

GEOTECHNICAL EXPLORATION AND TESTING

Subsurface Exploration

Nine borings were drilled to depths ranging from 21 and 76 feet, approximately 5 feet below the proposed sewer invert. Eight of the borings were drilled using an 8-inch diameter hollow stem auger. Refusal was encountered (with the hollow-stem auger drill rig) during the excavation of Boring B-4 in the bedrock at depth along the micro tunneling portion of the proposed alignment. Subsequently, an 18-inch bucket auger rig was used to advance the boring (Boring B-4A) to a depth of approximately 76 feet. Boring locations are shown on the Boring Location Map (Figure 2). Representative, relatively undisturbed soil samples were obtained at selected depth intervals within the borings using a California Split Barrel Sampler. Bulk samples of representative soil types were obtained during our investigation. The samples were transported to our laboratory for testing. Geotechnical logs of our borings are presented in Appendix B.

During excavation of the borings, we conducted air monitoring of samples to evaluate the presence of volatile organic compounds. None of the samples contained sufficient volatile compounds to register on the Photo Ionization Detector (PID).

Laboratory Testing

The following laboratory tests were performed on representative soil samples:

- Dry density and/or in situ moisture content tests were performed on all of the relatively undisturbed soil samples.
- Sand equivalents.
- Direct shear tests were performed on representative, relatively undisturbed samples.
- Chemical analysis was performed on selected representative soil samples to determine soluble sulfate, resistivity, chloride, and pH.
- Samples obtained from borings adjacent to the existing pump station and sewer line near the northwest corner of Carbon Canyon Regional Park (Borings B-5 and B-6) were transported to Applied P & Ch Laboratory for Total and Fecal Coliform analysis.



The results of the in situ moisture content and dry density tests are shown on our geotechnical boring logs (Appendix B). The results of the other laboratory tests are presented in Appendix C. All laboratory tests were conducted in accordance with either ASTM or California testing methods.



FINDINGS

Subsurface Soil Conditions

The proposed sewer alignment is underlain by alluvial soil deposits and Fernando Formation bedrock. Descriptions of the geologic units encountered during our investigation are presented below:

Alluvium(Oal):

The onsite alluvial soils encountered during our investigation were variable, consisting of both fine- and coarse-grained materials. The fine-grained material was generally comprised of medium-stiff to hard, sandy silt to sandy clay. The coarse-grained material was generally comprised of loose to very-dense, clayey sand, and silty sand. Occasional fine roots were encountered within the excavations. Local gravel-rich and porous areas were also observed during our excavation. The alluvial soils encountered were generally slightly moist to moist with moisture contents ranging from 3.6 to 18.7 percent.

Fernando Formation Bedrock (Tf):

Fernando Formation bedrock was encountered in Borings B-3, B-4/4A, and B-5 at depths ranging from 0 to 22 feet. The bedrock generally consisted of very stiff/very dense, to hard, silty sandstone to siltstone. The bedrock encountered was generally slightly moist to moist with moisture contents ranging from 2.5 to 17 percent.

PSE (1999) identified a queried landslide on their geotechnical map, in the vicinity of our Boring B-5. Based on the material encountered within this boring (approximately 22 feet of alluvium overlying very dense to hard sandstone and siltstone) and the lack of topographic evidence, it is our opinion that this landslide is not present as mapped.

Groundwater

Groundwater was not encountered in any of the borings excavated during this investigation. A study conducted by the California Department of Mines and Geology (CDMG, 2001) estimates that the historically highest groundwater level at the site was approximately 10 feet below the ground surface in the low-lying areas of the site (ranging from approximately 5 feet below to 10 feet above the proposed sewer invert). Boring B-3 of the PSE (1999) investigation encountered groundwater at a depth of 51 feet below the existing ground surface. This boring was located approximately 600 feet due east of the intersection of Rose and Vesuvius Drives. Based on a



review of the California Department of Water Resources data (CDWR, 2003) current groundwater levels in the general site vicinity are expected to be on the order of 50 feet below the ground surface in the low-lying areas of the site (ranging from approximately 30 to 45 feet below the proposed sewer invert). The local groundwater flow is generally to the southwest. Groundwater is not expected to pose a significant constraint to construction of the project.

Liquefaction

Liquefaction is the loss of soil strength or stiffness due to a buildup of pore-water pressure during severe ground shaking. Liquefaction is associated primarily with loose (low density), saturated, fine- to medium-grained, cohesionless soil. Bedrock and certain fine-grained soils (i.e. silt and clay) are not considered susceptible to liquefaction. Effects of severe liquefaction can include sand boils, excessive settlement, bearing capacity failures, and lateral spreading. The western half of the site is identified as potentially liquifiable on the Seismic Hazards Zone Map for the Yorba Linda Quadrangle (CDMG, 1998). This zoning is based on upon historic shallow groundwater levels and regional soil conditions.

We evaluated the liquefaction potential of the alluvial soil encountered in our borings, based on procedures set forth in Youd and Idriss (1997) and Martin and Lew (1999). Parameters utilized in the analysis to characterize the in situ soil include corrected Modified California sample blow count results from the hollow-stem auger borings and visual descriptions of soil samples retrieved. Based on our analysis, the soil encountered during our investigation is not considered susceptible to liquefaction, with the exception of one location. Soil potentially susceptible to liquefaction was observed at Boring B-6 (adjacent to the existing pump house) within a depth of 8 and 18 feet below existing ground up to approximately (10 feet below the invert). However, liquefaction could only occur in this area if the groundwater levels rise to historic levels.

Seismically Induced Settlement

During a strong seismic event, seismically induced settlement can occur within loose to moderately dense, dry or saturated granular soils. We performed an analysis of seismically induced settlement using the methods set forth by Tokimatsu and Seed (1987) and Martin and Lew (1999). Our analysis indicated that the seismically induced settlement along the proposed alignment is considered negligible, except for the location near boring B-6 where the potentially liquifiable soil was encountered. Assuming the historic high groundwater levels and a peak ground acceleration of 0.47g, the maximum seismically induced settlement was estimated to be on the order of 3.5 inch.



Soil Compressibility

Based on our field investigation the upper alluvial soil deposits are considered to be moderately compressible and are generally considered to have negligible hydrocollapse potential.

Soil Expansion Potential

Based on our field investigation the onsite alluvial soil and bedrock deposits are expected to exhibit a low to medium expansion potential.

Soluble Sulfates

Water-soluble sulfates in soil can react adversely with concrete. However, concrete structures in contact with soils containing sulfate concentrations of less than 0.10 percent are considered to have negligible sulfate exposure (UBC, Table 19-A-4; Chapter 19).

Seven representative samples of the subsurface soil were tested for water-soluble sulfates. The results of these tests indicate a soluble sulfate content of 0.03 percent or less percent by weight, indicating negligible sulfate exposure.

