JUNE 2013

GEOTECHNICAL BASELINE REPORT

PROPOSED DESALINATION PLANT
MONTEREY PENINSULA WATER SUPPLY PROJECT
MARINA
MONTEREY COUNTY, CALIFORNIA

Prepared for
California American Water Company
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June 20, 2013
URS Project No. 26818674

Mr. John Kilpatrick
California American Water Company
511 Forest Lodge Road, Suite 100
Pacific Grove, California 93950

Subject: Geotechnical Baseline Report
Proposed Desalination Plant
Marina, Monterey County, California

Dear Mr. Kilpatrick:

As authorized, we are pleased to submit our Geotechnical Baseline Report (GBR) for the proposed Desalination Plant. This new plant will be a key element of the proposed Monterey Peninsula Water Supply Project. The plant will be constructed on a vacant 46-acre parcel located north of the City of Marina in unincorporated Monterey County.

The purpose of this GBR is to explore the subsurface conditions at the site and develop baseline geotechnical conditions for the project. Preliminary recommendations for foundations, site preparation, and other geotechnical and geologic aspects of the project are also presented. This information will be used by prospective design-build contractors for the preparation of their bid submittals.

Paul Boddie, G.E., provided overall peer review of this report in accordance with URS' Quality Control Plan.

It has been a pleasure working with you at the initial phase of this project, and we look forward to providing continued assistance during the upcoming design-build process. Please contact our office if you have any questions or if we can be of further service.

Sincerely,

Timothy

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This Geotechnical Baseline Report (GBR) presents the results of an investigation performed for the proposed Monterey Peninsula Water Supply Project's Desalination Plant. The proposed 46-acre project site is located about 12 miles north of Monterey, east of Highway 1, north of Charles Benson Road and southwest of the Salinas River within Monterey County, California. The location of the project is shown on the Figure 1 – Location Map. The results of the subsurface exploration and laboratory testing, along with engineering judgment and experience, were used to formulate geotechnical baseline and preliminary geotechnical recommendations for foundation design and site development presented in this report.

1.1 PROJECT DESCRIPTION

The size and design of the new Desalination Plant will be determined during the design-build process. Preliminary design assumes the plant will be sized to produce from 6.4 to 9.6 million gallons per day of desalinated water. Actual capacity will depend on the availability of advanced-treatment, recycled water to support a proposed groundwater replenishment project. Anticipated structures are expected to include above and below-grade water storage structures, open-air treatment and storage ponds, pumping facilities, above-grade administrative and treatment structures, pipelines, and paved access roads.

Although the entire 46-acre site is available for development, the plant is expected to be sized to fit on less than half the total property area. URS understands the southerly half of the property is considered more desirable for the plant location. This elevated area will require less site grading than the sloping terrain of the northerly half of the site. The north half of the property is also impacted by geotechnical constraints associated with the shallow depth to groundwater near the northerly property line.

1.2 PURPOSE OF GEOTECHNICAL BASELINE REPORT

Information presented in the GBR is intended to provide bidding contractors with an explanation of the geologic and geotechnical conditions at the proposed project site. The report summarizes key geotechnical constraints that will need to be addressed for bid preparation, engineering design, and construction. Bidding contractors should use the baseline data presented in this report and surface conditions observed during site visits as a basis for bids.

The recommendations presented in this GBR are preliminary in nature and are intended to address the general feasibility of site development. Once site development plans are formalized, supplemental investigations should be made and geotechnical design recommendations prepared for structure foundations, site work, and other pertinent factors.

1.3 SCOPE OF WORK

The proposed plant site does not have any improvements and previous exploratory borings do not appear to have been completed here. To provide this subsurface data, new geologic reconnaissance and subsurface exploration of the site were performed. The scope of work developed to meet the objectives of the study described above included the following tasks:

- Reviewed published geologic maps and literature relating to geologic hazards and seismic hazards pertinent to the site.

- Performed a geologic reconnaissance of the site, emphasizing features pertinent to the proposed development.

- Explored subsurface conditions with the drilling and sampling of ten exploratory borings ranging to depths of 40 to 100 feet below ground surface.

- Performed laboratory tests on selected soil samples obtained during exploration to measure pertinent engineering properties.

- Evaluated the site for potential geologic constraints, including surface fault rupture, slope instability, liquefaction, and seismically-induced settlement.

- Evaluated site seismicity and recommend seismic coefficients and site class per California Building Code.

- Analyzed our findings to develop geotechnical baseline conditions for the site.

- Prepared preliminary geotechnical recommendations for foundations, earthwork, surface drainage, pavements, and corrosion potential.

- Prepared this written report presenting our geologic and geotechnical findings, conclusions regarding baseline conditions, and preliminary recommendations for the proposed construction.

2.1 SURFACE CONDITIONS

The proposed project site is shown on Figure 1 and can be located on the U.S.G.S. Marina 7 ½-minute quadrangle. The southern portion of the site is located on gently sloping older dune deposits ranging in elevation from about 80 feet to 115 feet (Mean Sea Level), as shown on Figure 2 – Geologic Map and Boring Locations. The northern portion of the site slopes moderately towards the north and northeast down to the floodplain of the Salinas River, at an elevation of about 10 to 20 feet. A dirt road roughly bisects the site in a northwest to southeast direction. The property north and west of the site is actively being farmed and the Monterey Peninsula Landfill is located east of the site. Vegetation on the site consists of grasses and a few low shrubs.

2.2 REGIONAL AND SITE GEOLOGIC SETTING

The project site is located in the northern Salinas Valley within the Coast Range Geomorphic Province. The Salinas Valley is filled with a thick sequence of marine and non-marine sedimentary rock and alluvium and is drained by the northwest-flowing Salinas River that empties into Monterey Bay just northwest of the project site.

The Salinas Valley is located on the Salinian block, a tectonic terrain that is underlain by relatively competent basement rocks consisting of Cretaceous granitic intrusives and pre-Cretaceous metamorphic rocks (Page, 1970). The Cretaceous granitic basement rocks and pre-Cretaceous metamorphic rocks outcrop in the foothills several miles east of the project site. These older basement rocks are in turn partially overlain by Miocene marine sedimentary rocks, Pleistocene terrace, alluvial fan, and dune deposits, and Holocene alluvium (Wagner, et al., 2002). The depth to bedrock at the project site is expected to be over 1,000 feet.

The geology of the Marina Quadrangle, which is included within the Monterey 30’ X 60’ quadrangle, has been mapped by the California Geological Survey (CGS) (Wagner, et al., 2002). A geologic map of northern Monterey and Southern Santa Cruz Counties prepared by the U.S.G.S. (Dupre and Tinsley, 1980) also covers the project area. The geologic map of the Marina quadrangle (Dibblee and Minch, 2007) also covers the site. As shown on Figure 2, the majority of the site has been mapped as older dune deposits. Older floodplain deposits have been mapped along the base of the lower north-facing slope below an elevation of about 25 feet and underlying the older dune deposits. Younger floodplain deposits are mapped north of the site along the active floodplain of the Salinas River.

2.3 SUBSURFACE CONDITIONS

2.3.1 Field Exploration

The surface conditions at the project site were investigated by completing a geologic reconnaissance on May 16, 2013 by Mark Schmoll, C.E.G. The subsurface conditions were investigated by drilling 10 hollow-stem auger borings ranging in depth from about 40 to 100 feet. The lower section of the 100-foot deep boring (B-4) was completed using rotary wash drilling methods. The subsurface investigations were completed between May 20 and 24, 2013. The locations of the borings are shown on Figure 2. Logs of the test borings are presented in Appendix A.

2.3.2 Laboratory Testing

Soil samples were carefully sealed in the field and returned to our laboratory for testing. Soil classifications made in the field were verified in the laboratory after further examination and testing. Laboratory tests were performed on selected soil samples, including moisture content, dry density, sieve analysis, direct shear strength, compaction characteristics, pavement support strength (R-value), and corrosion characteristics. The results of these tests are presented in Appendix A.

2.3.3 Geologic Units

A review of published geologic maps of the site (Wagner, et al., 2002, Dupre and Tinsley, 1980, Dibblee and Minch, 2007), results of the geologic reconnaissance, and a review of the borings completed for this investigation indicate that the site is underlain by Quaternary older dune deposits, older floodplain deposits, and younger floodplain deposits (Figure 2). Generalized geologic sections A-A′ and B-B′ (Figures 3.1 and 3.2) show the interpreted subsurface relationships of the older dune deposits and the older and younger floodplain deposits. The locations of the geotechnical sections are shown on Figure 2. Note that the geotechnical sections were drawn with a 4:1 vertical exaggeration to illustrate the interpreted relationships between the geologic units.

The older dune deposits, which cover the majority of the upland area of the project site, consist of unconsolidated to poorly consolidated wind-blown sand ranging from fine-grained silty sand to poorly graded sand. The older dune deposits are generally loose to medium dense in the upper 5 to 12 feet below ground surface, becoming medium dense to dense below 12 feet. Below a depth of about 25 to 30 feet, or below about elevation 60 to 70 feet, the older dune deposits are primarily classified as silty sand. Above this elevation the material is mostly poorly graded sand with silty sand interbeds. Based on the results of Boring B-4, which was the 100-foot deep boring, and Borings B-1 and B-2, the base of the older dune deposits is at an elevation of about 20 to 25 feet. The basal contact of the older dune deposits is shown on geologic section A-A′ and B-B′ (Figures 3.1 and 3.2).

Underlying the older dune deposits and encountered in Borings B-1, -2, and -4, are the older floodplain deposits. This unit consists of very stiff lean clay with interbeds of medium dense to very dense silty sand. The older floodplain deposits represent the ancestral Salinas River alluvium and predate deposition of the older dune deposits. The older floodplain deposits are exposed at the base of the slope along the northern site boundary below about elevation 20 to 25 feet, as shown on Figure 2.

Although not encountered in any of the borings, younger floodplain deposits have been mapped below about elevation 20 feet north of the project site within the modern floodplain of the Salinas River as shown on Figure 2. These deposits likely consist of loose silty sand derived from the erosion of the older dune deposits and soft to stiff interbedded silt and clay. This unit overlies the older floodplain deposits.

2.3.4 Groundwater

The project site is located within the Fort Ord Aquifer Sub-basin of the Salinas Valley Groundwater Basin (Monterey County Water Resources Agency [MCWRA], 2011). A regional groundwater elevation map of the Salinas Valley area published by MCWRA, (2011) records the depth to groundwater for the East Side shallow aquifer at about elevation 14 feet in the vicinity of the project area for the August 2011 monitoring period.

Groundwater was encountered in Borings B-1, -2, -4 and -6 at time of drilling. The depth to groundwater was at 57 feet in Boring B-4, drilled in the central portion of the site, or at about elevation 40 feet. Borings B-1, -3, and -6 drilled along the northern portion of the site, closer to the Salinas River, encountered groundwater at a depth of about 7 to 48 feet, or at about elevation 29 to 35 feet, indicating groundwater flow is to the north towards the Salinas River.

During the site reconnaissance no springs were noted on the site. Below about elevation 30 feet near the contact of the older dune deposits and the underlying older floodplain deposits along the northern site boundary, vegetation is relatively heavy with a thick growth of shrubs suggesting groundwater seeps may be present at or near the ground surface. Standing water also was noted in a drainage ditch at the base of the slope at about elevation 20 feet along the edge of the active farm fields.

2.4 FAULTS AND SEISMICITY

The Monterey Bay and Salinas Valley are among the most seismically active regions in the United States area, dominated by the active San Andreas Fault System. The San Andreas Fault System is the boundary of the North American Plate (east of the fault) and Pacific Plate (west of the fault). The tectonic plate movement is distributed along a complex system of generally northwest-trending, parallel and subparallel, strike-slip, right lateral faults. The San Andreas Fault System controls the geologic structure and geomorphic expression of the region. Several large active faults and numerous potentially active faults occur in this region. Figure 4 is a Regional Fault Map showing active faults relative to the project site.

The California Division of Mines and Geology (Jennings, 1994) has not mapped any active or potentially active faults bisecting the site, and does not include the site in any of the State of California Earthquake Fault Zones established by the Alquist-Priolo Earthquake Fault Zoning Act of 1972 (Hart and Bryant, 1997). The nearest Alquist-Priolo zoned fault is the San Andreas fault, located about15.2 miles (24.4 km) northeast of the site.

The closest seismic source to the site is the Reliz fault zone, which is located about 3 miles (4.9 km) southwest of the project site. This fault is a late Quaternary, mostly high angle reverse dip-slip fault. The Reliz fault is thought to be a Quaternary-active fault, but is not known to have ruptured the surface during the Holocene (USGS, 2008b; WGCEP, 2008).

Other nearby faults include the Monterey Bay-Tularcitos fault zone, a complex north-northwest-trending fault zone up to 15 km wide that includes the Navy fault, Monterey Bay fault, and Chupines (Ord Terrace) fault. These faults are located about 6.8 miles to 9.6 miles (15.5 km) southwest of the site and include offshore fault segments. Portions of these faults have documented Holocene displacement and are considered to be active. Other more distant active faults include the San Gregorio fault, located about 17.4 miles (28 km) to the southwest offshore.

The Rinconada fault located about 12.4 miles (19.9 km) southeast of the site forms a major structural element along the southwest side of the Salinas Valley. The Rinconada fault is on the same strike with the closer Reliz fault zone and appears to join with it southeast of the project site (Figure 4). The Rinconada fault is considered to be a geologically separate fault based on faulting style, fault strike, and total magnitude of displacement.

Faults included in the statewide probabilistic hazard map (and the fault model used to derive it) have classified faults zones as "Type A," "Type B," and "Type C" (WGCEP, 2008). A "Type A" fault is an active fault with a slip rate of greater than 5 mm/yr. and moment magnitude (**M**) greater than 7.0, and a "Type C" fault is a potentially active fault with a slip rate of less than 2 mm/yr. and a **M** of less than 6.5. "Type B" faults are defined as active or potentially active faults with a slip rate and **M** between a "Type A" and "Type C" fault. The nearest "Type A" fault to the project site is the San Andreas fault, located approximately 24.4 kilometers northeast of the site. The nearest "Type B" fault is the Reliz fault, which lies within 4.9 kilometers southwest of the site. This fault is poorly expressed in the site region and is not shown as a through going structure on geologic (Wagner et al., 2002) or fault compilation maps (USGS, 2008). Nearby active and potentially active faults, their distances from the site, their designated fault types ("A", "B" or "C"), average slip rates, and maximum moment magnitudes are summarized in Table 1 – Nearby Active and Potentially Active Faults.

TABLE 1

NEARBY ACTIVE AND POTENTIALLY ACTIVE FAULTS

FAULT	**TYPE**	**DISTANCE (km)**	**SLIP RATE (mm/yr.)**	**MAGNITUDE (max moment)**
Reliz	B	4.9	0.2 - 0.1	6 .25
Monterey Bay-Tularcitos	B	12	0.2 - 0.1	7.0
Rinconada	B	19.9	0.2 - 0.1	7.5
San Andreas	A	24.4	> 5.0	8.0
San Gregorio (Southern)	B	28.0	1.0 - 5.0	7.5

3.1 SURFACE FAULTING

Surface fault rupture recurs along existing fault traces, with rare exceptions. The highest potential for surface faulting is along existing fault traces that have had Holocene fault displacement. There are no known mapped faults on or in close vicinity to the site that have experienced Holocene displacement. The potential for surface fault rupture at the site is considered low.

3.2 GROUND SHAKING

The most significant potential geologic hazard to the site is strong ground shaking during future earthquakes. As shown on Table 1, the San Andreas fault is located about 24 km northeast of the site; this fault is capable of generating a **M**8.0 earthquake.

3.3 LIQUEFACTION

Liquefaction is a phenomenon in which a sudden increase in pore fluid pressure causes relatively loose, cohesionless soil beneath the water table to undergo temporary loss of strength and essentially total loss of shear resistance. The older dune deposits underlying the site are generally medium dense to very dense with a few loose zone near the ground surface. The underlying older floodplain deposits consist of very stiff lean clay with interbeds of dense to very dense silty sand. The depth to groundwater ranges from about 55 to 60 feet in the upper southern portion of the site to near ground surface at the toe of the slope along the northern portion of the site.

