# *Appendix F*
# *Engineering Calculations*

**SUMMARY OF LABORATORY CONSOLIDATION DATA**

| Boring | Depth (ft) | (ksf) po | (ksf) Pc | Cc$\varepsilon$ | Cr$\varepsilon$ | USCS Soil Type | Field Moisture | PI | LL | PL | Liquidity Index | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HS-3 | 10 | 1.25 | 5.0 | 0.04 | 0.009 | CL | 11.6 | 13 | 27 | 14 | -0.18 | Qal |
| HS-3 | 15 | 1.88 | 4.5 | 0.03 | 0.005 | CL | 9.7 | 10 | 25 | 15 | -0.53 | Qal |
| HS-3 | 25 | 3.13 | 5.0 | 0.10 | 0.02 | CL | 21.3 | 23 | 39 | 16 | 0.23 | Qal |
| HS-12 | 40 | 5.00 | 5.0 | 0.04 | 0.015 | CL | 14.8 | 23 | 37 | 14 | 0.03 | Qal |
| HS-12 | 50 | 6.25 | 9.0 | 0.12 | 0.018 | CL | 25.7 | 22 | 42 | 20 | 0.26 | Qal |
| HS-14 | 20 | 2.50 | 6.0 | 0.04 | 0.005 | SC | 9.1 | 10 | 25 | 15 | -0.59 | Qal |
| HS-15 | 25 | 3.13 | 7.0 | 0.06 | 0.009 | SC | 13.4 | 21 | 42 | 21 | -0.36 | Qal |
| HS-16 | 20 | 2.50 | 8.0 | 0.095 | 0.008 | CL | 16.4 | 17 | 36 | 19 | -0.15 | Qal |
| HS-17 | 20 | 2.50 | 3.5 | 0.095 | 0.017 | CL | 26.3 | 22 | 42 | 20 | 0.29 | Qal |
| HS-17 | 25 | 3.13 | 6.0 | 0.06 | 0.006 | CL | 18.2 | 15 | 32 | 17 | 0.08 | Qal |
| | | Average | 5.9 | 0.068 | 0.011 | | | 17.6 | 34.7 | 17.1 | -0.09 | |

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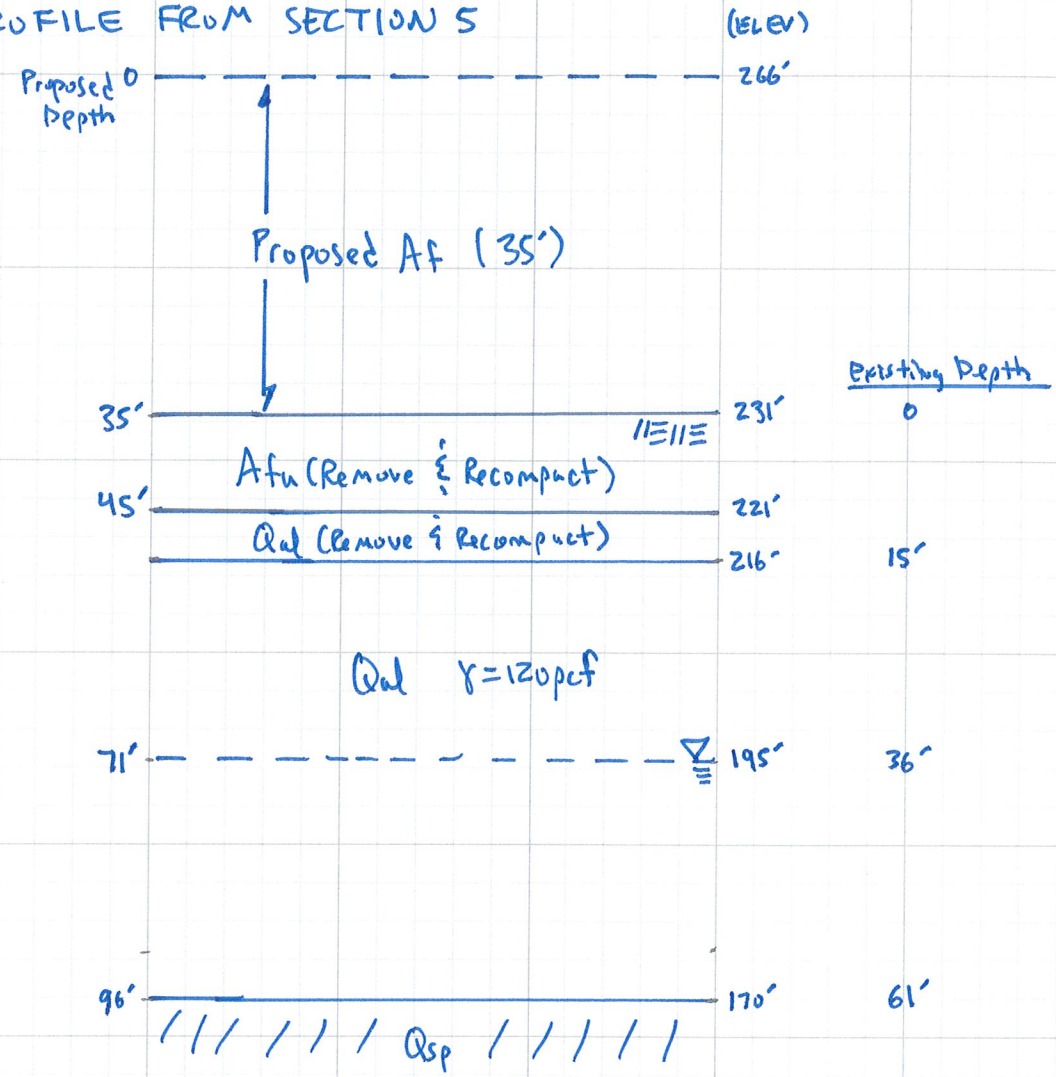
# SETTLEMENT OF Qal

IDEALIZED PROFILE FROM SECTION 5




$\Delta q = 120pcf\,(35') = 4.20\ ksf$

Project Name: Rancho La Habra | Drawn By: BTZ | Checked By: _____
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## SETTLEMENT OF Qal (CONT.)

