VENICE AUXILIARY PUMPING PLANT

(SCH #2015111038)

FINAL ENVIRONMENTAL IMPACT REPORT

PREPARED FOR:

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Chapter 1
Introduction

1.1 Final EIR Organization

This chapter presents background and introductory information for the proposed Venice Auxiliary Pumping Plant (VAPP) Project (Proposed Project). Chapter 2, "Responses to Comments," presents information regarding the distribution of and comments on the Draft EIR, and the responses to these comments. Chapter 3, "Modifications to the Draft EIR," presents the modifications to the Draft EIR. This Final EIR fulfills the requirements of the California Environmental Quality Act (CEQA) (California Public Resources Code [PRC] 21000 et seq.), the State CEQA Guidelines (California Code of Regulations [CCR] 15000 et seq.). The City of Los Angeles (City), Department of Public Works, Bureau of Engineering (LABOE) is the CEQA lead agency.

1.2 Project Background

This section briefly describes the project background and the Proposed Project. A description of alternatives to the Proposed Project is provided in Chapter 4 (Comparison of Alternatives) of the Draft EIR.

The City owns and operates the Venice Pumping Plant (VPP) (Pump Station No. 646), located at 140 Hurricane Street in the Los Angeles community of Venice, adjacent to the Ballona Lagoon and the Grand Canal. The VPP is the City's largest pumping plant and it is considered a critical facility for conveying sewage from its tributary area. The facility was designed and built in 1957 and was last upsized and upgraded in 1987. Five pumps currently serve the facility. The VPP collects sewage from the City's Coastal Interceptor Sewer (CIS), which serves the communities of Topanga, Pacific Palisades, Brentwood, Venice, and Mar Vista. It also serves the City of Santa Monica and parts of Los Angeles County. Sewage is pumped south to the City's Hyperion Treatment Plant (HTP), located in Playa del Rey. Unlike other portions of the City's sewage collection and conveyance system, there are no diversions for bypassing the facility or associated CIS for required maintenance or in the event of an emergency. Moreover, the existing VPP is essentially built out and has no additional space for required back up pumps and associated equipment to ensure system reliability.

During dry-weather flows (no rain), two pumps generally pump an average of 20 million gallons per day (mgd) of sewage. However, all five pumps have been used simultaneously to convey sewage influent from the collection area to the HTP during wet-weather flows (rain), depending on conditions. During certain years, flows during wet-weather conditions have reached 50 mgd and on several occasions, during extreme weather events (e.g., 1990s and 2000s), the flows exceeded the combined and simultaneous pumping capacity of the facility, resulting in near-miss events, which would have required emergency discharges directly to the Grand Canal and Ballona Lagoon or overflows into the surrounding street network. To address these issues, LABOE began planning and designing projects that would upgrade and enhance the CIS and VPP (see Chapter 2, Project Description of the Draft EIR), including the Proposed Project.

Construction is anticipated to begin in February 2018 and last approximately 2 years.

1.3 Existing Conditions

This section presents the existing environmental setting for the Proposed Project.

1.3.1 Project Location

The Project Site comprises three undeveloped residential lots, zoned Residential Water Ways (RW2-1), for a combined total of 12,076.5 square feet. Two lots are owned by the City of Los Angeles and located next to the existing VPP. The addresses are 3813 and 3817 South Esplanade (Assessor's Parcel Numbers [APNs] 4225-008-904 and 4225-008-904, respectively) (north parcels). One lot is privately owned; the City is in the process of acquiring the lot, which is located at 128 Hurricane Street (APN 4225-010-016) (west parcel). The three lots are not contiguous; however, their functions are integrative and needed to operate the VPP and VAPP as one facility. The west parcel comprises a single oblong lot west of the VPP that measures 85 by 60 feet. The north parcels, comprising two abutting parcels located north of the VPP, are approximately 90 feet long and 70 feet wide combined. Canal Court separates the VPP from the west parcel. Hurricane Street separates the VPP from the north parcels. The VPP manifold is underneath this portion of Hurricane Street (between Canal Court and Esplanade).

Figure 2-1, Project Vicinity Map of the Draft EIR, shows the location for the proposed VAPP in relation to the City and adjacent cities and communities. The Project Site is within the Ballona Lagoon West sub area of the Venice Community Planning Area and Council District 11.

Figure 2-2, Project Location Map of the Draft EIR shows the three construction Laydown Areas that will be used for material and equipment storage as well as construction staging during the anticipated 2-year construction period. Laydown Area 1 is located at 128 Hurricane Street, which is already part of the Project Site. Laydown Area 2 is a lot located at 3821 Via Dolce (APN 4225-013-904). This lot is approximately 3,537 square feet in size and across from the Venice Grand Canal, east of the Project Site. The lot is accessed from Via Dolce. Laydown Area 3 (APN 4296-001-270) is located at 9940 Jefferson Boulevard in Culver City, which is approximately 7 miles east of the Project Site. Laydown Area 3 is owned by the City of Los Angeles and approximately 198,735 square feet in size.

1.3.2 Environmental Setting

As shown in Figure 2-2, Project Location Map of the Draft EIR, the front eastern property lines of 3813 and 3817 South Esplanade abuts the Venice Grand Canal and are bounded by Canal Street to the west, Hurricane Street to the south, and multi-family residential to the north. The 128 Hurricane Street southern property line abuts Ballona Lagoon and is bounded by Hurricane Street to the north, Canal Court to the east, and multi-family residential to the west. The Esplanade, which is publicly accessible, connects the Ballona Lagoon trail with the California Coastal Trail at Washington Boulevard, 1,830 feet north of the Project Site. The Project Site is located within the California Coastal Zone. The Grand Canal and Ballona Lagoon (components of the Venice Canal System) are designated as Environmentally Sensitive Habitat Areas (ESHAs) by the California Coastal Commission, County of Los Angeles, and City of Los Angeles. The Venice Canal System, located adjacent to the Project Site, is a City of Los Angeles Historic-Cultural Monument (No. 270) and part of the Venice Historic Canal District (ZI–2370). The Project Site is also located within City Council District 11 and the Venice Community Planning Area (Ballona Lagoon West). The Project Site is classified as being within a liquefiable zone, a tsunami inundation zone, and a methane zone. The

128 Hurricane Street parcel is the site of an abandoned oil well and the overall Project Site is within the Playa del Rey oil/gas field and near other plugged and/or abandoned wells. Applicable plans include the Venice Local Coastal Plan Land Use Plan, Venice Specific Plan, and Coastal Corridor Transportation Specific Plan. The Proposed Project is subject to local City of Los Angeles Residential Design Standards and the Cultural Affairs Public Works Improvement Arts Program.

The VPP is one of five City-owned and operated pumping plants and part of the Hyperion Treatment Plant (HTP) service area (see Figure 2-3, Hyperion System of the Draft EIR). The HTP is located on a 144-acre site adjacent to Santa Monica Bay, southwest of Los Angeles International Airport (LAX) and approximately 4 miles south of the VPP. The area served by the HTP covers approximately 328,000 acres of the Los Angeles metropolitan area. The HTP, the largest treatment facility in the City, was designed and constructed to be a high-rate secondary treatment facility. The HTP provides primary treatment for all influent flow. The HTP is also the City of Los Angeles' main treatment facility for recycled water. Hyperion Treatment Plant is a recycled water source for the West Basin Municipal Water District, a public agency that provides recycled water from Hyperion to the cities of Carson, El Segundo, Gardena, Hawthorne, Hermosa Beach, Inglewood, Manhattan Beach, Lawndale, Redondo Beach, and unincorporated areas of Los Angeles County within its service area, as well as the cities of Torrance and Los Angeles, which are outside of its service area.

The HTP receives sewage from five major interceptor sewer systems, including the Coastal Interceptor Sewer (CIS). The CIS runs parallel to the coastal area of the City and includes a collection service area that encompasses the communities of Topanga, Pacific Palisades, Brentwood, Venice, and Mar Vista. It also services Santa Monica and parts of Los Angeles County. The CIS conveys untreated sewage flows from the collection area to the VPP via a 48-inch force main. Because of inadequate hydraulic head (liquid pressure), sewage flows from the CIS that enter the VPP must be continuously pumped in order to reach the HTP. The VPP is the City's largest pumping plant. Within the immediate vicinity of the VPP, the CIS parallels the Grand Canal. An emergency sewer discharge pipe is located within the Grand Canal. In an emergency, flows can be diverted to the Ballona Lagoon.

1.3.3 Project Site Land Use Designation and Zoning and Surrounding Uses

The Project Site is currently vacant, comprising three unimproved lots. These are zoned under the City of Los Angeles Planning and Zoning Code as RW2–1; the City of Los Angeles Venice Community Plan land use designation is Residential/Medium Residential (see Section 3.8, Land Use and Planning of the Draft EIR, for more details). Laydown Area 3 in Culver City is zoned Industrial General (IG).

The Project Site is highly urbanized within the Ballona Lagoon West sub-area of Venice, north of Ironside Street. This area contains a mix of residential, open space, and public facility land uses. The Proposed Project is considered infill development. North and west of 3813 and 3817 South Esplanade are single and multi-family residential uses. To the east is the Venice Canal System, which is designated as open space. To the south is the VPP, which is a public facilities land use.

The 128 Hurricane Street parcel is bounded by the Ballona Lagoon to the south, Hurricane Street to the north, multi-family residential to the west, and Canal Court and the VPP to the east.

1.4 Project Objectives

The Proposed Project is intended to meet the following objectives:

- Prevent potential impacts on human and environmental health caused by sewage spills from the existing VPP during extreme wet-weather events;
- Increase reliability to the system by providing redundancy to pumping capacity to improve system reliability and allow regular service and maintenance activities to take place without compromising the ability of the City to maintain pumping capacity and minimize the risk of sewage overflows; and
- Address future risks related to climate change, including increased storm intensities and sea-level rise, which have the potential to result in flows that would be beyond the capacity of the existing VPP.

1.5 Proposed Project

The Proposed Project would be built on three vacant lots with a total combined area of approximately 12,076 square feet. As shown in Figure 2-4, Site Plan of the Draft EIR, the Proposed Project would include a number of improvements:

- One building, two stories and approximately 32 feet in height, with a total of 2,500 square feet that will house the operational control center for the plant, related electrical equipment, and employee workstations;
- Three 18 mgd wet-pit submersible pumps, constructed underground;
- Electrical equipment, utility connections, instrumentation and controls, transformers, and generators;
- A 17- by 17-foot submerged diversion structure on the existing CIS, the top of which would be below the lowest elevation of the Grand Canal and buried underneath it;
- Concrete wet well, influent piping and a sluice gate;
- A new 66-inch sewer to connect VAPP to the new diversion structure;
- Fencing with blinds and vegetation for screening the VAPP building;
- Parking – a total of eight parking spaces will be provided at 128 Hurricane Street to allow for Project required employee, delivery/visitor, and Beach Impact Zone parking;, and public parking, including the relocation of coastal parking; and
- Landscaping and Open Space at 128 Hurricane Street.

1.5.1 Operational Requirements

The VPP and VAPP combined will have an ultimate peak flow capacity of 87 mgd, based on the ultimate wet-weather flows (10-year storm event). The City's peak wet-weather modeling results established this flow rate (*Development of a Conceptual Plan for an Auxiliary Pumping Facility Alternative for the Venice Pumping Plant* [Carollo 2014]). The basis of design for the VAPP is summarized as follows:

- Ultimate Peak Wet-Weather Flow: 87 mgd (design based on 10-year storm event)
- Ultimate Peak Dry-Weather Flow: 71 mgd
- Current Peak Wet-Weather Flow: 55 mgd (January 6, 2009)
- Current Peak Dry-Weather Flow: 36 mgd
- Minimum Low Dry-Weather flow: 15 mgd (design)

The VAPP will have three submersible pumps available to operate at all times with variable frequency drives (VFD) that have the ability to adjust motor speed to match discharge flows. Sufficient overlap of pump operating ranges will be provided so that each pump flow condition will allow for the most efficient pump operation.

The VPP and the VAPP will act as one large wet well connected via the influent sewer. They will operate independently however, with separate controls. The VAPP can be isolated from the influent sewer by a slide gate located at the entrance to the wet well. The VPP does not have the capabilities to be isolated and taken off-line and as such, for wet well maintenance, a temporary plug will be required at the upstream manhole. The control system will provide the ability to operate each pumping plant independently if one of the pumping plants needs to be taken off-line for maintenance. The ideal operations scenario for the VPP and VAPP will be to operate and maintain a constant water surface level using the VFDs and a set of pump operational parameters depending on the flow level.

1.5.2 Aboveground Facilities

The Proposed Project includes a two-story electrical and control building along the west side of Project Site, adjacent to Canal Court (see Figure 2-4, Site Plan of the Draft EIR) and associated employee and visitor/delivery parking for the new building located at 128 Hurricane Street. The building would be two stories, about 32 feet in height, 50 feet in length, and 2,500 square feet (both levels combined) in area. The building would include spaces for an electrical equipment room and a generator room on the first floor. In addition to a state-of-the-art control station, the second floor would include workstations for computer operators, a restroom, mechanical room, and server rooms. Heating, ventilation, and air-conditioning equipment for the electrical building would be located north of the building.

The preliminary building design includes perimeter walls constructed of reinforced concrete, with a cool roofing system (PVC membrane or similar) above the second level. Proposed finishes include architectural stamped concrete, reveals, and impressions; metal awnings over each of the exterior doors and sustainable roofing (Sika Décor or similar); and painted surfaces with colors that blend in with the surrounding neighborhood. Windows would be required for occupied spaces on the second level; all windows would be energy-efficient dual-glazed units. The exterior conceptual design would be enhanced to include architectural features that are in keeping with the architecture, massing, and materials that are currently present on the adjacent residential structures.

The VAPP electrical system would include a small diesel-fueled standby generator to provide power for critical loads in the event of a loss of power from the Los Angeles Department of Water and Power (LADWP) and the inability of existing VPP standby generators to provide power to the VAPP. The standby generator would be located in an enclosed room on the first floor with 1-hour flood-rated doors; an intake and exhaust louver would provide the proper cooling for the generator. Because of the location of the electrical building within a residential neighborhood, acoustic louvers

would also be installed. The VAPP generator would provide up to 24 kilowatts (kW) of power at 120/240 volts (V) for lighting, the Supervisory Control and Data Acquisition system, the security/access control system, and air conditioning for the VAPP control room. The VAPP generator would have an integral storage tank that would hold enough fuel for up to 8 hours of run time at full load.

1.5.3 Parking

Parking for the Proposed Project would be provided on the 128 Hurricane Street lot. There would be a total of eight parking spaces. Per the Venice Specific Plan and the Venice Local Coastal Program Land Use Plan, the Proposed Project would require at least five project-dedicated parking spaces, three are required for the project, and two for Beach Impact Zone parking. Five existing on-street parking spaces along Hurricane Street on the south side of the new VAPP lot will be removed; three will be relocated in the 128 Hurricane Street lot and the remaining made available in the project vicinity in accordance with the requirements of the City of Los Angeles Department of City Planning, Department of Transportation, and the California Coastal Commission.

1.5.4 Public Art

This Proposed Project may include a public art installation on the 128 Hurricane Street lot. All City capital improvement projects whether funded by Council controlled or proprietary departments must comply with the City of Los Angeles Public Works Improvements Arts Program. The program was established to connect all City capital improvement projects with the opportunity to create art installed at facilities, to enhance amenities, assist with the restoration of historic features and provide community art services throughout the City. The program is managed by the Department of Cultural Affairs (DCA) and its General Manager. All public art projects are reviewed by the Public Art Committee and recommended for approval by the Cultural Affairs Commission.

1.5.5 Belowground Facilities and Diversion Structure within the Grand Canal

At the northeast corner of the Project Site, adjacent to the Esplanade, three 18 mgd submersible pumps and a valve and metering vault are proposed (see Figure 2-4, Site Plan of the Draft EIR). The three submersible pumps would withdraw sewage from a wet well through a new 66-inch sewer pipe and discharge into a common header that would serve both the VPP and VAPP. Each force main (48-inch and 54-inch) could then be isolated by ball valves that would be controlled at the VAPP. Under normal operation, the VAPP and VPP would operate as a single functional pump station, with their respective wet wells hydraulically linked through similar elevations and an even flow split. Access would be limited to the structure that would house the pumps and vault. Sealed hatches would provide access for maintenance and minimize odors.

As noted above, the existing 66-inch CIS sewer pipe that serves the VPP is located within the Grand Canal. To minimize disruptions to the VPP, a diversion structure would be constructed to allow flows to be diverted to the VAPP. The diversion structure would be below the grade of the Grand Canal, by approximately 18 feet, and would not protrude aboveground into the Canal and would be buried beneath it. The structure would allow flows to be diverted to either the VAPP or VPP. A gate would also be provided at the inlet of the VAPP to allow isolation for maintenance purposes.

Influent piping would be provided from the new diversion structure to the new wet well. The lined concrete cylinder pipe would be protected from corrosion caused by hydrogen sulfide. The VAPP piping would connect to the new VPP replacement manifold that was recently constructed in Hurricane Street with use of a 42-inch flange at its west end. From there, the piping would continue back to the new valve vault at the VAPP.

1.5.6 Odor Control

As noted above, the existing VPP is equipped with an exhaust fan that discharges vapors through an existing stack. The wet well and associated pumps are sealed and located underground. Field investigation of the ventilation fan shows that the flange that connects the fan to the dispersion stack is displaced, and odors can exit through the gap at the joint. To remedy this, the fan and flanges would be replaced with compatible equipment. In addition, a slide gate at the entrance to the VAPP wet well from the influent pipe would be installed to deter odors. Any odors in the CIS piping will be confined to that system and handled as they normally are at the VPP. When the VAPP is in operation, the head spaces of the wet wells will be linked by the 66-inch sewer, and the exhaust fan will be able to service the entire system. No additional odor control measures are anticipated.

During construction of the coffer dam within the Grand Canal, sediment that contains organic material would be extracted which could result in odors when removed from the ground if not properly handled. Once these materials are removed, they would be temporarily stored in Laydown Areas 1 and 3. Various odors may be emitted from the sediment piles during construction that may impact the sensitive receptors in the project area. However, best management practices will be used to address any potential odors.

1.5.7 Utilities and Services

For VAPP operation, electricity, potable water, and sewer service utilities would be required. Each of these is discussed in greater detail below.

1.5.7.1 Electricity and Standby Power

Because the VAPP would be working separate from, yet in conjunction with, the VPP, the electrical power supply to VAPP would be independent from the VPP. As such, the Proposed Project would require two additional 480 V services from LADWP, providing an added degree of reliability and avoiding dependence on existing VPP step-down transformers and switchgear for utility power. Two existing 34.5 kV primary circuits that serve the VPP would be used because of their proximity. A new 34.5 kV switching cabinet, two new 34.5 kV–480 V three-phase pad-mounted transformers, and two new exterior secondary (480 V) cable pull sections, all owned and maintained by LADWP, would be installed for the new services at the VAPP. The 480 V three-phase power would be accepted from the LADWP pad-mounted transformers, with a switchgear located inside the VAPP electrical building. A main-tie arrangement would be provided to utilize either transformer, if necessary, and fully power the VAPP. Each main breaker would have an LADWP meter for revenue accounting and a digital meter for local monitoring/connectivity to the control system. The VAPP switchgear would distribute 480 V to the VAPP pump motor controllers and a motor control center.

Standby power for VAPP pumping operations would be provided by existing VPP standby generators in addition to a new generator (previously described above). The existing VPP 480 V switchgear, which receives and manages VPP standby generator power, would be utilized to provide

standby power to the VAPP electrical system. Two 480 V, 1,600-amp (A) power circuit breakers would be installed in the existing VPP switchgear and connected to the VAPP 480 V switchgear. Removal of two 1,200 A power circuit breakers from the existing VPP switchgear would be necessary to facilitate installation of the new 1,600 A power circuit breakers. These new 1,600 A power circuit breakers would be manually operated and normally closed.

1.5.7.2 Potable Water and Sanitary Sewer

Potable water would be provided for equipment wash down purposes and a restroom that would be located in the electrical building. Sanitary sewer service would be provided for wash down and lavatory water.

1.5.8 Landscaping and Drainage

Because a minimal amount of open area would be present at the VAPP site, landscaping would largely be limited to 0.75-inch gravel or crushed stone for erosion and dust control. Depending on space availability and infrastructure requirements, the planting of shrubbery and trees may also be possible. The specific locations and species would be evaluated and then included in a landscape plan that would be prepared during final design.

On the 128 Hurricane Street lot, following completion of project construction, the construction laydown site would be converted to a publicly accessible site with public art, parking, and Open Space. The specific locations and species of plantings within the Open Space would also be identified in a landscape plan that would be prepared during final design.

New stormwater drainage facilities associated with the Proposed Project would be constructed entirely within the Project Site. These may include storm drains, inlets, downspouts, catch basins, and overland sheet flow and low-impact development features.

1.5.9 Site Security

As with the existing VPP, the entire VAPP site would be secured with fencing and/or concrete walls. Signage at an access-controlled entry/exit gate would denote the area that is closed to the public. In addition, an access control and video surveillance system would be provided to protect operators while working between the two sites and provide remote monitoring. Perimeter security lighting would also be installed within the VAPP site. It is anticipated that nighttime lighting sources would face inside away from sensitive receptors and be similar to those on the adjacent VPP site. All lighting would adhere to applicable plans and ordinances.

1.5.10 On- and Off-site Circulation, Parking, and Pedestrian Access

Pacific Avenue, Hurricane Street, Via Dolce, and Marquesas Way will provide access to the Project Site, including construction Laydown Areas. Hurricane Street between Canal Court and Esplanade would be closed to public traffic during construction; however, these roadways would remain accessible during operation of the Proposed Project and preserve Coastal Access (see Figure 2-2, Project Location Map of the Draft EIR). Five parking spaces on Hurricane Street will be removed with a red curb and/or a driveway along the southerly boundary of the Proposed Project along Hurricane Street; three will be relocated in the 128 Hurricane Street lot and the remaining made

available in the project vicinity in accordance with the requirements of the City of Los Angeles Department of City Planning, Department of Transportation and the California Coastal Commission. A total of eight parking spaces would be provided on the 128 Hurricane Street lot with three spaces for the Project to address employee, delivery and visitor-serving parking, two spaces as required by Beach Impact Zone parking (in compliance with the Venice Specific Plan), and three spaces being relocated from Hurricane Street.

Pedestrian access to the Esplanade and associated Grand Canal and Ballona Lagoon from Hurricane Street would be temporarily eliminated during construction (up to 2 years). However, alternative access to these areas would be available via existing routes along Canal Court and Galleon Street or Esplanade. During operation, pedestrian access would continue to be available from Hurricane Street, Canal Court, and the 128 Hurricane Street lot, and coastal access would be maintained.

1.5.11 Open Space

The Proposed Project would include Open Space, as required by the Venice Specific Plan and would be incorporated into the project design on the VAPP site and at the 128 Hurricane Street lot. Although the exact design of the Open Space has not been finalized, Figure 2-4, Site Plan of the Draft EIR contains a preliminary design. As currently envisioned, a total of 3,639 square feet of open space would be provided on the VAPP site and a total of 787 square feet would be provided for public use on the 128 Hurricane Street lot. Some type of public art may also be incorporated into the 128 Hurricane Street lot.

1.5.12 Operations and Maintenance

Once operational, the VAPP would augment the existing capacity of the VPP. However, the VAPP would also enhance capacity so that a combined ultimate peak flow of 87 mgd could be accommodated and processed through the VPP and VAPP. This capacity would be capable of accommodating wet-weather flows from a 10-year storm event. During operations, the Proposed Project would require two full-time employees (per shift) who would work three consecutive 8-hour shifts, 7 days per week.

Maintenance requirements for VAPP equipment are anticipated to be similar to those for VPP. The main focus would be the three submersible pumps, which would be accessed from hatches to the wet well. It is anticipated that each pump would need to be inspected annually. This would require short-term use of equipment and machinery over 2 or 3 days as well as construction workers to remove, inspect, and service the pumps. Additionally, in instances when pumps need to be removed for maintenance purposes, temporary, short-term closure of Hurricane Street east of Canal Court to Esplanade and fronting both VAPP and VPP may be required. As noted above, this temporary closure is anticipated to occur twice yearly for up to 2 weeks. Access to the diversion structure would be provided from a manhole that would connect it to the wet well. No access from the Grand Canal would be required during these regularly scheduled maintenance activities.

1.5.13 Project Construction

Construction of the Proposed Project is anticipated to begin in March 2018 and last approximately two years. Construction would begin with initial site preparation, which would enable machinery and equipment to access and work within the site. Once the site is prepared, construction phasing

would involve six distinct stages in two separate areas, as outlined below and shown in Figure 2-2, Project Location Map of the Draft EIR, which shows the locations where access would be temporarily restricted to the public and the location of the three proposed laydown areas.

- Laydown Area 1 – A vacant lot at 128 Hurricane Street, immediately west of the VPP and adjacent to Ballona Lagoon. This site, which is approximately 4,345 square feet, would be used as a construction laydown area.
- Laydown Area 2 – A vacant lot owned by Los Angeles County, across from and east of the Grand Canal at Via Dolce. This site, which is accessed from Via Dolce, is approximately 6,150 square feet. Laydown Area 2 could be used for material and equipment storage. However, Laydown Area 1 is to be the primary site for construction staging and storage.
- Laydown Area 3 – A vacant lot located at 9940 Jefferson Boulevard, Culver City. It would be used for soil stockpiling. The lot is approximately 198,735 square feet.

Standard construction equipment would be used, including compactors, bulldozers, front loaders, trenchers, construction cranes, water trucks, dump trucks, and delivery trucks that would bring construction-related materials to the site. Construction access to the Project Site would be via Pacific Avenue, Hurricane Street, Via Dolce, and Marquesas Way. Construction workers would be required to park off-site and then travel to and from the site by shuttle. No construction worker or equipment parking would be allowed along Hurricane Street or on adjacent streets. Access to Laydown Area 3 in Culver City would be achieved via Hurricane Street, Pacific Avenue, Washington Boulevard, Lincoln Boulevard, and other streets such as Sepulveda Boulevard, and Jefferson Boulevard. The final haul route will be selected in consultation with the Los Angeles Department of Transportation (LADOT) and the City of Culver City.

During construction, some perimeter lighting may be required, both on the Project Site and in Laydown Areas 1 and 2, for security purposes. Lighting would, however, be directed on-site and away from sensitive receptors (residences and the Grand Canal) to minimize any spillover effects. Security fencing would be erected around all laydown areas prior to construction activities.

1.5.13.1 Stage 1

The Project Site and Laydown Area 1 (APN 4225-010-016) are currently fenced. A portion of Hurricane Street and Canal Court would be temporarily closed (see Figure 2-2, Project Location Map of the Draft EIR). Prior to use, security fencing would be erected around Laydown Area 2 (APN 4225-013-904), across from and east of the Grand Canal, and at Laydown Area 3, in Culver City (APN 4296-001-270). Shoring would be installed around the Project Site, after which excavation to a depth of approximately 25 feet and dewatering of the site would occur. At this stage of construction, pedestrian access along the Esplanade, Ballona Lagoon, and the Grand Canal would be maintained at Canal Court. However, pedestrian access to the Grand Canal from Hurricane Street would be temporarily eliminated; pedestrians would be diverted to Galleon Street to the north (see Figure 2-2, Project Location Map of the Draft EIR).

1.5.13.2 Stage 2

Upon completion of excavation at the VAPP site, the bottom of the excavated site would be sealed and prepared for the above - and below - ground structure and related facilities. Preliminary earthwork plans indicate that the Proposed Project would require approximately 10,000 cubic yards of soil to be excavated, of which approximately 2,300 cubic yards would be stockpiled at Laydown

Area 1. The remaining 7,700 cubic yards of soil would be exported off-site and stockpiled at Laydown Area 3, resulting in a total of 2,970 total one-way truck trips. Laydown Area 2 (across Grand Canal), given the slope and access constraints, may be used only as needed for equipment and materials storage. Laydown Area 1 will be the primary laydown area and storage site. For backfill at the VAPP, a total of 2,300 cubic yards of soil would be utilized from Laydown Area 1 and 3,850 cubic yards from Laydown Area 3. The total truck trips associated with transporting the 3,850 cubic yards of soil from Laydown Area 3 to the VAPP would be 1,486 total one-way truck trips. Once the VAPP is completed, the remaining total of 3,850 cubic yards of soil stockpiled at Laydown Area 3 would be disposed of at the Sunshine Canyon Landfill or similar facility, resulting in a total of 1,486 total one-way truck trips. The estimates presented here of total truck trips include an allowance of 35% for soil expansion and less-than-full loads, and assume that soil is transported in trucks with a capacity of seven cubic yards. Water pumped from the site would be disposed of in a manner consistent with Regional Water Quality Control Board regulations.

Proposed grading for the site would slope away from the electrical building and pumping plant for a minimum of 5 feet and then be directed via swales or similar surface features toward the east property boundary. This would follow the existing drainage pattern for the majority of the site.

1.5.13.3 Stage 3

Construction of the underground facilities associated with the proposed VAPP, including the three new pumps, the wet well, valve vault, meter vault, and piping, would occur during this stage. These facilities would be constructed at a maximum depth of approximately 25 feet below ground. Upon installation of the underground features, the site would be backfilled and compacted with the existing stockpiled soil contained within Laydown Area 1 and Laydown Area 3.

1.5.13.4 Stage 4

Within the Grand Canal, a new sewer diversion structure, approximately 23 by 95 feet, would be installed at a depth of approximately 18 feet below ground at the canal and then sealed. To facilitate the installation of the diversion structure, a temporary coffer dam would be installed. Water flowing in the Grand Canal would be diverted around the cofferdam structure so that excavation could occur without inundation. With excavation completed, the diversion structure would be constructed in place, and then sealing would occur. Excavated materials would be hauled from the site and stockpiled at either Laydown Area 1 or Laydown Area 3 or transported to an approved area landfill; upon completing of installation and sealing, The Grand Canal would be backfilled using the stockpiled excavated material and the coffer dam removed. Ultimately, the diversion structure would be entirely underneath the Grand Canal. Construction of the cofferdam, placement of the diversion structure, and backfill and soil compaction within the Grand Canal would last approximately 4 to 6 months. During that time, the Esplanade on the west side of the Grand Canal would be temporarily closed between the northern boundary of the Project Site and approximately 95 feet south of the existing VPP (see Figure 2-2, Project Location Map of the Draft EIR).

1.5.13.5 Stage 5

During this stage a modular diversion structure will be installed over the CIS, feeding the new wet well to divert sewage flows. The pipe would then be connected, and a seal would be inserted into the shell. Backfill and soil compaction would be completed, and the Grand Canal channel bottom would be restored to its original elevation.

1.5.13.6 Stage 6

This final stage would involve sealing the diversion structure, removing all shoring steel, and allowing flows to resume to pre-construction conditions within the Grand Canal. The Esplanade would be re-opened to pedestrian access on the west side of the Grand Canal. Construction of surface improvements at the Project Site would then occur. This would include constructing an approximately 32-foot-high electrical building, installing two new 480 V LADWP transformers, and providing public access and landscaping improvements.

Chapter 2
Response to Comments

2.1 Distribution of the Draft EIR

Per the requirements of the California Environmental Quality Act (CEQA), a Notice of Availability (NOA) and Notice of Completion (NOC) for the Draft Environmental Impact Report (Draft EIR) were distributed to interested parties and posted with the County of Los Angeles Clerk's Office and the State Clearinghouse on October 27, 2016. A notice regarding the public review period and time and location for a public meeting (see below) on the Draft EIR was published in the *Los Angeles Times* and *The Argonaut*. The Draft EIR was then circulated for review and comments from the public and other interested parties, agencies, and organizations for over 45 calendar days, beginning on October 27, 2016, and closing on December 15, 2016. The Draft EIR was also made available on line at: (http://eng.lacity.org/techdocs/emg/venice_aux_pumping_plant.htm) and at the following libraries:

Lloyd Taber-Marina del Rey Library
4533 Admiralty Way
Marina del Rey, CA 90292

Playa Vista Branch Library
6400 Playa Vista Drive
Los Angeles, CA 90094

Venice-Abbot Kinney Memorial Library
501 South Venice Boulevard
Venice, CA 90291

2.2 Comments on the Draft EIR

During the public comment period, all comments or questions about the Draft EIR were directed to:

Dr. Jan Green Rebstock, Environmental Supervisor II
Los Angeles Bureau of Engineering
Environmental Management Group
1149 South Broadway, Suite 600, Mail Stop 939 Los Angeles, CA 90015-2213
Email: jan.green.rebstock@lacity.org.

A public meeting on the Proposed Project to solicit comments on the Draft EIR was also held on November 17, 2016, at the Venice Foursquare Church. A notice regarding the public hearing was published in the *Los Angeles Times* and *The Argonaut* prior to the public hearing date. A presentation on the Proposed Project was given by City of Los Angeles Bureau of Engineering and Bureau of Sanitation staff. In addition, public testimony was taken and recorded by a court reporter. No comment cards or letters were received during the public hearing. A copy of the meeting transcript is contained within Appendix L (Public Hearing Transcript) of this Final EIR.

In addition to the public hearing, a total of eight (8) comment letters or emails on the Draft EIR were received from agencies and individuals and which are contained in Table 2-1, below. Section 2.3 below contains the comment letter or email and corresponding responses.

Table 2-1. Public Comments Received on the Draft EIR

Letter Code	Date	Individual/Organization	Page Number of Response
State Agencies			
S1	Nov 16, 2016	Dianna Watson, IGR/CEQA Branch Chief State of California, Department of Transportation, District 7, Office of Regional Planning, IGR/CEQA Branch	2-5
S2	Dec 13, 2016	Scott Morgan, Director, State Clearinghouse State of California, Governor's Office of Planning & Research, State Clearinghouse and Planning Unit	2-8
County Agencies			
C1	Oct 31, 2016	Troy Evangelho, Planner County of Los Angeles, Department of Beaches and Harbors	2-10
Interested Parties/Public			
GP1	Nov 7, 2016	Carol Kapp	2-12
GP2	No date provided (received Nov 8, 2016)	Lynne Shapiro	2-16
GP3	Dec 16, 2016	Eliane Gans	2-21
GP4	Nov 18, 2016	Steve Bradbury	2-25
GP5	Dec 12, 2016	McQueen-Whalen Revocable Trust	2-27

2.3 Responses to Comments

Each comment letter and/or email below has been assigned a specific number code referring to the correspondence received. Once assigned a code, the correspondence has been divided into individual sub-codes, intended to capture topical areas raised by the commenter. As an example, a letter received by a state agency would receive the code of S1 and then subsequent sub-codes (e.g., S1-1) included to address specific comments. Copies of the comment letters and the corresponding number are included below. Where applicable, some comments received may require revisions to the Final EIR. Chapter 3 (Modifications to the Draft EIR) of this Final EIR contains those changes, if applicable.

2.3.1 State Government

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY EDMUND G. BROWN, JR., Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 7, OFFICE OF REGIONAL PLANNING
IGR/CEQA BRANCH
100 MAIN STREET, MS # 16
LOS ANGELES, CA 90012-3606
PHONE: (213) 897-0219
FAX: (213) 897-1337

Serious drought
Help save water!

RECEIVED
ENVIRONMENTAL MANAGEMENT GROUP
NOV 28 2016
NAME:

November 16, 2016 S1

Dr. Jan Green Rebstock
City of Los Angeles
Public Works, Bureau of Engineering
Environmental Management Group
1149 S. Broadway, 6th Floor, Mail Stop 939
Los Angeles, Ca 90015-2213

Re: **Venice Auxiliary Pumping Plant**
Vic: LA-1/PM 32.232
SCH#2015111038
GTS# LA-2016-00258ME

Dear Mr. Rebstock:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the Venice Auxiliary Pumping Plant Project.

The proposed project would provide additional reliability and critical redundancies necessary to support the City of Los Angeles' wastewater conveyance and processing system. The project would be sized to supplement the plumping capacity of the VPP for a combined ultimate peak flow capacity of 87 million gallons per day, reflecting wet weather flows of a 10-year storm event.

The nearest State facility to the proposed project is State Route-1. Based on review, Caltrans does not expect project approval to result in a direct adverse impact to the existing State transportation facilities. S1-1

As a reminder, any transporting of heavy construction equipment and/or materials which require the use of oversized-transport vehicles on State highways will require a Caltrans transportation permit. Caltrans recommends that large size truck trips be limited to off-peak commute periods.

In the Spirit of mutual cooperation, Caltrans staff is available to work with your planners and traffic engineers for this project, if needed. If you have any questions regarding these comments, please contact project coordinator Ms. Miya Edmonson, at (213) 897-6536 and refer to GTS# LA-2016-00258ME

Sincerely,

DIANNA WATSON
IGR/CEQA Branch Chief

cc: Scott Morgan, State Clearinghouse

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Dianna Watson, IGR/CEQA Branch Chief, State of California, Department of Transportation, District 7, Office of Regional Planning, IGR/CEQA Branch

Response to Comment S1-1

Thank you for your comment. The City understands that the nearest State facility to the Proposed Project is State Route 1 (Lincoln Boulevard). Approval of the Proposed Project is not expected to result in direct adverse impacts to existing State transportation facilities. The City understands that any transporting of heavy construction equipment and/or materials which require the use of oversized-transport vehicles on State Highways will require a Caltrans (California Department of Transportation) permit. Moreover, the City understands that Caltrans recommends that large size truck trips be limited to off-peak commute periods. Based upon this comment and recommendation, an additional mitigation measure will be included in Chapter 3 (Modifications to the Draft EIR) of this Final EIR which indicates the following:

MM-TRANS-3: Transport of Heavy Construction Equipment and/or Materials

Provided heavy equipment and/or materials are required to be transported to the project site along State facilities (i.e., State Route 1 [Lincoln Boulevard]), the contractor, on behalf of the LABOE, shall obtain a Caltrans transportation permit, prior to transport and/or delivery of such equipment. In addition, large size truck trips (as defined by Caltrans), shall be limited to off-peak commute hours (i.e., not occurring between 7:00 a.m. – 9:00 a.m. and then again between 4:00 p.m. – 6:00 p.m.).

It should be noted that although the Draft EIR analysis determined that a significant impact would not result, this new mitigation measure has been included at the request of Caltrans and is not a result of impacts associated with the Proposed Project.

STATE OF CALIFORNIA
GOVERNOR'S OFFICE *of* PLANNING AND RESEARCH
STATE CLEARINGHOUSE AND PLANNING UNIT

EDMUND G. BROWN JR.
GOVERNOR

KEN ALEX
DIRECTOR

December 13, 2016

S2

RECEIVED
ENVIRONMENTAL MANAGEMENT GROUP
DEC 15 2016
NAME:

Jan Green Rebstock
City of Los Angeles
1149 S. Broadway, 6th Floor, Mail Stop 939
Los Angeles, CA 90015

Subject: Venice Auxiliary Pumping Plant Project
SCH#: 2015111038

Dear Jan Green Rebstock:

The State Clearinghouse submitted the above named Draft EIR to selected state agencies for review. On the enclosed Document Details Report please note that the Clearinghouse has listed the state agencies that reviewed your document. The review period closed on December 12, 2016, and the comments from the responding agency (ies) is (are) enclosed. If this comment package is not in order, please notify the State Clearinghouse immediately. Please refer to the project's ten-digit State Clearinghouse number in future correspondence so that we may respond promptly.

Please note that Section 21104(c) of the California Public Resources Code states that:

> "A responsible or other public agency shall only make substantive comments regarding those activities involved in a project which are within an area of expertise of the agency or which are required to be carried out or approved by the agency. Those comments shall be supported by specific documentation."

S2-1

These comments are forwarded for use in preparing your final environmental document. Should you need more information or clarification of the enclosed comments, we recommend that you contact the commenting agency directly.

This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act. Please contact the State Clearinghouse at (916) 445-0613 if you have any questions regarding the environmental review process.

Sincerely,

Scott Morgan
Director, State Clearinghouse

Enclosures
cc: Resources Agency

1400 10th Street P.O. Box 3044 Sacramento, California 95812-3044
(916) 445-0613 FAX (916) 323-3018 www.opr.ca.gov

Document Details Report
State Clearinghouse Data Base

SCH# 2015111038
Project Title Venice Auxiliary Pumping Plant Project
Lead Agency Los Angeles, City of

Type EIR Draft EIR

Description Construction of an auxiliary pumping plant and associated facilities in support fo the existing Venice Pumping plant (VPP). The proposed project would provide additional reliability and critical redundancies necessary to support the City of Los Angeles' wastewater conveyance and processing system. Project would be sized to supplement the plumping capacity of the VPP for a combined ultimate peak flow capacity of 87 million gallons per day, reflecting wet weather flows of a 10-year storm event. Components: two-story building/control center (approx. 32 ft high and 2,500 sf) electrical equipment, utility connections, instrumentation and controls, transformers, generators, three 18 mgd submersible pumps with concret wet well, influent piping, sluice gate, submerged diversion structure in Grand Canal, and parking (8 spaces) located at 128 Hurricane St.

Lead Agency Contact

Name Jan Green Rebstock
Agency City of Los Angeles
Phone 213-485-5671 **Fax**
email
Address 1149 S. Broadway, 6th Floor, Mail Stop 939
City Los Angeles **State** CA **Zip** 90015

Project Location

County Los Angeles
City Los Angeles, City of
Region
Lat / Long 33° 58' 33.44" N / 118° 27' 40.72" W
Cross Streets Hurricane Street/Canal Court
Parcel No. 4225008904, 4225008904
Township 2S **Range** 15W **Section** 1 **Base** Venice

S2-2

Proximity to:

Highways Pacific Coast Highway
Airports
Railways
Waterways Ballona Lagoon, Venice Canal, Pacific Ocean
Schools Westside Global Magnet
Land Use Residential/Medium Residential/RW2-1

Project Issues Aesthetic/Visual; Air Quality; Archaeologic-Historic; Biological Resources; Coastal Zone; Drainage/Absorption; Flood Plain/Flooding; Geologic/Seismic; Noise; Recreation/Parks; Soil Erosion/Compaction/Grading; Toxic/Hazardous; Traffic/Circulation; Vegetation; Water Quality; Water Supply; Wetland/Riparian; Growth Inducing; Landuse; Cumulative Effects; Other Issues

Reviewing Agencies Resources Agency; California Coastal Commission; Department of Conservation; Department of Fish and Wildlife, Region 5; Office of Historic Preservation; Department of Parks and Recreation; Department of Water Resources; California Highway Patrol; Caltrans, District 7; State Water Resources Control Board, Division of Drinking Water; State Water Resources Control Board, Division of Water Quality; Regional Water Quality Control Board, Region 4; Native American Heritage Commission; State Lands Commission

Date Received 10/27/2016 **Start of Review** 10/27/2016 **End of Review** 12/12/2016

Scott Morgan, Director, State Clearinghouse, State of California, Governor's Office of Planning & Research, State Clearinghouse and Planning Unit

Response to Comment S2-1

The commenter states that the Lead Agency has complied with the State Clearinghouse review requirements for the Draft EIR document, pursuant to CEQA. No further response to this comment is required.

Response to Comment S2-2

The Document Details Report from the State Clearinghouse database explaining the distribution of the Draft EIR is noted. No further response to this comment is required.

2.3.2 Local Government

C1

Eileen Schoetzow <eileen.schoetzow@lacity.org>

Fwd: Venice Pumping Plant EIR
1 message

Jan Green Rebstock <jan.green.rebstock@lacity.org> Tue, Nov 1, 2016 at 7:02 AM
To: eileen.schoetzow@lacity.org

Hi - please review EIR and prep answer.

Begin forwarded message:

From: Troy Evangelho <TEvangelho@bh.lacounty.gov>
Date: October 31, 2016 at 4:11:54 PM PDT
To: "Jan.Green.Rebstock@lacity.org" <Jan.Green.Rebstock@lacity.org>
Subject: Venice Pumping Plant EIR

Hi Jan,

I received your DEIR notice for the Venice Pumping Plant. Can you tell me if any of these construction activities will have any impact to the traffic or properties located in the neighboring unincorporated County jurisdiction of Marina del Rey? C1-1

Thank you,

Troy Evangelho
Planner, Beaches and Harbors
County of Los Angeles
Department of Beaches and Harbors
13837 Fiji Way
Marina del Rey, CA 90292
Office: 310.305.9533
Email: tevangelho@bh.lacounty.gov

COUNTY OF LOS ANGELES
DEPARTMENT OF
BEACHES
& HARBORS
Caring for Your Coast

Web | Facebook | Twitter

Troy Evangelho, Planner County of Los Angeles, Department of Beaches and Harbors

Response to Comment C1-1

Thank you for your comment. The Venice Auxiliary Pumping Plant (VAPP) will not introduce any significant traffic impacts to residential streets in the neighboring unincorporated County jurisdiction of Marina Del Rey. Access to the Project Site from State Route (SR) 90 can be obtained from Lincoln Boulevard (SR 1), through Marina Del Rey. Washington Boulevard, located approximately 0.3 mile north of the Project Site, serves as the nearest and primary commercial corridor. The main streets carrying project-related construction traffic (both worker trips and truck trips) through Marina del Rey to the construction site would be: Lincoln Boulevard and Washington Boulevard. Other major streets in Marina Del Rey serving the Proposed Project site are, Marquesas Way, Pacific Avenue, Via Marina and Via Dolce. This is discussed further in the Draft EIR in the traffic section (see pages 3.10-18 through 3.10-21). The lot at 3820 Via Dolce in Marina Del Rey has been identified as a potential laydown area in the Project Description, but the primary laydown area will be Laydown Area 1 located at 128 Hurricane Street, which is right across the street from the existing Venice Pumping Plant (VPP). The 3820 Via Dolce lot will only be used if needed and no soil will be stored there. Trucks traveling to and from the site for the export of soil will use a specific haul route to laydown area located at a City-owned property at 9940 Jefferson Boulevard in Culver City. It is expected that within the Project vicinity, the haul route for soil export and import would follow Hurricane Street, Canal Court, Galleon Street, Pacific Avenue, Washington Boulevard, and Lincoln Boulevard (as discussed on page 3.10-18 in the Draft EIR). As soil haul trucks will be restricted to the hours of 9:00 a.m. to 4:00 p.m., they will avoid morning peak (7:00 a.m. – 9:00 a.m.) and afternoon peak (4:00 p.m. – 6:00 p.m.) commute hours. Construction truck traffic would arrive and depart during allowed construction hours (8:00 a.m. – 6:00 p.m.), deliveries would be staggered throughout the day as work occurs, and to the extent feasible, coordinated to arrive and depart at off-peak commute times.

Construction noise and vibration impacts are significant and unavoidable. The Proposed Project will include a Construction Noise Control Plan to reduce construction noise at nearby residences. Mitigation Measure NOI-1 details several measures to reduce construction noise impacts, including constricting the time of day the use of noisy construction equipment, such as jackhammers and pile drivers, is used. Also, temporary noise barriers with a minimum height of 20 feet and the use of commercially available acoustical panels or blankets lined with sound-absorbing material will be employed around the Project Site. All construction equipment will be equipped with properly operating and maintained mufflers, air-inlet silencers where appropriate, and any other shrouds, shields, or other noise-reducing features that meet or exceed original factory specifications. It is also anticipated that the quietest available type of construction equipment will be used.

The City and/or its Contractor shall maintain good communication with the surrounding community regarding the schedule, duration, and progress of construction activities. Residents at properties within 500 feet of construction activities shall be notified 72 hours in advance of the planned activities prior to the start of work. A Construction Mitigation Coordinator for the Project will be required to maintain a call log, so that the City can track resolution and nature of any complaints. These complaints may range from noise, vibration, dust, traffic, etc. Residents shall be informed of the construction mitigation coordinator and on-site construction supervisor contact information by posting of the phone number on the construction site. In addition, as discussed in Best Management

Practice NOI-1, the City shall work with the construction contractor to identify potential offsite shared office space that could be made available to residents in the immediate vicinity that work at home during weekday construction hours.

Based upon the above and information contained in Section 3.10 of the Draft EIR, impacts related to transportation/traffic (including parking) would be less than significant impacts to Los Angeles County residents located in Marina del Rey.

2.3.3 Interested Parties/Public

GP1

VAPP Draft EIR Comments Nov.7, 2016

From: Carol Kapp C Kapp
127 Rees Street
Playa del Rey, Ca 90293 Adjacent Route for Venice Dual Force Main

Why didn't you The City of LA Department of Public Works present this document last January 21, 2015 at the Local Coastal Development Permit Public Hearing for the Venice Dual Force Main Project (SZS11631)?

This way of presenting projects is death by a 1000 cuts!! Why does Publics Works disrespect the citizens this way? You should have presented it all at once.
I am part of an educated public that cares and is interested in our community and projects like this.

GP1-1

The methods used by Public works is DISENGENUOUS. You started this in 2001. Has the plan been to sneak it in piecemeal since 2001? It appears that you hope to target small segments of the area so that you will get your project through without any input from the community. Shame on you. We pay your salaries so you can force feed us your ill conceived plans. What's next?
I remember The Thompson Pumping Plant Fiasco of 1998 on Culver Blvd in Playa del Rey. That is why I am writing to you today.

DEWATERING is very important and you need a plan which you did not have in 1998. GP1-2

I do not know the height restrictions for the proposed area of Venice but 32' appears to loom over the other Pumping plant on Hurricane. GP1-3

While you have briefly mentioned NOISE, LAND SETTLEMENT, LANDSLIDES, LIQUIDFACTION----they are of paramount concern to me . GP1-4

Where will the workers be parking and laying down equipment. Parking is a precious commodity in Venice. GP1-5

Is this the project that you would seek if it were next to the Mayor's House ?

Do you plan to drop any other bombs of this magnitude on this community ? GP1-6

Carol Kapp – GP1

Response to Comment GP1-1

Thank you for your comment. The Venice Dual Force Main Project (VDFM) is a separate, but related project to the Proposed Project. During the January 21, 2015 Local Coastal Development Permit Public Hearing, the Proposed Project (Venice Auxiliary Pumping Plant) was still in the planning stages and CEQA compliance had not been initiated until further details were known. In addition, the Draft EIR noted this in Chapter 1 (Introduction), Section 1.6 (Related Projects), acknowledging that the both the VDFM, Venice Pumping Plant Manifold Replacement Project, and Venice Pumping Plant Generator Replacement Project are related, but separate projects, but that in combination with the Proposed Project, will provide system reliability and redundancy and allow influent flows from the Coastal Interceptor Sewer (CIS) to be bypassed to the VDFM during extreme weather events or an unforeseen emergency. LABOE and the Bureau of Sanitation (LABOS) are actively and continuously upgrading sewage conveyance and treatment facilities throughout the City in order to ensure proper maintenance and provide redundancy for critical public facilities, such as the Proposed Project (see also Response to Comment GP1-6 for more information on Master Planning projects currently being considered and/or undertaken by LABOS). In addition, as these projects are planned and implemented, they are required to be disclosed to the public and comply with applicable laws, including CEQA. Both agencies have actively engaged the public, agencies with oversight or jurisdiction responsibilities and decision-makers on these projects, including the Proposed Project. It should also be noted that that these are separate, independent (but related) projects and that the VDFM has been included as a cumulative project and the combined impacts have been addressed accordingly.

Response to Comment GP1-2

Based on the depth to groundwater, it is anticipated that the Proposed Project would require groundwater dewatering during construction. Section 3.7 (Hydrology & Water Quality) provides both the regulatory framework and requirements associated with on-site dewatering associated with the Proposed Project. As noted in that analysis, discharges of treated or untreated groundwater generated from permanent, temporary dewatering operations or other applicable wastewater discharges not specifically covered in other general or individual NPDES permits are currently regulated under a regional general permit, General Waste Discharge Requirements (GWDR) for Discharges of Groundwater from Construction and Project Dewatering to Surface Waters in Coastal Watersheds of Los Angeles and Ventura Counties) (Order No. R4-2013-0095, NPDES No. CAG994004). As such, the Proposed Project would be subject to these requirements before dewatering operations are initiated on- or off-site. Moreover, as noted in Section 3.7, construction dewatering wastes (except stormwater) are regulated as low-threat discharges to surface waters. A Notice of Intent (NOI) and Report of Waste Discharge must be submitted to the Los Angeles RWQCB to comply with this General Permit. Therefore, dewatering impacts are addressed in the Draft EIR and will follow the GWDR to minimize impacts to water quality.

Response to Comment GP1-3

As noted in Section 3.8 (Land Use & Planning) of the Draft EIR, the height of the electrical building would be 32 feet, which although above the 30-foot maximum includes roof access structures, etc. and is permitted by the Venice Specific Plan (for residential zones). Exhaust ducts and other ancillary facilities associated with the building, except the heating and cooling mechanism (proposed to be constructed outside and at grade), would be contained within the building. The existing Venice

Pumping Plant is slightly smaller in size and massing than the Proposed Project. The Proposed Project is considered a Public Facilities use, which is not allowed by right in a RW2-1 zone or in a Medium Residential land use designation. The Proposed Project does however qualify as a Public Benefits Project under the public utilities and public services use per LAMC Article 14, Section 14.00(b). Given this, Section 3.8 of the Draft EIR addressed the Proposed Project's consistency with applicable plans and policies, related to land use and determined that it was consistent. As noted in the analysis for Section 3.8, the land use development and/or modifications within the Venice community are governed by local and state agencies and applicable plans and policies including the California Coastal Act, City of Los Angeles General Plan, and the City's Administrative Code, City of Los Angeles Municipal Code, Venice Coastal Zone Specific Plan (Venice Specific Plan), and Venice Local Coastal Program Land Use Plan. Based upon that analysis, the Proposed Project was determined to result in less than significant impacts related to land use (excepting for construction-related noise and vibration).

Chapter 2 (Project Description) of the Draft EIR noted that a high quality design is proposed for the electrical building and would complement the scale, massing, design, and architecture of the adjacent residential neighborhood. Section 3.1 (Aesthetics) of the Draft EIR addressed the Proposed Project's potential to result in impacts on aesthetic resources. The analysis in that Section addressed many of the same policies and plans, but also included design review from the City of Los Angeles Department of City Planning (DCP) Urban Design Studio which incorporated the Venice Specific Plan design elements, the City's Walkability Checklist and Residential Citywide Design Guidelines. Based upon that analysis, the Draft EIR determined that impacts related to aesthetics would be less than significant.

Response to Comment GP1-4

Section 3.9 (Noise & Vibration) of the Draft EIR addressed noise & vibration impacts related to the Proposed Project. As noted in Section 3.9, with construction of the Proposed Project, significant and unavoidable impacts related to Project construction would result. However, these impacts would be temporary and would cease once project construction is complete. In addition, a Best Management Practice was established and a number of mitigation measures were identified to assist in reducing impacts (see Section 3.9.5 [Mitigation Measures of the Draft EIR]), including the following:

- MM-NOI-1: Prepare and Implement a Construction Noise Control Plan
- MM-NOI-2: Implement ground-borne vibration control measures to reduce construction-generated vibration
- BMP-NOI-1: Offsite Work Space

Moreover, the analysis also determined that all operational noise impacts would be less than significant after implementation of MM-NOI-3 since this measure would require that noise levels from mechanical and electrical equipment comply with applicable regulations.
Section 3.5 (Geology & Soils) of the Draft EIR addressed geotechnical impacts, including landslides, liquefaction and land settlement. As noted in that analysis, the Geotechnical Engineering Report (GER) (see Appendix G of the Draft EIR) indicates that the primary geotechnical issue of concern for the Project Site is related to the uncertified fill soils and the potential for liquefaction. Impacts related to seismically related ground failure, including liquefaction, at the Project Site are therefore considered potentially significant. Potential liquefaction-induced settlement was identified to be on the order of up to 2 inches for the Project Site and 1 inch between the proposed structures and the pipe header. In addition, the Project Site is located in an area identified as having fill material, generally consisting of silty sand and sand with some construction debris, which could expand when

saturated. However, as noted in Section 3.5, the Proposed Project design and construction would incorporate the geotechnical engineering recommendations prescribed in the GER that assessed the potential for liquefaction at the Project Site and developed recommendations to address this issue. The recommendations focus on surficial soils, site preparation, site earthwork, foundations, retaining walls, slabs-on-grade, cement type, and corrosion measures. In addition, the Department of Building and Safety's *Geology and Soils Report Approval Letter* and the Department of Public Works Geotechnical Division's *Response to the City of Los Angeles, Department of Building and Safety Geology and Soils Report Correction Letter (*see Appendix M of the Final EIR for these reports) also include additional specific construction and design recommendations for the Proposed Project. The updated MM-GEO-1 described in Chapter 3 of this FEIR and included in the Proposed Project Mitigation Monitoring and Reporting Program has been identified as a required project measure to reduce these impacts to less than significant.

The Initial Study (see Appendix A of the Draft EIR) and the GER (see Appendix G of the Draft EIR) determined that the Project Site is not within a zone of earthquake-induced landslide potential, as shown by the State of California Seismic Hazard Zones Map, nor is it located on a slope. Therefore, impacts were determined to be less than significant and were eliminated from further analysis in the Draft EIR.

Response to Comment GP1-5

As noted in Section 3.10 (Transportation/Traffic) of the Draft EIR, mitigation measure MM-TRANS-1: Construction Shuttle Workers, would require construction workers to park at an off-site location and then be shuttled on 10 to 15-passenger shuttles or vans to and from the Project Site each workday. Although the exact location of the shuttle base has not been identified, it would be within five miles of the Project Site. The selected contractor would be required to identify and secure a suitable location. Similarly, Chapter 2 (Project Description) of the Draft EIR also noted that three construction Laydown Areas (see Figure 2-2, Project Location Map of the Draft EIR) will be used for material and equipment storage as well as construction staging during the anticipated 2-year construction period. Laydown Area 1 is located at 128 Hurricane Street, which is already part of the Project Site and Laydown Area 2 located at 3821 Via Dolce (Assessor Parcel Number [APN] 4225-013-904) would serve as the primary laydown areas. Laydown Area 3 (APN 4296-001-270) located at 9940 Jefferson Boulevard in Culver City, which is approximately 7 miles east of the Project Site would be used for the majority of the soil stockpile necessary for the Proposed Project. Laydown Area 3 is owned by the City of Los Angeles.

Chapter 2 (Project Description) of the Draft EIR indicated that a total of eight parking spaces will be provided at 128 Hurricane Street to allow for employee and delivery/visitor parking, beach impact zone parking and public parking, including the relocation of coastal parking. Therefore, no significant impacts would occur.

Response to Comment GP1-6

LABOS and other City agencies are proactively and continuously seeking to improve and ensure that approaches to infrastructure improvements are made in the interest of public safety and efficiency. To this end these agencies seek out and employ technologies that are able to meet both industry standards and associated regulations, but which also consider new technologies. LABOS' *Solid Waste Integrated Resources Plan – A Zero Waste Master Plan* (2013) (see: https://www.lacitysan.org/san/sandocview?docname=cnt012522 and which addresses anaerobic

digestion related to wastewater and their role in its plan to reduce solid waste) represents such a plan and identifies specific measures for its implementation. These technologies are then implemented as part of planned projects. Additional examples of the City's master planning process include its Enhanced Watershed Management Plans, LA River Revitalization Master Plan, City of Los Angeles General Plan (and associated Elements), and Sustainable City Plan.

GP2

Dr. Jan Green Rebstock

City of Los Angeles

Public Works Bureau of Engineering

Environmental Management Group

1149 S. Broadway, 6th Floor, Mail Stop 939

Los Angeles, CA. 90015-2213

Dr. Rebstock,

In addition to the MRI (and your letter does not state whether the water quality impacted means the canal water or the drinking water of nearby residents), it should be noted that there is a school nearby and that any use of Via Dolce during construction should be avoided. Why? Because Via Marina is subject to years of construction: the massive rebuilding of Bar Harbor that is taking place now and will be followed by that of Neptune and then, although still in moratorium, that of a very large hotel on Parcel 9U. Via Dolce must be open to traffic because Via Marina is now home to construction trucking, more and more on a daily basis. Only yesterday at 8:45 a.m., cars could not reach Washington for thirty minutes. GP2-1

Also, I question the use of the church at 6 p.m. for a public meeting on this project. Parking will be very limited in that residential area. GP2-2

Yours truly,
Lynne Shapiro

Lynne Shapiro

5100 Via Dolce #312

Marina del Rey, CA. 90292

Cc: Councilman Mike Bonin

RECEIVED
ENVIRONMENTAL MANAGEMENT
GROUP
NOV 08 2016

NOV 8 2016

NAME: _____

rec. 11/8/16

Lynne Shapiro – GP2

Response to Comment GP2-1

Thank you for your comment. Section 3.7 (Hydrology & Water Quality) addressed project-related impacts associated with hydrology and water quality and determined that impacts were less than significant (including those to the Grand Canal) and no mitigation measures were required. The Initial Study (see Appendix A [Notice of Preparation/Initial Study] of the Draft EIR) determined that the Proposed Project would have no impacts on either potable water supplies or quality and as such, no further analysis in the Draft EIR was required. The Initial Study (see Appendix A of the Draft EIR), which identified the Westside Global Awareness Magnet School located at 104 Anchorage Street, and approximately 0.25-mile northwest of the project site eliminated the analysis of schools with respect to potential hazardous materials impacts from further review in the Draft EIR as the impacts were determined to be less than significant and no mitigation would be required. Thus, this issue was not analyzed further in the EIR.

See Response to Comment C1-1 above regarding traffic related impacts associated with Marina del Rey, including Via Dolce and parking impacts from implementation of the Proposed Project. As noted in the Draft EIR Chapter 2, Project Description, the final haul route for the project will be selected in consultation with the City of Los Angeles Department of Transportation and City of Culver City.

Response to Comment GP2-2

A notice regarding the Public Hearing (see above) and its location for the Draft EIR was published in the *Los Angeles Times* and *The Argonaut*. The selection of the Venice Foursquare Church and the timing of the meeting was a chosen based on its close proximity to the Proposed Project and affected residence, its ability to accommodate the anticipated number of attendees, and its previous use for the two Public Scoping Meetings held in 2015. The meeting time of 6:00 PM is considered a typical public meeting time and has been used for past meetings, including the two previous Public Scoping meetings. No issues or concerns with either the meeting location or time were raised during the Public Scoping meetings. It is acknowledged that as with all of Los Angeles, street parking is at a premium. However, attendees were able to find adequate parking (on- and off-street) for the meeting and this issue was not raised at the Public Hearing.

GP3

Ruiz, Gilberto

From: Jan Green Rebstock <jan.green.rebstock@lacity.org>
Sent: Wednesday, January 04, 2017 2:21 PM
To: Eileen Schoetzow; Ruiz, Gilberto
Subject: Fwd: Proposed building project VAPP SCH# 2015111038, MDR

Dr. Jan Green Rebstock
Environmental Management Group, Environmental Supervisor II
Bureau of Engineering, Department of Public Works
213.485.5761
jan.green.rebstock@lacity.org
1149 S. Broadway, Ste. 600
Los Angeles, CA 90015

---------- Forwarded message ----------
From: **Debbie Dyner Harris** <debbie.dynerharris@lacity.org>
Date: Wed, Dec 21, 2016 at 4:12 PM
Subject: Re: Proposed building project VAPP SCH# 2015111038, MDR
To: Eliane Gans <elianegans@gmail.com>
Cc: Jan Green Rebstock <jan.green.rebstock@lacity.org>, Fernando Gonzalez <fernando.Gonzalez@lacity.org>

Hello Eliane, thank you for the email. As Dr. Green Rebstock stated at the hearing last month, all of the comments received by the City about this project will be incorporated into the Environmental Impact Report for response. So please know that your comments are taken very seriously and will be investigated.

Thank you again, and please let us know if you have any further questions or comments,
Debbie

On Fri, Dec 16, 2016 at 5:09 PM, Eliane Gans <elianegans@gmail.com> wrote:

Hello Debbie, Jan and Fernando:

We met at the last meeting on November 17th regarding the proposed building of the Venice Auxiliary Pumping Plant. GP3-1

At that time I voiced my strong opposition to this project on several grounds, which are outlined in the attached letter.

I respectfully request that you take into consideration my points, and that you reconsider this project.

I have copied several neighbors on this letter.

Kindly let me know if you have received this.

with the hope that you will not go forward with this proposed project without considerable further review and revision. GP3-1

I think you for your attention, and consideration.

Sincerely,

Eliane Gans, resident/property owner at:
3933 Esplanade #2, Marina Del Rey, CA 90292

Eliane Gans

--
--

Debbie Dyner Harris
District Director
Councilmember Mike Bonin
City of Los Angeles
310-575-8461| www.11thdistrict.com

Sign Up for Mike's Email Updates

Download the City of Los Angeles MyLA311 app for smartphones!

MyLA311 links Angelenos with the services and information they need to enjoy their city, beautify their community and stay connected with their local government. With MyLA311, City of Los Angeles information and services are just a few taps away.

2

Eliane Gans
Lonny Gans & Associates
Fine Art
3933 Esplanade, #2, Marina Del Rey, CA 90292
Tel: (310) 827-3757 * M. (310) 339-4056 * Email: elianegans@gmail.com

December 16, 2016

To: Debbie Dyner Harris, District Director, Council district 11
Dr. Jan Green Rebstock, Environmental Supervisor 11
Fernando F. Gonzalez, P.E., MBA BCEE, Assistant Division Manager,
Wastewater Engineering Services Division

RE: VAPP Venice Auxiliary Pumping Plant (SCH# 2015111038

Dear All: and To Whom it May Concern:

I am a resident/property owner and represent 3 tenants in my building, just West, off Hurricane, from the Pumping Station.

I have been present for the presentation that was given at the last meeting on November 17, 2016.

I have three important issues/points to bring to your/everyone's attention that has anything to do with this project.

GP3-2

1. ARCHITECTURAL DESIGN:
   - Did you have RFP for a design competition?
   - Were the residents close to the project consulted for feed back on the design?
   - Considering the world renowned and prized architects in the Venice/Marina area, were any of them considered for this project?
   - Any building in this Marina Area should reflect the property values, and aesthetics of the area
   - The current design is representative of a "Bunker" or a Soviet building. This would only bring all of our property values down!!!
   - A beautiful/contemporary and aesthetic design can be implemented for any kind of usage; If this were a new Condominium, or other use, a quality design would definitely be created; and would add to the Community and its values.

   I BELIEVE IT IS IMPORTANT FOR RESIDENTS WITHIN CLOSE PROXIMITY TO THE PROPOSED VAPP TO HAVE THE RIGHT TO A DESIGN REVIEW AND BE ABLE TO COMMENT AND REQUEST A REVISION OR NEW DESIGN!!!

GP3-3

2. PROPERTY VALUES:

   OUR PROPERTY VALUES ARE AT STAKE, HENCE PROPERTY TAXES FOR THE CITY OF LA.
   I HAVE OWNED MY PROPERTY FOR 31 YEARS AND IT IS A LIFE INVESTMENT! If the value of my property decreases, it will jeopardize my family and myself!!

GP3-4

VAPP response
P. 2

Noise: if there is noise and vibration, as stated by Mr. Gonzalez at the meeting, Rental prices and property values will decrease.
Trucks and other City Vehicles: coming and going up and down Hurricane and Strongs will also affect property values

GP3-4

LANDSCAPING:

The public works, or landscape authorities have stated that the plants that will be planted Are to be indigenous to the area ---Thus far, most of those are dead weeds.
If any project is to be built, it should require beautification with landscaping that stays alive, and enhances the envirionment!.

GP3-5

CONCLUSION:
I respectfully request that this entire project be put on Hold, and be reviewed by all residents, as to Design, impact to Values, landscaping, noise, and other matters.

The administrators and proponents of this project DO NOT LIVE HERE!! AND THEREFORE, IT IS SIMPLY A GOVERNMENT PROJECT. YOU HAVE NO STAKE IN OUR FUTURE, OR THE FUTURE OF THE NEXT GENERATION, WHO CHERISH AND CARE FOR THIS NEIGHBORHOOD/COMMUNITY.

THIS AREA IS VERY SPECIAL, IT IS NOT LIKE ANY OTHER CITY AREA OF LOS ANGELES. IT IS, THEREFORE, TO BE TREATED WITH CARE AND UNDERSTANDING FOR THE RIGHTS AND VALUES OF THOSE WHO LIVE HERE!

I thank you for reading this letter, and I trust that you will make every effort to modify, review, restrict or revise this project. I BEG OF YOU ALL!!

GP3-6

Sincerely,
Eliane Gans

Eliane Gans
3933 Esplanade #2, Marina Del Rey, CA 90292 (310) 339-4056

Eliane Gans – GP3

Response to Comment GP3-1

Thank you for your comment. A copy of the comment letter submitted as part of the email has been received and is included in this Final EIR.

As noted in Chapter 1 (Introduction) of the Draft EIR, the Board of Public Works will consider the Final EIR and make a recommendation to the Los Angeles City Council, as the governing body of the City of Los Angeles, regarding certification of the Final EIR and Project approval. The City Council may certify and approve the Final EIR or may choose to not approve the Project. During the environmental review and Project approval process, people and/or agencies may address the Board of Public Works and City Council regarding the Proposed Project. Public notification of agenda items for the Board of Public Works is available here: http://bpw.lacity.org/Agendas.html.

City Council agenda items are posted 72 hours prior to the public meeting. The City Council agenda can be obtained by visiting the City Council:

City Hall
200 North Spring Street
John Ferraro Council Chamber, Room 340
Los Angeles, CA 90012

Alternatively, agendas can also be accessed via the Internet at the following location:
http://lacity.org/cityg-overnment/elected-official-offices/citycouncil/council-calendar

Response to Comment GP3-2

The comments are not applicable, per CEQA and therefore, no response is required. However, see Response to Comment GP3-3 through GP3-5 below.

Response to Comment GP3-3

No Request for Proposals (RFP) was issued for the architectural design portion of the Proposed Project. The Proposed Project is in the preliminary engineering design phase and an RFP to finalize the design and construct is anticipated to be issued in 2018. During the two Scoping Meetings, circulation of the Draft EIR, and the Public Hearing, a conceptual design of the building was presented. In addition, Section 3.1 (Aesthetics) of the Draft EIR included photo-simulations of the conceptual design from various points of view (see Figures 3.1-2B and 3.1-3A of the Draft EIR) in order to provide context for building massing, height, architectural form and style and other considerations. As noted in Response to Comment GP1-3 (see above), the building design was reviewed by the DCP's Urban Design Studio and was required to comply with the Residential Citywide Design Guidelines and the Venice Specific Plan. A high quality design is proposed for the electrical building and would complement the scale, massing, design, and architecture of the adjacent residential neighborhood. Area residents will have an opportunity to provide comments on the building design, during the Planning entitlement process and which is scheduled during Fall/Winter 2017. Residents will be notified in advance of these meetings.

As noted above, as the electrical building was reviewed by the DCP's Urban Design Studio and has been designed in compliance with the Residential Citywide Design Guidelines and the Venice Specific Plan, the analysis in Section 3.1 (Aesthetics) determined that impacts would be less than

significant. Moreover, CEQA does not require an analysis of impacts to property values for proposed projects and instead, only addresses physical environmental impacts. As required, the Draft EIR did consider qualitative factors, as well as economic and technical factors and long-term benefits and costs when evaluating alternatives to the Proposed Project.

Response to Comment GP3-4

See Response to Comment GP3-3 above regarding property values. In addition, regarding noise and vibration-related impacts, please refer to Response to Comment GP1-4 (above). Deliveries of machinery and equipment will be necessary in order to construct the Proposed Project and will require access along Pacific Avenue and Hurricane Street. None are planned along Strong Drive. As noted in Section 3.10 (Transportation/Traffic) of the Draft EIR, the project would generate equipment and delivery truck trips during each phase of construction. Such trips are estimated to be two per day (four passenger car equivalents [PCE] trips per day) and could include cranes, bulldozers, excavators, and other large items of machinery. In addition, truck trips would also be generated from soil excavation. Section 3.10 of the Draft EIR noted that some 10,000 cubic yards of soil will be excavated and exported during construction Stages 1 and 2, of which approximately 2,300 cubic yards would be stockpiled at Laydown Area 1 and approximately 7,700 cubic yards of soil would be stockpiled at Laydown Area 3. If needed, up to 3,850 cubic yards will be imported (returned) back to the VAPP site to use as backfill during construction Stage 3 and 4. As noted in Table 3.10-2 (Daily Trip Generation by Construction Phase) of the Draft EIR, during peak periods of construction Stages 1 and 2 a total maximum of 104 Total Daily 1-way Passenger Car Equivalent (PCE) Trips would be generated (lasting some 95 days). Similarly, during the peak period for construction of Stage 3 (Pump Station), some 108 daily PCEs would be generated (lasting some 245 days). It should be noted that the analysis contained in Section 3.10 of the Draft EIR determined that construction-related traffic impacts were less than significant. In addition, please also note that the Proposed Project would not add any new City employees or associated trips.

Response to Comment GP3-5

As noted in Chapter 2 (Project Description) of the Draft EIR, the Grand Canal and Ballona Lagoon (components of the Venice Canal System) located immediately adjacent to the Proposed Project are designated as Environmentally Sensitive Habitat Areas (ESHAs) by the California Coastal Commission, County of Los Angeles, and City of Los Angeles. Moreover, Section 3.3 (Biological Resources) of the Draft EIR identified a number of sensitive plant and animal species associated with these resources, including along the Grand Canal banks. It also noted that portions of the Ballona Lagoon have been restored and have increased the functions and values of biological resources within the portion of the ESHA where the project is proposed (Hamilton 2010). Similarly, the Grand Canal has been identified for habitat restoration extending from Washington Boulevard south to the Ballona Lagoon as part of the Grand Canal Restoration Project. Based upon these considerations and in compliance with applicable laws and regulations, a portion of the Grand Canal temporarily disturbed by construction of the cofferdam and diversion structure will be restored and planted with native species. Further, as noted in mitigation measure MM Bio-3 Restoration of Vegetation within Grand Canal, habitat restoration will be performed in coordination with regulating agencies (California Coastal Commission, United States Army Corps of Engineers & Regional Water Quality Control Board) and as required by agency permits; accordingly the final Habitat Restoration Plan will include a native plant palette.

Because a minimal amount of open area would be present at the VAPP site, landscaping would largely be limited to 0.75-inch gravel or crushed stone for erosion and dust control. Depending on space availability and infrastructure requirements, the planting of shrubbery and trees may also be possible. The specific locations and species would be evaluated and then included in a landscape plan that would be prepared during final design.

On the 128 Hurricane Street lot, following completion of project construction, the construction laydown site would be converted to a publicly accessible site with public art, parking, and green open space. The specific locations and species of plantings within the open green space would also be identified in a landscape plan that would be prepared during final design.

Response to Comment GP3-6

The commenter's objections are noted. See Response to Comment GP3-1 and GP3-3 above.

GP4

---------- Forwarded message ----------
From: **Steve Bradbury** <steve@mycyberstuff.com>
Date: Fri, Nov 18, 2016 at 1:39 PM
Subject: Venice Auxiliary Construction Project
To: Dr Jan Green Rebstock <jan.green.rebstock@lacity.org>
Cc: Debbie Dyner Harris <debbie.dynerharris@lacity.org>, Karen Bradbury <karen@karenbradbury.com>

Jan:

After last nite's Draft EIR meeting, we were urged to submit additional public comments. Mine specifically relates to the proposed parking lot at 128 Hurricane St. This lot should ONLY accommodate the minimum # of cars required to provide employee parking for the pumping station and should ONLY be accessible during those times when employees are present. There should not be ANY public parking at ANY time. In fact, as was suggested by Debbie from Mike Bonin's office, there are ways to design the space with landscaping, etc such that there are literally no other available places to park. In addition, I wonder if some form of security can be added (such as an access gate) so that only those with an access card can even drive onto the lot. The goal is to eliminate this area as 1) a parking resource for visitors thereby turning Hurricane St into a tourist destination and 2) a hangout area for vagrants and others who might want to congregate in a less visible area away from Pacific Ave. We already have a recurring noise issue on Hurricane with people who come home drunk and loud late into the evening. There's no reason to provide additional pace for this to increase. GP4-1 GP4-2

Thank you,

Steve

~~~~~~~~~~~~~~~~~~~~
Steve Bradbury
c: 310-428-5904
steve@mycyberstuff.com
@stevbrad

2
~~~~~~~~~~~~~~~~~~~~

Steve Bradbury – GP4

Response to Comment GP4-1

Thank you for your comment. As noted in Chapter 2 (Project Description) of the Draft EIR, a total of eight parking spaces will be provided at 128 Hurricane Street to address Project-required employee and delivery/visitor parking, Beach Impact Zone parking and relocation of street parking at the terminus of Hurricane Street. These parking spaces are required to meet Venice Specific Plan and California Coastal Commission requirements and cannot be reduced. Moreover, due to California Coastal Act requirements, the public is entitled to access on-street and off-street public parking. Given these considerations, public parking spaces at the lot at 128 Hurricane Street lot cannot be eliminated and/or reduced or access restricted to local residents (including card key entry to the lot located at 128 Hurricane Street). Similarly, a final landscaping plan would need to take into consideration the public parking space requirements and be planned to accommodate these.

Response to Comment GP4-2

See Response to Comment GP4-1 above regarding public access to public off-site parking spaces. In addition, it should be noted that Section 3.10 (Transportation/Traffic) of the Draft EIR indicated that parking within the community is predominantly unrestricted, publicly available, and on street. Moreover, that due to its proximity to the Pacific Ocean, parking demand within the Venice community (including along Hurricane Street) can increase during weekends and summer months. Project required Beach Impact Zone Parking includes two parking spaces to meet this demand. However, the analysis also concluded that neither the temporary loss of parking during construction nor the provision of required public parking (to off-set the loss of parking along Hurricane Street between Canal Court and Esplanade) would be adversely affected with implementation of the Proposed Project. Given this, sufficient area parking exists and as such, the construction of the 128 Hurricane Street parking lot would not increase the number of visitors beyond existing conditions.

Homelessness and vagrancy are issues of concern throughout the City, including within the Venice community. There are existing vagrancy laws to address these issues should they occur and signage can be implemented, if necessary indicating “No Loitering.” Signage, along with appropriate lighting, may also assist in reducing the incidents of vagrancy and associated noise that currently occurs, as indicated by the commenter.

GP5

McQueen-Whalen Revocable Trust
2554 Lincoln Boulevard #588
Venice, California 90291
310.823.6811

RECEIVED
ENVIRONMENTAL MANAGEMENT
GROUP
DEC 15 2016
NAME: _____

December 12, 2016

Dr. Jan Green Rebstock
City of Los Angeles
Public Works, Bureau of Engineering
Environmental Management Group
1149 South Broadway Street, 6th Floor, Mail Stop 939
Los Angeles, California 90015-2213

RE: Draft Environmental Impact Report for the Proposed Venice Auxiliary Pumping Plant Project, SCH #2015111038

Dear Dr. Rebstock:

We wish to reiterate the concerns we have expressed to you over the past fourteen months (through our letter of November 25, 2015, and various emails and telephone conversations) that both the Initial Study/Environmental Checklist and the Draft Environmental Impact Report refer to the property at 128 Hurricane Street as being owned by the City of Los Angeles.

GP5-1

As you know, that is completely false. The property is, in fact, owned by the McQueen-Whalen Revocable Trust. This error of fact has permeated the breadth and depth of the Draft EIR to the point that it is fundamentally flawed.

You informed us on the phone that the underlying premise of the Draft EIR assumes the City will purchase our property. We believe it is imperative that the EIR address the possibility that the property might not be acquired. A thorough re-evaluation, excluding the property at 128 Hurricane, should be conducted and presented as part of the EIR.

GP5-2

Sincerely,

Daniel P. Whalen, AIA
Trustee

Sharon McQueen
Trustee

McQueen-Whalen Revocable Trust – GP5

Response to Comment GP5-1

Thank you for your comment. In Chapter 2 (Project Description) of the Draft EIR, it was noted that parcel located at 128 Hurricane Street (APN 4225-010-016) was privately owned, but that the City was in the process of acquiring the lot. However, in Section 4.2.3.3 (Expand Existing Venice Pumping Plant and Install Pumps and Piping Below-grade) the parcel was inadvertently noted as city-owned. Chapter 3 (Modifications to the Draft EIR) of this Final EIR includes a clarification that the parcel is not currently owned by the City.

Response to Comment GP5-2

Chapter 4 (Comparison of Alternatives) of the Draft EIR evaluated alternatives for the Proposed Project, including alternative locations and which assumed that the privately-owned parcel located at 128 Hurricane Street would not be acquired for the Proposed Project. Based upon the analysis in Chapter 4 of the Draft EIR, the Proposed Project was considered the Environmentally Superior Alternative. The Draft EIR also provided a thorough analysis of the Proposed Project's potential impacts, including a detailed analysis of alternatives (as discussed above) and therefore, no re-analysis or supplemental analysis is required in the Final EIR.

2.4 References

Venice Auxiliary Pumping Plant Draft Environmental Impact Report, October 2016.

City of Los Angeles Municipal Code. Source: https://law.resource.org/pub/us/code/city/ca/LosAngeles/Municipal/chapter04.pdf. Accessed on February 3, 2017.

Chapter 3
Modifications to the Draft EIR

3.1 Introduction

This chapter includes changes to the Draft Environmental Impact Report (Draft EIR) for the Proposed Project, as deemed necessary by the lead agency. These corrections and/or modifications to the Draft EIR are intended to provide clarity, refinements or supplemental information for the Proposed Project, based upon comments received from agencies and/or interested parties/public. None of the corrections and/or modifications to the Draft EIR constitute significant new information, changes to the analysis or conclusions originally contained in the Draft EIR and, therefore, do not require recirculation of the Draft EIR, per Section 15088.5 of the California Environmental Quality Act (CEQA) Guidelines.

