



CONSTRUCTION LEADERS

LETTER OF TRANSMITTAL	
DATE: April 20, 2015	PCL JOB NO: 5515002
ATTN: Chris Barker	TRANSMITTAL NO: 059

To: **State of Vermont Agency of Transportation**
One National Life Drive

(802) 828-0053

Re: Hartford Lateral Slide
Project No.: IM 091-2(79)
Contract ID.: 12A132

County: Windsor

PCL FILE NO: 5515002-39a

WE ARE SENDING Attached Under separate cover via Email & SP the following:

Shop drawings Prints Plans Samples Specifications

Copy of Letter Change Order Other

COPIES	SPEC.	REVISION	DESCRIPTION
1	204.01.b	1	Abutment SOE Walls (Abutment 2)

TRANSMITTED for as checked below:

For approval Approved as submitted Resubmit 1 Copies for approval

For your use Approved as noted Submit Copies for distribution

As requested Returned for corrections Return Corrected prints

For review and comment

Remarks:

The included SOE wall design is an addition to Submittal 039 Abutment SOE Walls and applies only at Abutment 2.

Please return an email of this approved submittal to Erich Heymann (ewheymann@pcl.com) and Jeremy Mackling (jmackling@pcl.com).

We request the review and return of this submittal within **1 day**. These SOE walls are currently installed and will be excavated pending approval. Please advise if this request cannot be met so we can plan accordingly.

By: **Erich Heymann**, Project Engineer

COPY TO: Project Files



CONSTRUCTION LEADERS

**SUBMITTAL NO. : 39a
Abutment SOE Walls**

Item No.	Specification	Description
1	204.01.b	Abutment SOE Walls (Abutment 2)

PROJECT:
HARTFORD LATERAL SLIDE
PROJECT NO.: IM 091-2(79)
CONTRACT ID.: 12A132

OWNER:
STATE OF VERMONT AGENCY OF TRANSPORTATION

ENGINEER OF RECORD:
STATE OF VERMONT AGENCY OF TRANSPORTATION

CONTRACTOR:
PCL CIVIL CONSTRUCTORS, INC.

APRIL 20, 2015



Vermont Agency of Transportation
I-91
Windsor County
Project Number: IM 091-2(79)

Hartford Lateral Slide

Calculations for Temporary Structures including:

Abutment 2 SOE Wall

Submitted By,

Tim Davis, P.E.
VT P.E. # 97183

André Tousignant, P.E.
VT P.E. # 100162



Apr 20 2015 2:37 PM



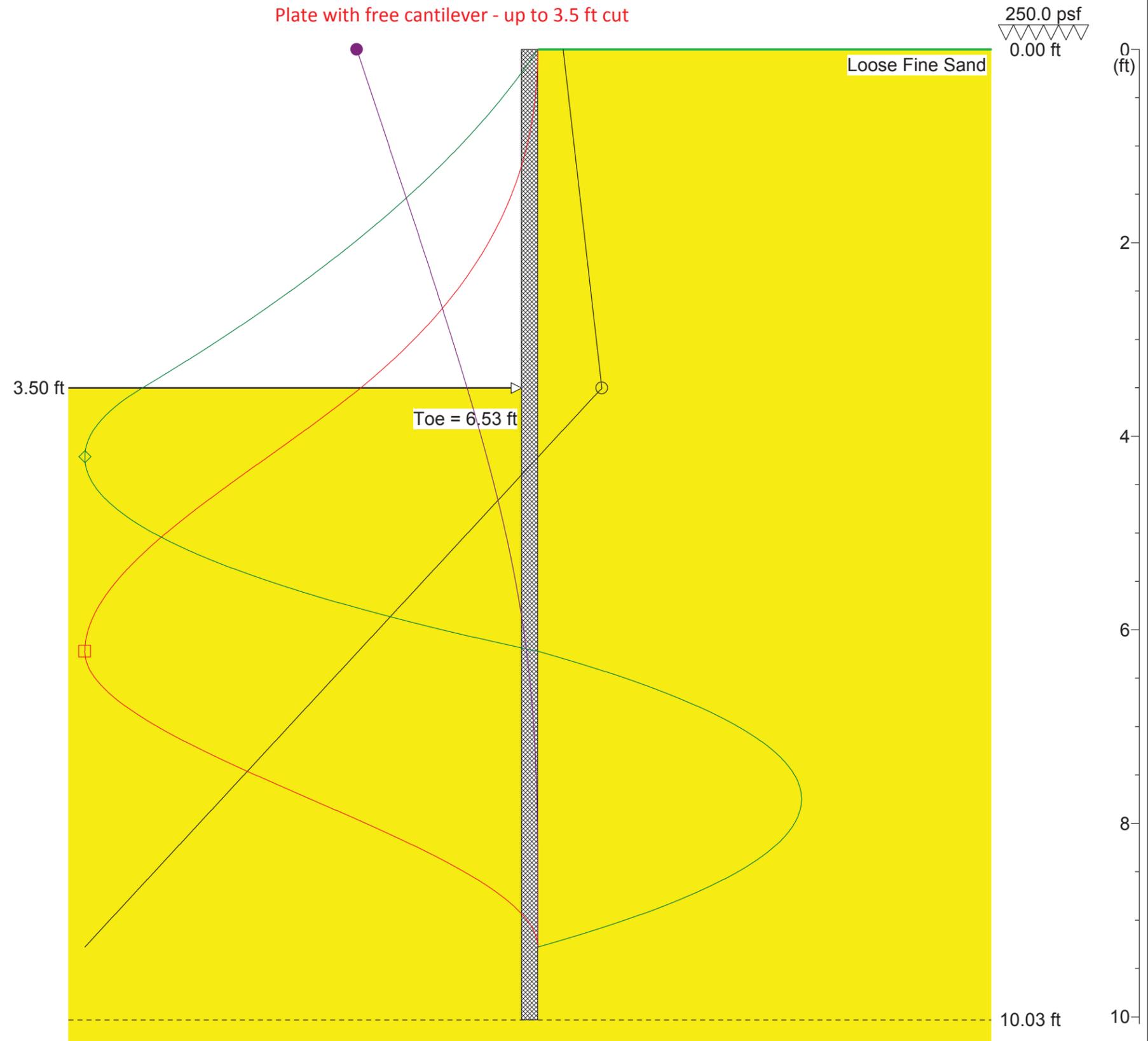
April 20, 2015

PCL Civil Constructors Inc.
3810 Northdale Blvd. Suite 200
Tampa, Florida 33624
813-264-9500

Sheet: 1" Road Plate
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 1.01 ($K_a \times 1.2$)
Toe: Cantilever

	Maximum	d (ft)
○	208.5 psf	3.50
□	1942.4 ftlb/ft	6.22
◇	584.4 lb/ft	4.21
●	2.5 in	0.00

Section A



Sheet: 1" Road Plate
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 1.01 ($K_a \times 1.2$)
Toe: Cantilever

Input Data

Calculations for Abut 2 SOE TMD AJT 4/20/15, Page 3 of 22
Water Density = 62.43pcf
Minimum Fluid Density = 31.82pcf

Depth Of Excavation = 3.50ft
Surcharge = 250.0psf
Depth Of Active Water = 20.00ft
Depth Of Passive Water = 20.00ft

Soil Profile

Depth (ft)	Soil Name	γ (pcf)	γ' (pcf)	C (psf)	C_a (psf)	ϕ (°)	δ (°)	K_a	K_{ac}	K_p	K_{pc}
0.00	Loose Fine Sand	109.20	65.55	0.0	0.0	30.0	0.0	0.33 (0.40)	0.00 (0.00)	3.00	0.00

() indicates factored value used in embedment calculation. Factor(s): $K_a \times 1.2$

Solution

Sheet

Sheet Name	E (psi)	I (in ⁴ /ft)	f (psi)	Z (in ³ /ft)	Allowed M_{max} (ftlb/ft)	b (in)	A (in ² /ft)	W (lb/ft)	Upstand (ft)	Toe (ft)	Length (ft)
1" Road Plate	3.04E+07	1.00	27000.0	2.00	4166.7	12.00	12.00	41.0	0.00	6.53	10.03

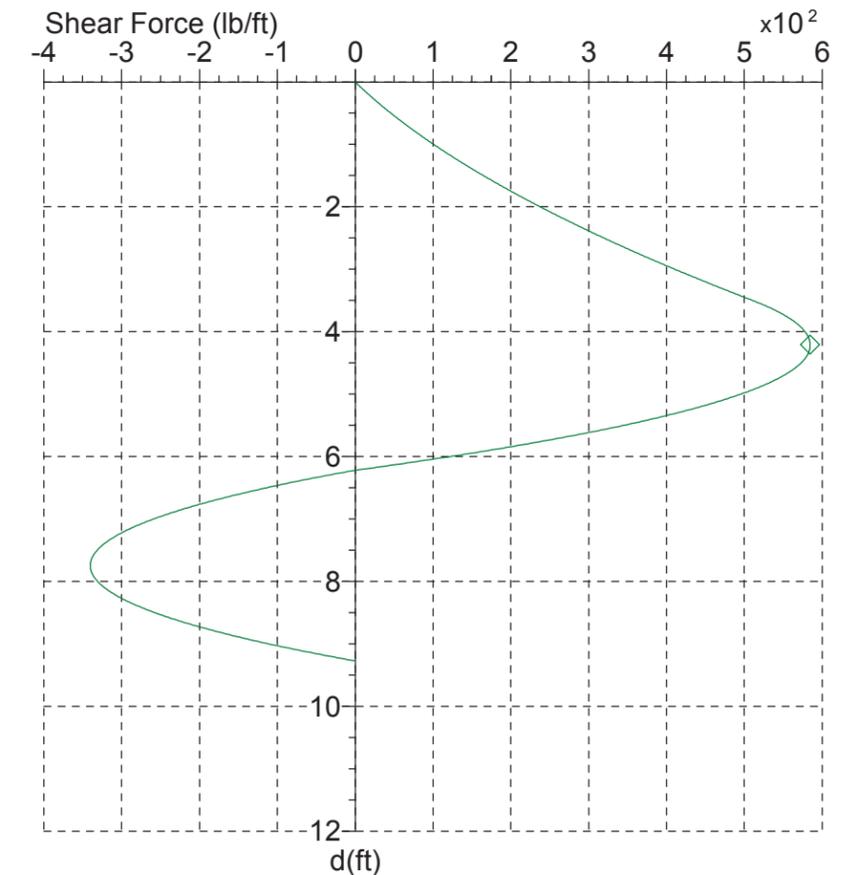
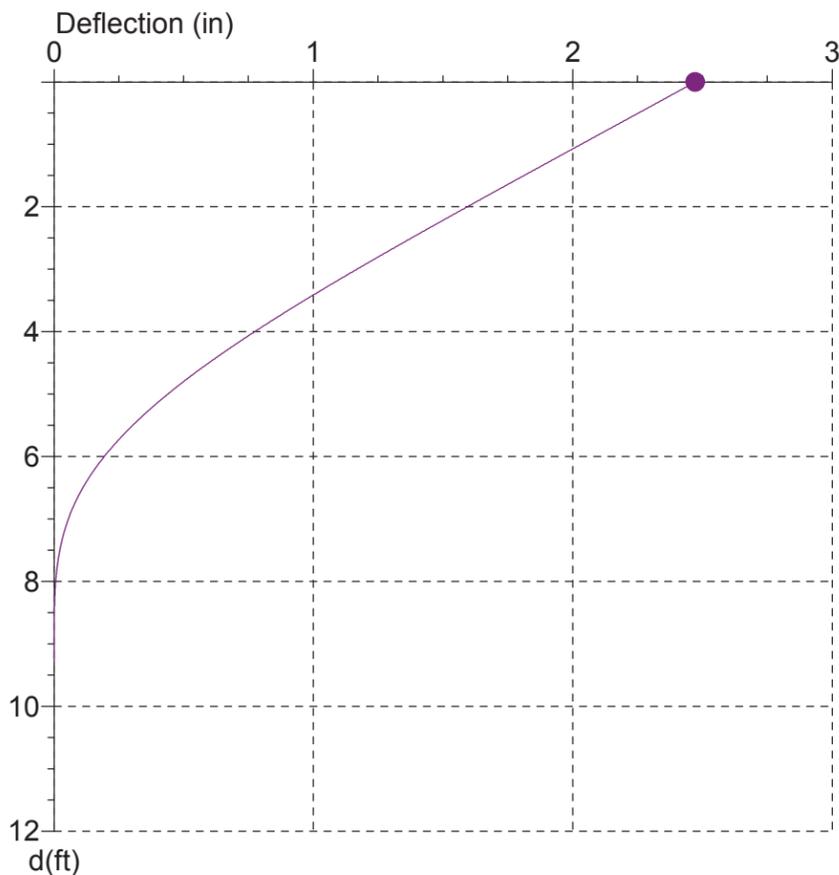
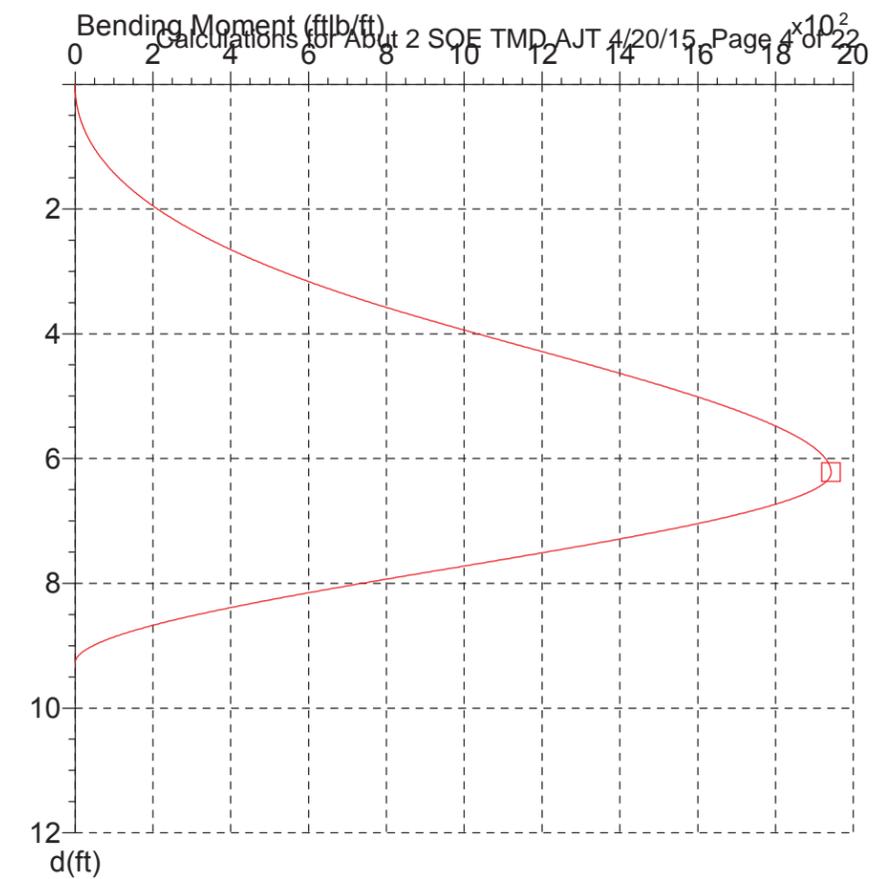
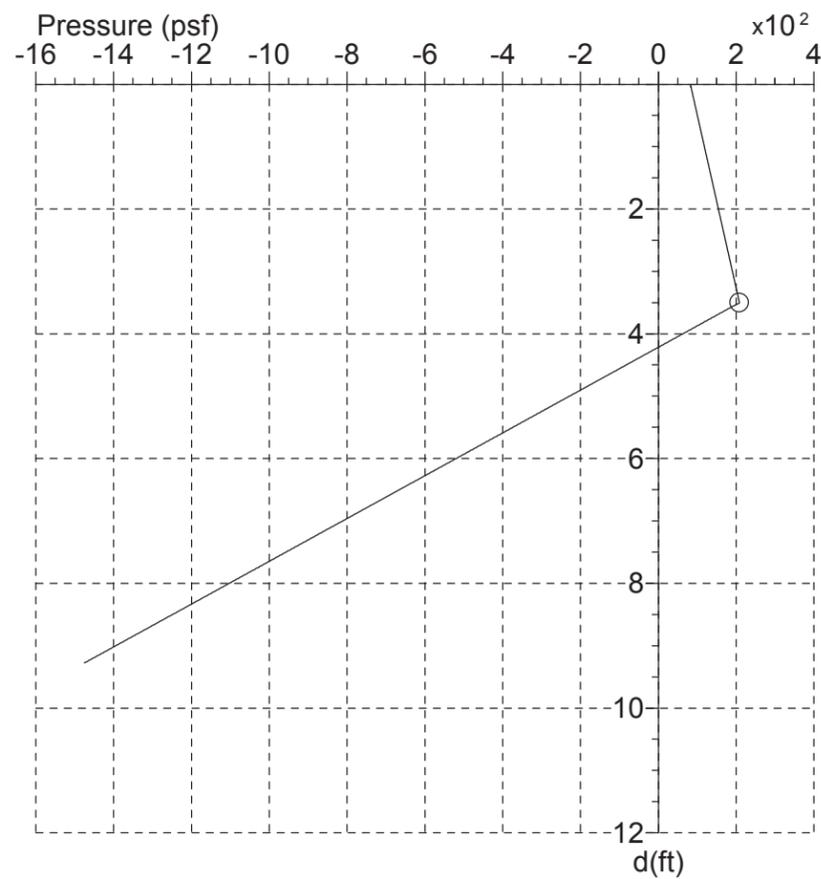
Maxima