Resistivity, Chloride, and pH

Soil corrosivity to ferrous metals can be estimated by the soil's pH level, electrical resistivity, and chloride content. In general, soil having a minimum resistivity between 1,000 and 2,000 ohm-cm is considered corrosive, and soil with a chloride content of 500 parts per millions (ppm) or more is considered corrosive to ferrous metals. As a screening for potentially corrosive soil, two representative soil samples were tested during this investigation to determine minimum resistivity, chloride content, and pH level. The minimum soil resistivity of the samples ranged from 1,195 to 2,200 ohm-cm, the chloride content ranged from approximately 73 to 112 ppm, and the pH level ranged from 7.9 to 8.1. The soil resistivity test results indicate that the onsite soils are corrosive to ferrous metal.



Fecal Coliform

A total of six samples were collected from Boring B-5 and Boring B- 6 and transported to Applied P and CH Analytical Laboratory for testing of Total Coliform (Method SM9221B) and Fecal Coliform (SM9221E). Samples were collected at 20, 25 and 30 feet in Boring B-5 and at 5, 10 and 15 feet in Boring B-6. The samples were collected in 5-inch long brass rings, kept chilled and transported to the lab within 4 hours of collection. The results of the tests are provided in Appendix C.



CONCLUSIONS AND RECOMMENDATIONS

General

Based on the results of this investigation, construction of the proposed sewer alignment is feasible from a geotechnical standpoint, provided the recommendations presented in this report are incorporated in the design and construction of the alignment. Specific recommendations for the proposed improvements are presented below.

Removals and Subgrade Preparation

In order to reduce the potential for adverse settlement of the proposed sewer alignment, the underlying subgrade soils must be prepared in such a manner that a uniform response to the applied loads is achieved. Prior to the placement of bedding material, the prepared subgrade should be uniform, firm and free of loose soil and debris.

Rippability and Oversize Materials

The onsite alluvial soil is expected to be readily excavated using conventional earthwork equipment in good working order. Our excavations within the onsite bedrock encountered locally cemented layers which presented some difficulty during excavation. We expect the micro-tunneling drill rig will be able to excavate the bedrock at depth, however, local well-cemented zones will likely be encountered which may significantly slow the rate of drilling.

Oversized material (rock or rock fragments greater than 8 inches in dimension) was not encountered during our investigation. However, oversized materials may be locally generated during excavation of the alluvial soils at depth. Oversized material may also be generated during the excavation of well-cemented layers encountered within the bedrock.

Liquefaction Mitigation

A potentially liquefiable soil layer was identified at a depth of 8 to 18 feet (10 feet below the proposed sewer line invert) near the existing pump station. The most significant impact of liquefaction on the proposed sewer line will be seismically induced settlement. Estimated settlement is expected to be on the order of 3.5 inches. However, in order for liquefaction and this settlement to occur, the groundwater would have to rise approximately 40 feet above current levels at the same time a severe ground shaking occurs in the site vicinity. The likelihood that these events will occur together is low, however, you may wish to consider the potential risk to the sewer line should liquefaction settlement occur. To mitigate the potential impact on the



sewer line, the following alternatives may be considered to reduce the potential damage to the sewer line:

- Design the sewer line to allow for ½ of the total estimated settlement (approximately 2 inches of differential settlement).
- Completely remove the potentially liquefiable materials (a depth of 8 to 18 feet below existing ground in the vicinity of the pump station).

You may also wish to take no remedial action with the understanding that repair of the sewer line could be required following a strong earthquake in the site vicinity.

Bearing Pressure

A net bearing allowable bearing pressure of 1,200 pounds per square foot may be used in the design sewer alignment. Since the weight of the sewer alignment and overburden will be lighter than the past overburden pressure, we anticipate that the total and differential settlement will be within tolerable limits.

Excavation Stability and Shoring

All temporary excavations, including utility trenches, retaining wall excavations and other excavations should be performed in accordance with project plans, specifications and all OSHA requirements.

No surcharge loads should be permitted within a horizontal distance equal to the height of cut or 5 feet, whichever is greater from the top of the slope, unless the cut is shored appropriately. Excavations that extend below an imaginary plane inclined at 45 degrees below the edge of any adjacent existing site foundation should be properly shored to maintain support of the adjacent structures.

Typical cantilever shoring should be designed based on an active fluid pressure of 35 pcf, assuming level ground above the shoring. If excavations are braced at the top and at specific design intervals, the active pressure may then be approximated by a rectangular soil pressure distribution with the pressure per foot of width equal to 25H, where H is equal to the depth of the excavation being shored.

During construction, the soil conditions should be regularly evaluated to verify that conditions are as anticipated. The contractor should be responsible for providing the "competent person"



required by OSHA standards to evaluate soil conditions. Close coordination between the competent person and the geotechnical engineer should be maintained to facilitate construction while providing safe excavations.

Retaining Wall Design

We recommend that retaining walls (if required) be backfilled with onsite, low expansive soil and constructed with a backdrain in accordance with the recommendations provided on Figure 3 (rear of text). Based on these recommendations, the following parameters may be used for retaining wall design:

| <u>Condition</u> | <u>Equivalent Fluid Pressure (psf/ft)</u> |
|------------------|-------------------------------------------|
| Active | 35 (Level Backfill) 55 (2:1 Backfill) |
| At-Rest | 55 (Level Backfill) 75 (2:1 Backfill) |
| Passive | 350 with a maximum value of 3,500 psf |

The above values do not contain an appreciable factor of safety, so the structural engineer should apply the applicable factors of safety and/or load factors during design.

Cantilever walls that are designed to yield at least $0.001H$, where H is equal to the wall height, may be designed using the active condition. Rigid walls and walls braced at the top should be designed using the at-rest condition.

Passive pressure is used to compute soil resistance to lateral structural movement. In addition, for sliding resistance, a frictional resistance coefficient of 0.35 may be used at the concrete and soil interface. The lateral passive resistance should be taken into account only if it is ensured that the soil providing passive resistance, embedded against the foundation elements, will remain intact with time.

In addition to the above lateral forces due to retained earth, surcharge due to improvements, such as an adjacent structure, should be considered in the design of the retaining wall. Loads applied within a 1:1 projection from the surcharging structure on the stem of the wall should be considered as lateral and vertical surcharge. For lateral surcharge conditions, we recommend utilizing a horizontal load equal to 50 percent of the vertical load, as a minimum. This horizontal



load should be applied below the 1:1 projection plane. To minimize the surcharge load from an adjacent structure on the retaining wall and to minimize settlement of the adjacent structure, deepened building footings may be considered.

The total depth of retained earth for design of cantilever walls should be the vertical distance below the ground surface measured at the wall face for stem design or measured at the heel of the footing for overturning and sliding. A soil unit weight of 120 pcf may be assumed for calculating the actual weight of the soil over the wall footing.

Retaining wall footings should have a minimum width of 24 inches and a minimum embedment of 12 inches below the lowest adjacent grade. An allowable bearing capacity of 2,000 psf may be used for retaining wall footing design, based on the minimum footing width and depth. This bearing value may be increased by 250 psf per foot increase in width or depth to a maximum allowable bearing pressure of 3,500 psf.

Trench Backfill

Utility trenches can be backfilled with the onsite material, provided it is free of debris, significant organic material and oversized material. Prior to backfilling the trench, pipes should be bedded in and covered with a granular material (onsite or import) that has a sand equivalent of 30 or greater. The pipe bedding should be densified in-place by jetting.