The U.S.G.S. (Dupre and Tinsley, 1980) has published a liquefaction potential map of the project area. The site is mapped as having a “low” liquefaction potential. The Monterey County General Plan (2010) also provides a regional liquefaction potential hazard map that shows the project site has a “low” liquefaction potential. Based on the depth to groundwater and the density of the soils, the potential for liquefaction in the southern half of the site is considered “low.” Boring B-2 located along the northerly property line encountered loose dune sand deposits below the groundwater table. The extent of these loose, saturated soils in this low-lying area is unknown. The liquefaction potential of the northern half of the property should be considered “moderate” to “high” until proved otherwise through additional exploration and testing.

The younger floodplain deposits within the active floodplain of the Salinas River have a “high” liquefaction potential, but these deposits are outside of the project area.

3.4 SLOPE STABILITY AND LANDSLIDES

The site surface of the proposed desalination plant is gently sloping along the southern portion and moderately sloping along the northern site boundary where it slopes down to the Salinas River. No landslides have been mapped near the site (Dupre and Tinsley, 1980 and Dibblee and Minch, 2007), nor were landslides or slope instability observed at the site. For the south side of the site where site facilities are expected to be located, cuts and fills for the proposed structures are expected to be relatively minor and slope stability is not considered to be a hazard. The potential for liquefaction in the vicinity of the northerly property line could impact slope stability in this area. Further investigation of this potential instability would be required if site development is planned for the north half of the site.

3.5 SEISMIC SETTLEMENT

Another type of seismically induced ground failure that can occur as a result of seismic shaking is dynamic compaction or seismic settlement. Such phenomena typically occur in unsaturated, loose granular material or uncompacted fill soils. Our subsurface exploration encountered relatively loose layers of silty sand extending from the ground surface to a depth of about 12 feet. These soils are judged to have a moderate potential to undergo dynamic compaction where strong seismic shaking occurs. Site preparation recommendations presented in the following sections of this report are intended to mitigate the potential for dynamic compaction of the near-surface soils. Dynamic compaction of the deeper sand layers during a large seismic event may result in area-wide settlement of up to one inch. Some repair of minor structural and underground utility damage may be required as a result of this amount of areal settlement.

3.6 EXPANSIVE AND COMPRESSIVE SOILS

The near-surface soils found at the site generally consist of silty to poorly graded sands that are not expected to be expansive or compressible.

3.7 FLOODING AND DAM INUNDATION

The Flood Insurance Rate Map for Monterey County was reviewed (FEMA, 1984). The project site is located outside of the FEMA 100-year flood zone (*i.e.*, the region that has approximately a 1% annual probability of flooding). Flood inundation maps in the Monterey County General Plan (Map 8d, 2010) resulting from a failure of San Antonio dam or Nacimiento dam, which flow into the Salinas River, show the site is outside of flood inundation areas. Flooding at the site is not considered to be a hazard.

3.8 SUBSIDENCE

Subsidence is the gradual settling or sinking of an area with little or no horizontal motion. Subsidence is caused by natural processes such as oxidation, solution wetting, and compaction of subsurface materials, and by tectonic downwarping. Subsidence can also be caused by man’s activities, such as removal of subsurface solids, liquids, or gases or by wetting certain types of dry, clay rich sediments resulting in the failure of intergranular supporting structures (Helley and LaJoie, 1979).

Despite extensive groundwater pumping over the last 50 years, land subsidence has not been significant in the Salinas Valley (Ferriz, 2001). The Monterey County General Plan (2010) does not discuss or identify land subsidence as a hazard for the Salinas Valley. There are no known oil or gas fields in the project vicinity and therefore subsidence due to extraction of oil or gas is not considered to be a hazard for the site.

3.9 TSUNAMIS AND SEICHES

Tsunamis (seismic sea waves) are generated by rapid displacement of the ocean floor during major earthquakes. The majority of the project site is located at an elevation of over 80 feet above sea level, and is about 2 miles from Monterey Bay. Therefore, the potential for seismic sea wave encroachment on this site is considered low.

A seiche is a wave generated on the surface of a closed or semi-enclosed body of water during and earthquake. There are no significant reservoirs and lakes near the project site, therefore the potential for the site being affected by a seiche is considered nil.

3.10 VOLCANIC HAZARDS

There are no known or mapped active or Quaternary volcanoes (Jennings, C.W., 1974) in the vicinity of the site. Therefore, the potential for volcanic hazards at the site is nil.

4.1 PRIMARY GEOTECHNICAL CONSIDERATIONS

Based on the information collected and preliminary analysis performed for this investigation, it is our opinion development of the site for the intended use is feasible. The primary geotechnical considerations include:

- The near-surface older dune sand deposits exhibit variable relative densities, from loose to dense. Left in-place, shallow foundations would likely exhibit unacceptable total and differential settlements. Over-excavation and replacement with compacted engineered fill is recommended to provide uniform support for shallow foundations.

- The project site is located in a seismically active area and strong ground shaking can be expected during the design lifetime of the facility. Structures built in accordance with current California Building Code requirements will have a potential for experiencing relatively minor damage, which should be repairable. Strong seismic shaking could result in architectural damage and the need for subsequent repair.

The following preliminary recommendations are presented as guidelines to be used in project planning and development. Once structure locations have been finalized, additional subsurface exploration and analysis will likely be required in order to issue a final design-level geotechnical report.

4.2 SEISMIC DESIGN

The seismic design parameters presented in Table 2 can be used for evaluating earthquake loads in accordance with the 2010 California Building Code. As previously discussed, the site should be characterized as Site Class D ("stiff soil profile") based on the subsurface exploration performed for this investigation. These parameters have been calculated assuming an Occupancy Category IV ("essential facilities") for the proposed project.

TABLE 2
SEISMIC DESIGN PARAMETERS

DESIGN PARAMETER	SPECIFIC TO SITE
S_S	1.58
S_1	0.56
F_a	1.0
F_v	1.5
S_{MS}	1.58
S_{M1}	0.84
S_{DS}	1.06
S_{D1}	0.56

4.3 FOUNDATIONS

It is our opinion that appropriate foundation support for the proposed structures will consist conventional spread footings for buildings and structural slabs for concrete tank structures. All foundations should be supported on engineered fill that has been prepared as described in Section 4.6 - Earthwork. For preliminary design purposes, assume that building foundations may be designed for an allowable soil bearing pressure of 2,000 pounds per square foot (psf) for dead plus normal live loads. This allowable pressure may be increased by one-third when considering the effects of additional short-term wind or seismic loads. Continuous footings should have a minimum width of 15 inches and isolated column footings should have a least width of 18 inches. Foundations should be embedded a minimum of 18 inches below adjacent finish grade or building pad subgrade, whichever is lower.

Post-construction foundation settlements for buildings are expected to be less than ¾-inch for maximum column loads of up to 100 kips. Water-holding tank structures may record larger settlements depending on total water load and depth of over-excavation and replacement.

Lateral loads may be resisted by friction between the foundation bottoms and the supporting subgrade, or by passive resistance acting against the vertical faces of the foundations. For preliminary design, an allowable friction coefficient of 0.35 between the foundation and supporting subgrade may be used. For passive resistance, an allowable equivalent fluid pressure of 325 pounds per cubic foot (pcf) acting against the footings may be used. When combining passive pressure and frictional forces, the passive pressure component should be reduced by one-third. The passive pressure can be assumed to act, starting at the top of the lowest adjacent grade in paved areas and at a depth of one-foot below grade in unpaved areas. It should be noted that the lateral load resistance values discussed above are only applicable where the concrete for footings is either placed directly against undisturbed soils or that the voids created from the use of forming are backfilled with soil compacted to a minimum relative compaction of 90 percent (ASTM D1557) or with lean or structural concrete.

4.4 CONCRETE SLABS-ON-GRADE

Concrete slabs-on-grade should be constructed on compacted engineered fill that has been prepared as described in Section 4.6 - Earthwork. The proposed building interior floor slabs and all adjoining exterior slabs should be constructed over engineered fill placed on soil subgrades that are properly moisture conditioned and compacted as recommended in this report.

Where dampness of floor slabs is to be reduced, interior concrete floor slabs should be constructed on a layer of capillary break material at least 4 inches thick covered by a continuous vapor retarder membrane, such as 10-mil (or thicker) membranes produced by Griffolyn or Stego. The capillary break material should consist of free-draining clean rock or gravel, such as No. 4 by ¾-inch pea gravel or permeable aggregate complying with Caltrans Standard Specification, Section 68, Class 1, Type B Permeable Material. Where crushed rock is used as the capillary break material, seating of the rock with a vibratory plate compactor may aid in reducing the potential for damage to the vapor barrier due to rock punctures as the reinforcing strands and the concrete are placed. Recent guidelines from the American Concrete Institute

(ACI) advise construction of the slab directly on the vapor retarder and the omission of the granular “blotter” layer that has been common practice in the past.

4.5 RETAINING WALLS

The lateral loads presented in Table 3 can be used for preliminary design of on-site retaining walls expected to be less than 8 feet in height. These values apply where backfill is drained, moderately compacted and not subject to traffic or surcharge loads.

TABLE 3
ACTIVE AND AT-REST EARTH PRESSURES

BACKFILL SLOPE (H:V)	ACTIVE EARTH PRESSURE (pcf)	AT-REST EARTH PRESSURE (pcf)
Level	40	55
3:1	50	70

Active earth pressures can be used for the design of unrestrained walls where the top of the wall is free to translate or rotate. To develop active earth pressures, the wall should be capable of deflecting by at least ½ percent of the wall’s height. At-rest earth pressures should be used for the design of walls where the top is restrained such that the deflections required to develop active soil pressures cannot occur or are undesirable. Retaining wall foundations should be designed and constructed in accordance with the recommendations presented in Section 4.3 – Foundations.

The design criteria presented above are based on fully drained conditions. Therefore, we recommend a zone of free-draining, cohesionless material at least 12 inches wide should be placed on the backfill side of all retaining walls. The free-draining material should consist of Class 2 Permeable Material complying with Section 68 of the Caltrans Standard Specifications. The free-draining material should be capped with at least 12 inches of compacted, relatively impermeable soil. Any water that collects in the drainage material should be collected by a perforated pipe, perforations facing down, placed on a 2 to 3-inch thick bed of the drainage material. The perforations should be no larger than ¼-inch diameter. The perforated pipe should be connected via a solid collector pipe to an appropriate discharge facility downslope of the wall.

4.6 EARTHWORK

4.6.1 Site Preparation

The areas to be graded should be stripped and cleared of any vegetation. Estimated stripping depths are expected to range from 3 to 6 inches. The site should be cleared of all debris and rubble. All deleterious materials resulting from the clearing and stripping operations should be removed from the site. Soils with deleterious materials should not be used as engineered fill or blended into engineered fill. Organic laden topsoil could be stockpiled for re-use in landscape areas (if desired) or disposed off-site. Our subsurface exploration encountered older dune sand deposits present at the ground surface. The near-surface sands exhibited variable relative densities ranging from loose to dense to a depth of approximately 12 feet. In order to provide uniform foundation support for the building and other at-grade structures, the near-surface soils should be over-excavated and replaced with compacted structural fill. In building areas, a minimum over-excavation depth should be at least 3 feet below the existing grade or 3 feet below finish pad grade, whichever is deeper. Deeper over-excavation depths for buildings may be required depending on the depth of loose soils encountered during site-specific exploration. For water-holding structures with large footprints, deeper over-excavation depths will likely be required to remove all loose sand deposits and provide uniform foundation support. Over-excavation depths for these structures should be determined by future exploration and analysis.

Finish pad grade for buildings should be taken as the top of pad prior to placement of the capillary break section discussed above. The area to be over-excavated should encompass the entire building pad area and should extend at least 5 feet beyond the outside edge of new perimeter footings. This over-build area may increase where deeper over-excavation and replacement are required. In concrete walkway and pavement areas located outside the building pad and overbuild areas, the over-excavation should extend at least 24 inches below the walkway/pavement subgrade or existing grade, whichever is deeper.

Prior to placement of engineered fill, the exposed soil surface should be “proof-rolled” using construction equipment with high-pressure rubber tires, such as a loaded scraper or loaded water truck, to check for soft or yielding areas. Loose existing fill soils encountered in the soil subgrade area should be removed and replaced with engineered fill. Once approved, the exposed soil surface should be scarified to a depth of 8 inches, water conditioned to a water content slightly above optimum, and compacted to at least 90 percent relative compaction based on ASTM D1557.

4.6.2 Engineered Fill

Areas to receive engineered fill should be prepared as discussed in the section entitled “Site Preparation.” Engineered fill should be placed in layers no greater than 8 inches in loose thickness, water conditioned to a water content near or slightly above optimum, then compacted to at least 90 percent relative compaction (per ASTM D1557). All engineered fill placed beneath buildings should be compacted to a minimum 95 percent relative compaction. In addition, the top 12 inches of finished subgrade beneath concrete walkway and pavements should be compacted to at least 95 percent relative compaction. Compacted subgrade soils should be non-yielding under wheel loading by construction equipment.

Material used for engineered fill is expected to be generated from on-site sources. In general, engineered fill should be non-expansive, free of organics or other deleterious material, and free of rock fragments larger than 3 inches in greatest dimension. If import fill is required, a sample should be submitted for testing and approval prior to delivery to the site.

4.6.3 Excavations

We anticipate that on-site excavations can be readily made with either a conventional backhoe or excavator. Due to the characteristics of the granular soils present at the site, it is very unlikely that vertical cuts of any height will stand more than a few days. Sands and silty sands are prone to raveling and caving as they lose moisture. Our experience in dune sand deposits indicates that attempts to maintain moisture are generally unsuccessful and result in erosion of the cut face. Vibration due to construction traffic also causes cut bank failure where steep to vertical cuts are made in dune sands. The contractors should be prepared to install shoring or to lay back the sidewalls at a proper inclination, estimated at 1.5H:1V (horizontal : vertical) or flatter. Excavations should be located so that no structures, existing or new, are located above a plane projected at an inclination of 2H:1V upward from any point in an excavation, regardless of whether it is shored or unshored. All excavations should be constructed and shored in accordance with OSHA and Cal-OSHA Safety Standards. Safety in and around utility trenches is the responsibility of the underground contractors.

4.6.4 Permanent Cut and Fill Slopes

Permanent cut and fill slopes at the site should be constructed with slope inclinations no steeper than 3H:1V. Where the vertical height of permanent cut and fill slopes exceeds 15 feet, intermediate benches should be provided.

The slope gradients recommended above assume natural water contents are present behind the slope face. Any seepage forces and generated from retained water will need to be relieved by adequate drainage.

4.6.5 Surface Drainage

The near-surface sandy soils will be susceptible to erosion if exposed at the ground surface. All graded slopes and exposed soil surfaces should be planted with erosion resistant vegetation and/or erosion control matting. The ground surface above the tops of slopes should be graded to drain away from the crest. Lined V-ditches or drainage berms should be constructed along the tops of slopes to prevent surface water from flowing onto the slope face.

Final site grading should provide surface drainage away from the structure and slabs-on-grade to reduce the percolation of water into the underlying soils. Ponding of surface water should not be allowed adjacent to the structures, or along edges of concrete slabs or pavements. Grades should be sloped away from the structure a minimum of 4 percent in landscaped areas and 2 percent in paved areas for a horizontal distance of at least 5 feet. Ideally, asphalt concrete pavements should be designed and constructed with a minimum slope of 2 percent to reduce surface water infiltration and the potential for local ponding, both of which could reduce pavement life.

Rainwater collected on building roofs should be conveyed through downspouts and closed pipes which discharge directly into the site storm water collection system or at an approved location away from structures. The discharge location should not be located at the top of, or on the face of, any existing or constructed slope areas. We recommend a discharge point at least 10 feet downslope of foundation or fill areas.