	Maximum	Depth (ft)
Pressure	208.5 psf	3.50
Bending Moment	1942.4 ftlb/ft	6.22
Deflection	2.5 in	0.00
Shear Force	584.4 lb/ft	4.21



Sheet: 1" Road Plate
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 1.01 ($K_a \times 1.2$)
Toe: Cantilever

	Maximum	d (ft)
○	208.5 psf	3.50
□	1942.4 ftlb/ft	6.22
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●	2.5 in	0.00



Sheet: 1" Road Plate
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 1.01 (K_ax1.2)
Toe: Cantilever

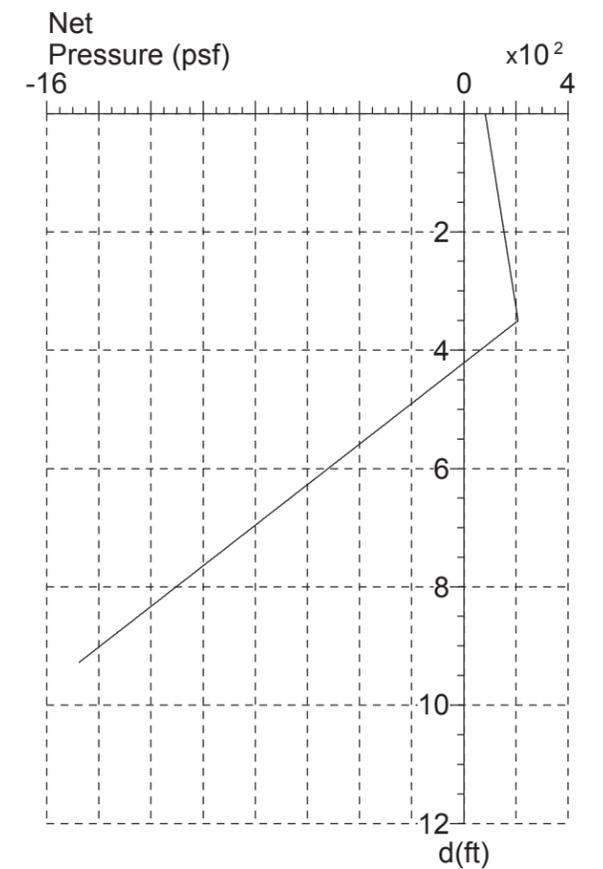
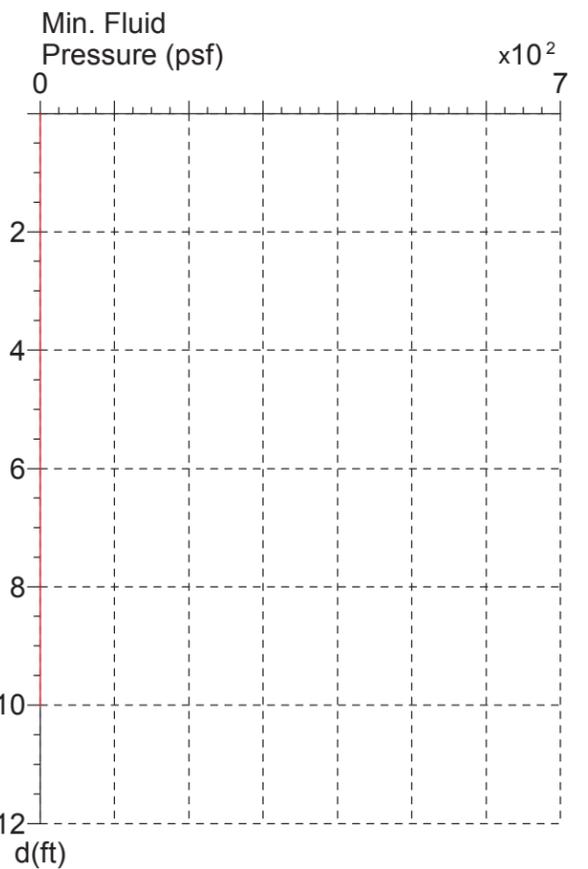
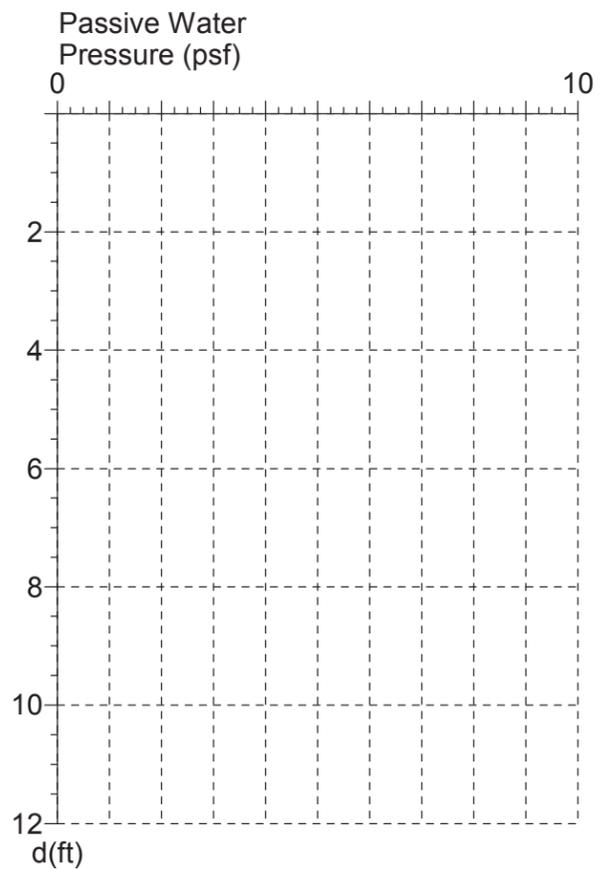
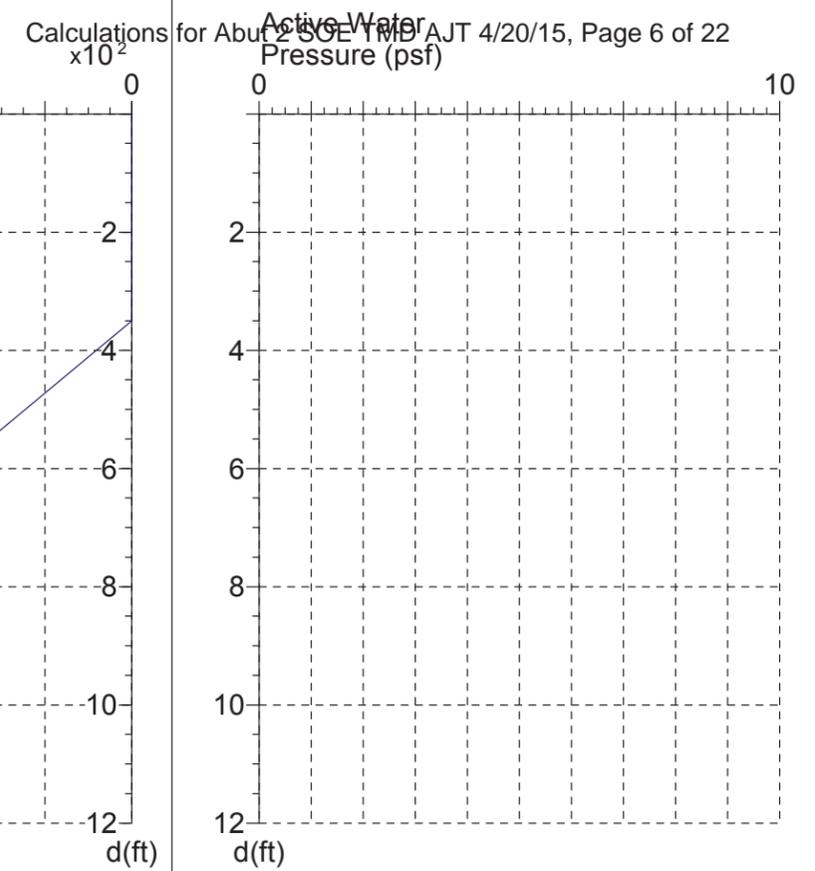
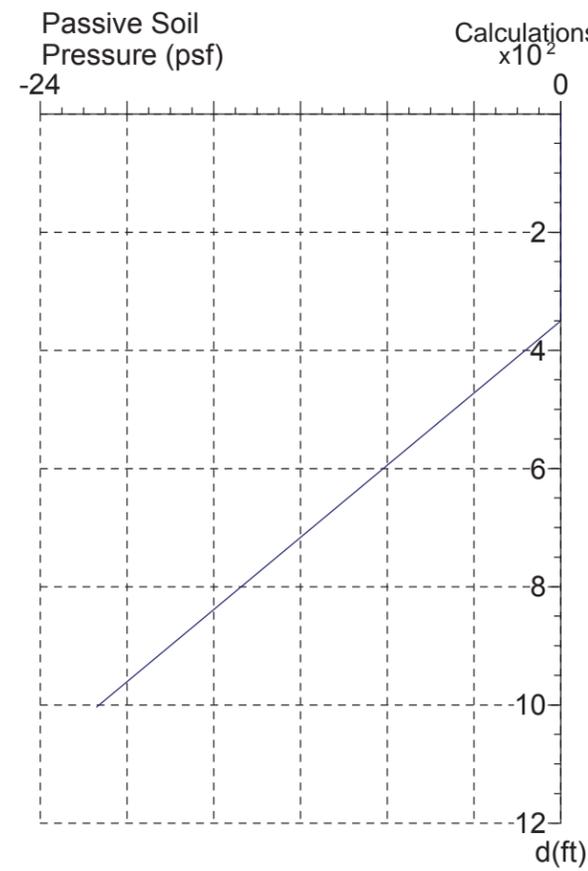
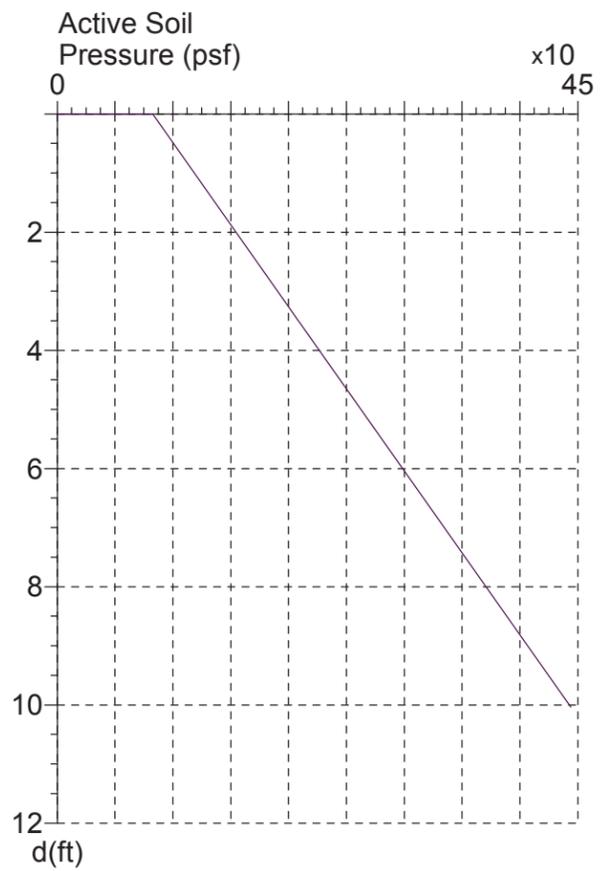
depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)
0.00	82.5	0.0	2.5	0.0	3.37	203.8	693.9	1.0	482.7	6.73	-733.2	1799.9	0.1	-189.4
0.07	85.0	0.2	2.4	5.8	3.43	206.3	727.8	1.0	497.0	6.80	-753.5	1761.2	0.1	-209.4
0.14	87.5	0.8	2.4	11.9	3.50	208.5	762.8	1.0	511.4	6.87	-773.8	1718.7	0.1	-227.9
0.21	90.0	1.8	2.4	18.1	3.57	187.0	798.7	0.9	525.1	6.94	-794.1	1672.8	0.1	-245.0
0.27	92.5	3.2	2.4	24.4	3.64	166.7	835.6	0.9	537.4	7.01	-814.4	1623.6	0.1	-260.7
0.34	94.8	4.9	2.3	30.2	3.71	148.7	869.0	0.9	547.1	7.08	-834.7	1571.5	0.0	-275.0
0.41	97.3	7.2	2.3	36.9	3.78	128.4	907.3	0.9	556.6	7.14	-852.8	1522.9	0.0	-286.6
0.48	99.8	10.0	2.3	43.8	3.85	108.1	946.2	0.8	564.8	7.21	-873.1	1466.0	0.0	-298.2
0.55	102.3	13.2	2.2	50.9	3.92	87.8	985.7	0.8	571.6	7.28	-893.4	1406.9	0.0	-308.4
0.62	104.8	17.0	2.2	58.1	3.98	67.5	1025.5	0.8	576.9	7.35	-913.7	1345.9	0.0	-317.2
0.69	107.3	21.3	2.2	65.5	4.05	47.2	1065.7	0.8	580.8	7.42	-934.0	1283.4	0.0	-324.6
0.76	109.8	26.0	2.1	73.1	4.12	26.9	1106.1	0.7	583.3	7.49	-954.3	1219.5	0.0	-330.5
0.82	112.3	31.4	2.1	80.8	4.19	6.6	1146.7	0.7	584.4	7.56	-974.6	1154.7	0.0	-335.1
0.89	114.6	36.5	2.1	87.9	4.26	-13.7	1187.3	0.7	584.2	7.62	-994.9	1089.0	0.0	-338.2
0.96	117.1	42.9	2.0	95.9	4.33	-31.8	1223.3	0.7	582.8	7.69	-1012.9	1030.2	0.0	-339.8
1.03	119.6	49.8	2.0	104.2	4.40	-52.1	1263.7	0.6	580.0	7.76	-1033.2	963.8	0.0	-340.3
1.10	122.1	57.3	2.0	112.6	4.46	-72.4	1303.9	0.6	575.7	7.83	-1053.5	897.5	0.0	-339.4
1.17	124.6	65.4	2.0	121.2	4.53	-92.7	1343.7	0.6	570.1	7.90	-1073.8	831.5	0.0	-337.0
1.24	127.1	74.1	1.9	130.0	4.60	-113.0	1383.0	0.6	563.0	7.97	-1094.1	766.1	0.0	-333.2
1.31	129.6	83.4	1.9	139.0	4.67	-133.3	1421.9	0.5	554.5	8.04	-1114.4	701.5	0.0	-328.0
1.37	132.1	93.3	1.9	148.1	4.74	-153.6	1460.1	0.5	544.6	8.11	-1134.7	638.0	0.0	-321.4
1.44	134.4	102.7	1.8	156.4	4.81	-173.9	1497.6	0.5	533.3	8.17	-1155.0	576.0	0.0	-313.4
1.51	136.9	113.8	1.8	165.8	4.88	-191.9	1530.2	0.5	522.0	8.24	-1173.1	522.3	0.0	-305.1
1.58	139.4	125.6	1.8	175.5	4.95	-212.2	1566.0	0.5	508.0	8.31	-1193.4	463.6	0.0	-294.5
1.65	141.9	138.1	1.7	185.3	5.01	-232.5	1600.8	0.4	492.6	8.38	-1213.7	407.2	0.0	-282.4
1.72	144.4	151.3	1.7	195.3	5.08	-252.8	1634.5	0.4	475.8	8.45	-1234.0	353.3	0.0	-268.9
1.79	146.9	165.2	1.7	205.4	5.15	-273.1	1667.0	0.4	457.6	8.52	-1254.3	302.1	0.0	-253.9
1.85	149.4	179.8	1.7	215.8	5.22	-293.4	1698.2	0.4	438.0	8.59	-1274.6	254.0	0.0	-237.6
1.92	151.9	195.1	1.6	226.3	5.29	-313.7	1728.0	0.4	416.9	8.65	-1294.9	209.1	0.0	-219.9
1.99	154.1	209.3	1.6	235.8	5.36	-334.0	1756.2	0.3	394.4	8.72	-1315.2	167.9	0.0	-200.7
2.06	156.7	226.0	1.6	246.6	5.43	-352.0	1780.0	0.3	373.3	8.79	-1335.5	130.5	0.0	-180.1
2.13	159.2	243.5	1.5	257.6	5.50	-372.3	1805.2	0.3	348.1	8.86	-1353.5	100.7	0.0	-160.7
2.20	161.7	261.7	1.5	268.8	5.56	-392.6	1828.5	0.3	321.6	8.93	-1373.8	71.4	0.0	-137.4
2.27	164.2	280.7	1.5	280.2	5.63	-412.9	1850.0	0.3	293.6	9.00	-1394.1	46.7	0.0	-112.8
2.34	166.7	300.5	1.4	291.7	5.70	-433.2	1869.5	0.3	264.2	9.07	-1414.4	26.9	0.0	-86.7
2.40	169.2	321.1	1.4	303.4	5.77	-453.5	1886.9	0.2	233.4	9.14	-1434.7	12.4	0.0	-59.2
2.47	171.7	342.6	1.4	315.3	5.84	-473.8	1902.1	0.2	201.2	9.20	-1455.0	3.3	0.0	-30.3
2.54	174.2	364.8	1.4	327.4	5.91	-494.1	1915.1	0.2	167.6	9.27	-1475.3	0.0	0.0	0.0
2.61	176.4	385.4	1.3	338.3	5.98	-512.2	1924.6	0.2	136.5	9.34	-1475.3	0.0	0.0	0.0
2.68	179.0	409.2	1.3	350.7	6.04	-532.5	1933.0	0.2	100.3	9.41	-1475.3	0.0	0.0	0.0
2.75	181.5	434.0	1.3	363.2	6.11	-552.8	1938.8	0.2	62.6	9.48	-1475.3	0.0	0.0	0.0
2.82	184.0	459.6	1.2	376.0	6.18	-573.1	1941.9	0.2	23.4	9.55	-1475.3	0.0	0.0	0.0
2.88	186.5	486.1	1.2	388.9	6.25	-593.4	1942.0	0.1	-13.6	9.62	-1475.3	0.0	0.0	0.0
2.95	189.0	513.5	1.2	402.0	6.32	-613.7	1936.7	0.1	-43.3	9.69	-1475.3	0.0	0.0	0.0
3.02	191.5	541.8	1.2	415.3	6.39	-634.0	1925.8	0.1	-71.6	9.75	-1475.3	0.0	0.0	0.0
3.09	194.0	571.1	1.1	428.7	6.46	-654.3	1909.5	0.1	-98.4	9.82	-1475.3	0.0	0.0	0.0
3.16	196.2	597.9	1.1	440.8	6.53	-674.6	1888.1	0.1	-123.9	9.89	-1475.3	0.0	0.0	0.0
3.23	198.8	628.9	1.1	454.6	6.59	-692.6	1864.9	0.1	-145.3	9.96	-1475.3	0.0	0.0	0.0
3.30	201.3	660.9	1.0	468.5	6.66	-712.9	1834.6	0.1	-168.1	10.03	-1475.3	0.0	0.0	0.0