Any import fill should be evaluated by Leighton Consulting prior to import. All fill soil should be placed in loose lifts, moisture-conditioned (moistened or dried) to slightly above the optimum moisture content, and compacted to a minimum 90 percent relative compaction as determined by ASTM Test Method D1557. The thickness of layers should be based on the compaction equipment used, in accordance with the latest edition of the *Standard Specifications for Public Works Construction*.

Cement Type

The results of our laboratory tests indicate that the onsite soils will have negligible concentrations of soluble sulfate. Therefore, Common Type I or II cement may be used for concrete structures in contact with the onsite soils.



Corrosive Soil

Laboratory tests performed on representative soil samples indicate that the onsite soil is considered corrosive to ferrous metals. Consultation with a qualified corrosion engineer should be considered if corrosive soils may be detrimental to the planned improvements.

Geotechnical Review, Observation and Testing

The geotechnical recommendations presented in this report are based on subsurface conditions, as interpreted from limited subsurface explorations and limited laboratory testing. Leighton Consulting should review the construction plans and specifications, when available, to comment on the geotechnical aspects of the plans. Our recommendations should be revised, as necessary, based on future plans and incorporated into the final design plans and specifications. Our conclusions and recommendations presented in this report should be reviewed and verified by Leighton Consulting during site construction and revised accordingly, if exposed geotechnical conditions vary from our preliminary findings and interpretations. Leighton Consulting should prepare a final geotechnical report summarizing the geotechnical conditions encountered and any field modifications of recommendations. Geotechnical observation and testing should be provided:


- During trench excavation.
- During trench backfill and compaction.
- When any unusual conditions are encountered.

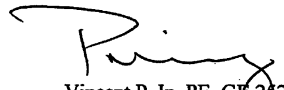


We appreciate the continued opportunity to be of service to RBF Consulting and the Orange County Sanitation District. If you have any questions regarding this report, please call us at your convenience.

Respectfully submitted,

LEIGHTON CONSULTING, INC.


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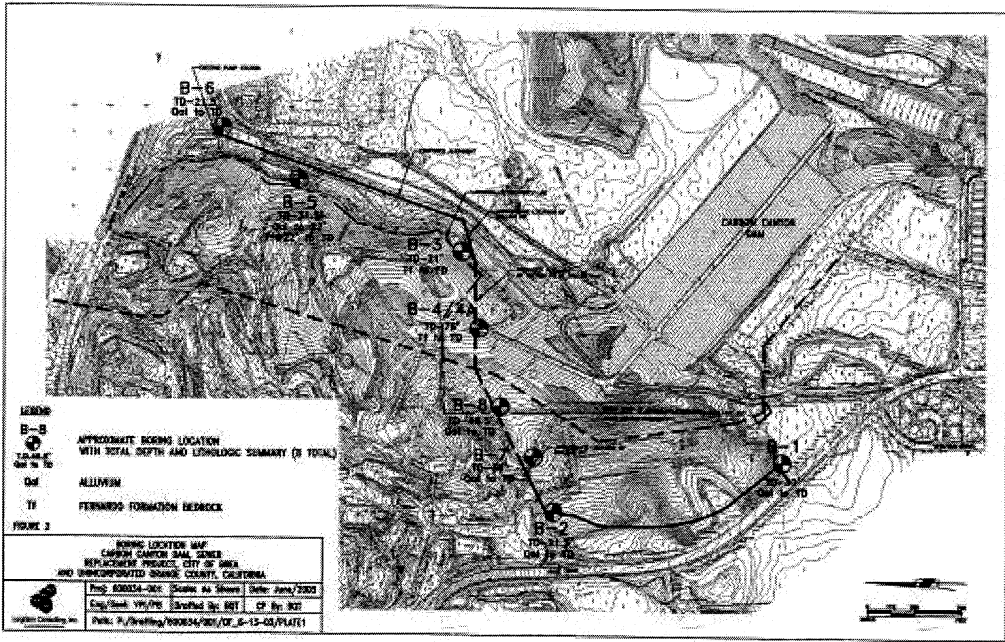


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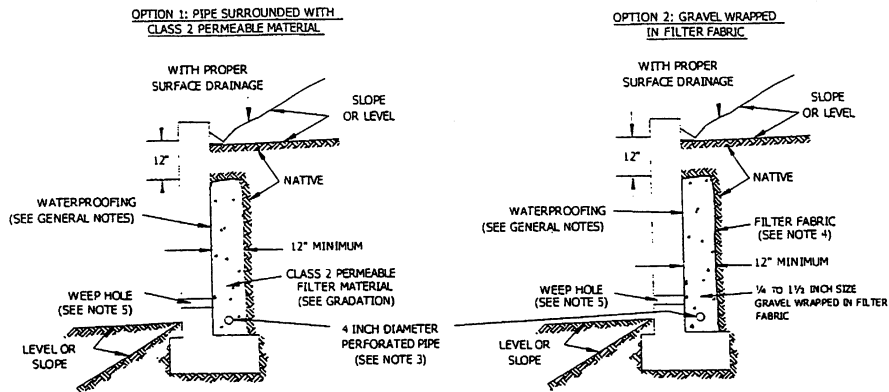
Attachments: Figure 1 - Site Location Map - Page 2
Figure 2 - Boring Location Map - Rear of Text
Figure 3 - Retaining Wall Backfill and Subdrain Detail - Rear of Text
Appendix A - References
Appendix B - Geotechnical Boring Logs
Appendix C - Laboratory Test Results

Distribution: (4) Addressee





SUBDRAIN OPTIONS AND BACKFILL WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF <50



Class 2 Filter Permeable Material Gradation
Per Caltrans Specifications

| Sieve Size | Percent Passing |
|------------|-----------------|
| 1" | 100 |
| 3/4" | 90-100 |
| 3/8" | 40-100 |
| No. 4 | 25-40 |
| No. 8 | 18-33 |
| No. 30 | 5-15 |
| No. 50 | 0-7 |
| No. 200 | 0-3 |

GENERAL NOTES:

- * Waterproofing should be provided where moisture nuisance problem through the wall is undesirable.
- * Water proofing of the walls is not under purview of the geotechnical engineer
- * All drains should have a gradient of 1 percent minimum
- * Outlet portion of the subdrain should have a 4-inch diameter solid pipe discharged into a suitable disposal area designed by the project engineer. The subdrain pipe should be accessible for maintenance (rodding)
- * Other subdrain backfill options are subject to the review by the geotechnical engineer and modification of design parameters.