Using $P_c = 5.9$ ksf $C_{c\varepsilon} = 0.068$ $C_{r\varepsilon} = 0.011$ $\Delta q = 4.20$ ksf

Layer ① 10' thick layer (15' to 25' below EG)

$\sigma_{v_i\,Avg}' = 120\,pcf(20') = 2{,}400\,psf = 2.40\,ksf$

$$\Delta S = H\left[C_{r\varepsilon}\log\left(\frac{P_c}{\sigma_{v_i}'}\right) + C_{c\varepsilon}\log\left(\frac{\sigma_{v_i}' + \Delta q}{P_c}\right)\right]$$

$$\Delta S = 10'(12''/ft)\left[0.011\log\left(\frac{5.9}{2.40}\right) + 0.068\log\left(\frac{2.4+4.20}{5.9}\right)\right] = 0.913''$$

Layer ② 11' thick layer (25' to 36' below EG)

$\sigma_{v\,Avg}' = 120\,pcf(30.5') = 3.66\,ksf$

$$\Delta S = 11'(12''/ft)\left[0.011\log\left(\frac{5.9}{3.66}\right) + 0.068\log\left(\frac{3.66+4.20}{5.9}\right)\right] = 1.419''$$

Layer ③ 12' thick layer (36' to 48' below EG)

$\sigma_{v\,Avg}' = 120\,pcf(36') + (120-62.4\,pcf)(6') = 4{,}666\,psf = 4.67\,ksf$

$$\Delta S = 12'(12''/ft)\left[0.011\log\left(\frac{5.9}{4.67}\right) + 0.068\log\left(\frac{4.67+4.2}{5.9}\right)\right] = 1.895''$$

Layer ④ 13' thick layer (48' to 61' below EG)

$\sigma_{v\,Avg}' = 120\,pcf(36') + (120-62.4\,psf)(18.5') = 5{,}386\,psf = 5.39\,ksf$

$$\Delta S = 13'(12''/ft)\left[0.011\log\left(\frac{5.9}{5.39}\right) + 0.068\log\left(\frac{5.39+4.2}{5.9}\right)\right] = 2.305''$$

$\delta_T = 0.913'' + 1.419'' + 1.895'' + 2.305'' = \underline{6.53''}$



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**SETTLEMENT CALCULATION**
**FOR FILL SURCHARGE**

| | | | |
|---|---|---|---|
| Soil Unit Weight | 120.0 pcf | Surcharge | 4,200 psf |
| Water Unit Weight | 62.4 pcf | Af Unit Wt | 120.0 pcf |
| Buoyant Unit Weight | 57.6 pcf | Fill Depth | 35.0 ft |
| Groundwater Depth | 36 feet | | |
| Pc' | 5,900.0 psf | | |