4.7 ASPHALT CONCRETE PAVEMENTS

A laboratory R-value test performed on a representative sample of the near-surface older dune sands measured in excess of 70. The minimum pavement structural sections included in Table 3 are based on an R-value of 40 to account for variability of the near-surface soils. The traffic indices of 5.0 and 6.0 presented in Table 4 correspond to Caltrans' recommended traffic loadings for auto parking areas and truck parking areas, respectively. Use of the on-site native sands should be verified in the field and, if necessary, modifications should be made to these preliminary pavement sections as appropriate for the final traffic loading conditions.

TABLE 4
RECOMMENDED MINIMUM VEHICLE PAVEMENT SECTIONS

TRAFFIC INDEX	ASPHALT CONCRETE (inches)	CLASS 2 AGGREGATE BASE (inches)
5.0	3.0	5.0
6.0	3.5	6.0

The traffic sections presented in Table 3 are for planning purposes only. Higher traffic indices may be warranted for areas where high truck traffic is planned.

Asphalt concrete should meet the requirements for 1/2 or 3/4-inch maximum, medium Type B asphalt concrete. These materials should comply with the specifications presented in Section 39 of the Caltrans Standard Specifications, latest edition. Aggregate base material should be compacted to at least 95 percent relative compaction in vehicle pavement areas (ASTM D1557). Class 2 aggregate base shall also conform to the materials specifications as presented in the Caltrans Standard Specifications, latest edition.

4.8 CORROSION POTENTIAL

Three representative samples of on-site soils were tested to evaluate the corrosion potential to buried pipelines and below-grade structures. Tests were performed by CERCO Analytical, Inc., in Concord, California. These preliminary test results indicate the on-site soils are mildly corrosive to underground metallic pipelines and non-corrosive to buried concrete structure elements. Corrosion test results and CERCO Analytical's summary report are included in Appendix A.

5.1 ADDITIONAL WORK

As discussed in this report, this investigation is preliminary and is based on a limited initial study. The primary focus of this initial study is to evaluate geotechnical baseline conditions and provide preliminary design information for the site. Performing a final design-level geotechnical report will be required to develop geotechnical criteria for design and construction of the proposed improvements. We recommend that the following work be performed to evaluate overall site stability and prepare geotechnical design recommendations:

- Obtain additional topographic information for the entire 46-acre site to better evaluate geotechnical site constraints.
- Perform additional subsurface exploration and laboratory testing to better define the subsurface soil conditions in areas proposed for new structures and site grading.
- If facilities or other site development features are proposed for the north half of the site, evaluate the liquefaction and stability issues identified above.
- Prepare geotechnical design recommendations for site preparation, grading and compaction; structure foundation design; retaining walls; surface drainage; concrete slabs-on-grade; and design pavement sections.

5.2 LIMITATIONS

This GBR has been prepared for the proposed Monterey Peninsula Water Supply Project’s Desalination Plant, as described herein. The conclusions and preliminary recommendations presented in this report are not applicable to any other sites or project elements. Our study did not include an assessment of environmental characteristics, hazardous substances, or the presence of underground tanks.

The recommendations presented in this report were developed with the standard of care commonly used in this profession and were produced in accordance with generally accepted practices for the preparation of geotechnical baseline reports. No other warranties are included, either express or implied, as to the professional advice presented in this report.

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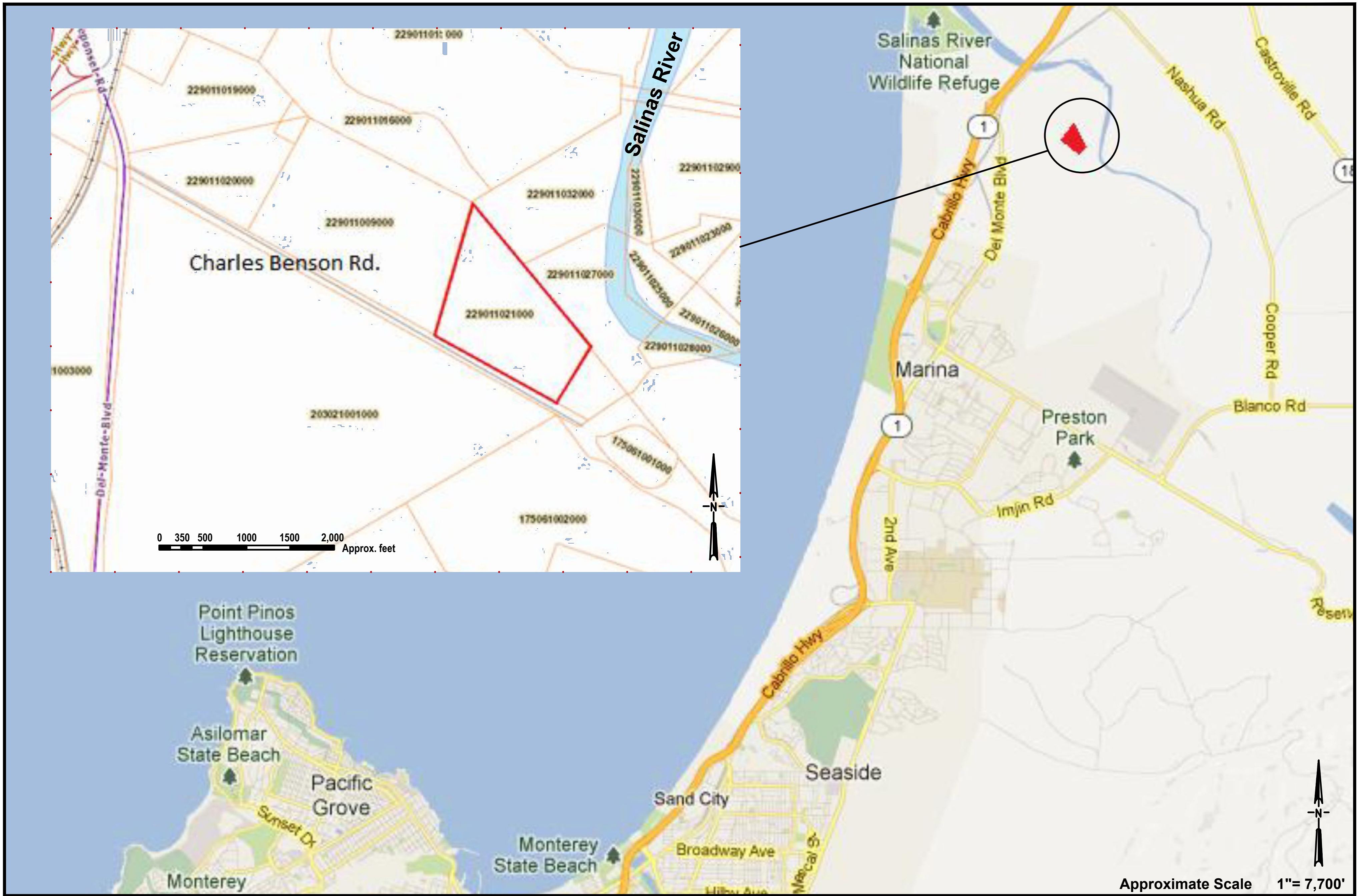
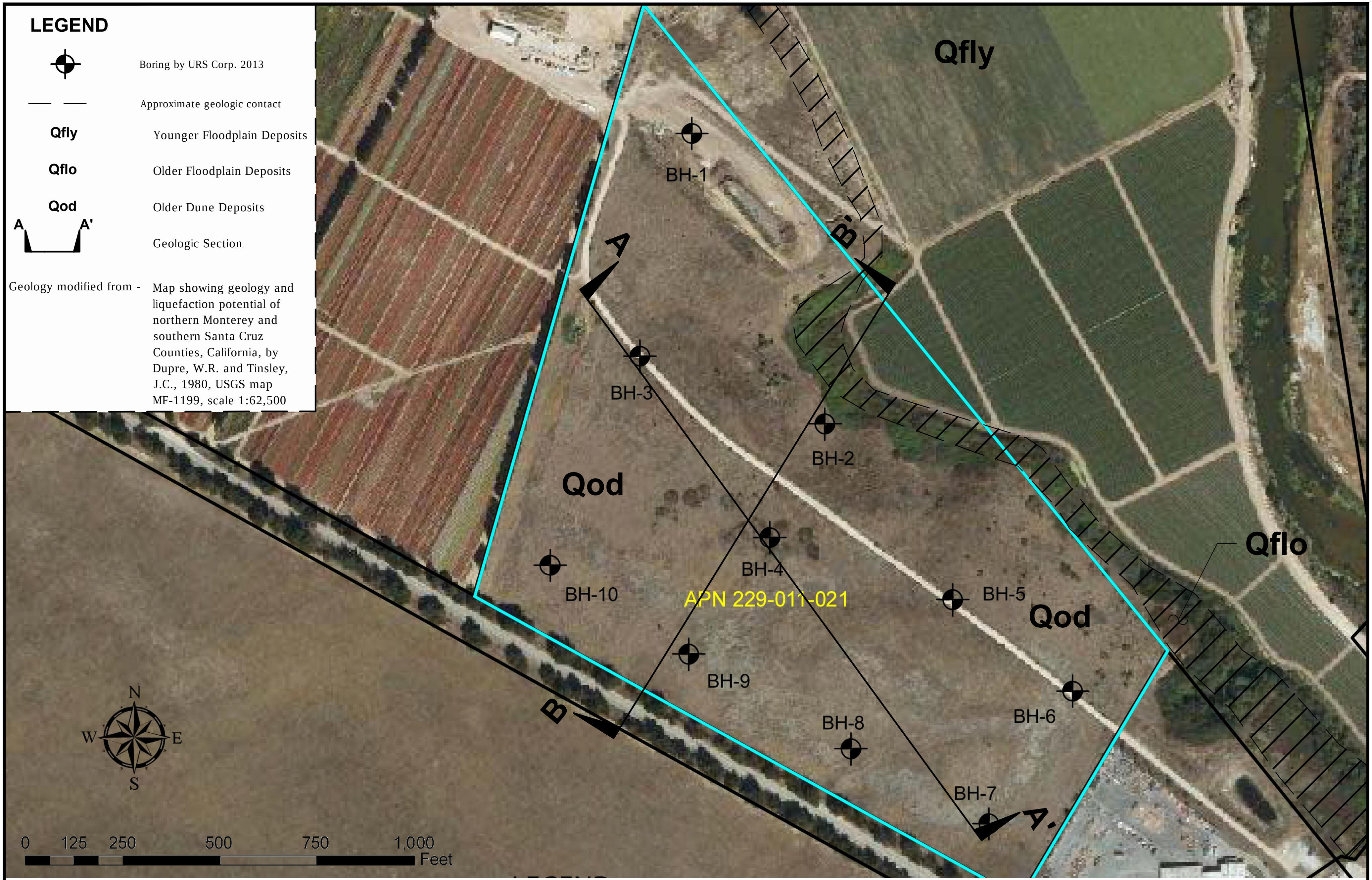


URS	**California American Water** **Proposed Desalination Plant** **Monterey County, CA**	**Site Location**	**Project No: 26818674** **Figure 1** **JUNE 2013**



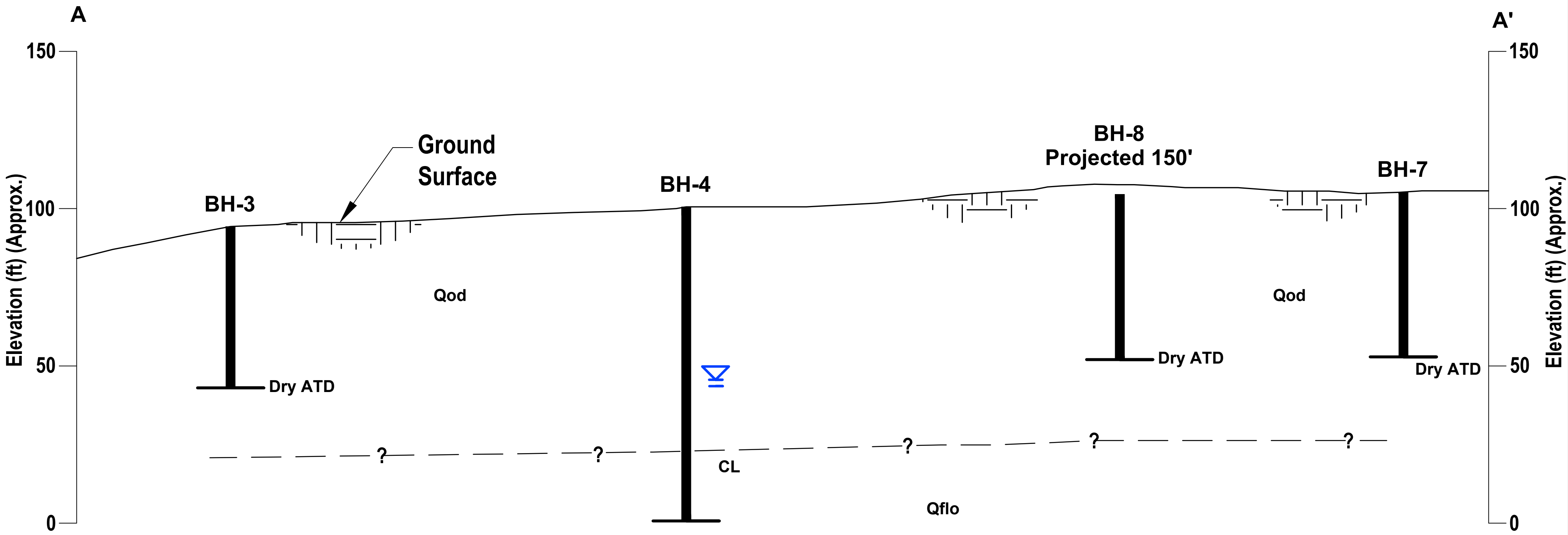
California American Water
Proposed Desalination Plant
Monterey County, CA

Geologic Map and Boring Locations

Project No: 26818674

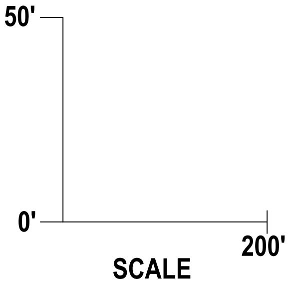
Figure
2

JUNE 2013



Legend

BH-9	Boring by URS Corp. 2013
⊻	Groundwater at time of drilling (ATD)
— —	Approximate geologic contact
Qfly	Younger Floodplain Deposits - Sand, Silt, and Clay
Qflo	Older Floodplain Deposits - interbedded Clay and Silty Sand
Qod	Older Dune Deposits - poorly graded Sand and Silty Sand