Notes:

- 1) Sand should have a sand equivalent of 30 or greater and may be densified by water jetting.
- 2) 1 Cu. ft. per ft. of 1/4- to 1 1/2-inch size gravel wrapped in filter fabric
- 3) Pipe type should be ASTM D1527 Acrylonitrile Butadiene Styrene (ABS) SDR35 or ASTM D1785 Polyvinyl Chloride plastic (PVC), Schedule 40, Armco A2000 PVC, or approved equivalent. Pipe should be installed with perforations down. Perforations should be 3/8 inch in diameter placed at the ends of a 120-degree arc in two rows at 3-inch on center (staggered)
- 4) Filter fabric should be Mirafi 140NC or approved equivalent.
- 5) Weepholes should be 3-inch minimum diameter and provided at 10-foot maximum intervals. If exposure is permitted, weepholes should be located 12 inches above finished grade. If exposure is not permitted such as for a wall adjacent to a sidewalk/curb, a pipe under the sidewalk to be discharged through the curb face or equivalent should be provided. For a basement-type wall, a proper subdrain outlet system should be provided.
- 6) Retaining wall plans should be reviewed and approved by the geotechnical engineer.
- 7) Walls over six feet in height are subject to a special review by the geotechnical engineer and modifications to the above requirements.

**RETAINING WALL BACKFILL AND SUBDRAIN DETAIL
FOR WALLS 6 FEET OR LESS IN HEIGHT
WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF <50**



Figure 3

APPENDIX A

References

California Department of Water Resources (CDWR), 2003, Website: <http://well.water.ca.gov/>

California Department of Conservation, Division of Mines and Geology (CDMG), 2001, Seismic Hazard Zone Report for the Yorba Linda 7.5-Minute Quadrangle, Los Angeles and Orange Counties, California, Seismic Hazards Zone Report 010, dated 1997, revised 2001.

_____, 1998, Seismic Hazard Zones Map, Yorba Linda Quadrangle, Official Map, released April 15, 1998.

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Martin, G. R., and Lew, M., ed., 1999, "Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction Hazards in California," Southern California Earthquake Center, dated March 1999.

Pacific Soils and Engineering, Inc. (PSE), 1999, Summary of Geotechnical Constraints, Brea Central Property, City of Brea, County of Orange, California, Work Order: 500503, dated May 25, 1999.

Tokimatsu, K., Seed, H. B., 1987, "Evaluation of Settlements in Sands Due to Earthquake Shaking," *Journal of the Geotechnical Engineering*, American Society of Civil Engineers, Vol. 113, No. 8, pp. 861-878.

Youd, T. L. and Idriss, I. M., editors, 1997, "Summary Report," *Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils*, National Center for Earthquake Engineering Research Technical Report NCEER-97-0022, dated December 31, 1997.

GEOTECHNICAL BORING LOG B-1

Date 5-6-03 Sheet 1 of 2
 Project RBF/Carbom Canyon Dam/Brea Project No. 600034-001
 Drilling Co. 2R Drilling Inc. Type of Rig CME-75
 Hole Diameter 8 inch Drive Weight 140 lbs. (Autohammer) Drop 30 in.
 Elevation Top of Hole (ft) 409 ± Location See Boring Location Map

| Elevation (Feet) | Depth (Feet) | Graphic Log | Altitudes | Sample No. | Blows Per Foot | Dry Density (pcf) | Moisture Content, % | Soil Class. (U.S.C.S.) | DESCRIPTION |
|------------------|--------------|---------------------|-----------|------------|----------------|-------------------|---------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| | | | | | | | | | Logged By <u>DPJ</u> Sampled By <u>DPJ</u> |
| 0 | | [Dotted pattern] | | Bag-1 | | | | SC | @ 0-5': Bag-1: Clayey SAND, brown, slightly moist to moist |
| 405 | 5 | [Diagonal hatching] | | R-1 | 14 | 113.2 | 14.8 | CL | @ 5': R-1: PID=0.0: Sandy CLAY, mottled orange and dark brown, moist, stiff, some coarse sand to 1/8" diameter |
| 400 | 10 | [Dotted pattern] | | R-2 | 71/11" | 119.5 | 12.0 | SC | @ 10': R-2: PID=0.0: Clayey SAND, orange-brown, dry to slightly moist, dense to very dense, slightly porous (2%) |
| 395 | 15 | [Vertical lines] | | R-3 | 56 | 114.3 | 15.7 | ML | @ 15': R-3: PID=0.0: (Bag-2 @ 15-20'): Sandy SILT with gravel, brown, moist, hard, gravel to 1/2" diameter, some white stringers |
| 390 | 20 | [Dotted pattern] | | R-4 | 88/9" | | 12.5 | SM-SP | @ 20': R-4: PID=0.0: Silty SAND to Gravelly SAND, light brown to medium brown, moist, very dense, gravel to 1.5" diameter |
| 385 | 25 | [Dotted pattern] | | R-5 | 50/5.5" | | | | @ 25': R-5: No Recovery |
| 380 | | | | | | | | | |
| 30 | | | | | | | | | |

SAMPLE TYPES: Bag=Bulk, R=2.5-in. Ring (Ca Mod), S=SPT, T=Shelby Tube

Leighton Consulting, Inc.

GEOTECHNICAL BORING LOG B-1

Date 5-6-03 Sheet 2 of 2
 Project RBF/Carbom Canyon Dam/Brea Project No. 600034-001
 Drilling Co. 2R Drilling Inc. Type of Rig CME-75
 Hole Diameter 8 inch Drive Weight 140 lbs. (Autohammer) Drop 30 in.
 Elevation Top of Hole (ft) 409 ± Location See Boring Location Map

| Elevation (Feet) | Depth (Feet) | Graphic Log | Attitudes | Sample No. | Blows Per Foot | Dry Density (pcf) | Moisture Content, % | Soil Class. (U.S.C.S.) | DESCRIPTION |
|------------------|--------------|-------------|-----------|------------|----------------|-------------------|---------------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | | | | | | | Logged By <u>DPJ</u> Sampled By <u>DPJ</u> |
| 30 | | | | R-6 | 50/5" | | 16.5 | ML | @30': R-6: PID=0.0: SILT with some fine sand, medium brown, moist, hard, some black flecks Total Depth 30.0' No Bedrock Encountered No Groundwater Encountered Boring Backfilled with Native Soil |
| 375 | 35 | | | | | | | | |
| 370 | 40 | | | | | | | | |
| 365 | 45 | | | | | | | | |
| 360 | 50 | | | | | | | | |
| 355 | 55 | | | | | | | | |
| 350 | | | | | | | | | |
| 60 | | | | | | | | | |

SAMPLE TYPES: Bag=Bulk, R=2.5-in. Ring (Ca Mod), S=SPT, T=Shelby Tube

Leighton Consulting, Inc.

