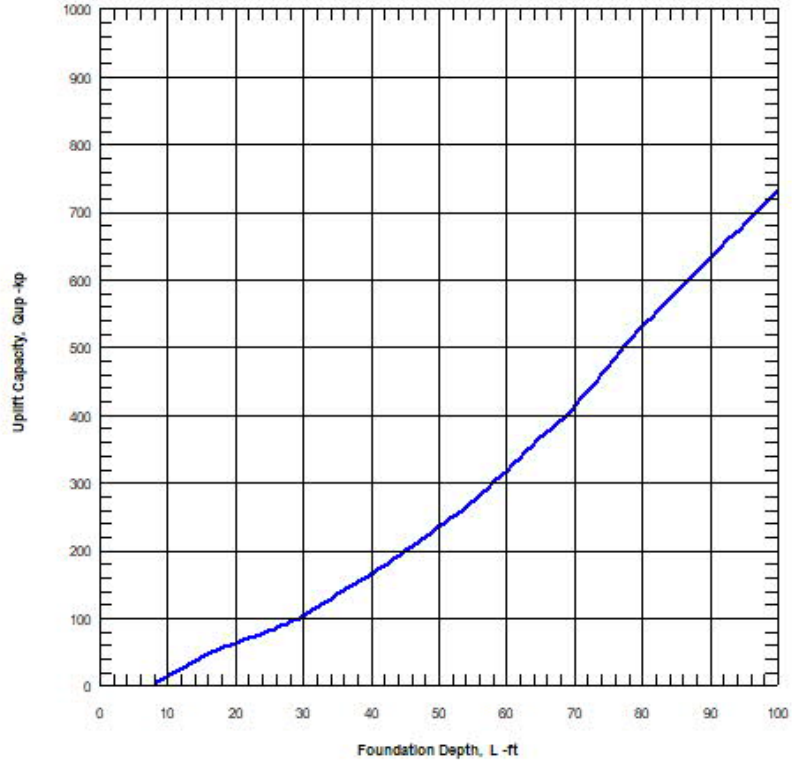
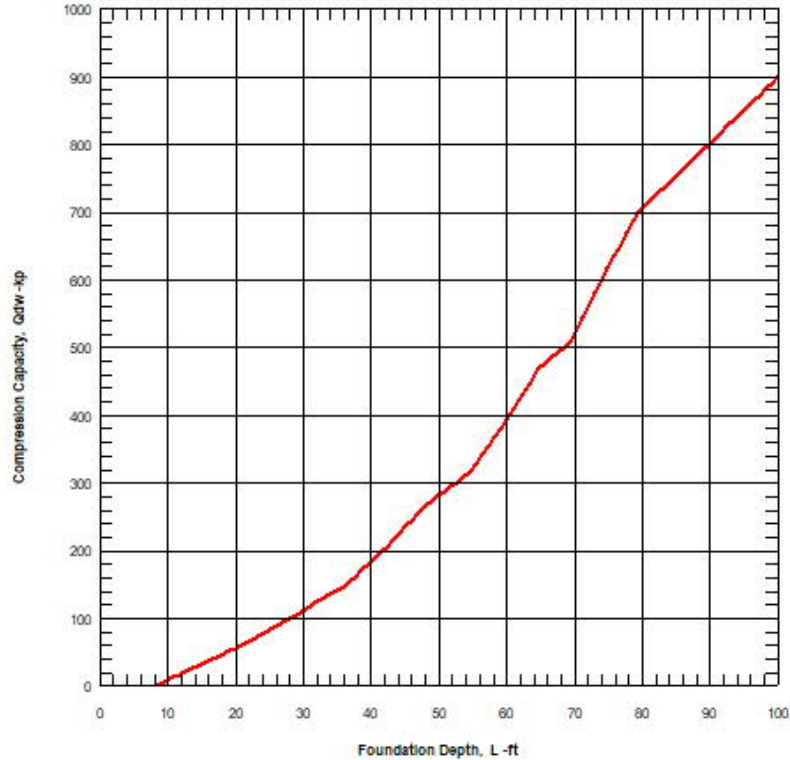