These changes are hereby incorporated within the Draft EIR and constitute the entirety of the EIR.

3.2 Changes to the Draft EIR

Corrections or revisions are noted below by Chapter and/or Section. Revisions are noted in two formats: (1) deleted text is provided in ~~strikethrough~~; and (2) new texts in noted in underline.

Changes Made to Executive Summary

Table ES-1 (Required Permits for Venice Auxiliary Pumping Plant Project) on page ES-4 of the Draft EIR is revised to include the following new permit and/or approvals:

Table ES-1. Required Permits for Venice Auxiliary Pumping Plant Project

Agency	Permit/Requirement	Issue
Local		
City of Los Angeles Department of Public Works	Local Coastal Development Permit (CDP)	Coastal access, construction within coastal zone, habitat disturbance, parking and traffic during construction. Also consistency with the Venice Local Coastal Program Land Use Plan.
City of Los Angeles Planning Department	Specific Plan Project Permit Compliance (SPP) (LAMC § 11.5.7)	Compliance with the Venice Coastal Specific Plan. ~~Also consistency with the Venice Local Coastal Program Land Use Plan~~
City of Los Angeles Planning Department	Public Benefits Project Permit (PUB) (LAMC § 14.A.6)	Section 14 of the Los Angeles Municipal Code. Public Benefit permit with Alternative Compliance for public utilities and public services uses and structures ~~Public Facilities and Park/Recreation uses~~

Agency	Permit/Requirement	Issue
City of Los Angeles Planning Department	Los Angeles Municipal Code Adjustment for Yards ~~and Rear Fence~~ (LAMC § 12.28)	Relief for encroachment and projections ~~more than 6 feet~~ into the rear and side yards to allow a side yard of 5 ½ feet in lieu of the required 8 feet (on the south side) ~~and an 8 foot high fence~~.
City of Los Angeles Planning Department	Conditional Use Permit for Parking (LAMC 12.24 U)	~~Relief for encroachment more than 6 feet into rear yard~~ To allow a public parking lot in the RW2 (Residential Waterways) zone.
Los Angeles County Department of Public Works/Department of Beaches and Harbors	Encroachment permit	Access and use of parcel for Laydown Area 2
City of Culver City, Planning Department	Temporary Use Permit	Temporary stockpile of soil (up to 7,700 cubic yards) for Laydown Area 3
Regional		
Los Angeles Regional Water Quality Control Board (RWQCB)	National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Pollution Prevention Plan permit	Water quality and placement of discharges associated with dewatering activities; no permit required for discharges to sewer (general permit saves time with RWQCB)
RWQCB	401C section certification	State water quality certification prior to an issuance of U.S. Army Corps of Engineers (USACE) nationwide permit
South Coast Air Quality Management District	Permit to construct and operate	Air quality, additional portable generator(s), and any modifications to odor dispersion stack
State		
California Coastal Commission	State Coastal Development Permit	Coastal access, construction within coastal zone, habitat disturbance, parking and traffic during construction
California Department of Conservation, Division of Oil, Gas, and Geothermal Resources	A construction notification form should be submitted to the division prior to any activity	Project is within boundaries of the Playa del Rey oil field, which contains numerous plugged and abandoned oil wells
State of California Department of Health Services	Project review for compliance with Title 22, Section 64630 (conducted through County Environmental Services Division)	Separation of water and sewer mains

Agency	Permit/Requirement	Issue
California Office of Historic Preservation	Consultation	Historic status of Grand Canal
Federal		
USACE	Section 10 permit	Pipeline construction under navigable waters
USACE	Section 404	Could fall under Nationwide Permit NWP 12, Utility Line Activities, and require Pre-Construction Notification (PCN)
National Marine Fisheries Service	Consultation notification	Impacts on aquatic and marine life
U.S. Fish and Wildlife Service	Notification through Section 10 process	Impacts on habitat (i.e., least tern)

The following text under the heading Impacts Determined to Be Less than Significant on page ES-12 of the Draft EIR is revised as follows:

Impacts Determined to Be Less than Significant

The analysis contained in the Draft EIR determined that the Proposed Project would result in less than significant or less than significant impacts after mitigation is implemented for the following resources:

- Aesthetics
- Air Quality
- Biological Resources
- Cultural Resources
- Geology and Soils
- Greenhouse Gas Emissions
- Hydrology and Water Quality & Service Systems
- Land Use and Planning (secondary impacts related to operation ~~only, for secondary~~ noise, aesthetics, geology and soils ~~and vibration impacts~~)
- Noise and Vibration (operation noise, construction vibration - potential building damage ~~operation only, for noise and vibration~~)
- Transportation/Traffic
- Energy

Table ES-3 (Summary of Environmental Impacts, Mitigation Measures, and Notable BMPs) on page ES-15 of the Draft EIR is revised to include the following changes to mitigation measures under Geology and Soils (on page ES-27) and Transportation/Traffic (on page ES-46):

Table ES-3. Summary of Environmental Impacts, Mitigation Measures and notable BMPs

Environmental Impact	Significance Before Mitigation	Mitigation Measures	Significance after Mitigation
Geology and Soils			
GEO-1. Seismic Hazards. During construction and operation, the Project Site could be subject to significant seismic ground shaking from regional faults; however the VAPP would be designed in conformance with the City of Los Angeles Building Code, which would reduce potential ground shaking hazards. Due to presence of uncertified fill soils, seismically related ground failure, including liquefaction, could occur on the Project Site.	Potentially Significant	**MM GEO-1: Liquefaction Considerations**. Potential liquefaction induced settlements shall be considered and accounted for in the design of the Proposed Project. The design shall comply with the specifications in the following three reports located in Appendix M: the Department of Public Works, Bureau of Engineering, Geotechnical Division's *Geotechnical Engineering Report*, Department of Building and Safety's *Geology and Soils Report Approval Letter* and the Department of Public Works Geotechnical Division's *Response to the City of Los Angeles, Department of Building and Safety Geology and Soils Report Correction Letter.* ~~Given the data presented in Section 3 of the *Geotechnical Engineering Report – Venice Auxiliary Pumping Plant*, December 14, 2015, and the results of the liquefaction calculations, potential liquefaction induced settlements on the order of 1.75 inches are estimated for the site. A potential liquefaction induced differential settlement of 1 inch is estimated between the proposed structures and the pipe header. These potential liquefaction induced settlements shall be considered and accounted for in the design of the Proposed Project.~~ ~~Mat foundations are recommended for support of the Project structures, with the understanding that the foundation would be susceptible to liquefaction-induced settlements. Mat foundations for the wetwell/valve structure and diversion structures shall be founded on jet-grouted columns constructed within the natural soils. The mat foundation for the electrical building shall be founded on compacted fill soil. Mat foundations shall be designed and constructed to bear at a depth of at least 24 inches below the lowest adjacent grade. Mat foundations can be designed for an allowable bearing capacity of 1,500 pounds per square foot (psf). A coefficient of vertical subgrade reaction, for a 1-foot-square loaded area, of 100 kips per cubic foot (kcf) may be used for design of the mats.~~	Less than Significant

Environmental Impact	Significance Before Mitigation	Mitigation Measures	Significance after Mitigation
		~~Total static settlement of the proposed foundations, designed and constructed in accordance with the recommendations presented herein, shall not exceed 1 inch. Differential static settlement shall not exceed one-half of the total settlement.~~ ~~Resistance to lateral loads can be provided by friction at the base of the foundation and passive earth pressure. A coefficient of friction of 0.35 may be assumed with dead-load forces. An allowable passive lateral earth pressure of 250 psf per foot of depth up to a maximum of 2,500 psf may be used for sides of the foundation poured against undisturbed natural soil or properly compacted fill. The allowable passive pressure may be increased by 33% of lateral loading due to wind or seismic forces.~~	
TRANS-3. Result in inadequate emergency access: Construction-related activities have the potential to result in temporary and periodic inadequate emergency access. Wherever possible, delivery trucks would be brought onto the Project Site and be loaded and unloaded within the perimeter fence of the construction site. The roadways surrounding the Project Site would remain accessible during operation of the Proposed Project. Operational impacts would be less than significant.	Potentially Significant	**MM TRANS-1: Construction Worker Shuttles.** Construction workers would park at an off-site location and be shuttled to and from the Project Site each workday on 10 to 15-passenger shuttles or vans. While no specific off-site location has been identified at this time, it would likely lie within five miles of the Project Site. The selected contractor would be required to identify and secure a suitable location. **MM TRANS-2: Coordination with Emergency Service Providers.** Coordinate with emergency service providers (police, fire, ambulance and paramedic services) to provide advance notice of any lane closures, construction hours and changes to local access and to identify alternative routes where appropriate. **MM-TRANS-3: Transport of Heavy Construction Equipment and/or Materials.** Provided heavy equipment and/or materials are required to be transported to the project site along State facilities (i.e., State Route 1 [Lincoln Boulevard]), the contractor, on behalf of the LABOE, shall obtain a Caltrans transportation permit, prior to transport and/or delivery of such equipment. In addition, large size truck trips (as defined by Caltrans), shall be limited to off-peak commute hours (i.e., not occurring between 7:00 a.m. – 9:00 a.m. and then again between 4:00 p.m. – 6:00 p.m.).	Less than Significant

Changes Made to Chapter 2 (Project Description)

The following text under Section 2.8.3 (Parking) on page 2-7 of the Draft EIR is revised as follows:

> Parking for the Proposed Project would be provided on the 128 Hurricane Street lot. There would be a total of eight parking spaces. Per the Venice Specific Plan and the Venice Local Coastal Program Land Use Plan, the Proposed Project would require at least five project-dedicated parking spaces, ~~four~~ three are required for the project, and ~~one~~ two for Beach Impact Zone parking. Five e~~E~~xisting on-street parking spaces along Hurricane Street on the south side of the new VAPP lot ~~would~~ will be removed ~~and replaced on the 128 Hurricane Street lot to be consistent with the California Coastal Act~~; three will be relocated in the 128 Hurricane Street lot and the remaining made available in accordance with the requirements of the City of Los Angeles Department of City Planning, Department of Transportation and the California Coastal Commission in the project vicinity.

The following text under Section 2.8.10 (On- and Off-site Circulation, Parking, and Pedestrian Access) on page 2-9 of the Draft EIR is revised as follows:

> Pacific Avenue, Hurricane Street, Via Dolce, and Marquesas Way will provide access to the Project Site, including construction Laydown Areas. Hurricane Street between Canal Court and Esplanade would be closed to public traffic during construction; however, these roadways would remain accessible during operation of the Proposed Project and preserve Coastal Access (see Figure 2-2, Project Location Map). Five on-street parking spaces ~~Parking~~ on Hurricane Street would be ~~eliminated~~ removed; ~~permanently but~~ three will be relocated to the 128 Hurricane Street lot and the remaining made available in the Project vicinity in accordance with the requirements of the City of Los Angeles Department of City Planning, Department of Transportation and the California Coastal Commission. A total of eight parking spaces would be provided on the 128 Hurricane Street lot for employees and deliveries/visitors (~~five~~ three spaces), Beach Impact Zone Parking (two spaces) and relocation of existing on-street parking spaces ~~at the terminus of~~ from Hurricane Street (three spaces).

Table 2-1 (Required Permits for Venice Auxiliary Pumping Plant Project) in Section 2.10 (Responsible Agencies and Project Approvals) on page 2-13 of the Draft EIR is revised to include the following new permit and/or approvals:

Table 2-1. Required Permits for Venice Auxiliary Pumping Plant Project

Agency	Permit/Requirement	Issue
Local		
City of Los Angeles Department of Public Works	Local Coastal Development Permit (CDP)	Coastal access, construction within coastal zone, habitat disturbance, parking and traffic during construction. Also consistency with the Venice Local Coastal Program Land Use Plan.
City of Los Angeles Planning Department	Specific Plan Project Permit Compliance (SPP) (LAMC § 11.5.7)	Compliance with the Venice Coastal Specific Plan. ~~Also consistency with the Venice Local Coastal Program Land Use Plan~~

Agency	Permit/Requirement	Issue
City of Los Angeles Planning Department	Public Benefits Project Permit (PUB) (LAMC § 14.A.6)	Section 14 of the Los Angeles Municipal Code. Public Benefit permit with Alternative Compliance for public utilities and public services uses and structures ~~Public Facilities and Park/Recreation uses~~
City of Los Angeles Planning Department	Los Angeles Municipal Code Adjustment for Yards ~~and Rear Fence~~ (LAMC § 12.28)	Relief for encroachment and projections ~~more than 6 feet~~ into the rear and side yards to allow a side yard of 5 ½ feet in lieu of the required 8 feet (on the south side) ~~and an 8 foot high fence~~.
City of Los Angeles Planning Department	Conditional Use Permit for Parking (LAMC 12.24 U)	~~Relief for encroachment more than 6 feet into rear yard~~ To allow a public parking lot in the RW zone.
Los Angeles County Department of Public Works/Department of Beaches and Harbors	Encroachment permit	Access and use of parcel for Laydown Area 2
City of Culver City, Planning Department	Temporary Use Permit	Temporary stockpile of soil (up to 7,700 cubic yards) for Laydown Area 3
Regional		
Los Angeles Regional Water Quality Control Board (RWQCB)	National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Pollution Prevention Plan permit	Water quality and placement of discharges associated with dewatering activities; no permit required for discharges to sewer (general permit saves time with RWQCB)
RWQCB	401C section certification	State water quality certification prior to an issuance of U.S. Army Corps of Engineers (USACE) nationwide permit
South Coast Air Quality Management District	Permit to construct and operate	Air quality, additional portable generator(s), and any modifications to odor dispersion stack
State		
California Coastal Commission	State Coastal Development Permit	Coastal access, construction within coastal zone, habitat disturbance, parking and traffic during construction
California Department of Conservation, Division of Oil, Gas, and Geothermal Resources	A construction notification form should be submitted to the division prior to any activity	Project is within boundaries of the Playa del Rey oil field, which contains numerous plugged and abandoned oil wells

Agency	Permit/Requirement	Issue
State of California Department of Health Services	Project review for compliance with Title 22, Section 64630 (conducted through County Environmental Services Division)	Separation of water and sewer mains
California Office of Historic Preservation	Consultation	Historic status of Grand Canal
Federal		
USACE	Section 10 permit	Pipeline construction under navigable waters
USACE	Section 404	Could fall under Nationwide Permit NWP 12, Utility Line Activities, and require Pre-Construction Notification (PCN)
National Marine Fisheries Service	Consultation notification	Impacts on aquatic and marine life
U.S. Fish and Wildlife Service	Notification through Section 10 process	Impacts on habitat (i.e., least tern)

Changes Made to Section 3.5 (Geology and Soils)

The following text and mitigation measure under Section 3.5.4 (Mitigation Measures) on pages 3.5-9 and 3.5-10 of the Draft EIR is revised as follows:

The following mitigation measure was developed to avoid or minimize potential impacts ~~on~~ of the proposed Project related to geology and soils. It should be noted that there are also specific recommendations contained in the *Geotechnical Engineering Report – Venice Auxiliary Pumping Plant*, December 14, 2015 (see Appendix G of ~~this~~ the Draft EIR), ~~and~~ *Phase I Environmental Site Assessment (128 Hurricane Street)*, May 2016 (see Appendix K of ~~this~~ the Draft EIR), and the Department of Public Works, Bureau of Engineering, Geotechnical Division's *Geotechnical Engineering Report*, Department of Building and Safety's *Geology and Soils Report Approval Letter* and the Department of Public Works Geotechnical Division's *Response to the City of Los Angeles, Department of Building and Safety Geology and Soils Report Correction Letter* (see Appendix M of the Final EIR for these three reports).

MM GEO-1: Liquefaction Considerations.

Potential liquefaction induced settlements shall be considered and accounted for in the design of the Proposed Project. The design shall comply with the specifications in the following three reports located in Appendix M: the Department of Public Works, Bureau of Engineering, Geotechnical Division's *Geotechnical Engineering Report*, Department of Building and Safety's *Geology and Soils Report Approval Letter* and the Department of Public Works Geotechnical Division's *Response to the City of Los Angeles, Department of Building and Safety Geology and Soils Report Correction Letter.*

~~Given the data presented in Section 3 of the *Geotechnical Engineering Report – Venice Auxiliary Pumping Plant*, December 14, 2015, and the results of the liquefaction calculations, potential liquefaction induced settlements on the order of 1.75 inches are estimated for the site. A~~

~~potential liquefaction induced differential settlement of 1 inch is estimated between the proposed structures and the pipe header. These potential liquefaction induced settlements shall be considered and accounted for in the design of the Proposed Project.~~

~~Mat foundations are recommended for support of the project structures, with the understanding that the foundation would be susceptible to liquefaction-induced settlements. Mat foundations for the wetwell/valve structure and diversion structures shall be founded on jet-grouted columns constructed within the natural soils. The mat foundation for the electrical building shall be founded on compacted fill soil. Mat foundations shall be designed and constructed to bear at a depth of at least 24 inches below the lowest adjacent grade. Mat foundations can be designed for an allowable bearing capacity of 1,500 pounds per square foot (psf). A coefficient of vertical subgrade reaction, for a 1-foot-square loaded area, of 100 kips per cubic foot (kcf) may be used for design of the mats.~~

~~Total static settlement of the proposed foundations, designed and constructed in accordance with the recommendations presented herein, shall not exceed 1 inch. Differential static settlement shall not exceed one-half of the total settlement.~~

~~Resistance to lateral loads can be provided by friction at the base of the foundation and passive earth pressure. A coefficient of friction of 0.35 may be assumed with dead-load forces. An allowable passive lateral earth pressure of 250 psf per foot of depth up to a maximum of 2,500 psf may be used for sides of the foundation poured against undisturbed natural soil or properly compacted fill. The allowable passive pressure may be increased by 33% of lateral loading due to wind or seismic forces.~~

Changes Made to Section 3.8 (Land Use and Planning)

Table 3.8-2 (Proposed Project Consistency with Applicable Plans and Goals, Objectives, and Policies) in Section 3.8.2.2 (Applicable Goals, Objectives, and Policies) on page 3.8-20 of the Draft EIR is revised as follows:

Table 3.8-2. Proposed Project Consistency with Applicable Plans and Goals, Objectives, and Policies

Plan Goal, Policy Or Objective Number	Applicable Goal, Policy, or Objective	Conflict with Applicable Plan, Policy, or Regulation?
Venice Local Coastal Program		
Policy II.A.3. Parking Requirements.	Public Utility Facility not having a Business Office on the premises: 2 spaces; plus 1 space for each 500 square feet of floor area. Parking shall be provided pursuant to a detailed parking study that demonstrates that the project will provide adequate parking to meet the needs of the development without causing negative impacts to coastal access or access to public recreational facilities.	No. The Proposed Project includes a total of eight parking spaces, five for on-site parking and three relocated off-site parking spaces. The Proposed Project requires a total of five on-site parking spaces. A total of ~~four~~ three spaces are required to comply with the Venice Specific Plan for the Project and ~~one~~ two parking spaces ~~is~~ are required to comply with Beach Impact Zone Parking requirements. These spaces are allowed off-site, located within 750 feet of the property per LAMC 12.21 A.4 (g) and would be located on 128 Hurricane Street with a recorded covenant. Since the proposed parking area is R-zoned, a Conditional Use for Parking (LAMC 12.24U) would be required to allow a parking lot on the R-zoned lot. ~~Also since the~~ Five on-street parking would be removed ~~and replaced~~ with a red curb and/or a driveway along the southerly boundary of the Proposed Project along Hurricane Street. Three spaces will be relocated on the 128 Hurricane Street lot and the remaining made available in the Project vicinity in accordance with the requirements of the City of Los Angeles Department of City Planning, Department of Transportation and the California Coastal Commission. It is possible that not all of the removed on-street parking will be replaced on a 1:1 ratio. According to the Project's *Parking Assessment Draft Memorandum*, even if parking is not replaced on a 1:1 ratio, it will not cause an impact to Coastal parking since there is adequate parking in the Project vicinity ~~three spaces would be relocated on the 128 Hurricane Street lot~~. It should be noted that the Draft EIR determined that impacts associated with parking during operation of the Proposed Project would be less than significant and therefore, no mitigation measures are required.

Plan Goal, Policy Or Objective Number	Applicable Goal, Policy, or Objective	Conflict with Applicable Plan, Policy, or Regulation?
Venice Community Plan		
Goal 13	A sufficient system of well designed and convenient on-street parking and off-street parking facilities throughout the plan area.	No. The Proposed Project will provide a total of eight parking spaces at the 128 Hurricane Street lot. A total of three ~~four~~ parking spaces would be provided to serve employees, two ~~one~~ space for the Beach Impact Zone parking requirement, and relocated parking spaces, which would be removed from the southerly boundary of the Proposed Project along Hurricane Street between Canal Court and Esplanade with three ~~and~~ relocated to 128 Hurricane Street and the remaining made available in the Project vicinity in accordance with the requirements of the City of Los Angeles Department of City Planning, Department of Transportation and the California Coastal Commission. It is possible that not all of the removed on-street parking will be replaced on a 1:1 ratio. According to the Project's *Parking Assessment Draft Memorandum*, even if parking is not replaced on a 1:1 ratio, it will not cause an impact to Coastal parking since there is adequate parking in the Project vicinity. Two existing non-public off-street parking spaces at the VPP would be maintained inside the existing VPP. The analysis contained in the Draft EIR determined that impacts related to the relocation of existing public parking spaces at the eastern terminus of Hurricane Street would result in less-than-significant parking impacts and no mitigation measures would be necessary.

The following text under Section 3.8.3.4 (Construction Impacts) on page 3.8-44 of the Draft EIR is revised as follows:

The Venice Coastal Specific Plan establishes the amount of required parking for the Proposed Project and the California Coastal Act protects coastal on-street parking. A total of eight parking spaces will be provided at the 128 Hurricane Street lot. Five parking spaces are required for the Proposed Project that would be located on the 128 Hurricane lot, within 750 feet of the Project Site. A Conditional Use Permit for Parking on this lot would be pursued in order for the parking requirements to be consistent with the Venice Specific Plan. There are five on-street parking spaces that will be removed from Hurricane Street east of Canal Court. It is possible that not all of these five removed on-street parking spaces will be replaced on a 1:1 ratio. Three ~~O~~on-street parking spaces ~~located on Hurricane Street west of Canal Court are proposed to~~ will be relocated on the 128 Hurricane Street lot and the remaining made available in the Project vicinity in accordance with the requirements of the City of Los Angeles Department of City Planning, Department of Transportation and the California Coastal Commission. As previously stated, according to the Project's *Parking Assessment Draft Memorandum*, even if parking is not replaced on a 1:1 ratio, it will not cause an impact to Coastal parking since there is adequate parking in the Project vicinity. ~~Therefore, a total of eight parking spaces will be provided at the 128 Hurricane Street lot.~~ Issuance of a Conditional Use Permit and a Coastal Development Permit would ensure that the Proposed Project would not conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project, adopted for the purpose of avoiding or mitigating an environmental effect and therefore, impacts would be **less than significant** and no mitigation is required.

The following text under Section 3.8.3.4 (Operational Impacts) on page 3.8-47 of the Draft EIR is revised as follows:

The curb along Hurricane Street, adjacent to the new VAPP site, would be changed to red and/or a driveway resulting in the removal of five on-street parking spaces. It is possible that not all of the removed on-street parking will be replaced on a 1:1 ratio. Three of the ~~The~~ current on-street parking spaces ~~would~~ will be relocated to the 128 Hurricane Street lot and the remaining made available in the Project vicinity in accordance with the requirements of the City of Los Angeles Department of City Planning, Department of Transportation and the California Coastal Commission. However, according to the Project's *Parking Assessment Draft Memorandum*, even if parking is not replaced on a 1:1 ratio, it will not cause an impact to Coastal parking since there is adequate parking in the Project vicinity. Because the VPP and VAPP are considered critical facilities, access would need to be controlled at all times. As discussed in Chapter 2 (Project Description), this would be achieved via security cameras, lighting, and perimeter fencing. Project parking for the VAPP would be located at the 128 Hurricane Street, just west of the existing VPP site. Therefore, the Proposed Project would not conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, a general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect and therefore, impacts would be **less than significant**.

Changes Made to Section 3.10 (Transportation/Traffic)

The following text in Section 3.10.3.2 (Screening Analysis) on pages 3.10-15 and 3.10-16 of the Draft EIR is revised as follows:

Once construction begins, Hurricane Street will be ~~permanently~~ closed to traffic between Esplanade and Canal Court. This will result in the ~~loss~~ removal of five on-street parking spaces. Additionally, the segment of Canal Court adjacent to the project site will be temporarily closed during the construction period; however, parking is prohibited there. Once the Project is operational, the five on-street parking spaces on Hurricane Street will be removed with a red curb and/or a driveway along the southerly boundary of the Proposed Project along Hurricane Street.

The Venice Pumping Plant currently requires two employees per 8-hour shift (three shifts over a 24-hour period) and two parking spaces are located within the VPP site. Once VAPP becomes operational, this staffing level will remain unchanged. Thus VAPP/VPP would require up to four parking spaces at the peak time, when shift changes occur. Per the Venice Specific Plan and the Venice Local Coastal Program Land Use Plan, the project must also provide ~~one~~ two spaces for Beach Impact Zone parking. ~~The proposed project will construct eight off-street parking spaces at 128 Hurricane Street, which will fully satisfy the need for replacement parking (five spaces), employee parking (four spaces including the existing two off-street employee spaces within the VPP), and the one new space required as Beach Impact Zone parking.~~ The Proposed Project will construct eight off-street parking spaces at 128 Hurricane Street; three spaces would be provided to address the loss of three (of five) on-street spaces along Hurricane Street; three spaces would be provided to address employee, delivery and visitor-serving parking, in compliance with the Venice Specific Plan and Venice Local Coastal Program Land Use Plan; and two spaces would be provided to address the Beach Impact Zone parking requirements. The remaining removed Hurricane Street spaces will be made available in the Project vicinity in accordance with the requirements of the City of Los Angeles Department of City Planning, Department of Transportation and the California Coastal Commission. It should also be noted that according to the Project's *Parking Assessment Draft Memorandum* (see Appendix J of the Draft EIR) there is adequate parking in the Project vicinity to accommodate the permanent loss of these two on-street spaces along Hurricane Street, should they not be replaced on a 1:1 ratio in the project vicinity. During the 2-year construction period of the VAPP, the loss of the five on-street existing parking spaces from Hurricane Street between Canal Court and the Grand Canal would temporarily reduce the parking supply in the project vicinity. This will affect the convenience of drivers seeking to park, by reducing the total supply of on-street parking in the neighborhood around the VAPP site, although the total on-street parking in the vicinity could still accommodate these vehicles. Once the Proposed Project is operational, of the five spaces removed from Hurricane Street, three spaces would be relocated to the 128 Hurricane Street lot and the remaining made available in the Project vicinity in accordance with the requirements of the City of Los Angeles Department of City Planning, Department of Transportation and the California Coastal Commission. It is possible that not all removed on-street parking spaces will be replaced on a 1:1 ratio. According to the Project's *Parking Assessment Draft Memorandum* (see Appendix J of the Draft EIR), even if parking is not replaced on a 1:1 ratio, it will not cause an impact to coastal parking since there is adequate parking in the Project vicinity.

The Parking Assessment Draft Memorandum concluded the existing available parking supply near the Project Site is sufficient under normal circumstances to accommodate the parking spaces that would be ~~temporarily~~ displaced ~~during construction of~~ by the Proposed Project. In addition, within approximately 1,000 feet of the Project Site, at least 70 spaces were available during the weekday peak period and at least 11 spaces were available during the busier weekend peak period. It is recognized, however, that during peak times on peak summer weekend days and weekdays and holidays, parking utilization is higher than what was observed on the survey dates. On those days, the ~~temporary loss~~ displacement of these on-street spaces would be expected to result in an increase in vehicles circling through the neighborhood as they seek available parking. However, under normal operating conditions, this impact is less than significant.

With implementation of the proposed parking spaces, the Project's parking supply would comply with City codes, plans, and ordinances. While the Project is located within the coastal one, the project's proposed parking supply would meet California Coastal Commission requirements. ~~Upon project completion, the on-street parking on Hurricane Street east of Canal Court would be fully replaced off-street at 128 Hurricane Street. In addition, the proposed VAPP project, together with the existing VPP facility, would provide four employee parking spaces, sufficient to accommodate its needs, as well as one additional space as required for Beach Impact Zone parking. Thus, upon completion the project would result in one additional parking space in the project vicinity.~~ As such, no significant project impacts to parking would occur and no further analysis required.

The following text in Section 3.10.3.3 (Thresholds of Significance) on pages 3.10-17 and 3.10-18 of the Draft EIR is revised as follows:

TRANS-4. L.8. To allow for discussion of this threshold in both construction and operational phases of the project, it has been modified to discuss both temporary and permanent potential impacts.

In-Street ~~Construction~~ Impacts: The determination of significance shall be made on a case-by-case basis, considering the following factors:

- ~~Temporary~~ Traffic Impacts:
  - The length of time of ~~temporary~~ street closures or closures of two or more traffic lanes;
  - The classification of the street (major arterial, state highway) affected;
  - The existing traffic levels and level of service (LOS) on the affected street segments and intersections;
  - Whether the affected street directly leads to a freeway on- or off-ramp or other state highway;
  - Potential safety issues involved with street or lane closures; and
  - The presence of emergency services (fire, hospital, etc.) located nearby that regularly use the affected street.
- ~~Temporary~~ Loss of Access:
  - The length of time of any loss of vehicular or pedestrian access to a parcel fronting the construction area;

- The availability of alternative vehicular or pedestrian access within ¼ mile of the lost access; and
- The type of land uses affected, and related safety, convenience, and/or economic issues.

- ~~Temporary~~ Loss of Bus Stops or Rerouting of Bus Lines:
  - The length of time that an existing bus stop would be unavailable or that existing service would be interrupted;
  - The availability of a nearby location (within ¼ mile) to which the bus stop or route can be temporarily relocated;
  - The existence of other bus stops or routes with similar routes/destinations within a ¼ mile radius of the affected stops or routes; and
  - Whether the interruption would occur on a weekday, weekend or holiday, and whether the existing bus route typically provides service that/those day(s).
- ~~Temporary~~ Loss of On-Street Parking:
  - The current utilization of existing on-street parking;
  - The availability of alternative parking locations or public transit options (e.g. bus, train) within ¼ mile of the Project Site; and
  - The length of time that existing parking spaces would be unavailable.

The following text in Section 3.10.3.4 (Construction Impacts) on page 3.10-20 of the Draft EIR is revised as follows:

> The added traffic would be most apparent on the local roadways serving the site, but as described above, this would be short-term in nature and the vehicle the trips would be distributed throughout the day (not all 58 vehicle trips would occur during the AM or PM peak hours). In addition, temporary street closures along Canal Court and Hurricane Street (see Chapter 2, Project Description) would not result in adverse traffic impacts on surrounding neighbors since alternate access would be available. Therefore, the Proposed Project would not exceed the capacity of the existing circulation system, based on an applicable measure of effectiveness (as designated in a general plan policy, ordinance, etc.), taking into account all relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit, and impacts would be **less than significant**; no mitigation measures are required. Transport of heavy construction equipment and materials associated with the Proposed Project that may need to occur along State Route 1 (Lincoln Boulevard), a Caltrans facility, will require a Caltrans transportation permit. Any large size truck trips (as defined by Caltrans), will be limited to off-peak commute hours. While impacts would be less than significant, Mitigation Measure MM TRANS-3 would be included to address heavy construction equipment and materials transport to the project site.

The following text in Section 3.10.3.4 (Construction Impacts) on pages 3.10-21 and 3.10-22 of the Draft EIR is revised as follows:

TRANS-4. L.8. Result in In-Street ~~Construction~~ Impacts

According to the *L.A. CEQA Thresholds Guide*, the determination of significance related to ~~in-street construction~~ this threshold shall be made on a case-by-case basis, considering several factors. These are each discussed below.

~~Temporary~~ Traffic Impacts

The City of Los Angeles has established threshold criteria to determine significant traffic impacts of a Proposed Project in its jurisdiction. Although the methodologies and the criteria to calculate volume-to-capacity (V/C) ratios for intersections are intended by LADOT to identify potential traffic impacts during operation, they can also be applied to construction periods.

Under the City of Los Angeles guidelines, a project would be considered to significantly affect a local residential street if the projected increase in daily traffic volumes is as follows:

Projected Average Daily Traffic (ADT) with Project (Final ADT)	Project-Related Increase in ADT
0 to 999	120 or more
1,000 to 1,999	12% or more of final ADT
2,000 to 2,999	10% or more of final ADT
3,000 or more	8% or more of final ADT
Source: Fehr & Peers 2016.	

Based on these guidelines, VAPP construction activity would not result in any significant traffic impacts on study area streets because the maximum number of daily project trips is estimated to be 58 one-way trips (or 108 PCEs), which is below the minimum threshold volume considered significant. Therefore, the Proposed Project's in-street construction impacts related to temporary traffic impacts would be **less than significant**, and no mitigation measures are required.

~~Temporary~~ Loss of Access

The entire Project Site would be fenced and Hurricane Street, between Canal Court and the Esplanade, would be closed to the public. During Stage 1 of construction, a portion of Hurricane Street and Canal Court would be temporarily closed and pedestrian access to the Grand Canal from Hurricane Street would be eliminated; pedestrians would be diverted to Galleon Street one block to the north or would be able to utilize Canal Court extending south to the Esplanade. Hurricane Street and Esplanade would be re-opened to pedestrian access on the west side of the Grand Canal following completion of Stage 6 of construction. Therefore, the Proposed Project would result in temporary loss of access impacts that would be **less than significant**; no mitigation measures are required.

~~Temporary~~ Loss of Bus Stops or Rerouting of Bus Lines

The nearest bus stop to the Project Site is located at the corner of Pacific Avenue and Hurricane Street, approximately 0.7 mile to the west. Construction activities would not result in disruption to the existing bus stop or bus service, as no improvements would occur within the vicinity of the bus stop. Additionally, access to this bus stop would remain unchanged throughout project construction. Therefore, ~~the Proposed Project would not result in in-street construction impacts~~ in-street construction impacts related to temporary loss of bus stops or rerouting of bus lines would be **less than significant**; no mitigation measures are required.

~~Temporary~~ Loss of On-Street Parking

As noted in the Parking Assessment Memorandum (Fehr & Peers 2016), within a study radius of 0.3 mile, there are an estimated 763 publicly available parking spaces, including 399 publicly available on-street spaces and 364 spaces at the public parking lot. This also includes 8 time-restricted parking spaces and 391 unrestricted parking spaces. During construction, a portion of Hurricane Street and Canal Court would be temporarily closed and parking spaces on Hurricane Street between Canal Court and the Esplanade would be unavailable. The loss of these spaces represents 0.65% of the total parking supply in the area.

Hurricane Street, where the Project Site is located, contains restricted on-street parking and parking is prohibited on Canal Court. There are approximately 19 parking spaces along Hurricane Street between Canal Court and Pacific Avenue. On weekend peak hours, parking on Hurricane Street is highly utilized and is greater than 85 percent. On weekday peak hours, parking on Hurricane Street is also highly utilized and is greater than 85 percent on the south side of the street but has a lower utilization less than 50 percent on the north side of the street. During construction, the loss of these on-street parking spaces would be expected to result in an increase in vehicles circling through the neighborhood as they seek available parking close to their residence. This impact could be adverse during peak hours, but ~~is not considered to be significant because of the temporary nature of the construction activities. In addition, it~~ is not considered significant because, within approximately 1,000 feet of the Project Site, at least 70 spaces are available during the weekday peak period and at least 11 spaces are available during the busier weekend peak period. It is noted however, that during peak times on peak summer weekend days and weekdays and holidays, it is recognized that parking utilization is higher than what was observed on the survey dates. On those days, the loss of these on-street spaces would be expected to result in a further increase in vehicles circling through the neighborhood as they seek available parking close to their destinations.

Because there is adequate supply during normal peak periods (the loss of these spaces represents less than 1% of the total parking within a 0.3-mile radius) ~~and the loss of parking would be a temporary impact that would occur only during construction, as~~ and parking spaces would be provided at the 128 Hurricane Street lot upon completion of the Proposed Project and will also be made available in the Project vicinity in accordance with the requirements of the City of Los Angeles Department of City Planning, Department of Transportation and the California Coastal Commission, ~~the Proposed Project **would not result in significant** **construction** **impacts**~~ related to loss of on-street parking would be **less than significant**, and no mitigation measures are required.

The following text in Section 3.10.3.5 (Operational Impacts) on page 3.10-23 of the Draft EIR is revised as follows:

TRANS-1. Exceed the capacity of the existing circulation system, based on an applicable measure of effectiveness (as designated in a general plan policy, ordinance, etc.), taking into account all relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit

The Proposed Project would require a total of six full-time employees, with two employees per shift working three consecutive eight-hour shifts. It is assumed that these employees would generally arrive two at a time to the job site via their personal automobiles and park at the 128

Hurricane Street lot. These existing ~~addition of these~~ twelve ~~new~~ one-way operation-related trips to the circulation and/or intersection or highway/freeway network would not generate any new levels that would exceed the capacity of these systems. Similarly, these trips would not exceed the capacity of the existing mass transit, pedestrian, or bicycle path system since adequate capacity currently exists and they would not generate sufficient trips to overwhelm these systems.

The following text in Section 3.10.3.5 (Operational Impacts) on page 3.10-24 of the Draft EIR is revised as follows:

TRANS-4. L.8. In-Street ~~Construction~~ Impacts

~~This threshold relates to construction impacts and does not apply to operational impacts. No further analysis is required.~~

According to the *L.A. CEQA Thresholds Guide*, the determination of significance related to this threshold shall be made on a case-by-case basis, considering several factors. These are each discussed below.

Traffic Impacts

Once VAPP becomes operational, no new trips will be added as a result of the Project. The VAPP will continue to require two operations employees at the site at any given time, and there would be three shifts per day. As such, the site is estimated to continue to generate twelve 1-way trips per day. Therefore, the Proposed Project's in-street impacts related to operations traffic would be **less than significant**, and no mitigation measures are required.

Loss of Access

The Proposed Project will provide additional pedestrian access. The 128 Hurricane Street lot will be designed with a path that provides additional pedestrian access to the Coastal Trial along the Ballona Lagoon. Upon completion of the project, public access to the Esplanade will be restored around the existing Venice Pumping Plant to the Coastal Trail and Hurricane Street will be reopened for pedestrian and vehicular access. Thus, the Proposed Project would result in **no impacts** to public access.

Loss of Bus Stops or Rerouting of Bus Lines

Operation of the Proposed Project would not result in the loss or relocation of an existing bus stop that serves the project site nor in the rerouting of bus lines; **no impacts** would occur.

Loss of On-Street Parking

The Proposed Project will construct eight off-street parking spaces at 128 Hurricane Street; three spaces would be provided to address the loss of three (of five) on-street spaces along Hurricane Street; three spaces would be provided to address employee, delivery and visitor-serving parking, in compliance with the Venice Specific Plan and Venice Local Coastal Program Land Use Plan; and two spaces would be provided to address the Beach Impact Zone parking requirements. The remaining removed Hurricane Street spaces will be made available in the Project vicinity in accordance with the requirements of the City of Los Angeles Department of City Planning, Department of Transportation and the California Coastal Commission. It should also be noted that according to the Project's *Parking Assessment Draft Memorandum* (see Appendix J of the Draft EIR) there is adequate parking in the Project vicinity to accommodate the

permanent loss of these two on-street spaces along Hurricane Street, should they not be replaced on a 1:1 ratio in the project vicinity. As such, impacts related to the loss of on-street parking would be **less than significant**; no mitigation measures are required.

The following new mitigation measure within Section 3.10.4 (Mitigation Measures) is hereby added to the EIR:

MM-TRANS-3: Transport of Heavy Construction Equipment and/or Materials

Provided heavy construction equipment and/or materials are required to be transported to the project site along State facilities (i.e., State Route 1 [Lincoln Boulevard]), the contractor, on behalf of the LABOE, shall obtain a Caltrans transportation permit, prior to transport and/or delivery of such equipment. In addition, large size truck trips (as defined by Caltrans), shall be limited to off-peak commute hours (i.e., not occurring between 7:00 a.m.–9:00 a.m. and then again between 4:00 p.m.–6:00 p.m.).

This new measure will also be incorporated into the Proposed Project's Mitigation Monitoring and Reporting Program (contained under separate cover).

Changes Made to Chapter 4 (Comparison of Alternatives)

The following text in Section 4.2.3.3 (Expand Existing Venice Pumping Plant and Install Pumps and Piping Below-grade) is revised as follows:

Since the Venice Manifold Project is located within Hurricane Street and the Grand Canal and Ballona Lagoon are located to the east and south, respectively, expansion would be limited to the west within Canal Court and the adjacent vacant ~~City~~ privately owned parcel at 128 Hurricane Street, currently under acquisition by the City.

Changes Made to Draft EIR Appendices

The following new appendices are included in the Final EIR:

Appendix L (Public Hearing Transcript)

This new appendix contains the transcript from the Public Hearing held on November 17, 2016, at the Venice Foursquare Church.

Appendix M (Updated Geotechnical Report for the Venice Auxiliary Pumping Plant)

This new appendix contains the updated geotechnical report and design specifications for the Venice Auxiliary Pumping Plant.

Appendix L

Public Hearing Transcript

In the Matter of:

City of LA Environmental Meeting Venice Pumping Plant

TRANSCRIPT OF PROCEEDINGS

November 17, 2016

Dianne Jones & Associates

Reporting and Videography

P.O. Box 1736
Pacific Palisades, California 90272
310.472.9882

CITY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

VENICE AUXILIARY PUMPING PLANT (VAPP) PROJECT

DRAFT ENVIRONMENTAL IMPACT REPORT (EIR)

PUBLIC COMMENT HEARING

THURSDAY, NOVEMBER 17, 2016

VENICE, CALIFORNIA

6:06 P.M.

REPORTED BY:

DAWN M. DAVILA

CSR No. 8383, RPR, CLR, CCRR

REPRESENTATIVES:

DR. JAN GREEN REBSTOCK, ENVIRONMENTAL SUPERVISOR II
ENVIRONMENTAL MANAGEMENT GROUP
BUREAU OF ENGINEERING
DEPARTMENT OF PUBLIC WORKS

FERNANDO GONZALEZ
BUREAU OF SANITATION
PROJECT DESIGN TEAM

ABID CHOWDHRY
BUREAU OF ENGINEERING
PROJECT DESIGN TEAM

KWASI BERKO
BUREAU OF SANITATION
PROJECT DESIGN TEAM

PUBLIC SPEAKERS:

ELIANIE GANS
MIKE HOFFS
STEVE BRADBURY

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THURSDAY, NOVEMBER 17, 2016 VENICE, CA

* * *

DR. REBSTOCK: Good evening. I guess we'll go ahead and get started. Welcome to the draft EIR public comment meeting for the proposed Venice Auxiliary Pumping Plant Project. My name is Jan Green Rebstock. I'm with the Bureau of Engineering with the Department of Public Works at the City of Los Angeles. And I'm here with my colleagues this evening. From L.A. Sanitation, Fernando Gonzalez. Would you please stand. And Abid Chowdhry, also with BOE, the project manager for the design of the project. And tonight we're going to review with you the purpose of the proposed project, the overview of the CEQA process, the project objectives, the proposed project description. We're going to share findings of the draft EIR, which was released on October 27th. Comment period closes December 15th. And we also have technical staff available here to answer any questions you might have.

So with that, again, we're really here just to review with you the major findings that we found through the preparation of the draft environmental impact report. We are going to have an open public comment period this evening where you can provide verbal comments on the -- on the analysis in the draft EIR. We do have Spanish translation available if anyone needs that.

Okay. Very quickly, where we are in the CEQA process, the California Environmental Quality Act process, we sent a notice of preparation letting people know the intent of the City to pursue the proposed Venice Auxiliary Pumping Plant Project back in the fall of 2015 where we identified the proposed scope of the analysis in the draft EIR and we held a scoping meeting here and also at the Venice library. Then we went back and performed our technical studies, and we are back here sharing those with you now in the form of the draft environmental impact report.

And we're having this meeting tonight here to collect your comments and also verbal comments as well. You can send them by email. The comment period closes, again, on December 15th. And then we will take all of that input and prepare a final draft of the environmental impact report and then present it for approval to city council for adoption. So hopefully, if all goes well and the council decides to take on the recommendation of the Board of Public Works, the EIR would be certified in the spring of 2017.

So with that, I'm going to turn the presentation over to Fernando, and he's going to tell you why we need the project.

MR. GONZALEZ: Good evening, everyone. Okay. So the coastal interceptor sewer is a trunk line that pretty

much runs along Pacific Coast Highway pretty much from our northern border here with the county unincorporated area and provides conveyance for waste water to most of the coastal cities, including City of Santa Monica and Marina Del Rey.

The gravity flow of this trunk line gets interrupted by the marina entrance. So in the late '90s, the Venice pumping plant was built to pretty much convey all waste water coming upstream and then just, via a force main, send the waste water over the other side of the marina entrance where it becomes gravity again and flows into the Hyperion water reclamation plant.

A couple of things that we need to be aware of in the importance of this pumping plant is that every drop of waste water that is collected upstream of that point has got nowhere to go but through the Venice pumping plant. During the summertime when it's dry, about 15 million gallons per day goes through that pumping plant, and sometimes even up to 89 or 90 million gallons will go through the pumping plant during a severe rainstorm.

So one of the challenges that we have is that this system, the coastal interceptor sewer, is totally depending on the rest of the waste water collection system in the city. There is no way that we could transfer or bypass these flows and send it somewhere else. So every single drop will have to go through the Venice pumping plant.

The dual force main project that -- and the completed manifold replacement project are going to provide the resiliency and the conveyance. So pretty much it's going to have the room for avoid a severe catastrophe in case of a -- something catastrophic that could fail or the increased demand for waste water, especially when it rains.

The next item that we need to cover to ensure resiliency and total redundancy for this very important system is to provide more pumping capacity. We've had two close calls already. One during summertime. One during wintertime. In 1998, last time El Nino really came during one of those severe storms, the -- all five pumps in the Venice pumping plant were running, yet the waste water was still -- the level of waste water was still rising inside the pipe in the coastal interceptor sewer. So we were very close, that we were only one pump failure away from a severe spill.

And then during summertime, out of the five pumps that we had, one was sent out for service for refurbishing. They were working servicing another one. And then out of the other three in service, one had a catastrophic failure. So all of a sudden, out of the five pumps, we had only two operational. So this happened right before the manifold replacement project got started, so we had to invest $2 and a half million and delay the manifold replacement project,

installing a temporary bypass system outside on Hurricane Street while all the repairs were being completed inside the pumping plant.

So like I said, the dual force main give us the conveyance. Now, these three additional pipes are going to provide the redundancy and the pumping capacity that we're going to need to face all the challenges of the future, any other severe weather conditions. So in order to materialize these objectives, we partnered with the Bureau of Engineering. They have completed a design that is the subject of the discussion tonight.

So with that, I'd like to invite Abid, who is going to give more information about the technical aspects of this much needed project.

MR. CHOWDHRY: Good afternoon, everyone. My name is Abid Chowdhry. Thank you, Fernando.

As I've said, I'd like to put things in perspective, along with the slide. As Fernando said, the coastal interceptor sewer is 66 inches in diameter. They'll bring the sewage by gravity to the Venice pump station, which is located under 1 -- 140 Hurricane Street, from there via Marina, via Lagoon. And the discharge point is about two miles away, 60 feet higher than the pump station under Vista Del Mar. So the sewage has nowhere to go. As Fernando said, it needs to be pumped through a force main.

Existing, we had a 48-inch force main. And he explained that how it was under capacity. So we had a new project, which is going to be awarded hopefully within next 30 days, that will build another 54-inch force main that will work in tandem, and it will be ready to accommodate all the flow, even in the worst El Nino or any storm that we may face in the next few -- next 50 years or so. So we will have enough conveyance capacity.

Existing Venice pump station is located under 140 Hurricane, which is essentially right here. That one has -- initially, in 1950 when it was built, it had the four pump stations. These four pumps' day-to-day operations, we normally need about two pumps on a regular basis. And occasionally when we have a heavy flow -- I mean, rain and stuff, we can use up to three and four. And during the two incidents, one Fernando mentioned, we needed all five pumps.

You can imagine these pumps are running constantly 24/7. These are mechanical things. They break down. They need a service. And there is no guarantee we will have all five pumps available when we need them and in an emergency case. So he said that, we wanted to build a redundancy -- 100 percent redundancy just in case so we have enough pumping capacity. We already established the conveyance capacity. We want to do a pumping capacity because we don't want any sewage coming to the Venice pump station under

gravity, go nowhere else but Lagoon or any other place, because the discharge point is 60 feet higher where there is no bypass.

So this project, which is Venice Auxiliary Pumping Plant, will build a new pumping facility which will cross across the street of Hurricane alongside the Grand Canal. And that will be purely underground. That will build three 500-horsepower pumps, which will make up, all together, 800 -- eight pumps. And they work in tandem together. And they will be discharging to a common header. All these five pumps, existing five pumps and new five pumps [sic], will be discharging to the newly built maintenance -- manifold which will be feeding the two force mains.

The element of the force main, basically, I just explained to you, the pump station -- the three pumps will be built underground, but there will be an electrical control room. And the control room and electrical building will be next door, which will be northwest of the existing pump station. It will be by the canal cord. That two-story building will be about 35, 32-feet high. And that will house a control room and equipment to run the pumps, and also the personnel on the second floor.

That new pump station will be fed from the existing flow. The flow will be split. There will be no additional flow. It will be coming to the same thing that could be

feeding the two pumps -- pump stations. There is no new vent out of the new pump station, so we will be using existing vent. So there will be no new odor source part of this project.

This pump station will -- will have a new power supply from DWP, and it will be relying on two existing backup, which is on Venice pump station, which is being upgraded to new Tier 4 exhaust friendly environmental, friendly generators that we'll be using in case of power failure.

In order to divert the flow, we will be building divergent structure under the existing COS, which is running underneath the Grand Canal. So we will be building a coffer dam in order to build that structure. That once that structure is built, there will be no interruption in flow, the top of that extra structure will be below the bottom of the Grand Canal.

Part of this project, there will be possibly an impact of loss of three parking spaces, perceived loss of spaces on north end of the Hurricane Street. And part of this project, we are trying -- acquiring -- we are -- the City is in the process of acquiring 128 Hurricane lot, which will give eight additional parking spaces. That once it's -- (unintelligible) -- approved, that's what we planned for. That will be available for people to use. That will also

provide a view of the lagoon, which you guys may not have seen before. That will be part of this project. It will be available to you.

128 Hurricane also will have some landscaped area and then will be a place for mural arts. On east side of the pump station, there will be 15 feet, I believe -- 10 to 15 feet of the green space, which is permitable required by the code, and also that will provide a native green, you know, shrubberies. So that will be something that people who walk on the sidewalk, they can enjoy that.

Initially, when this project was built, the design perceived, we wanted to put both pump stations in one campus for security reasons. But in the best interest of the community, as it was voiced, we avoided the vacation of Hurricane Street, that portion. It will be two separate campuses. You will not see blockade once the construction is done. The Hurricane Street, the segment between the two pump stations, will be open for people, local resident.

For the lay down area, once we did the manifold project, we used the existing lots for the lay down area. And also, we have leased 128 Hurricane at that time. What we are going to build, the greater portion of the land we used before, we don't have that much space left, so we are using 128 Hurricane. And possibly we'll be using a city owned lot right here. We may use this one for any other

purposes if the contractor choose to do that. But primarily we will -- our construction activities will be based right here on the lot, the two vacant lots, and this parcel where the city is trying to acquire from the own private owner. And this blue dot rectangle depicts the area not exactly in the same dimensions, but exactly where the coffer dam will be. And the junction -- the -- (unintelligible) -- structure will be built right here.

The next slide gives you illustration that the building, when it's built, what will the different elevation, how it's going to look. It's too small to read. I'm sorry. I can't. These are east, west, and north, south directions. And, you know, from vertically plan view, you can see this, exactly where the building is going to be relative to dimension of the lot. It will be toward the west end of the property.

This is -- this is the rendering which is what the building should look like when it's done. Details of the colors and the design. But only the fence, it is just there. It may be a little different, but the building is going to look exactly what the way it is, and you'll see that open street Hurricane. Onces it's done, this will be available. But there may not be parking. We lost three parking, which will be substituted on 128 Hurricane in terms of eight.

The project is designed, the permits and approval will take place, and we will have a project ready to be advertised in late 2017 and possibly awarded in winter 2018, and construction may begin before March to July 2018. That will be about a two-year project.

Once again, before I pass on to Jan Green for to discuss the environmental issues, she has identified and addressed that, I just wanted to share that we -- part of this project, once it's done, we are not anticipating any other project in that neighborhood. Nothing is planned. This completes the resilience and pumping capacity, conveying capacity, and the residents who live there, they can rest assured in any worst case of flooding, it will -- they will be able to live in that house. There will be no sewage; we are not anticipate will be going out to the property or Lagoon or Grand Canal. So said that, I would like to invite Jan to mention that -- her studies and findings and resolution. Thank you.

DR. REBSTOCK: Thank you, Abid.

Again, if anyone would like to speak during the public comment period, please be sure to fill out a speaker card at the back of the room, because we'll be opening the floor up shortly after the presentation.

Okay. So, in general, these are the range of environmental issues that were analyzed in the draft EIR,

which is available on the BOE web site for download. We have brought one here tonight for you to thumb through. And I believe we also have some CDs if you'd like to bring one home if you don't have one already. But we looked at a range of issues from aesthetics related to the site design and building design. And there is a site map over here on one of the boards if you'd like to look at it in more detail after the meeting. I will highlight the noise and vibration issues and go into them in a little more detail in a moment. And land use and planning. The lot is currently not zoned for the public facility use that we're proposing, so we will be going through an entitlement process with city planning, and so that's discussed through the document as well.

But, in general, the -- we do -- we did find significant and unavoidable environmental impacts related to noise and vibration, land use and planning, and that was also related to noise and vibration, and water quality. And the finding was significant -- significant and unavoidable because, regardless of the amount of mitigation measures that we're requiring, we did not find that it would reduce the impact to below CEQA thresholds. So that's -- that's why the finding is there, and that means that the city council will have to adopt overriding considerations to move forward with the project to acknowledge the fact that these environmental impacts will result during the construction

period, but that the project is still worth moving forward because of the -- the need that it addresses.

Okay. There is a slew of mitigation measures related to noise and vibration that I will review in a moment. So you can see that the City is making a good best effort to address those issues.

Related to water quality, we did find that the operation of the facility could contribute to inundation related to water that would be created from tsunami conditions or related to sea level rise in the future, and that there really wasn't any mitigation measures available to address that. So you can see the discussion in there. That is kind of an evolving issue, though, related to city planning and related to the operator L.A. sanitation, and Fernando might want to speak to you more after the meeting if you have any questions. But there is a system wide planning effort on behalf of L.A. sanitation to kind of look at how sea level rise conditions in the future would impact their infrastructure throughout the city.

Okay. These are the less than significant impacts that were identified with Mitigation, Incorporated. So when mitigation measures were applied, it didn't reduce impacts below the CEQA thresholds.

So some of the mitigation measures for noise and vibration that I'd like to highlight for you is that we do

have a restriction on construction hours. The construction hours -- the operation of construction equipment. So I want to be very clear. Operation of construction equipment would occur only between 8:00 a.m. and 6:00 p.m. Monday through Saturday. But we are allowing for there to be some arrival of the construction workers maybe 15 to 20 minutes before that 8:00 p.m. [sic] start time so they can get full use of the workday.

Okay. We've identified pile driving, equipment graders, and jackhammers to be the most noisy construction equipment, and we are limiting the hours of that use from 9:00 a.m. to 3:30 p.m. Okay. And then haul trucks, which also, you know, create traffic impacts of their own, so this is soil hauling trucks when you're excavating the site for the building foundations and for the diversion structure, the use of those soil haul trucks will -- and their access to local streets is going to be restricted from the hours of 9:00 a.m. to 4:00 p.m.

Okay. Also, we've identified the need for a construction mitigation coordinator. So we're going to have one person with -- their contact information is going to be available on signage that's posted on the construction site. And as part of that process, there will be a notification to adjacent neighbors when we know there is going to be noisy work activities occurring. And they will be there to

respond to calls with concerns about how -- how the construction is going or any issues related to noise or dust or traffic. And a log will be kept, and we'll be tracking how responsive we're being to those concerns.

Also, to the extent possible, we're requiring that temporary noise barriers be erected. And those should be a minimum of 20 feet surrounding the project site given the proximity of the neighbors.

Okay. So those are some of the things I'm going to highlight. Also, as best management practices, and we've done this for some projects in the past, the Department of Public Works Public Affairs office will also be administering the release of vouchers to the immediately adjacent neighbors as appropriate for window washing and car washing. And this is -- you know, obviously we're going to assume all permit -- we're going to comply with all permit conditions related to fugitive dust control. But if we're doing all that we should be doing and we're still having dust issues, this will, you know, be a gesture of goodwill there.

We are also exploring the possibility of providing off-site work space for adjacent neighbors that work at home during construction hours. So officially, the measure reads the City will work with the construction contractor to identify potential off-site shared office space with

Internet service and meeting room space for adjacent residents that work from home during workday construction hours. So that's something that we're committing to doing.

Okay. So at this point in time I'm going to open up the floor to any public comments that we might have tonight. And, of course, if you don't want to speak tonight, you can always fill out a comment card. You can send us an email. You can write us a letter. We're respect -- receiving comments until December 15th. And if you do decide to send us an email or letter, just please be sure to identify that your comment is related to the VAPP project in the subject line.

Okay. And at this point I'm going to open up the floor. And I'm going to call up Elaine Gans. And if you could, please speak very slowly for our court reporter. There is going to be a copy of this transcript posted -- and the meeting posted on our web site after the meeting.

MS. GANS: That's Elianie.

DR. REBSTOCK: Thank you.

MS. GANS: Can I --

DR. REBSTOCK: Please. Please. And -- and you have three minutes.

MS. GANS: Okay. Well, I have a lot to talk about, so we'll go fast. And maybe you can answer all of it later.

First question is, Was there an RFP for design?

And was there any kind of competition on the design? And who has the authority to approve the design?

DR. REBSTOCK: Okay. So just to remind you of the format, we'll go ahead and let you make your statement and then --

MS. GANS: Oh, okay. Okay.

DR. REBSTOCK: -- specific questions we'll have staff address.

MS. GANS: Okay. So the reason is because, as you know, it is the Grand Canal, and all of this affects our property values a lot. So I'm curious about the design. What we saw there looks like Moscow.

Secondly, landscape. Is that the jurisdiction of the city? And will it be the, quote, indigenous plants that are mostly sort of dead and dying looking, or will it be a landscape architect designer that will actually create something beautiful for us?

The next thing is something about viewing. You said something about viewing. Does that mean there is some kind of public platform that people will be able to come and walk and view the canal and so on like we had at the other end, question?

Noise and vibration. As you said, it's all residential around there and it's Grand Canal and it's gorgeous. And so noise and vibration, is that 24/7? And

what does that entail? I'd like that answered really clearly.

And then there was a discussion or you made a statement about the city council approving the reallocation of the lot or the lease that is proposed, the other lot, the lease that's been proposed. Does that belong to the City? Who does that belong to? And how is it renegotiated and who approves that? And do any of us residents actually have a say in any of this at this point?

DR. REBSTOCK: Okay.

MS. GANS: Thank you.

DR. REBSTOCK: Thank you.

Okay. I'm going to call up the next speaker. Mike Hoffs.

MR. HOFFS: Good evening. I'm Michael Hoffs. I live at 110 Hurricane Street. And I've been living there for -- for over ten years. And I was there, you know, during the -- our last situation. And, you know, I basically work in corporate America, you know, during -- with regular banking hours. And, you know, we as residents of the area, you know, like to, you know -- you know, come home and hopefully have a -- you know, a -- a sound-free weekend, if you will. And so I was a little disturbed to find out that it's going to be a six day a week, and I really think that's -- you know -- you know, an invasion of

our privacy really more than anything else because, you know, while there are a lot of people that work a six day a week, we're not thinking that there is going to be construction lasting a six-day week.

The other thing is about the parking lot. My feelings are that -- well, my question is, is that regarding the parking lot, will it be a staging and parking area only for the workers of, you know, the area? And my feeling is -- is that when it's paved and it's given back to the residents of Hurricane, you know, and everybody, after the project is actually finished with, I don't think that it should be a lot that -- you know, that it should be a public lot. And the reason is that -- is that we've had great concerns recently and for the last several years, you know, regarding vagrants parking on the -- you know, on the street, which is completely legal actually, but in -- you know, in motor homes and, you know, and whatnot. It's going to become an area that's virtually shielded from the street, you know, where, quote, unquote, you're not going to see crime. And it's going to be a major, major problem. And it's -- you know, people are going to be able to park there for undetermined periods, you know, at a time. And -- and we are going to have problems on the street, without a doubt. It is going -- it is going to cause crime. And it will cause your decrease in your -- in your property values.

So my last issue is that I do not feel that any of the workers should be able to get there before 8:00 a.m. We did have a lot of problems with -- you know, with people that had motorcycles, people that, you know, would come to -- come to the job site -- and it's an echo out there, people. It's an echo. You can hear everything. It's like you don't have walls. It's an echo. I can hear everything that you're saying. And I'm going to get in your face and everybody else will if you're making a lot of noise on the street before the time you're supposed to there, even if you are supposed to be there. It's rude if your voice is much louder than it should be. That's all I have to say.

DR. REBSTOCK: Okay. Thank you.

Is there anyone else that would like to speak?

Yes, sir. And if you could state your name for the court reporter.

MR. BRADBURY: Sure. So I'm Steve Bradbury. I'm at 109 Hurricane, right across the street. And I'll echo a couple things that Mike said. The first thing, though, is if we're dealing with a situation of rising sea levels in the first place, why are we doubling down building in an environment that's so close to the ocean? Why are we even putting a second plant so close to the ocean when we're dealing with rising sea levels or potential rising sea levels in the first place? It doesn't make sense. I would

rather see the whole project be moved inland a half a mile so that if something catastrophic happens, we're not dealing with a catastrophe. Someone, strikes me, just wasn't thinking on that. But to the project itself, there is two issues.

One -- and this came out of conversations we had in the street conversation -- in the open meeting that we had in the street. I appreciate the fact that there is a reference now to finding local office space for people like myself who work out of the home. It didn't strike me like, "Yes, it's going to happen." It struck me like, "We're going to make the effort to talk to the contractor to see if we could find something that might work." That's kind of the language that I read. It didn't say, "This will happen starting on this date and here is the process if you are a resident and you're working in the area, if you're working at home, that you'll be able to get it." So I would rather see something definitive that says, "This is what will happen if you qualify and you work at home."

The other issue, which was just brought up, was that parking area. I completely agree. That should not be a public parking area. The last thing that we want to have happen, especially in the summertime when visitors from all over are looking for places to park and they're cruising around, is to know that there is a parking lot at the end of

the street. And people can just start queuing up on the street. Literally queuing up in the street, waiting for a parking space. That means now there is a traffic flow of people all day coming up and down the street. And I live at the end -- at one side of it closer to Pacific. So people will be walking by my house all day and doing whatever they're going to do. And it's bad enough as it is with we have vagrant issues and people congregating, the last thing you want to do is create a space that offers that.

If that parking lot has to exist, it should be for residents only. It should be permit parking resident only if it even exists. And the other thing is if you need -- if you're trying to solve the case of losing three spots on the street, why create a lot with eight spots? Why not create a lot with three spots to replace those three and not have an opportunity for more cars to go park there? If you put a lot with eight spots, you're inviting more challenge. If you want to replace three, replace it with three. And don't put a park -- no park and sitting area and all that. We're not -- this is the spot we live. We're not looking to invite people to come down on Hurricane Street. It's a street like Galleon and all the other streets there that doesn't -- it's not an invitation for people to just come and hang out on the street. It goes to property value. It goes to quality of life. It goes to all of that.

MR. HOFFS: Can I add something to what Steve said -- (inaudible) -- the parking issue. I feel it's extremely important also that --

DR. REBSTOCK: Could you speak in the mic for the court reporter.

MR. HOFFS: Sure. Sure. Absolutely. Absolutely.

So for -- for workers that are participating in -- in the construction every day for the -- for the two-year period, I think it's extremely important, you know, for them to know that there will be very hash penalties if they -- if they park on Hurricane. Steep fines and maybe even termination from the -- you know, from the project. Otherwise, it is -- it is a city street, and anybody can park there. However, you know, it's the people -- it's the people of Hurricane and Marina Del Rey, as residents, you know, that are -- you know, that are really, you know, suffering the brunt of all of this. So anybody that can't park in that lot in those eight spots should be -- you know, should be bussed in from -- you know, from another site.

DR. REBSTOCK: Okay. Go ahead.

MS. GANS: Do we, as residents, or the residents in the entire neighborhood of the marina peninsula, because it affects everybody and all our properties values and noise levels and parking and everything else we've discussed, do we have any say now as to whether this will be built, won't

be built, moved, design, and all those things I mentioned before? Do we have any say at all right now, or are we just sort of talking here?

DR. REBSTOCK: Sure. Okay. So at this point I would like to address two points, and then I'm going to go ahead and close -- formally close the public hearing so we can give the court reporter a rest. And then we'll break, and then staff will be here to answer any other questions directly so we can continue the conversation if you want to.

So two items. One, do you have any say? Yes, absolutely. That's why we're here tonight to take your public comments. And I think you're hearing that some of the feedback that we've already received is -- like no vacating of the street on Hurricane or, yes, making an effort to look for alternate office space, there are -- there are things that can impact the project design, the mitigation measures, those types of things. So yes, please send your comments written, email. You know, thank you for speaking tonight.

The meeting before the Board of Public Works when we consider the final EIR will be publically noticed. There is room for public comment at that point. The meeting before city council when they consider approving the project and certifying the environmental document, those are also public meetings where you have a chance to share your

comments as well. So please, yes, stay engaged in the process and use our opportunities for you to share your thoughts.

On the construction worker parking, I did not highlight this, but there is a mitigation measure requiring that construction workers park off site and then have a -- take a shuttle that is provided by the construction contractor to the work site. So there will not be construction worker parker -- parking on Hurricane Street. So that -- that is a mitigation measure already in the draft EIR.

Okay. So thank you, everyone, for coming tonight. And like I said, we'll go ahead and end the meeting now, but staff will continue to stay and answer any other questions that you may have. Thank you.

(The proceedings concluded at 6:46 p.m.)

-oOo-

REPORTER'S CERTIFICATE

The undersigned Certified Shorthand Reporter does hereby declare under penalty of perjury:

THAT the foregoing was taken before me at the time and place therein set forth and was recorded stenographically by me and was thereafter transcribed, said transcript being a true copy of my shorthand notes thereof.

IN WITNESS WHEREOF, I have hereunto subscribed my hand this 2nd day of December, 2016.

_____

DAWN M. DAVILA
Certified Shorthand Reporter
Certificate No. 8383

Appendix M
Updated Geotechnical Report for the Venice Auxiliary Pumping Plant

CITY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
BUREAU OF ENGINEERING

GEOTECHNICAL ENGINEERING GROUP (GEO)

GEOTECHNICAL REPORT
VENICE AUXILIARY PUMPING PLANT
133 EAST HURRICANE STREET
VENICE AREA OF LOS ANGELES

W.O. SZC12923
GEO FILE NO.: 14-103
December 14, 2015

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APPENDIX A

Geotechnical Data Report, Venice Auxiliary Pump Plant, Los Angeles, CA prepared by Geotechnical Professionals Inc. dated September 29, 2015.

APPENDIX B

Logs of Borings and laboratory test results from exploratory borings G-1A and G-1B from Geotechnical Data Report, Venice Dual Force Main, Los Angeles, CA prepared by Amec dated March 26, 2009.

Log of Boring and laboratory test results from exploratory boring 8 from Report of Subsurface Investigation, Lab No 140-4360, prepared by Department of General Sevicecs Standards dated October 17, 1994 (GEO File No. 94-072).

Log of Test Boring 2 from Report of Subsurface Investigation, Lab No 140-3609, prepared by Department of General Sevicecs Standards dated April 4, 1990 (GEO File No. 89-305.)

APPENDIX C

Preliminary Subsruface Methane Gas Investigation at Venice Auxiliary Pump Station, 133 East Hurricane Street, Los Angeles, CA prepared by GeoKinetics dated August 20, 2015.

1.0 INTRODUCTION

This Geotechnical Report presents the results of a geotechnical investigation conducted for the Venice Auxiliary Pumping Plant to be located at 133 East Hurricane Street in the Venice area of Los Angeles. This report was prepared in response to a request received from the Wastewater Conveyance Engineering Division dated September 10, 2014. This investigation was performed to evaluate subsurface characteristics and to provide geotechnical recommendations for design and construction of the proposed project.

This report is based on visual observation, subsurface investigation and laboratory testing. At the request of the Geotechnical Engineering Group (GEO), Geotechnical Professionals Inc. (GPI) performed subsurface exploration at the site and laboratory testing of samples collected from the site. The results of their field work and laboratory tests are included in their Data Report, dated September 29, 2015, presented in Appendix A of this report.

In addition, Amec previously prepared a Geotechnical Data Report as part of a geotechnical investigation for the Venice Dual Force Main project. Their scope of work included two exploratory borings (G-1A and G-1B) in the southeast portion of the Venice Auxiliary Pumping Plant site. Logs of these exploratory borings and laboratory test results of samples retrieved from these borings are presented in Appendix B of this report.

Also, the Department of General Services Standards Division previously advanced two exploratory borings on the site in support of previous projects. Logs of these exploratory borings and laboratory test results of samples retrieved from these borings are presented in Appendix B of this report.

GEO has reviewed the above referenced reports and concurs with the findings and accepts responsibility for the use of the contents as described herein.

2.0 SITE DESCRIPTION

The Venice Auxiliary Pumping Plant site consists of an approximately 7,800 square foot piece of land bounded by private property to the northwest, the Grand Canal to the northeast, Hurricane Street to the southeast and Canal Street to the southwest. The site is across Hurricane Street from the existing Venice Pump Plant. At the time this report was prepared, the site was unoccupied. The site was recently used to facilitate construction of the Venice Manifold Replacement project. Site ground surface elevations are on the order of 5 to 6 feet above sea level. Figure 1, "Vicinity Map", illustrates the site location.

3.0 PROJECT SCOPE

In preparation of this report we have reviewed an October 2105 draft of the Preliminary Design Report for the project, prepared by Arcadis. Appendix B of the draft Preliminary Design Report includes several preliminary design drawings. Drawing C-03A illustrates a proposed layout of the planned construction. As shown on this drawing, the project is planned to consist of an auxiliary pumping plant (wetwell/valve vault), an electrical building, a diversion structure, a new 66-inch diameter sewer between the diversion structure and the new auxiliary pumping plant wetwell, and a new 42-inch discharge line to connect to the existing force main. Drawing C-03A has been reproduced herein as Figure 2, "Proposed Construction".

Preliminary Design Drawing C-03A indicates the auxiliary pumping plant (wetwell/valve vault) will be located in the east central portion of the site and that this structure is anticipated to have plan dimensions on the order of 55 feet by 32 feet. Preliminary Design Drawing S-2 indicates the wetwell will be founded on a mat foundation with a bearing elevation on the order of -26 feet (below sea level) and the valve vault at an elevation on the order of -9 feet (below sea level).

Preliminary Design Drawing C-03A indicates the new electrical building will be located in the west central portion of the site and will have plan dimensions on the order of 25 feet by 50 feet. Preliminary Design Drawing A-04 indicates this building will be an at-grade, two-story structure with an overall height on the order of 30 feet. The finish floor elevation of the ground level floor is expected to be on the order of 6 feet above sea level.

Preliminary Design Drawing C-03A indicates the diversion structure will encompass an existing 66-inch reinforced concrete sewer pipe that extends along the east side of the site. This structure is anticipated to have plan dimensions on the order of 21 feet by 21 feet and is expected to be founded on a mat foundation bearing at an elevation of approximately -20 feet (below sea level).

Approximately 23 feet of new 66-inch diameter reinforced concrete sewer pipe will be constructed between the new diversion structure and the auxiliary pumping plant wetwell. Preliminary Design Drawing S-3 indicates this sewer will have an invert elevation of -7.37 feet (below sea level).

A new 42-inch diameter pipe header is shown on Preliminary Design Drawing C-03A to extend from the new valve vault to the west end of the new manifold within Hurricane Street. Preliminary Design Drawing M-02 indicates this pipe header will have an invert elevation on the order of -4.75 feet (below sea level).

Construction will also include new equipment pads and possibly sidewalks, planters, landscaping, and other minor improvements. Final site grades are expected to be within one to two feet of the current site grades.

The analyses and recommendations of this report reflect the layout of major improvements provided in Figure 2, but are also intended to be flexible to allow minor changes in the scope. GEO shall review the final project scope and grading plans to confirm that the recommendations contain within this report are appropriate. If the final scope includes significant changes from those described herein, a supplemental report will be necessary.

4.0 EXPLORATION PROGRAM

4.1 Subsurface investigation 2015

Five Cone Penetrometer tests (CPT's) were performed for the project on July 31, 2015. The CPT's were advanced to approximate depths of 40 to 80 feet below ground surface (bgs). In addition, three rotary wash boring were drilled on August 6 and 7, 2015 to depths of 49 feet to 79-1/2 feet bgs. Approximate locations of the CPTs and exploratory borings are shown in Figure 3, "Exploration Locations Map" and in the data report presented in Appendix A.

Relatively undisturbed geotechnical samples were obtained from the rotary wash borings by driving a modified California-type split spoon sampler lined with 1-inch high brass rings. Standard Penetration Tests (SPT) were also performed in these borings. Starting began at a depth of 2.5 feet and was performed every 2.5 feet thereafter to the final depth of the borings. The samplers were driven with successive drops of a 140-pound automatic-trip hammer falling 30 inches.

Each collected sample was inspected and described in general conformance with the Unified Soil Classification System (USCS). All samples were sealed and packaged for transportation to GPI's laboratory. After completion of drilling and sampling, the borings were backfilled with cement slurry.

Although GEO has no record of contamination at the project site, the samples obtained from the borings were screened in the field for volatile organic compounds (VOCs) to determine if the site may have been contaminated in the past by petroleum distillates or other types of contamination. Soil samples were screened in the field with a photo-ionization detector. No organic vapors were detected. No odor, staining, or other evidence of contamination was observed in the borings.

The site is located within a Methane Study Zone and a Methane Study has been performed for the project. The requirements of the Methane Study report shall be incorporated into the design and construction of the project. A copy of the methane report is presented in Appendix C of this report.

4.2 Subsurface investigation 2008

In 2008, Amec drilled two exploratory borings (G-1A and G-1B) within the southeastern portion of the site as part of a subsurface investigation for the Venice Dual Force Main project. Ring, Standard Penetration Test (SPT) and shelby tube samples were collected from exploratory boring G-1A at depth intervals of 2-1/2 to 5 feet to the explored depth of approximately 71.5 feet below the ground surface. Ring and SPT samples were collected from exploratory boring G-1B at depth intervals of 2-1/2 to 5 feet to the explored depth of approximately 25.5 feet below the ground surface. Ring and SPT samplers were driven into the bottom of the borings with successive drops of a 140-pound Automatic trip hammer falling 30 inches. Approximate locations of these borings are shown on Figure 3.

Each collected sample was inspected and described in general conformance with the Unified Soil Classification System (USCS). All samples were sealed and packaged for transportation to Amec's laboratory. After completion of drilling and sampling, the borings were converted to monitoring wells.

Soil samples obtained from the borings during exploration were field-screened for the presence of organic vapors using a MiniRAE 2000, a portable photo-ionization detector (PID). Results of the PID screening are presented in the boring logs (Appendix B).

A portable combustible gas meter (CGM), RAE QRAE Plus 4, capable of measuring the Lower Explosive Limit (LEL) of potential gases, the percent of oxygen, carbon monoxide (CO), and hydrogen sulfide gases (H_2S), was used to measure the LEL at the ground surface. For these borings, only zero readings were recorded, and thus the values are not shown on the boring logs.

4.3 Subsurface investigation 1994

In 1994, the Department of General Services Standards Division drilled one exploratory boring (94-072 B-8) within the eastern portion of the site as part of a subsurface investigation for the Venice Area Relief sewer project. Standard Penetration Test (SPT) samples were collected from this exploratory boring at depths of 5 feet, 10 feet and every 5 feet thereafter to the explored depth of approximately 31 feet below the ground surface. The SPT samplers were driven into the bottom of the borings with successive drops of a 140-pound hammer falling 30 inches. The approximate location of this boring is shown on Figure 3.

Each collected sample was inspected and described in general conformance with the Unified Soil Classification System (USCS). All samples were sealed and packaged for transportation to the Standards laboratory. After completion of drilling, the exploratory boring was backfilled with soil cuttings. An exploratory boring log and laboratory test results of samples retrieved from this boring are presented in Appendix B.

4.4 Subsurface investigation 1990

In 1990, the Department of General Services Standards Division drilled one exploratory boring (89-305 B-2) within the western portion of the site as part of a subsurface investigation for a seismic evaluation of the existing Venice Pumping Plant. Standard Penetration Test (SPT) samples were collected from this exploratory boring at depths of 5 feet, 10 feet and every 5 feet thereafter to the explored depth of approximately 41 feet below the ground surface. The SPT samplers were driven into the bottom of the borings with successive drops of a 140-pound hammer falling 30 inches. The approximate location of this boring is shown on Figure 3.

Each collected sample was inspected and described in general conformance with the Unified Soil Classification System (USCS). All samples were sealed and packaged for transportation to the Standards laboratory. After completion of drilling, the exploratory boring was backfilled with soil cuttings. An exploratory boring log for this boring is presented in Appendix B.

5.0 GEOLOGIC CONDITIONS

5.1 Regional Geology

The Venice Auxiliary Pumping Plant site is located within the Los Angeles Basin part of the Peninsular Ranges geomorphic province, which extends from Southern California to the southern tip of Baja California. This province is characterized by elongate northwest-trending mountain ridges separated by straight-sided sediment-filled valleys. The northwest trend is further displayed in the dominant structural features of the province, which are northwest to west-northwest trending folds and faults, such as the nearby Newport-Inglewood fault zone.

The site is located in an alluviated lowland area in the west portion of the Los Angeles Basin, a northwest trending alluviated plain about 50 miles long and 20 miles wide. The Basin is bound on the north by the Santa Monica Mountains and the Elysian, Repetto, and Puente Hills, and on the east and southeast by the Santa Ana Mountains and San Joaquin Hills. The aerially extensive alluviated plain slopes southward and seaward however in the vicinity of the project the plain is interrupted by the Baldwin Hills and Beverly Hills. The Baldwin Hills are the northern extension of the Newport-Inglewood structural block which has uplifted the Baldwin Hills, Dominquez Hills, and Signal Hill located to the south.

The Los Angeles Basin is underlain by a deep structural depression. Parts of this depression have been filled with sediments discontinuously since the Late Cretaceous (starting about 85 million years ago). Starting in the middle Miocene (about 20 million years ago) the basin (which extended to the Ventura Basin) continuously subsided as sediments were deposited. The buried basement surface has relief of as much as 4.5 miles in a distance of 8 miles (Yerkes, et al, 1965).

5.2 Local Geologic Setting

The Marina Del Rey and Venice areas were once a large wetland marsh fed by the meandering Ballona Creek, which drained into the Santa Monica Bay near the current location. The 1924 United States Geological Survey Map of the Venice Quadrangle shows the project site is adjacent to a large lowland marsh area northeast of the Grand Canal. The elevation of the site was approximately 5 feet above sea level. Surficial geologic exposures are all Quaternary Age sedimentary units.

5.3 Stratigraphy

5.3.1 Fill (af)

Artificial fill soils exist within the site as the result of previous construction and/or previous construction activities on the site. In general, the depth of fill is expected to be on the order of three to four feet within the site. Fill depths may be deeper in some areas. The fill materials generally consist of silty sand and sand with some construction debris.

5.3.2 Alluvium (Qa)

Alluvial sediments encountered in the borings were primarily coarse grained soils consisting of gravels, sands, and silty sands with interlayered fine grained soils consisting of silts and clays.

Coarse-grained alluvial materials range widely in type and consistency from poorly graded sands and gravels to silty and clayey sands. Generally, the coarse alluvium soils are typically brown or light brown in color though they may be gray or olive with high fine contents in the case of silty or clayey sands. The coarse grained materials are moist to wet, loose to very dense with varying amounts of silt, clay, gravel, and cobbles.

The fine-grained materials are typically moist to wet. Fine-grained alluvium consists of lean and fat (low to high plasticity) silts and clays of very soft to hard consistency. Generally, the fine grained alluvial soils are brown, dark brown, dark gray or greenish gray in color.

Seashells and seashell fragments were observed in many of the samples collected from the borings. These materials were observed to be interspersed anywhere within the matrix of the soil and as concentrated lenses and layers of several inches in thickness.

More detailed descriptions of the alluvium can be found in the boring logs in Appendices A and B.

