Number of iterations = 14
Number of zero deflection points = 3

Summary of Pile-Head Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacement in
Type 2 = Shear and Slope, M = pile-head moment lbs-in
Type 3 = Shear and Rot. Stiffness, V = pile-head shear force lbs
Type 4 = Deflection and Moment, S = pile-head slope, radians
Type 5 = Deflection and Slope, R = rotational stiffness of pile-headin-lbs/rad

Load Type	Boundary Condition 1	Boundary Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
5	y= 1.000000	S= 0.000	90000.0000	1.0000000	-3217124.	88939.2961

Pile-head Deflection vs. Pile Length

Boundary Condition Type 5, Deflection and Slope

Deflection = 1.00000 in
Slope = .00000
Axial Load = 90000. lbs

Pile Length in	Pile Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
307.700	1.00000000	-3217124.	88939.29607
292.315	1.00000000	-3216711.	88927.94959
276.930	1.00000000	-3219069.	88974.93112
261.545	1.00000000	-3219627.	88978.44218
246.160	1.00000000	-3217266.	88918.77666
230.775	1.00000000	-3217618.	88922.61850
215.390	1.00000000	-3218486.	88940.50692
200.005	1.00000000	-3211881.	88802.24792
184.620	1.00000000	-3197454.	88411.09280
169.235	1.00000000	-3143411.	86546.91938

The analysis ended normally.

LPILE Plus for Windows, Version 5.0 (5.0.11)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

This program is licensed to:

Youwei Zhou
Kleifelder

Path to file locations: U:\YZhou\Projects\75010\Analysis\LPILE\A1\
Name of input data file: Alf6mm.lpd
Name of output file: Alf6mm.lpo
Name of plot output file: Alf6mm.lpp
Name of runtime file: Alf6mm.lpr

Time and Date of Analysis

Date: May 30, 2007 Time: 12:46:14

Problem Title

A1 fixed head 0.25 inch

Program Options

Units Used in Computations - US Customary Units, Inches, Pounds

Basic Program Options:

Analysis Type 1:
- Computation of Lateral Pile Response Using User-specified Constant EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis includes automatic computation of pile-top deflection vs. pile embedment length
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments = 200
- Maximum number of iterations allowed = 200
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+01 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 1

Pile Structural Properties and Geometry

Pile Length = 307.70 in
Depth of ground surface below top of pile = -100.30 in
Slope angle of ground surface = 25.00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	15.00000000	2485.0000	176.7000	4300000.
2	500.0000	15.00000000	2485.0000	176.7000	4300000.

Soil and Rock Layering Information

The soil profile is modelled using 6 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = -100.300 in
Distance from top of pile to bottom of layer = 91.700 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgsade modulus will be computed for the above soil layer.

Layer 2 is stiff clay without free water
Distance from top of pile to top of layer = 91.700 in
Distance from top of pile to bottom of layer = 175.700 in

Layer 3 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 175.700 in
Distance from top of pile to bottom of layer = 235.700 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is silt with cohesion and friction
Distance from top of pile to top of layer = 235.700 in
Distance from top of pile to bottom of layer = 295.700 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 5 is silt with cohesion and friction
Distance from top of pile to top of layer = 295.700 in
Distance from top of pile to bottom of layer = 381.700 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 6 is silt with cohesion and friction
Distance from top of pile to top of layer = 381.700 in
Distance from top of pile to bottom of layer = 450.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

(Depth of lowest layer extends 142.30 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth is defined using 12 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	-100.30	.07234
2	91.70	.07234
3	91.70	.07234
4	175.70	.07234
5	175.70	.07234
6	235.70	.07234
7	235.70	.06940
8	295.70	.06940
9	295.70	.07234
10	381.70	.07234
11	381.70	.03623
12	450.00	.03623

Shear Strength of Soils

Distribution of shear strength parameters with depth defined using 12 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	-100.300	.000D0	30.00	------	------
2	91.700	.00000	30.00	------	------
3	91.700	6.25000	.00	------	------
4	175.700	6.25000	.00	------	------
5	175.700	.00000	30.00	------	------
6	235.700	.000D0	30.00	------	------
7	235.700	5.56000	25.00	------	------
8	295.700	5.56000	25.00	------	------
9	295.700	3.47000	32.00	------	------
10	381.700	3.47000	32.00	------	------
11	381.700	3.47000	32.00	------	------
12	450.000	3.4700D	32.00	------	------

Notes:

(1) Cohesion = uniaxiol compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are D.
(4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load Case Number 1

Pile-head boundary conditions are Displacement and Slope (BC Type 5)
Deflection at pile head = .250 in
Slope at pile head = .000 in/in
Axial load at pile head = 90000.00D lbs

Computad Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 1

File-head boundary conditions are Displacemant and Slope (BC Type 5)
Specifiod deflection at pile head = .250000 in
Specifiod slope at pile head = 0.000E+00 in/in
Specifiod axial load at pile head = 98000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res P lbs/in
0.000	.250000	-1473348.	41521.2274	0.0000	4956.0633	-361.7302
1.539	.249837	-1409883.	40949.1218	-.0002076	4764.5490	-371.7766
3.077	.249361	-1347290.	40369.6544	-.0004061	4575.6057	-381.6646
4.615	.248587	-1285563.	39774.9878	-.0005956	4389.3079	-391.3827
6.154	.247529	-1224737.	39165.5092	-.0007763	4205.7287	-400.9196
7.692	.246199	-1164836.	38541.5061	-.0009483	4024.9399	-410.2642
9.231	.244611	-1105883.	37903.2826	-.0011118	3847.0119	-419.4057
10.770	.242778	-1047900.	37251.1594	-.0012669	3672.0135	-428.3332
12.308	.240713	-990910.	36585.4737	-.0014136	3500.0119	-437.0365
13.846	.238428	-934935.	35906.5784	-.0015523	3331.0729	-445.5053
15.385	.235936	-879996.	35214.8419	-.0026829	3165.2602	-453.7297
16.924	.233250	-826113.	34510.6475	-.0018058	3002.6359	-461.7001
18.462	.230380	-773306.	33794.3934	-.0019209	2843.2602	-469.4070
20.000	.227339	-721595.	33066.4916	-.0020285	2687.1913	-476.8416
21.539	.224138	-670999.	32327.3680	-.0021288	2534.4855	-483.9950
23.078	.220789	-621535.	31577.4616	-.0022218	2385.1969	-490.8590
24.616	.217302	-573220.	30817.2239	-.0023078	2239.3774	-497.4253
26.154	.213688	-526071.	30047.1187	-.0023870	2097.0770	-503.6864
27.693	.209957	-480104.	29267.6213	-.0024594	1958.3432	-509.6349
29.232	.206120	-435333.	28479.2180	-.0025253	1823.2212	-515.2638
30.770	.202187	-391774.	27682.4055	-.0025848	1691.7540	-520.5666
32.309	.198166	-349439.	26877.6904	-.0026382	1563.9821	-525.5369
33.847	.194069	-308341.	26065.5886	-.0026856	1439.9434	-530.1690
35.386	.189903	-268491.	25246.6249	-.0027271	1319.6736	-534.4574
36.924	.185678	-229902.	24421.3315	-.0027630	1203.2058	-538.3970
38.462	.181401	-192582.	23590.2490	-.0027934	1090.5703	-541.9832
40.001	.177082	-156541.	22753.9243	-.0028185	981.7950	-545.2117
41.539	.172729	-121787.	21912.9109	-.0028385	876.9052	-548.0785
43.078	.168348	-88326.6911	21067.7678	-.0028537	775.9234	-550.5801
44.617	.163948	-56171.5225	20219.0592	-.0028641	678.8696	-552.7134
46.155	.159535	-25321.4970	19367.3540	-.0028699	585.7609	-554.4757
47.694	.155117	4216.5992	18513.2249	-.0028715	522.0640	-555.8645
49.232	.150700	32438.8901	17657.2479	-.0028688	607.2420	-556.8777
50.770	.146290	59342.4146	16803.8577	-.0028622	608.4397	-552.5019
52.309	.141893	84936.9938	15962.4096	-.0028518	765.6869	-541.3532
53.847	.137515	109249.	15138.3182	-.0028379	839.0617	-529.9388
55.386	.133161	132303.	14331.9745	-.0028205	908.6442	-518.2818
56.925	.128836	154129.	13543.7341	-.0027998	974.5161	-506.4051
58.463	.124546	174753.	12773.9177	-.0027762	1036.7611	-494.3312
60.002	.120294	194203.	12022.8116	-.0027496	1095.4642	-482.0824
61.540	.116085	212509.	11290.6679	-.0027203	1150.7118	-469.6806
63.078	.111923	229698.	10577.7056	-.0026885	1202.5912	-457.1473
64.617	.107813	245801.	9804.1107	-.0026543	1251.1910	-444.5036
66.156	.103756	260846.	9210.0370	-.0026178	1296.6006	-431.7703
67.694	.099758	274865.	8555.6069	-.0025792	1338.9100	-418.9676
69.233	.095820	287886.	7920.9118	-.0025387	1378.2099	-406.1154
70.771	.091946	299941.	7306.0131	-.0024964	1414.5912	-393.2330
72.310	.088139	311058.	6710.9425	-.0024524	1448.1452	-380.3393
73.848	.084400	321269.	6135.7035	-.0024069	1478.9635	-367.4528
75.386	.080733	330604.	5580.2712	-.0023600	1507.1375	-354.5912
76.925	.077139	339093.	5044.5939	-.0023117	1532.7584	-341.7719
78.463	.073619	346767.	4529.5935	-.0022624	1555.9174	-329.0119
80.002	.070177	353654.	4032.1663	-.0022119	1576.7051	-316.3274
81.540	.066813	359786.	3555.1839	-.0021606	1595.2117	-303.7342
83.079	.063529	365192.	3097.4941	-.0021084	1611.5269	-291.2476
84.617	.060326	369901.	2658.9216	-.0020555	1625.7395	-278.8824
86.156	.057204	373943.	2239.2687	-.0020019	1637.9376	-266.6527
87.695	.054166	377346.	1838.3164	-.0019478	1648.2082	-254.5722
89.233	.051211	380139.	1455.8251	-.0018933	1656.6375	-242.6540
90.772	.048340	382350.	1091.5353	-.0018384	1663.3105	-230.9108
92.310	.045554	384006.	726.8405	-.0017832	1668.3108	-243.1807
93.849	.042853	385080.	355.5450	-.0017279	1671.5509	-239.4914
95.387	.040237	385579.	-10.0333	-.0016724	1673.0569	-235.7485
96.926	.037707	385512.	-369.8101	-.0016169	1672.8555	-231.9497
98.464	.035262	384889.	-723.6979	-.0015614	1670.9739	-228.0929
100.003	.032903	383710.	-1071.6053	-.0015061	1667.4398	-224.1753
101.541	.030628	382009.	-1413.4362	-.0014510	1662.2810	-220.1938
103.080	.028438	379770.	-1749.0898	-.0013961	1655.5263	-216.1449
104.618	.026332	377013.	-2078.4592	-.0013416	1847.2046	-212.0245
106.156	.024310	373747.	-2401.4303	-.0012876	1637.3456	-207.8276
107.695	.022370	369981.	-2717.8814	-.0012341	1625.9794	-203.5485
109.233	.020513	365725.	-3027.6808	-.0011811	1613.1368	-199.1807
110.772	.018736	360991.	-3330.6858	-.0011288	1598.8493	-194.7159
112.311	.017039	355789.	-3626.7399	-.0010772	1583.1491	-190.1448
113.849	.015421	350130.	-3915.6706	-.0010264	1566.0691	-185.4557
115.388	.013881	344025.	-4197.2854	-.0009764	1547.6432	-180.6344
116.926	.012417	337486.	-4471.3675	-.0009273	1527.9062	-175.6634
118.465	.011028	330524.	-4737.6698	-.0008792	1506.8939	-170.5208
120.003	.009712	323151.	-4995.9064	-.0008322	1484.6436	-165.1785
121.542	.008467	315382.	-5245.7423	-.0007862	1461.1939	-159.6000
123.080	.007293	307228.	-5486.7768	-.0007414	1436.5850	-153.7370
124.619	.006186	298704.	-5718.5210	-.0006978	1410.8594	-147.5229
126.157	.005146	289825.	-5940.3619	-.0006554	1384.0619	-140.8631
127.696	.004169	280607.	-6151.5057	-.0006143	1356.2407	-133.6169
129.234	.003255	271067.	-6350.8777	-.0005746	1327.4480	-125.5602
130.773	.002401	261225.	-6536.9304	-.0005363	1297.7421	-116.3023
132.311	.001605	251102.	-6707.2114	-.0004994	1267.1896	-105.0575
133.850	.000865	240725.	-6857.0857	-.0004640	1235.8715	-89.7742
135.388	.000177	230131.	-6957.6434	-.0004301	1203.8976	-40.9475
136.927	-.000459	219435.	-6929.2495	-.0003977	1171.6173	77.8588
138.465	-.001047	208920.	-6796.1879	-.0003669	1139.8801	95.1170
140.004	-.001588	198625.	-6641.9392	-.0003376	1108.8097	105.4013
141.542	-.002085	188576.	-6474.1261	-.0003097	1078.4804	112.7502
143.081	-.002541	178790.	-6296.3053	-.0002832	1048.9452	118.4110
144.619	-.002957	169281.	-6110.6363	-.0002582	1020.2451	122.9527
146.158	-.003335	160059.	-5918.6005	-.0002345	992.4132	126.6877
147.696	-.003678	151134.	-5721.2907	-.0002121	965.4767	129.8086
149.235	-.003988	142513.	-5519.5533	-.0001909	939.4584	132.4435
150.773	-.004266	134203.	-5314.0667	-.0001710	914.3777	134.6824
152.312	-.004514	126209.	-5105.3894	-.0001523	890.2511	136.5914

153.850	-.004734	118536.	-4893.9903	-.0001347	867.0927	138.2206
155.388	-.004928	111188.	-4680.2698	-.0001181	844.9145	139.6091
156.927	-.005098	104168.	-4464.5743	-.0001026	823.7270	140.7882
158.465	-.005244	97478.6553	-4247.2064	-8.8095E-05	803.5390	141.7830
160.004	-.005369	91123.3537	-4028.4335	-7.4518E-05	784.3580	142.6146
161.542	-.005473	85103.8016	-3808.4935	-6.1831E-05	766.1904	143.3002
163.081	-.005559	79421.7420	-3587.5896	-4.9987E-05	749.0413	143.8547
164.619	-.005627	74078.6005	-3365.9441	-3.8936E-05	732.9151	144.2904
166.158	-.005679	69075.5148	-3143.7013	-2.8631E-05	717.8153	144.6180
167.696	-.005715	64413.3602	-2921.0305	-1.9021E-05	703.7444	144.8468
169.235	-.005737	60092.7712	-2698.0778	-1.0058E-05	690.7044	144.9846
170.773	-.005746	56114.1602	-2474.9777	-1.6918E-06	678.6965	145.0382
172.312	-.005743	52477.7333	-2251.8554	6.1258E-06	667.7214	145.0136
173.851	-.005727	49183.5048	-2028.8274	1.3444E-05	657.7790	144.9155
175.389	-.005701	46231.3082	-1806.0035	2.0313E-05	648.8690	144.7483
176.928	-.005665	43620.8066	-1675.0778	2.6782E-05	640.9902	25.4508
178.466	-.005619	41069.6771	-1635.9145	3.2879E-05	633.2906	25.4601
180.005	-.005564	38577.9925	-1596.7717	3.8612E-05	625.7704	25.4243
181.543	-.005500	36145.7177	-1557.7175	4.3992E-05	618.4296	25.3449
183.082	-.005428	33772.7132	-1518.8179	4.9025E-05	611.2676	25.2233
184.620	-.005349	31458.7385	-1480.1365	5.3721E-05	604.2838	25.0612
186.159	-.005263	29203.4562	-1441.7345	5.8088E-05	597.4771	24.8601
187.697	-.005171	27006.4351	-1403.6707	6.2135E-05	590.8462	24.6216
189.236	-.005072	24867.1545	-1366.0014	6.5869E-05	584.3896	24.3472
190.774	-.004968	22785.0076	-1328.7806	6.9300E-05	578.1055	24.0386
192.313	-.004859	20759.3054	-1292.0598	7.2435E-05	571.9917	23.6974
193.851	-.004745	18789.2805	-1255.8877	7.5282E-05	566.0460	23.3251
195.390	-.004627	16874.0911	-1220.3110	7.7849E-05	560.2657	22.9235
196.928	-.004505	15012.8248	-1185.3734	8.0145E-05	554.6482	22.4942
198.467	-.004380	13204.5026	-1151.1165	8.2176E-05	549.1905	22.0387
200.005	-.004253	11448.0823	-1117.5791	8.3951E-05	543.8894	21.5589
201.543	-.004122	9742.4632	-1084.7975	8.5476E-05	538.7417	21.0562
203.082	-.003990	8086.4896	-1052.8055	8.6760E-05	533.7438	20.5324
204.620	-.003855	6478.9545	-1021.6343	8.7808E-05	528.8920	19.9891
206.159	-.003719	4918.6040	-991.3127	8.8629E-05	524.1827	19.4280
207.697	-.003582	3404.1412	-961.8669	8.9228E-05	519.6119	18.8507
209.236	-.003445	1934.2297	-933.3204	8.9612E-05	515.1756	18.2588
210.774	-.003307	507.4979	-905.6944	8.9788E-05	510.8695	17.6541
212.313	-.003169	-877.4569	-879.0073	8.9761E-05	511.9861	17.0382
213.851	-.003031	-2222.0652	-853.2752	8.9538E-05	516.0443	16.4127
215.390	-.002893	-3527.7807	-828.5116	8.9124E-05	519.9851	15.7792
216.928	-.002756	-4796.0767	-804.7274	8.8525E-05	523.8129	15.1395
218.467	-.002621	-6028.4421	-781.9310	8.7746E-05	527.5324	14.4951
220.005	-.002486	-7226.3777	-760.1282	8.6792E-05	531.1479	13.8478
221.544	-.002354	-8391.3918	-739.3224	8.5667E-05	534.6640	13.1990
223.083	-.002223	-9524.9967	-719.5145	8.4378E-05	538.0853	12.5506
224.621	-.002094	-10628.7047	-700.7028	8.2927E-05	541.4164	11.9041
226.160	-.001968	-11704.0241	-682.8830	8.1319E-05	544.6619	11.2611
227.698	-.001844	-12752.4552	-666.0483	7.9558E-05	547.8262	10.6234
229.237	-.001723	-13775.4867	-650.1894	7.7649E-05	550.9138	9.9925
230.775	-.001605	-14774.5913	-635.2947	7.5593E-05	553.9292	9.3702
232.314	-.001490	-15751.2224	-621.3496	7.3396E-05	556.8768	8.7580
233.852	-.001379	-16706.8094	-608.3372	7.1059E-05	559.7608	8.1576
235.391	-.001271	-17642.7544	-596.2382	6.8586E-05	562.5856	7.5707
236.929	-.001168	-18560.4279	-510.5796	6.5980E-05	565.3552	103.7826
238.468	-.001068	-19232.0798	-371.3236	6.3259E-05	567.3824	77.2458
240.006	-.000973	-19720.5089	-257.4583	6.0455E-05	568.8565	70.7753
241.545	-.000882	-20041.0209	-153.3640	5.7592E-05	569.8238	64.5439
243.083	-.000796	-20208.3591	-58.6647	5.4695E-05	570.3289	58.5622
244.622	-.000714	-20236.6788	27.0303	5.1783E-05	570.4144	52.8385
246.160	-.000637	-20139.5272	104.1228	4.8877E-05	570.1211	47.3792
247.699	-.000564	-19929.8284	173.0225	4.5992E-05	569.4882	42.1881
249.237	-.000495	-19619.8737	234.1438	4.3145E-05	568.5528	37.2676
250.775	-.000431	-19221.3161	287.9033	4.0349E-05	567.3499	32.6180
252.314	-.000371	-18745.1690	334.7168	3.7616E-05	565.9128	28.2381
253.852	-.000315	-18201.8093	374.9873	3.4956E-05	564.2729	24.1252
255.391	-.000263	-17600.9827	409.1524	3.2378E-05	562.4595	20.2754
256.930	-.000216	-16951.8138	437.5829	2.9891E-05	560.5003	16.6834
258.468	-.000172	-16262.8176	460.6808	2.7500E-05	558.4208	13.3431
260.007	-.000131	-15541.9144	478.0276	2.5210E-05	556.2450	10.2472
261.545	-9.39E-05	-14796.4465	492.3933	2.3026E-05	553.9951	7.3878
263.084	-6.02E-05	-14033.1968	501.7350	2.0951E-05	551.6916	4.7562
264.622	-2.95E-05	-13258.4096	507.1961	1.8986E-05	549.3532	2.3430
266.161	-1.74E-06	-12477.8122	509.1051	1.7133E-05	546.9973	.1386485
267.699	2.32E-05	-11696.6379	507.7755	1.5393E-05	544.6396	-1.8672
269.238	4.56E-05	-10919.6499	503.5046	1.3765E-05	542.2946	-3.6849
270.776	6.56E-05	-10151.1662	496.5736	1.2248E-05	539.9752	-5.3252
272.315	8.33E-05	-9395.0847	487.2472	1.0841E-05	537.6932	-6.7988
273.853	9.90E-05	-8654.9086	475.7734	9.5412E-06	535.4593	-8.1168
275.392	.000113	-7933.7723	462.3832	8.3469E-06	533.2828	-9.2899
276.930	.000125	-7234.4670	447.2913	7.2550E-06	531.1723	-10.3290
278.468	.000135	-6559.4660	430.6957	6.2620E-06	529.1350	-11.2467
280.007	.000144	-5910.9504	412.7781	5.3642E-06	527.1778	-12.0476
281.546	.000152	-5290.8333	393.7042	4.5578E-06	525.3062	-12.7478
283.084	.000158	-4700.7847	373.6244	3.8385E-06	523.5253	-13.3553
284.623	.000163	-4142.2542	352.6737	3.2019E-06	521.8396	-13.8788
286.161	.000168	-3616.4944	330.9729	2.6433E-06	520.2528	-14.3305
287.700	.000171	-3124.5825	308.6288	2.1580E-06	518.7682	-14.7162
289.238	.000174	-2667.4411	285.7349	1.7411E-06	517.3885	-15.0452
290.777	.000177	-2245.8584	262.3721	1.3874E-06	516.1161	-15.3256
292.315	.000179	-1860.5063	238.6098	1.0917E-06	514.9531	-15.5647
293.854	.000180	-1511.9584	214.5062	8.4896E-07	513.9011	-15.7692
295.392	.000181	-1200.7058	190.1095	6.5368E-07	512.9617	-15.9456
296.930	.000182	-927.1724	168.2870	5.0049E-07	512.1362	-12.4230
298.469	.000183	-683.0254	146.7985	3.8457E-07	511.3993	-15.5113
300.007	.000183	-475.5797	122.8270	3.0116E-07	510.7732	-15.6510
301.546	.000184	-305.1701	98.6471	2.4496E-07	510.2589	-15.7821
303.084	.000184	-172.1104	74.2695	2.1060E-07	509.8573	-15.9079
304.623	.000184	-76.7010	49.7008	1.9269E-07	509.5694	-16.0307
306.161	.000185	-19.2345	24.9439	1.8578E-07	509.3959	-16.1524
307.700	.000185	0.0000	0.0000	1.8439E-07	509.3379	-16.2739

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	.25000000 in
Computed slope at pile head	=	-.00000457
Maximum bending moment	=	-1473348. lbs-in
Maximum shear force	=	41521.21741 lbs
Depth of maximum bending moment	=	0.00000 in
Depth of maximum shear force	=	0.00000 in

Number of iterations = 12
Number of zero deflection points = 2

Summary of Pile-Head Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacment in
Type 2 = Shear and Slope, M = pile-head moment lbs-in
Type 3 = Shear and Rot. Stiffness, V = pile-head shear force lbs
Type 4 = Deflection and Moment, S = pile-head slope, radians
Type 5 = Deflection and Slope, R = rotational stiffness of pile-headin-lbs/rad

Load Type	Boundary Condition 1	Boundary Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
5	y= .250000	S= 0.000	90000.0000	.2500000	-1473368.	41521.2174

Pile-head Deflection vs. Pile Length

Boundary Condition Type 5, Deflection and Slope

Deflection = .25000 in
Slope = .00000
Axial Load = 90000. lbs

Pile Length in	Pile Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
307.700	.25000000	-1473368.	41521.21741
292.315	.25000000	-1473374.	41521.01359
276.930	.25000000	-1472982.	41510.06543
261.545	.25000000	-1472803.	41505.20486
246.160	.25000000	-1472810.	41502.00280
230.775	.25000000	-1472159.	41483.17699
215.390	.25000000	-1470519.	41463.75287
200.005	.25000000	-1466303.	41378.52072
184.620	.25000000	-1458222.	41196.60755
169.235	.25000000	-1439728.	40687.27099

The analysis ended normally.

LPILE Plus for Windows, Version 5.0 (5.0.11)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

This program is licensed to:

Youwei Zhou
Kleifelder

Path to file locations: U:\YZhou\Projects\75010\Anslysis\LPILE\A1\
Name of input data file: A1Stability.lpd
Name of output file: A1Stability.lpo
Name of plot output file: A1Stabillty.lpp
Name of runtime file: A1Stability.lpr

Time and Date of Analysis

Date: May 30, 2007 Time: 12:32:20

Problem Title

A1 Stability

Program Options

Units Used in Computations - US Customary Units, inches, pounds

Basic Program Options:

Analysis Type 1:
- Computation of Lateral Pile Response Using User-specified Constant EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis includes automatic computation of pile-top deflection vs. pile embedment length
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments = 200
- Maximum number of iterations allowed = 200
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+01 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 1

Pile Structural Properties and Geometry

Pile Length = 200.00 in
Depth of ground surface below top of pile = -100.30 in
Slope angle of ground surface = 25.00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	15.00000000	1242.5000	176.7000	4300000.
2	500.0000	15.00000000	1242.5000	176.7000	4300000.

Soil and Rock Layering Information

The soil profile is modelled using 6 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = -100.300 in
Distance from top of pile to bottom of layer = 91.700 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 2 is stiff clay without free water
Distance from top of pile to top of layer = 91.700 in
Distance from top of pile to bottom of layer = 175.700 in

Layer 3 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 175.700 in
Distance from top of pile to bottom of layer = 235.700 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is silt with cohesion and friction
Distance from top of pile to top of layer = 235.700 in
Distance from top of pile to bottom of layer = 295.700 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 5 is silt with cohesion and friction
Distance from top of pile to top of layer = 295.700 in
Distance from top of pile to bottom of layer = 381.700 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 6 is silt with cohesion and friction
Distance from top of pile to top of layer = 381.700 in
Distance from top of pile to bottom of layer = 450.000 in
p-y subgrade modulus k for top of soil layer = .000 lbs/in**3
p-y subgrade modulus k for bottom of layer = .000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

(Depth of lowest layer extends 250.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth is defined using 12 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	-100.30	.07234
2	91.70	.07234
3	91.70	.07234
4	175.70	.07234
5	175.70	.07234
6	235.70	.07234
7	235.70	.06940
8	295.70	.06940
9	295.70	.07234
10	381.70	.07234
11	381.70	.03623
12	450.00	.03623

Shear Strength of Soils

Distribution of shear strength parameters with depth defined using 12 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	-100.300	.00000	30.00	------	------
2	91.700	.00000	30.00	------	------
3	91.700	6.25000	.00	------	------
4	175.700	6.25000	.00	------	------
5	175.700	.00000	30.00	------	------
6	235.700	.00000	30.00	------	------
7	235.700	5.56000	25.00	------	------
8	295.700	5.56000	25.00	------	------
9	295.700	3.47000	32.00	------	------
10	381.700	3.47000	32.00	------	------
11	381.700	3.47000	32.00	------	------
12	450.000	3.47000	32.00	------	------

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 42000.000 lbs
Bending moment at pile head = .000 in-lbs
Axial load at pile head = 90000.000 lbs

(Zero moment at pile head for this load indicates a free-head condition)

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Specified shear force at pile head = 42000.000 lbs
Specified moment at pile head = .000 in-lbs
Specified axial load at pile head = 90000.000 lbs

(Zero moment for this load indicates free-head conditions)

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Soil Res p lbs/in
0.000	1.004	3.4404E-05	42000.0000	-.0175127	509.3379	-636.6502
1.000	.986588	43257.8209	41357.5330	-.0175087	770.4515	-648.2839
2.000	.969083	85866.6293	40703.3801	-.0174966	1027.6475	-660.0219
3.000	.951595	127814.	40037.4369	-.0174766	1280.8508	-671.8644
4.000	.934130	169087.	39359.5992	-.0174488	1529.9855	-683.8112
5.000	.916697	209674.	38669.7624	-.0174134	1774.9754	-695.8624
6.000	.899303	249561.	37967.8222	-.0173704	2015.7436	-708.0179
7.000	.881956	288736.	37253.6744	-.0173200	2252.2127	-720.2778
8.000	.864663	327186.	36527.2144	-.0172624	2484.3047	-732.6421
9.000	.847432	364898.	35788.3379	-.0171976	2711.9410	-745.1108
10.000	.830268	401858.	35036.9406	-.0171259	2935.0426	-757.6838
11.000	.813180	438054.	34272.9181	-.0170472	3153.5298	-770.3612
12.000	.796174	473473.	33496.1660	-.0169619	3367.3223	-783.1430
13.000	.779256	508100.	32706.5000	-.0168701	3576.3395	-796.0291
14.000	.762434	541923.	31904.0556	-.0167718	3780.5001	-809.0196
15.000	.745712	574927.	31088.4886	-.0166673	3979.7221	-822.1145
16.000	.729099	607100.	30259.7745	-.0165567	4173.9231	-835.3137
17.000	.712599	638427.	29417.8090	-.0164401	4363.0204	-848.6173
18.000	.696219	668894.	28562.4877	-.0163178	4546.9302	-862.0253
19.000	.679964	698489.	27693.7062	-.0161898	4725.5687	-875.5377
20.000	.663839	727196.	26811.3602	-.0160564	4898.8512	-889.1544
21.000	.647851	755002.	25915.3453	-.0159177	5066.6926	-902.8755
22.000	.632004	781892.	25005.5571	-.0157738	5229.0074	-916.7009
23.000	.616303	807852.	24081.8912	-.0156251	5385.7092	-930.6307
24.000	.600754	832868.	23144.2434	-.0154715	5536.7114	-944.6649
25.000	.585360	856926.	22192.5092	-.0153134	5681.9266	-958.8035
26.000	.570127	880010.	21226.5842	-.0151508	5821.2673	-973.0464
27.000	.555058	902106.	20251.4441	-.0149840	5954.6449	-977.2338
28.000	.540159	923210.	19277.3720	-.0148132	6082.0319	-970.9104
29.000	.525432	943327.	18309.7501	-.0146385	6203.4645	-964.3335
30.000	.510882	962464.	17348.8270	-.0144602	6318.9803	-957.5127
31.000	.496512	980627.	16394.8418	-.0142784	6428.6184	-950.4576
32.000	.482325	997824.	15448.0241	-.0140932	6532.4196	-943.1778
33.000	.468325	1014060.	14508.5935	-.0139049	6630.4262	-935.6835
34.000	.454515	1029344.	13576.7594	-.0137137	6722.6816	-927.9847
35.000	.440898	1043682.	12652.7212	-.0135197	6809.2309	-920.0916
36.000	.427476	1057083.	11736.6680	-.0133231	6890.1202	-912.0147
37.000	.414252	1069554.	10828.7784	-.0131241	6965.3968	-903.7645
38.000	.401228	1081103.	9929.2203	-.0129228	7035.1094	-895.3516
39.000	.388406	1091738.	9038.1512	-.0127194	7099.3076	-886.7867
40.000	.375789	1101469.	8155.7176	-.0125142	7158.0410	-878.0806
41.000	.363378	1110302.	7282.0552	-.0123072	7211.3638	-869.2441
42.000	.351174	1118248.	6417.2091	-.0120987	7259.3260	-860.2882
43.000	.339180	1125315.	5561.5331	-.0118887	7301.9816	-851.2238
44.000	.327397	1131511.	4714.8901	-.0116775	7339.3845	-842.0620
45.000	.315825	1136846.	3877.4523	-.0114652	7371.5896	-832.8137
46.000	.304467	1141330.	3049.3005	-.0112520	7398.6520	-823.4899
47.000	.293321	1144970.	2230.5047	-.0110380	7420.6276	-814.1016
48.000	.282390	1147778.	1421.1240	-.0108235	7437.5726	-804.6599
49.000	.271674	1149761.	621.2063	-.0106085	7449.5439	-795.1755
50.000	.261174	1150929.	-169.2112	-.0103931	7456.5984	-785.6595
51.000	.250888	1151293.	-950.1022	-.0101777	7458.7935	-776.1225
52.000	.240818	1150861.	-1721.3970	-.0099622	7456.1866	-766.4471
53.000	.230984	1149644.	-2482.8404	-.0097470	7448.8363	-756.4598
54.000	.221324	1147650.	-3234.1508	-.0095320	7436.8029	-746.1610
55.000	.211900	1144891.	-3975.0072	-.0093174	7420.1489	-735.5519
56.000	.202689	1141377.	-4705.1001	-.0091035	7398.9385	-724.6339
57.000	.193693	1137119.	-5424.1211	-.0088902	7373.2379	-713.4081
58.000	.184909	1132129.	-6131.7630	-.0086779	7343.1155	-701.8756
59.000	.176337	1126418.	-6827.7193	-.0084665	7308.6413	-690.0370
60.000	.167976	1119998.	-7509.3198	-.0082563	7269.8873	-673.1640
61.000	.159825	1112885.	-8168.1481	-.0080473	7226.9561	-644.4927
62.000	.151881	1105110.	-8798.5240	-.0078397	7180.0214	-616.2590
63.000	.144145	1096700.	-9400.8898	-.0076337	7129.2545	-588.4726
64.000	.136614	1087682.	-9975.6973	-.0074292	7074.8239	-561.1425
65.000	.129287	1078085.	-10523.4071	-.0072266	7016.8956	-534.2772
66.000	.122161	1067936.	-11044.4879	-.0070257	6955.6326	-507.8844
67.000	.115235	1057261.	-11539.4157	-.0068268	6891.1953	-481.9713
68.000	.108507	1046086.	-12008.6737	-.0066300	6823.7412	-456.5446
69.000	.101975	1034437.	-12452.7510	-.0064353	6753.4250	-431.6101
70.000	.095637	1022339.	-12872.1428	-.0062428	6680.3983	-407.1734
71.000	.089490	1009817.	-13267.3491	-.0060526	6604.8098	-383.2392
72.000	.083531	996894.	-13638.8746	-.0058648	6526.8054	-359.8118
73.000	.077760	983594.	-13987.2280	-.0056795	6446.5276	-336.8949
74.000	.072172	969942.	-14312.9213	-.0054967	6364.1163	-314.4916
75.000	.066767	955958.	-14616.4694	-.0053164	6279.7081	-292.6046
76.000	.061540	941666.	-14898.3897	-.0051388	6193.4364	-271.2359
77.000	.056489	927086.	-15159.2012	-.0049640	6105.4317	-250.3871
78.000	.051612	912241.	-15399.4243	-.0047918	6015.8213	-230.0592
79.000	.046905	897150.	-15619.5803	-.0046225	5924.7296	-210.2528
80.000	.042367	881834.	-15820.1907	-.0044560	5832.2774	-190.9680
81.000	.037993	866312.	-16001.7769	-.0042924	5738.5829	-172.2044
82.000	.033782	850603.	-16164.8596	-.0041317	5643.7608	-153.9610
83.000	.029730	834726.	-16309.9585	-.0039740	5547.9229	-136.2367
84.000	.025834	818698.	-16437.5917	-.0038193	5451.1777	-119.0296
85.000	.022091	802538.	-16548.2753	-.0036676	5353.6308	-102.3376
86.000	.018499	786262.	-16642.5231	-.0035189	5255.3846	-86.1581
87.000	.015053	769886.	-16720.8462	-.0033732	5156.5384	-70.4880
88.000	.011752	753427.	-16783.7522	-.0032307	5057.1884	-55.3240
89.000	.008592	736900.	-16831.7454	-.0030912	4957.4278	-40.6624
90.000	.005570	720320.	-16865.3260	-.0029548	4857.3469	-26.4988
91.000	.002682	703701.	-16884.9899	-.0028216	4757.0328	-12.8290
92.000	-7.32E-05	687058.	-16882.9508	-.0026914	4656.5696	16.9073
93.000	-.002700	670420.	-16814.4743	-.0025644	4556.1387	120.0457
94.000	-.005202	653891.	-16683.7497	-.0024404	4456.3642	141.4034
95.000	-.007581	637492.	-16535.3702	-.0023196	4357.3768	155.3558

96.000	-.009841	621237.	-16374.7814	-.0022018	4259.2623	165.8218
97.000	-.011985	605139.	-16204.7740	-.0020870	4162.0856	174.1929
98.000	-.014015	589204.	-16027.1068	-.0019752	4065.8988	181.1414
99.000	-.015935	573440.	-15843.0118	-.0018664	3970.7455	187.0487
100.000	-.017748	557854.	-15653.4104	-.0017606	3876.6630	192.1542
101.000	-.019456	542450.	-15459.0236	-.0016576	3783.6836	196.6193
102.000	-.021063	527234.	-15260.4349	-.0015575	3691.8360	200.5582
103.000	-.022571	512209.	-15058.1283	-.0014602	3601.1453	204.0551
104.000	-.023984	497380.	-14852.5135	-.0013657	3511.6342	207.1744
105.000	-.025303	482750.	-14643.9434	-.0012740	3423.3232	209.9659
106.000	-.026532	468322.	-14432.7256	-.0011850	3336.2304	212.4697
107.000	-.027673	454098.	-14219.1316	-.0010987	3250.3726	214.7103
108.000	-.028729	440081.	-14003.4033	-.0010150	3165.7646	216.7382
109.000	-.029703	426274.	-13785.7583	-.0009339	3082.4202	218.5519
110.000	-.030597	412678.	-13566.3933	-.0008554	3000.3516	220.1781
111.000	-.031414	399295.	-13345.4877	-.0007794	2919.5702	221.6330
112.000	-.032156	386127.	-13123.2060	-.0007059	2840.0860	222.9304
113.000	-.032825	373176.	-12899.6997	-.0006348	2761.9081	224.0823
114.000	-.033425	360442.	-12675.1089	-.0005662	2685.0450	225.0993
115.000	-.033958	347928.	-12449.5640	-.0004999	2609.5039	225.9905
116.000	-.034425	335633.	-12223.1867	-.0004359	2535.2916	226.7641
117.000	-.034830	323560.	-11996.0910	-.0003742	2462.4139	227.4275
118.000	-.035174	311708.	-11768.2837	-.0003148	2390.8762	227.9870
119.000	-.035459	300079.	-11540.1660	-.0002575	2320.6829	228.4485
120.000	-.035689	288674.	-11311.5330	-.0002024	2251.8381	228.8174
121.000	-.035864	277493.	-11082.5752	-.0001494	2184.3451	229.0982
122.000	-.035988	266536.	-10853.3785	-9.8536E-05	2118.2068	229.2953
123.000	-.036061	255804.	-10624.0245	-4.9653E-05	2053.4254	229.4126
124.000	-.036087	245297.	-10394.5914	-2.7578E-06	1990.0029	229.4537
125.000	-.036067	235015.	-10165.1536	4.2192E-05	1927.9404	229.4218
126.000	-.036002	224959.	-9935.7027	8.5239E-05	1867.2389	229.3199
127.000	-.035896	215128.	-9706.5474	.0001264	1807.8987	229.1507
128.000	-.035750	205523.	-9477.5137	.0001658	1749.9199	228.9167
129.000	-.035565	196143.	-9248.7452	.0002034	1693.3019	228.6202
130.000	-.035343	186989.	-9020.3035	.0002392	1638.0440	228.2633
131.000	-.035086	178060.	-8792.2479	.0002734	1584.1450	227.8479
132.000	-.034796	169355.	-8564.6160	.0003059	1531.6031	227.3759
133.000	-.034474	160875.	-8337.5237	.0003368	1480.4166	226.8487
134.000	-.034122	152620.	-8110.9654	.0003662	1430.5830	226.2680
135.000	-.033742	144588.	-7885.0139	.0003940	1382.0996	225.6350
136.000	-.033334	136779.	-7659.7209	.0004203	1334.9636	224.9510
137.000	-.032901	129192.	-7435.1369	.0004452	1289.1715	224.2171
138.000	-.032444	121828.	-7211.3112	.0004687	1244.7197	223.4343
139.000	-.031964	114685.	-6988.2923	.0004908	1201.6042	222.6035
140.000	-.031462	107763.	-6766.1278	.0005116	1159.8207	221.7255
141.000	-.030941	101061.	-6544.8645	.0005312	1119.3646	220.8010
142.000	-.030400	94577.9829	-6324.5487	.0005495	1080.2311	219.8305
143.000	-.029842	88313.0991	-6105.2262	.0005666	1042.4149	218.8146
144.000	-.029267	82265.5422	-5886.9421	.0005825	1005.9106	217.7536
145.000	-.028677	76434.3532	-5669.7414	.0005974	970.7122	216.6478
146.000	-.028072	70818.5243	-5453.6688	.0006112	936.8139	215.4973
147.000	-.027454	65416.9898	-5238.7691	.0006239	904.2091	214.3022
148.000	-.026824	60228.6756	-5025.0867	.0006357	872.8912	213.0625
149.000	-.026183	55252.3993	-4812.6665	.0006465	842.8533	211.7780
150.000	-.025531	50486.9702	-4601.5533	.0006564	814.0882	210.4483
151.000	-.024870	45931.1390	-4391.7926	.0006654	786.5882	209.0732
152.000	-.024200	41583.6072	-4183.4301	.0006736	760.3456	207.6518
153.000	-.023523	37443.0268	-3976.5123	.0006810	735.3521	206.1837
154.000	-.022838	33507.9994	-3771.0866	.0006877	711.5994	204.6677
155.000	-.022147	29777.0751	-3567.2013	.0006936	689.0788	203.1030
156.000	-.021451	26248.7523	-3364.9057	.0006988	667.7810	201.4881
157.000	-.020750	22923.4754	-3164.2509	.0007034	647.6969	199.8216
158.000	-.020044	19793.6340	-2965.2892	.0007074	628.8165	198.1017
159.000	-.019335	16863.5609	-2768.0752	.0007108	611.1300	196.3264
160.000	-.018623	14129.5301	-2572.6652	.0007138	594.6268	194.4934
161.000	-.017907	11589.7547	-2379.1186	.0007162	579.2961	192.5999
162.000	-.017190	9242.3840	-2187.4972	.0007181	565.1269	190.6428
163.000	-.016471	7085.5004	-1997.8665	.0007196	552.1075	188.6186
164.000	-.015751	5117.1160	-1810.2957	.0007208	540.2259	186.5231
165.000	-.015030	3335.1685	-1624.8584	.0007216	529.4697	184.3515
166.000	-.014308	1737.5164	-1441.6335	.0007220	519.8259	182.0983
167.000	-.013586	321.9332	-1260.7057	.0007222	511.2811	179.7572
168.000	-.012862	-913.8981	-1082.1668	.0007222	514.8543	177.3207
169.000	-.012141	-1972.3934	-906.1165	.0007219	521.2437	174.7799
170.000	-.011419	-2856.0755	-732.6643	.0007215	526.5778	172.1246
171.000	-.010698	-3567.5850	-561.9307	.0007209	530.8726	169.3425
172.000	-.009978	-4109.6918	-394.0500	.0007201	534.1449	166.4189
173.000	-.009258	-4485.3104	-229.1725	.0007193	536.4122	163.3359
174.000	-.008539	-4697.5176	-67.4687	.0007185	537.6931	160.0717
175.000	-.007821	-4749.5740	90.8666	.0007176	538.0073	156.5989
176.000	-.007104	-4644.9514	185.0564	.0007167	537.3758	31.7808
177.000	-.006388	-4508.4698	215.3148	.0007159	536.5520	28.7360
178.000	-.005672	-4343.1763	242.5124	.0007150	535.5542	25.6593
179.000	-.004958	-4152.1503	266.6173	.0007142	534.4011	22.5505
180.000	-.004244	-3938.5039	287.5973	.0007135	533.1115	19.4095
181.000	-.003531	-3705.3817	305.4201	.0007128	531.7044	16.2362
102.000	-.002818	-3455.9610	320.0533	.0007121	530.1988	13.0304
183.000	-.002106	-3193.4516	331.4646	.0007115	528.6142	9.7920
184.000	-.001395	-2921.0964	339.6210	.0007109	526.9702	6.5209
185.000	-.000685	-2642.1711	344.4898	.0007104	525.2866	3.2167
186.000	2.55E-05	-2359.9846	346.0379	.0007099	523.5832	-.1206027
187.000	.000735	-2077.8789	344.2319	.0007095	521.8804	-3.4914
188.000	.001445	-1799.2295	339.0384	.0007091	520.1984	-6.8957
189.000	.002153	-1527.4456	330.4235	.0007080	518.5579	-10.3340
190.000	.002862	-1265.9699	318.3534	.0007086	516.9795	-13.8063
191.000	.003571	-1018.2791	302.7939	.0007083	515.4844	-17.3128
192.000	.004279	-787.0840	283.7105	.0007082	514.0937	-20.8539
193.000	.004987	-578.3296	261.0687	.0007080	512.8288	-24.4297
194.000	.005695	-393.1951	234.8337	.0007080	511.7113	-28.0403
195.000	.006403	-236.0943	204.9706	.0007079	510.7630	-31.6860
196.000	.007111	-110.6755	171.4442	.0007079	510.0059	-35.3668
197.000	.007819	-20.6216	134.2193	.0007079	509.4622	-39.0830
198.000	.008526	30.3496	93.2605	.0007079	509.5211	-42.8345
199.000	.009234	38.4858	48.5326	.0007079	509.5702	-46.6214
200.000	.009942	0.0000	0.0000	.0007079	509.3379	-50.4438

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection = 1.00410077 in
Computed slope at pile head = -.01751273

Maximum bending moment = 1151293. lbs-in
Maximum shear force = 42000.00000 lbs
Depth of maximum bending moment = 51.00000000 in
Depth of maximum shear force = 0.00000 in
Number of iterations = 23
Number of zero deflection points = 2

Summary of Pile-Head Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacement in
Type 2 = Shear and Slope, M = pile-head moment lbs-in
Type 3 = Shear and Rot. Stiffness, V = pile-head shear force lbs
Type 4 = Deflection and Moment, S = pile-head slope, radians
Type 5 = Deflection and Slope, R = rotational stiffness of pile-headin-lbs/rad

Load Type	Boundary Condition 1	Boundary Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 42000.	M= 0.000	90000.0000	1.0041	1151293.	42000.0000

Pile-head Deflection vs. Pile Length

Boundary Condition Type 1, Shear and Moment

Shear = 42000. lbs
Moment = 0. in-lbs
Axial Load = 90000. lbs

Pile Length in	Pile Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
200.000	1.00410077	1151293.	42000.00000
190.000	1.00371538	1151322.	42000.00000
180.000	1.00327058	1151532.	42000.00000
170.000	1.00865826	1150257.	42000.00000
160.000	1.04092867	1144741.	42000.00000
150.000	1.13655660	1136726.	42000.00000
140.000	1.38300149	1138172.	42000.00000
130.000	2.15137770	1180271.	42000.00000

The analysis ended normally.

1

AXIALLY LOADING PILE ANALYSIS PROGRAM - APILEplus
VERSION 4.0 - (C) COPYRIGHT ENSOFT,INC.,1987-2004.

A1, Ground Elevation 930 ft MSL

DESIGNER : Youwei Zhou

DATE : 05-04-07

PILE PROPERTIES :

PERIMETER OF PILE WITH NONCIRCULAR SECTION= 0.00 IN.
TIP AREA OF PILE WITH NONCIRCULAR SECTION = 0.00 SQF
OUTSIDE DIAMETER OF CIRCULAR PILE = 15.00 IN.
INTERNAL DIAMETER OF CIRCULAR PILE = 0.00 IN.
PILE LENGTH = 43.00 FT.
MODULUS OF ELASTICITY = 0.430E+07 PSI

LENGTH OF SURFACE SECTION WITH ZERO SKIN FRICTION = 10.00 FT.
INCREMENT OF PILE LENGTH USED IN COMPUTATION = 0.50 FT.

