

Settlement Analysis

Organization: **SoilStructure.com**
 Project Name: **Oil Tank**
 Job #: **6789**
 Design by: **LAA**
 Date: **3/16/2017**

Foundation Geometry, GWT & Loading

Units: **SI**
 Footing Shape: **Circle**
 Method: **Terzaghi & Peck**

Variable	Value	Variable	Value
Footing Width	20.00 m	Ground Water Depth	5.0 m
Footing Thickness	0.85 m	Rigidity factor	0.9
Footing Length	20.00 m	Max. Depth	15.00 m
Embedment Depth	1.50 m	Axial Load	13500.0 kN

Time Rate Inputs

Thickness of Clay	5.00 m	Drainage Condition	Single Drainage
Coef. of Consolidation	0.050 m ² /day		

Geotechnical Properties

#	Material Type	USCS	Layer Thick, m	Consistency	Compr. Ratio Cc/(1+e)	Recompr. Ratio Cr/(1+e)	OC Margin sigma m' kPa	Unit Wt gamma kN/m ³
1	Granular Soil	SP	5.00 0 - 5	Loose	0.080	0.008	30	19.0
2	Cohesive Soil	CH	5.00 5 - 10	Firm	0.120	0.012	30	17.0
3	Granular Soil	SP	5.00 10 - 15	Medium Dense	0.040	0.004	30	20.0

Results

Applied Pressure, q:	78.4 kPa	Drainage Height:	5.00 m
Total Settlement, S:	47.7 mm	Time for 99% Consol.:	2.44 years