5.4 Groundwater

The Grand Canal and the Venice Canals convey surface water runoff from nearby areas to the Marina Del Rey entrance channel. The Marina Del Rey harbor and entrance channel are also unlined, and was constructed via dredging in the 1950's. In order to reduce the chance of flooding low lying areas along the Grand Canal, the County of Los Angeles maintains tide gates that control flow into and out of the Grand Canal from the Marina Del Rey entrance channel. County personnel report that when a high tide in excess of 5.7 feet above sea level is forecast, the tide gates are closed. In the past, when tide gates were not closed, water levels in the Grand Canal increased and local flooding resulted. Historically, groundwater levels have been measured near the ground surface in the project area.

Measured groundwater levels in the project area have generally varied between elevations of -2 to +4 feet of sea level. Groundwater levels beneath the site fluctuate as the result of seasonal variations and tidal fluctuations. Based on the available geotechnical data, a baseline groundwater elevation of one foot above sea level has been selected for the project.

6.0 FAULTING AND SEISMICITY

The site lies within Seismic Zone 4 of the 2010 California Building Code (CBC). Primary seismic hazards that could affect the site include ground motion or shaking, ground surface rupture along faults, liquefaction, and earthquake-induced landslides.

6.1 Ground Motion

Based on the current understanding of the geologic framework of the site area, the seismic hazard which is expected to have the highest probability of affecting the site is ground shaking or motion resulting from an earthquake occurring along any of several major active and potentially active faults in Southern California. Known regional faults that could produce significant ground shaking at the site include the Malibu Coast, Santa Monica, Palos Verdes, Newport-Inglewood, among others.

Ground motion parameters were determined for the site using the United States Geological Survey (USGS) 2008 Probabilistic Seismic Hazard Analysis Interactive Deaggregation web tool. The site longitude and latitude, a 10% probability of

exceedance in 50 years and an average shear wave velocity of 230 meters per second for the upper 100 feet of subsurface were input into the program. Using these parameters a peak ground acceleration of 0.4g was determined for the site. The program also calculated a mean earthquake magnitude of 6.7 at a distance of 20.5 kilometers from the site.

6.2 Ground Rupture and Deformation

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 (Act) requires that "Earthquake Fault Zones" be established along the trace of active faults. The purpose of the Act is to regulate development near active faults so as to mitigate the hazard of surface fault rupture. Earthquake faults that are "sufficiently active" (have evidence of surface displacement within Holocene time or the last 11,000 years) and "well-defined" (a fault whose trace is clearly detectable by a trained geologist as a physical feature at or just below the ground surface) are subject to zoning. Under the Act, the State Geologist is required to delineate Earthquake Fault Zones along all sufficiently active and well-defined faults that constitute a hazard to structures from surface displacement. Maps depicting the Earthquake Fault Zones are issued by the California Geological Survey (CGS). According to the CGS, the site is not located within an Alquist-Priolo Earthquake Fault Zone and no faults are known to be in close proximity of the site.

6.3 Liquefaction

According to the State of California Seismic Hazard Zones Map (Figure 4), the site is located within an area that has potential for liquefaction. Liquefaction is a process that occurs when saturated sediments are subjected to repeated strain reversals during a seismic event. The strain reversals cause an increase in pore water pressure such that the internal pore pressure approaches the overburden pressure and the shear strength approaches a low residual value. Liquefied soils are subject to flow, consolidation, or excessive strain. Liquefaction typically occurs in loose to medium dense sand and silty sand soils below the groundwater table. Predominately fine-grained soils, such as silts and clays are less susceptible to liquefaction.

Liquefaction analyses were performed for a ground acceleration of 0.43g (2/3 of the Maximum Considered Earthquake-Geometric Mean ground acceleration of 0.642g). The analyses were performed for the deepest rotary wash boring, RW-2, located near the center of the site. The analyses were performed with consideration to the soil particle size and plasticity information obtained through laboratory testing, and the measured and anticipated high groundwater levels. Potential liquefaction induced settlements on the order of 1-3/4 inches were calculated for the project site.

6.4 Earthquake-Induced Landslides

As shown by the State of California Seismic Hazard Zones Map (Figure 4), the site is not within a zone of earthquake-induced landslide potential.

6.5 Seismic Design Parameters

Table 1613.5.2 of 2013 California Building Code - "Site Class Definitions" list six Site Classes (A through F). The Site Class is based on the average properties of the upper 100 feet of the soil and/or bedrock beneath the site. The appropriate Site Class is chosen by referencing the average shear wave velocity, average Standard Penetration Test blow counts, and/or average undrained shear strength. Based on data obtained from the deepest boring, Site Class D is recommended for this site.

The mapped acceleration parameters Ss and S_1, 0.2 and 1-second spectral response accelerations, were determined and used along with the Site Class to obtain the site coefficients Fa and Fv. The maximum considered earthquake spectral response acceleration for short periods, S_{MS}, and at the 1.0-second period, S_{M1}, adjusted for Site Class effects were then calculated followed by the calculation of the design spectral response acceleration for short periods, S_{DS}, and at the 1.0-second period, S_{D1}. The values of T_O and T_S, in seconds, were then determined using the equations presented in the code to represent the beginning and end of the design response spectra peak.

The seismic parameter values for the site are summarized in Table 1, Seismic Design Parameters.

Table 1 – Seismic Design Parameters

Parameter	Value	2008 LABC Reference
Site Class	D	Table 1613.5.2
S_s	1.661	Figure 1613.5(3)
S_1	0.660	Figure 1613.5(4)
S_{MS}	1.661	Equation 16-37
S_{M1}	0.990	Equation 16-38
S_{DS}	1.107	Equation 16-39
S_{D1}	0.660	Equation 16-40
T_O (seconds)	0.119	Chapter 16
T_S (seconds)	0.596	Chapter 16

7.0 LABORATORY TESTING

Selected soil samples were tested for the following properties:

- In-Place Dry Density and Field Moisture (D2937)
- Laboratory Maximum Dry Density and Optimum Moisture Content (ASTM D1557)
- Consolidation (ASTM D 2435)
- Direct Shear (ASTM D 3080)
- Unconfined Compression Strength (ASTM D 2166)
- Triaxial Compresion Strength (ASTM D2850)
- Sieve and Hydrometer Analysis (ASTM D422)
- Liquid Limit and Plasticity Index (ASTM D4318)
- Conductivity (EPA 120.1)
- Chlorides (EPA 300.0)
- pH (SM 4500-H+B)
- Sulfates (EPA 300.0)

Laboratory test results are presented in Appendices A and B.

8.0 SITE RECOMMENDATIONS

8.1 General

Our primary geotechnical consideration with respect to the proposed construction is the existing uncertified fill soils and compressible shallow soils within the site, the potential for liquefaction at the site, and the potential for methane gas. Remedial earthwork is recommended in the area of the electrical building to provide suitable foundation support. To mitigate the potential effects of soil liquefaction, we recommend the project structures be supported on concrete mat foundations. Mat foundations should be designed and constructed to accommodate the estimated potential total and differential seismic induced settlements presented herein. The requirements of the Methane Study report shall be incorporated into the design and construction of the project. A copy of the methane report is presented in Appendix C of this report.

Detailed geotechnical engineering recommendations addressing the surficial soils, site preparation, site earthwork, foundations and retaining walls are presented in the remaining portions of this report. The following opinions, conclusions, and recommendations are based on the properties of materials encountered in the geotechnical field investigations and laboratory test results.

A representative of GEO will need to provide observation and testing services during site earthwork and construction of foundations. This will allow us the opportunity to compare actual conditions with those encountered in the exploratory borings and, if necessary, to expedite supplemental recommendations if warranted by the exposed subsurface conditions. We shall also review the preliminary foundation and earthwork plans and specifications. Specifications for groundwater control and discharge, shoring and jet grouting shall also be reviewed by our office. These reviews will provide us an opportunity to detect misinterpretation or misunderstandings of our recommendations prior to advertising the project for construction.

8.2 Site Clearing

Prior to construction, all organic or inorganic materials shall be removed from the construction area and disposed of outside the site. Any existing structural or landscape elements within these areas, including any foundation elements, shall be demolished and removed from the site. Any utilities, whether active or inactive, shall be identified and removed from the site or relocated per project plans and specifications. Any cavities resulting from removal of any existing foundations or utility lines shall be properly backfilled and compacted in accordance with the following sections.

8.3 Groundwater Control During Construction

Dewatering from outside of excavations is not allowed. Continuous, solid impervious shoring extending below planned excavation depths, to act as a groundwater cut-off, is required for all excavations that extend more than 3 feet below the baseline groundwater level. Acceptable methods of impervious shoring include sheet piles, secant piles or diaphragm walls.

In addition, Jet grouting shall be performed to create a structural and watertight bottom seal beneath the wetwell/vault structure and diversion structure. Jet grouting can also be used to create a bottom seal for the sewer pipe that will be constructed between the new diversion structure and the auxiliary pumping plant wetwell and the 42-inch header pipe. The zones of jet grouting shall extend from the bottom of proposed excavation to an elevation of at least -35 feet (below sea level). Jetted grouted bottom seals shall be in-place prior to excavating below the baseline groundwater level.

Actual plan dimensions and depths of the jetted grouted bottom seals shall be designed by a specialty geotechnical contractor and endorsed by a Geotechnical Engineer or Engineering Geologist with at least five years of experience in groundwater control applications in excavations. Calculations supporting the design dimensions of the treatment areas shall be provided to demonstrate that the goals of the treatment will be fulfilled and that the treated areas will have adequate factors of safety against bottom heave and piping.

Carefully controlled dewatering, in combination with continuous impervious shoring functioning as a groundwater cut-off, may be used to control groundwater to facilitate construction of the 66-inch diameter reinforced concrete sewer pipe as an alternative to jet grouting. This method of dewatering can also be used to facilitate construction of the 42-inch header pipe. For this method, impervious shoring shall be installed to extend from the ground surface to an elevation of -25 feet (below sea level) or deeper. Dewatering wells shall be located within the shored excavations and shall be constructed with the well points above the bottom of the shoring. The dewatering system shall be designed, constructed and operated to lower the ground water level within the excavation to at least 3 feet below the bottom of the excavation without drawing down groundwater levels outside the excavations. Dewatering to below the planned depth of excavation shall be completed prior to excavating below the baseline ground water level. The drawn down groundwater level should be maintained at least three (3) feet below the bottom of excavations until construction has progressed above the surrounding static groundwater level and sufficient structural dead-load and backfill have been placed to counteract hydrostatic uplift pressures. Backfill may be assumed to have a unit weight of 105 (pcf) above groundwater. Submerged backfill may be assumed to have a buoyant unit weight of 42 pcf. Monitoring wells shall be installed outside of the excavations. The locations shall be approved by GEO. Groundwater recharge shall be performed as necessary to maintain groundwater levels outside of excavations at their natural levels.

Sump pumps shall be provided at the base of excavations which extend below the baseline groundwater level to facilitate removal of any water that seeps into the excavations through the shoring system.

Any groundwater pumped from excavations shall be discharged into nearby sanitary sewers and discharge rates into the sewers shall not exceed those allowed by the Bureau of Sanitation.

8.4 Temporary Sloped Excavations

Based on our observations during subsurface investigation and results of laboratory tests, the materials at the site should be readily excavated by conventional earthmoving equipment in good operating condition. All temporary excavations shall conform to the State of California Construction Safety Orders (CAL/OSHA).

In level areas, unsurcharged, temporary vertical excavations can be a maximum depth of four feet. Unsurcharged excavations greater than 4 feet, to a maximum of 8 feet, in level areas shall be sloped at a 1:1 (H:V) or flatter inclination from the ground surface to the bottom of the excavation or should be shored. Excavations greater than 8 feet should be shored.

Any excavation that enters the influence zone (imaginary plane extending downward at a 1:1 inclination) of an adjacent structure, private property or right-of-way subject to vehicle loading shall utilize shoring.

8.5 Excavation Support

8.5.1 Excavation Methods

Based on the available geotechnical data and construction experience in similar materials, it is anticipated that excavations can be achieved using heavy excavation equipment. The artificial fill and alluvium can be excavated with backhoes, clam shells, excavators, dozers, and other hydraulic equipment.

In sizing and laying out excavations, the Contractor must consider allowable construction limits shown on the Contract Drawings, requirements for construction of permanent structures (indicated on the Contract Drawings), as well as requirements for construction methods selected for the work. The following sections address excavation methods and support requirements.

8.5.2 Excavation Support Requirements

Excavations will require continuous support unless the soils are strengthened or stabilized by implementing an effective ground improvement technique. Acceptable excavation support systems for excavations that extend more than three feet below the baseline groundwater level include water-tight interlocking sheet piling, secant piles or diaphragm walls or other approved water tight shoring.

Dewatering or bottom seals placed "in the wet" are not permitted. The relatively water-tight excavation support systems shall extend a sufficient depth below the bottom of the planned excavations to prevent heave and/or piping of excavation bottoms. Design of the embedment depth of the water tight shoring below the base of excavations shall be based on the assumption that the extension is embedded in pervious granular soils with seashell lenses and layers. Ground treatment consisting of jet grouting below the excavation bottom is also required for the wetwell/valve vault structure and the diversion structure to further reduce groundwater in-flow and the potential for bottom instability. As an alternative to jet grouting, impervious shoring and dewatering in accordance with the recommendations of section 8.3 can be used to facilitate construction of the 66-inch diameter reinforced concrete sewer pipe and 42-inch header pipe. Calculations supporting the design of the shoring cut-off depth and depth of jet grouting below the excavation bottoms shall be included in the shoring submittal.

Shoring for excavations shall be installed in accordance with the General Requirements, the project specifications and Section 306-1.1.6 of the Standard Specifications for Public Works Construction (SSPWC), most current edition adopted by the Board of Public Works. Design of shoring shall be in accordance with Title 8, Division 1, Chapter

4, Subchapter 4 of the California Code of Regulations: CAL/OSHA Construction Safety Orders or the lateral earth pressure distributions recommended in the following section of this report. Based on the soil classification system presented in the Construction Safety Orders, the site soils shall be considered as Type C soils. All shoring systems shall be designed for maximum deflections of ½-inch.

Where bracing is used, each excavation sequence must be designed to allow removals of struts during construction of permanent facilities within excavations and as excavations are backfilled.

Sheet piles, if used shall be installed and extracted using vibration- and percussive-free methods. Coating should be applied to the sheet piles to prevent the soils from adhering to the sheet piles to facilitate removal of the sheet piles at the end of construction.

For secant pile shoring, casing or other methods approved by the geotechnical engineer of record shall be used to support the sides of pile excavations in the artificial fill and alluvial materials. The inside diameter of casing shall be at least as large as the diameter of the pile as indicated on the plans. Drilling shall be accomplished within the casing. Drilling fluids shall not be used to support the sides of the excavation without the review and approval of GEO.

All proposed shoring system designs including supporting documentation and calculations shall be submitted to GEO for review and approval in reference to existing soil conditions. All shoring systems must meet the following minimum requirements to be considered for review.

- Shoring shall directly support the sides of the excavation. Shoring shall be designed to minimize the development and presence of voids behind shoring support.
- Shoring installation procedures shall be designed so that no person is required to enter an unsupported excavation greater than 5 feet in depth at any time.

Trench box and shield systems are not allowed as shoring for the project. Trench box or shield systems do not adequately support the adjacent soil and utilities. Also, voids can occur between the outside of the box and the firm soil.

8.5.3 Design Earth Pressures

Temporary internally braced shoring shall be designed using a lateral soil equivalent fluid pressure of 48 pounds per cubic foot (pcf) above groundwater. Below groundwater, the design soil lateral earth pressure can be assumed to increase at a rate of 24 pcf for braced shoring. Cantilevered shoring shall be designed using an effective fluid pressure (EFP) of 36 pounds per cubic foot (pcf). Cantilevered shoring shall not be allowed in areas where existing utilities and structures are located within a 1:1 projection upward from the bottom of the planned excavation. Hydrostatic pressures shall be added to the

lateral earth pressures for the portions of shoring that extend below the baseline groundwater level. These design pressures assume level backslopes.

A surcharge load equivalent to an additional 2 feet of retained soil shall be applied to the upper 10 feet of shoring. The minimum surcharge load shall be 100 psf. Heavy construction equipment wheel or outrigger loads shall not be located within a distance equal to 0.7H feet the face of the shoring unless considered as surcharge loads in the Contractor's shoring calculations.

Allowable passive earth pressures equal to 150 pounds per square foot (psf) per foot of depth below groundwater and 300 psf per foot of depth above groundwater, measured below the base on the planned excavation, to a maximum value of 3,000 psf can be used for resistance in the alluvium materials.

8.6 Over-excavation

All existing fill materials shall be removed from the area of the proposed electrical building. This area shall be further excavated as necessary to a depth of seven feet below the existing ground surface or to three feet below the bottom of the proposed mat foundation, whichever is deeper. Over-excavation depths may have to be greater in some areas to remove unsuitable soils. Removal excavations should extend a horizontal distance beyond the edges of the foundations equal to the depth of over excavation below the foundations or a minimum of 5 feet, whichever is greater. All exposed subgrade soil surfaces shall be observed by a representative of the GEO and the City of Los Angeles Grading Inspector prior to placement of fill.

Shallow sump pumps may be necessary to control groundwater within the over-excavation area. The exposed soils in the over-excavation bottom may be susceptible to pumping. The contractor should take precautionary measures to avoid disturbance of the over-excavation bottom. Heavy construction equipment, such as trucks or rubber tired equipment should not be allowed to operate within the over-excavation area. Over-excavation should be accomplished with excavation equipment operating from outside the over-excavation area to the extent possible. With-in the over-excavation area, only low ground pressure equipment should be used to excavate, place and compact materials over the over-excavation bottom. Track-mounted equipment will lessen the softening of wet soils as a result of the "pumping" action of moving heavy wheel loads.

After over-excavating for the foundation of the electrical building, the following shall be performed;

- The exposed over-excavation bottom shall be observed by a representative of the GEO and the City of Los Angeles Grading Inspector. The bottom shall be smooth and uniform (free of ruts). If necessary, additional over-excavation shall be performed as directed by the GEO. If additional over-excavation isn't

necessary, the subgrade shall be prepared as directed by the GEO.

- Place a Geotextile fabric over the over-excavation bottom. The geotextile shall be placed in accordance with manufacturer's recommendations. The geotextile fabric shall be temporary extended up the excavation slopes. The geofabric shall comply with following minimum requirements: Density of 6 ounces per square yard or more, Grab Tensile Strength (ASTM D-4632) of 120 pounds, Grab Tensile Elongation (ASTM D-4632) of 50%, Trapezoidal Tear Strength (ASTM D-4533) of 50 pounds. No equipment should operate directly over the geotextile fabric.

- Place a 24-inch layer of 1-inch crushed rock over the entire over-excavated area. Densify the crushed rock using vibration and track walking. Cover the crushed rock with the geotextile fabric that was temporary extended up the slopes of the excavation. Use additional geotextile fabric to completely cover the crushed rock. Overlap all seams per the geotextile manufacturer's recommendations.

- Place an 8-inch layer of Crushed Miscellaneous Base (CMB) over the geofabric. The CMB shall be moisture conditioned and compacted to at least 95-percent relative compaction.

- If pumping is observed, additional base shall be placed in 6-inch lifts until pumping ceases.

- Once pumping ceases, place a geotextile fabric over the compacted base and place suitable fill materials in lifts of 8 inches or less in thickness (before compaction) to finish subgrade elevation (base on the methane mitigation system). Each lift shall be moisture conditioned and compacted as specified section 8.9 of this report.

Exterior slab-on-grade and any pavement areas, should be over-excavated to a depth of at least 12 inches below existing grade or the finish subgrade elevation, whichever is lower, and replaced with properly compacted fill. Removal excavations should extend a horizontal distance of at least 2 feet beyond the plan dimensions of slabs-on-grade or pavements.

8.7 Subgrade Preparation

All exposed subgrade soil surfaces shall be observed by a representative of the GEO and the City of Los Angeles Grading Inspector prior to placement of fill. If soft, yielding, or unsuitable soils are exposed at the subgrade surface, then the unsuitable soils should be removed and replaced with properly compacted fill soils. Due to the nature of the site soils and shallow groundwater levels, unsuitable soft wet soils will be encountered below the ground surface in some areas. If a suitable bottom is not

obtainable within a reasonable depth of the excavation subgrade elevation, supplemental recommendations will be provided during construction to stabilize areas of soft soils.

Subgrade surfaces suitable for fill placement should be scarified to a depth of 6 inches, moisture-conditioned and compacted. Subgrade soils shall be moisture conditioned to between optimum moisture content and 2 percent above the optimum moisture content, at the time of compaction, and compacted to a minimum of 95 percent of the ASTM Test Method D1557-91 laboratory maximum density to a depth of 6 inches. After the completion and acceptance of the subgrade preparation, fill material may be placed in accordance with Section 8.9 of this report. Subgrade soils shall be kept moist (between 0 and 2 percent above the optimum moisture content) but not flooded until covered with subsequent fill or construction.

8.8 Fill Materials

Fill soils shall consist of select on-site soils or approved import material. The on-site soils encountered during the geotechnical investigation are generally acceptable for use as fill material for this project. On-site clayey and silty soils (such as elastic silt encountered in boring RW-1 between 4 and 6 feet) may not be used as fill within the electrical building footprint, below slabs or behind retaining walls. Before being used as fill, on-site soils shall be cleaned of all organic or inorganic debris and all materials with any dimension larger than 3 inches. Drying of wet site soils or mixing of these soils with dryer soils may be required prior to being used as compacted fill. Import material for use as fill for this project shall be predominantly granular (minimum 80% passing number 4 sieve and 25% or less passing the number 200 sieve), non-expansive (EI less than 20), and shall be free of organic or inorganic debris, contamination and materials with any dimension larger than 3 inches. Import material shall be tested and approved by GEO prior to importing to the job site. GEO shall be notified a minimum of five working days prior to scheduled importing of soil to the project site.

8.9 Fill and Backfill Placement

Structural fill shall only be placed on approved surfaces/subgrades prepared in accordance with Section 8.7 of this report. Fill material shall be placed in loose lifts not exceeding 8 inches in thickness, moisture-conditioned between 0 to 2 percent over the optimum moisture content and mechanically compacted. Fill soils placed below building foundations or slabs-on-grade shall be compacted to a minimum of 95 percent relative compaction, as determined by ASTM Test Method D1557.

Fill soils placed in non-structural areas such as paved areas, sidewalks, and landscaped areas shall be compacted to a minimum of 90 percent relative compaction, as determined by ASTM Test Method D1557. Any aggregate base should be moisture-conditioned between optimum and two percent above optimum-moisture and compacted to a minimum of 95 percent relative compaction.

Fill compaction shall be tested and recorded by a certified compaction testing agency working under the direct supervision of GEO. Densification by flooding or jetting is not allowed. Compacted fill soils shall be kept moist, (at or slightly above the specified moisture content at the time of compaction) but not flooded, until covered with subsequent construction. If fill soils are softened or eroded by excessive moisture or construction disturbance, they shall be replaced or recompacted at the discretion of the Geotechnical Engineer before additional fill or construction is placed. Certification and inspection approvals for compromised soils are void and invalid.

8.10 Trench Backfill

Trench excavations for utility pipes may be backfilled with on-site soils under the observation of a representative of GEO. After utility pipes have been laid, properly bedded, and covered per the project specifications, they shall be backfilled to the ground surface or design subgrade with controlled backfill. Controlled backfill shall be moisture conditioned, placed and compacted in accordance with the recommendations presented in Section 8.9 of this report.

8.11 Liquefaction Considerations

Based on the data presented in Section 3 of this report and the results of the liquefaction calculations, potential liquefaction induced settlements on the order of 1-3/4 inches are estimated for the site. A potential liquefaction induced differential settlement of 1 inch is estimated between the proposed structures and the pipe header. These potential liquefaction induced settlements shall be considered and accounted for in the design and construction of the project.

8.12 Mat Foundations

Mat foundations are recommended for support of the project structures with the understanding that the foundations will be susceptible to liquefaction induced settlements. Mat foundations for the wetwell/valve structure and diversion structures shall be founded on natural soils that have been jet grouted to create an excavation bottom seal. The mat foundation for the electrical building shall be founded on compacted fill soil. Mat foundations shall be designed and constructed to bear at a depth of at least 24 inches below the lowest adjacent grade. Mat foundations can be designed for an allowable bearing capacity of 1,500 pounds per square foot. A coefficient of vertical subgrade reaction, for a 1-foot-square loaded area, of 100 kips per cubic foot (kcf) may be used for design of the mats.

Total static settlement of the proposed foundations, designed and constructed in accordance with the recommendations presented herein, should not exceed 1-inch. Differential static settlement should not exceed one-half of the total settlement. The majority of these settlements are expected to occur within a year of construction. In

addition, the foundation will also be potentially susceptible to seismically induced settlements. Potential total and differential seismically induced settlements of 1-3/4 inches or less and 1 inch have been estimated for the project structures. The structural design of the proposed structures should consider the possibility that the estimated magnitudes of seismically induced settlement could occur during the life of the structures. The actual magnitude of total and differential static settlements of the mat foundations will be a function of the structural design and stiffness of the mats.

Resistance to lateral loads can be provided by friction acting at the base of the foundation and by passive earth pressure. A coefficient of friction of 0.35 may be assumed with dead-load forces. An allowable passive lateral earth pressure of 250 psf per foot of depth up to a maximum of 2,500 psf may be used for sides of the foundation poured against undisturbed natural soil or properly compacted fill. The allowable passive pressure may be increased by 33 percent of lateral loading due to wind or seismic forces.

8.13 Retaining Walls

Cantilevered retaining walls that retain a level granular (sand equivalent of 30 or greater) non-expansive backfill for a horizontal distance equal to or greater than the height of the wall may be designed for an active equivalent fluid pressure of 30 pcf. Walls that are fixed against rotation (no movement allowed) supporting a level ground surface and retaining native soils or granular (sand equivalent of 30 or greater) non-expansive backfill for a horizontal distance equal to or greater than the height of the wall can be designed using at-rest uniform pressure of 27H psf. Hydrostatic pressures shall be added to the lateral earth pressures for the portions of retaining walls that extend below the baseline groundwater level. A lateral seismic load of 24 psf per foot of height starting from 0 at the base of the retaining walls and increasing to a maximum at the top of the retaining walls can be considered for seismic conditions.

In addition to the above lateral pressures from retained earth, lateral pressures from other superimposed loads, such as those from vehicle traffic and adjacent structures, should be added, if the loads fall within a 1:1 projection of wall foundations. The effects of any surcharge loads should be added to the above recommended lateral earth pressures.

Backfill behind retaining walls should consist of free-draining granular soil as described in Section 8.8. Backfill should be placed in 8-inch or thinner loose lifts and compacted to a minimum of 90 percent of the ASTM Test Method D1557 maximum density. Compaction should be performed by mechanical means only and monitored by testing during construction. Care should be taken not to damage walls during backfill operations. Concrete should attain the strength specified by the structural designer prior to placement of large quantities of backfill.

Earth pressures presented herein also assume that only hand operated compaction equipment will be used within five feet of walls to limit compaction lateral stresses. The operation of compaction equipment behind retaining walls can induce horizontal pressures in excess of the at-rest pressures on the wall. To help reduce the development of excessive horizontal pressures over-compaction should be avoided.

Earth pressures used in the design of the walls should be indicated on the retaining wall plans. All retaining wall designs and plans should be reviewed by the project geotechnical consultant to confirm that the appropriate soil parameters are used.

Final surface grades should be sloped at a gradient such that surface water drains away from structures and retaining walls.

8.14 Cement Type and Corrosion Measures

Based on the results of soluble sulfate content testing of near-surface soils and our understanding of the proposed improvements, GEO recommends that Type II or Type V cement be used. Based on other test results including pH, chloride content, acidity, and conductivity, the site soils are moderately to severely corrosive. A corrosion expert should make the final determination of what corrosion measures are necessary for the project.

9.0 SUPPLEMENTAL GEOTECHNICAL SERVICES

9.1 Review of Plans and Specifications

The grading and foundation plans and specifications should implement the recommendations presented in this report and should be reviewed by GEO to ensure proper interpretation and application of our recommendations.

9.2 Geotechnical Observation and Testing During Construction

All grading, excavation, and construction of foundations should be performed under the observation and testing of the Geotechnical Engineer at the following stages:

- Upon completion of site clearing;
- During shoring installation;
- During jet grouting;
- During site excavation;
- During subgrade preparation;
- During fill placement;

- After excavation of foundations and immediately prior to placement of foundation concrete;
- During excavation and backfilling of all utility trenches; and
- When any unusual or unexpected geotechnical conditions are encountered

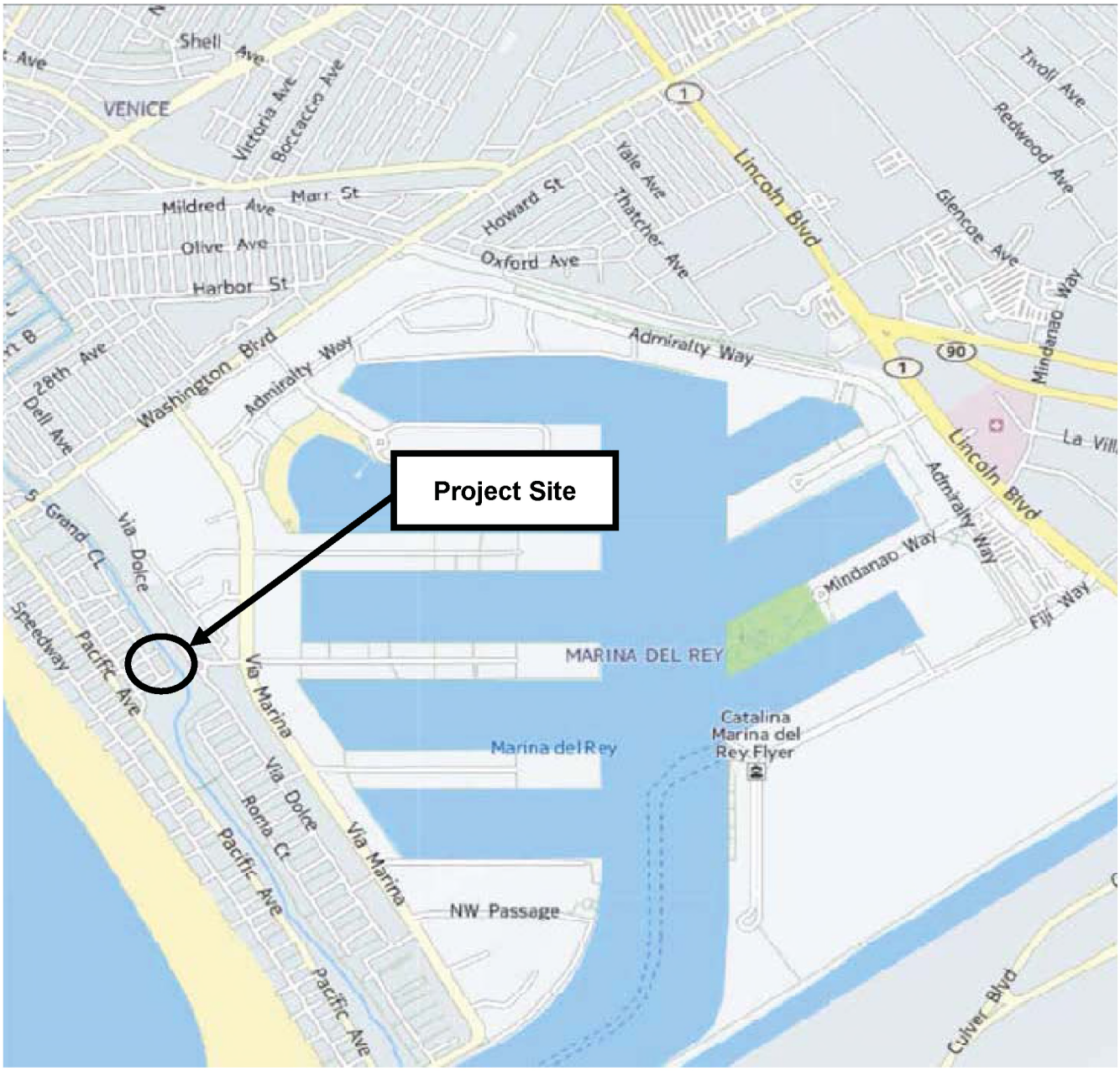
10.0 Closure

If there are any questions regarding this report, please contact Patrick Schmidt at (213) 847-0535 or Fred Burnett at (213) 847-0523.

REGISTERED PROFESSIONAL ENGINEER
PATRICK J. SCHMIDT
No. 2260
Ex. 3/31/16

Patrick J. Schmidt, GE 2260
Geotechnical Engineer II

Fred W. Burnett, CEG 2052
Engineering Geologist I



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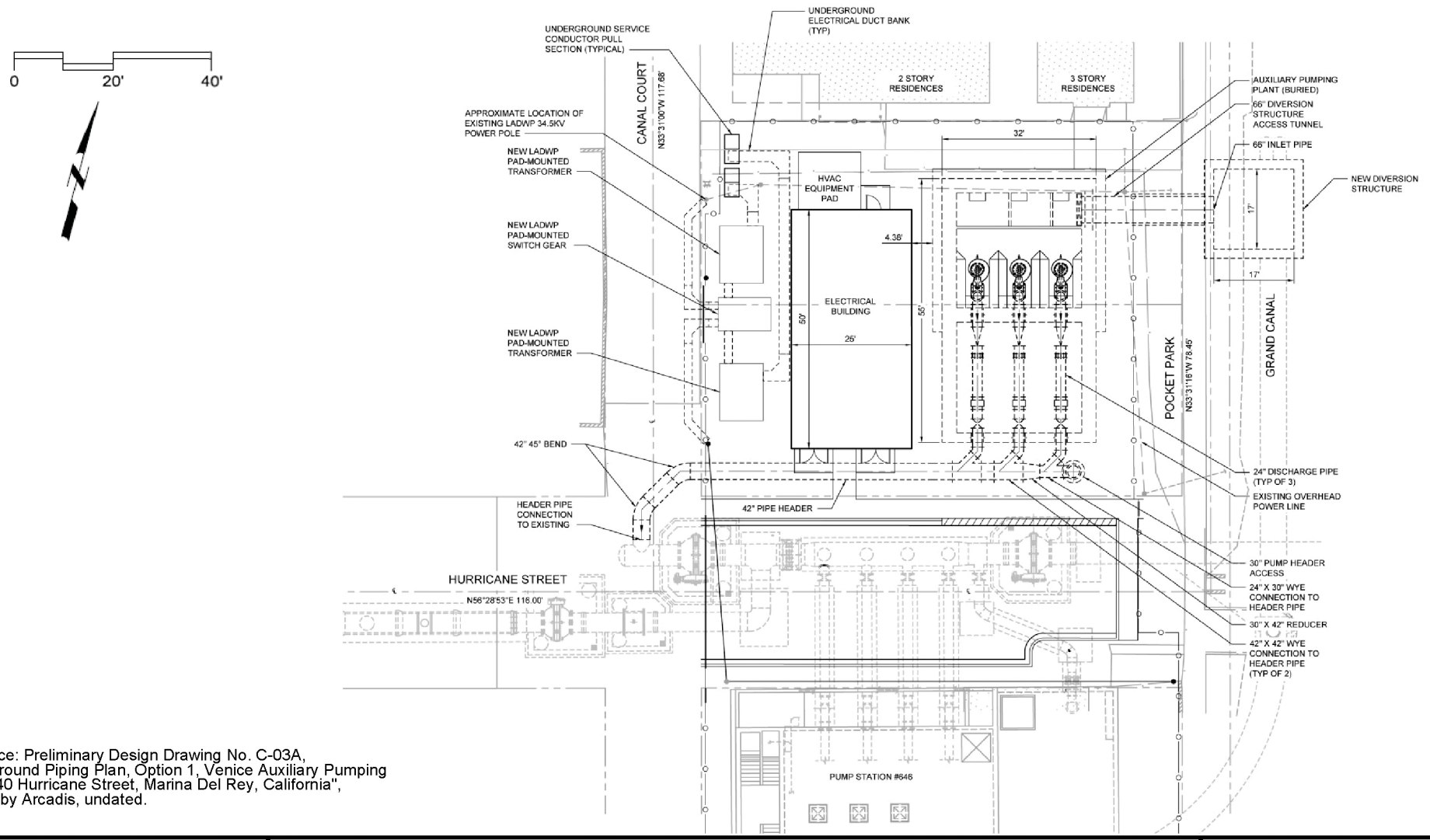
VICINITY MAP

VENICE AUXILIARY PUMPING PLANT **133 East Hurricane Street** **Venice Area of Los Angeles, CA**	BUREAU OF ENGINEERING GEOTECHNICAL ENGINEERING GROUP (GEO) FILE No.: 14-103 DATE: December 2015	**FIGURE 1**



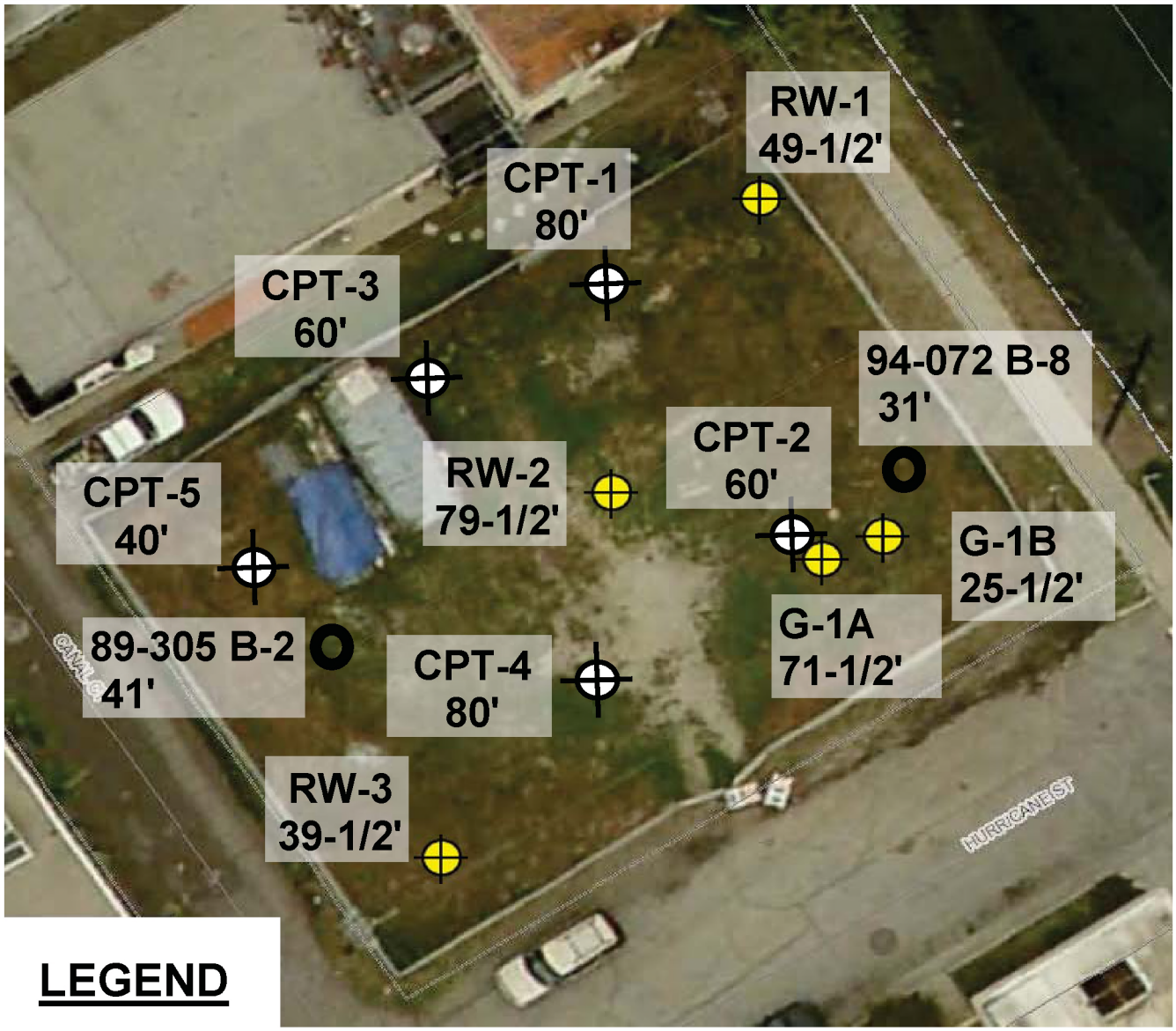
Reference: Preliminary Design Drawing No. C-03A, "Underground Piping Plan, Option 1, Venice Auxiliary Pumping Plant, 140 Hurricane Street, Marina Del Rey, California", prepard by Arcadis, undated.

VENICE AUXILIARY PUMPING PLANT

133 East Hurricane Street
Venice Area of Los Angeles, CA

PROPOSED CONSTRUCTION
BUREAU OF ENGINEERING
GEOTECHNICAL ENGINEERING GROUP
File No. 14-103 Date December 2015

FIGURE NO. 2



LEGEND

RW-2 — Rotary Wash Boring Number, Location, and Depth in feet

CPT-2 — Cone Penetration Test Number, Location, and Depth in feet

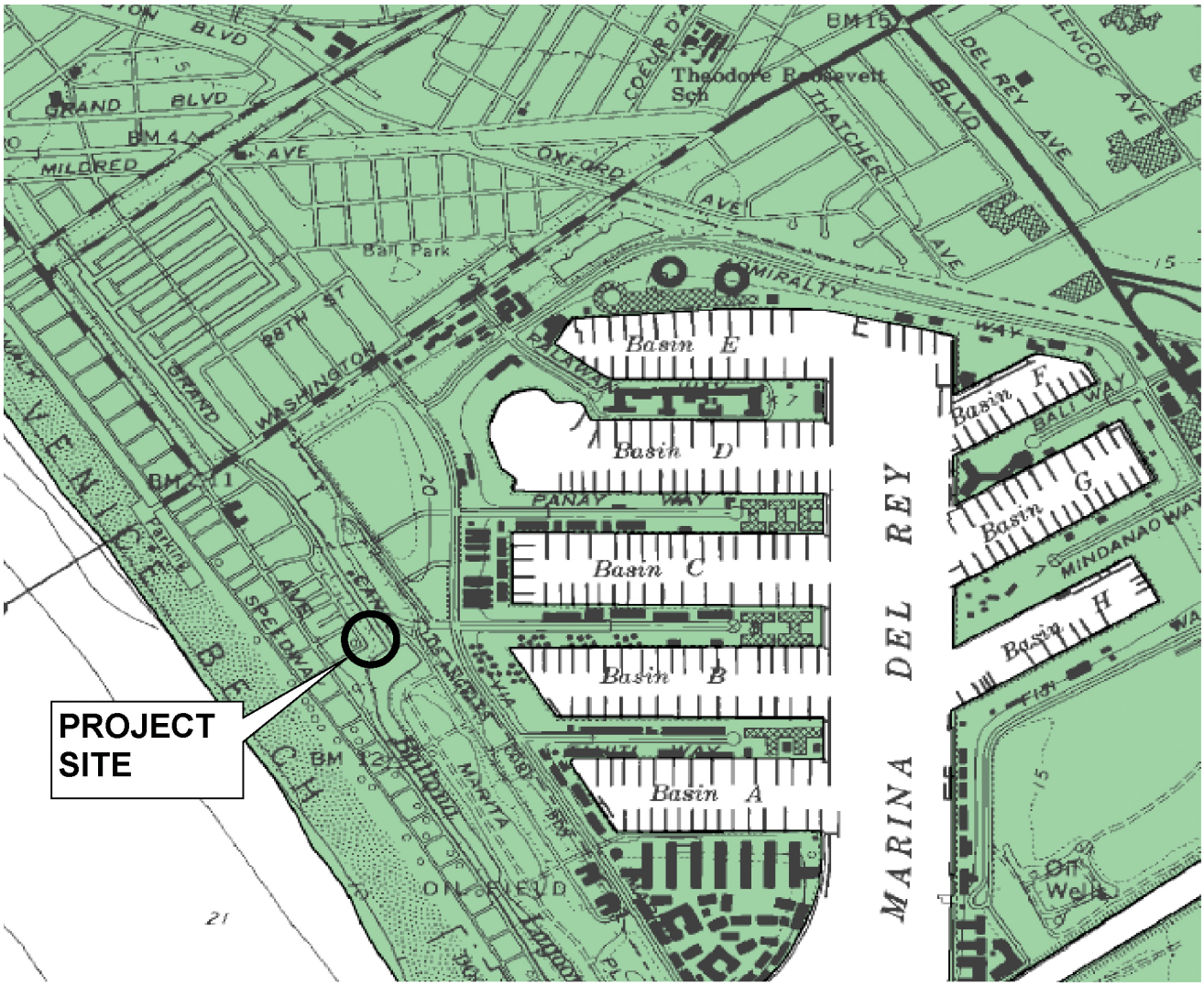
B-2 — Hollowstem Auger Boring Number, Location, and Depth in feet

N

APPROXIMATE SCALE
1 Inch = 20 Feet

EXPLORATION LOCATIONS MAP

VENICE AUXILIARY PUMPING PLANT **133 East Hurricane Street** **Venice Area of Los Angeles, CA**	BUREAU OF ENGINEERING GEOTECHNICAL ENGINEERING GROUP (GEO) FILE No.: 14-103 DATE: December 2015	**FIGURE 3**



Liquefaction

Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

Earthquake-Induced Landslides

Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

SCALE

N

Reference: "Official Map of Seismic Hazard Zones,"Venice", March 25, 1999, California, Department of Conservation, Division of Mines and Geology.

SEISMIC HAZARD ZONES

VENICE AUXILIARY PUMPING PLANT **133 East Hurricane Street** **Venice Area of Los Angeles, CA**	BUREAU OF ENGINEERING GEOTECHNICAL ENGINEERING GROUP (GEO) FILE No.: 14-103 DATE: December 2015	**FIGURE 4**

APPENDIX A

GPI GEOTECHNICAL PROFESSIONALS INC

September 29, 2015

City of Los Angeles
Department of Public Works Bureau of Engineering
Geotechnical Engineering Group
1149 South Broadway, Suite 120
Los Angeles, California 90015

Attention: Mr. Christopher F. Johnson
Manager, Geotechnical Engineering Group

Subject: Data Report
Geotechnical Investigation for
Venice Auxiliary Pump Plant (VAPP)
133 E. Hurricane Street
Venice Area of Los Angeles, California
Contract No. C-121601, Work Order No. SZC 12923
GPI Project No. 2500.06I

Dear Mr. Johnson:

This report presents geotechnical data from a subsurface field investigation and laboratory testing performed by Geotechnical Professionals Inc. (GPI) for the subject project. The site location is presented in Figure 1.

SCOPE OF WORK

The scope of the geotechnical investigation presented in this report was developed by the Geotechnical Engineering Group (GEO) of the City of Los Angeles Department of Public Works, as outlined in Task Order Solicitation No. 14-103 and further updated by GEO staff. We understand that GEO will review the data from this investigation and will be responsible for geotechnical recommendations for the subject project, as the Geotechnical Engineer of Record.

The full scope of work under the subject task order included a geotechnical investigation and a methane investigation. This report presents the results of the geotechnical investigation only. A separate methane investigation was performed by GeoKinetics under subcontract with GPI. Their report was submitted on August 20, 2015.

The geotechnical field investigation included five cone penetration tests to depths ranging from 40 to 80 feet and three rotary wash borings to depths ranging from 40 to 80 feet. The locations of the subsurface explorations were selected by GEO and marked in the field with GPI on July 28, 2015. The approximate locations are presented in Figure 2. A detailed description of CPT field procedures and results, including graphical CPT logs with site-specific soil descriptions, tabular data summaries and shearwave velocity measurements are presented in Appendix A. Field procedures and logs of the rotary wash borings are presented in Appendix B.

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Geotechnical laboratory testing, as requested by GEO, included the following types and number of tests:

- 19 Moisture and Density (ASTM D 2216)
- 8 Percent Passing No. 200 Sieve (ASTM D 1140)
- 16 Full Sieve Analyses (ASTM D 6913)
- 5 Atterberg Limits (ASTM D 4318)
- 1 Compaction (ASTM D 1557)
- 3 Consolidation Tests (ASTM D 2435)
- 8 sets Direct Shear Tests (ASTM D 3080)
- 2 Unconfined Compression (ASTM D 2166)
- 2 Unconsolidated Undrained Triaxial Test (ASTM D 2850)
- 1 Expansion Index (ASTM D 4829)
- 2 sets Corrosivity (California Test Methods 417, 422, 643)

A detailed description of laboratory test procedures and results are presented in Appendix C.

CONCLUDING REMARKS

GPI warrants that the services covered by this report were performed as requested by GEO, in accordance with the standard procedures indicated, and with the standard of care of the geotechnical engineering profession in Southern California at this time. No other warranty or representation is included or intended in this report.

We appreciate the opportunity of offering our services on this project. Do not hesitate to call us if you have any questions on the contents of this report.

Respectfully submitted by,
Geotechnical Professionals Inc.



Byron Konstantinidis, G.E.
Principal



SEP 29 2015

BK:sph

Attachments:
Figure 1 - Site Location Map
Figure 2 - Site Plan
Appendix A - Cone Penetration Test Results
Appendix B - Exploratory Borings
Appendix C - Laboratory Test Results



BASE MAP REPRODUCED FROM MICROSOFT STREETS AND TRIPS (C. 2008)

GPI GEOTECHNICAL PROFESSIONALS, INC.

VENICE AUXILLARY PUMP PLANTS

GPI PROJECT NO. 2500.061 | SCALE: 1" = 2000'

SITE LOCATION MAP

FIGURE 1



EXPLANATION

RW-1 — APPROXIMATE LOCATION AND NUMBER OF EXPLORATORY BORING

C-2 — APPROXIMATE LOCATION AND NUMBER OF CONE PENETRATION TEST

0 30 60 FEET

N

BASE MAP REPRODUCED FROM NAVIGATE LA MAP: (UNDATED)

GPI GEOTECHNICAL PROFESSIONALS, INC.

VENICE AUXILLARY PUMP PLANTS

GPI PROJECT NO.: 2500.061 | SCALE: 1" = 30'

SITE PLAN

FIGURE 2

APPENDIX A

APPENDIX A

CONE PENETRATION TESTS

The subsurface conditions were investigated by performing five Cone Penetration Tests (CPT's) at the site. The soundings were advanced to depths ranging from 40.5 to 80.5 feet below existing grades. The locations of the CPT's are shown on the Site Plan, Figure 2. The latitude and longitude of each CPT location and distances from the northeastern and northwestern fences at the site are presented below:

CPT No.	Latitude	Longitude	Distance (feet)	
			from NE Fence	from NW Fence
C-1	33° 58' 34.44"	-118° 27' 40.62"	32	8
C-2	34.03"	40.33"	22	48
C-3	34.29"	40.89"	48	9
C-4	33.98"	40.67"	51	48
C-5	34.12"	41.13"	75	16

The Cone Penetration Test consists of pushing a cone-tipped probe into the soil deposit while simultaneously recording the cone tip resistance and side friction resistance of the soil to penetration (refer to Figure A-1). The CPT's described in this report were conducted in general accordance with ASTM specifications (ASTM D 5778) using an electric cone penetrometer.

The CPT equipment consists of a cone assembly mounted at the end of a series of hollow sounding rods. A set of hydraulic rams is used to push the cone and rods into the soil while a continuous record of cone and friction resistance versus depth is obtained in both analog and digital form at the ground surface. A specially designed truck is used to transport and house the test equipment and to provide a 30-ton reaction to the thrust of the hydraulic rams.

Standard data obtained during a CPT consists of continuous stratigraphic information with close vertical resolution. Stratigraphic interpretation is based on relationships between cone tip resistance and friction resistance. The calculated friction ratio (CPT friction sleeve resistance divided by cone tip resistance) is used as an indicator of soil type. Granular soils typically have low friction ratios and high cone resistance, while cohesive or organic soils have high friction ratios and low cone resistance. These stratigraphic material categories form the basis for all subsequent calculations which utilize the CPT data.

Computer plots of the reduced CPT data acquired for this investigation are presented in Figures A-2 to A-6 of this appendix. The field testing and computer processing was performed by Kehoe Testing and Engineering under subcontract to Geotechnical Professionals Inc. (GPI). The interpreted soil descriptions were prepared by GPI.

The CPT locations were laid out in the field by measuring from existing site features. Upon completion, the uncaved portions of the CPT holes were backfilled with bentonite chips.

Ground surface elevations at the CPT locations were estimated from Google Earth and should be considered very approximate.

The cone penetrometer used for the project was equipped with a pore pressure transducer to measure both transient and stabilized pore pressures. At selected depths in sandy soils, the penetration was stopped until stabilized pore pressures were obtained as an indication of the static piezometric groundwater levels. The piezometric measurements are summarized below.

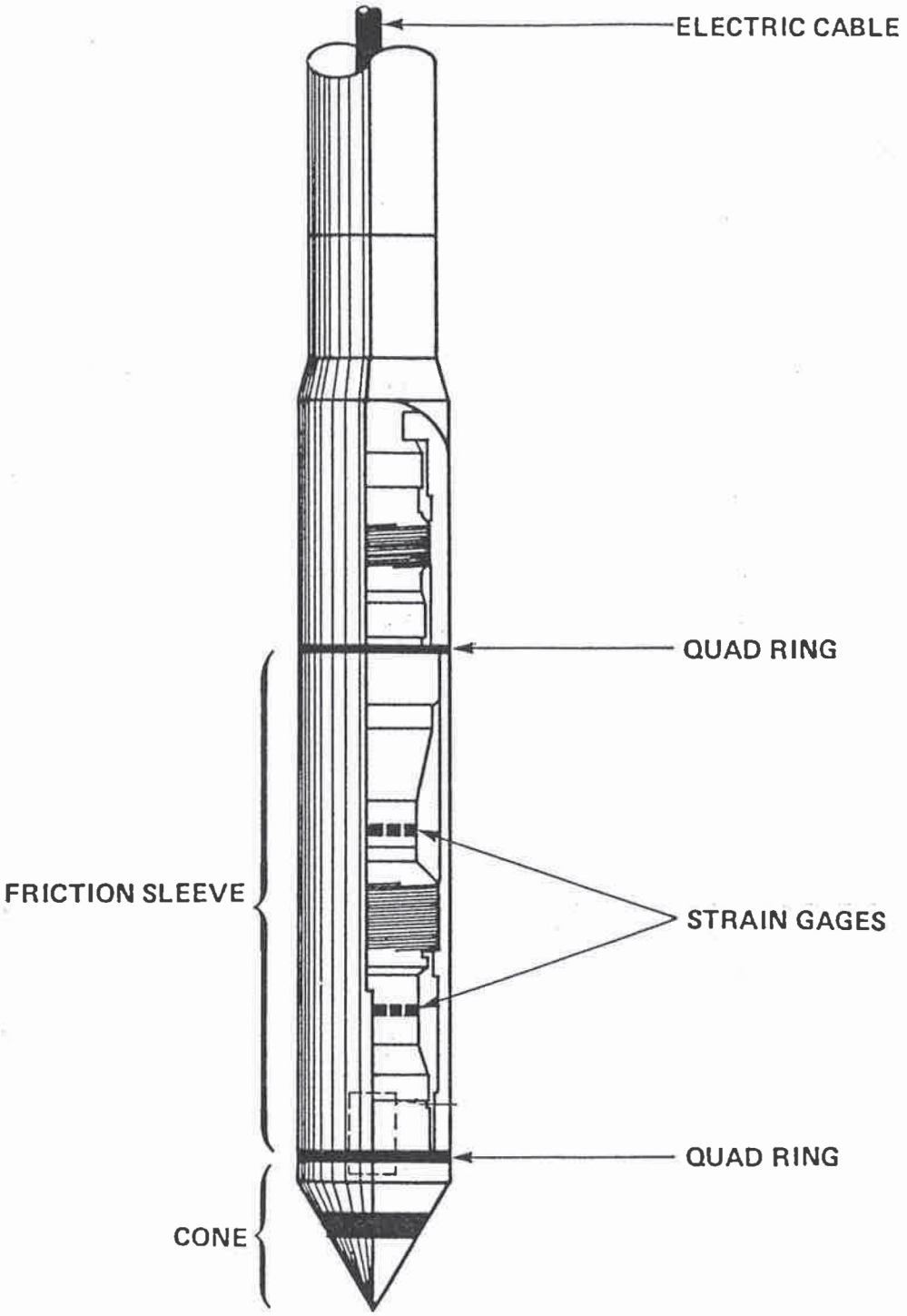
CPT NO.	Depth (ft)	Static Pore Pressure (psi)	Piezometric Groundwater Depth (ft)
C-2	18.8	6.2±	4.5
C-2	37.7	13.9	5.6
C-3	21.5	7.0±	5.3
C-3	37.8	13.7	6.1

The cone penetrometer was also equipped with a tri-axial geophone set and impact source for obtaining shear wave velocity measurements versus depth in accordance with ASTM D 7400-08. Such measurements were obtained at 5-foot depth intervals in CPT C-4. The results of the measurements are summarized below:

Tip Depth (ft)	Geophone Depth (ft)	Travel Distance (ft)	S-Wave Arrival (msec)	S-Wave Velocity from Surface (ft/sec)	Interval S-Wave Velocity (ft/sec)
5.16	4.16	6.50	9.76	666.42	
10.05	9.05	10.34	16.54	625.11	565.65
15.07	14.07	14.93	25.47	586.26	514.29
20.10	19.10	19.74	34.62	570.29	525.86
25.22	24.22	24.73	41.43	596.93	732.32
30.13	29.13	29.56	54.58	541.52	366.94
35.14	34014	34.50	62.96	548.03	590.48
40.12	39.12	39.44	67.44	584.79	1101.35
45.06	44.06	44.34	71.58	619.49	1184.68
50.08	49.08	49.33	76.05	648.71	1116.61
55.01	54.01	54.24	81.35	666.76	925.83
60.04	59.04	59.25	86.39	685.86	994.13
64.98	63.98	64.18	90.14	711.95	1313.00
70.14	69.14	69.32	95.61	725.03	940.67
75.04	74.04	74.21	99.75	743.95	1180.70
80.11	79.11	79.27	103.41	766.54	1382.30

Notes:

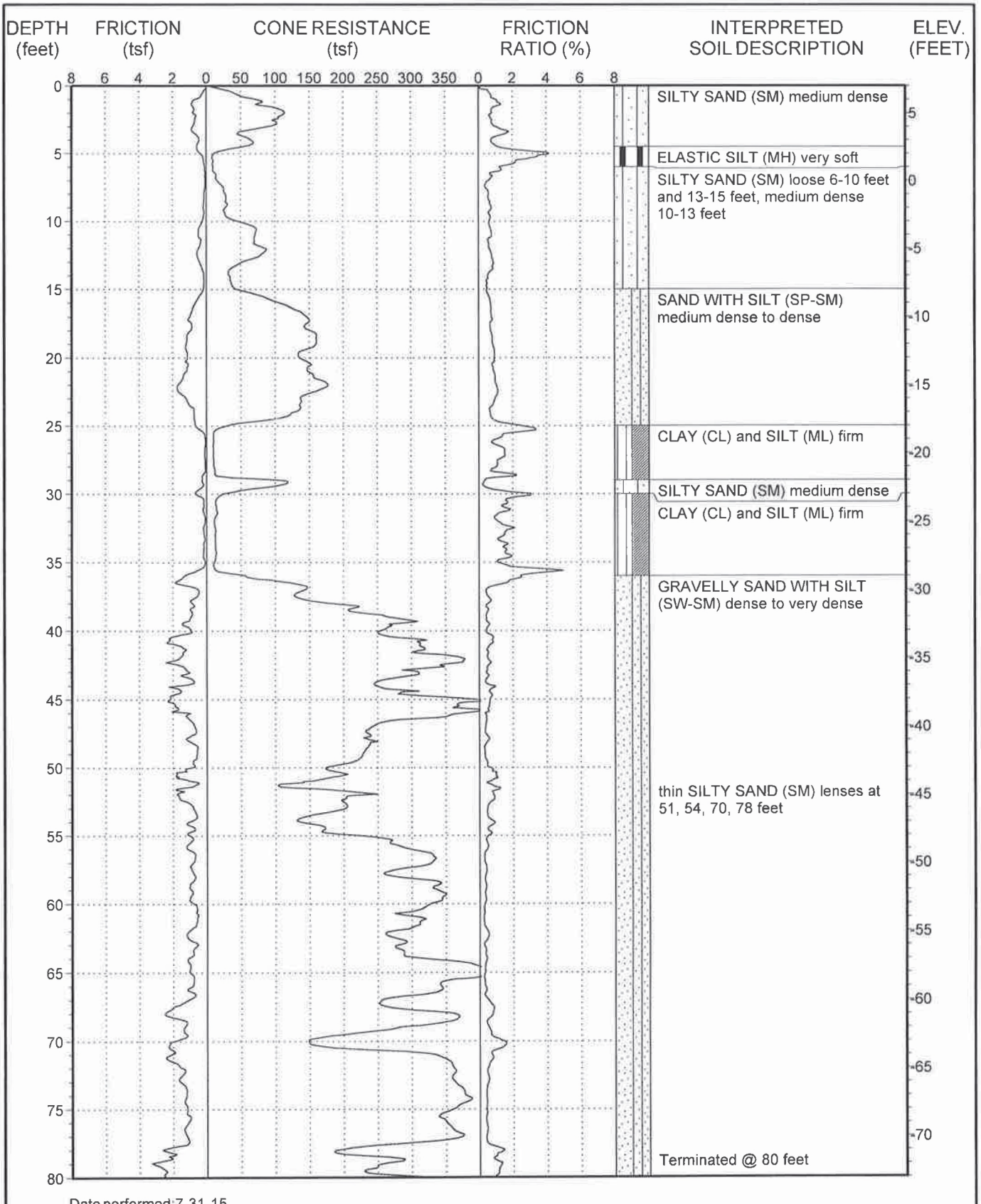
1. Shear Wave Source Offset = 5 ft
2. S-Wave Velocity from Surface = Travel Distance/S-Wave Arrival
3. Interval S-Wave Velocity = (Travel Dist2-Travel Dist1) / (Time2-Time1)



GPI GEOTECHNICAL PROFESSIONALS INC.

CONE PENETROMETER

FIGURE A-1



Date performed:7-31-15

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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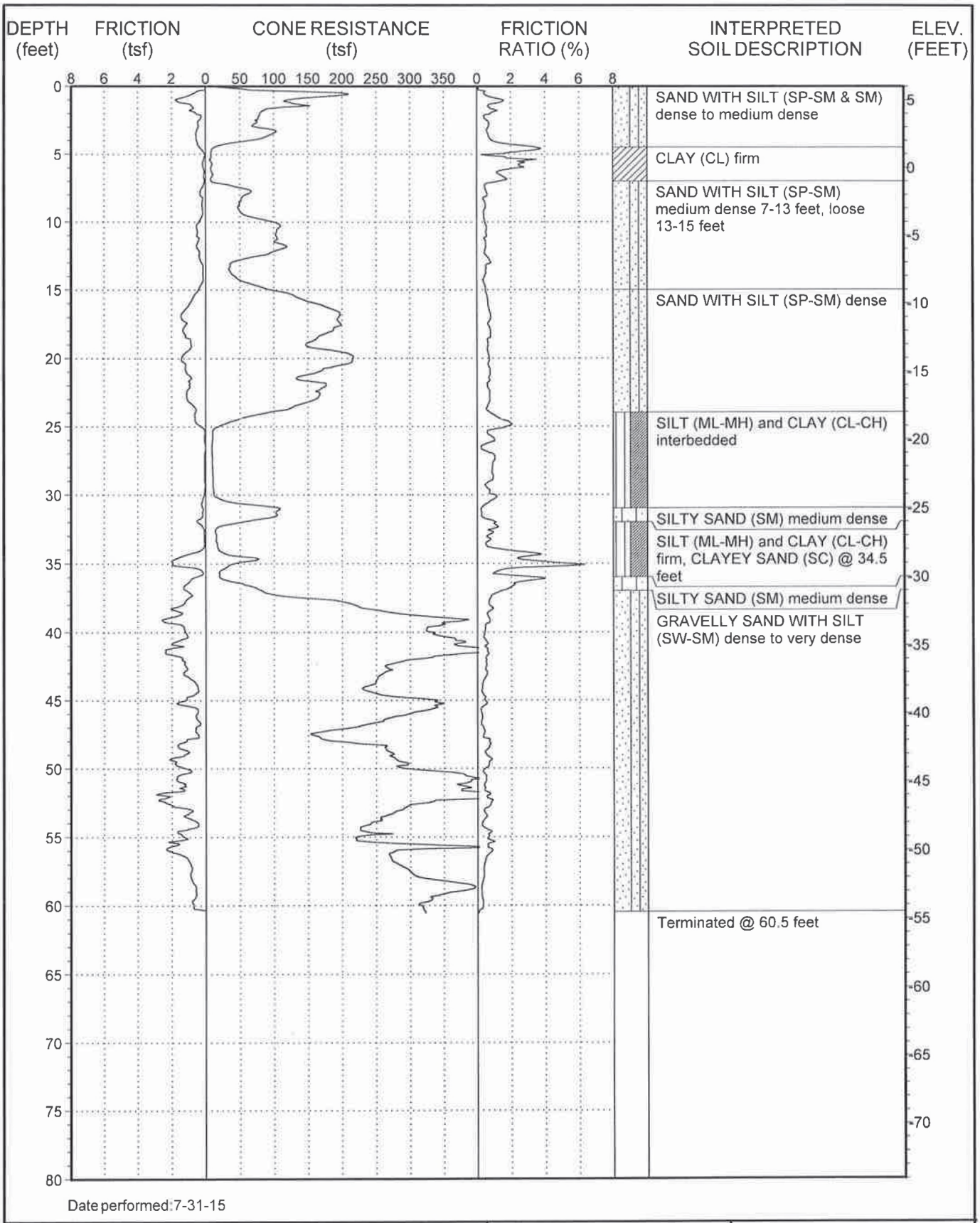
LOG OF CPT NO. C-1

FIGURE A-2



Date performed:7-31-15

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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PROJECT NO.: 2500.06I
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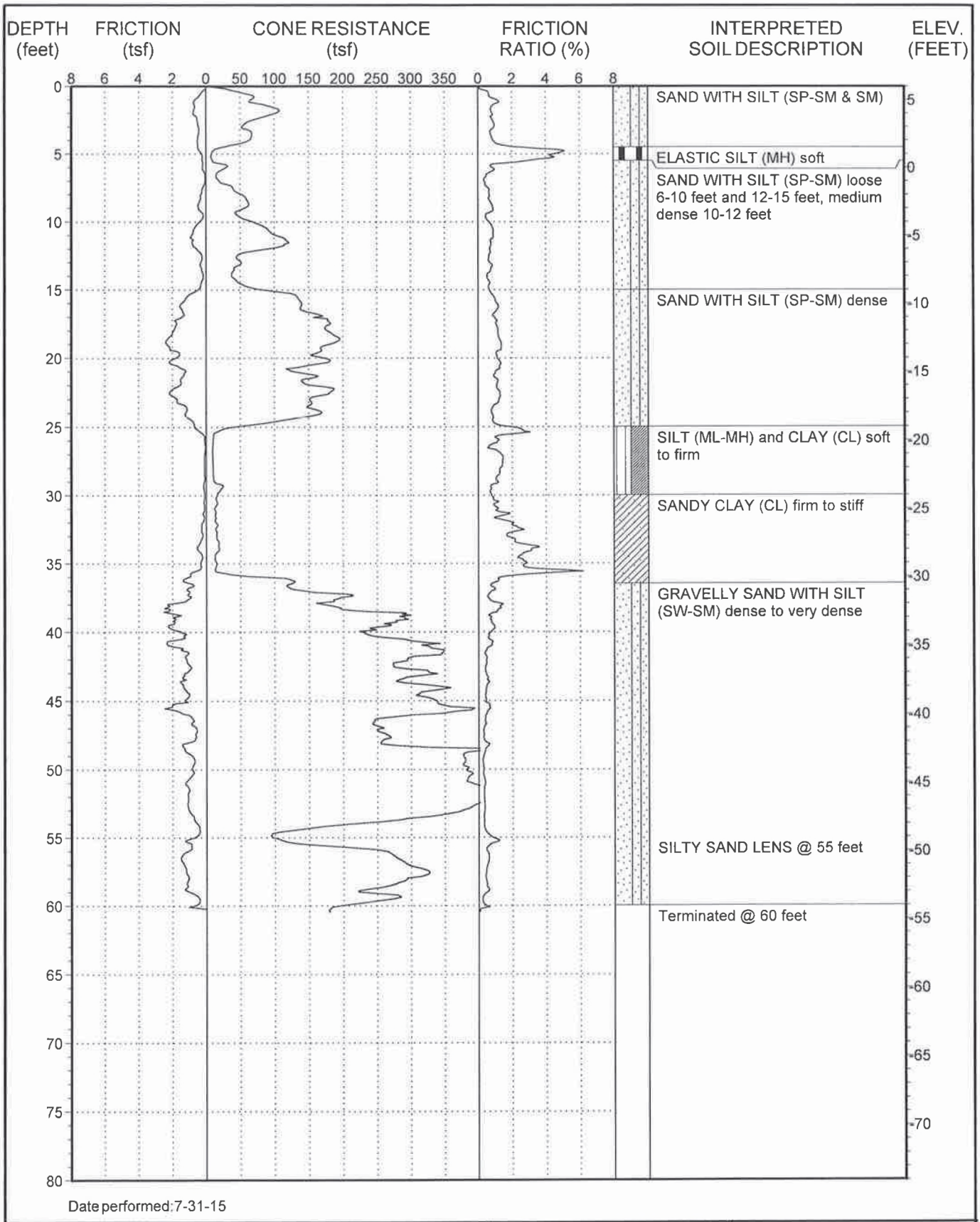
LOG OF CPT NO. C-2

FIGURE A-3



Date performed: 7-31-15

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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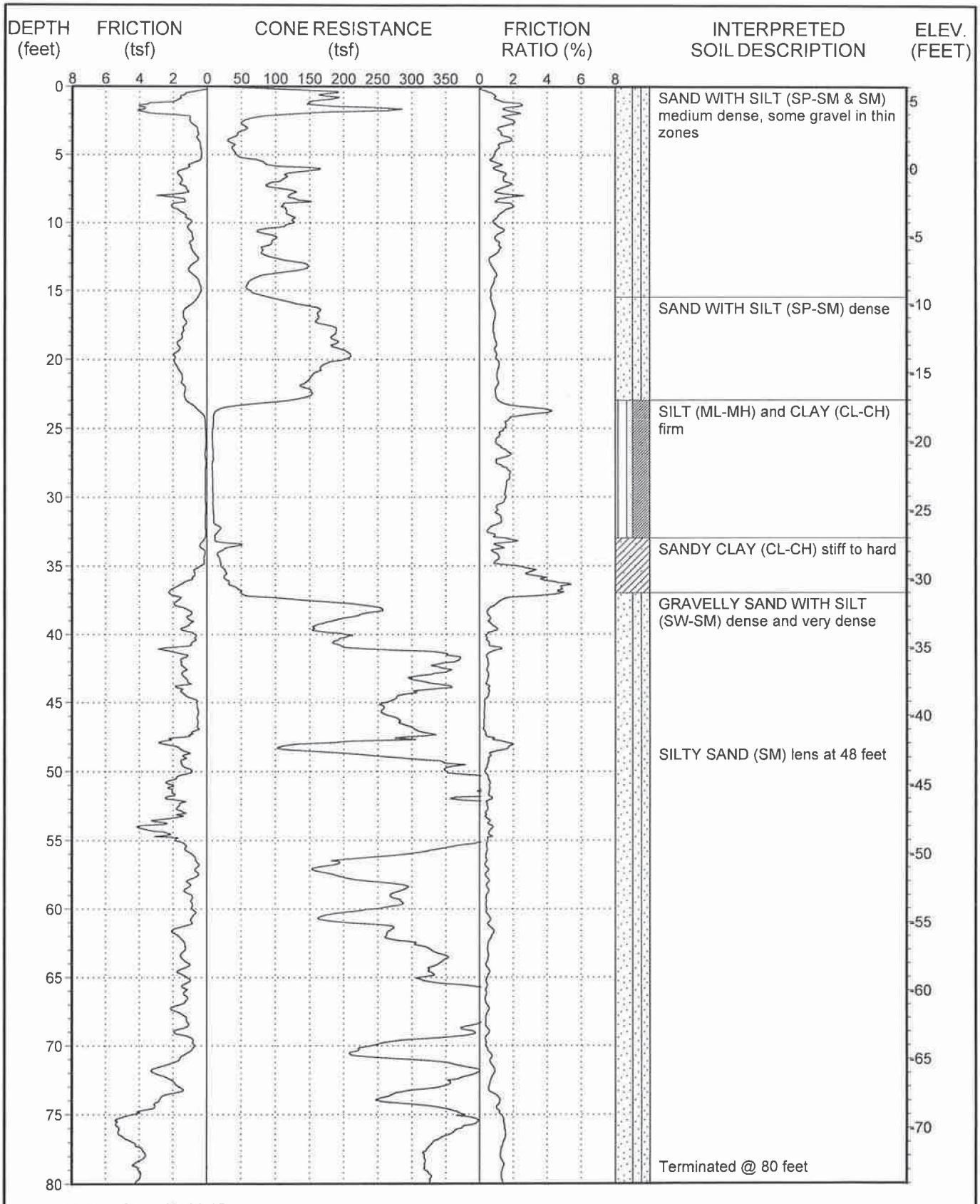
VENICE AUXILARY PUMP PLANT

LOG OF CPT NO. C-3

FIGURE A-4



Date performed:7-31-15

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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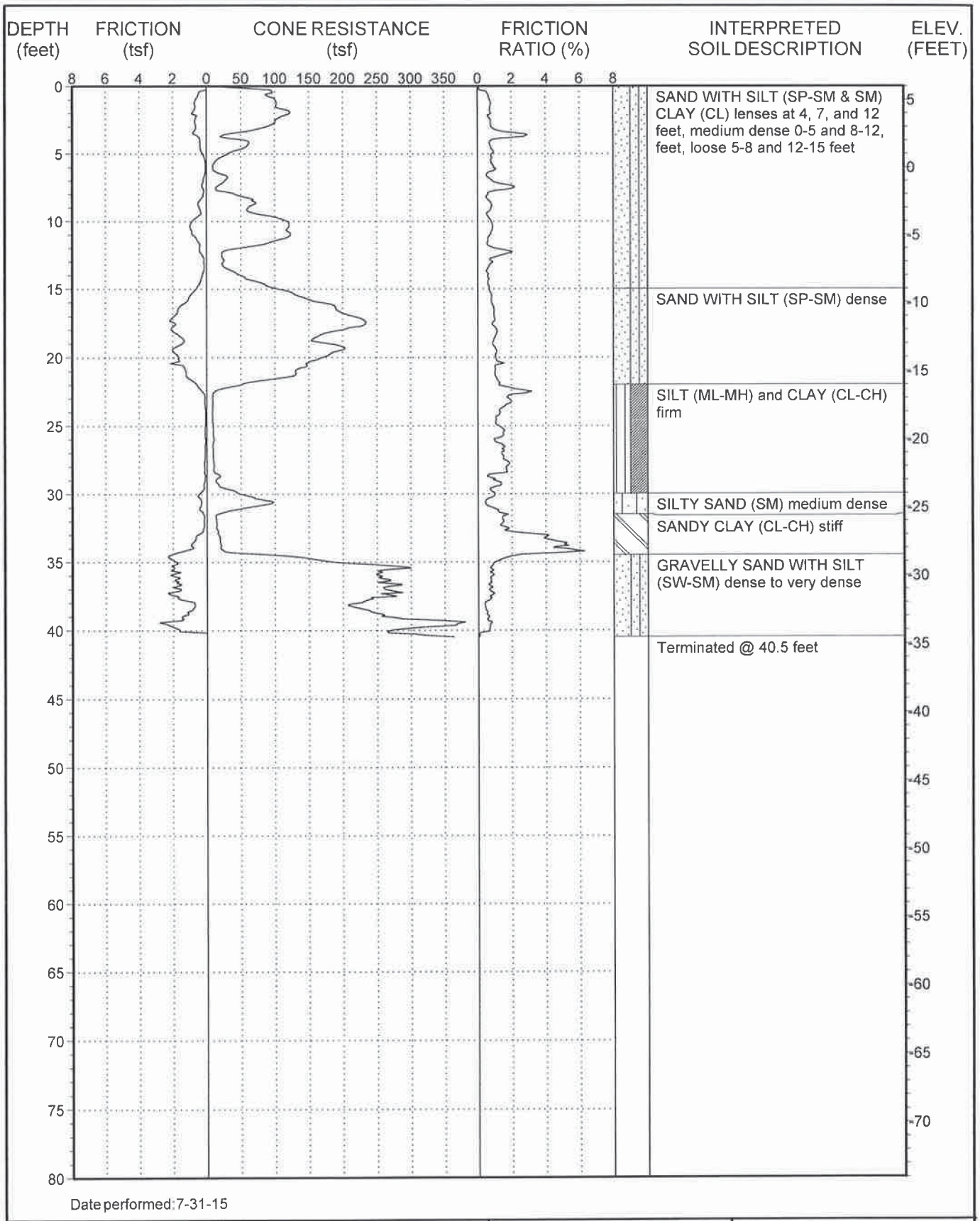
LOG OF CPT NO. C-4

FIGURE A-5



Date performed:7-31-15

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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LOG OF CPT NO. C-5

FIGURE A-6

APPENDIX B

APPENDIX B

EXPLORATORY BORINGS

The subsurface conditions at the site were investigated by drilling and sampling three rotary wash borings. The borings were advanced to depths ranging from 39.5 to 79.5 feet below the existing ground surface. The locations of the explorations are shown on the Site Plan, Figure 2. The latitude and longitude of each boring location and distances from the northeastern and northwestern fences at the site are as follows:

Boring No.	Latitude	Longitude	Distance (feet)	
			from NE Fence	from NW Fence
RW-1	33° 58' 34.48"	-118 27' 40.44"	7	11
RW-2	34.12"	40.71"	49	25
RW-3	33.73"	40.83"	75	68

Relatively undisturbed soil samples were obtained using two types of samplers. Thin walled Shelby tubes were used to obtain samples of relatively compressible silts and clays, in accordance with ASTM D 1587-08. The tubes were 30 inches long, had an inside diameter of 2.87 inches and an outside diameter of 3.00 inches. The Shelby tubes were pushed into the soils by hydraulic pressure. Thicker-walled, brass-ring lined samplers were used to sample mainly more granular soils and some cohesive soils, in accordance with ASTM D 3550-01. The sampler had an inside diameter of 2.42 inches and outside diameter of 3.25 inches. The sampler was driven into the soil using an automatic trip hammer weighing 140 pounds and dropping 30 inches. After seating the sampler into the soil 4 inches, the number of blows needed to drive the sampler 12 inches was recorded as the penetration resistance.

Relatively disturbed samples were also obtained using a split-spoon sampler by means of the Standard Penetration Test (SPT, ASTM D 1586-11). The spoon sampler was driven into the soil by a 140-pound hammer dropping 30 inches, employing the automatic trip hammer described above. The number of blows for each 6 inches of penetration was recorded and is presented on the logs. The blowcount for the first increment should be considered the seating blows while the sum of blows for the last 12 inches of penetration is considered the Standard Penetration Test blowcount. These values are the raw uncorrected blowcounts.

Bulk samples of the soils within the upper 4 feet were obtained with an auger at all boring locations.

The field explorations for the investigation were performed under the continuous technical supervision of GPI's representative, who visually inspected the site, maintained detailed logs of the borings, classified the soils encountered, and obtained relatively undisturbed samples for examination and laboratory testing. The soils encountered in the borings were classified in the field and through further examination in the laboratory in accordance with the Unified Soils Classification System. Detailed logs of the borings are presented in Figures B-1 to B-3 in this appendix. Laboratory test results of moisture content, density,

fines content (fraction passing No. 200 sieve) and Atterberg Limits are presented on the logs. For other laboratory tests, the type of test performed is shown with the following abbreviations:

CON – Consolidation Test
DS – Direct Shear Test
UC – Unconfined Compression Test
UU – Unconsolidated Undrained Triaxial Test

At selected depth intervals, soils were screened for organic vapors using a photo-ionization detector (Multi-Rae E-033). Organic vapors were not detected for any of the samples.

Upon completion of the borings, the boreholes were bailed (drilling mud removed) and groundwater level was measured. The boreholes were then backfilled with cement-bentonite grout to within approximately 2 feet from the ground surface and the balance was filled with soil. The grout was pumped from the bottom of the borehole up. Excess soil cuttings were placed in 55-gallon drums and hauled off site. The ground surface elevations at the exploration locations were estimated from a Google Earth and should be considered to be very approximate.