GEOTECHNICAL BORING LOG B-2

Date 5-6-03 Sheet 1 of 1
 Project RBF/Carbom Canyon Dam/Brea Project No. 600034-001
 Drilling Co. 2R Drilling Inc. Type of Rig CME-76
 Hole Diameter 8 inch Drive Weight 140 lbs. (Autohammer) Drop 30 in.
 Elevation Top of Hole (ft) 426 ± Location See Boring Location Map

| Elevation (Feet) | Depth (Feet) | Graphic Log | Attitudes | Sample No. | Blows Per Foot | Dry Density (pcf) | Moisture Content, % | Soil Class. (U.S.C.S.) | DESCRIPTION |
|------------------|--------------|-------------------|-----------|------------|----------------|-------------------|---------------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| 425 | 0 | [Hatched Pattern] | | Bag-1 | | | | CL | Logged By <u>DPJ</u> Sampled By <u>DPJ</u> @0-5': Bag-1: Sandy CLAY, medium brown, moist, fine to very coarse sand |
| 420 | 5 | [Hatched Pattern] | | R-1 | 29 | 109.0 | 18.0 | CL-SC | @5': R-1: PID=0.0: Sandy CLAY to Clayey SAND, orange brown, moist, very stiff/medium dense, fine to medium sand, black flecks, slightly porous to 1% |
| 415 | 10 | [Dotted Pattern] | | R-2 | 30 | 111.9 | 8.0 | SM | @10': R-2: PID=0.0: Silty SAND, orange brown, dry to slightly moist, medium dense, fine sand, some black flecks, slightly porous to 1% |
| 410 | 15 | [Vertical Lines] | | R-3 | 79 | 121.9 | 9.3 | ML | @15': R-3: PID=0.0: Sandy SILT, orange brown, dry to slightly moist, hard, fine sand, slightly porous to 1%, some gravel to 1/4" diameter |
| 405 | 20 | [Dotted Pattern] | | R-4 | 44 | | 5.8 | SM | @20': R-4: PID=0.0: Silty SAND, orange brown, dry, medium dense, rootlets, white flecks, some gravel to 1" diameter |
| 400 | 25 | | | | | | | | Total Depth 21.5' No Bedrock Encountered No Groundwater Encountered Boring Backfilled with Native Soil |
| 30 | | | | | | | | | |

SAMPLE TYPES: Bag=Bulk, R=2.5-in. Ring (Ca Mod), S=SPT, T=Shelby Tube

Leighton Consulting, Inc.

GEOTECHNICAL BORING LOG B-3

Date 5-6-03 Sheet 1 of 1
 Project RBF/Carbom Canyon Dam/Brea Project No. 600034-001
 Drilling Co. 2R Drilling Inc. Type of Rig CME-75
 Hole Diameter 8 inch Drive Weight 140 lbs. (Autohammer) Drop 30 in.
 Elevation Top of Hole (ft) 460 ± Location See Boring Location Map

| Elevation (Feet) | Depth (Feet) | Graphic Log | Attitudes | Sample No. | Blows Per Foot | Dry Density (pcf) | Moisture Content, % | Soil Class. (U.S.C.S.) | DESCRIPTION |
|------------------|--------------|-------------|-----------|------------|----------------|-------------------|---------------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 460 | 0 | | | Bag-1 | | | | ML | Logged By <u>DPJ</u> Sampled By <u>DPJ</u> @ 0-5': Bag-1: Clayey SILT, light gray, dry, some iron-oxide, grades to SILTSTONE @ 4' |
| 455 | 5 | | | R-1 | 33 | 102.1 | 7.3 | | @5': R-1: PID=0.0: SILTSTONE, light gray, dry, very stiff, some iron-oxide, slight fractures |
| 450 | 10 | | | R-2 | 81/11" | | 11.8 | | @10': R-2: PID=0.0: Fine Sandy SILTSTONE, light gray with brown, dry, hard, sample disturbed |
| 445 | 15 | | | R-3 | 50/5.5" | 108.8 | 12.3 | | @15': R-3: PID=0.0: SILTSTONE, orange brown, dry, hard, some cemented nodules to 3" diameter, scarce gravel to 1" diameter |
| 440 | 20 | | | R-4 | 50/4" | | 12.7 | | @20': R-4: PID=0.0: SILTSTONE, orange brown, dry, hard, scarce tight fractures |
| | | | | | | | | | Total Depth 21.0' Bedrock Encountered @ 4' No Groundwater Encountered Boring Backfilled with Native Soil |
| 435 | 25 | | | | | | | | |
| 430 | 30 | | | | | | | | |

SAMPLE TYPES: Bag=Bulk, R=2.5-in. Ring (Ca Mod), S=SPT, T=Shelby Tube

Leighton Consulting, Inc.

GEOTECHNICAL BORING LOG B-4

Date 5-6-03 Sheet 1 of 1
 Project RBF/Carbom Canyon Dam/Brea Project No. 600034-001
 Drilling Co. 2R Drilling Inc. Type of Rig CME-75
 Hole Diameter 8 inch Drive Weight 140 lbs. (Autohammer) Drop 30 in.
 Elevation Top of Hole (ft) 497 ± Location See Boring Location Map

| Elevation (Feet) | Depth (Feet) | Graphic Log | Attitudes | Sample No. | Blows Per Foot | Dry Density (pcf) | Moisture Content, % | Soil Class. (U.S.C.S.) | DESCRIPTION |
|------------------|--------------|-------------|-----------|------------|----------------|-------------------|---------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0 | | | | | | | | | Logged By <u>DPJ</u> Sampled By <u>DPJ</u> |
| 495 | | | | | | | | | |
| 5 | | | | | | | | | |
| 490 | | | | | | | | | |
| 10 | | | | S-1 | 32 | | | | @10': S-1: PID=0.0: SILTSTONE, light brown, dry, hard, some iron-oxide, some cemented zones |
| 485 | | | | | | | | | |
| 15 | | | | | | | | | |
| 480 | | | | | | | | | |
| 20 | | | | S-2 | 43 | | | | @20': S-2: PID=0.0: SILTSTONE, light brown, moist, hard, some iron-oxide, some cemented zones, some cemented nodules |
| 475 | | | | | | | | | |
| 25 | | | | | | | | | |
| 470 | | | | | | | | | |
| 30 | | | | | | | | | Refusal at 29.0'; Continued as B-4A with Bucket Auger Drill Rig, Total Depth 29.0' Bedrock Encountered @ Surface No Groundwater Encountered Boring Backfilled with Native Soil |

SAMPLE TYPES: Bag=Bulk, R=2.5-in. Ring (Ca Mod), S=SPT, T=Shelby Tube

Leighton Consulting, Inc.

GEOTECHNICAL BORING LOG B-4A

Date 5-7-03 Sheet 1 of 3
 Project RBF/Carbom Canyon Dam/Brea Project No. 600034-001
 Drilling Co. Tri-Valley Drilling Type of Rig Bucket Auger
 Hole Diameter 18 inch Drive Weight 0-30'@5952#, 30-57'@3921#, 57-86'@2531#, 86-116'@1407# Drop 6 in.
 Elevation Top of Hole (ft) 497 ± Location See Boring Location Map

| Elevation (Feet) | Depth (Feet) | Graphic Log | Attitudes | Sample No. | Blows Per Foot | Dry Density (pcf) | Moisture Content, % | Soil Class. (U.S.C.S.) | DESCRIPTION |
|------------------|--------------|-------------|-----------|------------|----------------|-------------------|---------------------|------------------------|---------------------------------------------------------------|
| | | | | | | | | | Logged By <u>WGH</u> Sampled By <u>WGH</u> |
| 0 | | | | | | | | | Continuation of Boring B-4 which encountered refusal at 29.0' |
| 495 | | | | | | | | | |
| 5 | | | | | | | | | |
| 490 | | | | | | | | | |
| 10 | | | | | | | | | |
| 485 | | | | | | | | | |
| 15 | | | | | | | | | |
| 480 | | | | | | | | | |
| 20 | | | | | | | | | |
| 475 | | | | | | | | | |
| 25 | | | | | | | | | |
| 470 | | | | | | | | | |
| 30 | | | | | | | | | |

SAMPLE TYPES: Bag-Bulk, R=2.5-in. Ring (Ca Mod), S=SPT, T=Shelby Tube

Leighton Consulting, Inc.