See Figure 2 for section location

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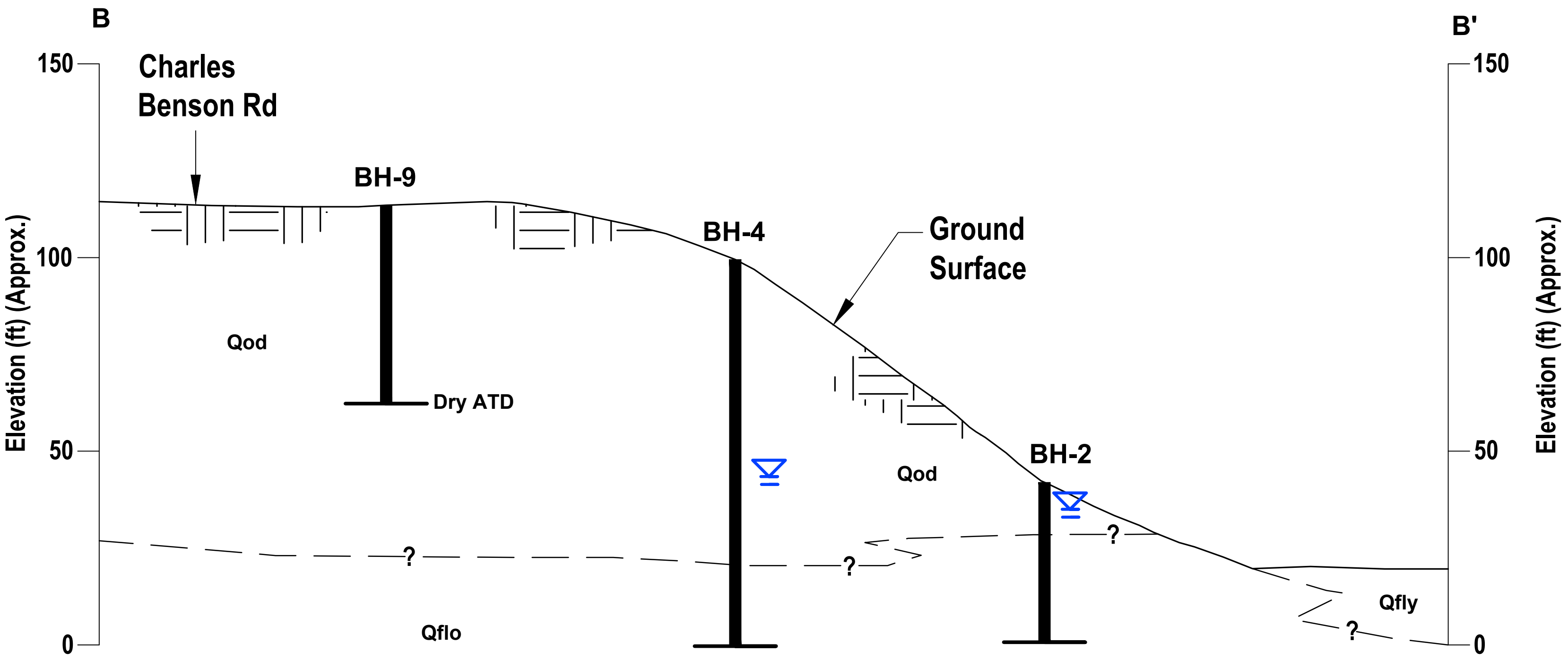
California American Water
Proposed Desalination Plant
Monterey County, CA

Generalized Geologic Section A-A'

Project No: 26818674
Figure
3.1
JUNE 2013



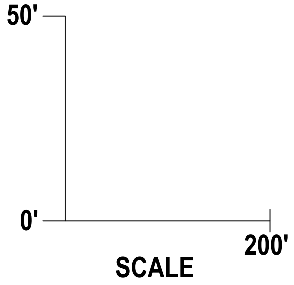
Legend

BH-9 Boring by URS Corp. 2013

▽ Groundwater at time of drilling (ATD)

— — Approximate geologic contact

Qfly	Younger Floodplain Deposits - Sand, Silt, and Clay
Qflo	Older Floodplain Deposits - interbedded Clay and Silty Sand
Qod	Older Dune Deposits - poorly graded Sand and Silty Sand



See Figure 2 for section location

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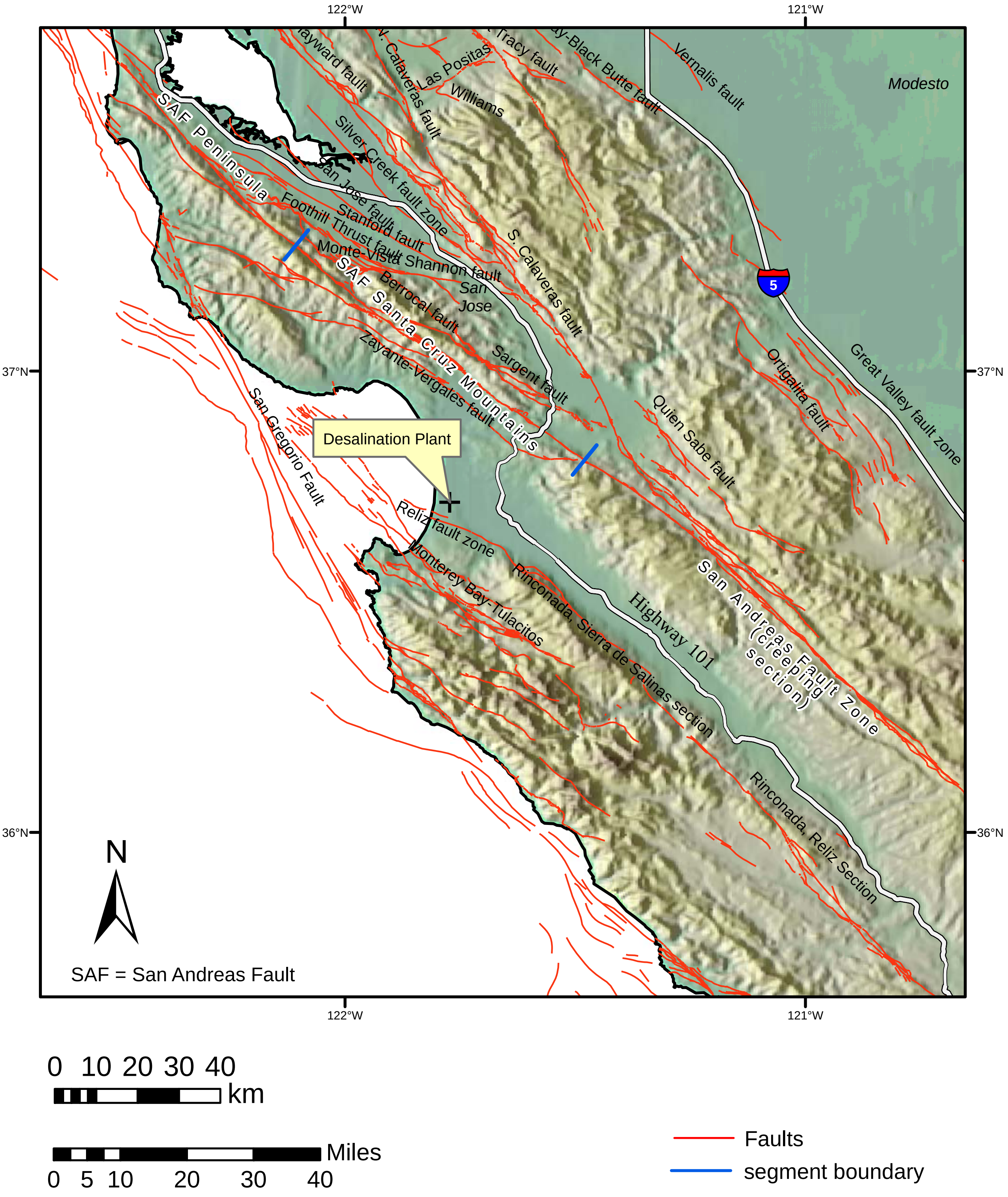
California American Water
Proposed Desalination Plant
Monterey County, CA

Generalized Geologic Section B-B'

Project No: 26818674
Figure
3.2
JUNE 2013



Fault Source: URS Seismic Source Model and
USGS Quaternary Fault Database

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Project No. 26818674

California American Water
Desalination Plant

REGIONAL FAULT MAP

Figure
4

FIELD EXPLORATION

Exploratory Borings

Ten exploratory borings were drilled for this investigation at the locations shown on Figure 2. The borings were drilled under the observation of a URS representative between May 20 and 24, 2013, using a track mounted CME-55 drill rig. All borings were drilled using hollow-stem auger drill equipment. The lower 30 feet of the 100-foot deep boring (B-4) was drilled using rotary wash drilling equipment.

Visual classifications of the soils encountered were made from the cuttings at the time of drilling. Samples of the soil encountered in the exploratory borings were collected with either a modified California sampler (2-inch inside diameter, 2-1/2-inch outside diameter) or a standard split spoon (SPT) sampler (1-3/8-inch inside diameter, 2-inch outside diameter). The split spoon and modified California samplers were driven 18 inches into the soil with a 140-pound hammer free-falling 30 inches, with blow counts being recorded for the last 12 inches of driving. Field classifications of soil samples were verified by further examination and testing in the laboratory.

The logs of borings made for this investigation are presented as Figures A-1.1 through A1.10. The type of sampler used at each depth interval is shown on the boring logs in accordance with the symbols explained on the Figure A-2.

SPT Energy Measurements

The energy transferred from the automatic drive hammer to the SPT sampler is an important measurement for the evaluation of in-place soil consistency and strength. The efficiency of energy transferred to the drill rod is measured by the energy ratio (ER), which is defined as the ratio of energy transferred to the drill rod to the theoretical “free fall” energy. With the energy correction factor (CE = ER/60) and other factors (e.g., CR and CS), a “raw” SPT blowcount (N) can be adjusted to a modified blowcount (N60) corresponding to an average energy ratio of 60 percent.

Energy measurements for the drill rig and automatic hammer used for exploration were provided by Abe Engineering, Inc. The results show an average measured energy transfer ratio of 83 percent for the CME-55 drill rig and automatic hammer used at this site. The hammer energy report is included in this appendix.

LABORATORY TESTING

Relatively undisturbed soil samples were carefully packaged in the field and sealed to prevent moisture loss. The samples were then transported to our San Jose laboratory for examination and testing. Laboratory tests were performed on selected samples as an aid in classifying the soils and to evaluate the physical properties of the soils. Descriptions of the laboratory tests are presented below under the appropriate test headings.

Moisture Content and Dry Density

Moisture content and dry density determinations were made on selected samples. The samples were first trimmed to obtain volume and wet weight and then dried in accordance with ASTM

Test Methods D2216 and D2937. After drying, the weight of each sample was measured, and moisture content and dry density were calculated. The results of the individual tests are presented in the boring logs at the respective sample locations.

Unconfined Compression Tests

Unconfined compression tests were performed on four samples of the clay soils obtained from the older floodplain deposits encountered in borings B-2 and B-4. Tests were performed in general conformance with ASTM Test Method D2166. Test results are presented on the log of boring sheets.

Direct Shear Tests

A total of nine direct shear tests were performed on samples representative of the older dune sand deposits. The tests were performed by URS/Signet Testing Labs in Hayward. Tests were performed under saturated, drained conditions in general conformance with ASTM Test Method D3080. Direct shear test results are presented on Figures A-3.1 through A-3.3.

Grain Size Distribution Tests

The grain size distribution of native older dune sand soils was determined for ten samples by performing sieve analysis tests generally in accordance with ASTM Test Method D422. The results of these tests are presented on Figures A-4.1 through A-4.3.

Compaction Test

A compaction test was performed on a representative sample of the near-surface older dune deposits. The test was performed in general conformance with ASTM Test Method D1557. Compaction test results are shown on Figure A-5.

R-Value Test

An R-value test was performed on a representative sample of the near-surface older dune deposits. The test was performed by URS/Signet Testing Labs in Hayward. The test was performed in general conformance with ASTM Test Method D2844. The R-value test results are shown on Figure A-6.

Corrosion Tests

Three representative samples of the near-surface older dune sand deposits were tested for their corrosion potential to buried pipelines and structures. Tests were performed by CERCO Analytical in Concord. Test results and CERCO’s summary report are included in this appendix.

MPWSP Desalination Plant Site; Monterey County, CA

BORING LOCATION:			GROUND SURFACE ELEVATION (ft): 63 approx TOP OF WELL CASING ELEVATION (ft):
DRILLING AGENCY	Britton Exploration	DRILLER Paul Britton	DATE STARTED: 5/21/13 DATE FINISHED: 5/21/13
DRILLING EQUIPMENT	CME 55		COMPLETION DEPTHS BORING: 51.5 (ft) WELL: N/A (ft)
DRILLING METHOD	Hollow Stem	DRILL BIT	HAMMER/ DROP 140/auto
SIZE AND TYPE OF CASING			NUMBER OF SAMPLES DIST: UNDIST:
TYPE OF PERFORATION	N/A	FROM N/A TO N/A	WATER DEPTH (ft) FIRST: 34 ▽ COMPL.: N/A ▼ 24 hr.: N/A ▽
SIZE AND TYPE OF PACK	N/A	FROM N/A TO N/A	LOGGED BY S.Ball CHECKED BY

TYPE OF SEAL	TYPE	FR	TO	TYPE	FR	TO
	No. 1: Cement	0	51.5'	No. 3: N/A	N/A	N/A
	No. 2: N/A	N/A	N/A	No. 4: N/A	N/A	N/A

LOG OF BORING B-1

(Sheet 1 of 2)

				FIELD TESTS					SAMPLES				INDEX PROPERTIES			
DEPTH (feet)	SOIL GRAPHIC	MATERIAL DESCRIPTION	ELEVATION (feet)	POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE,%	WATER LEVEL	DEPTH (feet)	NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
		Silty SAND (SM) dk brn, moist, loose														
									1	▯		9				
			60													
		very loose							2	▨		3	6	106		
5								5	3	▯		5				+#4=0 -#200=18%
		red brown, loose							4	▨		16	10	120		
			55													
10								10	5	▯		10				
		medium dense							6	▨		20	8	109		
			50													
		Silty SAND (SM) reddish brown, moist, medium dense														
15								15								
									7	▯		28				
			45													
20								20								
		dense							8	▨		60	11	111		
			40													
25								25								
		medium dense							9	▯		48				
			35													

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PROJECT NO. 26818674

Figure: A-1.1

MPWSP Desalination Plant Site
Monterey County, CA

LOG OF BORING B-1
Continued- Sheet 2 of 2

DEPTH (feet)	SOIL GRAPHIC	MATERIAL DESCRIPTION	ELEVATION (feet) approx	FIELD TESTS				DEPTH (feet)	SAMPLES				INDEX PROPERTIES			NOTES
				POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE, %	WATER LEVEL		NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	
		very dense							10	▨		83/ 11.5"	18	109		
			30													
							▽									
35		dense						35	11	▯		57				
		light yellow brown	25													
40		medium dense						40	12	▨		29	22	101		
			20													
		Lean CLAY (CL) light gray brown, moist														
45		**Silty SAND (SM)** light gray brown, moist, medium dense gray brown, very dense						45	13	▨		75/ 11"	20	108		
			15													
50		very dense						50	14	▯		59				
		BOTTOM OF BORING AT 51-1/2 FEET	10													
55								55								
			5													
60								60								
			0													
65								65								
			-5													

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PROJECT NO. 26818674

Figure: A-1.1

MPWSP Desalination Plant Site; Monterey County, CA

BORING LOCATION:
GROUND SURFACE ELEVATION (ft): 39 approx
TOP OF WELL CASING ELEVATION (ft):
DRILLING AGENCY: Britton Exploration
DRILLER: Paul Britton
DATE STARTED: 5/22/13
DATE FINISHED: 5/22/13
DRILLING EQUIPMENT: CME 55
COMPLETION DEPTHS: BORING: 40.0 (ft) WELL: N/A (ft)
DRILLING METHOD: Hollow Stem
DRILL BIT:
HAMMER/DROP: 140/auto
SIZE AND TYPE OF CASING:
NUMBER OF SAMPLES: DIST: UNDIST:
TYPE OF PERFORATION: N/A FROM N/A TO N/A
WATER DEPTH (ft): FIRST: 7 ▽ COMPL.: 33 ▼ 24 hr.: N/A
SIZE AND TYPE OF PACK: N/A FROM N/A TO N/A
LOGGED BY: C.Rambo
CHECKED BY:

TYPE OF SEAL	TYPE	FR	TO	TYPE	FR	TO
	No. 1: Cement	0	40'	No. 3: N/A	N/A	N/A
	No. 2: N/A	N/A	N/A	No. 4: N/A	N/A	N/A

LOG OF BORING B-2

(Sheet 1 of 2)

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet)	FIELD TESTS: POCKET PEN (tsf)	FIELD TESTS: POCKET TV (psf)	FIELD TESTS: STRAIN AT FAILURE,%	FIELD TESTS: WATER LEVEL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY (%)	SAMPLES: BLOWS /foot	INDEX PROPERTIES: MOISTURE CONTENT (%)	INDEX PROPERTIES: DRY DENSITY (pcf)	INDEX PROPERTIES: UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
	Silty SAND (SM) dark brown, moist , medium dense													
							1	▨		16				
							2	▯		3				+#4=0 -#200=8%
		35												
	very loose													
5														
							3	▨		4				
	very moist													
						▽								
	light brown, wet, very loose													
							4	▯		6				+#4=0 -#200=7%
		30												
10							5	▯		12				
	medium dense													
							6	▯		17				
	Lean CLAY (CL) light brown w/ orange brown streaks, moist, very stiff													
		25												
15														
					91.3		7	▨		21	27	97	4000	
		20												
20														
	Silty SAND (SM) gray brown, moist, medium dense						8	▨		17	25	97		
	Lean CLAY (CL) gray brown, moist, very stiff													Clay in shoe.
	Silty SAND (SM) gray brown, moist													
		15												
25														
	Lean CLAY (CL) gray brown, moist, very stiff						9	▯		12				
	gray													
		10												