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
			B	0	**SILTY SAND (SM)** brown, slightly moist, trace gravel, medium dense	5
		5 10 14	S			
48.9		0 1	D	5	**ELASTIC SILT (MH)** grey, wet, very soft LL=62, PI=33, PI=29, CON	
27.1	91	5 7	D		**SILTY SAND (SM)** grey, wet, loose to medium dense @ 7 feet, DS	0
		2 5 8	S	10	@ 10 feet, fines content 15.6%	
23.5	96	8 10	D		**SAND (SP)** grey, wet, medium dense @ 13 feet, fines content 2%	-5
		8 10 12	S	15	**SAND WITH SILT (SP-SM)** grey, wet, medium dense	-10
23.8	99	15 29	D			
		9 14 14	S	20	@ 20 feet, fines content 7.7%	-15
24.4	95	14 20	D		@ 23 feet, DS	
42.6	79		T	25	**LEAN CLAY WITH SAND (CL)** grey, wet, firm LL=40, PL=23, PI=17, CON, UC	-20
34.1	89					
18.3	100				**SANDY SILT (ML)** grey, wet, firm	
					LEAN CLAY (CL) grey, wet, firm	
25.5	103	2 4	D	30	**SANDY SILT (ML)** grey, wet, firm	
17.3	110					
			T		**SANDY CLAY (CL)** grey, wet, firm with CLAYEY SAND (SC) @ 32 feet, fines content 49.8%	-25
10.6	126	17 25	D	35	**GRAVELLY SAND WITH SILT (SW-SM)** grey, wet, dense	-30
		20 22 45	S		@ 38 feet, fines content 10.0%	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 8-7-15

EQUIPMENT USED: 5 " Rotary Wash

GROUNDWATER LEVEL (ft): 8

GPI

PROJECT NO.: 2500.061

VENICE AUXILARY PUMP PLANT

LOG OF BORING NO. RW-1

FIGURE B-1

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
13.6	120	22 30	D	40	@ 40 feet, DS **SAND WITH SILT (SP-SM)** grey, wet, dense with variable gravel content	-35
		21 23 25	S			
		29 40	D	45		-40
		16 20 24	S			
					Total depth 49 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 8-7-15

EQUIPMENT USED: 5 " Rotary Wash

GROUNDWATER LEVEL (ft): 8

GPI

PROJECT NO.: 2500.061

VENICE AUXILARY PUMP PLANT

LOG OF BORING NO. RW-1

FIGURE B-1

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
				0	This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
					SILTY SAND (SM) brown, moist, medium dense, with gravel	5
		6 7 5	S			
		8 9 14	S	5	@ 5 feet, fines content 25.1% grey below 5 feet	0
19.2	93	11 12	D		wet below 7 feet	
		3 5 9	S	10	@ 10 feet, fines content 17.7%	-5
22.0	103	14 19	D		@ 13 feet, DS, sea shells	
		8 12 12	S	15	**SAND WITH SILT (SP-SM)** grey wet, medium dense to dense @ 15 feet, fines content 6.8%	-10
23.6	100	15 25	D			
		5 6 11	S	20	@ 20 feet, fines content 11.8%	-15
24.3	96	11 19	D		@ 23 feet, DS	
76.2	56		T	25	**FAT CLAY (CH)** grey, wet, firm LL=72, PL=30, PI=43, CON, UU	-20
40.1	80		T	30	**CLAY WITH SAND (CL)** grey, wet, firm @ 29 feet, UC	
					CLAYEY SAND (SC) grey, wet, trace gravel	-25
17.0	120		T		**CLAY WITH SAND (CL)** grey, wet, firm @ 33 feet, fines content 27.9%	
15.9	121			35	**SILTY SAND (SM)** grey, wet	-30
					SAND WITH SILT (SW-SM) grey, wet, medium dense to dense, with gravel	
		15 18	S		@ 39 feet, fines content 9.2 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 8-6-15
EQUIPMENT USED: 5 " Rotary Wash
GROUNDWATER LEVEL (ft): 9

GPI

PROJECT NO.: 2500.06I
VENICE AUXILARY PUMP PLANT

LOG OF BORING NO. RW-2

FIGURE B-2

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ELEVATION (FEET)
		17		40	**SAND WITH SILT AND GRAVEL (SW-SM to SP-SM)** variable silt and gravel content, grey, wet, dense	-35
8.7	128	28 52	D			
		25 29 20	S	45	@ 45 feet, fines content 9.7%	-40
7.7		24 29	D			
		18 21 22	S	50	**SAND WITH SILT (SP-SM)** no gravel, grey, wet, dense to very dense, hard sandy silt lens at 51 feet @ 50 feet, fines content 7.0%	-45
20.2	105	22 36	D		@ 53 feet, DS	
		15 25 27	S	55	@ 56 feet, fines content, 10.5%	-50
18.2	107	26 29	D			
		29 34 43	S	60	variable silt and gravel content with silty fine sand layers below 60 feet @ 61 feet, fines content 7.9%	-55
18.5	108	32 45	D			
		21 35 25	S	65		-60
12.7	110	40 50/5"	D			
		18 50 33	S	70		-65
25.9	100	30 39	D			
		17 30 38	S	75		-70
					Boring Terminated at 79.5 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 8-6-15

EQUIPMENT USED: 5 " Rotary Wash

GROUNDWATER LEVEL (ft): 9

GPI

PROJECT NO.: 2500.061
VENICE AUXILARY PUMP PLANT

LOG OF BORING NO. RW-2

FIGURE B-2

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
			B	0	**SILTY SAND (SM)** brown, slightly moist, loose to medium dense, with gravel	5
		3 5 4	S			
		7 12 9	S	5	@ 5 feet, fines content 19.9% grey, wet, below 5 feet, variable silt content	0
8.4	118	9 17	D		interlayered sand with silt (SP-SM) @ 8 feet, fiens content 8.5%, DS	
		3 4 6	S	10	@ 10 feet, fines content 20%	-5
23.0	100	4 7	D			
		10 8 7	S	15	**SAND WITH SILT (SP-SM)** grey, wet, medium dense @ 15 feet, fines content 7.5%	-10
25.4	97	15 23	D			
		8 7 7	S	20	@ 20 feet, fines content 5.3%	-15
46.2	75		T		**LEAN CLAY (CL)** grey, wet, firm, with trace of sand @ 23 feet, UU @ 23.6 feet, LL=45, PL=26, PI=19	
				25		-20
43.8	73		T			
25.2	100			30	**CLAYEY SAND (SC)** grey, wet, firm/loose	-25
					CLAY WITH SAND (CL) grey, wet, firm	
14.2	118		T			
12.7	117				**CLAYEY SAND (SC)** grey, wet @ 34 feet, fines content 46.5%	
				35		
10.0	128	15 29	D		**SAND WITH SILT AND GRAVEL (SW-SM)** grey, wet, dense	-30
		19 29 27	S		Total Depth 39.5 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 8-6-15

EQUIPMENT USED: 5 " Rotary Wash

GROUNDWATER LEVEL (ft): 8

GPI

PROJECT NO.: 2500.06I

VENICE AUXILARY PUMP PLANT

LOG OF BORING NO. RW-3

FIGURE B-3

APPENDIX C

APPENDIX C

LABORATORY TESTS

INTRODUCTION

Representative undisturbed soil samples and bulk samples were carefully packaged in the field and sealed to prevent moisture loss. The samples were then transported to our Cypress office for examination and testing assignments. Laboratory tests were performed on selected representative samples as an aid in classifying the soils and to evaluate the physical properties of the soils affecting foundation design and construction procedures. Detailed descriptions of the laboratory tests are presented below under the appropriate test headings. Test results are presented on the boring logs and in the figures that follow.

MOISTURE CONTENT AND DRY DENSITY

Moisture content and dry density were determined from a number of the ring and Shelby tube samples. The samples were first trimmed to obtain volume and wet weight and then were dried in accordance with ASTM D 2216. After drying, the weight of each sample was measured, and moisture content and dry density were calculated. Moisture content and dry density values are presented on the boring logs in Appendix B.

COMPACTION TEST

A maximum dry density/optimum moisture test was performed in accordance with ASTM D 1557 on a representative bulk composite sample of the upper 4 feet of the on-site soils. The test results are graphically presented in Figure C-1 and summarized below.

BORING NO.	DEPTH (ft)	SOIL DESCRIPTION	OPTIMUM MOISTURE* (%)	MAXIMUM DRY DENSITY* (pcf)
RW-1, -2, -3	0-4	Silty Sand with Gravel (SM)	9.0	125

Note: * includes rock correction

EXPANSION INDEX

One expansion index test was performed in accordance with D 4829 on a composite bulk sample, representative of the soils in the upper 4 feet of the site. The test results are presented below:

BORING NO.	DEPTH (ft)	SOIL DESCRIPTION	EXPANSION INDEX
Composite RW-1, 2,3	0-4	Silty Sand with gravel (SM)	0

ATTERBERG LIMITS

Liquid and plastic limits were determined for selected samples in accordance with ASTM D 4318. The results of the Atterberg Limits tests are presented in Figure C-2.

GRAIN SIZE DISTRIBUTION

A total of 24 soil samples were dried, weighed, soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. That portion of the material retained on the No. 200 sieve was oven-dried and weighed to determine the percentage of the material passing the No. 200 sieve. For 16 of the samples, the retained material was run through a standard set of sieves in accordance with ASTM D 422. The weight of soil retained on each sieve was recorded and the total dry weight was calculated. The grain size distribution data from the full sieve analyses is presented in Figures C-3 through C-8. A summary of the percentages passing the No. 200 sieve (ASTM D1140) is presented below.

BORING NO.	DEPTH (ft)	SOIL DESCRIPTION	PERCENT PASSING No. 200 SIEVE
RW-1	32	Clayey Sand (SC)	49.8
	38	Gravelly Sand with Silt (SP-SM)	10.0
	43	Sand with Silt and Gravel (SW-SM)	9.8
RW-2	61	Sand with Silt and Gravel (SW-SM)	7.9
RW-3	8	Sand with Silt (SP-SM)	8.5
	10	Silty Sand (SM)	20.0
	15	Sand with Silt (SP-SM)	7.5
	20	Sand with Silt (SP-SM)	5.3

CONSOLIDATION

One-dimensional consolidation testing was performed on several undisturbed samples in accordance with ASTM D 2435. After trimming the ends, the samples were placed in the consolidometer and loaded to 0.25 or 0.4ksf. Thereafter, the samples were incrementally loaded to a maximum load of either 12.8 or 16 ksf. The samples were inundated at 0.4, or 0.5 ksf. Sample deformation was measured to 0.0001 inch. Rebound behavior was investigated by unloading the samples back to either 0.4 or 0.8 ksf. Results of the consolidation tests, in the form of percent consolidation versus log pressure, are presented in Figures C-9 to C-11.

DIRECT SHEAR

Direct shear tests were performed on remolded bulk samples and undisturbed samples in accordance with ASTM D 3080. The bulk sample was remolded to approximately 95 percent of maximum density (ASTM D1557). The samples were placed in the shear machine, and a normal load was applied. The samples were inundated, allowed to consolidate, and then were sheared to failure. The tests were repeated on additional test

specimens under increased normal loads. Shear stress and sample deformation were monitored throughout the test. The results of the direct shear tests are presented in Figures C-12 to C-19.

UNCOFINED COMPRESSION TESTS

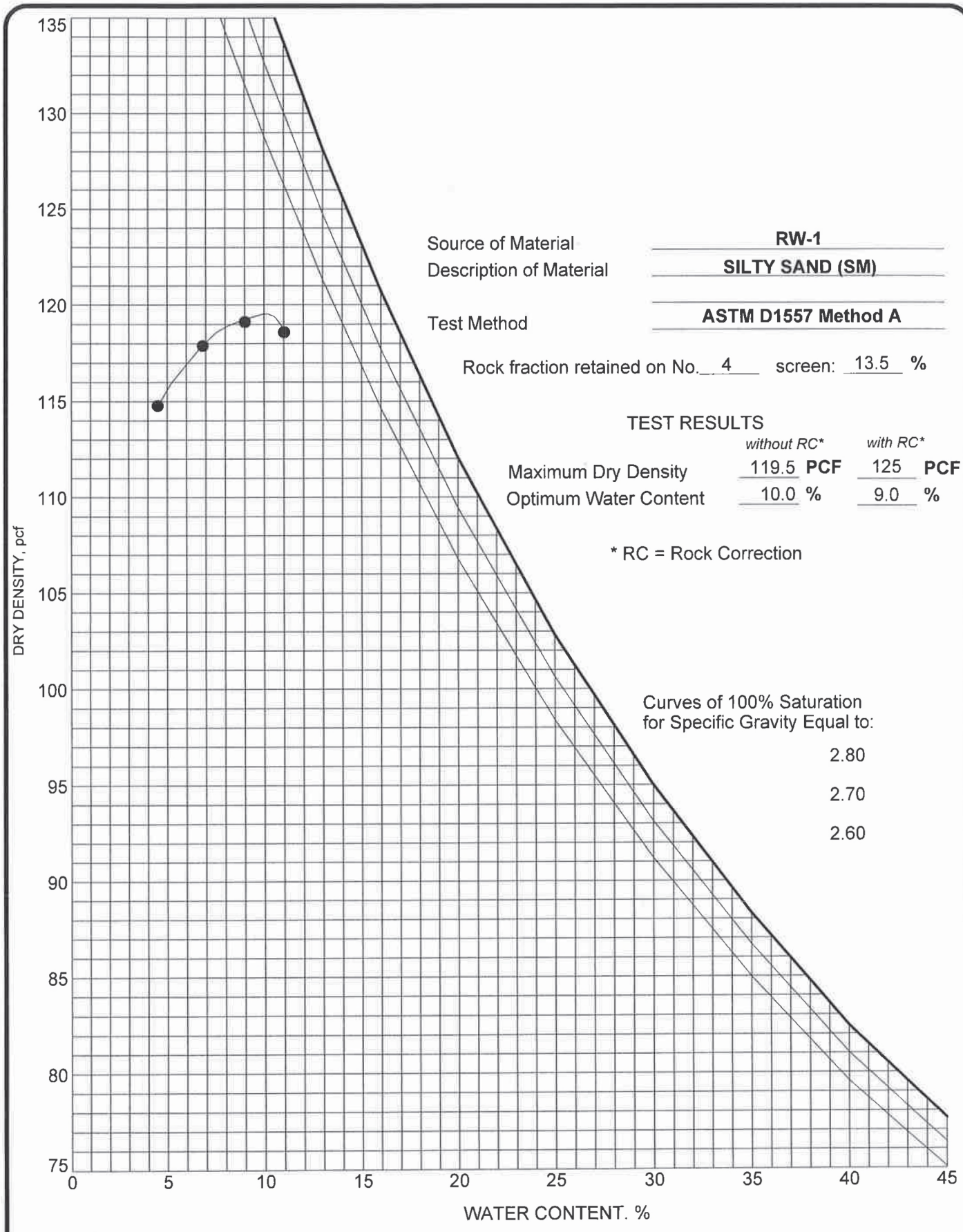
Unconfined compression tests were performed on two samples of cohesive soils in accordance with ASTM D 2166. Detailed test results are presented in Figures C-20 and C-21.

UNCONSOLIDATED UNDRAINED TRIAXIAL TESTS

Unconsolidated undrained triaxial tests were performed on two samples of cohesive soils in accordance with ASTM D 2850. Detailed test results are presented in Figures C-22 and C-23.

SOIL CORROSIVITY

Soil corrosivity testing on samples from shallow depths was performed by AP Engineering and Testing. Test results are presented in Figure C-24 at the end of this appendix.



Source of Material: **RW-1**

Description of Material: **SILTY SAND (SM)**

Test Method: **ASTM D1557 Method A**

Rock fraction retained on No. 4 screen: 13.5 %

TEST RESULTS

	*without RC**	*with RC**
Maximum Dry Density	119.5 **PCF**	125 **PCF**
Optimum Water Content	10.0 %	9.0 %

* RC = Rock Correction

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

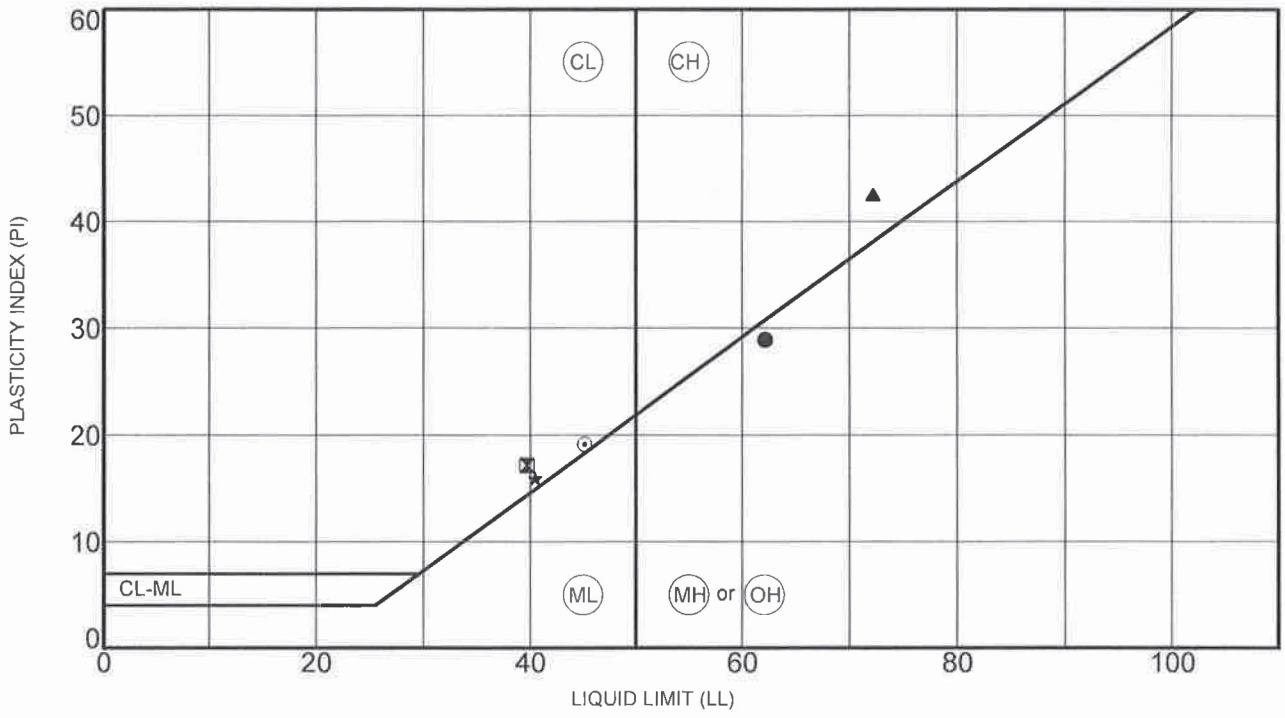
PROJECT: VENICE AUXILARY PUMP PLANT

PROJECT NO.2500.06I

GPI

MAXIMUM DENSITY - OPTIMUM MOISTURE TEST

FIGURE C1



	SAMPLE LOCATION		LL	PL	PI	Fines, %	Classification
●	RW-1	5-6	62	33	29		ELASTIC SILT (MH)
⊠	RW-1	26.1	40	23	17		LEAN CLAY WITH SAND (CL)
▲	RW-2	26.8	72	30	43		FAT CLAY (CH)
★	RW-2	29.6	40	25	16		SANDY CLAY (CL)
⊙	RW-3	23.6	45	26	19		LEAND CLAY WITH SAND (CL)

PROJECT: VENICE AUXILARY PUMP PLANT

PROJECT NO. 2500.06I

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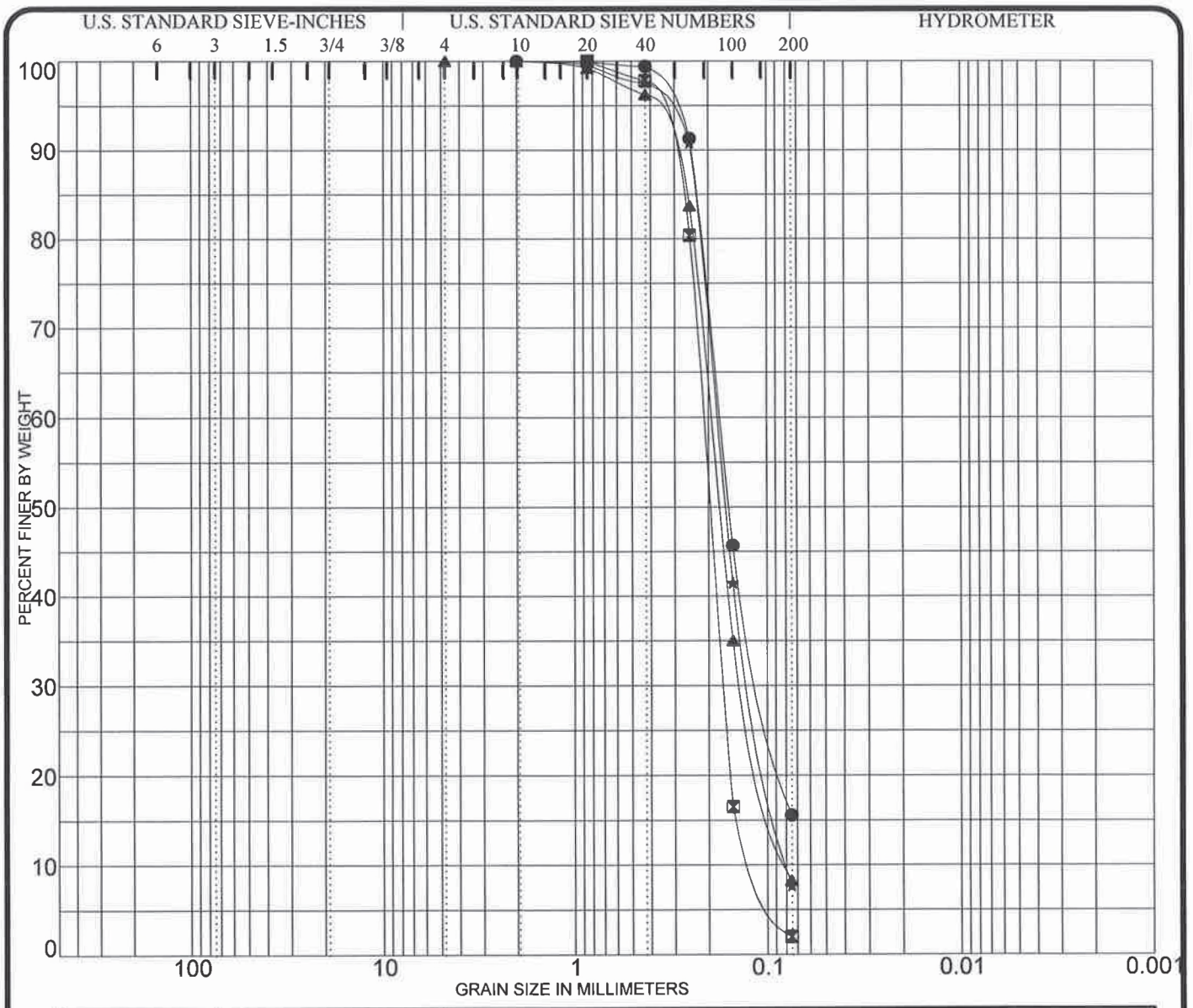
ATTERBERG LIMITS TEST RESULTS

FIGURE C-2



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Location		Classification	MC%	LL	PL	PI	Cc	Cu
●	RW-1	10.0	SILTY SAND (SM)						
⊠	RW-1	12-13	SAND (SP)					1.20	1.9
▲	RW-1	15.0	SAND WITH SILT (SP-SM)					1.13	2.5
★	RW-1	20-21	SAND WITH SILT (SP-SM)					0.98	2.3

	Sample Location		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	RW-1	10.0	2.00	0.18	0.105		0.0	84.4	15.6	
⊠	RW-1	12-13	0.85	0.21	0.167	0.1099	0.0	98.0	2.0	
▲	RW-1	15.0	4.75	0.19	0.132	0.0784	0.0	91.7	8.3	
★	RW-1	20-21	2.00	0.18	0.118	0.0786	0.0	92.3	7.7	

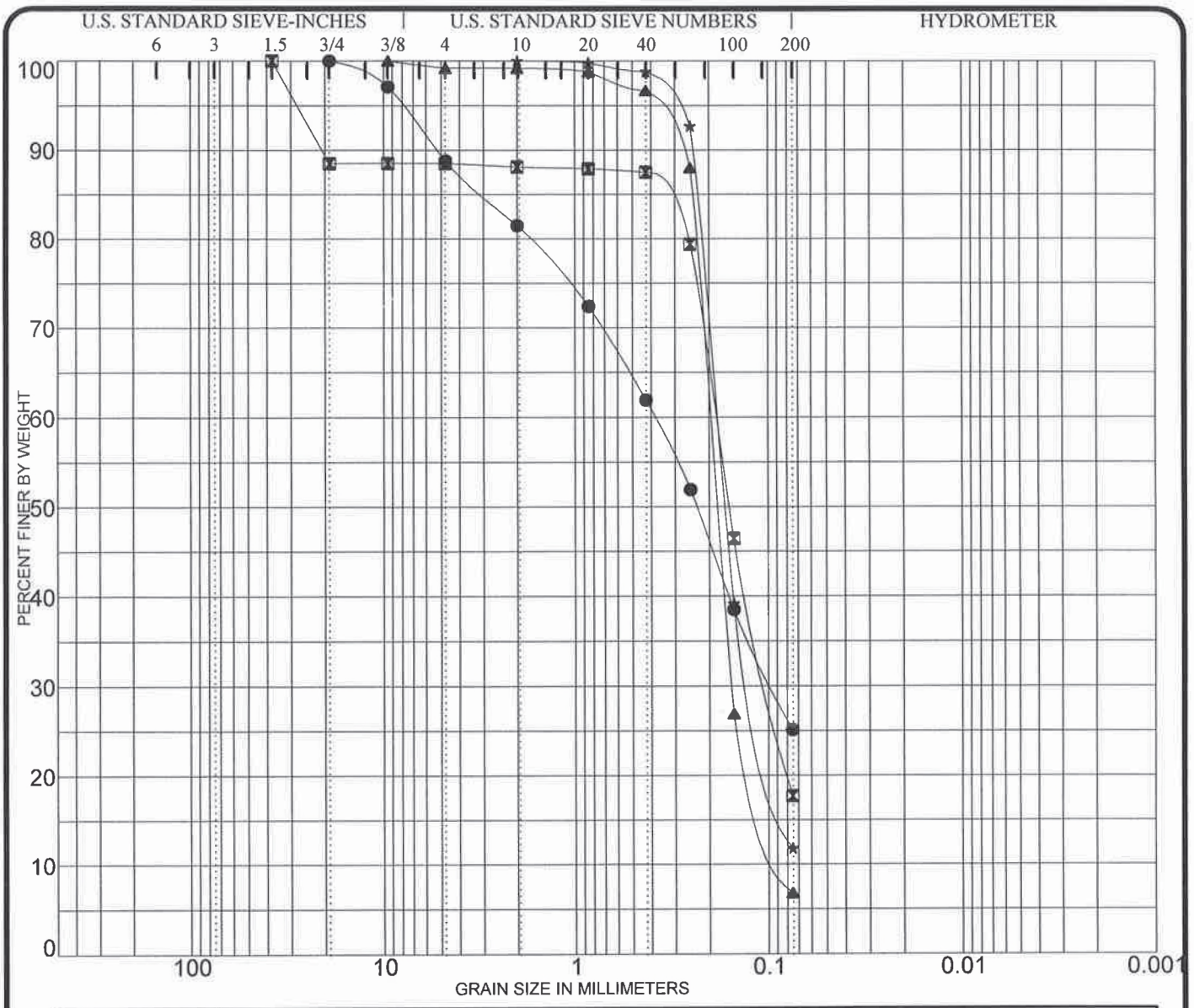
PROJECT: VENICE AUXILARY PUMP PLANT

PROJECT NO. 2500.06I

GPI

GRAIN SIZE DISTRIBUTION

FIGURE C-3



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Location		Classification	MC%	LL	PL	PI	Cc	Cu
●	RW-2	5-6	SILTY SAND (SM) WITH GRAVEL						
⊠	RW-2	10-11	SILTY SAND (SM) WITH GRAVEL						
▲	RW-2	15-16	SAND WITH SILT (SP-SM)					1.43	2.4
★	RW-2	20-21	SAND WITH SILT (SP-SM)					1.08	2.6

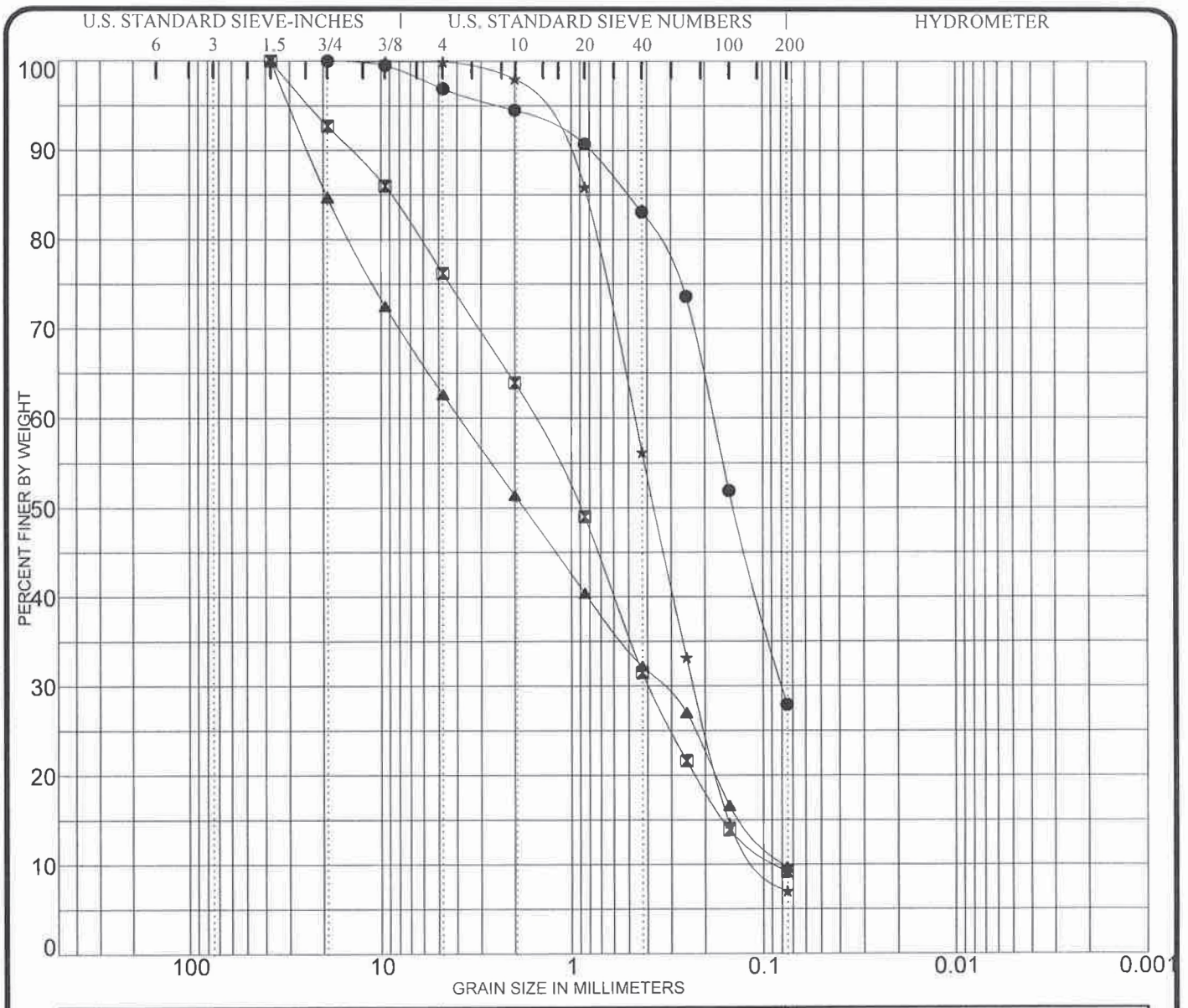
	Sample Location		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	RW-2	5-6	19.00	0.38	0.097		11.2	63.7	25.1	
⊠	RW-2	10-11	37.50	0.19	0.101		11.5	70.8	17.7	
▲	RW-2	15-16	9.50	0.20	0.154	0.0838	0.8	92.4	6.8	
★	RW-2	20-21	2.00	0.18	0.119		0.0	88.2	11.8	

PROJECT: VENICE AUXILARY PUMP PLANT PROJECT NO. 2500.06I

GPI

GRAIN SIZE DISTRIBUTION

FIGURE C-4



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Location		Classification	MC%	LL	PL	PI	Cc	Cu
●	RW-2	33-34	SILTY SAND (SM)						
⊠	RW-2	39-40	SAND WITH SILT (SW-SM)					1.14	18.9
▲	RW-2	45-46	SAND WITH SILT (SP-SM)					0.38	50.3
★	RW-2	50-51	SAND WITH SILT (SP-SM)					1.14	4.7

	Sample Location		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	RW-2	33-34	19.00	0.18	0.080		3.1	69.0	27.9	
⊠	RW-2	39-40	37.50	1.60	0.392	0.0844	23.8	67.0	9.2	
▲	RW-2	45-46	37.50	3.89	0.340	0.0773	37.4	52.9	9.7	
★	RW-2	50-51	19.00	0.46	0.229	0.0986	0.1	92.9	7.0	

PROJECT: VENICE AUXILARY PUMP PLANT

PROJECT NO. 2500.06I

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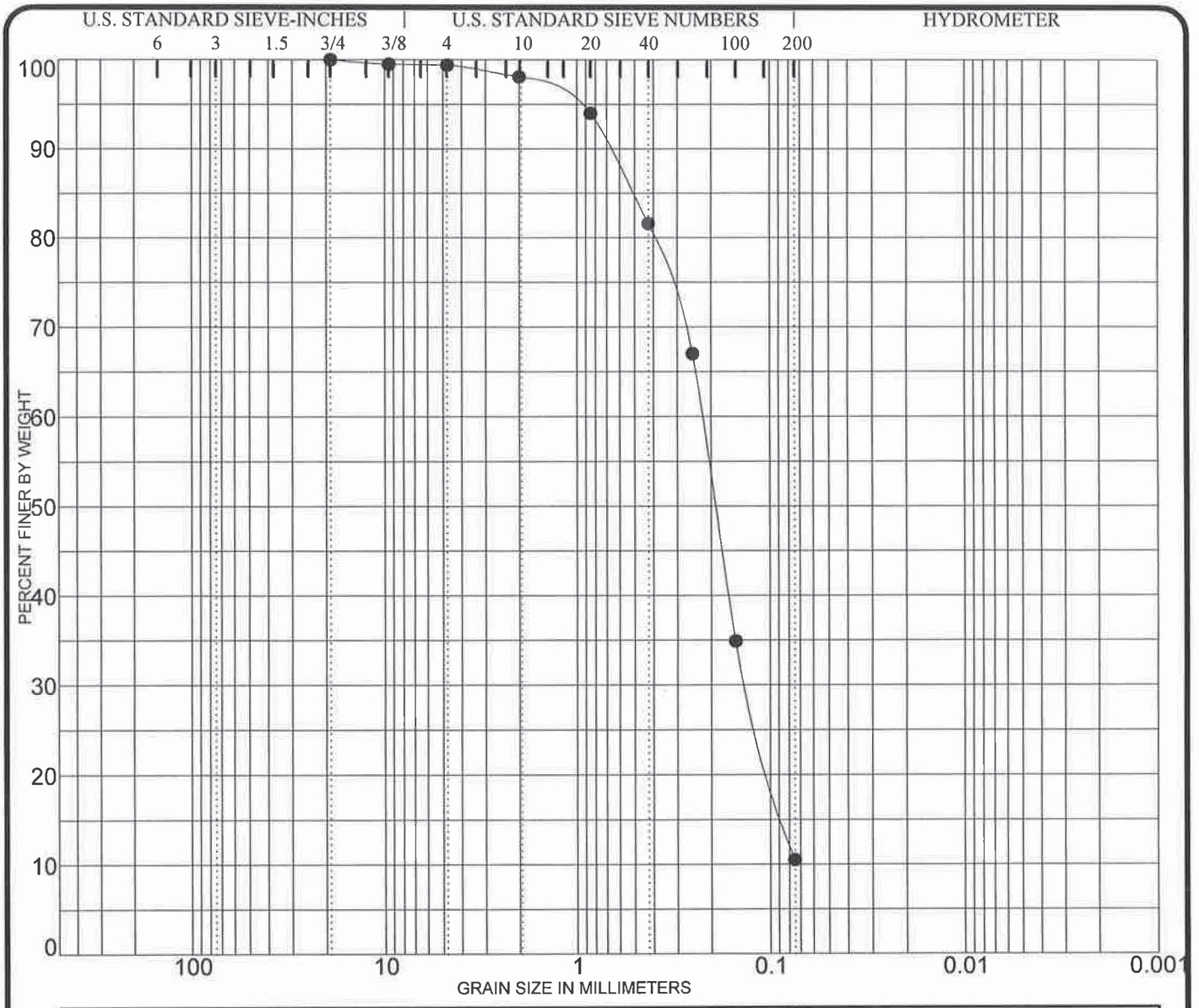
GRAIN SIZE DISTRIBUTION

FIGURE C-5



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample Location		Classification	MC%	LL	PL	PI	Cc	Cu
RW-2	56-57	SAND WITH SILT (SP-SM)					1.03	3.0

Sample Location		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
RW-2	56-57	19.00	0.22	0.131		0.6	88.9	10.5	

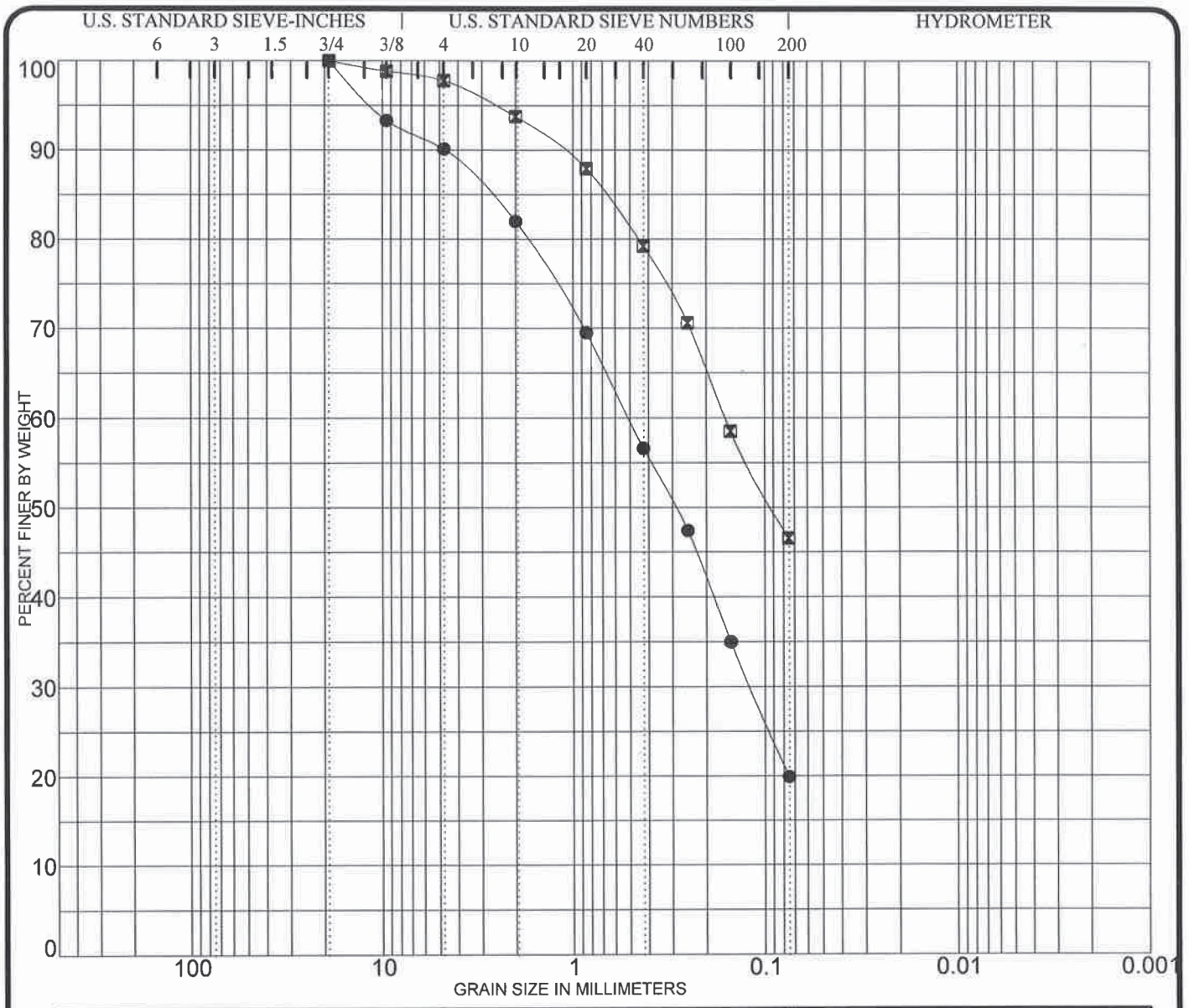
PROJECT: VENICE AUXILARY PUMP PLANT

PROJECT NO. 2500.06I

GPI

GRAIN SIZE DISTRIBUTION

FIGURE C-6



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Location		Classification	MC%	LL	PL	PI	Cc	Cu
●	RW-3	5-6	SILTY SAND (SM)						
⊠	RW-3	34.0	CLAYEY SAND (SC)						

	Sample Location		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	RW-3	5-6	19.00	0.51	0.119		9.9	70.2	19.9	
⊠	RW-3	34.0	19.00	0.16			2.2	51.2	46.5	

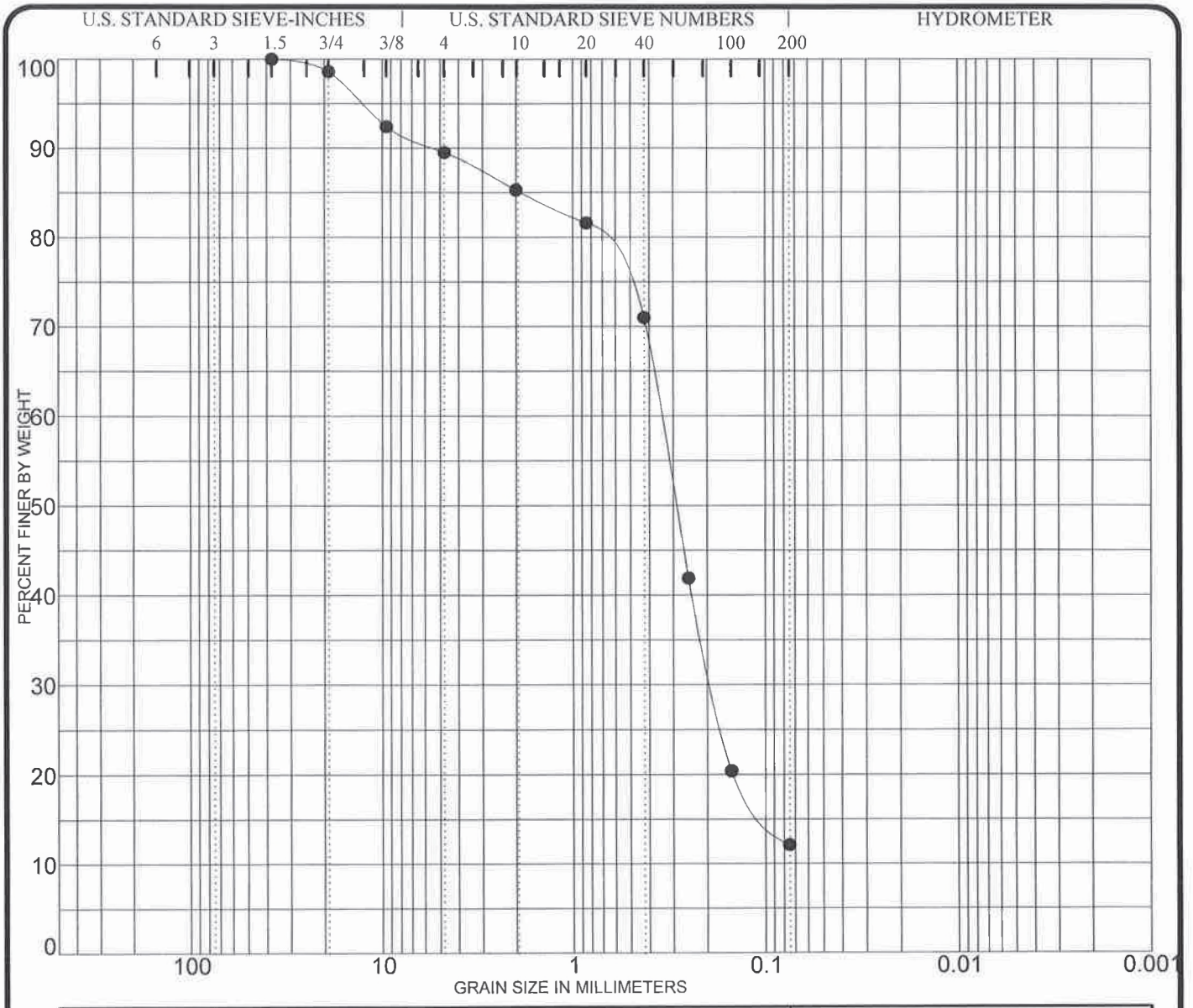
PROJECT: VENICE AUXILARY PUMP PLANT

PROJECT NO. 2500.06I

GPI

GRAIN SIZE DISTRIBUTION

FIGURE C-7



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample Location	Classification	MC%	LL	PL	PI	Cc	Cu
● RW-1,2,3 0-4	SILTY SAND WITH GRAVEL (SM)					1.62	5.5

Sample Location	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● RW-1,2,3 0-4	37.50	0.35	0.188		10.5	77.4	12.1	

PROJECT: VENICE AUXILARY PUMP PLANT PROJECT NO. 2500.06I

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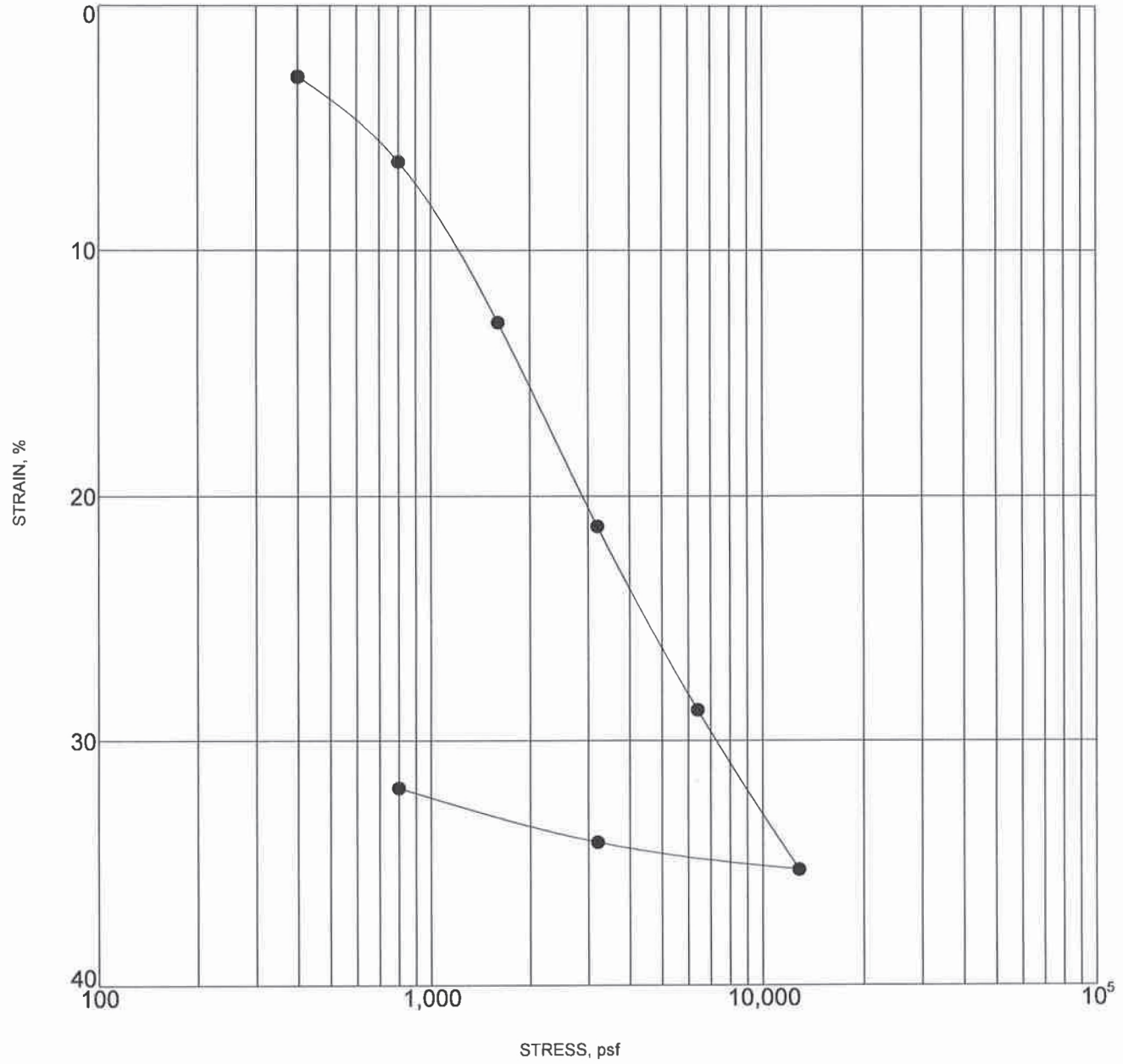
GRAIN SIZE DISTRIBUTION

FIGURE C-8



Sample inundated at 400 psf

	Sample Location		Classification	DD,pcf	MC,%
●	RW-1	5-6	ELASTIC SILT (MH)		

PROJECT: VENICE AUXILARY PUMP PLANT PROJECT NO.: 2500.06I

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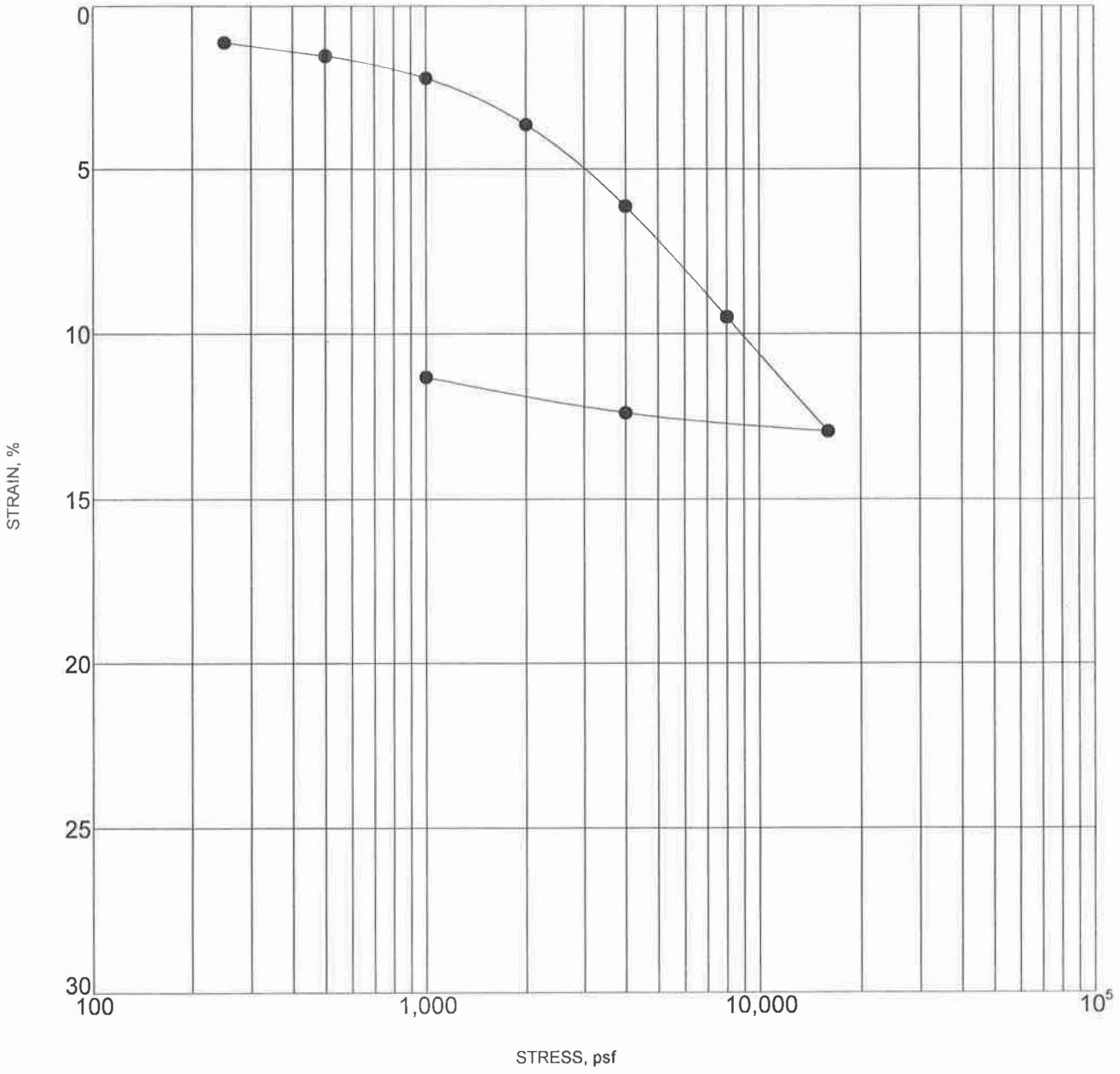
CONSOLIDATION TEST RESULTS

FIGURE C-9



Sample inundated at 500 psf

	Sample Location		Classification	DD,pcf	MC,%
●	RW-1	26.1	LEAN CLAY WITH SAND (CL)		

PROJECT: VENICE AUXILARY PUMP PLANT PROJECT NO.: 2500.06I

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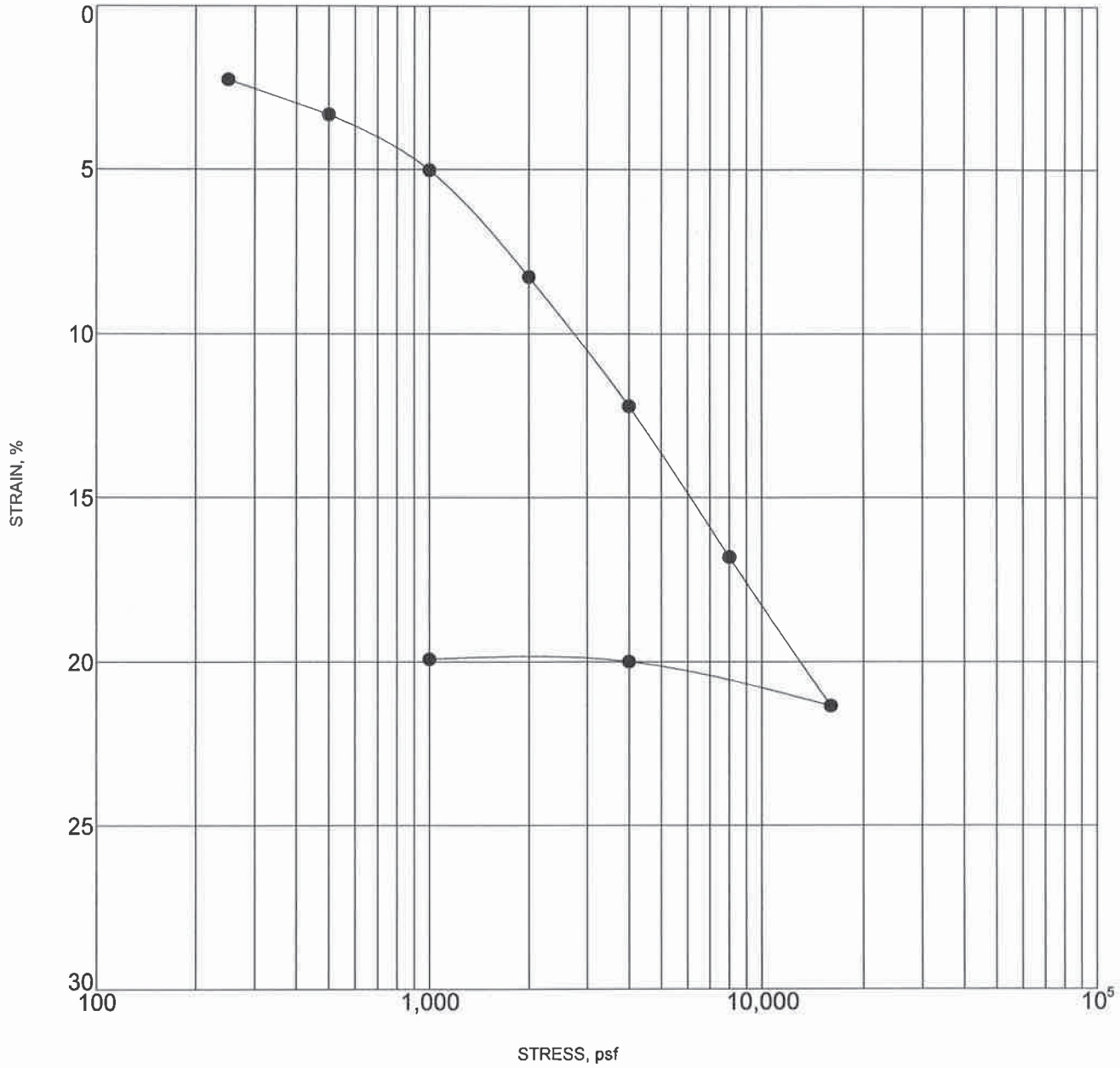
CONSOLIDATION TEST RESULTS

FIGURE C-10



Sample inundated at 500 psf

	Sample Location		Classification	DD,pcf	MC,%
●	RW-2	26.8	FAT CLAY (CH)		

PROJECT: VENICE AUXILARY PUMP PLANT PROJECT NO.: 2500.06I

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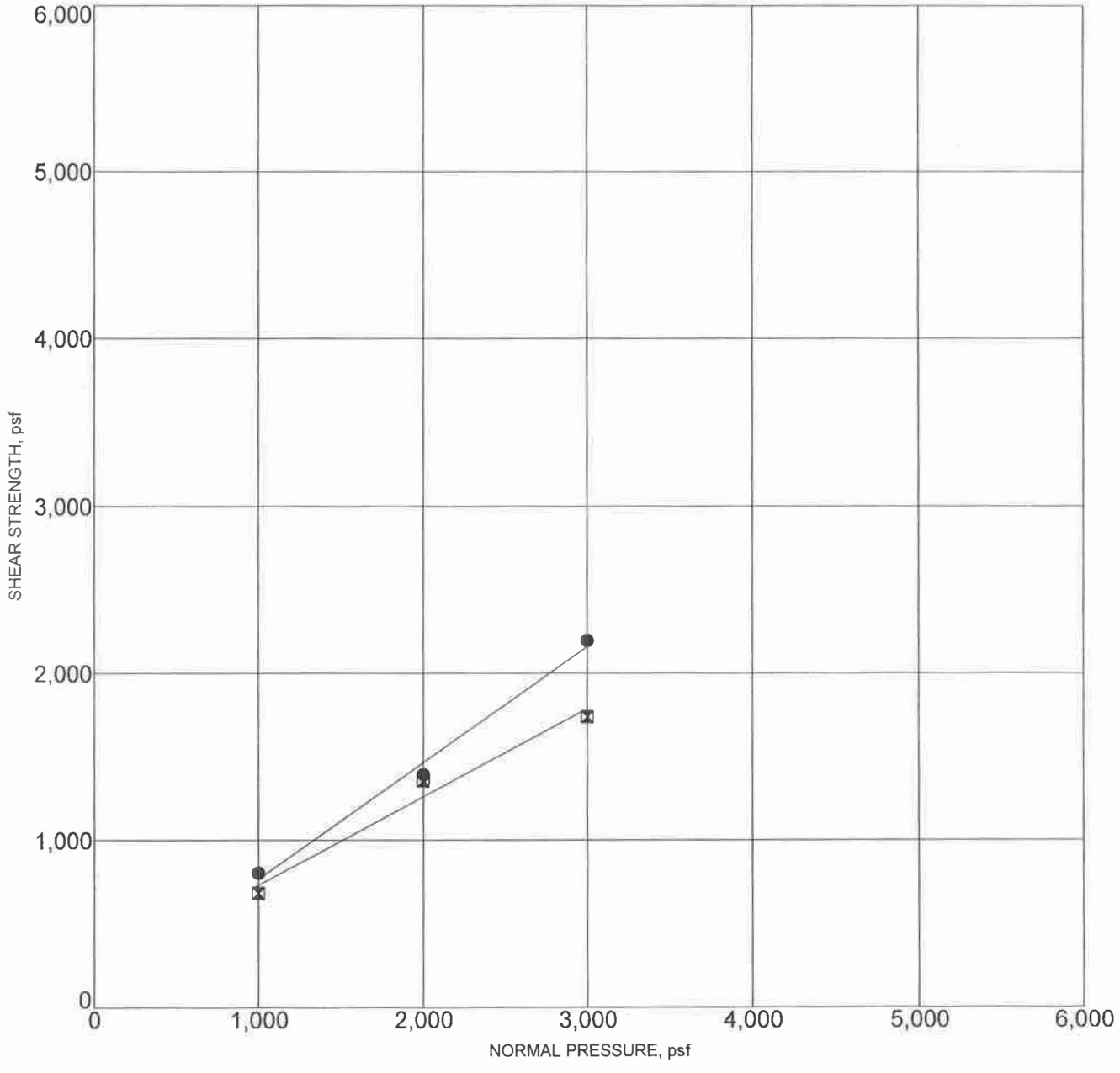
CONSOLIDATION TEST RESULTS

FIGURE C-11



● **PEAK STRENGTH**
Friction Angle= 35 degrees
Cohesion= 72 psf

⊠ **ULTIMATE STRENGTH**
Friction Angle= 28 degrees
Cohesion= 204 psf

Sample Location		Classification	DD,pcf	MC,%
RW-1	7-8	SILTY SAND (SM)	91	27.1

PROJECT: VENICE AUXILARY PUMP PLANT PROJECT NO.2500.06I

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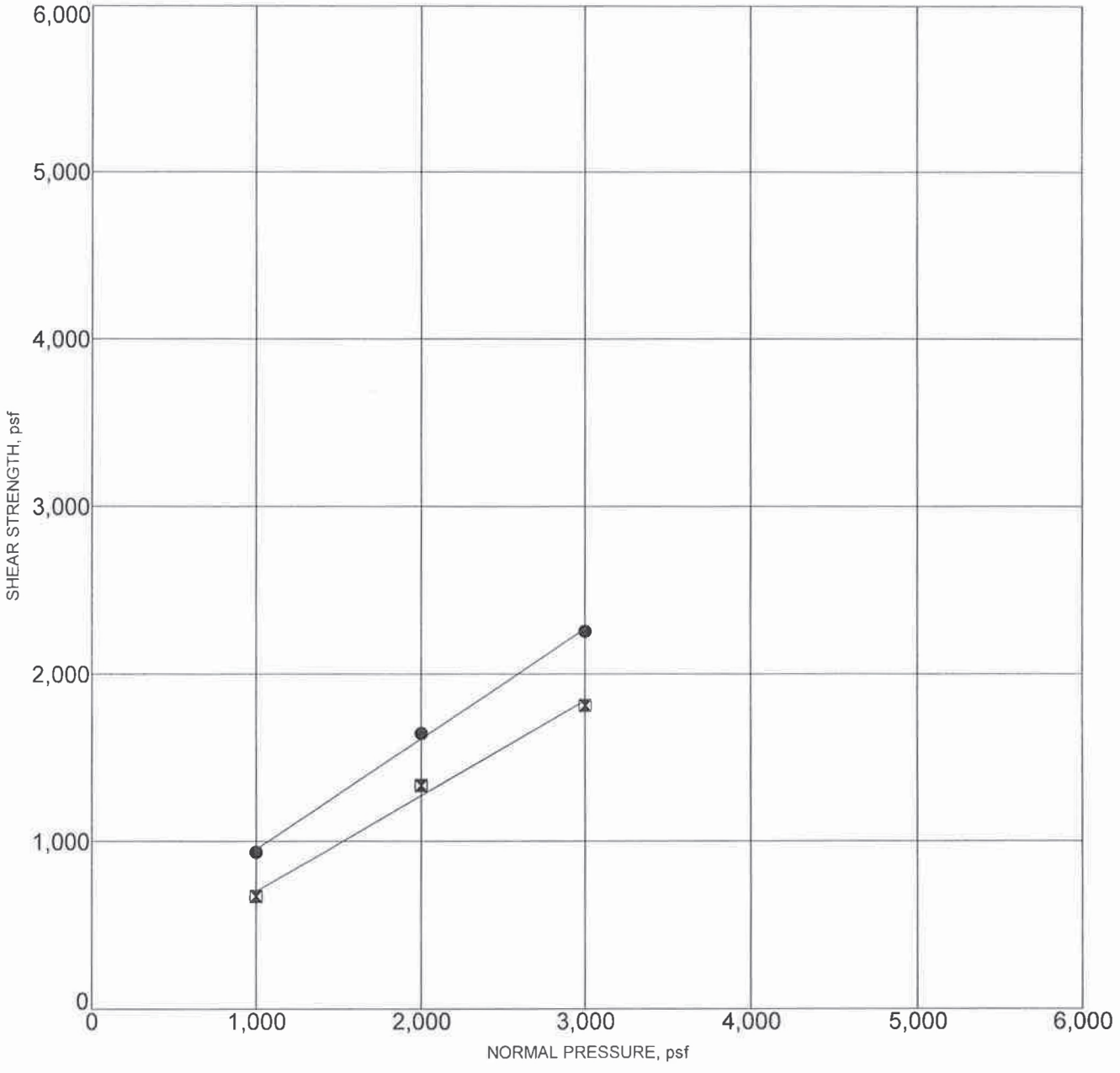
DIRECT SHEAR TEST RESULTS

FIGURE C-12



● **PEAK STRENGTH**
Friction Angle= 33 degrees
Cohesion= 292 psf

⊠ **ULTIMATE STRENGTH**
Friction Angle= 30 degrees
Cohesion= 132 psf

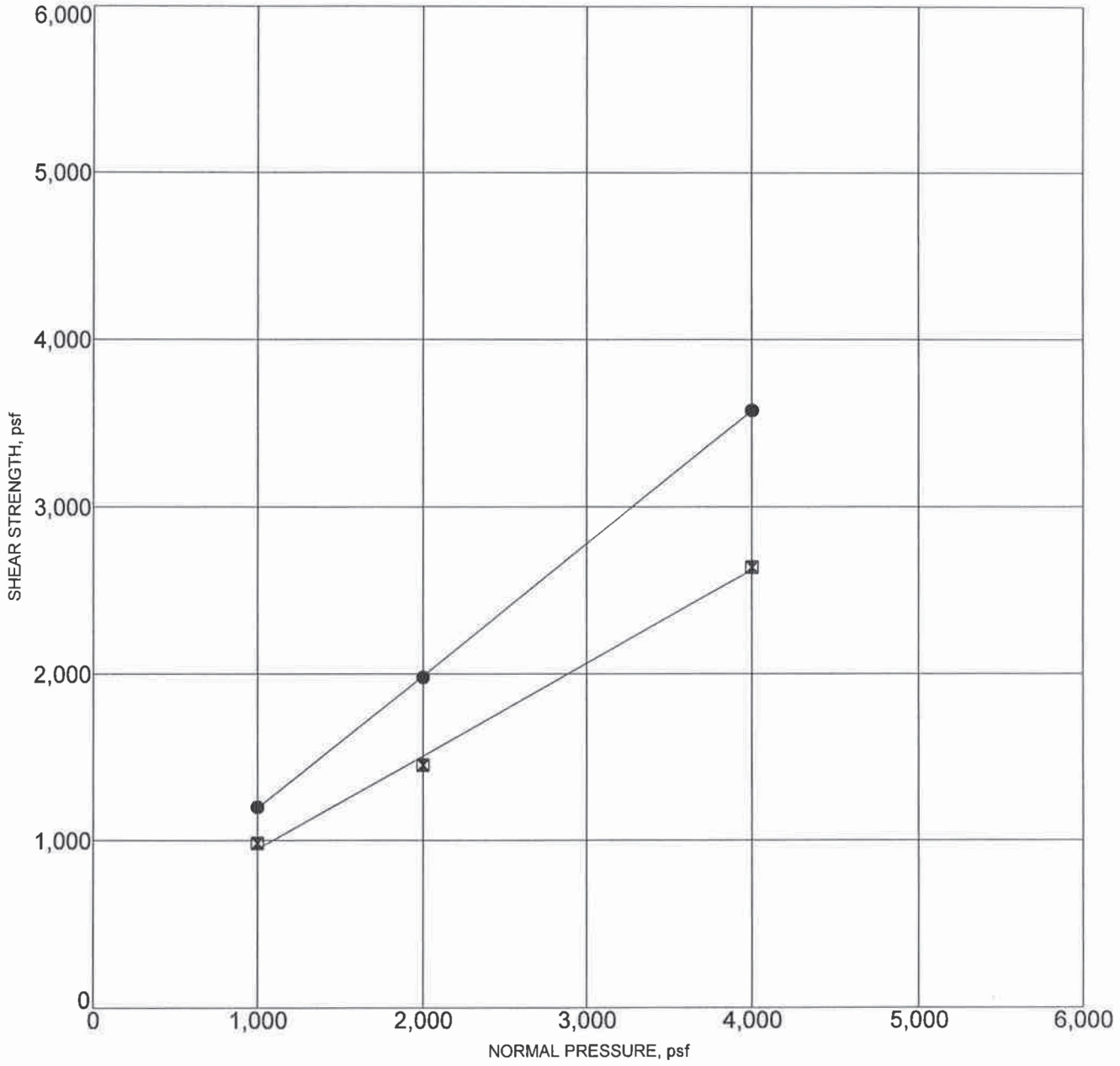
Sample Location		Classification	DD,pcf	MC,%
RW-1	23-24	SAND WITH SILT (SP-SM)	95	24.4

PROJECT: VENICE AUXILARY PUMP PLANT PROJECT NO.2500.06I

GPI

DIRECT SHEAR TEST RESULTS

FIGURE C-13



● **PEAK STRENGTH**
Friction Angle= 38 degrees
Cohesion= 402 psf

⊠ **ULTIMATE STRENGTH**
Friction Angle= 29 degrees
Cohesion= 390 psf

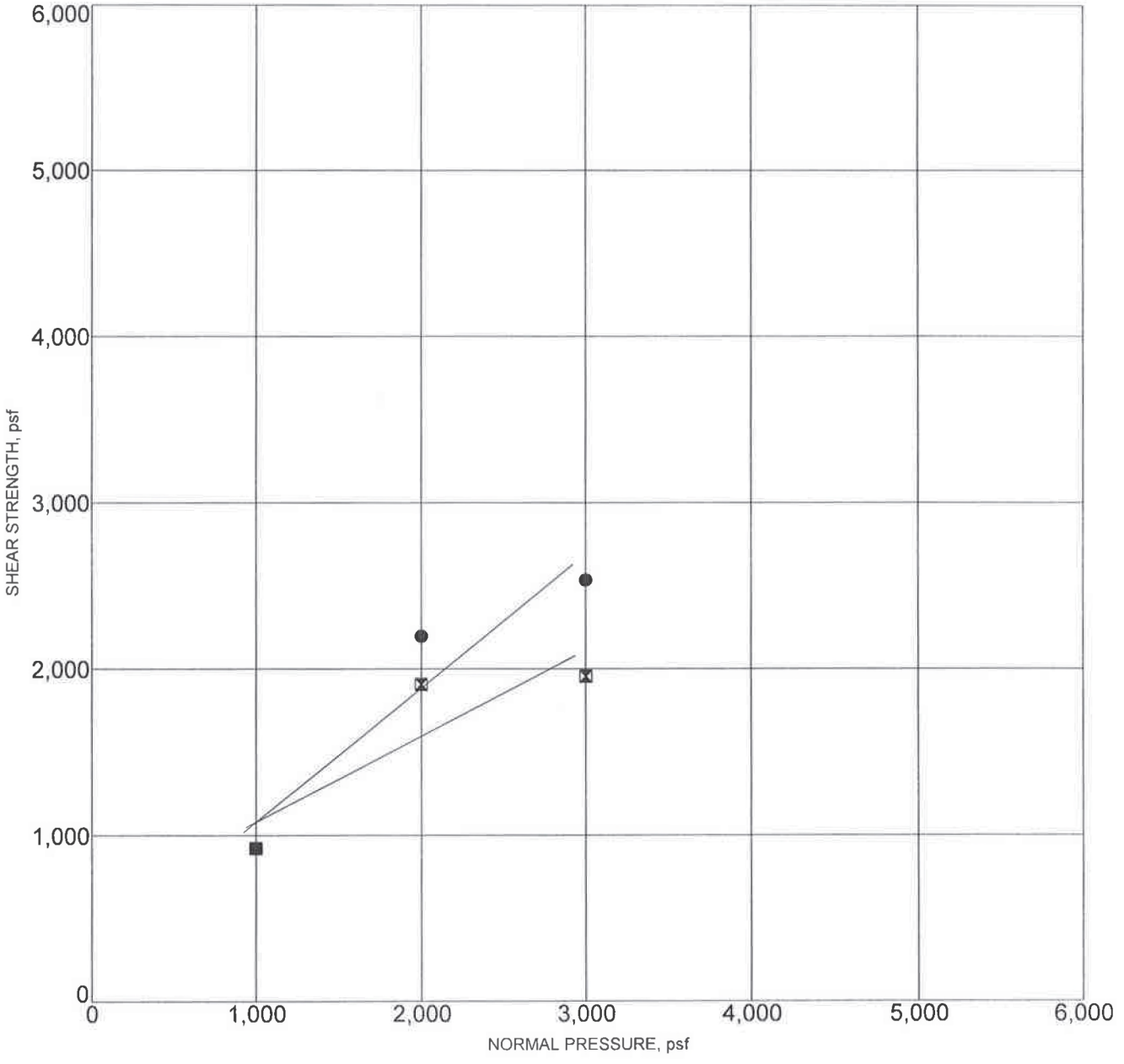
Sample Location		Classification	DD,pcf	MC,%
RW-1	40.0	SAND WITH SILT AND GRAVEL (SP-SM)	120	13.6

PROJECT: VENICE AUXILARY PUMP PLANT PROJECT NO.2500.06I

GPI

DIRECT SHEAR TEST RESULTS

FIGURE C-14



● **PEAK STRENGTH**
Friction Angle= 39 degrees
Cohesion= 276 psf

⊠ **ULTIMATE STRENGTH**
Friction Angle= 27 degrees
Cohesion= 564 psf

Note: Sample contains sea shells (may have impacted results)

Sample Location		Classification	DD,pcf	MC,%
RW-2	13-14	SILTY SAND (SM)	103	22.0

PROJECT: VENICE AUXILARY PUMP PLANT PROJECT NO.2500.06I

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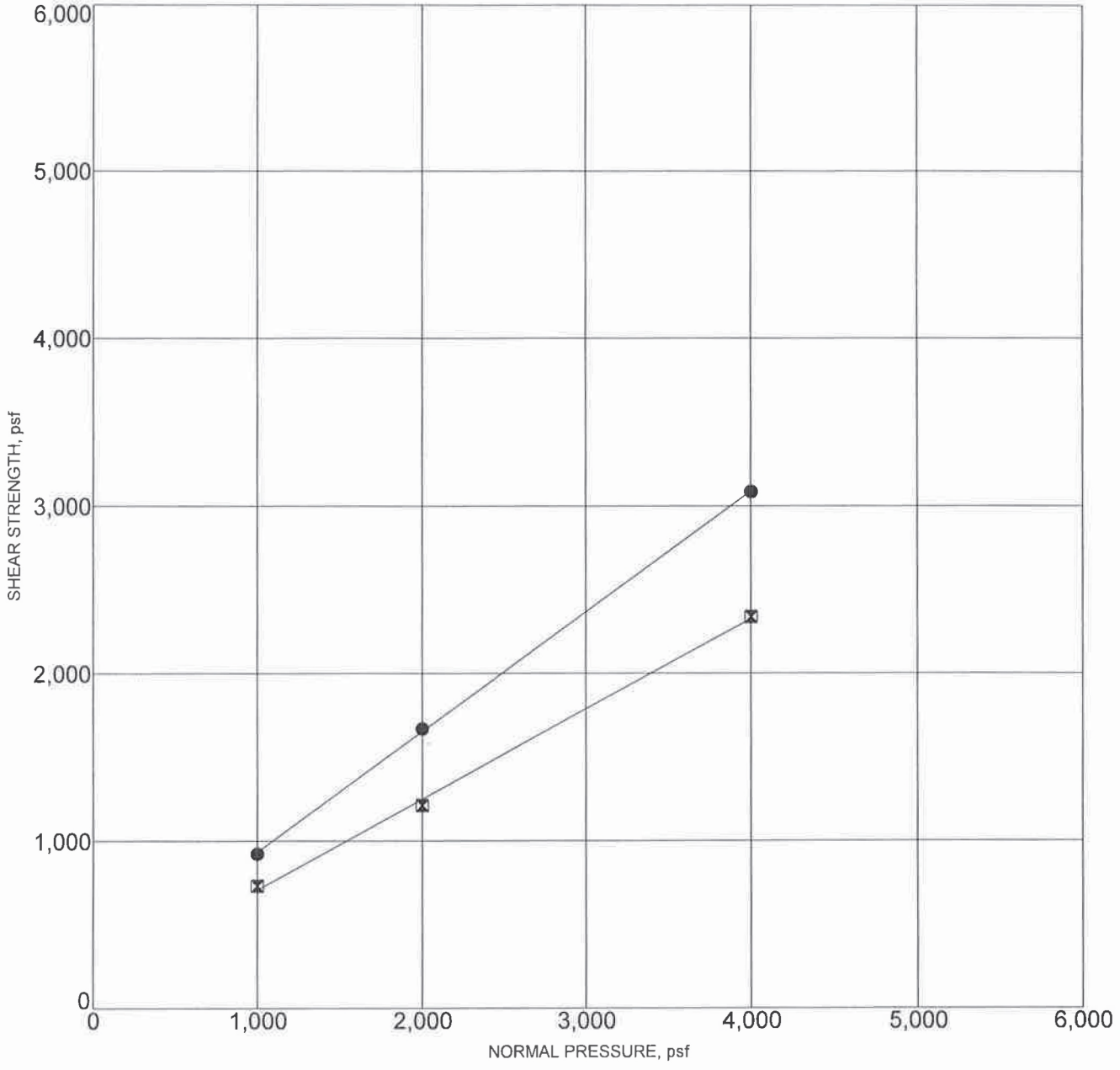
DIRECT SHEAR TEST RESULTS

FIGURE C-15



● **PEAK STRENGTH**
Friction Angle= 36 degrees
Cohesion= 216 psf

⊠ **ULTIMATE STRENGTH**
Friction Angle= 28 degrees
Cohesion= 168 psf

Sample Location		Classification	DD,pcf	MC,%
RW-2	23-24	SAND WITH SILT (SP-SM)	96	24.3

PROJECT: VENICE AUXILARY PUMP PLANT PROJECT NO.2500.06I

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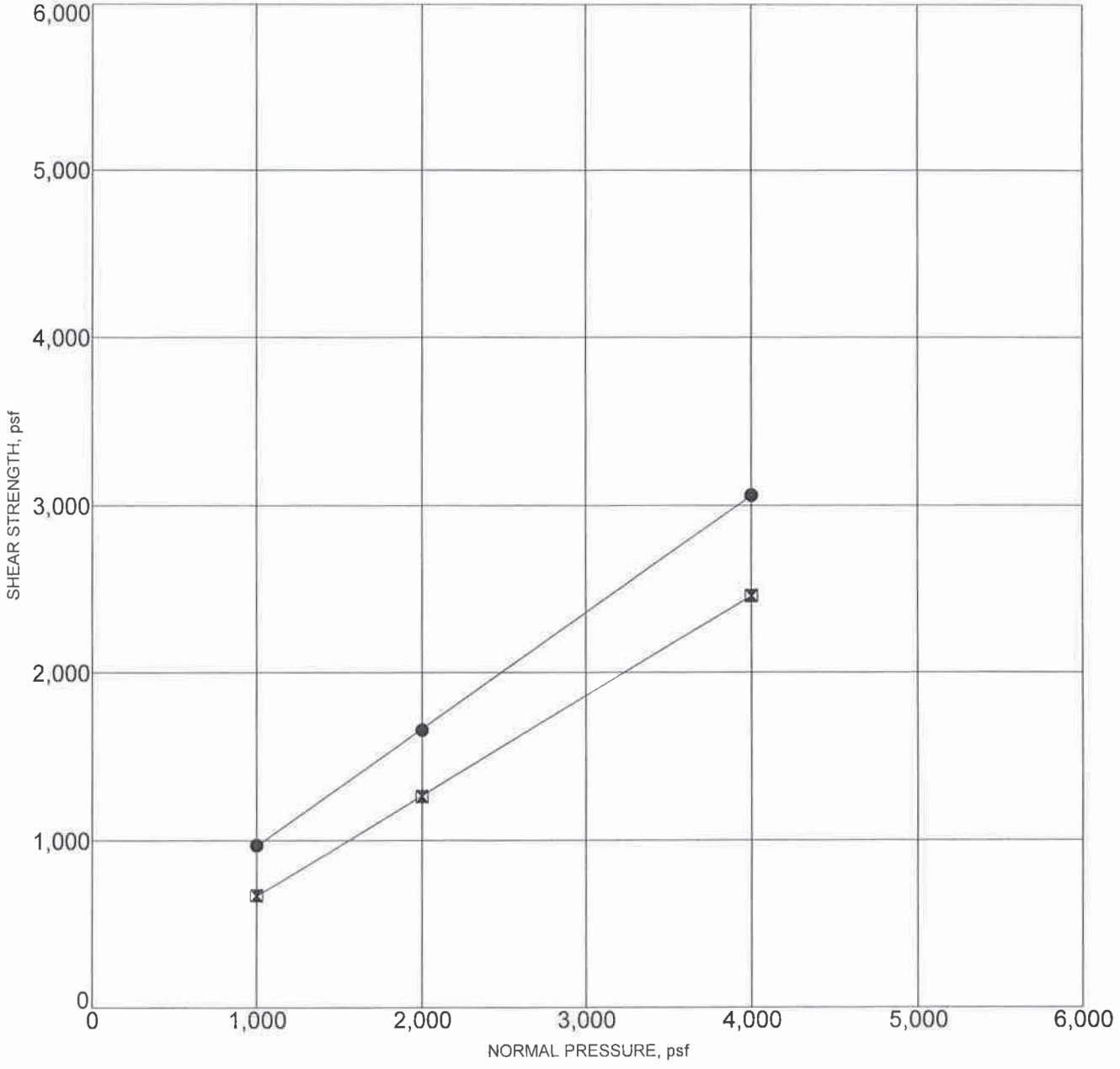
DIRECT SHEAR TEST RESULTS