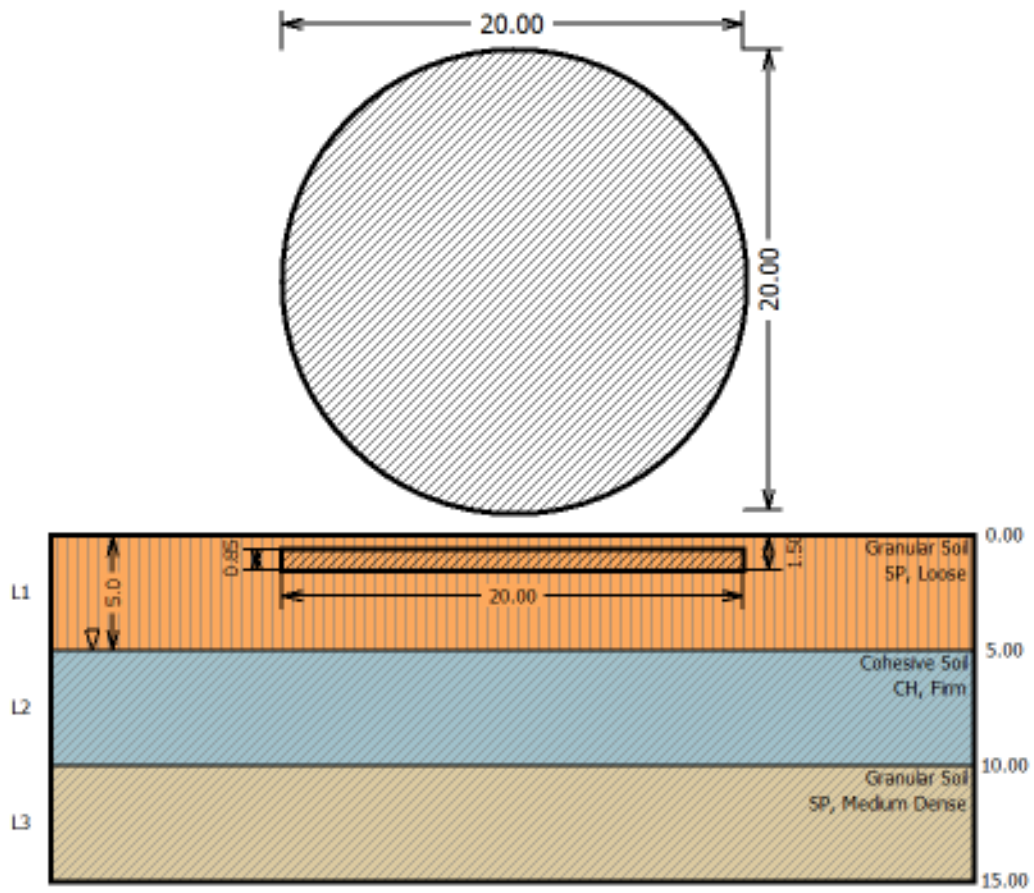


Fig. 1: Plan and Cross Section

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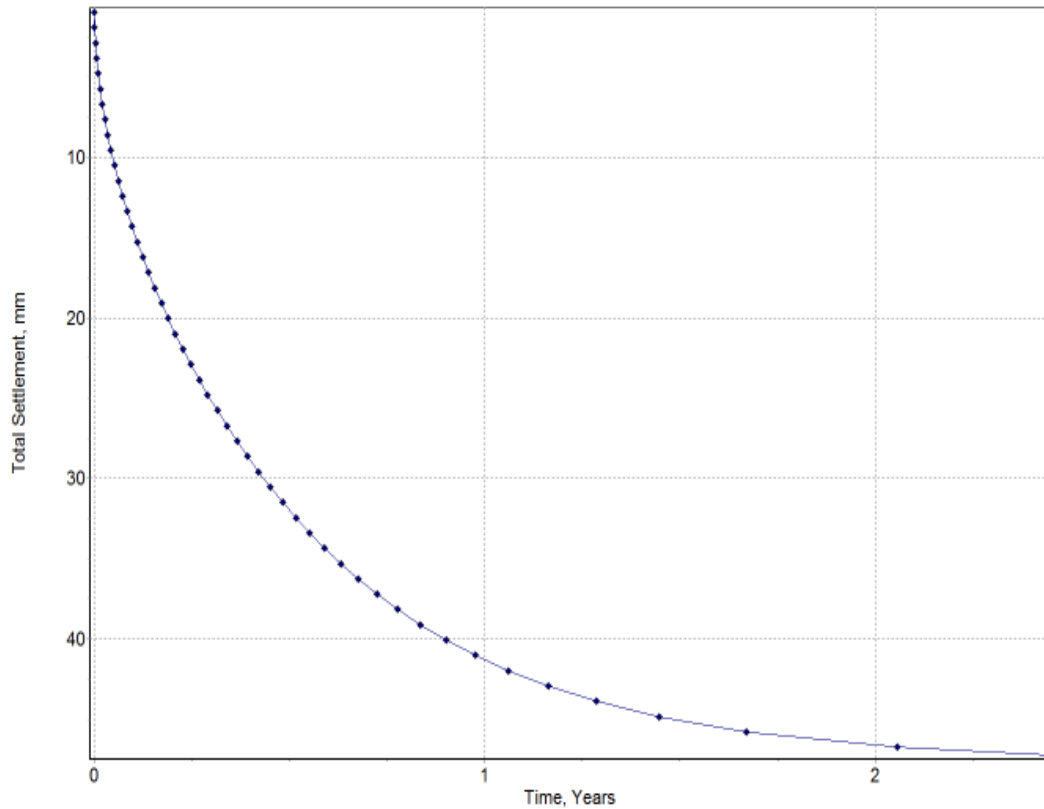
Node #	Depth (m)	O.C. + Eff. Str. (kPa)	Eff. Stress (kPa)	Ftng. Stress (kPa)	Ftng. + Eff. Str (kPa)
1	0.11	60.64	30.64	49.87	80.51
2	0.34	64.91	34.91	49.87	84.78
3	0.56	69.19	39.19	49.86	89.05
4	0.79	73.46	43.46	49.83	93.30
5	1.01	77.74	47.74	49.79	97.53
6	1.24	82.01	52.01	49.73	101.74
7	1.46	86.29	56.29	49.64	105.93
8	1.69	90.56	60.56	49.52	110.08
9	1.91	94.84	64.84	49.37	114.21
10	2.14	99.11	69.11	49.18	118.30
11	2.36	103.39	73.39	48.96	122.35
12	2.59	107.66	77.66	48.70	126.36
13	2.81	111.94	81.94	48.40	130.34
14	3.04	116.21	86.21	48.07	134.28
15	3.26	120.49	90.49	47.69	138.18
16	3.49	124.76	94.76	47.28	142.04
17	3.71	126.96	96.96	46.83	143.79
18	3.94	129.03	99.03	46.35	145.38
19	4.16	131.10	101.10	45.84	146.93
20	4.39	133.17	103.17	45.30	148.46
21	4.61	135.24	105.24	44.73	149.96
22	4.84	137.31	107.31	44.13	151.44
23	5.06	139.38	109.38	43.51	152.89
24	5.29	141.22	111.22	42.88	154.10
25	5.51	142.84	112.84	42.22	155.06
26	5.74	144.46	114.46	41.55	156.01
27	5.96	146.08	116.08	40.87	156.95
28	6.19	147.70	117.70	40.18	157.88
29	6.41	149.32	119.32	39.48	158.80
30	6.64	150.94	120.94	38.78	159.72
31	6.86	152.56	122.56	38.07	160.63
32	7.09	154.18	124.18	37.36	161.54
33	7.31	155.80	125.80	36.65	162.45
34	7.54	157.42	127.42	35.94	163.36
35	7.76	159.04	129.04	35.24	164.28
36	7.99	160.66	130.66	34.54	165.20
37	8.21	162.28	132.28	33.85	166.13
38	8.44	163.90	133.90	33.16	167.06
39	8.66	165.52	135.52	32.48	168.00
40	8.89	167.14	137.14	31.81	168.95
41	9.11	168.76	138.76	31.15	169.91
42	9.34	170.38	140.38	30.49	170.87
43	9.56	172.00	142.00	29.85	171.85
44	9.79	173.62	143.62	29.22	172.84
45	10.01	175.24	145.24	28.60	173.84
46	10.24	177.20	147.20	27.99	175.19
47	10.46	179.49	149.49	27.40	176.89
48	10.69	181.79	151.79	26.81	178.60
49	10.91	184.08	154.08	26.24	180.32
50	11.14	186.38	156.38	25.68	182.06
51	11.36	188.67	158.67	25.13	183.81
52	11.59	190.97	160.97	24.60	185.56
53	11.81	193.26	163.26	24.07	187.34
54	12.04	195.56	165.56	23.56	189.12
55	12.26	197.85	167.85	23.06	190.91
56	12.49	200.15	170.15	22.57	192.72
57	12.71	202.44	172.44	22.10	194.54
58	12.94	204.74	174.74	21.63	196.37
59	13.16	207.03	177.03	21.18	198.21
60	13.39	209.33	179.33	20.73	200.06