SOIL INFORMATIONS :

DEPTH FT.	SOIL TYPE	LATERAL EARTH PRESSURE	EFFECTIVE UNIT WEIGHT LB/CF	FRICTION ANGLE DEGREES	BEARING CAPACITY FACTOR
0.00	SAND	1.00	125.00	30.00	21.00
10.00	SAND	1.00	125.00	30.00	21.00
10.00	SAND	1.00	125.00	30.00	21.00
28.00	SAND	1.00	125.00	30.00	21.00
28.00	CLAY	0.00	125.00	0.00	0.00
35.00	CLAY	0.00	125.00	0.00	0.00
35.00	CLAY	0.00	62.60	0.00	0.00
37.00	CLAY	0.00	62.60	0.00	0.00
37.00	SAND	1.00	62.60	30.00	21.00
42.00	SAND	1.00	62.60	30.00	21.00
42.00	SAND	1.00	57.60	25.00	10.00
47.00	SAND	1.00	57.60	25.00	10.00
47.00	SAND	1.00	62.60	32.00	29.00
55.00	SAND	1.00	62.60	32.00	29.00

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
9999.00	99999.00	0.90	0.00	0.00	0.00	0.00
9999.00	99999.00	0.90	0.00	0.00	0.00	0.00
9999.00	99999.00	0.90	0.00	0.00	0.00	0.00
9999.00	99999.00	0.90	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.82	140.00	0.00	0.00	0.00	0.00	0.00
1.82	140.00	0.00	0.00	0.00	0.00	0.00

1

* COMPUTATION RESULT *

	FED. HWY. METHOD			ARMY CORPS METHOD			LAMBDA 2 METHOD		
PILE PENETRATION FT.	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPACITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPACITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPACITY KIP
0.0	0.0	3.3	3.3	0.0	4.4	4.4	0.0	4.0	4.0
0.5	0.0	4.7	4.7	0.0	6.2	6.2	0.0	5.6	5.6
1.0	0.0	6.0	6.0	0.0	7.9	7.9	0.0	7.2	7.2
1.5	0.0	7.3	7.3	0.0	9.7	9.7	0.0	8.9	8.9
2.0	0.0	8.7	8.7	0.0	11.5	11.5	0.0	10.5	10.5
2.5	0.0	10.0	10.0	0.0	13.2	13.2	0.0	12.1	12.1
3.0	0.0	11.3	11.3	0.0	15.0	15.0	0.0	13.7	13.7
3.5	0.0	12.7	12.7	0.0	16.8	16.8	0.0	15.3	15.3
4.0	0.0	13.9	13.9	0.0	18.5	18.5	0.0	16.9	16.9
4.5	0.0	14.9	14.9	0.0	20.3	20.3	0.0	18.5	18.5
5.0	0.0	15.6	15.6	0.0	22.1	22.1	0.0	20.1	20.1
5.5	0.0	16.1	16.1	0.0	23.8	23.8	0.0	21.7	21.7
6.0	0.0	16.3	16.3	0.0	25.6	25.6	0.0	23.4	23.4
6.5	0.0	16.3	16.3	0.0	27.3	27.3	0.0	25.0	25.0
7.0	0.0	16.3	16.3	0.0	29.1	29.1	0.0	26.6	26.6
7.5	0.0	16.3	16.3	0.0	30.9	30.9	0.0	28.2	28.2
8.0	0.0	16.3	16.3	0.0	32.6	32.6	0.0	29.8	29.8
8.5	0.0	16.3	16.3	0.0	34.4	34.4	0.0	31.4	31.4
9.0	0.0	16.3	16.3	0.0	36.2	36.2	0.0	33.0	33.0
9.5	0.0	16.3	16.3	0.0	37.9	37.9	0.0	34.6	34.6
10.0	0.6	16.3	16.9	0.7	39.5	40.2	0.0	36.2	36.2
10.5	1.7	16.3	18.0	2.0	40.8	42.8	8.2	37.9	46.1

11.0	2.9	16.3	19.2	3.5	41.6	45.1	9.3	39.5	48.8
11.5	4.2	16.3	20.5	5.0	42.2	47.1	10.6	41.1	51.7
12.0	5.5	16.3	21.8	6.5	42.3	48.9	11.9	42.7	54.6
12.5	6.8	16.3	23.2	8.2	42.3	50.5	13.3	44.3	57.6
13.0	8.3	16.3	24.6	9.8	42.3	52.2	14.7	45.9	60.6
13.5	9.7	16.3	26.1	11.5	42.3	53.8	16.1	47.5	63.6
14.0	11.3	16.3	27.6	13.2	42.3	55.5	17.6	49.1	66.8
14.5	12.9	16.3	29.2	14.8	42.3	57.2	19.2	50.7	69.9
15.0	14.5	16.3	30.8	16.5	42.3	58.8	20.7	52.3	73.1
15.5	16.2	16.3	32.5	18.2	42.3	60.5	22.3	54.0	76.3
16.0	18.0	16.3	34.3	19.8	42.3	62.2	24.0	55.6	79.6
16.5	19.8	16.3	36.1	21.5	42.3	63.8	25.7	57.2	82.9
17.0	21.6	16.3	38.0	23.2	42.3	65.5	27.4	58.8	86.2
17.5	23.6	16.3	39.9	24.8	42.3	67.2	29.2	60.4	89.6
18.0	25.5	16.3	41.9	26.5	42.3	68.8	31.0	62.0	93.0
18.5	27.6	16.3	43.9	28.2	42.3	70.5	46.7	63.6	110.3
19.0	29.7	16.3	46.0	29.8	42.3	72.2	48.2	65.2	114.4
19.5	31.8	16.3	48.2	31.5	42.3	73.8	51.7	66.8	118.5
20.0	34.0	16.3	50.4	33.1	42.3	75.5	54.3	68.5	122.7
20.5	36.3	16.3	52.6	34.8	42.3	77.2	56.9	70.1	127.0
21.0	38.6	16.3	54.9	36.5	42.3	78.8	58.5	71.7	131.2
21.5	41.0	16.3	57.3	38.1	42.3	80.5	62.2	73.3	135.5
22.0	43.4	16.3	59.7	39.8	42.3	82.1	64.9	74.9	139.8
22.5	45.9	16.3	62.2	41.5	42.3	83.8	67.7	76.5	144.2
23.0	48.4	16.3	64.7	43.1	42.3	85.5	70.5	78.1	148.6
23.5	51.0	16.3	67.3	44.8	42.3	87.1	73.3	79.7	153.0
24.0	53.6	16.3	70.0	46.5	42.3	88.8	76.2	81.3	157.5
24.5	56.3	16.3	72.7	48.1	42.3	90.5	79.0	82.9	162.0
25.0	59.1	16.3	75.5	49.8	42.3	92.1	82.0	84.6	166.5
25.5	61.9	16.3	78.3	51.5	42.3	93.8	84.9	86.2	171.1
26.0	64.8	15.1	79.9	53.1	35.9	89.0	87.9	71.6	159.4
26.5	67.7	13.8	81.5	54.8	29.4	84.2	90.9	56.6	147.5
27.0	70.7	12.5	83.2	56.5	22.9	79.4	93.9	41.4	135.3
27.5	73.7	11.2	85.0	58.1	16.4	74.6	97.0	25.8	122.8
28.0	76.8	9.9	86.8	59.8	9.9	69.7	100.1	9.9	110.0
28.5	79.2	9.9	89.2	61.3	9.9	71.3	102.3	9.9	112.3
29.0	00.8	9.9	90.9	62.8	9.9	72.7	104.6	9.9	114.6
29.5	82.7	9.9	92.6	64.2	9.9	74.1	106.9	9.9	116.9
30.0	84.4	9.9	94.4	65.6	9.9	75.5	109.2	9.9	119.2
30.5	86.2	9.9	96.1	67.0	9.9	76.9	111.5	9.9	121.5
31.0	87.9	9.9	97.9	68.4	9.9	78.3	113.9	9.9	123.8
31.5	89.7	9.9	99.6	69.8	9.9	79.8	116.2	9.9	126.2
32.0	91.4	9.9	101.3	71.2	9.9	81.2	118.6	9.9	128.5
32.5	93.2	9.9	103.1	72.7	9.9	82.6	121.0	9.9	130.9
33.0	94.8	9.9	104.8	74.1	9.9	84.0	123.4	9.9	133.3
33.5	96.6	9.9	106.6	75.5	9.9	85.4	125.8	9.9	135.7
34.0	98.4	9.9	108.3	76.9	9.9	86.8	128.2	9.9	138.2
34.5	100.1	9.9	110.1	78.3	9.9	88.2	130.7	9.9	140.6
35.0	101.9	11.2	113.1	79.7	16.4	96.1	133.1	31.2	164.3
35.5	103.6	12.5	116.1	81.1	22.9	104.8	102.3	52.7	154.9
36.0	105.4	13.8	119.2	82.5	29.4	111.9	104.3	74.3	178.5
36.5	107.1	15.1	122.2	84.0	35.9	119.8	106.3	96.1	202.3
37.0	108.9	16.3	125.2	85.6	42.3	128.0	108.3	118.0	226.2
37.5	111.8	16.3	128.1	87.3	42.3	129.6	111.2	118.8	230.0
38.0	115.1	16.3	131.4	89.0	42.3	131.3	114.2	119.6	233.8
38.5	118.4	16.3	134.8	90.6	42.3	133.0	117.2	120.4	237.6
39.0	121.8	16.3	138.1	92.3	42.3	134.6	157.3	121.2	278.4
39.5	125.1	16.3	141.5	94.0	42.3	136.3	160.8	121.8	282.6
40.0	128.5	16.3	144.8	95.6	39.5	135.1	164.4	109.6	273.9
40.5	131.8	16.3	148.1	97.3	36.6	133.9	167.9	97.2	265.2
41.0	135.1	16.3	151.5	99.0	33.7	132.7	171.5	84.8	256.3
41.5	138.5	16.3	154.8	100.6	30.9	131.5	175.0	72.4	247.4
42.0	141.8	16.3	158.1	102.3	28.0	130.3	178.6	60.0	238.5
42.5	145.1	16.3	161.5	103.9	28.0	131.9	181.8	60.3	242.1
43.0	147.9	16.3	164.2	105.6	28.0	133.6	185.0	60.7	245.7

****
* API RP-2A (1994) *
****

PILE PENETRATION FT.	TOTAL SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	4.0	4.0
0.50	0.0	5.6	5.6
1.00	0.0	7.2	7.2
1.50	0.0	8.9	8.9
2.00	0.0	10.5	10.5
2.50	0.0	12.1	12.1
3.00	0.0	13.7	13.7
3.50	0.0	15.3	15.3
4.00	0.0	16.9	16.9
4.50	0.0	18.5	18.5
5.00	0.0	20.1	20.1
5.50	0.0	21.7	21.7
6.00	0.0	23.4	23.4
6.50	0.0	25.0	25.0
7.00	0.0	26.6	26.6
7.50	0.0	28.2	28.2
8.00	0.0	29.8	29.8
8.50	0.0	31.4	31.4
9.00	0.0	33.0	33.0
9.50	0.0	34.6	34.6
10.00	0.6	36.2	36.8
10.50	1.7	37.9	39.6
11.00	3.0	39.5	42.4
11.50	4.3	41.1	45.3
12.00	5.6	42.7	48.3
12.50	7.0	44.3	51.3
13.00	8.5	45.9	54.4
13.50	10.0	47.5	57.5
14.00	11.6	49.1	60.7
14.50	13.2	50.7	63.9
15.00	14.9	52.3	67.2
15.50	16.6	54.0	70.6
16.00	18.4	55.6	74.0
16.50	20.3	57.2	77.5
17.00	22.2	58.8	81.0
17.50	24.2	60.4	84.6
18.00	26.2	62.0	88.2
18.50	28.3	63.6	91.9
19.00	30.4	65.2	95.7
19.50	32.6	66.8	99.5

20.00	34.9	68.5	103.4
20.50	37.2	70.1	107.3
21.00	39.6	71.7	111.3
21.50	42.0	73.3	115.3
22.00	44.5	74.9	119.4
22.50	47.1	76.5	123.6
23.00	49.7	78.1	127.8
23.50	52.3	79.7	132.1
24.00	55.0	81.3	136.4
24.50	57.8	82.9	140.8
25.00	60.7	84.6	145.2
25.50	63.5	86.2	149.7
26.00	66.5	71.6	138.1
26.50	69.5	56.6	126.1
27.00	72.6	41.4	114.0
27.50	75.7	25.8	101.5
28.00	78.9	9.9	88.8
28.50	81.3	9.9	91.3
29.00	83.1	9.9	93.0
29.50	84.9	9.9	94.8
30.00	86.6	9.9	96.6
30.50	88.4	9.9	98.3
31.00	90.2	9.9	100.1
31.50	91.9	9.9	101.9
32.00	93.7	9.9	103.6
32.50	95.5	9.9	105.4
33.00	97.2	9.9	107.2
33.50	99.0	9.9	108.9
34.00	100.8	9.9	110.7
34.50	102.5	9.9	112.5
35.00	104.3	31.2	135.5
35.50	106.1	52.7	158.7
36.00	107.8	74.3	182.1
36.50	109.6	96.1	205.7
37.00	111.4	118.0	229.4
37.50	114.3	118.8	233.1
38.00	117.7	119.6	237.3
38.50	121.0	120.4	241.4
39.00	124.3	121.2	245.5
39.50	127.7	121.8	249.5
40.00	131.0	109.6	240.6
40.50	134.4	97.2	231.6
41.00	137.7	84.8	222.5
41.50	141.0	72.4	213.4
42.00	144.4	60.0	204.3
42.50	147.7	60.3	208.0
43.00	151.0	60.7	211.7

AN ASTERISK WILL BE PLACED IN THE END-BEARING COLUMN IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.

```
**************************************************
* COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT *
* CURVES FOR AXIAL LOADING                      *
**************************************************
```

T-Z CURVE NO.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT IN.
1	10	0.0000E+00		
			0.0000E+00	0.0000E+00
			0.0000E+00	0.1000E-01
			0.0000E+00	0.2000E-01
			0.0000E+00	0.4000E-01
			0.0000E+00	0.6000E-01
			0.0000E+00	0.8000E-01
			0.0000E+00	0.9000E-01
			0.0000E+00	0.1000E+00
			0.0000E+00	0.5000E+00
			0.0000E+00	0.2000E+01
2	10	0.5025E+01		
			0.0000E+00	0.0000E+00
			0.0000E+00	0.1000E-01
			0.0000E+00	0.2000E-01
			0.0000E+00	0.4000E-01
			0.0000E+00	0.6000E-01
			0.0000E+00	0.8000E-01
			0.0000E+00	0.9000E-01
			0.0000E+00	0.1000E+00
			0.0000E+00	0.5000E+00
			0.0000E+00	0.2000E+01
3	10	0.9958E+01		
			0.0000E+00	0.0000E+00
			0.2024E+00	0.1000E-01
			0.4048E+00	0.2000E-01
			0.8096E+00	0.4000E-01
			0.1214E+01	0.6000E-01
			0.1619E+01	0.8000E-01
			0.1822E+01	0.9000E-01
			0.2024E+01	0.1000E+00
			0.2024E+01	0.5000E+00
			0.2024E+01	0.2000E+01
4	10	0.1000E+02		
			0.0000E+00	0.0000E+00
			0.4149E+00	0.1000E-01
			0.8298E+00	0.2000E-01
			0.1660E+01	0.4000E-01
			0.2489E+01	0.6000E-01
			0.3319E+01	0.8000E-01
			0.3734E+01	0.9000E-01
			0.4149E+01	0.1000E+00
			0.4149E+01	0.5000E+00
			0.4149E+01	0.2000E+01
5	10	0.1902E+02		
			0.0000E+00	0.0000E+00
			0.7792E+00	0.1000E-01
			0.1558E+01	0.2000E-01
			0.3117E+01	0.4000E-01
			0.4675E+01	0.6000E-01
			0.6234E+01	0.8000E-01

			0.7013E+01	0.9000E-01
			0.7792E+01	0.1000E+00
			0.7792E+01	0.5000E+00
			0.7792E+01	0.2000E+01
6	10	0.2796E+02		
			0.0000E+00	0.0000E+00
			0.1123E+01	0.1000E-01
			0.2247E+01	0.2000E-01
			0.4493E+01	0.4000E-01
			0.6740E+01	0.6000E-01
			0.8986E+01	0.8000E-01
			0.1011E+02	0.9000E-01
			0.3123E+02	0.1000E+00
			0.1123E+02	0.5000E+00
			0.1123E+02	0.2000E+01
7	10	0.2800E+02		
			0.0000E+00	0.0000E+00
			0.2633E+01	0.2400E-01
			0.4388E+01	0.4650E-01
			0.6582E+01	0.8550E-01
			0.7898E+01	0.1200E+00
			0.8776E+01	0.1500E+00
			0.7898E+01	0.3000E+00
			0.7898E+01	0.4500E+00
			0.7898E+01	0.7500E+00
			0.7898E+01	0.3000E+01
8	10	0.3152E+02		
			0.0000E+00	0.0000E+00
			0.1875E+01	0.2400E-01
			0.3125E+01	0.4650E-01
			0.4687E+01	0.8550E-01
			0.5625E+01	0.1200E+00
			0.6250E+01	0.1500E+00
			0.5625E+01	0.3000E+00
			0.5625E+01	0.4500E+00
			0.5625E+01	0.7500E+00
			0.5625E+01	0.3000E+01
9	10	0.3496E+02		
			0.0000E+00	0.0000E+00
			0.1875E+01	0.2400E-01
			0.3125E+01	0.4650E-01
			0.4687E+01	0.8550E-01
			0.5625E+01	0.1200E+00
			0.6250E+01	0.1500E+00
			0.5625E+01	0.3000E+00
			0.5625E+01	0.4500E+00
			0.5625E+01	0.7500E+00
			0.5625E+01	0.3000E+01
10	10	0.3500E+02		
			0.0000E+00	0.0000E+00
			0.1875E+01	0.2400E-01
			0.3125E+01	0.4650E-01
			0.4687E+01	0.8550E-01
			0.5625E+01	0.1200E+00
			0.6250E+01	0.1500E+00
			0.5625E+01	0.3000E+00
			0.5625E+01	0.4500E+00
			0.5625E+01	0.7500E+00
			0.5625E+01	0.3000E+01
11	10	0.3602E+02		
			0.0000E+00	0.0000E+00
			0.1875E+01	0.2400E-01
			0.3125E+01	0.4650E-01
			0.4687E+01	0.8550E-01
			0.5625E+01	0.1200E+00
			0.6250E+01	0.1500E+00
			0.5625E+01	0.3000E+00
			0.5625E+01	0.4500E+00
			0.5625E+01	0.7500E+00
			0.5625E+01	0.3000E+01
12	10	0.3696E+02		
			0.0000E+00	0.0000E+00
			0.1875E+01	0.2400E-01
			0.3125E+01	0.4650E-01
			0.4687E+01	0.8550E-01
			0.5625E+01	0.1200E+00
			0.6250E+01	0.1500E+00
			0.5625E+01	0.3000E+00
			0.5625E+01	0.4500E+00
			0.5625E+01	0.7500E+00
			0.5625E+01	0.3000E+01
13	10	0.3700E+02		
			0.0000E+00	0.0000E+00
			0.1048E+01	0.1000E-01
			0.2092E+01	0.2000E-01
			0.4185E+01	0.4000E-01
			0.6277E+01	0.6000E-01
			0.8370E+01	0.8000E-01
			0.9416E+01	0.9000E-01
			0.1046E+02	0.1000E+00
			0.1046E+02	0.5000E+00
			0.1046E+02	0.2000E+01
14	10	0.3952E+02		
			0.0000E+00	0.0000E+00
			0.1181E+01	0.1000E-01
			0.2361E+01	0.2000E-01
			0.4722E+01	0.4000E-01
			0.7083E+01	0.6000E-01
			0.9444E+01	0.8000E-01
			0.1062E+02	0.9000E-01
			0.1181E+02	0.1000E+00
			0.1181E+02	0.5000E+00
			0.1181E+02	0.2000E+01
15	10	0.4196E+02		
			0.0000E+00	0.0000E+00
			0.1181E+01	0.1000E-01
			0.2361E+01	0.2000E-01
			0.4722E+01	0.4000E-01
			0.7083E+01	0.6000E-01
			0.9444E+01	0.8000E-01
			0.1062E+02	0.9000E-01
			0.1181E+02	0.1000E+00
			0.1181E+02	0.5000E+00
			0.1181E+02	0.2000E+01
16	10	0.4200E+02		

			0.0000E+00	0.0000E+00
			0.1181E+01	0.1000E-01
			0.2361E+01	0.2000E-01
			0.4722E+01	0.4000E-01
			0.7083E+01	0.6000E-01
			0.9444E+01	0.8000E-01
			0.1062E+02	0.9000E-01
			0.1181E+02	0.1000E+00
			0.1181E+02	0.5000E+00
			0.1181E+02	0.2000E+01
17	10	0.4452E+02		
			0.0000E+00	0.0000E+00
			0.1181E+01	0.1000E-01
			0.2361E+01	0.2000E-01
			0.4722E+01	0.4000E-01
			0.7083E+01	0.6000E-01
			0.9444E+01	0.8000E-01
			0.1062E+02	0.9000E-01
			0.1181E+02	0.1000E+00
			0.1181E+02	0.5000E+00
			0.1181E+02	0.2000E+01
18	10	0.4696E+02		
			0.0000E+00	0.0000E+00
			0.1181E+01	0.1000E-01
			0.2361E+01	0.2000E-01
			0.4722E+01	0.4000E-01
			0.7083E+01	0.6000E-01
			0.9444E+01	0.8000E-01
			0.1062E+02	0.9000E-01
			0.1181E+02	0.1000E+00
			0.1181E+02	0.5000E+00
			0.1181E+02	0.2000E+01
19	10	0.4700E+02		
			0.0000E+00	0.0000E+00
			0.1181E+01	0.1000E-01
			0.2361E+01	0.2000E-01
			0.4722E+01	0.4000E-01
			0.7083E+01	0.6000E-01
			0.9444E+01	0.8000E-01
			0.1062E+02	0.9000E-01
			0.1181E+02	0.1000E+00
			0.1181E+02	0.5000E+00
			0.1181E+02	0.2000E+01
20	10	0.5102E+02		
			0.0000E+00	0.0000E+00
			0.1181E+01	0.1000E-01
			0.2361E+01	0.2000E-01
			0.4722E+01	0.4000E-01
			0.7083E+01	0.6000E-01
			0.9444E+01	0.8000E-01
			0.1062E+02	0.9000E-01
			0.1181E+02	0.1000E+00
			0.1181E+02	0.5000E+00
			0.1181E+02	0.2000E+01
21	10	0.5496E+02		
			0.0000E+00	0.0000E+00
			0.1181E+01	0.1000E-01
			0.2361E+01	0.2000E-01
			0.4722E+01	0.4000E-01
			0.7083E+01	0.6000E-01
			0.9444E+01	0.8000E-01
			0.1062E+02	0.9000E-01
			0.1181E+02	0.1000E+00
			0.1181E+02	0.5000E+00
			0.11E1E+02	0.2000E+01

TIP LOAD KIP	TIP MOVEMENT IN.
0.0000E+00	0.0000E+00
0.3791E+01	0.7500E-02
0.7582E+01	0.1500E-01
0.1516E+02	0.3000E-01
0.3033E+02	0.1950E+00
0.4549E+02	0.6300E+00
0.5459E+02	0.1095E+01
0.6066E+02	0.1500E+01
0.6066E+02	0.2250E+01
0.6066E+02	0.3000E+01

LOAD VERSUS SETTLEMENT CURVE

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.2583E+00	0.2207E-03	0.5055E-01	0.1000E-03
0.2583E+01	0.2207E-02	0.5055E+00	0.1000E-02
0.1292E+02	0.1103E-01	0.2527E+01	0.5000E-02
0.2583E+02	0.2207E-01	0.5055E+01	0.1000E-01
0.1125E+03	0.1011E+00	0.1700E+02	0.5000E-01
0.1719E+03	0.1801E+00	0.2160E+02	0.1000E+00
0.1929E+03	0.5941E+00	0.4096E+02	0.5000E+00
0.2047E+03	0.1102E+01	0.5273E+02	0.1000E+01
0.2126E+03	0.2107E+01	0.6066E+02	0.2000E+01

1

AXIALLY LOADING PILE ANALYSIS PROGRAM - APILEplus
VERSION 4.0 - (C) COPYRIGHT ENSOFT,INC.,1987-2004.

Bent 4, Ground Elevation 916 ft MSL

DESIGNER : Youwei Zhou

DATE : 05-04-07

PILE PROPERTIES :

PERIMETER OF PILE WITH NONCIRCULAR SECTION= 0.00 IN.
TIP AREA OF PILE WITH NONCIRCULAR SECTION = 0.00 SQF
OUTSIDE DIAMETER OF CIRCULAR PILE = 15.00 IN.
INTERNAL DIAMETER OF CIRCULAR PILE = 0.00 IN.
PILE LENGTH = 37.00 FT.
MODULUS OF ELASTICITY = 0.430E+07 PSI

LENGTH OF SURFACE SECTION WITH ZERO SKIN FRICTION = 8.25 FT.
INCREMENT OF PILE LENGTH USED IN COMPUTATION = 1.00 FT.

SOIL INFORMATIONS :

DEPTH FT.	SOIL TYPE	LATERAL EARTH PRESSURE	EFFECTIVE UNIT WEIGHT LB/CF	FRICTION ANGLE DEGREES	BEARING CAPACITY FACTOR
0.00	SAND	1.00	125.00	30.00	21.00
15.00	SAND	1.00	125.00	30.00	21.00
15.00	CLAY	0.00	125.00	0.00	0.00
19.00	CLAY	0.00	125.00	0.00	0.00
19.00	CLAY	0.00	62.60	0.00	0.00
21.00	CLAY	0.00	62.60	0.00	0.00
21.00	SAND	1.00	62.60	30.00	21.00
26.00	SAND	1.00	62.60	30.00	21.00
26.00	SAND	1.00	57.60	25.00	10.00
31.00	SAND	1.00	57.60	25.00	10.00
31.00	SAND	1.00	62.60	32.00	29.00
45.00	SAND	1.00	62.60	32.00	29.00

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
9999.00	99999.00	0.90	0.00	0.00	0.00	0.00
9999.00	99999.00	0.90	0.00	0.00	0.00	0.00
9999.00	99999.00	0.90	0.00	0.00	0.00	0.00
9999.00	99999.00	0.90	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.82	140.00	0.00	0.00	0.00	0.00	0.00
1.82	140.00	0.00	0.00	0.00	0.00	0.00

1

* COMPUTATION RESULT *

	* FED. HWY. METHOD *			* ARMY CORPS METHOD *			* LAMBDA 2 METHOD *		
PILE PENETRATION FT.	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPACITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPACITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPACITY KIP
0.0	0.0	3.3	3.3	0.0	4.4	4.4	0.0	4.0	4.0
1.0	0.0	6.0	6.0	0.0	7.9	7.9	0.0	7.2	7.2
2.0	0.0	8.7	8.7	0.0	11.5	11.5	0.0	10.5	10.5
3.0	0.0	11.3	11.3	0.0	15.0	15.0	0.0	13.7	13.7
4.0	0.0	13.9	13.9	0.0	18.5	18.5	0.0	16.9	16.9
5.0	0.0	15.6	15.6	0.0	22.1	22.1	0.0	20.1	20.1
6.0	0.0	16.3	16.3	0.0	25.6	25.6	0.0	23.4	23.4
7.0	0.0	16.3	16.3	0.0	29.1	29.1	0.0	26.6	26.6
8.0	0.0	16.3	16.3	0.0	32.6	32.6	0.0	29.8	29.8
9.0	1.0	16.3	17.3	1.2	36.2	37.4	6.6	33.0	39.7
10.0	3.1	16.3	19.5	3.7	39.9	43.6	8.9	36.2	45.1
11.0	5.5	16.3	21.8	6.5	42.7	49.2	11.3	39.5	50.8
12.0	8.0	16.3	24.4	9.6	44.1	53.7	13.9	42.7	56.6
13.0	10.8	15.1	25.9	12.9	37.3	50.2	16.7	38.1	54.7
14.0	13.8	12.5	26.3	16.3	23.6	39.9	19.6	24.6	44.2
15.0	17.1	9.9	27.0	19.6	9.9	29.5	22.8	9.9	32.8
16.0	20.4	9.9	30.4	22.7	9.9	32.6	36.8	9.9	46.8
17.0	23.9	9.9	33.8	25.5	9.9	35.4	40.9	9.9	50.8
18.0	27.3	9.9	37.3	28.3	9.9	38.3	45.0	9.9	54.9
19.0	30.8	11.2	42.0	31.2	16.8	47.9	49.1	20.9	70.1
20.0	34.2	13.8	48.0	34.0	30.4	64.4	53.3	43.4	96.7
21.0	37.7	16.3	54.0	37.3	44.1	81.4	57.5	66.4	123.9
22.0	41.7	16.3	58.0	40.6	44.1	84.7	62.6	68.1	130.7
23.0	46.3	16.3	62.7	44.0	44.1	88.1	67.7	69.7	137.4
24.0	51.1	16.3	67.4	47.3	41.1	88.4	72.9	63.6	136.5
25.0	55.9	16.3	72.3	50.6	35.1	85.8	78.0	49.7	127.7

26.0	60.9	16.3	77.2	54.0	29.1	83.1	83.2	35.4	118.6
27.0	65.0	16.3	81.3	57.3	29.1	86.4	87.9	36.1	124.1
28.0	68.3	16.3	84.6	60.6	29.1	89.8	92.7	36.8	129.5
29.0	71.6	21.2	92.8	64.0	34.8	98.8	97.4	52.1	149.5
30.0	75.0	30.8	105.8	67.3	46.2	113.5	102.2	82.3	184.5
31.0	78.4	40.5	118.9	70.6	57.5	128.1	107.0	113.2	220.1
32.0	83.7	40.5	124.2	74.0	57.5	131.5	112.5	115.4	227.9
33.0	90.9	40.5	131.4	77.3	57.5	134.8	118.1	117.6	235.7
34.0	98.0	40.5	138.5	80.6	57.5	138.1	123.7	119.8	243.5
35.0	105.2	40.5	145.7	84.0	57.5	141.5	129.3	122.1	251.3
36.0	112.3	40.5	152.8	87.3	57.5	144.8	134.9	124.3	259.2
37.0	119.5	40.5	160.0	90.6	57.5	148.1	140.5	126.5	267.1

*** API RP-2A (1994) ***

PILE PENETRATION FT.	TOTAL SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	4.0	4.0
1.00	0.0	7.2	7.2
2.00	0.0	10.5	10.5
3.00	0.0	13.7	13.7
4.00	0.0	16.9	16.9
5.00	0.0	20.1	20.1
6.00	0.0	23.4	23.4
7.00	0.0	26.6	26.6
8.00	0.0	29.0	29.8
9.00	1.0	33.0	34.0
10.00	3.2	36.2	39.4
11.00	5.6	39.5	45.1
12.00	8.2	42.7	50.9
13.00	11.1	38.1	49.2
14.00	14.2	24.6	38.8
15.00	17.5	9.9	27.5
16.00	20.5	9.9	30.5
17.00	23.2	9.9	33.2
18.00	26.0	9.9	35.9
19.00	28.8	20.9	49.7
20.00	31.7	43.4	75.1
21.00	34.6	66.4	101.1
22.00	38.4	68.1	106.5
23.00	43.2	69.7	112.9
24.00	48.1	63.6	111.7
25.00	53.0	49.7	102.7
26.00	58.1	35.4	93.5
27.00	62.8	36.1	98.9
28.00	66.9	36.8	103.7
29.00	71.1	52.1	123.2
30.00	75.4	82.3	157.7
31.00	79.8	113.2	193.0
32.00	85.2	115.4	200.6
33.00	91.6	117.6	208.2
34.00	98.1	119.8	218.0
35.00	104.8	122.1	226.8
36.00	111.5	124.3	235.8
37.00	118.4	126.5	244.9

AN ASTERISK WILL BE PLACED IN THE END-BEARING COLUMN IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.

*** COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT ***
*** CURVES FOR AXIAL LOADING ***

T-Z CURVE NO.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT IN.
1	10	0.0000E+00		
			0.0000E+00	0.0000E+00
			0.0000E+00	0.1000E-01
			0.0000E+00	0.2000E-01
			0.0000E+00	0.4000E-01
			0.0000E+00	0.6000E-01
			0.0000E+00	0.8000E-01
			0.0000E+00	0.9000E-01
			0.0000E+00	0.1000E+00
			0.0000E+00	0.5000E+00
			0.0000E+00	0.2000E+01
2	10	0.7525E+01		
			0.0000E+00	0.0000E+00
			0.0000E+00	0.1000E-01
			0.0000E+00	0.2000E-01
			0.0000E+00	0.4000E-01
			0.0000E+00	0.6000E-01
			0.0000E+00	0.8000E-01
			0.0000E+00	0.9000E-01
			0.0000E+00	0.1000E+00
			0.0000E+00	0.5000E+00
			0.0000E+00	0.2000E+01
3	10	0.1496E+02		
			0.0000E+00	0.0000E+00
			0.5869E+00	0.1000E-01
			0.1174E+01	0.2000E-01
			0.2348E+01	0.4000E-01
			0.3522E+01	0.6000E-01
			0.4695E+01	0.8000E-01
			0.5282E+01	0.9000E-01
			0.5869E+01	0.1000E+00
			0.5869E+01	0.5000E+00
			0.5869E+01	0.2000E+01
4	10	0.1500E+02		
			0.0000E+00	0.0000E+00
			0.1610E+01	0.2400E-01
			0.2683E+01	0.4650E-01
			0.4024E+01	0.8550E-01

			0.4829E+01	0.1200E+00
			0.5365E+01	0.1500E+00
			0.4829E+01	0.3000E+00
			0.4829E+01	0.4500E+00
			0.4829E+01	0.7500E+00
			0.4829E+01	0.3000E+01
5	10	0.1702E+02		
			0.0000E+00	0.0000E+00
			0.1461E+01	0.2400E-01
			0.2436E+01	0.4650E-01
			0.3654E+01	0.8550E-01
			0.4384E+01	0.1200E+00
			0.4871E+01	0.1500E+00
			0.4384E+01	0.3000E+00
			0.4384E+01	0.4500E+00
			0.4384E+01	0.7500E+00
			0.4384E+01	0.3000E+01
6	10	0.1896E+02		
			0.0000E+00	0.0000E+00
			0.1503E+01	0.2400E-01
			0.2504E+01	0.4650E-01
			0.3757E+01	0.8550E-01
			0.4508E+01	0.1200E+00
			0.5009E+01	0.1500E+00
			0.4508E+01	0.3000E+00
			0.4508E+01	0.4500E+00
			0.4508E+01	0.7500E+00
			0.4508E+01	0.3000E+01
7	10	0.1900E+02		
			0.0000E+00	0.0000E+00
			0.1533E+01	0.2400E-01
			0.2555E+01	0.4650E-01
			0.3832E+01	0.8550E-01
			0.4599E+01	0.1200E+00
			0.5110E+01	0.1500E+00
			0.4599E+01	0.3000E+00
			0.4599E+01	0.4500E+00
			0.4599E+01	0.7500E+00
			0.4599E+01	0.3000E+01
8	10	0.2002E+02		
			0.0000E+00	0.0000E+00
			0.1553E+01	0.2400E-01
			0.2588E+01	0.4650E-01
			0.3882E+01	0.8550E-01
			0.4658E+01	0.1200E+00
			0.5176E+01	0.1500E+00
			0.4658E+01	0.3000E+00
			0.4658E+01	0.4500E+00
			0.4658E+01	0.7500E+00
			0.4658E+01	0.3000E+01
9	10	0.2096E+02		
			0.0000E+00	0.0000E+00
			0.1553E+01	0.2400E-01
			0.2588E+01	0.4650E-01
			0.3882E+01	0.8550E-01
			0.4658E+01	0.1200E+00
			0.5176E+01	0.1500E+00
			0.4658E+01	0.3000E+00
			0.4658E+01	0.4500E+00
			0.4658E+01	0.7500E+00
			0.4658E+01	0.3000E+01
10	10	0.2100E+02		
			0.0000E+00	0.0000E+00
			0.6754E+00	0.1000E-01
			0.1351E+01	0.2000E-01
			0.2701E+01	0.4000E-01
			0.4052E+01	0.6000E-01
			0.5403E+01	0.8000E-01
			0.6078E+01	0.9000E-01
			0.6754E+01	0.1000E+00
			0.6754E+01	0.5000E+00
			0.6754E+01	0.2000E+01
11	10	0.2352E+02		
			0.0000E+00	0.0000E+00
			0.8603E+00	0.1000E-01
			0.1721E+01	0.2000E-01
			0.3441E+01	0.4000E-01
			0.5162E+01	0.6000E-01
			0.6882E+01	0.8000E-01
			0.7743E+01	0.9000E-01
			0.8603E+01	0.1000E+00
			0.8603E+01	0.5000E+00
			0.8603E+01	0.2000E+01
12	10	0.2596E+02		
			0.0000E+00	0.0000E+00
			0.9008E+00	0.1000E-01
			0.1802E+01	0.2000E-01
			0.3603E+01	0.4000E-01
			0.5405E+01	0.6000E-01
			0.7207E+01	0.8000E-01
			0.8108E+01	0.9000E-01
			0.9008E+01	0.1000E+00
			0.9008E+01	0.5000E+00
			0.9008E+01	0.2000E+01
13	10	0.2600E+02		
			0.0000E+00	0.0000E+00
			0.8183E+00	0.1000E-01
			0.1637E+01	0.2000E-01
			0.3273E+01	0.4000E-01
			0.4910E+01	0.6000E-01
			0.6546E+01	0.8000E-01
			0.7365E+01	0.9000E-01
			0.8183E+01	0.1000E+00
			0.8183E+01	0.5000E+00
			0.8183E+01	0.2000E+01
14	10	0.2852E+02		
			0.0000E+00	0.0000E+00
			0.7475E+00	0.1000E-01
			0.1495E+01	0.2000E-01
			0.2990E+01	0.4000E-01
			0.4485E+01	0.6000E-01
			0.5980E+01	0.8000E-01
			0.6727E+01	0.9000E-01
			0.7475E+01	0.1000E+00
			0.7475E+01	0.5000E+00

			0.7475E+01	0.2000E+01
15	10	0.3096E+02		
			0.0000E+00	0.0000E+00
			0.7766E+00	0.1000E-01
			0.1553E+01	0.2000E-01
			0.3106E+01	0.4000E-01
			0.4659E+01	0.6000E-01
			0.6213E+01	0.8000E-01
			0.6989E+01	0.9000E-01
			0.7766E+01	0.1000E+00
			0.7766E+01	0.5000E+00
			0.7766E+01	0.2000E+01
16	10	0.3100E+02		
			0.0000E+00	0.0000E+00
			0.9517E+00	0.1000E-01
			0.1903E+01	0.2000E-01
			0.3807E+01	0.4000E-01
			0.5710E+01	0.6000E-01
			0.7613E+01	0.8000E-01
			0.8565E+01	0.9000E-01
			0.9517E+01	0.1000E+00
			0.9517E+01	0.5000E+00
			0.9517E+01	0.2000E+01
17	10	0.3802E+02		
			0.0000E+00	0.0000E+00
			0.1219E+01	0.1000E-01
			0.2438E+01	0.2000E-01
			0.4877E+01	0.4000E-01
			0.7315E+01	0.6000E-01
			0.9753E+01	0.8000E-01
			0.1097E+02	0.9000E-01
			0.1219E+02	0.1000E+00
			0.1219E+02	0.5000E+00
			0.1219E+02	0.2000E+01
18	10	0.4496E+02		
			0.0000E+00	0.0000E+00
			0.1219E+01	0.1000E-01
			0.2438E+01	0.2000E-01
			0.4877E+01	0.4000E-01
			0.7315E+01	0.6000E-01
			0.9753E+01	0.8000E-01
			0.1097E+02	0.9000E-01
			0.1219E+02	0.1000E+00
			0.1219E+02	0.5000E+00
			0.1219E+02	0.2000E+01

TIP LOAD KIP	TIP MOVEMENT IN.
0.0000E+00	0.0000E+00
0.7907E+01	0.7500E-02
0.1581E+02	0.1500E-01
0.3163E+02	0.3000E-01
0.6326E+02	0.1950E+00
0.9489E+02	0.6300E+00
0.1139E+03	0.1095E+01
0.1265E+03	0.1500E+01
0.1265E+03	0.2250E+01
0.1265E+03	0.3000E+01

LOAD VERSUS SETTLEMENT CURVE

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.2514E+00	0.2176E-03	0.1054E+00	0.1000E-03
0.2514E+01	0.2176E-02	0.1054E+01	0.1000E-02
0.1257E+02	0.1088E-01	0.5272E+01	0.5000E-02
0.2527E+02	0.2101E-01	0.1054E+02	0.1000E-01
0.1012E+03	0.9660E-01	0.3546E+02	0.5000E-01
0.1541E+03	0.1711E+00	0.4505E+02	0.1000E+00
0.1939E+03	0.5945E+00	0.8544E+02	0.5000E+00
0.2185E+03	0.1109E+01	0.1100E+03	0.1000E+01
0.2350E+03	0.2119E+01	0.1265E+03	0.2000E+01

1

AXIALLY LOADING PILE ANALYSIS PROGRAM - APILEplus
VERSION 4.0 - (C) COPYRIGHT ENSOFT,INC.,1987-2004.

Bent 2 and 3, Ground Elevation 916 ft MSL

DESIGNER : Youwei Zhou

DATE : 05-04-07

PILE PROPERTIES :

PERIMETER OF PILE WITH NONCIRCULAR SECTION= 0.00 IN.
TIP AREA OF PILE WITH NONCIRCULAR SECTION = 0.00 SQF
OUTSIDE DIAMETER OF CIRCULAR PILE = 15.00 IN.
INTERNAL DIAMETER OF CIRCULAR PILE = 0.00 IN.
PILE LENGTH = 37.00 FT.
MODULUS OF ELASTICITY = 0.430E+07 PSI

LENGTH OF SURFACE SECTION WITH ZERO SKIN FRICTION = 8.25 FT.
INCREMENT OF PILE LENGTH USED IN COMPUTATION = 1.00 FT.