PCL Civil Constructors, Inc.

SupportIT, v2.36

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Tel/Fax: +44 (0)1292 477754
Email: GTSOFT@aol.com
Web: www.GTSOFT.org



Sheet: 1" Road Plate
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
Toe: Cantilever



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Sheet: 1" Road Plate
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 1.01 ($K_a \times 1.2$)
Toe: Cantilever

1. Factor(s) applied to soil parameter(s) in the 'Wall' page, and used in the embedment calculation.
Factor(s) used: $K_a \times 1.2$
2. Maximum bending moment = 1942.4ftlb/ft and $f = 27000.0$ psi. MINIMUM required sheet section modulus is: $Z = 0.86\text{in}^3/\text{ft}$ (= M/f). Sheet section modulus in this design is $Z = 2.00\text{in}^3/\text{ft}$, and is satisfactory.
3. FOS = 1.01 (Net Pressure)
This is the factor of safety against rotation about the toe. It is calculated using the factored soil parameters (see above).
The FOS can be changed using 'Defined FOS' or 'Manual' in the 'Wall' page.



Sheet: 1" Road Plate
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 2.69 ($K_p \div 1.5$)
Toe: Free Earth Support

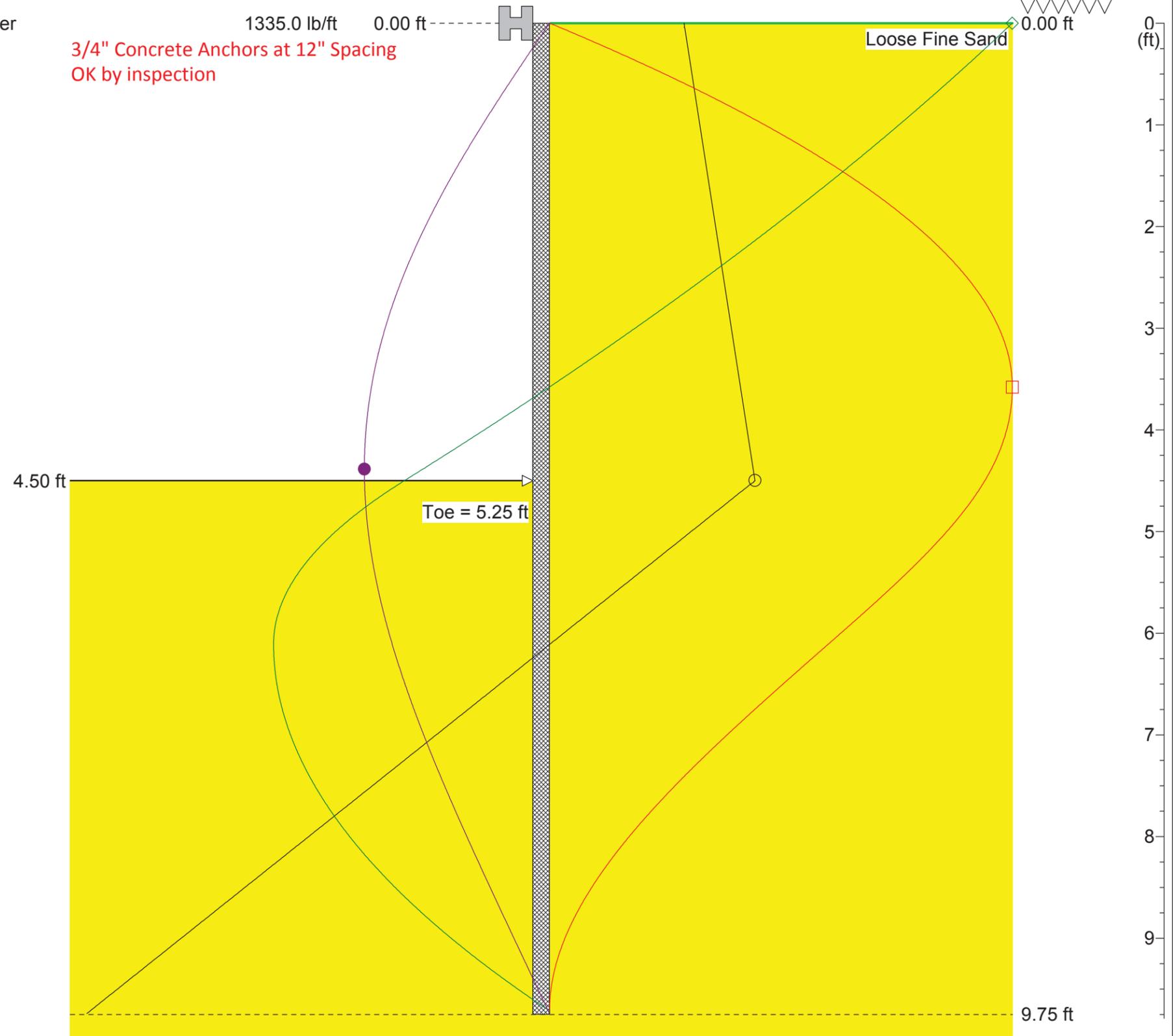
	Maximum	d (ft)
○	469.9 psf	4.50
□	2531.9 ftlb/ft	3.58
◇	1332.5 lb/ft	0.00
●	1.2 in	4.39

Section B

Calculations for Abut 2 SOE TMD AJT 4/20/15, Page 9 of 22
250 psf roadway surcharge loading
+ 6.25FT (109.2 pcf) soil load
behind wingwall = 932.5 psf

Steel Waler

1335.0 lb/ft 0.00 ft
3/4" Concrete Anchors at 12" Spacing
OK by inspection



PCL Civil Constructors, Inc.