MPWSP Desalination Plant Site
Monterey County, CA

LOG OF BORING B-2
Continued- Sheet 2 of 2

				FIELD TESTS					SAMPLES			INDEX PROPERTIES				
DEPTH (feet)	SOIL GRAPHIC	MATERIAL DESCRIPTION	ELEVATION (feet) approx	POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE, %	WATER LEVEL	DEPTH (feet)	NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
						73.6			10			17	35	88	3230	
							▼									Water at 33 feet.
			5													
35								35								
		w/ some black streaking				84.5			11			14	50	72	3700	
		Silty SAND (SM) yellow brown, moist, dense	0						12			48				
40		BOTTOM OF BORING AT 40 FEET						40								
			-5													
45								45								
			-10													
50								50								
			-15													
55								55								
			-20													
60								60								
			-25													
65								65								
			-30													

URS

PROJECT NO. 26818674

MPWSP Desalination Plant Site; Monterey County, CA

BORING LOCATION:				GROUND SURFACE ELEVATION (ft): 93 approx TOP OF WELL CASING ELEVATION (ft):	
DRILLING AGENCY	Britton Exploration	DRILLER	Paul Britton	DATE STARTED: 5/20/13 DATE FINISHED: 5/20/13	
DRILLING EQUIPMENT	CME 55			COMPLETION DEPTHS	BORING: 51.5 (ft) WELL: N/A (ft)
DRILLING METHOD	Hollow Stem	DRILL BIT		HAMMER/ DROP	140/auto
SIZE AND TYPE OF CASING				NUMBER OF SAMPLES	DIST: UNDIST:
TYPE OF PERFORATION	N/A	FROM N/A	TO N/A	WATER DEPTH (ft)	FIRST: N/A ▽ COMPL.: N/A ▼ 24 hr.: N/A ▽
SIZE AND TYPE OF PACK	N/A	FROM N/A	TO N/A	LOGGED BY C.Rambo	CHECKED BY

TYPE OF SEAL	TYPE	FR	TO	TYPE	FR	TO
	No. 1: Cement	0	51.5'	No. 3: N/A	N/A	N/A
	No. 2: N/A	N/A	N/A	No. 4: N/A	N/A	N/A

LOG OF BORING B-3

(Sheet 1 of 2)

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet)	POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE,%	WATER LEVEL	DEPTH (feet)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY (%)	SAMPLES BLOWS /foot	INDEX PROPERTIES MOISTURE CONTENT (%)	INDEX PROPERTIES DRY DENSITY (pcf)	INDEX PROPERTIES UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
	Silty SAND (SM) orange brown, moist, loose														
								1	▨		7	6	116		
		90													
								2	▯		12				
	medium dense														
5	**Poorly Graded SAND w/ Silt (SP-SM)** orange brown, moist, medium dense						5								
								3	▨		23	4	104		
								4	▯		24				
		85													
								5	▨		38	5	110		
10							10								
	dense														
	medium dense							6	▯		25				
		80													
15							15								
	dense							7	▨		35	11	107		
		75													
20							20								
	medium dense							8	▯		27				
		70													
25							25								
	dense							9	▨		46	4	102		
	Silty SAND (SM) yellow brown, moist, very dense	65													

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PROJECT NO. 26818674

Figure: A-1.3

MPWSP Desalination Plant Site
Monterey County, CA

LOG OF BORING B-3

Continued- Sheet 2 of 2

DEPTH (feet)	SOIL GRAPHIC	MATERIAL DESCRIPTION	ELEVATION (feet) approx	FIELD TESTS				DEPTH (feet)	SAMPLES				INDEX PROPERTIES			NOTES
				POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE, %	WATER LEVEL		NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	
									10	▯		53				
			60													
35								35								
									11	▨		59	11	119		
			55													
40		w/ tr clay, dense						40								
									12	▯		34				
			50													
45								45								
									13	▨		64	13	110		
		very dense														
			45													
50								50								
									14	▯		35				
		BOTTOM OF BORING AT 51-1/2 FEET														
			40													
55								55								
			35													
60								60								
			30													
65								65								
			25													

MPWSP Desalination Plant Site; Monterey County, CA

BORING LOCATION:				GROUND SURFACE ELEVATION (ft): 96 approx TOP OF WELL CASING ELEVATION (ft):	
DRILLING AGENCY	Britton Exploration	DRILLER	Paul Britton	DATE STARTED: 5/20/13 DATE FINISHED: 5/21/13	
DRILLING EQUIPMENT	CME 55			COMPLETION DEPTHS	BORING: 100.0 (ft) WELL: N/A (ft)
DRILLING METHOD	Hollow Stem	DRILL BIT		HAMMER/ DROP	140/auto
SIZE AND TYPE OF CASING				NUMBER OF SAMPLES	DIST: UNDIST:
TYPE OF PERFORATION	N/A	FROM N/A	TO N/A	WATER DEPTH (ft)	FIRST: 65 ▽ COMPL.: 57 ▼ 24 hr.: N/A ▽
SIZE AND TYPE OF PACK	N/A	FROM N/A	TO N/A	LOGGED BY C.Rambo	CHECKED BY

TYPE OF SEAL	TYPE	FR	TO	TYPE	FR	TO
	No. 1: Cement	0	100'	No. 3: N/A	N/A	N/A
	No. 2: N/A	N/A	N/A	No. 4: N/A	N/A	N/A

LOG OF BORING B-4

(Sheet 1 of 3)

DEPTH (feet)	SOIL GRAPHIC	MATERIAL DESCRIPTION	ELEVATION (feet)	FIELD TESTS: POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE,%	WATER LEVEL	DEPTH (feet)	SAMPLES: NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	INDEX PROPERTIES: MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
		Silty SAND (SM) brown, moist, medium dense														
			95													
									1	▨		20	2	110		
		yellow brown, loose														
									2	▯		8				
5		medium dense						5								
			90						3	▨		24	4	106		
									4	▯		16				
10								10	5	▨		26	6	107		
			85						6	▯		16				
15								15								
			80						7	▨		28	6	104		
20		**Poorly Graded SAND w/silt (SP-SM)** yellow brown, moist, dense						20								
			75						8	▯		32				
25								25								
			70						9	▨		49	3	106		

PROJECT NO. 26818674

Figure: A-1.4

MPWSP Desalination Plant Site
Monterey County, CA

LOG OF BORING B-4

Continued- Sheet 2 of 3

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet) approx	FIELD TESTS: POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE, %	WATER LEVEL	DEPTH (feet)	SAMPLES: NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	INDEX PROPERTIES: MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
	medium dense	65						10	▯		27				+#4=0 -#200=3%
	Silty SAND (SM) yellow brown, moist														
35	very dense	60					35	11	▨		61	13	118		
40	dense	55					40	12	▯		40				
45	brown w/ some black speckles, very dense	50					45	13	▨		78	15	115		
50	dense	45					50	14	▯		35				
55		40				▼	55								
60		35					60	15	▨		93/ 10"	16	107		
65		30				▽	65								

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Figure: A-1.4

MPWSP Desalination Plant Site
Monterey County, CA

LOG OF BORING B-4

Continued- Sheet 3 of 3

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet) approx	FIELD TESTS				SAMPLES			INDEX PROPERTIES			NOTES
			POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE, %	WATER LEVEL	NUMBER	RECOVERY (%)	BLOWS /foot	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	
70	very dense	25					16		63				
75		20											
	Lean CLAY (CL) gray brown												
80	**Silty SAND (SM)** gray brown, very dense	15					17		50/6"	19	107		
85		10											
	Lean CLAY w/ tr sand(CL) dark gray, very stiff												
90		5					18		35				
	Silty SAND (SM) orange brown, moist, very dense												
95	**Lean CLAY (CL)** moist, very stiff	0											
					158.3		19			41	81	7150	
100	BOTTOM OF BORING AT 100 FEET	-5											
105		-10											

MPWSP Desalination Plant Site; Monterey County, CA

BORING LOCATION:				GROUND SURFACE ELEVATION (ft): 97 approx TOP OF WELL CASING ELEVATION (ft):	
DRILLING AGENCY	Britton Exploration	DRILLER	Paul Britton	DATE STARTED: 5/22/13 DATE FINISHED: 5/22/13	
DRILLING EQUIPMENT	CME 55			COMPLETION DEPTHS	BORING: 51.5 (ft) WELL: N/A (ft)
DRILLING METHOD	Hollow Stem	DRILL BIT		HAMMER/ DROP	140/auto
SIZE AND TYPE OF CASING				NUMBER OF SAMPLES	DIST: UNDIST:
TYPE OF PERFORATION	N/A	FROM N/A TO N/A		WATER DEPTH (ft)	FIRST: N/A ▽ COMPL.: N/A ▼ 24 hr.: N/A ▽
SIZE AND TYPE OF PACK	N/A	FROM N/A TO N/A		LOGGED BY C.Rambo	CHECKED BY

TYPE OF SEAL	TYPE	FR	TO	TYPE	FR	TO
	No. 1: Cement	0	51.5'	No. 3: N/A	N/A	N/A
	No. 2: N/A	N/A	N/A	No. 4: N/A	N/A	N/A

LOG OF BORING B-5

(Sheet 1 of 2)

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet)	FIELD TESTS: POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE,%	WATER LEVEL	DEPTH (feet)	SAMPLES: NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	INDEX PROPERTIES: MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
	Silty SAND (SM) brown, moist, medium dense														
								1	▨		21	4	118		
		95													
	Poorly Graded SAND w/silt (SP-SM) orange brown, moist, very loose														
								2	▯		2				
5							5								
								3	▨		15	4	107		
	medium dense														
		90													
								4	▯		11				
10							10	5	▨		24	9	104		
	yellow brown														
		85						6	▯		17				
15	dense						15								
								7	▨		43	7	103		
		80													
20	medium dense						20								
								8	▯		24				
		75													
25	very dense						25								
								9	▨		84/ 10.5"	3	109		
		70													

MPWSP Desalination Plant Site
Monterey County, CA

LOG OF BORING B-5

Continued- Sheet 2 of 2

brown, dense

Silty SAND (SM)
orange brown, very dense

dense

BOTTOM OF BORING AT 51-1/2 FEET

DEPTH (feet)	SAMPLES NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
	10			34				
35	11	▨		82	11	119		
40	12			36				
45	13	▨		47	11	111		
50	14			38				

MPWSP Desalination Plant Site; Monterey County, CA

BORING LOCATION:				GROUND SURFACE ELEVATION (ft): 83 approx TOP OF WELL CASING ELEVATION (ft):	
DRILLING AGENCY	Britton Exploration	DRILLER	Paul Britton	DATE STARTED: 5/22/13 DATE FINISHED: 5/22/13	
DRILLING EQUIPMENT	CME 55			COMPLETION DEPTHS	BORING: 51.5 (ft) WELL: N/A (ft)
DRILLING METHOD	Hollow Stem	DRILL BIT		HAMMER/ DROP	140/auto
SIZE AND TYPE OF CASING				NUMBER OF SAMPLES	DIST: UNDIST:
TYPE OF PERFORATION	N/A	FROM N/A	TO N/A	WATER DEPTH (ft)	FIRST: 48 ▽ COMPL.: N/A ▼ 24 hr.: N/A ▽
SIZE AND TYPE OF PACK	N/A	FROM N/A	TO N/A	LOGGED BY C.Rambo	CHECKED BY

TYPE OF SEAL	TYPE	FR	TO	TYPE	FR	TO
	No. 1: Cement	0	51.5'	No. 3: N/A	N/A	N/A
	No. 2: N/A	N/A	N/A	No. 4: N/A	N/A	N/A

LOG OF BORING B-6

(Sheet 1 of 2)

DEPTH (feet)	SOIL GRAPHIC	MATERIAL DESCRIPTION	ELEVATION (feet)	FIELD TESTS POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE,%	WATER LEVEL	DEPTH (feet)	SAMPLES NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	INDEX PROPERTIES MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
		Silty Sand (SM) dark brown, moist, medium dense														
									1	▨		15	3	112		
			80													
									2	▯		13				
5								5								
									3	▨		29				
									4	▯		11				
		Poorly Graded Sand w/ silt (SP-SM) yellow brown w/ brown layers, moist, medium dense	75													
10								10	5	▨		20	11	111		
									6	▯		18				
			70													
15								15								
		dense							7	▨		44	9	125		
			65													
20		**Silty Sand (SM)** orange brown, moist, dense						20								
									8	▯		38				
			60													
25								25								
		very dense							9	▨		82/ 11"	12	118		
			55													

MPWSP Desalination Plant Site
Monterey County, CA

LOG OF BORING B-6

Continued- Sheet 2 of 2

DEPTH (feet)	SOIL GRAPHIC	MATERIAL DESCRIPTION	ELEVATION (feet) approx	FIELD TESTS				DEPTH (feet)	SAMPLES				INDEX PROPERTIES			NOTES
				POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE, %	WATER LEVEL		NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	
		dense							10	▯		40				
			50													
35		light brown, very dense						35	11	▨		84/ 11"	9	112		
			45													
40		yellow brown, dense						40	12	▯		45				
			40													
45		very moist, very dense						45	13	▨		55	19	108		
			35				∇									
50		wet, dense						50	14	▯		46				
		BOTTOM OF BORING AT 51-1/2 FEET	30													
55								55								
			25													
60								60								
			20													
65								65								
			15													

MPWSP Desalination Plant Site; Monterey County, CA

BORING LOCATION:		GROUND SURFACE ELEVATION (ft): 97 approx TOP OF WELL CASING ELEVATION (ft):	
DRILLING AGENCY Britton Exploration	DRILLER Paul Britton	DATE STARTED: 5/23/13 DATE FINISHED: 5/23/13	
DRILLING EQUIPMENT CME 55		COMPLETION DEPTHS BORING: 51.5 (ft) WELL: N/A (ft)	
DRILLING METHOD Hollow Stem	DRILL BIT	HAMMER/ DROP 140/auto	
SIZE AND TYPE OF CASING		NUMBER OF SAMPLES DIST: UNDIST:	
TYPE OF PERFORATION N/A	FROM N/A TO N/A	WATER DEPTH (ft) FIRST: N/A ▽ COMPL.: N/A ▼ 24 hr.: N/A ▽	
SIZE AND TYPE OF PACK N/A	FROM N/A TO N/A	LOGGED BY C.Rambo	CHECKED BY

TYPE OF SEAL	TYPE	FR	TO	TYPE	FR	TO
	No. 1: Cement	0	51.5'	No. 3: N/A	N/A	N/A
	No. 2: N/A	N/A	N/A	No. 4: N/A	N/A	N/A

LOG OF BORING B-7

(Sheet 1 of 2)

				FIELD TESTS					SAMPLES				INDEX PROPERTIES			
DEPTH (feet)	SOIL GRAPHIC	MATERIAL DESCRIPTION	ELEVATION (feet)	POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE,%	WATER LEVEL	DEPTH (feet)	NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
		Silty Sand (SM) brown, moist, loose														
			95						1			10	2	106		
									2			7				
5		lighter brown, dense						5	3			35	4	120		
		light brown, medium dense	90						4			21				
10		**Poorly Graded Sand w/silt (SP-SM)** brown. moist, medium dense						10	5			18	3	103		
			85						6			11				+#4=0 -#200=3%
15								15	7			26	3	102		
			80													
20								20	8			28				
			75													
25		dense						25	9			33	6	112		
			70													
		Silty Sand (SM) yellow brown, moist, dense														