SOIL INFORMATIONS :

DEPTH FT.	SOIL TYPE	LATERAL EARTH PRESSURE	EFFECTIVE UNIT WEIGHT LB/CF	FRICTION ANGLE DEGREES	BEARING CAPACITY FACTOR
0.00	SAND	1.00	125.00	30.00	21.00
6.00	SAND	1.00	125.00	30.00	21.00
6.00	CLAY	0.00	125.00	0.00	0.00
19.00	CLAY	0.00	125.00	0.00	0.00
19.00	CLAY	0.00	62.60	0.00	0.00
21.00	CLAY	0.00	62.60	0.00	0.00
21.00	SAND	1.00	62.60	30.00	21.00
26.00	SAND	1.00	62.60	30.00	21.00
26.00	SAND	1.00	57.60	25.00	10.00
31.00	SAND	1.00	57.60	25.00	10.00
31.00	SAND	1.00	62.60	32.00	29.00
45.00	SAND	1.00	62.60	32.00	29.00

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
9999.00	99999.00	0.90	0.00	0.00	0.00	0.00
9999.00	99999.00	0.90	0.00	0.00	0.00	0.00
9999.00	99999.00	0.90	0.00	0.00	0.00	0.00
9999.00	99999.00	0.90	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.82	140.00	0.00	0.00	0.00	0.00	0.00
1.82	140.00	0.00	0.00	0.00	0.00	0.00

1

* COMPUTATION RESULT *

PILE PENETRATION FT.	FED. HWY. METHOD TOTAL SKIN FRIC KIP	FED. HWY. METHOD END BEARING KIP	FED. HWY. METHOD ULTIM CAPACITY KIP	ARMY CORPS METHOD TOTAL SKIN FRIC KIP	ARMY CORPS METHOD END BEARING KIP	ARMY CORPS METHOD ULTIM CAPACITY KIP	LAMBDA 2 METHOD TOTAL SKIN FRIC KIP	LAMBDA 2 METHOD END BEARING KIP	LAMBDA 2 METHOD ULTIM CAPACITY KIP
0.0	0.0	3.3	3.3	0.0	4.4	4.4	0.0	4.0	4.0
1.0	0.0	6.0	6.0	0.0	7.9	7.9	0.0	7.2	7.2
2.0	0.0	8.7	8.7	0.0	11.5	11.5	0.0	10.5	10.5
3.0	0.0	11.3	11.3	0.0	15.0	15.0	0.0	13.7	13.7
4.0	0.0	12.7	12.7	0.0	16.1	16.1	0.0	14.9	14.9
5.0	0.0	11.8	11.8	0.0	13.7	13.7	0.0	13.1	13.1
6.0	0.0	9.9	9.9	0.0	9.9	9.9	0.0	9.9	9.9
7.0	0.0	9.9	9.9	0.0	9.9	9.9	0.0	9.9	9.9
8.0	0.0	9.9	9.9	0.0	9.9	9.9	0.0	9.9	9.9
9.0	1.7	9.9	11.7	1.4	9.9	11.4	7.1	9.9	17.0
10.0	5.2	9.9	15.1	4.2	9.9	14.2	9.7	9.9	19.6
11.0	8.6	9.9	18.6	7.1	9.9	17.0	12.3	9.9	22.3
12.0	12.1	9.9	22.0	9.9	9.9	19.8	15.0	9.9	24.9
13.0	15.5	9.9	25.5	12.7	9.9	22.7	26.0	9.9	35.9
14.0	19.0	9.9	28.9	15.6	9.9	25.5	29.9	9.9	39.8
15.0	22.5	9.9	32.4	18.4	9.9	28.3	33.8	9.9	43.7
16.0	25.9	9.9	35.9	21.2	9.9	31.1	37.8	9.9	47.7
17.0	29.4	9.9	39.3	24.0	9.9	34.0	41.8	9.9	51.7
18.0	32.8	9.9	42.8	26.9	9.9	36.8	45.9	9.9	55.8
19.0	36.3	11.2	47.5	29.7	16.8	46.5	50.0	20.9	71.0
20.0	39.7	13.0	53.5	32.5	30.4	63.0	54.2	43.4	97.6
21.0	43.2	16.3	59.5	35.8	44.1	79.9	58.3	66.4	124.8
22.0	47.2	16.3	63.5	39.2	44.1	83.3	63.4	68.1	131.5
23.0	51.8	16.3	68.2	42.5	44.1	86.6	68.5	69.7	138.2
24.0	56.6	16.3	72.9	45.8	41.1	87.0	73.7	63.6	137.3
25.0	61.4	16.3	77.8	49.2	35.1	84.3	78.8	49.7	128.5

26.0	66.4	16.3	82.7	52.5	29.1	81.7	84.0	35.4	119.4
27.0	70.5	16.3	86.9	55.8	29.1	85.0	88.7	36.1	124.8
28.0	73.8	16.3	90.1	59.2	29.1	88.3	93.4	36.8	130.2
29.0	77.1	21.2	98.3	62.5	34.8	97.3	98.2	52.1	150.2
30.0	80.5	30.8	111.3	65.8	46.2	112.0	102.9	82.3	185.2
31.0	83.9	40.5	124.4	69.2	57.5	126.7	107.7	113.2	220.9
32.0	89.3	40.5	129.8	72.5	57.5	130.0	113.2	115.4	228.6
33.0	96.4	40.5	136.9	75.8	57.5	133.3	118.8	117.6	236.4
34.0	103.5	40.5	144.0	79.2	57.5	136.7	124.4	119.8	244.2
35.0	110.7	40.5	151.2	82.5	57.5	140.0	129.9	122.1	252.0
36.0	117.8	40.5	158.3	85.8	57.5	143.3	135.6	124.3	259.9
37.0	125.0	40.5	165.5	89.2	57.5	146.7	141.2	126.5	267.7

```
**********************
* API RP-2A (1994)   *
**********************
```

PILE PENETRATION FT.	TOTAL SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	4.0	4.0
1.00	0.0	7.2	7.2
2.00	0.0	10.5	10.5
3.00	0.0	13.7	13.7
4.00	0.0	14.9	14.9
5.00	0.0	13.1	13.1
6.00	0.0	9.9	9.9
7.00	0.0	9.9	9.9
8.00	0.0	9.9	9.9
9.00	1.0	9.9	10.9
10.00	3.0	9.9	13.0
11.00	5.2	9.9	15.1
12.00	7.4	9.9	17.3
13.00	9.7	9.9	19.7
14.00	12.1	9.9	22.1
15.00	14.6	9.9	24.6
16.00	17.2	9.9	27.2
17.00	19.9	9.9	29.8
18.00	22.7	9.9	32.6
19.00	25.5	20.9	46.4
20.00	28.4	43.4	71.7
21.00	31.3	66.4	97.8
22.00	35.1	68.1	103.2
23.00	39.9	69.7	109.6
24.00	44.7	63.6	108.4
25.00	49.7	49.7	99.4
26.00	54.8	35.4	90.2
27.00	59.4	36.1	95.6
28.00	63.6	36.8	100.4
29.00	67.8	52.1	119.9
30.00	72.1	82.3	154.4
31.00	76.5	113.2	189.7
32.00	81.9	115.4	197.3
33.00	88.3	117.6	205.9
34.00	94.8	119.8	214.6
35.00	101.5	122.1	223.5
36.00	108.2	124.3	232.5
37.00	115.1	126.5	241.6

AN ASTERISK WILL BE PLACED IN THE END-BEARING COLUMN IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.

```
*************************************************
* COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT *
* CURVES FOR AXIAL LOADING                      *
*************************************************
```

T-Z CURVE NO.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT IN.
1	10	0.0000E+00		
			0.0000E+00	0.0000E+00
			0.0000E+00	0.1000E-01
			0.0000E+00	0.2000E-01
			0.0000E+00	0.4000E-01
			0.0000E+00	0.6000E-01
			0.0000E+00	0.8000E-01
			0.0000E+00	0.9000E-01
			0.0000E+00	0.1000E+00
			0.0000E+00	0.5000E+00
			0.0000E+00	0.2000E+01
2	10	0.3025E+01		
			0.0000E+00	0.0000E+00
			0.0000E+00	0.1000E-01
			0.0000E+00	0.2000E-01
			0.0000E+00	0.4000E-01
			0.0000E+00	0.6000E-01
			0.0000E+00	0.8000E-01
			0.0000E+00	0.9000E-01
			0.0000E+00	0.1000E+00
			0.0000E+00	0.5000E+00
			0.0000E+00	0.2000E+01
3	10	0.5958E+01		
			0.0000E+00	0.0000E+00
			0.0000E+00	0.1000E-01
			0.0000E+00	0.2000E-01
			0.0000E+00	0.4000E-01
			0.0000E+00	0.6000E-01
			0.0000E+00	0.8000E-01
			0.0000E+00	0.9000E-01
			0.0000E+00	0.1000E+00
			0.0000E+00	0.5000E+00
			0.0000E+00	0.2000E+01
4	10	0.6000E+01		
			0.0000E+00	0.0000E+00
			0.0000E+00	0.2400E-01
			0.0000E+00	0.4650E-01
			0.0000E+00	0.8550E-01

			0.0000E+00	0.1200E+00
			0.0000E+00	0.1500E+00
			0.0000E+00	0.3000E+00
			0.0000E+00	0.4500E+00
			0.0000E+00	0.7500E+00
			0.0000E+00	0.3000E+01
5	10	0.1253E+02		
			0.0000E+00	0.0000E+00
			0.1235E+01	0.2400E-01
			0.2058E+01	0.4650E-01
			0.3088E+01	0.8550E-01
			0.3705E+01	0.1200E+00
			0.4117E+01	0.1500E+00
			0.3705E+01	0.3000E+00
			0.3703E+01	0.4500E+00
			0.3705E+01	0.7500E+00
			0.3705E+01	0.3000E+01
6	10	0.1896E+02		
			0.0000E+00	0.0000E+00
			0.1503E+01	0.2400E-01
			0.2504E+01	0.4650E-01
			0.3757E+01	0.8550E-01
			0.4508E+01	0.1200E+00
			0.5009E+01	0.1500E+00
			0.4508E+01	0.3000E+00
			0.4508E+01	0.4500E+00
			0.4508E+01	0.7500E+00
			0.4508E+01	0.3000E+01
7	10	0.1900E+02		
			0.0000E+00	0.0000E+00
			0.1533E+01	0.2400E-01
			0.2555E+01	0.4650E-01
			0.3832E+01	0.8550E-01
			0.4599E+01	0.1200E+00
			0.5110E+01	0.1500E+00
			0.4599E+01	0.3000E+00
			0.4599E+01	0.4500E+00
			0.4599E+01	0.7500E+00
			0.4599E+01	0.3000E+01
8	10	0.2002E+02		
			0.0000E+00	0.0000E+00
			0.1553E+01	0.2400E-01
			0.2588E+01	0.4650E-01
			0.3882E+01	0.8550E-01
			0.4658E+01	0.1200E+00
			0.5176E+01	0.1500E+00
			0.4658E+01	0.3000E+00
			0.4658E+01	0.4500E+00
			0.4658E+01	0.7500E+00
			0.4658E+01	0.3000E+01
9	10	0.2096E+02		
			0.0000E+00	0.0000E+00
			0.1553E+01	0.2400E-01
			0.2588E+01	0.4650E-01
			0.3882E+01	0.8550E-01
			0.4658E+01	0.1200E+00
			0.5176E+01	0.1500E+00
			0.4658E+01	0.3000E+00
			0.4658E+01	0.4500E+00
			0.4658E+01	0.7500E+00
			0.4658E+01	0.3000E+01
10	10	0.2100E+02		
			0.0000E+00	0.0000E+00
			0.6754E+00	0.1000E-01
			0.1351E+01	0.2000E-01
			0.2701E+01	0.4000E-01
			0.4052E+01	0.6000E-01
			0.5403E+01	0.8000E-01
			0.6079E+01	0.9000E-01
			0.6754E+01	0.1000E+00
			0.6754E+01	0.5000E+00
			0.6754E+01	0.2000E+01
11	10	0.2352E+02		
			0.0000E+00	0.0000E+00
			0.8603E+00	0.1000E-01
			0.1721E+01	0.2000E-01
			0.3441E+01	0.4000E-01
			0.5162E+01	0.6000E-01
			0.6882E+01	0.8000E-01
			0.7743E+01	0.9000E-01
			0.8603E+01	0.1000E+00
			0.8603E+01	0.5000E+00
			0.8603E+01	0.2000E+01
12	10	0.2596E+02		
			0.0000E+00	0.0000E+00
			0.9008E+00	0.1000E-01
			0.1802E+01	0.2000E-01
			0.3603E+01	0.4000E-01
			0.5405E+01	0.6000E-01
			0.7207E+01	0.8000E-01
			0.8108E+01	0.9000E-01
			0.9008E+01	0.1000E+00
			0.9008E+01	0.5000E+00
			0.9008E+01	0.2000E+01
13	10	0.2600E+02		
			0.0000E+00	0.0000E+00
			0.8183E+00	0.1000E-01
			0.1637E+01	0.2000E-01
			0.3273E+01	0.4000E-01
			0.4910E+01	0.6000E-01
			0.6546E+01	0.8000E-01
			0.7365E+01	0.9000E-01
			0.8183E+01	0.1000E+00
			0.8183E+01	0.5000E+00
			0.8183E+01	0.2000E+01
14	10	0.2852E+02		
			0.0000E+00	0.0000E+00
			0.7475E+00	0.1000E-01
			0.1495E+01	0.2000E-01
			0.2990E+01	0.4000E-01
			0.4485E+01	0.6000E-01
			0.5980E+01	0.8000E-01
			0.6727E+01	0.9000E-01
			0.7475E+01	0.1000E+00
			0.7475E+01	0.5000E+00

			0.7475E+01	0.2000E+01
15	10	0.3036E+02		
			0.0000E+00	0.0000E+00
			0.7766E+00	0.1000E-01
			0.1553E+01	0.2000E-01
			0.3106E+01	0.4000E-01
			0.4659E+01	0.6000E-01
			0.6213E+01	0.8000E-01
			0.6989E+01	0.9000E-01
			0.7766E+01	0.1000E+00
			0.7766E+01	0.5000E+00
			0.7766E+01	0.2000E+01
16	10	0.3100E+02		
			0.0000E+00	0.0000E+00
			0.9517E+00	0.1000E-01
			0.1903E+01	0.2000E-01
			0.3807E+01	0.4000E-01
			0.5710E+01	0.6000E-01
			0.7613E+01	0.8000E-01
			0.8565E+01	0.9000E-01
			0.9517E+01	0.1000E+00
			0.9517E+01	0.5000E+00
			0.9517E+01	0.2000E+01
17	10	0.3802E+02		
			0.0000E+00	0.0000E+00
			0.1219E+01	0.1000E-01
			0.2438E+01	0.2000E-01
			0.4877E+01	0.4000E-01
			0.7315E+01	0.6000E-01
			0.9753E+01	0.8000E-01
			0.1097E+02	0.9000E-01
			0.1219E+02	0.1000E+00
			0.1219E+02	0.5000E+00
			0.1229E+02	0.2000E+01
18	10	0.4496E+02		
			0.0000E+00	0.0000E+00
			0.1219E+01	0.1000E-01
			0.2438E+01	0.2000E-01
			0.4877E+01	0.4000E-01
			0.7315E+01	0.6000E-01
			0.9753E+01	0.8000E-01
			0.1097E+02	0.9000E-01
			0.1219E+02	0.1000E+00
			0.1219E+02	0.5000E+00
			0.1219E+02	0.2000E+01

TIP LOAD KIP	TIP MOVEMENT IN.
0.0000E+00	0.0000E+00
0.7907E+01	0.7500E-02
0.1581E+02	0.1500E-01
0.3163E+02	0.3000E-01
0.6326E+02	0.1950E+00
0.9489E+02	0.6300E+00
0.1139E+03	0.1095E+01
0.1265E+03	0.1500E+01
0.1265E+03	0.2250E+01
0.1265E+03	0.3000E+01

LOAD VERSUS SETTLEMENT CURVE

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.2578E+00	0.2185E-03	0.1054E+00	0.1000E-03
0.2578E+01	0.2185E-02	0.1054E+01	0.1000E-02
0.1289E+02	0.1092E-01	0.5272E+01	0.5000E-02
0.2592E+02	0.2190E-01	0.1054E+02	0.1000E-01
0.1008E+03	0.9642E-01	0.3546E+02	0.5000E-01
0.1544E+03	0.1710E+00	0.4505E+02	0.1000E+00
0.1933E+03	0.5943E+00	0.8544E+02	0.5000E+00
0.2179E+03	0.1109E+01	0.1100E+03	0.1000E+01
0.2344E+03	0.2118E+01	0.1265E+03	0.2000E+01

1

AXIALLY LOADING PILE ANALYSIS PROGRAM - APILEplus
VERSION 4.0 - (C) COPYRIGHT ENSOFT,INC.,1987-2004.

A1,Ground Elevation 916 ft MSL

DESIGNER : Youwei Zhou

DATE : 05-04-07

PILE PROPERTIES :

PERIMETER OF PILE WITH NONCIRCULAR SECTION=	0.00 IN.
TIP AREA OF PILE WITH NONCIRCULAR SECTION =	0.00 SQF
OUTSIDE DIAMETER OF CIRCULAR PILE =	15.00 IN.
INTERNAL DIAMETER OF CIRCULAR PILE =	0.00 IN.
PILE LENGTH =	34.00 FT.
MODULUS OF ELASTICITY =	0.430E+07 PSI

LENGTH OF SURFACE SECTION WITH ZERO SKIN FRICTION = 11.00 FT.
INCREMENT OF PILE LENGTH USED IN COMPUTATION = 0.50 FT.

SOIL INFORMATIONS :

DEPTH FT.	SOIL TYPE	LATERAL EARTH PRESSURE	EFFECTIVE UNIT WEIGHT LB/CF	FRICTION ANGLE DEGREES	BEARING CAPACITY FACTOR
0.00	SAND	1.00	125.00	30.00	21.00
11.00	SAND	1.00	125.00	30.00	21.00
11.00	SAND	1.00	125.00	30.00	21.00
16.00	SAND	1.00	125.00	30.00	21.00
16.00	CLAY	0.00	125.00	0.00	0.00
23.00	CLAY	0.00	125.00	0.00	0.00
23.00	SAND	1.00	125.00	30.00	21.00
28.00	SAND	1.00	125.00	30.00	21.00
28.00	SAND	1.00	120.00	25.00	10.00
33.00	SAND	1.00	120.00	25.00	10.00
33.00	SAND	1.00	125.00	32.00	29.00
41.00	SAND	1.00	125.00	32.00	29.00
41.00	SAND	1.00	62.60	32.00	29.00
50.00	SAND	1.00	62.60	32.00	29.00

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
9999.00	99999.00	0.90	0.00	0.00	0.00	0.00
9999.00	99999.00	0.90	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.70	100.00	0.00	0.00	0.00	0.00	0.00
1.82	140.00	0.00	0.00	0.00	0.00	0.00
1.82	140.00	0.00	0.00	0.00	0.00	0.00
1.82	140.00	0.00	0.00	0.00	0.00	0.00
1.82	140.00	0.00	0.00	0.00	0.00	0.00

1

*** COMPUTATION RESULT ***

	FED. HWY. METHOD			ARMY CORPS METHOD			LAMBDA 2 METHOD		
PILE PENETR-ATION FT.	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC-ITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC-ITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC-ITY KIP
0.0	0.0	3.3	3.3	0.0	4.4	4.4	0.0	4.0	4.0
0.5	0.0	4.7	4.7	0.0	6.2	6.2	0.0	5.6	5.6
1.0	0.0	6.0	6.0	0.0	7.9	7.9	0.0	7.2	7.2
1.5	0.0	7.3	7.3	0.0	9.7	9.7	0.0	8.9	8.9
2.0	0.0	8.7	8.7	0.0	11.5	11.5	0.0	10.5	10.5
2.5	0.0	10.0	10.0	0.0	13.2	13.2	0.0	12.1	12.1
3.0	0.0	11.3	11.3	0.0	15.0	15.0	0.0	13.7	13.7
3.5	0.0	12.7	12.7	0.0	16.8	16.8	0.0	15.3	15.3
4.0	0.0	13.9	13.9	0.0	18.5	18.5	0.0	16.9	16.9
4.5	0.0	14.9	14.9	0.0	20.3	20.3	0.0	18.5	18.5
5.0	0.0	15.6	15.6	0.0	22.1	22.1	0.0	20.1	20.1
5.5	0.0	16.1	16.1	0.0	23.8	23.8	0.0	21.7	21.7
6.0	0.0	16.3	16.3	0.0	25.6	25.6	0.0	23.4	23.4
6.5	0.0	16.3	16.3	0.0	27.3	27.3	0.0	25.0	25.0
7.0	0.0	16.3	16.3	0.0	29.1	29.1	0.0	26.6	26.6
7.5	0.0	16.3	16.3	0.0	30.9	30.9	0.0	28.2	28.2
8.0	0.0	16.3	16.3	0.0	32.6	32.6	0.0	29.8	29.8
8.5	0.0	16.3	16.3	0.0	34.4	34.4	0.0	31.4	31.4
9.0	0.0	16.3	16.3	0.0	36.2	36.2	0.0	33.0	33.0
9.5	0.0	16.3	16.3	0.0	37.9	37.9	0.0	34.6	34.6
10.0	0.0	16.3	16.3	0.0	39.5	39.5	0.0	36.2	36.2
10.5	0.0	16.3	16.3	0.0	40.8	40.8	0.0	37.9	37.9

11.0	0.6	16.3	17.0	0.7	41.6	42.4	0.0	39.5	39.5
11.5	1.9	16.3	18.2	2.2	42.2	44.4	9.7	43.1	50.8
12.0	3.2	16.3	19.5	3.8	42.3	46.1	10.9	42.7	53.5
12.5	4.5	16.3	20.9	5.4	42.3	47.8	12.2	44.3	56.5
13.0	6.0	16.3	22.3	7.1	42.3	49.4	13.6	45.9	59.5
13.5	7.4	16.3	23.8	8.8	42.3	51.1	15.0	47.5	62.5
14.0	9.0	15.1	24.0	10.4	35.9	46.3	16.5	40.6	57.2
14.5	10.6	13.8	24.3	12.1	29.4	41.5	18.0	33.5	51.5
15.0	12.2	12.5	24.7	13.8	22.9	36.7	19.6	25.9	45.6
15.5	13.9	11.2	25.1	15.4	16.4	31.8	21.2	18.1	39.3
16.0	15.7	9.9	25.6	17.1	9.9	27.0	22.9	9.9	32.8
16.5	17.4	9.9	27.4	18.6	9.9	28.6	24.4	9.9	34.3
17.0	19.1	9.9	29.1	20.0	9.9	30.0	25.9	9.9	35.8
17.5	20.9	9.9	30.8	21.5	9.9	31.4	27.4	9.9	37.4
18.0	22.6	9.9	32.5	22.9	9.9	32.8	29.0	9.9	38.9
18.5	24.3	9.9	34.2	24.3	9.9	34.2	30.5	9.9	40.5
19.0	26.0	9.9	35.9	25.7	9.9	35.6	32.1	9.9	42.0
19.5	27.7	9.9	37.7	27.1	9.9	37.1	33.7	9.9	43.6
20.0	29.4	9.9	39.4	28.5	9.9	38.5	35.3	9.9	45.2
20.5	31.2	9.9	41.1	29.9	9.9	39.9	36.9	9.9	46.8
21.0	32.9	11.2	44.1	31.4	16.4	47.8	38.5	22.9	61.4
21.5	34.6	12.5	47.1	32.8	22.9	55.7	40.1	36.2	76.4
22.0	36.3	13.8	50.1	34.2	29.4	63.6	43.8	49.9	91.7
22.5	38.0	15.1	53.1	35.6	35.9	71.5	43.4	63.8	107.3
23.0	39.8	16.3	56.1	37.3	42.3	79.6	45.1	78.1	123.2
23.5	41.9	16.3	58.3	38.9	42.3	81.3	47.3	79.7	127.1
24.0	44.6	16.3	60.9	40.6	42.3	82.9	49.6	81.3	130.9
24.5	47.3	16.3	63.6	42.3	42.3	84.6	51.8	82.9	134.8
25.0	50.0	16.3	66.4	43.9	42.3	86.3	54.1	84.6	138.7
25.5	52.9	16.3	69.2	45.6	42.3	87.9	56.5	86.2	142.6
26.0	55.7	16.3	72.1	47.3	39.5	86.7	58.8	78.2	137.1
26.5	58.7	16.3	75.0	48.9	36.6	85.5	61.2	70.1	131.4
27.0	61.6	16.3	78.0	50.6	33.7	84.3	87.2	61.8	149.1
27.5	64.7	16.3	81.0	52.3	30.9	83.1	90.3	53.4	143.7
28.0	67.8	16.3	84.1	53.9	28.0	81.9	93.5	44.8	138.3
28.5	70.3	16.3	86.7	55.6	28.0	83.6	96.4	45.5	141.9
29.0	72.3	16.3	88.7	57.3	28.0	85.2	99.3	46.3	145.5
29.5	74.4	16.3	90.7	58.9	28.0	86.9	102.2	47.0	149.2
30.0	76.5	16.3	92.8	60.6	29.0	88.6	105.2	47.7	152.9
30.5	78.6	16.3	94.9	62.2	28.0	90.2	100.1	48.5	156.6
31.0	80.7	21.2	101.9	63.9	33.4	97.3	111.1	68.5	179.6
31.5	82.9	26.0	108.9	65.6	38.9	104.5	114.2	88.8	202.9
32.0	85.1	30.8	116.0	67.2	44.3	111.6	117.2	109.4	226.6
32.5	87.4	35.7	123.1	68.9	49.8	118.7	120.5	130.3	250.6
33.0	89.7	40.5	130.2	70.6	55.2	125.8	123.4	151.5	274.9
33.5	93.2	40.5	133.7	72.2	55.2	127.5	127.0	153.7	280.7
34.0	96.8	40.5	137.3	73.9	55.2	129.1	130.6	155.9	286.5

****
* API RP-2A (1984) *
****

PILE PENETRATION FT.	TOTAL SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	4.0	4.0
0.50	0.0	5.6	5.6
1.00	0.0	7.2	7.2
1.50	0.0	8.9	8.9
2.00	0.0	10.5	10.5
2.50	0.0	12.1	12.1
3.00	0.0	13.7	13.7
3.50	0.0	15.3	15.3
4.00	0.0	16.9	16.9
4.50	0.0	18.5	18.5
5.00	0.0	20.1	20.1
5.50	0.0	21.7	21.7
6.00	0.0	23.4	23.4
6.50	0.0	25.0	25.0
7.00	0.0	26.6	26.6
7.50	0.0	28.2	28.2
8.00	0.0	29.8	29.8
8.50	0.0	31.4	31.4
9.00	0.0	33.0	33.0
9.50	0.0	34.6	34.6
10.00	0.0	36.2	36.2
10.50	0.0	17.9	37.9
11.00	0.6	39.5	40.1
11.50	1.9	41.1	43.0
12.00	3.3	42.7	45.9
12.50	4.7	44.3	49.0
13.00	6.1	45.9	52.0
13.50	7.6	47.5	55.2
14.00	9.2	40.6	49.9
14.50	10.4	33.5	44.3
15.00	12.5	25.9	38.5
15.50	14.3	18.1	32.4
16.00	16.1	9.9	26.0
16.50	17.7	9.9	27.6
17.00	19.0	9.9	29.0
17.50	20.4	9.9	30.3
18.00	21.8	9.9	31.7
18.50	23.2	9.9	33.1
19.00	24.6	9.9	34.5
19.50	26.0	9.9	36.0
20.00	27.5	9.9	37.4
20.50	29.0	9.9	38.9
21.00	30.5	22.9	53.4
21.50	12.0	36.2	68.3
22.00	33.5	49.9	83.4
22.50	35.1	63.8	98.9
23.00	36.7	78.1	114.8
23.50	38.8	79.7	118.5
24.00	41.5	81.3	122.9
24.50	44.3	82.9	127.2
25.00	47.1	84.6	131.7
25.50	50.0	86.2	136.2
26.00	53.0	78.2	131.2
26.50	56.0	70.1	126.1
27.00	59.0	61.9	120.9
27.50	62.1	53.4	115.6
28.00	65.3	44.8	110.1
28.50	68.2	45.5	113.7

29.00	70.8	46.3	117.0
29.50	73.4	47.0	120.4
30.00	76.0	47.7	123.8
30.50	78.7	48.5	127.2
31.00	81.5	68.5	149.9
31.50	84.2	88.8	173.0
32.00	87.1	109.4	196.4
32.50	89.9	130.3	220.2
33.00	92.8	151.5	244.3
33.50	96.4	153.7	250.1
34.00	100.0	155.9	255.9

AN ASTERISK WILL BE PLACED IN THE END-BEARING COLUMN IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.

```
**************************************************
* COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT *
* CURVES FOR AXIAL LOADING                      *
**************************************************
```

T-Z CURVE NO.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT IN.
1	10	0.0000E+00		
			0.0000E+00	0.0000E+00
			0.0000E+00	0.1000E-01
			0.0000E+00	0.2000E-01
			0.0000E+00	0.4000E-01
			0.0000E+00	0.6000E-01
			0.0000E+00	0.8000E-01
			0.0000E+00	0.9000E-01
			0.0000E+00	0.1000E+00
			0.0000E+00	0.5000E+00
			0.0000E+00	0.2000E+01
2	10	0.5525E+01		
			0.0000E+00	0.0000E+00
			0.0000E+00	0.1000E-01
			0.0000E+00	0.2000E-01
			0.0000E+00	0.4000E-01
			0.0000E+00	0.6000E-01
			0.0000E+00	0.8000E-01
			0.0000E+00	0.9000E-01
			0.0000E+00	0.1000E+00
			0.0000E+00	0.5000E+00
			0.0000E+00	0.2000E+01
3	10	0.1096E+02		
			0.0000E+00	0.0000E+00
			0.2226E+00	0.1000E-01
			0.4453E+00	0.2000E-01
			0.8905E+00	0.4000E-01
			0.1336E+01	0.6000E-01
			0.1781E+01	0.8000E-01
			0.2004E+01	0.9000E-01
			0.2226E+01	0.1000E+00
			0.2226E+01	0.5000E+00
			0.2226E+01	0.2000E+01
4	10	0.1100E+02		
			0.0000E+00	0.0000E+00
			0.4554E+00	0.1000E-01
			0.9108E+00	0.2000E-01
			0.1822E+01	0.4000E-01
			0.2732E+01	0.6000E-01
			0.3643E+01	0.8000E-01
			0.4098E+01	0.9000E-01
			0.4554E+01	0.1000E+00
			0.4554E+01	0.5000E+00
			0.4554E+01	0.2000E+01
5	10	0.1353E+02		
			0.0000E+00	0.0000E+00
			0.5566E+00	0.1000E-01
			0.1113E+01	0.2000E-01
			0.2226E+01	0.4000E-01
			0.3339E+01	0.6000E-01
			0.4453E+01	0.8000E-01
			0.5009E+01	0.9000E-01
			0.5566E+01	0.1000E+00
			0.5566E+01	0.5000E+00
			0.5566E+01	0.2000E+01
6	10	0.1596E+02		
			0.0000E+00	0.0000E+00
			0.6375E+00	0.1000E-01
			0.1275E+01	0.2000E-01
			0.2550E+01	0.4000E-01
			0.3825E+01	0.6000E-01
			0.5100E+01	0.8000E-01
			0.5738E+01	0.9000E-01
			0.6375E+01	0.1000E+00
			0.6375E+01	0.5000E+00
			0.6375E+01	0.2000E+01
7	10	0.1600E+02		
			0.0000E+00	0.0000E+00
			0.1681E+01	0.2400E-01
			0.2802E+01	0.4650E-01
			0.4203E+01	0.8550E-01
			0.5043E+01	0.1200E+00
			0.5604E+01	0.1500E+00
			0.5043E+01	0.3000E+00
			0.5043E+01	0.4500E+00
			0.5043E+01	0.7500E+00
			0.5043E+01	0.3000E+01
8	10	0.1952E+02		
			0.0000E+00	0.0000E+00
			0.1553E+01	0.2400E-01
			0.2588E+01	0.4650E-01
			0.3882E+01	0.8550E-01
			0.4658E+01	0.1200E+00
			0.5176E+01	0.1500E+00
			0.4658E+01	0.3000E+00
			0.4658E+01	0.4500E+00
			0.4658E+01	0.7500E+00

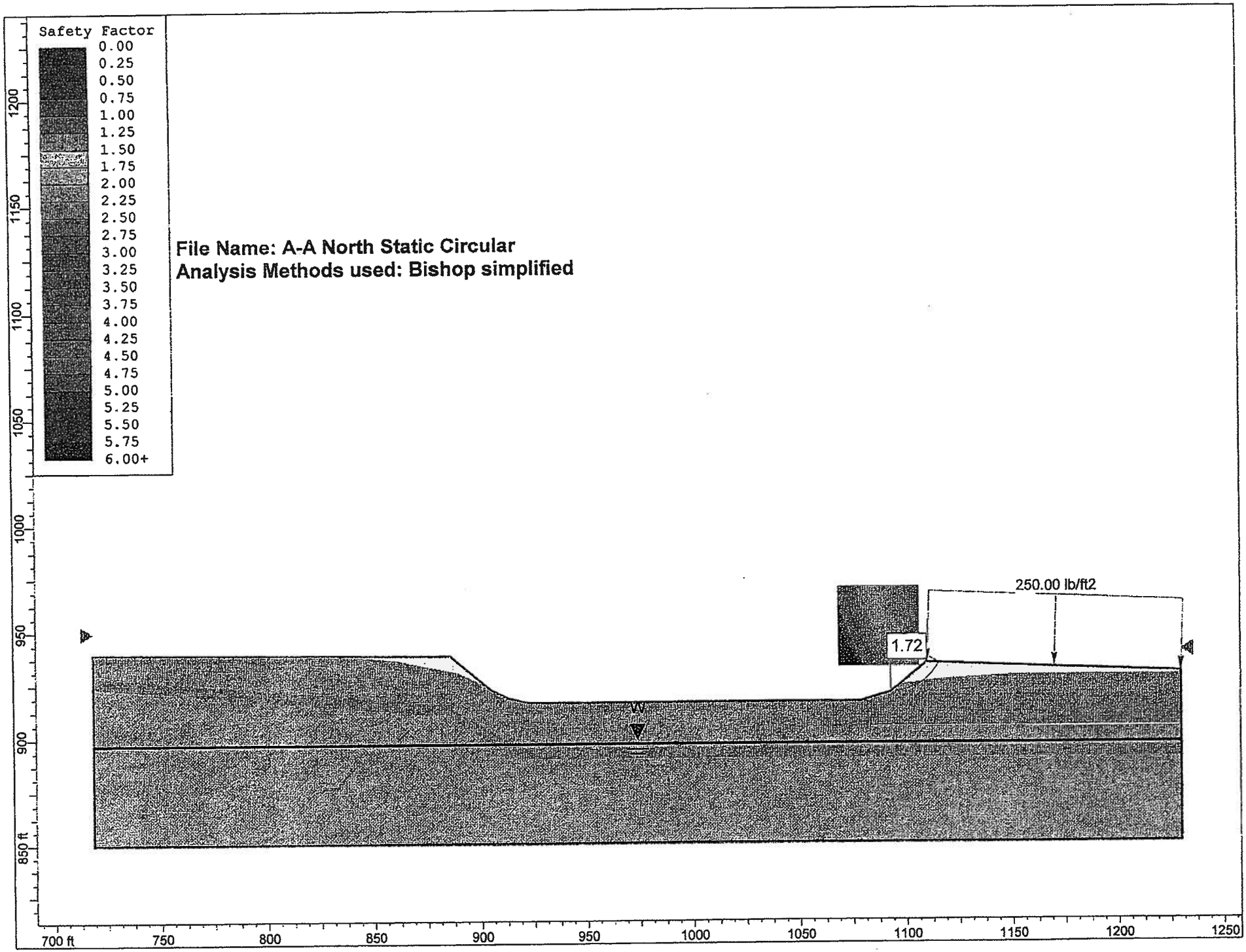
			0.4658E+01	0.3000E+01
9	10	0.2296E+02		
			0.0000E+00	0.0000E+00
			0.1666E+01	0.2400E-01
			0.2777E+01	0.4650E-01
			0.4166E+01	0.8550E-01
			0.4999E+01	0.1200E+00
			0.5555E+01	0.1500E+00
			0.4999E+01	0.3000E+00
			0.4999E+01	0.4500E+00
			0.4999E+01	0.7500E+00
			0.4999E+01	0.3000E+01
10	10	0.2300E+02		
			0.0000E+00	0.0000E+00
			0.7549E+00	0.1000E-01
			0.1510E+01	0.2000E-01
			0.3020E+01	0.4000E-01
			0.4529E+01	0.6000E-01
			0.6039E+01	0.8000E-01
			0.6794E+01	0.9000E-01
			0.7549E+01	0.1000E+00
			0.7549E+01	0.5000E+00
			0.7549E+01	0.2000E+01
11	10	0.2552E+02		
			0.0000E+00	0.0000E+00
			0.1042E+01	0.1000E-01
			0.2085E+01	0.2000E-01
			0.4169E+01	0.4000E-01
			0.6254E+01	0.6000E-01
			0.8338E+01	0.8000E-01
			0.9381E+01	0.9000E-01
			0.1042E+02	0.1000E+00
			0.1042E+02	0.5000E+00
			0.1042E+02	0.2000E+01
12	10	0.2796E+02		
			0.0000E+00	0.0000E+00
			0.1123E+01	0.1000E-01
			0.2247E+01	0.2000E-01
			0.4493E+01	0.4000E-01
			0.6740E+01	0.6000E-01
			0.8986E+01	0.8000E-01
			0.1011E+02	0.9000E-01
			0.1123E+02	0.1000E+00
			0.1123E+02	0.5000E+00
			0.1123E+02	0.2000E+01
13	10	0.2800E+02		
			0.0000E+00	0.0000E+00
			0.1017E+01	0.1000E-01
			0.2033E+01	0.2000E-01
			0.4066E+01	0.4000E-01
			0.6100E+01	0.6000E-01
			0.8133E+01	0.8000E-01
			0.9149E+01	0.9000E-01
			0.1017E+02	0.1000E+00
			0.1017E+02	0.5000E+00
			0.1017E+02	0.2000E+01
14	10	0.3052E+02		
			0.0000E+00	0.0000E+00
			0.9681E+00	0.1000E-01
			0.1936E+01	0.2000E-01
			0.3872E+01	0.4000E-01
			0.5808E+01	0.6000E-01
			0.7744E+01	0.8000E-01
			0.8713E+01	0.9000E-01
			0.9681E+01	0.1000E+00
			0.9681E+01	0.5000E+00
			0.9681E+01	0.2000E+01
15	10	0.3296E+02		
			0.0000E+00	0.0000E+00
			0.1029E+01	0.1000E-01
			0.2057E+01	0.2000E-01
			0.4115E+01	0.4000E-01
			0.6172E+01	0.6000E-01
			0.8230E+01	0.8000E-01
			0.9258E+01	0.9000E-01
			0.1029E+02	0.1000E+00
			0.1029E+02	0.5000E+00
			0.1029E+02	0.2000E+01
16	10	0.3300E+02		
			0.0000E+00	0.0000E+00
			0.1255E+01	0.1000E-01
			0.2509E+01	0.2000E-01
			0.5018E+01	0.4000E-01
			0.7527E+01	0.6000E-01
			0.1004E+02	0.8000E-01
			0.1129E+02	0.9000E-01
			0.1255E+02	0.1000E+00
			0.1255E+02	0.5000E+00
			0.1255E+02	0.2000E+01
17	10	0.3702E+02		
			0.0000E+00	0.0000E+00
			0.1264E+01	0.1000E-01
			0.2528E+01	0.2000E-01
			0.5056E+01	0.4000E-01
			0.7583E+01	0.6000E-01
			0.1011E+02	0.8000E-01
			0.1137E+02	0.9000E-01
			0.1264E+02	0.1000E+00
			0.1264E+02	0.5000E+00
			0.1264E+02	0.2000E+01
18	10	0.4096E+02		
			0.0000E+00	0.0000E+00
			0.1264E+01	0.1000E-01
			0.2528E+01	0.2000E-01
			0.5056E+01	0.4000E-01
			0.7583E+01	0.6000E-01
			0.1011E+02	0.8000E-01
			0.1137E+02	0.9000E-01
			0.1264E+02	0.1000E+00
			0.1264E+02	0.5000E+00
			0.1264E+02	0.2000E+01
19	10	0.4100E+02		
			0.0000E+00	0.0000E+00
			0.1264E+01	0.1000E-01
			0.2528E+01	0.2000E-01

			0.5056E+01	0.4000E-01
			0.7583E+01	0.6000E-01
			0.1011E+02	0.8000E-01
			0.1137E+02	0.9000E-01
			0.1264E+02	0.1000E+00
			0.1264E+02	0.5000E+00
			0.1264E+02	0.2000E+01
20	10	0.4552E+02		
			0.0000E+00	0.0000E+00
			0.1264E+01	0.1000E-01
			0.2528E+01	0.2000E-01
			0.5056E+01	0.4000E-01
			0.7583E+01	0.6000E-01
			0.1011E+02	0.8000E-01
			0.1137E+02	0.9000E-01
			0.1264E+02	0.1000E+00
			0.1264E+02	0.5000E+00
			0.1264E+02	0.2000E+01
21	10	0.4996E+02		
			0.0000E+00	0.0000E+00
			0.1264E+01	0.1000E-01
			0.2528E+01	0.2000E-01
			0.5056E+01	0.4000E-01
			0.7583E+01	0.6000E-01
			0.1011E+02	0.8000E-01
			0.1137E+02	0.9000E-01
			0.1264E+02	0.1000E+00
			0.1264E+02	0.5000E+00
			0.1264E+02	0.2000E+01

TIP LOAD KIP	TIP MOVEMENT IN.
0.0000E+00	0.0000E+00
0.9745E+01	0.7500E-02
0.1949E+02	0.1500E-01
0.3898E+02	0.3000E-01
0.7796E+02	0.1950E+00
0.1169E+03	0.6300E+00
0.1403E+03	0.1095E+01
0.1559E+03	0.1500E+01
0.1559E+03	0.2250E+01
0.1559E+03	0.3000E+01

LOAD VERSUS SETTLEMENT CURVE

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.2698E+00	0.2194E-03	0.1299E+00	0.1000E-03
0.2698E+01	0.2194E-02	0.1299E+01	0.1000E-02
0.1349E+02	0.1097E-01	0.6497E+01	0.5000E-02
0.2699E+02	0.2394E-01	0.1299E+02	0.1000E-01
0.1057E+03	0.9590E-01	0.4371E+02	0.5000E-01
0.1570E+03	0.1682E+00	0.5552E+02	0.1000E+00
0.2066E+03	0.5949E+00	0.1053E+03	0.5000E+00
0.2369E+03	0.1111E+01	0.1356E+03	0.1000E+01
0.2572E+03	0.2122E+01	0.1559E+03	0.2000E+01


Safety Factor
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
File Name: A-A North Static Circular
Analysis Methods used: Bishop simplified
250.00 lb/ft2
1.72
1200
1150
1100
1050
1000
950
900
850 ft
700 ft
750
800
850
900
950
1000
1050
1100
1150
1200
1250

Slide Analysis Information

Document Name

File Name: A-A North Static Circular

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2

Material Properties

Material: New Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Old Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Alluvium (CL)
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 900 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Alluvium (SM/SC)
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 100 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock-Highly Weathered
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 800 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 500 psf
Friction Angle: 32 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified

FS: 1.716380
Center: 1093.172, 945.484
Radius: 25.466
Left Slip Surface Endpoint: 1093.023, 920.019
Right Slip Surface Endpoint: 1115.789, 933.780
Resisting Moment=342710 lb-ft
Driving Moment=199870 lb-ft

List of All Coordinates

Material Boundary
838.000 938.000
860.000 936.000
890.000 930.000
903.538 923.231

Material Boundary
1095.833 922.333
1100.000 924.000
1116.000 926.000
1150.000 928.000
1229.857 928.000

Material Boundary
884.000 910.000
918.000 890.000
1229.857 890.000

Material Boundary
718.096 923.525
884.000 910.000

Material Boundary
718.096 928.525
884.000 915.000
918.000 895.000
1229.857 895.000

Material Boundary
834.096 938.419
838.000 938.000

Material Boundary
718.096 935.000
850.000 935.000
884.012 925.045
918.000 911.000
932.000 911.000

Material Boundary
718.096 918.525
884.000 905.000
918.000 885.000
1229.857 885.000

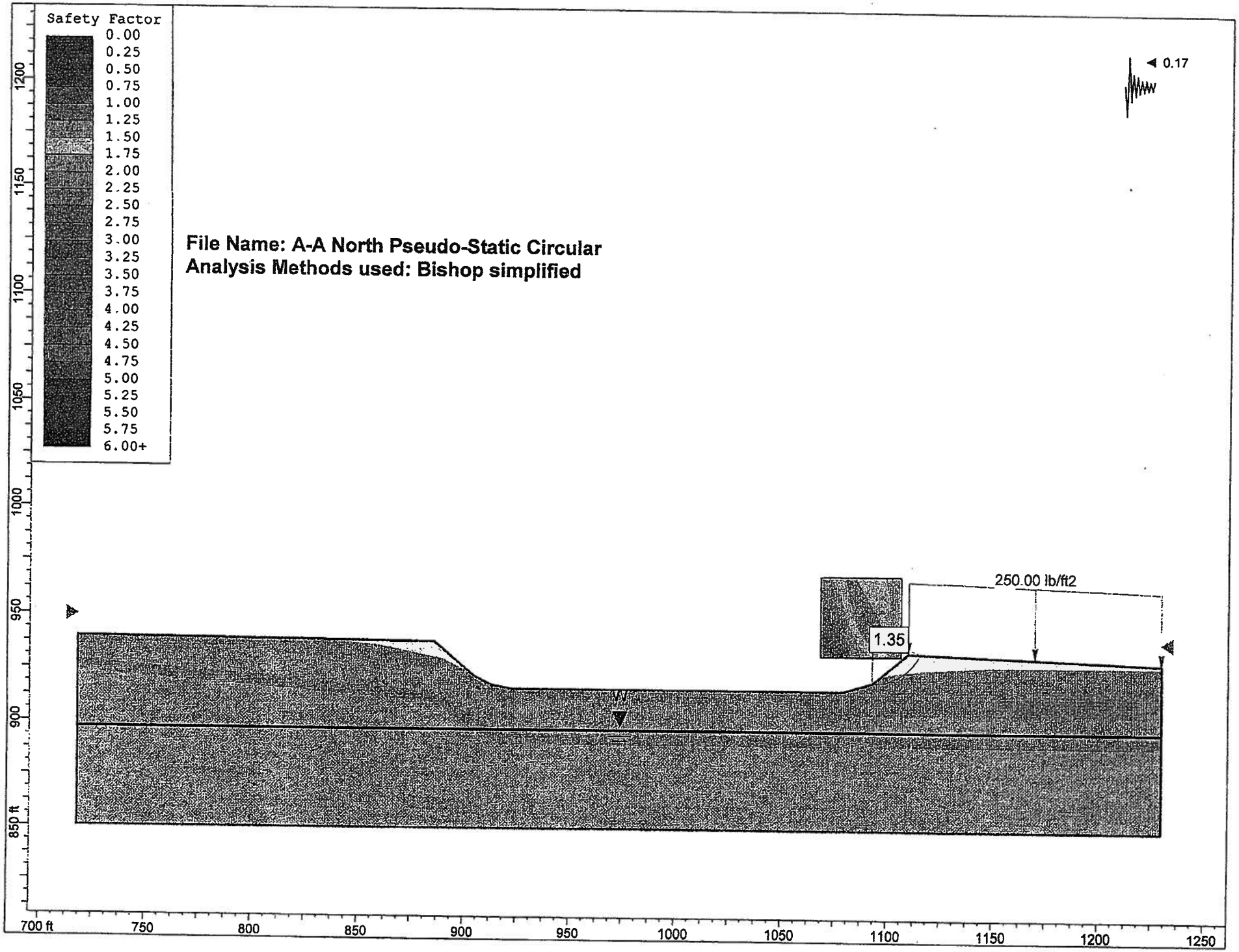
Material Boundary
932.000 911.000
1050.000 912.000
1070.000 899.000
1084.000 904.500
1229.857 904.500

Material Boundary
1084.000 904.500
1229.857 903.808

External Boundary
718.096 850.000
1229.857 850.000
1229.857 885.000
1229.857 890.000
1229.857 895.000
1229.857 903.808
1229.857 904.500
1229.857 928.000
1229.857 929.454
1110.000 934.000
1095.833 922.333
1093.000 920.000
1079.000 916.000
933.000 916.000
923.000 916.000
913.000 918.000
905.000 922.000
903.538 923.231
886.000 938.000
834.096 938.419
718.096 939.354
718.096 935.000
718.098 928.525
718.096 923.525
718.096 918.525

Water Table
718.000 897.000
1229.857 897.000

Distributed Load
1229.857 929.454
1110.000 934.000


Safety Factor
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
0.17
File Name: A-A North Pseudo-Static Circular
Analysis Methods used: Bishop simplified
250.00 lb/ft2
1.35
1200
1150
1100
1050
1000
950
900
850 ft
700 ft
750
800
850
900
950
1000
1050
1100
1150
1200
1250

Slide Analysis Information

Document Name

File Name: A-A North Pseudo-Static Circular

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.17
1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 250 lb/ft2

Material Properties

Material: New Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Old Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Alluvium (CL)
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 900 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Alluvium (SM/SC)
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 100 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock-Highly Weathered
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 450 psf
Friction Angle: 21 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 500 psf
Friction Angle: 32 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.350860
Center: 1093.172, 945.484
Radius: 25.486
Left Slip Surface Endpoint: 1093.023, 920.019
Right Slip Surface Endpoint: 1115.789, 933.780
Resisting Moment=327066 lb-ft
Driving Moment=242118 lb-ft

List of All Coordinates

Search Grid
1068.396 932.412
1106.512 932.412
1106.512 969.761
1068.396 969.761

Material Boundary
838.000 938.000
860.000 936.000
890.000 930.000
903.538 923.231

Material Boundary
1095.833 922.333
1100.000 924.000
1116.000 926.000
1150.000 928.000
1229.857 928.000

Material Boundary
884.000 910.000
918.000 890.000
1229.857 890.000

Material Boundary
718.096 923.525
884.000 910.000

Material Boundary
718.096 928.525
884.000 915.000
918.000 895.000
1229.857 895.000

Material Boundary
834.096 938.419
838.000 938.000

Material Boundary
718.096 935.000
850.000 935.000
884.012 925.045
918.000 911.000
932.000 911.000

Material Boundary
718.096 918.525
884.000 905.000
918.000 885.000
1229.857 885.000

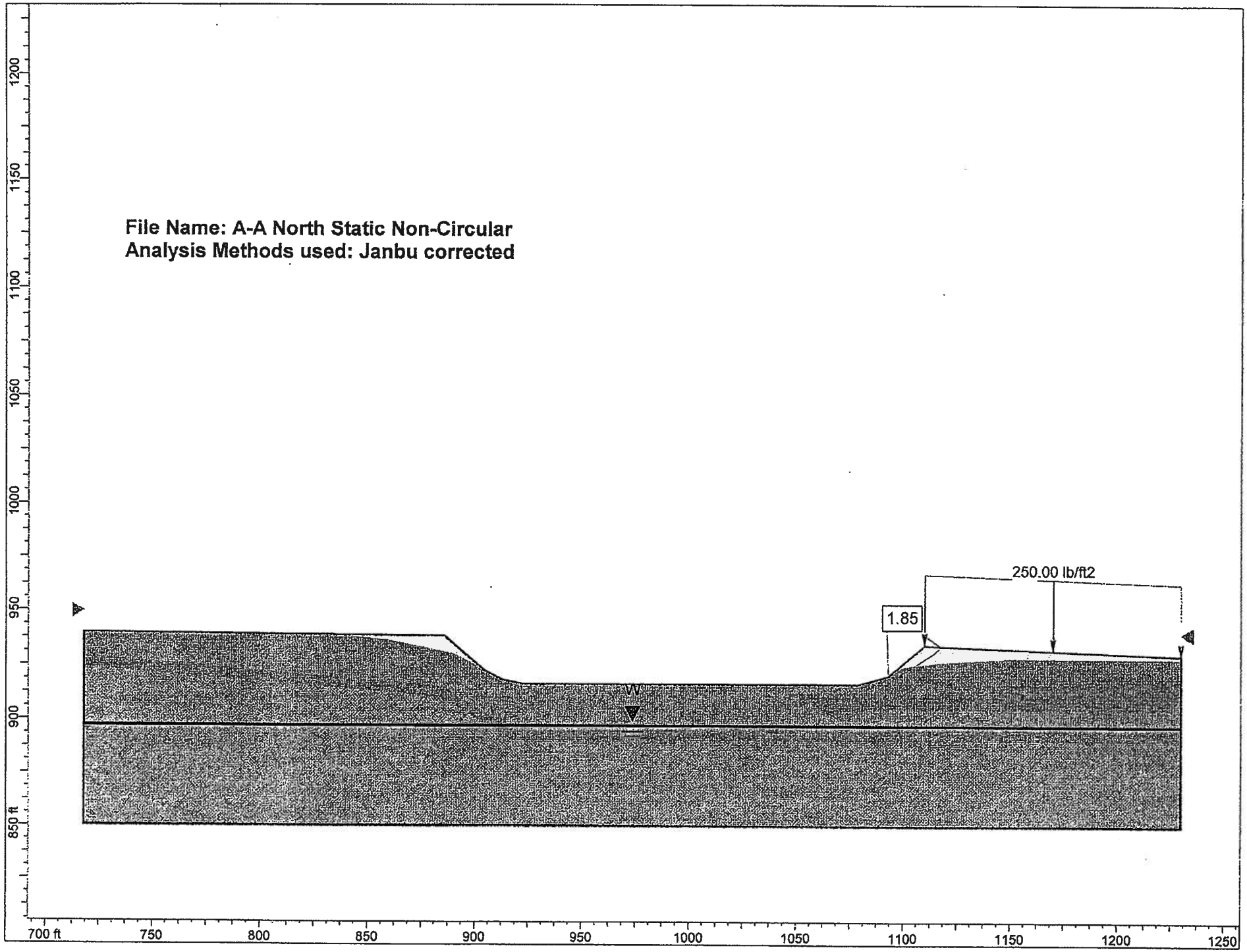
Material Boundary
932.000 911.000
1050.000 912.000
1070.000 899.000
1084.000 904.500
1229.857 904.500

External Boundary
718.096 850.000
1229.857 850.000
1229.857 885.000
1229.857 890.000
1229.857 895.000
1229.857 903.808
1229.857 904.500
1229.857 928.000
1229.857 929.454
1110.000 934.000
1095.833 922.333
1093.000 920.000
1079.000 916.000
933.000 916.000
923.000 916.000
913.000 918.000
905.000 922.000
903.538 923.231
886.000 938.000
834.096 938.419
718.096 939.354
718.096 935.000
718.096 928.525
718.096 923.525
718.096 918.525

Water Table
718.000 897.000
1229.857 897.000

Distributed Load
1110.000 934.000
1229.857 929.454

File Name: A-A North Static Non-Circular
Analysis Methods used: Janbu corrected



Slide Analysis Information

Document Name

File Name: A-A North Static Non-Circular

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 115
Left Projection Angle (End Angle): 165
Right Projection Angle (Start Angle): 10
Right Projection Angle (End Angle): 45
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 250 lb/ft2

