tentative torsional velocity criteria for the 1- and 10-year return periods.

(6) With the inclusion of hurricanes, it is not appropriate to consider events beyond the 1-year return period when evaluating occupant comfort. Therefore, longer return period values with hurricanes are not provided.

Predicted Peak Accelerations and Torsional Velocities
Worst Case Configuration - 5% Damping

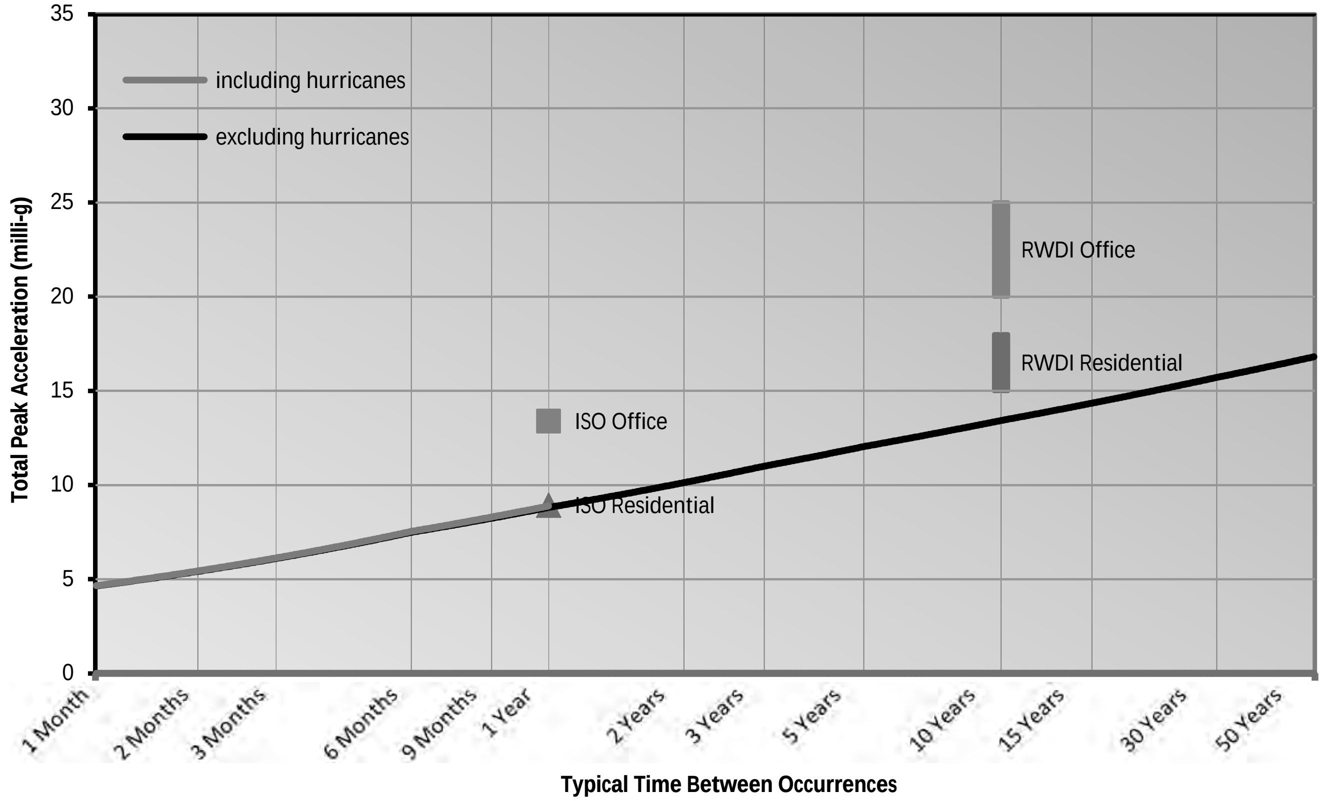
Figure No. 6d

151 Maiden Lane - New York, NY

Project #1400899

Date: August 14, 2014

RWDI



Return Period (Years)	Peak Accelerations[2] (milli-g) Total - [X, Y and torsional components]		Peak Torsional Velocities (milli-rads/sec)		
	without hurricanes	with [6] hurricanes	without hurricanes	with hurricanes	CTBUH[5] Criteria
1	8.8 - [3.3, 8.7, 0.9]	8.9 - [3.3, 8.8, 0.9]	0.4	0.4	1.5
5	12 - [4.5, 12, 1.3]	-	0.6	-	-
10	13 - [5.3, 13, 1.5]	-	0.6	-	3

Notes:

(1) A damping ratio of 6% of critical was used, along with frequencies of 0.1621, 0.2481, and 0.6250 Hz.

(2) Accelerations are predicted at Structural Level '51' (614 ft above Structural Level '1') at a radial distance of 27.9 ft from the central axis of the tower (given in Figure 4).

(3) ISO is the International Organization for Standardization, and the current standard (ISO 10137:2007) provides acceleration criteria for buildings at the 1-year return period. The criteria plotted on the graph have been generated based on a response-weighted interpretation of the individual modal component of the ISO criteria.

(4) RWDI's criteria for residential and office buildings are based on research, experience and surveys of existing buildings, and is in agreement with general practice in North America.

(5) The Council on Tall Buildings and Urban Habitat (CTBUH) provides tentative torsional velocity criteria for the 1- and 10-year return periods.

(6) With the inclusion of hurricanes, it is not appropriate to consider events beyond the 1-year return period when evaluating occupant comfort. Therefore, longer return period values with hurricanes are not provided.

Predicted Peak Accelerations and Torsional Velocities

Worst Case Configuration - 6% Damping

Figure No. 6e

151 Maiden Lane - New York, NY — Project #1400899 — Date: August 14, 2014

RA Consultants LLC
Geotechnical Engineering

Walter J. Papp, Jr., Ph.D, P.E.
Senior Partner

Nidal M. AbiSaab, P.E.
Partner

Robert Alperstein, P.E.
Consultant

November 13, 2014
Revised November 18, 2014

13C1126

Akiva Kobre
Fortis Property Group LLC
45 Main Street
Brooklyn, New York 11201

Re: Revised Report of
Supplementary Geotechnical Investigation
52-Story Residential Structure
161 Maiden Lane
New York, NY 10038

Dear Mr. Kobre:

This revised report is submitted in accordance with our proposals of September 18, 2013 and May 28, 2014 as authorized by you on November 1, 2013 and May 28, 2014, respectively. It covers a supplementary geotechnical investigation related to the proposed construction at the referenced address and supersedes our report dated February 15, 2014.

We understand that the proposed project consists of two contiguous tower structures without a basement: a 52-story residential structure and a 30-story hotel. This report covers only the residential structure. The boring logs from a previous investigation by others for a different project on the site are available and utilized in our evaluation for the current project.

The hotel and residential structures may be constructed separately or at the same time. The total project footprint area will be approximately 11,536-ft^2. The footprint of the hotel will be approximately 6,700-ft^2 and the footprint of the residential building will be approximately 4,835-ft^2.

The total site is trapezoidal in shape with approximate average plan dimensions of 49-ft by 237-ft. It is located on the lower east side of Manhattan near the South Street Sea Port. The site consists of Lots 2 and 7 in Block 72. It is bounded on the east by South Street (approximately 150-ft from the East River), on the south by Maiden Lane, on the west by Front Street and on the north by Fletcher Street. The site presently is a parking lot with ground surface elevation approximately +3.5 Borough of Manhattan Datum (BMD).

Available maps indicate that the site is located east of the 17^{th} Century Manhattan shoreline and is "made land". Further, the site had several previous usages after being reclaimed from the river with fill. The previous investigations at the site included seven borings; three of these were within Block 72 Lot 2 (the proposed site of the residential building) and one was within 25-ft of its south property line. Observation wells were installed in two completed borings; one of these was the boring just outside the building's footprint at its south east corner.

PURPOSE AND SCOPE OF SERVICES

The purpose of the investigation was to obtain additional subsurface data at the site that would confirm and supplement the available information and provide recommendations for design and construction of foundations based on the data obtained.

We provided the following services:

1) Engaged Warren George Inc. (WGI) to drill a boring.

2) Provided special inspections to observe and log the boring. We classified the soils in the field and verified that the driller used proper procedures.

3) Evaluated the available and new data, performed Finite Element Analyses (FEA) and prepared this report.

4) Engaged TerraSense LLC to conduct laboratory tests on representative soil samples selected by us.

5) We will execute TR-1 forms for the boring.

6) Met with you and members of the design team to discuss our findings.

INVESTIGATION

The previous borings indicated that a deep foundation will be necessary to support the proposed structure (see evaluation below). Therefore at least four borings are necessary to provide design information and satisfy the 2008 New York City Building Code (Code) requirements. As discussed above four borings were drilled for the residential building site. These borings were drilled by Craig Test Borings in 2012 under controlled inspection by others. A CME 75 truck mounted drill rig was used to advance the borings. Steel casing was used to support the walls of the boreholes and water was used as the drilling fluid. Samples were obtained by the Standard Penetration Test Method (ASTM D 1586) generally at 5-ft depth intervals, but typically they were taken continuously within the upper 15-ft depth of the boring. All borings penetrated into bedrock (Class 1c or better). Boring logs pertinent to the proposed residential structure covered by this report are presented in Appendix A.

The supplemental investigation consisted of one boring (B-8). It was drilled by WGI during January 13 to January 16, 2014. It was drilled with an Acker 82 truck mounted drill rig by rotary methods with bio-degradable mud as the drilling fluid. Steel casing was used to support the upper portion of the borehole during soil sampling and then spun to top of rock to enable coring of the rock with an NX-double tube diamond core bit. Soil samples were obtained generally at 5-ft depth intervals by the Standard Penetration Test method (ASTM D1586) using a safety hammer. The drilling was observed by our Mr. Michael Filler. The boring log is presented in Appendix B.

TerraSense LLC conducted three grain size analyses, and one analysis of amount passing the No. 200 sieve on representative samples selected by us. The test results are presented in Appendix C and tabulated on the boring log in Appendix B.

SUBSURFACE CONDITIONS

The previous borings revealed that subsurface conditions generally consist of up to 28-ft of uncontrolled fill, underlain by approximately 5- to 13.5-ft of compressible former marsh deposits followed by up to 122-ft of sand deposits, then sporadically up to about 25-ft of decomposed rock, and hard mica schist bedrock at depths varying from about 111- to 155-ft with depth increasing from west to east across the site.

About 10-ft of wood was encountered below the marsh deposits in two borings in the western (hotel) portion of the site. The wood may have been part of old ship wreckages or buried bulkhead cribbing dating to the 18^{th} Century when this part of Maiden Lane was a dock or ship slip.

Groundwater was encountered about 5½- to 7½-ft below ground surface and appeared to be tidally influenced.

Boring B-8 drilled for this investigation revealed conditions similar to those described above. Uncontrolled fill (class 7 in accordance with Code) was encountered to a depth of about 24-ft below grade. The fill was comprised of gravel, sand, silt, pieces of concrete, steel, bricks, and wood. Typical N-values were around 20-blows/ft, but much higher values were recorded while penetrating the construction debris.

Organic Clay (OH, per Unified Soil Classification System) (Class 7) was encountered below the Fill stratum to a depth of about 35-ft below grade. N-values varied from about 3- to 5-blows/ft indicating a soft to medium consistency. It is most likely an estuarine or tidal marsh deposit.

Dense poorly graded Sand (SP, and SP-SM), with N-values generally exceeding 35-blows/ft, was encountered below the unsuitable upper soil strata. The top of this stratum varied from about 29- to 39-ft below ground surface based on the previous borings. The Sand is class 3a per Code, in some samples it is thinly laminated with silt (previous borings) and may contain dense to very dense silt layers. This stratum probably is a glacial outwash deposited in a high energy environment.

Below about 55-ft depth the Sand becomes more silty (typically SP-SM or SM) and denser with N-values mostly above 50-blows/ft although some lower values were recorded. We believe that at the lower depths the Sand stratum probably is a till deposited by advancing and retreating glaciers some 12,000-14,000 years ago. The bottom of the till was encountered at about 130-ft depth below ground surface. The bottom of the till varied from about 129- to 162-ft below ground surface in the previous borings.

Decomposed rock (class 1d) was encountered below the till stratum. N-values were very high (exceeding 100-blows/ft) and when the stratum was cored with an NX core barrel very little recovery and zero RQD was obtained.

Bedrock consisting of hard mica schist (class 1a) with quartz was encountered at depth of approximately 155-ft. Core recovery and RQD were 100 percent. In the previous borings the top of rock varied from about 132-to 166-ft below ground surface. Core recoveries and RQD's were somewhat lower than obtained in this investigation,

EVALUATION AND RECOMMENDATIONS

Foundations

The Fill and Organic Clay strata are unsuitable for supporting the heavy foundation loads of the proposed structure. These soils must be either bypassed with deep foundation elements (bearing in the very dense sand (glacial till) or socketed into the bedrock) or improved. Because of the height and slenderness of the proposed structure only high capacity deep foundation elements would be suitable. The cost-effectiveness of the options should be determined by others.

Deep Foundations

In our judgment large diameter drilled piles bearing in the glacial till, caissons drilled into the bedrock, or driven proprietary Taper Tube (TT) piles (see later discussion relating to pile driving vibrations) would be suitable deep foundations. Estimating the relative cost-effectiveness of these foundations requires input from contractors. The cost-effectiveness would be affected by the time required to install the foundation elements and the number of elements.

Typical designs and capacities for drilled caissons and drilled piles are shown in Table 1 (next page). We understand that a driven 20-in OD x 3/8 in wall thickness TT driven about 85-ft deep could be expected to develop a design capacity of 250-tons when driven with a hammer delivering 55,000-ft/lbs of energy per blow. Design uplift and lateral capacities of 40- and 15-tons, respectively also are expected. Spring constants of piles for use in structural design are shown in Table 2.

The drilled caissons and the larger drilled piles can be expected to develop significantly higher capacities than the TT piles and correspondingly fewer elements are needed. We expect that approximately 7- to 8– TT piles could be installed each day per pile driving rig and that one rig would be mobilized for the project. However, the presence of wood or other obstructions in the Fill could impede the pile driving progress and require spudding or drilling to bypass the obstruction.

TABLE 1 TYPICAL PILE AND CAISSON DESIGNS

	Diameter [inches]	Compressive Design Axial Capacity [kips]	Bar size and grade	Number of Bars	Uplift Design Capacity [Kips]	Lateral Design Capacity [Kips]	Socket Length [ft]
Caissons	18x0.5	1,200	#28 GR 75	1	144	72	11*
		2,400	#28 GR 97	4	745		22*
	24x0.5	1,600	#28 GR 75	1	144	76	11*
		4,000	#28 GR 97	6	1,100		25*
	36x0.5	6,400	#28 GR 97	8	1,490	130	25*

* Casing to penetrate one ft into rock and one ft of rock discounted due to potential disturbance

Drilled Piles	24x0.5	500	#20 GR 75	1	80	30	*
	30x0.5	950	#28 GR 75	1	150	40	*
	36x0.5	1,200	#28 GR 75	2	200	55	*

* Drilled piles to penetrate to 100-ft below bottom of pile cap for preliminary budget purposes.

TABLE 2 SPRING CONSTANTS FOR STRUCTURAL DESIGN

Pile	Design Load (Kips)	Estimated Deflection at Design Load (in)	Spring Constant (Kips/in)
24x0.5	500 compression	0.5	1000
30x0.5	950 compression	0.8	1190
36x0.5	1200 compression	0.7	1715
20 x 3/8 TT	500 compression	0.4	1250
24x0.5	80 uplift	0.38	210
30x0.5	150 uplift	0.38	395
36x0.5	200 uplift	0.38	525
20 x 3/8 TT	70 uplift	0.38	185

We would expect that each drilled pile would require 2- to 3-days for installation per rig and that each drilled caisson would require 3- to 4-days per rig for installation. We assume that about 120 TT-piles would be required and that alternatively about 60-drilled piles or 40-drilled caissons would be required. The estimated time for foundation construction would be about three to four weeks for the TT piles and about sixteen to thirty-two weeks for the drilled foundations, for two or one rig, respectively.

The minimum center to center spacing for the deep foundation elements (piles or caissons) should be a minimum of 2½ diameters of the element or 4-ft (whichever is greater).

Two load tests will be required for the drilled or driven pile foundations. No load tests are required for the drilled caissons but down-the-hole remote TV inspection is required for each caisson as part of special inspections. The load tests for the TT piles and for the drilled piles shall be conducted in accordance with ASTM D 1143 with the final load increment held in place for at least 24-hrs. The test piles shall be subjected to cyclical loading or suitably instrumented with tell tales and strain gauges to allow evaluation of tip and frictional resistances, as specified by the Code.

We estimate that settlements of drilled elements may be about ½- to 1-inch, occurring mainly during construction. Similarly we estimate that settlements of driven TT piles may be about ½-in occurring mainly during construction.

Vibrations Due to Pile Driving- Vibrations due to pile driving can be detrimental to adjacent structures. Problems usually develop when the adjacent structures are old and brittle and/or when they are founded on granular soils that can densify and settle because of the vibrations. For most situations induced vibrations with peak particle velocities less than 2-in/sec are acceptable if the critical conditions are absent. Sometimes cosmetic cracking occurs due to vibrations, even with relatively low vibration velocities.

We understand that all the nearby existing structures are supported on piles driven into the dense sand layer. This should be confirmed and documented. We estimated the potential vibration levels caused by a 55,000-ft-lb hammer based on available empirical data. The estimated vibration levels are about 2-in/sec at a distance of about 20- to 25-ft from the source. The distance from the property line to the closest adjacent building is about 25-ft. Therefore we anticipate that pile driving vibrations should be acceptable if these buildings are supported on piles driven into the dense sand deposit.

Soil Improvement

We consider soil improvement a technically feasible alternative to deep foundations. The unsuitable soils would be improved by jet grouting techniques. The existing soils are penetrated and mixed in place with cement grout that is pumped under high pressure through a pipe with small diameter openings that is inserted to the desired depth of improvement. The pipe is rotated as it is removed from the ground and the grout flows through the openings as jet streams. The rotating jet streams mix the existing soil in place with the grout. The resulting cured improved ground is a soilcrete having unconfined compressive strengths in the range of 350- to 1,000-lbs/in^2.

We estimated the potential settlements of the proposed 52-story structure supported by a structural mat bearing on the soilcrete using FEA with the commercial program Plaxis3D. The dimensions of the mat and the design foundation loads were provided by the project structural engineer, WSP Cantor Seinuk. We assumed that the site would be contained by tangent piles also constructed by the jet grouting method. Probable engineering properties of the soilcrete were estimated based on information provided by the specialty contractor Hayward Baker. We estimated the engineering properties of the natural subsoils based on our experience and evaluation of N-values shown on the boring logs. Details of the analysis are provided in Appendix D.

The results of the analysis suggest that settlements of about 2-in should be anticipated during construction as the dead and permanent live loads are applied to the foundation. Differential settlements of about 1-in also should be anticipated. Potential movements during the application of design wind loads may be about ½ -in varying from about 0- to 1-in across the site. The structural engineer should confirm that the estimated settlements and movements would be tolerable.

We evaluated the global lateral stability of the building under the design wind loadings provided by the structural engineer. The calculated safety factor was greater than 3 assuming a conservative soil friction coefficient of 0.2 (equivalent friction angle of 11^o).

Spring constants for structural design of the mat supported on the soilcrete may be taken as follows:

- Equivalent spring constant of soilcrete and underlying sand: 460- to 920-tons/ft^3.

- Equivalent spring constant of tangent wall and underlying sand: 550- to 1,100-tons/ft^3.

The above spring constants represent the probable range of the parameter within our ability to estimate them and are not necessarily representative of differing values across the site.

Quality Control and Verification

Quality control and verification procedures will be necessary during construction utilizing proposed soil improvement. Daily observations of contractor operations by a "Special Inspector" will be necessary. Grab samples of the soilcrete should be obtained by the contractor while observed by the Special Inspector on every day of the jet grouting operations. These samples should be formed into 3-in diameter by 6-in long cylinders for unconfined (U) and possible consolidated undrained (CU) and/or consolidated drained (CD) triaxial compression testing. At least two U tests should be conducted for each day of jet grouting operations. The U tests should be conducted 28 days after each sample was obtained to verify that the design assumptions of unconfined compressive strength are obtained. Depending on results of the initial tests the engineer may request supplementary testing to evaluate beneficial effects of confinement and aging.

Also, at least six (6) core borings penetrating to the depth of improvement should be obtained to verify that the grouting has been effective. U or triaxial tests may be ordered at the engineer's discretion, recognizing that micro cracking and other defects that occur during coring could affect the test results.

<u>Uplift Tiedowns</u>

Anchors drilled and socketed into soil or rock may be used to resist uplift caused by wind or other horizontal loading. Typical soil and rock anchor designs and spring constants for structural design purposes are shown in Table 3.

Table 3 Typical Tiedown Anchors

Design Capacity (kips)	**Type**	Hole Diameter (inches)	Bar Size and Grade	Free Length Below bottom of Mat (ft)	Socket Length (ft)	Spring Constant (Kip/in)
580	Soil	9 5/8	#24 Gr150	25 ±	115	180- to 280
580*	Rock	8	#24 Gr150	150 ±	20	130- to 150

* Higher rock anchor capacities possible with tendons.

Where the tie-downs are locked in at the bottom of the mat the spring constants may be taken as 1,200-kip/in.

The minimum spacing of rock anchors shall be four hole diameters or 4-ft, whichever is greater.

Alternatively, the deep foundation elements described above may be used as tiedowns. All tie-downs shall be tested in accordance with PTI recommendations.

Groundwater Control

The previous investigation indicated that groundwater levels are related to the level of the nearby East River. The measured groundwater levels in 2007 were about 5- to 7- ft below ground surface. These should be expected to vary by several feet during the normal tide cycle and could be as high as the River level during a major or design level flood.

During Construction- Unless a major storm occurs we expect that the groundwater level will be near or slightly below subgrade level but may be encountered during excavation for pile caps if they are used. Local sumps and pumps probably will be able to dewater the local excavations to allow placement of re-bars and concrete. If a major storm occurs and the general area is flooded construction probably will be delayed until the flood waters subside.

If soil improvement is used as described above the staging depth may be below the ground water level. This would depend on the contractor’s means and methods. A relatively impervious SOE wall (*e.g.* tangent pile wall) and sump pumping should be sufficient to control groundwater.

After Construction-The site lies within the 100-yr flood plain of the East River, and is at approximately el 4.5- to 6.3 (NAVD88 Datum). The 100-yr flood plain is approximately at el +13 (NAVD88 Datum). We understand that the building must be “flood proofed” for water levels up to 1-ft above the 100-yr flood plain elevation. Therefore the ground floor slab should be designed as a pressure slab with hydrostatic uplift pressures based on a design water level of +14 (NAVD88 Datum).