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### NOMINAL RESISTANCE VS FOUNDATION DEPTH



**CivilTech  
Software**

**NA205020 Fyffe Grade Separation - North Abutment  
14-inch Square Concrete Driven Pile** Figure 1

Downward and Uplift Capacity vs Pile Length

The results are for single section pile. Multiple sections may not be correct!  
 \*\*\*\*\*

Length -ft	Qtip -kp	Qside -kp	Q_dw -kp	Qd_alw -kp	Wei ght -kp	Qsi d* -kp	Q_up -kp	Qu_alw -kp
8.00	0.00	0.05	0.0	0.05	4.81	0.05	4.85	4.85
8.93	0.00	4.40	4.4	4.40	5.36	4.40	9.76	9.76
9.86	0.00	8.80	8.8	8.80	5.92	8.80	14.71	14.71
10.79	0.00	13.20	13.2	13.20	6.47	13.20	19.67	19.67
11.72	0.00	17.60	17.6	17.60	7.03	17.60	24.63	24.63
12.65	0.00	22.00	22.0	22.00	7.59	22.00	29.58	29.58
13.58	0.00	26.39	26.4	26.39	8.15	26.39	34.54	34.54
14.51	0.00	30.79	30.8	30.79	8.70	30.79	39.50	39.50
15.43	0.00	35.19	35.2	35.19	9.26	35.19	44.45	44.45
16.36	0.00	39.59	39.6	39.59	9.82	39.59	49.41	49.41
17.29	0.00	43.99	44.0	43.99	10.38	43.99	54.37	54.37
18.22	0.00	48.30	48.3	48.30	10.88	47.96	58.85	58.85
19.15	0.00	52.42	52.4	52.42	11.21	50.48	61.69	61.69
20.08	0.00	56.71	56.7	56.71	11.53	53.15	64.68	64.68
21.01	0.00	61.16	61.2	61.16	11.86	55.86	67.72	67.72
21.94	0.00	65.77	65.8	65.77	12.18	58.68	70.86	70.86
22.87	0.00	70.58	70.6	70.58	12.51	61.66	74.17	74.17
23.80	0.00	75.53	75.5	75.53	12.83	64.70	77.53	77.53
24.73	0.00	80.71	80.7	80.71	13.16	67.92	81.08	81.08
25.66	0.00	86.00	86.0	86.00	13.49	71.15	84.64	84.64
26.59	0.00	91.49	91.5	91.49	13.81	74.55	88.36	88.36
27.52	0.00	97.13	97.1	97.13	14.14	78.00	92.14	92.14
28.44	0.00	103.02	103.0	103.02	14.47	81.67	96.14	96.14
29.37	0.00	108.75	108.8	108.75	14.79	85.94	100.74	100.74
30.30	0.00	114.15	114.1	114.15	15.11	91.39	106.51	106.51
31.23	0.00	119.61	119.6	119.61	15.44	96.76	112.20	112.20
32.16	0.00	125.08	125.1	125.08	15.77	102.31	118.08	118.08
33.09	0.00	130.47	130.5	130.47	16.09	107.68	123.77	123.77
34.02	0.00	135.93	135.9	135.93	16.42	113.16	129.57	129.57
34.95	0.00	141.47	141.5	141.47	16.75	118.73	135.48	135.48
35.88	0.00	146.78	146.8	146.78	17.06	124.02	141.08	141.08
36.81	0.00	154.63	154.6	154.63	17.40	129.31	146.71	146.71
37.74	0.00	163.07	163.1	163.07	17.72	134.29	152.01	152.01
38.67	0.00	171.64	171.6	171.64	18.05	139.64	157.69	157.69
39.60	0.00	180.30	180.3	180.30	18.37	145.00	163.37	163.37
40.53	0.00	189.47	189.5	189.47	18.70	150.58	169.29	169.29
41.45	0.00	198.72	198.7	198.72	19.03	156.30	175.34	175.34
42.38	0.00	208.04	208.0	208.04	19.36	162.17	181.53	181.53
43.31	0.00	217.58	217.6	217.58	19.68	167.97	187.65	187.65
44.24	0.00	227.15	227.1	227.15	20.00	173.74	193.74	193.74
45.17	0.00	237.30	237.3	237.30	20.34	180.11	200.45	200.45
46.10	0.00	247.07	247.1	247.07	20.65	185.90	206.55	206.55
47.03	0.00	257.45	257.5	257.45	20.98	192.34	213.32	213.32
47.96	0.00	267.85	267.9	267.85	21.30	198.75	220.05	220.05