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FOS: 2.69 ($K_p \div 1.5$)
Toe: Free Earth Support

Input Data

Calculations for Abut 2 SOE TMD AJT 4/20/15, Page 10 of 22
Water Density = 62.43pcf
Minimum Fluid Density = 31.82pcf

Depth Of Excavation = 4.50ft
Surcharge = 932.5psf
Depth Of Active Water = 20.00ft
Depth Of Passive Water = 20.00ft

Soil Profile

Depth (ft)	Soil Name	γ (pcf)	γ' (pcf)	C (psf)	C_a (psf)	ϕ (°)	δ (°)	K_a	K_{ac}	K_p	K_{pc}
0.00	Loose Fine Sand	109.20	65.55	0.0	0.0	30.0	0.0	0.33	0.00	3.00 (2.00)	0.00 (0.00)

() indicates factored value used in embedment calculation. Factor(s): $K_p \div 1.5$

Solution

Sheet

Sheet Name	E (psi)	I (in ⁴ /ft)	f (psi)	Z (in ³ /ft)	Allowed M_{max} (ftlb/ft)	b (in)	A (in ² /ft)	W (lb/ft)	Upstand (ft)	Toe (ft)	Length (ft)
1" Road Plate	3.04E+07	1.00	27000.0	2.00	4166.7	12.00	12.00	41.0	0.00	5.25	9.75

Load Model: Area Distribution

Supports

d (ft)	Type	Load (lb/ft)
0.00	Steel Waler	1335.0

3/4" Concrete Anchors at 12" Spacing
OK by inspection

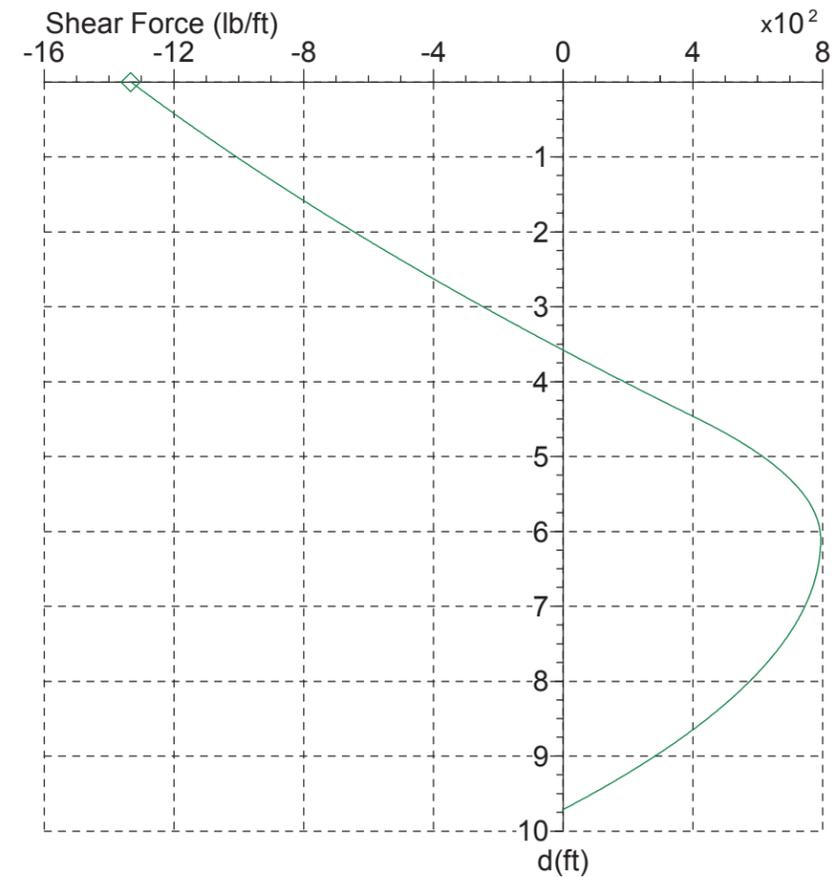
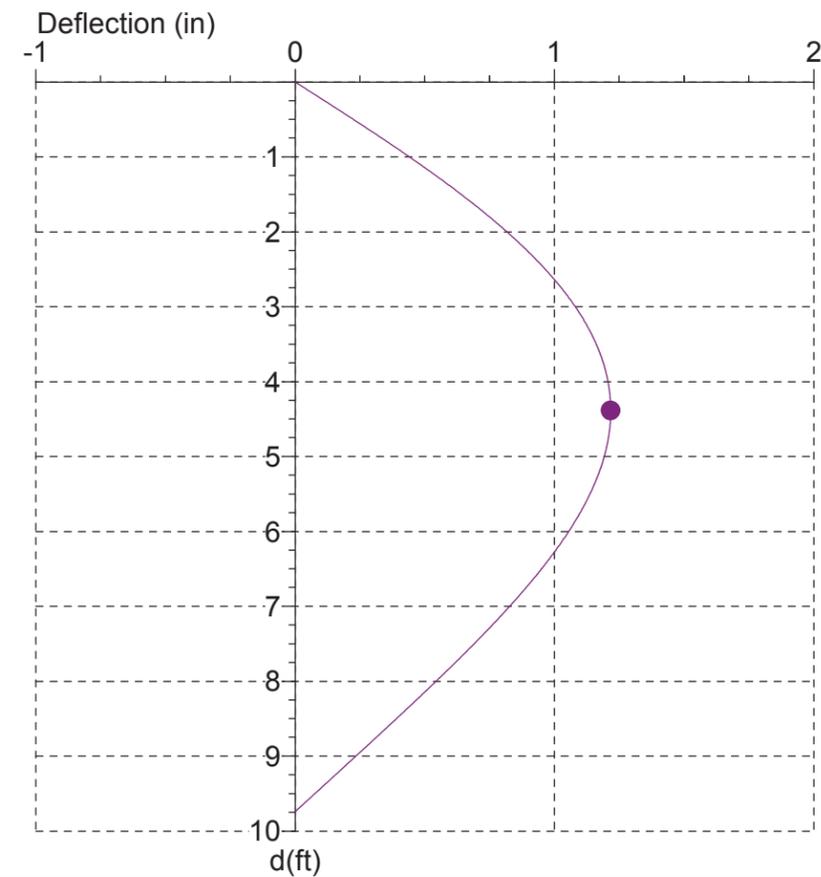
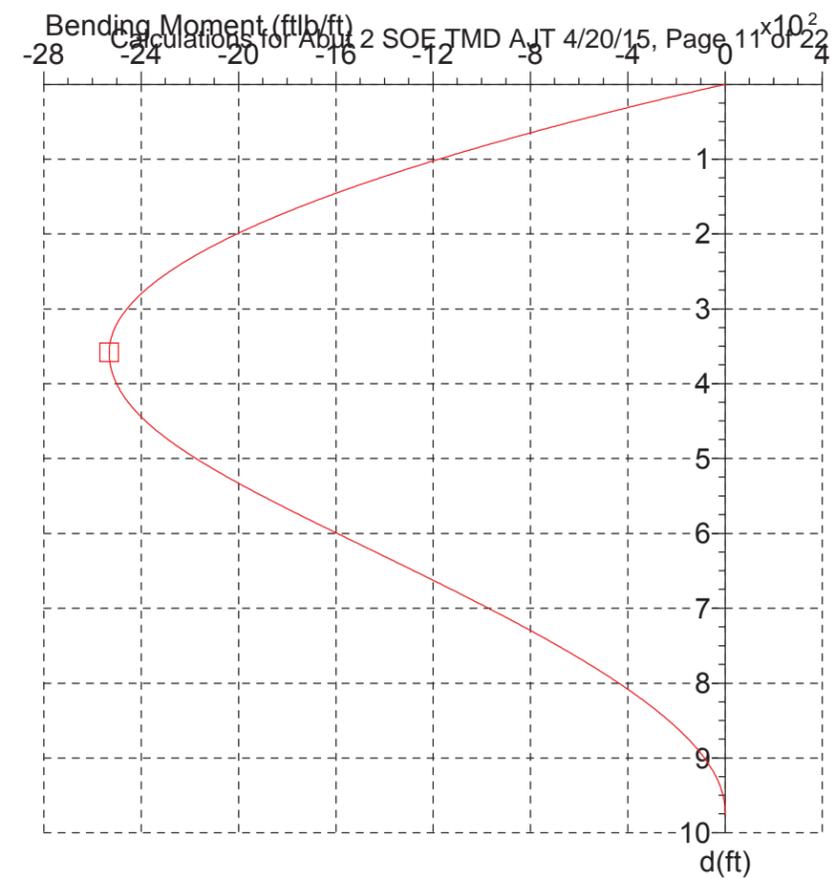
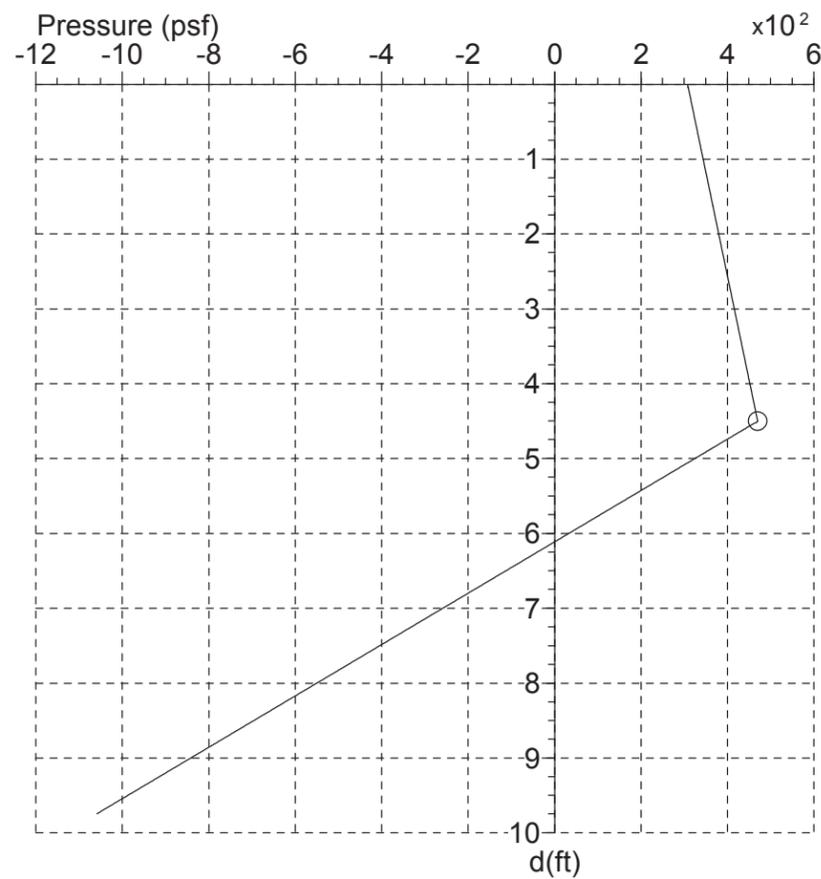
Maxima

	Maximum	Depth (ft)
Pressure	469.9 psf	4.50
Bending Moment	2531.9 ftlb/ft	3.58
Deflection	1.2 in	4.39
Shear Force	1332.5 lb/ft	0.00



Sheet: 1" Road Plate
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Toe: Free Earth Support