FIGURE C-16



● **PEAK STRENGTH**
Friction Angle= 35 degrees
Cohesion= 270 psf

⊠ **ULTIMATE STRENGTH**
Friction Angle= 31 degrees
Cohesion= 72 psf

Sample Location		Classification	DD,pcf	MC,%
RW-2	53-54	SAND WITH SILT (SP-SM)	105	20.2

PROJECT: VENICE AUXILARY PUMP PLANT PROJECT NO.2500.06I

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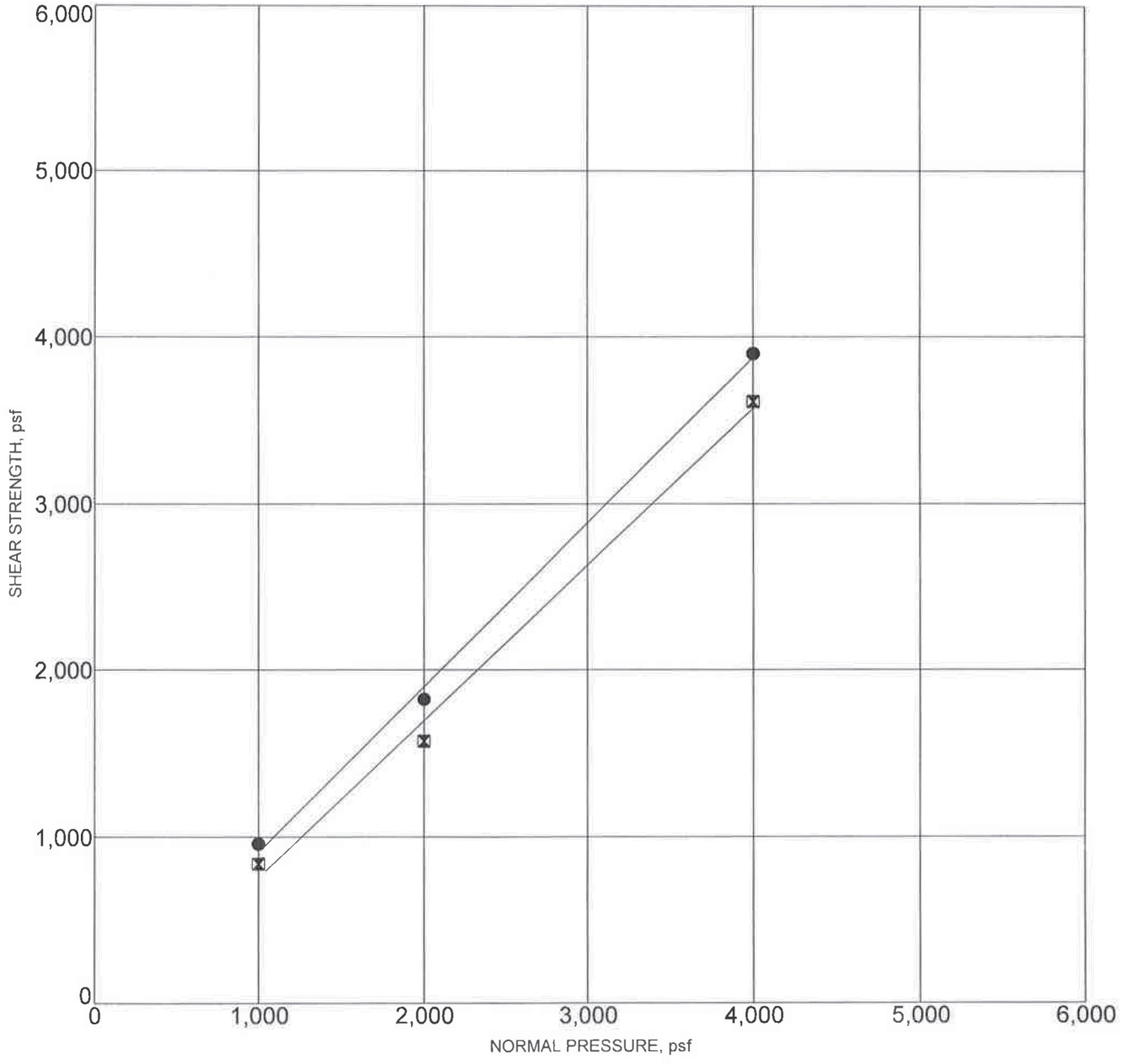
DIRECT SHEAR TEST RESULTS

FIGURE C-17



● **PEAK STRENGTH**
Friction Angle= 44 degrees
Cohesion= 0 psf

⊠ **ULTIMATE STRENGTH**
Friction Angle= 41 degrees
Cohesion= 0 psf

Sample Location		Classification	DD,pcf	MC,%
RW-3	8-9	SAND WITH SILT AND GRAVEL (SP-SM)	118	8.4

PROJECT: VENICE AUXILARY PUMP PLANT PROJECT NO.:2500.06I

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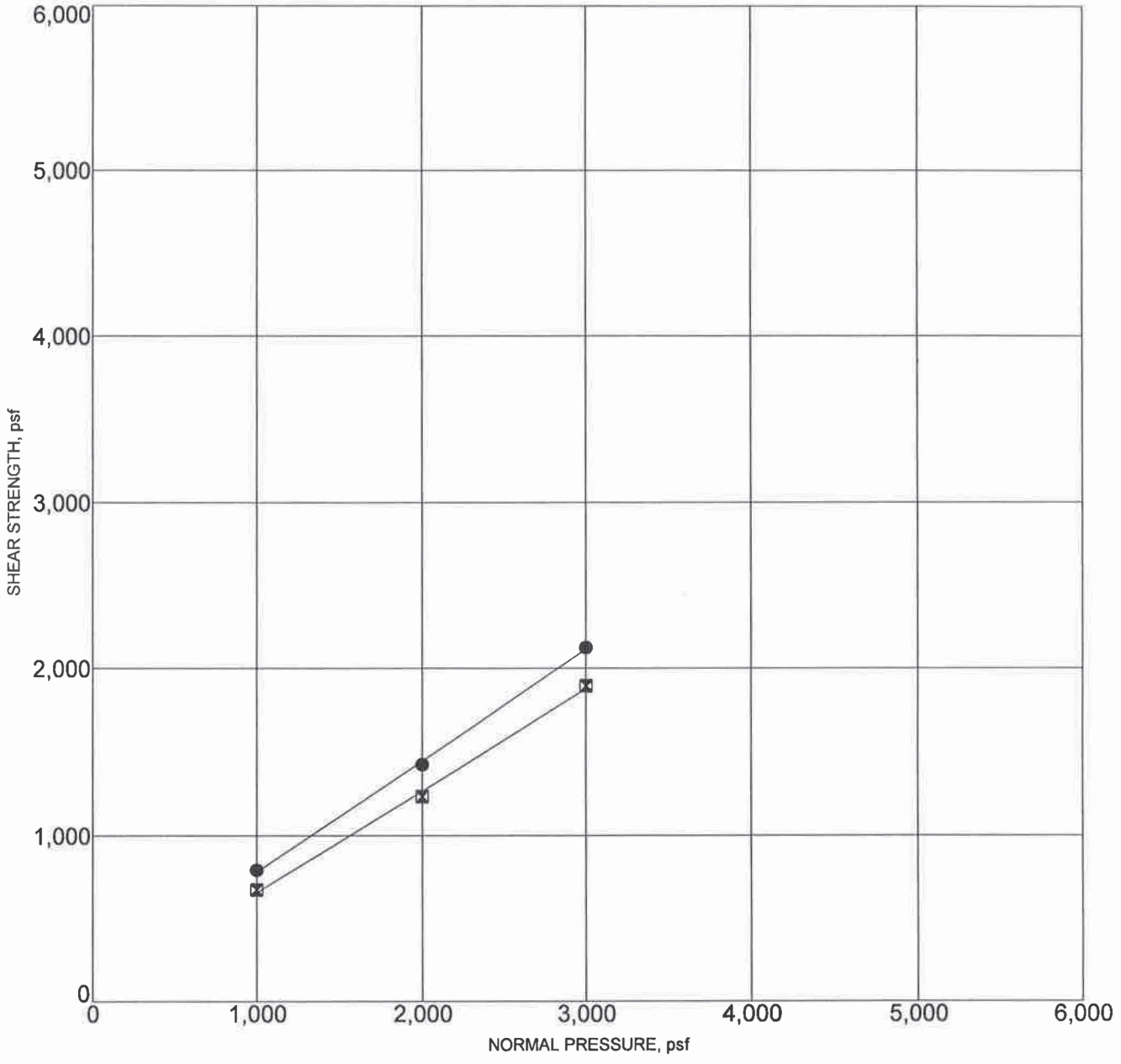
DIRECT SHEAR TEST RESULTS

FIGURE C-18



● **PEAK STRENGTH**
Friction Angle= 34 degrees
Cohesion= 116 psf

⊠ **ULTIMATE STRENGTH**
Friction Angle= 31 degrees
Cohesion= 44 psf

Note: Sample remolded to 95% of the maximum dry density

Sample Location		Classification	DD,pcf	MC,%
RW-1,2,3	0-4	SILTY SAND (SM)	114	10.0

PROJECT: VENICE AUXILARY PUMP PLANT PROJECT NO.2500.06I

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DIRECT SHEAR TEST RESULTS

FIGURE C-19

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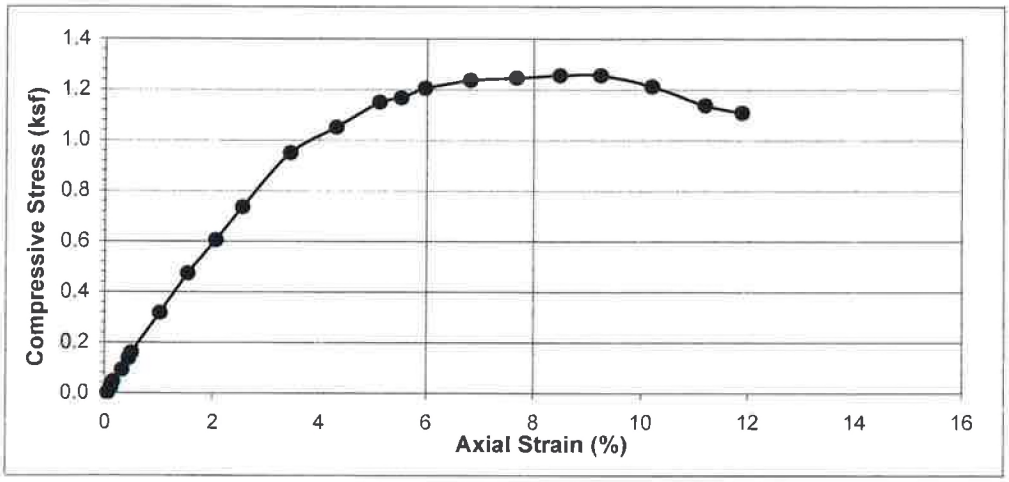
UNCONFINED COMPRESSION TEST RESULTS
ASTM D 2166

Project Name:	VAPP	Sample Type:	Shelby Tube
Project No.:	2500.06I	Soil Description	Clay
Boring No.:	RW-1	Dry Density (pcf):	78.5
Sample No.:	-	Moisture Content (%)	42.6
Depth (feet):	25-25.6	Test Date:	08/26/15
Sample Diameter (inch):	2.831	Wt. Wet Soil+Container(gms)	575.37
Sample Height (inch):	5.884	Wt. Dry Soil+Container(gms)	447.46
Sample Weight (gms):	1088.17	Wt. Container (gms)	147.13





Load (lbs)	Deformation (inch)	Area (sq.in)	Compressive Stress (ksf)	Axial Strain (%)
0	0.003	6.30	0.00	0.05
1	0.007	6.30	0.02	0.12
2	0.009	6.30	0.05	0.15
4	0.019	6.32	0.09	0.32
6	0.026	6.32	0.14	0.44
7	0.029	6.33	0.16	0.49
14	0.060	6.36	0.32	1.02
21	0.090	6.39	0.47	1.53
27	0.121	6.43	0.60	2.06
33	0.150	6.46	0.74	2.55
43	0.203	6.52	0.95	3.45
48	0.254	6.58	1.05	4.32
53	0.301	6.63	1.15	5.12
54	0.325	6.66	1.17	5.52
56	0.351	6.69	1.20	5.97
58	0.401	6.75	1.24	6.82
59	0.452	6.82	1.25	7.68
60	0.500	6.88	1.26	8.50
61	0.544	6.94	1.26	9.25
59	0.600	7.01	1.21	10.20
56	0.658	7.09	1.14	11.18
55	0.699	7.14	1.11	11.88

FIGURE C-20

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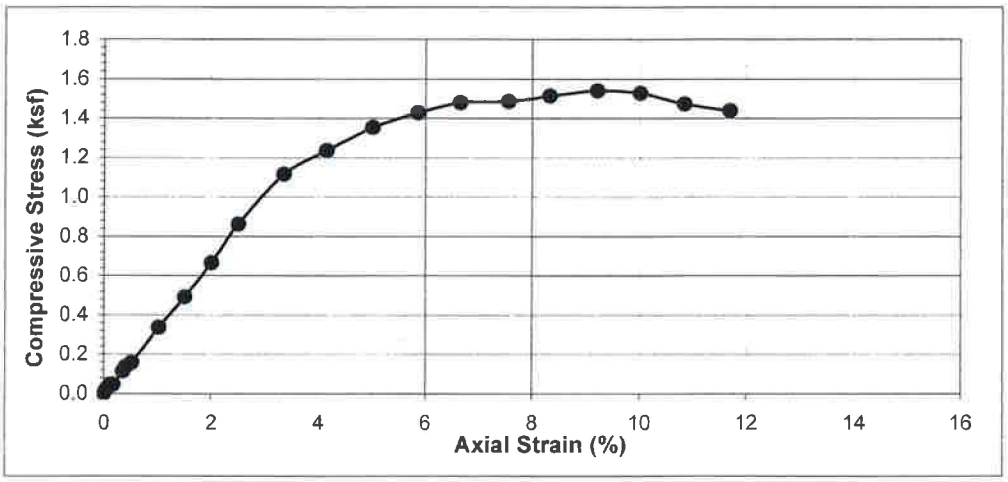
UNCONFINED COMPRESSION TEST RESULTS
ASTM D 2166

Project Name:	VAPP	Sample Type:	Shelby Tube
Project No.:	2500.06I	Soil Description	Clay
Boring No.:	RW-2	Dry Density (pcf):	79.9
Sample No.:	-	Moisture Content (%)	40.1
Depth (feet):	29-29.6	Test Date:	08/26/15
Sample Diameter (inch):	2.847	Wt. Wet Soil+Container(gms)	626.18
Sample Height (inch):	5.994	Wt. Dry Soil+Container(gms)	489.4
Sample Weight (gms):	1120.80	Wt. Container (gms)	148.08





Load (lbs)	Deformation (inch)	Area (sq.in)	Compressive Stress (ksf)	Axial Strain (%)
0	0.000	6.37	0.00	0.00
1	0.003	6.37	0.02	0.05
2	0.007	6.37	0.05	0.12
2	0.010	6.38	0.05	0.17
5	0.021	6.39	0.11	0.35
6	0.024	6.39	0.14	0.40
7	0.031	6.40	0.16	0.52
15	0.061	6.43	0.34	1.02
22	0.090	6.46	0.49	1.50
30	0.120	6.50	0.67	2.00
39	0.150	6.53	0.86	2.50
51	0.201	6.59	1.11	3.35
57	0.249	6.64	1.24	4.15
63	0.300	6.70	1.35	5.01
67	0.351	6.76	1.43	5.86
70	0.399	6.82	1.48	6.66
71	0.453	6.89	1.48	7.56
73	0.499	6.94	1.51	8.32
75	0.552	7.01	1.54	9.21
75	0.600	7.07	1.53	10.01
73	0.650	7.14	1.47	10.84
72	0.701	7.21	1.44	11.70

FIGURE C-21

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UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (UU,Q)
ASTM D 2850

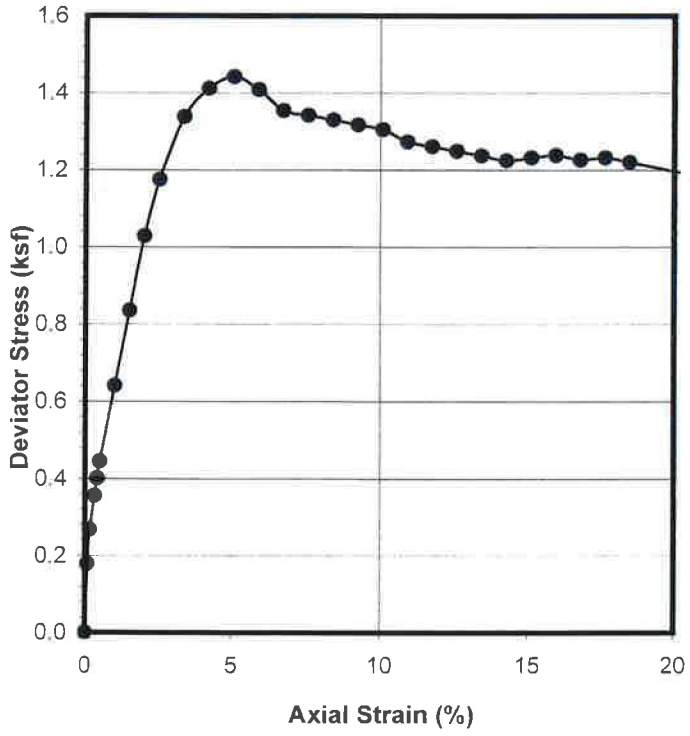
Client Name:	Geotechnical Professionals, Inc.		Tested By:	ST	Date: 08/25/15
Project Name:	VAPP		Checked by:	AP	Date: 08/26/15
Project No.:	2500.06I				
Boring No.:	RW-2				
Sample No.:	-	Depth (feet): 25-25.6			
Soil Description	Clay		Sample Type:	Shelby Tube	

Sample Diameter (inch):	2.866	Wet Unit Weight (pcf):	98.3
Sample Hieght (inch):	5.954	Dry Unit Weight (pcf):	55.8
Sample Weight (gms):	991.76	Moisture Content (%):	76.2
Wt. Wet Soil+Container(gms)	1135.32	Void Ratio for Gs=2.7:	2.02
Wt. Dry Soil+Container(gms)	708.23	% Saturation:	101.8
Wt. Container (gms)	147.65		

TEST DATA

Cell Pressure (ksf):	1.00
Back Pressure (ksf):	0.0
Eff. Confining Pressure (ksf):	1.00
Shear Rate (%/min):	0.3
Maximum Deviator Stress (ksf):	1.44
Ultimate Deviator Stress (ksf):	1.19
Ultimate Undrained Shear Strength (ksf):	0.60
Axial Strain @ Maximum Stress (%)	5.04





Load (lbs)	Def. (inch)	Area (sq.in)	Deviator Stress (ksf)	Axial Strain (%)
0	0.000	6.45	0.00	0.00
8	0.005	6.46	0.18	0.08
12	0.010	6.46	0.27	0.17
16	0.020	6.47	0.36	0.34
18	0.025	6.48	0.40	0.42
20	0.030	6.48	0.44	0.50
29	0.060	6.52	0.64	1.01
38	0.090	6.55	0.84	1.51
47	0.120	6.58	1.03	2.02
54	0.150	6.62	1.17	2.52
62	0.200	6.68	1.34	3.36
66	0.250	6.73	1.41	4.20
68	0.300	6.79	1.44	5.04
67	0.350	6.85	1.41	5.88
65	0.400	6.92	1.35	6.72
65	0.450	6.98	1.34	7.56
65	0.500	7.04	1.33	8.40
65	0.550	7.11	1.32	9.24
65	0.600	7.17	1.30	10.08
64	0.650	7.24	1.27	10.92
64	0.700	7.31	1.26	11.76
64	0.750	7.38	1.25	12.60
64	0.800	7.45	1.24	13.44
64	0.850	7.53	1.22	14.28
65	0.900	7.60	1.23	15.12
66	0.950	7.68	1.24	15.96
66	1.000	7.75	1.23	16.80
67	1.050	7.83	1.23	17.64
67	1.100	7.91	1.22	18.47
67	1.200	8.08	1.19	20.15

FIGURE C-22

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UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (UU,Q)
ASTM D 2850

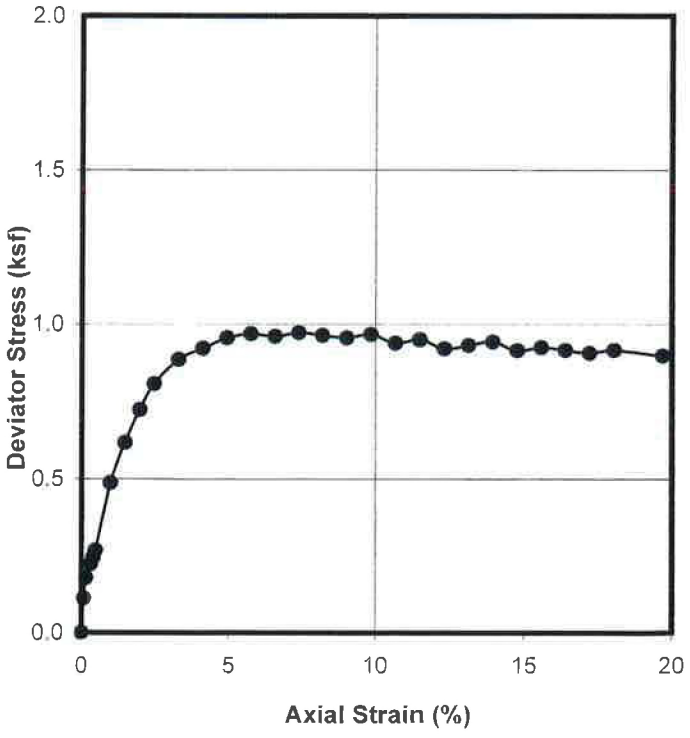
Client Name:	Geotechnical Professionals, Inc.		Tested By:	ST	Date: 08/25/15
Project Name:	VAPP		Checked by:	AP	Date: 08/26/15
Project No.:	2500.06				
Boring No.:	RW-3				
Sample No.:	-	Depth (feet): 23-23.6			
Soil Description	Clay		Sample Type:	Shelby Tube	

Sample Diameter (inch):	2.864	Wet Unit Weight (pcf):	110.0
Sample Hieght (inch):	6.095	Dry Unit Weight (pcf):	75.2
Sample Weight (gms):	1134.67	Moisture Content (%):	46.2
Wt. Wet Soil+Container(gms)	1280.03	Void Ratio for Gs=2.7:	1.24
Wt. Dry Soil+Container(gms)	922.39	% Saturation:	100.7
Wt. Container (gms)	148.60		

TEST DATA

Cell Pressure (ksf):	1.00
Back Pressure (ksf):	0.0
Eff. Confining Pressure (ksf):	1.00
Shear Rate (%/min):	0.3
Maximum Deviator Stress (ksf):	0.97
Ultimate Deviator Stress (ksf):	0.90
Ultimate Undrained Shear Strength (ksf):	0.45
Axial Strain @ Maximum Stress (%)	7.38





Load (lbs)	Def. (inch)	Area (sq.in)	Deviator Stress (ksf)	Axial Strain (%)
0	0.000	6.44	0.00	0.00
5	0.005	6.45	0.11	0.08
8	0.010	6.45	0.18	0.16
10	0.020	6.46	0.22	0.33
11	0.025	6.47	0.24	0.41
12	0.030	6.47	0.27	0.49
22	0.060	6.51	0.49	0.98
28	0.090	6.54	0.62	1.48
33	0.120	6.57	0.72	1.97
37	0.150	6.60	0.81	2.46
41	0.200	6.66	0.89	3.28
43	0.250	6.72	0.92	4.10
45	0.300	6.78	0.96	4.92
46	0.350	6.83	0.97	5.74
46	0.400	6.89	0.96	6.56
47	0.450	6.96	0.97	7.38
47	0.500	7.02	0.96	8.20
47	0.550	7.08	0.96	9.02
48	0.600	7.15	0.97	9.84
47	0.650	7.21	0.94	10.66
48	0.700	7.28	0.95	11.48
47	0.750	7.35	0.92	12.31
48	0.800	7.42	0.93	13.13
49	0.850	7.49	0.94	13.95
48	0.900	7.56	0.91	14.77
49	0.950	7.63	0.92	15.59
49	1.000	7.71	0.92	16.41
49	1.050	7.78	0.91	17.23
50	1.100	7.86	0.92	18.05
50	1.200	8.02	0.90	19.69

FIGURE C-23

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CORROSION TEST RESULTS

Client Name: Geotechnical Professionals, Inc.
Project Name: VAPP
Project No.: 2500.06I

AP Job No.: 15-0845
Date 08/26/15

Boring No.	Sample Type	Depth (feet)	Soil Type	Minimum Resistivity (ohm-cm)	pH	Sulfate Content (ppm)	Chloride Content (ppm)
Composite	Bag	0-4	SM	1067	7.7	919	667
RW-2	Bag	26-26.3	CH	93	7.4	1691	10192

NOTES: Resistivity Test and pH: California Test Method 643
Sulfate Content : California Test Method 417
Chloride Content : California Test Method 422
ND = Not Detectable
NA = Not Sufficient Sample
NR = Not Requested

FIGURE C-24

APPENDIX B

EXPLANATION OF BORING LOGS

VENICE DUAL FORCE MAIN
Los Angeles, California

MAJOR DIVISIONS		LTR	DESCRIPTION	MAJOR DIVISIONS		LTR	DESCRIPTION
COARSE GRAINED SOILS	GRAVEL	GW	Well-graded gravels or gravel-sand mixtures, little or no fines	FINE GRAINED SOILS	SILTS AND CLAYS LL<50	ML	Inorganic silts and very fine sand, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity
		GP	Poorly-graded gravels or gravel-sand mixture, little or no fines			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		GM	Silty gravels, gravel-sand-silt mixtures			OL	Organic silts and organic silt-clays of low plasticity
		GC	Clayey gravels, gravel-sand-clay mixtures		SILTS AND CLAYS LL>50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	SAND	SW	Well-graded sands or sand with gravel, little or no fines			CH	Inorganic clays of hogh plasticity, fat clays
		SP	Poorly-graded sands or sand with gravel, little or no fines			OH	Organic clays of medium to high plasticity
		SM	Silty sands, sand-silt mixtures				
		SC	Clayey sands, sand-clay mixtures	HIGHLY ORGANIC SOILS		PT	Peat and other highly organic soils

SAMPLE COLUMN SYMBOLS

- Standard penetration test (SPT) sample
- Shelby tube sample
- Modified California split spoon sample
- Bulk sample
- P — Piston sample
- Continuous soil or rock core
- NR — No recovery

BLOWS/FOOT - Summation of blow counts for deepest 12 inches is sampling interval
RQD% - Rock quality designation in percent

DESCRIPTION COLUMN SYMBOLS

- --- Dashed lines separating soil strata represent inferred boundaries between sampled intervals or no recovery intervals and may be distinct or gradual transitions
- —— Solid lines represent distinct or gradual boundaries observed within sampled intervals
- Description right of bracket symbol represents soil conditions within the depth interval defined by the bracket length
- Description right of arrow symbol represents soil conditions to the next deeper boundary line unless otherwise noted
- Water level at time of drilling
- Water level after at least 12 hours from time of drilling

LABORATORY TEST ABBREVIATIONS

ATT	Atterberg Limits	CORR	Corrosion	S	Grain Size Analysis
COLL	Collapse Potential	DS	Direct Shear	SE	Sand Equivalent
COMP	Compaction	EI	Expansion Index	SG	Specific Gravity
CON	Consolidation	OC	Organic Content	TX	Triaxial Test
R	R-Value	PERM	Permeability	UC	Unconfined Compression Test
H	Hydrometer Test			#200	No. 200 Wash Sieve Analysis

NOTES

1. Soil descriptions are in accordance with the USCS as set forth by ASTM D2488 "Standard Practice for Description and Identification Soil (Visual-Manual Procedure)."
2. Soil color described according to Munsell Soil Color Chart. Rock color described according to Munsell Rock-Color Chart
3. Soil descriptions in these borings are generalized representations and based upon visual classification of cuttings and/or samples during drilling. Descriptions and related information in these borings depict subsurface conditions at the specific location and at the time of drilling only. Soil conditions at other locations may differ from conditions observed at the boring locations. Also, soil and groundwater conditions may change with time at these locations.

P:\12075.000.0\12075.006.0\GINT\12075.006.0 LOGS.GPJ

PROJECT: VENICE DUAL FORCE MAIN
Los Angeles, California

Log of Boring No. G-1A

BORING LOCATION: Northing 1814021.085, Easting 6421835.287

DATE STARTED: 8/15/08 | DATE FINISHED: 8/15/08

DRILLING METHOD: Mud Rotary

HAMMER WEIGHT: 140 lbs | DROP: 30 in

SAMPLER: SPT, CA Modified, Shelby Tube

NOTES:
Drilling Contractor: SoCal Drilling Company
Drilling Equipment: Mayhew-1000
Logged By: T. Naing

ELEV. (feet)	DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ 6-inch	MATERIAL DESCRIPTION	PID Reading (ppm)	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
					Surface Elevation: 4.84' datum is ground surface				
	1	1		Bulk	SILTY SAND (SM): light brownish gray (10YR 6/2), dry, ~70% fine to coarse sand, ~20% fines, ~10% fine gravel				COMP
	2								
	3	2		4 5 5	POORLY GRADED SAND (SP): olive brown (2.5Y 4/2), moist, ~95% fine sand, ~5% fines	0			
	4								
	5			0	SANDY SILT (ML): dark gray (2.5Y 4/1), wet, ~55% low plasticity fines, ~45% fine sand				
	6	3		0 0	(pushed)	0			<#200= 56%
	7				SILTY SAND (SM): dark gray (2.5Y 4/1), ~70% fine sand, ~30% low plasticity fines, with seashells				
	8	4		3 5	large shell fragments	0	25.1	90.5	
	9		NR	7					
	10			4	POORLY GRADED SAND with SILT (SP-SM): dark gray (2.5Y 4/1), ~90% fine sand, ~10% low plasticity fines, with seashells				
	11	5		8 9		0			
	12			5			20.8	99.0	
	13	6		3 2		0			
	14				SILTY SAND (SM): dark gray (2.5Y 4/1), ~70% fine sand, ~30% low plasticity fines, with seashells				
	15								

GEO3 PID 6 INCH

PROJECT: VENICE DUAL FORCE MAIN
Los Angeles, California

Log of Boring No. G-1A (cont'd)

ELEV. (feet)	DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ 6-inch	MATERIAL DESCRIPTION	PID Reading (ppm)	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
	16	7		8 10 10	SILTY SAND (SM): continued	0.1			
	17								
	18								
	19								
	20	8		10 16 18		0	24.7	97.9	
	21								
	22								
	23								
	24				LEAN CLAY with SAND (CL): greenish black (5GY 2.5/1), moist, ~85% fines, ~15% fine sand, medium plasticity, soft				
	25								
	26	9		0 0 0	(pushed)	3.5			ATT S H <#200 =84% CORR
	27								
	28						30.8	88.1	COMPOSITE 25-40' CON TX CORR
	29	10							
	30			5	SILTY SAND (SM): dark gray (2.5Y 4/1), wet, ~55% fine to medium sand, ~45% low plasticity fines, abundant shell fragments fine sand				
	31	11		1 1	medium sand	0			S H <#200=
	32								

GEO3 PID 6 INCH

PROJECT: VENICE DUAL FORCE MAIN
Los Angeles, California

Log of Boring No. G-1A (cont'd)

ELEV. (feet)	DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ 6-inch	MATERIAL DESCRIPTION	PID Reading (ppm)	LABORATORY TESTS Moisture Content (%)	Dry Density (pcf)	Other Tests
									44%
	33	12		2 5 8	SILTY SAND (SM)/SANDY SILT (ML): very dark grayish brown (2.5Y 3/2), moist, ~50% fine to medium sand, ~50% nonplastic to low plasticity fines, trace coarse sand	0	14.9	121.0	ATT S H <#200= 50%
	34								
	35			7	SILTY SAND (SM): very dark greenish gray (GLEY 3/1), wet, ~85% fine to medium sand, ~15% low plasticity fines, trace fine subrounded gravel	0			CON S <#200= 16%
	36	13		7 9					
	37								
	38	14		12 25 25	POORLY GRADED SAND with SILT (SP-SM): very dark greenish gray (10Y 3/1), wet, ~80% fine to coarse sand, ~10% fine subangular to subrounded gravel, ~10% fines	0	8.5	121.9	DS
	39								
	40			20	fine to coarse gravel				
	41	15		26 24		0			<#200= 11%
	42								
	43				POORLY GRADED SAND with SILT and GRAVEL (SP-SM): very dark greenish gray (10Y 3/1), wet, ~65% fine to coarse sand, ~30% fine to coarse gravel, ~5% fines, hard drilling				
	44								
	45			39					
	46	16		48		0	12.1	126.2	
	47								
	48								
	49								

GEO3 PID 6 INCH

PROJECT: VENICE DUAL FORCE MAIN
Los Angeles, California

Log of Boring No. G-1A (cont'd)

ELEV. (feet)	DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ 6-inch	MATERIAL DESCRIPTION	PID Reading (ppm)	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
	50				POORLY GRADED SAND with SILT and GRAVEL (SP-SM): continued				
				16					
		17		18		0			S <#200= 6%
	51			22					
	52								
	53				POORLY GRADED SAND with SILT (SP-SM): very dark greenish gray (10Y 3/1), wet, ~80% fine to coarse sand, ~10% fine subrounded gravel, ~10% fines				
	54								
	55			24					
		18		60/6"		0	14.3	116.5	DS
	56								
	57								
	58								
	59								
	60			16	interbedded with fine sand and silt layers of ~1" thick				
		19		19		0			<#200= 11%
	61			23					
	62								
	63								
	64								
	65			29					
		20		50/5"		0	23.8	101.3	
	66								

GEO3 PID 6 INCH

PROJECT: VENICE DUAL FORCE MAIN
Los Angeles, California

Log of Boring No. G-1A (cont'd)

ELEV. (feet)	DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ 6-inch	MATERIAL DESCRIPTION	PID Reading (ppm)	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
	67				POORLY GRADED SAND with SILT (SP-SM): continued				
	68								
	69								
	70			24					
		21		30					
	71			36		5.2			
	72				Bottom of boring at 71.5 feet bgs. Sample at 10 feet was missed in this boring. Sample #5 (SPT: 10-11.5) was collected from stepout boring G-1B, drilled a few feet away for shallower monitoring well. Sample at 12.5 feet was collected using SPT in G-1A and CA Modified in G-1B. Boring converted into monitoring well. Boring is ~12' north of Hurricane Street and ~12' west of northeast fence.				
	73								
	74								
	75								
	76								
	77								
	78								
	79								
	80								
	81								
	82								
	83								

GEO3 PID 6 INCH

PROJECT: VENICE DUAL FORCE MAIN
Los Angeles, California

Log of Boring No. G-1B

BORING LOCATION: Northing 1814023.456; Easting 6421840.813

DATE STARTED: 8/18/08 | DATE FINISHED: 8/18/08

DRILLING METHOD: Mud Rotary

HAMMER WEIGHT: 140 lbs | DROP: 30 in

SAMPLER: SPT, CA Modified, Shelby Tube

NOTES:
Drilling Contractor: SoCal Drilling Company
Drilling Equipment: Mayhew-1000
Logged By: T. Naing

Surface Elevation: 4.94'

ELEV. (feet)	DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/6-inch	MATERIAL DESCRIPTION	PID Reading (ppm)	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
	1			Bulk	SILTY SAND (SM): light brownish gray (10YR 6/2), dry, ~70% fine to coarse sand, ~20% fines, ~10% fine gravel				
	2								
	3	2		4 5 5	POORLY GRADED SAND (SP): olive brown (2.5Y 4/2), moist, ~95% fine sand, ~5% fines	0			
	4								
	5			0	SANDY SILT (ML): dark gray (2.5Y 4/1), wet, ~55% low plasticity fines, ~45% fine sand				
	6	3		0 0	(pushed)	0			
	7				SILTY SAND (SM): dark gray (2.5Y 4/1), ~70% fine sand, ~30% low plasticity fines				
	8	4		3 5	large shell fragments	0			
	9		NR	7					
	10			4	POORLY GRADED SAND with SILT (SP-SM): dark gray (2.5Y 4/1), ~90% fine sand, ~10% low plasticity fines with seashells				
	11	5		8 9		0			
	12			10					
	13	6		11 11		0			
	14				SILTY SAND (SM): dark gray (2.5Y 4/1), ~70% fine sand, ~30% low plasticity fines with seashells				
	15								

GEO3 PID 6 INCH

PROJECT: VENICE DUAL FORCE MAIN
Los Angeles, California

Log of Boring No. G-1B (cont'd)

ELEV. (feet)	DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/6-inch	MATERIAL DESCRIPTION	PID Reading (ppm)	LABORATORY TESTS: Moisture Content (%)	LABORATORY TESTS: Dry Density (pcf)	LABORATORY TESTS: Other Tests
				8	SILTY SAND (SM): continued				
		7		10		0			
	16			10					
	17								
	18								
	19								
	20			10					
		8		16		0			
	21			18					
	22								
	23								
					LEAN CLAY with SAND (CL): greenish black (5GY 2.5/1), moist, ~85% fines, ~15% fine sand, medium plasticity, soft				
	24								
	25								
					Bottom of boring at 25.5 feet bgs. Boring converted into monitoring well. Boring is ~13' north of Hurricane Street and ~10' west of the northeast fence.				
	26								
	27								
	28								
	29								
	30								
	31								
	32								

GEO3 PID 6 INCH

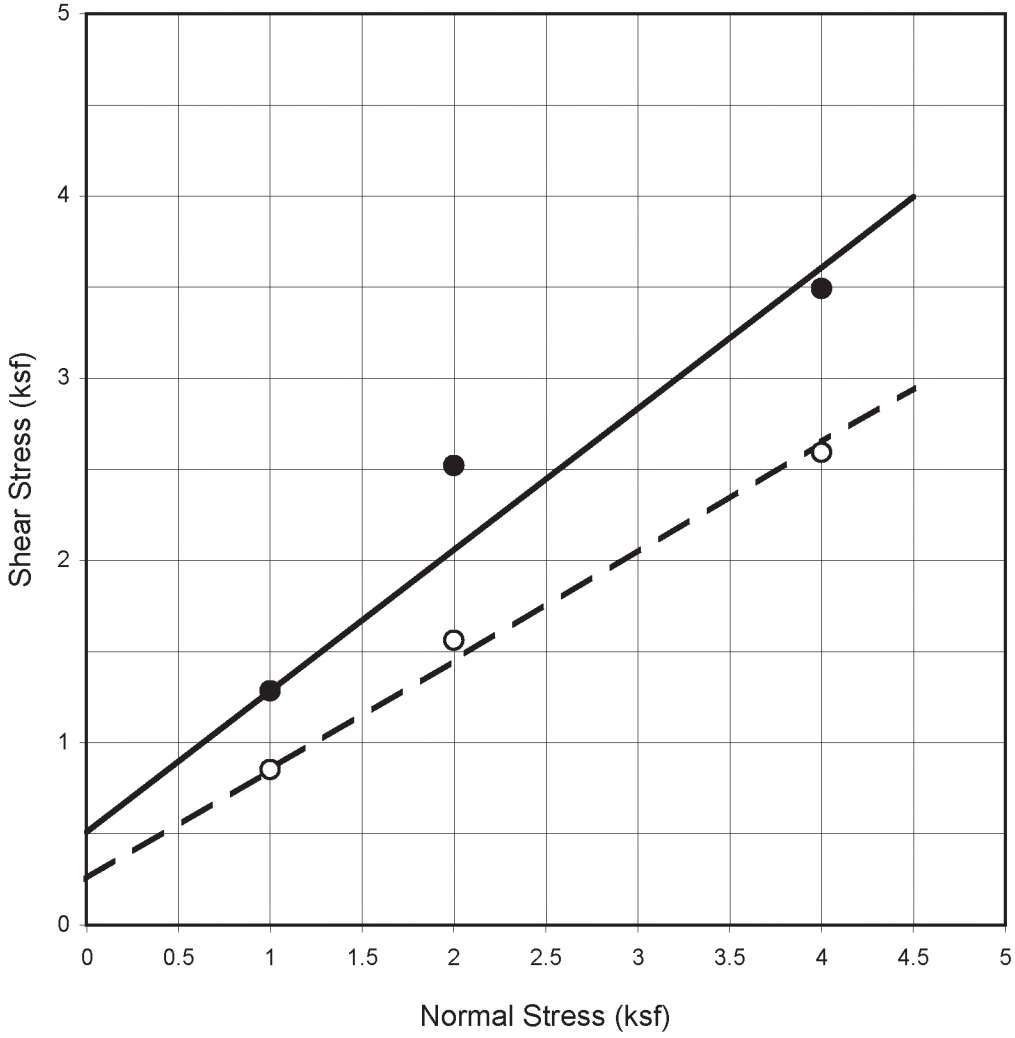
AP Engineering & Testing, Inc.

PERCENT PASSING NO. 200 SIEVE

Client: AMEC Geomatrix
Project Name: Venice Dual Force Main
Project Number: 14403.000

AP Lab No.: 28-0929
Date: 09/22/08

Boring No.	Sample No.	Sample Depth (ft)	Percent Fine (%)
G-1	3	6-6.5	56.4
G-1	15	40-41.5	11.0
G-1	19	60-61.5	10.8
G-7	14	45-46.5	14.2
G-8	9	25-26.5	39.2
G-8	13	40-41.5	4.7
G-8	15	45-46	18.1
G-8	18	55-56.5	22.7
G-9	6	15-16.5	3.3
G-9	11	37-37.5	6.6
G-9	14	45-46.5	10.3
G-9	15	47.5-48	3.8
G-9	16	50-51.5	7.0
G-10	11	35-36.5	4.7
G-10	13	40-41.5	2.6
G-10	15	45-46.5	2.8
G-10	19	60-61.5	31.6
G-10	21	70-71	48.6
G-11	2	5-6.5	6.7
G-11	8	25-26.5	10.0
G-11	10	32.5-34	11.1
G-11	17	50	6.8
G-12	8	21-21.5	8.6
G-12	10	30-33	9.6
G-12	12	31.9	9.5
G-12	20	55-56.5	10.3



Project Name:	:	Venice Dual Force Main
Project No.	:	14403.000
Boring No.	:	G-1
Sample No.	:	14
Depth (ft)	:	38.5-38.9
Sample Type	:	Mod. Cal.
Soil Type	:	Poorly Graded Sand with silt
Test Condition	:	Saturated Drained
Initial Dry Density	:	121.9 pcf
Moisture Content (before)	:	8.5 %
Moisture Content (after)	:	15.3 %

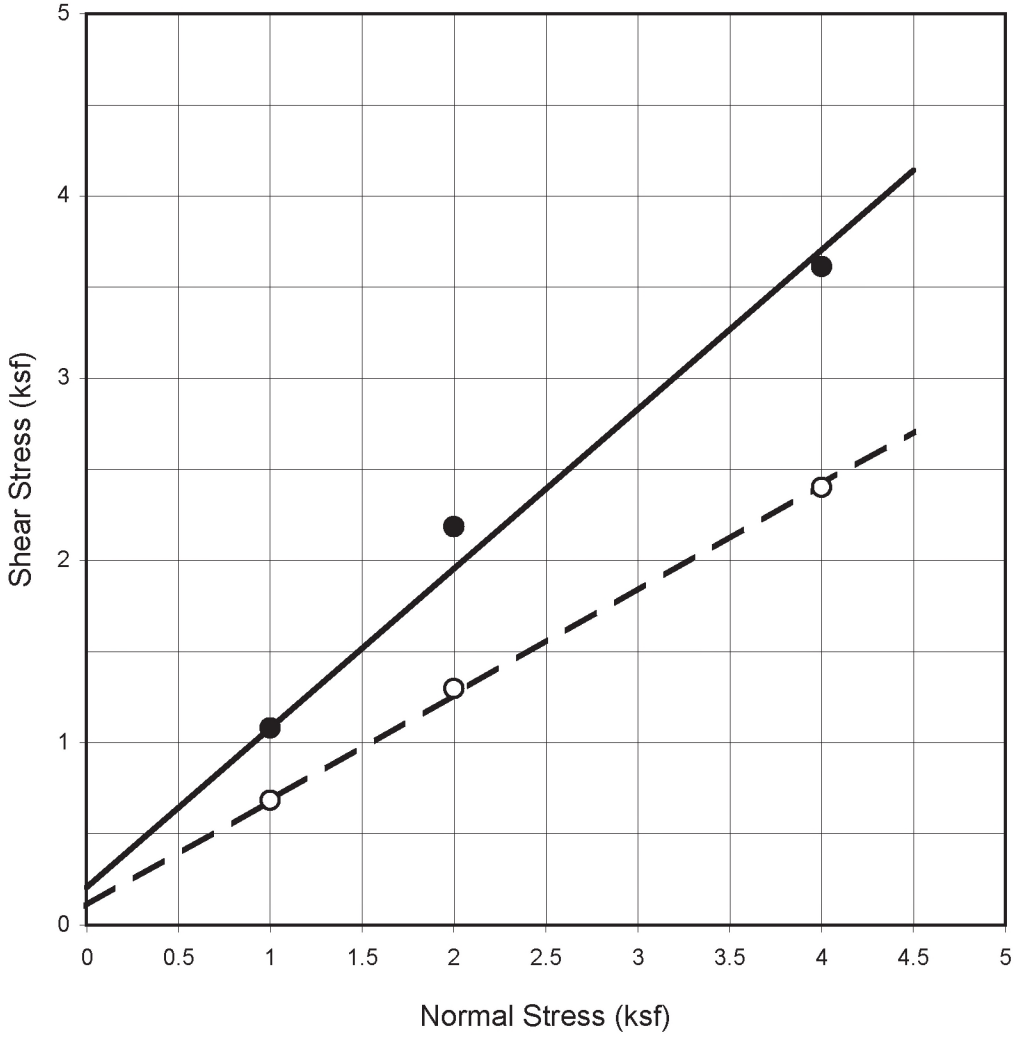
	Peak	Ultimate
Cohesion (psf) :	500	250
Friction Angle :	38 °	31 °

Normal Stress (ksf)	Shear Stress Peak (ksf)	Shear Stress Ultimate (ksf)
1	1.284	0.852
2	2.520	1.562
4	3.492	2.592

AP Engineering & Testing, Inc.

DIRECT SHEAR
TEST RESULTS
(ASTM D 3080)

Mar-09 Figure No.



Project Name:	:	Venice Dual Force Main
Project No.	:	14403.000
Boring No.	:	G-1
Sample No.	:	18
Depth (ft)	:	55-56
Sample Type	:	Mod. Cal.
Soil Type	:	Poorly Graded Sand with silt
Test Condition	:	Saturated Drained
Initial Dry Density	:	116.5 pcf
Moisture Content (before)	:	14.3 %
Moisture Content (after)	:	16.5 %

	Peak	Ultimate
Cohesion (psf) :	200	100
Friction Angle :	41 °	30 °

Normal Stress (ksf)	Shear Stress Peak (ksf)	Shear Stress Ultimate (ksf)
1	1.080	0.684
2	2.184	1.296
4	3.612	2.400

AP Engineering & Testing, Inc.

DIRECT SHEAR
TEST RESULTS
(ASTM D 3080)

Mar-09 Figure No.

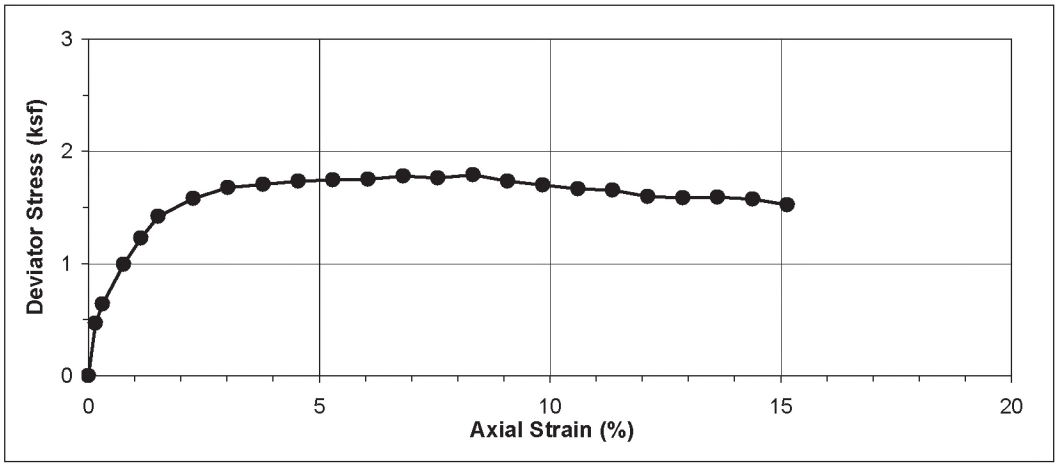
AP Engineering & Testing, Inc.

GEOTECHNICAL TESTING LABORATORY

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Project Name:	Venice Dual Force Main	Sample Type:	Shelby Tube
Work Order:	14403.000	Soil Description	Gray Silty Clay
Boring No.:	G-1	Dry Density (pcf):	77.0
Sample No.:	10	Moisture Content (%)	43.4
Depth (feet):	27.5-29.5	Test Date:	9/18/2008

Sample Diameter (inch):	2.875	Wt. Wet Soil+Container(gms)	733.54
Sample Hieght (inch):	6.60	Wt. Dry Soil+Container(gms)	570.46
Sample Weight (gms):	1242.28	Wt. Container (gms)	194.91



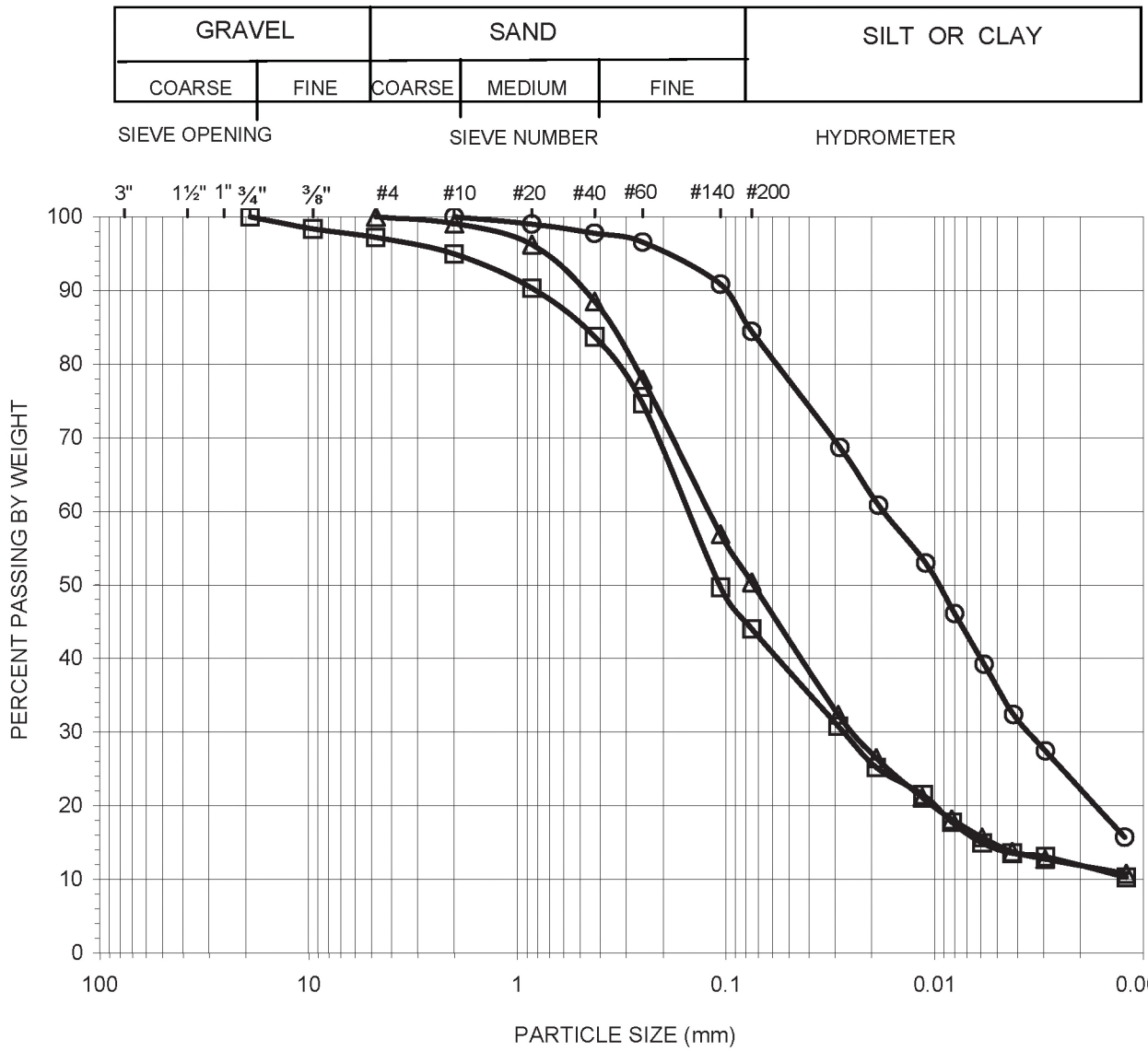
Confining Pressure : 1.20 ksf

Load (lbs)	Deformation (inch)	Area (sq.in)	Deviator Stress (ksf)	Axial Strain (%)
0	0.00	6.49	0.00	0.00
21	0.01	6.50	0.47	0.15
29	0.02	6.51	0.64	0.30
45	0.05	6.54	0.99	0.76
56	0.075	6.57	1.23	1.14
65	0.10	6.59	1.42	1.52
73	0.15	6.64	1.58	2.27
78	0.20	6.69	1.68	3.03
80	0.25	6.75	1.71	3.79
82	0.30	6.80	1.74	4.55
83	0.35	6.86	1.74	5.30
84	0.40	6.91	1.75	6.06
86	0.45	6.97	1.78	6.82
86	0.50	7.02	1.76	7.58
88	0.55	7.08	1.79	8.33
86	0.60	7.14	1.73	9.09
85	0.65	7.20	1.70	9.85
84	0.70	7.26	1.67	10.61
84	0.75	7.32	1.65	11.36
82	0.80	7.39	1.60	12.12
82	0.85	7.45	1.58	12.88
83	0.90	7.52	1.59	13.64
83	0.95	7.58	1.58	14.39
81	1.00	7.65	1.52	15.15

AP Engineering & Testing, Inc.

GRAIN SIZE DISTRIBUTION CURVE
ASTM D 422

Project Name: Venice Dual Force Main Tested by: DK Date: 09/17/08
Project Number: 14403.000 Checked by: AP Date: 10/08/08

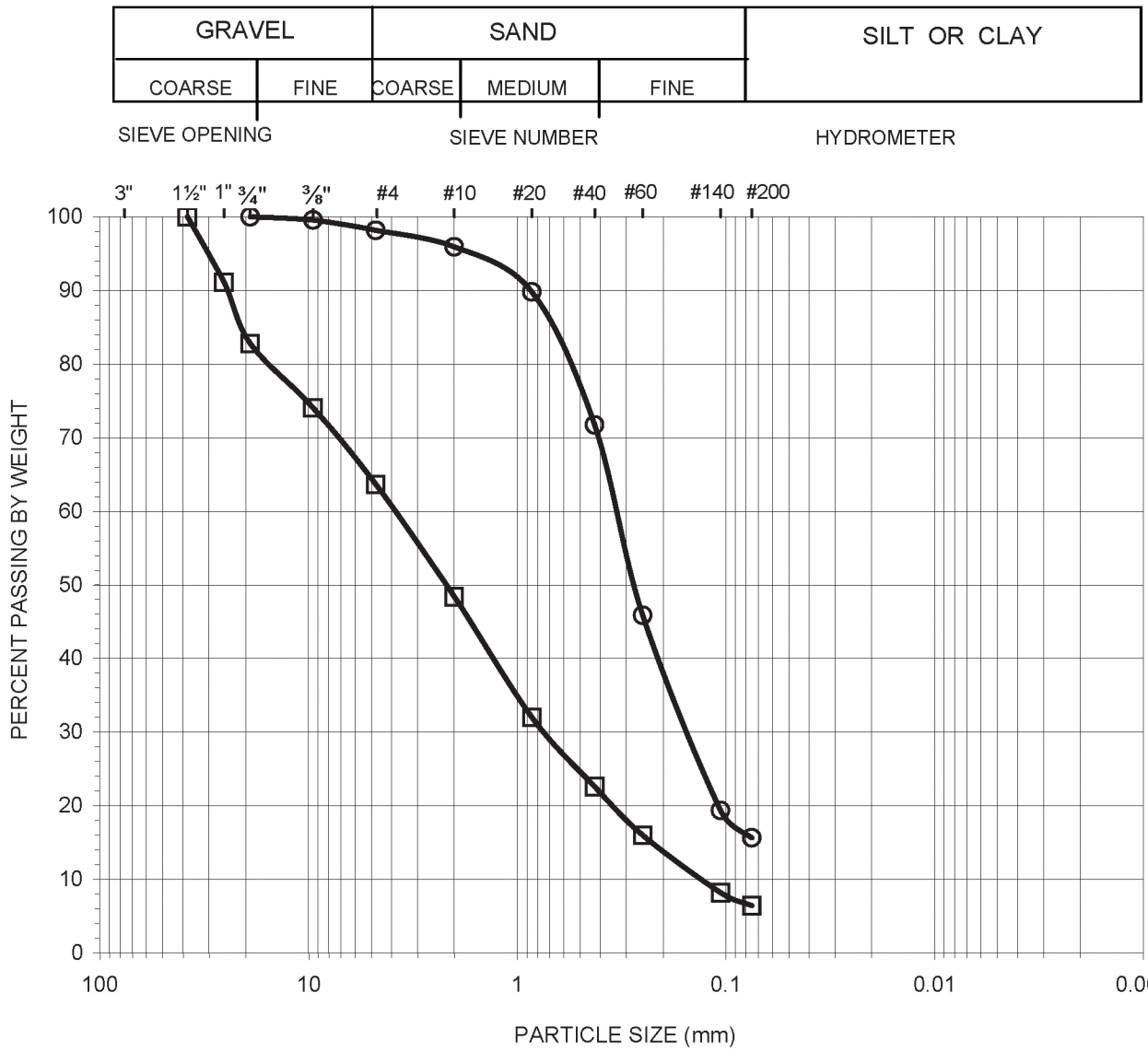


Symbol	Boring No.	Sample No.	Depth (feet)	Percent			Atterberg Limits LL:PL:PI	Soil Type U.S.C.S
				Gravel	Sand	Fines		
○	G-1	9	25-26.5	0.00	15.57	84.43	N/A	CL
□	G-1	11	30-31.5	2.79	53.21	44.00	N/A	SM
△	G-1	12	33.5-33.9	0.00	49.65	50.35	N/A	ML

AP Engineering & Testing, Inc.

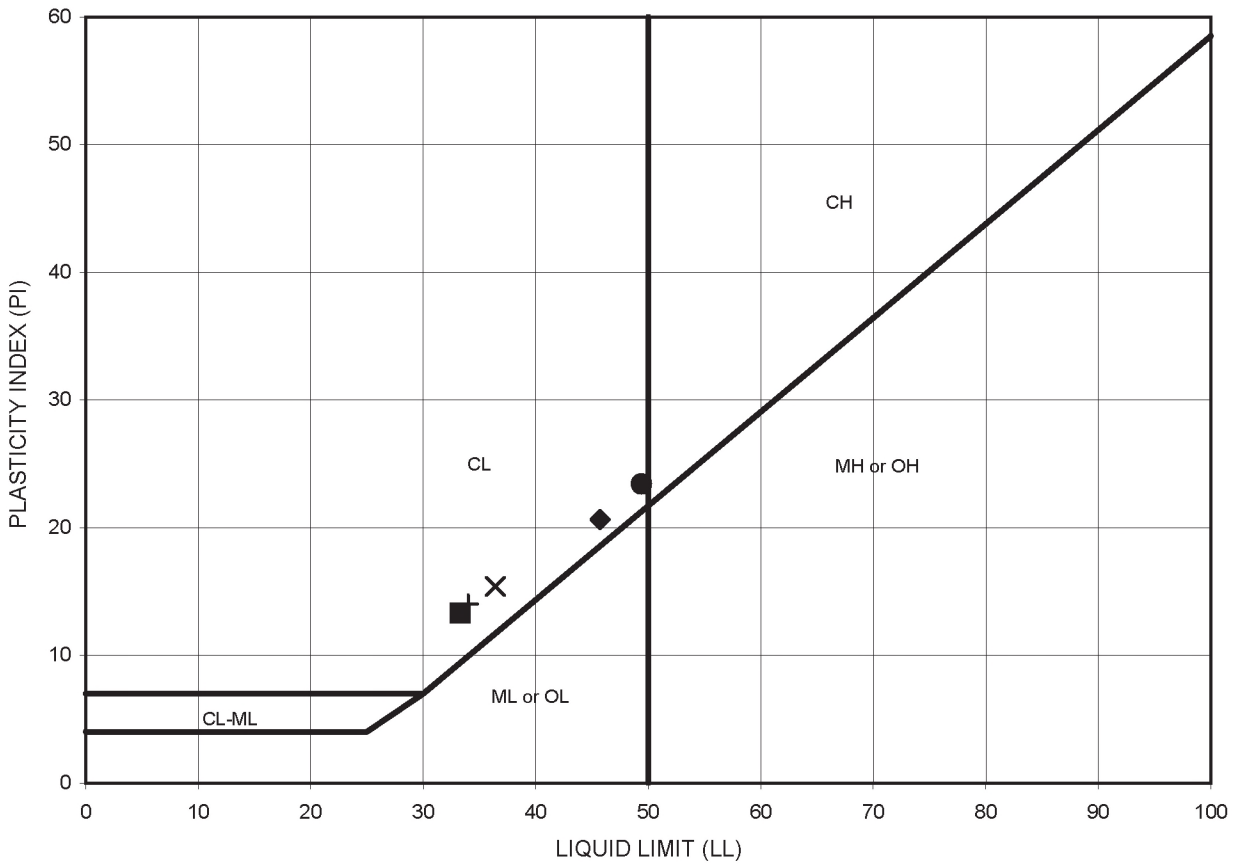
GRAIN SIZE DISTRIBUTION CURVE
ASTM D 422

Project Name: Venice Dual Force Main Tested by: DK Date: 09/17/08
Project Number: 14403.000 Checked by: AP Date: 10/08/08



Symbol	Boring No.	Sample No.	Depth (feet)	Percent			Atterberg Limits LL:PL:PI	Soil Type U.S.C.S
				Gravel	Sand	Fines		
○	G-1	13	35-36.5	1.84	82.54	15.62	N/A	SM
□	G-1	17	50-51.5	36.35	57.24	6.41	N/A	SW-SM

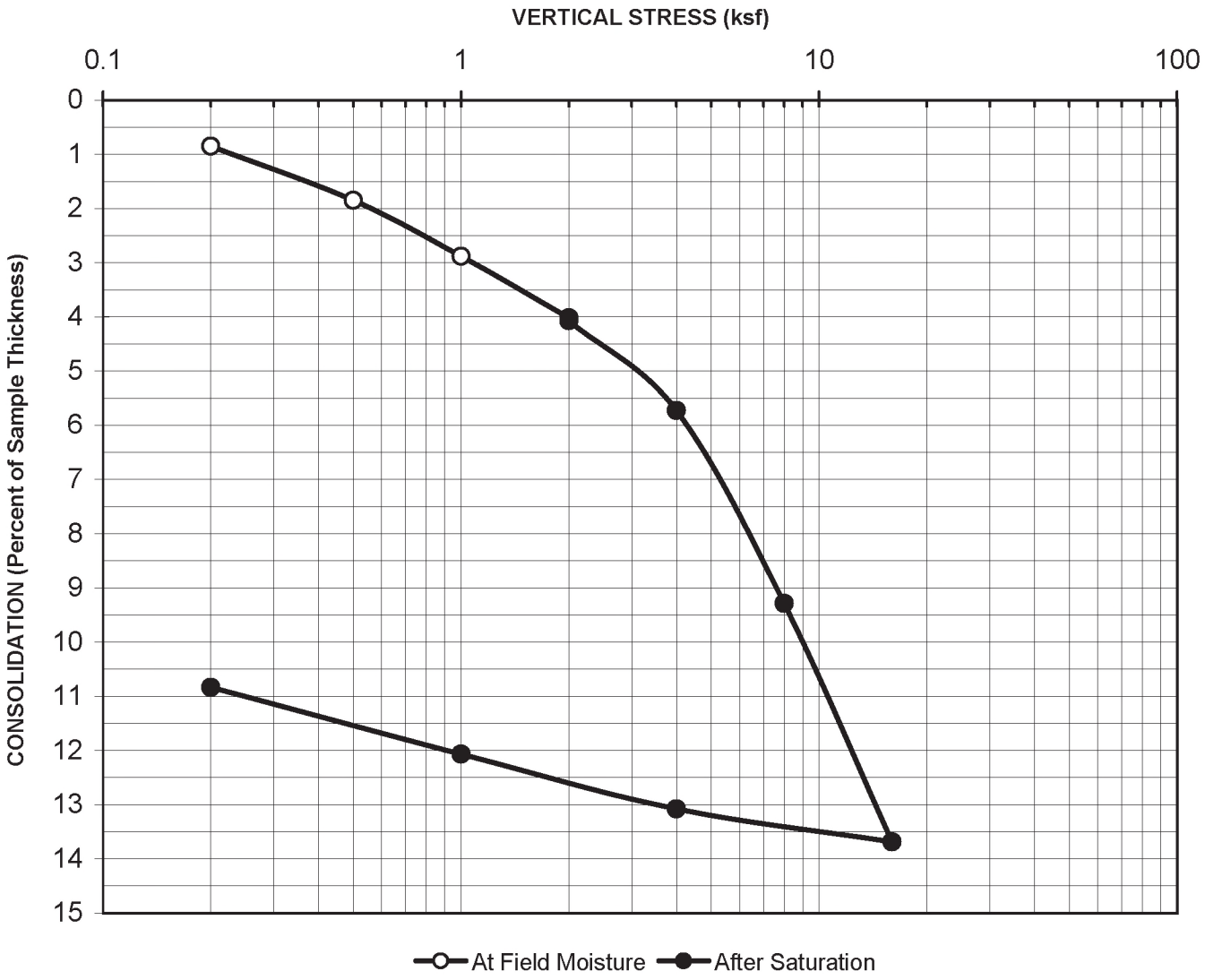
AP Engineering & Testing, Inc.



Symbol	Boring Number	Sample Number	Depth (feet)	LL	PL	PI	U.S.C.S Symbol
♦	G-1	9	25-26.5	46	25	21	CL
	G-1	12	33.5-33.9	NP	NP	NP	ML
■	G-7	7	20-21.5	33	20	13	CL
●	G-7	18	60-61.5	49	26	23	CL
X	G-8	19	60-61.5	36	21	15	CL
+	G-9	18	60-61.5	34	20	14	CL

ATTERBERG LIMITS
ASTM D 4318-93

Project Name: Venice Dual Force Main
Project No.: 14403.000
Date: 09/17/08
AP No: 28-0929 **Figure No.:**



Boring No. :	G-1	Initial Dry Unit Weight (pcf):	88.1
Sample No.:	10	Initial Moisture Content (%):	30.8
Depth (feet):	27.5-29.5	Final Moisture Content (%):	28.4
Sample Type:	Mod. Cal	Assumed Specific Gravity:	2.7
Soil Description:	Gray Silty Clay	Initial Void Ratio:	0.91

AP Engineering & Testing, Inc.

PROJECT NAME: Venice Dual Force Main

PROJECT NO.: 14403.000

AP LAB NO.: 28-0929

CONSOLIDATION TEST RESULTS
ASTM D 2435

Sep-08

AP Engineering & Testing, Inc.

COMPACTION TEST

Client: AMEC Geomatrix
Project Name: Venice Dual Force Main
Project No. : 14403.000
Location: G-1
Sample No. : 1
Visual Sample Description: Brown Silty Sand w/gravel

AP Number: 28-0929
Tested By: JT Date: 09/26/08
Calculated By: KM Date: 10/09/08
Checked By: AP Date: 10/09/08
Depth (ft): 0-2

Compaction Method: [X] ASTM D1557 [ ] ASTM D698
Preparation Method: [ ] Moist [X] Dry

METHOD: C
MOLD VOLUME (CU.FT): 0.0752

Trial No.	1	2	3	4	5	6
Wt. Comp. Soil + Mold (gm.)	7230	7042	7245	7322		
Wt. of Mold (gm.)	2647	2647	2647	2647		
Net Wt. of Soil (gm.)	4583	4395	4598	4675		
Container No.						
Wt. of Container (gm.)	154.50	196.30	193.50	154.10		
Wet Wt. of Soil + Cont. (gm.)	939.90	912.70	1229.20	1135.10		
Dry Wt. of Soil + Cont. (gm.)	854.75	871.68	1151.31	1043.93		
Moisture Content (%)	12.16	6.07	8.13	10.25		
Wet Density (pcf)	134.37	128.85	134.80	137.05		
Dry Density (pcf)	119.80	121.47	124.66	124.32		

Maximum Dry Density (pcf): **126.0**
Optimum Moisture Content (%): **9.0**

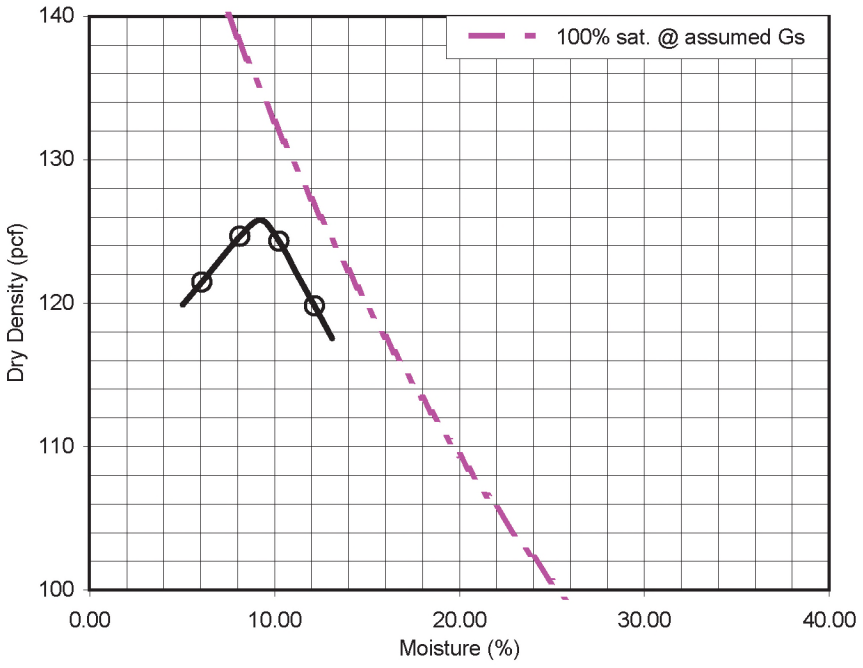
Assumed Specific Gravity = 2.7

PROCEDURE USED

[ ] Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if No.4 retained < 20%

[ ] Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if + No.4 > 20% and - 3/8 " < 20%

[X] Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if + 3/8 in >20% and + 3/4 in <30%



AP Engineering & Testing, Inc.

CORROSION TEST RESULTS

Client Name: AMEC Geomatrix
Project Name: Venice Dual Force Main
Project No.: 14403.000

AP Job No.: 28-0929
Date 09/17/08

Boring No.	Sample No.	Depth (ft)	Soil Type	Minimum Resistivity (ohm-cm)	pH	Sulfate Content (ppm)	Chloride Content (ppm)
G-1	10	27.5-29.5	CL	92	7.2	190	1805
G-1	Mixed	25-40	SM/ML	200	7.1	88	1459
G-9	8	25-27.3	CL	230	9.4	37	1587
G-9	Mixed	35-50	SM	1000	7.1	58	205

NOTES: Resistivity Test and pH: California Test Methods 532 and 643
Sulfate Content : California Test Method 417
Chloride Content : California Test Method 422
ND = Not Detectable
NA = Not Sufficient Sample
NR = Not Requested

2607 Pomona Boulevard, Pomona, CA 91768
Tel. (909) 869-6316 Fax. (909)869-6318

LOG OF TEST BORING

CORRECTED COPY: 03-27-96

LAB NO. : 140- 4360 PROJECT: VENICE AREA RELIEF SEWER

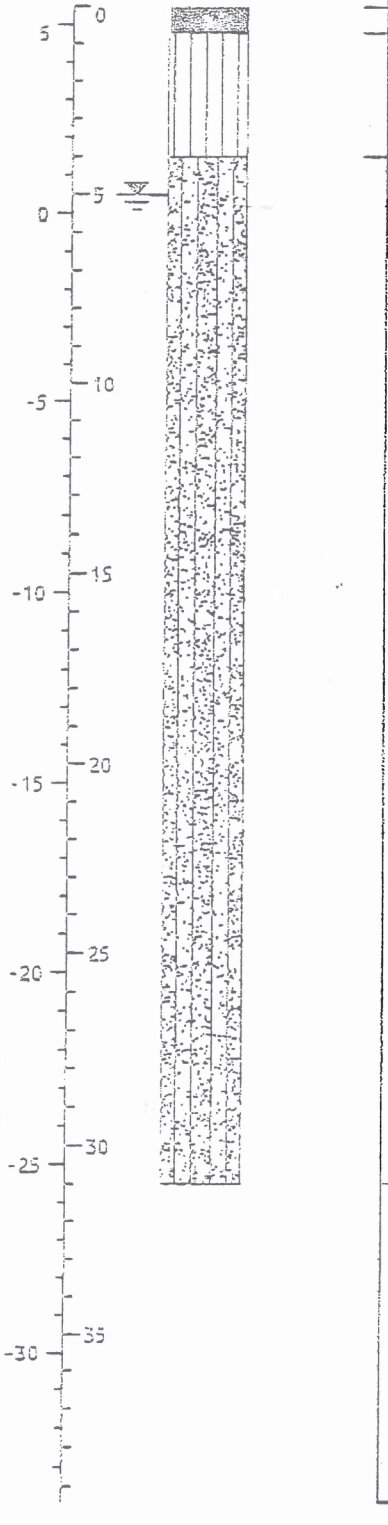
BORING NO.: 8 ELEVATION: 5.5' DRILLING DATE: 08-11-94

BORING LOCATION: 21' N/o NCF Hurricane St. and 92' E/o C/L Canal Ct.

DRILL RIG TYPE: CME-75 using 8" hollow stem augers

DEPTH TO STANDING WATER: 5' DEPTH TO WATER SEEPAGE: none

DRILLER: Ramirez LOGGER: Roth ENGINEER: James



USCS	Field Description	Standard Penetration Readings 1st 6"	2nd 6"	3rd 6"
	8" AC pavement in fair condition.			
ML	Brown sandy silt with a trace of gravel. Moist and soft.			
SP-SM	Brown poorly graded sand with some silt. Moist and dense. Color changed to dark gray at 5'. Encountered groundwater at 5'.	1	3	7
		2	3	4
		3	6	7
		4	5	7
	Encountered a 2' fat clay lense at 25' depth.	2	2	2
		3	4	3
	Encountered groundwater at 5' depth.			
	OVA = 0 for all sample depths.			

LOG OF TEST BORING

CORRECTED COPY: 03-27-96

LAB NO. : 140- 4360 PROJECT: VENICE AREA RELIEF SEWER

BORING NO.: 8 ELEVATION: 5.5' DRILLING DATE: 08-11-94

BORING LOCATION: 21' N/o NCF Hurricane St. and 92' E/o C/L Canal Ct.

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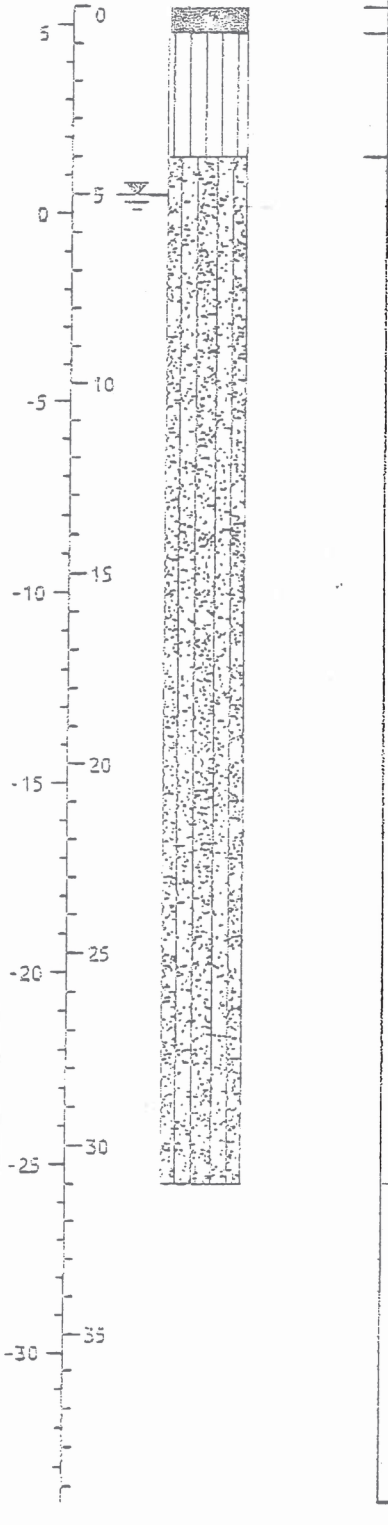
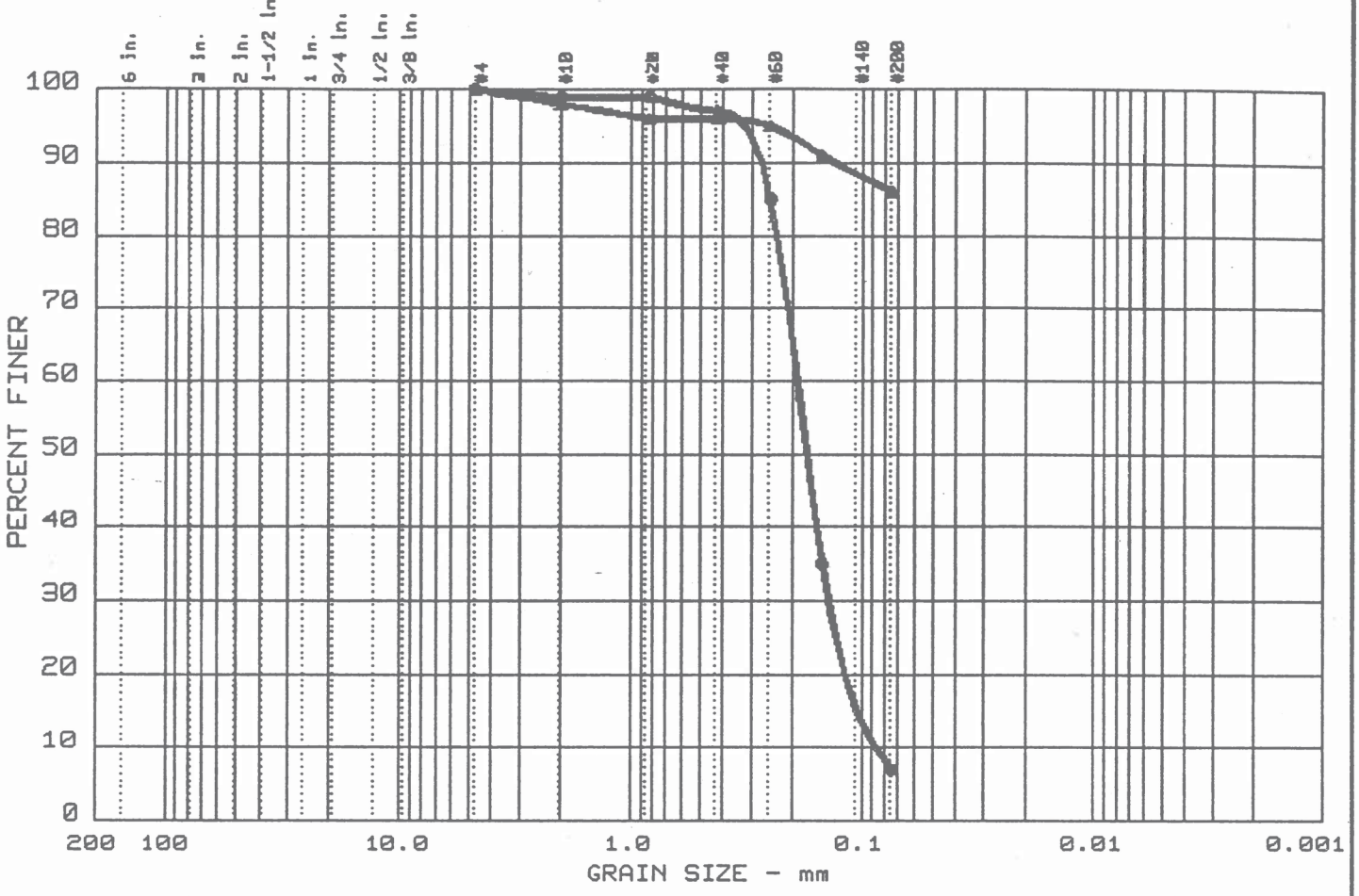
DEPTH TO STANDING WATER: 5' DEPTH TO WATER SEEPAGE: none

DRILLER: Ramirez LOGGER: Roth ENGINEER: James



USCS	Field Description	Standard Penetration Readings 1st 6"	2nd 6"	3rd 6"
	8" AC pavement in fair condition.			
ML	Brown sandy silt with a trace of gravel. Moist and soft.			
SP-SM	Brown poorly graded sand with some silt. Moist and dense. Color changed to dark gray at 5'. Encountered groundwater at 5'.	1	3	7
		2	3	4
		3	6	7
		4	5	7
	Encountered a 2' fat clay lense at 25' depth.	2	2	2
		3	4	3
	Encountered groundwater at 5' depth.			
	OVA = 0 for all sample depths.			