48.89	0.00	275.30	275.3	275.30	21.64	205.68	227.32	227.32
49.82	0.00	281.59	281.6	281.59	21.96	212.23	234.19	234.19
50.75	0.00	287.83	287.8	287.83	22.28	218.44	240.72	240.72
51.68	0.00	294.66	294.7	294.66	22.62	225.40	248.02	248.02
52.61	0.00	300.99	301.0	300.99	22.93	231.73	254.66	254.66
53.54	0.00	307.83	307.8	307.83	23.26	238.18	261.44	261.44
54.46	0.00	316.75	316.8	316.75	23.59	245.39	268.98	268.98
55.39	0.00	329.77	329.8	329.77	23.92	253.11	277.03	277.03
56.32	0.00	342.39	342.4	342.39	24.25	261.25	285.50	285.50
57.25	0.00	355.43	355.4	355.43	24.57	269.17	293.74	293.74
58.18	0.00	368.60	368.6	368.60	24.89	277.37	302.26	302.26
59.11	0.00	381.76	381.8	381.76	25.21	285.29	310.50	310.50
60.04	0.00	395.29	395.3	395.29	25.53	293.64	319.17	319.17
60.97	0.00	409.90	409.9	409.90	25.88	302.80	328.68	328.68
61.90	0.00	424.19	424.2	424.19	26.19	311.27	337.46	337.46
62.83	0.00	439.09	439.1	439.09	26.53	320.31	346.84	346.84
63.76	0.00	452.95	453.0	452.95	26.85	329.28	356.13	356.13
64.69	0.00	468.78	468.8	468.78	27.19	338.78	365.97	365.97
65.62	0.00	477.82	477.8	477.82	27.50	346.20	373.70	373.70
66.55	0.00	484.77	484.8	484.77	27.83	353.62	381.45	381.45
67.47	0.00	492.55	492.5	492.55	28.14	360.13	388.27	388.27
68.40	0.00	498.70	498.7	498.70	28.47	367.46	395.93	395.93
69.33	0.00	509.43	509.4	509.43	28.81	375.97	404.78	404.78
70.26	0.00	528.36	528.4	528.36	29.14	387.36	416.49	416.49
71.19	0.00	545.37	545.4	545.37	29.44	397.91	427.35	427.35
72.12	0.00	563.74	563.7	563.74	29.77	408.63	438.40	438.40
73.05	0.00	582.04	582.0	582.04	30.10	419.87	449.96	449.96
73.98	0.00	599.57	599.6	599.57	30.43	430.94	461.37	461.37
74.91	0.00	617.81	617.8	617.81	30.76	442.09	472.84	472.84
75.84	0.00	635.43	635.4	635.43	31.08	452.87	483.95	483.95
76.77	0.00	653.07	653.1	653.07	31.41	463.95	495.36	495.36
77.70	0.00	671.13	671.1	671.13	31.73	474.92	506.65	506.65
78.63	0.00	688.01	688.0	688.01	32.06	485.56	517.61	517.61
79.56	0.00	701.66	701.7	701.66	32.38	495.72	528.10	528.10
80.48	0.00	711.01	711.0	711.01	32.70	504.66	537.36	537.36
81.41	0.00	718.91	718.9	718.91	33.02	513.39	546.41	546.41
82.34	0.00	729.30	729.3	729.30	33.38	523.26	556.64	556.64
83.27	0.00	737.43	737.4	737.43	33.70	531.53	565.22	565.22
84.20	0.00	745.54	745.5	745.54	34.02	540.56	574.58	574.58
85.13	0.00	755.62	755.6	755.62	34.33	549.93	584.26	584.26
86.06	0.00	763.57	763.6	763.57	34.65	557.87	592.52	592.52
86.99	0.00	774.67	774.7	774.67	35.01	568.26	603.27	603.27
87.92	0.00	782.45	782.4	782.45	35.32	576.44	611.76	611.76
88.85	0.00	791.47	791.5	791.47	35.64	585.37	621.01	621.01
89.78	0.00	801.35	801.4	801.35	35.99	594.81	630.80	630.80
90.71	0.00	809.04	809.0	809.04	36.30	603.47	639.77	639.77
91.64	0.00	818.97	819.0	818.97	36.62	612.58	649.19	649.19
92.57	0.00	829.40	829.4	829.40	36.97	622.88	659.85	659.85
93.49	0.00	835.87	835.9	835.87	37.28	630.45	667.74	667.74
94.42	0.00	843.97	844.0	843.97	37.59	638.70	676.29	676.29
95.35	0.00	855.19	855.2	855.19	37.94	649.00	686.95	686.95