Underpinning and Lateral Retaining Systems

No deep excavations near existing structures are planned. Therefore no underpinning should be necessary. General excavation depths for foundation and ground floor construction should be about the order of 8-ft below existing ground surface. We expect that sufficient space should be available to allow open cut construction. Temporary side slopes should be no steeper than 1:1½ (v:h). If insufficient space is available we anticipate that cantilevered (unbraced) vertical soldier pile and lagging retaining walls would be used to retain the earth.

Deeper excavations may be necessary for implementing soil improvement and constructing a mat. A tangent or secant pile wall could be used to control water and support the excavation.

Unbraced walls (soldier-pile and lagging, tangent pile, secant pile) may be designed based on active earth pressures calculated using an effective soil friction angle of 32^o and total unit weight of 125-lbs/ft^3.

Potential Effects on Adjacent Structures

As discussed earlier nearby adjacent structures are believed supported on piles bearing in the dense sand strata and are located at least 25-ft from the property line. Therefore, no significant effects on the existing structures are anticipated due to the nominal excavation depths that may be required. Similarly, the adjacent structures are sufficiently distant so that no negative effects are expected with properly executed construction of drilled foundation elements although slight migration of fine soil particles into the drill hole could occur.

The potential effects of pile driving vibrations were discussed earlier. We recommend that vibrations be monitored at various distances from the piles during the driving of initial test piles to confirm that the expected vibration levels will be acceptable. Vibration levels on the adjacent structures should be monitored during installation of piles.

Seismic Considerations

Potential Liquefaction- No potentially liquefiable soils were encountered in the boring drilled for this supplementary investigation. Several N-values from the previous borings plotted below the Code liquefaction screening diagram of N-value vs. depth. However, we analyzed the data using the Simplified Seed Idriss method and found that, with the exception of three isolated points, all calculated "safety factors with respect to liquefaction" exceeded 1.25. The lowest calculated safety factors for the isolated points were approximately 1.1. If soil improvement is used no localized zones with calculated low safety factors with respect to liquefaction would be present. We conclude that liquefaction need not be considered in the design for any suitable foundation option.

Site Class- The site class is determined by considering the weighted N-value for granular soils and the weighted undrained shear strength for cohesive soils in the various soil layers in the upper 100-ft of the soil profile. We estimated undrained shear strengths from N-values reported on the boring logs applicable to the project.

Our analysis indicates that the site may be classified as "D Stiff soil profile" based on the granular soils, but as "E Soft soil profile" in accordance with Table 1615.1.1 of the Code. Therefore Site Class E should be used for design.

If soil improvement is used the site class would be improved to Class C for seismic design purposes.

Additional Investigation

Possibly, a site specific investigation involving *in-situ* shear wave velocity testing and site spectral analysis could reduce the design spectral accelerations to about 80 per cent of the Site Class determined by the *in-situ* shear wave velocity testing.

LIMITATIONS

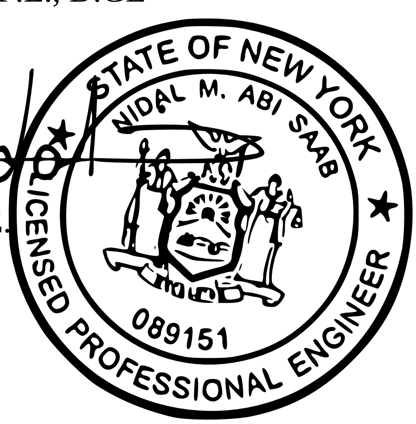
Our recommendations presented above are based on our interpretation of subsurface conditions based on the results of four available boring logs and the boring drilled for this investigation and our understanding of the project as described above. Significant differences in the project or other changed conditions should be reported to us and we should be requested to revise our recommendations if necessary.

We appreciate this opportunity to be of service and look forward to working with you as the project proceeds.

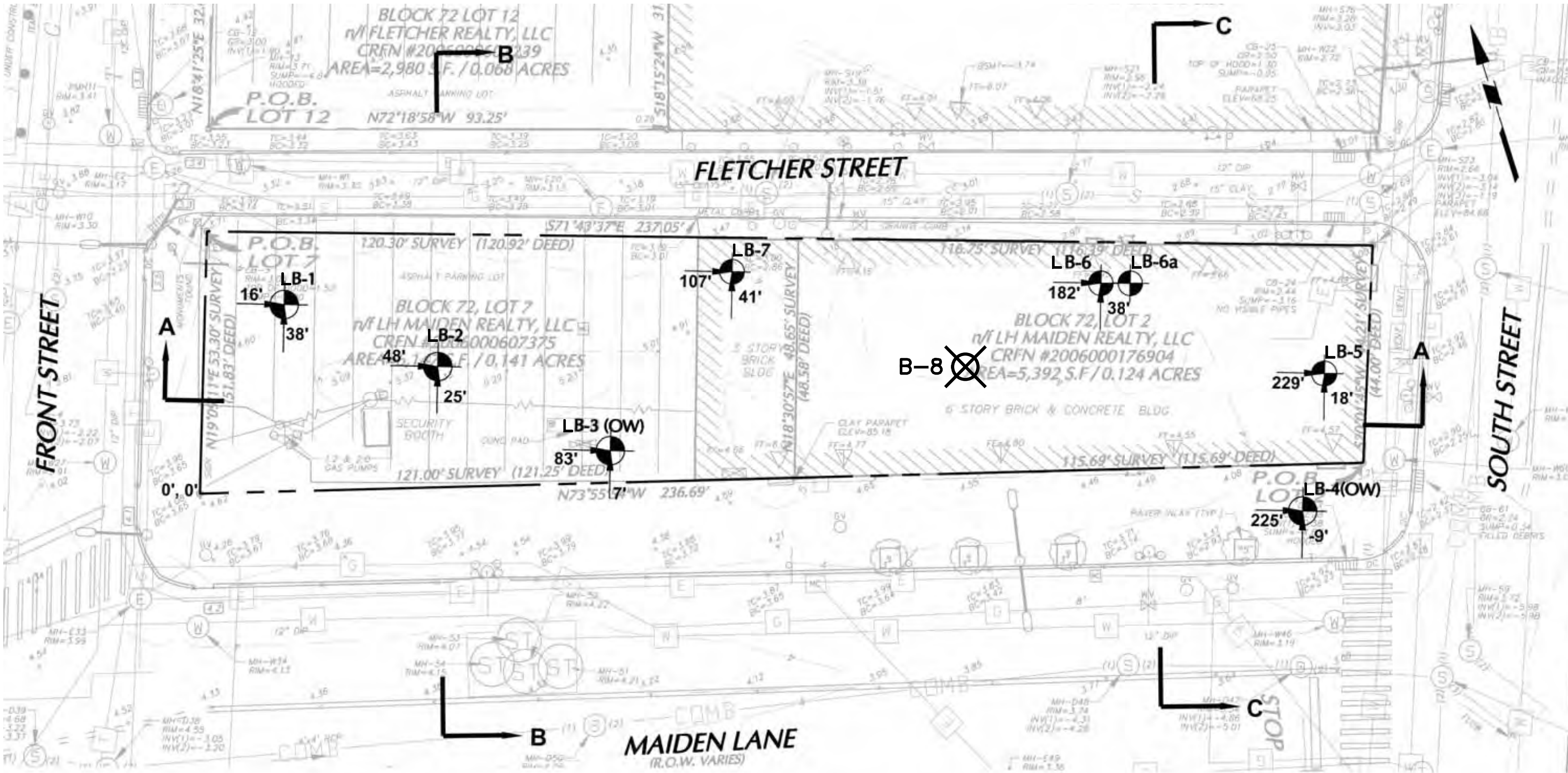
Very truly yours,
RA CONSULTANTS LLC

Robert Alperstein, P.E., D.GE

Nidal AbiSaab, P.E.



Unauthorized alteration or addition to this report is a violation of New York State Education Law Article 145 section 7209.



NOTES:

- BORINGS LB–1 THROUGH LB–7 WERE DRILLED AND OBSERVED BY OTHERS.
- BORING B–8 WAS DRILLED BY WARREN GEORGE INC. AND OBSERVED BY RA CONSULTANTS LLC., BETWEEN JANUARY 13TH THROUGH JANUARY 16TH, 2014.

LEGEND:

- BORING OBSERVED BY OTHERS
- BORING OBSERVED BY RA CONSULTANTS LLC

1 BORING LOCATION PLAN

Scale: 1/32":1'-0"

PROJECT	151 MAIDEN LANE NEW YORK, NY
RA CONSULTANTS LLC Geotechnical Engineering 47 WILKENS DR., DUMONT, NJ 07628 201.374.1794 WWW.RACLLC.COM (C) RA CONSULTANTS LLC	
DATE:	FEB. 5, 2014
PROJ. NO.:	13C1126
DRN/CHKD:	PS/RA
TITLE:	BORING LOCATION PLAN
DWG:	FIGURE 1

C:\USERS\PATRICK\DROPBOX\RA CLLC\RAC LLC 2013 PROJECTS\13C1126 151 MAIDEN LANE\DWG

PATRICK

APPENDIX A

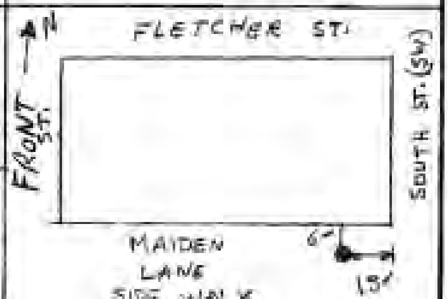
BORING LOGS BY OTHERS

LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES

LOG OF BORING B-4(ow) SHEET 1 OF 10

PROJECT: Maiden Lane Development	PROJECT NO. 9158301
LOCATION: 151-161 Maiden Lane, NY, NY.	ELEVATION AND DATUM: +3.3' sidewalk level
DRILLING AGENCY: ADT	DATE STARTED: 1/5/07 · DATE FINISHED: 1/11/07
DRILLING EQUIPMENT: MCE 75	COMPLETION DEPTH: 166 ft · ROCK DEPTH: 155 ft
SIZE AND TYPE OF BIT: 3 7/8" Tricone Roller Bit	NO. SAMPLES: DIST 34 · UNDIST — · CORE 11 ft
CASING: 4" ID - STEEL	WATER LEVEL: FIRST — · COMPL. — · 24 HR. —
CASING HAMMER: AUTO · WEIGHT: 140 lbs · DROP: 30"	FOREMAN: James
SAMPLER: 2" OD - SPLIT SPOON	
SAMPLER HAMMER: AUTO · WEIGHT: 140 lbs · DROP: 30"	INSPECTOR: Bachir Brimo

NYCBC	Symbol	SAMPLE DESCRIPTION	DEPTH SCALE	NUMBER	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		SIDEWALK CONCRETE	0					
11-65	FILL	Brown (f-c) SAND & GRAVEL tr. bricks (FILL)	1–2	S1	SS	6"	4 4 6	
		Brown (f-c) SAND some Gravel, tr. bricks (FILL)	2–4	S2	SS	6"	7 6 8 35	1/5/07
		Brown (f-c) SAND, some Gravel, tr. bricks, concrete (FILL)	4–6	S3	SS	6"	9 13 6 4	- Drill through concrete; SS: 0.5-2 ft
		Black woods, coarse black Sand tr. bricks (FILL)	6–8	S4	SS	8"	9 9 6 20	SS: 2-4 ft; SS: 4-6 ft
		Interbedded layers of woods and black coarse sands (strong smell) (FILL)	8–10	S5	SS	6"	11 47 8 65	SS: 6-8 ft; SS: 8-10 ft
11-65	FILL	Interbedded layers of woods and black coarse sands smell (FILL)	10–12	S6	SS	12"	50 32 11 16	SS: 10-12 ft; drill to 15 ft
			13					
			14					



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ENGINEERING & ENVIRONMENTAL SERVICES

JOB NO. 9158301
DATE 1/5/07

LOG OF BORING NO. B-4 (OW)

SHEET 2 OF 10

NYCBC	Symbol	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
								4" casing to 15 ft
11-65	FILL	Gray SILT and SAND, some Woods (FILL)	15					SS: 15-17 ft
			16	S7	SS	12"	11 9 7 3	
			17					drill to 20 ft
			18					
		? ——— ? ——— ?						
			19					4" casing to 20 ft (hard)
11-65	WOODS	Woods (small) (FILL)	20					SS: 20-22 ft
			21	S8	SS	3"	100/3"	
			22					drill to 25 ft
			23					
			24					4" casing to 25 ft (Hard)
11-65	WOODS	Woods (small) (FILL)	25					SS: 25-27 ft
			26	S9	SS	10"	9 5 12 15	
			27					drill to 30 ft
		? ——— ? ——— ? ——— ?	28					
			29					4" casing to 30 ft
11-65	CLAYEY SILT	Gray CLAYEY SILT, some woods, tr. organics (MH)	30					SS: 30-32
			31	S10	SS	1"	WOH WOH WOH 3	drill to 35 ft
			32					

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JOB NO. 915801
DATE 1/8/07

LOG OF BORING NO. B-4 (OW)

SHEET 3 OF 10

NYeBC	Symbol	SAMPLE DESCRIPTION	DEPTH SCALE	NO.	TYPE	RECOV. FT	PENETR. RESIST BL/6 IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
11-65	CL.SILT		33					1/8/07 - Driller centred rig on boring - 2 hours to pull out casing from woods
		? — ? — ?	34					
7-65	SAND	Brown (f-m) SAND, tr. Mica (SP)	35–37	S1	SS	12"	10, 14, 17, 17	SS: 35-37 ft; drill to 40 ft
			38					
			39					
7-65	SAND	Brown (f-m) SAND, tr. Mica (SP)	40–42	S2	SS	6"	12, 6, 9, 10	SS: 40-42 ft; drill to 45 ft
		? — ?	43					
8-65	SAND		44					
	BOULDER	NO RECOVERY	45–47	S3	SS	0"	100/0"	SS: 45-47 ft - Boulder 4 ft long - Cored through boulder (2") - drilled through boulder (4" drilling bit) (2 hours)
			48					
			49					- Drill from 49-50 ft
			50					

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JOB NO. 915 8301
DATE 1/8/07

LOG OF BORING NO. B-4 (OW)
SHEET 4 OF 10

NYCBC	Symbol	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC	TYPE	RECOV. FT	PENETR. RESIST BL/6 in	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
8-65	SAND	Brown fine SAND, tr. Mica (SP)	51	S14	SS	18"	11 29 39 38	SS: 50-52 ft drill to 55 ft
			52					
			53					
			54					
8-65	SAND	Brown fine SAND, tr. Mica (SP)	55 56	S15	SS	16"	9 18 24 29	SS: 55-57 drill to 60 ft
			57					
			58					
			59					
8-65	SAND	Brown fine SAND, tr. Mica (SP)	60 61	S16	SS	16"	9 15 20 30	SS: 60-62 ft drill to 65 ft
			62					
			63					
			64					
8-65	SAND	Brown fine SAND, tr. Mica (SP)	65 66	S17	SS	14"	7 16 17 23	SS: 65-67 ft drill to 70 ft
			67					
			68					

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JOB NO. 9158301
DATE 1/8/07

LOG OF BORING NO. B-4 (OW)
SHEET 5 OF 10

NYCBC	Symbol	SAMPLE DESCRIPTION	DEPTH SCALE	NO.	TYPE	RECOV. FT	PENETR. RESIST BL/6 IN	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			69					
8-65	SAND	Brown fine SAND, tr. Mica (SP)	70	S18	SS	18"	11 14 25 29	SS: 70-72 ft
			71					
			72					drill to 75 ft
			73					
8-65	SAND		74					
		Brown fine SAND, tr. Mica (SP)	75	S19	SS	16"	11 20 23 23	SS: 75-77 ft
			76					
			77					drill to 80 ft
			78					
			79					
8-65	SAND	Brown fine SAND, tr. Mica (SP)	80	S20	SS	16"	15 21 35 30	SS: 80-82 ft STOPPED FOR THE DAY 1/9/08
			81					
			82					drill to 85 ft
			83					
			84					
8-65	SAND	Brown fine SAND, tr. Mica silt (SP)	85	S21	SS	16"	19 31	SS: 85-87 ft
			86					

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JOB NO. 9158301
DATE 1/9/07

LOG OF BORING NO. B-4 (OW)

SHEET 6 OF 10

NYCBC	Symbol	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC.	TYPE	RECOV. FT	PENETR. RESIST BL/6 IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
8-65	SAND			S21	SS		39 37	
			87					drill to 90 ft
			88					
			89					
8-65	SAND	Brown fine SAND, tr. Mica, tr. alternating varves of gray silt (SP)	90					SS: 90 - 92 ft
			91	S22	SS	20"	19 27 36 41	
			92					drill to 95 ft
			93					
			94					
8-65	SAND	Brown fine SAND, some gray silt, Mica (SP)	95					SS: 95 - 97 ft
			96	S23	SS	20"	12 19 34 40	
			97					drill to 100 ft
			98					
			99					
8-65	SAND	Brown fine SAND, tr. Mica (SP)	100					SS: 100 - 102 ft
			101	S24	SS	16"	12 18 29 30	
			102					drill to 105 ft
			103					
			104					

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JOB NO. 958301
DATE 1/9/07

LOG OF BORING NO. B-4 (OW)

SHEET 7 OF 10

NYCBC	Symbol	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC.	TYPE	RECOV. FT	PENETR. RESIST BL/6 IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			105					SS: 105-107
8-65	SAND	Brown fine SAND, tr. Mica (SP)	106	S25	SS	13"	13 19 22 25	
			107					drill to 107 ft
			108					
			109					
			110					SS: 110-112 ft
8-65	SAND	Brown fine SAND, tr. Mica (SP)	111	S26	SS	18"	14 21 24 29	
			112					drill to 115 ft
			113					
			114					
			115					SS: 115-117 ft
8-65	SAND	Brown fine SAND, tr. Mica (SP)	116	S27	SS	21"	15 24 28 31	
			117					drill to 120 ft
			118					
			119					
			120					SS: 120-122 ft
8-65	SAND	Alternating varves of brown fine SAND and gray silt (SP)	121	S28	SS	22"	12 18 26 36	
			122					drill to 125 ft

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JOB NO. 915 8301
DATE 1/9/07

LOG OF BORING NO. B-4 (OW)

SHEET 8 OF 10

NYCBC	Symbol	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./DC	TYPE	RECOV. FT.	PENETR. RESIST. BL/6 IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			123					
			124					
8-65	SAND	Brown fine SAND, tr. Mica silt (SP)	125–127	S29	SS	16"	9, 17, 28, 42	SS: 125-127 ft; drill to 130 ft
			128					
			129					
8-65	SAND	Brown fine SAND, tr. Mica silt (SP)	130–132	S30	SS	18"	16, 26, 36, 46	SS: 130 - 132 ft; drill to 135 ft
			133					
			134					
8-65	SAND	Brown fine SAND, tr. Mica silt (SP)	135–137	S31	SS	12"	25, 40, 62, 63	SS: 135 - 137 ft; drill to 140 ft
			138					
			139					
			140					

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JOB NO. 915830l

DATE 1/9/07

LOG OF BORING NO. B-4 (OW)

SHEET 9 OF 10

N-Value	Symbol	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
8-65	SAND	Brown fine SAND, tr. Mica (SP)	140–142	S32		8"	29 35 42 50	SS: 140-142 ft; drill to 145 ft
			143					
			144					
8-65	SAND	Brown fine SAND, tr. Mica (SP)	145–147	S33		17"	21 29 45 47	SS: 145-147 ft - STOPPED FOR THE DAY - SPOON LEFT IN BORING; 1/10/07; drill to 150 ft. The boring collapsed. Driller had to wash it out and use 3" casing to a depth of 130 ft.
			148					
			149					
8-65	SAND	Brown fine SAND, tr. Mica (SP)	150–152	S34	SS	15"	9 15 30 64	SS: 150-152 ft; drill to 155 ft; hard drilling @ 154 ft; 1/11/07
			153					
			154					
L-65	ROCK	Gray Manhattan Schist Rock (8, 9, 8)	155–158	C1	NX	REC. = 60/60 = 100%	RQD = 60/60 = 100%	started coring @ 155 ft; C1: 155-160 ft

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JOB NO. 9158301
DATE 1/11/07

LOG OF BORING NO. B-4(OW)
SHEET 10 OF 10

NYCBC	Symbol	SAMPLE DESCRIPTION		DEPTH SCALE	NO./LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
1-65	ROCK	Gray Manhattan schist Rock	9	159	C-1	NX	100%	100%	
			9	160					started coring second run
		Gray Manhattan schist Rock	9	161					- Driller started loosing water @ 161.0 ft. - Re-started coring C-2: 161-166 ft
			8	162	C2	NX	REC. = 57/60 = 95%	RQD = 57/60 = 95%	
			7	163					
			7	164					
			7	165					
			8						
		E.O.B.							A well was installed in this boring. Details are in a separate report.