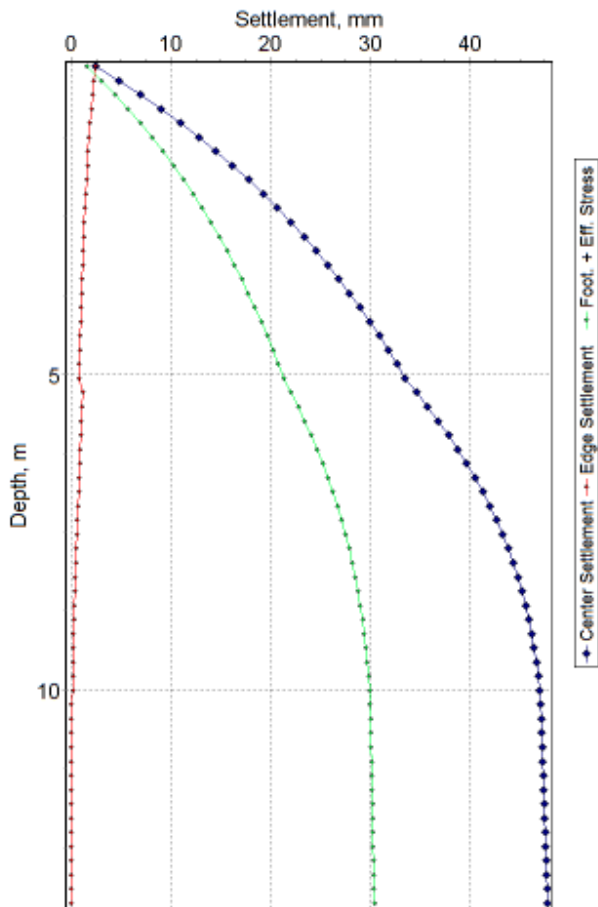
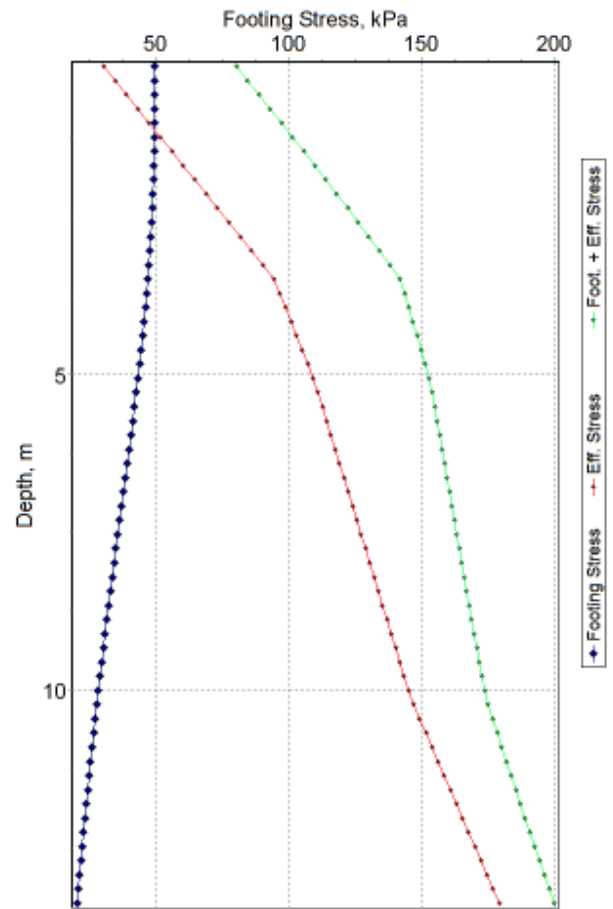
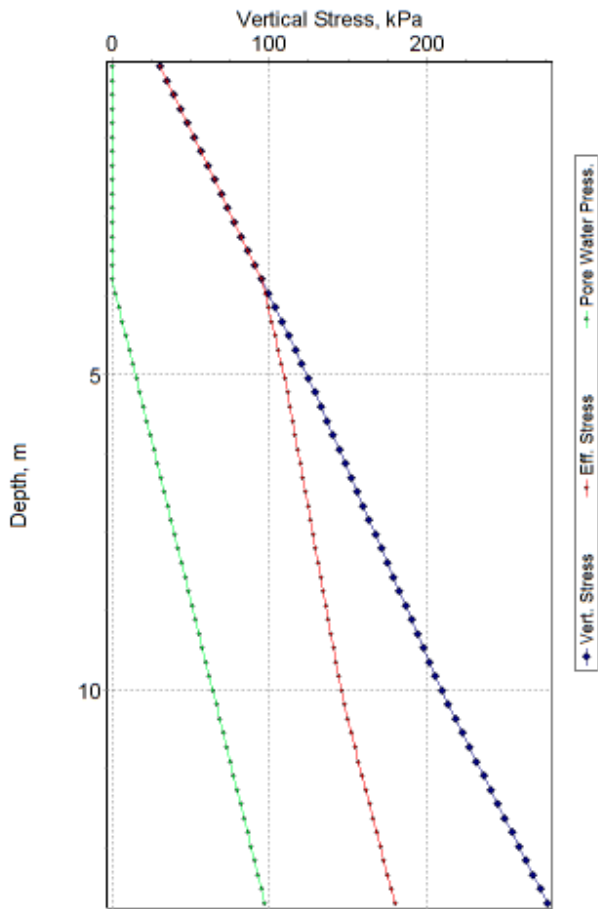
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Node #	Strain (%)	Indiv. Sett. (mm)	Center Sett. (mm)	Total Stress (kPa)	Pore Water (kPa)	Edge Sett. (mm)
1	1.100	2.5	2.5	30.64	0.00	1.575
2	1.029	2.3	4.8	34.91	0.00	3.049
3	0.967	2.2	7.0	39.19	0.00	4.434
4	0.912	2.1	9.0	43.46	0.00	5.740
5	0.862	1.9	11.0	47.74	0.00	6.974
6	0.816	1.8	12.8	52.01	0.00	8.144
7	0.775	1.7	14.5	56.29	0.00	9.253
8	0.736	1.7	16.2	60.56	0.00	10.308
9	0.700	1.6	17.8	64.84	0.00	11.311
10	0.666	1.5	19.3	69.11	0.00	12.265
11	0.634	1.4	20.7	73.39	0.00	13.172
12	0.603	1.4	22.0	77.66	0.00	14.036
13	0.573	1.3	23.3	81.94	0.00	14.858
14	0.545	1.2	24.6	86.21	0.00	15.638
15	0.518	1.2	25.7	90.49	0.00	16.380
16	0.492	1.1	26.8	94.76	0.00	17.085
17	0.474	1.1	27.9	99.04	2.08	17.763
18	0.456	1.0	28.9	103.31	4.29	18.416
19	0.438	1.0	29.9	107.59	6.49	19.043
20	0.420	0.9	30.9	111.86	8.70	19.644
21	0.402	0.9	31.8	116.14	10.90	20.220
22	0.383	0.9	32.6	120.41	13.11	20.769
23	0.365	0.8	33.4	124.69	15.31	21.292
24	0.521	1.2	34.6	128.74	17.52	22.038
25	0.496	1.1	35.7	132.56	19.72	22.748
26	0.470	1.1	36.8	136.39	21.93	23.422
27	0.444	1.0	37.8	140.21	24.13	24.058