NORTH ABUTMENT

96.28	0.00	864.74	864.7	864.74	38.25	657.97	696.22	696.22
97.21	0.00	870.58	870.6	870.58	38.56	665.34	703.90	703.90
98.14	0.00	883.06	883.1	883.06	38.91	676.02	714.94	714.94
99.07	0.00	889.66	889.7	889.66	39.22	683.42	722.64	722.64
100.00	0.00	901.83	901.8	901.83	39.57	694.49	734.06	734.06

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FACTOR OF SAFETY:

FSside FStip FSup FSweight

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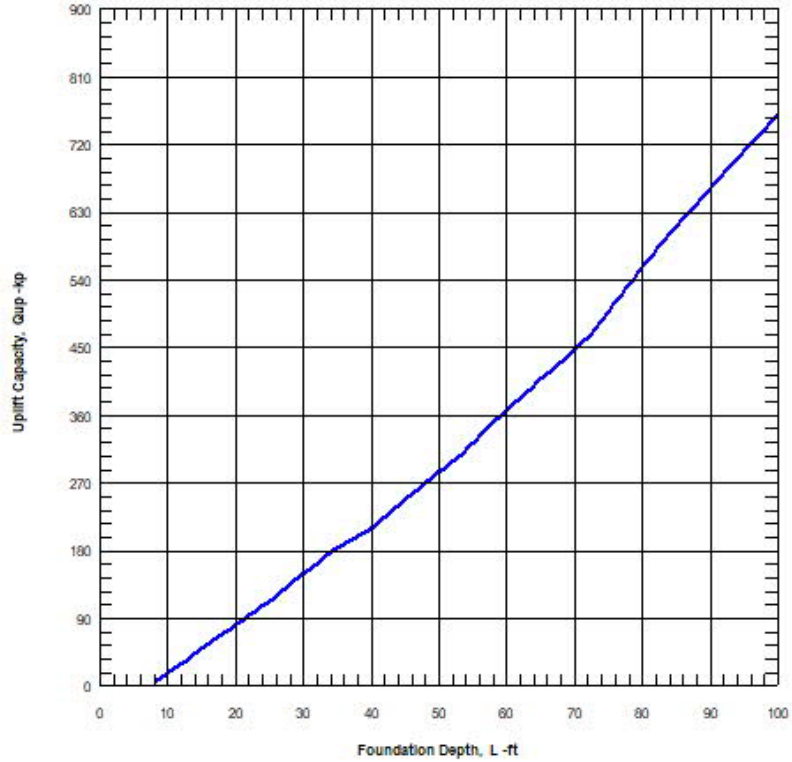
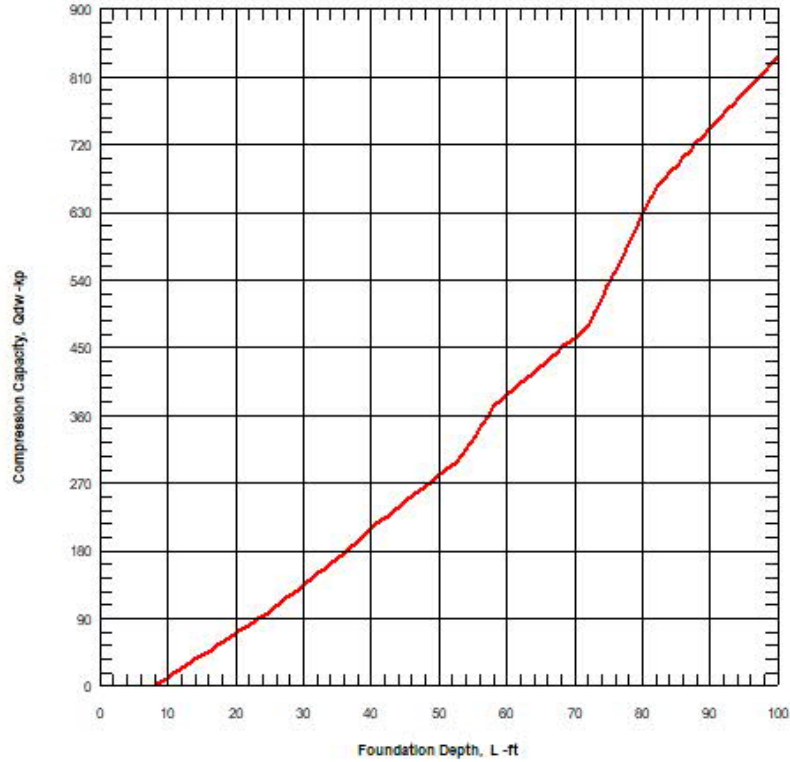
1.0	1.0	1.0	1.0
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Note: Data can be selected, copied and pasted to Excel to create graphics  
 Length - Pile length, distance from pile top to tip (not from ground surface)  
 Qtip - Ultimate pile tip resistance  
 Qside - Ultimate pile side resistance  
 Q\_dw - Ultimate pile downward resistance  
 Qd\_alw - Allowable pile downward resistance  
 Weight - Weight of pile shaft  
 Qsid\* - Ultimate pile side uplift resistance  
 Q\_up - Ultimate pile uplift resistance  
 Qu\_alw - Allowable pile uplift resistance