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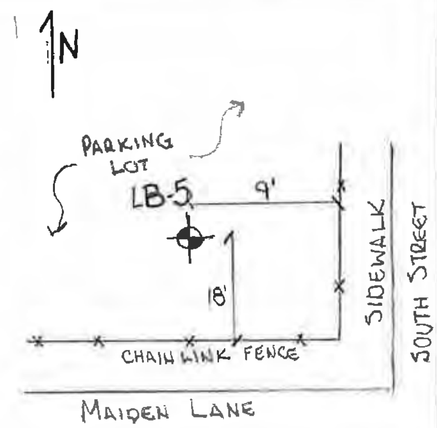
LOG OF BORING LB-5 **SHEET** 1 **OF** 10

PROJECT: 151 TO 161 MAIDEN LN.	PROJECT NO.: 170166601
LOCATION: NEW YORK, NY	ELEVATION AND DATUM: EL 4± (MANHATTAN DATUM)
DRILLING AGENCY: CRAIG TEST BORING	DATE STARTED: 3/28/12 — DATE FINISHED: 3/30/12
DRILLING EQUIPMENT: CME 75 TRUCK MOUNTED RIG	COMPLETION DEPTH: 168' — ROCK DEPTH: 166'
SIZE AND TYPE OF BIT: 2 7/8" Ø TRICONE ROLLER BIT	NO. SAMPLES — DIST. 37 — UNDIST. – — CORE 1
CASING: 4" Ø FLUSH JOINT STEEL CASING	WATER LEVEL — FIRST - — COMPL. 14' — 24 HR. -
CASING HAMMER: AUTO — WEIGHT: 140 LB. — DROP: 30"	FOREMAN: CRAIG & ED
SAMPLER: 2" Ø SPLIT SPOON BARREL	
SAMPLER HAMMER: AUTO — WEIGHT: 140 LB. — DROP: 30"	INSPECTOR: CORRIE CAMPBELL

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	PID (ppm)	CASING BLOWS	DEPTH SCALE	NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.
CLASS 7	FILL	~2" GRAVEL PARKING LOT SURFACE			0				
		dk. brn. f-c SAND WITH SOME f. GRAVEL, TRACE SILT, TRACE BRICK, DRY [FILL]	0.0		0–2	S-1	SS	8"	12, 6, 5, 7
		mottled f-c SAND and some f. GRAVEL, trace silt, trace wood, trace brick, dry [FILL]	0.0	PUSH	2–4	S-2	SS	5"	16, 50/3"
		mottled f-c SAND with some gravel, some brick, trace silt, moist [FILL]	0.0	28	4–6	S-3	SS	5"	4, 3, 2, 2
		dk. brn. f-c SAND AND SOME f. GRAVEL, TRACE BRICK, TRACE WOOD, TRACE SILT, MOIST [FILL]	0.0	10, 10	6–8	S-4	SS	3"	3, 1, 3, 2
		mottled f-c SAND WITH SOME GRAVEL, SOME BRICK, TRACE SILT, MOIST [FILL]	0.0	10	8–10	S-5	SS	16"	2, 3, 1, 2
		mottled f-c SAND WITH SOME GRAVEL, SOME BRICK, TRACE SILT, TRACE SEASHELL, MOIST [FILL]	0.0	PUSH	10–12	S-6	SS	7"	2, 5, 4, 5
					12–14				

REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)



- START DRILLING @ 8:45 ON 3/28/12
- DRIVE SS 0'-2', TAKE S-1
- ATTEMPT TO DRIVE SS 2'-4', HAD REFUSAL => TAKE S-2
- FILLED TUB WITH WATER, ADDED QUIK GEL
- DRILL DOWN TO 4'
- RIG CHATTER 3' TO 3 1/2'
- DRIVE SS 4'-6', TAKE S-3
- DRIVE SS 6'-8', TAKE S-4
- INSTALL 10' OF CASING, PUSH IN FIRST 5', DROVE ~5' TO 8 1/2'
- BROWN WASH
- AT 5', WHEN DRILLING DOWN WOOD FOUND IN WASH
- DRILL DOWN TO 10', DRIVE SS 10'-12', TAKE S-6
- INSTALL 5' OF CASING FROM 8 1/2' TO 13 1/2', PUSH CASING FOR ALL 5'
- DRILL DOWN TO 15'
- TAKE S-7 AT 15'-17'
- FOUND SILT, BAD RECOVERY
- TAKE S-8 AT 17'-19'

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JOB NO. 170166601

DATE 3/28/12

LOG OF BORING NO. LB-5

SHEET 2 OF 10

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	PPM	CASING BLOWS	DEPTH SCALE	SAMPLES NO./LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
CLASS 7	FILL				14–15					- INSTALL 5' OF CASING, PUSH FROM 13½ TO 18½'
		dk brn. f-c SAND AND SILT WITH SOME f GRAVEL [FILL]	0		15–17	S-7	SS	>1"	2, 2, 2, 1	
		dk.brn. f-c SAND AND GRAVEL WITH TRACE SILT [FILL]	0		17–19	S-8	SS	>1"	2, 1, 2, 4	
					19–20					- DRILL FROM 15' TO 20' - BROWN WASH FROM 15' TO 20' - INSTALL 5' OF CASING, PUSH FROM 18½' TO 23½'
		dk brn. PEAT AND f-c SILTY SAND WITH TRACE GRAVEL, moist, odor	3.5		20–22	S-9	SS	8"	1, 1, WOH, 1	- TAKE S-9 FROM 20' TO 22'
					22–24.5					- DRILL DOWN TO 25' => BROWN - ODOR COMING FROM HOLE
		dk. brn CLAY, WITH GRAVEL, TRACE SAND, TRACE BRICK, SOME SILT [CH]	PUSH		24.5–25	S-9a				- HIT LAYER OF COHESIVE MATERIAL GOT RETURN FROM DRILLING => S-9a
				441	25–27	U-1	SHELBY			- PLACE U-1 - BOTTOM OF TUBE CRUSHED UPON REMOVAL, SAMPLE UNUSABLE WOOD @ TIP OF SHELBY TUBE
		GREY WOOD AND CLAY TRACE f-c SAND, MOIST [CH]	3.8	127	27–29	S-10	SS	16"	5, 4, 5, 6	- TAKE S-10 FROM 27' TO 24'
					29–30					- DRILL DOWN TO 30' - LOTS OF WOOD CHUNKS IN RETURN
		GREY CLAY WITH SOME WOOD, SOME SILT, MOIST [CH]	0	337	30–32	S-11	SS	14"	WOH, 1, 1, WOH	- TAKE S-11 FROM 30' TO 32' - INSTALL 5' CASING, PUSH TO 25', DRIVE TO 27', HIT OBSTRUCTION, FINISHED DRIVING TO 28½'

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LOG OF BORING NO. LB-5

JOB NO. 170166601
DATE 3/28/12

SHEET 3 OF 10

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	PID (ppm)	CASING BLOWS	DEPTH SCALE	NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
					32					-DRILL DOWN TO 35' -WOOD ODOR WHEN DRILLING -WOOD PIECES COMING OUT WITH RETURN -SLOW DRILLING HARD TIME GETTING THROUGH WOOD STUCK IN CASING -LOSING WATER AT 33' -ADD MORE WATER TO BASIN
CLASS 7	FILL	BROWN f-c SAND WITH SOME WOOD TRACE f. GRAVEL, TRACE SILT, MOIST [SP]	0	148 BLOWS/5FT	35	S-12	SS	15"	3, 7, 12, 14	-TAKE S-12 AT 35'-37'
					37					-DRIVE IN CASING 28.5' TO 33.5' -DRILL TO 40' -ADD MORE WATER & QUIK GEL AT 40' -WASH NOW A LIGHTER SHADE OF BROWN THAN BEFORE -SOME WOOD STILL COMING UP WITH RETURN
		? — ? — ? — ?			38.5					
CLASS 6	SAND	BRN. m-f SAND WITH TRACE GRAVEL, MOIST [SP]	0	132 BLOWS/5FT	40	S-13	SS	11"	3, 3, 5, 5	-TAKE S-13 AT 40'
					42					-DRILL DOWN TO 45'
?		? — ? — ?			43.5					
CLASS 3	SAND	BRN. c-f SAND WITH TRACE GRAVEL, MOIST [SP]	0	636 BLOWS/5FT	45	S-14	SS	18"	5, 7, 7, 10	-TAKE S-14 AT 45'-47'
					47					-INSTALL 5' OF CASING FROM 33.5' TO 38.5' -INSTALL ANOTHER 5' OF CASING FROM 38.5' TO 43.5' -INSTALL ANOTHER 5' OF CASING FROM 43.5' TO 48.5'
?		? — ? — ?			48.5					
					49					

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JOB NO. 170166601

DATE 3/28/12

LOG OF BORING NO. LB-5

SHEET 4 OF 10

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	PID (ppm)	DEPTH SCALE	SAMPLES NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		VARIED BROWN f. SAND AND GREY SILT TRACE GRAVEL [SP & MH]	0	50–52	S-15	SS	21"	10, 14, 18, 26	-DRILLED DOWN TO 50' -SLOW DRILLING [illegible] WOOD STUCK [illegible] -TAKE S-15 AT 50
				52–55					-END 3/28/12 @ 2:15 ON ACCOUNT OF [illegible] -START 3/29/12 @ 7:40 A.M. -TOOK GW READING BEFORE DRILLING COMMENCED -ADDED MORE QUIKGEL TO TUB -SMOOTH DRILLING DOWN TO 55'
		BROWN f-m SAND WITH SOME SILT, TRACE MICA [SP]	0	55–57	S-16	SS	17"	9, 15, 17, 18	-TAKE S-16 AT 55' TO 57'
				57–60					-DRILL DOWN TO 60' -SMOOTH DRILLING, BROWN WASH
CLASS 3	SAND	BROWN f-m SAND WITH SOME SILT, TRACE MICA [SP]	0	60–62	S-17	SS	18"	5, 9, 11, 12	-TAKE S-17 AT 60' TO 62'
				62–65					-SMOOTH DRILLING DOWN TO 65' -BROWN WASH
		BROWN f-m SAND WITH SOME SILT, TRACE MICA [SP]	0	65–67	S-18	SS	15"	9, 16, 16, 17	-TAKE S-18 AT 65' TO 67'
				67–68					

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JOB NO. 170166601

DATE 3/29/12

LOG OF BORING NO. LB-5

SHEET 5 OF 10

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 In.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			68–70					-SMOOTH DRILLING DOWN TO 70' -BROWN WASH
		BROWN f-m SAND TRACE SILT, TRACE MICA [SP]	70–72	S-19	SS	17"	6, 10, 15, 17	-TAKE S-19 AT 70' TO 72'
			72–75					-SMOOTH DRILLING DOWN TO 75' -BROWN WASH
		BROWN f-m SAND TRACE SILT, TRACE MICA [SP]	75–77	S-20	SS	14"	12, 15, 15, 16	-TAKE S-20 FROM 75' TO 77'
CLASS 3	SAND		77–80					-DRILL DOWN TO 80', SMOOTH DRILLING -BROWN WASH
		BROWN f-m SAND WITH TRACE SILT TRACE MICA [SP]	80–82	S-21	SS	10"	20, 33, 35, 32	-TAKE S-21 FROM 80' TO 82'
			82–85					-DRILL DOWN TO 85' -SMOOTH & FAST DRILLING -BROWN WASH
		BROWN f-m SAND WITH TRACE SILT, MOIST [SP]	85–	S-22	SS	18"	20, 33	-TAKE S-22 FROM 85' TO 87'

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JOB NO. 170166601

DATE 3/29/12

LOG OF BORING NO. LB-5

SHEET 6 OF 10

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
CLASS 3	SAND	BROWN f-m SAND WITH TRACE SILT, MOIST [SP]	86	S-22	SS	18"	35, 32	
			87					-DRILL DOWN TO 90' -SMOOTH DRILLING -BROWN WASH
			88					
			89					
		BROWN f-m SAND WITH SOME SILT, MOIST [SP]	90	S-23	SS	19"	12, 19, 22, 27	-TAKE S-23 FROM 90' TO 92'
			91					
			92					-DRILL DOWN TO 95' -SMOOTH DRILLING -BROWN WASH
			93					
			94					
		BROWN f SILTY SAND, MOIST [SM]	95	S-24	SS	16"	11, 18, 23, 26	-TAKE S-24 FROM 95' TO 97'
			96					
			97					-DRILL DOWN TO 100' -SMOOTH DRILLING -BROWN WASH
			98					
			99					
		BROWN f-m SAND WITH SOME SILT, MOIST [SP]	100	S-25	SS	20"	8, 12, 13, 18	-TAKE S-25 FROM 100' TO 102'
			101					
			102					
			103					

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JOB NO. 170166601
DATE 3/29/12

LOG OF BORING NO. LB-5

SHEET 7 OF 10

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			104					-DRILL DOWN TO 105' -SMOOTH DRILLING -BROWN WASH
		BROWN f-m SAND WITH TRACE SILT, MOIST [SP]	105–107	S-26	SS	18"	14, 19, 21, 20	-TAKE SS SAMPLE S-26 FROM 105' TO 107'
			107–110					-SMOOTH DRILLING DOWN TO 110' -BROWN WASH
		BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]	110–112	S-27	SS	24"	14, 16, 18, 16	-TAKE SS SAMPLE FROM 110' TO 112'
			112–115					-SMOOTH DRILLING DOWN TO 115' -BROWN WASH
CLASS 3	SAND	BROWN f-m SAND WITH TRACE SILT, TRACE MICA [SP]	115–117	S-28	SS	20"	14, 19, 16, 18	-TAKE SS SAMPLE S-28 FROM 115' TO 117'
			117–120					-SMOOTH DRILLING DOWN TO 120' -BROWN WASH
		VARVED BROWN f-m SAND AND THIN LAYERS OF BROWN SILT, TRACE MICA, MOIST [SP & MH]	120–122	S-29	SS	19"	10, 15, 17, 23	-TAKE S-29 FROM 120' TO 122' WITH SS

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JOB NO. 170166601

DATE 3/30/12

LOG OF BORING NO. LB-5

SHEET 8 OF 10

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
CLASS 3	SAND		122					-DRILL DOWN TO 125' -SMOOTH DRILLING -BROWN WASH
			123					
			124					
		BROWN f-m SAND, TRACE MICA, MOIST [SP]	125	S-30	SS	15"	7 / 17 / 20 / 24	-TAKE S-30 FROM 125' TO 127' WITH SS
			126					
			127					-DRILL DOWN TO 130' -SMOOTH DRILLING -BROWN WASH
			128					
			129					
		BROWN f-m SAND TRACE MICA MOIST [SP]	130	S-31	SS	20"	8 / 14 / 19 / 19	-TAKE S-31 FROM 130' TO 132' WITH SS
			131					
			132					-DRILL DOWN TO 135' -SMOOTH DRILLING -BROWN WASH
			133					
			134					
		BROWN f-m SAND TRACE MICA, MOIST [SP]	135	S-32	SS	20"	19 / 26 / 28 / 29	-TAKE S-32 FROM 135' TO 137' WITH SS
			136					
			137					-ADDED QUIK GEL TO TUB -DRILL DOWN TO 140' -SMOOTH DRILLING -BROWN WASH
			138					
			139					

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JOB NO. 170166601
DATE 3/29/12

LOG OF BORING NO. LB-5

SHEET 9 OF 10

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
CLASS 3	SAND	BROWN f-m SAND TRACE MICA, MOIST [SP]	140–142	S-33	SS	21"	17, 26, 27, 25	-TAKE S-33 FROM 140' TO 142' WITH SS
			142–145					-DRILL DOWN TO 145' -SMOOTH DRILLING -BROWN WASH
		BROWN f-m SAND, TRACE MICA, MOIST [SP]	145–147	S-34	SS	19"	15, 20, 26, 26	-TAKE S-34 AT 145' TO 147' WITH SS
			147–150					-DRILL DOWN TO 150' -SMOOTH DRILLING -BROWN WASH
		BROWN f-m SAND TRACE MICA, MOIST [SP]	150–152	S-35	SS	21"	24, 26, 26, 30	-TAKE S-35 FROM 150' TO 152' WITH SS -END OF 3/29/12 AT 2:45 P.M
			152–155					-DRILL DOWN TO 155' -SMOOTH DRILLING DOWN -BROWN WASH
		BROWN f-m SILTY SAND WITH SOME GRAVEL, MOIST [SM]	155–157	S-36	SS	24"	23, 32, 33, 47	-TAKE S-36 FROM 155' TO 157'

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JOB NO. 170161601
DATE 3/30/12

LOG OF BORING NO. LB-5

SHEET 10 OF 10

NYSBC CLASS	SYMBOL	SAMPLE DESCRIPTION	TIME TO CORE (MIN)	DEPTH SCALE	SAMPLES NO. LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
				158					-DRILL DOWN TO 160' -LOTS OF RIG CHATTER -BROWN WASH
				159					
CLASS 3	SAND	BROWN f-c GRAVELLY SAND, MOIST [SP]		160	S-37	SS	<1"	100/3"	-ATTEMPT TO TAKE S-37 FROM 160' TO 162' WITH SS -REFUSAL AT 160'-3"
				161					
				162					-DRILL DOWN TO 163' -SLOW PROGRESS -RIG CHATTER -START ROCK CORE C-1 AT 11:08 A.M
		? ___ ? START OF BEDROCK @ 163' ?		163					
		mottled DECOMPOSED ROCK	3 MIN						
			1 MIN	164					
		ASSUMED TOP OF COMPETANT BEDROCK	1 MIN	165					
CLASS 1d	ROCK	grey, moderately decomposed MICA SCHIST [CLASS 1d]	7 MIN	166	C-1	NX	REC: 26"/60" = 43%	RQD: 6"/60" = 10%	BOREHOLE TERMINATED @ 168' BECAUSE BOREHOLE COLLAPSED AND ROCK WEDGED/BLOCKED THE ROCK SOCKET
			4 MIN	167					
		E.O.B. AT 168' BELOW EXISTING GRADE		168					
				169					
				170					
				171					
				172					
				173					
				174					
				175					

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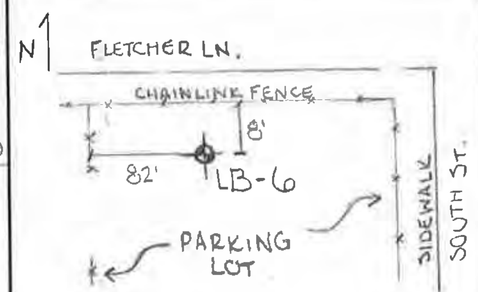
LOG OF BORING LB-6 — SHEET 1 OF 9

PROJECT	151-161 Maiden Ln.	PROJECT NO.	170166601
LOCATION	New York, NY	ELEVATION AND DATUM	EL 5± (BPMD)
DRILLING AGENCY	Craig Testing Inc.	DATE STARTED 4/2/12	DATE FINISHED 4/4/12
DRILLING EQUIPMENT	CME-75 Truck Mounted Rig	COMPLETION DEPTH 152'	ROCK DEPTH ~152'
SIZE AND TYPE OF BIT	2 7/8" Tricone Roller Bit	NO. SAMPLES: DIST. 36, UNDIST. -, CORE -	
CASING	4" Diameter Flush Joint Steel	WATER LEVEL: FIRST ~7', COMPL., 24 HR.	
CASING HAMMER	Auto; WEIGHT 140 lb.; DROP 30"	FOREMAN	Keith Parent / Craig Cohen
SAMPLER	2" Diameter Split Spoon	INSPECTOR	Corrie Campbell
SAMPLER HAMMER	Safety; WEIGHT 140 lb.; DROP 30"		

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	PID (ppm)	CASING BLOWS/FT	DEPTH SCALE	NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.
		brown f-c SAND with some gravel, trace brick, trace silt, dry [SP]	0	PUSH	0–2	S-1	SS	10"	15, 11, 11, 20
		brown f-c SAND with some gravel, trace wood, trace silt, dry [SP]	0		2–4	S-2	SS	5"	20, 11, 9, 9
		mottled f-c gravelly SAND and BRICK with trace silt [SP]	0		4–6	S-3	SS	6"	19, 14, 15, 7
		brown f-c SAND with some brick, trace gravel, moist [SP]	0	174 BLOWS/5FT	6–8	S-4	SS	1"	4, 3, 3, WOH
CLASS 7	FILL	brown f. sandy GRAVEL with some brick, moist [GP]	0		8–10	S-5	SS	6"	1, 1, 1, 1
		tan f. SANDY GRAVEL, MOIST [GP]	0	PUSH; 114 BLOWS/3 FT	10–12	S-6	SS	2"	4, 8, 6, 9
					12–14				

REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)



- START DRILLING @ 8:30 A.M.
- TAKE S-1 w/ SS SAMPLER FROM 0'-2'
- TAKE S-2 w/ SS SAMPLER FROM 2'-4'
- TAKE S-3 w/ SS SAMPLER FROM 4'-6'
- ADD WATER & QUIKGEL TO TUB
- DRILL TO 6' ⇒ LOTS OF CHATTER
- TAKE S-4 w/ SS SAMPLER FROM 6'-8'
- TAKE S-5 w/ SS SAMPLER FROM 8'-10'
- INSTALL 9' OF CASING
- DRILL TO 10'
- BROWNISH-GRAY WASH GRAVEL COMING OUT W/ RETURN
- TAKE S-6 w/ SS SAMPLER FROM 10'-12'
- INSTALL 5' OF CASING FROM 9' TO 14'
- DRILL TO 15'
- TAN → BROWN WASH

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JOB NO. 170166601

DATE 4/2/12

LOG OF BORING NO. LB-6

SHEET 2 OF 9

NYSC CLASS	SYMBOL	SAMPLE DESCRIPTION	PID (ppm)	CASING BLOWS (BPF)	DEPTH SCALE	SAMPLES NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
					14					
		GRAY f. SANDY GRAVEL, MOIST [GP]	0.3	309 BLOWS/5FT	15–17	S-7	SS	4"	4, 21, 8, 37	-TAKE S-7 W/ SS AT 15'-17'
					17–20					-INSTALL CASING 5' FROM 14' TO 19' -DRILL TO 20' -BROWN WASH -RIG CHATTER 17' TO 20'
		GREY f GRAVEL WITH SOME f-m SAND moist [GP]	1.4	355 BLOWS/FT	20–22	S-8	SS	1"	3, 14, 4, 5	TAKE S-8 W/ SS SAMPLER FROM 20'-22'
CLASS 7	FILL			526 BL/FT	22–25					-INSTALL 5' CASING FROM 19' TO 24' -DRILL DOWN TO 25' -A LITTLE RIG CHATTER FROM 23' TO 25'
		BROWN WOOD WITH TRACE f-m SAND, MOIST	4.9 PPM	239 BLOWS/4FT	25–27	S-9	SS	5"	29, 9, 14, 19	TAKE S-9 W/ SS SAMPLER FROM 25' TO 27'
					27–30					-INSTALL 5' CASING FROM 24' TO 29' -INCREASED RESISTANCE TO INSTALL CASING BETWEEN 24' AND 25' -AT 11:10 A.M. STOP TO REPAIR AUTOHAMMER DRILL TO 30' -BROWN WASH, SLOW DRILLING -ODOR OBSERVED IN HOLE -WOOD CHUNKS COMING UP W/ RETURN -AT 29.5' HIT THIN LAYER PRODUCING BLACK WASH
		BLACK ORGANIC SILT AND WOOD, MOIST [MH]	0 PPM		30–31	S-10	SS	1"	4, 3, 5, 5	

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JOB NO. 170166601
DATE 4/2/12