MPWSP Desalination Plant Site
Monterey County, CA

LOG OF BORING B-7

Continued- Sheet 2 of 2

DEPTH (feet)	SOIL GRAPHIC	MATERIAL DESCRIPTION	ELEVATION (feet) approx	FIELD TESTS				DEPTH (feet)	SAMPLES				INDEX PROPERTIES			NOTES
				POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE, %	WATER LEVEL		NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	
									10	▯		36				
			65													
35		w/ some orange brown streaks, dense						35	11	▨		38	9	111		
			60													
40		orange brown, very moist, medium dense						40	12	▯		30				+#4=0 -#200=12%
			55													
45		very dense						45	13	▨		74	5	112		
			50													
50		dense						50	14	▯		39				
		BOTTOM OF BORING AT 51-1/2 FEET	45													
55								55								
			40													
60								60								
			35													
65								65								
			30													

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Figure: A-1.7

MPWSP Desalination Plant Site; Monterey County, CA

BORING LOCATION:				GROUND SURFACE ELEVATION (ft): 99 approx TOP OF WELL CASING ELEVATION (ft):	
DRILLING AGENCY	Britton Exploration	DRILLER	Paul Britton	DATE STARTED: 5/23/13 DATE FINISHED: 5/23/13	
DRILLING EQUIPMENT	CME 55			COMPLETION DEPTHS	BORING: 51.5 (ft) WELL: N/A (ft)
DRILLING METHOD	Hollow Stem	DRILL BIT		HAMMER/ DROP	140/auto
SIZE AND TYPE OF CASING				NUMBER OF SAMPLES	DIST: UNDIST:
TYPE OF PERFORATION	N/A	FROM N/A	TO N/A	WATER DEPTH (ft)	FIRST: N/A ▽ COMPL.: N/A ▼ 24 hr.: N/A ▽
SIZE AND TYPE OF PACK	N/A	FROM N/A	TO N/A	LOGGED BY C.Rambo	CHECKED BY

TYPE OF SEAL	TYPE	FR	TO	TYPE	FR	TO
	No. 1: Cement	0	51.5'	No. 3: N/A	N/A	N/A
	No. 2: N/A	N/A	N/A	No. 4: N/A	N/A	N/A

LOG OF BORING B-8

(Sheet 1 of 2)

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet)	FIELD TESTS: POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE,%	WATER LEVEL	SAMPLES: NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	INDEX PROPERTIES: MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
	Silty Sand (SM) brown, moist, very loose													
							1	▨		2	3	101		
	light brown, very loose	95					2	□		9				
5	medium dense						3	▨		28	5	120		
							4	□		11				
		90												
10	light brown w/ brown mottles, medium dense						5	▨		21				
	Poorly Graded Sand w/silt (SP-SM) light brown w/ some brown mottling, moist, medium dense						6	□		12				
		85												
15	medium dense						7	▨		26	4	106		
		80												
20							8	□		18				+#4=0 -#200=3%
		75												
25	dense						9	▨		44	4	113		
		70												

MPWSP Desalination Plant Site
Monterey County, CA

LOG OF BORING B-8

Continued- Sheet 2 of 2

				FIELD TESTS					SAMPLES				INDEX PROPERTIES			
DEPTH (feet)	SOIL GRAPHIC	MATERIAL DESCRIPTION	ELEVATION (feet) approx	POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE, %	WATER LEVEL	DEPTH (feet)	NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
		light brown w/orange brown mottles							10	▯		21				
		Silty Sand (SM) orange brown, moist, dense	65													
35								35	11	▨		42	12	121		
			60													
40								40	12	▯		32				
			55													
45		very dense						45	13	▨		94/ 10"	7	116		
			50													
50								50	14	▯		50				
		BOTTOM OF BORING AT 51-1/2 FEET														
			45													
55								55								
			40													
60								60								
			35													
65								65								
			30													

MPWSP Desalination Plant Site; Monterey County, CA

BORING LOCATION:		GROUND SURFACE ELEVATION (ft): 110 approx TOP OF WELL CASING ELEVATION (ft):	
DRILLING AGENCY	Britton Exploration DRILLER Paul Britton	DATE STARTED: 5/23/13 DATE FINISHED: 5/24/13	
DRILLING EQUIPMENT	CME 55	COMPLETION DEPTHS	BORING: 51.5 (ft) WELL: N/A (ft)
DRILLING METHOD	Hollow Stem DRILL BIT	HAMMER/ DROP	140/auto
SIZE AND TYPE OF CASING		NUMBER OF SAMPLES	DIST: UNDIST:
TYPE OF PERFORATION	N/A FROM N/A TO N/A	WATER DEPTH (ft)	FIRST: N/A ▽ COMPL.: N/A ▼ 24 hr.: N/A ▽
SIZE AND TYPE OF PACK	N/A FROM N/A TO N/A	LOGGED BY	C.Rambo CHECKED BY

TYPE OF SEAL	TYPE	FR	TO	TYPE	FR	TO
	No. 1: Cement	0	51.5'	No. 3: N/A	N/A	N/A
	No. 2: N/A	N/A	N/A	No. 4: N/A	N/A	N/A

LOG OF BORING B-9

(Sheet 1 of 2)

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet)	POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE,%	WATER LEVEL	DEPTH (feet)	NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
	Silty Sand (SM) brown, moist, medium dense	110													
								1	▨		13	2	104		
	light brown							2	☐		9				
	Poorly Graded Sand (SP) light brown, moist, medium dense														
5		105					5								
								3	▨		20				
								4	☐		13				+#4=0 -#200=3%
10		100					10	5	▨		21	6	106		
								6	☐		16				
15	dense	95					15								
								7	▨		38	4	110		
20	medium dense	90					20								
								8	☐		22				
25	dense	85					25								
								9	▨		41	3	110		
		80													

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Figure: A-1.9

MPWSP Desalination Plant Site
Monterey County, CA

LOG OF BORING B-9

Continued- Sheet 2 of 2

				FIELD TESTS					SAMPLES			INDEX PROPERTIES			
DEPTH (feet)	SOIL GRAPHIC	MATERIAL DESCRIPTION	ELEVATION (feet) approx	POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE, %	WATER LEVEL	DEPTH (feet)	NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
	░		80						10	▯		32				
35	░		75					35	11	▨		44	3	106		
40	░		70					40	12	▯		41				
45	░	very dense	65					45	13	▨		55	8	120		
50	░	medium dense	60					50	14	▯		25				
		BOTTOM OF BORING AT 51-1/2 FEET														
55			55					55								
60			50					60								
65			45					65								

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Figure: A-1.9

MPWSP Desalination Plant Site; Monterey County, CA

BORING LOCATION:
GROUND SURFACE ELEVATION (ft): 95 approx
TOP OF WELL CASING ELEVATION (ft):
DRILLING AGENCY: Britton Exploration
DRILLER: Paul Britton
DATE STARTED: 5/24/13
DATE FINISHED: 5/24/13
DRILLING EQUIPMENT: CME 55
COMPLETION DEPTHS: BORING: 51.5 (ft) WELL: N/A (ft)
DRILLING METHOD: Hollow Stem
DRILL BIT:
HAMMER/DROP: 140/auto
SIZE AND TYPE OF CASING:
NUMBER OF SAMPLES: DIST: UNDIST:
TYPE OF PERFORATION: N/A FROM N/A TO N/A
WATER DEPTH (ft): FIRST: N/A ▽ COMPL.: N/A ▼ 24 hr.: N/A ▽
SIZE AND TYPE OF PACK: N/A FROM N/A TO N/A
LOGGED BY: C.Rambo
CHECKED BY:

TYPE OF SEAL	TYPE	FR	TO	TYPE	FR	TO
	No. 1: Cement	0	51.5'	No. 3: N/A	N/A	N/A
	No. 2: N/A	N/A	N/A	No. 4: N/A	N/A	N/A

LOG OF BORING B-10

(Sheet 1 of 2)

DEPTH (feet)	SOIL GRAPHIC	MATERIAL DESCRIPTION	ELEVATION (feet)	FIELD TESTS: POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE,%	WATER LEVEL	DEPTH (feet)	SAMPLES: NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	INDEX PROPERTIES: MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
		Silty Sand (SM) brown, moist, medium dense	95													
									1	▨		16				
		loose							2	▯		6				+#4=0 -#200=9%
5		**Poorly Graded Sand w/ silt (SP-SM)** light yellow brown, moist, medium dense	90					5	3	▨		18	3	106		
		orange brown, loose							4	▯		10				+#4=0 -#200=3%
		medium dense														
10			85					10	5	▨		19	8	113		
									6	▯		14				
15		very dense	80					15	7	▨		55	4	106		
20		dense	75					20	8	▯		35				
25		very dense	70					25	9	▨		58	3	105		
			65													

MPWSP Desalination Plant Site
Monterey County, CA

LOG OF BORING B-10

Continued- Sheet 2 of 2

				FIELD TESTS					SAMPLES				INDEX PROPERTIES			
DEPTH (feet)	SOIL GRAPHIC	MATERIAL DESCRIPTION	ELEVATION (feet) approx	POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE, %	WATER LEVEL	DEPTH (feet)	NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
		medium dense	65						10			27				
35		very dense, orange brown	60					35	11			64	12	122		
40		medium dense	55					40	12			30				
45		very dense	50					45	13			62	10	114		
50			45					50	14			62				
		BOTTOM OF BORING AT 51-1/2 FEET														
55			40					55								
60			35					60								
65			30					65								

URS

PROJECT NO. 26818674

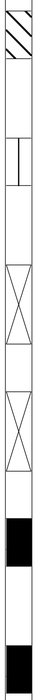
Figure: A-1.10

Project: MPWSP Desalination Plant Site
Location: Monterey County, CA

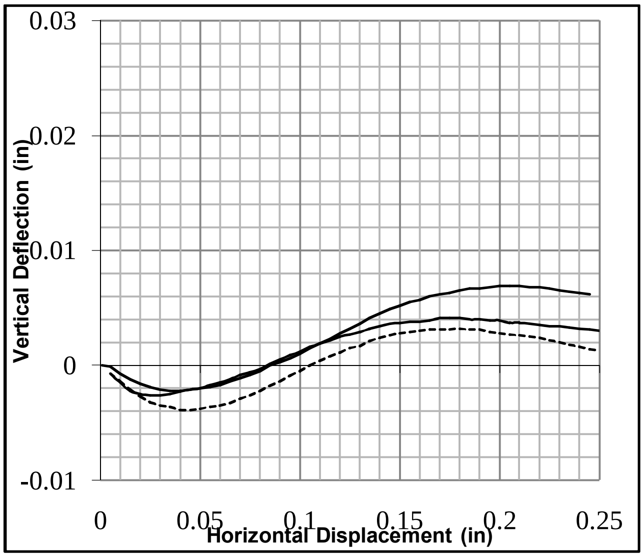
Log of Boring LEGEND

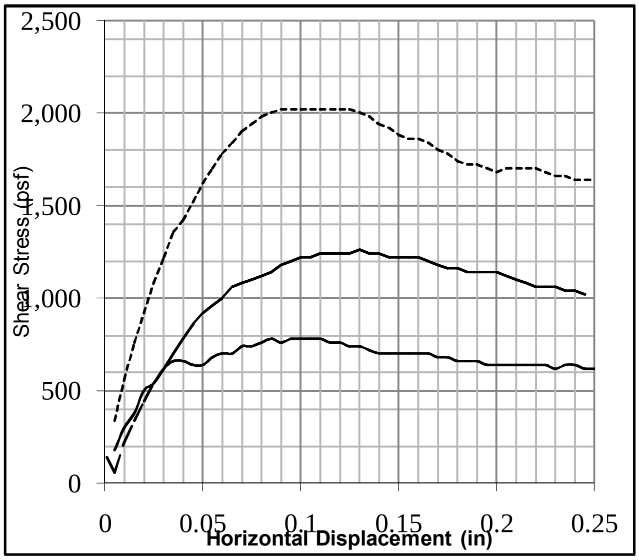
Date Drilled:
Type of Boring: (as noted)
Hammer/drop: (as noted)

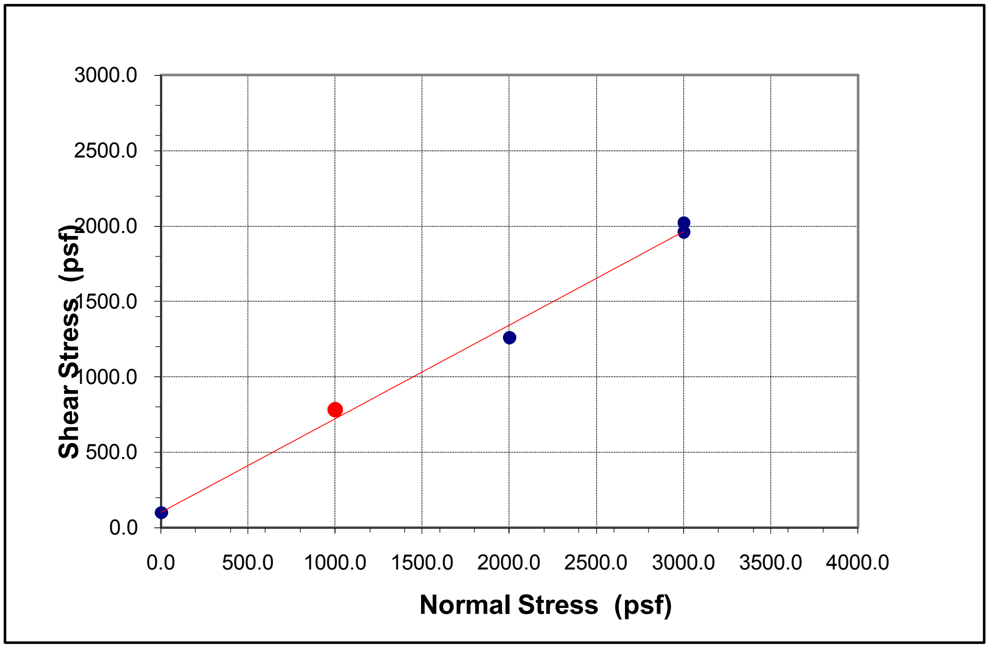
Remarks:
Surface Elevation: feet (approx.)



Depth, feet	Samples	Blows/ft	Recovery, (%)	Graphic Log	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf	Other Tests/ Remarks
					Arrow denotes bottom of fill layer FILL ↑				
5					← 2 inch inside diameter Modified California sample				
					← 2 inch outside diameter Standard Split Spoon sample (Standard Penetration Test)				
10									
					← 3 inch outside diameter Shelby tube sample				
15									
		350 psi			← Hydraulic Pressure required to push Shelby tube sampler				
20		29			← Blow count with 140-lb hammer falling 30 inches for 12 inches of penetration				
25		50/ 5"			← Blow count with 140-lb hammer falling 30 inches for 5 inches of penetration				
					▽ Groundwater level at time of drilling				
30									
					▼ Groundwater at a time after drilling (as specified)				
35					**KEY TO LABORATORY TESTS**				
					PP= Pocket Penetrometer reading in tons per square foot (tsf)				PP=3.0tsf
					LL= Liquid Limit (%) PI= Plasticity Index (%) NOTE: PI= LL - (Plastic Limit [%])				LL=42 PI=21
40					+#4= Percentage of material retained on #4 sieve -#200= Percentage of material passing #200 sieve				+#4=13% -#200=10%
45									







Legend

———— Test 1
– – – – – Test 2
………… Test 3

Results

C = 100 psf
phi = 32 deg.