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### NOMINAL RESISTANCE VS FOUNDATION DEPTH



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**NA205020 Fyffe Grade Separation - South Abutment  
14-inch Square Concrete Driven Pile** Figure 1

Downward and Uplift Capacity vs Pile Length

The results are for single section pile. Multiple sections may not be correct!  
 \*\*\*\*\*

Length -ft	Qtip -kp	Qside -kp	Q_dw -kp	Qd_alw -kp	Wei ght -kp	Qsi d* -kp	Q_up -kp	Qu_alw -kp
8.00	0.00	0.06	0.1	0.06	4.81	0.06	4.86	4.86
8.93	0.00	5.44	5.4	5.44	5.36	5.44	10.80	10.80
9.86	0.00	10.89	10.9	10.89	5.92	10.89	16.80	16.80
10.79	0.00	16.33	16.3	16.33	6.47	16.33	22.80	22.80
11.72	0.00	21.77	21.8	21.77	7.03	21.77	28.80	28.80
12.65	0.00	27.21	27.2	27.21	7.59	27.21	34.80	34.80
13.58	0.00	32.66	32.7	32.66	8.15	32.66	40.80	40.80
14.51	0.00	38.10	38.1	38.10	8.70	38.10	46.80	46.80
15.43	0.00	43.54	43.5	43.54	9.26	43.54	52.80	52.80
16.36	0.00	48.98	49.0	48.98	9.82	48.98	58.80	58.80
17.29	0.00	54.43	54.4	54.43	10.38	54.43	64.80	64.80
18.22	0.00	59.87	59.9	59.87	10.88	59.87	70.75	70.75
19.15	0.00	65.31	65.3	65.31	11.21	65.31	76.52	76.52
20.08	0.00	70.75	70.8	70.75	11.53	70.75	82.29	82.29
21.01	0.00	76.20	76.2	76.20	11.86	76.20	88.05	88.05
21.94	0.00	81.64	81.6	81.64	12.18	81.64	93.82	93.82
22.87	0.00	87.08	87.1	87.08	12.51	87.08	99.59	99.59
23.80	0.00	92.52	92.5	92.52	12.83	92.52	105.36	105.36
24.73	0.00	97.97	98.0	97.97	13.16	97.97	111.13	111.13
25.66	0.00	104.17	104.2	104.17	13.49	104.17	117.66	117.66
26.59	0.00	110.73	110.7	110.73	13.81	110.72	124.54	124.54
27.52	0.00	117.29	117.3	117.29	14.14	117.29	131.43	131.43
28.44	0.00	123.86	123.9	123.86	14.47	123.86	138.33	138.33
29.37	0.00	130.41	130.4	130.41	14.79	130.41	145.20	145.20
30.30	0.00	136.94	136.9	136.94	15.11	136.94	152.05	152.05
31.23	0.00	143.48	143.5	143.48	15.44	143.48	158.92	158.92
32.16	0.00	150.03	150.0	150.03	15.77	150.03	165.80	165.80
33.09	0.00	156.58	156.6	156.58	16.09	156.58	172.67	172.67
34.02	0.00	163.13	163.1	163.13	16.42	163.13	179.55	179.55
34.95	0.00	169.98	170.0	169.98	16.75	167.39	184.14	184.14
35.88	0.00	176.90	176.9	176.90	17.06	171.65	188.72	188.72
36.81	0.00	184.10	184.1	184.10	17.40	176.09	193.49	193.49
37.74	0.00	191.40	191.4	191.40	17.72	180.59	198.31	198.31
38.67	0.00	198.95	199.0	198.95	18.05	185.29	203.33	203.33
39.60	0.00	206.63	206.6	206.63	18.37	189.92	208.29	208.29
40.53	0.00	213.83	213.8	213.83	18.70	195.73	214.43	214.43
41.45	0.00	220.46	220.5	220.46	19.03	202.22	221.25	221.25
42.38	0.00	227.02	227.0	227.02	19.36	208.89	228.24	228.24
43.31	0.00	233.53	233.5	233.53	19.68	215.34	235.03	235.03
44.24	0.00	239.99	240.0	239.99	20.00	221.80	241.80	241.80
45.17	0.00	246.60	246.6	246.60	20.34	228.58	248.92	248.92
46.10	0.00	253.18	253.2	253.18	20.65	234.97	255.61	255.61
47.03	0.00	259.72	259.7	259.72	20.98	241.53	262.50	262.50
47.96	0.00	266.21	266.2	266.21	21.30	248.09	269.39	269.39