LOG OF BORING NO. LB-6

SHEET 3 OF 9

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	PID (ppm)	CASING BLOWS	DEPTH SCALE	NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
CLASS 7	FILL	BLACK ORGANIC SILT AND WOOD, MOIST [MH]	0	63 BLOWS/5FT	32–34	S-11	SS	1"	3, 2, 2, 3	TAKE S-11 w/SS FROM 32' TO 34' POOR RECOVERY
		BLACK ORGANIC CLAYEY SILT WITH SOME WOOD, MOIST [MH]	0		34–36	S-11a	SS	5"	PUSH	TAKE S-11a FROM 34' TO 36' w/ 3-IN Ø SPLIT SPOON TO MAKE SURE GET ACCEPTABLE SAMPLE
?		? ——— ? ——— ?								
		BROWN f-c GRAVELLY SAND WITH TRACE SILT [SP]	0	98 BLOWS/5FT	36–38	S-12	SS	3"	12, 12, 14, 18	TAKE S-12 FROM 36' TO 38'
					38–40					-DRILL TO 40' -BLACK TO BROWN WASH @ ~36.5'
		BROWN f-m SAND WITH SOME GRAVEL, TRACE SILT, MOIST [SP]	0	178 BLOWS/5FT	40–42	S-13	SS	4"	15, 11, 9, 13	-TAKE S-13 w/SS FROM 40' TO 42'
					42–45					-DRILL TO 45' -BROWN WASH, RIG CHATTER 43' TO 45'
CLASS 3	SAND	BROWN f-m SILTY SAND WITH SOME GRAVEL, MOIST [SM]	0		45–47	S-14	SS	2"	14, 23, 25, 38	-TAKE S-14 w/SS FROM 45' TO 47'
					47–50					-INSTALL 5' OF CASING FROM 34' TO 39' -INSTALL 5' OF CASING FROM 39' TO 44' -DRILL TO 50' -BROWN WASH -RIG CHATTER FROM 48' TO 50'

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JOB NO. 170166601
DATE 4/2/12

LOG OF BORING NO. LB-6

SHEET 4 OF 9

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	CASING BLOWS (bpf)	DEPTH SCALE	NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
CLASS 3	SAND	VARVED BROWN f-m SAND AND GRAY SILT WITH TRACE MICA, MOIST [SP]		50	S-15	SS	19"	14, 14, 14, 24	TAKE S-15 w/ SS FROM 50' TO 52'
				52					-DRILL TO 55' -SMOOTH DRILLING -BROWN WASH
		BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]		55	S-16	SS	19"	9, 11, 23, 30	TAKE S-16 W/SS FROM 55' TO 57' -END OF 4/2/12 AT 1:15 P.M. -START OF 4/3/12 AT 7:30 A.M. -ADD MORE WATER & QUIKGEL TO TUB
				57					-DRILL TO 60' -SMOOTH DRILLING, BROWN WASH
		NO RECOVERY		60	S-17	SS	0"	22, 26, 26, 30	TAKE S-17 W/ SS FROM 60' TO 62' NO RECOVERY SO TAKE ANOTHER SAMPLE IMMEDIATELY AFTER
		BROWN f-m SAND WITH SOME SILT, TRACE MICA, MOIST [SP]		62	S-18	SS	23"	26, 34, 43, 50/5	TAKE S-18 W/SS FROM 62' TO 64'
				64					-DRILL TO 65' -SMOOTH DRILLING, BROWN WASH
		BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]		65	S-19	SS	18"	8, 15, 21, 24	

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JOB NO. 170166601

DATE 4/3/12

LOG OF BORING NO. LB-6

SHEET 5 OF 9

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			68					-DRILL TO 70' -SMOOTH DRILLING -BROWN WASH
			69					
		BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]	70	S-20	SS	16"	10 14 16 17	-TAKE S-20 WITH SS FROM 70' TO 72'
			71					
			72					-DRILL TO 75' -SMOOTH DRILLING, BROWN WASH
			73					
			74					
		BROWN f-m SAND WITH TRACE SILT, TRACE MICA [SP]	75	S-21	SS	20"	10 10 12 15	TAKE S-21 WITH SS FROM 75' TO 77'
			76					
CLASS 3	SAND		77					-DRILL TO 80' -SMOOTH DRILLING -BROWN WASH
			78					
			79					
		BROWN f-m SAND WITH TRACE SILT, TRACE MICA [SP]	80	S-22	SS	14"	16 21 17 18	TAKE S-22 W/SS FROM 80' TO 82'
			81					
			82					-DRILL TO 85' -SMOOTH DRILLING -BROWN WASH
			83					
			84					
		BROWN f-m SAND WITH TRACE MICA, MOIST [SP]	85	S-23	SS	15"	32 42	TAKE S-23 WITH SS FROM 85' TO 87'

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JOB NO. 170166601

DATE 4/13/12

LOG OF BORING NO. LB-6

SHEET 6 OF 9

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			86	S-23	SS		45 47	
			87					-DRILL TO 90' -SMOOTH DRILLING -BROWN WASH
			88					
			89					
		BROWN f-m SAND WITH SOME SILT, TRACE MICA, MOIST [SP]	90	S-24	SS	17"	28 35 34 49	-TAKE S-24 WITH SS FROM 90' TO 92'
			91					
			92					-DRILL TO 95' -SMOOTH DRILLING -BROWN WASH
			93					
			94					
CLASS 3	SAND	BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]	95	S-25	SS	16"	10 19 28 21	-TAKE S-25 WITH SS FROM 95' TO 97'
			96					
			97					-DRILL TO 100' -SMOOTH DRILLING -BROWN WASH
			98					
			99					
		BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]	100	S-26	SS	14"	16 20 20 25	-TAKE S-26 WITH SS FROM 100' TO 102'
			101					
			102					-DRILL TO 105' -SMOOTH DRILLING -BROWN WASH
			103					

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JOB NO. 170166601
DATE 4/3/12

LOG OF BORING NO. LB-6

SHEET 7 OF 9

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	DEPTH SCALE	NO./LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
CLASS 3	SAND		104					
		BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]	105–107	S-27	SS	21"	19, 28, 24, 29	TAKE S-27 WITH SS FROM 105' TO 107'
			107–110					-DRILL TO 110' -SMOOTH DRILLING -BROWN WASH
		BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]	110–112	S-28	SS	18"	17, 24, 22, 23	TAKE S-28 WITH SS FROM 110' TO 112'
			112–115					-DRILL TO 115' -SMOOTH DRILLING -BROWN WASH
		BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]	115–117	S-29	SS	21"	23, 22, 23, 25	TAKE S-29 WITH SS FROM 115' TO 117'
			117–120					DRILL TO 120' SMOOTH DRILLING BROWN WASH
		BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]	120–122	S-30	SS	20"	20, 23, 20, 29	TAKE S-30 FROM 120' TO 122'

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JOB NO. 170166601
DATE 4/13/12

LOG OF BORING NO. LB-6

SHEET 8 OF 9

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	DEPTH SCALE	NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			122					-DRILL TO 125' -SMOOTH DRILLING -BROWN WASH
		BROWN f-m SAND WITH SOME SILT, TRACE MICA [SP]	125–127	S-31	SS	21"	16, 22, 22, 32	-TAKE S-31 WITH SS FROM 125' TO 127'
			127					-DRILL TO 130' -BROWN WASH -A LITTLE RIG CHATTER IN LAST 1' OF DRILLING
		VARVED BROWN f-m SAND AND GREY SILT, TRACE MICA, MOIST [SP]	130–132	S-32	SS	20"	16, 20, 25, 33	-TAKE S-32 W/SS FROM 130' TO 132'
			132					-DRILL DOWN TO 135' -BROWN WASH -SMOOTH DRILLING
		BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]	135–137	S-33	SS	21"	33, 34, 47, 50/4	TAKE S-33 W/SS FROM 135' TO 137'
			137–139					-DRILL DOWN TO 140' -SLIGHT RIG CHATTER -BROWN WASH

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ENGINEERING & ENVIRONMENTAL SERVICES

JOB NO. 170166601

DATE 4/3/12

LOG OF BORING NO. LB-6

SHEET 9 OF 9

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	DEPTH SCALE	NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
CLASS 3	SAND	BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]	140 – 142	S-34	SS	22"	25, 28, 34, 41	TAKE S-34 W/ SS FROM 140' TO 142'
			142 – 145					-DRILL TO 145' -RIG CHATTER -BROWN WASH END OF 4/3/12 AT 3:00 P.M START 4/4/12 AT 7:45 A.M
		BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]	145 – 147	S-35	SS	20"	22, 30, 30, 29	TAKE S-35 W/ SS FROM 145' TO 147'
			147 – 150					-ADD MORE QUIKGEL & WATER TO TUB -DRILL TO 150' -SMOOTH DRILLING -BROWN WASH
		BROWN f-m SAND AND DECOMPOSED ROCK WITH TRACE GRAVEL, MOIST [SP]	150 – 152	S-36	SS	4"	100/4"	ATTEMPT TO TAKE S-36 W/ SS FROM 150' TO 152' -REFUSAL @ 150'-4"
?	?	? EOB AT 152' ? ROCK ?	152					-DRILL DOWN TO 152', ROCK BEGINS -START CORING -DUE TO CASING BEING CROOKED, UNABLE TO GET NX CORE BARREL DOWN WITH ROCK CORE RODS, HAD TO USE REGULAR RODS -WHEN USING REGULAR RODS, NO RETURN -HOLE CAVED IN @ 12:10 P.M -HAVE TO DRILL ANOTHER HOLE RIGHT NEXT TO FIRST ONE FOR ROCK CORE SAMPLES
			153 – 157					

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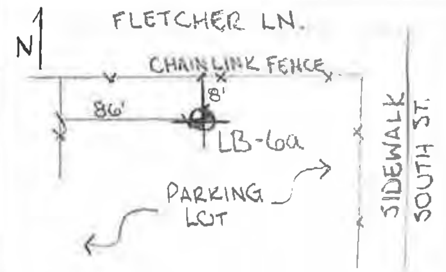
LOG OF BORING LB-6a **SHEET** 1 **OF** 11

PROJECT: 151 Maiden Ln.	PROJECT NO.: 170166601
LOCATION: New York, NY	ELEVATION AND DATUM: EL. 5± BPMD
DRILLING AGENCY: Craig Test Boring, Inc.	DATE STARTED: 4/4/12 — DATE FINISHED: 4/5/12
DRILLING EQUIPMENT: CME-75	COMPLETION DEPTH: 180' — ROCK DEPTH: 162'
SIZE AND TYPE OF BIT: 3 7/8" Ø Tricone Roller Bit	NO. SAMPLES — DIST. — UNDIST. — CORE
CASING: 4" Ø Flush Joint Steel Casing	WATER LEVEL — FIRST: – — COMPL.: 6'-4" — 24 HR.: –
CASING HAMMER: Auto — WEIGHT: 140 LB — DROP: 30"	FOREMAN: Craig Cohen
SAMPLER: 2" Ø NX Core Barrel	INSPECTOR: Corrie Campbell
SAMPLER HAMMER: – — WEIGHT: – — DROP: –	

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	CASING BLOWS	DEPTH SCALE	NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
				0–1					(sketch map below)
Class 7	Fill		Push	0–10					-Start at 2:00 P.M. on 4/4/12 -Install casing from 0' to 10' -Drill to 10' -Rig chatter from 0' to 10' -Slow drilling
			243 Blows/5 ft	10–14					-Install casing from 10' to 15' -Drill to 15' -Rig chatter -Slow drilling



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JOB NO. 170166601
DATE 4/5/12

LOG OF BORING NO. LB-6a

SHEET 2 OF 11

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	CASING BLOWS	DEPTH SCALE	SAMPLES NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
				14					
				15					-ADD 5' OF CASING FROM 15' TO 20' -DRILL TO 20' -SLOW DRILLING
				16					
				17					
			160 BLOWS/5FT	18					
				19					
				20					-ADD 5' OF CASING FROM 20' TO 25' -DRILL TO 25' -SLOW DRILLING -BROWN TO BLACK WASH AT~24'
				21					
				22					
			185 BLOWS/5FT	23					
				24					
CLASS 7	FILL			25					-ADD 5' OF CASING FROM 25' TO 30' -DRILL TO 30' -SOME WOOD IN RETURN -BLACK WASH
				26					
				27					
			133 BLOWS/5FT	28					
				29					
				30					-ADD 5' OF CASING FROM 30' TO 35' -DRILL TO 35' -BLACK TO BROWN WASH AT 31'
			111 BLOWS/5FT	31					
				32					

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ENGINEERING & ENVIRONMENTAL SERVICES

JOB NO. 170166601
DATE 4/5/12

LOG OF BORING NO. LB-6a

SHEET 3 OF 11

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION		DEPTH SCALE	SAMPLES NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
CLASS 7	FILL		111 BLOWS/5FT	33–35					
	?	? ? ?		35					-ADD 5' OF CASING FROM 35' TO 40' -DRILL TO 40' -BROWN WASH -ADD QUIKGEL & WATER TO TUB @ 35' -RIG CHATTER FROM 35' TO 40'
			232 BLOWS/5FT	35–40					
				40					-ADD 5' OF CASING FROM 40' TO 45' -DRILL TO 45' -BROWN WASH -SMOOTH DRILLING
CLASS 3	SAND		312 BLOWS/5FT	40–45					
				45–51					-DRILL TO 162' -BROWN WASH -SMOOTH DRILLING

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JOB NO. 170166601
DATE 4/5/12

LOG OF BORING NO. LB-6a

SHEET 4 OF 11

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			51					CONTINUE DRILLING TO 162' -BROWN WASH -SMOOTH DRILLING
			52					
			53					
			54					
			55					
			56					
			57					
			58					
			59					
			60					
CLASS 3	SAND		61					
			62					
			63					
			64					
			65					
			66					
			67					
			68					

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JOB NO. 170166601
DATE 4/5/12

LOG OF BORING NO. LB-6a

SHEET 5 OF 11

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 In.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			69					CONTINUE DRILLING TO 162' -BROWN WASH -SMOOTH DRILLING
			70					
			71					
			72					
			73					
			74					
			75					
			76					
			77					
			78					
			79					
CLASS 3	SAND		80					
			81					
			82					
			83					
			84					
			85					
			86					

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JOB NO. 170166601
DATE 4/5/12

LOG OF BORING NO. LB-6a
SHEET 6 OF 11

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			87					CONTINUE DRILLING TO 162' -BROWN WASH -SMOOTH DRILLING
			88					
			89					
			90					
			91					
			92					
			93					
			94					
			95					
			96					
			97					
CLASS 3	SAND		98					
			99					
			100					
			101					
			102					
			103					
			104					

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JOB NO. 170166601
DATE 4/5/12

LOG OF BORING NO. LB-6a

SHEET 7 OF 11

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	DEPTH SCALE	NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			105					CONTINUE DRILLING TO 162' -BROWN WASH -SMOOTH DRILLING
			106					
			107					
			108					
			109					
			110					
			111					
			112					
			113					
			114					
			115					
CLASS 3	SAND		116					
			117					
			118					
			119					
			120					
			121					
			122					

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JOB NO. 170166601

DATE 4/5/12

LOG OF BORING NO. LB-6a

SHEET 8 OF 11

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
CLASS 3	SAND		123					CONTINUE DRILLING TO 162' -BROWN WASH -SMOOTH DRILLING
			124					
			125					
			126					
			127					
			128					
			129					
			130					
			131					
			132					
			133					
			134					
			135					
			136					
			137					
			138					
			139					
			140					

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JOB NO. 170166601

DATE 4/5/12

LOG OF BORING NO. LB-6a

SHEET 9 OF 11

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			140					CONTINUE DRILLING TO 162' -SMOOTH DRILLING -BROWN WASH
			141					
			142					
			143					
			144					
			145					
			146					
			147					
			148					
			149					
			150					
			151					
CLASS 3	SAND		152					
			153					
			154					
			155					
			156					
			157					

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JOB NO. 170166601
DATE 4/5/12

LOG OF BORING NO. LB-6a

SHEET 10 OF 11

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	TIME TO CORE (MIN)	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BL/6 IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
CLASS 3	SAND			158					
				159					
				160					
				161					
CLASS 1	ROCK	NO RECOVERY	2 MIN	162	C-1	NX CORE SAMPLER			-CHANGE WATER & QUIK GEL IN TUB -START CORING AT 12:22 P.M.
			3 MIN	163					-LOSING WATER FROM 163-163.5'
			4 MIN	164					-LOTS OF RIG CHATTER FROM 164' - 172' -LOSING WATER FROM 164' TO 172'
			3 MIN	165					
			9 MIN	166					-ADDED MORE WATER & QUIK GEL
			9 MIN	167					
			23 MIN	168					-ADDED MORE WATER & QUIK GEL TO TUB -ADDED MORE WATER & QUIK GEL TO TUB
			18 MIN	169					
CLASS 1b	ROCK	GRAY MICA SCHIST [CLASS 1b]	4 MIN 2 MIN	170	C-2	NX CORE SAMPLER	98"/120" = 82"	68"/120" = 52"	-UNABLE TO MOVE FURTHER
			3 MIN.	171					-WHEN PULLED UP ROCK CORE ALL SAND B/C OF MACHINE MALFUNCTION
			3 MIN.	172					
			3 MIN	173					
			4 MIN	174					
			5 MIN	175					
				176					

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JOB NO. 170166601
DATE 4/5/12

LOG OF BORING NO. LB-6a

SHEET 11 OF 11

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	TIME (MIN)	DEPTH SCALE	SAMPLES NO./LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
CLASS 1b	ROCK	GREY MICA SCHIST [CLASS 1b]	6 MIN / 10 MIN / 12 MIN / 11 MIN	176–180	C-2	NX CORE SAMPLER	98"/120" = 82%	68"/120" = 57%	- ADD MORE WATER & QUIKGEL TO TUB
		E.O.B. AT 180'		180					

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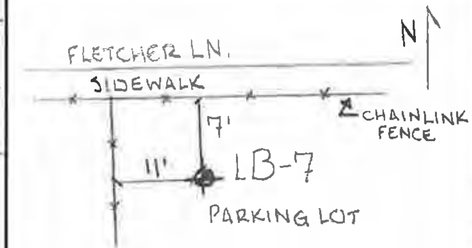
LOG OF BORING LB-7 SHEET 1 OF 9

PROJECT: 151 MAIDEN LN.	PROJECT NO.: 170166601
LOCATION: NEW YORK, NY	ELEVATION AND DATUM:
DRILLING AGENCY: CRAIG TEST DRILLING, INC.	DATE STARTED: 4/6/12 — DATE FINISHED: 4/9/12
DRILLING EQUIPMENT: CME-75 TRUCK-MOUNTED RIG	COMPLETION DEPTH: 142 FT — ROCK DEPTH: 132 FT
SIZE AND TYPE OF BIT: 3 7/8" Ø TRICONE ROLLER BIT	NO. SAMPLES: DIST. 31 — UNDIST. – — CORE 10 FT
CASING: 4" Ø FLUSH JOINT STEEL CASING	WATER LEVEL: FIRST – — COMPL. – — 24 HR. –
CASING HAMMER: AUTO — WEIGHT: 140 LB. — DROP: 30"	FOREMAN: DAVE COOK
SAMPLER: 2" Ø SPLIT SPOON SAMPLER	
SAMPLER HAMMER: SAFETY 0-4' AUTO 95- — WEIGHT: 140 LB. — DROP: 30"	INSPECTOR: CORRIE CAMPBELL / KONSTANTINOS SYNGROS

Stratum	SAMPLE DESCRIPTION	PID (ppm)	CASING BLOWS	DEPTH SCALE (ft)	NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.
	~6" ASPHALT			0–0.5				
	~3" SUBGRADE							
	BROWN f-m SAND WITH SOME ASPHALT, TRACE SILT, TRACE BRICK, DRY [SP]	0		0.5–2	S-1	SS	9"	9 / 12 / 18
	MOTTLED f-c SAND AND RED BRICK WITH SOME GRAVEL, TRACE SILT, DRY [SP]	0	PUSH	2–4	S-2	SS	12"	15 / 17 / 50/5"
	GRAY GRAVELLY SILT WITH SOME BRICK, MOIST [ML]	0		4–6	S-3	SS	11"	8 / 6 / 2 / 3
	MOTTLED f. SANDY GRAVEL WITH SOME BRICK, MOIST [GP]	0.1	131 BLOWS/3FT	6–8	S-4	SS	5"	100/5"
	BLACK SILTY SAND WITH TRACE GRAVEL, MOIST [SM]	0	11 BLOWS/2FT	8–10	S-5	SS	8"	3 / 4 / 6 / 15
CLASS 7 FILL	BLACK f. SANDY GRAVEL WITH TRACE WOOD, MOIST [GP]	0		10–12	S-6	SS	1"	12 / 12 / 8 / 6
			215 BLOWS/5FT	12–14				

REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)



- START DRILLING ON 4/6/12 AT 7:24 A.M.
- TAKE S-1 FROM 0.5' TO 2'
- TAKE S-2 FROM 2' TO 4'
- DRILL TO 4'
  - RIG CHATTER FROM 0.5' TO 4'
- TAKE S-3 FROM 4'-6'
- ATTEMPT TO TAKE S-4 FROM 6' TO 8'
  - REFUSAL @ 6'-5"
- DRILL TO 8'
  - RIG CHATTER FROM 6'-8'
  - DARK BROWN WASH
- INSTALL 8' OF CASING
- TAKE S-5 FROM 8' TO 10'
- INSTALL 2' OF CASING FROM 8'-10'
- DRILL TO 10'
  - SMOOTH DRILLING
  - BLACK WASH
- TAKE S-6 FROM 10'-12'
- INSTALL 5' OF CASING FROM 10' TO 15'
- DRILL TO 15'

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JOB NO. 170166601
DATE 4/6/12

LOG OF BORING NO. LB-7

SHEET 2 OF 9

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION			DEPTH SCALE	NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
					14					
		BROWN f-m SAND AND WOOD WITH SOME SILT, MOIST [SP]	0.1	PUSH	15–17	S-7	SS	0"	2, 3, 2, 3	-TAKE S-7 W/SS FROM 15'-17' -NO RECOVERY-PUSHED DOWN 3" SS FOR SAMPLE (S-7a)
					17–20					-PUSH 5' OF CASING FROM 15' TO 20' -DRILL DOWN TO 20' -SOME WOOD IN RETURNS -BROWN WASH
CLASS 7	FILL	BROWN f-m SAND AND WOOD WITH SOME GRAVEL, TRACE SILT, TRACE BRICK, MOIST [SP]	0	PUSH	20–22	S-8	SS	>1"	8, 3, 5, 4	TAKE S-8 W/SS FROM 20' TO 22' -NO RECOVERY -USE 3" SS TO GET S-8a FROM 20' TO 22'
					22–25					-INSTALL 5' OF CASING FROM 20' TO 25' -DRILL DOWN TO 25' -SOME WOOD IN RETURN -BROWN => BLACK WASH @ ~23'
		BLACK ORGANIC SILT WITH SOME WOOD, MOIST [MH]	0	PUSH	25–27	S-9	SS	0"	2, 2, 2, 3	-TAKE S-9 W/SS FROM 25' TO 27' -NO RECOVERY -TAKE S-9a W/3" SS FROM 25'-27'
		BLACK ORGANIC SILT WITH SOME WOOD, TRACE GRAVEL [MH]	0		27–29	S-10	SS	22"	2, 1, 2, 3	-TAKE S-10 W/SS FROM 27' TO 29'
?		? ? ? ?			29					-PUSH IN 4' OF CASING -DRILL DOWN TO 29' -SMOOTH DRILLING -BLACK WASH
CLASS 3	SAND	BROWN f-c GRAVELLY SAND WITH TRACE SILT, MOIST [SP]	0	43 BLOWS/5FT	29–31	S-11	SS	10"	1, 4, 3, 1	-TAKE S-11 W/SS FROM 29' TO 31'
					31					-INSTALL 5' OF CASING FROM 29' TO 34'

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JOB NO. 170106601
DATE 4/6/12.