	Maximum	d (ft)
○	469.9 psf	4.50
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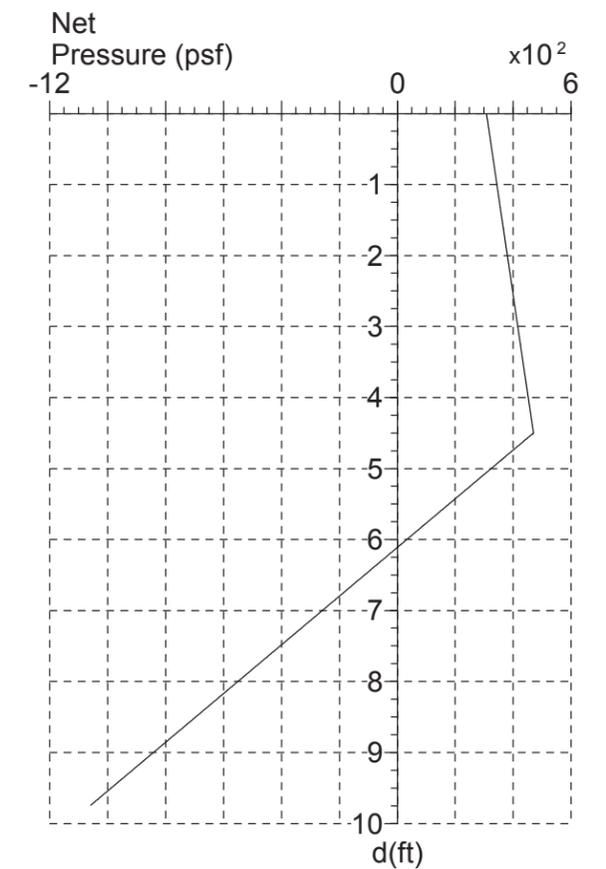
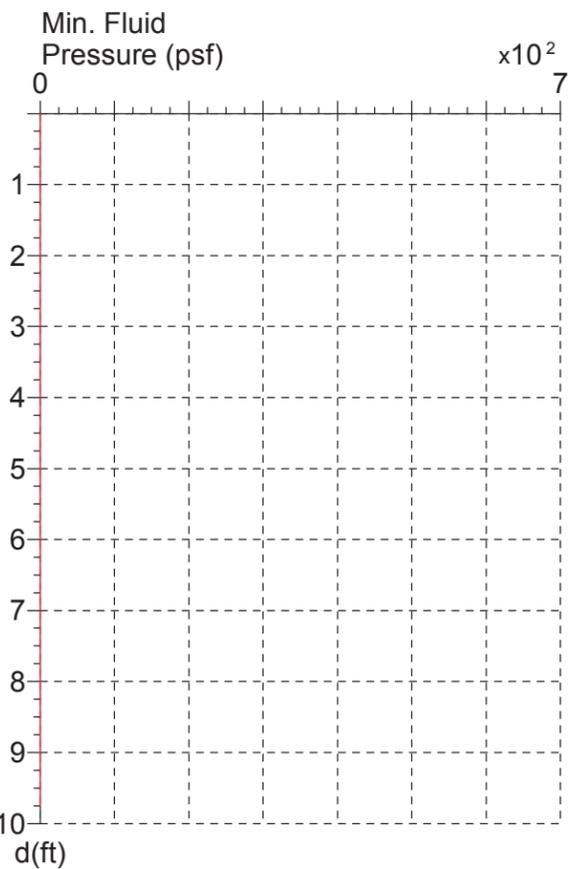
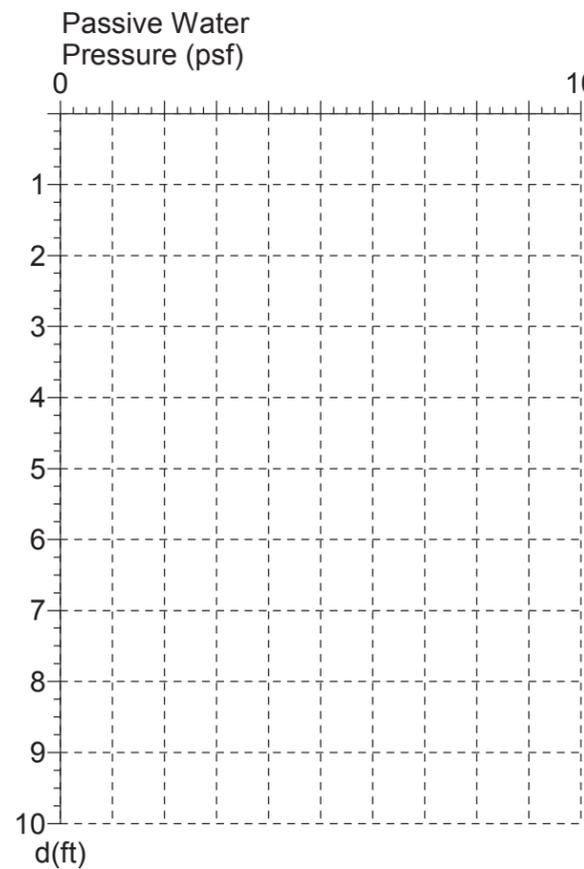
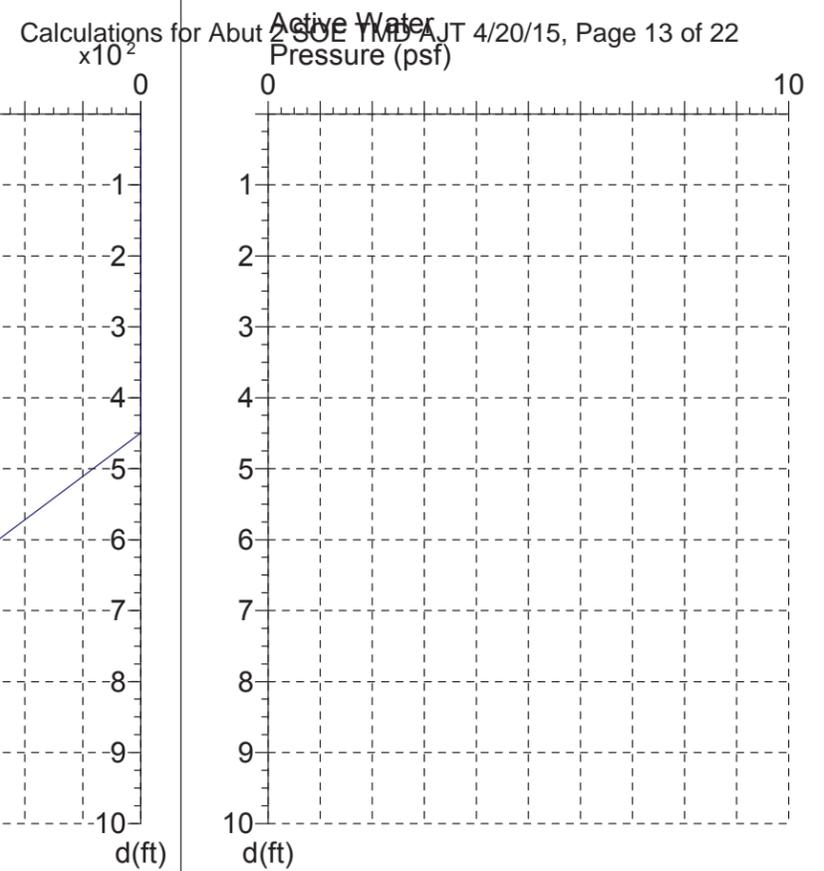
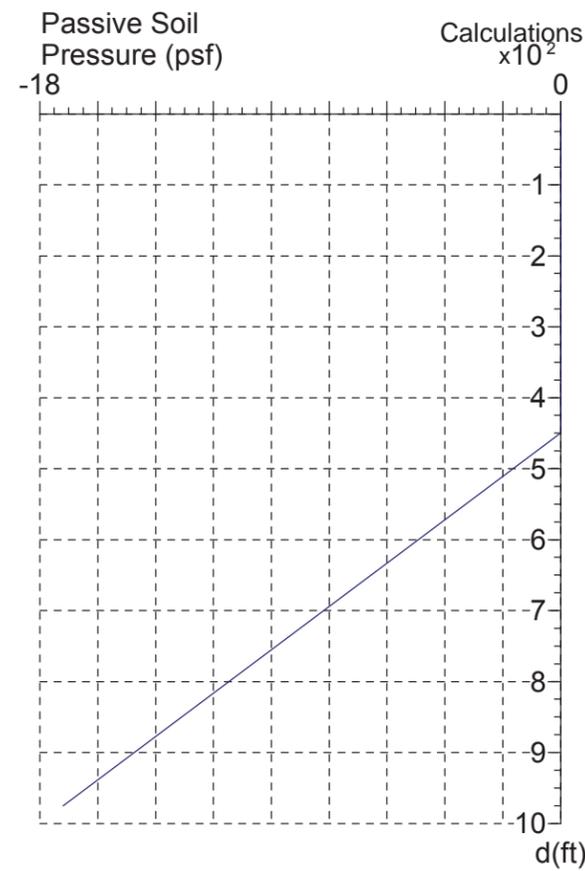
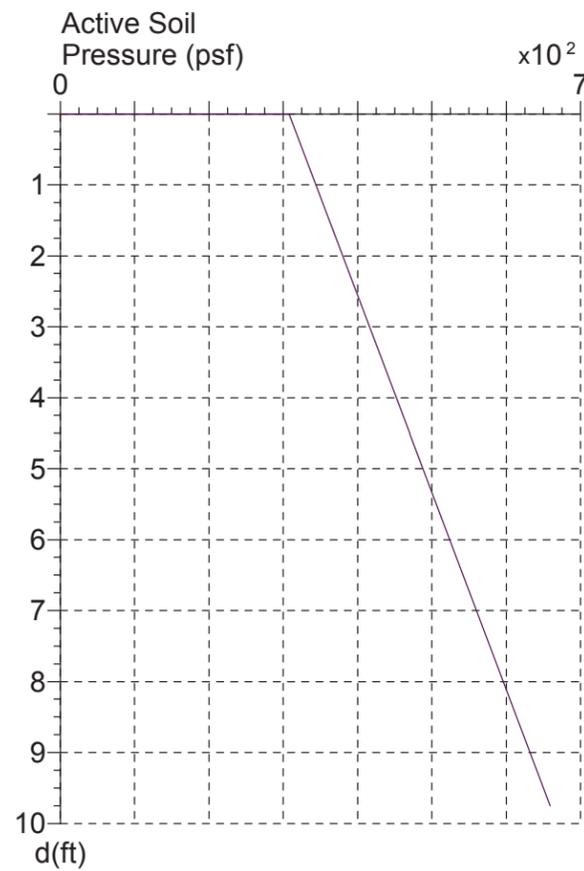
depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)
0.00	307.7	0.0	0.0	-1332.5	3.27	425.7	-2511.3	1.1	-131.3	6.54	-125.1	-1252.6	0.9	783.0
0.07	310.1	-86.2	0.0	-1312.5	3.34	428.1	-2519.1	1.1	-103.5	6.61	-146.4	-1207.0	0.9	778.8
0.13	312.4	-171.1	0.1	-1292.2	3.41	430.4	-2525.0	1.1	-75.6	6.68	-165.4	-1166.8	0.9	774.6
0.20	315.0	-265.0	0.1	-1269.3	3.47	432.7	-2529.1	1.2	-47.6	6.74	-184.3	-1126.7	0.9	769.8
0.27	317.4	-347.1	0.1	-1248.7	3.54	435.4	-2531.6	1.2	-15.8	6.81	-203.3	-1087.0	0.9	764.5
0.33	319.7	-427.8	0.2	-1228.0	3.61	437.7	-2531.8	1.2	12.6	6.88	-224.6	-1042.6	0.9	757.9
0.40	322.1	-507.1	0.2	-1207.1	3.67	440.1	-2530.5	1.2	41.1	6.95	-243.5	-1003.4	0.8	751.5
0.47	324.7	-594.8	0.2	-1183.5	3.74	442.4	-2527.8	1.2	69.8	7.01	-262.5	-964.6	0.8	744.5
0.53	327.0	-671.3	0.2	-1162.3	3.81	444.8	-2523.5	1.2	98.7	7.08	-281.4	-926.2	0.8	737.1
0.60	329.4	-746.3	0.3	-1140.9	3.87	447.4	-2516.9	1.2	131.3	7.15	-300.4	-888.2	0.8	729.1
0.67	331.7	-820.0	0.3	-1119.4	3.94	449.7	-2509.4	1.2	160.5	7.21	-321.7	-845.9	0.8	719.6
0.73	334.1	-892.3	0.3	-1097.8	4.01	452.1	-2500.4	1.2	189.8	7.28	-340.7	-808.9	0.8	710.5
0.80	336.7	-971.9	0.4	-1073.2	4.07	454.4	-2489.9	1.2	219.2	7.35	-359.6	-772.2	0.7	701.0
0.87	339.1	-1041.2	0.4	-1051.3	4.14	457.0	-2476.3	1.2	252.6	7.41	-378.6	-736.1	0.7	690.9
0.93	341.4	-1109.0	0.4	-1029.1	4.21	459.4	-2462.5	1.2	282.4	7.48	-399.9	-696.2	0.7	678.9
1.00	343.7	-1175.4	0.4	-1006.9	4.27	461.7	-2447.2	1.2	312.3	7.55	-418.8	-661.2	0.7	667.7
1.07	346.4	-1248.3	0.5	-981.6	4.34	464.1	-2430.4	1.2	342.4	7.61	-437.8	-626.9	0.7	656.0
1.14	348.7	-1311.6	0.5	-959.0	4.41	466.4	-2411.9	1.2	372.7	7.68	-456.7	-593.2	0.6	643.8
1.20	351.1	-1373.4	0.5	-936.3	4.47	469.1	-2389.3	1.2	406.9	7.75	-475.7	-560.1	0.6	631.1
1.27	353.4	-1433.7	0.5	-913.4	4.54	457.7	-2367.5	1.2	437.1	7.81	-497.0	-523.7	0.6	616.2
1.34	355.7	-1492.5	0.6	-890.3	4.61	438.7	-2344.2	1.2	466.2	7.88	-516.0	-492.1	0.6	602.3
1.40	358.4	-1556.9	0.6	-864.2	4.67	419.8	-2319.4	1.2	494.0	7.95	-534.9	-461.2	0.6	588.0
1.47	360.7	-1612.5	0.6	-840.8	4.74	398.5	-2289.8	1.2	523.8	8.01	-553.9	-431.0	0.5	573.1
1.54	363.1	-1666.6	0.7	-817.3	4.81	379.5	-2262.1	1.2	549.0	8.08	-575.2	-398.1	0.5	555.8
1.60	365.4	-1719.1	0.7	-793.6	4.87	360.6	-2233.1	1.2	573.0	8.15	-594.1	-369.6	0.5	539.9
1.67	367.7	-1770.1	0.7	-769.8	4.94	341.6	-2202.9	1.2	595.8	8.21	-613.1	-342.0	0.5	523.4
1.74	370.4	-1825.6	0.7	-742.8	5.01	322.6	-2171.5	1.2	617.3	8.28	-632.0	-315.3	0.5	506.4
1.80	372.7	-1873.3	0.8	-718.6	5.08	301.3	-2134.9	1.2	640.0	8.35	-651.0	-289.4	0.4	488.9
1.87	375.1	-1919.4	0.8	-694.3	5.14	282.4	-2101.3	1.2	658.9	8.41	-672.3	-261.4	0.4	468.6
1.94	377.4	-1963.9	0.8	-669.8	5.21	263.4	-2066.8	1.2	676.6	8.48	-691.3	-237.6	0.4	450.0
2.00	380.0	-2012.1	0.8	-642.1	5.28	244.5	-2031.4	1.2	693.0	8.55	-710.2	-214.7	0.4	430.9
2.07	382.4	-2053.2	0.8	-617.3	5.34	223.2	-1990.5	1.2	710.0	8.61	-729.2	-192.8	0.4	411.3
2.14	384.7	-2092.7	0.9	-592.4	5.41	204.2	-1953.4	1.1	723.8	8.68	-748.1	-171.9	0.3	391.1
2.20	387.1	-2130.5	0.9	-567.3	5.48	185.2	-1915.6	1.1	736.4	8.75	-769.4	-149.7	0.3	367.8
2.27	389.4	-2166.8	0.9	-542.1	5.54	166.3	-1877.2	1.1	747.7	8.82	-788.4	-131.2	0.3	346.6
2.34	392.0	-2205.5	0.9	-513.5	5.61	147.3	-1838.2	1.1	757.9	8.88	-807.3	-113.7	0.3	324.8
2.40	394.4	-2238.3	0.9	-487.9	5.68	126.0	-1793.7	1.1	767.8	8.95	-826.3	-97.4	0.3	302.5
2.47	396.7	-2269.3	1.0	-462.2	5.74	107.1	-1753.8	1.1	775.3	9.02	-847.6	-80.4	0.2	276.9
2.54	399.1	-2298.7	1.0	-436.3	5.81	88.1	-1713.4	1.1	781.5	9.08	-866.6	-66.6	0.2	253.5
2.60	401.7	-2329.7	1.0	-407.0	5.88	69.2	-1672.8	1.1	786.6	9.15	-885.5	-54.0	0.2	229.6
2.67	404.1	-2355.4	1.0	-380.8	5.94	47.8	-1626.8	1.1	790.8	9.22	-904.5	-42.6	0.2	205.2
2.74	406.4	-2379.5	1.0	-354.5	6.01	28.9	-1585.8	1.1	793.2	9.28	-923.4	-32.5	0.1	180.3
2.80	408.7	-2401.8	1.0	-328.0	6.08	9.9	-1544.7	1.0	794.4	9.35	-944.7	-22.8	0.1	151.6
2.87	411.1	-2422.4	1.1	-301.3	6.14	-9.0	-1503.5	1.0	794.4	9.42	-963.7	-15.5	0.1	125.6
2.94	413.7	-2443.5	1.1	-271.1	6.21	-28.0	-1462.3	1.0	793.9	9.48	-982.7	-9.6	0.1	99.1
3.01	416.1	-2460.4	1.1	-244.2	6.28	-49.3	-1416.1	1.0	792.7	9.55	-1001.6	-5.1	0.1	72.0
3.07	418.4	-2475.5	1.1	-217.0	6.34	-68.2	-1375.0	1.0	791.0	9.62	-1022.9	-1.7	0.0	41.0
3.14	420.7	-2488.9	1.1	-189.8	6.41	-87.2	-1334.1	1.0	788.9	9.68	-1041.9	-0.2	0.0	12.8
3.21	423.4	-2501.7	1.1	-158.9	6.48	-106.1	-1293.3	1.0	786.2	9.75	-1058.5	0.0	0.0	0.0



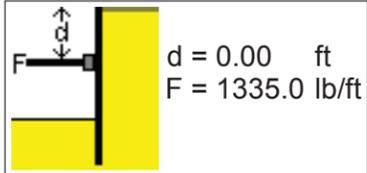
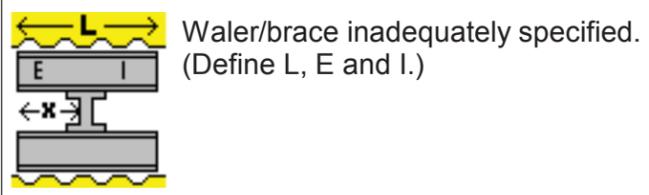
PCL Civil Constructors, Inc.