Material Properties

Material: New Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Old Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Alluvium (CL)
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 600 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Alluvium (SM/SC)
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 100 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock-Highly Weathered
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 800 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 500 psf
Friction Angle: 32 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu corrected
FS: 1.845560
Axis Location: 1091.884, 951.526
Left Slip Surface Endpoint: 1093.157, 920.129
Right Slip Surface Endpoint: 1117.765, 933.705
Resisting Horizontal Force=11600.8 lb
Driving Horizontal Force=6285.78 lb

List of All Coordinates

Material Boundary
838.000 938.000
860.000 936.000
890.000 930.000
903.538 923.231

Material Boundary
1095.833 922.333
1100.000 924.000
1116.000 928.000
1150.000 928.000
1229.857 928.000

Material Boundary
884.000 910.000
918.000 890.000
1229.857 890.000

Material Boundary
718.098 923.525
884.000 910.000

Material Boundary
718.098 928.525
884.000 915.000
918.000 895.000
1229.857 895.000

Material Boundary
834.096 938.419
838.000 938.000

Material Boundary
718.098 935.000
850.000 935.000
884.012 925.045
918.000 911.000
932.000 911.000

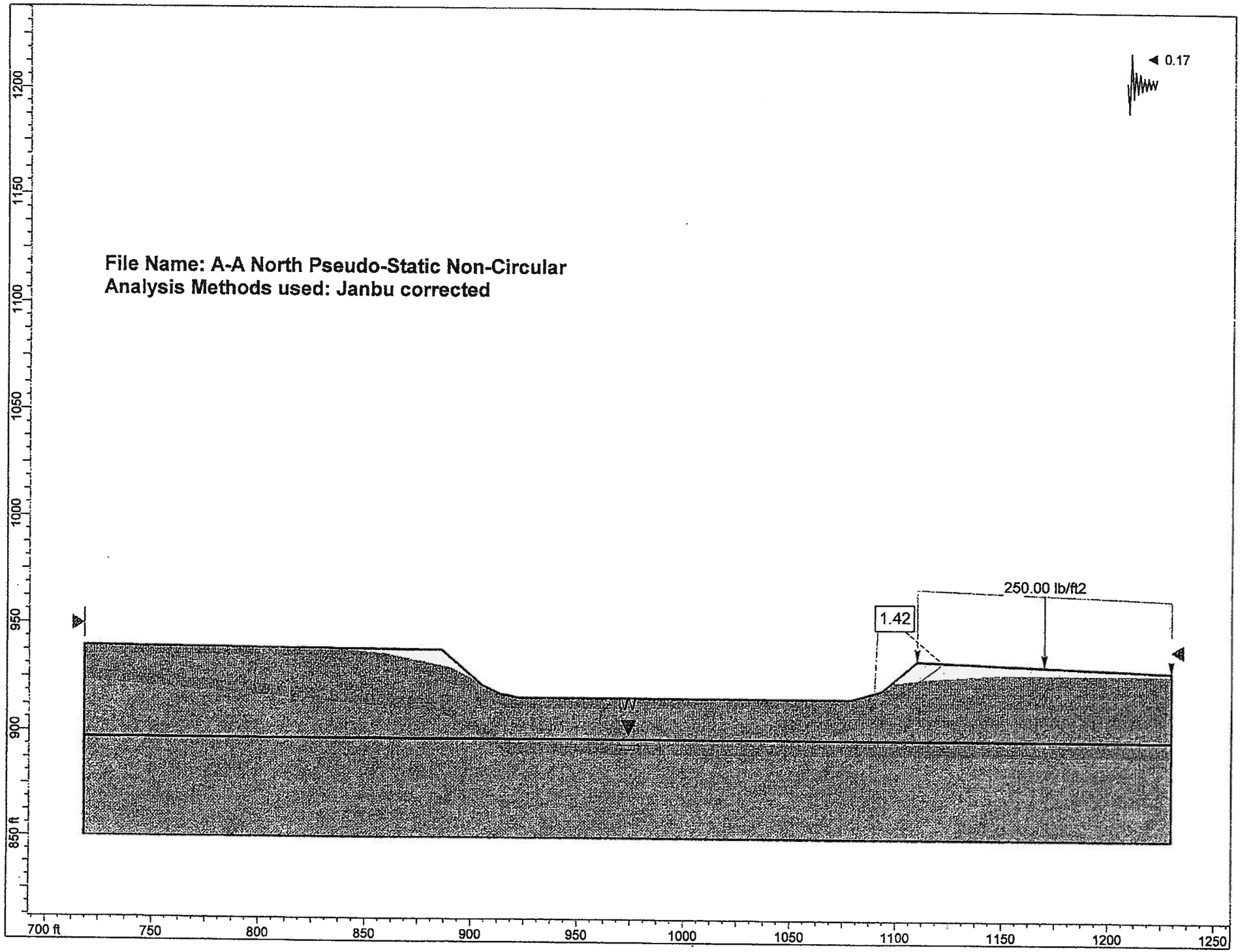
Material Boundary
718.098 918.525
884.000 905.000
918.000 885.000
1229.857 885.000

Material Boundary
932.000 911.000
1050.000 912.000
1070.000 899.000
1084.000 904.500
1229.857 904.500

External Boundary
718.098 850.000
1229.857 850.000
1229.857 885.000
1229.857 890.000
1229.857 895.000
1229.857 903.808
1229.857 904.500
1229.857 928.000
1229.857 929.454
1110.000 934.000
1095.833 922.333
1093.000 920.000
1079.000 916.000
933.000 916.000
923.000 916.000
913.000 918.000
905.000 922.000
903.538 923.231
886.000 938.000
834.096 938.419
718.098 939.354
718.098 935.000
718.098 928.525
718.098 923.525
718.098 918.525

Water Table
718.000 897.000
1229.857 897.000

Distributed Load
1110.000 934.000
1229.857 929.454


0.17
File Name: A-A North Pseudo-Static Non-Circular
Analysis Methods used: Janbu corrected
250.00 lb/ft2
1.42
1200
1150
1100
1050
1000
950
900
850 ft
700 ft
750
800
850
900
950
1000
1050
1100
1150
1200
1250

Slide Analysis Information

Document Name

File Name: A-A North Pseudo-Static Non-Circular

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 115
Left Projection Angle (End Angle): 165
Right Projection Angle (Start Angle): 10
Right Projection Angle (End Angle): 45
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.17
1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 250 lb/ft2

Material Properties

Material: New Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Old Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Alluvium (CL)
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 900 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Alluvium (SM/SC)
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 100 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock-Highly Weathered
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 800 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 500 psf
Friction Angle: 32 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu corrected
FS: 1.415500
Axis Location: 1091.639, 958.651
Left Slip Surface Endpoint: 1089.899, 919.114
Right Slip Surface Endpoint: 1122.225, 933.536
Resisting Horizontal Force=19215.7 lb
Driving Horizontal Force=13575.3 lb

List of All Coordinates

Material Boundary

838.000	938.000
860.000	936.000
890.000	930.000
903.538	923.231

Material Boundary

1095.833	922.333
1100.000	924.000
1116.000	926.000
1150.000	928.000
1229.857	928.000

Material Boundary

884.000	910.000
918.000	890.000
1229.857	890.000

Material Boundary

718.096	923.525
884.000	910.000

Material Boundary

718.096	928.525
884.000	915.000
918.000	895.000
1229.857	895.000

Material Boundary

834.096	938.419
838.000	938.000

Material Boundary

718.096	935.000
850.000	935.000
884.012	925.045
918.000	911.000
932.000	911.000

Material Boundary

718.096	918.525
884.000	905.000
918.000	885.000
1229.857	885.000

Material Boundary

932.000	911.000
1050.000	912.000
1070.000	899.000
1084.000	904.500
1229.857	904.500

External Boundary

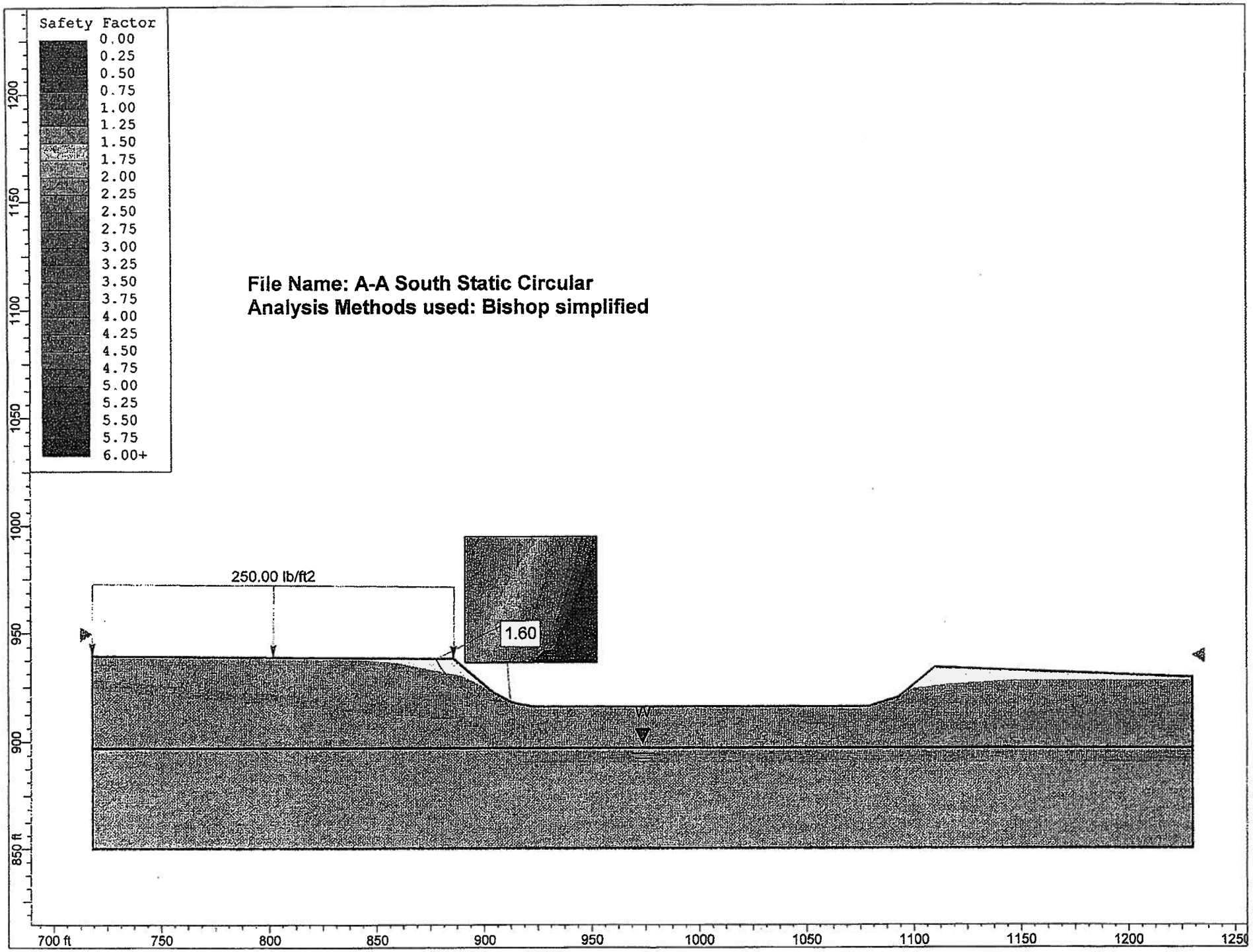
718.096	850.000
1229.857	850.000
1229.857	885.000
1229.857	890.000
1229.857	895.000
1229.857	903.808
1229.857	904.500
1229.857	928.000
1229.857	929.454
1110.000	934.000
1095.833	922.333
1093.000	920.000
1079.000	916.000
933.000	916.000
923.000	916.000
913.000	918.000
905.000	922.000
903.538	923.231
886.000	938.000
834.096	938.419
718.096	939.354
718.098	935.000
718.096	928.525
718.096	923.525
718.098	918.525

Water Table

718.000	897.000
1229.857	897.000

Distributed Load

1110.000	934.000
1229.857	929.454


Safety Factor
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
File Name: A-A South Static Circular
Analysis Methods used: Bishop simplified
250.00 lb/ft2
1.60
1200
1150
1100
1050
1000
950
900
850 ft
700 ft
750
800
850
900
950
1000
1050
1100
1150
1200
1250

Slide Analysis Information

Document Name

File Name: A-A South Static Circular

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Left to Right
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2

Material Properties

Material: New Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Old Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Alluvium (CL)
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 600 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Alluvium (SM/SC)
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 100 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock-Highly Weathered
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 450 psf
Friction Angle: 21 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 500 psf
Friction Angle: 32 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified

FS: 1.601660
Center: 909.752, 953.827
Radius: 35.645
Left Slip Surface Endpoint: 877.780, 938.066
Right Slip Surface Endpoint: 912.435, 918.262
Resisting Moment=857573 lb-ft
Driving Moment=535428 lb-ft

List of All Coordinates

Search Grid
891.358 936.306
952.677 936.306
952.677 994.708
891.358 994.708

Material Boundary
838.000 938.000
860.000 936.000
890.000 930.000
903.538 923.231

Material Boundary
1095.833 922.333
1100.000 924.000
1116.000 926.000
1150.000 928.000
1229.857 928.000

Material Boundary
884.000 910.000
918.000 890.000
1229.857 890.000

Material Boundary
718.096 923.525
884.000 910.000

Material Boundary
718.096 928.525
884.000 915.000
918.000 895.000
1229.857 895.000

Material Boundary
834.096 938.419
838.000 938.000

Material Boundary
718.096 935.000
850.000 935.000
884.012 925.045
918.000 911.000
932.000 911.000

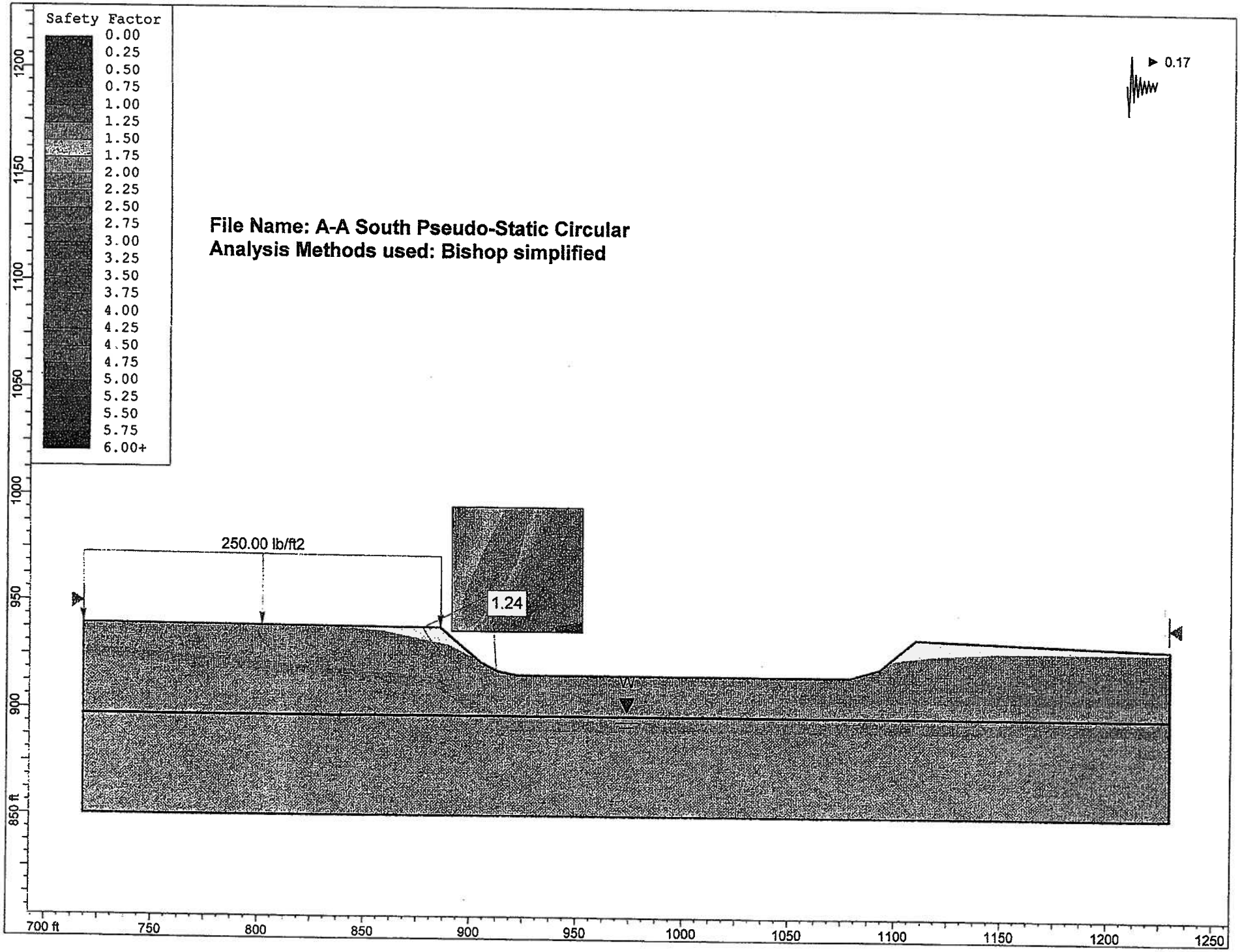
Material Boundary
718.096 918.525
884.000 905.000
918.000 885.000
1229.857 885.000

Material Boundary
932.000 911.000
1050.000 912.000
1070.000 899.000
1084.000 904.500
1229.857 904.500

External Boundary
718.096 850.000
1229.857 850.000
1229.857 885.000
1229.857 890.000
1229.857 895.000
1229.857 903.808
1229.857 904.500
1229.857 928.000
1229.857 929.454
1110.000 934.000
1095.833 922.333
1093.000 920.000
1079.000 916.000
933.000 916.000
923.000 916.000
913.000 918.000
905.000 922.000
903.538 923.231
886.000 938.000
834.096 938.419
718.096 939.354
718.096 935.000
718.096 928.525
718.096 923.525
718.096 918.525

Water Table
718.000 897.000
1229.857 897.000

Distributed Load
886.000 938.000
834.096 938.419
718.096 939.354


Safety Factor
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
0.17
File Name: A-A South Pseudo-Static Circular
Analysis Methods used: Bishop simplified
250.00 lb/ft2
1.24
1200
1150
1100
1050
1000
950
900
850 ft
700 ft
750
800
850
900
950
1000
1050
1100
1150
1200
1250

Slide Analysis Information

Document Name

File Name: A-A South Pseudo-Static Circular

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Left to Right
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.17
1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 250 lb/ft2

Material Properties

Material: New Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Old Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Alluvium (CL)
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 900 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Alluvium (SM/SC)
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 100 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock-Highly Weathered
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 800 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 500 psf
Friction Angle: 32 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.240350
Center: 909.752, 953.827
Radius: 35.645
Left Slip Surface Endpoint: 877.780, 938.066
Right Slip Surface Endpoint: 912.435, 918.282
Resisting Moment=815041 lb-ft
Driving Moment=657105 lb-ft

List of All Coordinates

Search Grid
891.356 936.306
952.677 936.306
952.677 994.708
891.356 994.708

Material Boundary
838.000 938.000
860.000 936.000
890.000 930.000
903.538 923.231

Material Boundary
1095.833 922.333
1100.000 924.000
1116.000 926.000
1150.000 928.000
1229.857 928.000

Material Boundary
884.000 910.000
918.000 890.000
1229.857 890.000

Material Boundary
718.096 923.525
884.000 910.000

Material Boundary
718.096 926.525
884.000 915.000
918.000 895.000
1229.857 895.000

Material Boundary
834.096 938.419
838.000 938.000

Material Boundary
718.096 935.000
850.000 935.000
884.012 925.045
918.000 911.000
932.000 911.000

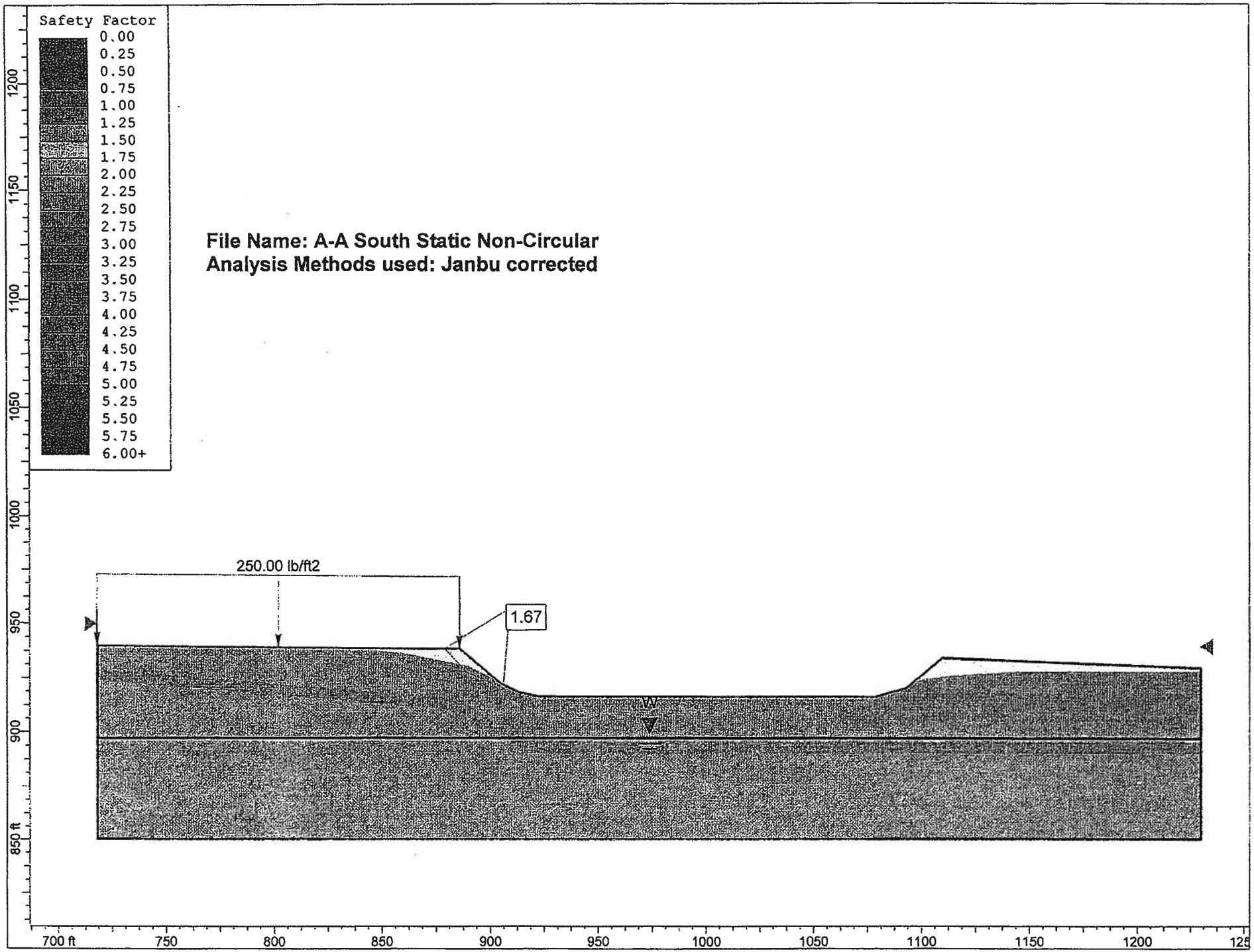
Material Boundary
718.096 918.525
884.000 905.000
918.000 885.000
1229.857 885.000

Material Boundary
932.000 911.000
1050.000 912.000
1070.000 899.000
1084.000 904.500
1229.857 904.500

External Boundary
718.096 850.000
1229.857 850.000
1229.857 885.000
1229.857 890.000
1229.857 895.000
1229.857 903.808
1229.857 904.500
1229.857 928.000
1229.857 929.454
1110.000 934.000
1095.833 922.333
1093.000 920.000
1079.000 916.000
933.000 916.000
923.000 916.000
913.000 918.000
905.000 922.000
903.538 923.231
886.000 938.000
834.096 938.419
718.096 939.354
718.096 935.000
718.096 926.525
718.096 923.525
718.096 918.525

Water Table
718.000 897.000
1229.857 897.000

Distributed Load
886.000 938.000
834.096 938.419
718.096 939.354


Safety Factor
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
File Name: A-A South Static Non-Circular
Analysis Methods used: Janbu corrected
250.00 lb/ft2
1.67
1200
1150
1100
1050
1000
950
900
850 ft
700 ft
750
800
850
900
950
1000
1050
1100
1150
1200

Slide Analysis Information

Document Name

File Name: A-A South Static Non-Circular

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Left to Right
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 115
Left Projection Angle (End Angle): 165
Right Projection Angle (Start Angle): 10
Right Projection Angle (End Angle): 45
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 250 lb/ft2

Material Properties

Material: New Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Old Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Alluvium (CL)
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 900 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Alluvium (SM/SC)
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 100 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock-Highly Weathered
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 800 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 500 psf
Friction Angle: 32 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu corrected
FS: 1.578750
Axis Location: 911.892, 960.427
Left Slip Surface Endpoint: 877.891, 938.065
Right Slip Surface Endpoint: 909.381, 919.809
Resisting Horizontal Force=18795 lb
Driving Horizontal Force=11905 lb

Method: spencer
FS: 1.669650
Axis Location: 909.358, 956.921
Left Slip Surface Endpoint: 879.081, 938.056
Right Slip Surface Endpoint: 906.272, 921.364
Resisting Moment=546789 lb-ft
Driving Moment=327487 lb-ft
Resisting Horizontal Force=12882.2 lb
Driving Horizontal Force=7715.47 lb

List of All Coordinates

Material Boundary
838.000 938.000
860.000 936.000
890.000 930.000
903.538 923.231

Material Boundary
1095.833 922.333
1100.000 924.000
1116.000 928.000
1150.000 928.000
1229.857 928.000

Material Boundary
884.000 910.000
918.000 890.000
1229.857 890.000

Material Boundary
718.096 923.525
884.000 910.000

Material Boundary
718.096 928.525
884.000 915.000
918.000 895.000
1229.857 895.000

Material Boundary
834.096 938.419
838.000 938.000

Material Boundary
718.096 935.000
850.000 935.000
884.012 925.045
918.000 911.000
932.000 911.000

Material Boundary
718.096 918.525
884.000 905.000
918.000 885.000
1229.857 885.000

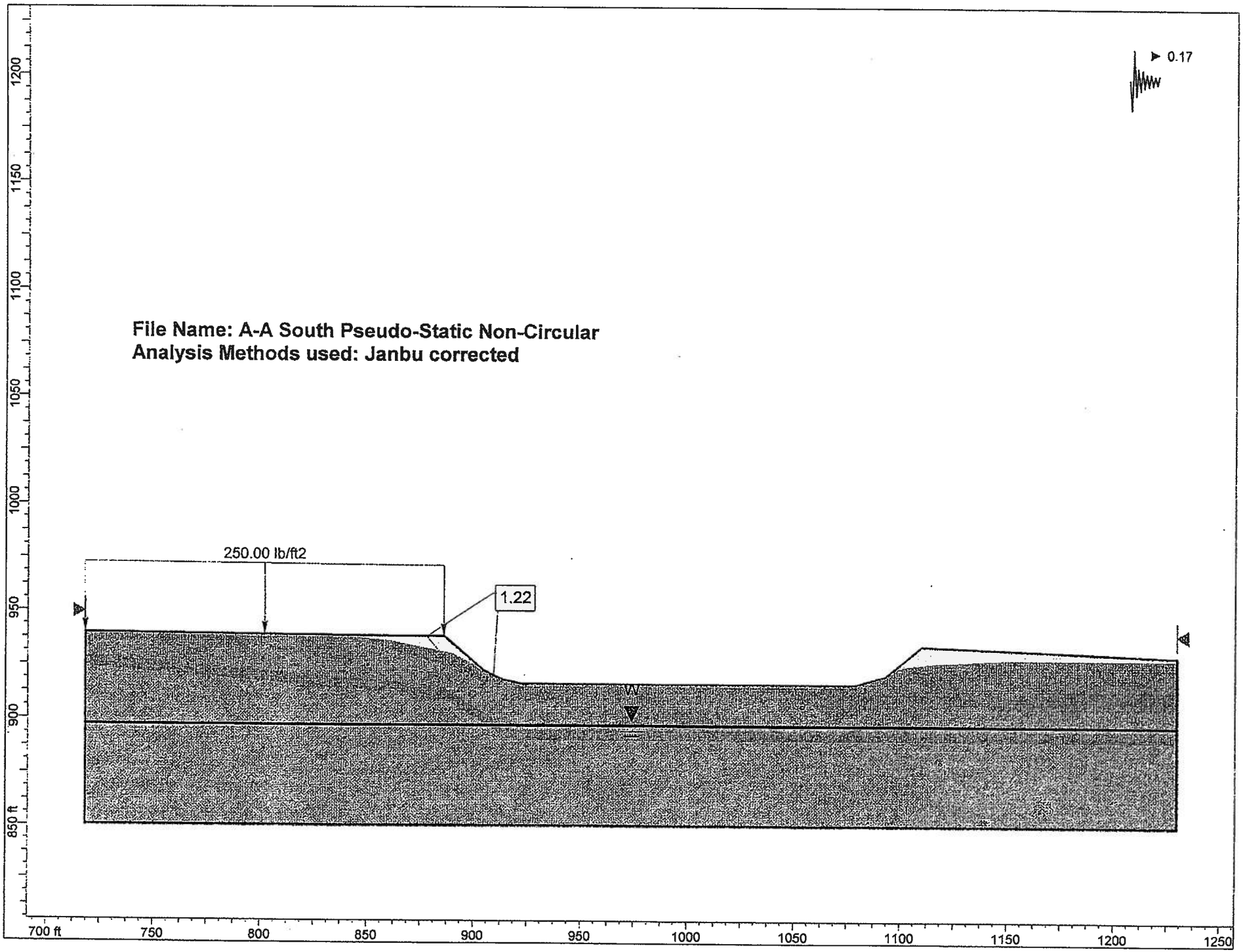
Material Boundary
932.000 911.000
1050.000 912.000
1070.000 899.000
1084.000 904.500
1229.857 904.500

External Boundary
718.098 850.000
1229.857 850.000
1229.857 885.000
1229.857 890.000
1229.857 895.000
1229.857 903.808
1229.857 904.500
1229.857 928.000
1229.857 929.454
1110.000 934.000
1095.833 922.333
1093.000 920.000
1079.000 916.000
933.000 916.000
923.000 916.000
913.000 918.000
905.000 922.000
903.538 923.231
886.000 938.000
834.096 938.419
718.096 939.354
718.096 935.000
718.096 928.525
718.096 923.525
718.096 918.525

Water Table
718.000 897.000

1229.857 897.000

Distributed Load
886.000 938.000
834.096 938.419
718.096 939.354


0.17
File Name: A-A South Pseudo-Static Non-Circular
Analysis Methods used: Janbu corrected
250.00 lb/ft2
1.22
W
1200
1150
1100
1050
1000
950
900
850 ft
700 ft
750
800
850
900
950
1000
1050
1100
1150
1200
1250

Slide Analysis Information

Document Name

File Name: A-A South Pseudo-Static Non-Circular

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Left to Right
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 115
Left Projection Angle (End Angle): 165
Right Projection Angle (Start Angle): 10
Right Projection Angle (End Angle): 45
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.17
1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 250 lb/ft2

Material Properties

Material: New Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Old Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Alluvium (CL)
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 900 psf
Friction Angle: 24 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Alluvium (SM/SC)
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 100 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock-Highly Weathered
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 800 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 500 psf
Friction Angle: 32 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu corrected
FS: 1.216000
Axis Location: 911.892, 960.427
Left Slip Surface Endpoint: 877.891, 938.065
Right Slip Surface Endpoint: 909.381, 919.809
Resisting Horizontal Force=17935.7 lb
Driving Horizontal Force=14749.8 lb

List of All Coordinates

Material Boundary
838.000	938.000
860.000	936.000
890.000	930.000
903.538	923.231

Material Boundary
1095.833	922.333
1100.000	924.000
1116.000	926.000
1150.000	928.000
1229.857	928.000

Material Boundary
884.000	910.000
918.000	890.000
1229.857	890.000

Material Boundary
718.096	923.525
884.000	910.000

Material Boundary
718.096	928.525
884.000	915.000
918.000	895.000
1229.857	895.000

Material Boundary
834.096	938.419
838.000	936.000

Material Boundary
718.096	935.000
850.000	935.000
884.012	925.045
918.000	911.000
932.000	911.000

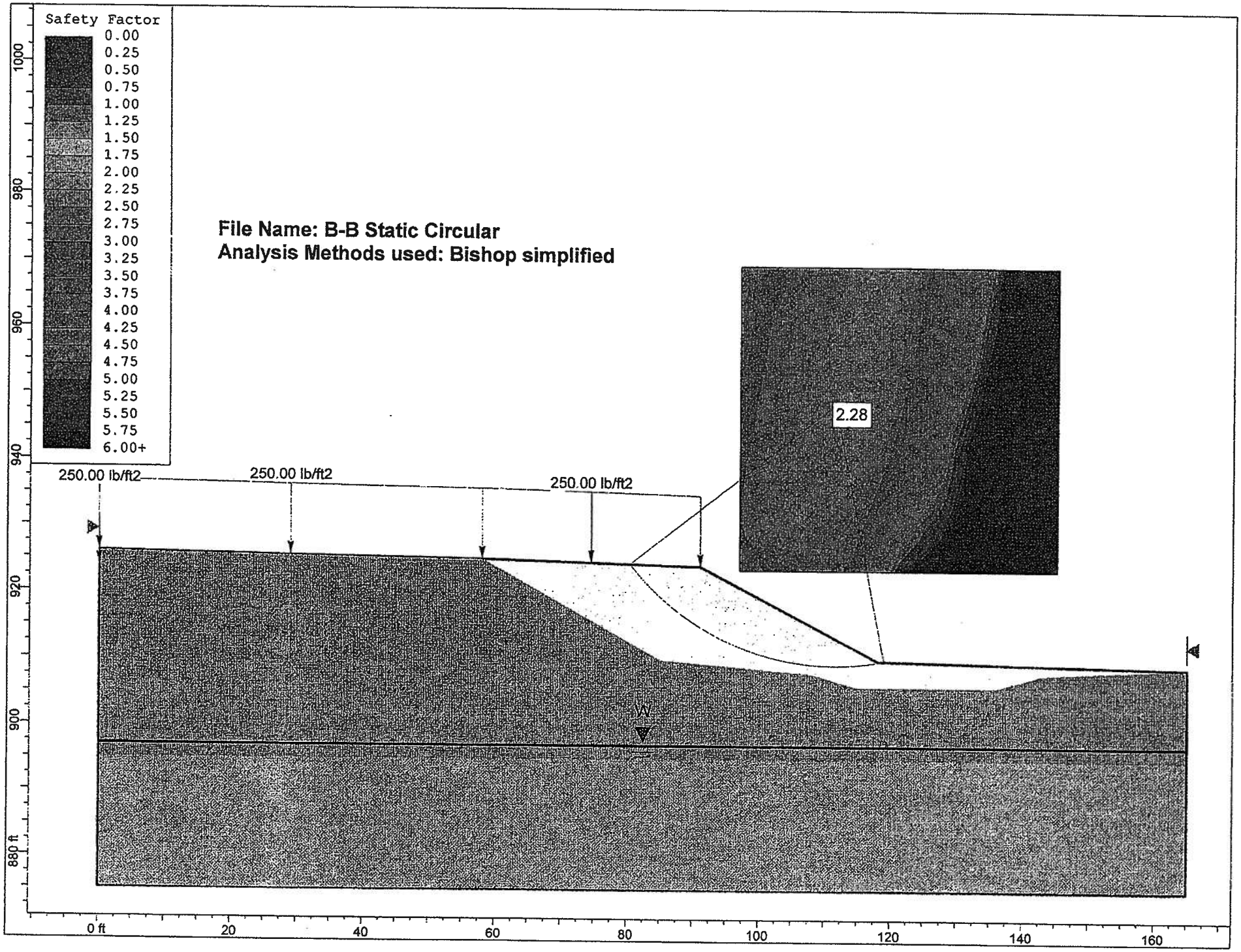
Material Boundary
718.096	918.525
884.000	905.000
918.000	885.000
1229.857	885.000

Material Boundary
932.000	911.000
1050.000	912.000
1070.000	899.000
1084.000	904.500
1229.857	904.500

External Boundary
718.096	850.000
1229.857	850.000
1229.857	885.000
1229.857	890.000
1229.857	895.000
1229.857	903.808
1229.857	904.500
1229.857	928.000
1229.857	929.454
1110.000	934.000
1095.833	922.333
1093.000	920.000
1079.000	918.000
933.000	916.000
923.000	916.000
913.000	918.000
905.000	922.000
903.538	923.231
886.000	936.000
834.096	938.419
718.096	939.354
718.096	935.000
718.098	928.525
718.098	923.525
718.096	918.525

Water Table
718.000	897.000
1229.857	897.000

Distributed Load
718.096	939.354
834.098	938.419
886.000	936.000


Safety Factor
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
File Name: B-B Static Circular
Analysis Methods used: Bishop simplified
2.28
250.00 lb/ft2
250.00 lb/ft2
250.00 lb/ft2
W
1000
980
960
940
920
900
880 ft
0 ft
20
40
60
80
100
120
140
160

Slide Analysis Information

Document Name

File Name: B-B Static Circular

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Left to Right
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 250 lb/ft2

Material Properties

Material: New Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Old Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Alluvium (SM/SC)
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 100 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock-Highly Weathered
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 450 psf
Friction Angle: 21 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 500 psf
Friction Angle: 32 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 2.281250
Center: 111.446, 948.811
Radius: 39.555
Left Slip Surface Endpoint: 80.384, 924.322
Right Slip Surface Endpoint: 118.976, 909.979
Resisting Moment=1.02074e+006 lb-ft
Driving Moment=447445 lb-ft

List of All Coordinates

Search Grid
96.983 923.476
145.194 923.476
145.194 969.540
96.983 969.540

Material Boundary
58.000 925.000
85.000 910.000
108.000 908.000
115.000 906.000
136.000 906.000
143.000 908.000
165.000 909.000

Material Boundary
0.000 890.000
165.000 890.000

Material Boundary
0.000 895.000
165.000 895.000

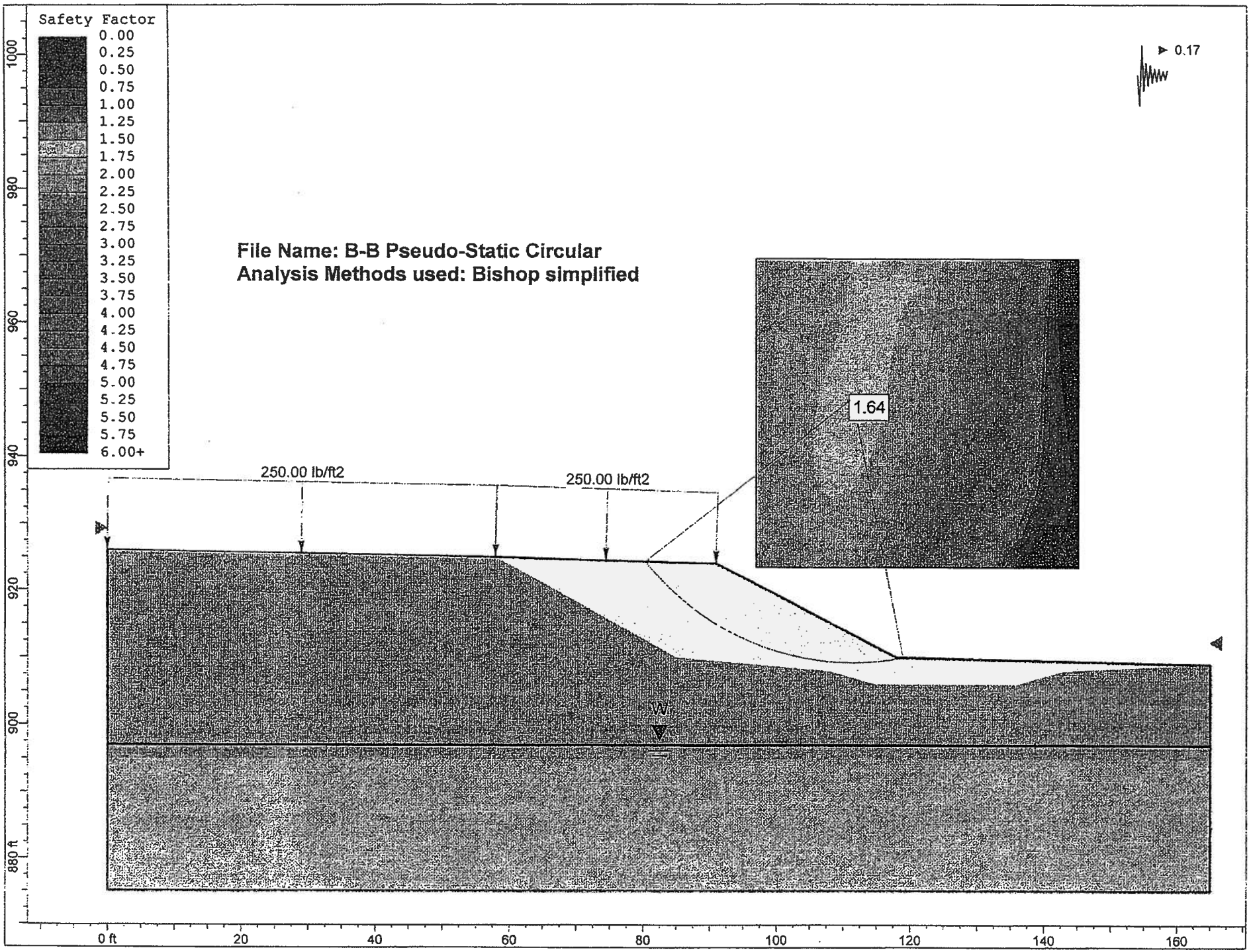
Material Boundary
0.000 900.000
165.000 900.000

External Boundary
58.000 925.000
0.000 926.000
0.000 900.000
0.000 895.000
0.000 890.000
0.000 885.000
0.000 875.000
165.000 875.000
165.000 885.000
165.000 890.000
165.000 895.000
165.000 900.000
165.000 909.000
118.000 910.000
91.000 924.000

Water Table
0.000 897.000
165.000 897.000

Distributed Load
91.000 924.000
58.000 925.000

0.000 926.000
0.000 923.714


Safety Factor
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
5.75
6.00+
0.17
File Name: B-B Pseudo-Static Circular
Analysis Methods used: Bishop simplified
1.64
250.00 lb/ft2
250.00 lb/ft2
W
1000
980
960
940
920
900
880 ft
0 ft
20
40
60
80
100
120
140
160

Slide Analysis Information

Document Name

File Name: B-B Pseudo-Static Circular

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Left to Right
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.17
1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Normal to boundary, Magnitude: 250 lb/ft2

Material Properties

Material: New Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Old Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Alluvium (SM/SC)
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 100 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock-Highly Weathered
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 800 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 500 psf
Friction Angle: 32 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.642700
Center: 111.446, 948.811
Radius: 39.555
Left Slip Surface Endpoint: 80.384, 924.322
Right Slip Surface Endpoint: 118.976, 909.979
Resisting Moment=985558 lb-ft
Driving Moment=599962 lb-ft

List of All Coordinates

Search Grid
96.983 923.476
145.194 923.476
145.194 969.540
96.983 969.540

Material Boundary
58.000 925.000
85.000 910.000
108.000 908.000
115.000 906.000
136.000 906.000
143.000 908.000
165.000 909.000

Material Boundary
0.000 890.000
165.000 890.000

Material Boundary
0.000 895.000
165.000 895.000

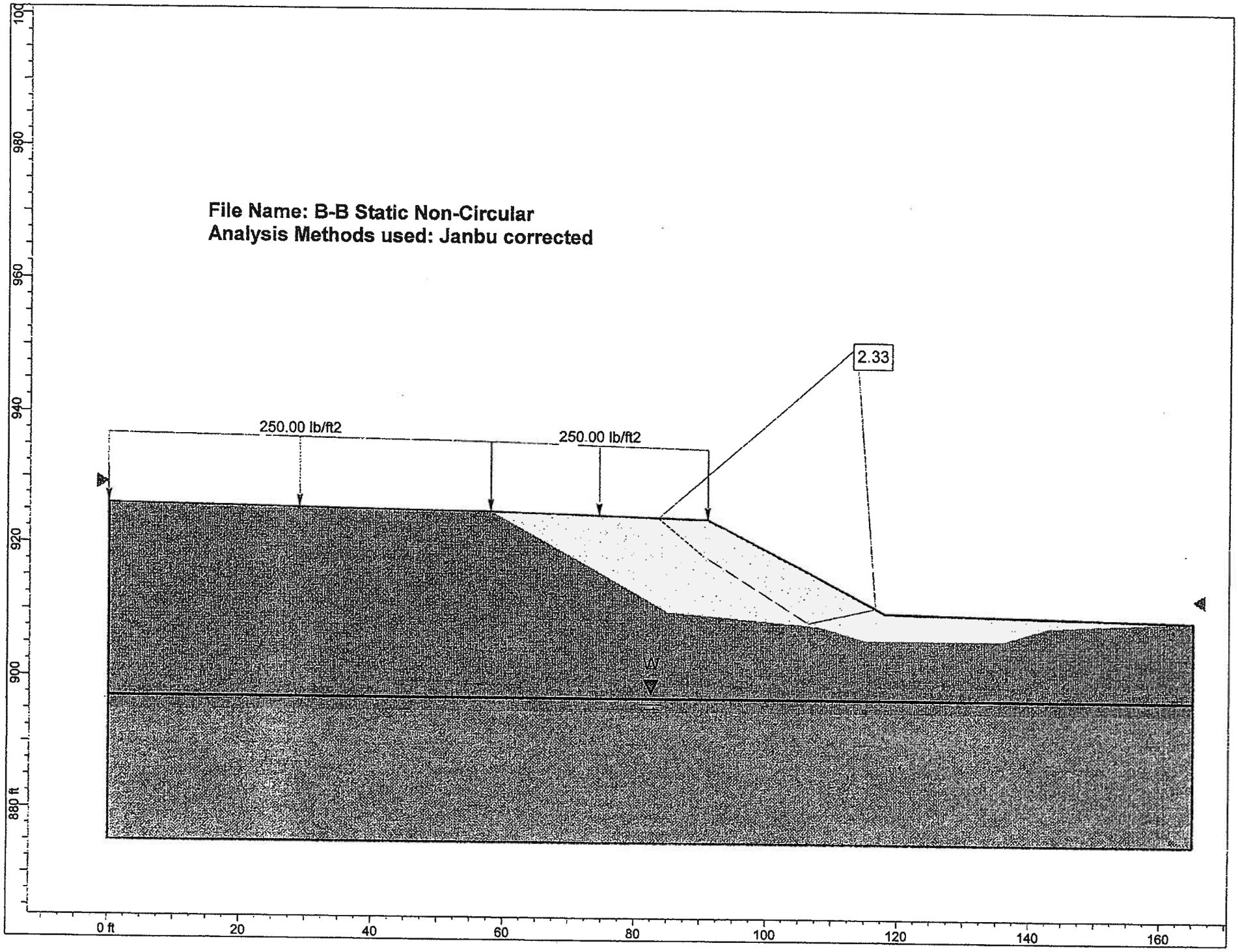
Material Boundary
0.000 900.000
165.000 900.000

External Boundary
58.000 925.000
0.000 926.000
0.000 900.000
0.000 895.000
0.000 890.000
0.000 885.000
0.000 875.000
165.000 875.000
165.000 885.000
165.000 890.000
165.000 895.000
165.000 900.000
165.000 909.000
118.000 910.000
91.000 924.000

Water Table
0.000 897.000
165.000 897.000

Distributed Load
91.000 924.000
58.000 925.000
0.000 926.000

File Name: B-B Static Non-Circular
Analysis Methods used: Janbu corrected



Slide Analysis Information

Document Name

File Name: B-B Static Non-Circular

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Left to Right
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 115
Left Projection Angle (End Angle): 165
Right Projection Angle (Start Angle): 10
Right Projection Angle (End Angle): 45
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 250 lb/ft2

Material Properties

Material: New Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Old Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Alluvium (SM/SC)
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 100 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock-Highly Weathered
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 450 psf
Friction Angle: 21 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 500 psf
Friction Angle: 32 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu corrected
FS: 2.328240
Axis Location: 113.516, 950.568
Left Slip Surface Endpoint: 83.487, 924.228
Right Slip Surface Endpoint: 116.571, 910.741
Resisting Horizontal Force=18747.9 lb
Driving Horizontal Force=8052.4 lb