LOG OF BORING NO. LB-7

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	CASING BLOWS	DEPTH SCALE	NO./LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
				32–35					-DRILL TO 35' -BROWN WASH -SOME RIG CHATTER FROM 31' TO 35'
		BROWN f-m SAND WITH SOME SILT, TRACE MICA, TRACE GRAVEL, MOIST [SP]	0	35–37	S-12	SS	20"	8, 11, 16, 22	-TAKE S-12 FROM 35' TO 37'
				37–40					-CHANGE WATER 3 QUIK GEL -DRILL TO 40' -BROWN WASH -SMOOTH DRILLING
CLASS 3 SAND		BROWN f-m SILTY SAND WITH TRACE GRAVEL, MOIST [SM]	0	40–42	S-13	SS	18"	9, 9, 11, 14	-TAKE S-13 WITH SS FROM 40'-42'
				42–45					-DRILL DOWN TO 45' -BROWN WASH SMOOTH DRILLING
		BROWN f-m SILTY SAND WITH TRACE MICA [SM]	0	45–47	S-14	SS	18"	10, 11, 12, 18	-TAKE S-14 WITH SS FROM 45' TO 47'
				47–50					-DRILL TO 50' -SMOOTH DRILLING -BROWN WASH

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JOB NO. 170166601
DATE 4/16/12

LOG OF BORING NO. LB-7

SHEET 4 OF 9

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
CLASS 3	SAND	BROWN f-m SILTY SAND WITH TRACE MICA MOIST [SM]	50	S-15	SS	00	14 / 24 / 29 / 30	TAKE S-15 W/SS FROM 50' TO 52'
			52					- DRILL TO 55' - BROWN WASH - SMOOTH DRILLING - ADD WATER & QUIK GEL TO TUB
		BROWN f-m SILTY SAND WITH TRACE MICA, MOIST [SP]	55	S-16	SS	17"	11 / 16 / 21 / 22	TAKE S-16 W/SS FROM 55' TO 57'
			57					- DRILL TO 60' - BROWN WASH - SMOOTH DRILLING
		VARVED BROWN f-m SAND AND BROWN SILT WITH TRACE MICA, MOIST [SP]	60	S-17	SS	16"	8 / 12 / 22 / 31	TAKE S-17 FROM 60'-62'
			62					- DRILL TO 65' - BROWN WASH - SMOOTH DRILLING
		BROWN f-m SAND WITH SOME SILT, TRACE MICA, MOIST [SP]	65	S-18	SS	17"	8 / 17 / 18 / 25	TAKE S-18 FROM 65' TO 67' W/ SS
			67					

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JOB NO. 170166601
DATE 4/6/12

LOG OF BORING NO. LB-7

SHEET 5 OF 9

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	DEPTH SCALE	NO./LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			68					-DRILL TO 70' -BROWN WASH -SMOOTH DRILLING
			69					
		BROWN f-m SAND WITH TRACE SILT, TRACE MICA [SP]	70	S-19	SS	22"	11 14 21 27	-TAKE S-19 W/SS FROM 70' TO 72'
			71					
			72					-DRILL TO 75' -BROWN WASH -SMOOTH DRILLING
			73					
			74					
		BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]	75	S-20	SS	19"	8 16 23 30	-TAKE S-20 W/SS FROM 75' TO 77'
			76					
			77					-DRILL TO 80' -SLIGHT RIG CHATTER @ 77' -BROWN WASH
CLASS 3	SAND		78					
			79					
		BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]	80	S-21	SS	14"	15 24 20 25	-TAKE S-21 FROM 80' TO 82'
			81					
			82					-DRILL TO 85' -SMOOTH DRILLING -BROWN WASH
			83					
			84					
		BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]	85	S-22	SS	16"	24 34	-TAKE S-22 FROM 85' TO 87'

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JOB NO. 170166601

DATE 4/6/12

LOG OF BORING NO. LB-7

SHEET 6 OF 9

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	DEPTH SCALE	NO./LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			86	S-22	SS		44, 49	
			87 – 90					-DRILL TO 90' -SMOOTH DRILLING -BROWN WASH
		VARVED BROWN f-m SAND AND BROWN SILT WITH TRACE MICA, MOIST [SP]	90 – 92	S-23	SS	20"	31, 32, 36, 35	-TAKE S-23 WITH SS FROM 90' TO 92'
			92 – 95					-DRILL TO 95' -SMOOTH DRILLING -BROWN WASH SWITCHED TO AUTO HAMMER
CLASS 3	SAND	BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]	95 – 97	S-24	SS	17"	9, 15, 22, 32	-TAKE S-24 WITH SS FROM 95' TO 97'
			97 – 100					-DRILL TO 100' -SMOOTH DRILLING -BROWN WASH
		BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]	100 – 102	S-25	SS	18"	14, 17, 22, 22	-TAKE S-25 FROM 100' TO 102'
			102 – 103					-DRILL TO 105' -SMOOTH DRILLING -BROWN WASH

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JOB NO. 170166601

DATE 4/6/12

LOG OF BORING NO. LB-7

SHEET 7 OF 9

NYBC CLASS	SYMBOL	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			104					
CLASS 3	SAND	BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]	105 – 107	S-26	SS	20"	14, 20, 21, 23	-TAKE S-26 W/ SS FROM 105' TO 107'
			107 – 110					-DRILL TO 110' - BROWN WASH - SMOOTH DRILLING
		BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]	110 – 112	S-27	SS	19"	14, 18, 18, 22	-TAKE S-27 W/SS FROM 110' TO 112'
			112 – 115					-WHEN TRYING TO PUT ROD BACK IN, HOLE CAVE-IN AT ~85' -HAVE TO DRILL BACK DOWN TO 115' -DRILL TO 115' -SMOOTH DRILLING -BROWN WASH
		BROWN f-m SAND WITH TRACE SILT, TRACE MICA, MOIST [SP]	115 – 117	S-28	SS	20"	11, 17, 18, 22	-TAKE S-28 W/SS FROM 115' TO 117'
			117 – 120					-DRILL TO 120' -SMOOTH DRILLING -BROWN WASH
		BROWN f-m SILTY SAND WITH SOME GRAVEL, MOIST [SP]	120 – 122	S-29	SS	13"	12, 22, 43, 46	-TAKE S-29 W/SS FROM 120'-122'

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JOB NO. 170166601

DATE 4/6/12 – 4/9/12

LOG OF BORING NO. LB-7

SHEET 8 OF 9

NYCBC	TYPE	SAMPLE DESCRIPTION	PID (PPM)	DEPTH SCALE	SAMPLES NO.LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BL/6 in.
CLASS 3a	SAND	Brown, f-m silty SAND, tr-sm f gravel tr c sand, dense, moist		122–129	S-30	S.S.	24-12	14 / 20 / 25 / 40
		—?— —?— —?— —?—						
CLASS 1d	DEC ROCK	DECOMPOSED MICA SCHIST BASED ON WASH RETURN AND DRILLING TIME.	CORING TIME / ROCK CORE SKETCH	129–132	S-31	S.S.	0	50/1"
CLASS 1b	BEDROCK	Gray, slightly fractured, slightly weathered MICA SCHIST	3 MIN, 4 MIN, 3 MIN, 3 MIN, 3 MIN (M.B., M.B., M.B.)	132–137	RUN 1	NX CORE BARREL	REC = 55/60 = 92%	RQD = 48/60 = 80%
		Gray, slightly fractured, slightly weathered, MICA SCHIST	3 MIN, 6 MIN, 5 MIN (M.B., M.B., M.B.)	137–140	RUN 2	NX CORE BARREL	REC = 56/60 = 92%	RQD = 49.5/60 = 83%

REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)

- DRILL TO 125'
- BROWN WASH
- SMOOTH DRILLING
- END OF 4/6/12 AT 2:35 PM

4/9/12
START 7:00
- CLEANED TUB
- FILLED TUB WITH WATER
- ADDED QUICK GEL
- DRILLED TO 125 FT
- BROWN WASH, SMOOTH DRILLING TO 125 FT
- DROVE S.S. 125–127 FT
- TOOK S-30

7:40 CABLE GOT JAMMED, NEEDED TO REPAIR
8:00 CABLE FIXED
- DRILLED TO 130 FT
- SLOW, SMOOTH DRILLING, BROWN WASH TRACE MICA, SLOW DRILLING WITH PRESSURE 129–130 FT, SPOON BOUNCED WHEN DROPPED.
- ATTEMPT DRIVE S.S. 130–132 FT
- REFUSAL, NO RECOVERY
- 8:35 START DRILLING @ 130 FT

BIT PRESSURE @ 500 PSI
RIG CHATTER @ 130.5 FT
MICA IN WASH
8:41 @ 131 FT
8:44 @ 132 FT
FLUSH HOLE W MUD UNTIL 9:38
START CORING, RUN 1 @ 9:47
132 FT TO 137 FT

START CORING, RUN 2 @ 137–142 FT

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JOB NO. 170166601
DATE 4/9/2012

LOG OF BORING NO. LB-7

NYCBC		SAMPLE DESCRIPTION	TIME	CORE SKETCH	DEPTH SCALE	SAMPLES NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
CLASS 1b	-//- BEDROCK -//-		4 MIN 4 MIN	MB	140 141 142					
		END OF BORING @ 142 FT			143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158					

APPENDIX B

BORING LOG BY RA CONSULTANTS

RA CONSULTANTS LLC
Geotechnical Engineering

Log of Boring: B-8

PROJECT: 151 MAIDEN LANE, NY, NEW YORK, 10038		PROJECT NUMBER: 13C1126	
LOCATION: Bituminous Parking Lot (~150' From East River)		ELEVATION & DATUM: +5' (+/-) BMD	
DRILLING AGENCY: Warren George, INC.		DATE STARTED: MON. 01-13-2014	DATE COMPLETED: Thursday, 01-16-2014
DRILLING EQUIPMENT: ACKER 82 TRUCK MOUNT RIG		COMPLETION DEPTH (FT): 160'	ROCK DEPTH (FT): 155'

SIZE AND TYPE OF BIT	3-7/8" ø roller-bit	SIZE AND TYPE CORE BARREL		NO.SAMPLES	DIST. 27	UNDIST. N/A	CORE (FT) 5		
CASING SIZE AND TYPE	4" ø NW	2" ID, NX barrel		WATER LEVEL	FIRST	COMPL.	24HR		
CASING HAMMER WEIGHT	300 lbs	DROP	24"	SAMPLING HAMMER TYPE	FOREMAN MIKE KELLY				
SAMPLER	2" ø split spoon	DROP	30"		HELPER ALAN DEPUE				
SAMPLER HAMMER WEIGHT	140 lbs.	☒ Safety ☐ Donut ☐ ATH			INSPECTOR Michael B. Filler				

DESCRIPTION	DEPTH (ft)	Samples: Type / No.	Recov. FT / %	Resist. BL/6" / RQD%	Lab. Results: water cont. (%)	-200 (%)	STRATA	REMARKS
								[ ] = USCS Classification ( ) = NYC BC Class Driller arrived onsite @ 10:15-hrs Began drilling @ ~10:30-hrs
S-1: Fill-Tan, silty gravel with sand, brick, wood (class 7)	1–3	S1	0.34	5, 7, 14, 6			FILL	
S-2: Fill-Tan, well-graded gravel with sand, brick, wood (class 7)	5–7	S2	0.75	10, 29, 50+, —				
	7–10							Boulder encountered @ 7'-0" bgs Spun down 7' of 4" ø casing. drilled obstruction out from 7-10', and spun casing to 10'.
Concrete & steel from 10-11' (class 7)	10–11							Boulder @ 10'-0". sent core barrel down. Concrete and steel recovery
	12–14						FILL	Spun down 4" ø casing to depth of 15'.
S-3: Fill-Grey, silty sand with gravel, some wood (class 7)	15–17	S3	1.25	12, 13, 8, 10				
	18–20							

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Geotechnical Engineering

Log of Boring: B-8

DESCRIPTION	DEPTH (ft)	Samples: Type No.	Samples: Recov. FT / %	Samples: Resist. BL/6" / RQD%	Lab. Results: water cont. (%)	Lab. Results: -200 (%)	STRATA	REMARKS
S-4: Fill - Grey, poorly-graded sand with silt and gravel, wood, brick (class 7)	21–22	S4	0.75	14 12 20 18			FILL	
	22–24						~24'	
25 S-5: Dark grey, Organic Clay with sand [OH] (class 6)	25–27	S5	1.34'	WOR 12" 2 1	62.6	82.2		
	27–30							
30 S-6: Dark grey, sandy Organic Clay trace wood. [OH] (class 4c)	30–32	S6	1.75	WOR 2 3 3			CLAY	
	32–35						~35'	
35 S-7: Brown, poorly-graded sand [SP] (class 3a)	35–37	S7	1.0	15 22 20 21				
	37–40							
40 S-8: Brown, poorly-graded sand w/silt [SP-SM] (class 3a)	40–42	S8	1.8'	12 18 17 22	18.1	5.1	SAND	Stopped drilling @ 14:45-hrs Driller left site @ 15:00-hrs
	42–45							01/14: WGI arrived @ 07:00 hrs Drove 4"ø casing to 22' bgs Emptied and cleaned tub and mixed a batch of Quick GEL to keep borehole open.

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Log of Boring: B-8

Sheet 3 of 7

Elev.	DESCRIPTION	DEPTH (ft)	Samples: Type / No.	Recov. FT / %	Resist. BL/6" / RQD%	Lab. Results: water cont. (%)	-200 (%)	STRATA	REMARKS
45	S-9: Brown/grey, sandy silt [ML] (class 5a)	45–47	S9	2.0	14, 20, 24, 26			SAND ~46'	
		47–50						SILT	
50	S-10: No Recovery	50–52	S10	NC	21, 50, 60 _				pushed cobble w/ SS; small piece in sampler
		52–55						~53'	
55	S-11: Brown, poorly-graded sand with silt [SP-SM] (class 3a)	55–57	S11	1.0'	15, 18, 28, 33				
60	S-12: Reddish brown, poorly-graded sand with silt [SP-SM] (class 3a)	60–62	S12	1.34'	10, 13, 31, 30			SAND	
65	S-13: Brown, poorly-graded sand [SP] (class 3a)	65–67	S13	1.0'	13, 20, 30, 20				
		67–70							

![RA Consultants LLC logo]

RA CONSULTANTS LLC
Geotechnical Engineering

Log of Boring: B-8

Sheet 4 of 7

DESCRIPTION	DEPTH (ft)	Samples Type No.	Samples Recov. FT / %	Samples Resist. BL/6" / RQD%	Lab. Results water cont. (%)	Lab. Results -200 (%)	STRATA	REMARKS
S-14: Brown, Silty Sand [SM] (class 3a)	70–72	S14	0.85'	29 26 31 27			SAND	
	73							
	74							
S-15: Brown, lean clay with sand [CL] (class 6)	75–77	S15	0.5'	WOR 18" 19	27.2	70.8		WGI took break for WX (15 min)
	78							
	79							
S-16: Brown, poorly-graded sand with silt [SP-SM] (class 3a)	80–82	S16	0.75'	33 37 68 —			SAND	
	83							
	84							
S-17: Brown, poorly-graded sand with silt [SP-SM] (class 3a)	85–87	S17	1.0'	30 35 38 42				
	88							
	89							
S-18: Brown, silty sand and gravel trace shells, [SP-SM] (class 3a)	90–92	S18	0.5'	30 47 63 —			SAND	
	93							
	94							
	95							

RA CONSULTANTS LLC
Geotechnical Engineering

Log of Boring: B-8

DESCRIPTION	DEPTH (ft)	Samples: Type No.	Samples: Recov. FT / %	Samples: Resist. BL/6" / RQD%	Lab. Results: water cont. (%)	Lab. Results: -200 (%)	STRATA	REMARKS
S-19: Brown, sandy silt with gravel [ML] (class 5a)	96	S19	0.5'	31, 31, 35, 49			SILT	
	97							
	98							01-15-14 WGI arrived @ 07:00 and began drilling @ 07:20-hrs.
	99							
100 S-20: Brown, sandy lean clay [CL-ML] (class 4a)	100–101	S20	0.75'	30, 33, 37, 41	21.2	56.9		
	102							
	103							
	104						~104'	
S-21: Tan, poorly-graded sand [SP] (class 3a)	105–106	S21	1.0'	14, 17, 23, 32				
	107							
	108							
	109							
S-22: Grey, poorly-graded sand [SP] (class 3a)	110–111	S22	0.75'	20, 19, 28, 31			SAND	
	112							
	113							
	114							
S-23: Grey, poorly-graded sand [SP] (class 3a)	115–116	S23	0.85'	19, 21, 26, 30				
	117							
	118							
	119							
	120							

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Log of Boring: B-8

Sheet 6 of 7

DESCRIPTION	DEPTH (ft)	Samples: Type / No.	Samples: Recov. FT / %	Samples: Resist. BL/6" / RQD%	Lab. Results: water cont. (%)	Lab. Results: -200 (%)	STRATA	REMARKS
S-24: Brown/grey, well-graded gravel with silt and sand [GW-GM] (class 2a)	121	S24	0.5'	59 / 100/4"				
	122							
	123							
	124						GRAVEL w/SILT & SAND	
S-25: Brown/grey, well-graded gravel with silt and sand [GW-GM] (class 2a)	125–126	S25	0.25'	100/3"				
	127							
	128							
	129							Attempt rock core C1:R1: From 130'-139'
	130						~130	
	131							
	132	C1						
	133							
	134						~134'	core barrel advancement slowed down.
	135							
	136							
S-27: Core 1, run 1 Recovery Grey, Sandy silt with gravel (ML)	137						~137	core run advancement slowed
	138	S26		*				* core recovery
	139							
	140							WGI was unable to maintain open borehole. Spun 4"Ø casing from 45' to 140'
	141							
	142						TILL	01-16-14: WGI arrived @ 7:15 Spun 4"Ø casing to 145 and attempted SS sample.
	143							
	144							
	145							

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Geotechnical Engineering

Log of Boring: B-8

Sheet 7 of 7

DESCRIPTION	DEPTH (ft)	Samples Type No.	Recov. FT / %	Resist. BL/6" / RQD%	Lab. Results water cont. (%)	-200 (%)	STRATA	REMARKS
S-27: Grey, sandy silt with gravel [ML] (class 5a)	146	S27	0.2'	100/2"				
	147							
	148							
	149							
	150						TILL	Drill rig bouncing
	151							
	152							
	153						~153'	
	154						WX ROCK	SS refusal @ 155' Attempt rock core C2:R1
Core 2, Run 1: 155'-160' Grey, Mica Schist with Quartz NYC BC Class 1a - Hard Sound Rock	155						155'	Run 60", Recovery = 100%
	156							
	157	C2 R1	100	100			BEDROCK	
	158							
	159							
Bottom of exploratory boring	160						160' EOB	
	161							
	162							
	163							
	164							
	165							
	166							
	167							
	168							
	169							
	170							

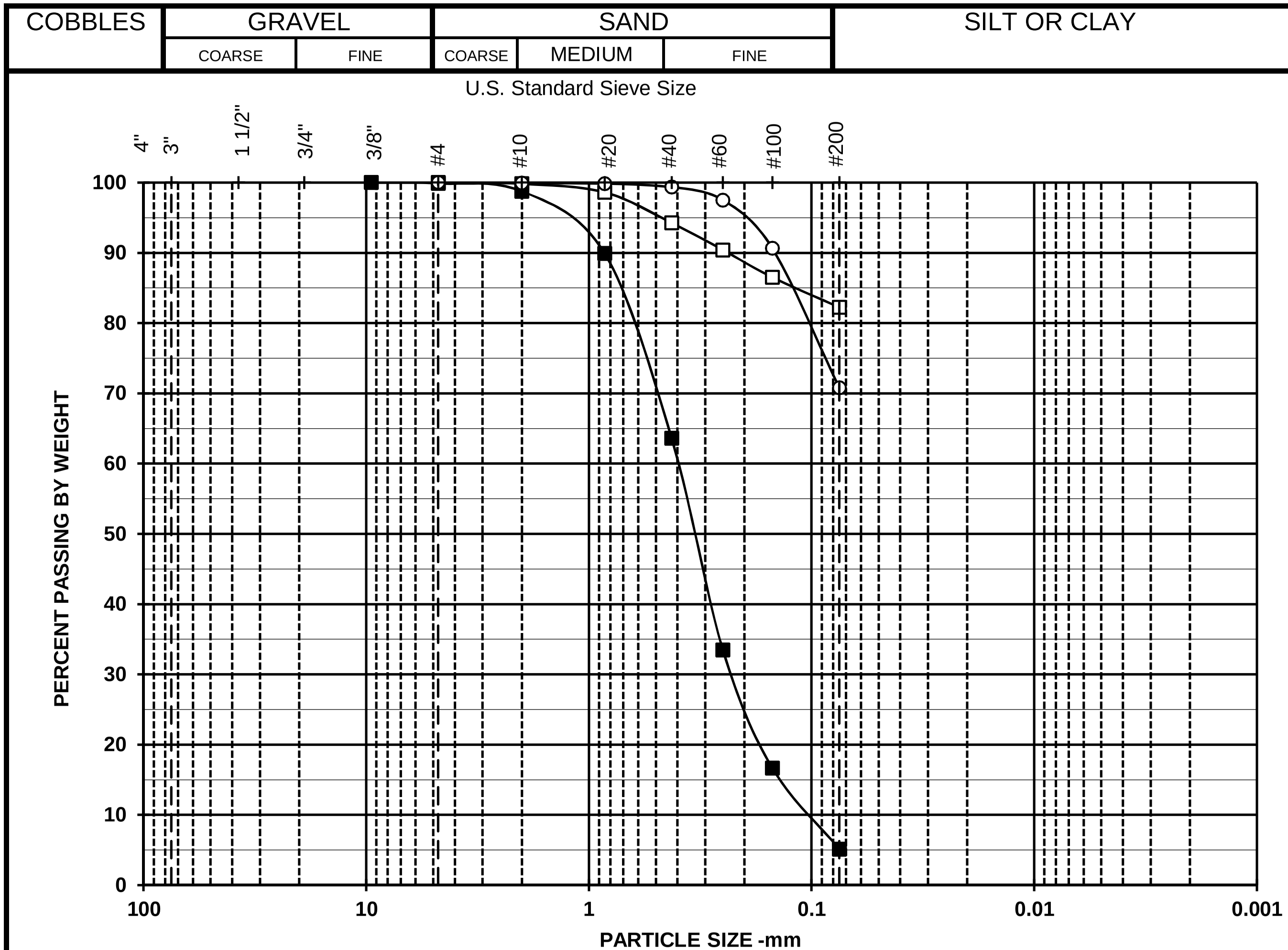
APPENDIX C

SOIL TESTING RESULTS

RA Consultants #13C1126
151 Maiden Lane New York,NY
LABORATORY TESTING DATA SUMMARY

BORING NO.	SAMPLE NO.	DEPTH (ft)	IDENTIFICATION TESTS			REMARKS
			WATER CONTENT (%)	USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	
B-8	SS-5	25-27	62.6	OH	82.2	
B-8	SS-8	40-42	18.1	SP-SM	5.1	
B-8	SS-15	75-77	27.2	CL	70.8	
B-8	SS-20	100-102	21.2	CL-ML	56.9	

Note: (1) USCS symbol based on visual observation and Sieve results reported.