28	0.419	0.9	38.7	144.04	26.34	24.659
29	0.394	0.9	39.6	147.86	28.54	25.223
30	0.369	0.8	40.5	151.69	30.75	25.752
31	0.344	0.8	41.2	155.51	32.95	26.245
32	0.320	0.7	41.9	159.34	35.16	26.704
33	0.296	0.7	42.6	163.16	37.36	27.128
34	0.273	0.6	43.2	166.99	39.57	27.519
35	0.250	0.6	43.8	170.81	41.77	27.877
36	0.228	0.5	44.3	174.64	43.98	28.204
37	0.206	0.5	44.8	178.46	46.18	28.498
38	0.184	0.4	45.2	182.29	48.39	28.762
39	0.164	0.4	45.5	186.11	50.59	28.997
40	0.143	0.3	45.9	189.94	52.80	29.202
41	0.124	0.3	46.1	193.76	55.00	29.379
42	0.104	0.2	46.4	197.59	57.21	29.528
43	0.089	0.2	46.6	201.41	59.41	29.657
44	0.087	0.2	46.8	205.24	61.62	29.781
45	0.084	0.2	47.0	209.06	63.82	29.902
46	0.027	0.1	47.0	213.23	66.03	29.941
47	0.026	0.1	47.1	217.73	68.23	29.978
48	0.025	0.1	47.1	222.23	70.44	30.015
49	0.025	0.1	47.2	226.73	72.64	30.050
50	0.024	0.1	47.3	231.23	74.85	30.084
51	0.023	0.1	47.3	235.73	77.05	30.117
52	0.022	0.1	47.4	240.23	79.26	30.149
53	0.022	0.0	47.4	244.73	81.46	30.180
54	0.021	0.0	47.5	249.23	83.67	30.210
55	0.020	0.0	47.5	253.73	85.87	30.238
56	0.019	0.0	47.5	258.23	88.08	30.266
57	0.019	0.0	47.6	262.73	90.28	30.293
58	0.018	0.0	47.6	267.23	92.49	30.319
59	0.018	0.0	47.7	271.73	94.69	30.345
60	0.017	0.0	47.7	276.23	96.90	30.369