GRAIN SIZE DISTRIBUTION TEST REPORT



	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	0.0	93.0	7.0	
▲	0.0	0.0	14.0	86.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	-	N/P	0.25	0.19	0.17	0.140	0.1047	0.0870	1.17	2.2
▲	52	25								

MATERIAL DESCRIPTION	USCS	AASHTO
● POORLY GRADED SAND WITH SILT	SP-SM	A-3
▲ FAT CLAY	CH	A-7-6(23.9)

Project No.: 140-4360
Project: VENICE AREA RELIEF SEWER (PHASE I)
● Location: B-8 @ 20' DEPTH
▲ Location: B-8 @ 25' DEPTH

Date: 10-03-94 BY: JV/PTF

GRAIN SIZE DISTRIBUTION TEST REPORT

CITY OF LOS ANGELES - STANDARDS DIVISION

Remarks:
-
-
-
-

Figure No. -

Lab. No.: 140-4360

CITY OF LOS ANGELES
DEPARTMENT OF GENERAL SERVICES
STANDARDS DIVISION
2319 DORRIS PLACE
LOS ANGELES, CA 90031
(213) 485-2242

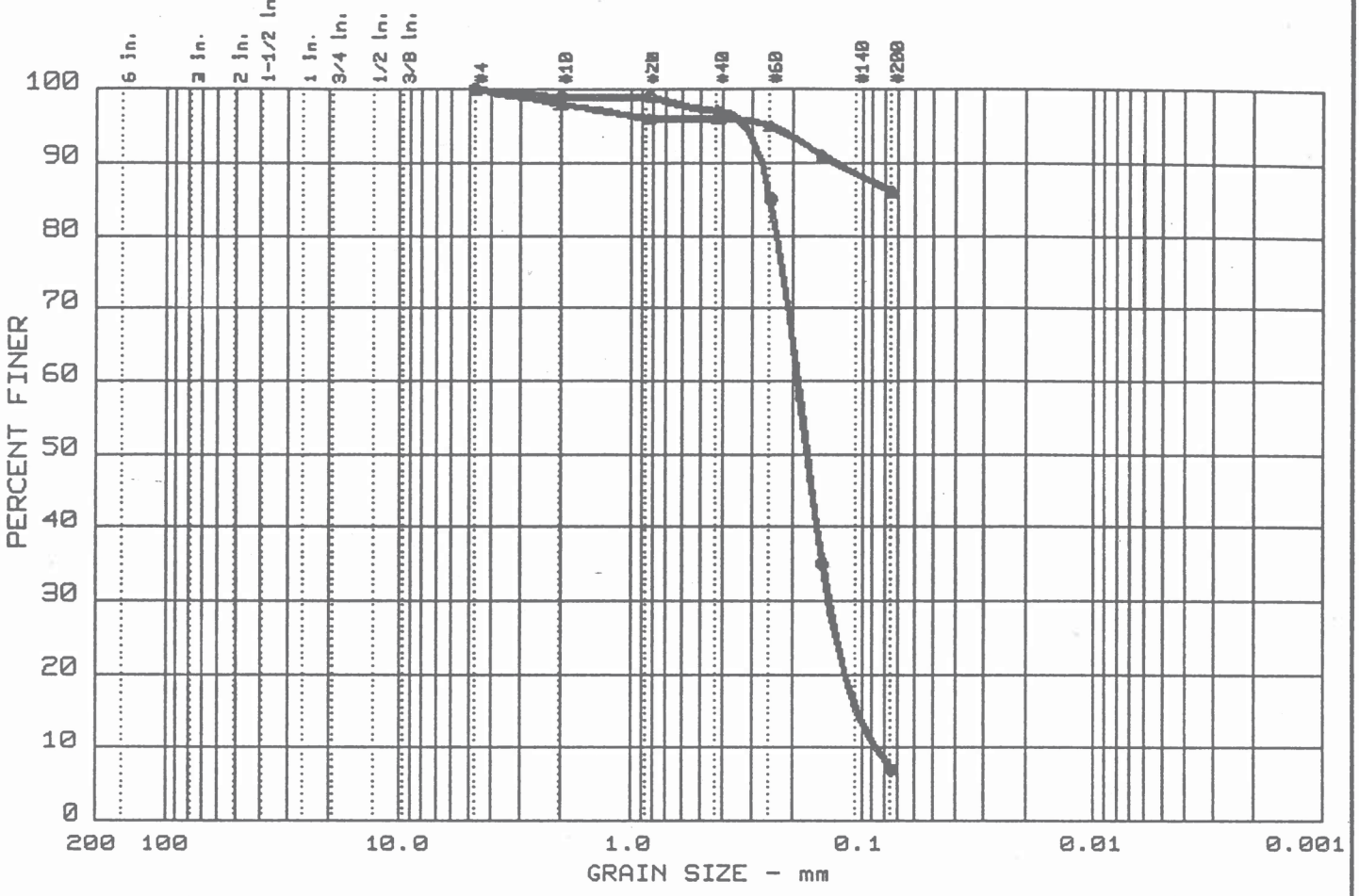
TEST BORING DATA

Job Title: VENICE AREA RELIEF SEWER (PHASE I) W.O. No.: E2000461

Test Boring No.	7						8					
Sample Depth, ft.	5	10	15	20	25	30	5	10	15	20	25	30
In Place Dry Density, pcf	124		100	107		99						
Field Moisture, %	9.9		23.0	21.3		25.7						
Lab. Max. Dry Density, pcf	125											
Lab. Optimum Moisture, %	9											
Relative Compaction, %	99											
Mechanical Analysis (% Passing)												
3/4"												
No. 4						100				100	100	
No. 10						99				99	98	
No. 20			100			98				99	96	
No. 40			99			98				97	96	
No. 60			83			97				85	95	
No. 100			33			95				35	91	
No. 200			6			86				7	86	
5 μ (Micron), %												
Liquid Limit			--			33				--	52	
Plasticity Index			N/P			14				N/P	25	
Sand Equivalent									41			
Expansion Index												
Unconfined Compression				132								

SOIL COMPACTION FAX TEL:213-847-3761 Apr 02'96 13:56 No.008 P.12

GRAIN SIZE DISTRIBUTION TEST REPORT



	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	0.0	93.0	7.0	
▲	0.0	0.0	14.0	86.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	-	N/P	0.25	0.19	0.17	0.140	0.1047	0.0870	1.17	2.2
▲	52	25								

MATERIAL DESCRIPTION	USCS	AASHTO
● POORLY GRADED SAND WITH SILT	SP-SM	A-3
▲ FAT CLAY	CH	A-7-6(23.9)

Project No.: 140-4360
Project: VENICE AREA RELIEF SEWER (PHASE I)
● Location: B-8 @ 20' DEPTH
▲ Location: B-8 @ 25' DEPTH

Date: 10-03-94 BY: JV/PTF

GRAIN SIZE DISTRIBUTION TEST REPORT

CITY OF LOS ANGELES - STANDARDS DIVISION

Remarks:
-
-
-
-

Figure No. -

Lab. No.: 140-4360

CITY OF LOS ANGELES
DEPARTMENT OF GENERAL SERVICES
STANDARDS DIVISION
2319 DORRIS PLACE
LOS ANGELES, CA 90031
(213) 485-2242

TEST BORING DATA

Job Title: VENICE AREA RELIEF SEWER (PHASE I) W.O. No.: E2000461

Test Boring No.	7						8					
Sample Depth, ft.	5	10	15	20	25	30	5	10	15	20	25	30
In Place Dry Density, pcf	124		100	107		99						
Field Moisture, %	9.9		23.0	21.3		25.7						
Lab. Max. Dry Density, pcf	125											
Lab. Optimum Moisture, %	9											
Relative Compaction, %	99											
Mechanical Analysis (% Passing)												
3/4"												
No. 4						100				100	100	
No. 10						99				99	98	
No. 20			100			98				99	96	
No. 40			99			98				97	96	
No. 60			83			97				85	95	
No. 100			33			95				35	91	
No. 200			6			86				7	86	
5 μ (Micron), %												
Liquid Limit			--			33				--	52	
Plasticity Index			N/P			14				N/P	25	
Sand Equivalent									41			
Expansion Index												
Unconfined Compression				132								

SOIL COMPACTION FAX TEL:213-847-3761 Apr 02'96 13:56 No.008 P.12

APPENDIX C



GeoKinetics
Geotechnical & Environmental Engineers

Preliminary Subsurface Methane Gas Investigation at Venice Auxiliary Pumping Station 133 East Hurricane Street Los Angeles, California

Prepared by

GeoKinetics

77 Bunsen
Irvine, CA 92618
Tel 949.502.5353, Fax 949.502.5354

Prepared for

Geotechnical Engineering Group
Mr. Christoper F. Johnson
1149 South Broadway
Los Angeles, California 90015

August 20, 2015

1.0 Introduction: GeoKinetics has completed a subsurface methane gas investigation at the proposed Venice Auxiliary Pumping Plant located at 133 Hurricane Street, in the City of Los Angeles. The location of the subject property is shown in Figure 1 while a recent aerial photograph of the site is provided as Figure 2. We understand that the proposed auxiliary pumping plant will consist of a wet well / valve vault, an electrical building and a diversion structure on the approximate 7,850 square foot property. The subject property is located in the Playa Del Rey Oil Field as it has been mapped by the California Department of Conservation, Division of Oil, Gas & Geothermal Resources (DOGGR). No oil wells are shown to exist at the property based upon our review of the DOGGR oil field map. The closest mapped oil well (Allied Petroleum Corp., "Rawco – Woodford", #1) is located approximately 55 feet southwest of the subject property. As a result, it is within a Methane Zone designated by LADBS. It will therefore be necessary to incorporate methane gas mitigation measures into the design of the proposed structures in accordance with LADBS requirements

Under the current building code, the nature and extent of the required mitigation measures are partially dependent upon the concentration and pressure of any methane gas that may be present at the site. The current investigation has been performed for the purpose of documenting the concentration and pressure of methane gas in the subsurface of the subject property such that appropriate mitigative improvements can be specified. This report presents the results of the subsurface gas investigation as well as associated methane mitigation recommendations in accordance with typical LADBS requirements.

2.0 Background: The presence of methane gas in the subsurface is common within former oil production areas and other locations where organic material - such as grass, leaves, wood, manure, etc. - are present in the soil. Biogenic methane is generated by the bacteriological digestion, or biodegradation, of organic matter in the absence of oxygen. Methane of thermogenic or petrogenic origin may also be present in surficial soils as a result of its upward migration from deeper oil and gas bearing zones. Our experience indicates methane gas is common and can be found in the soil at a relatively high percentage of building sites in southern California. Methane is not toxic, however it is combustible and potentially explosive at concentrations above 55,000 ppm in the presence of oxygen. This concentration is referred to as its Lower Explosive Level or LEL. Methane is lighter than air and therefore has a natural tendency to rise to the ground surface where it typically dissipates into the atmosphere. The presence of non-pressurized methane at shallow depths beneath the ground surface is normally not problematic. The rates at which the methane is generated and/or migrates towards the ground surface are slow enough such that the gas dissipates naturally under normal circumstances. However, as methane migrates to the ground surface, the

potential exists for its accumulation beneath slab-on-grade foundation systems or other relatively impermeable ground coverings. If the gas accumulates to high concentrations, and becomes pressurized, and a crack or other penetration is present in the floor slab of the structure, detectable levels of methane may enter the interior of the building. Improvements - such as sub-slab vent lines or gas membranes - are generally required by LADBS as a precautionary measure for new structures at Methane Zone sites.

3.0 Field Investigation: The field work associated with the methane gas investigation at the subject property included the installation and monitoring of five (5) multi-stage subsurface gas probes. The locations of these gas probes are shown in Figure 2. The subsurface gas probes were installed on August 6th, 2015 and they were subsequently monitored on August 7th and 11th, 2015. The gas probes were installed using 6" hollow stem auger drilling equipment. A schematic illustrating the general configuration of the gas probes is provided as Figure 3. The LADBS guidelines require that individual sampling tips be installed at depths of 5, 10, and 20 feet below the lowest floor level of the proposed structures. However, based on the known groundwater depth of approximately 8 feet bgs, probes were proposed to be installed on site at depths of 2, 5 and 7 feet bgs. Per LADBS guidelines, five shallow probes would be installed at a depth of 5' bgs and then two deeper probes would be installed at the two locations with the highest methane readings. However, in order to save time and reduce costs, all five borings were advanced to 8' bgs and probe tips were installed at 2, 5 and 7' bgs in each of the five borings. All five borings were logged in the field under the supervision of a registered engineering geologist. Copies of the boring logs for this project are included as Attachment A for your reference. As indicated, the upper four to five feet primarily consisted of moist fine grained sands. Clay, silty-clay and sandy estuarine deposits were noted just below the fine grain sands in each boring.

The sampling tips of the current installation were embedded within a 12-inch interval of washed Monterey #3 sand. Bentonite clay seals were placed above and below each sand interval in order to isolate the gas sampling tips. Gas tight quick connect fittings were installed on the ends of the polyethylene tubing at the ground surface in order to seal the probes between monitoring events. Flush-mounted vaults were installed at the ground surface to protect the installations.

As discussed previously, the installations were monitored on August 7th and 11th, 2015. All monitoring was performed during periods of falling barometric pressure. The subsurface gas pressure relative to atmospheric, and the concentrations of methane, oxygen, and carbon dioxide, were measured in the subsurface probes during each monitoring event. The monitoring equipment that was utilized and the associated detection limits, or resolutions, are summarized in Table 1. As indicated, subsurface gas pressures were

measured to the nearest 0.05 inches of water prior to each sampling event using a Magnahelic gauge while the barometric pressure was measured and recorded to the nearest 0.1 inches of mercury using a digital barometer. The gas probe methane, oxygen, and carbon dioxide concentrations were measured in the field using a portable, methane specific, LandTec GEM2000-Plus infra-red gas analyzer. A volume of gas equivalent to approximately ten times that of the ¼-inch diameter polyethylene gas probe tube was extracted through the LandTec GEM2000-Plus during the monitoring process. Steady state readings were generally obtained after approximately two tubing volumes of gas had been extracted. The highest methane reading displayed in each instance was recorded. The LandTec GEM2000-Plus was calibrated at the beginning and the end of each day of monitoring using a certified mixture of 15% methane, 15% carbon dioxide, and 70% nitrogen calibration gas (Note: all gas concentrations referred to in this report are on a volumetric basis). A Photovac Flame Ionization Detector (FID) was used to confirm combustible gas levels at selected probes where sufficient oxygen was present in the probe to operate the FID. The gas levels measured with both detectors were found to be consistent. Combustible gas concentrations in excess of 450 ppm were not detected with the FID.

Ambient gas levels in the air four feet above the ground surface were recorded at the site periodically during the monitoring. In each instance, the measured gas level fell within the following range:

Gas	Measured Range
Methane	<0.1%
Carbon Dioxide	<0.1%
Oxygen	20.8% – 20.9%

4.0 Results: The pressures and concentrations measured in each of the subsurface gas probes during the monitoring events are summarized in Table 2. As indicated, three of the 7' deep probe tips were flooded with water during the monitoring events. Also as indicated, the highest methane gas detection on site was 1,000 ppm (0.1%) at 5 feet bgs at probe P-5. Methane gas was not detected at any of the other gas probe installations. The site FID readings ranged from 0 to 449 ppm for the probes with enough oxygen to record a reading. This is consistent with the LandTec GEM2000-Plus readings.

The soil gas pressures measured in the gas probes range from 0.00 to 0.50 inches of water. This pressure range is normal and consistent with normal

barometric variations. There was no indication of elevated soil gas pressures associated with methane generation or migration.

The concentration of oxygen in the atmosphere at sea level is approximately 21%. The subsurface oxygen levels were found to be slightly to moderately depressed below typical atmospheric levels at each of the gas probe installations. The lowest subsurface oxygen level recorded at the site was 2.5% while the average oxygen concentration measured in the gas probes was approximately 14.6%. The average concentration of carbon dioxide in the atmosphere at sea level is approximately 0.03%. Subsurface carbon dioxide levels were slightly to moderately elevated above typical atmospheric levels in each of the gas probes. The highest carbon dioxide concentration measured at the site was 3.2% while the average carbon dioxide concentration measured in the gas probes was approximately 1.3%. The slightly to moderately depressed subsurface oxygen levels and slightly to moderately elevated carbon dioxide levels suggest residual organic matter entrained within the near surface soils is being biodegraded under aerobic conditions.

Based upon the measured methane levels and the corresponding soil gas pressures, we conclude the property should be classified as a Level II site with a Design Methane Pressure of •2" of water in accordance with LADBS guidelines. A copy of the LADBS methane testing compliance form for this project is included as Attachment B for your reference.

As discussed previously, the property is shown to be located within a Methane Zone. The following primary methane mitigation measures are typically required by LADBS for new Level II slab-on-grade structures within the methane zone:

1. **Sub-Slab Vent System:** A series of perforated vent lines and an associated 2" thick gravel blanket must be installed beneath the floor slab of the proposed structure. The perforated vent lines are connected to solid vent piping that extends through the walls or pipe chases of the building to outlets above the roof line. A dewatering system (sump and pump) must be installed if the design high groundwater level for the project is not at least one foot below the lowest vent piping elevation. A dewatering system is not necessary for on-grade structures for this project. However, structures that extend below approximately 5' bgs will likely need either a dewatering system, or be constructed hydrostatically. If the hydrostatic option is selected, a modification from LADBS will likely be required in order to remove the sub-slab venting system requirement.

2. **Impervious Membrane:** A continuous gas membrane is required below the floor slab of the structures. This membrane must be sealed against footings, pilings, and utilities to form a gas-tight barrier beneath the buildings.

3. **Utility Trench Dams:** A section of impervious backfill consisting of compacted native soil or sand / cement slurry must be installed in utility trenches that extend beneath the perimeter of the buildings in order to prevent methane gas from migrating beneath the structure through sand bedding or backfill.

4. **Conduit Seals:** Gas tight seals must be installed on all conduits (e.g. electrical, cable T.V., telephone, etc.) that extend to the interior of the structure. The purpose of these seals is to prevent methane gas from entering subsurface cracks or discontinuities in the conduits and subsequently migrating to the interior of the buildings.

There are exceptions in the City Methane Ordinance (Ordinance No. 175790) that allow some of the requirements outlined above to be omitted, or modified, under certain conditions. These possible exceptions should be considered as the building plans are developed in order to determine the specific mitigative measures that will be required for the project.

5.0 Closing: This investigation has been performed with the degree of skill and care ordinarily exercised by engineers practicing in this, and similar, localities. No other warranty, expressed or implied, is given regarding the conclusions or professional opinions presented in this report. The scope of this report is limited to the matters expressly covered herein. This report is presented for the sole use of the Geotechnical Engineering Group and may not be relied upon by any other party without written authorization from GeoKinetics. All recommendations, findings, and conclusions presented in this report are based upon facts and circumstances as they existed at the time this report was prepared. A change in any fact or circumstance upon which this report is based may necessitate re-evaluation and/or modification of the recommendations, findings, and conclusions presented herein. Due to the nature of this type of investigation, uncertainty exists with respect to the subsurface conditions that are present between boring / sampling locations. The subsurface methane concentrations at the site could vary over time and may change in response to site modifications. The methane levels identified in this report represent the concentrations that were measured at the time of the

current investigation. Higher or lower concentrations could occur in the future. If the level of inherent uncertainty is unacceptable, additional sampling and/or testing should be considered.

We hope this information is helpful to you. Please do not hesitate to contact the undersigned if you have any questions or comments.

Sincerely,
GEOKINETICS, INC.

Kevin J. Lea, RCE
Senior Engineer

attachments

REGISTERED PROFESSIONAL ENGINEER
KEVIN J. LEA
NO. C- 67844
EXP. 6-30-17
CIVIL
STATE OF CALIFORNIA

Geoffrey Stokes, CEG / PG
Senior Geologist

PROFESSIONAL GEOLOGIST
Geoffrey Daniel Stokes
NO. 2266
CERTIFIED
ENGINEERING
GEOLOGIST
Exp. 7-31-17
STATE OF CALIFORNIA

Table 1. Gas Probe Monitoring Equipment & Parameters

Parameter	Equipment	Detection Limit or Resolution	Range
Barometric Pressure	Digital Barometer	0.1" of Hg	25 to 36 in Hg
Gas Probe Pressure	Pressure Gauge	0.1" of H_2O	-5 to +5 in H_2O
Methane Concentration	LandTec GEM2000-Plus Infrared Gas Analyzer	0.1%	0.1% to 100%
	FID	0.1 ppm	0.1 to 1,000 ppm
		1 ppm	1 to 10,000 ppm
Carbon Dioxide Concentration	LandTec GEM2000-Plus Infrared Gas Analyzer	0.1%	0.1% to 50%
Oxygen Concentrations	LandTec GEM2000-Plus Infrared Gas Analyzer	0.1%	0.1% to 25%

133 Hurricane Street - Methane Investigation
Los Angeles, California
Multi-Stage Gas Probe Monitoring Results

GAS PROBE #	MONITORING DATE	PROBE DEPTH (feet)	GAS CONCENTRATION (%)			GAS PROBE PRESSURE (IN H_20)	BAROMETRIC PRESSURE (IN Hg)	FID (ppm)
			CH_4	CO_2	O_2			
P-1	8/7/2015	2	0.00	1.4	18.7	0.00	29.9	0.0
	8/11/2015		0.00	1.5	19.0	0.00	29.9	0.0
	8/7/2015	5	0.00	1.6	17.7	0.00	29.9	6.6
	8/11/2015		0.00	2.1	17.8	0.00	29.9	0.8
	8/7/2015	7	0.00	0.1	15.9	0.00	29.9	200.0
	8/11/2015		flooded				29.9	-
P-2	8/7/2015	2	0.00	0.8	18.8	0.00	29.9	0.0
	8/11/2015		0.00	1.1	18.7	0.00	29.9	0.2
	8/7/2015	5	0.00	2.2	14.9	0.00	29.9	9.6
	8/11/2015		0.00	3.2	14.8	0.00	29.9	4.6
	8/7/2015	7	0.00	0.4	16.7	0.50	29.9	449.0
	8/11/2015		0.00	1.6	6.9	0.00	29.9	flameout
P-3	8/7/2015	2	0.00	0.8	17.6	0.00	29.9	0.9
	8/11/2015		0.00	1.2	17.7	0.00	29.9	0.3
	8/7/2015	5	0.00	3.7	9.2	0.00	29.9	flameout
	8/11/2015		0.00	3.9	10.0	0.00	29.9	flameout
	8/7/2015	7	0.00	0.2	9.9	0.00	29.9	flameout
	8/11/2015		0.00	0.6	2.5	0.00	29.9	flameout
P-4	8/7/2015	2	0.00	0.6	19.9	0.00	29.9	0.0
	8/11/2015		0.00	0.3	19.8	0.00	29.9	0.0
	8/7/2015	5	0.00	0.5	7.7	0.00	29.9	flameout
	8/11/2015		0.00	0.8	8.2	0.00	29.9	flameout
	8/7/2015	7	flooded				29.9	-
	8/11/2015		flooded				29.9	-
P-5	8/7/2015	2	0.00	0.5	18.4	0.00	29.9	10.6
	8/11/2015		0.00	0.9	18.1	0.00	29.9	0.7
	8/7/2015	5	0.10	0.4	13.2	0.00	29.9	flameout
	8/11/2015		0.00	2.0	13.7	0.00	29.9	flameout
	8/7/2015	7	flooded				29.9	-
	8/11/2015		flooded				29.9	-

Background	8/7/2015	Pre-Monitoring	0.00	0.0	20.9	-	29.9	1.4
	8/11/2015		0.00	0.0	20.8	-	29.9	0.0
	8/7/2015	Post-Monitoring	0.00	0.0	20.9	-	29.9	1.6
	8/11/2015		0.00	0.0	20.8	-	29.9	1.3

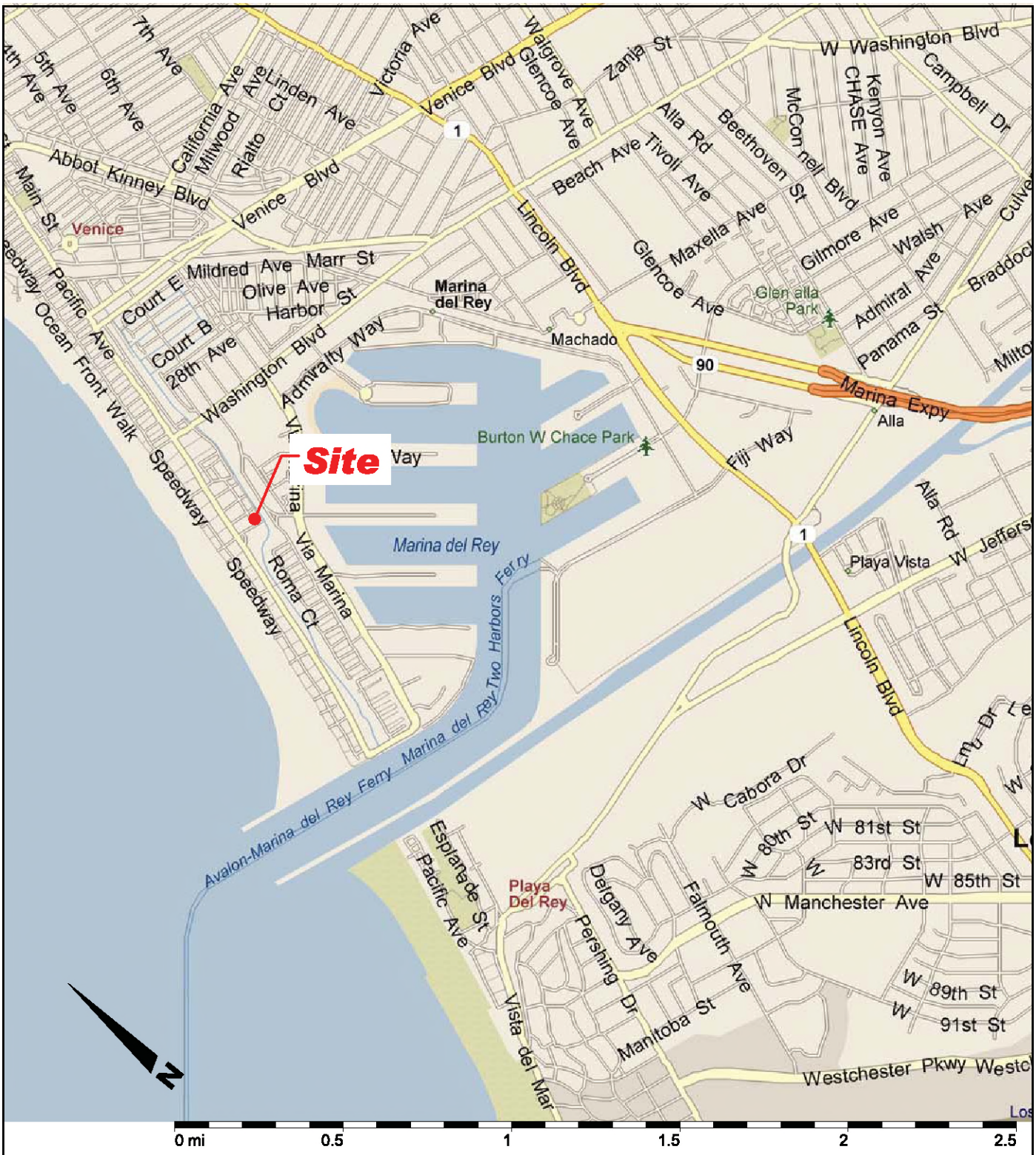
Level I: 0 - 100 ppm (0% to 0.01%)

Level II: 101 - 1,000 ppm (>0.01% to 0.1%)

Level III: 1,001 - 5,000 ppm (>01% to 0.5%)

Level IV: 5,001 to 12,500 ppm (>0.5% to 1.25%)

Level V: Greater than 12,500 ppm (>1.25%)



GeoKinetics
Geotechnical & Environmental Engineers

Project Name: GPI - Venice

Date: August 2015

Site Location Map

133 East Hurricane Street
Venice, California

Figure 1



Legend

P-5 Approximate Location of Multi-Stage Gas Probe Location & Designation

1,000 Methane Concentration in Parts per Million (ppm)

ND Methane Concentration Below Detection Limit in Parts per Million (ppm)

0 25 50 ft

Approximate Scale

GeoKinetics
Geotechnical & Environmental Engineers

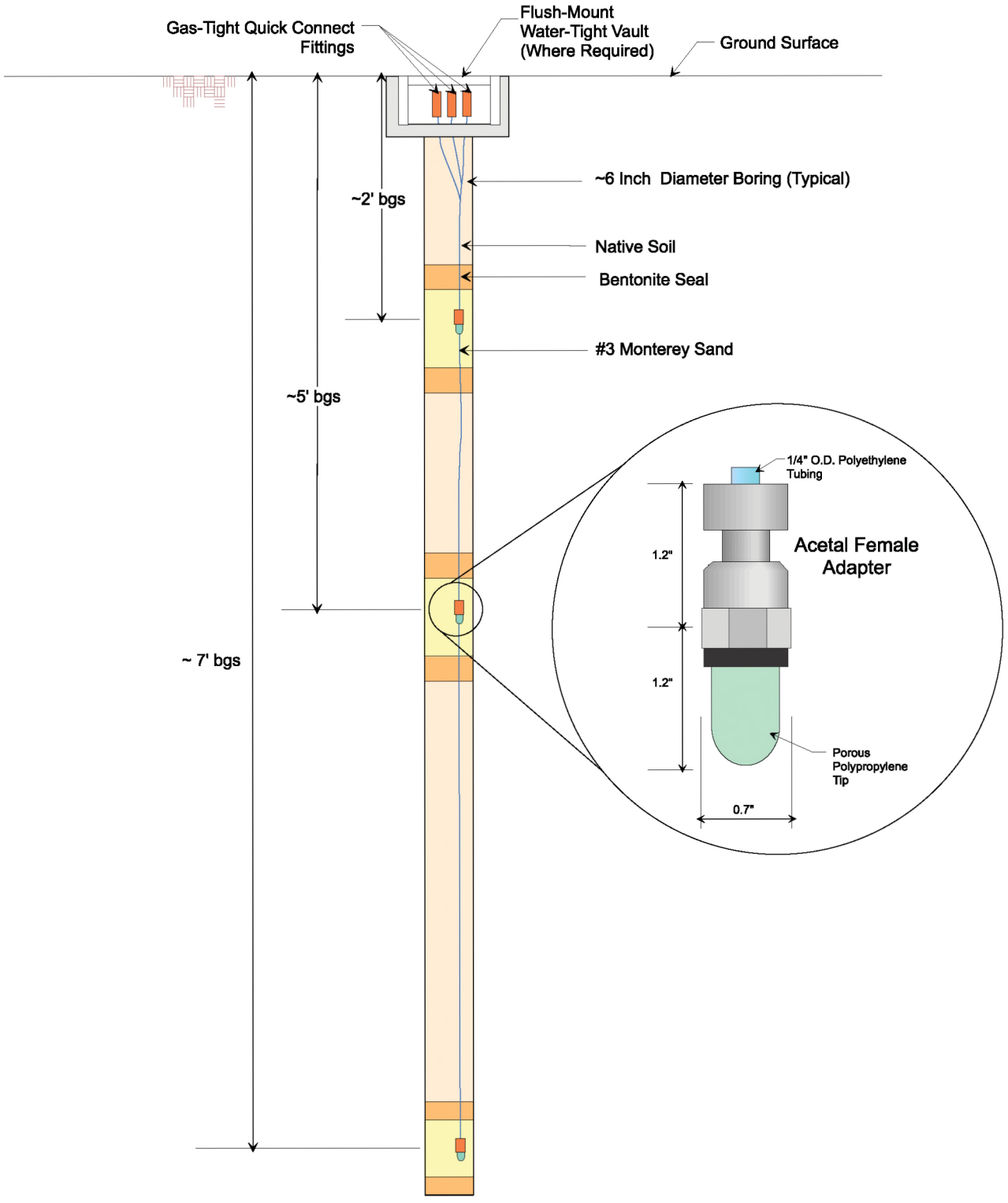
Project Name: GPI - Venice

Date: August 2015

Aerial Photograph

133 East Hurricane Street
Venice, California

Figure 1



Note: Probe Depths May Vary From One Installation to Another Due to sub-surface Conditions.

GeoKinetics
Geotechnical & Environmental Engineers

Project Name: GPI - Venice

Date: August 2015

Gas Probe Schematic

Figure 3

Attachment A

Boring Logs

BORING LOG NO.: P-1

Moisture (%)	Dry Density (pcf)	Penetration Resistance (Blows/6 inch)	Sample Type	Depth (Feet)	Lithology	Description of Subsurface Materials: Classification, (USCS) color, mixture, consistency, etc.	% Comp	% Saturation	Void Ratio	Elevation (Feet)
					SP-SM	Fill: SAND with silt (SP-SM), fine-grained, trace gravel, slightly moist, medium dense, brown.				
				2	SP	@1' SAND (SP), fine-grained, moist, medium dense, brown.				
				4	SP	@4' SAND (SP), fine-grained, moist, medium dense, light brown.				
				6	CL	Estuarine Deposits: @5' Silty CLAY (CL), elastic, very moist, soft, dark gray.				
				8		Total Depth = 8 ft bgs Groundwater not encountered. Staged soil vapor probes set at 2', 5' & 7' per work plan.				
				10						
				12						
				14						

GeoKinetics
Geotechnical & Environmental Engineers

Project Name: GPI -Venice

Project No.:

Sample Types:
- B Bulk Sample
- C Rock Core
- R Ring Sample
- S Standard Split Spoon
- T Tube Sample

Location: 133 Hurricane Street, Venice Logged by: GDS

Date Drilled: 8/6/15 Equipment Used: CME-75 Ring Type:

Ground Elevation: Notes:

BORING LOG NO.: P-2

Moisture (%)	Dry Density (pcf)	Penetration Resistance (Blows/6 inch)	Sample Type	Depth (Feet)	Lithology	Description of Subsurface Materials: Classification, (USCS) color, mixture, consistency, etc.	% Comp	% Saturation	Void Ratio	Elevation (Feet)
				0	SP-SM	Fill: SAND with silt (SP-SM), fine-grained, trace gravel, slightly moist, medium dense, brown.				
						Cobble at 18"				
				2						
						@2.5' SAND (SP), fine-grained, moist, medium dense, brown reddish-brown; contains trace clay pods (gray).				
					SP					
				4		@4 SAND (SP), fine-grained, moist, medium dense, light brown.				
					CL	Estuarine Deposits: @5' Silty CLAY (CL), elastic, very moist, soft, bluish-gray.				
				6		@6' Sandy SILT (ML) to silty SAND (SM), fine grained sand, very moist, soft/loose, bluish-gray.				
					ML-SM					
				8		Total Depth = 8 ft bgs Seepage at 8 ft Staged soil vapor probes set at 2', 5' & 7' per work plan.				
				10						
				12						
				14						

GeoKinetics
Geotechnical & Environmental Engineers

Project Name: GPI -Venice

Project No.:

Sample Types:
- B Bulk Sample
- C Rock Core
- R Ring Sample
- S Standard Split Spoon
- T Tube Sample

Location: 133 Hurricane Street, Venice Logged by: GDS

Date Drilled: 8/6/15 Equipment Used: CME-75 Ring Type:

Ground Elevation: Notes:

BORING LOG NO.: P-3

Moisture (%)	Dry Density (pcf)	Penetration Resistance (Blows/6 inch)	Sample Type	Depth (Feet)	Lithology	Description of Subsurface Materials: Classification, (USCS) color, mixture, consistency, etc.	% Comp	% Saturation	Void Ratio	Elevation (Feet)
				0	SP-SM	Fill: SAND with silt (SP-SM), fine-grained, trace gravel, slightly moist, medium dense, brown.				
				2	SP	@2' SAND (SP), fine-grained, moist, medium dense, brown.				
						@3' SAND (SP), fine-grained, moist, medium dense, light brown, contains pods of Clay (gray).				
				4						
				6	SM	Estuarine Deposits: @6' Silty SAND (SM), fine-grained, very moist, medium dense, bluish-gray.				
				8		Total Depth = 8 ft bgs Staged soil vapor probes set at 2', 5' & 7' per work plan.				
				10						
				12						
				14						

GeoKinetics
Geotechnical & Environmental Engineers

Project Name: GPI -Venice

Project No.:

Sample Types:
- B Bulk Sample
- C Rock Core
- R Ring Sample
- S Standard Split Spoon
- T Tube Sample

Location: 133 Hurricane Street, Venice Logged by: GDS

Date Drilled: 8/6/15 Equipment Used: CME-75 Ring Type:

Ground Elevation: Notes:

BORING LOG NO.: P-4

Moisture (%)	Dry Density (pcf)	Penetration Resistance (Blows/6 inch)	Sample Type	Depth (Feet)	Lithology	Description of Subsurface Materials: Classification, (USCS) color, mixture, consistency, etc.	% Comp	% Saturation	Void Ratio	Elevation (Feet)
				2	SP	Fill: SAND (SP) fine-grained, slightly moist, loose to medium dense, mottled reddish-brown and grayish-brown. @1' SAND (SP), fine-grained, moist, medium dense, light brown. @3.5' contains pods of clay (gray)				
				4	CL	Estuarine Deposits: @4' CLAY (CL), very moist, soft, dark gray, contains some organics (decomposing plant material).				
				6	ML+ SM	@5.5' Sandy SILT (ML) to Silty SAND (SM), fine-grained sand, very moist, soft/loose, bluish gray.				
				8		Total Depth = 8 ft bgs Seepage at 8 ft Staged soil vapor probes set at 2', 5' & 7' per work plan.				
				10						
				12						
				14						

GeoKinetics
Geotechnical & Environmental Engineers

Project Name: GPI -Venice

Project No.:

Sample Types:
- B Bulk Sample
- C Rock Core
- R Ring Sample
- S Standard Split Spoon
- T Tube Sample

Location: 133 Hurricane Street, Venice Logged by: GDS

Date Drilled: 8/6/15 Equipment Used: CME-75 Ring Type:

Ground Elevation: Notes:

BORING LOG NO.: P-5

Moisture (%)	Dry Density (pcf)	Penetration Resistance (Blows/6 inch)	Sample Type	Depth (Feet)	Lithology	Description of Subsurface Materials: Classification, (USCS) color, mixture, consistency, etc.	% Comp	% Saturation	Void Ratio	Elevation (Feet)
				0	SP-SM	Fill: SAND with Silt (SP-SM) trace gravel, trace brick and metal debris, slightly moist, loose to medium dense, brown.				
						@1' cobble (concrete debris)				
				2						
						@2.5' SAND (SP), fine grained, moist, medium dense, light brown.				
				4	CL	Estuarine Deposits: @4.5' CLAY (CL), very moist, soft, dark gray, contains some organics (decomposing plant material).				
						@5' Sandy SILT (ML) to Silty SAND (SM) fine grained sand, very moist, soft/loose, bluish gray.				
				6	ML+SM					
				8		Total Depth = 8 ft bgs Slight seepage at 8 ft Staged soil vapor probes set at 2', 5' & 7' per work plan.				
				10						
				12						
				14						

GeoKinetics
Geotechnical & Environmental Engineers

Project Name: GPI -Venice

Project No.:

Sample Types:
- B Bulk Sample
- C Rock Core
- R Ring Sample
- S Standard Split Spoon
- T Tube Sample

Location: 133 Hurricane Street, Venice Logged by: GDS

Date Drilled: 8/6/15 Equipment Used: CME-75 Ring Type:

Ground Elevation: Notes:

Attachment B

Methane Gas Investigation Compliance Certificate

FORM 1 - CERTIFICATE OF COMPLIANCE FOR METHANE TEST DATA

Part 1: Certification Sheet

Site: Venice Auxiliary Pumping Station Project

Address: 133 East Hurricane Street, Los Angeles, California.

Legal Description: APN # 4225008904

Building Use: Auxiliary Pump Station

Name of Engineer:	Kevin J. Lea GeoKinetics	**Registered Civil / Soil Engineer Stamp:**
Mailing Address:	77 Bunsen Irvine, CA 92618	
Telephone:	(949) 502-5353	
Testing Laboratory:	GeoKinetics License # 10234	

REGISTERED PROFESSIONAL ENGINEER
KEVIN J. LEA
NO. C- 67844
EXP. 6-30-17
CIVIL
STATE OF CALIFORNIA

I hereby certify that I have tested the above site for the purpose of methane mitigation, and that all procedures were conducted by a City of Los Angeles licensed testing agency in conformity with the requirements of the LADBS Information Bulletin P/BC 2002-101. Where the inspection and testing of all or part of the work above is delegated, full responsibility shall be assumed by the licensed engineer or geologist whose signature is affixed thereon.

Signed: _____ **Date:** 8-20-15

Required Data:

- Project is in a *METHANE ZONE*
- Depth to ground water observed during testing was: 7-8 feet below existing ground surface.
- Depth of Historical High Ground Water Table Elevation* is ~5 ft below existing ground surface.
- Design Methane Concentration**: 1,000 parts per million in volume (ppmv).
- Design Methane Pressure***: ≤ 2 inches of water column.
- Methane Design Level: II

De-watering:

- De-watering is Required for all construction below approximately 5' bgs. This condition can be potentially removed using a hydrostatic design under LADBS modification.
- Pump discharge rate N/A gallons per minute.
- Reference geology or soil report: N/A

Additional Investigation:

- Additional investigation was Not conducted.

Latest Grading on Site:

- Date of last grading on site was: Years ago
- Explanation of the effect on soil gas survey results by grading operations: N/A
- Building Excavation: Not Yet Initiated

Notes:

* Historical High Ground Water Table Elevation Shall mean the highest recorded elevation of ground water based on historical records and field investigations as determined by the engineer for the methane mitigation system.

** Design Methane Concentration shall mean the highest recorded measured methane concentration from either shallow soil gas test or any gas probe set on the site.

*** Design Methane Pressure shall mean the highest total pressure measured from any Gas Probe Set on the site.

As a covered entity under Title II of the Americans with Disabilities Act, the City of Los Angeles does not discriminate on the basis of disability and, upon request, will provide reasonable accommodation to ensure equal access to its programs, services and activities. For efficient handling of information internally and in the internet, conversion to this new format of code related and administrative information bulletins including MGD and RGA that were previously issued will allow flexibility and timely distribution of information to the public.

CITY OF LOS ANGELES
INTER-DEPARTMENTAL CORRESPONDENCE

Date: June 27, 2016

To: Bradley Jenson, Division Engineer
Wastewater Conveyance Engineering Division

Attention: Abid Chowdhry, Project Manager, Civil Engineer

From: Christopher F. Johnson, Group Manager
Geotechnical Engineering Group (GEO)

Subject: **Response to City of Los Angeles, Department of Building & Safety Geology and Soils Report Correction Letter, Venice Auxiliary Pumping Plant, 133 East Hurricane Street, Venice Area of Los Angeles, Silver Strand Tract (MP 7-83), Block 4, Lots 4 and 5, WO SZC12923, GEO File 14-103**

This letter report has been prepared in response to the "Geology and Soils Report Correction Letter" received from the City of Los Angeles Department of Building & Safety (CLADBS) Grading Division. The correction letter was prepared in regards to the Geotechnical Engineering Group's (GEO) Geotechnical Report for the Venice Auxiliary Pumping Plant, dated December 14, 2015. The geotechnical report was submitted to the CLADBS under Log No 93303. A copy of the "Geology and Soils Report Correction Letter" is presented in Appendix A of this letter report. GED received the "Geology and Soils Report Correction Letter" on June 14, 2016.

This report responds to the "Geology and Soils Report Correction Letter" and request's approval of the geotechnical report. For ease of reference, each of the review comments is repeated with our response.

Comment No. 1

"Clarify whether or not the proposed Wetwell (with mat foundation) will have subterranean walls to approximately El. -26 feet."

Response:

The wetwell will have walls extending upward from the mat foundation (with a bearing elevation on the order of -26 feet) to the ground surface.

Comment No. 2

"Baseline groundwater elevation shall not be deeper than 5 feet above mean sea level. Revise all calculations and recommendations based on a design groundwater of El. +5 feet."

Response:

All calculations for the permanent structures have been revised to incorporate a groundwater elevation of +5 feet above sea level as requested. Calculations for temporary construction incorporate a groundwater elevation of +1 foot above sea level. The baseline groundwater elevation presented in Section 5.4 of the Geotechnical Report shall be considered to be changed to 5 feet above sea level in order to comply with this requirement. Thus, project structures will need to be designed for uplift pressures with a groundwater elevation of +5 feet. All other recommendations presented in the geotechnical report remain unchanged excepted as noted herein.

Comment No. 3

"Provide CPT interpretation data sheets for all CPTs performed."

Response:

CPT interpretation data sheets, along with tables of various geotechnical parameter estimates provided by the CPT sub-consultant, are provided within Appendix B of this letter report.

Comment No. 4

"Two levels of liquefaction analyses shall be performed (reference to Department letter dated 07/16/2014). For layers excluded from liquefaction analysis based on screening criteria, laboratory tests shall be provided. Liquefaction analyses shall be performed on the soil boring with the most severe liquefaction potential. Calculation sheets for the liquefaction analyses shall be provided."

Response:

Revised liquefaction analyses have been performed for each of the recent rotary wash borings. The analyses were performed for the Maximum Considered Earthquake-Geometric Mean ground acceleration of 0.64g and a ground acceleration of 0.43g (2/3 of the Maximum Considered Earthquake-Geometric Mean ground acceleration of 0.64g).The revised analyses incorporate a groundwater elevation of +5 feet as required per comment number 2.

The susceptibility criteria adopted by the Los Angeles Department of Building and Safety, based on the findings of Bray and Sancio (2006), was used to evaluate soils logged as clay. Per this criterion, in order to assume a soil is not

susceptible to liquefaction, the moisture content must not be greater than 80 percent of the liquid limit, or the soil must have a minimum Plasticity Index of 18.

For the analyses of boring RW-1, blow counts recorded for driven samples were used. Since the liquid limit for the clay layer logged between depths of 25 and 27 feet was found to be less than 18, this layer was assumed to be susceptible to liquefaction. Since the spreadsheet used for liquefaction analyses assumes soils classified as clay (CL or CH) and Elastic silt (MH) are not liquefiable, a soil classification of silt (ML) was used in the spreadsheet for this layer. The clay layer logged between depths of 28-1/2 to 29-1/2 feet was considered non-liquefiable due to the moisture content being less than 80% of the liquid limit. Driven sampler blow counts of 8 were assumed for the sandy silt layers logged between depths of 27 and 28-1/2 feet and 29-1/2 and 31-1/2 feet based on the lower 6 inches of the sampler driven between depths of 29 and 30 feet. For the sandy clay logged between depths of 31-1/2 and 35 feet, an estimated Standard Penetration Test $(SPT)_{60}$ blow count of 5 was assumed based on the estimated parameters (Appendix B) for this depth interval from CPT-1. This layer was conservatively assumed to be susceptible to liquefaction and identified as a silt (ML) soil in the spreadsheet. The results of the analyses indicate a potential liquefaction induced settlement of about 1 inch. Results of the analyses are presented in Appendix C.

For the analyses of boring RW-2, blow counts recorded for driven samples were used. Since the plasticity index for the clay layer logged between depths of 25 and 28-1/2 feet was found to be more than 18, this layer was assumed not to be susceptible to liquefaction. The clay layer between depths of 28-1/2 feet and 30-1/2 feet was assumed to have similar plasticity characteristics as the clay layer above it. Since data is lacking for the soil layers logged between depths of 30-1/2 feet and 36 feet, these layers were conservatively assumed to be susceptible to liquefaction. The clays and sands within this range were assumed to have estimated Standard Penetration Test $(SPT)_{60}$ blow counts of 5 and 10, respectively, based on the estimated parameters (Appendix B) for this depth interval from CPT-1 through CPT-4. The results of the analyses indicate a potential liquefaction induced settlement on the order of 2-1/2 inches. Results of the analyses are presented in Appendix C.

For the analyses of boring RW-3, blow counts recorded for driven samples were used. Since the plasticity index for the clay layer logged between depths of 23 and 29 feet was found to be more than 18, this layer was assumed not to be susceptible to liquefaction. Since data is lacking for the soil layers logged between depths of 29 feet and 35-1/2 feet, these layers were conservatively assumed to be susceptible to liquefaction. The clays and sands within this range were assumed to have estimated Standard Penetration Test $(SPT)_{60}$ blow counts of 5 and 10, respectively, based on the estimated parameters (Appendix B) for this depth interval from CPT-4. The results of the analyses indicate a potential

liquefaction induced settlement on the order of 2 inches. Results of the analyses are presented in Appendix C.

Potentially liquefiable soil layers beneath the auxiliary pump plant and diversion structures will be remediated by the planned jet grouting beneath these structures. Thus, mat foundations for these structures can be designed without consideration to potential liquefaction settlements. Based on the revised liquefaction analyses, the mat foundation for the electrical building shall be designed for potential total and differential seismically induced settlements of 2 inches and 1 inch, respectively, in addition to static settlements.

Comment No. 5

"Provide static settlement analysis based on bearing pressure, foundation size and compression indices derived from consolidation tests performed. Note that based on the consolidation test results, the silt and clay are highly compressible."

Response:

The auxiliary pump plant is expected to be founded at an elevation of -26 feet below sea level and the diversion structure at an elevation of -20 feet below sea level. Based on data from borings RW-2 and RW-1, effective stresses at the time of exploration have been estimated to be on the order of 2,000 pounds per square foot (psf) at an elevation of -26 feet and 1,700 psf at an elevation of -20 feet. These values are more than the recommended allowable bearing capacity of 1,500 psf presented in the geotechnical report. Thus, structure foundations in accordance with the recommendations of the geotechnical report will result in decreased loading of the underlying soils. In addition, jet grouting recommended beneath the auxiliary pump plant and diversion structures will reduce the influence of the compressible soils. To assist in counteracting uplift pressures, we recommend that the allowable bearing pressure for the wetwell foundation be increased to 2,000 psf. With consideration to these factors, settlement of these structures is expected to be negligible. Calculations have not been performed for these structures since they would indicate zero settlement.

Settlement calculations were performed for the clayey soil layers encountered in the recent rotary wash borings for the purpose of evaluating potential consolidation settlements of the planned electrical building. For these calculations, the shallow compressible elastic silt layer is not considered since this layer will be replaced with compacted fill in accordance with the earthwork recommendations of the geotechnical report. The silts and sands interlayered with the clayey soils were not considered in the consolidation calculations due to the relatively high densities measured in these materials. The consolidation curve for the sample from boring RW-1 at a depth of 26.1 feet was considered representative of the soils logged as lean clay and the consolidation curve from boring RW-2 at a depth of 26.8 feet was considered representative of the soils logged as fat clay. The pre-consolidation pressure was assumed to be equal to

the effective stress, i.e., an over-consolidation ratio of one. Consolidation settlements were calculated to vary from approximately ½-inch to ¾-inches for the clay layers. The interpolated consolidation curves and results of the analyses are presented in Appendix D.

Comment No. 6

"Past histories of braced shoring have shown trapezoidal-shaped envelope of earth pressure. Clarify why a triangular shaped distribution is recommended for the internally braced shoring, or revise recommendations to provide trapezoidal shaped earth pressure."

Response:

The triangular shaped distribution recommended for temporary shoring was developed with consideration to at-rest earth pressure coefficients. These triangular pressure distributions were recommended for the successfully completed braced sheet pile shoring associated with the manifold replacement project within Hurricane Street, adjacent to the site, in 2014 and 2015.

As requested, in lieu of triangular pressure distributions, shoring for the Venice Auxiliary Pumping Plant project should be designed using a uniform rectangular pressure of 24H psf, where H is the height of excavation, for above groundwater. Before groundwater, a uniform rectangular pressure of 18H psf can be used in combination with hydrostatic pressures.

Comment No. 7

"Provide analyses of sheet pile/secant pile cut-off depth for groundwater control. Analyze influence of seepage on the stability of sheeted excavation."

Response:

We have recommended that the deeper auxiliary pump plant and diversion structure excavations be relatively water tight. This is planned to be completed with continuous impervious shoring consisting of sheet piles, secant piles or diaphragm walls with a jet grouted bottom cutoff. Thus, these excavations are not expected to be significantly affected by seepage. As stated in the report, a specialty geotechnical contractor endorsed by a Geotechnical Engineer or Engineering Geologist with at least five years of experience in groundwater control applications for excavations shall determine the cutoff depths. They are also required to provide calculations demonstrating the excavations will have adequate factors of safety against bottom heave and piping.

Based on the exploratory borings and CPTs, laterally continuous clayey layers extend beneath the site. Thus, recommendations were provided for the sewer pipe and header pipe excavations to extend perimeter shoring into the underlying relatively impermeable layers to restrict seepage and to dewater above these

layers. These same recommendations were utilized for the recently completed manifold replacement project within Hurricane Street adjacent to the site. The manifold replacement project included an excavation on the order of 160 feet in length, 22 to 42 feet in width and 12 feet in depth. This excavation was supported with sheetpiles extending to a depth of 30 feet below the ground surface. Five dewatering wells were installed to depths of approximately 20 feet below the ground surface, above the clay layers to reduce pumping volumes. Dewatering was performed for this project for more than a year with discharge rates on the order of 100 to 150 gallons per minute for the complete excavation. Observations wells outside the exaction did not record any significant drawdowns as a result of the pumping.

As requested, we have further analyzed the cut-off depths for the sewer and header pipe excavations using a ground elevation of +1 feet. Analyses were performed with reference to Chapter 6 of NAVFAC Design Manual 7.1 Soil Mechanics. As shown in Appendix E, analyses were performed per the last portion of Figure 3 of this referenced manual with the cutoff assumed to extend to the top of the relatively impermeable clay soils. This figure and the analyses are presented in Appendix E.

The analyses for the header pipe excavation indicate the cut-off depths recommended in the geotechnical report are adequate. This is reasonable since this excavation will be shallower than the excavation for the recently constructed manifold replacement project.

For the deeper slightly deeper sewer pipe excavation, the analyses indicate pressure relief wells or grouting is required. This excavation will be on the order of 14 feet in depth, a couple of feet deeper than the excavation for the recently constructed manifold replacement project. Pressure relief wells in combination with deeper cut-offs could be used for this excavation. However, this would result in much greater pumping volumes and an increased risk of impacting adjacent groundwater levels. Since the sewer pipe excavation will extend between the auxiliary pump plant and the diversion structure (with both structures having jet grouted bottoms to facilitate construction) and will only be approximately 16 feet in length, impervious shoring in combination with jet grouting of the bottom is more appropriate for this excavation. Shoring and jet grouting shall be performed for this excavation in accordance with Section 8.3 of the geotechnical report.

Comment No. 8

"Provide details of construction dewatering using well points, including depth of penetration, screened depth, flow rate, and cone of depression etc."

Response:

Well point dewatering systems are not planned for the deeper auxiliary pump plant and diversion structure excavations as these excavations are planned to

have relatively watertight shoring in combination with jet grouted bottom cutoffs. In response to Comment 7 above, this same condition now applies to the sewer pipe excavation. Any minor water infiltration through the shoring or cutoff is expected to be controlled with sump pumps within the excavation.

For the header pipe excavation, the geotechnical report provides recommendations for the same system of shoring and dewatering that was successfully utilized for the recent manifold construction within Hurricane Street, adjacent to the site. The header pipe excavation will be shallower than the excavation for the manifold replacement project. Similar to the manifold replacement project dewatering wells, dewatering wells for the header pipe excavation are recommended to be constructed and screened above the clay layer. These wells in combination with continuous shoring extending to an elevation of at least -25 feet are expected to result in relatively low pumping rates and are not expected to significantly impact groundwater levels outside the excavation. Based on the pumping rates for the much larger manifold replacement project excavation, pumping rates for the header pipe excavation, shored and dewatered as recommended, is expected to be less than 25 gallons per minute.

Actual design of the dewatering system, including the depth of penetration and screened depth, will be performed by the contractor. The design will be reviewed to ensure it complies with the geotechnical recommendations. The planned method of dewatering is not expected to create a cone of groundwater of depression around the excavation. Monitoring wells will be installed outside the excavation to monitor groundwater levels outside the excavation.

If you have any questions, please contact Patrick Schmidt at (213) 847-4046.



Patrick J. Schmidt, GE 2260
Geotechnical Engineer II

Fred Burnett, CEG 2052
Engineering Geologist I

Attachments: Appendix A - CLADBS Review Letter
Appendix B - CPT Interpretation Data
Appendix C - Liquefaction Analyses
Appendix D - Electrical Building Settlement Calculations
Appendix E - Analyses of Cutoff Depths

Q:\14\14-103 Venice Auxiliary Pump Plant\B&S Response Letter.doc

Appendix A
Building & Safety Review Letter

BOARD OF
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LOS ANGELES, CA 90012

RAYMOND S. CHAN, C.E., S.E.
GENERAL MANAGER

FRANK BUSH
EXECUTIVE OFFICER

GEOLOGY AND SOILS REPORT CORRECTION LETTER

June 13, 2016

LOG # 93303
SOILS/GEOLOGY FILE - 2
LAN

City of Los Angeles
1149 S. Broadway, Suite 600
Los Angeles, CA 90015

TRACT: SILVER STRAND (MP 7-83)
BLOCK: 4
LOTS: 4 and 5
LOCATION: 133 E. Hurricane Street

CURRENT REFERENCE REPORT/LETTER(S)	REPORT No.	DATE OF DOCUMENT	PREPARED BY
Geology/Soils Report	14-103	12/14/2015	Geotechnical Engineering Group
Geotechnical Data Report	2500.061	09/29/2015	Geotechnical Professionals Inc.

The Grading Division of the Department of Building and Safety has reviewed the referenced reports providing recommendations for the proposed Venice Auxiliary Pumping Plant. The proposed project includes the construction of an auxiliary 32 by 55 feet pumping plant (wetwell/valve vault), 25 by 50 feet electrical building, 21 foot square diversion structure, new 23 foot long 66-inch diameter sewer pipeline, and new 42-inch discharge line. The elevation of the proposed structures varies from 5 to 26 feet below sea level. The earth materials at the subsurface exploration locations consist of up to 4 feet of uncertified fill underlain by alluvium. The consultants recommend to utilize continuous, solid impervious shoring and possibly jet grouting to act as a groundwater cut-off and to support the proposed structures on mat-type foundations bearing on native undisturbed soils.

The review of the subject report can not be completed at this time and will be continued upon submittal of an addendum to the report which shall include, but not be limited to, the following:

(Note: Numbers in parenthesis ( ) refer to applicable sections of the 2014 City of LA Building Code. P/BC numbers refer the applicable Information Bulletin. Information Bulletins can be accessed on the internet at LADBS.ORG.)

1. Clarify whether or not the proposed Wetwell (with mat foundation) will have subterranean walls to approximately El. -26 feet.

2. Baseline groundwater elevation shall not be deeper than 5 feet above mean sea level. Revise all calculations and recommendations based on design groundwater of El. +5 feet.

3. Provide CPT interpretation data sheets for all CPTs performed.

4. Two levels of liquefaction analyses shall be performed (reference to Department letter dated 07/16/2014). For layers excluded from liquefaction analysis based on screening criteria, laboratory tests shall be provided. Liquefaction analysis shall be performed on the soil boring with most severe liquefaction potential. Calculation sheets for the liquefaction analysis shall be provided.

5. Provide static settlement analysis based on bearing pressure, foundation size, and compression indices derived from consolidation tests performed. Note that based on the consolidation test results, the silt and clay are highly compressible.

6. Past histories of braced shoring have shown trapezoidal-shaped envelope of earth pressure. Clarify why a triangular shaped distribution is recommended for the internally braced shoring, or revise recommendations to provide trapezoidal shaped earth pressure.

7. Provide analysis of sheet pile / secant pile cut-off depth for groundwater control. Analyze influence of seepage on the stability of sheeted excavation.

8. Provide details of construction dewatering using well points, including depth of penetration, screened depth, flow rate, and cone of depression etc.

The geologist and soils engineer shall prepare a report containing the corrections indicated in this letter. The report shall be in the form of an itemized response. It is recommended that once all correction items have been addressed in a response report, to contact the report review engineer and/or geologist to schedule a verification appointment to demonstrate compliance with all the corrections. Do not schedule an appointment until all corrections have been addressed. Bring two copies of the response report, including one unbound wet-signed original for microfilming in the event that the report is found to be acceptable.

CASEY LEE JENSEN
Engineering Geologist Associate II

YING LIU
Geotechnical Engineer I

CLJ/YL:clj/yl
Log No. 93303
213-482-0480

cc: Abid Chowdry, Applicant
Geotechnical Engineering Group, Project Consultant
Geotechnical Professionals Inc., Project Consultant
WL District Office

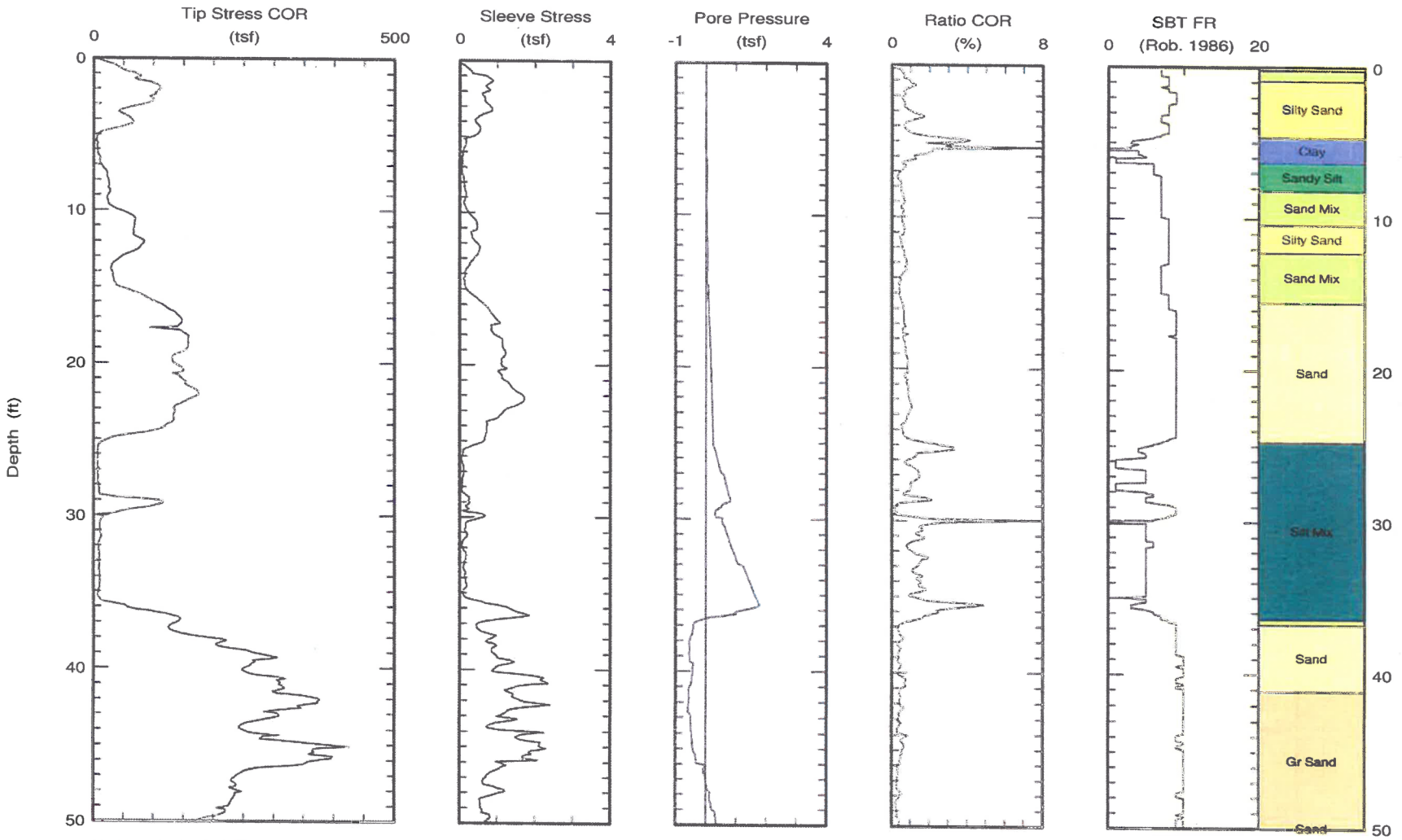
Appendix B
CPT Interpretation Data Sheets

Kehoe Testing & Engineering
Office: (714) 901-7270
Fax: (714) 901-7289
rich@kehoetesting.com
www.kehoetesting.com

CPT Data
30 ton rig

Date: 31/Jul/2015
Test ID: CPT-1
Project: MarinaDelRey

Customer: GPI
Job Site: Venice Auxiliary Pumping Plant / 2500.



Maximum depth: 80 45 (ft)

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CPT Data
30 ton rig

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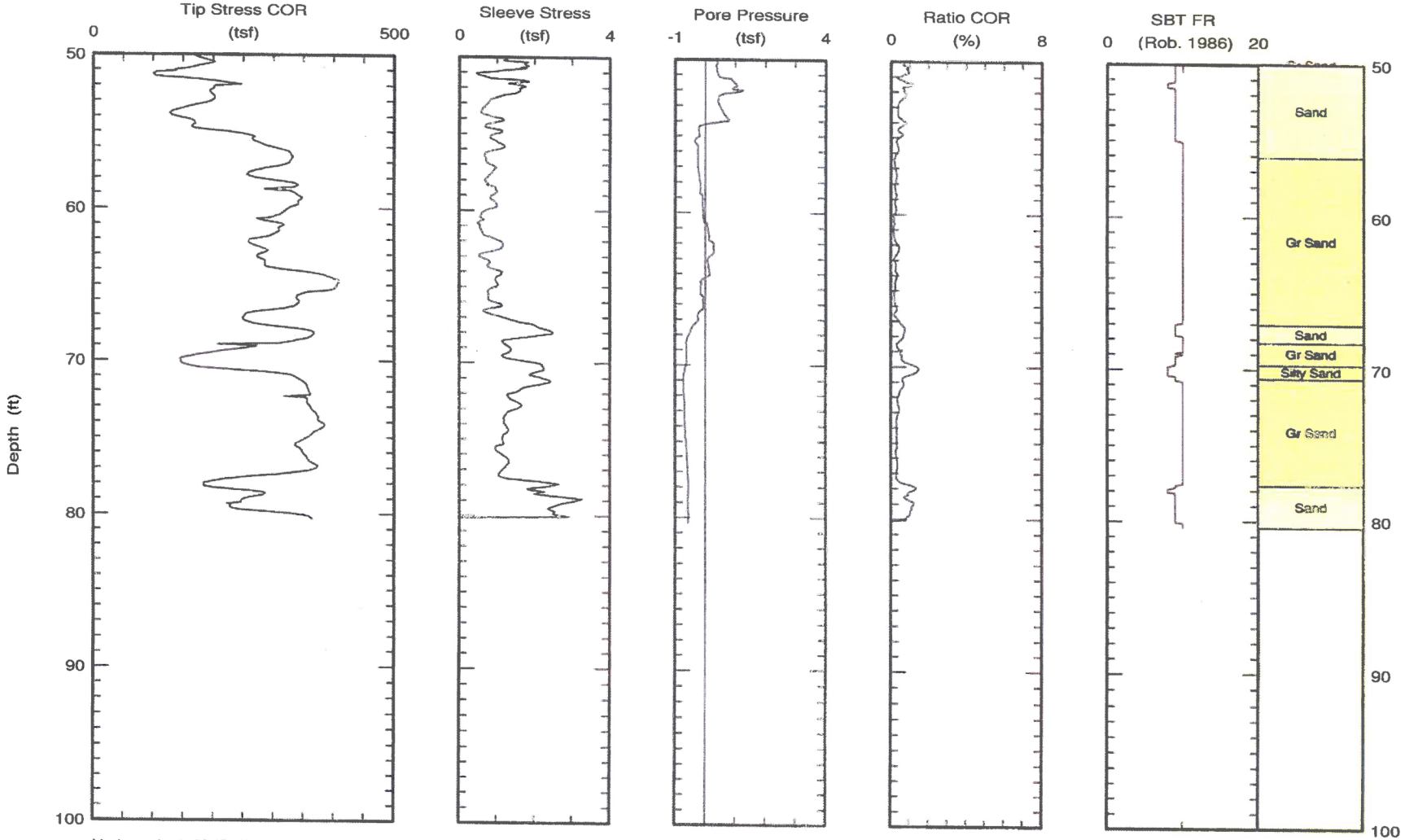

Maximum depth: 80.45 (ft)

CPT-1

	In situ data						Estimations												
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
0.5	37.6	0.21	6	5.50E-04	7	242.30967	71	42	193.33218	242.30967	0	0	0	0.33	0	380.56049	-0.18326	0	0	20
1	70.8	0.69	6	3.87E-04	14	486.18167	86	44	387.91091	486.18167	0	0	0	0.33	0	515.11053	-0.23662	0	0	20
1.5	87.1	0.79	6	4.51E-04	17	581.60475	86	44	464.04634	581.60475	0	0	0	0.33	0	559.85919	-0.23595	0	0	20
2	112.1	0.8	6	8.53E-04	21	667.00104	88	44	532.18168	667.00104	0	0	0	0.33	0	597.78595	-0.24312	0	0	20
2.5	94.5	0.68	6	5.27E-04	18	613.15863	79	43	489.22231	613.15863	0	0	0	0.33	0	577.01941	-0.21236	0	0	20
3	86.9	0.81	6	2.47E-04	18	646.26669	75	43	515.63832	646.26669	0	0	0	0.33	0	589.72369	-0.2013	0	0	20
3.5	42.7	0.66	6	2.39E-05	11	483.33202	57	40	385.63725	483.33202	0	0	0	0.33	0	517.02625	-0.154	0	0	20
4	63	0.42	6	1.80E-04	14	495.24705	61	41	395.14393	495.24705	0	0	0	0.33	0	528.745	-0.14338	0	0	20
4.5	50	0.55	6	4.43E-05	12	505.98541	55	40	403.71176	505.98541	0	0	0	0.33	0	531.17401	-0.13677	0	0	20
5	8.3	0.35	3	1.01E-07	4	112.11793	0	0	0	244.75471	14	0.57203	1.79175	0.33	8.2779	382.38284	0	1.35569	1.60168	20
5.5	7.5	0.17	4	1.92E-07	3	100.56016	0	0	0	195.5337	14	0.51306	1.4265	0.33	6.59041	350.90268	0	1.254	2.95765	20
6	7.7	0.09	4	4.58E-07	3	103.06472	0	0	136.65397	171.27298	14	0.52584	1.29777	0.33	5.99568	336.04141	0	1.21408	5.72582	20
6.5	11.5	0.07	5	2.40E-06	4	156.02541	26	33	153.25623	192.08114	0	0	0	0.33	0	357.44565	0.00391	0	0	20
7	13.1	0.07	5	3.42E-06	4	178.08559	27	33	164.1241	205.70221	0	0	0	0.33	0	369.29706	0.00646	0	0	20
7.5	22.7	0.07	6	2.16E-05	6	258.16947	33	35	205.98628	258.16947	0	0	0	0.33	0	410.89594	-0.00298	0	0	20
8	25.3	0.13	6	1.48E-05	7	308.31289	35	35	245.99433	308.31289	0	0	0	0.33	0	438.47903	-0.02448	0	0	20
8.5	25.7	0.15	5	1.26E-05	7	322.18387	35	35	257.0616	322.18387	0	0	0	0.33	0	445.89639	-0.0295	0	0	20
9	24.6	0.17	5	8.73E-06	7	329.07339	34	35	262.55856	329.07339	0	0	0	0.33	0	448.90158	-0.03298	0	0	20
9.5	25.3	0.14	5	1.20E-05	7	319.27268	34	35	254.73884	319.27268	0	0	0	0.33	0	445.03775	-0.02424	0	0	20
10	42.8	0.24	6	4.11E-05	11	435.85155	43	37	347.7539	435.85155	0	0	0	0.33	0	507.35916	-0.0647	0	0	20
10.5	69.5	0.43	6	1.07E-04	16	597.58043	53	40	476.7929	597.58043	0	0	0	0.33	0	579.763	-0.11253	0	0	20
11	68.5	0.47	6	8.51E-05	16	613.79146	53	39	489.72723	613.79146	0	0	0	0.33	0	586.00055	-0.11282	0	0	20
11.5	67.8	0.34	6	1.30E-04	15	562.35921	52	39	448.69086	562.35921	0	0	0	0.33	0	566.84027	-0.10132	0	0	20
12	83.8	0.47	6	1.75E-04	18	659.50742	57	40	526.20273	659.50742	0	0	0	0.33	0	606.13763	-0.12451	0	0	20
12.5	76.3	0.53	6	9.69E-05	17	667.6404	54	40	532.6918	667.6404	0	0	0	0.33	0	608.15417	-0.11992	0	0	20
13	49.2	0.39	6	2.74E-05	13	538.28578	44	38	429.48334	538.28578	0	0	0	0.33	0	554.02905	-0.08126	0	0	20
13.5	32.2	0.26	5	9.26E-06	9	424.9324	36	36	339.04181	424.9324	0	0	0	0.33	0	501.21143	-0.04823	0	0	20
14	30.9	0.14	6	1.76E-05	8	362.23265	35	35	289.01541	362.23265	0	0	0	0.33	0	472.9241	-0.0211	0	0	20
14.5	33.8	0.14	6	2.40E-05	9	375.1142	36	36	299.29325	375.1142	0	0	0	0.33	0	480.75546	-0.02435	0	0	20
15	41.8	0.18	6	3.86E-05	10	427.41989	40	37	341.0265	427.41989	0	0	0	0.33	0	507.48645	-0.04255	0	0	20
15.5	78.5	0.41	6	1.39E-04	17	642.08561	53	40	512.30235	642.08561	0	0	0	0.33	0	601.099	-0.10805	0	0	20
16	104.4	0.65	6	2.00E-04	22	801.44611	61	41	639.45168	801.44611	0	0	0	0.33	0	659.93341	-0.14131	0	0	20
16.5	127	0.82	6	2.87E-04	26	915.08912	66	42	730.1243	915.08912	0	0	0	0.33	0	698.77692	-0.16156	0	0	20
17	144	0.98	6	3.36E-04	29	1008.86291	70	42	804.94381	1008.8629	0	0	0	0.33	0	728.85803	-0.17714	0	0	20
17.5	143.1	0.86	6	4.06E-04	28	968.52772	69	42	772.76148	968.52772	0	0	0	0.33	0	716.99249	-0.17401	0	0	20
18	149.4	0.94	6	4.02E-04	30	1013.154	70	42	808.36755	1013.154	0	0	0	0.33	0	731.0498	-0.17874	0	0	20
18.5	157.5	1.14	6	3.39E-04	32	1101.83748	72	42	879.12565	1101.8375	0	0	0	0.33	0	757.6076	-0.18536	0	0	20
19	157.3	1.18	6	3.08E-04	32	1119.43076	72	42	893.16284	1119.4308	0	0	0	0.33	0	762.8631	-0.18393	0	0	20
19.5	135.4	1.15	6	1.70E-04	29	1071.44344	66	42	854.87509	1071.4434	0	0	0	0.33	0	748.00824	-0.1699	0	0	20
20	133.3	1.12	6	1.64E-04	29	1061.71162	66	42	847.11033	1061.7116	0	0	0	0.33	0	745.30365	-0.16666	0	0	20
20.5	150.9	1.07	6	2.92E-04	31	1083.19131	69	42	864.24839	1083.1913	0	0	0	0.33	0	752.90222	-0.17365	0	0	20
21	145.8	1.2	6	1.98E-04	31	1122.17652	68	42	895.35361	1122.1765	0	0	0	0.33	0	763.98969	-0.17354	0	0	20