Description: Idealized Profile from Section 5

| | | Stress at Layer Bottom | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth (ft) | Unit Weight γ (pcf) | Total Stress (psf) | Pore Water (psf) | Effective Stress, po (psf) | Δp | Ccε | Crε | po + Δp | Δ s (feet) | Δ s (inch) | Depth (ft) |
| 0 | 120.0 | 0.0 | 0.0 | 0.0 | 4200.0 | 0 | 0 | 4200.0 | 0.000 | 0 | 0.0 |
| 1 | 120.0 | 120.0 | 0.0 | 120.0 | 4200.0 | 0 | 0 | 4320.0 | 0.000 | 0.000 | 1.0 |
| 2 | 120.0 | 240.0 | 0.0 | 240.0 | 4200.0 | 0 | 0 | 4440.0 | 0.000 | 0.000 | 2.0 |
| 3 | 120.0 | 360.0 | 0.0 | 360.0 | 4200.0 | 0 | 0 | 4560.0 | 0.000 | 0.000 | 3.0 |
| 4 | 120.0 | 480.0 | 0.0 | 480.0 | 4200.0 | 0 | 0 | 4680.0 | 0.000 | 0.000 | 4.0 |
| 5 | 120.0 | 600.0 | 0.0 | 600.0 | 4200.0 | 0 | 0 | 4800.0 | 0.000 | 0.000 | 5.0 |
| 6 | 120.0 | 720.0 | 0.0 | 720.0 | 4200.0 | 0 | 0 | 4920.0 | 0.000 | 0.000 | 6.0 |
| **7** | 120.0 | 840.0 | 0.0 | 840.0 | 4200.0 | 0 | 0 | 5040.0 | 0.000 | 0.000 | 7.0 |
| 8 | 120.0 | 960.0 | 0.0 | 960.0 | 4200.0 | 0 | 0 | 5160.0 | 0.000 | 0.000 | 8.0 |
| 9 | 120.0 | 1080.0 | 0.0 | 1080.0 | 4200.0 | 0 | 0 | 5280.0 | 0.000 | 0.000 | 9.0 |
| 10 | 120.0 | 1200.0 | 0.0 | 1200.0 | 4200.0 | 0 | 0 | 5400.0 | 0.000 | 0.000 | 10.0 |
| 11 | 120.0 | 1320.0 | 0.0 | 1320.0 | 4200.0 | 0 | 0 | 5520.0 | 0.000 | 0.000 | 11.0 |
| 12 | 120.0 | 1440.0 | 0.0 | 1440.0 | 4200.0 | 0 | 0 | 5640.0 | 0.000 | 0.000 | 12.0 |
| 13 | 120.0 | 1560.0 | 0.0 | 1560.0 | 4200.0 | 0 | 0 | 5760.0 | 0.000 | 0.000 | 13.0 |
| 14 | 120.0 | 1680.0 | 0.0 | 1680.0 | 4200.0 | 0 | 0 | 5880.0 | 0.000 | 0.000 | 14.0 |
| 15 | 120.0 | 1800.0 | 0.0 | 1800.0 | 4200.0 | 0 | 0 | 6000.0 | 0.000 | 0.000 | 15.0 |
| 16 | 120.0 | 1920.0 | 0.0 | 1920.0 | 4200.0 | 0.068 | 0.011 | 6120.0 | 0.006 | 0.077 | 16.0 |
| 17 | 120.0 | 2040.0 | 0.0 | 2040.0 | 4200.0 | 0.068 | 0.011 | 6240.0 | 0.007 | 0.081 | 17.0 |
| 18 | 120.0 | 2160.0 | 0.0 | 2160.0 | 4200.0 | 0.068 | 0.011 | 6360.0 | 0.007 | 0.084 | 18.0 |
| 19 | 120.0 | 2280.0 | 0.0 | 2280.0 | 4200.0 | 0.068 | 0.011 | 6480.0 | 0.007 | 0.088 | 19.0 |
| 20 | 120.0 | 2400.0 | 0.0 | 2400.0 | 4200.0 | 0.068 | 0.011 | 6600.0 | 0.008 | 0.091 | 20.0 |
| 21 | 120.0 | 2520.0 | 0.0 | 2520.0 | 4200.0 | 0.068 | 0.011 | 6720.0 | 0.008 | 0.095 | 21.0 |
| 22 | 120.0 | 2640.0 | 0.0 | 2640.0 | 4200.0 | 0.068 | 0.011 | 6840.0 | 0.008 | 0.098 | 22.0 |
| 23 | 120.0 | 2760.0 | 0.0 | 2760.0 | 4200.0 | 0.068 | 0.011 | 6960.0 | 0.009 | 0.102 | 23.0 |
| 24 | 120.0 | 2880.0 | 0.0 | 2880.0 | 4200.0 | 0.068 | 0.011 | 7080.0 | 0.009 | 0.106 | 24.0 |
| 25 | 120.0 | 3000.0 | 0.0 | 3000.0 | 4200.0 | 0.068 | 0.011 | 7200.0 | 0.009 | 0.109 | 25.0 |
| 26 | 120.0 | 3120.0 | 0.0 | 3120.0 | 4200.0 | 0.068 | 0.011 | 7320.0 | 0.009 | 0.113 | 26.0 |
| 27 | 120.0 | 3240.0 | 0.0 | 3240.0 | 4200.0 | 0.068 | 0.011 | 7440.0 | 0.010 | 0.117 | 27.0 |
| 28 | 120.0 | 3360.0 | 0.0 | 3360.0 | 4200.0 | 0.068 | 0.011 | 7560.0 | 0.010 | 0.120 | 28.0 |
| 29 | 120.0 | 3480.0 | 0.0 | 3480.0 | 4200.0 | 0.068 | 0.011 | 7680.0 | 0.010 | 0.124 | 29.0 |
| 30 | 120.0 | 3600.0 | 0.0 | 3600.0 | 4200.0 | 0.068 | 0.011 | 7800.0 | 0.011 | 0.127 | 30.0 |