Table of Time Rate Results

Node #	Tot. Sett. (mm)	Time Factor (Tv)	Time (years)	Node #	Tot. Sett. (mm)	Time Factor (Tv)	Time (years)
1	0.95	0.00030	0.00	26	24.81	0.21200	0.29
2	1.91	0.00013	0.00	27	25.76	0.23000	0.32
3	2.86	0.00283	0.00	28	26.71	0.24800	0.34
4	3.82	0.00502	0.01	29	27.67	0.26700	0.37
5	4.77	0.00785	0.01	30	28.62	0.28600	0.39
6	5.72	0.01130	0.02	31	29.58	0.30700	0.42
7	6.68	0.01540	0.02	32	30.53	0.32900	0.45
8	7.63	0.02010	0.03	33	31.48	0.35200	0.48
9	8.59	0.02540	0.03	34	32.44	0.37700	0.52
10	9.54	0.03140	0.04	35	33.39	0.40300	0.55
11	10.49	0.03800	0.05	36	34.35	0.43100	0.59
12	11.45	0.04520	0.06	37	35.30	0.46100	0.63
13	12.40	0.05310	0.07	38	36.25	0.49300	0.68
14	13.36	0.06150	0.08	39	37.21	0.52900	0.72
15	14.31	0.07070	0.10	40	38.16	0.56700	0.78
16	15.27	0.08030	0.11	41	39.12	0.61000	0.84
17	16.22	0.09070	0.12	42	40.07	0.65800	0.90
18	17.17	0.10200	0.14	43	41.03	0.71200	0.98
19	18.13	0.11300	0.15	44	41.98	0.77400	1.06
20	19.08	0.12600	0.17	45	42.93	0.84800	1.16
21	20.04	0.13800	0.19	46	43.89	0.93800	1.28
22	20.99	0.15200	0.21	47	44.84	1.05500	1.45
23	21.94	0.16600	0.23	48	45.80	1.21900	1.67
24	22.90	0.18100	0.25	49	46.75	1.50000	2.05
25	23.85	0.19700	0.27	50	47.23	1.78100	2.44





References:

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