List of All Coordinates

Material Boundary

58.000	925.000
85.000	910.000
108.000	908.000
115.000	906.000
136.000	906.000
143.000	908.000
165.000	909.000

Material Boundary

0.000	890.000
165.000	890.000

Material Boundary

0.000	895.000
165.000	895.000

Material Boundary

0.000	900.000
165.000	900.000

External Boundary

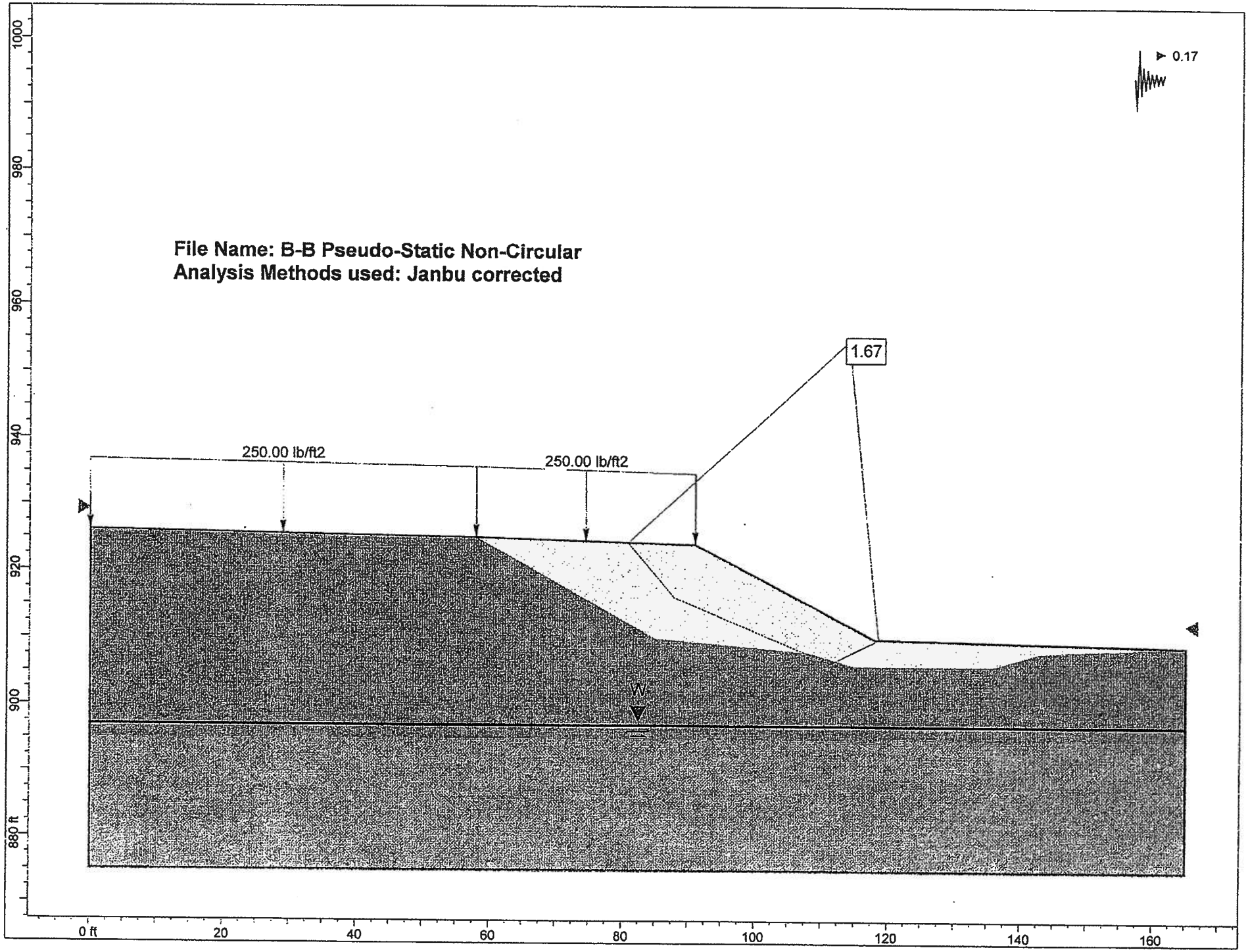
58.000	925.000
0.000	926.000
0.000	900.000
0.000	895.000
0.000	890.000
0.000	885.000
0.000	875.000
165.000	875.000
165.000	885.000
165.000	890.000
165.000	895.000
165.000	900.000
165.000	909.000
118.000	910.000
91.000	924.000

Water Table

0.000	897.000
165.000	897.000

Distributed Load

91.000	924.000
58.000	925.000
0.000	926.000


File Name: B-B Pseudo-Static Non-Circular
Analysis Methods used: Janbu corrected
0.17
1.67
250.00 lb/ft2
250.00 lb/ft2
1000
980
960
940
920
900
880 ft
0 ft
20
40
60
80
100
120
140
160

Slide Analysis Information

Document Name

File Name: B-B Pseudo-Static Non-Circular

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Left to Right
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 115
Left Projection Angle (End Angle): 165
Right Projection Angle (Start Angle): 10
Right Projection Angle (End Angle): 45
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.17
1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 250 lb/ft2

Material Properties

Material: New Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Old Fill
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 200 psf
Friction Angle: 30 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Alluvium (SM/SC)
Strength Type: Mohr-Coulomb
Unsaturated Unit Weight: 125 lb/ft3
Saturated Unit Weight: 125 lb/ft3
Cohesion: 100 psf
Friction Angle: 35 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock-Highly Weathered
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 800 psf
Friction Angle: 25 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Bedrock
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 600 psf
Friction Angle: 32 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu corrected
FS: 1.666640
Axis Location: 114.058, 954.915
Left Slip Surface Endpoint: 80.853, 924.307
Right Slip Surface Endpoint: 118.621, 909.987
Resisting Horizontal Force=24894.7 lb

Driving Horizontal Force=14937.1 lb

List of All Coordinates

Water Table
0.000 897.000
165.000 897.000

Material Boundary
58.000 925.000
85.000 910.000
108.000 908.000
115.000 906.000
136.000 906.000
143.000 908.000
165.000 909.000

Material Boundary
0.000 890.000
165.000 890.000

Material Boundary
0.000 895.000
165.000 895.000

Material Boundary
0.000 900.000
165.000 900.000

External Boundary
58.000 925.000
0.000 926.000
0.000 900.000
0.000 895.000
0.000 890.000
0.000 885.000
0.000 875.000
165.000 875.000
165.000 885.000
165.000 890.000
165.000 895.000
165.000 900.000
165.000 909.000
118.000 910.000
91.000 924.000

Distributed Load
91.000 924.000
58.000 925.000
0.000 926.000

Focus/Block Search Window
63.132 924.000
55.238 907.233
91.000 897.000
91.000 924.000

Focus/Block Search Window
103.982 917.269
91.000 897.000
129.023 897.000
135.514 909.627

APPENDIX D
TECHNICAL MEMORANDUM FOR LIMITED ADL STUDY

KLEINFELDER
An employee owned company

January 31, 2007
Project No. 75010/2

Mr. Thomas E. Sardo, P.E
STV Incorporated
8001 Irvine Center Drive, 4th Floor
Irvine, California 92618

Subject: **Aerially Deposited Lead Technical Letter Report**
Appendix D to Draft Foundation Report
101 Freeway Reyes Adobe Interchange
Los Angeles, California

Dear Mr. Sardo:

Kleinfelder, Inc. (Kleinfelder) has performed aerially deposited lead (ADL) testing of the United States (US) Highway 101/Reyes Adobe Overcrossing (herein known as the Site) in Los Angeles, California, (Plate 1). This letter has been prepared to provide STV Incorporated with a summary of the findings of the ADL testing.

Purpose and Scope of Work

The purpose of this ADL testing was to evaluate the presence of ADL on the Site relative to the September 22, 2000 Variance granted to the California Department of Transportation (Caltrans) by the California Department of Toxic Substances Control (DTSC, 2001). Kleinfelder's scope of work for this ADL testing included collecting soil samples, performing laboratory testing, and preparing this technical letter.

Background and Regulatory Information

According to Title 22, California Code of Regulations (CCR), solid wastes with total lead concentrations equal to or exceeding 1,000 milligrams per kilogram (mg/kg), the Total Threshold Limit Concentration (TTLC), are classified as California hazardous waste. Assembly Bill (AB 2784) 2784, effective January 1, 1999, amended California Health and Safety Code (HSC) Section 25157.8 (a) and Title 22 CCR by reducing the practical disposal limit for non-hazardous solid waste to 350 mg/kg total lead until the California Regional Water Quality Control Board (RWQCB) amends a disposal facility's waste discharge requirements.

KLEINFELDER 8 Pasteur Street, Suite 190, Irvine, CA 92618 (949) 727-4466 (949) 727-9242 fax

Solid wastes with soluble lead concentrations (assessed using California Waste Extraction Test [WET] procedures) equal to or exceeding 5.0 milligrams per liter (mg/L), the Soluble Threshold Limit Concentration (STLC), also are classified as California hazardous waste under California law. California hazardous materials must be disposed of under a hazardous waste manifest at an approved Class I disposal facility. Wastes with lead concentrations less than both the TTLC and the STLC, which are therefore not a California hazardous waste, may be disposed of at a Class II or III facility, provided that site-specific disposal facility requirements are satisfied.

According to federal law, as stipulated in the Resource Conservation and Recovery Act (RCRA), wastes that exceed 5.0 mg/l soluble lead, extracted using the federal Toxicity Characteristic Leaching Procedure (TCLP) are classified as RCRA hazardous waste. This material must be disposed of as RCRA hazardous waste if transported offsite.

In September 22, 2000, the DTSC issued a revised Variance to Caltrans specifying that "lead-contaminated soil," as defined by California HSC and Title 22 CCR, within a highway right-of-way could remain within the right-of-way during earthmoving and road construction activities provided certain criteria were met (DTSC, 2001). In a April 6, 2006 letter, the DTSC extended the variance to Caltrans until June 30, 2007. The DTSC Variance was written as two conditions.

For Variance Condition 1, "lead-contaminated" soil with total lead concentrations 350 mg/kg or less and 0.5 mg/L or less soluble lead (using a modified WET extraction procedure with de-ionized [DI] water as the extractant rather than an acidic, buffered sodium citrate solution) may be reused in a Caltrans right-of-way provided it is placed a minimum of 5 feet (1.5 meter) above the maximum water table and is covered by 1 foot (0.3 meter) of non-hazardous soil. The limit on total lead within shall be the following: Total parts per million (ppm), equivalent to mg/kg lead, shall be at or below the statutory limits in effect when the soils is used as fill or the risk-based limit of 1,496 mg/kg, whichever is less. On the effective date of this variance, HSC section 25157.8 limits total lead concentrations to 350 ppm.

For Variance Condition 2, "lead-contaminated" soil that contains more than 500 micrograms per liter (ug/L) and less than 50 mg/L extractable lead (using a modified WET extraction procedure with DI water as the extractant rather than an acidic, buffered sodium citrate solution) and 350 mg/kg or less total lead may be used as fill provided that it is placed a minimum of 5 feet (1.5 meters) above the maximum water table and is covered by a pavement structure.

KLEINFELDER 8 Pasteur Street, Suite 190, Irvine, CA 92618 (949) 727-4466 (949) 727-9242 fax

The hydrogen ion index (pH) of the reused soil also must be at or above 5.0 standard units (SU); otherwise the soil must be placed as specified in Variance Condition 2.

Other reuse conditions, soil handling procedures, and notifications are specified in the Variance. Soil that exceeds 350 mg/kg total lead or 50 mg/L soluble lead (DI-WET) cannot be reused within a Caltrans right-of-way and must be properly disposed offsite.

It is important to note that the total lead limit of 350 mg/kg is the current statutory limit (HSC 25157.8) in effect at the time the revised Variance was issued in September 2000. The Variance indicates that this maximum lead value could be modified if the statutory limit is changed, but the maximum total lead value cannot exceed a risk-based limit of 1,496 mg/kg.

Soil Sampling

This section summarizes ADL soil-sampling activities performed on the Site. The soil sampling required soil samples from exposed unpaved locations in areas where excavations are planned near two abutments and two bents. A site plan showing the boring locations is shown in Plate 2. Soil samples collected from the Site were tested for pH, total lead and organochlorine pesticides. Testing of some samples for soluble lead was also required and performed based on total lead analytical results.

Prior to implementation of subsurface field investigation activities, Caltrans was notified that traffic control would be required under Encroachment Permit No. 706-6SV-2176. Kleinfelder also notified Underground Service Alert (USA) that a subsurface investigation was taking place so that its subscribing utility companies with underground utilities in the area would be notified.

A total of 25 soil samples were collected from six boring locations (designated Borings B1 through B3 and HB-1 through HB-3). For Borings B-1 through B-2, soil samples were collected at 150 millimeters (mm; 0.5 feet), 350 mm (1.5 feet), 600 mm (2 feet), 900 mm (3 feet), and 1,500 mm (5 feet). For Boring B-3, soil samples were collected at150 millimeters (mm; 0.5 feet), 350 mm (1.5 feet), 600 mm (2 feet), and 900 mm (3 feet). For borings HB-1 and HB-2, soil samples were collected at the surface, 150 millimeters (mm; 0.5 foot), 350 mm (1.5 foot). For Boring HB-3, soil samples were collected at the surface and from approximate depths of 150 mm (0.5 foot), 350 mm (1.5 foot), 600 mm (2 foot), and 900 mm (3 foot).

KLEINFELDER 8 Pasteur Street, Suite 190, Irvine, CA 92618 (949) 727-4466 (949) 727-9242 fax

Soil Sampling Methodology

Soil samples were collected using hand-auger methods at each of the sampling depths. Soil samples were collected directly from the target sample depth by manually scooping soil directly into glass sampling jars. Borings were then further advanced using hand-auger and hollow-stem auger drilling methods as a part of a geotechnical investigation that Kleinfelder performed at the time of the ADL sampling.

Decontamination procedures included: (1) washing the equipment with a Liquinox™ detergent and water solution; (2) rinsing with tap water; (3) rinsing with de-ionized water, and 4) allowing equipment to air dry or drying with paper towels.

Summary of Analytical Results

The samples collected were analyzed for total lead by U.S. Environmental Protection Agency (EPA) Method 6010B by Enviro-Chem, Inc., located in Pomona, California, a laboratory accredited by the California Environmental Protection Agency (Cal/EPA), Department of Health Services (DHS), Environmental Laboratory Accreditation Program (ELAP). Based on analytical results, total lead was detected in all of the 25 soil samples analyzed, at concentrations up to 232 milligrams per kilogram (mg/kg). Since several soil samples contained greater than 50 mg/kg total lead, further testing was required for soluble lead.

Based on analytical results, soluble lead as analyzed using the CA WET Method (EPA 3050A) with sodium Citrate was detected in seven of the soil samples, at concentrations up to 9.74 mg/L. These samples were then analyzed for soluble lead using the De-ionized water extraction method. Based on these analytical results, soluble lead was detected in three of the samples at concentrations up to 0.474 mg/L.

Four samples (B-3/1 @ 0.5', B-3/2 @ 1.5', HB-1 @ 0', and HB-1 @ 0.5') were also analyzed for soluble lead (TCLP) using EPA Method 1311. Based on the analytical results, soluble lead (TCLP) was detected in the four samples at concentrations up to 1.62 mg/L.

All of the samples (25 total) were analyzed for pH using EPA Method 9045C. The pH values of the soil samples analyzed ranged from 6.89 to 8.63. According to DTSC, soils with a pH of less than 5.0 would be of concern for potentially leaching lead (DTSC, 2000). However, none of the soil samples analyzed had a pH less than 5.0. Table 1

KLEINFELDER 8 Pasteur Street, Suite 190, Irvine, CA 92618 (949) 727-4466 (949) 727-9242 fax

summarizing the soil analytical data and the certified laboratory reports along with the chain-of-custody are included as attachments to this letter report. Twelve of the samples were analyzed for organochlorine pesticides using EPA Method 8081A. Organochlorine pesticides were not detected in the samples.

Variance Conclusions

The analytical results of this ADL Survey suggest that the soil tested on the Site does not contain total lead and soluble lead in excess of the limits set forth in Variance Condition 1. As such, soil within the Site boundaries would be appropriate for reuse within the Caltrans rights-of-way for this project under Variance Condition 1.

Waste Characterization Conclusions

The analytical results of this ADL Survey indicate that the soil tested at two boring locations (B-3 and HB-1) on the Site contain total soluble lead using a sodium citrate extraction in excess of 5 mg/L. As such, soil within the Site boundaries must be disposed of or re-used on site under the conditions set forth in Variance Condition 1.

Recommendations

Based on the findings and conclusions of this report, Kleinfelder does not recommend that additional ADL soil sampling be completed for the Site. In our opinion, the data reported herein are sufficient to characterize Site soil. Kleinfelder also recommends any soils within the site boundary be handled according to the conditions set forth in Variance 1 and California hazardous waste laws.

Conclusions

Based on the analytical results of this ADL Survey, the upper 3 feet of soil tested on the Site does not contain total lead or soluble lead in excess of the limits set forth in Variance Condition 1. As such, soil from these areas would be appropriate for reuse within the Caltrans rights-of-way for this project under Variance Condition 1, provided that it is placed a minimum of 5 feet (1.5 meters) above the maximum water table and is covered by at least 1 foot of non-hazardous soil.

Kleinfelder recommends that the upper 3 feet of soil excavated from the Site be utilized in accordance with variance conditions. If soil is not used onsite, the excess soil must

KLEINFELDER 8 Pasteur Street, Suite 190, Irvine, CA 92618 (949) 727-4466 (949) 727-9242 fax

be disposed of as non-RCRA, California hazardous waste at a Class I hazardous waste disposal facility.

Limitations

Kleinfelder performed the scope of work in accordance with generally accepted standards of care practiced by other members in our profession at the time the work was completed. Our findings are limited to the conditions and results reported for the time the observations were completed. No warranty, expressed or implied, is made.

This report may be used only by the client and only for the purposes stated, within a reasonable time from its issuance, but in no event later than 3 years from the date of the report. Land or facility use, on and off-site conditions, regulations, or other factors may change over time, and additional work may be required with the passage of time. Based on the intended use of the report, Kleinfelder may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else will release Kleinfelder from any liability resulting from the use of this report by any unauthorized party and client agrees to defend, indemnify, and hold harmless Kleinfelder from any claim or liability associated with such unauthorized use or non-compliance.

The scope of services described herein is not intended to be inclusive, to identify all potential concerns, or to eliminate the possibility of other environmental problems. Within current technology, no level of assessment can show conclusively that a property or its structures are completely free of hazardous substances. Therefore, Kleinfelder cannot offer a certification that the property is free of environmental liability. Kleinfelder will assume no responsibility or liability whatsoever for any claim, loss of property value, damage, or injury which results from pre-existing hazardous materials being encountered or present on the project site, or from the discovery of such hazardous materials. Kleinfelder offers a range of investigative and engineering services to suit the varying needs of our clients. Although risk can never be eliminated, more detailed and extensive investigations yield more information, which may help understand and manage the degree of risk. Since such detailed services involve greater expense, our clients participate in determining the level of service that provides adequate information for their purposes at an acceptable level of risk.

KLEINFELDER 8 Pasteur Street, Suite 190, Irvine, CA 92618 (949) 727-4466 (949) 727-9242 fax

Closing Remarks

We appreciate the opportunity to provide our environmental services. If you have questions, please contact the undersigned at (818) 226-6900.

Respectfully submitted,

KLEINFELDER, INC.

Raymond Montero
Staff Professional II

Herbert (Bert) A. Vogler III, PG
Senior Hydrogeologist

Justin J. Kempton, PE, GE
Area Manager

Attachments:

Plates

Plate 1 Site Location Map
Plate 2 Site Plan Showing Approximate Boring Locations

Tables

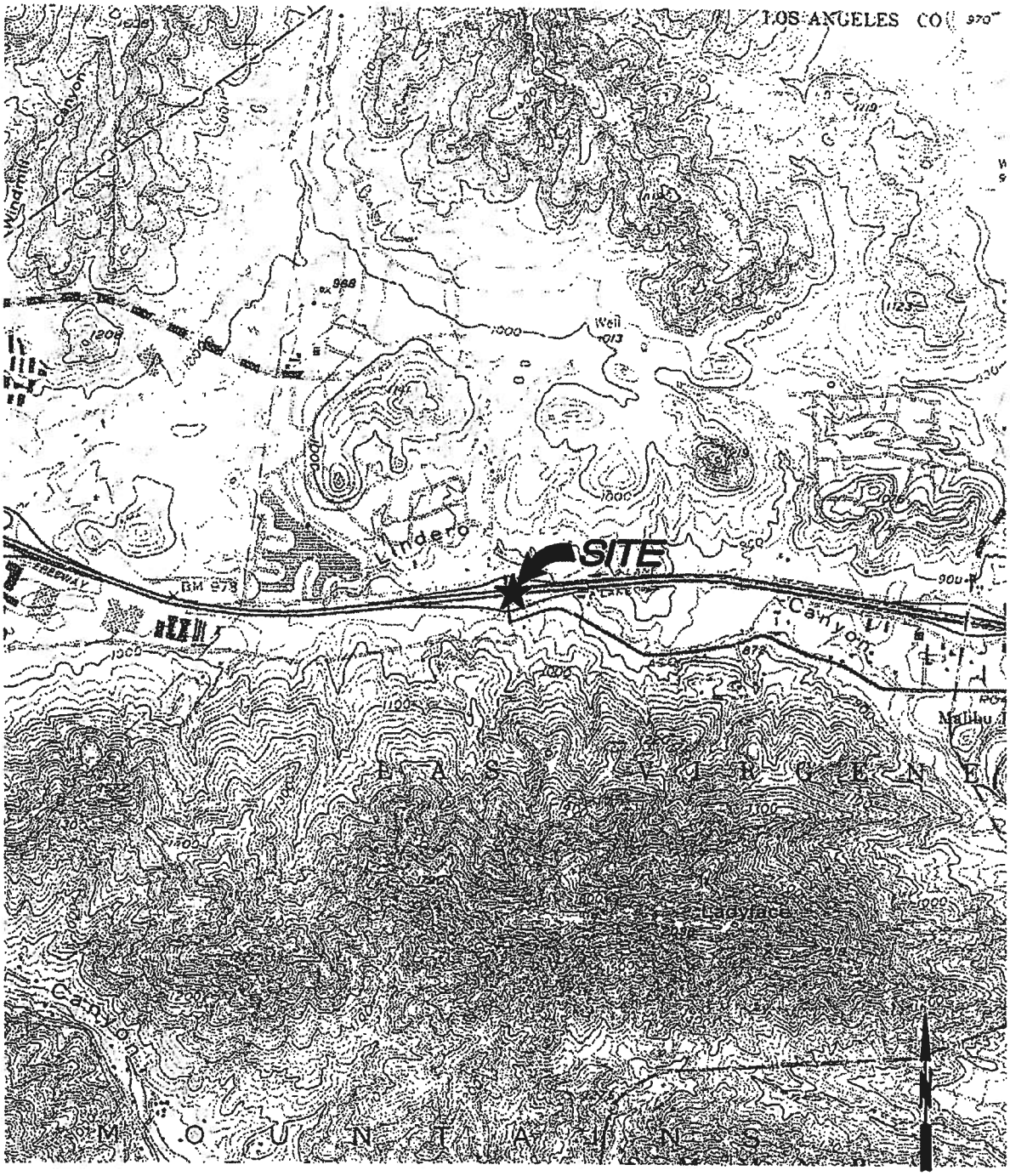
Table 1 Summary of Soil Analytical Data

Appendix

Appendix A Laboratory Analytical Report and Chain-of-Custody

KLEINFELDER 8 Pasteur Street, Suite 190, Irvine, CA 92618 (949) 727-4466 (949) 727-9242 fax

PLATES



SOURCE: U.S.G.S. 7.5' topographic series, Agoura Hills, California quadrangle dated 1950, photorevised 1981.

ATTACHED IMAGES: Images: SCN_20070124084157_001.jpg
ATTACHED XREFS:
Plot: I:\2005\05PROJ CAD FILE: U:\CCardiel\70510\ LAYOUT: Layout2

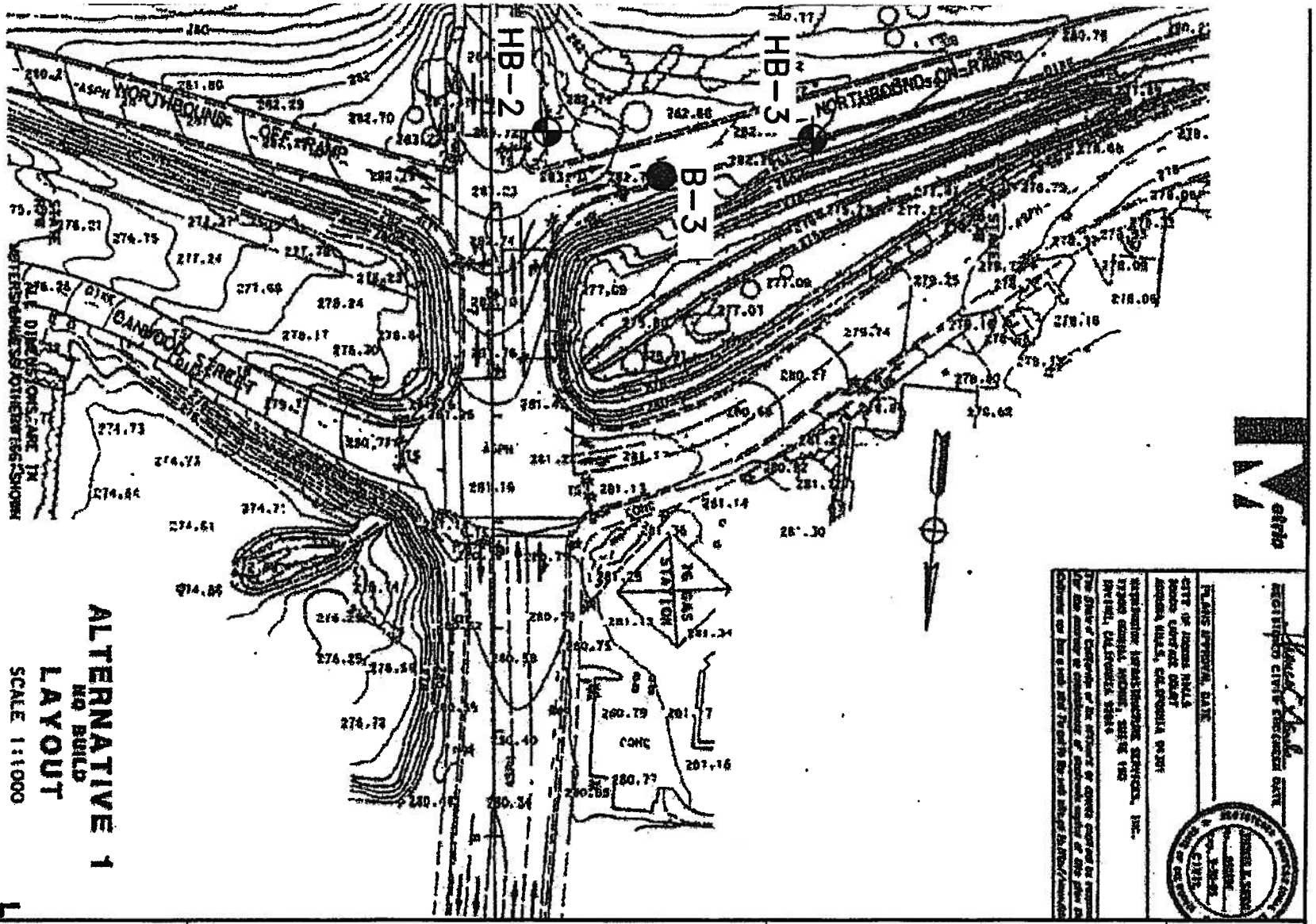
KLEINFELDER
6430 Variel Avenue, Suite 103
Woodland Hills, CA. 91367
PH. (818) 226-6900 FAX. (818) 226-6910
www.kleinfelder.com

SITE LOCATION MAP

REYES ADOBE ROAD
101 FREEWAY AND REYES ADOBE INTERCHANGE
AGOURA HILLS, CALIFORNIA

DRAWN BY:	C. CARDIEL
REVISED BY:	D. FAHRNEY
CHECKED BY:	R. MONTERO
PLATE	1

DRAWN: 1/24/07 | APPROVED BY: _____ | PROJECT NO. 70510 | FILE NAME: 70510p1.dwg



DRAWN BY: C. CARDIEL	**SITE PLAN WITH APPROXIMATE BORING LOCATIONS**	KLEINFELDER	PLATE
REVISED BY: D. FAHRNEY			
CHECKED BY: R. MONTERO	REYES ADOBE ROAD 101 FREEWAY AND REYES ADOBE INTERCHANGE AGOURA HILLS, CALIFORNIA	6430 Variel Avenue, Suite 103 Woodlad Hills, CA. 91367 PH. (818) 226-6900 FAX. (818) 226-6910 www.kleinfelder.com	2
DATE: 1/24/07 APPROVED BY: _____	PROJECT NO. 75010 FILE NAME: 75010p2.dwg		

PLOTTED: 30 Jan 2007, 2:13pm, dfahrney

TABLES

TABLE 1
SUMMARY OF SOIL ANALYTICAL DATA
101 FREEWAY AND REYES ADOBE INTERCHANGE
AGOURA HILLS, CALIFORNIA

Sample ID	Sample Date	pH	Total Lead	STLC-Lead (Sodium Citrate)	STLC Lead (De-ionized)	TCLP-Lead	Organochlorine Pesticides
Analytical Method		9045C	6010B	6010B	6010B	40 CFR 261.24	8081A
Units		pH	mg/kg	mg/L	mg/L	mg/L	mg/kg
PQL		-	0.50	0.05	0.05	0.01	0.01-20
B-1/1 @ 0.5'	1/4/2007	7.32	2.05	NA	NA	NA	ND
B-1/2 @ 1.5'	1/4/2007	8.56	2.35	NA	NA	NA	ND
B-1/3 @ 2'	1/4/2007	8.61	1.72	NA	NA	NA	ND
B-1/4 @ 3'	1/4/2007	8.32	61.2	2.72	NA	NA	NA
B-1/5 @ 5'	1/4/2007	8.17	26.0	NA	NA	NA	NA
B-2/1 @ 0.5'	1/4/2007	8.34	16.4	NA	NA	NA	NA
B-2/2 @ 1.5'	1/4/2007	8.10	44.3	NA	NA	NA	ND
B-2/3 @ 2'	1/4/2007	7.98	3.75	NA	NA	NA	NA
B-2/4 @ 3'	1/4/2007	8.07	16.9	NA	NA	NA	NA
B-2/5 @ 5'	1/4/2007	7.91	17.0	NA	NA	NA	NA
B-3/1 @ 0.5'	1/4/2007	7.88	139	6.29*	0.223	1.62	ND
B-3/2 @ 1.5'	1/4/2007	8.63	165	6.83*	ND	0.575	ND
B-3/3 @ 2'	1/4/2007	8.51	8.03	NA	NA	NA	NA
B-3/4 @ 3'	1/4/2007	8.39	6.00	NA	NA	NA	NA
HB-1 @ 0'	1/4/2007	7.95	232	9.74*	0.474	0.345	NA
HB-1/1 @ 0.5'	1/4/2007	7.83	169	8.38*	0.216	0.228	ND
HB-1/2 @ 1.5'	1/4/2007	7.69	46.9	NA	NA	NA	ND
HB-2 @ 0'	1/4/2007	7.64	59.4	1.97	NA	NA	NA
HB-2/1 @ 0.5'	1/4/2007	6.89	52.9	1.47	NA	NA	ND
HB-2/2 @ 1.5'	1/4/2007	7.42	13.7	NA	NA	NA	ND
HB-3 @ 0'	1/4/2007	7.43	40.7	NA	NA	NA	NA
HB-3/1 @ 0.5'**	1/4/2007	7.59	48.7	NA	NA	NA	ND
HB-3/2 @ 1.5'	1/4/2007	7.76	4.75	NA	NA	NA	ND
HB-3/3 @ 2'	1/4/2007	7.95	27.3	NA	NA	NA	NA
HB-3/4 @ 3'	1/4/2007	7.68	4.96	NA	NA	NA	NA

Notes:

PQL	Pratical quanitation limit
*	The concentration exceeds the Soluble Threshold Limit Concentration (STLC) Limit of 5 parts per million (ppm), therefore the sample is defined as hazardous waste per California Code of Regulations (CCR) Title 22
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
NA	Not analyzed
ND	Not detected
**	Enviro-Chem lab report has error and calls the sample ID "HB-3/2" @ 0.5'. It should be HB-3/2 @ 1.5'

APPENDIX A

LABORATORY ANALYTICAL REPORT AND CHAIN-OF-CUSTODY

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Date: January 11, 2007

Mr. Ray Montero
Kleinfelder
1370 Valley Vista Drive
Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324

Project Name: **US 101-Reyes Adobe Rd. Interchange**
Project Number: **75010-2**
Lab I.D.: **070104-15 through -39**

Dear Mr. Montero:

The **analytical results** for the soil samples, received by our laboratory on January 4, 2007, are attached. All samples were received chilled, intact and accompanying chain of custody.

Enviro-Chem appreciates the opportunity to provide you and your company this and other services. Please do not hesitate to call us if you have any questions.

Sincerely,

Curtis Desilets
Vice President/Program Manager

Jesse Tu, Ph.D.
Laboratory Manager

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324
PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/03-04/07
REPORT TO: Mr. RAY MONTERO

DATE RECEIVED: 01/04/07
DATE ANALYZED: 01/05/07
DATE REPORTED: 01/11/07

EPA 6010B FOR TTLC-LEAD
UNITS: MG/KG = MILLIGRAM PER KILOGRAM = PPM

SAMPLE I.D.	LAB I.D.	TTLC-LEAD RESULT	DF
B-1/1 @ 0.5'	070104-15	2.05	1
B-1/2 @ 1.5'	070104-16	2.35	1
B-1/3 @ 2'	070104-17	1.72	1
B-1/4 @ 3'	070104-18	61.2 *	1
B-1/5 @ 5'	070104-19	26.0	1
B-2/1 @ 0.5'	070104-20	16.4	1
B-2/2 @ 1.5'	070104-21	44.3	1
B-2/3 @ 2'	070104-22	3.75	1
B-2/4 @ 3'	070104-23	16.9	1
B-2/5 @ 5'	070104-24	17.0	1
B-3/1 @ 0.5'	070104-25	139 *	1
B-3/2 @ 1.5'	070104-26	165 *	1
B-3/3 @ 2'	070104-27	8.03	1
B-3/4 @ 3'	070104-28	6.00	1
HB-1 @ 0'	070104-29	232 *	1
HB-1/1 @ 0.5'	070104-30	169 *	1
HB-1/2 @ 1.5'	070104-31	46.9	1
HB-2 @ 0'	070104-32	59.4 *	1
HB-2/1 @ 0.5'	070104-33	52.9 *	1
HB-2/2 @ 1.5'	070104-34	13.7	1
HB-3 @ 0'	070104-35	40.7	1
HB-3/1 @ 0.5'	070104-36	48.7	1
HB-3/2 @ 1.5'	070104-37	4.75	1
HB-3/3 @ 2'	070104-38	27.3	1
HB-3/4 @ 3'	070104-39	4.96	1
Method Blank	---	ND	1
	PQL	**0.50**	

COMMENTS:
DF = Dilution Factor
PQL = Practical Quantitation Limit
Actual Detection Limit = DF X PQL
ND = Non-Detected or below the Actual Detection Limit
TTLC = Total Threshold Limit Concentration
STLC = Soluble Threshold Limit Concentration
STLC Limit for lead = 5 PPM
* = STLC analysis is recommended (if marked)
*** = The concentration exceeds the TTLC Limit @ 1000 PPM, therefore the sample is defined as hazardous waste as per CCR-TITLE 22 (if marked)

Data Reviewed and Approved by: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

QA/QC for Metals Analysis --TTLC--SOLID/SOIL MATRIX

Matrix Spike/ Matrix Spike Duplicate/ LCS :

ANALYSIS DATE: 1/5/2007

Unit : mg/kg(ppm)

Analysis	Spk.Sample ID	LCS CONC.	LCS %Rec.	LCS STATUS	Sample Result	Spike Conc.	MS	% Rec MS	MSD	% Rec MSD	% RPD
Arsenic (As)	070104-15	1.00	111	PASS	0	50.0	53.3	107%	53.4	107%	0%
Copper (Cu)	070104-15	1.00	99.2	PASS	9.33	50.0	64.3	110%	64.0	109%	1%
Lead (Pb)	070104-15	1.00	110	PASS	2.05	50.0	53.5	103%	53.5	103%	0%

ANALYSIS DATE. :

Analysis	Spk.Sample ID	LCS CONC.	LCS %Rec.	LCS STATUS	Sample Result	Spike Conc.	MS	% Rec MS	MSD	% Rec MSD	% RPD
Mercury (Hg)		0.300				0.300		0%		0%	#DIV/0!

MS/MSD Status:

Analysis	%MS	%MSD	%LCS	%RPD
Arsenic (As)	PASS	PASS	PASS	PASS
Copper (Cu)	PASS	PASS	PASS	PASS
Lead (Pb)	PASS	PASS	PASS	PASS
Mercury (Hg)				
Accepted Range	75 ~ 125	75 ~ 125	85 ~ 115	0 ~ 20

ANALYST: Keith

FINAL REVIEWER: [illegible]

QA/QC for Metals Analysis --TTLC--SOLID/SOIL MATRIX

Matrix Spike/ Matrix Spike Duplicate/ LCS :

ANALYSIS DATE: 1/5/2007

Unit : mg/kg(ppm)

Analysis	Spk.Sample ID	LCS CONC.	LCS %Rec.	LCS STATUS	Sample Result	Spike Conc.	MS	% Rec MS	MSD	% Rec MSD	% RPD
Arsenic (As)	070104-37	1.00	114	PASS	0.048	50.0	51.1	102%	51.9	104%	2%
Copper (Cu)	070104-37	1.00	100.0	PASS	9.56	50.0	59.3	99%	59.9	101%	1%
Lead (Pb)	070104-37	1.00	113	PASS	4.75	50.0	53.5	98%	54.5	100%	2%

ANALYSIS DATE. :

Analysis	Spk.Sample ID	LCS CONC.	LCS %Rec.	LCS STATUS	Sample Result	Spike Conc.	MS	% Rec MS	MSD	% Rec MSD	% RPD
Mercury (Hg)		0.300				0.300		0%		0%	#DIV/0!

MS/MSD Status:

Analysis	%MS	%MSD	%LCS	%RPD
Arsenic (As)	PASS	PASS	PASS	PASS
Copper (Cu)	PASS	PASS	PASS	PASS
Lead (Pb)	PASS	PASS	PASS	PASS
Mercury (Hg)				
Accepted Range	75 ~ 125	75 ~ 125	85 ~ 115	0 ~ 20

ANALYST: Keith

FINAL REVIEWER: CJ

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324
PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/03-04/07
REPORT TO: Mr. RAY MONTERO
DATE RECEIVED: 01/04/07
DATE ANALYZED: 01/04/07
DATE REPORTED: 01/11/07

pH ANALYSIS
METHOD: EPA 9045C
UNIT: pH UNITS

SAMPLE I.D.	LAB I.D.	pH RESULT
B-1/1 @ 0.5'	070104-15	7.32
B-1/2 @ 1.5'	070104-16	8.56
B-1/3 @ 2'	070104-17	8.61
B-1/4 @ 3'	070104-18	8.32
B-1/5 @ 5'	070104-19	8.17
B-2/1 @ 0.5'	070104-20	8.34
B-2/2 @ 1.5'	070104-21	8.10
B-2/3 @ 2'	070104-22	7.98
B-2/4 @ 3'	070104-23	8.07
B-2/5 @ 5'	070104-24	7.91
B-3/1 @ 0.5'	070104-25	7.88
B-3/2 @ 1.5'	070104-26	8.63
B-3/3 @ 2'	070104-27	8.51
B-3/4 @ 3'	070104-28	8.39
HB-1 @ 0'	070104-29	7.95
HB-1/1 @ 0.5'	070104-30	7.83
HB-1/2 @ 1.5'	070104-31	7.69
HB-2 @ 0'	070104-32	7.64
HB-2/1 @ 0.5'	070104-33	6.89
HB-2/2 @ 1.5'	070104-34	7.42
HB-3 @ 0'	070104-35	7.43
HB-3/1 @ 0.5'	070104-36	7.59
HB-3/2 @ 1.5'	070104-37	7.76
HB-3/3 @ 2'	070104-38	7.95
HB-3/4 @ 3'	070104-39	7.68

COMMENTS:
pH ANALYSIS CONDUCTED ON 1:1 SOIL/DEIONIZED WATER EXTRACTION

DATA REVIEWED AND APPROVED BY: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro-Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766
Tel (909)590-5905 Fax (909)590-5907

Matrix: Water/Liquid

QA/QC Report

Analysis	Units	Date Analyzed	Sample I.D.	S.R.	Duplicate	% RPD	ACP %RPD
Alkalinity	mg/L					0.00%	0-20
Residual Chlorine	mg/L					0.00%	0-20
Density	g/mL					0.00%	0-20
EC/SC	umhos/cm					0.00%	0-20
pH	pH units	1/4/2007	070104-2	8.97	8.95	0.22%	0-20
TDS	mg/L					0.00%	0-20
TSS	mg/L	1/9/2007	070105-31	31	32	3.17%	0-20
Turbidity	mg/L					0.00%	0-20
OIL & GREASE 413.1	mg/L					0.00%	0-20
Salinity	S					0.00%	0-20
Settleable Solid	mL/L/hr					0.00%	0-20
Resistivity	ohms					0.00%	0-20
Acidity	mg/L					0.00%	0-20

%RPD = Relative Percent Difference ACP %RPD = Acceptable Relative Percent Difference

Analysis	Units	Date Analyzed	Sample I.D.	Spk Conc	S.R.	ACP %RPD	ACP %RC	MS	MS %RC	MSD	MSD %RC	% RPD
Acidity	mg/L					0-20	80-120					#VALUE!
Ammonia as N	mg/L	1/8/2007	070108-LCS1/2	5.00	0.000	0-20	80-120	4.85	97%	4.65	93%	4.0%
Chloride	mg/L			20.0		0-20	80-120					#VALUE!
COD	mg/L	1/10/2007	LCS1/2	500	0.000	0-20	80-120	461	92%	453	91%	1.6%
CR VI	mg/L			0.4		0-20	80-120					#VALUE!
Cyanide	mg/L			0.2		0-20	80-120					#VALUE!
Fluoride	mg/L			1.0		0-20	80-120					#VALUE!
MBAS	mg/L			0.6		0-20	80-120					#VALUE!
Nitrate as N	mg/L			0.400		0-20	80-120					#VALUE!
Nitrite as N	mg/L			0.400		0-20	80-120					#VALUE!
EPA 1664A	mg/L			4.0		0-20	80-120					#VALUE!
OIL & GREASE 413.2	mg/L			20		0-20	80-120					#VALUE!
Phenolics	mg/L			0.5		0-20	80-120					#VALUE!
Sulfate	mg/L			20.0		0-20	80-120					#VALUE!
Dissolved Sulfide	mg/L	1/10/2007	070104-11	0.300	0.000	0-20	80-120	0.257	86%	0.255	85%	0.7%
Total Sulfide	mg/L			0.3		0-20	80-120					#VALUE!
TRPH	mg/L			20.0		0-20	80-120					#VALUE!

S.R. = Sample Results %RC = Percent Recovery ACP %RC = Acceptable Percent Recovery Spk Conc = Spike Concentration

Analyst Signature: WP

Final Reviewer: [illegible]

Enviro-Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766
Tel (909)590-5905 Fax (909)590-5907

Matrix: Water/Liquid

QA/QC Report

Analysis	Units	Date Analyzed	Sample I.D.	S.R.	Duplicate	% RPD	ACP %RPD
Alkalinity	mg/L					0.00%	0-20
Residual Chlorine	mg/L					0.00%	0-20
Density	g/mL					0.00%	0-20
EC/SC	umhos/cm					0.00%	0-20
pH	pH units	1/4/2007	070104-54	8.12	8.14	0.25%	0-20
TDS	mg/L					0.00%	0-20
TSS	mg/L	1/9/2007	070105-31	31	32	3.17%	0-20
Turbidity	mg/L					0.00%	0-20
OIL & GREASE 413.1	mg/L					0.00%	0-20
Salinity	S					0.00%	0-20
Settleable Solid	mL/L/hr					0.00%	0-20
Resistivity	ohms					0.00%	0-20
Acidity	mg/L					0.00%	0-20

%RPD = Relative Percent Difference ACP %RPD = Acceptable Relative Percent Difference

Analysis	Units	Date Analyzed	Sample I.D.	Spk Conc	S.R.	ACP %RPD	ACP %RC	MS	MS %RC	MSD	MSD %RC	% RPD
Acidity	mg/L					0-20	80-120					#VALUE!
Ammonia as N	mg/L	1/8/2007	070108-LCS1/2	5.00	0.000	0-20	80-120	4.85	97%	4.65	93%	4.0%
Chloride	mg/L			20.0		0-20	80-120					#VALUE!
COD	mg/L	1/10/2007	LCS1/2	500	0.000	0-20	80-120	461	92%	453	91%	1.6%
CR VI	mg/L			0.4		0-20	80-120					#VALUE!
Cyanide	mg/L			0.2		0-20	80-120					#VALUE!
Fluoride	mg/L			1.0		0-20	80-120					#VALUE!
MBAS	mg/L			0.6		0-20	80-120					#VALUE!
Nitrate as N	mg/L			0.400		0-20	80-120					#VALUE!
Nitrite as N	mg/L			0.400		0-20	80-120					#VALUE!
EPA 1664A	mg/L			4.0		0-20	80-120					#VALUE!
OIL & GREASE 413.2	mg/L			20		0-20	80-120					#VALUE!
Phenolics	mg/L			0.5		0-20	80-120					#VALUE!
Sulfate	mg/L			20.0		0-20	80-120					#VALUE!
Dissolved Sulfide	mg/L	1/10/2007	070104-11	0.300	0.000	0-20	80-120	0.257	86%	0.255	85%	0.7%
Total Sulfide	mg/L			0.3		0-20	80-120					#VALUE!
TRPH	mg/L			20.0		0-20	80-120					#VALUE!

S.R. = Sample Results %RC = Percent Recovery ACP %RC = Acceptable Percent Recovery Spk Conc = Spike Concentration

Analyst Signature: _____

Final Reviewer: _____

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324
PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/03-04/07
REPORT TO: Mr. RAY MONTERO
DATE RECEIVED: 01/04/07
DATE ANALYZED: 01/08-10/07
DATE REPORTED: 01/11/07

EPA 6010B FOR STLC-LEAD
UNIT: MG/L IN THE STLC LEACHATE

SAMPLE I.D.	LAB I.D.	STLC-LEAD RESULT	DF
B-1/4 @ 3'	070104-18	2.72	1
HB-2 @ 0'	070104-32	1.97	1
HB-2/1 @ 0.5'	070104-33	1.47	1
Method Blank	--	ND	1
	PQL	0.05	

COMMENTS:
DF = Dilution Factor
PQL = Practical Quantitation Limit
Actual Detection Limit = DF X PQL
ND = Non-Detected or below the Actual Detection Limit
STLC = Soluble Threshold Limit Concentration
MG/L = Milligram Per Liter = PPM
*** = The concentration exceeds the STLC Limit @ 5 PPM, therefore the sample is defined as hazardous waste as per CCR-TITLE 22 (if marked)

Data Reviewed and Approved by: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

QA/QC for Metals Analysis --STLC

Matrix Spike/ Matrix Spike Duplicate/ LCS :

ANALYSIS DATE: 1/10/2007

Unit : mg/L (ppm)

Analysis	Spk.Sample ID	LCS CONC.	LCS %Rec.	LCS STATUS	Sample Result	Spike Conc.	MS	% Rec MS	MSD	% Rec MSD	% RPD
Arsenic (As)	061228-7	1.000	106	PASS	0	5.00	4.89	98%	4.87	97%	0%
Chromium(Cr)	061228-7	1.00	105	PASS	0.256	5.00	5.17	98%	5.16	98%	0%
Lead (Pb)	061228-7	1.00	107	PASS	4.03	5.00	8.90	97%	8.93	98%	1%

ANALYSIS DATE:

Analysis	Spk.Sample ID	LCS CONC.	LCS %Rec.	LCS STATUS	Sample Result	Spike Conc.	MS	% Rec MS	MSD	% Rec MSD	% RPD
Mercury (Hg)		0.0300				0.0300		0%		0%	#DIV/0!