48.89	0.00	272.90	272.9	272.90	21.64	254.80	276.44	276.44
49.82	0.00	279.43	279.4	279.43	21.96	261.43	283.40	283.40
50.75	0.00	285.92	285.9	285.92	22.28	267.81	290.09	290.09
51.68	0.00	292.50	292.5	292.50	22.62	274.49	297.11	297.11
52.61	0.00	298.93	298.9	298.93	22.93	280.87	303.80	303.80
53.54	0.00	308.45	308.5	308.45	23.26	287.92	311.18	311.18
54.46	0.00	321.14	321.1	321.14	23.59	295.88	319.47	319.47
55.39	0.00	334.31	334.3	334.31	23.92	303.80	327.72	327.72
56.32	0.00	347.28	347.3	347.28	24.25	311.74	335.99	335.99
57.25	0.00	360.67	360.7	360.67	24.57	319.86	344.43	344.43
58.18	0.00	373.15	373.1	373.15	24.89	327.91	352.81	352.81
59.11	0.00	380.32	380.3	380.32	25.21	335.12	360.34	360.34
60.04	0.00	387.06	387.1	387.06	25.53	342.29	367.82	367.82
60.97	0.00	395.13	395.1	395.13	25.88	349.47	375.34	375.34
61.90	0.00	401.36	401.4	401.36	26.19	356.44	382.63	382.63
62.83	0.00	409.38	409.4	409.38	26.53	363.90	390.43	390.43
63.76	0.00	416.05	416.1	416.05	26.85	370.83	397.68	397.68
64.69	0.00	423.28	423.3	423.28	27.19	378.16	405.35	405.35
65.62	0.00	430.72	430.7	430.72	27.50	385.29	412.79	412.79
66.55	0.00	437.84	437.8	437.84	27.83	392.62	420.45	420.45
67.47	0.00	444.45	444.5	444.45	28.14	399.60	427.74	427.74
68.40	0.00	452.25	452.3	452.25	28.47	406.66	435.14	435.14
69.33	0.00	458.37	458.4	458.37	28.81	413.73	442.53	442.53
70.26	0.00	466.04	466.0	466.04	29.14	421.08	450.22	450.22
71.19	0.00	472.50	472.5	472.50	29.44	428.06	457.49	457.49
72.12	0.00	480.35	480.4	480.35	29.77	435.18	464.95	464.95
73.05	0.00	498.35	498.3	498.35	30.10	446.22	476.31	476.31
73.98	0.00	514.82	514.8	514.82	30.43	456.28	486.71	486.71
74.91	0.00	531.92	531.9	531.92	30.76	467.04	497.79	497.79
75.84	0.00	549.21	549.2	549.21	31.08	477.77	508.85	508.85
76.77	0.00	566.38	566.4	566.38	31.41	488.10	519.51	519.51
77.70	0.00	582.80	582.8	582.80	31.73	498.67	530.40	530.40
78.63	0.00	601.01	601.0	601.01	32.06	509.05	541.11	541.11