| 31 | 120.0 | 3720.0 | 0.0 | 3720.0 | 4200.0 | 0.068 | 0.011 | 7920.0 | 0.011 | 0.131 | 31.0 |
| 32 | 120.0 | 3840.0 | 0.0 | 3840.0 | 4200.0 | 0.068 | 0.011 | 8040.0 | 0.011 | 0.134 | 32.0 |
| 33 | 120.0 | 3960.0 | 0.0 | 3960.0 | 4200.0 | 0.068 | 0.011 | 8160.0 | 0.011 | 0.138 | 33.0 |
| 34 | 120.0 | 4080.0 | 0.0 | 4080.0 | 4200.0 | 0.068 | 0.011 | 8280.0 | 0.012 | 0.141 | 34.0 |
| 35 | 120.0 | 4200.0 | 0.0 | 4200.0 | 4200.0 | 0.068 | 0.011 | 8400.0 | 0.012 | 0.145 | 35.0 |
| 36 | 120.0 | 4320.0 | 0.0 | 4320.0 | 4200.0 | 0.068 | 0.011 | 8520.0 | 0.012 | 0.148 | 36.0 |
| 37 | 120.0 | 4440.0 | 62.4 | 4377.6 | 4200.0 | 0.068 | 0.011 | 8577.6 | 0.012 | 0.150 | 37.0 |
| 38 | 120.0 | 4560.0 | 124.8 | 4435.2 | 4200.0 | 0.068 | 0.011 | 8635.2 | 0.013 | 0.151 | 38.0 |
| 39 | 120.0 | 4680.0 | 187.2 | 4492.8 | 4200.0 | 0.068 | 0.011 | 8692.8 | 0.013 | 0.153 | 39.0 |
| 40 | 120.0 | 4800.0 | 249.6 | 4550.4 | 4200.0 | 0.068 | 0.011 | 8750.4 | 0.013 | 0.155 | 40.0 |
| 41 | 120.0 | 4920.0 | 312.0 | 4608.0 | 4200.0 | 0.068 | 0.011 | 8808.0 | 0.013 | 0.156 | 41.0 |
| 42 | 120.0 | 5040.0 | 374.4 | 4665.6 | 4200.0 | 0.068 | 0.011 | 8865.6 | 0.013 | 0.158 | 42.0 |
| 43 | 120.0 | 5160.0 | 436.8 | 4723.2 | 4200.0 | 0.068 | 0.011 | 8923.2 | 0.013 | 0.159 | 43.0 |
| 44 | 120.0 | 5280.0 | 499.2 | 4780.8 | 4200.0 | 0.068 | 0.011 | 8980.8 | 0.013 | 0.161 | 44.0 |
| 45 | 120.0 | 5400.0 | 561.6 | 4838.4 | 4200.0 | 0.068 | 0.011 | 9038.4 | 0.014 | 0.163 | 45.0 |
| 46 | 120.0 | 5520.0 | 624.0 | 4896.0 | 4200.0 | 0.068 | 0.011 | 9096.0 | 0.014 | 0.164 | 46.0 |
| 47 | 120.0 | 5640.0 | 686.4 | 4953.6 | 4200.0 | 0.068 | 0.011 | 9153.6 | 0.014 | 0.166 | 47.0 |
| 48 | 120.0 | 5760.0 | 748.8 | 5011.2 | 4200.0 | 0.068 | 0.011 | 9211.2 | 0.014 | 0.167 | 48.0 |
| 49 | 120.0 | 5880.0 | 811.2 | 5068.8 | 4200.0 | 0.068 | 0.011 | 9268.8 | 0.014 | 0.169 | 49.0 |
| 50 | 120.0 | 6000.0 | 873.6 | 5126.4 | 4200.0 | 0.068 | 0.011 | 9326.4 | 0.014 | 0.170 | 50.0 |
| 51 | 120.0 | 6120.0 | 936.0 | 5184.0 | 4200.0 | 0.068 | 0.011 | 9384.0 | 0.014 | 0.172 | 51.0 |
| 52 | 120.0 | 6240.0 | 998.4 | 5241.6 | 4200.0 | 0.068 | 0.011 | 9441.6 | 0.014 | 0.173 | 52.0 |
| 53 | 120.0 | 6360.0 | 1060.8 | 5299.2 | 4200.0 | 0.068 | 0.011 | 9499.2 | 0.015 | 0.175 | 53.0 |
| 54 | 120.0 | 6480.0 | 1123.2 | 5356.8 | 4200.0 | 0.068 | 0.011 | 9556.8 | 0.015 | 0.176 | 54.0 |
| 55 | 120.0 | 6600.0 | 1185.6 | 5414.4 | 4200.0 | 0.068 | 0.011 | 9614.4 | 0.015 | 0.178 | 55.0 |
| 56 | 120.0 | 6720.0 | 1248.0 | 5472.0 | 4200.0 | 0.068 | 0.011 | 9672.0 | 0.015 | 0.179 | 56.0 |
| 57 | 120.0 | 6840.0 | 1310.4 | 5529.6 | 4200.0 | 0.068 | 0.011 | 9729.6 | 0.015 | 0.181 | 57.0 |
| 58 | 120.0 | 6960.0 | 1372.8 | 5587.2 | 4200.0 | 0.068 | 0.011 | 9787.2 | 0.015 | 0.182 | 58.0 |
| 59 | 120.0 | 7080.0 | 1435.2 | 5644.8 | 4200.0 | 0.068 | 0.011 | 9844.8 | 0.015 | 0.184 | 59.0 |
| 60 | 120.0 | 7200.0 | 1497.6 | 5702.4 | 4200.0 | 0.068 | 0.011 | 9902.4 | 0.015 | 0.185 | 60.0 |
| 61 | 120.0 | 7320.0 | 1560.0 | 5760.0 | 4200.0 | 0.068 | 0.011 | 9960.0 | 0.016 | 0.187 | 61.0 |
| | | | | | | | | | **Total:** | **6.58** | **inches** |