MS/MSD Status:

Analysis	%MS	%MSD	%LCS	%RPD
Arsenic (As)	PASS	PASS	PASS	PASS
Chromium(Cr)	PASS	PASS	PASS	PASS
Lead (Pb)	PASS	PASS	PASS	PASS
Mercury (Hg)				
Accepted Range	75 ~ 125	75 ~ 125	85 ~ 115	0 ~ 20

ANALYST: Kuite

FINAL REVIEWER: [illegible]

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324
PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/03-04/07
REPORT TO: Mr. RAY MONTERO
DATE RECEIVED: 01/04/07
DATE ANALYZED: 01/08-09/07
DATE REPORTED: 01/11/07

TCLP-LEAD ANALYSIS
(PER 40 CFR 261.24)/LIMIT @ 5.0
CONCENTRATION UNIT: MG/L IN LEACHATE

SAMPLE I.D.	LAB I.D.	TCLP-LEAD RESULT	DF
B-3/1 @ 0.5'	070104-25	1.62	1
B-3/2 @ 1.5'	070104-26	0.575	1
HB-1 @ 0'	070104-29	0.345	1
HB-1/1 @ 0.5'	070104-30	0.228	1
Method Blank	--	ND	1
	PQL	0.01	

COMMENTS
MG/L = Milligram per Liter = PPM
TCLP Extraction Method = EPA 1311
DF = Dilution Factor
PQL = Practical Quantitation Limit
Actual Detection Limit = PQL X DF
ND = Below the Actual Detection Limit or non-detected
EPA# = The EPA Hazardous Waste Number
LIMIT@ = The "EPA Acceptable Land Disposal Limit"
*** = The concentration exceeds the TCLP Limit (if marked)

Data Reviewed and Approved by: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

QA/QC for Metals Analysis --TCLP

Matrix Spike/ Matrix Spike Duplicate/ LCS :

ANALYSIS DATE: 1/9/2007

Unit : mg/L (ppm)

Analysis	Spk.Sample ID	LCS CONC.	LCS %Rec.	LCS STATUS	Sample Result	Spike Conc.	MS	% Rec MS	MSD	% Rec MSD	% RPD
Arsenic (As)	061213-11	1.00	112	PASS	0	1.00	1.12	112%	1.10	110%	2%
Chromium (Cr)	061213-11	1.00	107	PASS	0	1.00	0.944	94%	0.949	95%	1%
Lead (Pb)	061213-11	1.00	112	PASS	0.022	1.00	0.998	98%	0.989	97%	1%

ANALYSIS DATE:

Analysis	Spk.Sample ID	LCS CONC.	LCS %Rec.	LCS STATUS	Sample Result	Spike Conc.	MS	% Rec MS	MSD	% Rec MSD	% RPD
Mercury (Hg)		0.0300				0.0300		0%		0%	#DIV/0!

MS/MSD Status:

Analysis	%MS	%MSD	%LCS	%RPD
Arsenic (As)	PASS	PASS	PASS	PASS
Chromium (Cr)	PASS	PASS	PASS	PASS
Lead (Pb)	PASS	PASS	PASS	PASS
Mercury (Hg)				
Accepted Range	75 ~ 125	75 ~ 125	85 ~ 115	0 ~ 20

ANALYST: Keitha

FINAL REVIEWER: CD

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324

PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/03/07
REPORT TO: Mr. RAY MONTERO

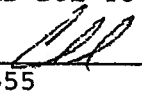
DATE RECEIVED: 01/04/07
DATE EXTRACTED: 01/04/07
DATE ANALYZED: 01/05/07
DATE REPORTED: 01/11/07

SAMPLE I.D.: **B-1/1 @ 0.5'**
LAB I.D.: 070104-15

Organochlorine Pesticides Analysis
Method: EPA 8081A
Unit: Mg/Kg = Milligram Per Kilogram = PPM

PARAMETER	SAMPLE RESULT	PQL	DF
Aldrin	ND	0.001	100*
alpha-BHC	ND	0.001	100*
beta-BHC	ND	0.001	100*
gamma-BHC (Lindane)	ND	0.001	100*
delta-BHC	ND	0.001	100*
alpha-Chlordane	ND	0.001	100*
gamma-Chlordane	ND	0.001	100*
4,4'-DDD	ND	0.001	100*
4,4'-DDE	ND	0.001	100*
4,4'-DDT	ND	0.001	100*
Dieldrin	ND	0.001	100*
Endosulfan I	ND	0.001	100*
Endosulfan II	ND	0.001	100*
Endosulfan Sulfate	ND	0.001	100*
Endrin	ND	0.001	100*
Endrin Aldehyde	ND	0.001	100*
Endrin Ketone	ND	0.001	100*
Heptachlor Epoxide	ND	0.001	100*
Heptachlor	ND	0.001	100*
Methoxyclor	ND	0.001	100*
Toxaphene	ND	0.200	100*

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = PQL X DF
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT
* = ACTUAL DETECTION LIMIT RAISED DUE TO MATRIX INTERFERENCE

DATA REVIEWED AND APPROVED BY: 
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324

PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/03/07
REPORT TO: Mr. RAY MONTERO

DATE RECEIVED: 01/04/07
DATE EXTRACTED: 01/04/07
DATE ANALYZED: 01/05/07
DATE REPORTED: 01/11/07

SAMPLE I.D.: **B-1/2 @ 1.5'**
LAB I.D.: 070104-16

Organochlorine Pesticides Analysis
Method: EPA 8081A
Unit: Mg/Kg = Milligram Per Kilogram = PPM

PARAMETER	SAMPLE RESULT	PQL	DF
Aldrin	ND	0.001	100*
alpha-BHC	ND	0.001	100*
beta-BHC	ND	0.001	100*
gamma-BHC (Lindane)	ND	0.001	100*
delta-BHC	ND	0.001	100*
alpha-Chlordane	ND	0.001	100*
gamma-Chlordane	ND	0.001	100*
4,4'-DDD	ND	0.001	100*
4,4'-DDE	ND	0.001	100*
4,4'-DDT	ND	0.001	100*
Dieldrin	ND	0.001	100*
Endosulfan I	ND	0.001	100*
Endosulfan II	ND	0.001	100*
Endosulfan Sulfate	ND	0.001	100*
Endrin	ND	0.001	100*
Endrin Aldehyde	ND	0.001	100*
Endrin Ketone	ND	0.001	100*
Heptachlor Epoxide	ND	0.001	100*
Heptachlor	ND	0.001	100*
Methoxyclor	ND	0.001	100*
Toxaphene	ND	0.200	100*

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = PQL X DF
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT
* = ACTUAL DETECTION LIMIT RAISED DUE TO MATRIX INTERFERENCE

DATA REVIEWED AND APPROVED BY: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324

PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/03/07
REPORT TO: Mr. RAY MONTERO

DATE RECEIVED: 01/04/07
DATE EXTRACTED: 01/04/07
DATE ANALYZED: 01/05/07
DATE REPORTED: 01/11/07

SAMPLE I.D.: **B-2/1 @ 0.5'** LAB I.D.: 070104-20

Organochlorine Pesticides Analysis
Method: EPA 8081A
Unit: Mg/Kg = Milligram Per Kilogram = PPM

PARAMETER	SAMPLE RESULT	PQL	DF
Aldrin	ND	0.001	100*
alpha-BHC	ND	0.001	100*
beta-BHC	ND	0.001	100*
gamma-BHC (Lindane)	ND	0.001	100*
delta-BHC	ND	0.001	100*
alpha-Chlordane	ND	0.001	100*
gamma-Chlordane	ND	0.001	100*
4,4'-DDD	ND	0.001	100*
4,4'-DDE	ND	0.001	100*
4,4'-DDT	ND	0.001	100*
Dieldrin	ND	0.001	100*
Endosulfan I	ND	0.001	100*
Endosulfan II	ND	0.001	100*
Endosulfan Sulfate	ND	0.001	100*
Endrin	ND	0.001	100*
Endrin Aldehyde	ND	0.001	100*
Endrin Ketone	ND	0.001	100*
Heptachlor Epoxide	ND	0.001	100*
Heptachlor	ND	0.001	100*
Methoxyclor	ND	0.001	100*
Toxaphene	ND	0.200	100*

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = PQL X DF
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324

PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/03/07
REPORT TO: Mr. RAY MONTERO

DATE RECEIVED: 01/04/07
DATE EXTRACTED: 01/04/07
DATE ANALYZED: 01/05/07
DATE REPORTED: 01/11/07

SAMPLE I.D.: **B-2/2 @ 1.5'**
LAB I.D.: 070104-21

Organochlorine Pesticides Analysis
Method: EPA 8081A
Unit: Mg/Kg = Milligram Per Kilogram = PPM

PARAMETER	SAMPLE RESULT	PQL	DF
Aldrin	ND	0.001	100*
alpha-BHC	ND	0.001	100*
beta-BHC	ND	0.001	100*
gamma-BHC (Lindane)	ND	0.001	100*
delta-BHC	ND	0.001	100*
alpha-Chlordane	ND	0.001	100*
gamma-Chlordane	ND	0.001	100*
4,4'-DDD	ND	0.001	100*
4,4'-DDE	ND	0.001	100*
4,4'-DDT	ND	0.001	100*
Dieldrin	ND	0.001	100*
Endosulfan I	ND	0.001	100*
Endosulfan II	ND	0.001	100*
Endosulfan Sulfate	ND	0.001	100*
Endrin	ND	0.001	100*
Endrin Aldehyde	ND	0.001	100*
Endrin Ketone	ND	0.001	100*
Heptachlor Epoxide	ND	0.001	100*
Heptachlor	ND	0.001	100*
Methoxyclor	ND	0.001	100*
Toxaphene	ND	0.200	100*

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = PQL X DF
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT
* = ACTUAL DETECTION LIMIT RAISED DUE TO MATRIX INTERFERENCE

DATA REVIEWED AND APPROVED BY: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324

PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/03/07
REPORT TO: Mr. RAY MONTERO

DATE RECEIVED: 01/04/07
DATE EXTRACTED: 01/04/07
DATE ANALYZED: 01/05/07
DATE REPORTED: 01/11/07

SAMPLE I.D.: **B-3/1 @ 0.5'**
LAB I.D.: 070104-25

Organochlorine Pesticides Analysis
Method: EPA 8081A
Unit: Mg/Kg = Milligram Per Kilogram = PPM

PARAMETER	SAMPLE RESULT	PQL	DF
Aldrin	ND	0.001	100*
alpha-BHC	ND	0.001	100*
beta-BHC	ND	0.001	100*
gamma-BHC (Lindane)	ND	0.001	100*
delta-BHC	ND	0.001	100*
alpha-Chlordane	ND	0.001	100*
gamma-Chlordane	ND	0.001	100*
4,4'-DDD	ND	0.001	100*
4,4'-DDE	ND	0.001	100*
4,4'-DDT	ND	0.001	100*
Dieldrin	ND	0.001	100*
Endosulfan I	ND	0.001	100*
Endosulfan II	ND	0.001	100*
Endosulfan Sulfate	ND	0.001	100*
Endrin	ND	0.001	100*
Endrin Aldehyde	ND	0.001	100*
Endrin Ketone	ND	0.001	100*
Heptachlor Epoxide	ND	0.001	100*
Heptachlor	ND	0.001	100*
Methoxyclor	ND	0.001	100*
Toxaphene	ND	0.200	100*

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = PQL X DF
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT
* = ACTUAL DETECTION LIMIT RAISED DUE TO MATRIX INTERFERENCE

DATA REVIEWED AND APPROVED BY: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324

PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/04/07
REPORT TO: Mr. RAY MONTERO

DATE RECEIVED: 01/04/07
DATE EXTRACTED: 01/04/07
DATE ANALYZED: 01/05/07
DATE REPORTED: 01/11/07

SAMPLE I.D.: **B-3/2 @ 1.5'** LAB I.D.: 070104-26

Organochlorine Pesticides Analysis
Method: EPA 8081A
Unit: Mg/Kg = Milligram Per Kilogram = PPM

PARAMETER	SAMPLE RESULT	PQL	DF
Aldrin	ND	0.001	100*
alpha-BHC	ND	0.001	100*
beta-BHC	ND	0.001	100*
gamma-BHC (Lindane)	ND	0.001	100*
delta-BHC	ND	0.001	100*
alpha-Chlordane	ND	0.001	100*
gamma-Chlordane	ND	0.001	100*
4,4'-DDD	ND	0.001	100*
4,4'-DDE	ND	0.001	100*
4,4'-DDT	ND	0.001	100*
Dieldrin	ND	0.001	100*
Endosulfan I	ND	0.001	100*
Endosulfan II	ND	0.001	100*
Endosulfan Sulfate	ND	0.001	100*
Endrin	ND	0.001	100*
Endrin Aldehyde	ND	0.001	100*
Endrin Ketone	ND	0.001	100*
Heptachlor Epoxide	ND	0.001	100*
Heptachlor	ND	0.001	100*
Methoxyclor	ND	0.001	100*
Toxaphene	ND	0.200	100*

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = PQL X DF
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT
* = ACTUAL DETECTION LIMIT RAISED DUE TO MATRIX INTERFERENCE

DATA REVIEWED AND APPROVED BY: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324

PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/04/07
REPORT TO: Mr. RAY MONTERO

DATE RECEIVED: 01/04/07
DATE EXTRACTED: 01/04/07
DATE ANALYZED: 01/05/07
DATE REPORTED: 01/11/07

SAMPLE I.D.: **HB-1/1 @ 0.5'**
LAB I.D.: 070104-30

Organochlorine Pesticides Analysis
Method: EPA 8081A
Unit: Mg/Kg = Milligram Per Kilogram = PPM

PARAMETER	SAMPLE RESULT	PQL	DF
Aldrin	ND	0.001	10*
alpha-BHC	ND	0.001	10*
beta-BHC	ND	0.001	10*
gamma-BHC (Lindane)	ND	0.001	10*
delta-BHC	ND	0.001	10*
alpha-Chlordane	ND	0.001	10*
gamma-Chlordane	ND	0.001	10*
4,4'-DDD	ND	0.001	10*
4,4'-DDE	ND	0.001	10*
4,4'-DDT	ND	0.001	10*
Dieldrin	ND	0.001	10*
Endosulfan I	ND	0.001	10*
Endosulfan II	ND	0.001	10*
Endosulfan Sulfate	ND	0.001	10*
Endrin	ND	0.001	10*
Endrin Aldehyde	ND	0.001	10*
Endrin Ketone	ND	0.001	10*
Heptachlor Epoxide	ND	0.001	10*
Heptachlor	ND	0.001	10*
Methoxyclor	ND	0.001	10*
Toxaphene	ND	0.200	10*

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = PQL X DF
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT
* = ACTUAL DETECTION LIMIT RAISED DUE TO MATRIX INTERFERENCE

DATA REVIEWED AND APPROVED BY: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324

PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/04/07
REPORT TO: Mr. RAY MONTERO

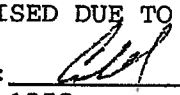
DATE RECEIVED: 01/04/07
DATE EXTRACTED: 01/04/07
DATE ANALYZED: 01/05/07
DATE REPORTED: 01/11/07

SAMPLE I.D.: **HB-1/2 @ 1.5'** LAB I.D.: 070104-31

Organochlorine Pesticides Analysis
Method: EPA 8081A
Unit: Mg/Kg = Milligram Per Kilogram = PPM

PARAMETER	SAMPLE RESULT	PQL	DF
Aldrin	ND	0.001	10*
alpha-BHC	ND	0.001	10*
beta-BHC	ND	0.001	10*
gamma-BHC (Lindane)	ND	0.001	10*
delta-BHC	ND	0.001	10*
alpha-Chlordane	ND	0.001	10*
gamma-Chlordane	ND	0.001	10*
4,4'-DDD	ND	0.001	10*
4,4'-DDE	ND	0.001	10*
4,4'-DDT	ND	0.001	10*
Dieldrin	ND	0.001	10*
Endosulfan I	ND	0.001	10*
Endosulfan II	ND	0.001	10*
Endosulfan Sulfate	ND	0.001	10*
Endrin	ND	0.001	10*
Endrin Aldehyde	ND	0.001	10*
Endrin Ketone	ND	0.001	10*
Heptachlor Epoxide	ND	0.001	10*
Heptachlor	ND	0.001	10*
Methoxyclor	ND	0.001	10*
Toxaphene	ND	0.200	10*

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = PQL X DF
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT
* = ACTUAL DETECTION LIMIT RAISED DUE TO MATRIX INTERFERENCE

DATA REVIEWED AND APPROVED BY: 
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324

PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/04/07
REPORT TO: Mr. RAY MONTERO

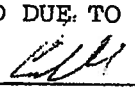
DATE RECEIVED: 01/04/07
DATE EXTRACTED: 01/04/07
DATE ANALYZED: 01/05/07
DATE REPORTED: 01/11/07

SAMPLE I.D.: **HB-2/1 @ 0.5'**
LAB I.D.: 070104-33

Organochlorine Pesticides Analysis
Method: EPA 8081A
Unit: Mg/Kg = Milligram Per Kilogram = PPM

PARAMETER	SAMPLE RESULT	PQL	DF
Aldrin	ND	0.001	10*
alpha-BHC	ND	0.001	10*
beta-BHC	ND	0.001	10*
gamma-BHC (Lindane)	ND	0.001	10*
delta-BHC	ND	0.001	10*
alpha-Chlordane	ND	0.001	10*
gamma-Chlordane	ND	0.001	10*
4,4'-DDD	ND	0.001	10*
4,4'-DDE	ND	0.001	10*
4,4'-DDT	ND	0.001	10*
Dieldrin	ND	0.001	10*
Endosulfan I	ND	0.001	10*
Endosulfan II	ND	0.001	10*
Endosulfan Sulfate	ND	0.001	10*
Endrin	ND	0.001	10*
Endrin Aldehyde	ND	0.001	10*
Endrin Ketone	ND	0.001	10*
Heptachlor Epoxide	ND	0.001	10*
Heptachlor	ND	0.001	10*
Methoxyclor	ND	0.001	10*
Toxaphene	ND	0.200	10*

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = PQL X DF
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT
* = ACTUAL DETECTION LIMIT RAISED DUE TO MATRIX INTERFERENCE

DATA REVIEWED AND APPROVED BY: 
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro - Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324

PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/04/07
REPORT TO: Mr. RAY MONTERO

DATE RECEIVED: 01/04/07
DATE EXTRACTED: 01/04/07
DATE ANALYZED: 01/05/07
DATE REPORTED: 01/11/07

SAMPLE I.D.: **HB-2/2 @ 1.5'**
LAB I.D.: 070104-34

Organochlorine Pesticides Analysis
Method: EPA 8081A
Unit: Mg/Kg = Milligram Per Kilogram = PPM

PARAMETER	SAMPLE RESULT	PQL	DF
Aldrin	ND	0.001	10*
alpha-BHC	ND	0.001	10*
beta-BHC	ND	0.001	10*
gamma-BHC (Lindane)	ND	0.001	10*
delta-BHC	ND	0.001	10*
alpha-Chlordane	ND	0.001	10*
gamma-Chlordane	ND	0.001	10*
4,4'-DDD	ND	0.001	10*
4,4'-DDE	ND	0.001	10*
4,4'-DDT	ND	0.001	10*
Dieldrin	ND	0.001	10*
Endosulfan I	ND	0.001	10*
Endosulfan II	ND	0.001	10*
Endosulfan Sulfate	ND	0.001	10*
Endrin	ND	0.001	10*
Endrin Aldehyde	ND	0.001	10*
Endrin Ketone	ND	0.001	10*
Heptachlor Epoxide	ND	0.001	10*
Heptachlor	ND	0.001	10*
Methoxyclor	ND	0.001	10*
Toxaphene	ND	0.200	10*

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = PQL X DF
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT
* = ACTUAL DETECTION LIMIT RAISED DUE TO MATRIX INTERFERENCE

DATA REVIEWED AND APPROVED BY: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324

PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/04/07
REPORT TO: Mr. RAY MONTERO

DATE RECEIVED: 01/04/07
DATE EXTRACTED: 01/04/07
DATE ANALYZED: 01/05/07
DATE REPORTED: 01/11/07

SAMPLE I.D.: **HB-3/1 @ 0.5'**
LAB I.D.: 070104-36

Organochlorine Pesticides Analysis
Method: EPA 8081A
Unit: Mg/Kg = Milligram Per Kilogram = PPM

PARAMETER	SAMPLE RESULT	PQL	DF
Aldrin	ND	0.001	100*
alpha-BHC	ND	0.001	100*
beta-BHC	ND	0.001	100*
gamma-BHC (Lindane)	ND	0.001	100*
delta-BHC	ND	0.001	100*
alpha-Chlordane	ND	0.001	100*
gamma-Chlordane	ND	0.001	100*
4,4'-DDD	ND	0.001	100*
4,4'-DDE	ND	0.001	100*
4,4'-DDT	ND	0.001	100*
Dieldrin	ND	0.001	100*
Endosulfan I	ND	0.001	100*
Endosulfan II	ND	0.001	100*
Endosulfan Sulfate	ND	0.001	100*
Endrin	ND	0.001	100*
Endrin Aldehyde	ND	0.001	100*
Endrin Ketone	ND	0.001	100*
Heptachlor Epoxide	ND	0.001	100*
Heptachlor	ND	0.001	100*
Methoxyclor	ND	0.001	100*
Toxaphene	ND	0.200	100*

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = PQL X DF
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324

PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/04/07
REPORT TO: Mr. RAY MONTERO

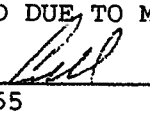
DATE RECEIVED: 01/04/07
DATE EXTRACTED: 01/04/07
DATE ANALYZED: 01/05/07
DATE REPORTED: 01/11/07

SAMPLE I.D.: **HB-3/2 @0.5'**
LAB I.D.: 070104-37

Organochlorine Pesticides Analysis
Method: EPA 8081A
Unit: Mg/Kg = Milligram Per Kilogram = PPM

PARAMETER	SAMPLE RESULT	PQL	DF
Aldrin	ND	0.001	10*
alpha-BHC	ND	0.001	10*
beta-BHC	ND	0.001	10*
gamma-BHC (Lindane)	ND	0.001	10*
delta-BHC	ND	0.001	10*
alpha-Chlordane	ND	0.001	10*
gamma-Chlordane	ND	0.001	10*
4,4'-DDD	ND	0.001	10*
4,4'-DDE	ND	0.001	10*
4,4'-DDT	ND	0.001	10*
Dieldrin	ND	0.001	10*
Endosulfan I	ND	0.001	10*
Endosulfan II	ND	0.001	10*
Endosulfan Sulfate	ND	0.001	10*
Endrin	ND	0.001	10*
Endrin Aldehyde	ND	0.001	10*
Endrin Ketone	ND	0.001	10*
Heptachlor Epoxide	ND	0.001	10*
Heptachlor	ND	0.001	10*
Methoxyclor	ND	0.001	10*
Toxaphene	ND	0.200	10*

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = PQL X DF
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT
* = ACTUAL DETECTION LIMIT RAISED DUE TO MATRIX INTERFERENCE

DATA REVIEWED AND APPROVED BY: 
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

METHOD BLANK REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324

PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/03-04/07
REPORT TO: Mr. RAY MONTERO

DATE RECEIVED: 01/04/07
DATE EXTRACTED: 01/04/07
DATE ANALYZED: 01/05/07
DATE REPORTED: 01/11/07

METHOD BLANK FOR LAB I.D.:
070104-15, -16, -20, -21, -25, -26, -30, -31, -33, -34, -36, -37

Organochlorine Pesticides Analysis
Method: EPA 8081A
Unit: Mg/Kg = Milligram Per Kilogram = PPM

PARAMETER	SAMPLE RESULT	PQL	DF
Aldrin	ND	0.001	1
alpha-BHC	ND	0.001	1
beta-BHC	ND	0.001	1
gamma-BHC (Lindane)	ND	0.001	1
delta-BHC	ND	0.001	1
alpha-Chlordane	ND	0.001	1
gamma-Chlordane	ND	0.001	1
4,4'-DDD	ND	0.001	1
4,4'-DDE	ND	0.001	1
4,4'-DDT	ND	0.001	1
Dieldrin	ND	0.001	1
Endosulfan I	ND	0.001	1
Endosulfan II	ND	0.001	1
Endosulfan Sulfate	ND	0.001	1
Endrin	ND	0.001	1
Endrin Aldehyde	ND	0.001	1
Endrin Ketone	ND	0.001	1
Heptachlor Epoxide	ND	0.001	1
Heptachlor	ND	0.001	1
Methoxyclor	ND	0.001	1
Toxaphene	ND	0.200	1

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = PQL X DF
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT

DATA REVIEWED AND APPROVED BY: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro-Chem, Inc.

1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909)590-5905 Fax (909)590-5907

EPA 8081 QA/QC Report

Matrix: **Soil/Sludge** Date Analyzed: **1/4-5/2006**

Unit: mg/Kg

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)

Spiked Sample Lab I.D.: 061222-4,8,10,82 MS/MSD

Analyte	S.R.	spk conc	MS	%REC	MSD	%REC	%RPD	ACP %RPD	ACP %REC
Gamma-BHC	0.000	0.0500	0.0499	100%	0.0491	98%	2%	0-20%	70-130
Aldrin	0.000	0.0500	0.0476	95%	0.0469	94%	1%	0-20%	70-130
4,4-DDE	0.000	0.0500	0.0485	97%	0.0477	95%	2%	0-20%	70-130

Lab Control Spike (LCS) Recovery:

Analyte	spk conc	LCS	% REC	ACP %REC
Gamma-BHC	0.00500	0.00540	108%	75-125
Aldrin	0.00500	0.00562	112%	75-125
4,4-DDE	0.00500	0.00471	94%	75-125
Dieldrin	0.00500	0.00482	96%	75-125

Surrogate Recovery	ACP%	%REC	%REC	%REC	%REC	%REC	%REC	%REC
Sample I.D.		MB	061222-4,8,10,82	061222-20,22,23,84	061222-36,38,39,66	061222-52,53,55,88	070104-15	070104-16
Tetra-chloro-meta-xylene	50-150	114%	109%	110%	108%	109%	97%	104%
Decachlorobiphenyl	50-150	83%	89%	87%	87%	85%	80%	77%

Surrogate Recovery	%REC	%REC	%REC	%REC	%REC	%REC	%REC	%REC
Sample I.D.	070104-20	070104-21	070104-25	070104-26	070104-30	070104-31	070104-33	070104-34
Tetra-chloro-meta-xylene	91%	104%	99%	112%	109%	107%	105%	106%
Decachlorobiphenyl	81%	83%	81%	87%	87%	87%	83%	86%

Surrogate Recovery	%REC	%REC	%REC	%REC	%REC	%REC
Sample I.D.	070104-36	070104-37				
Tetra-chloro-meta-xylene	112%	108%				
Decachlorobiphenyl	88%	86%				

S.R. = Sample Result

spk conc = Spike Concentration

%REC = Percent Recovery

ACP %RPD = Acceptable Percent RPD Range

ACP %REC = Acceptable Percent Recovery Range

** = Surrogate fail due to matrix interference (If Marked)*

Note: *LCS, MS, MSD are in control therefore results are in control.*

Analyzed and Reviewed By: AW

Final Reviewer: CP

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Date: January 15, 2007

Mr. Ray Montero
Kleinfelder
1370 Valley Vista Drive
Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324

Project Name: **US 101-Reyes Adobe Rd. Interchange**
Project Number: **75010-2**
Lab I.D.: **070104-15 through -39**

Dear Mr. Montero:

The **STLC/STLC DI-Pb results** for the soil samples, received by our laboratory on January 4, 2007, are attached. All samples were received chilled, intact and accompanying chain of custody.

Enviro-Chem appreciates the opportunity to provide you and your company this and other services. Please do not hesitate to call us if you have any questions.

Sincerely,

Curtis Desilets
Vice President/Program Manager

Jesse Tu, Ph.D.
Laboratory Manager

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324
PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/03-04/07
REPORT TO: Mr. RAY MONTERO
DATE RECEIVED: 01/04/07
DATE ANALYZED: 01/10-15/07
DATE REPORTED: 01/15/07

EPA 6010B FOR STLC-LEAD
UNIT: MG/L IN THE STLC LEACHATE

SAMPLE I.D.	LAB I.D.	STLC-LEAD RESULT	DF
B-3/1 @ 0.5'	070104-25	6.29 ***	1
B-3/2 @ 1.5'	070104-26	6.83 ***	1
HB-1 @ 0'	070104-29	9.74 ***	1
HB-1/1 @ 0.5'	070104-30	8.38 ***	1
Method Blank	--	ND	1
	PQL	0.05	

COMMENTS:
DF = Dilution Factor
PQL = Practical Quantitation Limit
Actual Detection Limit = DF X PQL
ND = Non-Detected or below the Actual Detection Limit
STLC = Soluble Threshold Limit Concentration
MG/L = Milligram Per Liter = PPM
*** = The concentration exceeds the STLC Limit @ 5 PPM, therefore the sample is defined as hazardous waste as per CCR-TITLE 22 (if marked)

Data Reviewed and Approved by: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

QA/QC for Metals Analysis --STLC

Matrix Spike/ Matrix Spike Duplicate/ LCS :

ANALYSIS DATE: 1/15/2007 Unit : mg/L (ppm)

Analysis	Spk.Sample ID	LCS CONC.	LCS %Rec.	LCS STATUS	Sample Result	Spike Conc.	MS	% Rec MS	MSD	% Rec MSD	% RPD
Chromium (Cr)	070112-9	1.00	103	PASS	0	5.00	5.08	102%	5.09	102%	0%
Copper (Cu)	070112-9	1.00	96.7	PASS	0.533	5.00	5.89	107%	5.92	108%	1%
Lead (Pb)	070112-9	1.00	107	PASS	0.127	5.00	5.11	100%	5.12	100%	0%

ANALYSIS DATE:

Analysis	Spk.Sample ID	LCS CONC.	LCS %Rec.	LCS STATUS	Sample Result	Spike Conc.	MS	% Rec MS	MSD	% Rec MSD	% RPD
Mercury (Hg)		0.0300				0.0300		0%		0%	#DIV/0!

MS/MSD Status:

Analysis	%MS	%MSD	%LCS	%RPD
Chromium (Cr)	PASS	PASS	PASS	PASS
Copper (Cu)	PASS	PASS	PASS	PASS
Lead (Pb)	PASS	PASS	PASS	PASS
Mercury (Hg)				
Accepted Range	75 ~ 125	75 ~ 125	85 ~ 115	0 ~ 20

ANALYST: Keith

FINAL REVIEWER: @

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324

PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/03-04/07
REPORT TO: Mr. RAY MONTERO

DATE RECEIVED: 01/04/07
DATE ANALYZED: 01/11-15/07
DATE REPORTED: 01/15/07

EPA 6010B FOR STLC DI-LEAD
UNIT: MG/L IN THE STLC LEACHATE

SAMPLE I.D.	LAB I.D.	STLC-LEAD RESULT	DF
B-3/1 @ 0.5'	070104-25	0.223	1
B-3/2 @ 1.5'	070104-26	ND	1
HB-1 @ 0'	070104-29	0.474	1
HB-1/1 @ 0.5'	070104-30	0.216	1
Method Blank	--	ND	1
	PQL	0.05	

COMMENTS:
DF = Dilution Factor
PQL = Practical Quantitation Limit
Actual Detection Limit = DF X PQL
Extraction performed using DI Water
ND = Non-Detected or below the Actual Detection Limit
STLC = Soluble Threshold Limit Concentration
MG/L = Milligram Per Liter = PPM

Data Reviewed and Approved by: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

QA/QC for Metals Analysis --STLC D.I.WATER

Matrix Spike/ Matrix Spike Duplicate/ LCS :

ANALYSIS DATE: 1/15/2007 Unit : mg/L (ppm)

Analysis	Spk.Sample ID	LCS CONC.	LCS %Rec.	LCS STATUS	Sample Result	Spike Conc.	MS	% Rec MS	MSD	% Rec MSD	% RPD
Barium (Ba)	070112-9	1.00	104	PASS	0.169	5.00	5.22	101%	5.23	101%	0%
Copper (Cu)	070112-9	1.00	96.7	PASS	0.533	5.00	5.89	107%	5.92	108%	1%
Lead (Pb)	070112-9	1.00	107	PASS	0.127	5.00	5.11	100%	5.12	100%	0%

ANALYSIS DATE:

Analysis	Spk.Sample ID	LCS CONC.	LCS %Rec.	LCS STATUS	Sample Result	Spike Conc.	MS	% Rec MS	MSD	% Rec MSD	% RPD
Mercury (Hg)		0.0300				0.0300		0%		0%	#DIV/0!

MS/MSD Status:

Analysis	%MS	%MSD	%LCS	%RPD
Barium (Ba)	PASS	PASS	PASS	PASS
Copper (Cu)	PASS	PASS	PASS	PASS
Lead (Pb)	PASS	PASS	PASS	PASS
Mercury (Hg)				
Accepted Range	75 ~ 125	75 ~ 125	85 ~ 115	0 ~ 20

ANALYST: _____

FINAL REVIEWER: _____

Enviro-Chem, Inc. Laboratories
1214 E. Lexington Avenue,
Pomona, CA 91766
Tel: (909) 590-5905 Fax: (909) 590-5907
CA-DHS ELAP CERTIFICATE # 1555

Turnaround Time
0 Same Day
0 24 Hours
0 48 Hours
0 72 Hours
(0) 1 Week (Standard)
Other:

SAMPLE ID	LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	No. OF CONTAINERS	TEMPERATURE	PRESERVATION	EPA 6010	EPA 150.1/9045C	EPA 8081A	COMMENTS
B-1/1 @ 0.5'	070104-15	1/3/07	PM	SOIL	2		ICE	X	X	X	
B-1/2 @ 1.5'	-16									X	
B-1/3 @ 2'	-17										
B-1/4 @ 3'	-18										
B-1/5 @ 5'	-19										
B-2/1 @ 0.5'	-20									X	
B-2/2 @ 1.5'	-21									X	
B-2/3 @ 2'	-22										
B-2/4 @ 3'	-23										
B-2/5 @ 5'	-24										
B-3/1 @ 0.5'	-25									X	
B-3/2 @ 1.5'	-26									X	
B-3/3 @ 2'	-27										
B-3/4 @ 3'	-28										
		↓	↓	↓	↓		↓	↓	↓		

Misc.

Company Name: KLEINFELDER
Address: 1370 VALLEY VISTA DR. STE 150
City/State/Zip: DIAMOND BAR, CA 91765

Project Contact: RAY MONTERO
Tel: 818-254-6018
Fax:

Sampler's Signature: [signature]
Project Name/ID: US 101 - REYES ADOBE RD INTERCHANGE/7500

Relinquished by: [signature], M. Jano[illegible]	Received by: [signature]	Date & Time: 1/4/07 1110
Relinquished by:	Received by:	Date & Time:
Relinquished by:	Received by:	Date & Time:

Instructions for Sample Storage After Analysis:
(●) Dispose of O Return to Client O Store (30 Days)
O Other:

CHAIN OF CUSTODY RECORD

Date: 1/4/07

WHITE WITH SAMPLE - YELLOW TO CLIENT

Enviro-Chem, Inc. Laboratories
1214 E. Lexington Avenue,
Pomona, CA 91766
Tel: (909) 590-5905 · Fax: (909) 590-5907
CA-DHS ELAP CERTIFICATE # 1555

Turnaround Time
0 Same Day
0 24 Hours
0 48 Hours
0 72 Hours
● 1 Week (Standard)
Other:

SAMPLE ID	LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	No. OF CONTAINERS	TEMPERATURE	PRESERVATION	EPA 6010	EPA 150.1/9045C	EPA 8281A	Misc.	COMMENTS
				Analysis Required								
HB-1 @ 0'	070704-29	1/4/07	am	SOIL	2 4oz		ICE	X	X			
HB-1/1 @ 0.5'	-30									X		
HB-1/2 @ 1.5'	-31									X		
HB-2 @ 0'	-32											
HB-2/1 @ 0.5'	-33									X		
HB-2/2 @ 1.5'	-34									X		
HB-3 @ 0'	-35											
HB-3/1 @ 0.5'	-36									X		
HB-3/2 @ 1.5'	-37									X		
HB-3/3 @ 2'	-38											
HB-3/4 @ 3'	-39	↓	↓	↓	↓		↓	↓	↓			

Company Name: KLEINFELDER
Address: 1370 VALLEY VISTA DR., STE 150
City/State/Zip: DIAMOND BAR, CA 91765

Project Contact: RAY MONTERO
Tel: 818-254-6018
Fax:

Sampler's Signature:
Project Name/ID: US 101 / REYES ADOBE RD INTERCHANGE / 75010-2

Relinquished by: , M. Janousek	Received by:	Date & Time: 1/4/07 1110	Instructions for Sample Storage After Analysis:
Relinquished by:	Received by:	Date & Time:	● Dispose of O Return to Client O Store (30 Days)
Relinquished by:	Received by:	Date & Time:	O Other:

CHAIN OF CUSTODY RECORD

Date: 1/4/07

WHITE WITH SAMPLE · YELLOW TO CLIENT

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324

PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/04/07
REPORT TO: Mr. RAY MONTERO

DATE RECEIVED: 01/04/07
DATE EXTRACTED: 01/04/07
DATE ANALYZED: 01/05/07
DATE REPORTED: 01/11/07

SAMPLE I.D.: **HB-3/1 @ 0.5'**
LAB I.D.: 070104-36

Organochlorine Pesticides Analysis
Method: EPA 8081A
Unit: Mg/Kg = Milligram Per Kilogram = PPM

PARAMETER	SAMPLE RESULT	PQL	DF
Aldrin	ND	0.001	100*
alpha-BHC	ND	0.001	100*
beta-BHC	ND	0.001	100*
gamma-BHC (Lindane)	ND	0.001	100*
delta-BHC	ND	0.001	100*
alpha-Chlordane	ND	0.001	100*
gamma-Chlordane	ND	0.001	100*
4,4'-DDD	ND	0.001	100*
4,4'-DDE	ND	0.001	100*
4,4'-DDT	ND	0.001	100*
Dieldrin	ND	0.001	100*
Endosulfan I	ND	0.001	100*
Endosulfan II	ND	0.001	100*
Endosulfan Sulfate	ND	0.001	100*
Endrin	ND	0.001	100*
Endrin Aldehyde	ND	0.001	100*
Endrin Ketone	ND	0.001	100*
Heptachlor Epoxide	ND	0.001	100*
Heptachlor	ND	0.001	100*
Methoxyclor	ND	0.001	100*
Toxaphene	ND	0.200	100*

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = PQL X DF
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324

PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/04/07
REPORT TO: Mr. RAY MONTERO

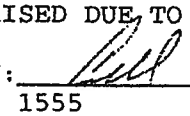
DATE RECEIVED: 01/04/07
DATE EXTRACTED: 01/04/07
DATE ANALYZED: 01/05/07
DATE REPORTED: 01/11/07

SAMPLE I.D.: **HB-3/2 @0.5'**
LAB I.D.: 070104-37

Organochlorine Pesticides Analysis
Method: EPA 8081A
Unit: Mg/Kg = Milligram Per Kilogram = PPM

PARAMETER	SAMPLE RESULT	PQL	DF
Aldrin	ND	0.001	10*
alpha-BHC	ND	0.001	10*
beta-BHC	ND	0.001	10*
gamma-BHC (Lindane)	ND	0.001	10*
delta-BHC	ND	0.001	10*
alpha-Chlordane	ND	0.001	10*
gamma-Chlordane	ND	0.001	10*
4,4'-DDD	ND	0.001	10*
4,4'-DDE	ND	0.001	10*
4,4'-DDT	ND	0.001	10*
Dieldrin	ND	0.001	10*
Endosulfan I	ND	0.001	10*
Endosulfan II	ND	0.001	10*
Endosulfan Sulfate	ND	0.001	10*
Endrin	ND	0.001	10*
Endrin Aldehyde	ND	0.001	10*
Endrin Ketone	ND	0.001	10*
Heptachlor Epoxide	ND	0.001	10*
Heptachlor	ND	0.001	10*
Methoxyclor	ND	0.001	10*
Toxaphene	ND	0.200	10*

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = PQL X DF
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT
* = ACTUAL DETECTION LIMIT RAISED DUE TO MATRIX INTERFERENCE

DATA REVIEWED AND APPROVED BY: 
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

METHOD BLANK REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324

PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/03-04/07
REPORT TO: Mr. RAY MONTERO

DATE RECEIVED: 01/04/07
DATE EXTRACTED: 01/04/07
DATE ANALYZED: 01/05/07
DATE REPORTED: 01/11/07

METHOD BLANK FOR LAB I.D.:
070104-15, -16, -20, -21, -25, -26, -30, -31, -33, -34, -36, -37

Organochlorine Pesticides Analysis
Method: EPA 8081A
Unit: Mg/Kg = Milligram Per Kilogram = PPM

PARAMETER	SAMPLE RESULT	PQL	DF
Aldrin	ND	0.001	1
alpha-BHC	ND	0.001	1
beta-BHC	ND	0.001	1
gamma-BHC (Lindane)	ND	0.001	1
delta-BHC	ND	0.001	1
alpha-Chlordane	ND	0.001	1
gamma-Chlordane	ND	0.001	1
4,4'-DDD	ND	0.001	1
4,4'-DDE	ND	0.001	1
4,4'-DDT	ND	0.001	1
Dieldrin	ND	0.001	1
Endosulfan I	ND	0.001	1
Endosulfan II	ND	0.001	1
Endosulfan Sulfate	ND	0.001	1
Endrin	ND	0.001	1
Endrin Aldehyde	ND	0.001	1
Endrin Ketone	ND	0.001	1
Heptachlor Epoxide	ND	0.001	1
Heptachlor	ND	0.001	1
Methoxyclor	ND	0.001	1
Toxaphene	ND	0.200	1

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = PQL X DF
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT

DATA REVIEWED AND APPROVED BY: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro-Chem, Inc.

1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909)590-5905 Fax (909)590-5907

EPA 8081 QA/QC Report

Matrix: **Soil/Sludge** Date Analyzed: **1/4-5/2006**

Unit: mg/Kg

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)

Spiked Sample Lab I.D.: 061222-4,8,10,82 MS/MSD

Analyte	S.R.	spk conc	MS	%REC	MSD	%REC	%RPD	ACP %RPD	ACP %REC
Gamma-BHC	0.000	0.0500	0.0499	100%	0.0491	98%	2%	0-20%	70-130
Aldrin	0.000	0.0500	0.0476	95%	0.0469	94%	1%	0-20%	70-130
4,4-DDE	0.000	0.0500	0.0485	97%	0.0477	95%	2%	0-20%	70-130

Lab Control Spike (LCS) Recovery:

Analyte	spk conc	LCS	% REC	ACP %REC
Gamma-BHC	0.00500	0.00540	108%	75-125
Aldrin	0.00500	0.00562	112%	75-125
4,4-DDE	0.00500	0.00471	94%	75-125
Dieldrin	0.00500	0.00482	96%	75-125

Surrogate Recovery	ACP%	%REC	%REC	%REC	%REC	%REC	%REC	%REC
Sample I.D.		MB	061222-4,8,10,82	061222-20,22,23,84	061222-36,38,39,66	061222-52,53,55,68	070104-15	070104-16
Tetra-chloro-meta-xylene	50-150	114%	109%	110%	108%	109%	97%	104%
Decachlorobiphenyl	50-150	83%	89%	87%	87%	85%	80%	77%

Surrogate Recovery	%REC	%REC	%REC	%REC	%REC	%REC	%REC	%REC
Sample I.D.	070104-20	070104-21	070104-25	070104-26	070104-30	070104-31	070104-33	070104-34
Tetra-chloro-meta-xylene	91%	104%	99%	112%	109%	107%	105%	106%
Decachlorobiphenyl	81%	83%	81%	87%	87%	87%	83%	86%

Surrogate Recovery	%REC	%REC	%REC	%REC	%REC	%REC
Sample I.D.	070104-36	070104-37				
Tetra-chloro-meta-xylene	112%	108%				
Decachlorobiphenyl	88%	86%				

S.R. = Sample Result

spk conc = Spike Concentration

%REC = Percent Recovery

ACP %RPD = Acceptable Percent RPD Range

ACP %REC = Acceptable Percent Recovery Range

** = Surrogate fail due to matrix interference (If Marked)*

Note: *LCS, MS, MSD are in control therefore results are in control.*

Analyzed and Reviewed By: AW

Final Reviewer: CP

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Date: January 15, 2007

Mr. Ray Montero
Kleinfelder
1370 Valley Vista Drive
Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324

Project Name: **US 101-Reyes Adobe Rd. Interchange**
Project Number: **75010-2**
Lab I.D.: **070104-15 through -39**

Dear Mr. Montero:

The **STLC/STLC DI-Pb results** for the soil samples, received by our laboratory on January 4, 2007, are attached. All samples were received chilled, intact and accompanying chain of custody.

Enviro-Chem appreciates the opportunity to provide you and your company this and other services. Please do not hesitate to call us if you have any questions.

Sincerely,

Curtis Desilets
Vice President/Program Manager

Jesse Tu, Ph.D.
Laboratory Manager

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324
PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/03-04/07
REPORT TO: Mr. RAY MONTERO

DATE RECEIVED: 01/04/07
DATE ANALYZED: 01/10-15/07
DATE REPORTED: 01/15/07

EPA 6010B FOR STLC-LEAD
UNIT: MG/L IN THE STLC LEACHATE

SAMPLE I.D.	LAB I.D.	STLC-LEAD RESULT	DF
B-3/1 @ 0.5'	070104-25	6.29 ***	1
B-3/2 @ 1.5'	070104-26	6.83 ***	1
HB-1 @ 0'	070104-29	9.74 ***	1
HB-1/1 @ 0.5'	070104-30	8.38 ***	1
Method Blank	--	ND	1
	PQL	0.05	

COMMENTS:
DF = Dilution Factor
PQL = Practical Quantitation Limit
Actual Detection Limit = DF X PQL
ND = Non-Detected or below the Actual Detection Limit
STLC = Soluble Threshold Limit Concentration
MG/L = Milligram Per Liter = PPM
*** = The concentration exceeds the STLC Limit @ 5 PPM, therefore the sample is defined as hazardous waste as per CCR-TITLE 22 (if marked)

Data Reviewed and Approved by: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

QA/QC for Metals Analysis --STLC

Matrix Spike/ Matrix Spike Duplicate/ LCS :

ANALYSIS DATE: 1/15/2007

Unit : mg/L (ppm)

Analysis	Spk.Sample ID	LCS CONC.	LCS %Rec.	LCS STATUS	Sample Result	Spike Conc.	MS	% Rec MS	MSD	% Rec MSD	% RPD
Chromium (Cr)	070112-9	1.00	103	PASS	0	5.00	5.08	102%	5.09	102%	0%
Copper (Cu)	070112-9	1.00	96.7	PASS	0.533	5.00	5.89	107%	5.92	108%	1%
Lead (Pb)	070112-9	1.00	107	PASS	0.127	5.00	5.11	100%	5.12	100%	0%

ANALYSIS DATE:

Analysis	Spk.Sample ID	LCS CONC.	LCS %Rec.	LCS STATUS	Sample Result	Spike Conc.	MS	% Rec MS	MSD	% Rec MSD	% RPD
Mercury (Hg)		0.0300				0.0300		0%		0%	#DIV/0!

MS/MSD Status:

Analysis	%MS	%MSD	%LCS	%RPD
Chromium (Cr)	PASS	PASS	PASS	PASS
Copper (Cu)	PASS	PASS	PASS	PASS
Lead (Pb)	PASS	PASS	PASS	PASS
Mercury (Hg)				
Accepted Range	75 ~ 125	75 ~ 125	85 ~ 115	0 ~ 20

ANALYST: Keith

FINAL REVIEWER: [signature]

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
1370 Valley Vista Drive, Suite 150
Diamond Bar, CA 91765
Tel(909)396-0335 Fax(909)396-1324
PROJECT NAME: **US 101-Reyes Adobe Rd. Interchange**
PROJECT NUMBER: **75010-2**
MATRIX: SOIL
DATE SAMPLED: 01/03-04/07
REPORT TO: Mr. RAY MONTERO
DATE RECEIVED: 01/04/07
DATE ANALYZED: 01/11-15/07
DATE REPORTED: 01/15/07

EPA 6010B FOR STLC DI-LEAD
UNIT: MG/L IN THE STLC LEACHATE

SAMPLE I.D.	LAB I.D.	STLC-LEAD RESULT	DF
B-3/1 @ 0.5'	070104-25	0.223	1
B-3/2 @ 1.5'	070104-26	ND	1
HB-1 @ 0'	070104-29	0.474	1
HB-1/1 @ 0.5'	070104-30	0.216	1
Method Blank	--	ND	1
	PQL	0.05	

COMMENTS:
DF = Dilution Factor
PQL = Practical Quantitation Limit
Actual Detection Limit = DF X PQL
Extraction performed using DI Water
ND = Non-Detected or below the Actual Detection Limit
STLC = Soluble Threshold Limit Concentration
MG/L = Milligram Per Liter = PPM

Data Reviewed and Approved by: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

QA/QC for Metals Analysis --STLC D.I.WATER

Matrix Spike/ Matrix Spike Duplicate/ LCS :

ANALYSIS DATE: 1/15/2007

Unit : mg/L (ppm)

Analysis	Spk.Sample ID	LCS CONC.	LCS %Rec.	LCS STATUS	Sample Result	Spike Conc.	MS	% Rec MS	MSD	% Rec MSD	% RPD
Barium (Ba)	070112-9	1.00	104	PASS	0.169	5.00	5.22	101%	5.23	101%	0%
Copper (Cu)	070112-9	1.00	96.7	PASS	0.533	5.00	5.89	107%	5.92	108%	1%
Lead (Pb)	070112-9	1.00	107	PASS	0.127	5.00	5.11	100%	5.12	100%	0%

ANALYSIS DATE:

Analysis	Spk.Sample ID	LCS CONC.	LCS %Rec.	LCS STATUS	Sample Result	Spike Conc.	MS	% Rec MS	MSD	% Rec MSD	% RPD
Mercury (Hg)		0.0300				0.0300		0%		0%	#DIV/0!