Gs = 2.70
Type = undisturbed

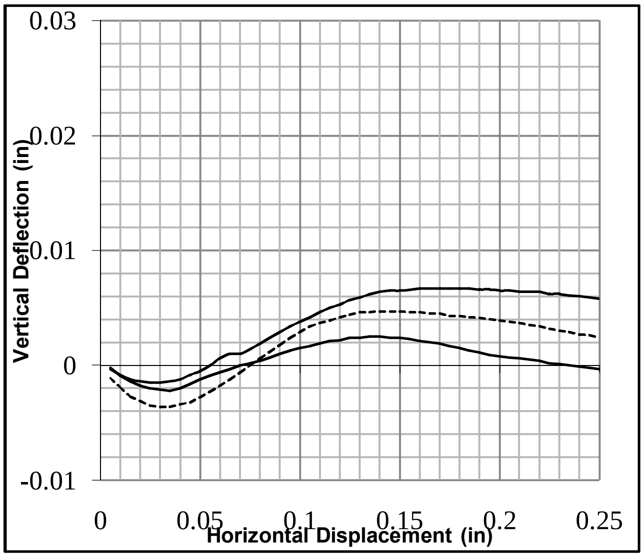
Test no.	SigN psf	Peak Shear str., psf	Displ. in.	Strain Rate in./hr	Initial MC %	Initial DD pcf	Initial Sat. %	Initial Void Ratio	Initial Ht. in.	Initial Dia. in.	Final MC %	Final DD pcf	Final Sat. %	Final Void Ratio	Final Ht. in.
1	1000	781	0.085	0.18	5.2	98.7	20	0.708	1.00	1.870	18.2	99.2	70	0.698	0.995
2	2000	1262	0.130	0.18	7.4	98.6	28	0.710	1.00	1.870	17.4	98.7	66	0.708	0.999
3	3000	2023	0.090	0.18	7.2	99.1	28	0.701	1.00	1.870	16.7	99.8	65	0.690	0.993

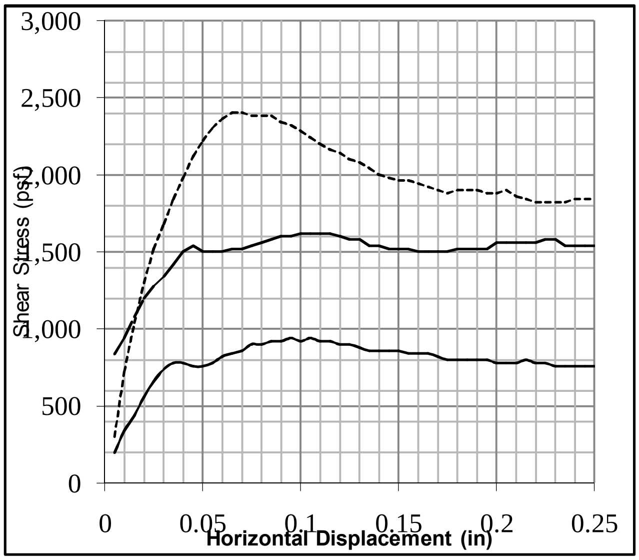
Client: **URS**
Boring #: **5**
Sample #: **3**
Project: **CAL AM DESAL PLANT**
Project #: **26818674**
Depth (ft): **5-6.5**
Project #: **46227976**
Soil: **Yellow brown Sand**

TEST REPORT: **Direct shear - inundated, consolidated, & drained test**

Signet Testing Labs, Inc.

Figure No: A-3.1



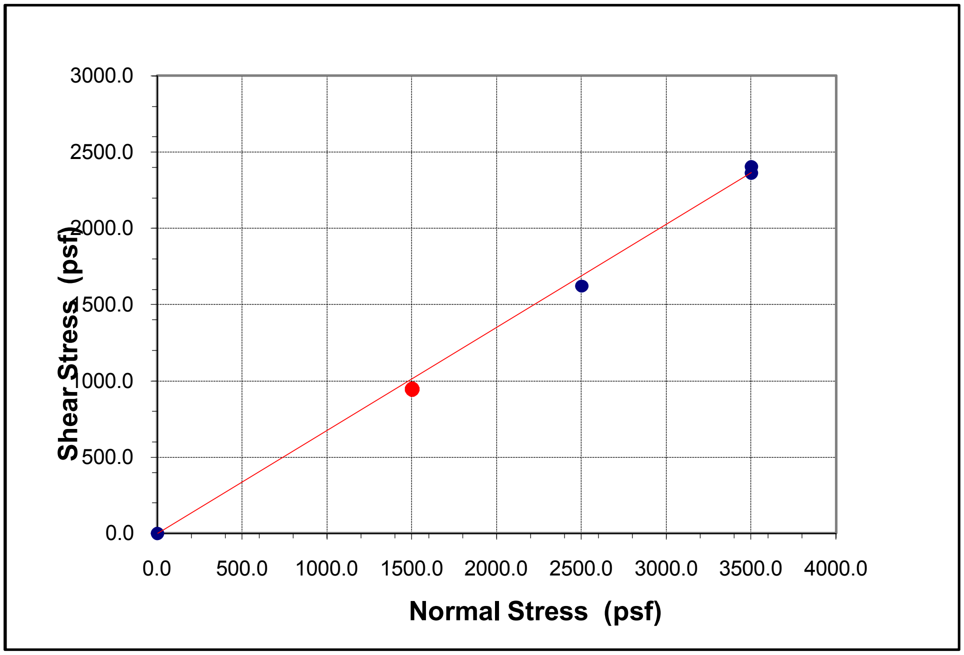


Legend

———— Test 1

– – – – – Test 2

………… Test 3



Results

C = 0 psf
phi = 34 deg.

Gs = 2.70
Type = undisturbed

Test no.	SigN psf	Peak Shear str., psf	Displ. in.	Strain Rate in./hr	Initial MC %	Initial DD pcf	Initial Sat. %	Initial Void Ratio	Initial Ht. in.	Initial Dia. in.	Final MC %	Final DD pcf	Final Sat. %	Final Void Ratio	Final Ht. in.
1	1500	941	0.095	0.18	5.5	97.0	20	0.738	1.00	1.870	18.5	97.6	69	0.727	0.994
2	2500	1622	0.100	0.18	6.5	96.8	24	0.741	1.00	1.870	19.5	98.5	74	0.712	0.983
3	3500	2404	0.065	0.18	5.0	99.4	19	0.696	1.00	1.870	18.5	100.3	73	0.681	0.991

Client: **URS**

Boring #: **8**

Sample #: **5**

Project: **CAL AM DESAL PLANT**

Project #: **26818674**

Depth (ft): **9-10.5**

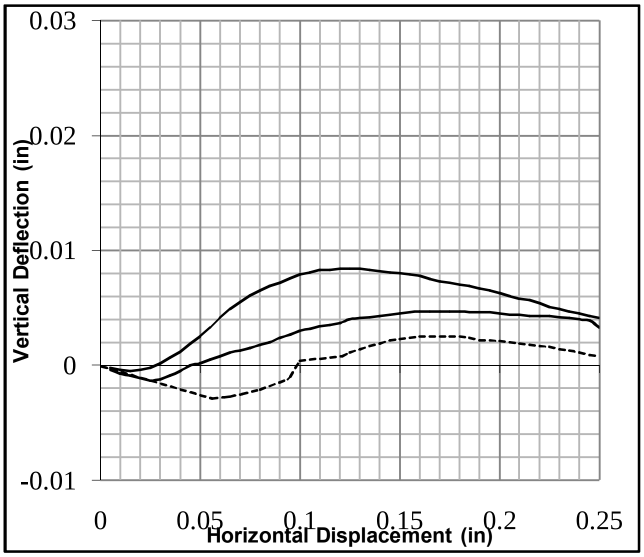
Project #: **46227976**

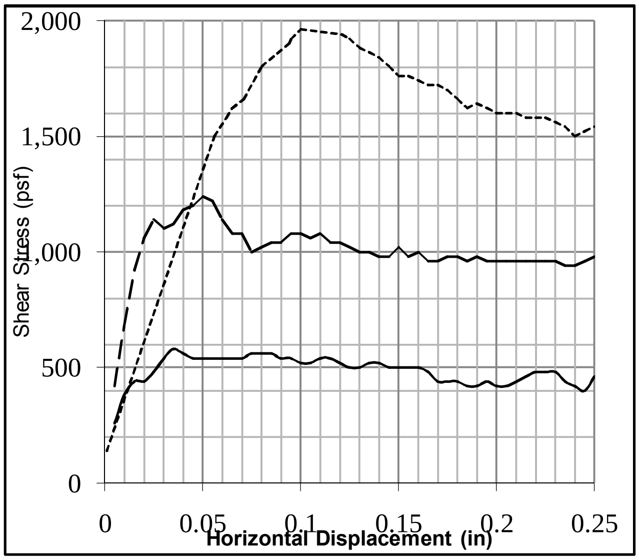
Soil: **Yellow brown Sand**

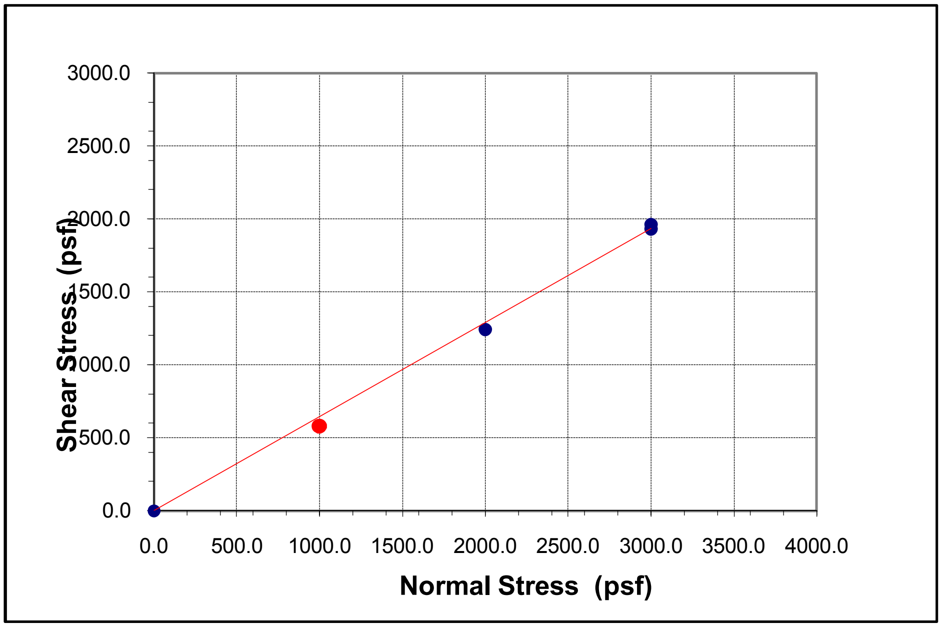
TEST REPORT: Direct shear - inundated, consolidated, & drained test

Signet Testing Labs, Inc.

Figure No: A-3.2







Legend

————	Test 1
– – – – –	Test 2
…………	Test 3

Results

C = 0 psf
phi = 33 deg.

Gs = 2.70
Type = undisturbed

Test no.	SigN psf	Peak Shear str., psf	Displ. in.	Strain Rate in./hr	Initial MC %	Initial DD pcf	Initial Sat. %	Initial Void Ratio	Initial Ht. in.	Initial Dia. in.	Final MC %	Final DD pcf	Final Sat. %	Final Void Ratio	Final Ht. in.
1	1000	581	0.035	0.18	6.0	93.2	20	0.808	1.00	1.870	19.3	96.5	70	0.747	0.966
2	2000	1242	0.050	0.18	2.9	97.7	11	0.724	1.00	1.870	18.3	99.0	70	0.702	0.987
3	3000	1963	0.100	0.18	5.6	97.5	21	0.729	1.00	1.870	18.6	99.3	72	0.697	0.982

Client: **URS**

Boring #: **9**

Sample #: **3**

Project: **CAL AM DESAL PLANT**

Project #: **26818674**

Depth (ft): **5-6.5**

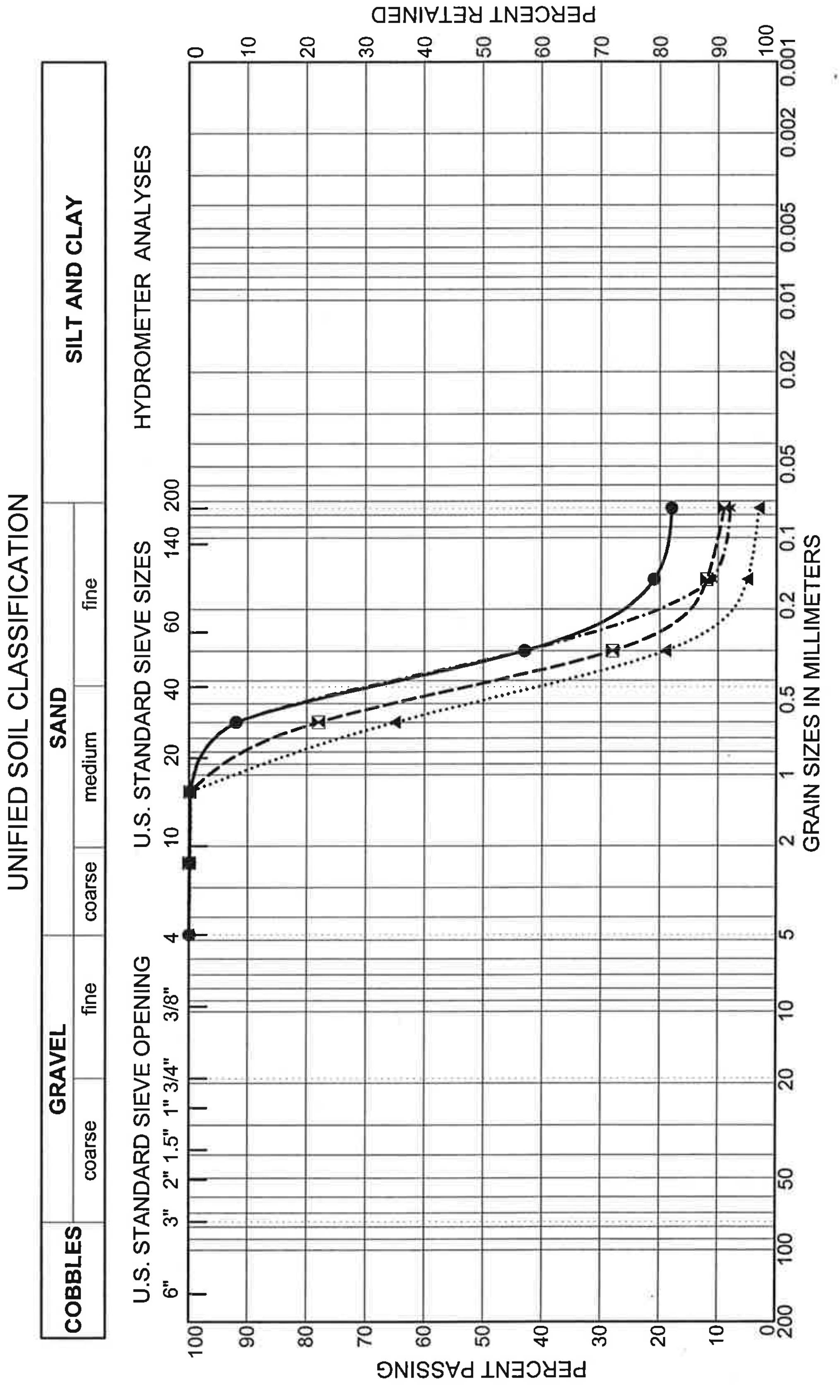
Project #: **46227976**

Soil: **Yellow brown Sand**

TEST REPORT: **Direct shear - inundated, consolidated, & drained test**

Signet Testing Labs, Inc.