SYMBOL	w (%)	LL	PL	PI	USCS	DESCRIPTION AND REMARKS	Date Tested
□	62.6				OH	Gray, Organic clay with sand	1/30/2014
■	18.1				SP-SM	Brown, Poorly-graded sand with silt	1/28/2014
○	27.2				CL	Brown, Lean clay with sand	1/28/2014

Symbol	□	■	○
Boring	B-8	B-8	B-8
Sample	SS-5	SS-8	SS-15
Depth	25-27	40-42	75-77
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.1	0.0
% SAND	17.8	94.8	29.2
%C SAND	0.2	1.1	0.1
%M SAND	5.6	35.2	0.6
%F SAND	12.0	58.5	28.6
% FINES	82.2	5.1	70.8
% -2µ			
D_{100} (mm)	4.75	9.50	4.75
D_{60} (mm)		0.40	
D_{30} (mm)		0.23	
D_{10} (mm)		0.11	
Cc		1.2	
Cu		3.8	

Particle Size (Sieve #)	PERCENT FINER □	■	○
4"			
3"			
1 1/2"			
3/4"			
3/8"		100.0	
4	100.0	99.9	100.0
10	99.8	98.8	99.9
20	98.6	89.9	99.8
40	94.3	63.6	99.4
60	90.4	33.5	97.5
100	86.5	16.7	90.6
200	82.2	5.1	70.8

TerraSense, LLC

7685-14002

RA Consultants

13C1126

PARTICLE SIZE DISTRIBUTION

151 Maiden Lane New York,NY

Analysis File: 3SV-MasterRev3

siev.xls 2/3/2014

APPENDIX D

FINITE ELEMENT ANALYSIS

APPENDIX D

Finite Element Analysis Results
161 Maiden Lane
New York, NY

This summarizes results of subgrade stress distribution and settlement under the proposed mat foundation at 161 Maiden Lane using finite element analysis.

Executive Summary:

Our engineer, Mr. Rui Guo, estimated subgrade stresses and settlements using the commercial software Plaxis 3D v2013, assuming typical soil conditions. The analysis considered the structural loads provided to us on June 11, 2014 by WSP Cantor Seinuk (WSPCS) including tie-down loads.

Considering dead and live loads, we estimate the maximum settlement of the mat at 2.0-in with a differential settlement of 1.0-in. The estimated average subgrade stress under soilcrete is 11.0-tsf.

In the scenarios with North and South wind loads respectively, the estimated maximum additional settlement is 1.0-in and the estimated maximum soil rebound is 10% of the maximum additional settlement.

Finite Element Model Input

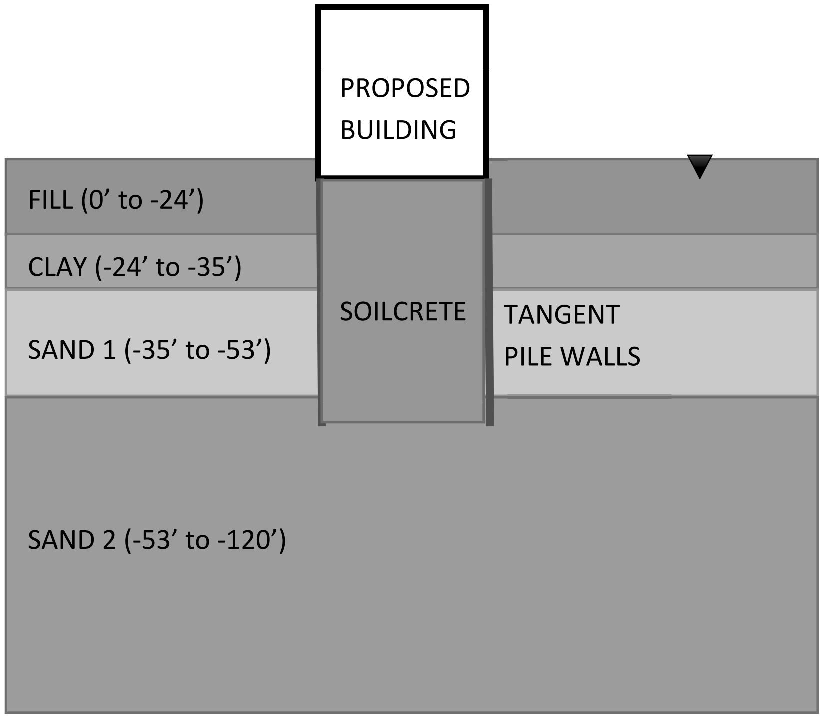
1. Structural Loads

   The assumed total structural loads were provided by WSPCS (refer to Appendix D-1). An axial load of 74,827-kip (dead plus live) was applied to the mat foundation. Tie-down loads of 10,000-kip and 14,500-kip were applied to the North and South sides of the mat, respectively.

   We considered maximum net uplift loads of 14,500-kips on the South side and 10,000-kips on the North side of the building due to two respective wind conditions.

2. Model Parameters

   A generalized soil stratigraphy created for the Finite Element Method (FEM) model is shown below. It is based on our geotechnical investigation described in the body of this report. The top and bottom depths of the soil layers are shown in brackets. Sand layers 1 and 2 are separated based on Standard Penetration Test N-values. Sand 1 generally is less dense than Sand 2.



The groundwater level was estimated at 5-ft below grade. Groundwater level within the site was always assumed as 2-ft below the bottom of the excavation for the various construction phases.

The proposed mat foundation and tangent pile walls were modeled as plates in Plaxis. The various parameters for the plates, soils, and soilcrete used in the FEM model are shown in Tables 1 to 3 below.

Table 1 Plate Parameters

Plate		**Mat**	**Tangent wall**
Thickness	d (ft)	7	5ft
Weight	γ (lb/ft^3)	150	150
Type of behavior	Type	Linear, isotropic	Linear, isotropic
Young's modulus	E_1 (lb/ft^2)	1,170,000k	1,000,000k
Poisson's ratio	ν_{12}	0.003	0.003

Table 2 Soil Parameters

Soil		**Fill**	**Clay**	**Sand 1**	**Sand 2**
Depth	**h**	0 to -24	-24 to -35	-35 to -53	-53 to -120
Blow count	**N**	21 - 32	2 - 5	35 - 44	44 - 100
Unsat unit weight	**γ_{unsat} (lb/ft^3)**	115 - 120	110 - 115	110 - 140	120 - 140
Sat unit weight	**γ_{sat} (lb/ft^3)**	120 - 125	115 - 120	120 - 150	130 - 150
Young's modulus	**E' (lb/ft^2)**	300k - 600k	50k - 200k	500k - 1,000k	1,000k - 2,000k
Poisson's ratio	**ν'**	0.2 - 0.25	0.4	0.25 - 0.3	0.25 - 0.3
Cohesion	**c'_{ref} (lb/ft^2)**	10 - 50	200 - 500	10 - 50	10 - 50
Friction angle	**ϕ'**	28 - 32	27 - 35	30 - 45	30 - 45
Dilatancy angle	**ψ**	0	0	0 - 10	0 – 10
Permiability	**k (ft/s)**	$4.6x10^{-5}$	$3.0x10^{-6}$	$9.4x10^{-5}$	$9.45x10^{-5}$
Interface reduction factor	**R_{inter}**	0.8	0.7	0.8	0.8
Hardening Soil Model					
Secant stiffness for CD triaxial test	**E_{50}^{ref} (lb/ft^2)**	-	-	800k	2,000k - 2,600k
Tangent oedometer stiffness	**E_{oed}^{ref} (lb/ft^2)**	-	-	1.6 times E_{50}^{ref}	1.6 times E_{50}^{ref}
Unloading/reloading stiffness	**E_{ur}^{ref} (lb/ft^2)**	-	-	3 times E_{50}^{ref}	3 times E_{50}^{ref}

Table 3 Soilcrete Parameters

Soilcrete	MC mode	**Fill**	**Clay**	**Sand 1**
Unsat unit weight	**γ_{unsat} (lb/ft^3)**	95 - 105	100 - 110	95 - 110
Sat unit weight	**γ_{sat} (lb/ft^3)**	95 - 105	100 - 110	95 - 110
Young's modulus	**E' (lb/ft^2)**	10,800k - 21,600k	5,760k - 14,400k	17,300k - 43,200k
Poisson's ratio	**ν'**	0.2	0.2	0.2
Cohesion	**c'_{ref} (lb/ft^2)**	21,600 - 43,200	14,400 - 36,000	28,800 - 72,000
Friction angle	**ϕ'**	0	0	0
Dilatancy angle	**ψ**	0	0	0
Permeability	**K (ft/min)**	$1.97x10^{-6}$	$1.97 x10^{-6}$	$1.97 x10^{-6}$

3. Geometry

The FEM model space in Plaxis 3D encompassed an area approximately nine times the building footprint area, with the building located in the middle. The map of coordinates of the model space and building footprint together with the construction model and loads approximations in Plaxis 3D are shown in Appendix D-2.

The excavation was assumed to be supported by tangent pile walls. The tangent piles were assumed penetrating to a depth of 55-ft below ground and consisted of 60-in diameter piles with steel reinforcing.

We modeled six construction phases as described below:

- Initial Phase: Existing conditions.
- Tangent Wall Construction: Tangent pile walls 55-ft deep are constructed along building footrpint.
- Excavation: Site is excavated 5-ft.
- Grouting: The entire footprint is grouted to create soilcrete to a depth of 55-ft.
- Mat Construction: Mat is constructed with tie-down loads applied.
- Loading: Dead and live loads are applied.
- Wind: Worst case scenario wind loads are applied to soil in undrained conditions.

Finite Element Analysis Results

Estimated settlement distributions of the mat foundation after the application of dead and live load and wind loads are shown in Appendix D-3. Under dead and live loads, the maximum and differential settlements are estimated at about 2.0-in and 1.0-in, respectively. For wind loads, the maximum additional settlement is estimated to be 0.25-in in the North wind scenario and 1.0-in in the South wind scenario. The maximum soil rebound due to reduced compressive loads is estimated at 10% of the maximum additional settlement.

Appendix D-4 shows the estimated subgrade stresses under the proposed mat foundation after the application of dead and live loads. Appendix D-5 shows the estimated subgrade stresses under the mat foundation after considering the worst case wind scenarios. The results are also summarized in Table 4 below.

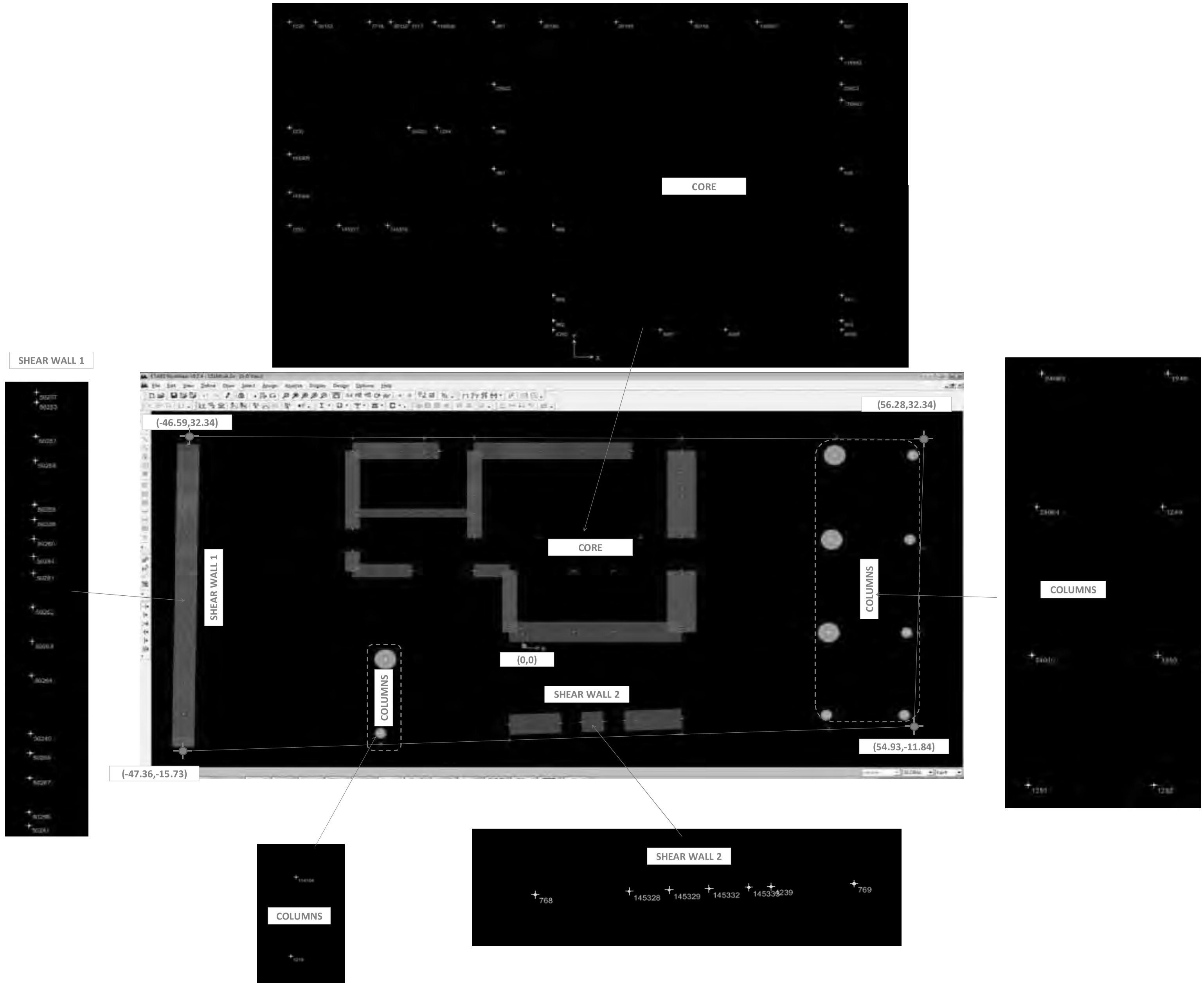
Table 4 Subgrade Stresses under Soilcrete

	Maximum Edge Stress (ton/ft^2)	Average Bearing Stress (ton/ft^2)
Dead and Live Loads	14	10
Wind Loads	15	11
NYCBC Requirement	15	12

APPENDIX D-1

STRUCTURAL LOADS

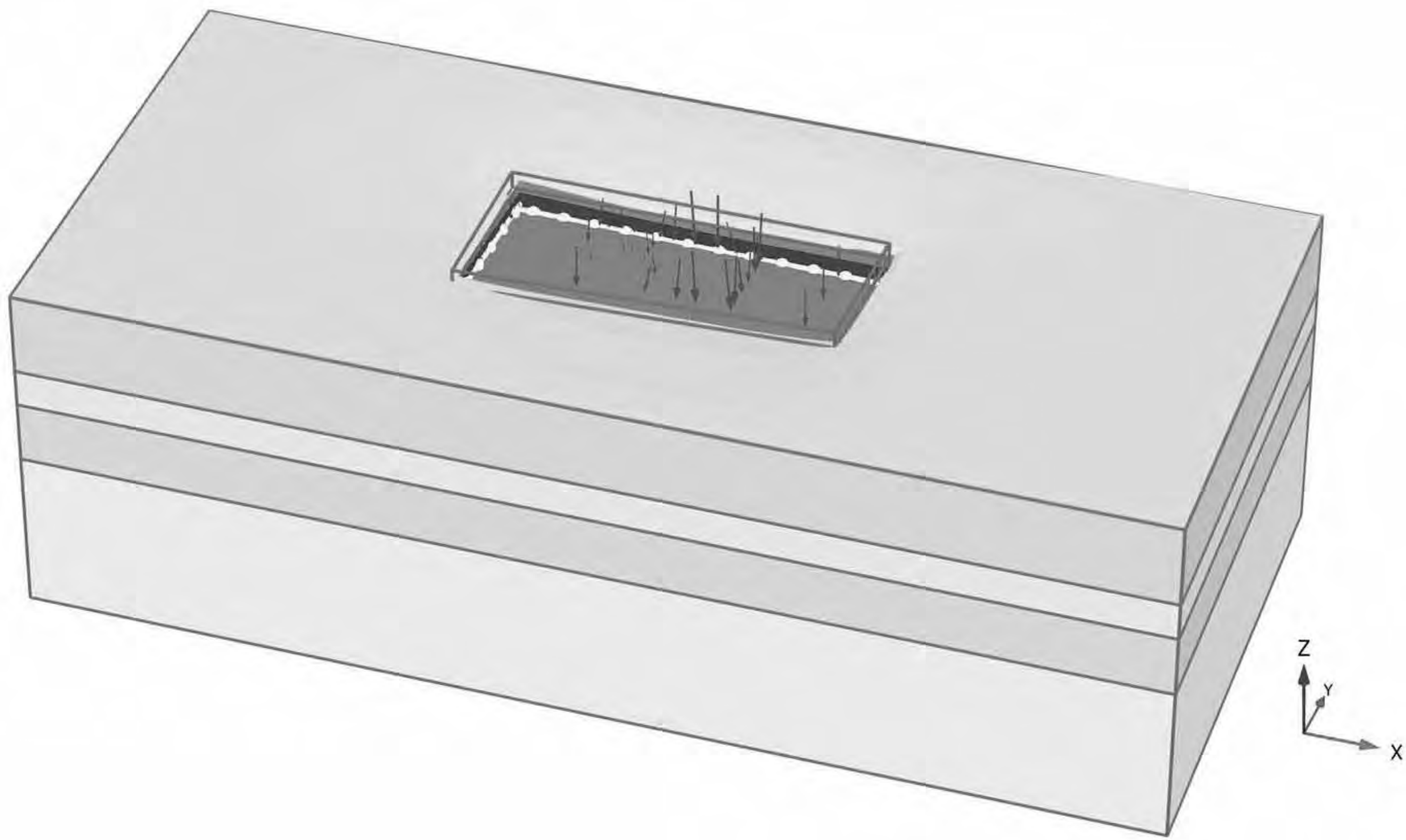
Structural Layout (Walls and Columns)