CPT-1

	In situ data								Estimations										
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
21.5	155.8	1.39	6	1.90E-04	33	1207.97793	70	42	963.81218	1207.9779	0	0	0	0.33	0	788.72614	-0.18221	0	0	20
22	175	1.68	6	2.05E-04	37	1339.59231	74	43	1068.8237	1339.5923	0	0	0	0.33	0	825.08984	-0.1963	0	0	20
22.5	154.2	1.64	6	1.24E-04	34	1291.6931	69	42	1030.6062	1291.6931	0	0	0	0.33	0	811.75952	-0.18411	0	0	20
23	134.4	1.18	6	1.32E-04	30	1110.98922	64	41	886.42757	1110.9892	0	0	0	0.33	0	761.16089	-0.16179	0	0	20
23.5	133.1	1	6	1.71E-04	29	1050.16414	63	41	837.89692	1050.1641	0	0	0	0.33	0	743.76068	-0.15522	0	0	20
24	124	0.73	6	2.20E-04	26	933.49894	61	41	744.81299	933.49894	0	0	0	0.33	0	708.44373	-0.13989	0	0	20
24.5	96.8	0.72	6	7.80E-05	22	876.39772	53	40	699.2535	876.39772	0	0	0	0.33	0	688.46344	-0.11798	0	0	20
25	26.7	0.66	4	3.50E-07	10	354.36505	0	0	0	618.1737	14	1.80798	1.9715	0.33	9.10835	587.60413	0	1.40075	2.68458	20
25.5	7.9	0.16	3	1.34E-08	4	46.42221	0	0	0	286.39951	14	0.4643	0.51012	0.33	2.35677	425.30225	0	0.88217	2.84381	20
26	7.6	0.07	4	3.57E-08	4	41.6598	0	0	0	228.3229	14	0.44185	0.48105	0.33	2.22244	391.72134	0	0.86464	6.18586	20
26.5	7.2	0.08	3	2.19E-08	4	35.95359	0	0	0	232.70931	14	0.41238	0.44482	0.33	2.05508	393.72256	0	0.8418	5.05167	20
27	7.5	0.11	3	1.66E-08	4	39.29236	0	0	0	257.10973	14	0.43323	0.46274	0.33	2.13784	408.73404	0	0.85324	3.85968	20
27.5	7.7	0.08	3	2.90E-08	4	41.45596	0	0	0	239.89073	14	0.44704	0.47314	0.33	2.1859	399.39468	0	0.85975	5.4762	20
28	8.2	0.08	4	3.84E-08	4	47.7226	0	0	0	245.75779	14	0.48182	0.50534	0.33	2.33465	403.92679	0	0.87933	5.90235	20
28.5	9.2	0.15	3	2.64E-08	5	62.05654	0	0	0	301.38221	14	0.55227	0.57329	0.33	2.64862	436.46179	0	0.91811	3.60819	20
29	105.9	0.25	6	4.73E-04	21	691.79103	54	40	551.96093	691.79103	0	0	0	0.33	0	631.95886	-0.10382	0	0	20
29.5	86	0.26	6	1.91E-04	18	658.86822	49	39	525.69273	658.86822	0	0	0	0.33	0	617.35156	-0.07886	0	0	20
30	20.9	0.65	4	9.16E-08	9	270.33374	0	0	0	600.94682	14	1.37925	1.37525	0.33	6.35367	581.13055	0	1.23841	2.07949	20
30.5	10.6	0.16	4	3.95E-08	5	80.04036	0	0	0	325.92219	14	0.64252	0.63557	0.33	2.93635	452.0957	0	0.95107	3.93543	20
31	11.7	0.18	4	5.16E-08	5	99.5472	0	0	0	348.15062	14	0.72026	0.70515	0.33	3.2578	464.76721	0	0.98547	3.92142	20
31.5	12.4	0.12	4	1.20E-07	5	112.3946	0	0	0	319.27357	14	0.76937	0.74534	0.33	3.44348	451.25916	0	1.00433	6.28317	20
32	8.5	0.09	3	2.77E-08	4	45.30817	0	0	0	265.19742	14	0.49026	0.47151	0.33	2.17838	417.54388	0	0.85874	5.33843	20
32.5	9.6	0.2	3	1.51E-08	5	60.23091	0	0	0	343.07037	14	0.56809	0.54094	0.33	2.49914	460.68649	0	0.90005	2.78363	20
33	9.6	0.14	3	2.55E-08	5	59.5895	0	0	0	311.6325	14	0.56767	0.53557	0.33	2.47432	444.67279	0	0.89698	3.97372	20
33.5	9.8	0.13	3	3.11E-08	5	62.26304	0	0	0	308.89473	14	0.5829	0.54498	0.33	2.51779	443.77405	0	0.90234	4.39419	20
34	10	0.16	3	2.44E-08	5	64.61336	0	0	0	330.13895	14	0.59658	0.55258	0.33	2.55293	455.25122	0	0.90663	3.65406	20
34.5	10.5	0.19	3	2.32E-08	5	71.77422	0	0	0	352.98487	14	0.63179	0.57962	0.33	2.67784	467.60815	0	0.92156	3.25869	20
35	7.9	0.08	3	1.89E-08	4	35.38902	0	0	0	258.15205	14	0.44538	0.4054	0.33	1.87293	414.07965	0	0.76382	5.45593	24.15015
35.5	9.6	0.39	3	4.14E-09	6	56.60245	0	0	0	432.05276	14	0.56625	0.51	0.33	2.35622	505.18878	0	0.81844	1.42287	25.94108
36	54.8	1.32	5	1.36E-06	19	742.32019	37	36	808.67481	1013.5391	0	0	0	0.33	0	731.04663	-0.1172	0	0	20
36.5	122.3	1.83	6	2.32E-05	32	1375.26166	56	40	1097.2832	1375.2617	0	0	0	0.33	0	836.82214	-0.1498	0	0	20
37	140.4	0.47	6	5.13E-04	27	902.88833	60	41	720.38963	902.88833	0	0	0	0.33	0	705.38892	-0.13207	0	0	20
37.5	127	0.56	6	2.50E-04	26	928.2686	57	40	740.63984	928.2686	0	0	0	0.33	0	712.0802	-0.11823	0	0	20
38	181.6	0.83	6	5.95E-04	35	1140.3877	68	42	909.88381	1140.3877	0	0	0	0.33	0	776.98578	-0.16773	0	0	20
38.5	205.4	0.97	6	7.56E-04	39	1236.75838	72	42	986.77531	1236.7584	0	0	0	0.33	0	804.39801	-0.18488	0	0	20
39	265.7	1.02	6	2.09E-03	45	1334.12983	82	44	1064.4653	1334.1298	0	0	0	0.33	0	832.10309	-0.22231	0	0	20
39.5	267.8	1.47	6	1.05E-03	49	1523.31132	82	44	1215.408	1523.3113	0	0	0	0.33	0	879.64478	-0.2218	0	0	20
40	251.3	0.9	6	2.00E-03	43	1271.72533	79	43	1014.6745	1271.7253	0	0	0	0.33	0	815.87512	-0.21258	0	0	20
40.5	279.6	2.15	6	5.49E-04	54	1788.68472	83	44	1427.1421	1788.6847	0	0	0	0.33	0	942.51495	-0.22536	0	0	20
41	310.6	1.77	6	1.31E-03	55	1697.72289	87	44	1354.5661	1697.7229	0	0	0	0.33	0	922.39758	-0.24087	0	0	20
41.5	303.6	1.32	6	2.14E-03	52	1518.7661	86	44	1211.7815	1518.7661	0	0	0	0.33	0	880.00531	-0.23749	0	0	20
42	373.2	1.57	7	3.72E-03	60	1692.07197	96	45	1350.0574	1692.072	0	0	0	0.33	0	922.40442	-0.2674	0	0	20

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	In situ data								Estimations										
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
42.5	339.2	1.59	6	2.34E-03	57	1671.13101	91	45	1333.3492	1671.131	0	0	0	0.33	0	917.18213	-0.25204	0	0	20
43	307.1	1.03	7	3.47E-03	50	1407.79399	86	44	1123.2399	1407.794	0	0	0	0.33	0	853.30701	-0.23767	0	0	20
43.5	265.1	0.91	6	2.23E-03	45	1314.15722	80	43	1048.5297	1314.1572	0	0	0	0.33	0	828.66327	-0.21485	0	0	20
44	246.1	1.86	6	3.84E-04	49	1675.73382	76	43	1337.0217	1675.7338	0	0	0	0.33	0	917.13641	-0.19971	0	0	20
44.5	281.8	1.57	6	9.95E-04	52	1617.35384	81	44	1290.4419	1617.3538	0	0	0	0.33	0	904.23199	-0.22041	0	0	20
45	390	2.14	6	2.16E-03	66	1949.77406	96	45	1555.6708	1949.7741	0	0	0	0.33	0	981.10229	-0.26821	0	0	20
45.5	367.2	1.92	6	2.07E-03	63	1849.5288	93	45	1475.6879	1849.5288	0	0	0	0.33	0	959.01379	-0.25864	0	0	20
46	376.3	0.91	7	9.81E-03	56	1430.73635	95	45	1141.545	1430.7364	0	0	0	0.33	0	861.65375	-0.26519	0	0	20
46.5	276	0.99	6	2.11E-03	47	1381.95628	80	43	1102.6247	1381.9563	0	0	0	0.33	0	847.31342	-0.216	0	0	20
47	239.1	0.7	6	2.00E-03	41	1207.55964	74	43	963.47843	1207.5596	0	0	0	0.33	0	801.43665	-0.1944	0	0	20
47.5	234.7	0.67	6	1.95E-03	40	1190.38248	73	43	949.77326	1190.3825	0	0	0	0.33	0	796.9212	-0.19097	0	0	20
48	239.7	1.11	6	8.71E-04	44	1406.24465	73	43	1122.0037	1406.2447	0	0	0	0.33	0	853.02966	-0.19113	0	0	20
48.5	233.6	0.53	6	2.63E-03	39	1121.36371	73	43	894.70508	1121.3637	0	0	0	0.33	0	779.06702	-0.18978	0	0	20
49	225.6	0.57	6	2.01E-03	39	1136.47963	71	42	906.76566	1136.4796	0	0	0	0.33	0	782.82892	-0.18333	0	0	20
49.5	215.3	0.82	6	8.97E-04	40	1254.4166	69	42	1000.8643	1254.4166	0	0	0	0.33	0	813.80841	-0.1735	0	0	20
50	171.3	0.95	6	2.41E-04	36	1261.49519	61	41	1006.5121	1261.4952	0	0	0	0.33	0	814.36847	-0.13831	0	0	20
50.5	202.1	1.68	6	1.62E-04	44	1603.12231	65	42	1279.087	1603.1223	0	0	0	0.33	0	901.35657	-0.16555	0	0	20
51	144.3	0.88	6	1.23E-04	32	1196.1109	55	40	954.3438	1196.1109	0	0	0	0.33	0	796.16913	-0.11833	0	0	20
51.5	132	1.54	6	2.66E-05	34	1440.97248	51	39	1149.7121	1440.9725	0	0	0	0.33	0	860.24237	-0.12369	0	0	20
52	225.9	1.66	6	2.65E-04	47	1641.45586	69	42	1309.6722	1641.4559	0	0	0	0.33	0	911.40552	-0.17415	0	0	20
52.5	195.8	1.17	6	2.76E-04	40	1409.10896	64	41	1124.2891	1409.109	0	0	0	0.33	0	854.26703	-0.15204	0	0	20
53	199.4	0.78	6	6.25E-04	38	1237.89054	65	41	987.67862	1237.8905	0	0	0	0.33	0	810.26862	-0.15589	0	0	20
53.5	149.6	0.6	6	2.60E-04	31	1082.89968	55	40	864.0157	1082.8997	0	0	0	0.33	0	766.16193	-0.11191	0	0	20
54	135	1.11	6	5.26E-05	33	1301.72533	51	39	1038.6106	1301.7253	0	0	0	0.33	0	825.36786	-0.11235	0	0	20
54.5	170.5	0.68	6	3.70E-04	34	1159.39622	59	41	925.05017	1159.3962	0	0	0	0.33	0	788.67883	-0.12892	0	0	20
55	221	0.99	6	6.15E-04	42	1376.24463	68	42	1098.0675	1376.2446	0	0	0	0.33	0	847.41693	-0.16786	0	0	20
55.5	266	0.99	6	1.42E-03	47	1427.15184	75	43	1138.685	1427.1518	0	0	0	0.33	0	861.3714	-0.19723	0	0	20
56	296.4	1.12	6	1.83E-03	51	1520.46712	79	43	1213.1387	1520.4671	0	0	0	0.33	0	884.92633	-0.21323	0	0	20
56.5	329.4	0.69	7	6.69E-03	51	1338.33657	85	44	1067.8217	1338.3366	0	0	0	0.33	0	841.37238	-0.23301	0	0	20
57	326.4	0.82	7	4.84E-03	52	1405.93057	84	44	1121.7531	1405.9306	0	0	0	0.33	0	857.99524	-0.22984	0	0	20
57.5	274.6	0.91	6	1.82E-03	48	1408.8326	76	43	1124.0686	1408.8326	0	0	0	0.33	0	857.69324	-0.20023	0	0	20
58	272	0.68	6	2.79E-03	45	1290.98663	76	43	1030.0425	1290.9866	0	0	0	0.33	0	828.30951	-0.20002	0	0	20
58.5	340.8	1	7	4.05E-03	55	1516.25738	85	44	1209.7798	1516.2574	0	0	0	0.33	0	885.43292	-0.23366	0	0	20
59	335.9	0.91	7	4.42E-03	54	1470.52526	85	44	1173.2914	1470.5253	0	0	0	0.33	0	874.52911	-0.23137	0	0	20
59.5	342.5	0.97	7	4.28E-03	55	1508.70061	85	44	1203.7505	1508.7006	0	0	0	0.33	0	883.97186	-0.23346	0	0	20
60	325.3	0.73	7	5.36E-03	51	1374.68698	83	44	1096.8247	1374.687	0	0	0	0.33	0	851.38678	-0.22644	0	0	20
60.5	303.7	0.57	7	5.58E-03	47	1272.97036	80	43	1015.6678	1272.9704	0	0	0	0.33	0	826.00195	-0.21614	0	0	20
61	311.1	0.57	7	6.14E-03	48	1281.80029	81	44	1022.713	1281.8003	0	0	0	0.33	0	828.65857	-0.21956	0	0	20
61.5	309.6	0.62	7	5.29E-03	49	1310.30732	81	44	1045.458	1310.3073	0	0	0	0.33	0	835.72644	-0.21767	0	0	20
62	268.1	1.07	6	1.09E-03	49	1508.22506	73	43	1203.3711	1508.2251	0	0	0	0.33	0	883.40222	-0.18889	0	0	20
62.5	274.5	1.12	6	1.10E-03	50	1541.4136	74	43	1229.8513	1541.4136	0	0	0	0.33	0	891.6662	-0.19171	0	0	20
63	277.8	0.53	7	3.90E-03	45	1240.27059	75	43	989.57759	1240.2706	0	0	0	0.33	0	817.88013	-0.19887	0	0	20

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	In situ data								Estimations										
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
63.5	286.2	0.8	6	2.38E-03	48	1397.96565	76	43	1115.3981	1397.9657	0	0	0	0.33	0	857.30927	-0.20026	0	0	20
64	318.3	1.16	6	1.98E-03	55	1608.69362	80	43	1283.5321	1608.6936	0	0	0	0.33	0	908.67261	-0.21419	0	0	20
64.5	393.4	0.97	7	7.29E-03	60	1574.23044	90	45	1256.0349	1574.2304	0	0	0	0.33	0	901.74036	-0.2507	0	0	20
65	405.7	1.02	7	7.62E-03	62	1610.84103	92	45	1285.2455	1610.841	0	0	0	0.33	0	910.54919	-0.25485	0	0	20
65.5	356.2	0.77	7	6.61E-03	55	1449.22697	86	44	1156.2981	1449.227	0	0	0	0.33	0	871.98279	-0.23479	0	0	20
66	340.8	0.87	7	4.37E-03	54	1493.40942	83	44	1191.5501	1493.4094	0	0	0	0.33	0	882.35449	-0.22575	0	0	20
66.5	324.9	0.68	7	5.13E-03	51	1382.09958	81	44	1102.739	1382.0996	0	0	0	0.33	0	855.51123	-0.21912	0	0	20
67	252.7	1.11	6	6.76E-04	48	1545.25176	69	42	1232.9136	1545.2518	0	0	0	0.33	0	893.73682	-0.17144	0	0	20
67.5	263.2	1.99	6	2.43E-04	55	1937.27129	69	42	1545.6952	1937.2713	0	0	0	0.33	0	983.59161	-0.17386	0	0	20
68	361.1	2.5	6	6.45E-04	69	2236.93403	82	44	1784.7878	2236.934	0	0	0	0.33	0	1047.06299	-0.2216	0	0	20
68.5	357.6	1.24	6	2.72E-03	60	1707.48632	83	44	1362.3561	1707.4863	0	0	0	0.33	0	933.29407	-0.22731	0	0	20
69	276.8	1.35	6	6.73E-04	53	1695.36069	71	42	1352.6814	1695.3607	0	0	0	0.33	0	929.98523	-0.18187	0	0	20
69.5	199.3	1.14	6	1.93E-04	42	1520.51696	59	40	1213.1784	1520.517	0	0	0	0.33	0	887.9278	-0.13213	0	0	20
70	146.3	1.99	5	1.35E-05	40	1793.01706	47	38	1430.5987	1793.0171	0	0	0	0.33	0	951.56873	-0.11639	0	0	20
70.5	188.9	2.25	6	3.47E-05	47	1962.81899	55	40	1566.079	1962.819	0	0	0	0.33	0	989.7157	-0.13808	0	0	20
71	333.1	2.19	6	5.53E-04	64	2118.09314	77	43	1689.9679	2118.0931	0	0	0	0.33	0	1023.42224	-0.20498	0	0	20
71.5	354.5	1.99	6	9.11E-04	65	2061.19374	80	43	1644.5695	2061.1937	0	0	0	0.33	0	1011.71722	-0.2162	0	0	20
72	359.7	1.4	6	2.03E-03	62	1809.69047	82	44	1443.902	1809.6905	0	0	0	0.33	0	957.4035	-0.22234	0	0	20
72.5	357.7	1.48	6	1.74E-03	62	1849.1097	81	44	1475.3535	1849.1097	0	0	0	0.33	0	966.28156	-0.22005	0	0	20
73	361.6	1.57	6	1.61E-03	63	1897.01566	81	44	1513.5763	1897.0157	0	0	0	0.33	0	976.96356	-0.22054	0	0	20
73.5	372.5	1.21	7	3.09E-03	61	1737.38619	84	44	1386.2124	1737.3862	0	0	0	0.33	0	941.72742	-0.22817	0	0	20
74	377.7	1.21	7	3.26E-03	62	1744.25206	84	44	1391.6905	1744.2521	0	0	0	0.33	0	943.45978	-0.22996	0	0	20
74.5	376.3	1.32	6	2.68E-03	63	1800.82198	83	44	1436.8261	1800.822	0	0	0	0.33	0	956.26086	-0.22766	0	0	20
75	357.8	1.16	6	2.67E-03	60	1712.12542	81	44	1366.0575	1712.1254	0	0	0	0.33	0	936.36835	-0.21977	0	0	20
75.5	336.6	0.98	6	2.68E-03	56	1607.44505	79	43	1282.536	1607.4451	0	0	0	0.33	0	912.32391	-0.21039	0	0	20
76	348.8	1.12	6	2.47E-03	59	1692.01488	80	43	1350.0119	1692.0149	0	0	0	0.33	0	932.03577	-0.21449	0	0	20
76.5	358.5	1.34	6	1.97E-03	62	1811.78836	80	43	1445.5758	1811.7884	0	0	0	0.33	0	959.19885	-0.2165	0	0	20
77	371.7	1.15	7	3.11E-03	61	1729.67128	82	44	1380.0569	1729.6713	0	0	0	0.33	0	941.04285	-0.2241	0	0	20
77.5	288.1	1.11	6	9.65E-04	53	1651.06863	70	42	1317.342	1651.0686	0	0	0	0.33	0	922.64886	-0.179	0	0	20
78	188.1	2.57	6	2.02E-05	49	2150.39215	52	39	1715.7384	2150.3922	0	0	0	0.33	0	1032.08167	-0.13261	0	0	20
78.5	260.7	2.15	6	1.47E-04	57	2096.08426	64	41	1672.4077	2096.0843	0	0	0	0.33	0	1020.96826	-0.16022	0	0	20
79	254.6	3.05	6	5.79E-05	61	2421.12203	62	41	1931.7463	2421.122	0	0	0	0.33	0	1086.82837	-0.16275	0	0	20
79.5	228.4	2.4	6	5.84E-05	54	2163.35379	58	40	1726.0802	2163.3538	0	0	0	0.33	0	1035.29553	-0.14601	0	0	20
80	328.3	2.69	6	2.61E-04	68	2387.576	72	42	1904.9809	2387.576	0	0	0	0.33	0	1080.49658	-0.18774	0	0	20

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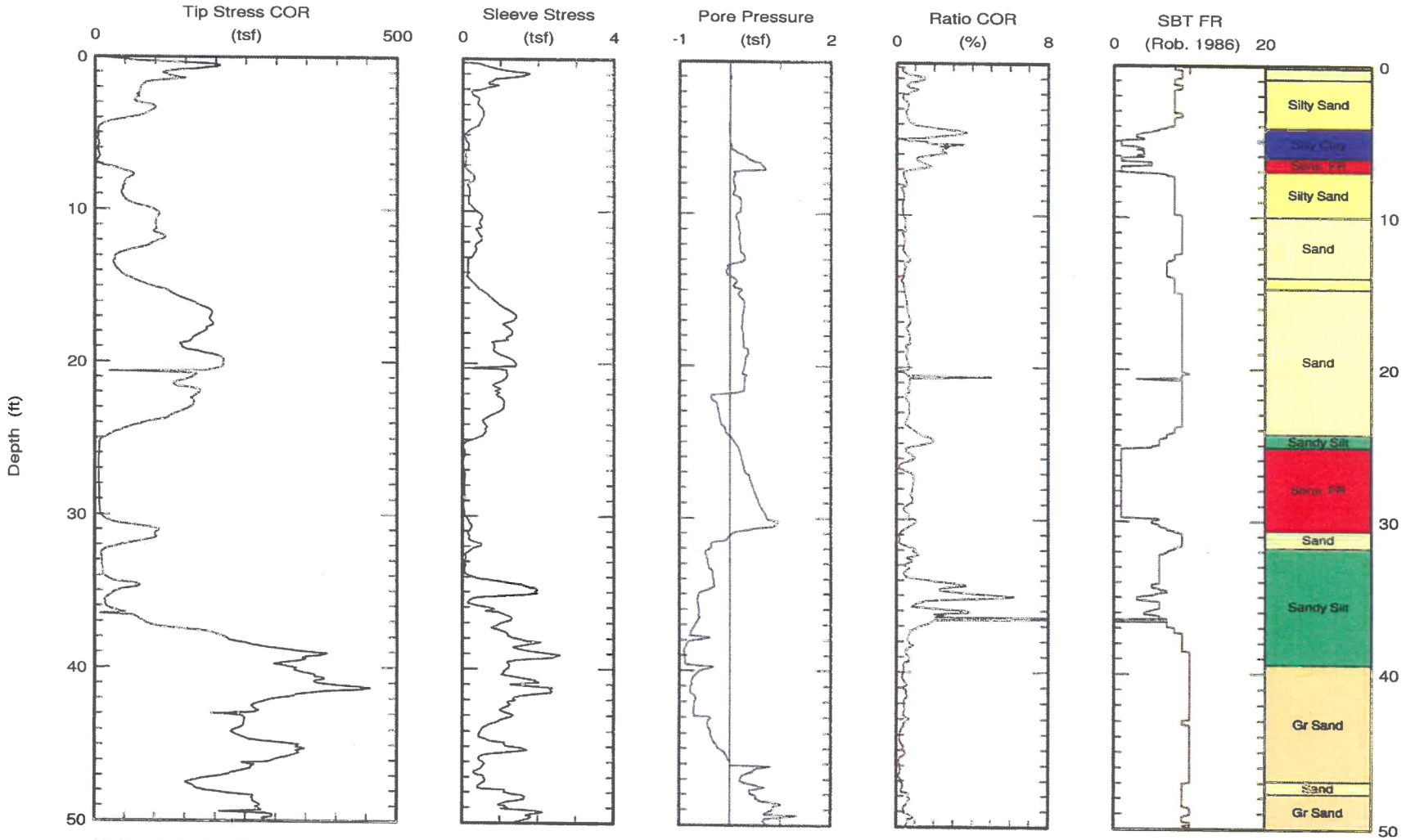
CPT Data
30 ton rig

Date: 31/Jul/2015
Test ID: CPT-2
Project: MarinaDelRey

Customer: GPI
Job Site: Venice Auxiliary Pumping Plant / 2500.



Maximum depth: 60.58 (ft)

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CPT Data
30 ton rig

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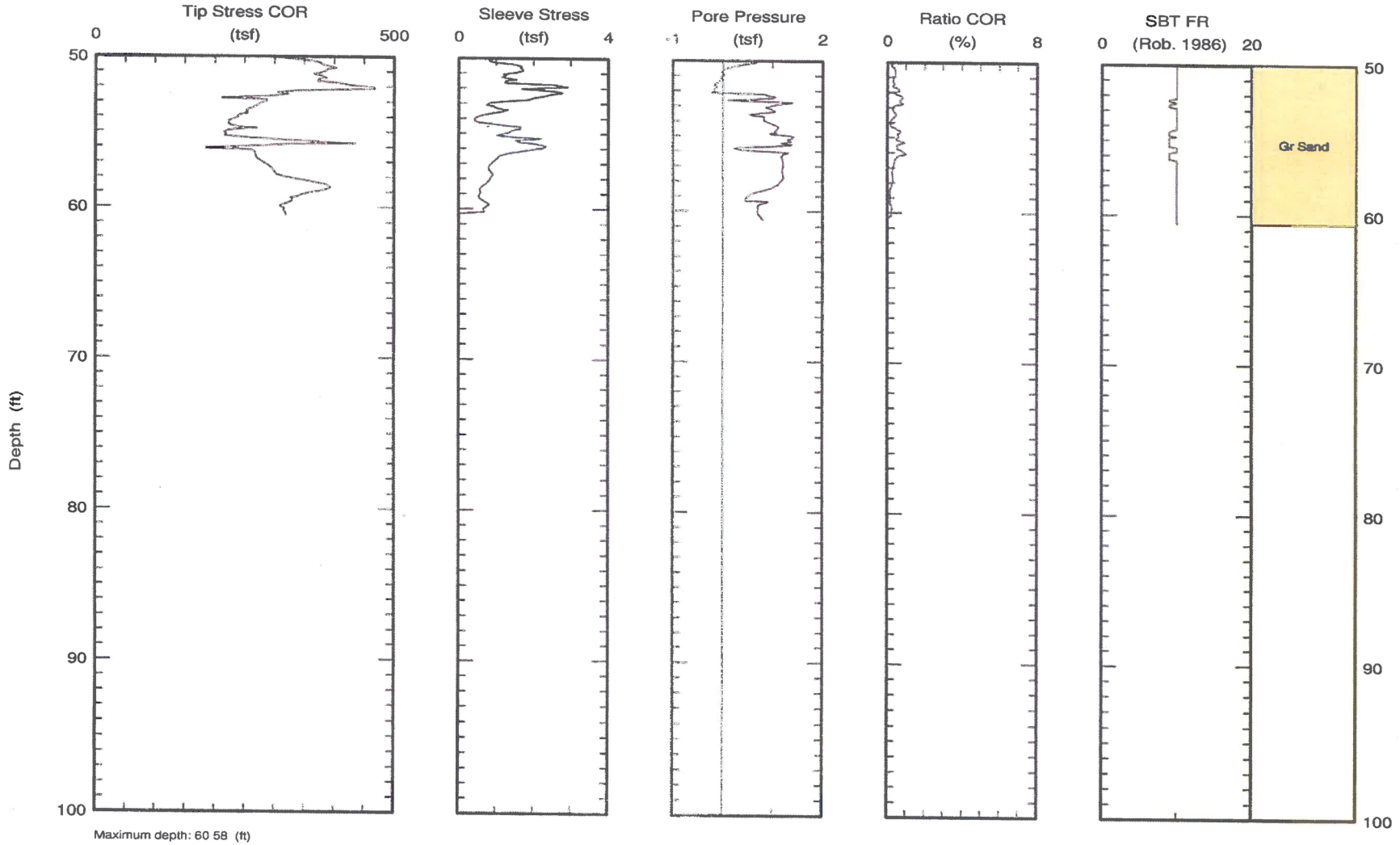

Maximum depth: 60 58 (ft)

CPT-2

	In situ data						Estimations													
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
0.5	199.7	0.65	7	1.58E-02	28	701.11577	100	47	559.40088	701.11577	0	0	0	0.33	0	613.16577	-0.32543	0	0	20
1	116.4	1.77	6	3.16E-04	24	829.34761	100	47	661.71352	829.34761	0	0	0	0.33	0	650.78394	-0.30811	0	0	20
1.5	124.5	0.74	6	1.61E-03	22	660.65351	93	45	527.11716	660.65351	0	0	0	0.33	0	595.71497	-0.25907	0	0	20
2	76.8	0.53	6	4.49E-04	15	512.90826	75	43	409.23531	512.90826	0	0	0	0.33	0	533.00726	-0.19655	0	0	20
2.5	70.5	0.38	6	4.70E-04	14	466.8489	68	42	372.48583	466.8489	0	0	0	0.33	0	514.39563	-0.17005	0	0	20
3	72	0.42	6	3.76E-04	14	496.13939	67	42	395.8559	496.13939	0	0	0	0.33	0	528.46686	-0.16559	0	0	20
3.5	95.6	0.56	6	5.67E-04	18	611.77436	73	43	488.11784	611.77436	0	0	0	0.33	0	579.78278	-0.19084	0	0	20
4	59.8	0.51	6	1.09E-04	13	515.19827	60	41	411.06245	515.19827	0	0	0	0.33	0	536.25732	-0.14776	0	0	20
4.5	10	0.34	4	2.58E-07	4	136.30772	0	0	0	251.3095	14	0.69545	2.21358	0.33	10.22676	387.03357	0	1.45735	2.00453	20
5	5.6	0.04	5	5.41E-07	2	74.42034	21	31	95.71532	119.9632	0	0	0	0.33	0	291.43008	0.01497	0	0	20
5.5	5.3	0.12	4	8.94E-08	2	69.93099	0	0	0	156.16349	14	0.35679	1.05814	0.33	4.8886	318.92911	0	1.13221	2.91379	20
6	5.1	0.12	4	6.63E-08	2	64.8389	0	0	0	158.13596	14	0.34232	0.96639	0.33	4.46473	321.07217	0	1.09763	2.79558	20
6.5	8.5	0.12	4	4.10E-07	3	114.95389	0	0	155.46245	194.84627	14	0.5865	1.38801	0.33	6.41262	354.15625	0	1.24232	4.78975	20
7	6.2	0.06	4	2.81E-07	2	80.67319	0	0	0	150.76701	14	0.42371	0.97142	0.33	4.48798	321.00757	0	1.02432	6.92052	33.67053
7.5	51.6	0.22	6	1.15E-04	12	438.30586	48	39	349.71212	438.30586	0	0	0	0.33	0	509.20645	-0.08258	0	0	20
8	55.2	0.3	6	8.93E-05	13	490.83652	49	39	391.62488	490.83652	0	0	0	0.33	0	532.93054	-0.09247	0	0	20
8.5	46.9	0.19	6	8.65E-05	11	418.59707	45	38	333.98703	418.59707	0	0	0	0.33	0	500.6391	-0.0675	0	0	20
9	45.2	0.18	6	7.81E-05	10	410.7275	44	38	327.70811	410.7275	0	0	0	0.33	0	497.03226	-0.06232	0	0	20
9.5	56.3	0.19	6	1.58E-04	12	450.93693	48	39	359.7901	450.93693	0	0	0	0.33	0	518.54309	-0.0782	0	0	20
10	97.5	0.38	6	4.81E-04	19	640.73359	62	41	511.22361	640.73359	0	0	0	0.33	0	600.53717	-0.14025	0	0	20
10.5	103.2	0.51	6	3.74E-04	21	709.87069	63	41	566.38619	709.87069	0	0	0	0.33	0	625.86792	-0.1481	0	0	20
11	100.7	0.51	6	3.30E-04	20	708.16567	62	41	565.0258	708.16567	0	0	0	0.33	0	625.27588	-0.14344	0	0	20
11.5	98.8	0.45	6	3.61E-04	20	683.23805	61	41	545.13675	683.23805	0	0	0	0.33	0	616.72253	-0.13841	0	0	20
12	107.7	0.46	6	4.74E-04	21	709.25365	63	41	565.89387	709.25365	0	0	0	0.33	0	627.34821	-0.14768	0	0	20
12.5	74.4	0.37	6	1.53E-04	16	599.77026	53	40	478.5401	599.77026	0	0	0	0.33	0	583.20496	-0.10732	0	0	20
13	35.1	0.26	5	1.34E-05	10	435.03284	38	36	347.10067	435.03284	0	0	0	0.33	0	506.638	-0.05102	0	0	20
13.5	31.5	0.14	6	1.94E-05	8	363.2388	35	36	289.81819	363.2388	0	0	0	0.33	0	473.4762	-0.02256	0	0	20
14	40.5	0.15	6	4.49E-05	10	403.14866	39	37	321.66117	403.14866	0	0	0	0.33	0	496.15762	-0.03745	0	0	20
14.5	61.2	0.22	6	1.31E-04	14	504.89063	47	38	402.83827	504.89063	0	0	0	0.33	0	545.47491	-0.07556	0	0	20
15	93.4	0.41	6	2.80E-04	19	674.78871	58	40	538.39524	674.78871	0	0	0	0.33	0	615.0766	-0.12169	0	0	20
15.5	129.6	0.7	6	4.26E-04	26	869.84329	67	42	694.0239	869.84329	0	0	0	0.33	0	684.43304	-0.16495	0	0	20
16	160.1	0.93	6	5.89E-04	31	1014.4154	74	43	809.37399	1014.4154	0	0	0	0.33	0	731.23279	-0.19252	0	0	20
16.5	188.6	1.25	6	6.40E-04	36	1177.9778	80	43	939.8759	1177.9778	0	0	0	0.33	0	779.84058	-0.21422	0	0	20
17	191.9	1.41	6	5.28E-04	37	1240.6761	80	43	989.90114	1240.6761	0	0	0	0.33	0	797.3775	-0.21583	0	0	20
17.5	196.6	1.15	6	8.51E-04	37	1165.97493	80	43	930.29915	1165.9749	0	0	0	0.33	0	777.44543	-0.21616	0	0	20
18	182.3	1.32	6	4.66E-04	36	1204.74775	77	43	961.2349	1204.7478	0	0	0	0.33	0	787.65491	-0.20578	0	0	20
18.5	161.1	1.12	6	3.78E-04	32	1105.09413	72	43	881.72404	1105.0941	0	0	0	0.33	0	758.95404	-0.18712	0	0	20
19	144.7	0.85	6	3.97E-04	29	983.04478	68	42	784.34424	983.04478	0	0	0	0.33	0	722.51813	-0.17007	0	0	20
19.5	194.4	1.1	6	8.13E-04	36	1161.84489	78	43	927.0039	1161.8449	0	0	0	0.33	0	777.17133	-0.20922	0	0	20
20	213	1.41	6	7.16E-04	40	1303.08875	82	44	1039.6985	1303.0888	0	0	0	0.33	0	816.36102	-0.22135	0	0	20
20.5	195.7	1.16	6	7.24E-04	37	1194.02107	78	43	952.67639	1194.0211	0	0	0	0.33	0	786.57489	-0.20779	0	0	20
21	162.4	1.14	6	3.37E-04	33	1136.16735	71	42	906.5165	1136.1674	0	0	0	0.33	0	769.08588	-0.18131	0	0	20
21.5	130.5	0.83	6	2.40E-04	27	969.02373	63	41	773.15723	969.02373	0	0	0	0.33	0	718.61169	-0.15193	0	0	20

CPT-2

	In situ data						Estimations													
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
22	174.4	0.96	6	6.01E-04	33	1098.51134	73	43	876.47181	1098.5113	0	0	0	0.33	0	759.57422	-0.18771	0	0	20
22.5	164.9	1.1	6	3.61E-04	33	1138.58109	70	42	908.44236	1138.5811	0	0	0	0.33	0	770.60541	-0.17931	0	0	20
23	158.7	1.08	6	3.11E-04	32	1124.73902	69	42	897.39816	1124.739	0	0	0	0.33	0	766.61426	-0.17271	0	0	20
23.5	127.6	0.7	6	2.69E-04	26	926.59484	61	41	739.3044	926.59484	0	0	0	0.33	0	706.52374	-0.14138	0	0	20
24	85.4	0.6	6	6.37E-05	20	800.07658	50	39	638.35898	800.07658	0	0	0	0.33	0	662.38635	-0.10346	0	0	20
24.5	44.9	0.62	5	3.81E-06	14	608.77067	37	36	550.04313	689.38738	0	0	0	0.33	0	618.3692	-0.07832	0	0	20
25	16.4	0.28	4	1.75E-07	7	209.70873	0	0	0	414.48166	14	1.06994	1.16708	0.33	5.3919	497.53372	0	1.1708	3.7448	20
25.5	7.6	0.04	4	7.02E-08	3	41.55444	0	0	0	201.5874	14	0.44088	0.48089	0.33	2.22169	376.22498	0	0.86454	10.80154	20
26	7.3	0.07	3	2.83E-08	4	37.20872	0	0	0	225.39947	14	0.41828	0.45386	0.33	2.09685	389.42163	0	0.84761	5.85586	20
26.5	6.4	0.01	1	9.29E-08	3	26.15872	0	0	0	153.35649	14	0.35284	0.37825	0.33	1.74753	336.1535	0	0.79639	34.5784	20
27	6.7	0.05	4	2.63E-08	3	29.16129	0	0	0	203.70317	14	0.37307	0.3988	0.33	1.84247	375.4726	0	0.81093	7.31221	20
27.5	7	0.07	3	2.08E-08	4	32.25177	0	0	0	224.49924	14	0.39408	0.41756	0.33	1.92911	388.82886	0	0.82378	5.5171	20
28	7.2	0.06	4	2.84E-08	4	34.16536	0	0	0	219.31504	14	0.40732	0.42795	0.33	1.97712	386.45554	0	0.83073	6.65295	20
28.5	7.8	0.06	4	4.12E-08	4	41.19158	0	0	0	226.16102	14	0.44914	0.46791	0.33	2.16176	392.03455	0	0.85649	7.33603	20
29	8.1	0.06	4	4.81E-08	4	44.64545	0	0	0	229.92991	14	0.46963	0.48502	0.33	2.24081	395.09125	0	0.86708	7.67066	20
29.5	8.5	0.04	4	9.38E-08	4	49.58889	0	0	0	215.88248	14	0.49756	0.50849	0.33	2.34924	388.71161	0	0.88121	12.19017	20
30	9.3	0.09	4	5.29E-08	4	61.06845	0	0	0	266.60361	14	0.55395	0.56246	0.33	2.59858	418.20355	0	0.91214	6.03185	20
30.5	31.6	0.2	5	4.17E-06	10	420.78287	29	34	374.08595	468.85439	0	0	0	0.33	0	531.26813	-0.01092	0	0	20
31	107	0.16	6	7.23E-04	20	646.24335	54	40	515.61969	646.24335	0	0	0	0.33	0	619.87994	-0.10267	0	0	20
31.5	102.4	0.16	6	6.01E-04	20	638.56867	53	39	509.49628	638.56867	0	0	0	0.33	0	616.49536	-0.09547	0	0	20
32	46.4	0.49	5	4.93E-06	14	623.76965	35	36	537.91192	674.18294	0	0	0	0.33	0	615.89185	-0.05814	0	0	20
32.5	11.8	0.09	4	1.23E-07	5	94.44935	0	0	0	292.50363	14	0.70837	0.68027	0.33	3.14285	436.86459	0	0.97344	7.71339	20
33	13.4	0.05	5	4.29E-07	5	125.96936	18	29	215.95423	270.66263	0	0	0	0.33	0	428.99786	0.0506	0	0	20
33.5	14.6	0.06	5	5.11E-07	5	152.3409	19	29	230.92623	289.42754	0	0	0	0.33	0	440.03912	0.04406	0	0	20
34	16.3	0.25	4	1.20E-07	7	193.32997	0	0	0	425.73052	14	1.02618	0.96121	0.33	4.44081	506.25092	0	1.09561	4.02262	20
34.5	53.9	1.48	5	1.05E-06	19	727.13707	37	36	829.49457	1039.6332	0	0	0	0.33	0	738.02966	-0.12802	0	0	20
35	39	1.92	3	1.36E-07	16	517.37146	0	0	0	1071.4922	14	2.63965	2.4076	0.33	11.12313	745.88739	0	1.49983	1.34732	20
35.5	19.1	0.23	4	2.55E-07	7	238.33975	0	0	0	440.39502	14	1.21602	1.10041	0.33	5.08388	515.44879	0	1.14748	5.1813	20
36	18.6	0.62	3	3.91E-08	9	231.00283	0	0	0	599.00941	14	1.17859	1.04994	0.33	4.85073	581.85907	0	1.1292	1.86293	20
36.5	53.5	1.13	5	1.59E-06	18	719.20378	36	36	761.35738	954.23458	0	0	0	0.33	0	712.87903	-0.10578	0	0	20
37	81.1	1.07	5	1.11E-05	23	1031.41616	45	38	822.93843	1031.4162	0	0	0	0.33	0	739.26532	-0.10539	0	0	20
37.5	144.1	1.01	6	1.54E-04	31	1152.27602	60	41	919.36916	1152.276	0	0	0	0.33	0	778.2428	-0.14283	0	0	20
38	215.3	1.38	6	4.78E-04	42	1409.24521	74	43	1124.3978	1409.2452	0	0	0	0.33	0	849.41162	-0.19224	0	0	20
38.5	261.1	1.55	6	8.66E-04	48	1537.33376	81	44	1226.5961	1537.3338	0	0	0	0.33	0	882.55249	-0.21969	0	0	20
39	361.1	2.59	6	1.16E-03	65	2022.31166	95	45	1613.5465	2022.3117	0	0	0	0.33	0	994.58868	-0.26582	0	0	20
39.5	343.2	1.32	7	3.87E-03	55	1544.30104	93	45	1232.1551	1544.301	0	0	0	0.33	0	886.32416	-0.25903	0	0	20
40	330.6	1.19	7	3.96E-03	53	1480.89845	91	45	1181.5679	1480.8985	0	0	0	0.33	0	870.86719	-0.25293	0	0	20
40.5	364.9	1.37	7	4.59E-03	58	1592.29163	96	45	1270.4455	1592.2916	0	0	0	0.33	0	898.49426	-0.26661	0	0	20
41	369	1.3	7	5.28E-03	58	1569.91455	96	45	1252.5914	1569.9146	0	0	0	0.33	0	893.41382	-0.2677	0	0	20
41.5	410.3	2.38	6	2.31E-03	69	2027.85673	100	46	1617.9708	2027.8567	0	0	0	0.33	0	997.11469	-0.28092	0	0	20
42	301	1.37	6	1.88E-03	52	1540.77807	86	44	1229.3442	1540.7781	0	0	0	0.33	0	885.4801	-0.23508	0	0	20
42.5	260.3	1.15	6	1.37E-03	46	1408.91342	79	43	1124.133	1408.9134	0	0	0	0.33	0	852.26874	-0.21272	0	0	20
43	259.3	1.31	6	1.03E-03	47	1477.74607	79	43	1179.0527	1477.7461	0	0	0	0.33	0	869.55737	-0.21085	0	0	20

CPT-2

	In situ data								Estimations										
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
43.5	248.2	0.76	6	2.27E-03	42	1225.84311	77	43	978.06632	1225.8431	0	0	0	0.33	0	805.18188	-0.20527	0	0	20
44	231	0.49	7	3.17E-03	38	1072.83551	74	43	855.98578	1072.8355	0	0	0	0.33	0	763.96051	-0.19488	0	0	20
44.5	247.3	0.61	7	3.08E-03	41	1155.62164	77	43	922.03854	1155.6216	0	0	0	0.33	0	787.02649	-0.20404	0	0	20
45	338.6	1.16	7	4.08E-03	54	1507.61522	90	45	1202.8845	1507.6152	0	0	0	0.33	0	879.13574	-0.24939	0	0	20
45.5	338.3	0.68	7	9.91E-03	50	1283.08122	90	45	1023.735	1283.0812	0	0	0	0.33	0	823.9613	-0.25066	0	0	20
46	295.8	0.53	7	7.78E-03	45	1170.79756	84	44	934.14699	1170.7976	0	0	0	0.33	0	794.13477	-0.23014	0	0	20
46.5	258.3	0.46	7	5.18E-03	41	1098.97158	78	43	876.83903	1098.9716	0	0	0	0.33	0	773.82654	-0.20903	0	0	20
47	212.8	0.59	6	1.58E-03	37	1120.37233	70	42	893.91409	1120.3723	0	0	0	0.33	0	776.90411	-0.17732	0	0	20
47.5	151.5	0.46	6	5.09E-04	30	973.81883	58	40	776.98311	973.81883	0	0	0	0.33	0	732.47528	-0.12437	0	0	20
48	187.1	1.1	6	2.92E-04	38	1333.50144	64	41	1063.9639	1333.5014	0	0	0	0.33	0	832.91882	-0.15278	0	0	20
48.5	260.9	1.55	6	6.54E-04	50	1613.86991	76	43	1287.6622	1613.8699	0	0	0	0.33	0	904.25214	-0.20235	0	0	20
49	271.7	1.27	6	1.16E-03	49	1515.59377	78	43	1209.2504	1515.5938	0	0	0	0.33	0	881.01135	-0.20905	0	0	20
49.5	282.8	1.68	6	7.76E-04	53	1697.55973	79	43	1354.436	1697.5597	0	0	0	0.33	0	924.54547	-0.21289	0	0	20
50	288.6	1.17	6	1.74E-03	50	1496.50283	81	44	1194.0182	1496.5028	0	0	0	0.33	0	877.02747	-0.21745	0	0	20
50.5	379.3	1.81	6	2.45E-03	64	1853.18399	93	45	1478.6043	1853.184	0	0	0	0.33	0	961.2691	-0.25721	0	0	20
51	385.8	1.46	7	4.09E-03	62	1717.52006	94	45	1370.3618	1717.5201	0	0	0	0.33	0	930.95209	-0.26058	0	0	20
51.5	376.7	1.32	7	4.43E-03	60	1652.10879	92	45	1318.1719	1652.1088	0	0	0	0.33	0	915.91443	-0.25674	0	0	20
52	456.7	2.04	7	4.24E-03	73	2021.81937	100	46	1613.1538	2021.8194	0	0	0	0.33	0	998.9292	-0.28371	0	0	20
52.5	325.6	2.33	6	6.65E-04	62	2010.8119	84	44	1604.3712	2010.8119	0	0	0	0.33	0	995.63861	-0.22794	0	0	20
53	286.4	0.83	7	2.89E-03	48	1354.33408	79	43	1080.5857	1354.3341	0	0	0	0.33	0	842.88763	-0.21375	0	0	20
53.5	258.3	1.25	6	8.39E-04	48	1525.39036	74	43	1217.0668	1525.3904	0	0	0	0.33	0	884.69775	-0.19373	0	0	20
54	239.1	0.46	6	3.04E-03	40	1117.61715	72	42	891.71581	1117.6172	0	0	0	0.33	0	780.98407	-0.18653	0	0	20
54.5	223.6	1.19	6	4.65E-04	44	1466.89517	68	42	1170.3951	1466.8952	0	0	0	0.33	0	870.03772	-0.16927	0	0	20
55	218.1	1.27	6	3.60E-04	44	1498.36653	67	42	1195.5052	1498.3665	0	0	0	0.33	0	877.85907	-0.16395	0	0	20
55.5	292.9	1.33	6	1.26E-03	53	1609.33494	79	43	1284.0438	1609.3349	0	0	0	0.33	0	905.97101	-0.2107	0	0	20
56	276	2.22	6	3.18E-04	56	1943.50866	75	43	1550.6718	1943.5087	0	0	0	0.33	0	981.68512	-0.19592	0	0	20
56.5	268.5	1.1	6	1.19E-03	48	1489.11711	75	43	1188.1254	1489.1171	0	0	0	0.33	0	877.05768	-0.19644	0	0	20
57	279.5	0.89	6	2.07E-03	48	1401.84635	77	43	1118.4944	1401.8464	0	0	0	0.33	0	855.97162	-0.20385	0	0	20
57.5	297.2	0.85	7	2.94E-03	49	1400.57867	79	43	1117.483	1400.5787	0	0	0	0.33	0	856.23419	-0.21355	0	0	20
58	316	0.84	7	3.92E-03	51	1414.39789	82	44	1128.509	1414.3979	0	0	0	0.33	0	860.22815	-0.22303	0	0	20
58.5	386.6	0.65	7	1.42E-02	55	1373.19372	92	45	1095.6333	1373.1937	0	0	0	0.33	0	852.41681	-0.25708	0	0	20
59	366	0.59	7	1.25E-02	53	1328.4051	90	45	1059.8977	1328.4051	0	0	0	0.33	0	841.31903	-0.24813	0	0	20
59.5	330.1	0.67	7	6.58E-03	51	1344.9378	84	44	1073.0887	1344.9378	0	0	0	0.33	0	844.16901	-0.22992	0	0	20
60	312.9	0.73	7	4.49E-03	50	1365.34516	81	44	1089.3711	1365.3452	0	0	0	0.33	0	848.81519	-0.21994	0	0	20

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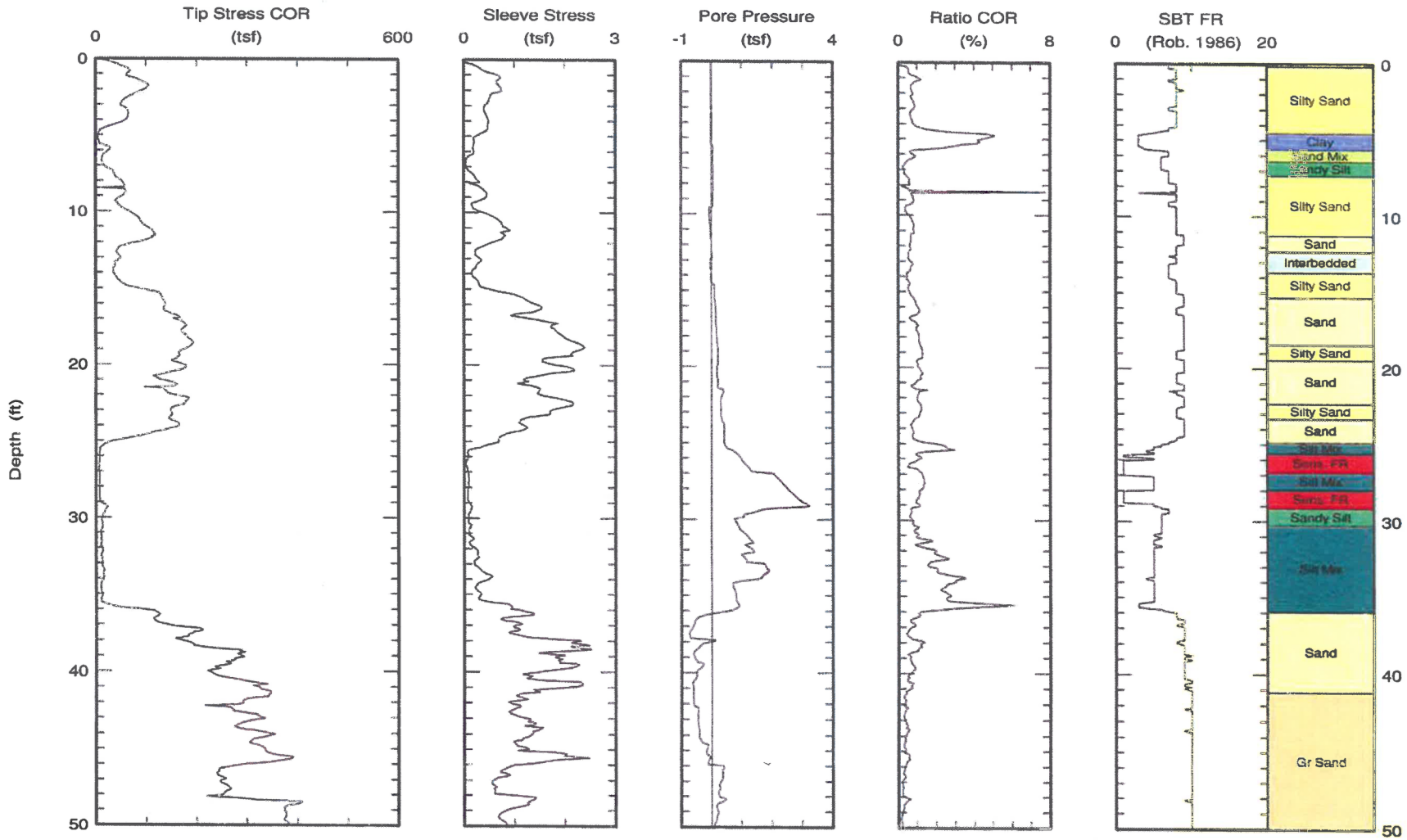
CPT Data
30 ton rig

Date: 31/Jul/2015
Test ID: CPT-3
Project: MarinaDelRey

Customer: GPI
Job Site: Venice Auxiliary Pumping Plant / 2500.



Maximum depth: 60.48 (ft)

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CPT Data
30 ton rig

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Test ID: CPT-3
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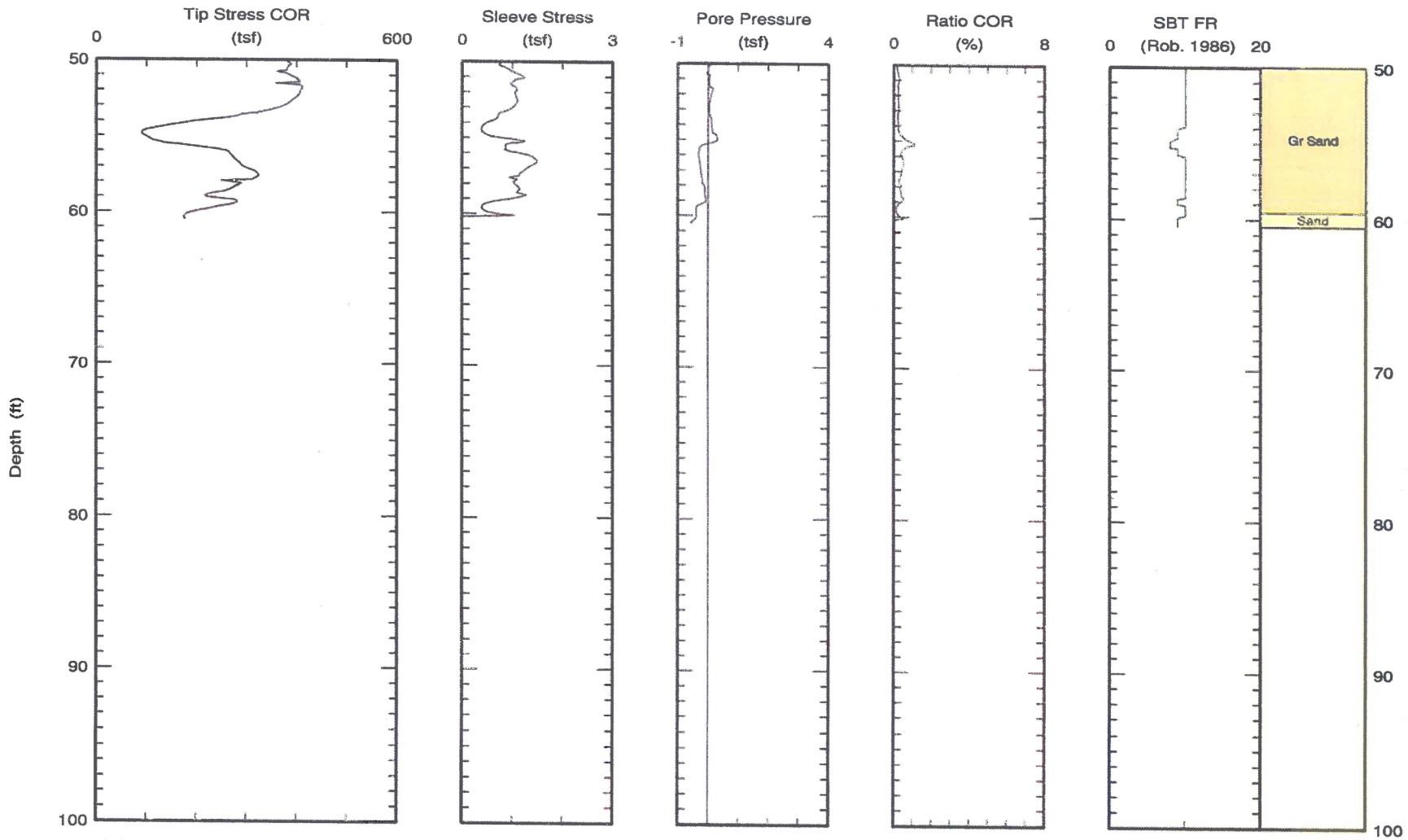

Maximum depth: 60.48 (ft)

CPT-3

	In situ data								Estimations										
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
0.5	52.2	0.29	6	9.23E-04	10	306.35682	80	43	244.43363	306.35682	0	0	0	0.33	0	421.76328	-0.21428	0	0	20
1	62.5	0.66	6	2.76E-04	13	456.07023	83	44	363.88582	456.07023	0	0	0	0.33	0	500.24063	-0.22651	0	0	20
1.5	92.8	0.65	6	7.77E-04	17	561.67641	85	44	448.14607	561.67641	0	0	0	0.33	0	553.13879	-0.23406	0	0	20
2	98.2	0.76	6	5.92E-04	19	624.18975	84	44	498.02374	624.18975	0	0	0	0.33	0	579.97113	-0.23035	0	0	20
2.5	65.9	0.52	6	2.37E-04	14	493.87391	69	42	394.04833	493.87391	0	0	0	0.33	0	524.1814	-0.1763	0	0	20
3	49.9	0.43	6	1.03E-04	11	434.1756	60	41	346.4167	434.1756	0	0	0	0.33	0	495.93442	-0.14644	0	0	20
3.5	65	0.43	6	2.24E-04	14	491.56413	63	41	392.20542	491.56413	0	0	0	0.33	0	526.20251	-0.15253	0	0	20
4	60.4	0.49	6	1.23E-04	13	509.08215	61	41	406.18257	509.08215	0	0	0	0.33	0	533.68616	-0.14763	0	0	20
4.5	21.7	0.48	5	2.60E-06	7	300.14183	41	37	290.68596	364.3264	0	0	0	0.33	0	456.7652	-0.12178	0	0	20
5	5.5	0.25	3	3.81E-08	3	72.97683	0	0	0	190.10214	14	0.37233	1.26792	0.33	5.85777	342.55148	0	1.20446	1.45954	20
5.5	7.4	0.21	4	1.34E-07	3	99.31829	0	0	0	206.07106	14	0.50673	1.45764	0.33	6.73427	357.59192	0	1.26329	2.36472	20
6	26.8	0.21	5	1.45E-05	7	329.73846	39	37	263.0892	329.73846	0	0	0	0.33	0	445.64899	-0.05792	0	0	20
6.5	12.7	0.06	5	4.09E-06	4	172.86518	27	33	154.21288	193.28014	0	0	0	0.33	0	360.21179	0.01109	0	0	20
7	16.9	0.05	5	1.18E-05	5	213.473	30	34	170.3242	213.473	0	0	0	0.33	0	379.82529	0.01508	0	0	20
7.5	36.6	0.19	6	3.92E-05	9	376.46602	42	37	300.37183	376.46602	0	0	0	0.33	0	476.1181	-0.05654	0	0	20
8	50.7	0.31	6	6.15E-05	12	481.96103	48	38	384.54337	481.96103	0	0	0	0.33	0	528.01312	-0.08776	0	0	20
8.5	59.2	0.39	6	7.55E-05	14	542.62888	51	39	432.94857	542.62888	0	0	0	0.33	0	555.15131	-0.10341	0	0	20
9	53.7	0.44	6	4.13E-05	13	548.18778	49	39	437.38387	548.18778	0	0	0	0.33	0	556.40729	-0.10031	0	0	20
9.5	43.4	0.15	6	7.93E-05	10	392.58944	43	37	313.23626	392.58944	0	0	0	0.33	0	489.22421	-0.05324	0	0	20
10	66.6	0.38	6	1.11E-04	15	568.56239	52	39	453.64021	568.56239	0	0	0	0.33	0	568.02124	-0.10639	0	0	20
10.5	87.4	0.7	6	1.14E-04	20	744.20259	59	41	593.77866	744.20259	0	0	0	0.33	0	635.63873	-0.14299	0	0	20
11	100.6	0.83	6	1.42E-04	22	824.03016	63	41	657.47087	824.03016	0	0	0	0.33	0	664.42273	-0.15702	0	0	20
11.5	118.4	0.83	6	2.62E-04	25	868.42053	67	42	692.88872	868.42053	0	0	0	0.33	0	680.95898	-0.16688	0	0	20
12	86.8	0.53	6	1.61E-04	19	693.5068	58	40	553.3299	693.5068	0	0	0	0.33	0	618.98694	-0.12934	0	0	20
12.5	42.8	0.23	6	3.48E-05	11	447.34024	41	37	356.9204	447.34024	0	0	0	0.33	0	514.73859	-0.05548	0	0	20
13	49.4	0.31	6	3.84E-05	12	508.00565	44	38	405.32366	508.00565	0	0	0	0.33	0	542.24823	-0.07215	0	0	20
13.5	38.8	0.25	6	1.98E-05	10	447.78846	39	37	357.27803	447.78846	0	0	0	0.33	0	514.12103	-0.05135	0	0	20
14	35.3	0.17	6	2.23E-05	9	397.38979	37	36	317.06632	397.38979	0	0	0	0.33	0	491.24951	-0.03252	0	0	20
14.5	46.1	0.29	6	2.95E-05	12	495.94913	42	37	395.70409	495.94913	0	0	0	0.33	0	537.36322	-0.06283	0	0	20
15	79.4	0.47	6	1.18E-04	18	669.91878	53	40	534.50966	669.91878	0	0	0	0.33	0	611.25079	-0.11247	0	0	20
15.5	130.7	1.14	6	1.78E-04	28	1027.15147	68	42	819.53575	1027.1515	0	0	0	0.33	0	732.83093	-0.17551	0	0	20
16	138	1.44	6	1.36E-04	30	1138.92701	70	42	908.71836	1138.927	0	0	0	0.33	0	765.96655	-0.18606	0	0	20
16.5	138.1	1.39	6	1.42E-04	30	1129.69116	69	42	901.34933	1129.6912	0	0	0	0.33	0	763.63947	-0.18351	0	0	20
17	156.4	1.45	6	2.12E-04	33	1190.88504	73	43	950.17423	1190.885	0	0	0	0.33	0	782.13037	-0.19301	0	0	20
17.5	179.4	1.74	6	2.50E-04	37	1327.11984	77	43	1058.8722	1327.1198	0	0	0	0.33	0	820.21344	-0.20827	0	0	20
18	175	1.93	6	1.77E-04	38	1378.03473	76	43	1099.4958	1378.0347	0	0	0	0.33	0	833.51215	-0.20874	0	0	20
18.5	191.6	2.21	6	1.87E-04	41	1493.74814	79	43	1191.8203	1493.7481	0	0	0	0.33	0	863.71106	-0.21912	0	0	20
19	176.8	2.31	6	1.19E-04	39	1495.73379	76	43	1193.4046	1495.7338	0	0	0	0.33	0	863.85669	-0.21301	0	0	20
19.5	165.4	1.66	6	1.79E-04	36	1298.5149	73	43	1036.0491	1298.5149	0	0	0	0.33	0	813.06403	-0.19529	0	0	20
20	171.2	1.8	6	1.70E-04	37	1356.34187	74	43	1082.1877	1356.3419	0	0	0	0.33	0	828.75714	-0.19942	0	0	20
20.5	152.2	1.83	6	9.80E-05	35	1330.89147	69	42	1061.8815	1330.8915	0	0	0	0.33	0	821.48132	-0.18932	0	0	20
21	126.3	1.18	6	1.08E-04	28	1084.06459	63	41	864.94515	1084.0646	0	0	0	0.33	0	752.34314	-0.15936	0	0	20

CPT-3

	In situ data								Estimations										
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
21.5	145.4	1.49	6	1.19E-04	32	1227.15836	67	42	979.11571	1227.1584	0	0	0	0.33	0	793.88342	-0.17666	0	0	20
22	154.1	1.57	6	1.33E-04	34	1274.41184	69	42	1016.818	1274.4118	0	0	0	0.33	0	807.33685	-0.18181	0	0	20
22.5	178.7	2.17	6	1.22E-04	40	1502.99811	73	43	1199.2006	1502.9981	0	0	0	0.33	0	867.40247	-0.20293	0	0	20
23	148.8	1.71	6	9.16E-05	34	1315.60633	67	42	1049.6859	1315.6063	0	0	0	0.33	0	818.52844	-0.17921	0	0	20
23.5	145.6	1.17	6	1.77E-04	31	1142.40045	65	42	911.48972	1142.4005	0	0	0	0.33	0	771.42993	-0.16504	0	0	20
24	165.9	1.22	6	2.78E-04	34	1201.01894	69	42	958.25979	1201.0189	0	0	0	0.33	0	788.98254	-0.17586	0	0	20
24.5	112.7	0.87	6	1.00E-04	26	976.69616	57	40	779.27885	976.69616	0	0	0	0.33	0	721.48871	-0.13338	0	0	20
25	38.7	0.7	5	1.49E-06	13	522.34163	33	35	559.27103	700.95302	0	0	0	0.33	0	622.11438	-0.0853	0	0	20
25.5	8.6	0.19	3	1.45E-08	4	55.40206	0	0	0	313.96583	14	0.5161	0.54769	0.33	2.53034	442.10339	0	0.90387	2.66199	20
26	7.6	0.09	3	2.41E-08	4	41.12027	0	0	0	247.81545	14	0.4467	0.46966	0.33	2.16981	404.1723	0	0.85758	4.86411	20
26.5	6.6	0.04	4	3.30E-08	3	28.90162	0	0	0	197.02406	14	0.37593	0.39225	0.33	1.8122	372.5155	0	0.76345	9.21017	23.39656
27	6.6	0.09	3	1.24E-08	4	29.88325	0	0	0	240.29492	14	0.384	0.39705	0.33	1.83437	398.55576	0	0.71616	4.18129	27.21842
27.5	6.9	0.1	3	1.33E-08	4	33.33272	0	0	0	251.85064	14	0.40743	0.41741	0.33	1.92843	406.17062	0	0.71486	3.99281	28.52832
28	7	0.09	3	1.63E-08	4	34.3754	0	0	0	247.41526	14	0.41561	0.42199	0.33	1.94961	404.07123	0	0.70842	4.52554	29.26449
28.5	7.2	0.09	3	1.86E-08	4	36.70963	0	0	0	250.89675	14	0.43141	0.43415	0.33	2.00577	406.73886	0	0.70589	4.69752	30.15975
29	8.9	0.11	4	3.85E-08	4	60.26339	0	0	0	283.11757	14	0.55532	0.55367	0.33	2.55797	427.76874	0	0.77088	4.94741	32.17472
29.5	19.3	0.14	5	7.93E-07	7	250.09455	22	31	300.2296	376.28777	0	0	0	0.33	0	484.61572	0.00641	0	0	20
30	13.7	0.1	4	2.53E-07	5	143.25309	0	0	0	314.024	14	0.86583	0.84414	0.33	3.89991	449.97983	0	1.04801	8.48518	20
30.5	13.5	0.15	4	1.32E-07	6	137.40026	0	0	0	347.4011	14	0.85138	0.82339	0.33	3.80407	466.48132	0	1.03913	5.56237	20
31	9.8	0.11	4	4.40E-08	5	65.08625	0	0	0	292.7141	14	0.58822	0.56454	0.33	2.60817	434.6503	0	0.91329	5.2405	20
31.5	10	0.13	4	3.75E-08	5	67.89045	0	0	0	309.0887	14	0.60353	0.57392	0.33	2.65151	443.80307	0	0.91845	4.54972	20
32	11.3	0.23	3	2.71E-08	6	88.97951	0	0	0	377.20645	14	0.69447	0.6537	0.33	3.0201	479.78171	0	0.96026	2.95906	20
32.5	10.7	0.29	3	1.32E-08	6	76.26099	0	0	0	399.5954	14	0.64629	0.60203	0.33	2.78137	490.21472	0	0.93359	2.18403	20
33	12.6	0.2	4	5.47E-08	6	112.38895	0	0	0	377.14874	14	0.7884	0.72731	0.33	3.36018	481.45804	0	0.99595	3.86316	20
33.5	16	0.37	4	5.94E-08	7	189.81975	0	0	0	485.50177	14	1.03009	0.94018	0.33	4.34361	533.48877	0	1.08735	2.72835	20
34	16.2	0.5	3	3.45E-08	8	189.4788	0	0	0	538.19637	14	1.03513	0.93392	0.33	4.31471	556.10651	0	1.08487	2.02885	20
34.5	9.9	0.23	3	1.09E-08	5	58.35613	0	0	0	369.60002	14	0.57722	0.51581	0.33	2.38304	475.69025	0	0.88552	2.45946	20
35	12.4	0.35	3	1.62E-08	6	98.70158	0	0	0	449.87048	14	0.75457	0.66738	0.33	3.08328	516.00922	0	0.96709	2.11278	20
35.5	10	0.51	3	2.95E-09	6	58.08455	0	0	0	481.11577	14	0.58195	0.50924	0.33	2.35267	528.21814	0	0.88164	1.11826	20
36	79.4	1.03	5	1.09E-05	22	1014.97819	44	38	809.82302	1014.9782	0	0	0	0.33	0	734.32977	-0.10259	0	0	20
36.5	120.6	0.82	6	1.03E-04	27	1033.70852	55	40	824.76743	1033.7085	0	0	0	0.33	0	743.08185	-0.12151	0	0	20
37	139.2	1.11	6	1.08E-04	31	1186.98668	59	41	947.06384	1186.9867	0	0	0	0.33	0	787.9278	-0.14076	0	0	20
37.5	194.2	0.92	6	6.50E-04	37	1201.13794	70	42	958.35474	1201.1379	0	0	0	0.33	0	794.4245	-0.17639	0	0	20
38	168.1	2.41	6	4.70E-05	41	1670.31745	64	41	1332.7001	1670.3175	0	0	0	0.33	0	912.22144	-0.17719	0	0	20
38.5	226.1	2.4	6	1.72E-04	49	1780.87879	74	43	1420.9139	1780.8788	0	0	0	0.33	0	939.41779	-0.20209	0	0	20
39	288.3	1.89	6	8.41E-04	54	1708.04146	84	44	1362.799	1708.0415	0	0	0	0.33	0	924.12451	-0.23094	0	0	20
39.5	268.2	2.25	6	4.10E-04	53	1808.20649	81	44	1442.7179	1808.2065	0	0	0	0.33	0	946.79956	-0.21854	0	0	20
40	223.5	1.5	6	4.29E-04	44	1491.562	73	43	1190.0761	1491.562	0	0	0	0.33	0	871.43927	-0.19124	0	0	20
40.5	279.8	1.2	6	1.79E-03	49	1445.24029	83	44	1153.1173	1445.2403	0	0	0	0.33	0	861.50452	-0.2251	0	0	20
41	317.8	2.13	6	9.42E-04	58	1845.15198	88	44	1472.1957	1845.152	0	0	0	0.33	0	956.37726	-0.24155	0	0	20
41.5	344.4	1.06	7	5.50E-03	54	1453.83498	92	45	1159.9747	1453.835	0	0	0	0.33	0	865.44751	-0.2555	0	0	20
42	292.2	1.16	6	2.22E-03	50	1451.70873	84	44	1158.2782	1451.7087	0	0	0	0.33	0	863.92072	-0.22935	0	0	20

CPT-3

	In situ data								Estimations										
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
42.5	271.8	0.93	6	2.39E-03	46	1331.66224	81	44	1062.4965	1331.6622	0	0	0	0.33	0	833.4201	-0.21831	0	0	20
43	330.5	1.24	7	3.29E-03	54	1530.28136	89	44	1220.9692	1530.2814	0	0	0	0.33	0	884.21179	-0.24649	0	0	20
43.5	279.6	1.26	6	1.49E-03	49	1491.42037	81	44	1189.9631	1491.4204	0	0	0	0.33	0	873.92188	-0.21989	0	0	20
44	347.3	1.35	7	3.39E-03	57	1599.70495	91	45	1276.3603	1599.705	0	0	0	0.33	0	901.39252	-0.25228	0	0	20
44.5	310.1	0.98	7	3.70E-03	50	1404.78321	86	44	1120.8377	1404.7832	0	0	0	0.33	0	853.56128	-0.23544	0	0	20
45	335.4	1.22	7	3.45E-03	55	1539.40514	89	44	1228.2488	1539.4051	0	0	0	0.33	0	887.13501	-0.24593	0	0	20
45.5	377.3	2.23	6	1.64E-03	66	1983.3733	94	45	1582.4787	1983.3733	0	0	0	0.33	0	988.6817	-0.26032	0	0	20
46	311.6	1.03	7	3.32E-03	51	1438.96932	85	44	1148.1138	1438.9693	0	0	0	0.33	0	862.57709	-0.23381	0	0	20
46.5	243.4	0.71	6	2.07E-03	42	1221.2126	75	43	974.37175	1221.2126	0	0	0	0.33	0	805.46246	-0.19618	0	0	20
47	256.5	0.59	7	3.43E-03	42	1175.76016	77	43	938.10651	1175.7602	0	0	0	0.33	0	794.3631	-0.20449	0	0	20
47.5	263.5	0.64	7	3.37E-03	43	1211.40327	78	43	966.54516	1211.4033	0	0	0	0.33	0	804.10175	-0.20771	0	0	20
48	253.3	0.96	6	1.42E-03	45	1361.10654	75	43	1085.9893	1361.1065	0	0	0	0.33	0	842.37384	-0.19883	0	0	20
48.5	409.2	1.25	7	7.45E-03	62	1635.81687	98	45	1305.173	1635.8169	0	0	0	0.33	0	912.09436	-0.27236	0	0	20
49	375.2	0.84	7	1.01E-02	55	1418.29942	93	45	1131.6219	1418.2994	0	0	0	0.33	0	859.95587	-0.2602	0	0	20
49.5	377	0.69	7	1.38E-02	54	1346.98083	94	45	1074.7188	1346.9808	0	0	0	0.33	0	842.94415	-0.26132	0	0	20
50	379.4	0.86	7	1.00E-02	56	1436.71651	94	45	1146.3164	1436.7165	0	0	0	0.33	0	864.82391	-0.26067	0	0	20
50.5	383.2	0.91	7	9.41E-03	57	1466.98697	94	45	1170.4683	1466.987	0	0	0	0.33	0	872.34436	-0.26136	0	0	20
51	387.9	1.24	7	5.63E-03	61	1629.99818	94	45	1300.5305	1629.9982	0	0	0	0.33	0	911.15234	-0.26082	0	0	20
51.5	407.8	1	7	1.04E-02	60	1534.7941	97	45	1224.5698	1534.7941	0	0	0	0.33	0	889.26587	-0.26954	0	0	20
52	409	1.07	7	9.21E-03	61	1572.29749	96	45	1254.4927	1572.2975	0	0	0	0.33	0	898.26117	-0.26901	0	0	20
52.5	398.1	1.11	7	7.54E-03	60	1586.35223	95	45	1265.7066	1586.3522	0	0	0	0.33	0	901.53918	-0.26383	0	0	20
53	375.3	1.02	7	6.65E-03	58	1529.05497	92	45	1219.9907	1529.055	0	0	0	0.33	0	887.80658	-0.25428	0	0	20
53.5	319.9	0.73	7	5.60E-03	50	1342.5706	84	44	1071.1999	1342.5706	0	0	0	0.33	0	841.52283	-0.22999	0	0	20
54	212	0.52	6	1.47E-03	37	1128.05886	67	42	900.04697	1128.0589	0	0	0	0.33	0	782.62756	-0.16471	0	0	20
54.5	117.7	0.39	6	1.57E-04	26	926.61466	48	39	739.32021	926.61466	0	0	0	0.33	0	720.14752	-0.07793	0	0	20
55	96.2	0.72	6	2.26E-05	25	1069.06422	42	37	852.97677	1069.0642	0	0	0	0.33	0	760.42999	-0.07058	0	0	20
55.5	143.9	0.87	6	1.02E-04	33	1229.09069	53	39	980.65746	1229.0907	0	0	0	0.33	0	807.37781	-0.10972	0	0	20
56	259.7	1.11	6	9.85E-04	48	1488.01074	73	43	1187.2426	1488.0107	0	0	0	0.33	0	876.79297	-0.19004	0	0	20
56.5	276.5	1.49	6	7.25E-04	52	1675.68413	75	43	1336.982	1675.6841	0	0	0	0.33	0	921.94666	-0.19717	0	0	20
57	293.4	1.31	6	1.22E-03	53	1618.56801	78	43	1291.4107	1618.568	0	0	0	0.33	0	908.95795	-0.20724	0	0	20
57.5	324.8	1.19	6	2.33E-03	55	1595.68253	82	44	1273.151	1595.6825	0	0	0	0.33	0	904.1413	-0.22405	0	0	20
58	291.9	1.04	6	1.81E-03	51	1499.12404	78	43	1196.1096	1499.124	0	0	0	0.33	0	880.73737	-0.20686	0	0	20
58.5	269	1.12	6	1.07E-03	49	1518.88102	74	43	1211.8732	1518.881	0	0	0	0.33	0	885.30219	-0.19205	0	0	20
59	220.1	0.99	6	5.23E-04	43	1409.89184	66	42	1124.9137	1409.8918	0	0	0	0.33	0	857.74738	-0.15905	0	0	20
59.5	270.9	0.4	7	5.16E-03	43	1149.683	75	43	917.30026	1149.683	0	0	0	0.33	0	794.53766	-0.19889	0	0	20
60	194.7	0.67	6	5.71E-04	38	1224.32255	62	41	976.85309	1224.3226	0	0	0	0.33	0	809.73578	-0.14024	0	0	20

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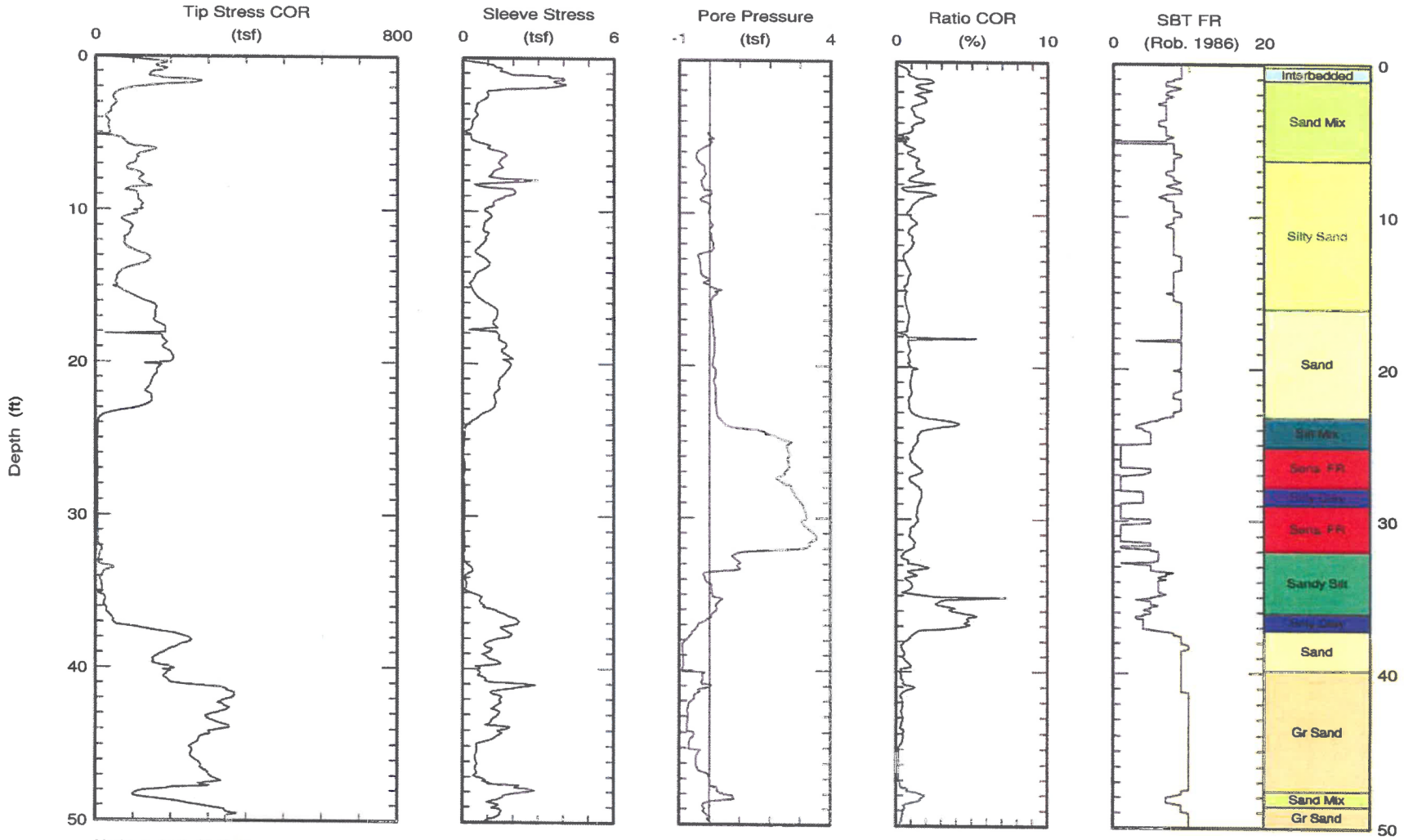
CPT Data
30 ton rig

Date: 31/Jul/2015
Test ID: CPT-4
Project: MarinaDelRey

Customer: GPI
Job Site: Venice Auxiliary Pumping Plant / 2500.