MS/MSD Status:

Analysis	%MS	%MSD	%LCS	%RPD
Barium (Ba)	PASS	PASS	PASS	PASS
Copper (Cu)	PASS	PASS	PASS	PASS
Lead (Pb)	PASS	PASS	PASS	PASS
Mercury (Hg)				
Accepted Range	75 ~ 125	75 ~ 125	85 ~ 115	0 ~ 20

ANALYST: _____

FINAL REVIEWER: _____

Enviro-Chem, Inc. Laboratories
1214 E. Lexington Avenue,
Pomona, CA 91766
Tel: (909) 590-5905 Fax: (909) 590-5907
CA-DHS ELAP CERTIFICATE # 1555

Turnaround Time
0 Same Day
0 24 Hours
0 48 Hours
0 72 Hours
(0) 1 Week (Standard)
Other:

Misc.

SAMPLE ID	LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	No. OF CONTAINERS	TEMPERATURE	PRESERVATION	EPA 6010	EPA 150.1/9045C	EPA 8081A	COMMENTS
B-1/1 @ 0.5'	070104-15	1/3/07	PM	SOIL	2		ICE	X	X	X	
B-1/2 @ 1.5'	-16									X	
B-1/3 @ 2'	-17										
B-1/4 @ 3'	-18										
B-1/5 @ 5'	-19										
B-2/1 @ 0.5'	-20									X	
B-2/2 @ 1.5'	-21									X	
B-2/3 @ 2'	-22										
B-2/4 @ 3'	-23										
B-2/5 @ 5'	-24										
B-3/1 @ 0.5'	-25									X	
B-3/2 @ 1.5'	-26									X	
B-3/3 @ 2'	-27										
B-3/4 @ 3'	-28										
		↓	↓	↓	↓		↓	↓	↓		

Company Name: KLEINFELDER
Address: 1370 VALLEY VISTA DR, STE 150
City/State/Zip: DIAMOND BAR, CA 91765

Project Contact: RAY MONTERO
Tel: 818-254-6018
Fax:

Sampler's Signature: [signature]
Project Name/ID: US 101 - REYES ADOBE RD INTERCHANGE/7500

Relinquished by: [signature], M. Janowsk	Received by: [signature]	Date & Time: 1/4/07 1110
Relinquished by:	Received by:	Date & Time:
Relinquished by:	Received by:	Date & Time:

Instructions for Sample Storage After Analysis:
(●) Dispose of O Return to Client O Store (30 Days)
O Other:

CHAIN OF CUSTODY RECORD

Date: 1/4/07

WHITE WITH SAMPLE · YELLOW TO CLIENT

Enviro-Chem, Inc. Laboratories
1214 E. Lexington Avenue,
Pomona, CA 91766
Tel: (909) 590-5905 · Fax: (909) 590-5907
CA-DHS ELAP CERTIFICATE # 1555

Turnaround Time
0 Same Day
0 24 Hours
0 48 Hours
0 72 Hours
1 Week (Standard)
Other:

SAMPLE ID	LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	No. OF CONTAINERS	TEMPERATURE	PRESERVATION	EPA 6010	EPA 150.1/9045C	EPA 8260B								Misc.	COMMENTS
								Analysis Required											
HB-1 @ 0'	07004-29	1/4/07	am	SOIL	2-4oz		ICE	X	X										
HB-1/1 @ 0.5'	-30									X									
HB-1/2 @ 1.5'	-31									X									
HB-2 @ 0'	-32																		
HB-2/1 @ 0.5'	-33									X									
HB-2/2 @ 1.5'	-34									X									
HB-3 @ 0'	-35																		
HB-3/1 @ 0.5'	-36									X									
HB-3/2 @ 1.5'	-37									X									
HB-3/3 @ 2'	-38																		
HB-3/4 @ 3'	-39	↓	↓	↓	↓		↓	↓	↓										

Company Name: KLEINFELDER	Project Contact: RAY MONTERO	Sampler's Signature:
Address: 1370 VALLEY VISTA DR., STE 150	Tel: 818-254-6018	Project Name/ID: US 101 / REYES ADOBE RD INTERCHANGE / 75010-2
City/State/Zip: DIAMOND BAR, CA 91765	Fax:	

Relinquished by: , M. Janousek	Received by:	Date & Time: 1/4/07 1110	Instructions for Sample Storage After Analysis:
Relinquished by:	Received by:	Date & Time:	● Dispose of O Return to Client O Store (30 Days)
Relinquished by:	Received by:	Date & Time:	O Other:

CHAIN OF CUSTODY RECORD

Date: 1/4/07

WHITE WITH SAMPLE · YELLOW TO CLIENT

APPENDIX E
RESPONSE TO CALTRANS REVIEW COMMENTS

KLEINFELDER

September 6, 2007

STV, Inc.
100 Pacifica, Suite 140
Irvine, California 92618

Attention: Mr. Tim J. McGrady
Project Manager

Subject: Response to Caltrans Review Comments
Proposed Reyes Adobe Road Bridge Widening
Over U.S. Highway 101
Bridge No. 53-1726
Agoura Hills, California

References: 1) Draft Geotechnical Design Report, Proposed Reyes Adobe Road Bridge Widening, by Kleinfelder West, Inc. dated June 1, 2007
2) Draft Foundation Report, Proposed Reyes Adobe Road Bridge Widening, by Kleinfelder West, Inc. dated May 30, 2007

Dear Mr. McGrady:

Kleinfelder West, Inc. (Kleinfelder) is pleased to submit our response to Caltrans review comments dated July 3, 2007. A copy of the comments is included as Appendix A. The response to the review comments is in the same order as the comments.

Draft Geotechnical Design Report

Comment No. 1: In Table 1 – Summary of Design Parameters for Slope Stability Analysis, some of the design parameters (Angle of Internal Friction and Cohesion) representing different elevations (soil layers) are somewhat inconsistent with the lab test results. Please reevaluate and explain it.

Response: Design parameters summarized in Table 1 were developed based on the results of the current and previous field investigations, laboratory testing, and our experience with similar materials. The laboratory direct shear testing results for similar soils were combined and the upper and lower bound values were reviewed. The recommended values for design tend to be conservative in our opinion.

Comment No. 2: Caltrans concurs with the procedure of determining Peak Bedrock Acceleration (PBA) using both Caltrans California Seismic Hazard Map and Sadigh's attenuation relationships. The recommended seismic design parameters are summarized as follows: the controlling fault is the Malibu coast-Santa Monica-Hollywood-Raymond (MMR), the fault type is reverse/oblique, the site distance from the

fault is 11 km, the maximum credible earthquake (MCE) is 7.5, the peak bedrock acceleration (PBA) is 0.5g, and the soil profile type is S_D.

Response: Acknowledged. Caltrans concurs with our procedure and the recommended seismic design parameters.

Comment No 3: A soil unit weight of 140 pounds per cubic foot for compacted fill appears to be high and it should also be consistent with lab test results. Please reevaluate and provide the supporting data.

Response: Caltrans BDS Section 6 for Culverts specifies that the vertical earth pressure on flexible or rigid converts should be an equivalent fluid pressure of 140 pcf, which corresponds to an overlying soil unit weight of 140 pcf. This unit weight is recommended only for culvert design.

Draft Foundation Report

Comment No. 4: In Tables 1 and 2 – Summary of Design Parameters for Slope Stability Analysis, some of the design parameters (Angle of Internal Friction and Cohesion) representing different elevations (soil layers) are somewhat inconsistent with the lab test results. Additional lab tests may be needed to reassess the design parameters.

Response: See response for Comment No.1.

Comment No. 5: Caltrans concurs with the procedure of determining Peak Bedrock Acceleration (PBA) using both Caltrans California Seismic Hazard Map and Sadigh's attenuation relationships. The recommended seismic design parameters are summarized as follows: the controlling fault is the Malibu coast-Santa Monica-Hollywood-Raymond (MMR), the fault type is reverse/oblique, the site distance from the fault is 11 km, the maximum credible earthquake (MCE) is 7.5, the peak bedrock acceleration (PBA) is 0.5g, and the soil profile type is S_D. Caltrans also concurs with the modified ARS curve presented in Figure 6.

Response: Acknowledged. Caltrans concurs with our procedure and the recommended seismic design parameters.

Comment No. 6: Both samples tested for consolidation were inundated at 2.14 tsf. Please explain why at this particular load the samples were inundated. Also explain the swell characteristics at this load for the B-2 sample.

Response: There is a typo in the comment. It should be "2.14 ksf". The specimen was inundated at 2.14 ksf which corresponds to approximately 15 to 20 feet of overburden for a finished grade condition (with new fill on top) subject to wetting. About 2% swelling occurred after inundation based on B-2 sample. We will include a discussion of

expansive potential of the existing fill material (CL) in Section 8 of our final FR and recommend removal from the bridge abutments as shown in Figure 8.

Comment No. 7: Caltrans concurs with the modified ARS curve presented on the Plans.

Response: Acknowledged. This comment does not require a response.

Closure

We will include all responses to the final GDR and FR as an appendix.

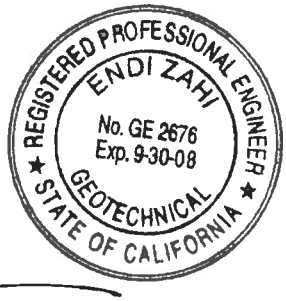
The following is attached and complete this letter.

Appendix A Caltrans Review Comments

We appreciate the opportunity to be of service to you on this project. If you have any questions or comments regarding this letter, please contact the undersigned.

Sincerely,

KLEINFELDER, INC.



Justin Kempton, PE, GE
Area Manager

Endi Zhai, PhD, GE
Principal Geotechnical Engineer

Distribution: (PDF) Addressee

APPENDIX A
CALTRANS REVIEW COMMENTS

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. EARL SEABERG
Office of Special Funded Projects
Attention: Ms. Lily Sun

DATE: July 3, 2007

FILE: 07 (District) LA (County) 101 (Route) 36.1 (Post Mile)

FDN REPORT BY: Kleinfelder West, Inc. DATED: 06/01/07

Reyes Adobe Road Bridge OC Widening (Structure Name)

GENERAL PLAN DATED: 05/31/07 FDN PLAN DATED: 05/31/07

07-240241 (EA Number) 53-1729 (Bridge Number)

Submittal (*Check One*): [X] 1st [ ] 2nd [ ] 3rd [ ] 4th [ ] Other:

The following review comments are made based on the Draft Geotechnical Design Report, the Draft Foundation Report, and the Contract Plans for the proposed Reyes Adobe Road Bridge Widening Over U.S. Highway 101 in Agoura Hills, California prepared by Kleinfelder West, Inc. dated June 1, 2007.

Draft Geotechnical Design Report

Section 6.2 Subsurface Conditions

1. In Table 1 – Summary of Design Parameters for Slope Stability Analysis, some of the design parameters (Angle of Internal Friction and Cohesion) representing different elevations (soil layers) are somehow inconsistent with the lab test results. Please reevaluate and explain it.

Section 7.2 Dynamic Analysis

2. Caltrans concurs with the procedure of determining Peak Bedrock Acceleration (PBA) using both Caltrans California Seismic Hazard Map and Sadigh's attenuation relationships. The recommended seismic design parameters are summarized as follows: the controlling fault is the Malibu coast-Santa Monica-Hollywood-Raymond (MMR), the fault type is reverse/oblique, the site distance from the fault is 11 km, the maximum credible earthquake (MCE) is 7.5, the peak bedrock acceleration (PBA) is 0.5g, and the soil profile type is S_D.

Section 7.4 Culvert Foundation

3. A soil unit weight of 140 pounds per cubic foot for compacted fill appears to be high and it should also be consistent with lab test results. Please reevaluate and provide the supporting data.

Draft Foundation Report

Section 5.3 Subsurface Profile and Engineering Parameters

4. In Tables 1 and 2 – Summary of Design Parameters for Slope Stability Analysis and Foundation Design, some of the design parameters (Angle of Internal Friction and Cohesion) representing different elevations (soil layers) are somehow inconsistent with the lab test results. Additional lab tests may be needed to reassess the design parameters.

Section 6.2 Seismic Shaking and Design ARS Curves

5. Caltrans concurs with the procedure of determining Peak Bedrock Acceleration (PBA) using both Caltrans California Seismic Hazard Map and Sadigh's attenuation relationships. The recommended seismic design parameters are summarized as follows: the controlling fault is the Malibu coast-Santa Monica-Hollywood-Raymond (MMR), the fault type is reverse/oblique, the site distance from the fault is 11 km, the maximum credible earthquake (MCE) is 7.5, the peak bedrock acceleration (PBA) is 0.5g, and the soil profile type is S_D. Caltrans also concurs with the modified ARS curve presented in Figure 6.

Appendix B – Laboratory Testing

6. Both samples tested for consolidation were inundated at 2.14 tsf. Please explain why at this particular load the samples were inundated. Also explain the swell characteristics at this load for the B-2 sample.

Contract Plans

7. Caltrans concurs with the modified ARS curve presented on the Plans.

All responses to Caltrans Foundation Review Comments should be attached to the final foundation reports as an Appendix. The review is limited to geotechnical engineering aspects of the project. If you have any questions or comments, please call Yung Chung at (916) 227-5398.

Approval: (C3) Not approved (resubmittal to OGDS-1 required)

Office of Special Funded Projects

Reviewer's Name Yung Chung

Office of Geotechnical Design – South 1

cc: OGDS-1 (Sacramento), GS File

Revised 04/01

KLEINFELDER

April 1, 2008

STV, Inc.
100 Pacifica, Suite 140
Irvine, California 92618

Attention: Mr. Tim J. McGrady
Project Manager

Subject: Response to Caltrans Review Comments
Proposed Reyes Adobe Road Bridge Widening
Over U.S. Highway 101
Bridge No. 53-1726
Agoura Hills, California

References: Final Foundation Report, Proposed Reyes Adobe Road Bridge Widening Over US Highway 101, Bridge No. 53-1726, Agoura Hills, California, by Kleinfelder West, Inc. dated September 26, 2007

Dear Mr. McGrady:

Kleinfelder West, Inc. (Kleinfelder) is pleased to submit our response to the Caltrans review comments summarized below regarding our referenced report.

1. Foundation Review dated October 12, 2007 from Division of Engineering Services, Geotechnical Services, (Reviewer is Hung Po (Paul) Yang).
2. Review of Plans and Special Provisions by Structure Specifications Branch, Memoranda dated October 29, 2007 (Reviewer is Blair Anderson).
3. Comment from Caltrans Construction Group (undated) handwritten on LOTB, (Per STV reviewer is Hussam Buran) July 3, 2007.

Each comment is presented below and followed by our response. Each review sheet is also attached to this letter. The response to the review comments is in the same order as the comments.

RESPONSE TO COMMENTS

Foundation Review dated October 12, 2007 (Item 1 above)

Comment No. 1 (regarding Final Report): According to the preliminary Foundation Report (prepared by Kleinfelder, dated August 8, 2006), Very Dense to very dense siltstone and sandstone formations were presented below El. 890.0 feet to 905.0 feet. During current field investigation, highly weathered to moderately weathered claystone and siltstone formations were encountered below an elevation of approximately 897 (reference 1).

Based on structural design drawings (reference 2), pile tip elevations vary from 904 to 879. It appears piles will penetrate claystone and siltstone formations for more than 5 feet in some locations. Hard Driving conditions may be encountered if concrete piles are required to penetrate more than 5 feet into formational materials as mentioned in the preliminary report (prepared by Kleinfelder, dated August 8, 2006). Pile drivability should be evaluated was also recommended in the preliminary report.

Based on the aforementioned information, the drivability of concrete piles should be evaluated and construction considerations should also be addressed.

Kleinfelder Response: For information purposes, our updated Pile Data Table (updated to include recommended tip elevations for tension demands) is attached to this letter. The specified pile tip elevations for the structure are all controlled by the compression demands on the piles. The Specified tip elevations are 904 feet for Abut 1, 879 feet for Bents 2 through 4, and 889 feet for Abut 5. The tip elevations required for the tension demands of the bents are approximately 19 feet higher at elevations of about 897.8 to 898.8 feet. The tip elevations required for the lateral loading requirements are approximately 8.5 to 19.8 feet above the specified tip elevations.

The upper approximately 5 to 12 feet of bedrock materials consists generally of highly weathered siltstone and sandstone. Slightly to moderately weathered formational materials were encountered below the highly weathered materials. Field blow counts (N-values) in the highly weathered materials were comparable to the alluvial soils above the bedrock. Significantly higher blow counts were not encountered until the slightly to moderately weathered formational materials were encountered.

The approximate elevation of the highly weathered bedrock encountered in our current explorations ranged from 897 feet at Boring 1 (near Bent 2) to 894 feet at Boring 2 (near Bent 4 and Abut 5). The highly weathered bedrock was up to 12 feet in thickness as encountered in our borings. Slightly to moderately weathered formational materials were encountered at approximate elevation 885 to 887 feet. We anticipate the elevation of the highly weathered bedrock near Abut 1 to be approximately 910 feet.

At Abuts 1 and 5, the specified pile tip elevations result in an embedment into bedrock of less than about 5 feet. At Bents 2 through 4 the specified tips (based on the compression demands) are anticipated to be 5 to 8 feet into the slightly to moderately weathered bedrock. To satisfy the tension and lateral demands, the piles at Bents 2 through 4 are anticipated to extend approximately 2 to 5 feet below top of the highly weathered bedrock and not penetrate the slightly to moderately weathered bedrock.

In Section 8.5 under Construction Considerations, we stated that 'Hard driving conditions are anticipated in the lower portion of the bedrock'. The lower portion of the bedrock was referring to the slightly to moderately weathered portion of the bedrock below the upper highly weathered bedrock.

There is a reasonable potential that the piles could reach nominal compression demands prior to reaching the specified tip elevation because, based on the as built data of the existing bridge, there were substantial variation of pile lengths between Abut. 1 and Abut. 5 and within the same supports. The as-built drawing showed final tip elevations that varied as much as 16 feet difference within the same support (existing bent 2). Existing Bents 3 and 4 had final tip elevations within each support that varied as 13 feet and 10 feet, respectfully. Abut 1 and Abut 5 had final tip elevations within each same support that varied 9.3 feet and 2.5 feet, respectfully. We do not anticipate that nominal compression capacity will be achieved prior to achieving the design tip elevation for lateral or tension demands. If the design tip elevations for lateral or tension demands are achieved and the nominal compression capacity is achieved prior to achieving the specified tip elevation, the concrete pile shall be cut off at the designated elevation in accordance with Section 49 of the standard specifications.

A pile driving criteria for the nominal compression demands should be prepared by the contractor and approved by the engineer based on the actual hammer and driving system proposed to be used by the contractor. The pile driving criteria for compression demands along with the design tip elevations for tension and lateral loads should be used by the resident engineer when approving the pile installation.

Comment No. 2 (Regarding Sheet 2 of 25, Index to Plans): The expansion index (EI) in the low expansion material criteria shows a value of greater than 50. It should be less than 50.

Kleinfelder Response: We concur. The figure has been modified by STV to be consistent with Figure 8 from our September 26, 2007 Foundation Report.

Review of Plans and Special Provisions by Structure Specifications Branch, dated October 29, 2007 (Item 2 above)

The review sheet includes comments for Plans and Special Provisions to be address by others. Hand written notes are also provided regarding formatting elements of the LOTB. The LOTB was updated by STV and Kleinfelder has signed the final version.

Comment from Caltrans Construction Group (undated) handwritten on LOTB, (Per STV reviewer is Hussam Buran) July 3, 2007 (Item 3 above)

Comment: This comment was provided as handwritten comments on the LOTBS, " Conc. Pile Tip is below bedrock – Verify w/ Driveability Study.

Kleinfelder Response: Please refer to our response to Comment 1 Foundation Review dated October 12, 2007 above. Our response above addresses this as well.

CLOSING

We appreciate the opportunity to be of service to you on this project. If you have any questions or comments regarding this letter, please contact the undersigned.

Sincerely,

KLEINFELDER WEST, INC.

Justin Kempton, PE, GE
Area Manager

REGISTERED PROFESSIONAL ENGINEER
JUSTIN J KEMPTON
No. 2385
Exp. 9/30/09
GEOTECHNICAL
STATE OF CALIFORNIA

Endi Zhai, PhD, GE
Principal Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
ENDI ZAHI
No. GE 2676
Exp. 9-30-08
GEOTECHNICAL
STATE OF CALIFORNIA

Attachments: Review Sheets
Table 6, Pile Data Table (updated to include Tension demands)

APPENDIX A
CALTRANS REVIEW COMMENTS

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. EARL SEABERG
Office of Special Funded Projects
Attention: Mr. Richard Hartzell

DATE: October 12, 2007

FILE: 07 (District) LA (County) 101 (Route) PM 36.1 (Post Mile)

FDN REPORT BY: Kleinfelder West, Inc. DATED: 09/26/2007

Reyes Adobe Road Bridge OC Widening (Structure Name)

GENERAL PLAN DATED: 09/05/2007 FDN PLAN DATED: 09/05/2007

07-240241 (EA Number) 53-1726 (Bridge Number)

Submittal (*Check One*): [ ] 1st [x] 2nd [ ] 3rd [ ] 4th [ ] Other: _____

This Office has review the following items provided by Kleinfelder West, Inc. (Kleinfelder), and STV, Inc.

1. Final Foundation Report for Proposed Reyes Adobe Road Bridge Widening Over U.S. Highway 101 Bridge No. 53-1726 in Agoura Hills, California, prepared by Kleinfelder, dated September 26, 2007; and
2. A set of 95% submittal structural design drawings for Proposed Reyes Adobe Road Bridge Widening Over U.S. Highway 101 Bridge No. 53-1726 in Agoura Hills, California prepared by STV, Inc., revised 09/05/2007.

The following are review comments:

Final Geotechnical Report:

According to the preliminary Foundation Report (prepared by Kleifelder, dated August 8, 2006), dense to very dense siltstone and sandstone formations were presented below EL. 890.0 feet to EL. 905.0 feet. During current field investigation, highly weathered to moderately weathered claystone and siltstone formations were encountered below an elevation of approximately 897 (Reference 1).

Based on structural design drawings (Reference2), pile tip elevations vary from 904 to 879. It appears piles will penetrate claystone and siltstone formations for more than 5 feet in some locations. Hard driving conditions may be encountered if concrete piles are required to penetrate more than 5 feet into formational materials was mentioned in the preliminary report (prepared by Kleifelder, dated August 8, 2006). Pile drivability should be evaluated was also recommended in the preliminary report.

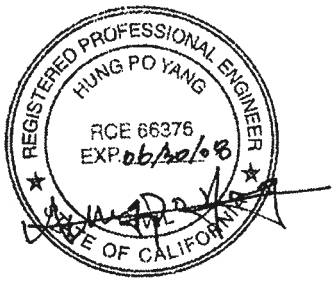
Based on the aforementioned information, the drivability of concrete piles should be evaluated and construction consideration should also be addressed.

Structural Design Drawing:

Sheet 2 of 25, Index to Plans

The expansion index (EI) in the low expansion material criteria shows a value of greater than 50. It should be less than 50.

All responses to Caltrans Foundation Review Comments should be attached to the final foundation report as an Appendix. The review is limited to the geotechnical engineering aspects of the project. Should you have any question and comment, please contact Hung Po (Paul) Yang at (916) 227-4534.



Approval: (C3) Not approved (resubmitted to OGDS-1 required)

Office of Special Funded Projects

Reviewer's Name Hung Po (Paul) Yang, P.E.

Office of Geotechnical Design South - 1

cc: OGDS-1 (Sacramento), ~~OGDS-1 (Los Angeles)~~, GS File

Revised 04/01

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: Richard Hartzell
Liaison Engineer

Date: October 29, 2007

File: 07-LA-101
Reyes Adobe Road OC
Bridge No. 53-1726
EA 07-240201

From: Blair Anderson
Chief
Structure Specifications Branch
Structure Office Engineer

Subject: Review of Plans and Special Provisions

A first review has been done on the above referenced project. Please have the Consultant respond to the comments in writing. If you have any questions or comments, please contact John Strootman at (916) 227-8189.

PLANS

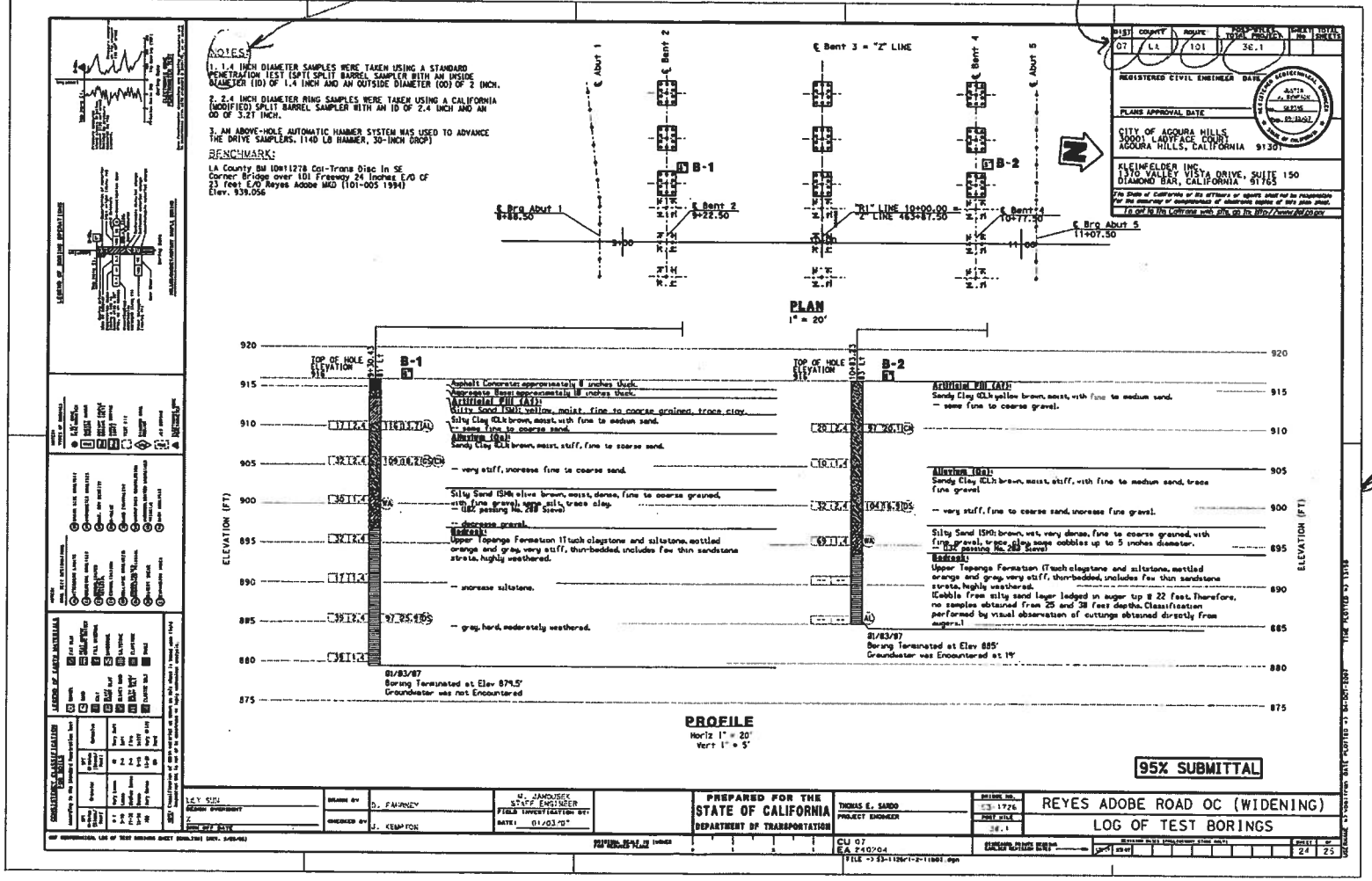
Abutment Details	Joint seals are not specified.
Sheet 3	Is anchorage of K-rail to existing deck necessary given the proposed location of the K-rail on the deck?
Sheet 4	Paragraph 11 of SSP refers to an ultimate geotechnical capacity but the plans do not show a value in the pile table.
Sheet 7	Note under wall removal detail references burning off exposed rebar and epoxy grout holes. This does not appear to be addressed in the special provisions.
Sheet 11	We question why the bridge deck needs to be refinished where the new type 26 modified barrier is going to be constructed.
Sheet 16	Part Plan Detail A references an upgraded chain link fence. The special provisions do not appear to define this item.
Sheet 21	Cross-hatching is indicated to define slope paving removal but limits of slope paving removal do not appear to be shown.

SPECIAL PROVISIONS

S5-250	This SSP should be included to address materials on hand payments.
S8-C15	This SSP should be included to include precast concrete quality control.
S8-W04 and S8-W06	These SSP's should be included to address welding requirements.
15RETR	This SSP has been updated 10-18-06.
15-805	This SSP has been updated 09-07-07. We question why sub-paragraph C was struck as it is related to the following sub-paragraph D.
19-010	Requirements for low expansion material do not appear to be addressed.
19-510	We question why this ssp has been included. The plans indicate driven piles.
19-059	Paragraphs 1 and 2 address pervious backfill material. The plans do no appear to call for any pervious backfill material.
49-400	This SSP has been replaced by Reference SSP 49PAPI dated 1-02-07.
51-300	This SSP has been updated 1-19-07.
51METH	This SSP no longer exists as the information has been included in the ammendments to standard specifications, SSP S1-020 dated 1-19-07
SSP 51-551	This SSP has been updated 06-15-07. Reference to sleeper slabs can be deleted in paragraph 2. We question including paragraphs 31 through 33---Is this structure in Climate Area III?(SSP 51-555 for the type R approach slab does not include these requirements)
SSP 51-555	This SSP has been replaced by Reference SSP 51RAPS dated 6-11-07. Paragraph 7 has not been completely edited. Paragraph includes reference to epoxy-coated materials. The plans or special provisions do not appear to indicate this requirement.
SSP 51-556	Either paragraphs 2 through 3 or paragraphs 4 through 13 should be struck to specify one paving notch material requirement.
SSP 51-600	This SSP has been updated 77-20-07. This detail does not appear to be detailed on the plans.
SSP 51-740	This SSP has been updated 10-05-07.
SSP 51-800	This SSP has been updated 1-05-07. Also refer to comment for

	plan sheet 11 above.
SSP 72-200 and 72-210	Editing has not been completed regarding color and rock cobble texture.
SSP 83-460	This SSP should be included to address concrete barriers.
Bridge Mounted Sign	Are specifications regarding the bridge mounted sign included in the roadway special provisions?

use correct levels



Shape

NOTES:

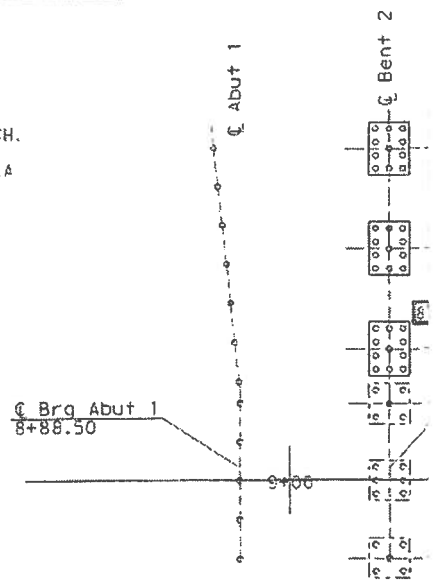
1. 1.4 INCH DIAMETER SAMPLES WERE TAKEN USING A STANDARD PENETRATION TEST (SPT) SPLIT BARREL SANPLER WITH AN INSIDE DIAMETER (ID) OF 1.4 INCH AND AN OUTSIDE DIAMETER (OD) OF 2 INCH.

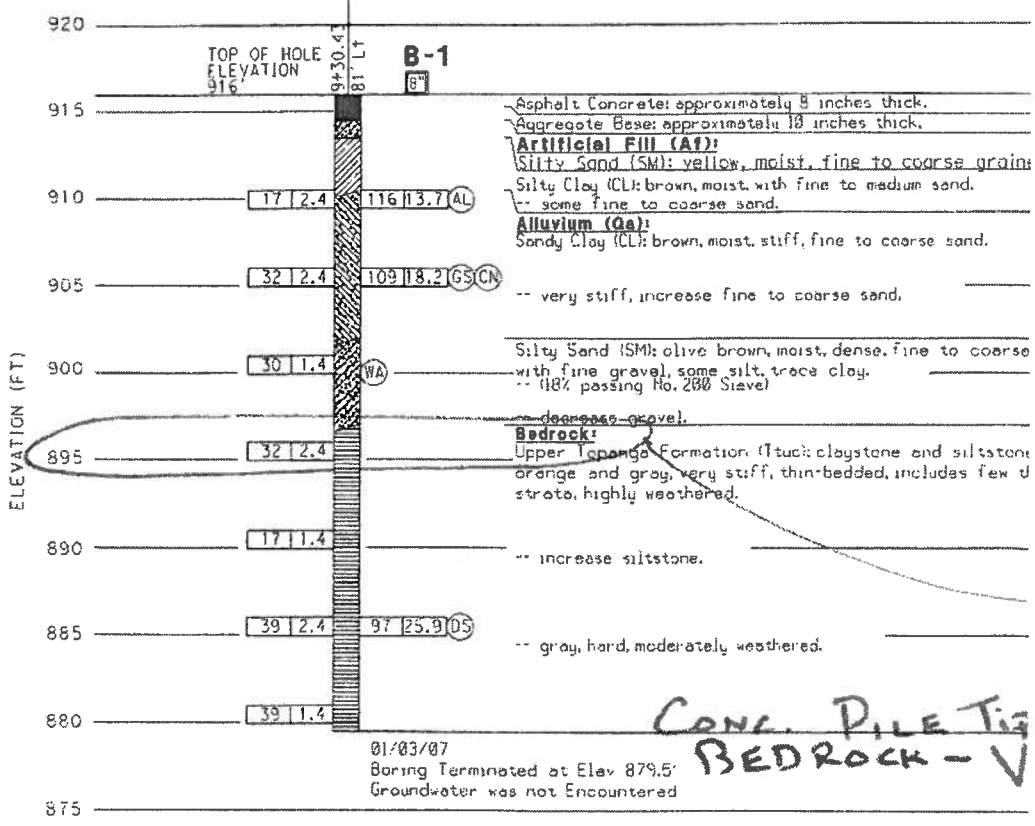
2. 2.4 INCH DIAMETER RING SAMPLES WERE TAKEN USING A CALIFORNIA (MODIFIED) SPLIT BARREL SAMPLER WITH AN ID OF 2.4 INCH AND AN OD OF 3.27 INCH.

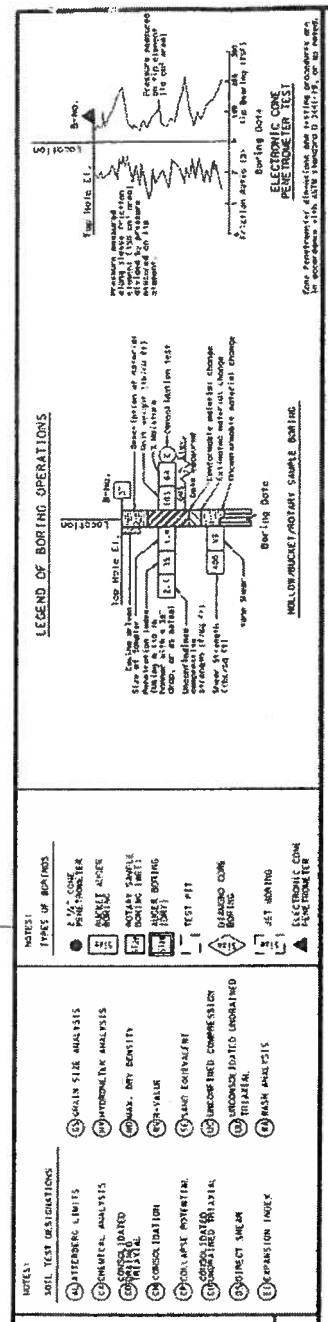
3. AN ABOVE-HOLE AUTOMATIC HAMMER SYSTEM WAS USED TO ADVANCE THE DRIVE SAMPLERS. (140 LB HAMMER, 30-INCH DROP)

BENCHMARK:

LA County BM ID#11278 Cal-Trans Disc in SE Corner Bridge over 101 Freeway 24 inches E/O CF 23 feet E/O Reyes Adobe MKD (101-005 1994) Elev. 939.056



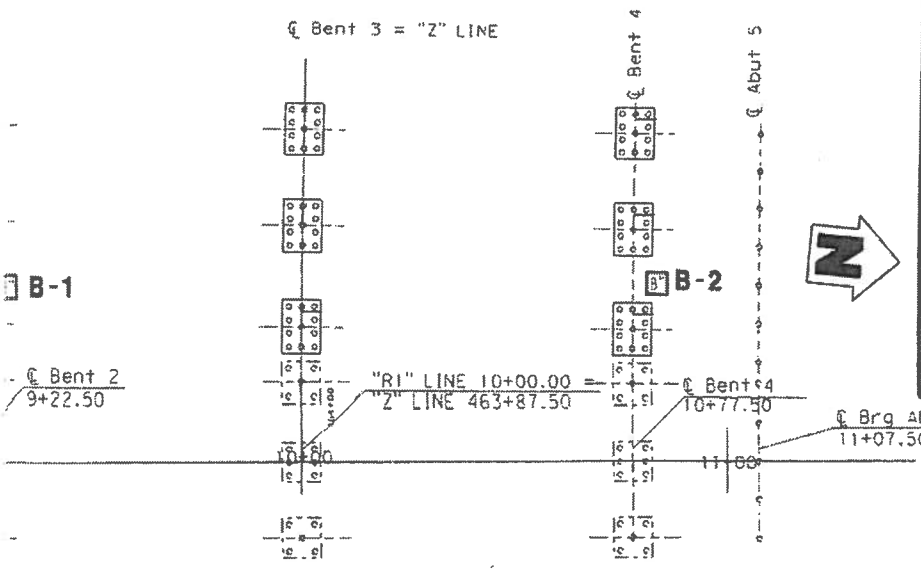




LILY SUN	DRAWN BY	D. FAHRNEY	M. JANOUSEK STAFF ENGINEER
DESIGN OVERSIGHT	CHECKED BY	J. KEMPTON	FIELD INVESTIGATION BY:
X SIGN OFF DATE			DATE: 01/03/07

OSF GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 2/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS



PLAN
1" = 20'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
07	LA	101	36.1		

REGISTERED CIVIL ENGINEER DATE

REGISTERED GEOTECHNICAL ENGINEER — JUSTIN J. KEMPTON — No. GE2385 — Exp. 09/30/07 — STATE OF CALIFORNIA

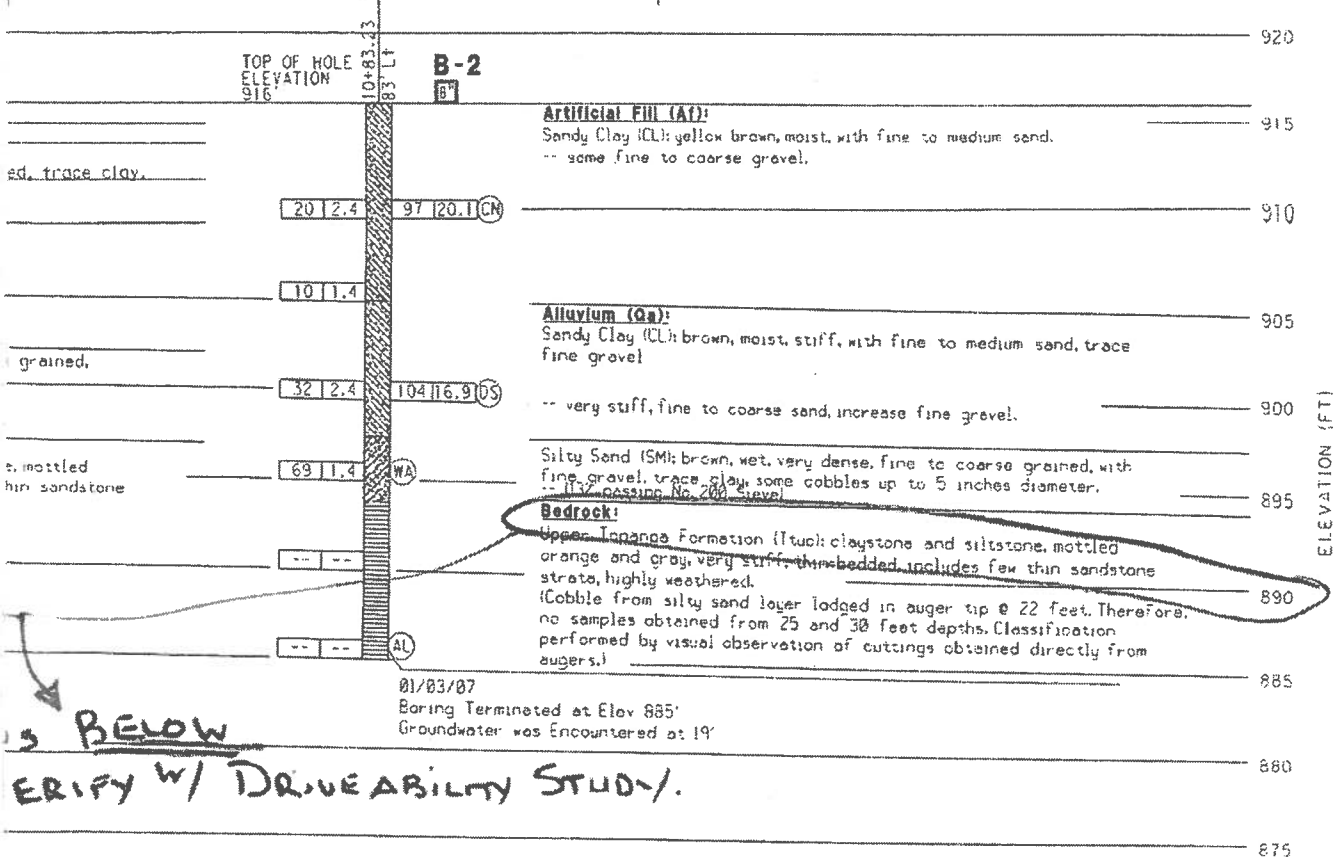
PLANS APPROVAL DATE

CITY OF AGOURA HILLS
30001 LADYFACE COURT
AGOURA HILLS, CALIFORNIA 91301

KLEINFELDER INC.
1370 VALLEY VISTA DRIVE, SUITE 150
DIAMOND BAR, CALIFORNIA 91765

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

To get to the Caltrans web site, go to: http://www.dot.ca.gov/



BELOW
VERIFY W/ DRIVEABILITY STUDY.

PROFILE
Horiz 1" = 20'
Vert 1" = 5'

95% SUBMITTAL

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	THOMAS E. SARDO, PROJECT ENGINEER	BRIDGE NO. 53-1726	REYES ADOBE ROAD OC (WIDENING)
		POST MILE 36.1	LOG OF TEST BORINGS
0 1 2 3	CU 07 EA 240204	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES (PRELIMINARY STAGE ONLY) SHEET SHEET — SHEET 24 OF 25

FILE => $REQUEST

DATE PLOTTED => $DATE TIME PLOTTED => $TIME USERNAME => $USER

APPENDIX F
TECHNICAL MEMORANDUM FOR PILE FOUNDATION STIFFNESS MATRICES

KLEINFELDER

Technical Memorandum

To: Mr. Tim J. McGrady
Project Manager
STV, Inc.
100 Pacifica, Suite 140
Irvine, CA 92618

From: Endi Zhai, PhD, GE

Reviewed By Justin Kempton, GE

Re: **Pile Foundations Stiffness Matrices**
Reyes Adobe Road Bridge Widening Over US Highway 101 (Bridge No. 53-1726)

Project Name: Reyes Adobe Road Bridge Widening Project
Project No.: 75010
File No.: IRV8M001

Date: January 4, 2008
Number of Pages: 18 (including attachments and divider pages)

INTRODUCTION

Transmitted in this memorandum are the results of calculated single pile-head stiffness and pile group stiffness matrices for the new bent pile foundations of Reyes Adobe Road Bridge (Bridge No. 53-1726) over U.S. Highway 101 in Agoura Hills, California. The bent layout provided by STV is included in Attachment 1.

ANALYSIS APPROACH

The analysis approach generally follows Section 6 "Geotechnical Modeling and Capacity Assessment" of FHWA-HRT-06-032 "Seismic Retrofitting Manual for Highway Structures: Part 1 – Bridges" (2006). The appropriate design charts for deriving coefficients of variations in subgrade modulus with depth and individual pile-head stiffness are excerpted and included in Attachment 2.

For a vertical pile group, the stiffness for the translational displacement terms (the two horizontal and the vertical displacement terms) and the cross-coupling terms can be obtained by merely multiplying the corresponding stiffness components of an individual pile by the number of piles. However, the rotational stiffness terms (the two rocking and

KLEINFELDER 8 Pasteur Street, Suite 190. Irvine. CA 92618 (949) 727-4466 (949) 727-9242 fax

the torsional rotations) require consideration of an additional stiffness component. In addition to individual pile-head bending moments at each pile head, a unit rotation at the pile cap will introduce translational displacements and corresponding forces at each pile head (e.g. vertical forces for rocking rotation and lateral pile forces for torsional rotation). These pile-head forces will work together among the piles and will result in an additional moment reaction on the overall pile group. The following equation was used to develop the rotational stiffness terms of a pile group:

$$K_{rg} = N K_{rp} + \sum_{n=1}^{N} K_{\delta n} S_n^2$$

where K_{rg} and K_{rp} are the rotational stiffness of pile group, and stiffness of single piles, respectively. S_n is the spacing between the n^{th} pile and the point of loading (center of the pile group). The subscript $_n$ denotes the pile number. Summation is conducted for all the piles in the pile group in the above equation.

Pile cap passive resistance may be added to the above pile group stiffness. Because of the possibility of soil settlement and the uncertain interaction between the footing and the piles, contributions to soil stiffness and capacity from the footing's base and side shear are neglected. Hence the primary source of lateral resistance is the mobilization of passive pressure on the vertical face of the pile cap.

ANALYSIS RESULTS

The individual pile-head stiffness and pile group stiffness including the pile cap stiffness components were calculated based on the aforementioned approach. Soil type and strength parameters affecting the coefficient of variations of subgrade modulus (typically the upper 5 to 10 diameters) were summarized in our Final Foundation Report dated September 26, 2007. The calculated stiffness matrices for Bents 2 through 4 are provided in Attachment 3.

LIMITATIONS

The professional opinions presented in this memorandum have been developed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No warranty, expressed or implied, is made as to the professional advice included in this document.