FROM WSPCS JUNE 11 2014

APPENDIX D-2

MODEL SPACE &
BUILDING FOOTPRINT

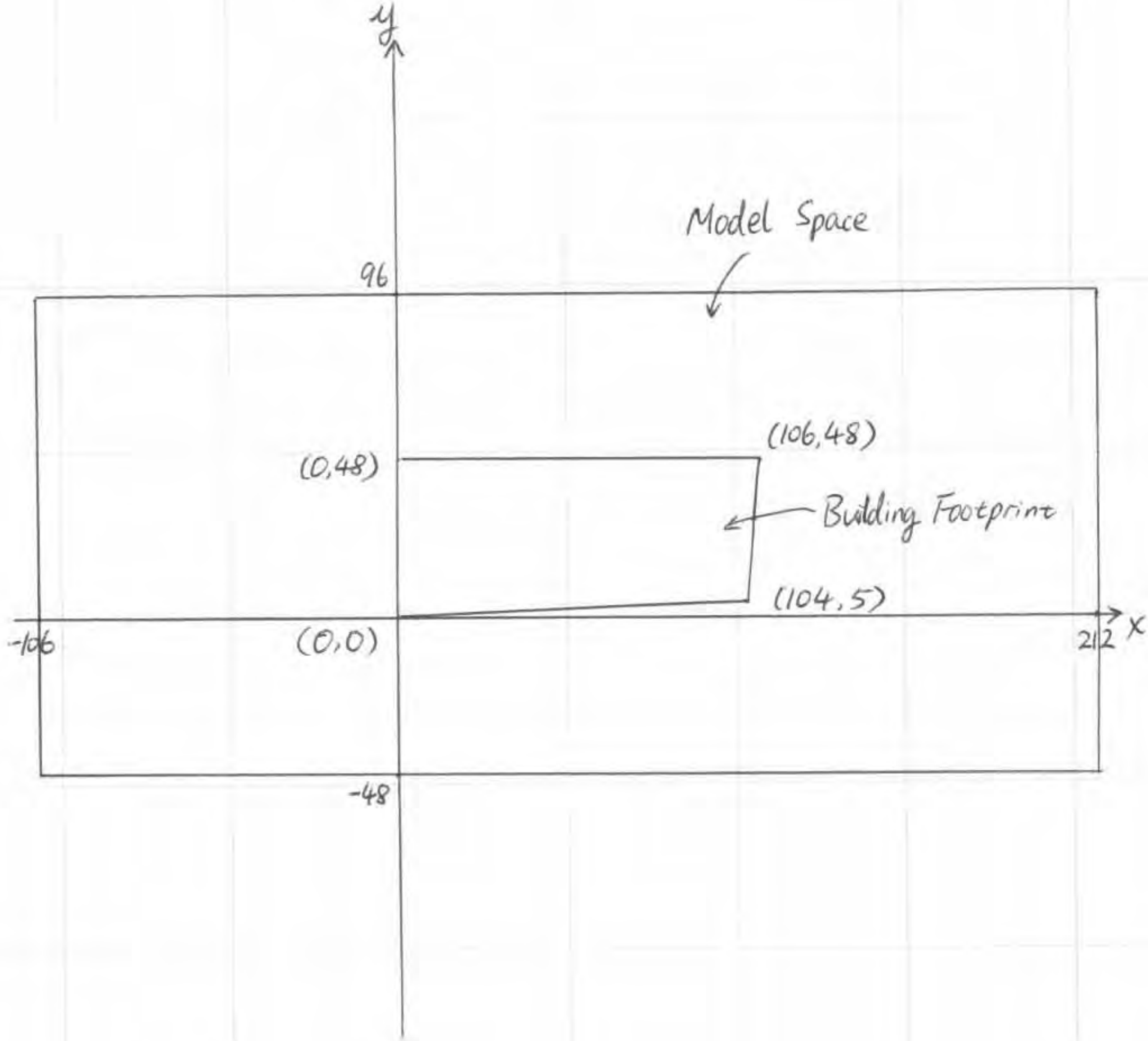


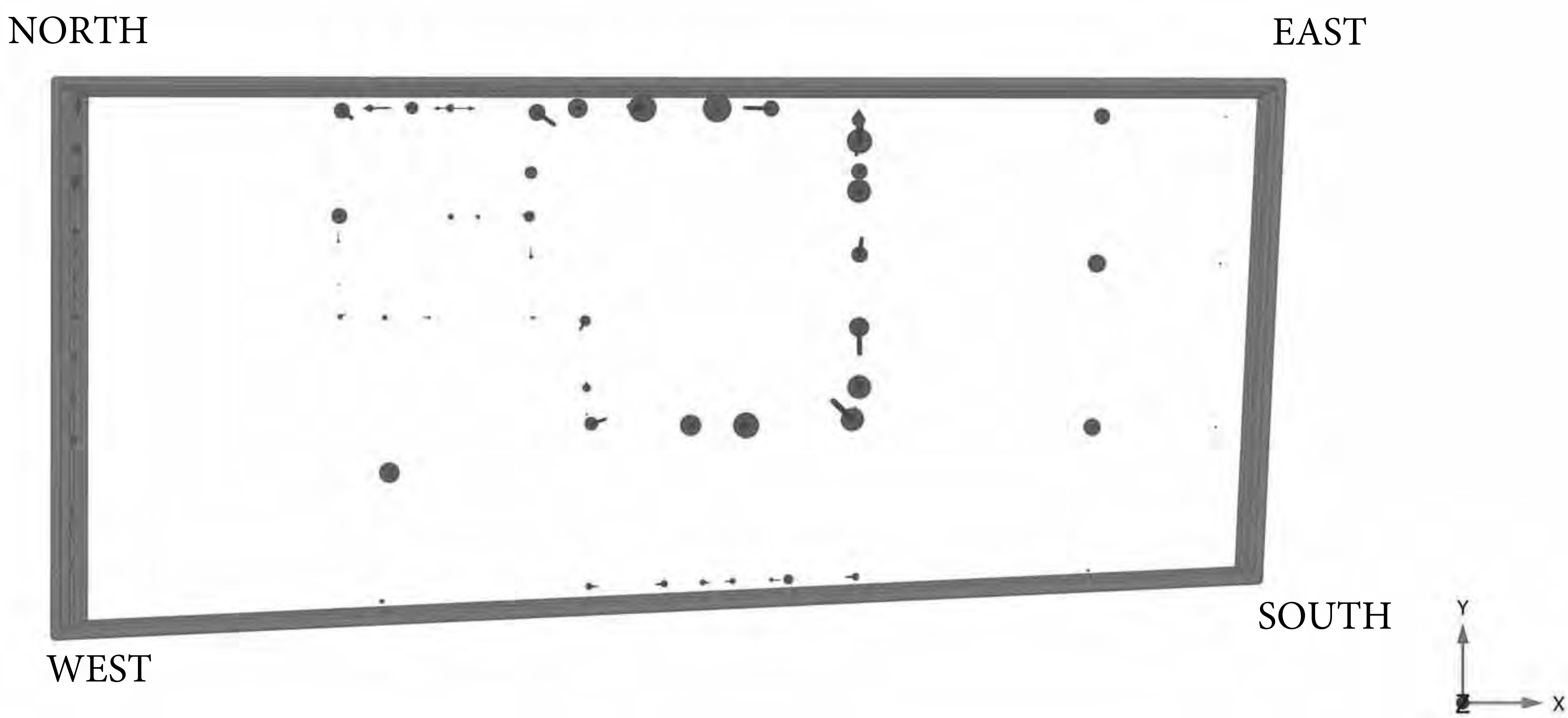
Deformed mesh |u| (scaled up 50.0 times)

RA CONSULTANTS LLC Geotechnical Engineering	Project description: Model Overview		Date: 8/1/2014
	Project filename: North Wind HS model un ...	Step: 32	User name: RA Consultants LLC

RA Consultants LLC
512 7th Avenue • 6th Floor • New York, NY 10018

Project No. 13C1126 | Sheet No. Appendix D-2
Project 161 Maiden Ln, New York, NY | Date
Subject Model Space & Building Footprint | By RG



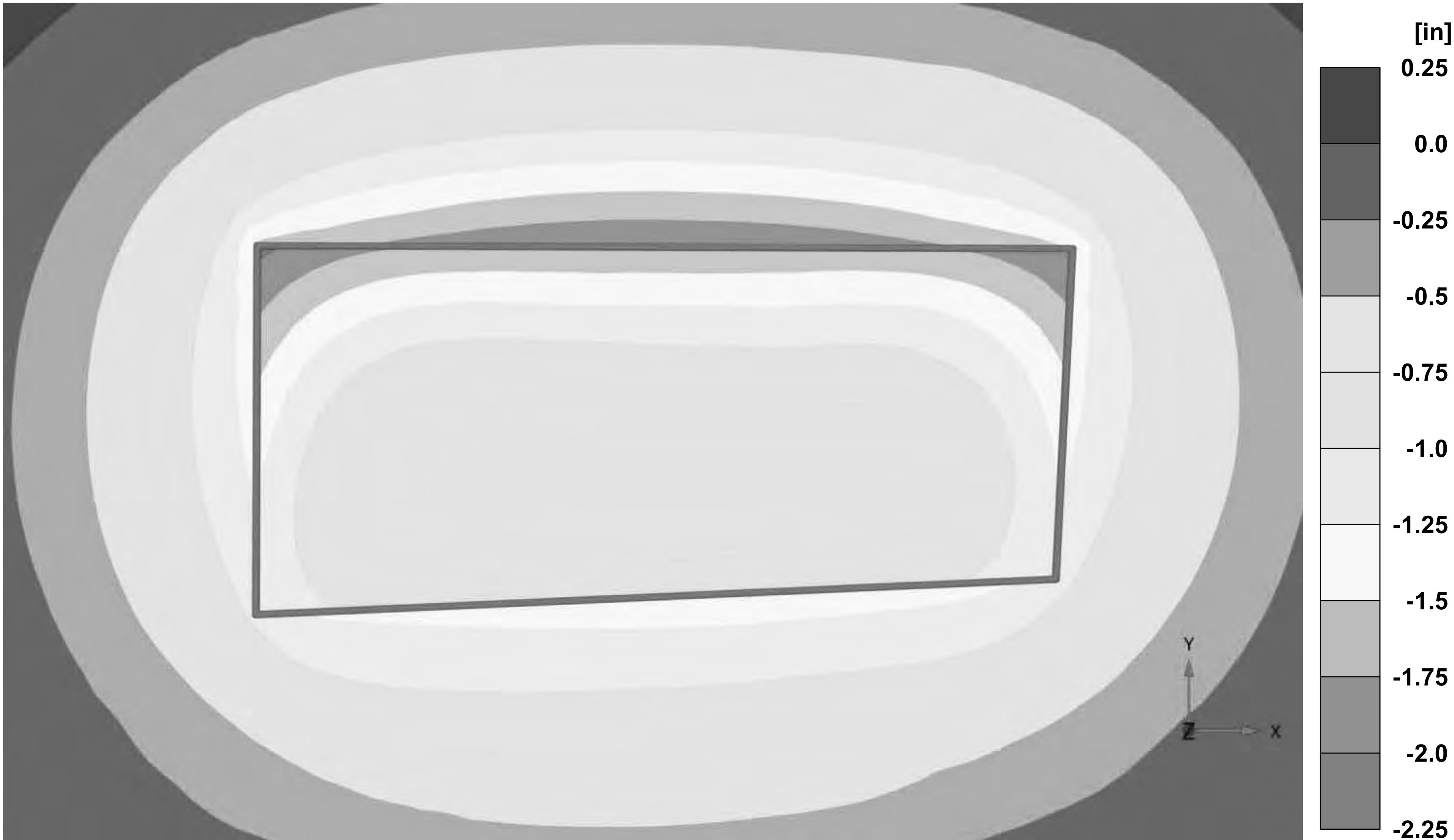


RA CONSULTANTS LLC Geotechnical Engineering	Project description: Dead and Live Load Approximation	Date: 6/13/2014
	Project filename: 161 Maiden Lane New Load 70 ...	User name: RA Consultants LLC

APPENDIX D-3

SETTLEMENT DISTRIBUTION
UNDER MAT

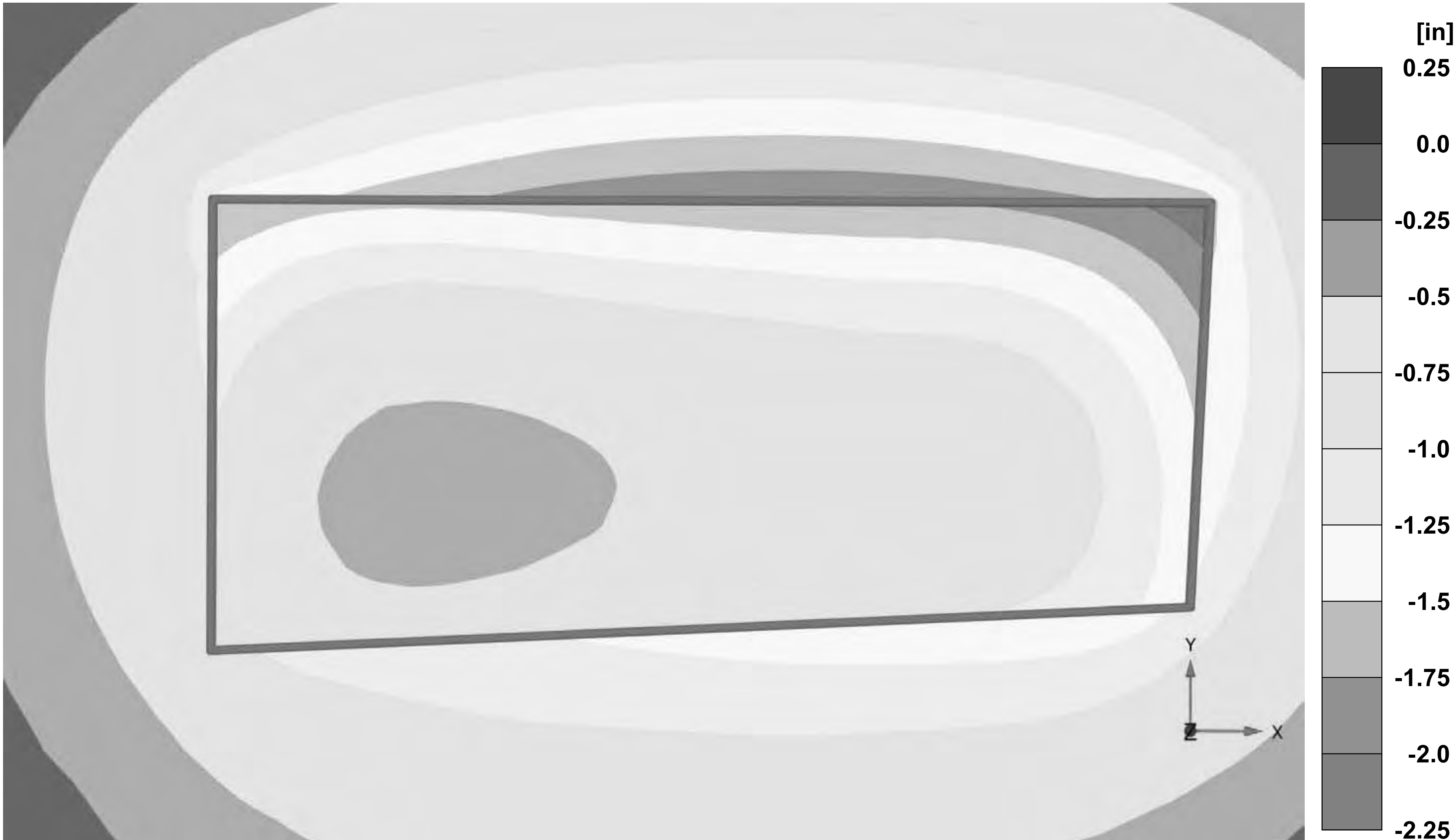
Output Version 2013.1.13962.9831



Total displacements u_z

Minimum value = -2.0 in

RA CONSULTANTS LLC Geotechnical Engineering	*Project description* Settlement under Dead & Live Loads			*Date* 7/23/2014
	Project filename South Wind HS model u ...	*Step* 25	*User name* RA Consultants LLC	

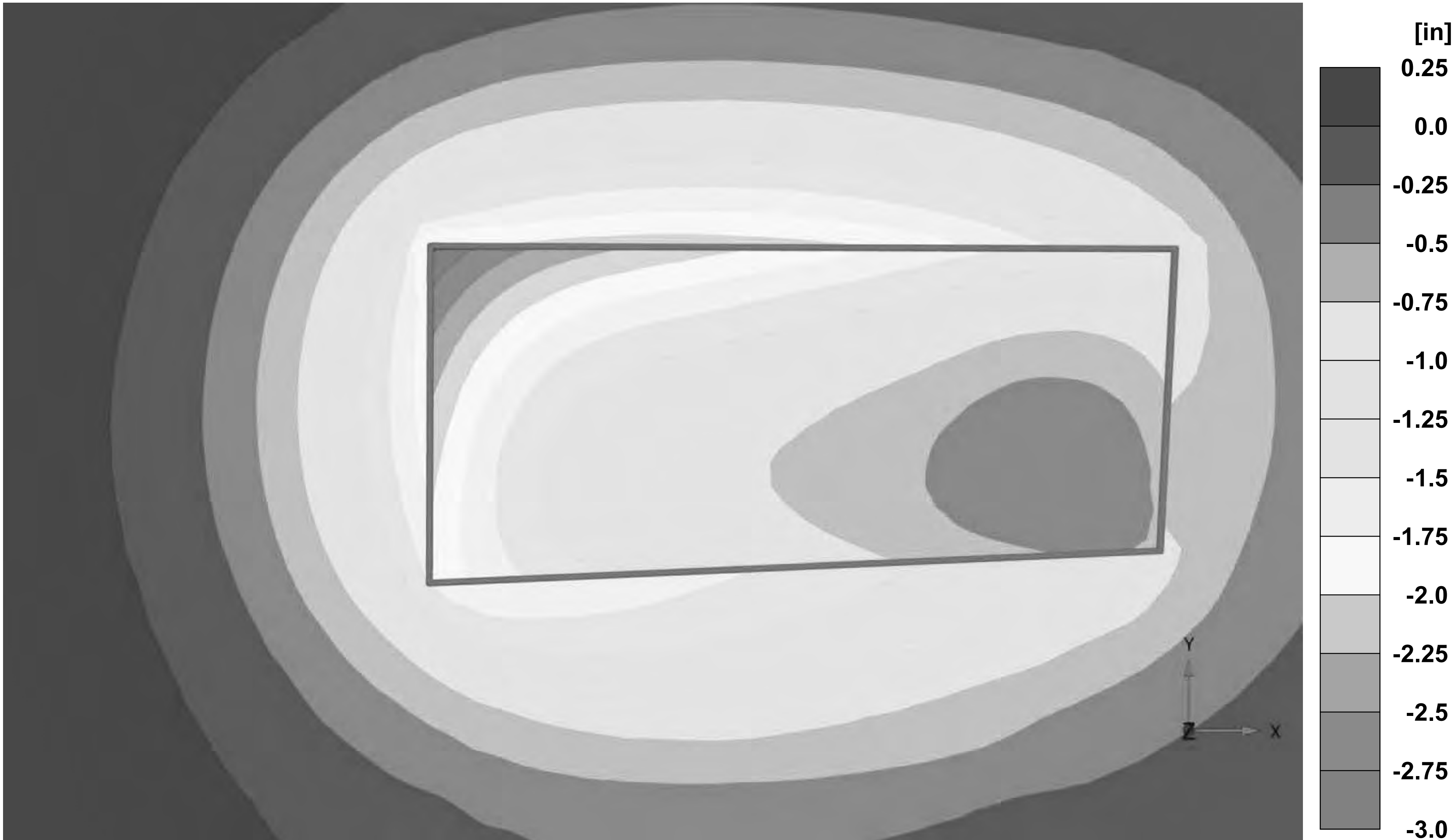


Total displacements u_z

Minimum value = -2.25 in

RA CONSULTANTS LLC Geotechnical Engineering	*Project description* Settlement under North Wind Load		*Date* 7/23/2014
	Project filename North Wind HS model un ...	*Step* 28	*User name* RA Consultants LLC

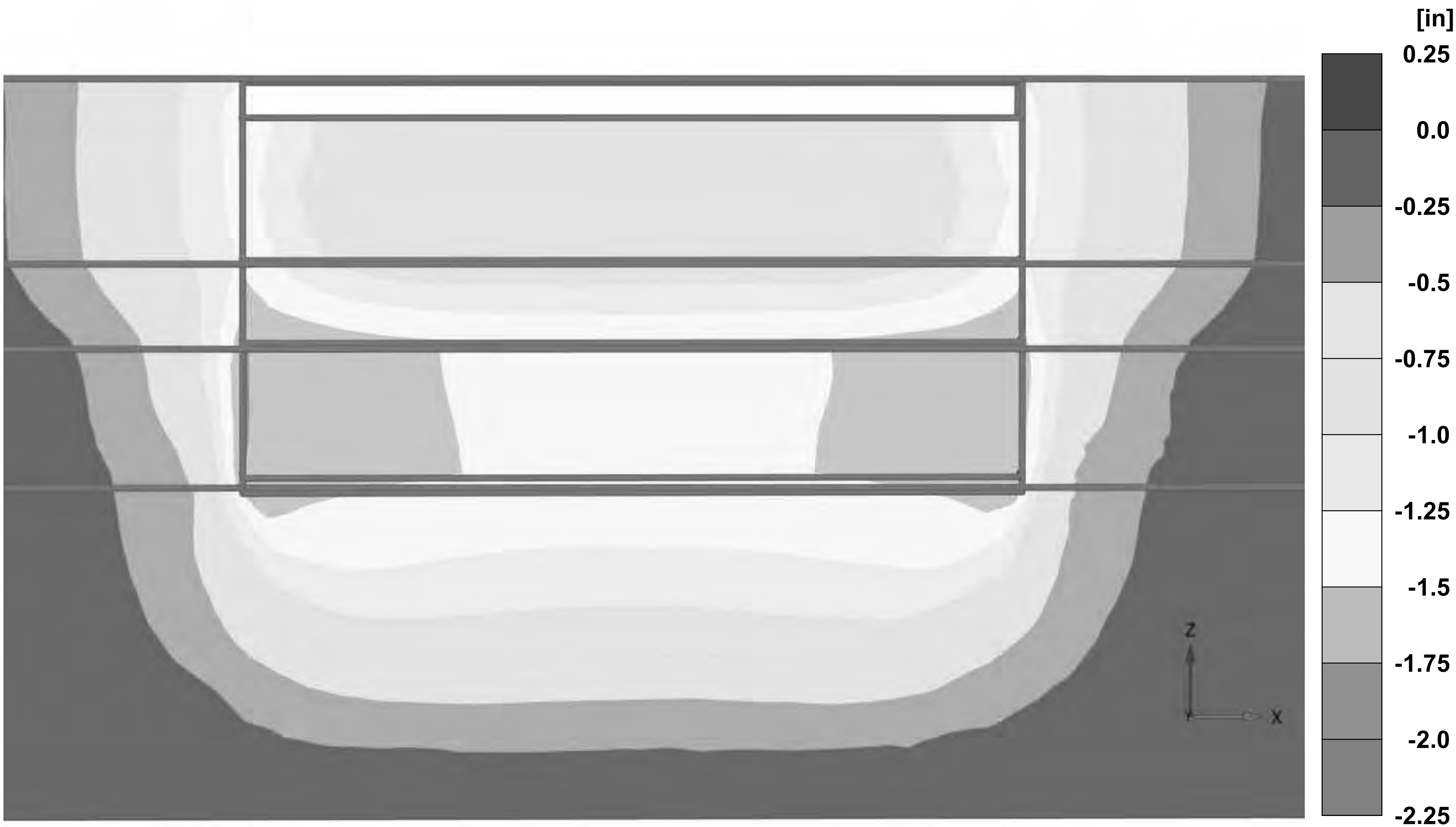
Output Version 2013.1.13962.9831



Total displacements u_z

Minimum value = -3.0 in

RA CONSULTANTS LLC Geotechnical Engineering	Project description: Settlement under South Wind Load		Date: 7/23/2014
	Project filename: South Wind HS model u ...	Step: 40	User name: RA Consultants LLC

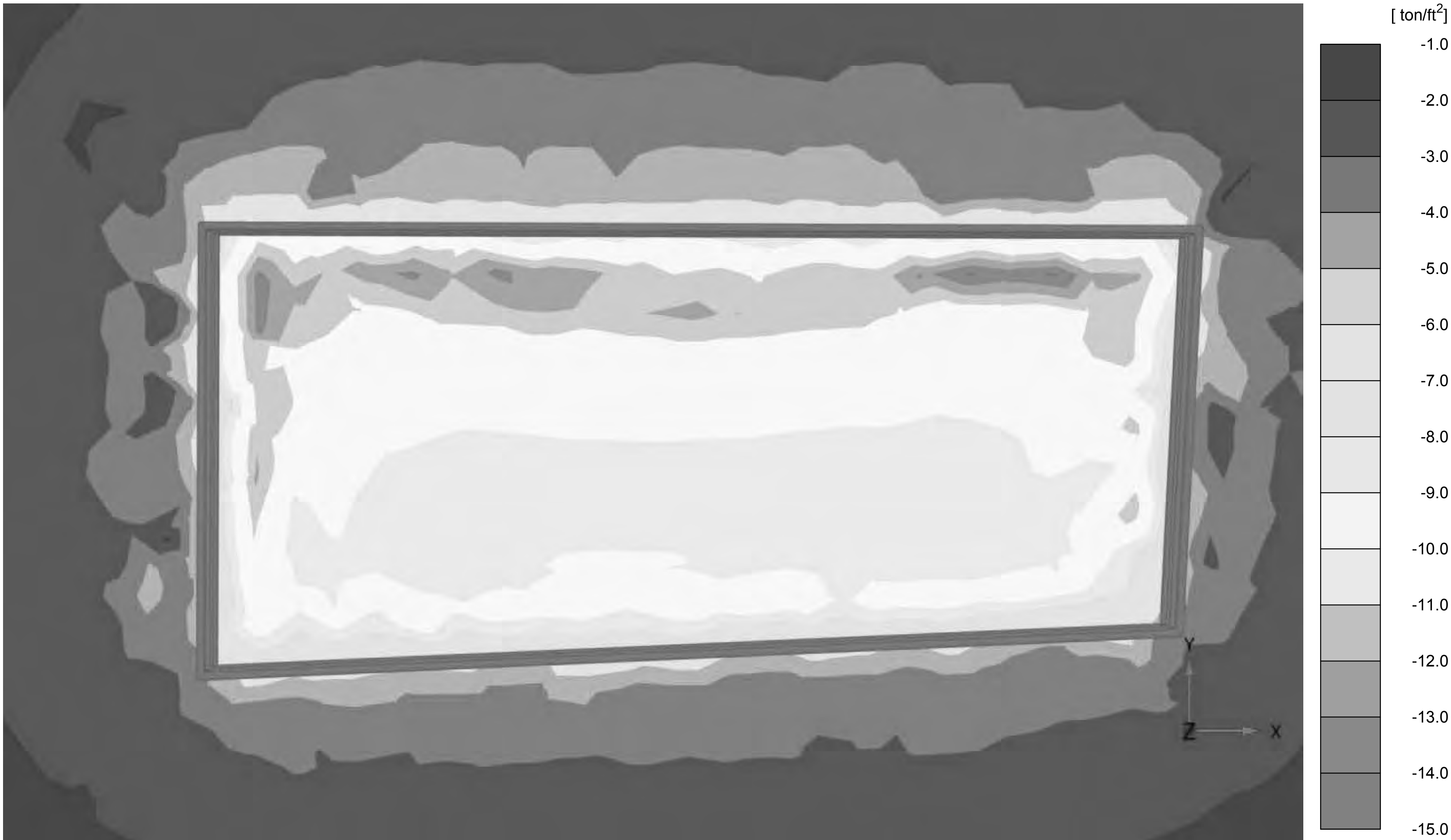


Total displacements u_z

RA CONSULTANTS LLC Geotechnical Engineering	Project description: Typical Settlement - Section View		Date: 7/23/2014
	Project filename: South Wind HS model u ...	Step: 25	User name: RA Consultants LLC