**SETTLEMENT CALCULATION**
**FOR FILL SURCHARGE**

| | | | |
|---|---|---|---|
| Soil Unit Weight | 120.0 pcf | Surcharge | 4,200 psf |
| Water Unit Weight | 62.4 pcf | Af Unit Wt | 120.0 pcf |
| Buoyant Unit Weight | 57.6 pcf | Fill Depth | 35.0 ft |
| Groundwater Depth | 36 feet | | |

Description: Idealized Profile from Section 5

| Depth (ft) | Unit Weight γ (pcf) | Stress at Layer Bottom: Total Stress (psf) | Pore Water (psf) | Effective Stress, po (psf) | Δp | Crε | po + Δp | Δ s (feet) | Δ s (inch) | Depth (ft) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 120.0 | 0.0 | 0.0 | 0.0 | 4200.0 | 0 | 4200.0 | 0.000 | 0.000 | 0 | |
| 1 | 120.0 | 120.0 | 0.0 | 120.0 | 4200.0 | 0 | 4320.0 | 0.000 | 0.000 | 1 | |
| 2 | 120.0 | 240.0 | 0.0 | 240.0 | 4200.0 | 0 | 4440.0 | 0.000 | 0.000 | 2 | |
| 3 | 120.0 | 360.0 | 0.0 | 360.0 | 4200.0 | 0 | 4560.0 | 0.000 | 0.000 | 3 | |
| 4 | 120.0 | 480.0 | 0.0 | 480.0 | 4200.0 | 0 | 4680.0 | 0.000 | 0.000 | 4 | |
| 5 | 120.0 | 600.0 | 0.0 | 600.0 | 4200.0 | 0 | 4800.0 | 0.000 | 0.000 | 5 | |
| 6 | 120.0 | 720.0 | 0.0 | 720.0 | 4200.0 | 0 | 4920.0 | 0.000 | 0.000 | 6 | |
| 7 | 120.0 | 840.0 | 0.0 | 840.0 | 4200.0 | 0 | 5040.0 | 0.000 | 0.000 | 7 | |
| 8 | 120.0 | 960.0 | 0.0 | 960.0 | 4200.0 | 0 | 5160.0 | 0.000 | 0.000 | 8 | |
| 9 | 120.0 | 1080.0 | 0.0 | 1080.0 | 4200.0 | 0 | 5280.0 | 0.000 | 0.000 | 9 | |
| 10 | 120.0 | 1200.0 | 0.0 | 1200.0 | 4200.0 | 0 | 5400.0 | 0.000 | 0.000 | 10 | |
| 11 | 120.0 | 1320.0 | 0.0 | 1320.0 | 4200.0 | 0 | 5520.0 | 0.000 | 0.000 | 11 | |
| 12 | 120.0 | 1440.0 | 0.0 | 1440.0 | 4200.0 | 0 | 5640.0 | 0.000 | 0.000 | 12 | |
| 13 | 120.0 | 1560.0 | 0.0 | 1560.0 | 4200.0 | 0 | 5760.0 | 0.000 | 0.000 | 13 | |
| 14 | 120.0 | 1680.0 | 0.0 | 1680.0 | 4200.0 | 0 | 5880.0 | 0.000 | 0.000 | 14 | |
| 15 | 120.0 | 1800.0 | 0.0 | 1800.0 | 4200.0 | 0 | 6000.0 | 0.000 | 0.000 | 15 | |
| 16 | 120.0 | 1920.0 | 0.0 | 1920.0 | 4200.0 | 0.012 | 6120.0 | 0.006 | 0.072 | 16 | |
| 17 | 120.0 | 2040.0 | 0.0 | 2040.0 | 4200.0 | 0.012 | 6240.0 | 0.006 | 0.070 | 17 | |
| 18 | 120.0 | 2160.0 | 0.0 | 2160.0 | 4200.0 | 0.012 | 6360.0 | 0.006 | 0.068 | 18 | |
| 19 | 120.0 | 2280.0 | 0.0 | 2280.0 | 4200.0 | 0.012 | 6480.0 | 0.005 | 0.065 | 19 | |
| 20 | 120.0 | 2400.0 | 0.0 | 2400.0 | 4200.0 | 0.012 | 6600.0 | 0.005 | 0.063 | 20 | |
| 21 | 120.0 | 2520.0 | 0.0 | 2520.0 | 4200.0 | 0.012 | 6720.0 | 0.005 | 0.061 | 21 | |
| 22 | 120.0 | 2640.0 | 0.0 | 2640.0 | 4200.0 | 0.012 | 6840.0 | 0.005 | 0.060 | 22 | |
| 23 | 120.0 | 2760.0 | 0.0 | 2760.0 | 4200.0 | 0.012 | 6960.0 | 0.005 | 0.058 | 23 | |
| 24 | 120.0 | 2880.0 | 0.0 | 2880.0 | 4200.0 | 0.012 | 7080.0 | 0.005 | 0.056 | 24 | |
| 25 | 120.0 | 3000.0 | 0.0 | 3000.0 | 4200.0 | 0.012 | 7200.0 | 0.005 | 0.055 | 25 | |
| 26 | 120.0 | 3120.0 | 0.0 | 3120.0 | 4200.0 | 0.012 | 7320.0 | 0.004 | 0.053 | 26 | |
| 27 | 120.0 | 3240.0 | 0.0 | 3240.0 | 4200.0 | 0.012 | 7440.0 | 0.004 | 0.052 | 27 | |
| 28 | 120.0 | 3360.0 | 0.0 | 3360.0 | 4200.0 | 0.012 | 7560.0 | 0.004 | 0.051 | 28 | |
| 29 | 120.0 | 3480.0 | 0.0 | 3480.0 | 4200.0 | 0.012 | 7680.0 | 0.004 | 0.050 | 29 | |
| 30 | 120.0 | 3600.0 | 0.0 | 3600.0 | 4200.0 | 0.012 | 7800.0 | 0.004 | 0.048 | 30 | |
| 31 | 120.0 | 3720.0 | 0.0 | 3720.0 | 4200.0 | 0.012 | 7920.0 | 0.004 | 0.047 | 31 | |
| 32 | 120.0 | 3840.0 | 0.0 | 3840.0 | 4200.0 | 0.012 | 8040.0 | 0.004 | 0.046 | 32 | |
| 33 | 120.0 | 3960.0 | 0.0 | 3960.0 | 4200.0 | 0.012 | 8160.0 | 0.004 | 0.045 | 33 | |
| 34 | 120.0 | 4080.0 | 0.0 | 4080.0 | 4200.0 | 0.012 | 8280.0 | 0.004 | 0.044 | 34 | |
| 35 | 120.0 | 4200.0 | 0.0 | 4200.0 | 4200.0 | 0.012 | 8400.0 | 0.004 | 0.043 | 35 | |
| 36 | 120.0 | 4320.0 | 0.0 | 4320.0 | 4200.0 | 0.012 | 8520.0 | 0.004 | 0.042 | 36 | |
| 37 | 120.0 | 4440.0 | 62.4 | 4377.6 | 4200.0 | 0.012 | 8577.6 | 0.004 | 0.042 | 37 | |
| 38 | 120.0 | 4560.0 | 124.8 | 4435.2 | 4200.0 | 0.012 | 8635.2 | 0.003 | 0.042 | 38 | |
| 39 | 120.0 | 4680.0 | 187.2 | 4492.8 | 4200.0 | 0.012 | 8692.8 | 0.003 | 0.041 | 39 | |
| 40 | 120.0 | 4800.0 | 249.6 | 4550.4 | 4200.0 | 0.012 | 8750.4 | 0.003 | 0.041 | 40 | |
| 41 | 120.0 | 4920.0 | 312.0 | 4608.0 | 4200.0 | 0.012 | 8808.0 | 0.003 | 0.041 | 41 | |
| 42 | 120.0 | 5040.0 | 374.4 | 4665.6 | 4200.0 | 0.012 | 8865.6 | 0.003 | 0.040 | 42 | |
| 43 | 120.0 | 5160.0 | 436.8 | 4723.2 | 4200.0 | 0.012 | 8923.2 | 0.003 | 0.040 | 43 | |
| 44 | 120.0 | 5280.0 | 499.2 | 4780.8 | 4200.0 | 0.012 | 8980.8 | 0.003 | 0.039 | 44 | |
| 45 | 120.0 | 5400.0 | 561.6 | 4838.4 | 4200.0 | 0.012 | 9038.4 | 0.003 | 0.039 | 45 | |
| 46 | 120.0 | 5520.0 | 624.0 | 4896.0 | 4200.0 | 0.012 | 9096.0 | 0.003 | 0.039 | 46 | |
| 47 | 120.0 | 5640.0 | 686.4 | 4953.6 | 4200.0 | 0.012 | 9153.6 | 0.003 | 0.038 | 47 | |
| 48 | 120.0 | 5760.0 | 748.8 | 5011.2 | 4200.0 | 0.012 | 9211.2 | 0.003 | 0.038 | 48 | |
| 49 | 120.0 | 5880.0 | 811.2 | 5068.8 | 4200.0 | 0.012 | 9268.8 | 0.003 | 0.038 | 49 | |
| 50 | 120.0 | 6000.0 | 873.6 | 5126.4 | 4200.0 | 0.012 | 9326.4 | 0.003 | 0.037 | 50 | |
| 51 | 120.0 | 6120.0 | 936.0 | 5184.0 | 4200.0 | 0.012 | 9384.0 | 0.003 | 0.037 | 51 | |
| 52 | 120.0 | 6240.0 | 998.4 | 5241.6 | 4200.0 | 0.012 | 9441.6 | 0.003 | 0.037 | 52 | |
| 53 | 120.0 | 6360.0 | 1060.8 | 5299.2 | 4200.0 | 0.012 | 9499.2 | 0.003 | 0.037 | 53 | |
| 54 | 120.0 | 6480.0 | 1123.2 | 5356.8 | 4200.0 | 0.012 | 9556.8 | 0.003 | 0.036 | 54 | |
| 55 | 120.0 | 6600.0 | 1185.6 | 5414.4 | 4200.0 | 0.012 | 9614.4 | 0.003 | 0.036 | 55 | |
| 56 | 120.0 | 6720.0 | 1248.0 | 5472.0 | 4200.0 | 0.012 | 9672.0 | 0.003 | 0.036 | 56 | |
| 57 | 120.0 | 6840.0 | 1310.4 | 5529.6 | 4200.0 | 0.012 | 9729.6 | 0.003 | 0.035 | 57 | |
| 58 | 120.0 | 6960.0 | 1372.8 | 5587.2 | 4200.0 | 0.012 | 9787.2 | 0.003 | 0.035 | 58 | |
| 59 | 120.0 | 7080.0 | 1435.2 | 5644.8 | 4200.0 | 0.012 | 9844.8 | 0.003 | 0.035 | 59 | |
| 60 | 120.0 | 7200.0 | 1497.6 | 5702.4 | 4200.0 | 0.012 | 9902.4 | 0.003 | 0.035 | 60 | |
| 61 | 120.0 | 7320.0 | 1560.0 | 5760.0 | 4200.0 | 0.012 | 9960.0 | 0.003 | 0.034 | 61 | |