Figure No: A-3.3



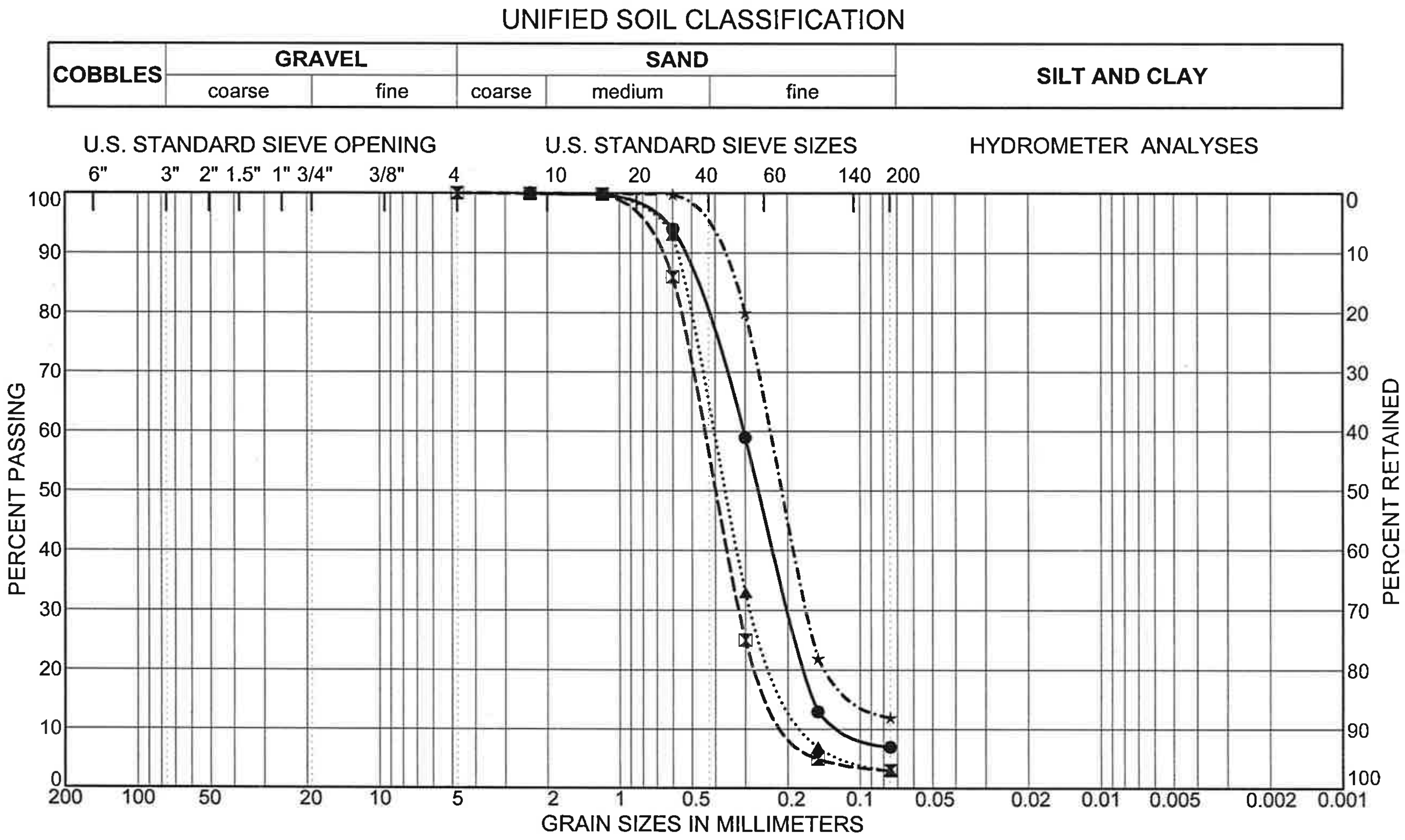
Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Classification
B-1	3	6	●			Silty SAND (SM)
B-10	2	4	⊠			Poorly graded SAND (SP-SM) with silt
B-10	4	8	▲			Poorly graded SAND (SP)
B-2	2	4	★			Poorly graded SAND (SP-SM) with silt

Project : MPWSP Desalination Plant Site
Project No. 26818674

GRAIN SIZE DISTRIBUTION CURVES

Fig. A-4.1

URS

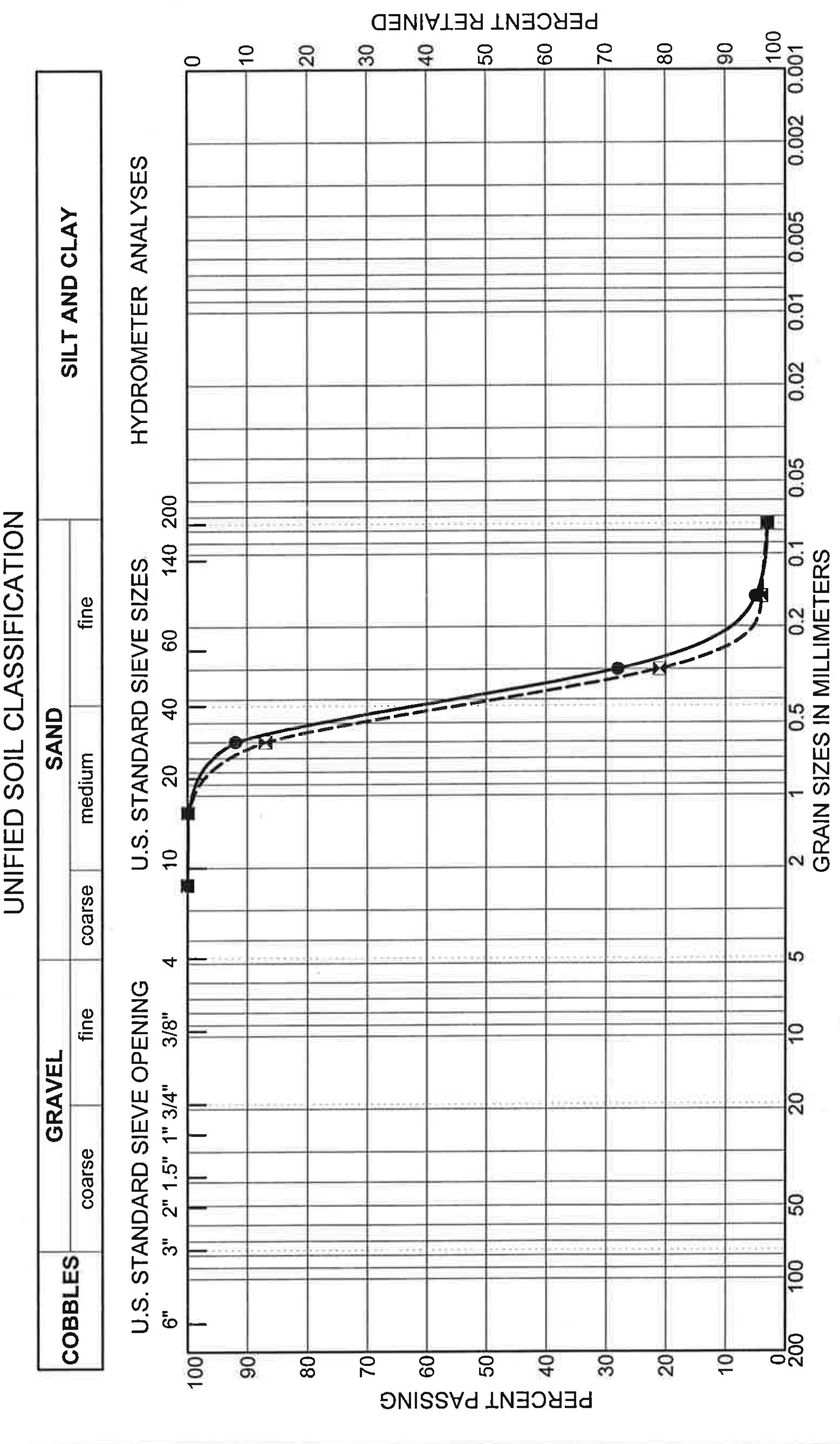


Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Classification
B-2	4	8	●			Poorly graded SAND (SP-SM) with silt
B-4	10	31	⊠			Poorly graded SAND (SP)
B-7	6	12	▲			Poorly graded SAND (SP)
B-7	12	41	★			Silty SAND (SM)

Project : MPWSP Desalination Plant Site
Project No. 26818674

GRAIN SIZE DISTRIBUTION CURVES

Fig. A-4.2



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Classification
B-8	8	21	●			Poorly graded SAND (SP)
B-9	4	8	⊠			Poorly graded SAND (SP)

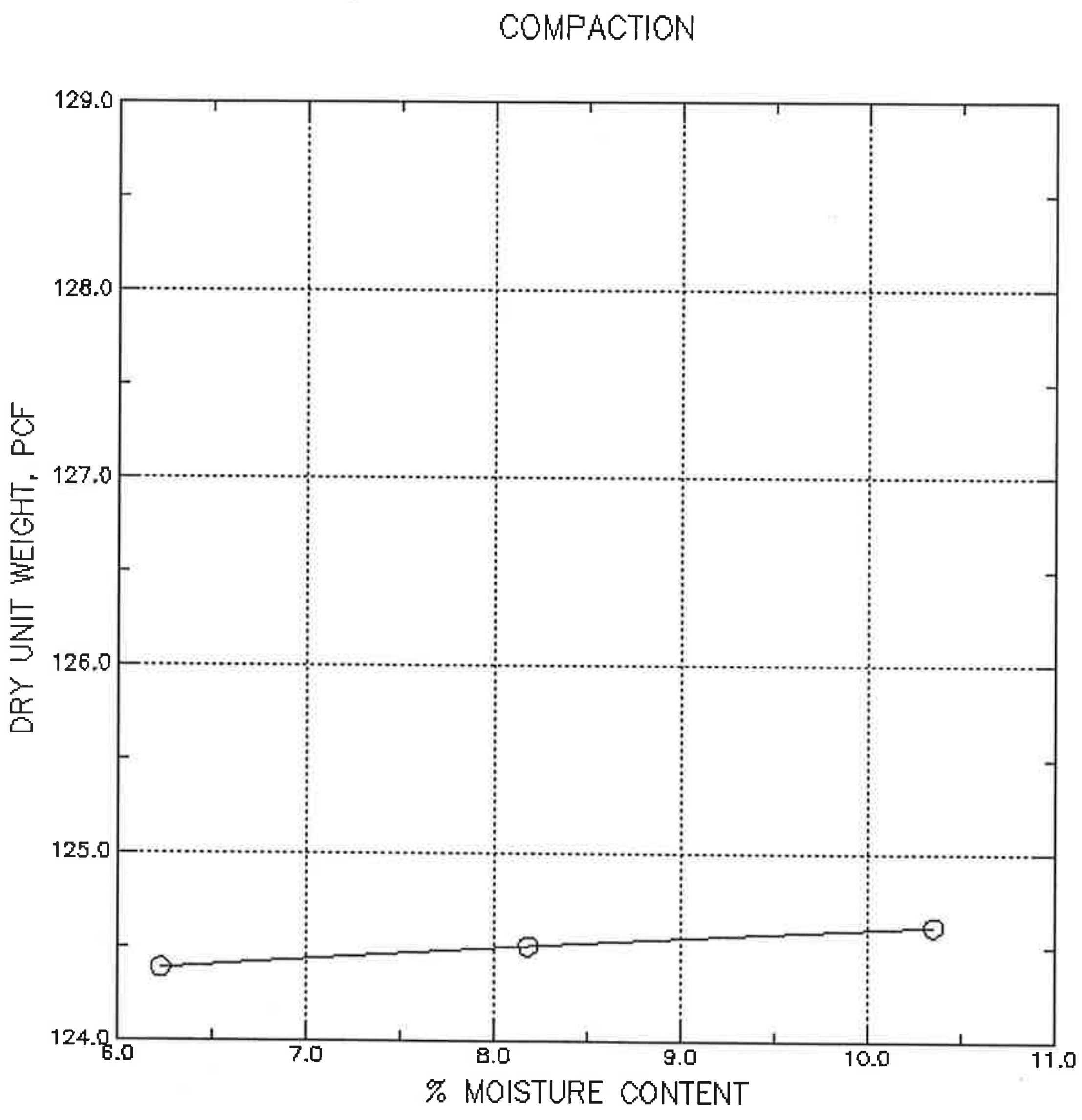
Project : MPWSP Desalination Plant Site
Project No. 26818674

GRAIN SIZE DISTRIBUTION CURVES

Fig. A-4.3

Boring No. : N/A
Sample No. : B-3
Tested by : CR
Filename : MDP-B3

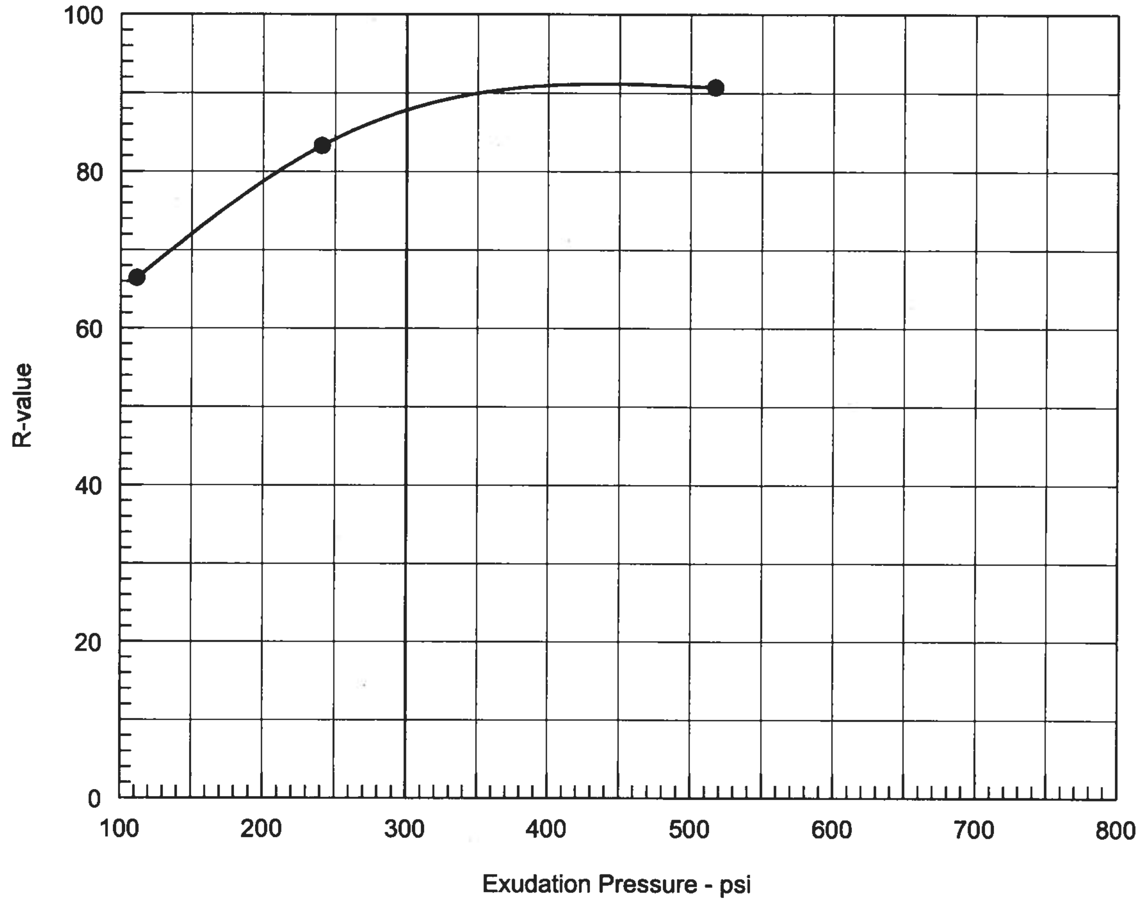
Project : Monterey Desal Plant
Project No.: 26818674
Location : Marina
Date: Thu Jun 20 2013



Sample Description : Reddish brown Pg SAND (SP-SM) with silt
Compaction Test Designation : None
Maximum Dry Density : 124.6 PCF
Optimum Moisture Content : 10.4 %

Figure A-5

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D 2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	300	122.7	10.0	0.00	36	2.55	111	66	66
2	350	123.5	8.7	0.00	19	2.51	241	83	83
3	350	124.8	8.1	0.00	10	2.47	517	91	91

Test Results	Material Description
R-value at 300 psi exudation pressure = 88	Brown poorly graded Sand with silt

Project No.: 46227976

Project:CAL AM DESAL PLANT 26818674

Source of Sample: B-6 **Depth:** 0-5

Date: 7/2/2013

R-VALUE TEST REPORT

SIGNET TESTING LABS, INC.

Tested by: DN

Checked by: GR

Remarks:

Figure A-6