APPENDIX D-4

SUBGRADE STRESSES UNDER DEAD & LIVE LOADS



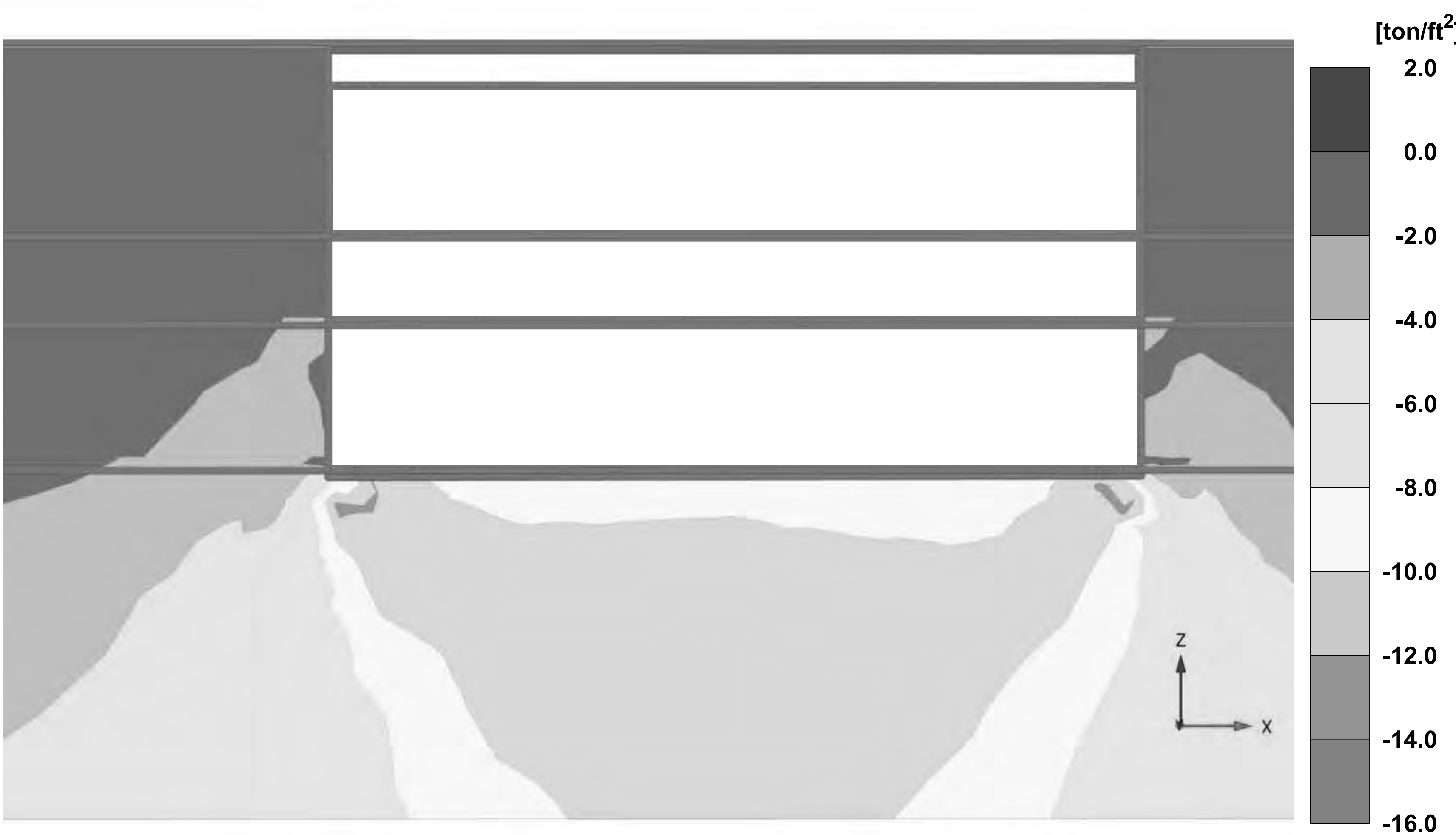
Principal effective stress σ'_1

Maximum value = -1.7 ton/ft^2

Minimum value = -14 ton/ft^2

RA CONSULTANTS LLC Geotechnical Engineering	*Project description* Subgrade Stress Under Dead & Live Loads			*Date* 8/1/2014
	Project filename North Wind HS model un ...	*Step* 27	*User name* RA Consultants LLC	

Output Version 2013.1.13962.9831



Principal effective stress σ'_1

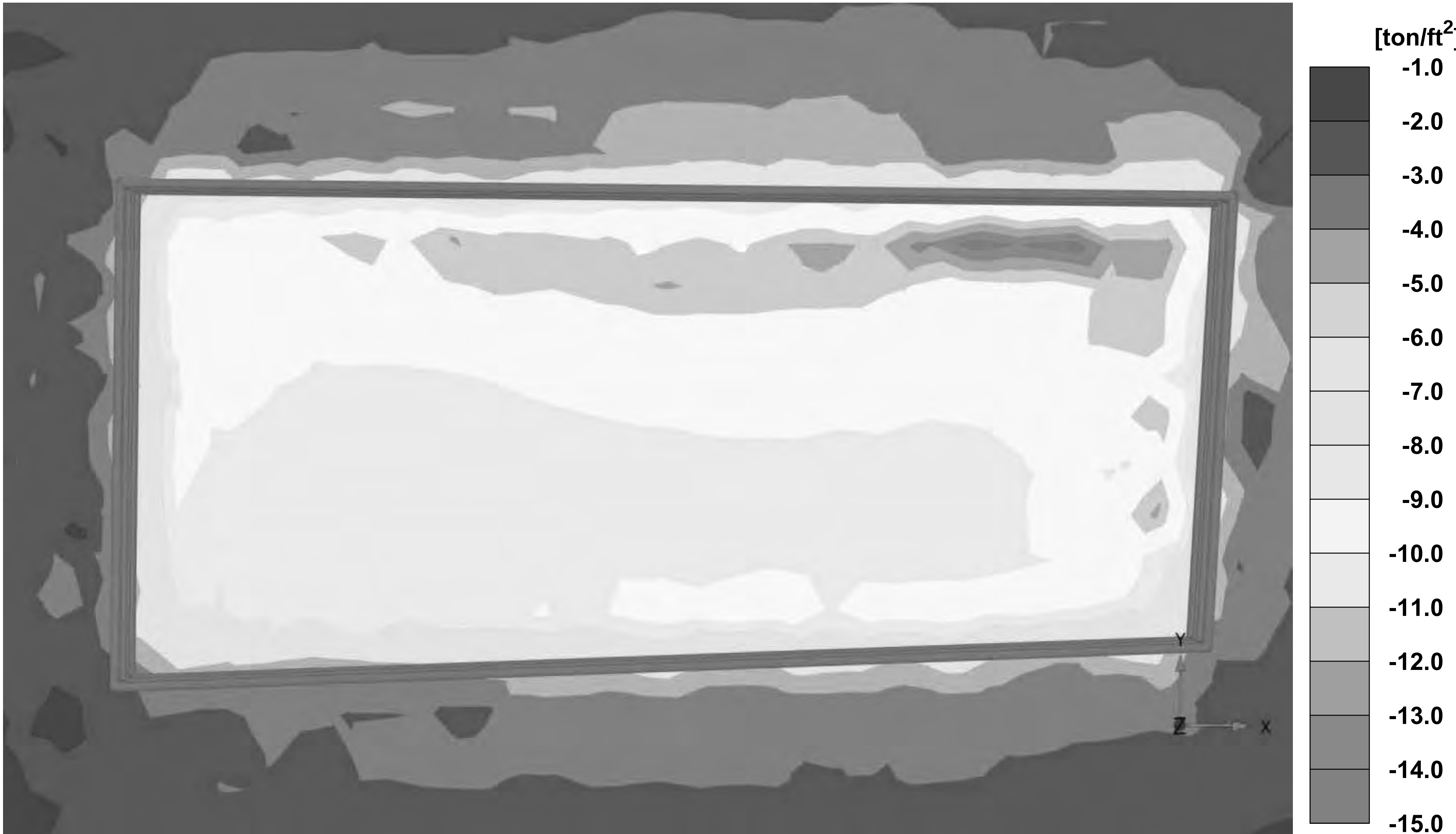
Project description			Date
Typical Subgrade Stress Under Dead & Live Loads			8/1/2014
Project filename	**Step**	**User name**	
North Wind HS model un ...	27	RA Consultants LLC	

RA CONSULTANTS LLC
Geotechnical Engineering

APPENDIX D-5

SUBGRADE STRESSES UNDER WIND LOADS

Output Version 2013.1.13962.9831



Principal effective stress σ'_1

Maximum value = -1.6 ton/ft2
Minimum value = -14.5 ton/ft2

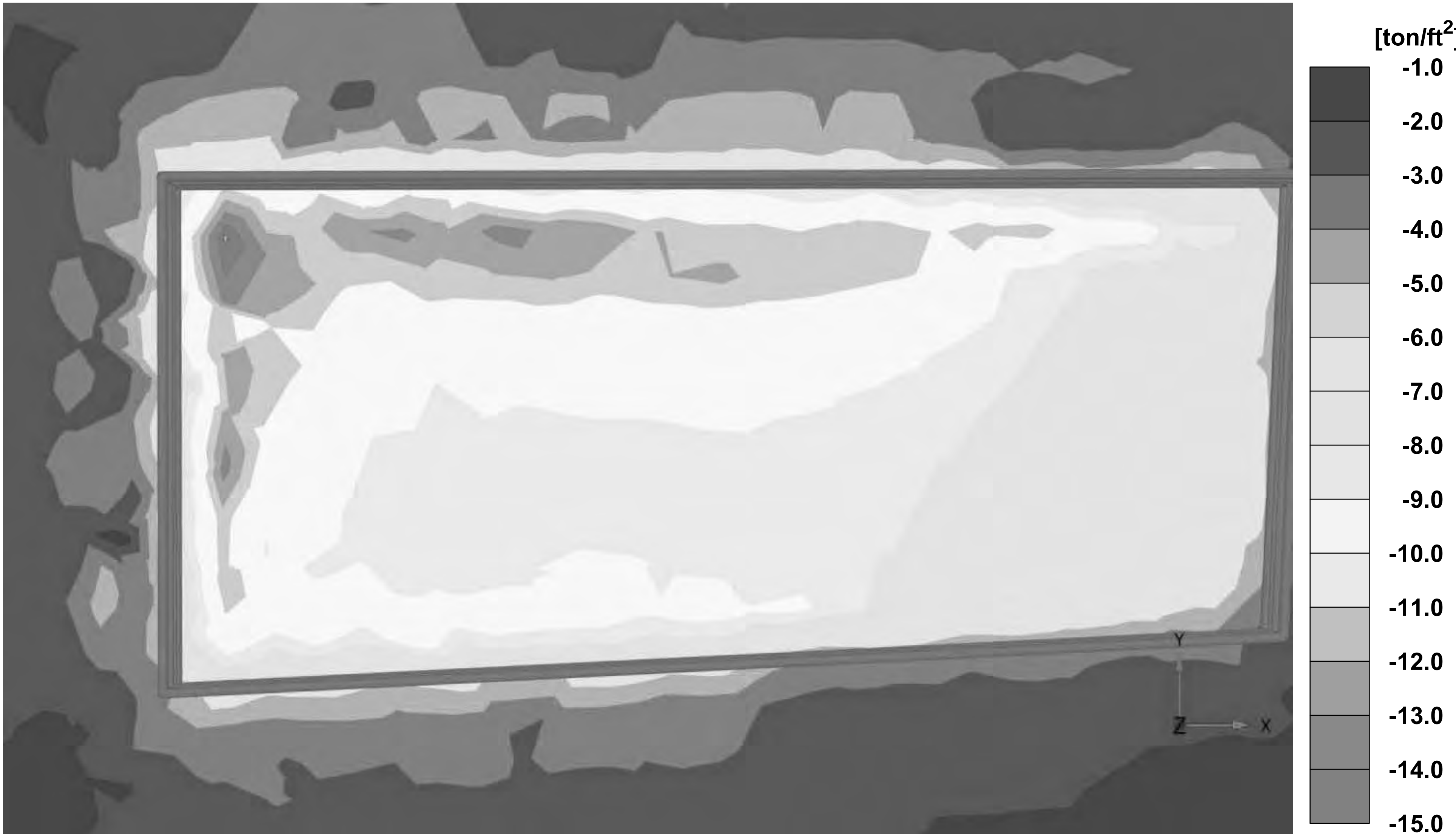
RA CONSULTANTS LLC Geotechnical Engineering	Project description: Subgrade Stress Under North Wind		Date: 8/1/2014
	Project filename: North Wind HS model un ...	Step: 32	User name: RA Consultants LLC

Output Version 2013.1.13962.9831

Principal effective stress σ'_1

	Project description			Date
RA CONSULTANTS LLC Geotechnical Engineering	Typical Subgrade Stress Under North Wind			8/1/2014
	Project filename: North Wind HS model un ...	Step: 32	User name: RA Consultants LLC	

Output Version 2013.1.13962.9831



Principal effective stress σ'_1

Maximum value = -1.5 ton/ft2
Minimum value = -15.0 ton/ft2

RA CONSULTANTS LLC Geotechnical Engineering	Project description: Subgrade Stress Under South Wind		Date: 8/1/2014
	Project filename: South Wind HS model u ...	Step: 52	User name: RA Consultants LLC

Output Version 2013.1.13962.9831

Principal effective stress σ'_1

RA CONSULTANTS LLC Geotechnical Engineering	Project description: Typical Subgrade Stress Under South Wind			Date: 8/1/2014
	Project filename: South Wind HS model u ...	Step: 52	User name: RA Consultants LLC	

Appendix C

Structural Design Criteria

161 Maiden Lane
STRUCTURAL NARRATIVE

PART 1 – INTRODUCTION

1.1 Project Description

161 Maiden Lane is located in the South Street Seaport area in Lower Manhattan with the site defined by South Street to the east, Fletcher Street to the north and Maiden Lane to the south. At 629 feet tall above ground, the building consists of 52 stories of residential, amenity, and mechanical space. The approximate gross area of the project is 176,860 s.f. A 300' tall hotel is currently in design and planned adjacent to the site.

1.2 Scope

The scope of this narrative is intended to provide the peer reviewer information regarding the design methodologies, criteria used, and description of the building.

1.3 Project Team

A. Developer: Fortis Properties Group LLC
B. Architects: Goldstein, Hill & West Architects, LLP
C. Structural: WSP Building Structures
D. MEP: WSP Building Systems
E. Geotechnical: R.A. Consultants LLC

PART 2 – STRUCTURAL DESIGN CRITERIA

2.1 Floor Live Loads

Design floor live loads are as follows:

Occupancy or Use	Uniform (psf)	Concentrated (lbs)
Ground/Amenities/Public Spaces	100	
Corridors (except as noted below)	100	
Residential: Private rooms and corridors serving them	40	
Balconies & Terraces - Residences not exceeding 100 ft2	100 60	
Roof used for assembly purposes	100*	
Stairs and Exits	100	300 (on area of 4 square inches)
MEP Spaces & Rooms	100*	

Notes:

o Live load reductions have been accounted for in design of column and foundation per NYCBC Section 1607.9

* Or actual weights of equipment

2.2 Roof Live Loads / Snow Loads

A. Unoccupied roof areas shall be designed per NYCBC section 1608 with a ground snow load of Pg=25psf

B. All exterior areas (occupied and unoccupied) shall be designed for minimum snow load, including drifting and sliding (as applicable)

C. Occupied roof areas shall be designed for a live load based on the larger of snow loads or live loads per section 2.1 of this document.

2.3 Wind Loads

A. As per wind tunnel study by RWDI.
B. Basic wind speed: Ultimate = 115 mph (700 YRP)
   Serviceability = 90 mph (50 YRP)
C. Wind importance factor, Iw = 1.0
D. Component and cladding design wind pressure = as per cladding study by RWDI.

2.4 Earthquake Loads

A. Earthquake Design Factor, Ss= 0.365
B. Earthquake Design Factors, S1=0.071
C. Soil Site Class C
D. Seismic Design Category B
E. Seismic importance factor, Ie=1.0
F. Response Modification Coefficient, R=4

2.5 Geotechnical Criteria/Foundation System

A. 7' to 12' mat supported on a soil improvement system (Underlying Jet-grouted mat and perimeter walls)
B. Design Flood Elevation = 14' (AE13)

2.6 Structural Integrity

A. Structural integrity requirements per NYCBC

2.7 Materials

A. Concrete strength:

   1. Foundation Mat and foundation walls:
      F'c = 10,000 psi
   2. Shear walls and columns:
      F'c = 12,000 psi Foundation – Level 18
      F'c = 10,000 psi Level 19 – Level 26
      F'c = 8000 psi Level 27 – Level 42
      F'c = 6000 psi Level 43 - Roof
   3. Link Beams:
      F'c per link beam detail on S-949
   4. Concrete slabs:
      F'c = 7,200 psi Ground – Level 26
      F'c = 6,000 psi Level 27 – Roof

B. Steel reinforcement strength:

1. Grade 60 (Fy = 60,000 psf)

2.8 Serviceability Criteria

Wind inter-story drift limited to h/400 (h equals story height)

Long term floor deflection (due to live load, creep and shrinkage) target of L/480 (L is the span between vertical supports, such as walls or columns).

Immediate floor deflection (due to live load) target of L/360.

*Floor deflection targets are for engineering best practices only, and do not guarantee that initial deflection will not exceed these targets due to construction tolerance or contractor selected means and methods.

2.9 Reference Codes and Standards

A. The project is being designed to meet the following applicable building codes

1. 2008 New York City Building Code

B. The following standards are also being used for the structural design of the project:

1. ACI 315 - Manual of Standard Practice for Detailing Reinforced Concrete Structures
2. ACI 318-02 - Building Code Requirements for Structural Concrete
3. ACI 530-02 – Building Code Requirements for Masonry Structures
4. ASCE 7-02 – Minimum Design Loads for Buildings and Other Structures

PART 3 – STRUCTURAL SYSTEM CONCEPT AND ALTERNATES

3.1 Substructure

A. Foundation

1. The foundation system for the proposed tower includes a 12' thick reinforced concrete mat supported on a soil improvement system. The underlying jet grouted mat and perimeter wall system was analyzed by the geotechnical consultant to distribute the gravity and lateral loads from the tower to the supporting soil layers. Expected settlements and stresses in the soil are reported in the geotechnical report by R.A. Consultants.

2. Rock anchors are located to resist the uplift as a result of the wind and seismic overturning moments and hydrostatic uplift.

3. Rotational stiffness of the overall foundation system as a result of the combined effects of the underlying soil, soil improvement, rock anchors, and mat were considered in the overall effect to the tower.

3.2 Superstructure

A. Gravity Systems

a. Typical residential floors: 8" conventional flat plate spanning between shear walls and/or columns. Extent and location of balconies vary as indicated on framing plans.

b. Lobbies, Amenities, Mechanical, and public spaces: 9" conventional flat plate

c. Columns sizes as indicated in the column schedule on drawing S-950. Reinforcing and concrete strength will be reduced as appropriate as loads and stiffness requirements reduce on upper levels.

B. Lateral System

1. The primary wind resisting lateral system of the tower is an ordinary reinforced concrete shear walls. Each segment of core wall is linked to adjacent segments with concrete link beams. Two levels of belt walls at the mechanical levels 25 and Slosh Tank Level are used to engage perimeter columns. In addition, a wind resisting moment frames supplement the shear walls through the interaction between the concrete columns and flat plate system.

a. The core walls will consist of high strength concrete starting at 12ksi at the foundation and reducing to 10ksi, 8ksi and 6ksi at intermediate points in the tower as indicated on the drawings.

b. The wall thickness will vary from 48" to 12" at as indicated on the drawings.

c. The belt walls will provide connections between the core and the perimeter columns to provide stability and more efficiently resist overturning forces on the tower.

PART 4 – ITEMS UNDER COORDINATION/REVIEW/VERIFICATION

The following project items are currently under coordination/review/verification (partially presented/not presented in the design drawings):

1) Foundation mat (design verification for updated/optimized rock anchor layout).
2) Elevator machine room slabs (to be designed).

3) Mechanical mezzanine floor slabs at level 25 and 47 (to be designed based on the latest architectural layout).
4) Mechanical roof slab (stair and mechanical openings to be incorporated).
5) Tower top structures (bulkhead and parapet supporting framing to be designed).
6) Swimming pool (currently under development and coordination by architects).
7) MEP/architecture openings/penetrations in 25th floor belt walls (currently under coordination with MEP and Architecture).
8) MEP openings in core/shear walls and slabs (MEP design is currently under optimization).
9) Link beam design verification for updated wind tunnel test results.
10) Column tension load/design verification based on redistribution of gravity loads between core and columns through the belt walls
11) Stair structures for levels 1 to 4 (design to be incorporated).

END OF SECTION