**Total:** **2.10** **inches**

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# TIME-RATE CONSOLIDATION ESTIMATE

$C_v = 0.004\ cm^2/sec = 0.37\ ft^2/day$ (Lower Bound)

$= 0.009\ cm^2/sec = 0.84\ ft^2/day$

} From Figure 4 of NAVFAC 7.1 (7.1-144)

Assume 20' layer with double drainage

$$t = \frac{T_v H^2}{C_v} = \frac{(0.848)(20'/2)^2}{0.37\ ft^2/day} = 229.19\ days = \underline{7.64\ months}$$

$$t = \frac{(0.848)(20'/2)^2}{0.84\ ft^2/day} = 100.95\ days = \underline{3.37\ months}$$

Project Name: Rancho La Habra | Drawn By: | Checked By:

Project Number: 14057-01 | Date: 2/10/17 | Scale: N/A | Page: 1 of 1

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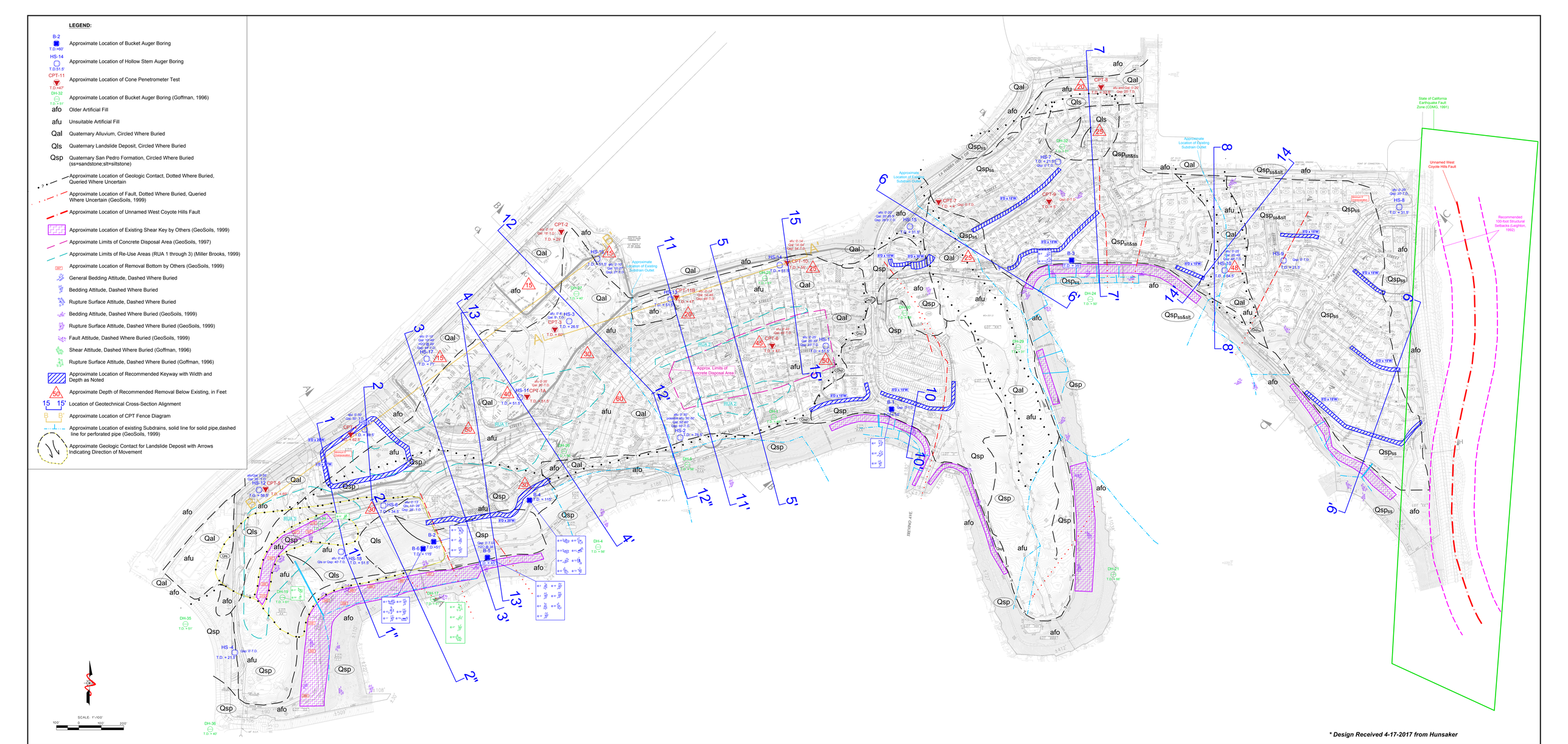


* Design Received 4-17-2017 from Hunsaker

LGC Geotechnical, Inc.
131 Calle Iglesia, Ste. 200
San Clemente, CA 92672
TEL (949) 369-6141 FAX (949) 369-6142

# Geotechnical Map

CLIENT:
CalAtlantic Homes
15360 Barranca Parkway
Irvine, CA 92618

| | |
|---|---|
| PROJECT NAME | Rancho La Habra - VTTM 17845 |
| PROJECT NO. | 14057-01 |
| ENG. / GEOL. | DJB / KTM |
| SCALE | 1" = 100' |
| DATE | April 2017 |

**Sheet 1 of 3**

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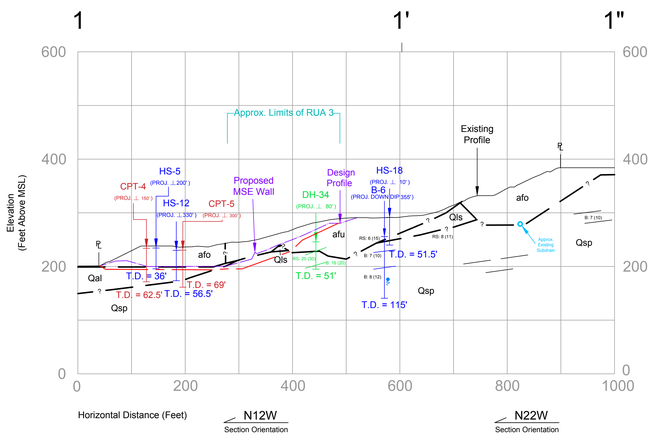