79.56	0.00	618.00	618.0	618.00	32.38	519.88	552.26	552.26
80.48	0.00	635.97	636.0	635.97	32.70	530.38	563.08	563.08
81.41	0.00	651.32	651.3	651.32	33.02	540.55	573.57	573.57
82.34	0.00	666.88	666.9	666.88	33.38	551.37	584.75	584.75
83.27	0.00	676.01	676.0	676.01	33.70	560.17	593.87	593.87
84.20	0.00	684.63	684.6	684.63	34.02	569.03	603.04	603.04
85.13	0.00	693.10	693.1	693.10	34.33	577.91	612.24	612.24
86.06	0.00	702.92	702.9	702.92	34.65	587.02	621.67	621.67
86.99	0.00	711.92	711.9	711.92	35.01	596.23	631.24	631.24
87.92	0.00	722.75	722.7	722.75	35.32	605.55	640.87	640.87
88.85	0.00	729.19	729.2	729.19	35.64	613.82	649.45	649.45
89.78	0.00	740.56	740.6	740.56	35.99	623.53	659.52	659.52
90.71	0.00	747.93	747.9	747.93	36.30	631.77	668.08	668.08
91.64	0.00	757.45	757.4	757.45	36.62	641.29	677.91	677.91
92.57	0.00	767.39	767.4	767.39	36.97	650.70	687.67	687.67
93.49	0.00	774.52	774.5	774.52	37.28	658.91	696.19	696.19
94.42	0.00	784.18	784.2	784.18	37.59	668.04	705.63	705.63
95.35	0.00	792.38	792.4	792.38	37.94	676.93	714.88	714.88

SOUTH ABUTMENT

96.28	0.00	802.56	802.6	802.56	38.25	685.95	724.20	724.20
97.21	0.00	810.51	810.5	810.51	38.56	694.77	733.33	733.33
98.14	0.00	818.83	818.8	818.83	38.91	703.23	742.14	742.14
99.07	0.00	828.25	828.2	828.25	39.22	712.34	751.56	751.56
100.00	0.00	837.47	837.5	837.47	39.57	721.86	761.42	761.42

## FACTOR OF SAFETY:

FSside	FStip	FSup	FSweight
1.0	1.0	1.0	1.0

Note: Data can be selected, copied and pasted to Excel to create graphics

Length - Pile length, distance from pile top to tip (not from ground surface)

Qtip - Ultimate pile tip resistance

Qside - Ultimate pile side resistance

Q\_dw - Ultimate pile downward resistance

Qd\_alw - Allowable pile downward resistance

Weight - Weight of pile shaft

Qsid\* - Ultimate pile side uplift resistance

Q\_up - Ultimate pile uplift resistance

Qu\_alw - Allowable pile uplift resistance