GEOTECHNICAL BORING LOG B-4A

Date 5-7-03 Sheet 3 of 3
 Project RBF/Carbom Canyon Dam/Brea Project No. 600034-001
 Drilling Co. Tri-Valley Drilling Type of Rig Bucket Auger
 Hole Diameter 18 Inch Drive Weight 0-30'@5952#, 30-57'@3921#, 57-86'@2531#, 86-116'@1407# Drop 6 in.
 Elevation Top of Hole (ft) 497 ± Location See Boring Location Map

| Elevation (feet) | Depth (feet) | Graphic Log | Attitudes | Sample No. | Blows Per Foot | Dry Density (pcf) | Moisture Content, % | Soil Class. (U.S.C.S.) | DESCRIPTION |
|------------------|--------------|-------------|-----------|------------|----------------|-------------------|---------------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 60 | | | | R-1 Bag-1 | 86 | 132.0 | 12.1 | | Logged By <u>WGH</u> Sampled By <u>WGH</u> @60': R-1: (Bag-1 @ 59-60'): PID=0.0: Silty SANDSTONE, orange-brown to gray, slightly moist, very dense, black flecks |
| 435 | | | | | | | | | |
| 65 | | | | R-2 | 94 | 134.5 | 9.1 | | @65': R-2: PID=0.0: Sandy SILTSTONE to Silty SANDSTONE, orange-brown to gray, slightly moist, very dense, black flecks, cobbles to 3" diameter |
| 430 | | | | | | | | | |
| 70 | | | | R-3 | 50/2.5* | 110.8 | 17.0 | | @70': R-3: PID=0.0: Silty fine SANDSTONE, orange-brown, moist, very dense, black flecks, cobbles to 2" diameter |
| 425 | | | | | | | | | @72-74': Hard drilling, well cemented bedrock with gravel and cobbles |
| 75 | | | | R-4 Bag-2 | 50/4.5* | | 12.7 | | @75': R-4: (bag-2 @ 74-75'): PID=0.0: Sandy SILTSTONE, orange-brown, moist, hard, some gray clayey lenses, bottom 2" of sampler encountered well cemented siltstone |
| 420 | | | | | | | | | Total Depth 76' Bedrock Encountered at Surface No Groundwater Encountered Boring Backfilled with Native Soil |
| 80 | | | | | | | | | |
| 415 | | | | | | | | | |
| 85 | | | | | | | | | |
| 410 | | | | | | | | | |
| 90 | | | | | | | | | |

SAMPLE TYPES: Bag=Bulk, R=2.5-in. Ring (Ca Mod), S=SPT, T=Shelby Tube

Leighton Consulting, Inc.

GEOTECHNICAL BORING LOG B-5

Date 5-6-03 Sheet 1 of 2
 Project RBF/Carbom Canyon Dam/Brea Project No. 600034-001
 Drilling Co. 2R Drilling Inc. Type of Rig CME-75
 Hole Diameter 8 Inch Drive Weight 140 lbs. (Autohammer) Drop 30 in.
 Elevation Top of Hole (ft) 455 ± Location See Boring Location Map


| Elevation (Feet) | Depth (Feet) | Graphic Log | Attitudes | Sample No. | Blows Per Foot | Dry Density (pcf) | Moisture Content, % | Soil Class. (U.S.C.S.) | DESCRIPTION |
|------------------|--------------|-------------|-----------|------------|----------------|-------------------|---------------------|------------------------|-------------------------------------------------------------------------------------------------------------------------|
| 455 | 0 | | | Bag-1 | | | | CL | @0-5': Bag-1: Sandy CLAY, red- brown, slightly moist, coarse sand, scarce gravel, some white stringers |
| 450 | 5 | | | R-1 | 39 | 113.8 | 10.6 | CL | @5': R-1: PID=0.0: Sandy CLAY, red- brown, slightly moist, very stiff, coarse sand, scarce gravel, some white stringers |
| 445 | 10 | | | R-2 | 63 | 119.4 | 3.6 | CL | @10': R-2: PID=0.0: Gravelly Sandy CLAY, red- brown, dry to slightly moist, hard, gravel to 1" diameter |
| 440 | 15 | | | R-3 | 27 | 111.4 | 10.8 | ML | @15': R-3: PID=0.0: SILT, red- brown, dry, very stiff, 2% porosity to 1/8" diameter, scarce rootlets |
| 435 | 20 | | | R-4 | 85 | 111.0 | 11.4 | ML | @20': R-4: PID=0.0: Sandy SILT, red- brown, dry, hard, porous to 1/8" 2%, some gravel to 1/4" diameter |
| 430 | 25 | | | R-5 | 33 | 106.0 | 4.6 | | @25': R-5: PID=0.0: Silty Fine SANDSTONE, red- brown, dry, very stiff, homogeneous |
| 425 | 30 | | | | | | | | |

SAMPLE TYPES: Bag=Bulk, R=2.5-in. Ring (Ca Mod), S=SPT, T=Shelby Tube

Leighton Consulting, Inc.

GEOTECHNICAL BORING LOG B-5

Date 5-6-03 Sheet 2 of 2
 Project RBF/Carbom Canyon Dam/Brea Project No. 600034-001
 Drilling Co. 2R Drilling Inc. Type of Rig CME-75
 Hole Diameter 8 Inch Drive Weight 140 lbs. (Autohammer) Drop 30 in.
 Elevation Top of Hole (ft) 455 ± Location See Boring Location Map

| Elevation (Feet) | Depth (Feet) | Graphic Log | Attitudes | Sample No. | Blows Per Foot | Dry Density (pcf) | Moisture Content, % | Soil Class. (U.S.C.S.) | DESCRIPTION |
|------------------|--------------|-----------------------------------------------------------------------------------|-----------|------------|----------------|-------------------|---------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 425 | 30 |  | | R-6 | 80 | | 2.5 | | Logged By <u>DPJ</u> Sampled By <u>DPJ</u> @30': R-6: PID=0.0: SANDSTONE, light brown, dry, hard, fine to medium sand, scarce cobbles to 3" diameter Total Depth 31.5' Bedrock Encountered @ 22' +/- No Groundwater Encountered Boring Backfilled with Native Soil |
| 420 | 35 | | | | | | | | |
| 415 | 40 | | | | | | | | |
| 410 | 45 | | | | | | | | |
| 405 | 50 | | | | | | | | |
| 400 | 55 | | | | | | | | |
| 395 | 60 | | | | | | | | |

SAMPLE TYPES: Bag=Bulk, R=2.6-in. Ring (Ca Mod), S=SPT, T=Shelby Tube

Leighton Consulting, Inc.