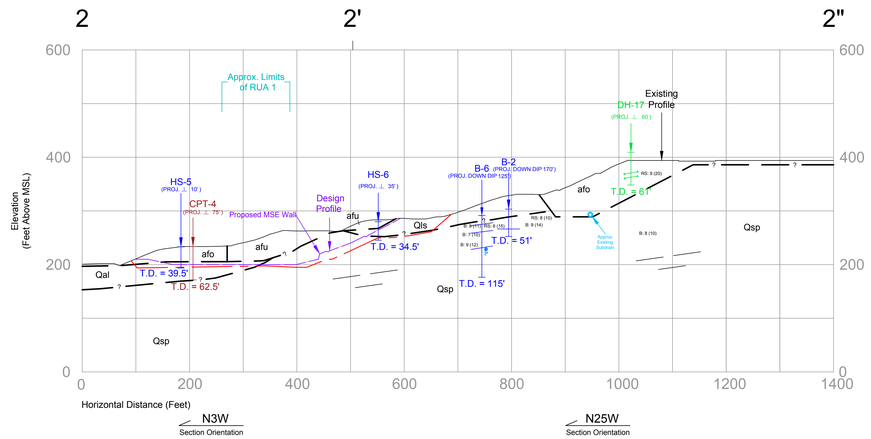


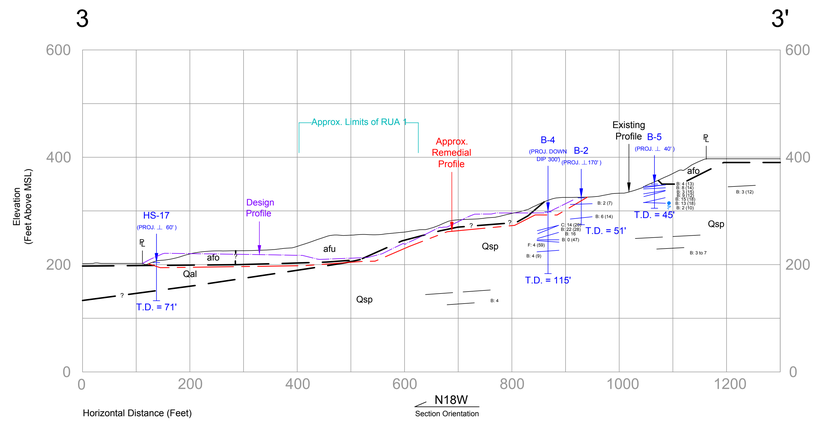


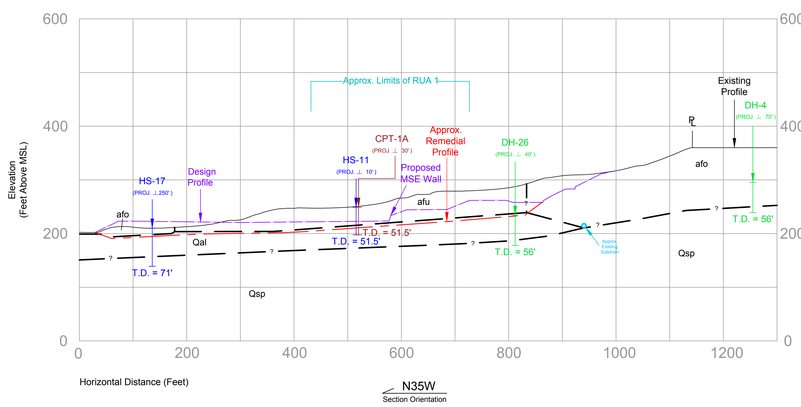


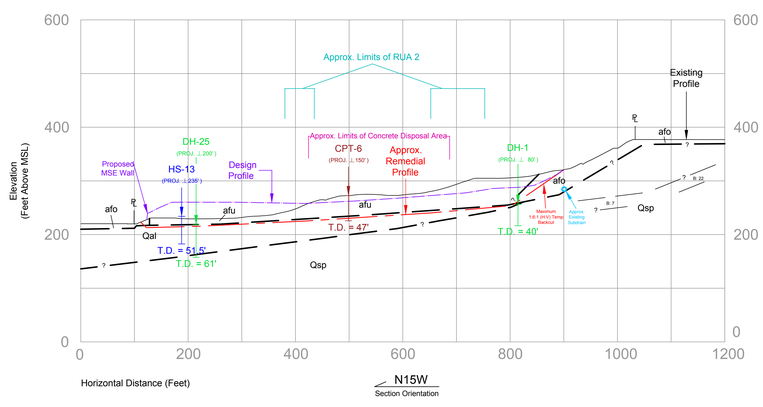


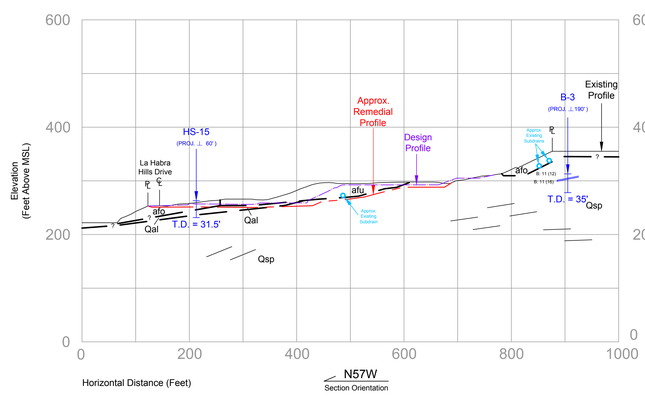


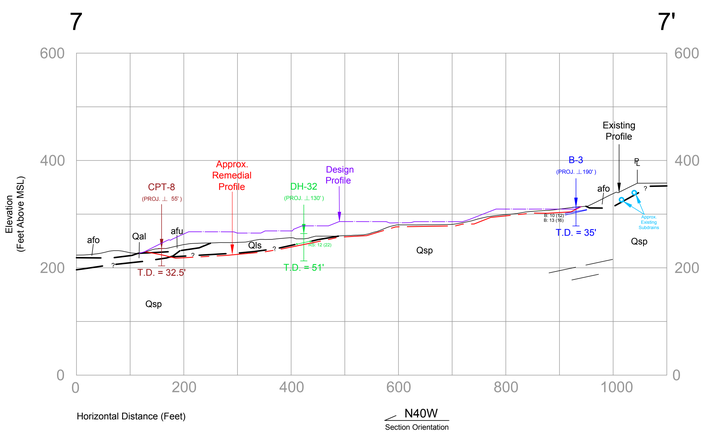


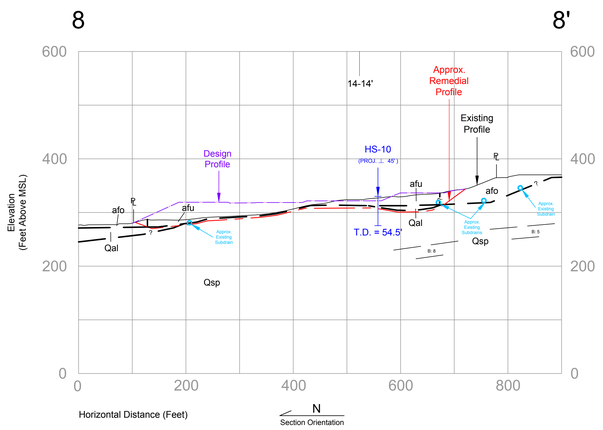


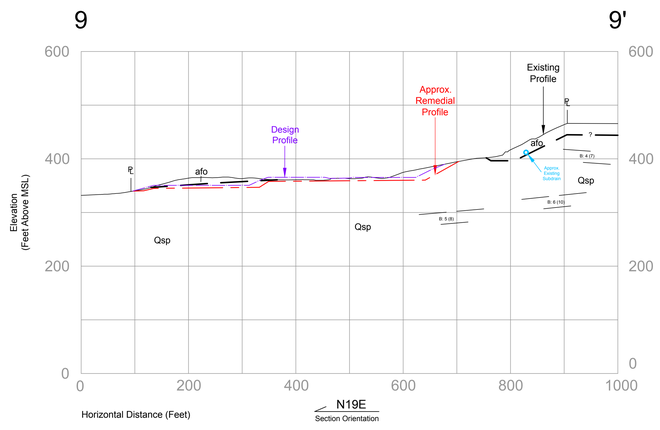


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# Geotechnical Cross-Sections 1-1' through 9-9'

| | |
|---|---|
| PROJECT NAME | Rancho La Habra - VTTM 17845 |
| PROJECT NO. | 14057-01 |
| ENG. / GEOL. | DJB / KTM |
| SCALE | 1" = 100' |
| DATE | April 2017 |

**SHEET 2 of 3**

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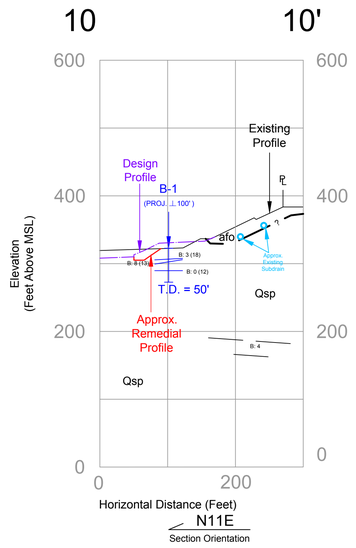