REFERENCES

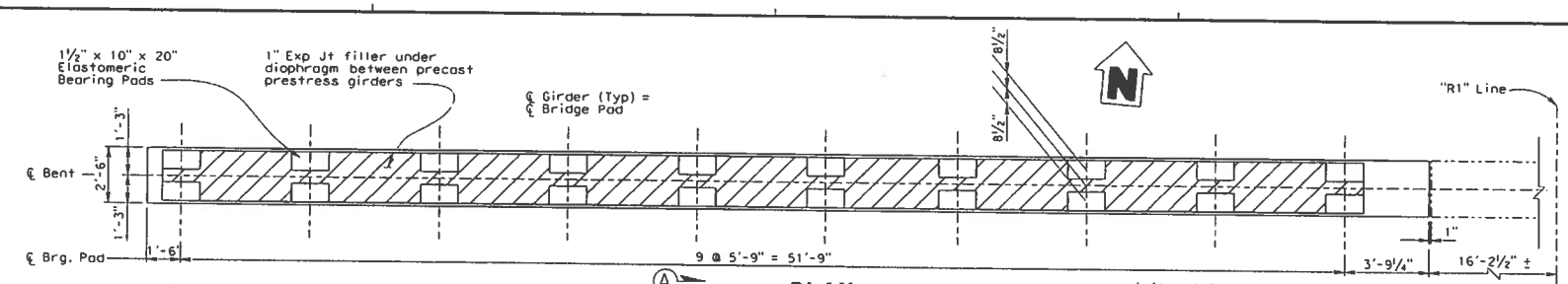
1) FHWA/RD-86/102 Seismic Design of Highway Bridge Foundations, Vol. II Design Procedures and Guidelines, 1986.
2) FHWA--HRT-06-032 Seismic Retrofit Manual for Highway Structures: Part 1 - Bridge, Section 6.2.2, 2006.

KLEINFELDER 8 Pasteur Street, Suite 190. Irvine. CA 92618 (949) 727-4466 (949) 727-9242 fax

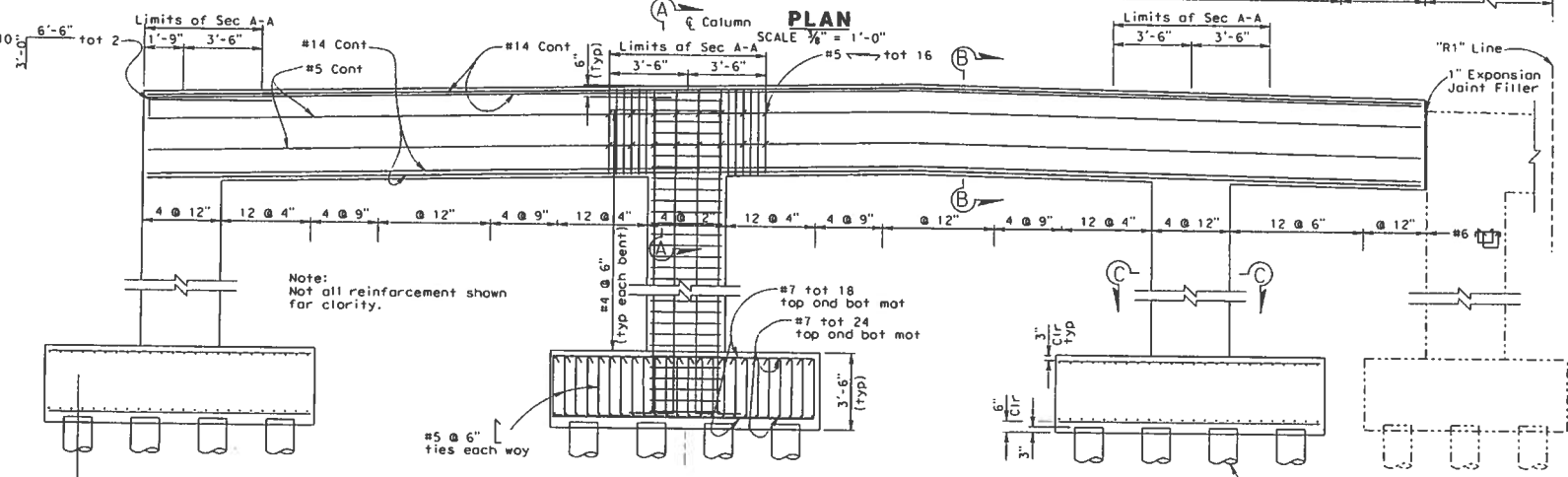
3) Final Foundation Report for the Reyes Adobe Road Bridge (Widening) by Kleinfelder West, Inc., September 26, 2006.

KLEINFELDER 8 Pasteur Street, Suite 190, Irvine, CA 92618 (949) 727-4466 (949) 727-9242 fax

ATTACHMENT 1
BENT PILE LAYOUT



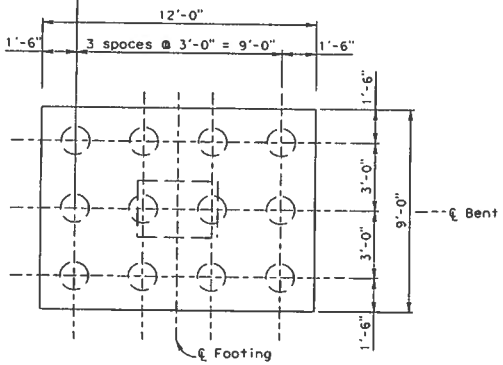
PLAN
SCALE ⅜" = 1'-0"



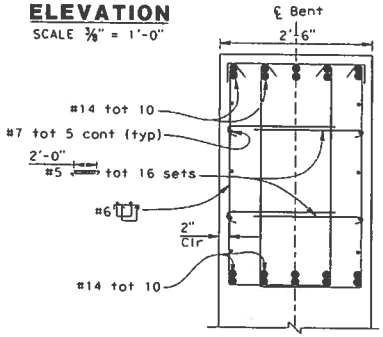
Note:

1. Place stirrups parallel to girders.
2. No splice allowed in the column main reinforcement.
3. Only staggered service level splice are allowed in main bent cap reinforcement.

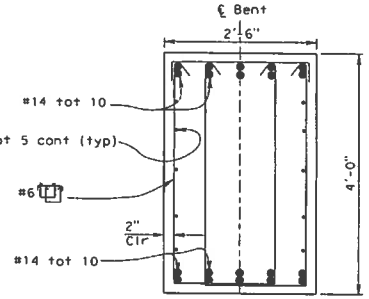
FOOTING PLAN
SCALE ⅜" = 1'-0"



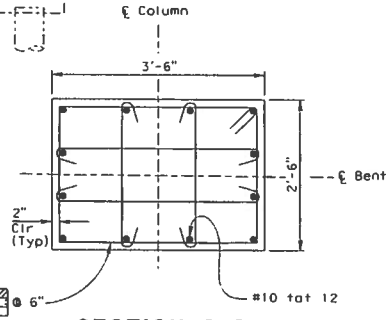
ELEVATION
SCALE ⅜" = 1'-0"



SECTION A-A
SCALE 1" = 1'-0"



SECTION B-B
SCALE 1" = 1'-0"



SECTION C-C
SCALE 1" = 1'-0"

ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

100% SUBMITTAL

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
07	LA	101	36.1/36.3		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

REGISTERED PROFESSIONAL ENGINEER — Timothy J. McGrady — No. 45988 — Exp. 12-31-08 — CIVIL — STATE OF CALIFORNIA

CITY OF AGOURA HILLS
30001 LADYFACE COURT
AGOURA HILLS, CALIFORNIA 91301

SYV INCORPORATED
1055 WEST 7TH STREET, SUITE 3150
LOS ANGELES, CALIFORNIA 90017

Richard Hartzell	DESIGN	BY Susan Michalski	CHECKED Wellington Chu
DESIGN OVERSIGHT	DETAILS	BY Wellington Chu	CHECKED Susan Michalski
X	QUANTITIES	BY Susan Michalski	CHECKED Wellington Chu
SIGN OFF DATE			

DESIGN DETAIL SHEET (ENGLISH) (REV. 6/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

Wellington H. Chu
PROJECT ENGINEER

CU 07-274
EA 240201

BRIDGE NO.	53-1726
POST MILE	36.1/36.3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REYES ADOBE ROAD OC (WIDENING)
BENT LAYOUT

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET	OF
8	26

ATTACHMENT 2
DESIGN CHARTS EXCERPTED FROM THE REFERENCES

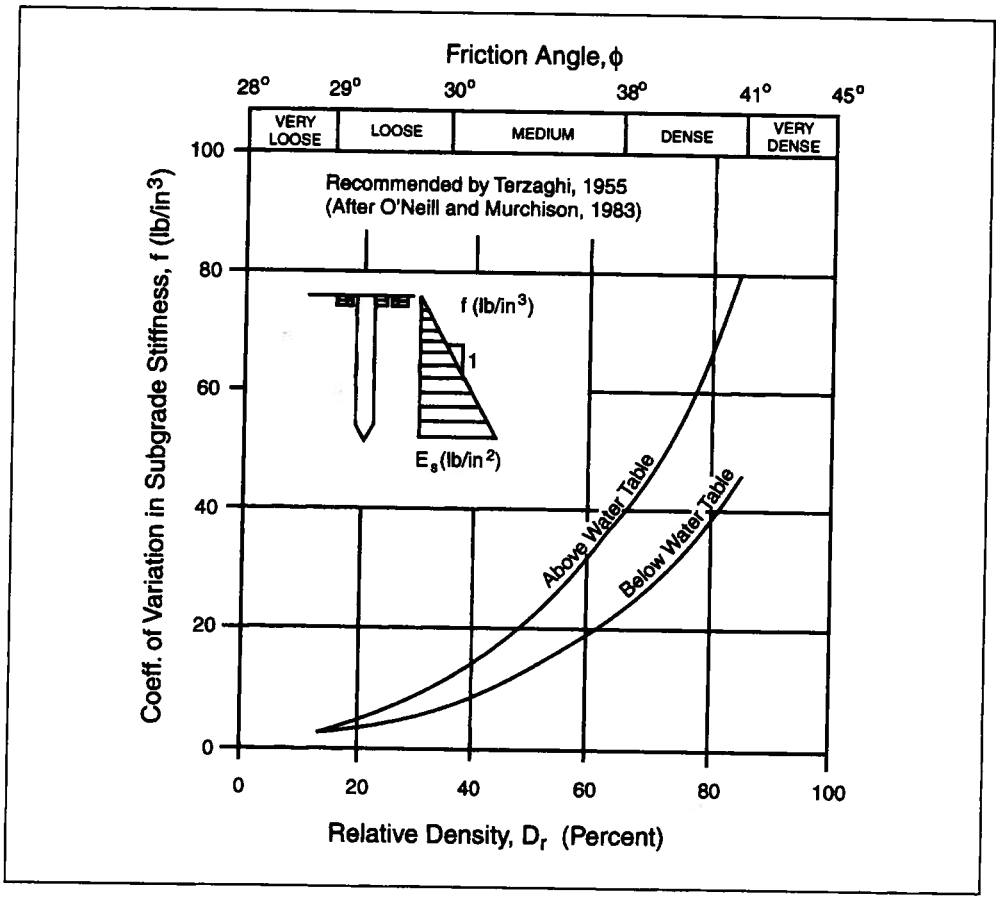


Figure 6-12. Recommended coefficient of variation in subgrade modulus (f) with depth of sand.

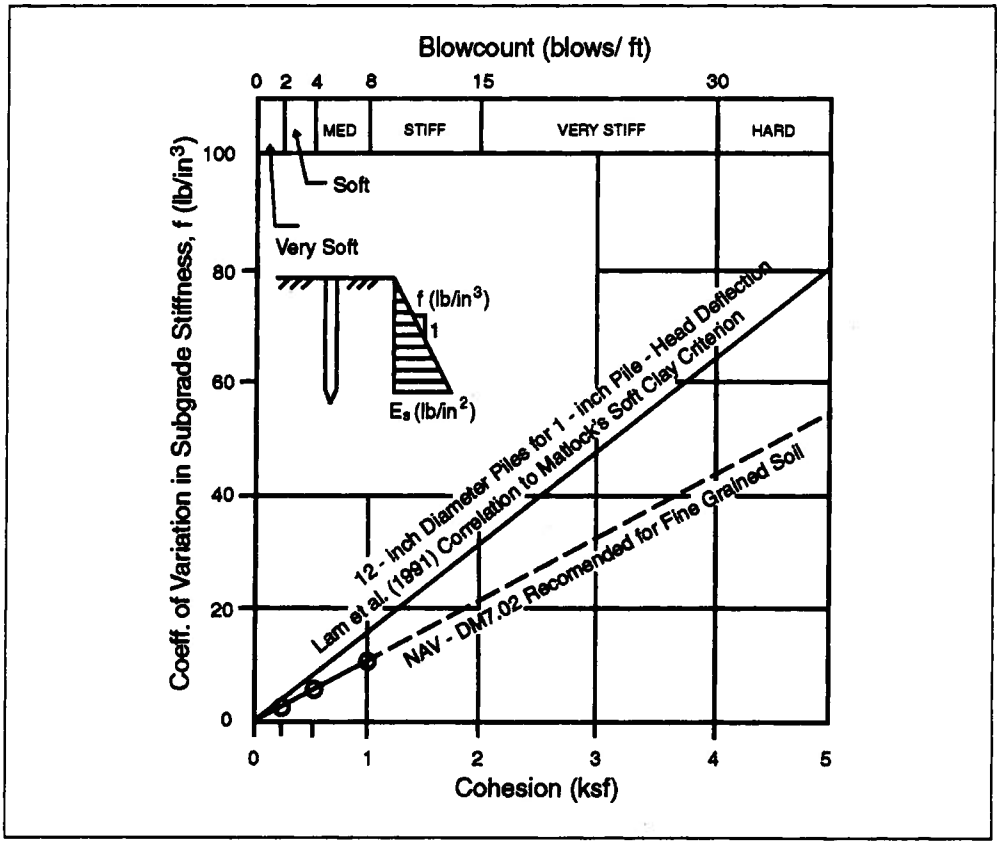


Figure 6-13. Recommended coefficient of variation in subgrade modulus (f) with depth of clay.

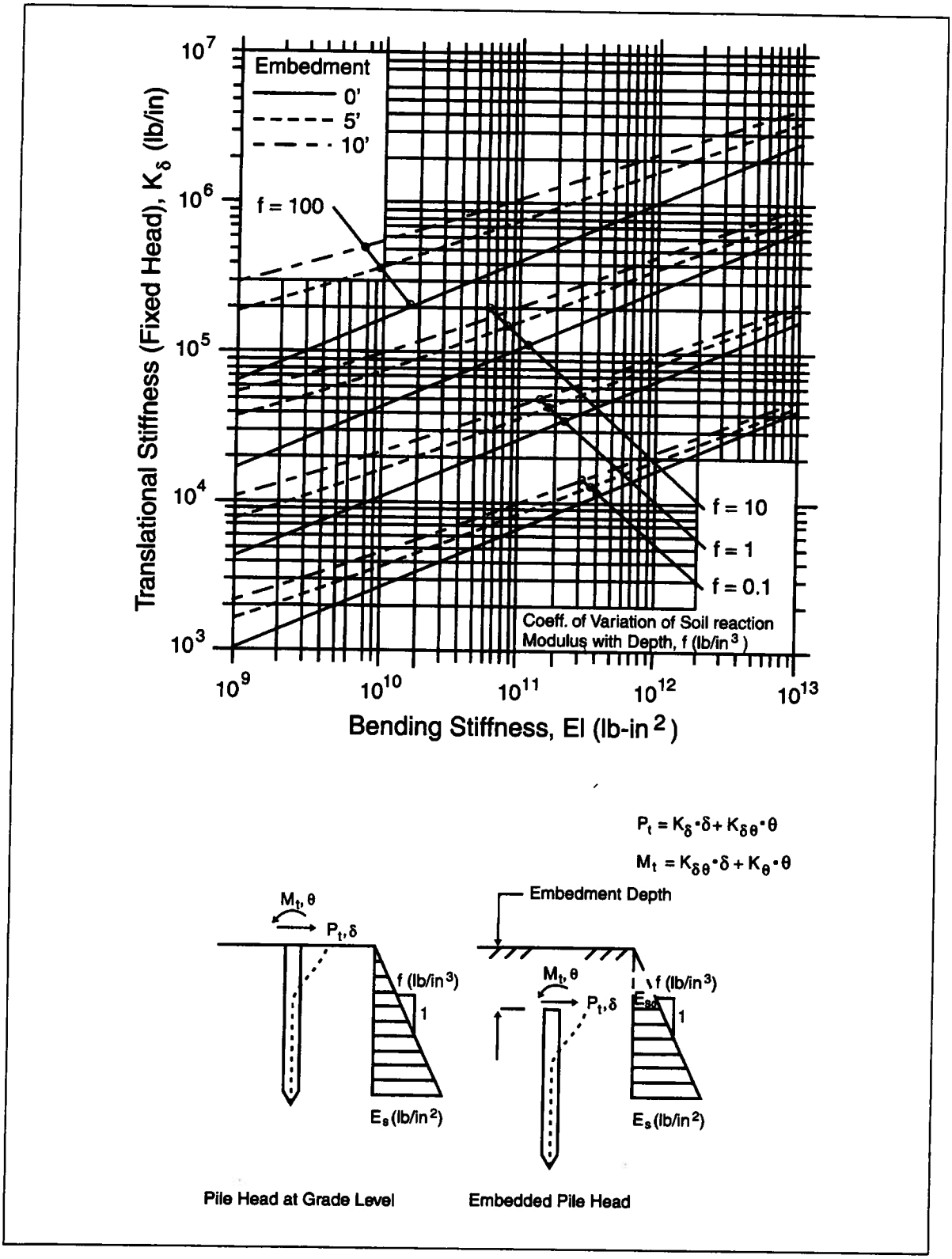


Figure 6-14. Lateral embedded pile-head stiffness (fixed-head condition).

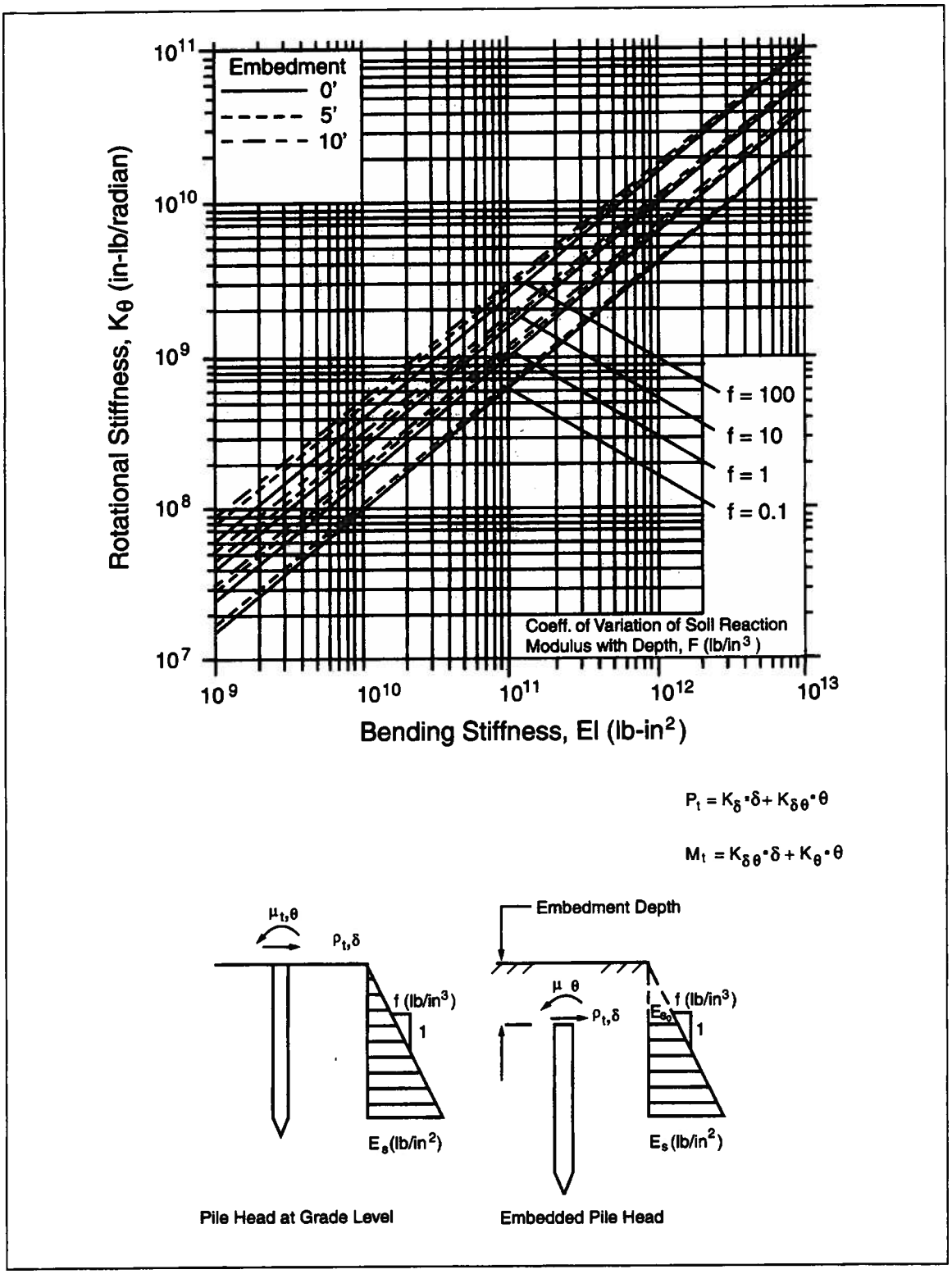


Figure 6-15. Embedded pile-head rotational stiffness.

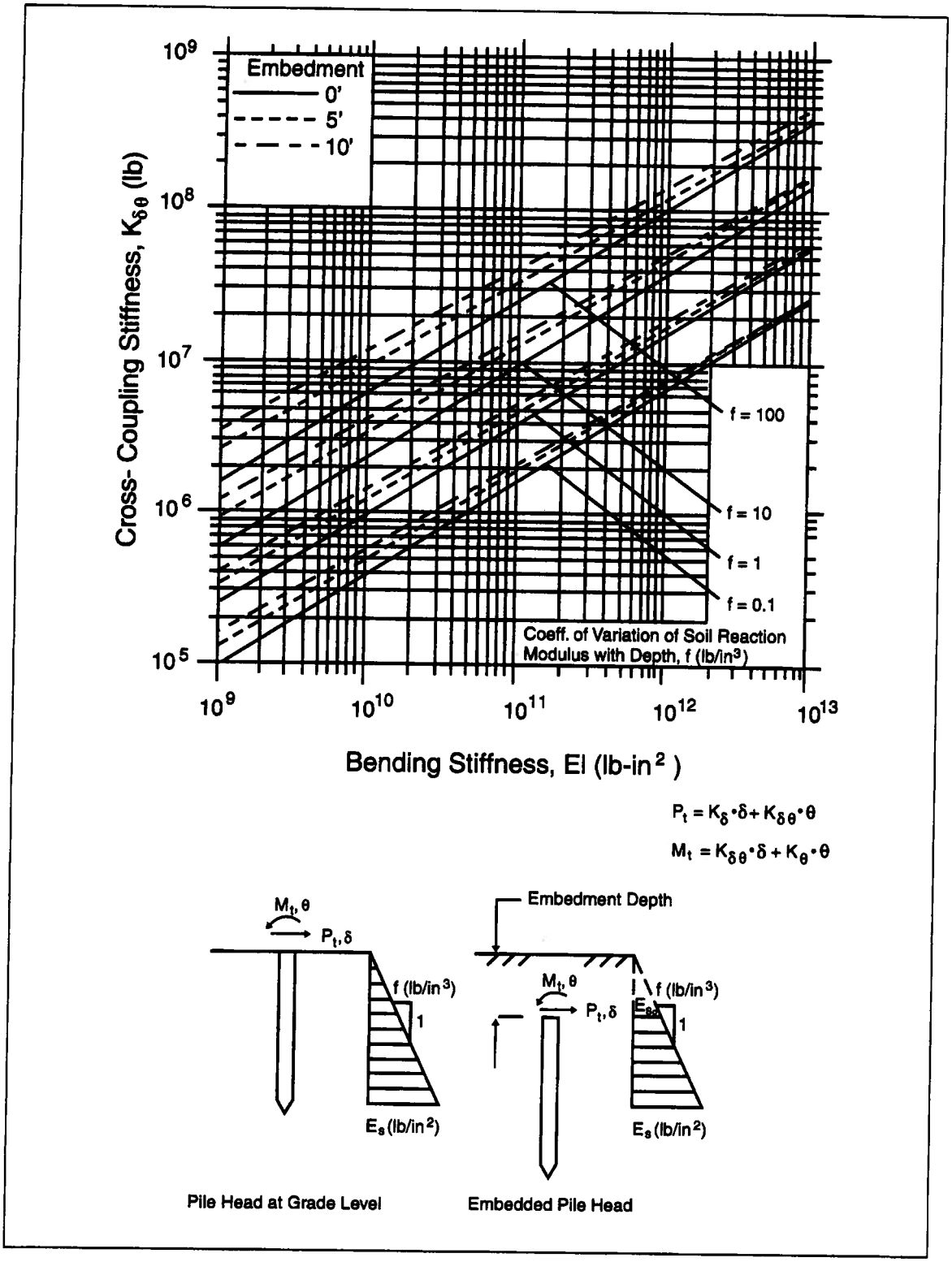


Figure 6-16. Embedded pile cross-coupling pile-head stiffness.

ATTACHMENT 3
SPREADSHEETS CONTAINING PILE FOUNDATION STIFFNESS COMPONENTS

STIFFNESS PARAMETERS OF PILE FOUNDATIONS

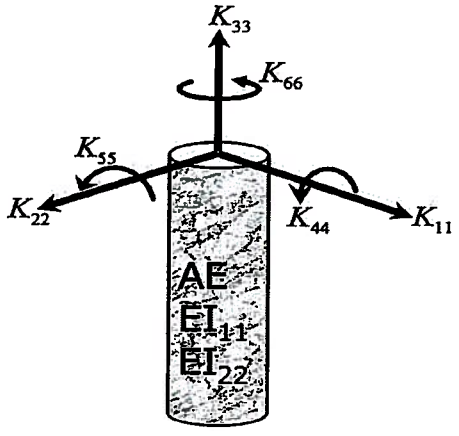
EZ_Pile-Foundation-Stiffness v1.0

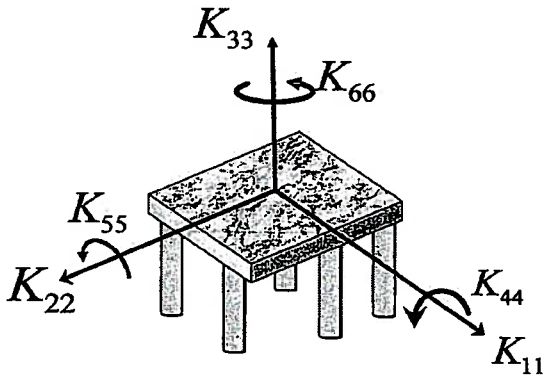
PROJECT INFORMATION	
Project Name	Reyes Adobe Road Bridge
Project No.	75010
Support Location	Bents 2 and 3
Boring Profile	B-1

INPUT SOIL PARAMETERS	
Average of Upper 5 to 10 Diameter Soil Type	2 (1=Sand; 2=Clay)
Above or Below Water Table (for Sand)	1 (1=Above; 2=Below)
Friction Angle, Φ (for Sand, not used for Clay)	0.0 degrees
Cohesion, c (for Clay, not used for Sand)	900.0 psf

INPUT PILE PARAMETERS	
Young's Modulus, E	4.3000E+06 psi
Moment of Inertia, I_x (Bridge Long. Direction)	1,242.52 inch^4 (I_crack)
Moment of Inertia, I_y (Bridge transv. Direction)	1,242.52 inch^4 (I_crack)
Pile Diameter, D	15.00 inch
Pile Section Area, A	176.71 inch^2
Pile Length, L	28.75 ft
Pile Head Embedment Depth, D_f	8.25 ft
Pile End Bearing Condition, α	1.50 (1=End-bearing;2=Friction;1.5=Both)

INPUT PILE GROUP PARAMETERS	
Number of Total Piles under Pile Cap, N	12
Number of Rows along Long. Direction, N_L	3 (This program limits to 50 rows)
Number of Rows along Transv. Direction, N_T	4 (This program limits to 50 rows)
Pile Spacing along Long. Direction, S_L	3.0 ft
Pile Spacing along Transv. Direction, S_T	3.0 ft
Pile Cap Width along Long. Direction , W_L	9.0 ft
Pile Cap Width along Transv. Direction , W_T	12.0 ft
Pile Cap Thickness , T	3.5 ft





SINGLE PILE-HEAD STIFFNESS

EZ_Pile-Foundation-Stiffness v1.0

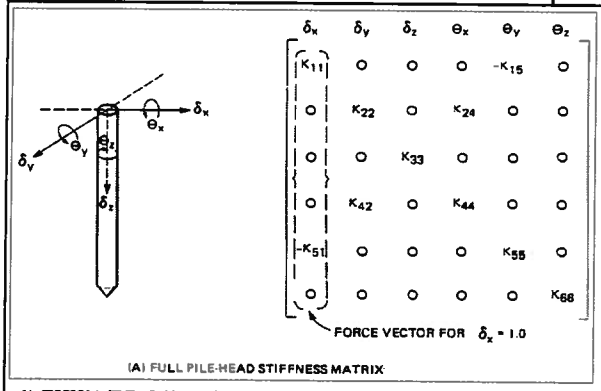
PROJECT INFORMATION	
Project Name	Reyes Adobe Road Bridge
Project No.	75010
Support Location	Bents 2 and 3
Boring Profile	B-1

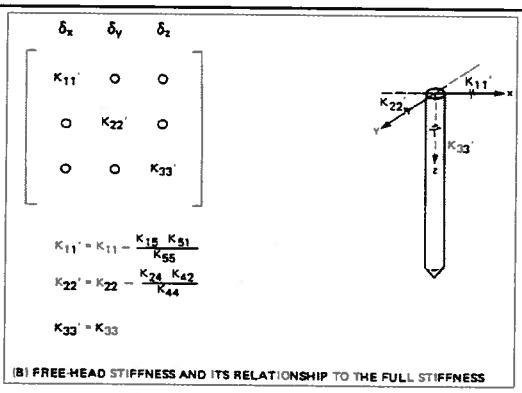
PILE PARAMETERS		
Young's Modulus, E	4.3000E+06	psi
Moment of Inertia, I_x (Bridge Long. Direction)	1,242.52	inch^4
Moment of Inertia, I_y (Bridge Transv. Direction)	1,242.52	inch^4
Pile Diameter, D	15.00	inch
Pile Section Area, A	176.71	inch^2
Bending Stiffness, EI_x (Bridge Long. Direction)	5.3429E+09	LB-in^2
Bending Stiffness, EI_y (Bridge Transv. Direction)	5.3429E+09	LB-in^2
Axial Stiffness, EA	7.5987E+08	LB
Pile Length, L	28.75	ft
Pile Head Embedment Depth, D_f	8.25	ft

SOIL PARAMETERS		
Effective Soil Type (Upper 5 to 10 Diamters)	2	(1=Sand; 2=Clay)
Above or Below Water Table (for Sand)	1	(1=Above; 2=Below)
Friction Angle, Φ (for Sand, not used for Clay)	0.0	degrees
Cohesion, c (for Clay, not used for Sand)	900.0	psf
Coefficient of Variation in Subgrade Stiffness, f	8.5	pci

SINGLE PILE HEAD STIFFNESS	Fixed-Head Condition	Pin-Head Condition
Translational Stiffness, K_s (K11, Long. Direction)	7.52E+04 LB/inch	3.86E+04 LB/inch
Translational Stiffness, K_s (K22, Transv. Direction)	7.52E+04 LB/inch	3.86E+04 LB/inch
Axial Stiffness, K_a (K33, Vertical Axis)	3.30E+06 LB/inch	3.30E+06 LB/inch
Rotational Stiffness, K_θ (K44, about Long. Direction)	1.66E+08 Inch-LB/Rad	0.0 Inch-LB/Rad
Rotational Stiffness, K_θ (K55, about Transv. Direction)	1.66E+08 Inch-LB/Rad	0.0 Inch-LB/Rad
Torsional Stiffness, K_θ (K66, about Vertical Axis)	0.00E+00 Inch-LB/Rad	0.0 Inch-LB/Rad
Cross-Coupling Stiffness, $K_{s\theta}$ (K15)	2.46E+06 LB	0.0 LB
Cross-Coupling Stiffness, $K_{s\theta}$ (K51)	2.46E+06 LB	0.0 LB
Cross-Coupling Stiffness, $K_{s\theta}$ (K24)	2.46E+06 LB	0.0 LB
Cross-Coupling Stiffness, $K_{s\theta}$ (K42)	2.46E+06 LB	0.0 LB

REFERENCES





1) FHWA/RD-86/102 Seismic Design of Highway Bridge Foundations, Vol. II Design Procedures and Guidelines

2) FHWA--HRT-06-032 Seismic Retrofit Manual for Highway Structures: Part 1 -Bridge, Section 6.2.2

PILE GROUP STIFFNESS

EZ_Pile-Foundation-Stiffness v1.0

PROJECT INFORMATION	
Project Name	Reyes Adobe Road Bridge
Project No.	75010
Support Location	Bents 2 and 3
Boring Profile	B-1

PILE GROUP PARAMETERS	
Number of Total Piles under Pile Cap, N	12
Number of Rows along Long. Direction, NL	3
Number of Rows along Transv. Direction, NT	4
Pile Spacing along Long. Direction, SL	3.0 ft
Pile Spacing along Transv. Direction, ST	3.0 ft
Pile Cap Width along Long. Direction , WL	9.0 ft
Pile Cap Width along Transv. Direction , WT	12.0 ft
Pile Cap Thickness , T	4 ft

PILE GROUP STIFFNESS	Fixed-Head Condition	Pin-Head Condition
Translational Stiffness, K_s (K11g, Long. Direction)	9.02E+05 LB/inch	4.64E+05 LB/inch
Translational Stiffness, K_s (K22g, Transv. Direction)	9.02E+05 LB/inch	4.64E+05 LB/inch
Axial Stiffness, K_a (K33g, Vertical Axis)	3.96E+07 LB/inch	3.96E+07 LB/inch
Rotational Stiffness, K_θ (K44g, about Long. Direction)	6.62E+10 Inch-LB/Rad	4.46E+08 Inch-LB/Rad
Rotational Stiffness, K_θ (K55g, about Transv. Direction)	3.62E+10 Inch-LB/Rad	2.38E+08 Inch-LB/Rad
Torsional Stiffness, K_θ (K66g, about Vertical Axis)	2.24E+09 Inch-LB/Rad	8.00E+06 Inch-LB/Rad
Cross-Coupling Stiffness, $K_{s\theta}$ (K15g)	2.96E+07 LB	0.0 LB
Cross-Coupling Stiffness, $K_{s\theta}$ (K51g)	2.96E+07 LB	0.0 LB
Cross-Coupling Stiffness, $K_{s\theta}$ (K24g)	2.96E+07 LB	0.0 LB
Cross-Coupling Stiffness, $K_{s\theta}$ (K42g)	2.96E+07 LB	0.0 LB

PILE CAP STIFFNESS		
Translational Stiffness, Kδ ($K11_{CAP}$, Long. Direction)	2.84E+05 LB/inch	(assumed initial 20 kip/in per ft based
Translational Stiffness, Kδ ($K22_{CAP}$, Transv. Direction)	2.13E+05 LB/inch	on Caltrans SDC)
Torsional Stiffness, Kθ ($K66_{CAP}$, about Vertical Axis)	4.84E+06 Inch-LB/Rad.	

FORMULAS AND REFERENCES

Translational and Cross-Coupling:

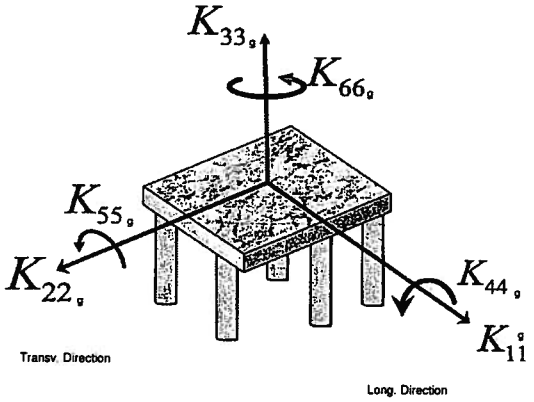
K11g=N*K11; K22g=N*K22; K33g=N*K33

K15g=N*K15; K51g=N*K51; K24g=N*K24; K42g=N*K42

Rotational and Torsional:

$$K_{rg} = N\,K_{rp} + \sum_{n=1}^{N} K_{\delta n}\,S_n^2$$

where K_rg and K_rp are the rotional stiffness of pile group and single piles, respectively. Kδn is the appropriate translational stiffness of single piles, and Sn is the spacing between the nth pile and the point of loading (center of the pile group).



1) FHWA/RD-86/102 Seismic Design of Highway Bridge Foundations, Vol. II Design Procedures and Guidelines

2) FHWA--HRT-06-032 Seismic Retrofit Manual for Highway Structures: Part 1 -Bridge, Section 6.2.2

STIFFNESS PARAMETERS OF PILE FOUNDATIONS

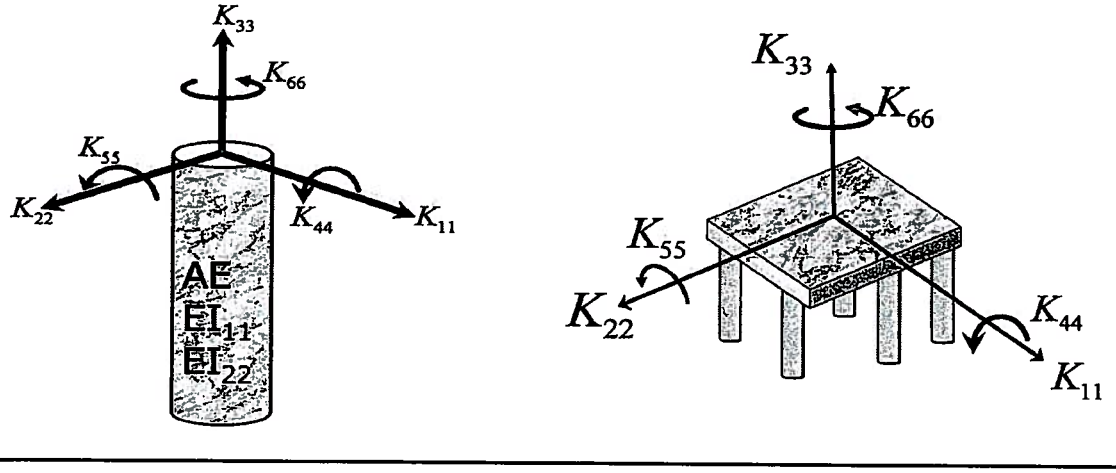
EZ_Pile-Foundation-Stiffness v1.0

PROJECT INFORMATION	
Project Name	Reyes Adobe Road Bridge
Project No.	75010
Support Location	Bent 4
Boring Profile	B-2

INPUT SOIL PARAMETERS	
Average of Upper 5 to 10 Diameter Soil Type	1 (1=Sand; 2=Clay)
Above or Below Water Table (for Sand)	1 (1=Above; 2=Below)
Friction Angle, Φ (for Sand, not used for Clay)	30.0 degrees
Cohesion, c (for Clay, not used for Sand)	0.0 psf

INPUT PILE PARAMETERS	
Young's Modulus, E	4.3000E+06 psi
Moment of Inertia, I_x (Bridge Long. Direction)	1,242.52 inch^4 (I_crack)
Moment of Inertia, I_y (Bridge transv. Direction)	1,242.52 inch^4 (I_crack)
Pile Diameter, D	15.00 inch
Pile Section Area, A	176.71 inch^2
Pile Length, L	28.75 ft
Pile Head Embedment Depth, D_f	8.25 ft
Pile End Bearing Condition, α	1.50 (1=End-bearing;2=Friction;1.5=Both)

INPUT PILE GROUP PARAMETERS	
Number of Total Piles under Pile Cap, N	12
Number of Rows along Long. Direction, N_L	3 (This program limits to 50 rows)
Number of Rows along Transv. Direction, N_T	4 (This program limits to 50 rows)
Pile Spacing along Long. Direction, S_L	3.0 ft
Pile Spacing along Transv. Direction, S_T	3.0 ft
Pile Cap Width along Long. Direction , W_L	9.0 ft
Pile Cap Width along Transv. Direction , W_T	12.0 ft
Pile Cap Thickness , T	3.5 ft



SINGLE PILE-HEAD STIFFNESS

EZ_Pile-Foundation-Stiffness v1.0

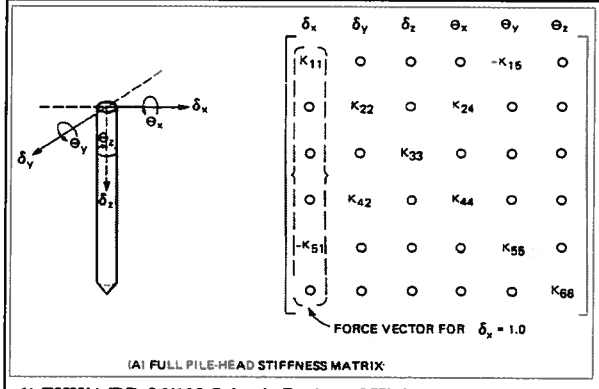
PROJECT INFORMATION	
Project Name	Reyes Adobe Road Bridge
Project No.	75010
Support Location	Bent 4
Boring Profile	B-2

PILE PARAMETERS		
Young's Modulus, E	4.3000E+06	psi
Moment of Inertia, I_x (Bridge Long. Direction)	1,242.52	inch^4
Moment of Inertia, I_y (Bridge Transv. Direction)	1,242.52	inch^4
Pile Diameter, D	15.00	inch
Pile Section Area, A	176.71	inch^2
Bending Stiffness, EI_x (Bridge Long. Direction)	5.3429E+09	LB-in^2
Bending Stiffness, EI_y (Bridge Transv. Direction)	5.3429E+09	LB-in^2
Axial Stiffness, EA	7.5987E+08	LB
Pile Length, L	28.75	ft
Pile Head Embedment Depth, D_f	8.25	ft

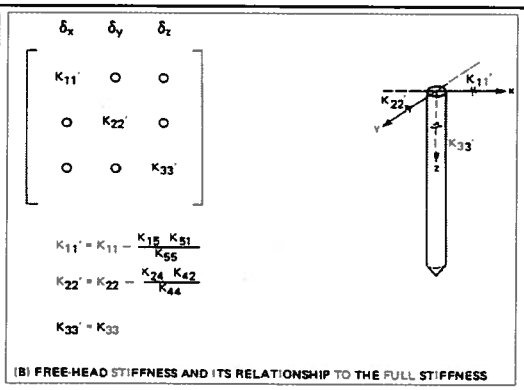
SOIL PARAMETERS		
Effective Soil Type (Upper 5 to 10 Diamters)	1	(1=Sand; 2=Clay)
Above or Below Water Table (for Sand)	1	(1=Above; 2=Below)
Friction Angle, Φ (for Sand, not used for Clay)	30.0	degrees
Cohesion, c (for Clay, not used for Sand)	0.0	psf
Coefficient of Variation in Subgrade Stiffness, f	11.6	pci

SINGLE PILE HEAD STIFFNESS	Fixed-Head Condition	Pin-Head Condition
Translational Stiffness, K_s (K11, Long. Direction)	8.85E+04 LB/inch	4.53E+04 LB/inch
Translational Stiffness, K_s (K22, Transv. Direction)	8.85E+04 LB/inch	4.53E+04 LB/inch
Axial Stiffness, K_a (K33, Vertical Axis)	3.30E+06 LB/inch	3.30E+06 LB/inch
Rotational Stiffness, K_θ (K44, about Long. Direction)	1.76E+08 Inch-LB/Rad	0.0 Inch-LB/Rad
Rotational Stiffness, K_θ (K55, about Transv. Direction)	1.76E+08 Inch-LB/Rad	0.0 Inch-LB/Rad
Torsional Stiffness, K_θ (K66, about Vertical Axis)	0.00E+00 Inch-LB/Rad	0.0 Inch-LB/Rad
Cross-Coupling Stiffness, $K_{s\theta}$ (K15)	2.75E+06 LB	0.0 LB
Cross-Coupling Stiffness, $K_{s\theta}$ (K51)	2.75E+06 LB	0.0 LB
Cross-Coupling Stiffness, $K_{s\theta}$ (K24)	2.75E+06 LB	0.0 LB
Cross-Coupling Stiffness, $K_{s\theta}$ (K42)	2.75E+06 LB	0.0 LB

REFERENCES



(A) FULL PILE-HEAD STIFFNESS MATRIX



(B) FREE-HEAD STIFFNESS AND ITS RELATIONSHIP TO THE FULL STIFFNESS

1) FHWA/RD-86/102 Seismic Design of Highway Bridge Foundations, Vol. II Design Procedures and Guidelines
2) FHWA--HRT-06-032 Seismic Retrofit Manual for Highway Structures: Part 1 -Bridge, Section 6.2.2

PILE GROUP STIFFNESS

EZ_Pile-Foundation-Stiffness v1.0

PROJECT INFORMATION	
Project Name	Reyes Adobe Road Bridge
Project No.	75010
Support Location	Bent 4
Boring Profile	B-2

PILE GROUP PARAMETERS	
Number of Total Piles under Pile Cap, N	12
Number of Rows along Long. Direction, NL	3
Number of Rows along Transv. Direction, NT	4
Pile Spacing along Long. Direction, SL	3.0 ft
Pile Spacing along Transv. Direction, ST	3.0 ft
Pile Cap Width along Long. Direction , WL	9.0 ft
Pile Cap Width along Transv. Direction , WT	12.0 ft
Pile Cap Thickness , T	4 ft

PILE GROUP STIFFNESS	Fixed-Head Condition	Pin-Head Condition
Translational Stiffness, K_5 (K11g, Long. Direction)	1.06E+06 LB/inch	5.44E+05 LB/inch
Translational Stiffness, K_5 (K22g, Transv. Direction)	1.06E+06 LB/inch	5.44E+05 LB/inch
Axial Stiffness, K_g (K33g, Vertical Axis)	3.96E+07 LB/inch	3.96E+07 LB/inch
Rotational Stiffness, K_θ (K44g, about Long. Direction)	6.63E+10 Inch-LB/Rad	4.46E+08 Inch-LB/Rad
Rotational Stiffness, K_θ (K55g, about Transv. Direction)	3.64E+10 Inch-LB/Rad	2.38E+08 Inch-LB/Rad
Torsional Stiffness, K_θ (K66g, about Vertical Axis)	2.64E+09 Inch-LB/Rad	9.38E+06 Inch-LB/Rad
Cross-Coupling Stiffness, K_{56} (K15g)	3.30E+07 LB	0.0 LB
Cross-Coupling Stiffness, K_{56} (K51g)	3.30E+07 LB	0.0 LB
Cross-Coupling Stiffness, K_{56} (K24g)	3.30E+07 LB	0.0 LB
Cross-Coupling Stiffness, K_{56} (K42g)	3.30E+07 LB	0.0 LB

PILE CAP STIFFNESS		
Translational Stiffness, Kδ ($K11_{CAP}$, Long. Direction)	2.84E+05 LB/inch	(assumed initial 20 kip/in per ft based
Translational Stiffness, Kδ ($K22_{CAP}$, Transv. Direction)	2.13E+05 LB/inch	on Caltrans SDC)
Torsional Stiffness, Kθ ($K66_{CAP}$, about Vertical Axis)	4.84E+06 Inch-LB/Rad.	

FORMULAS AND REFERENCES

Translational and Cross-Coupling:

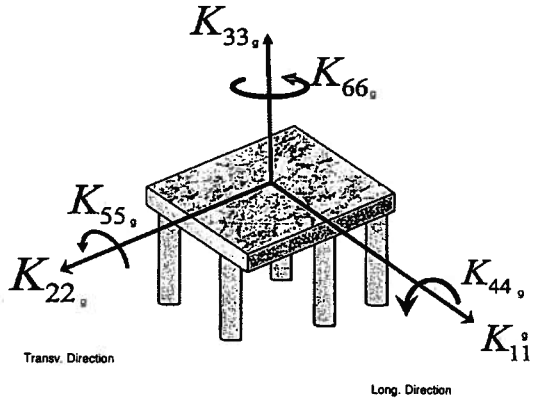
K11g=N*K11; K22g=N*K22; K33g=N*K33

K15g=N*K15; K51g=N*K51; K24g=N*K24; K42g=N*K42

Rotational and Torsional:

$$K_{rg} = N\,K_{rp} + \sum_{n=1}^{N} K_{\delta n}\,S_n^2$$

where K_rg and K_rp are the rotional stiffness of pile group and single piles, respectively. Kδn is the appropriate translational stiffness of single piles, and Sn is the spacing between the nth pile and the point of loading (center of the pile group).



1) FHWA/RD-86/102 Seismic Design of Highway Bridge Foundations, Vol. II Design Procedures and Guidelines

2) FHWA--HRT-06-032 Seismic Retrofit Manual for Highway Structures: Part 1 -Bridge, Section 6.2.2