SupportIT, v2.36

Sheet: 1" Road Plate
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 2.69 ($K_p \div 1.5$)
Toe: Free Earth Support



Sheet: 1" Road Plate
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
Toe: Free Earth Support



Sheet: 1" Road Plate
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 2.69 ($K_p \div 1.5$)
Toe: Free Earth Support

1. Factor(s) applied to soil parameter(s) in the 'Wall' page, and used in the embedment calculation.
Factor(s) used: $K_p \div 1.5$
2. Maximum bending moment = 2531.9ftlb/ft and $f = 27000.0$ psi. MINIMUM required sheet section modulus is: $Z = 1.13$ in³/ft (= M/f). Sheet section modulus in this design is $Z = 2.00$ in³/ft, and is satisfactory.
3. Frame primary axis bending moments checked. Users should manually check the axial load capacities and the effects of combined axial and bending stresses to confirm frames are suitable.
4. FOS = 2.69 (Net Pressure)
This is the factor of safety against rotation about the lowest frame. It is calculated using the factored soil parameters (see above).
The FOS can be changed using 'Defined FOS' or 'Manual' in the 'Wall' page.



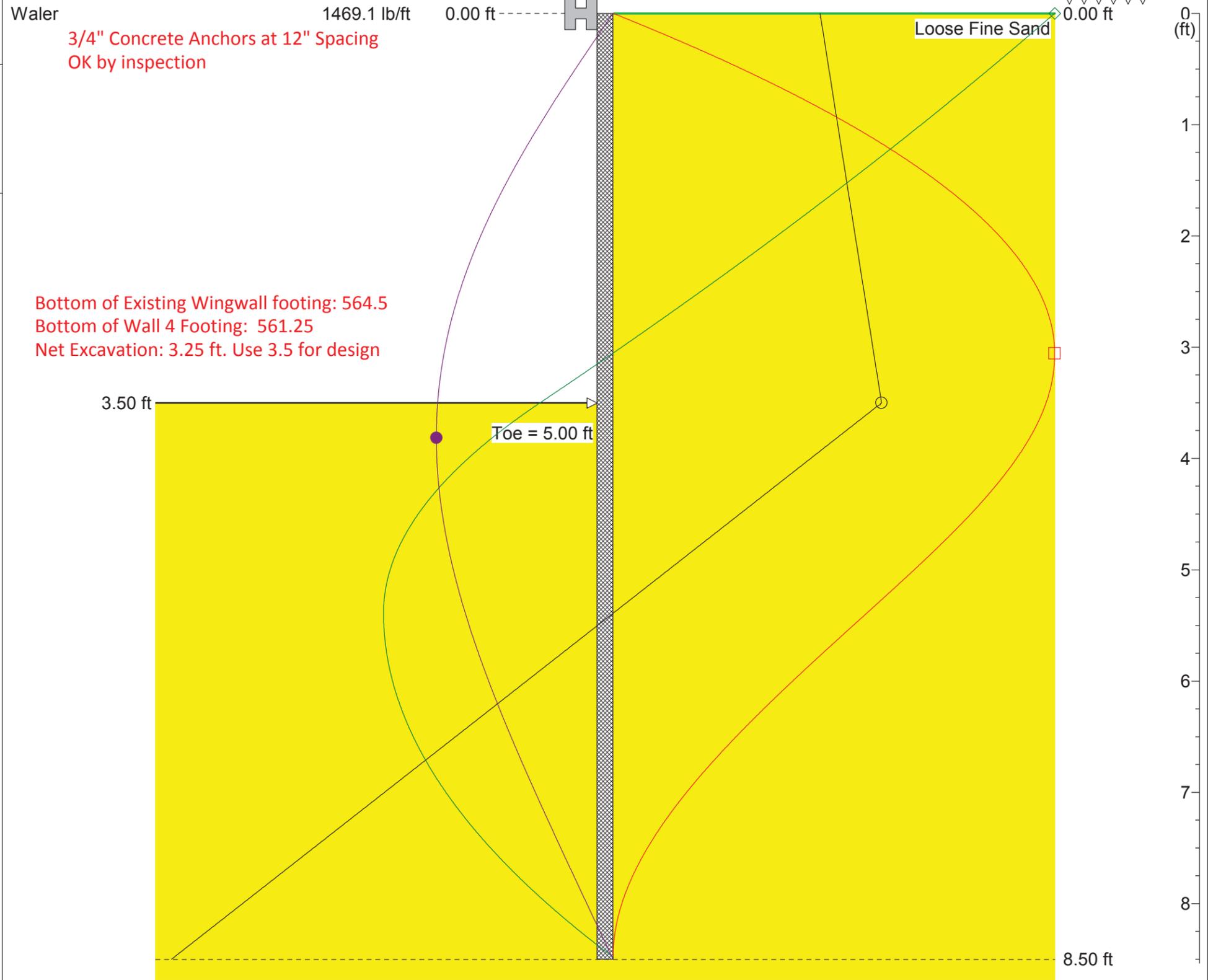
Sheet: 1" Road Plate
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 2.01 ($K_p \div 1.5$)
Toe: Free Earth Support

	Maximum	d (ft)
○	551.2 psf	3.50
□	2333.3 ftlb/ft	3.06
◇	1466.0 lb/ft	0.00
●	0.8 in	3.81

Section C

Calculations for Abut 2 SOE TMD AJT 4/20/15, Page 16 of 22

250 psf roadway surcharge loading
+ 9.5FT (109.2 pcf) soil load
behind wingwall = 1288psf



Sheet: 1" Road Plate
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 2.01 ($K_p \div 1.5$)
Toe: Free Earth Support

Input Data

Calculations for Abut 2 SOE TMD AJT 4/20/15, Page 17 of 22
Water Density = 62.43pcf
Minimum Fluid Density = 31.82pcf

Depth Of Excavation = 3.50ft
Surcharge = 1288.0psf
Depth Of Active Water = 20.00ft
Depth Of Passive Water = 20.00ft

Soil Profile

Depth (ft)	Soil Name	γ (pcf)	γ' (pcf)	C (psf)	C_a (psf)	ϕ (°)	δ (°)	K_a	K_{ac}	K_p	K_{pc}
0.00	Loose Fine Sand	109.20	65.55	0.0	0.0	30.0	0.0	0.33	0.00	3.00 (2.00)	0.00 (0.00)

() indicates factored value used in embedment calculation. Factor(s): $K_p \div 1.5$

Solution

Sheet

Sheet Name	E (psi)	I (in ⁴ /ft)	f (psi)	Z (in ³ /ft)	Allowed M_{max} (ftlb/ft)	b (in)	A (in ² /ft)	W (lb/ft)	Upstand (ft)	Toe (ft)	Length (ft)
1" Road Plate	3.04E+07	1.00	27000.0	2.00	4166.7	12.00	12.00	41.0	0.00	5.00	8.50

Load Model: Area Distribution

Supports

d (ft)	Type	Load (lb/ft)
0.00	Waler	1469.1

3/4" Concrete Anchors at 12" Spacing
OK by inspection

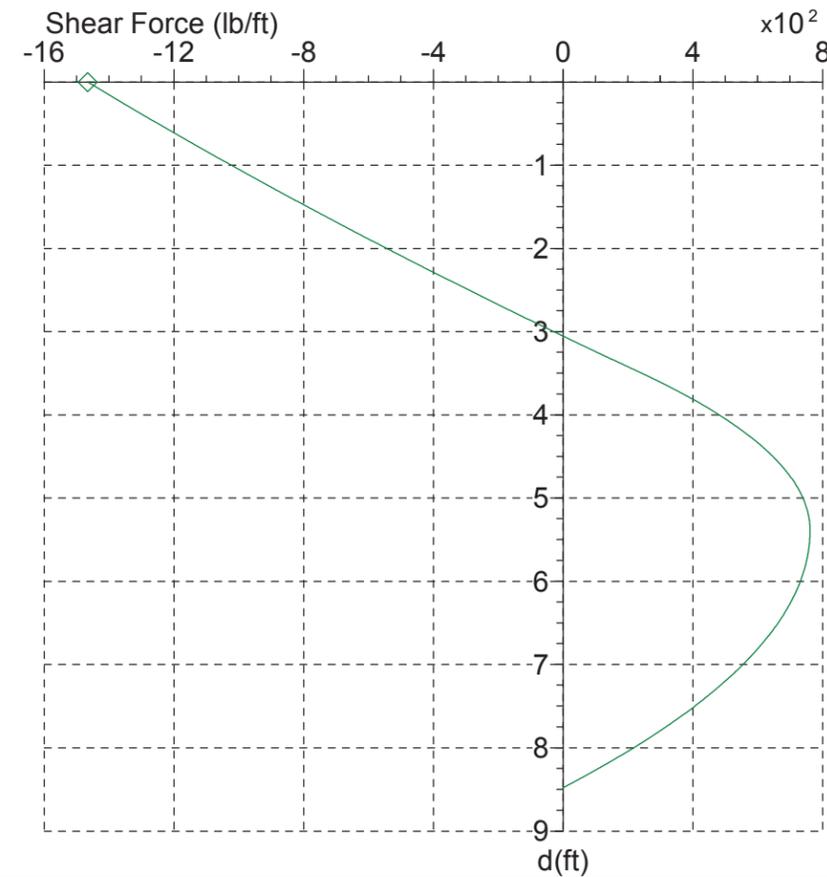
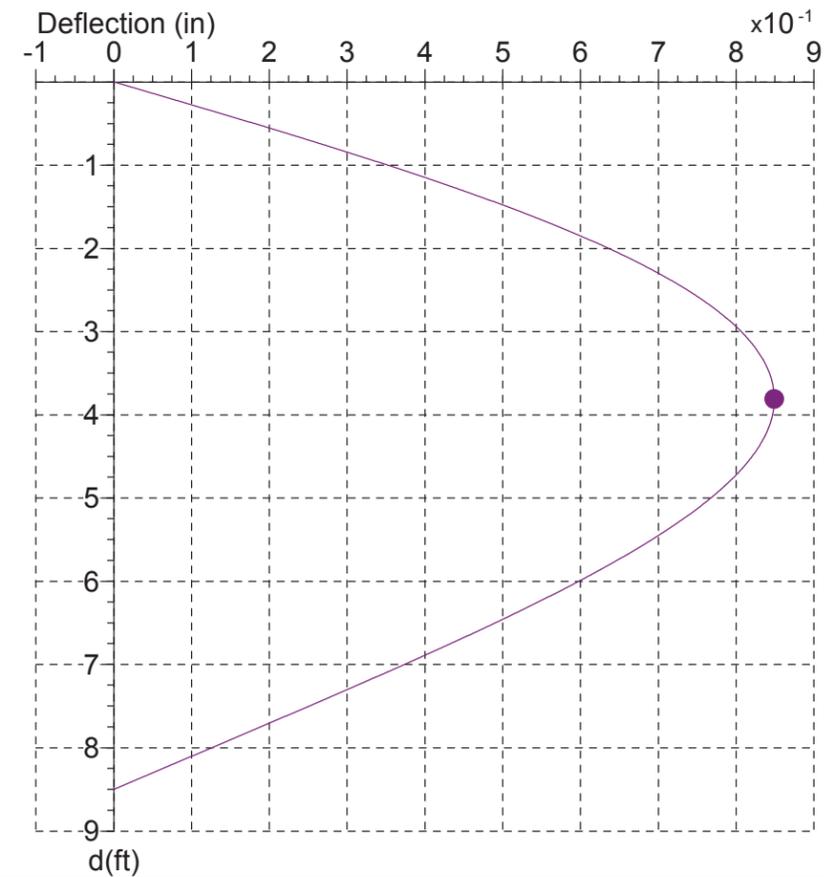
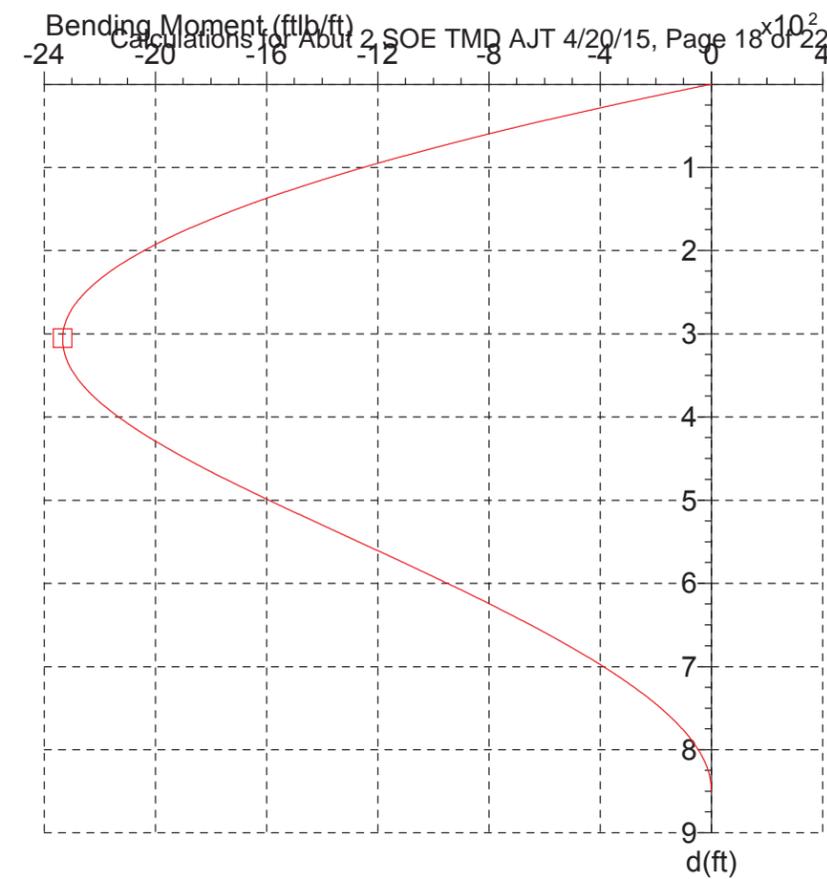
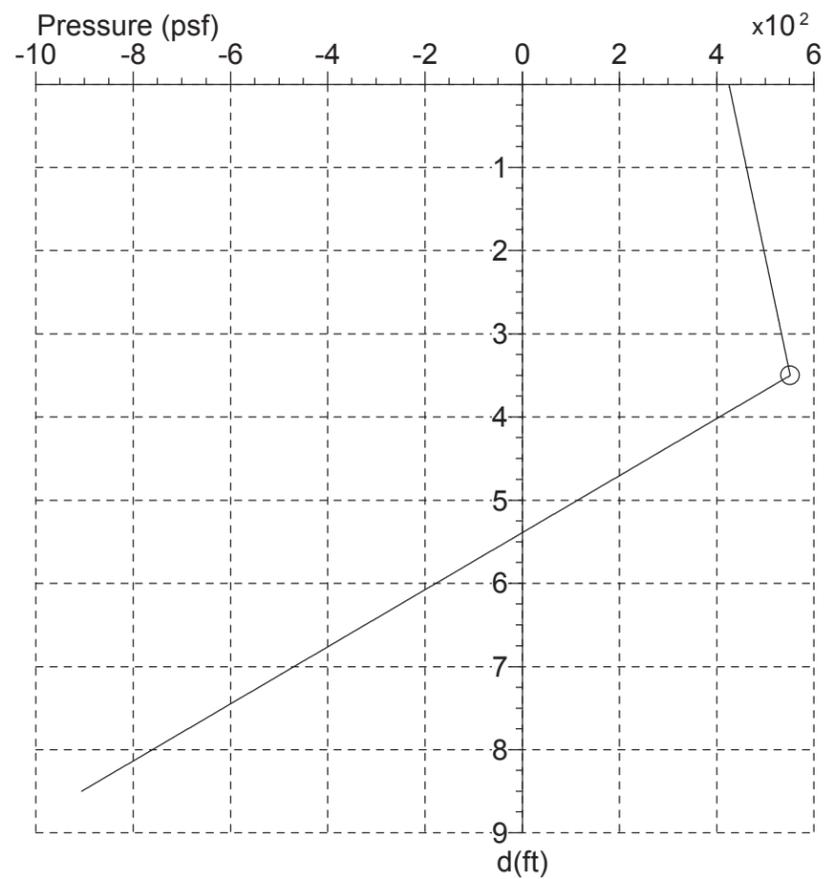
Maxima