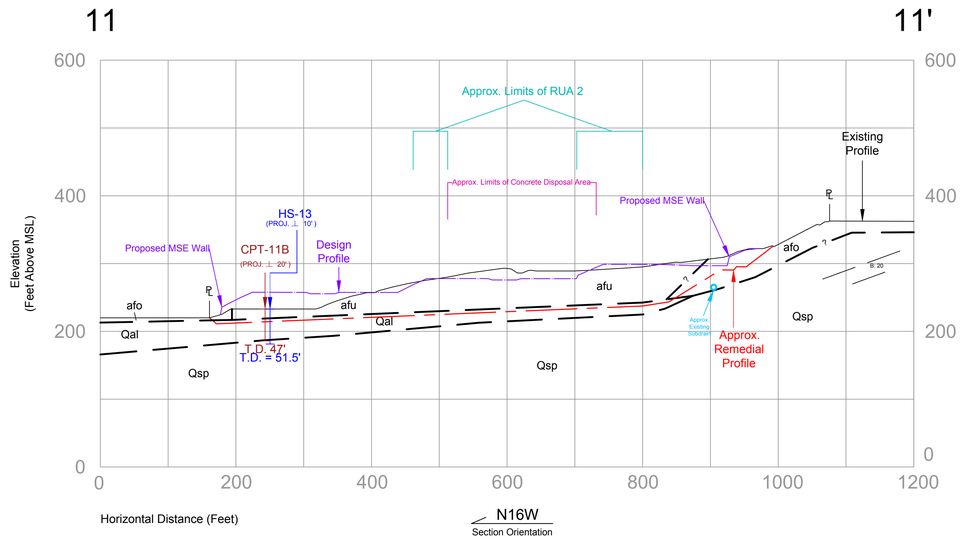


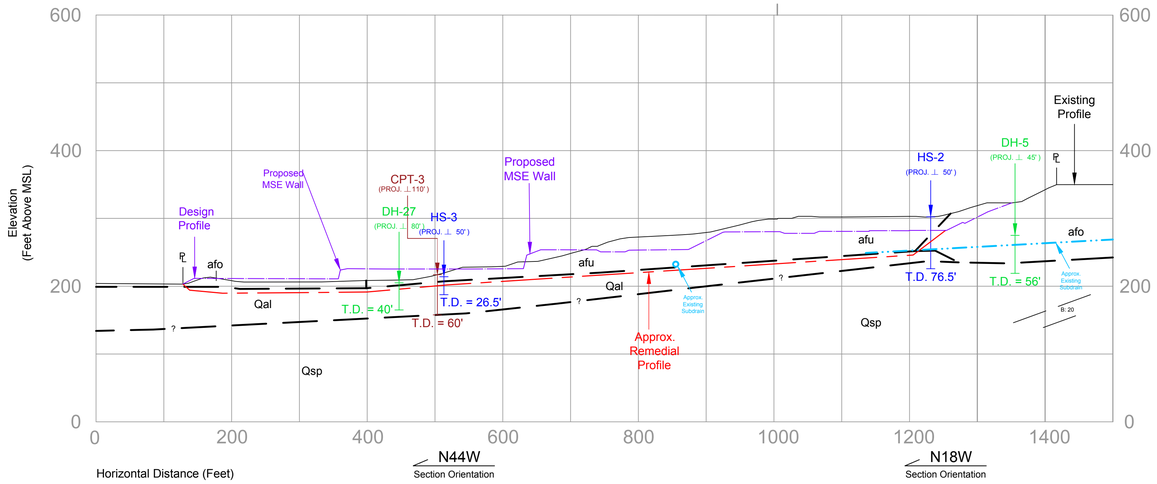


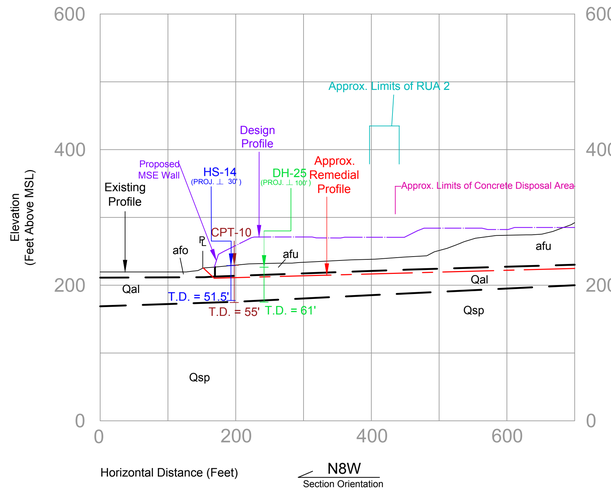


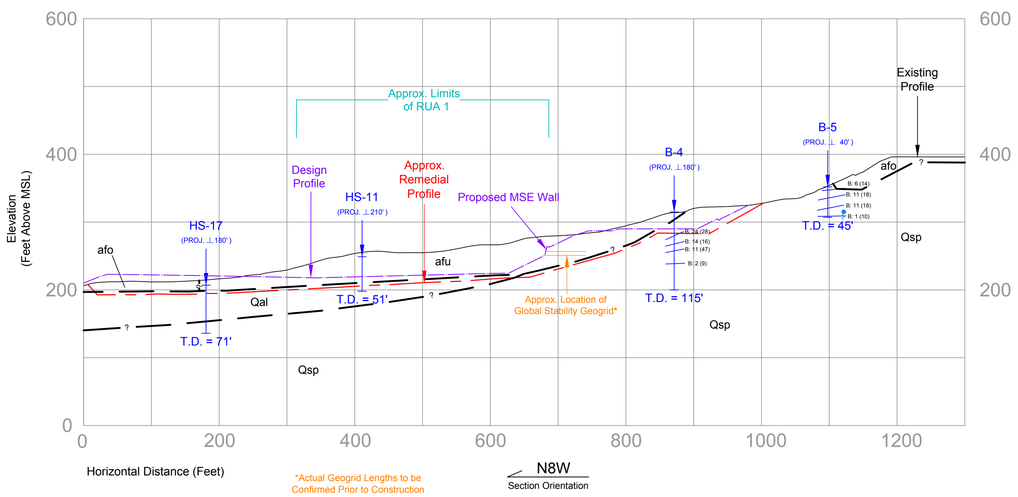


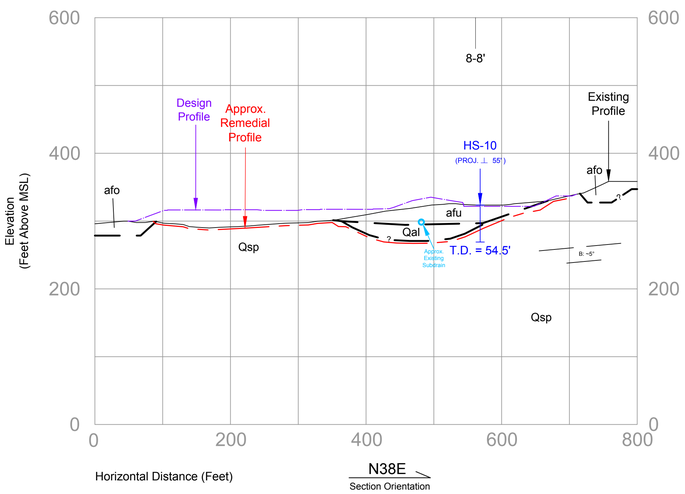


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# Geotechnical Cross-Sections 10-10' through 15-15'

| | |
|---|---|
| PROJECT NAME | Rancho La Habra - VTTM 17845 |
| PROJECT NO. | 14057-01 |
| ENG. / GEOL. | DJB / KTM |
| SCALE | 1" = 100' |
| DATE | April 2017 |

SHEET 3 of 3

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