GEOTECHNICAL BORING LOG B-6

Date 5-6-03 Sheet 1 of 1
 Project RBF/Carbom Canyon Dam/Brea Project No. 600034-001
 Drilling Co. 2R Drilling Inc. Type of Rig CME-75
 Hole Diameter 8 inch Drive Weight 140 lbs. (Autohammer) Drop 30 in.
 Elevation Top of Hole (ft) 442 ± Location See Boring Location Map

| Elevation (Feet) | Depth (Feet) | Graphic Log | Attitudes | Sample No. | Blows Per Foot | Dry Density (pcf) | Moisture Content, % | Soil Class. (U.S.C.S.) | DESCRIPTION |
|------------------|--------------|------------------------------|-----------|------------|----------------|-------------------|---------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | | | | | | | Logged By <u>DPJ</u> Sampled By <u>DPJ</u> |
| 0 | | [Graphic Log: 0-5' interval] | | Bag-1 | | | | SM | @0-5': Bag-1: Silty SAND, light brown, dry, fine to medium sand, trace fine gravel to 1/4" |
| 440 | | | | | | | | | |
| | 5 | | | R-1 | 10 | 88.7 | 6.7 | SM | @5': R-1: PID=0.0: Silty SAND, light brown, dry, loose, fine to medium sand, trace fine gravel to 1/4", some black staining |
| 435 | | | | | | | | | |
| | 10 | | | R-2 | 10 | 87.9 | 5.8 | ML | @10': R-2: PID=0.0: Fine Sandy SILT, light brown, slightly moist, medium stiff, some medium grained sand pockets, some white stringers |
| 430 | | | | | | | | | |
| | 15 | | | R-3 | 12 | 95.5 | 5.3 | ML-SM | @15': R-3: PID=0.0: Fine Sandy SILT to Silty Fine SAND, light brown, slightly moist, medium stiff/loose to medium dense, slightly porous, some white stringers |
| 425 | | | | | | | | | |
| | 20 | | | R-4 | 25 | 102.6 | 11.7 | ML | @20': R-4: PID=0.0: Clayey Sandy SILT, light brown, slightly moist, stiff to very stiff, fine to medium sand, some white stringers, black flecks |
| 420 | | | | | | | | | Total Depth 21.5' No Bedrock Encountered No Groundwater Encountered Boring Backfilled with Native Soil |
| 415 | | | | | | | | | |
| 30 | | | | | | | | | |

SAMPLE TYPES: Bag=Bulk, R=2.5-in. Ring (Ca Mod), S=SPT, T=Shelby Tube

Leighton Consulting, Inc.



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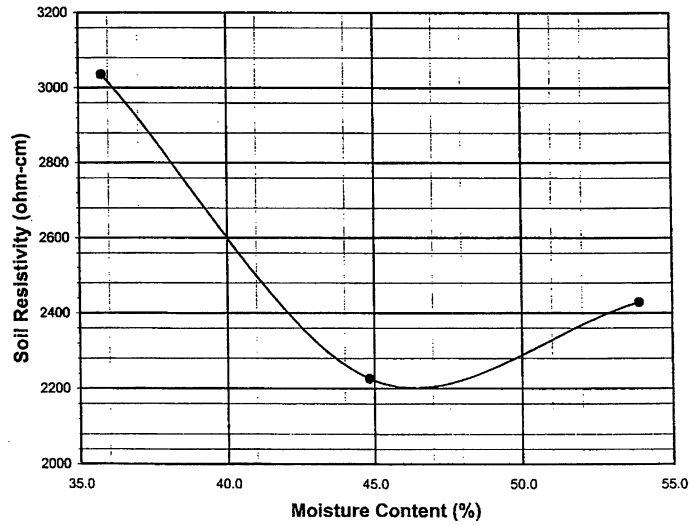
SOIL RESISTIVITY TEST
DOT CA TEST 532 / 643

Project Name: RBF / Carbon Canyon Dam Tested By: VJ Date: 05/19/03
 Project No. : 600034-001 Data Input By: JHW Date: 05/21/03
 Boring No.: B-4A Depth (ft.): 75.0
 Sample No. : B-2
 Soil Identification: Brownish Yellow (SM)

| Specimen No. | Water Added (ml) (Wa) | Adjusted Moisture Content (MC) | Resistance Reading (ohm) | Soil Resistivity (ohm-cm) |
|--------------|-----------------------|--------------------------------|--------------------------|---------------------------|
| 1 | 200 | 35.78 | 450 | 3036 |
| 2 | 300 | 44.84 | 330 | 2226 |
| 3 | 400 | 53.89 | 360 | 2429 |
| 4 | | | | |
| 5 | | | | |

| | |
|-----------------------------------------------------------|---------|
| Moisture Content (%) (Mci) | 17.68 |
| Wet Wt. of Soil + Cont. (g) | 152.10 |
| Dry Wt. of Soil + Cont. (g) | 135.13 |
| Wt. of Container (g) | 39.14 |
| Container No. | |
| Initial Soil Wt. (g) (Wt) | 1300.00 |
| Box Constant | 6.746 |
| $MC = \frac{((1 + Mci/100) \times (Wa/Wt + 1)) - 1}{100}$ | |

| Min. Resistivity (ohm-cm) | Moisture Content (%) | Sulfate Content (ppm) | Chloride Content (ppm) | Soil pH | |
|---------------------------|----------------------|-------------------------|------------------------|-----------------------|-------------|
| | | | | pH | Temp. (°C) |
| DOT CA Test 532 / 643 | | DOT CA Test 417 Part II | DOT CA Test 422 | DOT CA Test 532 / 643 | |
| 2200 | 46.5 | 90 | 73 | 8.10 | 20.9 |





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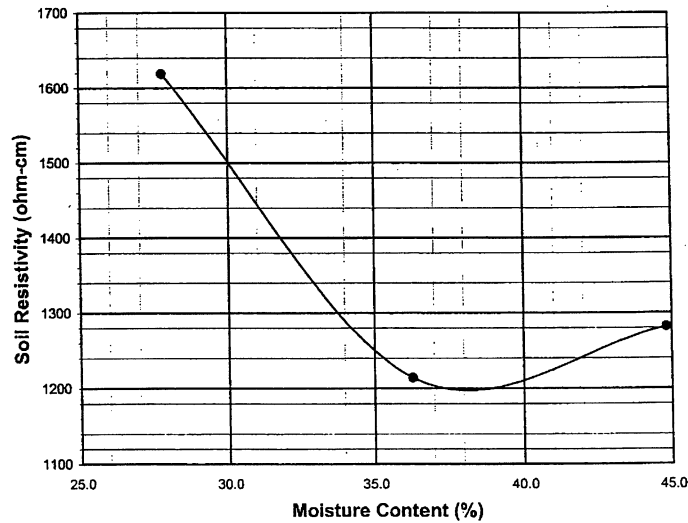
SOIL RESISTIVITY TEST
DOT CA TEST 532 / 643