	Maximum	Depth (ft)
Pressure	551.2 psf	3.50
Bending Moment	2333.3 ftlb/ft	3.06
Deflection	0.8 in	3.81
Shear Force	1466.0 lb/ft	0.00



Sheet: 1" Road Plate
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 2.01 ($K_p \div 1.5$)
Toe: Free Earth Support

	Maximum	d (ft)
○	551.2 psf	3.50
□	2333.3 ftlb/ft	3.06
◇	1466.0 lb/ft	0.00
●	0.8 in	3.81



Sheet: 1" Road Plate
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 2.01 ($K_p \div 1.5$)
Toe: Free Earth Support

depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)
0.00	425.0	0.0	0.0	-1466.0	2.85	527.7	-2321.9	0.8	-108.2	5.71	-92.1	-1135.0	0.7	753.6
0.06	427.1	-82.7	0.0	-1441.9	2.91	530.0	-2327.8	0.8	-74.4	5.76	-108.7	-1098.6	0.6	750.5
0.12	429.1	-164.0	0.0	-1417.6	2.97	532.1	-2331.3	0.8	-44.3	5.82	-125.2	-1062.4	0.6	746.8
0.17	431.4	-253.9	0.1	-1390.1	3.03	534.1	-2333.1	0.8	-14.1	5.88	-143.8	-1021.9	0.6	742.1
0.23	433.5	-332.2	0.1	-1365.6	3.09	536.2	-2333.1	0.8	16.3	5.94	-160.3	-986.1	0.6	737.4
0.29	435.5	-409.2	0.1	-1341.0	3.14	538.5	-2331.4	0.8	50.6	6.00	-176.9	-950.5	0.6	732.1
0.35	437.6	-484.8	0.1	-1316.2	3.20	540.5	-2328.3	0.8	81.2	6.05	-193.4	-915.2	0.6	726.3
0.41	439.6	-559.0	0.1	-1291.3	3.26	542.5	-2323.8	0.8	111.9	6.11	-209.9	-880.2	0.6	720.1
0.47	441.9	-640.7	0.2	-1263.2	3.32	544.6	-2317.7	0.8	142.7	6.17	-228.5	-841.2	0.6	712.4
0.52	443.9	-711.9	0.2	-1238.1	3.38	546.6	-2310.1	0.8	173.7	6.23	-245.1	-806.9	0.5	705.0
0.58	446.0	-781.6	0.2	-1212.8	3.43	548.9	-2299.8	0.8	208.6	6.29	-261.6	-772.9	0.5	697.1
0.64	448.0	-849.9	0.2	-1187.5	3.49	551.0	-2289.1	0.8	239.8	6.35	-278.1	-739.4	0.5	688.7
0.70	450.3	-925.0	0.3	-1158.8	3.55	536.2	-2276.8	0.8	270.7	6.40	-294.7	-706.3	0.5	679.8
0.76	452.4	-990.2	0.3	-1133.2	3.61	519.6	-2263.1	0.8	300.5	6.46	-313.3	-669.5	0.5	669.2
0.82	454.4	-1053.9	0.3	-1107.5	3.67	503.1	-2247.9	0.8	329.5	6.52	-329.8	-637.4	0.5	659.2
0.87	456.5	-1116.2	0.3	-1081.7	3.73	484.5	-2229.2	0.8	360.9	6.58	-346.3	-605.7	0.5	648.7
0.93	458.5	-1177.1	0.3	-1055.7	3.78	468.0	-2211.2	0.8	387.9	6.64	-362.9	-574.5	0.5	637.7
0.99	460.8	-1243.7	0.3	-1026.4	3.84	451.4	-2191.9	0.8	413.9	6.70	-379.4	-543.9	0.4	626.1
1.05	462.8	-1301.4	0.4	-1000.2	3.90	434.9	-2171.3	0.8	439.0	6.75	-398.0	-510.2	0.4	612.5
1.11	464.9	-1357.5	0.4	-973.9	3.96	418.4	-2149.6	0.8	463.1	6.81	-414.5	-480.8	0.4	599.9
1.16	466.9	-1412.2	0.4	-947.4	4.02	399.8	-2123.8	0.8	489.1	6.87	-431.1	-452.1	0.4	586.8
1.22	469.0	-1465.4	0.4	-920.9	4.08	383.2	-2099.6	0.8	511.3	6.93	-447.6	-424.0	0.4	573.1
1.28	471.3	-1523.4	0.4	-890.9	4.13	366.7	-2074.4	0.8	532.5	6.99	-466.2	-393.2	0.4	557.2
1.34	473.3	-1573.4	0.5	-864.1	4.19	350.2	-2048.2	0.8	552.7	7.04	-482.8	-366.5	0.4	542.4
1.40	475.4	-1621.8	0.5	-837.2	4.25	331.6	-2017.6	0.8	574.4	7.10	-499.3	-340.6	0.3	527.2
1.46	477.4	-1668.7	0.5	-810.2	4.31	315.0	-1989.5	0.8	592.7	7.16	-515.8	-315.4	0.3	511.4
1.51	479.7	-1719.6	0.5	-779.6	4.37	298.5	-1960.4	0.8	610.0	7.22	-532.4	-291.0	0.3	495.2
1.57	481.7	-1763.2	0.5	-752.4	4.42	282.0	-1930.6	0.8	626.4	7.28	-551.0	-264.5	0.3	476.2
1.63	483.8	-1805.3	0.5	-725.0	4.48	265.4	-1899.9	0.8	641.9	7.34	-567.5	-241.9	0.3	458.9
1.69	485.8	-1845.8	0.6	-697.5	4.54	246.8	-1864.6	0.8	658.2	7.39	-584.0	-220.0	0.3	441.0
1.75	487.9	-1884.8	0.6	-669.9	4.60	230.3	-1832.5	0.8	671.6	7.45	-600.6	-199.1	0.3	422.6
1.80	490.2	-1926.7	0.6	-638.6	4.66	213.8	-1799.7	0.8	684.2	7.51	-617.1	-179.1	0.2	403.7
1.86	492.2	-1962.3	0.6	-610.8	4.72	197.2	-1766.4	0.8	695.8	7.57	-635.7	-157.6	0.2	381.9
1.92	494.3	-1996.3	0.6	-582.8	4.77	180.7	-1732.5	0.8	706.4	7.63	-652.2	-139.6	0.2	361.9
1.98	496.3	-2028.7	0.6	-554.7	4.83	162.1	-1693.8	0.8	717.3	7.68	-668.8	-122.5	0.2	341.4
2.04	498.4	-2059.6	0.6	-526.5	4.89	145.6	-1658.9	0.8	726.0	7.74	-685.3	-106.4	0.2	320.4
2.10	500.7	-2092.3	0.7	-494.6	4.95	129.0	-1623.6	0.8	733.7	7.80	-703.9	-89.6	0.2	296.1
2.15	502.7	-2119.7	0.7	-466.2	5.01	112.5	-1587.9	0.8	740.5	7.86	-720.4	-75.7	0.2	274.0
2.21	504.7	-2145.5	0.7	-437.6	5.07	93.9	-1547.5	0.8	747.0	7.92	-737.0	-62.9	0.1	251.4
2.27	506.8	-2169.6	0.7	-408.9	5.12	77.3	-1511.2	0.8	751.8	7.98	-753.5	-51.3	0.1	228.3
2.33	509.1	-2194.9	0.7	-376.5	5.18	60.8	-1474.8	0.7	755.6	8.03	-770.0	-40.7	0.1	204.6
2.39	511.1	-2215.5	0.7	-347.6	5.24	44.3	-1438.2	0.7	758.6	8.09	-788.6	-30.2	0.1	177.4
2.45	513.2	-2234.6	0.7	-318.5	5.30	27.7	-1401.4	0.7	760.5	8.15	-805.2	-22.2	0.1	152.7
2.50	515.2	-2251.9	0.7	-289.3	5.36	9.1	-1360.0	0.7	761.7	8.21	-821.7	-15.3	0.1	127.5
2.56	517.3	-2267.6	0.7	-260.1	5.41	-7.4	-1323.2	0.7	761.7	8.27	-838.2	-9.7	0.1	101.7
2.62	519.6	-2283.3	0.8	-227.0	5.47	-23.9	-1286.3	0.7	761.2	8.33	-854.8	-5.3	0.0	75.4
2.68	521.6	-2295.5	0.8	-197.5	5.53	-40.5	-1249.5	0.7	760.2	8.38	-873.4	-1.9	0.0	45.3
2.74	523.6	-2306.0	0.8	-167.8	5.59	-57.0	-1212.8	0.7	758.6	8.44	-889.9	-0.3	0.0	17.9
2.79	525.7	-2314.8	0.8	-138.0	5.65	-75.6	-1171.5	0.7	756.3	8.50	-906.4	0.0	0.0	0.0

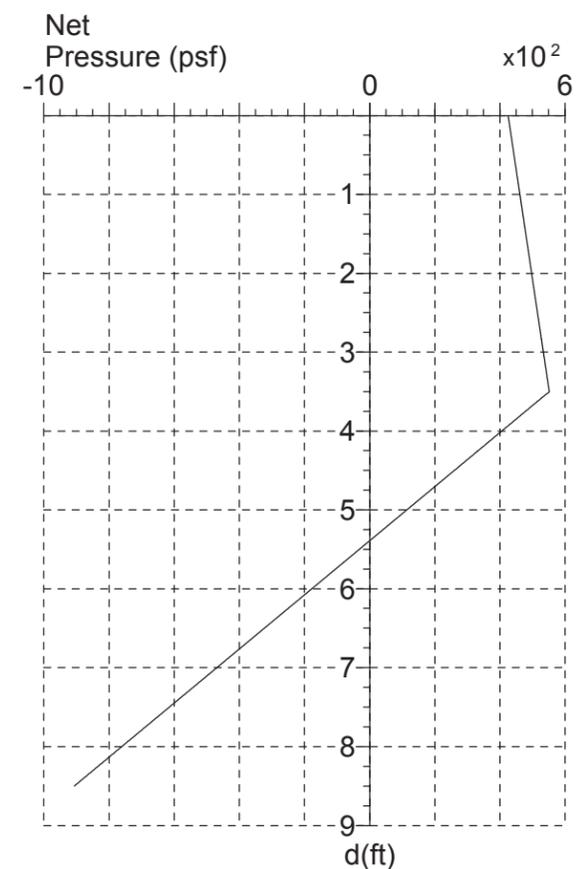
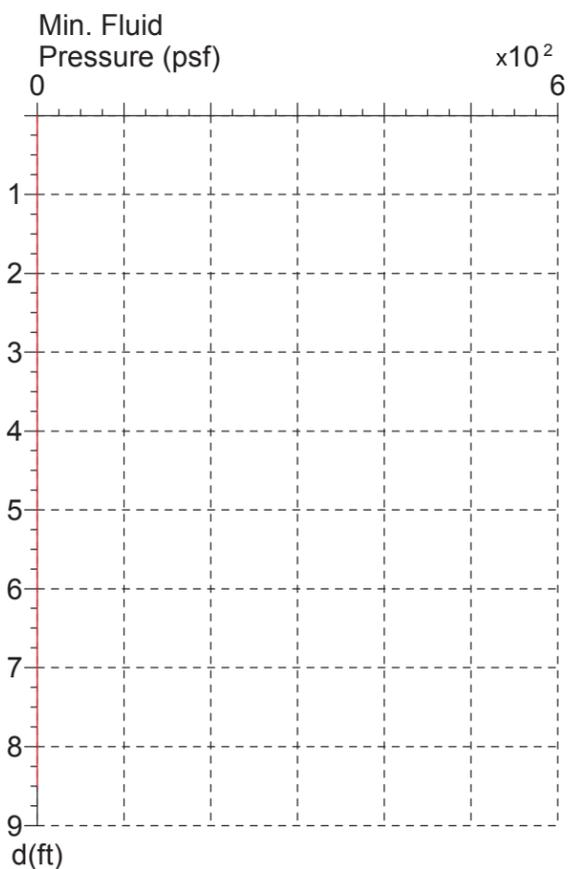
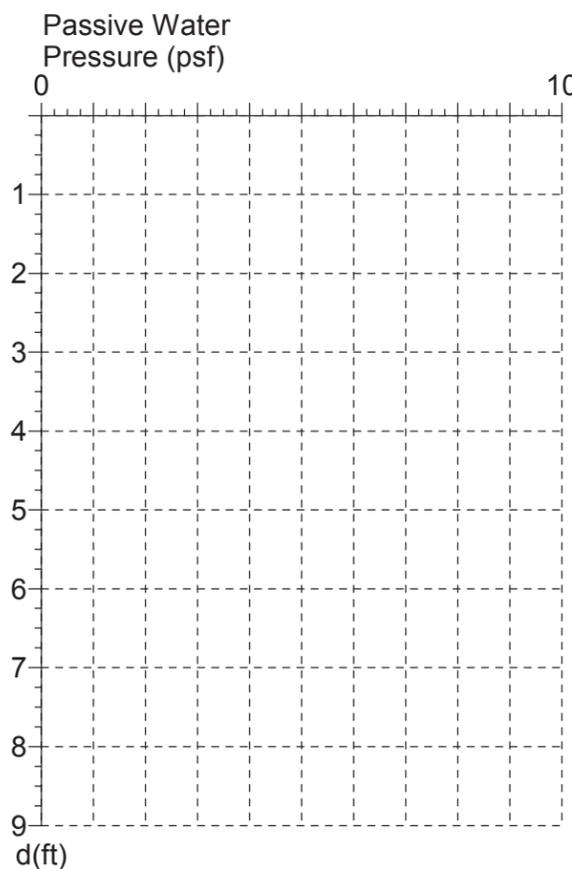
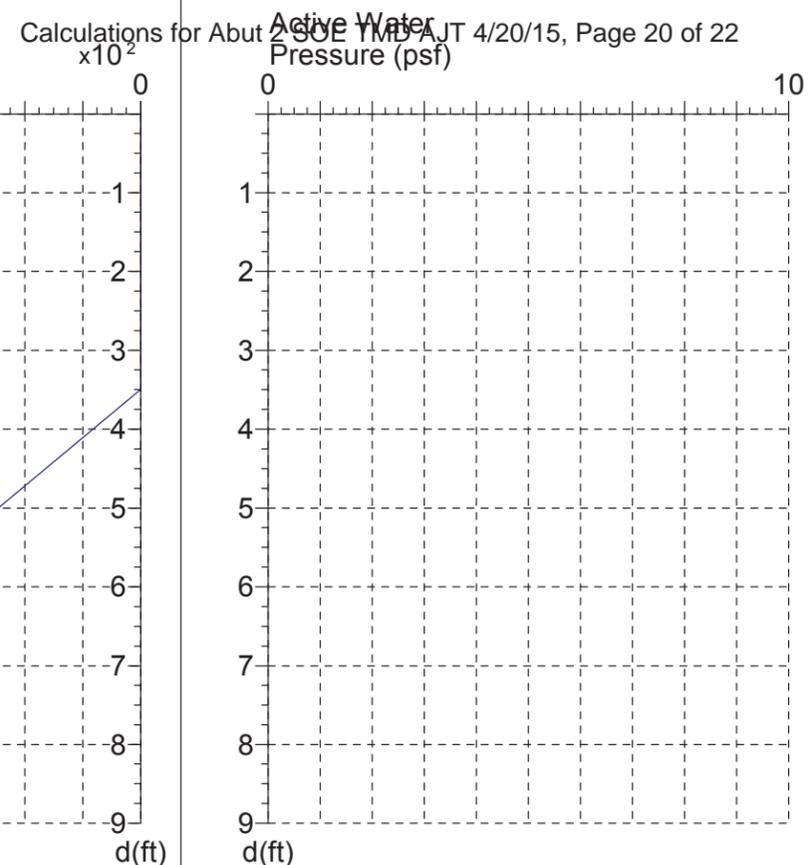
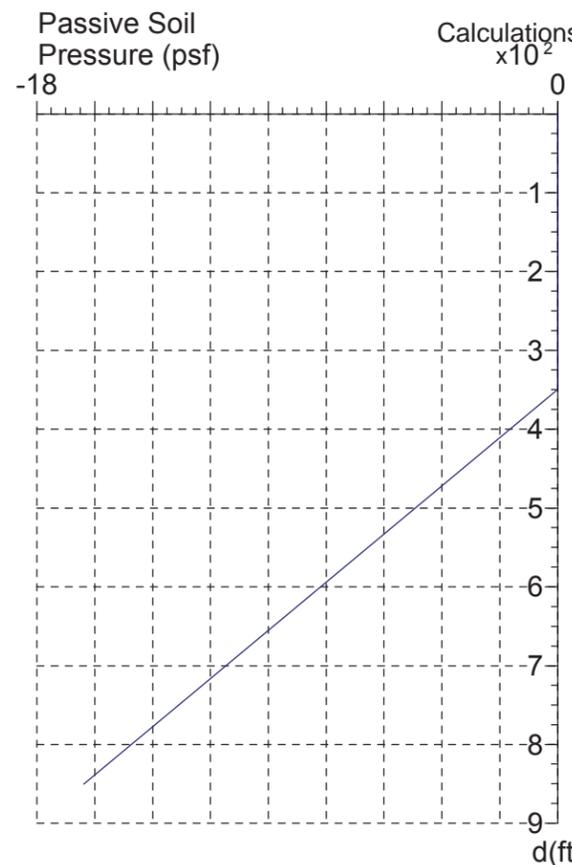
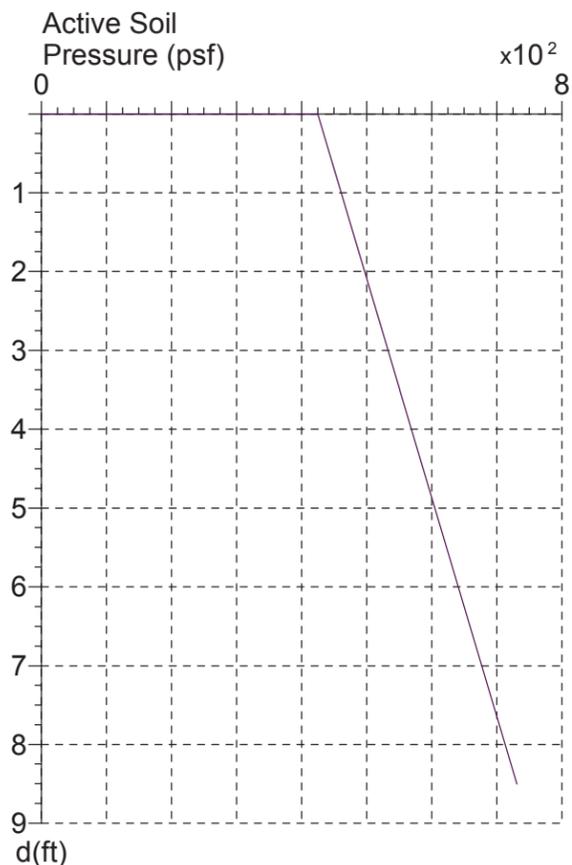


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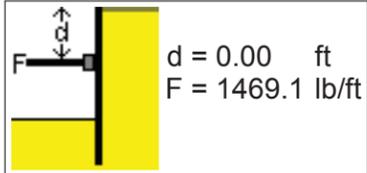
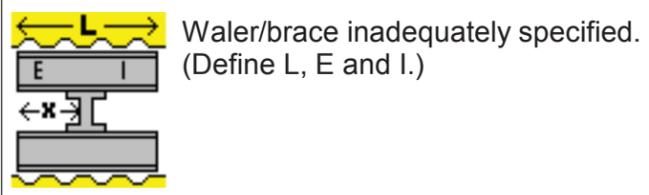
SupportIT, v2.36

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Tel/Fax: +44 (0)1292 477754
Email: GTSOFT@aol.com
Web: www.GTSOFT.org

Sheet: 1" Road Plate
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 2.01 ($K_p \div 1.5$)
Toe: Free Earth Support



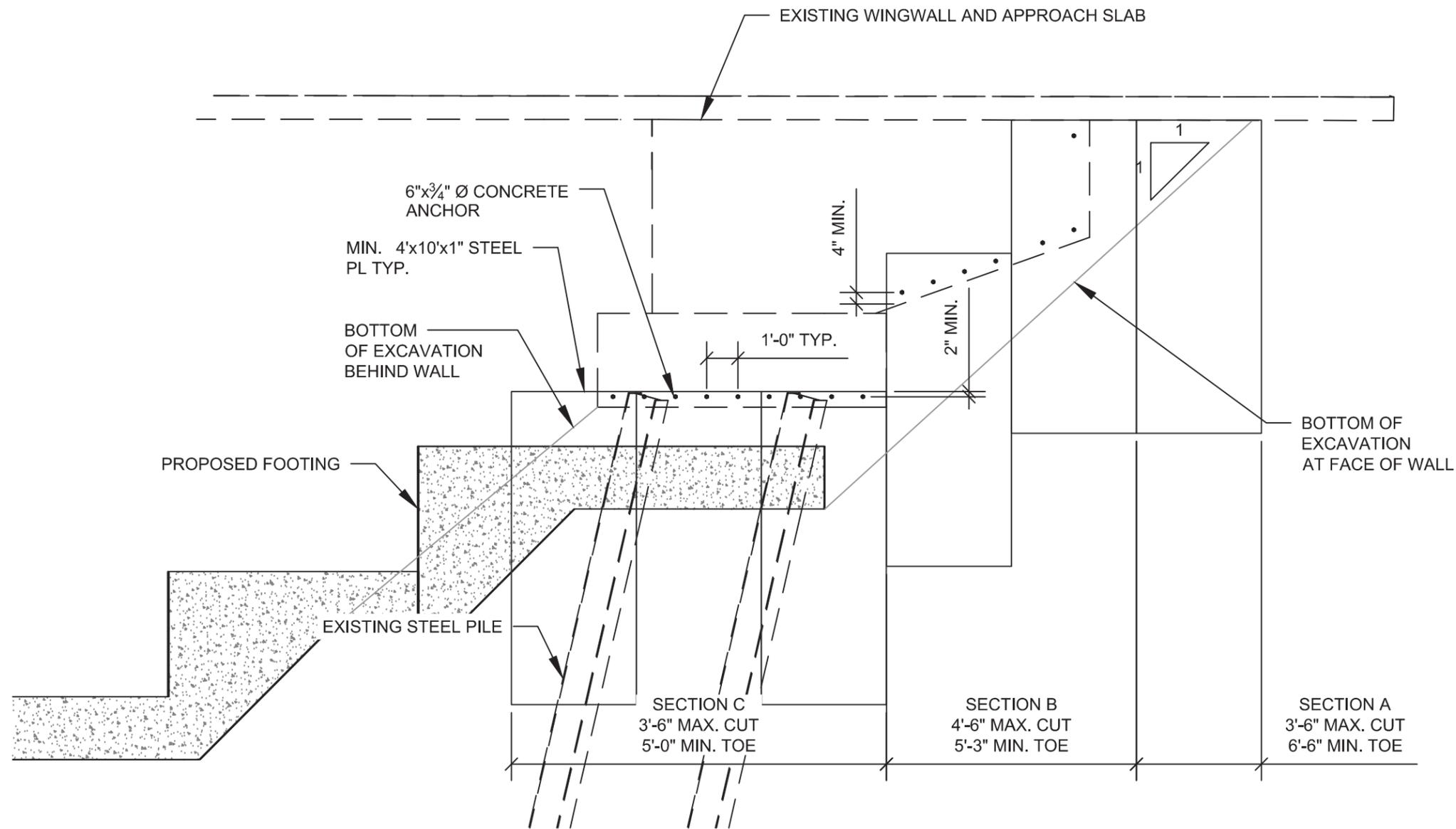
Sheet: 1" Road Plate
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
Toe: Free Earth Support



Sheet: 1" Road Plate
Works: Temporary
Pressure: Rankine
Analysis: Net Pressure
FOS: 2.01 ($K_p \div 1.5$)
Toe: Free Earth Support

1. Factor(s) applied to soil parameter(s) in the 'Wall' page, and used in the embedment calculation.
Factor(s) used: $K_p \div 1.5$
2. Maximum bending moment = 2333.3ftlb/ft and $f = 27000.0$ psi. MINIMUM required sheet section modulus is: $Z = 1.04$ in³/ft (= M/f). Sheet section modulus in this design is $Z = 2.00$ in³/ft, and is satisfactory.
3. Frame primary axis bending moments checked. Users should manually check the axial load capacities and the effects of combined axial and bending stresses to confirm frames are suitable.
4. FOS = 2.01 (Net Pressure)
This is the factor of safety against rotation about the lowest frame. It is calculated using the factored soil parameters (see above).
The FOS can be changed using 'Defined FOS' or 'Manual' in the 'Wall' page.





ELEVATION - ABUTMENT 2 SOE

GENERAL NOTES

DRAWINGS SHALL NOT BE SCALED

MATERIAL PROPERTIES

- PLATE - GR. 36, Fy = 36 KSI MIN.

Revision No. & Date		Vermont Agency of Transportation			Drawing Status	Name	Date	PCL Civil Constructors, Inc.		
					Apr 20 2015 2:39 PM	Drawn By	AJT	04/19/15	3810 Northdale Blvd. Suite 200, Tampa Florida 33624 (813)-264-9500 ; Fax: (813)-264-6689	
Road No.	County / City	Financial Project ID No.			FOR CONSTRUCTION	Design By	TMD/AJT	04/19/15	Submittal	PCL Project / Job No.
I-91	Hartford	IM 091-2(79)				Check By	TMD	04/19/15	ABUTMENT BOTTOM SOE WALL	I-91 Hartford / 5515002
									Drawing Title	Sheet No.
									TYP. ABUTMENT BOT. SOE WALL	01