Project Name: RBF / Carbon Canyon Dam Tested By: VJ Date: 05/19/03
 Project No.: 600034-001 Data Input By: JHW Date: 05/21/03
 Boring No.: B-3 Depth (ft.): 0-5
 Sample No.: B-1
 Soil Identification: Olive Yellow (SM)

| Specimen No. | Water Added (ml) (Wa) | Adjusted Moisture Content (MC) | Resistance Reading (ohm) | Soil Resistivity (ohm-cm) |
|--------------|-----------------------|--------------------------------|--------------------------|---------------------------|
| 1 | 200 | 27.78 | 240 | 1619 |
| 2 | 300 | 36.30 | 180 | 1214 |
| 3 | 400 | 44.82 | 190 | 1282 |
| 4 | | | | |
| 5 | | | | |

| | |
|--------------------------------------------------------|---------|
| Moisture Content (%) (MCI) | 10.74 |
| Wet Wt. of Soil + Cont. (g) | 126.26 |
| Dry Wt. of Soil + Cont. (g) | 117.78 |
| Wt. of Container (g) | 38.83 |
| Container No. | |
| Initial Soil Wt. (g) (Wt) | 1300.00 |
| Box Constant | 6.746 |
| $MC = (((1+Mci/100) \times (Wa/Wt+1)) - 1) \times 100$ | |

| Min. Resistivity (ohm-cm) | Moisture Content (%) | Sulfate Content (ppm) | Chloride Content (ppm) | Soil pH | |
|---------------------------|----------------------|-------------------------|------------------------|-----------------------|-------------|
| | | | | pH | Temp. (°C) |
| DOT CA Test 532 / 643 | | DOT CA Test 417 Part II | DOT CA Test 422 | DOT CA Test 532 / 643 | |
| 1195 | 38.2 | 129 | 112 | 7.89 | 21.0 |





Teratest Labs, Inc.
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Soluble Sulfates
(Hach Sulfate Test Kit)

Project Name: RBF / Carbon Canyon Dam
 Project Number: 600034-001
 Date: 05/21/03
 Technician: JHW

| Sample Identification | Dilution | Reading (PPM) | | | % Sulfates |
|------------------------|----------|---------------|-----|----------------|---------------|
| | | Tube Reading | X | Water Fraction | |
| Boring No.: <u>B-1</u> | 3 :1 | 100 | X | 3 | <u>0.0300</u> |
| Sample No.: <u>R-2</u> | | = | 300 | | |
| Depth (ft.): <u>10</u> | | | | | |
| Boring No.: <u>B-2</u> | 3 :1 | 50 | X | 3 | <u>0.0150</u> |
| Sample No.: <u>R-3</u> | | = | 150 | | |
| Depth (ft.): <u>15</u> | | | | | |
| Boring No.: <u>B-5</u> | 3 :1 | 100 | X | 3 | <u>0.0300</u> |
| Sample No.: <u>R-3</u> | | = | 300 | | |
| Depth (ft.): <u>15</u> | | | | | |
| Boring No.: _____ | | | | | |
| Sample No.: _____ | | | | | |
| Depth (ft.): _____ | | | | | |
| Boring No.: _____ | | | | | |
| Sample No.: _____ | | | | | |
| Depth (ft.): _____ | | | | | |
| Boring No.: _____ | | | | | |
| Sample No.: _____ | | | | | |
| Depth (ft.): _____ | | | | | |
| Boring No.: _____ | | | | | |
| Sample No.: _____ | | | | | |
| Depth (ft.): _____ | | | | | |
| Boring No.: _____ | | | | | |
| Sample No.: _____ | | | | | |
| Depth (ft.): _____ | | | | | |



Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

Soluble Sulfates
(Hach Sulfate Test Kit)

Project Name: RBF / Carbon Canyon Dam
 Project Number: 600034-001
 Date: 05/22/03
 Technician: VJ

| Sample Identification | Dilution | Reading (PPM) | | | % Sulfates |
|---------------------------|----------|---------------|----------------|---|---------------|
| | | Tube Reading | Water Fraction | | |
| Boring No.: <u>B-7</u> | 3 :1 | 50 | X | 3 | <u>0.0150</u> |
| Sample No.: <u>B-1</u> | | = | 150 | | |
| Depth (ft.): <u>25-35</u> | | | | | |
| Boring No.: <u>B-8</u> | 3 :1 | 50 | X | 3 | <u>0.0150</u> |
| Sample No.: <u>R-7</u> | | = | 150 | | |
| Depth (ft.): <u>35</u> | | | | | |
| Boring No.: _____ | | | | | |
| Sample No.: _____ | | | | | |
| Depth (ft.): _____ | | | | | |
| Boring No.: _____ | | | | | |
| Sample No.: _____ | | | | | |
| Depth (ft.): _____ | | | | | |
| Boring No.: _____ | | | | | |
| Sample No.: _____ | | | | | |
| Depth (ft.): _____ | | | | | |
| Boring No.: _____ | | | | | |
| Sample No.: _____ | | | | | |
| Depth (ft.): _____ | | | | | |
| Boring No.: _____ | | | | | |
| Sample No.: _____ | | | | | |
| Depth (ft.): _____ | | | | | |

Applied P & Ch Laboratory

13760 Magnolia Ave. Chino CA 91710

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Submitted to:

Leighton and Associates, Inc.

Attention: Daniel Jankly

14125 Telephone Ave # 1

Chino CA 91710-5770

Tel: (909)590-4909 Fax: (909)590-2989

APCL Analytical Report

Service ID #: 801-033101

Received: 05/06/03

Collected by:

Extracted: N/A

Collected on: 05/06/03

Tested: 05/06/03

Reported: 05/16/03

Sample Description: Soil from Carbon Canyon Dam.

Project Description: 600034-001

Analysis of Soil Samples

| Component Analyzed | Method | Unit | PQL | Analysis Result | | |
|--------------------------------|---------|---------|-----|-----------------|------------|------------|
| | | | | B-5 @20' | B-5 @25' | B-5 @30' |
| | | | | 03-03101-1 | 03-03101-2 | 03-03101-3 |
| Total Coliform, MTF, 3X5 tubes | SM9221B | MPN/10g | 2 | <2 | <2 | <2 |
| Fecal Coliform, MTF, 3X5 tubes | SM9221E | MPN/10g | 2 | <2 | <2 | <2 |

| Component Analyzed | Method | Unit | PQL | Analysis Result | | |
|--------------------------------|---------|---------|-----|-----------------|------------|------------|
| | | | | B-6 @5' | B-6 @10' | B-6 @15' |
| | | | | 03-03101-4 | 03-03101-5 | 03-03101-6 |
| Total Coliform, MTF, 3X5 tubes | SM9221B | MPN/10g | 2 | 50.0 | <2 | <2 |
| Fecal Coliform, MTF, 3X5 tubes | SM9221E | MPN/10g | 2 | <2 | <2 | <2 |

PQL: Practical Quantitation Limit. MDL: Method Detection Limit. CRDL: Contract Required Detection Limit

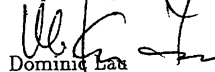
N.D.: Not Detected or less than the practical quantitation limit.

"-": Analysis is not required.

J: Reported between PQL and MDL.

Listed Dilution Factors (DF) are relative to the method default DF. All unlisted DFs are 1.0

Respectfully submitted,



Dominic Lau
Laboratory Director
Applied P & Ch Laboratory



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