Maximum depth: 80.49 (ft)

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CPT Data
30 ton rig

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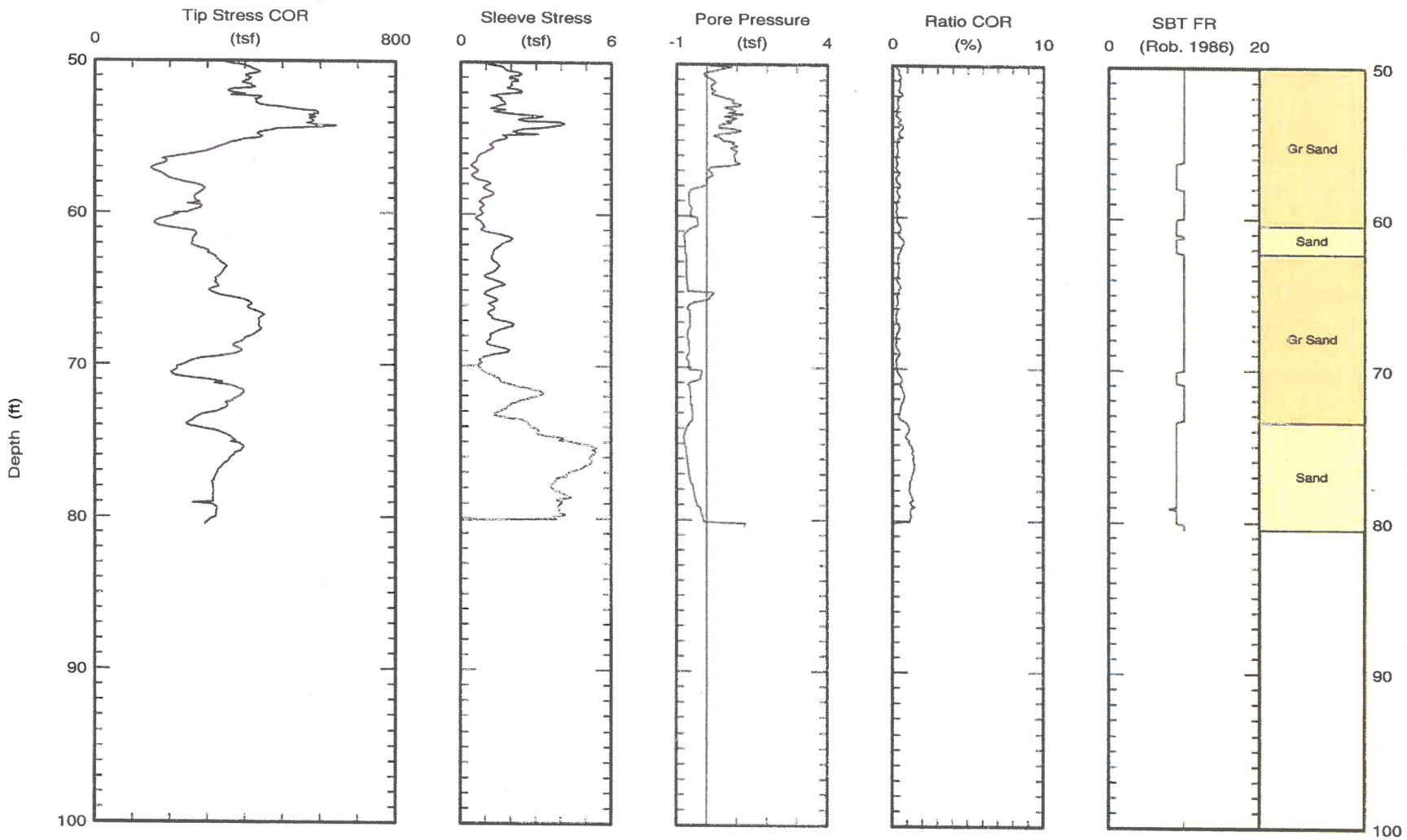

Maximum depth: 80 49 (ft)

CPT-4

	In situ data								Estimations										
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
0.5	174.8	1.28	7	3.28E-03	29	815.81811	100	48	650.91871	815.81811	0	0	0	0.33	0	649.01617	-0.3487	0	0	20
1	160.7	1.8	6	8.91E-04	30	949.35089	100	47	757.46082	949.35089	0	0	0	0.33	0	693.77838	-0.33004	0	0	20
1.5	223.1	3.78	8	4.18E-04	44	1511.43653	100	48	1205.9334	1511.4365	0	0	0	0.33	0	854.67645	-0.36571	0	0	20
2	123.4	2.62	8	1.03E-04	28	1076.64233	100	46	859.02313	1076.6423	0	0	0	0.33	0	732.78491	-0.29917	0	0	20
2.5	51.3	1.01	6	2.74E-05	13	567.32135	67	42	452.65001	567.32135	0	0	0	0.33	0	551.77307	-0.19812	0	0	20
3	56.4	0.59	6	8.70E-05	13	506.07785	63	41	403.78552	506.07785	0	0	0	0.33	0	529.37415	-0.16272	0	0	20
3.5	41.5	0.5	6	3.30E-05	10	443.00913	54	40	353.46473	443.00913	0	0	0	0.33	0	499.5184	-0.13495	0	0	20
4	27.5	0.46	5	7.31E-06	8	384.07918	45	38	306.44615	384.07918	0	0	0	0.33	0	468.42871	-0.118	0	0	20
4.5	33.6	0.37	6	1.90E-05	9	395.12165	46	38	315.25664	395.12165	0	0	0	0.33	0	477.46072	-0.10177	0	0	20
5	40.4	0.32	6	4.14E-05	10	413.02435	48	39	329.5407	413.02435	0	0	0	0.33	0	489.50327	-0.09668	0	0	20
5.5	78	0.55	6	1.79E-04	17	613.66778	62	41	489.62855	613.66778	0	0	0	0.33	0	582.24158	-0.14941	0	0	20
6	158.9	1.17	6	6.31E-04	30	996.99298	83	44	795.47312	996.99298	0	0	0	0.33	0	720.0498	-0.22757	0	0	20
6.5	111.3	1.63	6	7.63E-05	26	1021.88253	73	43	815.33181	1021.8825	0	0	0	0.33	0	724.43951	-0.20577	0	0	20
7	98.5	1.51	6	5.13E-05	24	971.22053	67	42	774.91	971.22053	0	0	0	0.33	0	708.6795	-0.19099	0	0	20
7.5	106.2	1.21	6	9.98E-05	24	928.46156	68	42	740.7938	928.46156	0	0	0	0.33	0	696.93768	-0.18192	0	0	20
8	116.3	2.96	5	1.99E-05	31	1361.58949	72	42	1086.3746	1361.5895	0	0	0	0.33	0	821.69397	-0.22702	0	0	20
8.5	138.7	1.49	6	1.70E-04	30	1101.48871	74	43	878.84738	1101.4887	0	0	0	0.33	0	752.48553	-0.20235	0	0	20
9	112.3	1.65	6	5.75E-05	27	1083.90637	68	42	864.81891	1083.9064	0	0	0	0.33	0	745.76886	-0.1906	0	0	20
9.5	120.9	1.24	6	1.34E-04	27	1002.12653	69	42	799.56904	1002.1265	0	0	0	0.33	0	722.60309	-0.18257	0	0	20
10	123.9	0.93	6	2.48E-04	26	918.21011	68	42	732.61445	918.21011	0	0	0	0.33	0	697.48474	-0.1726	0	0	20
10.5	77.1	1.06	6	2.81E-05	20	844.82558	55	40	674.06296	844.82558	0	0	0	0.33	0	669.58234	-0.1455	0	0	20
11	97.2	0.86	6	1.02E-04	22	843.81846	61	41	673.25941	843.81846	0	0	0	0.33	0	671.86066	-0.14978	0	0	20
11.5	92.1	1.06	6	5.38E-05	22	897.57427	59	41	716.14968	897.57427	0	0	0	0.33	0	688.93866	-0.15217	0	0	20
12	79	0.88	6	4.00E-05	19	811.26815	55	40	647.28842	811.26815	0	0	0	0.33	0	659.69885	-0.13418	0	0	20
12.5	88.1	0.56	6	1.34E-04	19	727.39647	56	40	580.36952	727.39647	0	0	0	0.33	0	632.73877	-0.12519	0	0	20
13	139.2	0.8	6	4.42E-04	27	928.18399	69	42	740.57234	928.18399	0	0	0	0.33	0	703.63739	-0.17399	0	0	20
13.5	133.1	1.08	6	2.07E-04	28	1017.90839	68	42	812.16095	1017.9084	0	0	0	0.33	0	730.57288	-0.17368	0	0	20
14	71.3	0.63	6	4.25E-05	17	721.6535	50	39	575.78737	721.6535	0	0	0	0.33	0	629.31128	-0.10998	0	0	20
14.5	57	0.45	6	2.94E-05	14	614.60943	45	38	490.37986	614.60943	0	0	0	0.33	0	588.35669	-0.08373	0	0	20
15	60.2	0.35	6	5.30E-05	14	584.23987	46	38	466.14883	584.23987	0	0	0	0.33	0	577.9585	-0.07783	0	0	20
15.5	88.9	0.52	6	1.33E-04	20	733.49086	55	40	585.23207	733.49086	0	0	0	0.33	0	636.80084	-0.11674	0	0	20
16	131.9	0.92	6	2.41E-04	28	980.6962	66	42	782.47037	980.6962	0	0	0	0.33	0	720.60815	-0.16246	0	0	20
16.5	161.9	1.38	6	2.50E-04	34	1196.84218	73	43	954.92728	1196.8422	0	0	0	0.33	0	784.95514	-0.18978	0	0	20
17	160.8	1.35	6	2.48E-04	34	1190.05866	72	42	949.51489	1190.0587	0	0	0	0.33	0	783.28333	-0.18736	0	0	20
17.5	172.8	1.29	6	3.58E-04	35	1197.05563	74	43	955.09758	1197.0556	0	0	0	0.33	0	786.07721	-0.19292	0	0	20
18	186.2	1.4	6	4.06E-04	37	1261.30775	76	43	1006.3626	1261.3078	0	0	0	0.33	0	804.38312	-0.20193	0	0	20
18.5	180.9	1.5	6	3.06E-04	37	1289.23983	75	43	1028.6488	1289.2398	0	0	0	0.33	0	811.83679	-0.19697	0	0	20
19	179.2	1.67	6	2.30E-04	38	1344.12346	74	43	1072.4389	1344.1235	0	0	0	0.33	0	826.43829	-0.19812	0	0	20
19.5	203.7	1.83	6	3.18E-04	41	1441.89893	79	43	1150.4513	1441.8989	0	0	0	0.33	0	852.67133	-0.21108	0	0	20
20	198.3	1.92	6	2.51E-04	41	1464.66298	77	43	1168.6141	1464.663	0	0	0	0.33	0	858.41571	-0.20837	0	0	20
20.5	164.4	1.76	6	1.34E-04	36	1358.34684	70	42	1083.7874	1358.3468	0	0	0	0.33	0	830.22955	-0.18926	0	0	20
21	154.1	1.5	6	1.39E-04	34	1263.67685	68	42	1008.2528	1263.6769	0	0	0	0.33	0	804.99902	-0.1779	0	0	20

CPT-4

	In situ data							Estimations											
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
21.5	146.2	1.45	6	1.17E-04	33	1236.85599	66	42	986.85319	1236.856	0	0	0	0.33	0	797.60645	-0.1714	0	0	20
22	136.4	1.27	6	1.11E-04	31	1163.25797	63	41	928.13136	1163.258	0	0	0	0.33	0	777.05627	-0.16066	0	0	20
22.5	151.4	1.34	6	1.52E-04	33	1220.63536	66	42	973.91119	1220.6354	0	0	0	0.33	0	793.92139	-0.16989	0	0	20
23	114.1	1.2	6	5.56E-05	27	1100.68517	57	40	878.20625	1100.6852	0	0	0	0.33	0	758.47198	-0.14256	0	0	20
23.5	22.8	0.67	4	1.51E-07	9	299.937	0	0	0	609.46576	14	1.53029	1.59848	0.33	7.38496	584.1424	0	1.30378	2.23834	20
24	7.6	0.22	3	5.86E-09	4	40.61508	0	0	0	319.74047	14	0.44626	0.46435	0.33	2.1453	444.49106	0	0.85426	1.98787	20
24.5	6.7	0.11	3	1.03E-08	4	31.57038	0	0	0	255.57985	14	0.3953	0.40747	0.33	1.88249	407.91177	0	0.72407	3.52181	27.26377
25	5.9	0.09	3	7.77E-09	3	23.91101	0	0	0	235.26831	14	0.34556	0.35303	0.33	1.63101	394.80396	0	0.64989	3.7628	29.22015
25.5	4.9	0.06	3	5.02E-09	3	14.70563	0	0	0	200.47669	14	0.27208	0.27576	0.33	1.27399	370.96878	0	0.59403	4.44404	28.02491
26	5.2	0.05	3	8.34E-09	3	16.84795	0	0	0	196.50356	14	0.29234	0.29404	0.33	1.35845	369.64291	0	0.60824	5.72987	28.29168
26.5	5.8	0.08	3	7.42E-09	3	21.71541	0	0	0	228.81737	14	0.3333	0.33241	0.33	1.53573	391.17148	0	0.64011	4.08297	28.60239
27	6	0.11	3	5.23E-09	4	22.98383	0	0	0	251.91636	14	0.34445	0.34044	0.33	1.57285	405.41885	0	0.65369	3.0687	28.17473
27.5	5	0.05	3	5.53E-09	3	13.87183	0	0	0	194.4535	14	0.26859	0.26351	0.33	1.21741	367.93878	0	0.61206	5.2643	26.00974
28	5.2	0.09	3	3.18E-09	3	15.6164	0	0	0	229.61113	14	0.28618	0.27841	0.33	1.28626	390.59192	0	0.60009	3.11616	27.79989
28.5	5.4	0.1	3	3.21E-09	3	17.05415	0	0	0	240.01832	14	0.30034	0.2897	0.33	1.33843	397.57452	0	0.60342	2.94338	28.32912
29	5.4	0.09	3	3.69E-09	3	16.97903	0	0	0	234.46613	14	0.30093	0.28787	0.33	1.32995	394.48077	0	0.59327	3.27679	28.88639
29.5	5.6	0.09	3	4.36E-09	4	18.46969	0	0	0	238.19441	14	0.31516	0.299	0.33	1.38138	397.4194	0	0.59693	3.43175	29.3777
30	6.2	0.1	3	6.13E-09	4	23.5061	0	0	0	253.78534	14	0.35704	0.33589	0.33	1.55183	408.11816	0	0.62488	3.49903	29.86275
30.5	5.6	0.07	3	5.66E-09	3	17.75943	0	0	0	224.6257	14	0.31154	0.29084	0.33	1.34369	389.64383	0	0.59469	4.36159	28.98903
31	6.3	0.07	3	1.04E-08	4	24.03548	0	0	0	234.89708	14	0.36383	0.33705	0.33	1.55718	397.86127	0	0.61735	5.09365	30.44758
31.5	6.9	0.09	3	1.12E-08	4	29.49338	0	0	0	257.98254	14	0.40467	0.37185	0.33	1.71796	412.56903	0	0.64664	4.40637	30.60155
32	9.6	0.1	4	4.46E-08	5	62.45583	0	0	0	293.54879	14	0.59135	0.53886	0.33	2.48952	436.72961	0	0.77435	5.79522	31.10446
32.5	12.9	0.05	4	3.33E-07	5	113.12038	0	0	0	274.91557	14	0.79698	0.72417	0.33	3.34565	432.48184	0	0.99448	15.62074	20
33	9.3	0.14	3	1.83E-08	5	51.47507	0	0	0	315.50954	14	0.54119	0.48528	0.33	2.24199	447.60672	0	0.86723	3.78832	20
33.5	45.6	0.44	5	4.60E-06	14	612.02645	34	35	534.39319	669.7728	0	0	0	0.33	0	616.0979	-0.0479	0	0	20
34	14.7	0.1	4	2.35E-07	6	143.29894	0	0	0	334.01268	14	0.90922	0.80411	0.33	3.715	463.74362	0	1.03074	8.91039	20
34.5	16.4	0.18	4	1.71E-07	7	182.5628	0	0	0	401.51203	14	1.03136	0.90312	0.33	4.1724	497.20172	0	1.0725	5.6152	20
35	17.6	0.37	4	7.23E-08	8	210.56784	0	0	0	507.26671	14	1.11543	0.96315	0.33	4.44975	544.8501	0	1.09637	2.95438	20
35.5	25.7	0.71	4	1.30E-07	11	332.14863	0	0	0	692.95289	14	1.69464	1.45162	0.33	6.70651	620.93903	0	1.26151	2.33907	20
36	25.5	0.91	3	7.49E-08	11	328.74552	0	0	0	758.01018	14	1.67727	1.41586	0.33	6.54128	644.45142	0	1.25079	1.80629	20
36.5	37.1	1.74	3	1.10E-07	16	490.23986	0	0	0	1055.1063	14	2.50122	2.0905	0.33	9.65813	742.66748	0	1.42911	1.40874	20
37	47.7	2.21	4	2.00E-07	19	637.19988	0	0	0	1230.1931	14	3.25102	2.69535	0.33	12.45253	794.35168	0	1.55888	1.44163	20
37.5	137.6	1.69	6	4.10E-05	34	1396.15248	58	40	1113.9514	1396.1525	0	0	0	0.33	0	844.14703	-0.14898	0	0	20
38	243.6	1.54	6	6.16E-04	47	1524.30228	77	43	1216.1986	1524.3023	0	0	0	0.33	0	879.55359	-0.20631	0	0	20
38.5	225.8	0.89	6	1.25E-03	40	1241.91747	75	43	990.8916	1241.9175	0	0	0	0.33	0	807.38556	-0.19541	0	0	20
39	183.3	0.93	6	4.54E-04	36	1207.62441	67	42	963.53012	1207.6244	0	0	0	0.33	0	796.76892	-0.16286	0	0	20
39.5	153.4	1.38	6	9.40E-05	35	1340.34513	60	41	1069.4243	1340.3451	0	0	0	0.33	0	831.1275	-0.14877	0	0	20
40	199.4	0.68	6	1.10E-03	36	1120.77411	69	42	894.23466	1120.7741	0	0	0	0.33	0	774.20447	-0.17474	0	0	20
40.5	183.7	0.76	6	6.28E-04	35	1141.64584	66	42	910.88764	1141.6458	0	0	0	0.33	0	779.39081	-0.16116	0	0	20
41	204.2	2.46	6	9.31E-05	47	1794.95065	69	42	1432.1415	1794.9507	0	0	0	0.33	0	943.3645	-0.18742	0	0	20
41.5	348.8	1.16	7	4.83E-03	55	1507.27666	92	45	1202.6144	1507.2767	0	0	0	0.33	0	878.78436	-0.25607	0	0	20
42	362	1.51	7	3.35E-03	59	1671.47795	93	45	1333.626	1671.478	0	0	0	0.33	0	918.06384	-0.25997	0	0	20

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	In situ data								Estimations										
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
42.5	342.7	1.27	7	3.66E-03	56	1556.45261	91	45	1241.8505	1556.4526	0	0	0	0.33	0	890.81134	-0.25152	0	0	20
43	316.5	1.43	6	2.00E-03	54	1602.20377	87	44	1278.3541	1602.2038	0	0	0	0.33	0	901.40558	-0.23798	0	0	20
43.5	317.1	1.12	7	3.21E-03	52	1473.67497	87	44	1175.8045	1473.675	0	0	0	0.33	0	870.63208	-0.23859	0	0	20
44	337.7	1.42	7	2.65E-03	56	1625.80886	89	44	1297.1879	1625.8089	0	0	0	0.33	0	907.63885	-0.24652	0	0	20
44.5	277.6	1.25	6	1.40E-03	49	1497.83668	80	43	1195.0825	1497.8367	0	0	0	0.33	0	876.06512	-0.21588	0	0	20
45	259.5	0.58	7	3.81E-03	42	1166.90737	78	43	931.04311	1166.9074	0	0	0	0.33	0	791.69147	-0.20798	0	0	20
45.5	255.1	0.54	7	3.86E-03	41	1143.88269	77	43	912.67236	1143.8827	0	0	0	0.33	0	785.6936	-0.20495	0	0	20
46	266.5	0.54	7	4.61E-03	42	1157.91025	79	43	923.86456	1157.9103	0	0	0	0.33	0	790.14331	-0.21115	0	0	20
46.5	279.2	0.51	7	6.00E-03	43	1157.04598	81	44	923.17498	1157.046	0	0	0	0.33	0	790.85754	-0.21804	0	0	20
47	303.1	0.49	7	8.84E-03	45	1171.89384	84	44	935.02168	1171.8938	0	0	0	0.33	0	796.22302	-0.2305	0	0	20
47.5	293.4	1.18	6	1.87E-03	51	1502.64012	81	44	1198.915	1502.6401	0	0	0	0.33	0	878.4679	-0.22065	0	0	20
48	143.6	2.55	5	1.38E-05	39	1769.31266	54	40	1411.6856	1769.3127	0	0	0	0.33	0	938.75543	-0.15181	0	0	20
48.5	135.3	1.39	6	3.82E-05	34	1384.25778	52	39	1104.461	1384.2578	0	0	0	0.33	0	845.48218	-0.12369	0	0	20
49	274.4	1.23	6	1.22E-03	49	1515.80821	78	43	1209.4215	1515.8082	0	0	0	0.33	0	881.81628	-0.20744	0	0	20
49.5	366.4	1.49	7	3.07E-03	60	1717.826	91	45	1370.6059	1717.826	0	0	0	0.33	0	930.95111	-0.25151	0	0	20
50	349	0.85	7	6.91E-03	53	1412.09843	89	44	1126.6743	1412.0984	0	0	0	0.33	0	858.38721	-0.24655	0	0	20
50.5	417.8	1.79	7	3.72E-03	68	1893.25833	97	45	1510.5785	1893.2583	0	0	0	0.33	0	971.02618	-0.26982	0	0	20
51	403.3	1.84	7	2.95E-03	67	1905.33068	94	45	1520.2107	1905.3307	0	0	0	0.33	0	973.68243	-0.26324	0	0	20
51.5	406.4	2.06	6	2.36E-03	69	1999.20648	94	45	1595.1116	1999.2065	0	0	0	0.33	0	994.13904	-0.26286	0	0	20
52	357.1	2.4	6	9.13E-04	66	2083.22672	87	44	1662.149	2083.2267	0	0	0	0.33	0	1011.7016	-0.24001	0	0	20
52.5	433.3	1.59	7	5.40E-03	68	1835.81304	98	45	1464.7445	1835.813	0	0	0	0.33	0	959.06989	-0.27383	0	0	20
53	484.2	1.29	7	1.35E-02	70	1739.02285	100	46	1387.5182	1739.0229	0	0	0	0.33	0	938.05292	-0.29272	0	0	20
53.5	582.7	3.25	7	4.05E-03	94	2604.65513	100	47	2078.1823	2604.6551	0	0	0	0.33	0	1116.79871	-0.31416	0	0	20
54	578.7	4.17	6	2.09E-03	99	2916.26303	100	47	2326.8056	2916.263	0	0	0	0.33	0	1173.85376	-0.30983	0	0	20
54.5	479.8	2.19	7	4.13E-03	77	2135.08828	100	46	1703.5279	2135.0883	0	0	0	0.33	0	1024.01868	-0.28487	0	0	20
55	443.9	1.86	7	4.09E-03	71	1977.20796	98	45	1577.5595	1977.208	0	0	0	0.33	0	990.67896	-0.27296	0	0	20
55.5	351	1.23	7	3.19E-03	58	1632.34017	86	44	1302.3991	1632.3402	0	0	0	0.33	0	912.89844	-0.23741	0	0	20
56	288.6	0.86	6	2.46E-03	49	1403.73245	78	43	1119.9993	1403.7325	0	0	0	0.33	0	857.15027	-0.2074	0	0	20
56.5	185	0.64	6	5.20E-04	36	1184.58981	61	41	945.15144	1184.5898	0	0	0	0.33	0	798.00568	-0.13553	0	0	20
57	153.8	0.62	6	2.30E-04	32	1135.81862	54	40	906.23826	1135.8186	0	0	0	0.33	0	783.65009	-0.10757	0	0	20
57.5	183.7	0.46	6	8.03E-04	34	1085.85681	60	41	866.37511	1085.8568	0	0	0	0.33	0	771.91797	-0.13497	0	0	20
58	239.5	1.22	6	5.17E-04	47	1539.51807	68	42	1228.3389	1539.5181	0	0	0	0.33	0	890.07477	-0.17096	0	0	20
58.5	289.5	1.23	6	1.21E-03	52	1597.69442	76	43	1274.7562	1597.6944	0	0	0	0.33	0	904.85254	-0.2016	0	0	20
59	265.5	0.87	6	1.52E-03	47	1404.80267	73	43	1120.8532	1404.8027	0	0	0	0.33	0	857.89948	-0.18944	0	0	20
59.5	282.6	0.9	6	1.89E-03	49	1438.67836	75	43	1147.8817	1438.6784	0	0	0	0.33	0	866.7702	-0.19891	0	0	20
60	245.6	0.88	6	1.01E-03	45	1396.8265	69	42	1114.4892	1396.8265	0	0	0	0.33	0	855.83105	-0.17496	0	0	20
60.5	167.7	0.83	6	1.87E-04	36	1286.0524	55	40	1026.1056	1286.0524	0	0	0	0.33	0	825.77625	-0.11676	0	0	20
61	204.5	0.78	6	5.20E-04	40	1308.0704	62	41	1043.6732	1308.0704	0	0	0	0.33	0	832.71674	-0.14377	0	0	20
61.5	268.1	1.99	6	2.89E-04	55	1915.03039	71	42	1527.9498	1915.0304	0	0	0	0.33	0	977.76044	-0.17976	0	0	20
62	259	1.62	6	3.77E-04	52	1762.08947	69	42	1405.9225	1762.0895	0	0	0	0.33	0	943.73895	-0.17513	0	0	20
62.5	303.5	1.3	6	1.23E-03	54	1669.63268	77	43	1332.1537	1669.6327	0	0	0	0.33	0	923.09039	-0.20342	0	0	20
63	325.8	1.26	6	1.81E-03	56	1673.49559	80	43	1335.2358	1673.4956	0	0	0	0.33	0	924.36157	-0.21502	0	0	20

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	In situ data							Estimations											
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
63.5	351.3	1.51	6	1.78E-03	61	1812.27589	83	44	1445.9648	1812.2759	0	0	0	0.33	0	956.22357	-0.22522	0	0	20
64	337.4	1.01	7	3.16E-03	56	1567.35395	82	44	1250.5484	1567.354	0	0	0	0.33	0	900.05597	-0.22177	0	0	20
64.5	322.4	1.69	6	9.13E-04	60	1873.56186	78	43	1494.8632	1873.5619	0	0	0	0.33	0	969.92407	-0.20803	0	0	20
65	311.5	1.17	6	1.61E-03	55	1632.54669	77	43	1302.5639	1632.5467	0	0	0	0.33	0	915.34967	-0.20546	0	0	20
65.5	356	1.36	6	2.24E-03	60	1761.60919	83	44	1405.5393	1761.6092	0	0	0	0.33	0	945.47931	-0.22599	0	0	20
66	420	1.27	7	5.52E-03	66	1767.07885	92	45	1409.9033	1767.0789	0	0	0	0.33	0	947.3136	-0.25423	0	0	20
66.5	435.3	1.09	7	8.62E-03	65	1690.47599	94	45	1348.784	1690.476	0	0	0	0.33	0	930.34442	-0.26132	0	0	20
67	438.2	1.58	7	4.27E-03	70	1932.05457	93	45	1541.5329	1932.0546	0	0	0	0.33	0	983.96503	-0.25786	0	0	20
67.5	440.4	1.77	7	3.41E-03	72	2022.80428	92	45	1613.9396	2022.8043	0	0	0	0.33	0	1003.52094	-0.25673	0	0	20
68	424.5	1.2	7	6.21E-03	66	1748.49031	92	45	1395.0721	1748.4903	0	0	0	0.33	0	943.7666	-0.25426	0	0	20
68.5	387.1	1.06	7	4.99E-03	61	1656.73069	87	44	1321.8596	1656.7307	0	0	0	0.33	0	922.81384	-0.23914	0	0	20
69	389.7	1.94	6	1.51E-03	69	2070.8514	85	44	1652.2751	2070.8514	0	0	0	0.33	0	1013.90894	-0.23261	0	0	20
69.5	315.6	0.83	6	2.85E-03	52	1490.96222	77	43	1189.5975	1490.9622	0	0	0	0.33	0	883.53851	-0.20514	0	0	20
70	238.1	0.71	6	9.66E-04	44	1361.72562	65	42	1086.4832	1361.7256	0	0	0	0.33	0	850.7337	-0.15721	0	0	20
70.5	206.9	1.1	6	2.24E-04	44	1538.00848	59	41	1227.1344	1538.0085	0	0	0	0.33	0	893.62946	-0.1312	0	0	20
71	294.8	1.59	6	5.79E-04	57	1855.61317	72	42	1480.5424	1855.6132	0	0	0	0.33	0	967.77832	-0.18404	0	0	20
71.5	373.4	2.68	6	5.61E-04	72	2371.38936	81	44	1892.066	2371.3894	0	0	0	0.33	0	1075.65662	-0.21747	0	0	20
72	392.4	3.09	6	5.02E-04	77	2543.66429	82	44	2029.5194	2543.6643	0	0	0	0.33	0	1109.1665	-0.22328	0	0	20
72.5	351.9	2.05	6	7.57E-04	66	2114.69078	78	43	1687.2533	2114.6908	0	0	0	0.33	0	1023.97406	-0.20934	0	0	20
73	338.6	1.61	6	1.05E-03	62	1918.06863	77	43	1530.3739	1918.0686	0	0	0	0.33	0	982.27759	-0.20512	0	0	20
73.5	270.7	2.19	6	1.79E-04	58	2102.37836	66	42	1677.4295	2102.3784	0	0	0	0.33	0	1021.60516	-0.16755	0	0	20
74	249.1	2.64	6	7.73E-05	58	2249.10565	62	41	1794.4992	2249.1057	0	0	0	0.33	0	1051.94165	-0.16052	0	0	20
74.5	338.8	3.08	6	2.36E-04	71	2512.55448	74	43	2004.6977	2512.5545	0	0	0	0.33	0	1103.94958	-0.19677	0	0	20
75	374.7	4.41	6	1.57E-04	81	2993.65874	77	43	2388.5575	2993.6587	0	0	0	0.33	0	1192.18384	-0.2134	0	0	20
75.5	395	5.24	6	1.29E-04	87	3271.97034	79	43	2610.6146	3271.9703	0	0	0	0.33	0	1240.02649	-0.22153	0	0	20
76	369.9	5.16	6	9.69E-05	84	3224.11362	75	43	2572.4311	3224.1136	0	0	0	0.33	0	1232.15173	-0.2131	0	0	20
76.5	348	5.08	6	7.44E-05	81	3179.437	72	42	2536.7848	3179.437	0	0	0	0.33	0	1224.76465	-0.20533	0	0	20
77	328.3	4.34	6	8.23E-05	76	2942.21235	70	42	2347.5099	2942.2124	0	0	0	0.33	0	1183.81543	-0.19529	0	0	20
77.5	319.1	3.83	6	9.63E-05	73	2778.04065	69	42	2216.5218	2778.0407	0	0	0	0.33	0	1154.52441	-0.18925	0	0	20
78	315.4	3.64	6	1.02E-04	71	2718.2718	69	42	2168.8339	2718.2718	0	0	0	0.33	0	1143.74634	-0.18641	0	0	20
78.5	316.4	4.24	6	7.02E-05	74	2916.31829	68	42	2326.8497	2916.3183	0	0	0	0.33	0	1179.73169	-0.18871	0	0	20
79	316.3	4.03	6	7.84E-05	73	2857.4366	68	42	2279.8696	2857.4366	0	0	0	0.33	0	1169.37659	-0.18704	0	0	20
79.5	326	3.95	6	9.41E-05	74	2850.29152	69	42	2274.1688	2850.2915	0	0	0	0.33	0	1168.2301	-0.18939	0	0	20
80	322	4.25	6	7.31E-05	75	2946.56737	68	42	2350.9846	2946.5674	0	0	0	0.33	0	1185.56885	-0.18857	0	0	20

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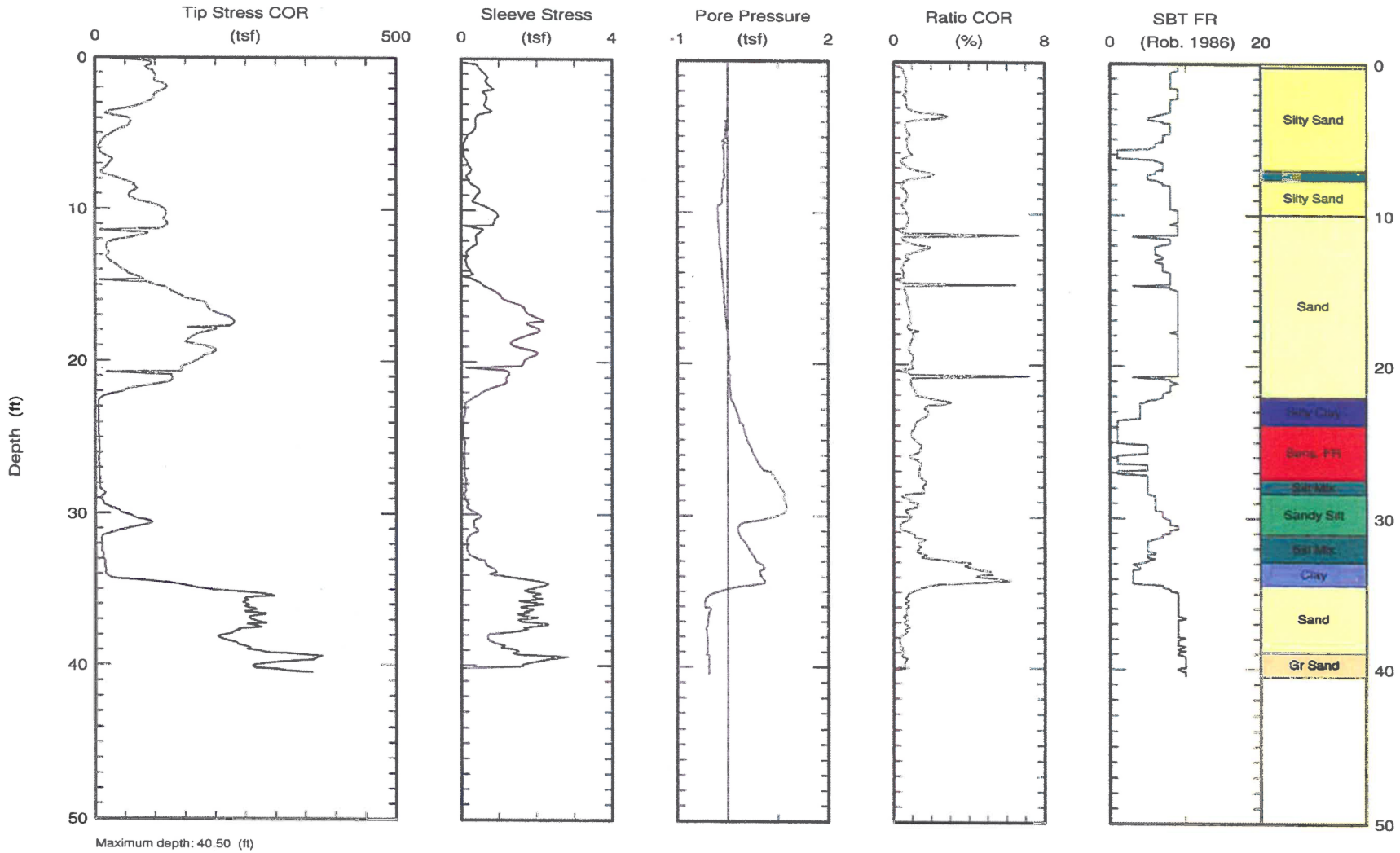
CPT Data
30 ton rig

Date: 31/Jul/2015
Test ID: CPT-5
Project: MarinaDelRey

Customer: GPI
Job Site: Venice Auxiliary Pumping Plant / 2500.



CPT-5

	In situ data							Estimations											
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
0.5	91.6	0.45	7	2.68E-03	15	443.55377	95	45	353.89928	443.55377	0	0	0	0.33	0	497.30783	-0.26585	0	0	20
1	98.3	0.64	6	1.24E-03	18	546.8461	92	45	436.31338	546.8461	0	0	0	0.33	0	545.7251	-0.25484	0	0	20
1.5	99	0.66	6	9.29E-04	18	580.16291	87	44	462.89594	580.16291	0	0	0	0.33	0	561.52795	-0.2389	0	0	20
2	119.1	0.86	6	9.14E-04	22	699.89578	90	45	558.42749	699.89578	0	0	0	0.33	0	610.63147	-0.2496	0	0	20
2.5	97.5	0.67	6	5.97E-04	19	618.64271	80	43	493.5979	618.64271	0	0	0	0.33	0	579.67285	-0.21413	0	0	20
3	84	0.62	6	3.47E-04	17	587.62883	73	43	468.85279	587.62883	0	0	0	0.33	0	567.18805	-0.18885	0	0	20
3.5	32.5	0.83	5	5.73E-06	10	452.09219	52	39	379.39928	475.51377	0	0	0	0.33	0	510.6142	-0.16875	0	0	20
4	55	0.39	6	1.24E-04	12	462.60408	58	40	369.099	462.60408	0	0	0	0.33	0	512.99182	-0.13273	0	0	20
4.5	55.2	0.39	6	1.11E-04	12	473.41592	56	40	377.72547	473.41592	0	0	0	0.33	0	518.93146	-0.12732	0	0	20
5	28.4	0.22	6	2.08E-05	7	327.77749	42	37	261.5246	327.77749	0	0	0	0.33	0	443.32645	-0.06877	0	0	20
5.5	11	0.08	5	2.26E-06	4	149.44894	27	33	148.44172	186.04696	0	0	0	0.33	0	350.22534	-0.00781	0	0	20
6	6.9	0.06	5	5.09E-07	3	91.70657	21	31	119.27785	149.4949	0	0	0	0.33	0	319.29138	0.00182	0	0	20
6.5	19.4	0.08	5	1.34E-05	5	240.23643	32	35	191.67801	240.23643	0	0	0	0.33	0	395.18216	-0.00686	0	0	20
7	23.8	0.19	5	8.65E-06	7	319.85565	35	36	255.20397	319.85565	0	0	0	0.33	0	441.03729	-0.04479	0	0	20
7.5	11.2	0.24	4	3.02E-07	4	150.85206	0	0	0	270.30908	14	0.76965	1.64065	0.33	7.5798	405.69113	0	1.31545	3.14275	20
8	39.8	0.22	6	3.97E-05	10	408.11979	42	37	325.6275	408.11979	0	0	0	0.33	0	492.79944	-0.06221	0	0	20
8.5	65.2	0.43	6	9.29E-05	15	575.683	53	40	459.32155	575.683	0	0	0	0.33	0	569.43152	-0.11255	0	0	20
9	58.2	0.42	6	6.01E-05	14	555.1944	50	39	442.97425	555.1944	0	0	0	0.33	0	560.30914	-0.10293	0	0	20
9.5	76.1	0.37	6	1.97E-04	16	586.75875	55	40	468.15858	586.75875	0	0	0	0.33	0	576.70929	-0.11598	0	0	20
10	116	0.86	6	2.44E-04	24	861.85405	68	42	687.64951	861.85405	0	0	0	0.33	0	677.79163	-0.17036	0	0	20
10.5	116.7	0.95	6	2.02E-04	25	897.27537	68	42	715.9112	897.27537	0	0	0	0.33	0	689.46198	-0.1728	0	0	20
11	120.8	0.83	6	2.88E-04	25	871.22672	68	42	695.12771	871.22672	0	0	0	0.33	0	681.92139	-0.16887	0	0	20
11.5	93.5	0.49	6	2.48E-04	19	691.25627	59	41	551.53426	691.25627	0	0	0	0.33	0	619.0282	-0.13301	0	0	20
12	41.4	0.41	5	1.30E-05	11	516.68693	41	37	412.25021	516.68693	0	0	0	0.33	0	542.93768	-0.07782	0	0	20
12.5	19.8	0.27	5	1.29E-06	7	267.01927	29	34	293.68631	368.08684	0	0	0	0.33	0	468.45331	-0.05213	0	0	20
13	21.4	0.18	5	3.10E-06	7	289.09907	30	34	271.08505	339.75992	0	0	0	0.33	0	455.96829	-0.02617	0	0	20
13.5	27.9	0.16	5	9.96E-06	8	361.45236	33	35	288.39284	361.45236	0	0	0	0.33	0	470.77838	-0.02243	0	0	20
14	47.4	0.25	6	4.15E-05	12	479.64736	42	37	382.69737	479.64736	0	0	0	0.33	0	530.91028	-0.0604	0	0	20
14.5	73.5	0.38	6	1.23E-04	16	614.97561	52	39	490.67203	614.97561	0	0	0	0.33	0	590.12616	-0.10168	0	0	20
15	101.9	0.62	6	2.00E-04	22	782.56042	60	41	624.38332	782.56042	0	0	0	0.33	0	653.23077	-0.13874	0	0	20
15.5	131.8	0.99	6	2.39E-04	28	981.89732	68	42	783.42871	981.89732	0	0	0	0.33	0	719.46991	-0.17102	0	0	20
16	165.9	1.25	6	3.79E-04	33	1137.89571	75	43	907.89551	1137.8957	0	0	0	0.33	0	767.42371	-0.1978	0	0	20
16.5	187.7	1.69	6	3.33E-04	38	1318.8333	80	43	1052.2606	1318.8333	0	0	0	0.33	0	817.98218	-0.21436	0	0	20
17	213.5	1.93	6	4.17E-04	42	1441.01607	84	44	1149.7469	1441.0161	0	0	0	0.33	0	850.73401	-0.23043	0	0	20
17.5	231.4	1.83	6	6.36E-04	44	1447.11624	87	44	1154.614	1447.1162	0	0	0	0.33	0	853.17511	-0.23903	0	0	20
18	194.9	2.07	6	2.35E-04	41	1458.19939	80	43	1163.457	1458.1994	0	0	0	0.33	0	854.82416	-0.2189	0	0	20
18.5	158.3	1.51	6	1.89E-04	34	1230.57158	72	42	981.83902	1230.5716	0	0	0	0.33	0	794.02454	-0.19088	0	0	20
19	179.5	1.46	6	3.33E-04	36	1260.02912	76	43	1005.3424	1260.0291	0	0	0	0.33	0	803.27966	-0.19979	0	0	20
19.5	192.6	2.01	6	2.23E-04	41	1454.0437	78	43	1160.1413	1454.0437	0	0	0	0.33	0	854.41748	-0.21323	0	0	20
20	167.5	1.66	6	1.83E-04	36	1309.48575	73	43	1044.8025	1309.4858	0	0	0	0.33	0	816.39392	-0.19466	0	0	20
20.5	144.4	1.72	6	8.89E-05	33	1284.25314	67	42	1024.6701	1284.2531	0	0	0	0.33	0	808.81665	-0.18275	0	0	20
21	127.7	1.21	6	1.06E-04	29	1098.17918	63	41	876.20679	1098.1792	0	0	0	0.33	0	756.58099	-0.16062	0	0	20

CPT-5

	In situ data						Estimations													
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
21.5	105.2	1.08	6	5.74E-05	25	1009.13429	57	40	805.16034	1009.1343	0	0	0	0.33	0	729.11987	-0.141	0	0	20
22	47.6	0.56	5	6.60E-06	14	665.04278	38	36	530.61924	665.04278	0	0	0	0.33	0	608.93256	-0.07582	0	0	20
22.5	8.3	0.26	3	9.67E-09	4	57.63559	0	0	0	327.72619	14	0.50077	0.58721	0.33	2.71291	446.9978	0	0.92567	1.88753	20
23	6	0.11	3	7.18E-09	3	25.62263	0	0	0	231.85742	14	0.33566	0.38947	0.33	1.79935	389.25079	0	0.80439	2.99039	20
23.5	6.1	0.1	3	8.68E-09	3	26.27781	0	0	0	228.00645	14	0.34166	0.39241	0.33	1.81291	387.29224	0	0.80646	3.3483	20
24	5.5	0.07	3	8.10E-09	3	19.83216	0	0	0	201.53674	14	0.2982	0.33931	0.33	1.56763	369.54736	0	0.76734	4.17484	20
24.5	5.8	0.06	3	1.27E-08	3	22.40185	0	0	0	198.23104	14	0.31835	0.35902	0.33	1.65866	368.44312	0	0.7823	5.1998	20
25	6.9	0.08	3	2.04E-08	3	34.29634	0	0	0	226.34049	14	0.3958	0.4421	0.33	2.04249	388.51147	0	0.84003	4.84852	20
25.5	7	0.1	3	1.54E-08	4	35.03559	0	0	0	241.89945	14	0.40203	0.44462	0.33	2.05415	398.20975	0	0.84166	3.93994	20
26	7.8	0.07	4	4.21E-08	4	45.10874	0	0	0	229.8136	14	0.45829	0.50219	0.33	2.32011	392.85385	0	0.87745	6.41603	20
26.5	6.4	0.1	3	9.02E-09	3	27.19515	0	0	0	236.99009	14	0.35757	0.38804	0.33	1.79274	394.56281	0	0.80338	3.50418	20
27	6.6	0.09	3	1.20E-08	4	29.04025	0	0	0	233.76814	14	0.37125	0.3991	0.33	1.84385	393.26123	0	0.81114	4.04245	20
27.5	7	0.11	3	1.19E-08	4	33.53732	0	0	0	252.54375	14	0.40091	0.4268	0.33	1.97182	405.38208	0	0.82997	3.57174	20
28	7.8	0.13	3	1.56E-08	4	43.2082	0	0	0	274.45639	14	0.45735	0.48201	0.33	2.2269	419.46585	0	0.86523	3.44773	20
28.5	12	0.11	4	1.52E-07	5	116.38216	0	0	0	300.89786	14	0.75681	0.78459	0.33	3.6248	439.61688	0	1.02211	6.74251	20
29	10.6	0.09	4	1.09E-07	5	86.56907	0	0	0	276.7667	14	0.65503	0.67429	0.33	3.11522	425.38474	0	0.9705	7.13253	20
29.5	18.6	0.17	5	5.55E-07	7	240.12276	22	31	307.41373	385.29188	0	0	0	0.33	0	487.25839	-0.0056	0	0	20
30	48	0.47	5	6.81E-06	14	663.51252	36	36	529.39828	663.51252	0	0	0	0.33	0	611.56091	-0.05856	0	0	20
30.5	88.6	0.33	6	1.54E-04	19	706.08674	49	39	563.36708	706.08674	0	0	0	0.33	0	633.93604	-0.08485	0	0	20
31	56.3	0.43	5	1.48E-05	15	677.36455	39	37	540.45044	677.36455	0	0	0	0.33	0	618.63995	-0.05797	0	0	20
31.5	11.6	0.2	3	3.97E-08	5	95.19143	0	0	0	357.90235	14	0.70619	0.68773	0.33	3.17731	469.57233	0	0.97707	3.46035	20
32	11.6	0.17	4	4.98E-08	5	94.14233	0	0	0	343.39482	14	0.70579	0.68054	0.33	3.14409	462.5874	0	0.97357	4.06868	20
32.5	11.5	0.2	3	3.59E-08	5	91.13766	0	0	0	360.24059	14	0.69794	0.66623	0.33	3.07799	471.13388	0	0.96652	3.41989	20
33	14.2	0.54	3	1.75E-08	7	146.39504	0	0	0	523.03232	14	0.88981	0.83941	0.33	3.87805	547.66211	0	1.046	1.61485	20
33.5	16.6	0.77	3	1.84E-08	8	205.57141	0	0	0	618.28316	14	1.06098	0.98856	0.33	4.56713	587.69995	0	1.10617	1.35033	20
34	17.7	0.82	3	2.12E-08	9	222.83445	0	0	0	645.43078	14	1.13691	1.04628	0.33	4.83382	598.86865	0	1.12786	1.35875	20
34.5	98.8	2.23	5	6.27E-06	29	1405.25158	50	39	1121.2114	1405.2516	0	0	0	0.33	0	842.8092	-0.15517	0	0	20
35	184.7	1.73	6	1.64E-04	40	1465.90513	69	42	1169.6052	1465.9051	0	0	0	0.33	0	861.93915	-0.18166	0	0	20
35.5	279	1.94	6	7.66E-04	52	1681.85336	85	44	1341.9043	1681.8534	0	0	0	0.33	0	916.61682	-0.23304	0	0	20
36	252.4	2.15	6	3.89E-04	50	1718.87657	80	44	1371.4441	1718.8766	0	0	0	0.33	0	924.83112	-0.21709	0	0	20
36.5	248.5	1.81	6	5.19E-04	48	1605.57416	80	43	1281.0432	1605.5742	0	0	0	0.33	0	898.34692	-0.21399	0	0	20
37	259.8	1.48	6	9.46E-04	48	1506.1669	81	44	1201.7289	1506.1669	0	0	0	0.33	0	874.76471	-0.21994	0	0	20
37.5	274.6	1.72	6	8.69E-04	51	1617.02869	83	44	1290.1825	1617.0287	0	0	0	0.33	0	902.00232	-0.2269	0	0	20
38	220.4	0.68	6	1.87E-03	38	1128.03979	74	43	900.03175	1128.0398	0	0	0	0.33	0	775.91956	-0.19508	0	0	20
38.5	231.8	0.88	6	1.48E-03	41	1237.45065	76	43	987.32764	1237.4507	0	0	0	0.33	0	805.99091	-0.20131	0	0	20
39	258.7	1.48	6	8.75E-04	48	1520.23233	80	43	1212.9513	1520.2323	0	0	0	0.33	0	878.87573	-0.21565	0	0	20
39.5	369.4	2.71	6	1.11E-03	67	2085.00093	96	45	1663.5646	2085.0009	0	0	0	0.33	0	1008.40326	-0.26644	0	0	20
40	267.7	1.6	6	8.40E-04	50	1584.89085	81	44	1264.5406	1584.8909	0	0	0	0.33	0	895.06427	-0.21865	0	0	20

Appendix C
Liquefaction Analyses

Calculation of Liquefaction Potential Using SPT Data
Youd et al. (2001)

All calculations per 10/01 Journal of Geotech.
Soil types CL, CH, or MH will return a "non-liquefiable" FS
Sampler types: **s** = SPT OR **m** = Modified California
Liner: **y** = liners used or no room for liners OR **n** = room for liners but no liners used

Non-Standard samplers Conversion to SPT
N = N'(WH/4200)(2.0**2-1.375**2)/(OD**2-ID**2)

FIELD DATA									STANDARDIZED BLOW COUNTS						OVERBURDEN CORRECTION & CORRECTED BLOW COUNTS						
Boring Number	Sample No.	Sample Depth (ft)	Field Blow Count, N	USCS	%fines	Sampler Type	Liner	Hammer Efficiency (%)	CR_rods	CB_Borehole	ModCal / SPT conversion	CS_liner	CE_energy	N_{60}	Groundwater Depth During Sampling (ft)	Avg Unit Wt Above Sample (pcf)	Total Overburden Stress (psf)	Pore Pressure (psf)	Effective Overburden Stress (psf)	C_N	$(N1)_{60}$
RW-1	1	3.0	24	sm	25	s	n	90	0.75	1.00	1	1.25	150%	34	5	120	360	0	360	1.70	57.5
	2	6.0	1	mh	75	m	y	90	0.75	1.00	1.39	1.00	150%	2	5	125	735	62.4	672.6	1.70	2.7
	3	8.0	14	sm	16	m	y	90	0.75	1.00	1.39	1.00	150%	22	5	125	985	187.2	797.8	1.63	35.7
	4	11.0	13	sm	16	s	n	90	0.80	1.00	1	1.16	150%	18	5	125	1360	374.4	985.6	1.47	26.6
	5	13.0	18	sp	2	m	y	90	0.80	1.00	1.39	1.00	150%	30	5	125	1610	499.2	1110.8	1.38	41.4
	6	16.0	22	sp-sm	8	s	n	90	0.85	1.00	1	1.24	150%	35	5	125	1985	686.4	1298.6	1.28	44.2
	7	18.0	44	sp-sm	8	m	y	90	0.85	1.00	1.39	1.00	150%	78	5	125	2235	811.2	1423.8	1.22	95.1
	8	21.0	28	sp-sm	8	s	n	90	0.95	1.00	1	1.28	150%	51	5	125	2610	998	1612	1.15	58.7
	9	25.0	34	sp-sm	8	m	y	90	0.95	1.00	1.39	1.00	150%	67	5	125	3110	1248	1862	1.07	71.8
	10	27.0	4	ml	50	m	y	90	0.95	1.00	1.39	1.00	150%	8	5	125	3360	1373	1987	1.03	8.2
	11	28.0	8	ml	50	m	y	90	0.95	1.00	1.39	1.00	150%	16	5	125	3485	1435	2050	1.02	16.1
	12	29.0	4	cl	50	m	y	90	0.95	1.00	1.39	1.00	150%	8	5	125	3610	1498	2112	1.00	7.9
	13	31.0	8	ml	50	m	y	90	0.95	1.00	1.39	1.00	150%	16	5	125	3860	1622	2238	0.97	15.4
	14	35.0		ml	50	m	y	90	1	1.00	1.39	1.00	150%	5	5	125	4360	1872	2488	0.92	4.6
	15	37.0	42	sw-sm	10	m	y	90	1	1.00	1.39	1.00	150%	88	5	125	4610	1997	2613	0.90	78.8
	16	40.0	67	sw-sm	10	s	n	90	1	1.00	1	1.30	150%	131	5	125	4985	2184	2801	0.87	113.5
	17	42.0	52	sp-sm	10	m	n	90	1	1.00	1.39	1.30	150%	141	5	135	5345	2309	3036	0.84	117.7
	18	44.0	48	sp-sm	5	s	n	90	1	1.00	1	1.30	150%	94	5	135	5615	2434	3181	0.82	76.4
	19	46.0	69	sp-sm	5	m	n	90	1	1.00	1.39	1.30	150%	187	5	135	5885	2558	3327	0.80	149.2
	20	49.0	44	sp-sm	5	s	n	90	1	1.00	1	1.30	150%	86	5	135	6290	2746	3544	0.77	66.3

Red font indicates actual fines content from laboratory test results

FINES CORRECTION		CSR & LIQUEFACTION TRIGGERING RESULT													SATURATED SETTLEMENT			
Fines Correction	$(N1)_{60\text{-}clean\text{-}sand}$	PGA	M	Groundwater Depth During EARTHQUAKE (ft)	Avg Unit Wt Above Sample (pcf)	Total Overburden Stress (psf)	Pore Pressure (psf)	Effective Overburden Stress (psf)	rd	CSR	CRR7.5	MSF	Ksig	FS	Volumetrc Strain (%)	Layer Thickness (ft)	Layer Settlement (in)	Cumulative Settlement (in)
42.5	100	0.43	6.8	0	120	360	187	173	0.99	0.58		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
5.3	8	0.43	6.8	0	125	735	374	361	0.99	0.56	0.10	1.28	1.00	non-liquefiable	0.00	3.0	0.00	0.00
4.3	40	0.43	6.8	0	125	985	499	486	0.98	0.56		1.28	1.00	N160cs>=30	0.00	2.0	0.00	0.00
4.4	31	0.43	6.8	0	125	1360	686	674	0.98	0.55		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
0.0	41	0.43	6.8	0	125	1610	811	799	0.97	0.55		1.28	1.00	N160cs>=30	0.00	2.0	0.00	0.00
0.8	45	0.43	6.8	0	125	1985	998	987	0.97	0.54		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
1.9	97	0.43	6.8	0	125	2235	1123	1112	0.96	0.54		1.28	1.00	N160cs>=30	0.00	2.5	0.00	0.00
1.3	60	0.43	6.8	0	125	2610	1310	1300	0.95	0.54		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
1.2	73	0.43	6.8	0	125	3110	1560	1550	0.94	0.53		1.28	1.00	N160cs>=30	0.00	2.5	0.00	0.00
6.8	15	0.43	6.8	0	125	3360	1685	1675	0.93	0.52	0.16	1.28	1.00	0.39	1.93	2.0	0.46	0.46
7.9	24	0.43	6.8	0	125	3485	1747	1738	0.93	0.52	0.27	1.28	1.00	0.67	1.29	1.0	0.15	0.62
7.1	15	0.43	6.8	0	125	3610	1810	1800	0.93	0.52	0.16	1.28	1.00	non-liquefiable	0.00	2.5	0.00	0.62
7.6	23	0.43	6.8	0	125	3860	1934	1926	0.92	0.51	0.26	1.28	1.00	0.64	1.36	2.0	0.33	0.94
6.4	11	0.43	6.8	0	125	4360	2184	2176	0.89	0.50	0.12	1.28	0.99	0.31	2.50	4.0	1.20	2.14
2.2	81	0.43	6.8	0	125	4610	2309	2301	0.88	0.49		1.28	0.98	N160cs>=30	0.00	2.0	0.00	2.14
3.5	117	0.43	6.8	0	125	4985	2496	2489	0.85	0.48		1.28	0.96	N160cs>=30	0.00	3.0	0.00	2.14
3.3	121	0.43	6.8	0	135	5345	2621	2724	0.83	0.46		1.28	0.94	N160cs>=30	0.00	11.0	0.00	0.94
0.0	76	0.43	6.8	0	135	5615	2746	2869	0.81	0.44		1.28	0.93	N160cs>=30	0.00	2.5	0.00	0.94
0.0	149	0.43	6.8	0	135	5885	2870	3015	0.79	0.43		1.28	0.92	N160cs>=30	0.00	2.5	0.00	0.94
0.0	66	0.43	6.8	0	135	6290	3058	3232	0.76	0.41		1.28	0.90	N160cs>=30	0.00	2.5	0.00	0.94

Calculation of Liquefaction Potential Using SPT Data
Youd et al. (2001)

All calculations per 10/01 Journal of Geotech.
Soil types CL, CH, or MH will return a "non-liquefiable" FS
Sampler types: **s** = SPT OR **m** = Modified California
Liner: **y** = liners used or no room for liners OR **n** = room for liners but no liners used

Non-Standard samplers Conversion to SPT
N = N'(WH/4200)(2.0**2-1.375**2)/(OD**2-ID**2)

FIELD DATA									STANDARDIZED BLOW COUNTS						OVERBURDEN CORRECTION & CORRECTED BLOW COUNTS						
Boring Number	Sample No.	Sample Depth (ft)	Field Blow Count, N	USCS	%fines	Sampler Type	Liner	Hammer Efficiency (%)	CR_rods	CB_Borehole	ModCal / SPT conversion	CS_liner	CE_energy	N_{60}	Groundwater Depth During Sampling (ft)	Avg Unit Wt Above Sample (pcf)	Total Overburden Stress (psf)	Pore Pressure (psf)	Effective Overburden Stress (psf)	C_N	$(N1)_{60}$
RW-1	1	3.0	24	sm	25	s	n	90	0.75	1.00	1	1.25	150%	34	5	120	360	0	360	1.70	57.5
	2	6.0	1	mh	75	m	y	90	0.75	1.00	1.39	1.00	150%	2	5	125	735	62.4	672.6	1.70	2.7
	3	8.0	14	sm	16	m	y	90	0.75	1.00	1.39	1.00	150%	22	5	125	985	187.2	797.8	1.63	35.7
	4	11.0	13	sm	16	s	n	90	0.80	1.00	1	1.16	150%	18	5	125	1360	374.4	985.6	1.47	26.6
	5	13.0	18	sp	2	m	y	90	0.80	1.00	1.39	1.00	150%	30	5	125	1610	499.2	1110.8	1.38	41.4
	6	16.0	22	sp-sm	8	s	n	90	0.85	1.00	1	1.24	150%	35	5	125	1985	686.4	1298.6	1.28	44.2
	7	18.0	44	sp-sm	8	m	y	90	0.85	1.00	1.39	1.00	150%	78	5	125	2235	811.2	1423.8	1.22	95.1
	8	21.0	28	sp-sm	8	s	n	90	0.95	1.00	1	1.28	150%	51	5	125	2610	998	1612	1.15	58.7
	9	25.0	34	sp-sm	8	m	y	90	0.95	1.00	1.39	1.00	150%	67	5	125	3110	1248	1862	1.07	71.8
	10	27.0	4	ml	50	m	y	90	0.95	1.00	1.39	1.00	150%	8	5	125	3360	1373	1987	1.03	8.2
	11	28.0	8	ml	50	m	y	90	0.95	1.00	1.39	1.00	150%	16	5	125	3485	1435	2050	1.02	16.1
	12	29.0	4	cl	50	m	y	90	0.95	1.00	1.39	1.00	150%	8	5	125	3610	1498	2112	1.00	7.9
	13	31.0	8	ml	50	m	y	90	0.95	1.00	1.39	1.00	150%	16	5	125	3860	1622	2238	0.97	15.4
	14	35.0		ml	50	m	y	90	1	1.00	1.39	1.00	150%	5	5	125	4360	1872	2488	0.92	4.6
	15	37.0	42	sw-sm	10	m	y	90	1	1.00	1.39	1.00	150%	88	5	125	4610	1997	2613	0.90	78.8
	16	40.0	67	sw-sm	10	s	n	90	1	1.00	1	1.30	150%	131	5	125	4985	2184	2801	0.87	113.5
	17	42.0	52	sp-sm	10	m	n	90	1	1.00	1.39	1.30	150%	141	5	135	5345	2309	3036	0.84	117.7
	18	44.0	48	sp-sm	5	s	n	90	1	1.00	1	1.30	150%	94	5	135	5615	2434	3181	0.82	76.4
	19	46.0	69	sp-sm	5	m	n	90	1	1.00	1.39	1.30	150%	187	5	135	5885	2558	3327	0.80	149.2
	20	49.0	44	sp-sm	5	s	n	90	1	1.00	1	1.30	150%	86	5	135	6290	2746	3544	0.77	66.3

Red font indicates actual fines content from laboratory test results

FINES CORRECTION		CSR & LIQUEFACTION TRIGGERING RESULT													SATURATED SETTLEMENT			
Fines Correction	$(N1)_{60\text{-}clean\text{-}sand}$	PGA	M	Groundwater Depth During EARTHQUAKE (ft)	Avg Unit Wt Above Sample (pcf)	Total Overburden Stress (psf)	Pore Pressure (psf)	Effective Overburden Stress (psf)	rd	CSR	CRR7.5	MSF	Ksig	FS	Volumetric Strain (%)	Layer Thickness (ft)	Layer Settlement (in)	Cumulative Settlement (in)
42.5	100	0.64	6.8	0	120	360	187	173	0.99	0.86		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
5.3	8	0.64	6.8	0	125	735	374	361	0.99	0.84	0.10	1.28	1.00	non-liquefiable	0.00	3.0	0.00	0.00
4.3	40	0.64	6.8	0	125	985	499	486	0.98	0.83		1.28	1.00	N160cs>=30	0.00	2.0	0.00	0.00
4.4	31	0.64	6.8	0	125	1360	686	674	0.98	0.82		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
0.0	41	0.64	6.8	0	125	1610	811	799	0.97	0.82		1.28	1.00	N160cs>=30	0.00	2.0	0.00	0.00
0.8	45	0.64	6.8	0	125	1985	998	987	0.97	0.81		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
1.9	97	0.64	6.8	0	125	2235	1123	1112	0.96	0.80		1.28	1.00	N160cs>=30	0.00	2.5	0.00	0.00
1.3	60	0.64	6.8	0	125	2610	1310	1300	0.95	0.80		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
1.2	73	0.64	6.8	0	125	3110	1560	1550	0.94	0.79		1.28	1.00	N160cs>=30	0.00	2.5	0.00	0.00
6.8	15	0.64	6.8	0	125	3360	1685	1675	0.93	0.78	0.16	1.28	1.00	**0.26**	1.93	2.0	0.46	0.46
7.9	24	0.64	6.8	0	125	3485	1747	1738	0.93	0.78	0.27	1.28	1.00	**0.45**	1.29	1.0	0.15	0.62
7.1	15	0.64	6.8	0	125	3610	1810	1800	0.93	0.77	0.16	1.28	1.00	non-liquefiable	0.00	2.5	0.00	0.62
7.6	23	0.64	6.8	0	125	3860	1934	1926	0.92	0.76	0.26	1.28	1.00	**0.43**	1.36	2.0	0.33	0.94
6.4	11	0.64	6.8	0	125	4360	2184	2176	0.89	0.74	0.12	1.28	0.99	**0.21**	2.50	4.0	1.20	2.14
2.2	81	0.64	6.8	0	125	4610	2309	2301	0.88	0.73		1.28	0.98	N160cs>=30	0.00	2.0	0.00	2.14
3.5	117	0.64	6.8	0	125	4985	2496	2489	0.85	0.71		1.28	0.96	N160cs>=30	0.00	3.0	0.00	2.14
3.3	121	0.64	6.8	0	135	5345	2621	2724	0.83	0.68		1.28	0.94	N160cs>=30	0.00	11.0	0.00	0.94
0.0	76	0.64	6.8	0	135	5615	2746	2869	0.81	0.66		1.28	0.93	N160cs>=30	0.00	2.5	0.00	0.94
0.0	149	0.64	6.8	0	135	5885	2870	3015	0.79	0.64		1.28	0.92	N160cs>=30	0.00	2.5	0.00	0.94
0.0	66	0.64	6.8	0	135	6290	3058	3232	0.76	0.62		1.28	0.90	N160cs>=30	0.00	2.5	0.00	0.94

Calculation of Liquefaction Potential Using SPT Data
Youd et al. (2001)

All calculations per 10/01 Journal of Geotech.
Soil types CL, CH, or MH will return a "non-liquefiable" FS
Sampler types: **s** = SPT OR **m** = Modified California
Liner: **y** = liners used or no room for liners OR **n** = room for liners but no liners used

Non-Standard samplers Conversion to SPT
N = N'(WH/4200)(2.0**2-1.375**2)/(OD**2-ID**2)

	FIELD DATA								STANDARDIZED BLOW COUNTS						OVERBURDEN CORRECTION & CORRECTED BLOW COUNTS						
Boring Number	Sample No.	Sample Depth (ft)	Field Blow Count, N	USCS	%fines	Sampler Type	Liner	Hammer Efficiency (%)	CR_rods	CB_Borehole	ModCal / SPT conversion	CS_liner	CE_energy	N_{60}	Groundwater Depth During Sampling (ft)	Avg Unit Wt Above Sample (pcf)	Total Overburden Stress (psf)	Pore Pressure (psf)	Effective Overburden Stress (psf)	C_N	$(N1)_{60}$
RW-2	1	3.0	12	sm	25	s	n	90	0.75	1.00	1	1.16	150%	16	5	120	360	0	360	1.70	26.5
	2	6.0	23	sm	25	s	n	90	0.75	1.00	1	1.24	150%	32	5	125	735	62.4	672.6	1.70	54.7
	3	8.0	23	sm	18	m	y	90	0.75	1.00	1.39	1.00	150%	36	5	125	985	187.2	797.8	1.63	58.6
	4	11.0	14	sm	18	s	n	90	0.80	1.00	1	1.17	150%	20	5	125	1360	374.4	985.6	1.47	28.8
	5	13.0	33	sm	18	m	y	90	0.80	1.00	1.39	1.00	150%	55	5	125	1610	499.2	1110.8	1.38	76.0
	6	16.0	24	sp-sm	7	s	n	90	0.85	1.00	1	1.25	150%	38	5	125	1985	686.4	1298.6	1.28	48.9
	7	18.0	40	sp-sm	12	m	y	90	0.85	1.00	1.39	1.00	150%	71	5	125	2235	811.2	1423.8	1.22	86.4
	8	21.0	17	sp-sm	12	s	n	90	0.95	1.00	1	1.20	150%	29	5	125	2610	998	1612	1.15	33.2
	9	25.0	30	sp-sm	12	m	y	90	0.95	1.00	1.39	1.00	150%	59	5	125	3110	1248	1862	1.07	63.3
	10	28.0	6	ch	70	s	n	90	0.95	1.00	1	1.11	150%	9	5	125	3485	1435	2050	1.02	9.6
	11	30.0	6	cl	70	s	n	90	0.95	1.00	1	1.11	150%	9	5	125	3735	1560	2175	0.99	9.3
	12	32.0		sc	28	s	n	90	0.95	1.00	1	1.10	150%	10	5	125	3985	1685	2300	0.96	9.6
	13	34.0		ml	8	s	n	90	1	1.03	1	1.10	150%	5	5	125	4235	1810	2425	0.93	4.7
	14	36.0		sm	12	s	n	90	1	1.00	1	1.10	150%	10	5	135	4505	1934	2571	0.91	9.1
	15	42.0	35	sw-sm	9	s	n	90	1	1.00	1	1.30	150%	68	5	135	5315	2309	3006	0.84	57.3
	16	46.0	49	sw-sm	10	s	n	90	1	1.00	1	1.30	150%	96	5	135	5855	2558	3297	0.80	76.5
	17	48.0	53	sw-sm	10	m	y	90	1	1.00	1.39	1.00	150%	111	5	135	6125	2683	3442	0.78	86.6
	18	51.0	43	sp-sm	7	s	n	90	1	1.00	1	1.30	150%	84	5	135	6530	2870	3660	0.76	63.7
	19	54.0	58	sp-sm	7	m	y	90	1	1.00	1.39	1.00	150%	121	5	135	6935	3058	3877	0.74	89.4
	20	56.0	52	sp-sm	11	s	n	90	1	1.00	1	1.30	150%	101	5	135	7205	3182	4023	0.73	73.5
	21	59.0	55	sp-sm	11	m	y	90	1	1.00	1.39	1.00	150%	115	24	135	7610	2184	5426	0.62	71.6

Red font indicates actual fines content from laboratory test results

FINES CORRECTION		CSR & LIQUEFACTION TRIGGERING RESULT													SATURATED SETTLEMENT			
Fines Correction	$(N1)_{60\text{-}clean\text{-}sand}$	PGA	M	Groundwater Depth During EARTHQUAKE (ft)	Avg Unit Wt Above Sample (pcf)	Total Overburden Stress (psf)	Pore Pressure (psf)	Effective Overburden Stress (psf)	rd	CSR	CRR7.5	MSF	Ksig	FS	Volumetrc Strain (%)	Layer Thickness (ft)	Layer Settlement (in)	Cumulative Settlement (in)
73.5	100	0.43	6.8	0	120	360	187	173	0.99	0.58		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
9.0	64	0.43	6.8	0	125	735	374	361	0.99	0.56		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
7.4	66	0.43	6.8	0	125	985	499	486	0.98	0.56		1.28	1.00	N160cs>=30	0.00	2.0	0.00	0.00
5.2	34	0.43	6.8	0	125	1360	686	674	0.98	0.55		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
8.0	84	0.43	6.8	0	125	1610	811	799	0.97	0.55		1.28	1.00	N160cs>=30	0.00	2.0	0.00	0.00
0.1	49	0.43	6.8	0	125	1985	998	987	0.97	0.54		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
4.6	91	0.43	6.8	0	125	2235	1123	1112	0.96	0.54		1.28	1.00	N160cs>=30	0.00	2.5	0.00	0.00
2.8	36	0.43	6.8	0	125	2610	1310	1300	0.95	0.54		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
3.7	67	0.43	6.8	0	125	3110	1560	1550	0.94	0.53		1.28	1.00	N160cs>=30	0.00	2.5	0.00	0.00
7.4	17	0.43	6.8	0	125	3485	1747	1738	0.93	0.52	0.18	1.28	1.00	non-liquefiable	0.00	3.0	0.00	0.00
6.7	16	0.43	6.8	0	125	3735	1872	1863	0.92	0.52	0.17	1.28	1.00	non-liquefiable	0.00	2.0	0.00	0.00
5.4	15	0.43	6.8	0	125	3985	1997	1988	0.91	0.51	0.16	1.28	1.00	0.40	1.93	2.5	0.58	0.58
0.3	5	0.43	6.8	0	125	4235	2122	2113	0.90	0.50	0.07	1.28	1.00	0.18	5.00	2.0	1.20	1.78
1.9	11	0.43	6.8	0	135	4505	2246	2259	0.88	0.49	0.12	1.28	0.98	0.31	2.50	2.0	0.60	2.38
1.7	59	0.43	6.8	0	135	5315	2621	2694	0.83	0.46		1.28	0.94	N160cs>=30	0.00	2.5	0.00	2.38
2.5	79	0.43	6.8	0	135	5855	2870	2985	0.79	0.44		1.28	0.92	N160cs>=30	0.00	2.5	0.00	2.38
2.4	89	0.43	6.8	0	135	6125	2995	3130	0.77	0.42		1.28	0.91	N160cs>=30	0.00	2.5	0.00	2.38
0.3	64	0.43	6.8	0	135	6530	3182	3348	0.74	0.40		1.28	0.89	N160cs>=30	0.00	2.5	0.00	2.38
0.6	90	0.43	6.8	0	135	6935	3370	3565	0.71	0.39		1.28	0.88	N160cs>=30	0.00	2.5	0.00	2.38
3.5	77	0.43	6.8	0	135	7205	3494	3711	0.69	0.38		1.28	0.87	N160cs>=30	0.00	2.5	0.00	2.38
3.4	75	0.43	6.8	0	135	7610	3682	3928	0.67	0.36		1.28	0.86	N160cs>=30	0.00	2.5	0.00	2.38

Calculation of Liquefaction Potential Using SPT Data
Youd et al. (2001)

All calculations per 10/01 Journal of Geotech.
Soil types CL, CH, or MH will return a "non-liquefiable" FS
Sampler types: **s** = SPT OR **m** = Modified California
Liner: **y** = liners used or no room for liners OR **n** = room for liners but no liners used

Non-Standard samplers Conversion to SPT
N = N'(WH/4200)(2.0**2-1.375**2)/(OD**2-ID**2)

FIELD DATA									STANDARDIZED BLOW COUNTS						OVERBURDEN CORRECTION & CORRECTED BLOW COUNTS						
Boring Number	Sample No.	Sample Depth (ft)	Field Blow Count, N	USCS	%fines	Sampler Type	Liner	Hammer Efficiency (%)	CR_rods	CB_Borehole	ModCal / SPT conversion	CS_liner	CE_energy	N_{60}	Groundwater Depth During Sampling (ft)	Avg Unit Wt Above Sample (pcf)	Total Overburden Stress (psf)	Pore Pressure (psf)	Effective Overburden Stress (psf)	C_N	$(N1)_{60}$
RW-2	1	3.0	12	sm	25	s	n	90	0.75	1.00	1	1.16	150%	16	5	120	360	0	360	1.70	26.5
	2	6.0	23	sm	25	s	n	90	0.75	1.00	1	1.24	150%	32	5	125	735	62.4	672.6	1.70	54.7
	3	8.0	23	sm	18	m	y	90	0.75	1.00	1.39	1.00	150%	36	5	125	985	187.2	797.8	1.63	58.6
	4	11.0	14	sm	18	s	n	90	0.80	1.00	1	1.17	150%	20	5	125	1360	374.4	985.6	1.47	28.8
	5	13.0	33	sm	18	m	y	90	0.80	1.00	1.39	1.00	150%	55	5	125	1610	499.2	1110.8	1.38	76.0
	6	16.0	24	sp-sm	7	s	n	90	0.85	1.00	1	1.25	150%	38	5	125	1985	686.4	1298.6	1.28	48.9
	7	18.0	40	sp-sm	12	m	y	90	0.85	1.00	1.39	1.00	150%	71	5	125	2235	811.2	1423.8	1.22	86.4
	8	21.0	17	sp-sm	12	s	n	90	0.95	1.00	1	1.20	150%	29	5	125	2610	998	1612	1.15	33.2
	9	25.0	30	sp-sm	12	m	y	90	0.95	1.00	1.39	1.00	150%	59	5	125	3110	1248	1862	1.07	63.3
	10	28.0	6	ch	70	s	n	90	0.95	1.00	1	1.11	150%	9	5	125	3485	1435	2050	1.02	9.6
	11	30.0	6	cl	70	s	n	90	0.95	1.00	1	1.11	150%	9	5	125	3735	1560	2175	0.99	9.3
	12	32.0		sc	28	s	n	90	0.95	1.00	1	1.10	150%	10	5	125	3985	1685	2300	0.96	9.6
	13	34.0		ml	8	s	n	90	1	1.03	1	1.10	150%	5	5	125	4235	1810	2425	0.93	4.7
	14	36.0		sm	12	s	n	90	1	1.00	1	1.10	150%	10	5	135	4505	1934	2571	0.91	9.1
	15	42.0	35	sw-sm	9	s	n	90	1	1.00	1	1.30	150%	68	5	135	5315	2309	3006	0.84	57.3
	16	46.0	49	sw-sm	10	s	n	90	1	1.00	1	1.30	150%	96	5	135	5855	2558	3297	0.80	76.5
	17	48.0	53	sw-sm	10	m	y	90	1	1.00	1.39	1.00	150%	111	5	135	6125	2683	3442	0.78	86.6
	18	51.0	43	sp-sm	7	s	n	90	1	1.00	1	1.30	150%	84	5	135	6530	2870	3660	0.76	63.7
	19	54.0	58	sp-sm	7	m	y	90	1	1.00	1.39	1.00	150%	121	5	135	6935	3058	3877	0.74	89.4
	20	56.0	52	sp-sm	11	s	n	90	1	1.00	1	1.30	150%	101	5	135	7205	3182	4023	0.73	73.5
	21	59.0	55	sp-sm	11	m	y	90	1	1.00	1.39	1.00	150%	115	24	135	7610	2184	5426	0.62	71.6

Red font indicates actual fines content from laboratory test results

FINES CORRECTION		CSR & LIQUEFACTION TRIGGERING RESULT													SATURATED SETTLEMENT			
Fines Correction	$(N1)_{60,clean-sand}$	PGA	M	Groundwater Depth During EARTHQUAKE (ft)	Avg Unit Wt Above Sample (pcf)	Total Overburden Stress (psf)	Pore Pressure (psf)	Effective Overburden Stress (psf)	rd	CSR	CRR7.5	MSF	Ksig	FS	Volumetric Strain (%)	Layer Thickness (ft)	Layer Settlement (in)	Cumulative Settlement (in)
73.5	100	0.64	6.8	0	120	360	187	173	0.99	0.86		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
9.0	64	0.64	6.8	0	125	735	374	361	0.99	0.84		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
7.4	66	0.64	6.8	0	125	985	499	486	0.98	0.83		1.28	1.00	N160cs>=30	0.00	2.0	0.00	0.00
5.2	34	0.64	6.8	0	125	1360	686	674	0.98	0.82		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
8.0	84	0.64	6.8	0	125	1610	811	799	0.97	0.82		1.28	1.00	N160cs>=30	0.00	2.0	0.00	0.00
0.1	49	0.64	6.8	0	125	1985	998	987	0.97	0.81		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
4.6	91	0.64	6.8	0	125	2235	1123	1112	0.96	0.80		1.28	1.00	N160cs>=30	0.00	2.5	0.00	0.00
2.8	36	0.64	6.8	0	125	2610	1310	1300	0.95	0.80		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
3.7	67	0.64	6.8	0	125	3110	1560	1550	0.94	0.79		1.28	1.00	N160cs>=30	0.00	2.5	0.00	0.00
7.4	17	0.64	6.8	0	125	3485	1747	1738	0.93	0.78	0.18	1.28	1.00	non-liquefiable	0.00	3.0	0.00	0.00
6.7	16	0.64	6.8	0	125	3735	1872	1863	0.92	0.77	0.17	1.28	1.00	non-liquefiable	0.00	2.0	0.00	0.00
5.4	15	0.64	6.8	0	125	3985	1997	1988	0.91	0.76	0.16	1.28	1.00	0.27	1.93	2.5	0.58	0.58
0.3	5	0.64	6.8	0	125	4235	2122	2113	0.90	0.75	0.07	1.28	1.00	0.12	5.00	2.0	1.20	1.78
1.9	11	0.64	6.8	0	135	4505	2246	2259	0.88	0.73	0.12	1.28	0.98	0.21	2.50	2.0	0.60	2.38
1.7	59	0.64	6.8	0	135	5315	2621	2694	0.83	0.68		1.28	0.94	N160cs>=30	0.00	2.5	0.00	2.38
2.5	79	0.64	6.8	0	135	5855	2870	2985	0.79	0.65		1.28	0.92	N160cs>=30	0.00	2.5	0.00	2.38
2.4	89	0.64	6.8	0	135	6125	2995	3130	0.77	0.63		1.28	0.91	N160cs>=30	0.00	2.5	0.00	2.38
0.3	64	0.64	6.8	0	135	6530	3182	3348	0.74	0.60		1.28	0.89	N160cs>=30	0.00	2.5	0.00	2.38
0.6	90	0.64	6.8	0	135	6935	3370	3565	0.71	0.58		1.28	0.88	N160cs>=30	0.00	2.5	0.00	2.38
3.5	77	0.64	6.8	0	135	7205	3494	3711	0.69	0.56		1.28	0.87	N160cs>=30	0.00	2.5	0.00	2.38
3.4	75	0.64	6.8	0	135	7610	3682	3928	0.67	0.54		1.28	0.86	N160cs>=30	0.00	2.5	0.00	2.38

Calculation of Liquefaction Potential Using SPT Data
Youd et al. (2001)

All calculations per 10/01 Journal of Geotech.
Soil types CL, CH, or MH will return a "non-liquefiable" FS
Sampler types: **s** = SPT OR **m** = Modified California
Liner: **y** = liners used or no room for liners OR **n** = room for liners but no liners used

Non-Standard samplers Conversion to SPT
N = N'(WH/4200)(2.0**2-1.375**2)/(OD**2-ID**2)

FIELD DATA									STANDARDIZED BLOW COUNTS						OVERBURDEN CORRECTION & CORRECTED BLOW COUNTS						
Boring Number	Sample No.	Sample Depth (ft)	Field Blow Count, N	USCS	%fines	Sampler Type	Liner	Hammer Efficiency (%)	C_R_rods	C_B_Borehole	ModCal / SPT conversion	C_S_liner	C_E_energy	N_{60}	Groundwater Depth During Sampling (ft)	Avg Unit Wt Above Sample (pcf)	Total Overburden Stress (psf)	Pore Pressure (psf)	Effective Overburden Stress (psf)	C_N	$(N1)_{60}$
RW-3	1	3.0	9	sm	20	s	n	90	0.75	1.00	1	1.13	150%	11	5	120	360	0	360	1.70	19.5
	2	6.0	21	sm	20	s	n	90	0.75	1.00	1	1.23	150%	29	5	125	735	62.4	672.6	1.70	49.3
	3	8.0	34	sm	9	m	y	90	0.75	1.00	1.39	1.00	150%	53	5	125	985	187.2	797.8	1.63	86.6
	4	11.0	10	sm	20	s	n	90	0.80	1.00	1	1.14	150%	14	5	125	1360	374.4	985.6	1.47	20.0
	5	13.0	14	sm	20	m	y	90	0.80	1.00	1.39	1.00	150%	23	5	125	1610	499.2	1110.8	1.38	32.2
	6	16.0	15	sm	20	s	n	90	0.85	1.00	1	1.18	150%	23	5	125	1985	686.4	1298.6	1.28	28.8
	7	18.0	38	sp-sm	8	m	y	90	0.85	1.00	1.39	1.00	150%	67	5	125	2235	811.2	1423.8	1.22	82.1
	8	23.0	14	sp-sm	8	s	n	90	0.95	1.00	1	1.17	150%	23	5	125	2860	1123	1737	1.10	25.8
	9	29.0	6	cl	75	m	y	90	0.95	1.00	1.39	1.00	150%	12	5	125	3610	1498	2112	1.00	11.9
	10	31.0		sc	47	m	y	90	0.95	1.00	1.39	1.00	150%	10	5	125	3860	1622	2238	0.97	9.7
	11	34.0		cl	75	m	y	90	1	1.00	1.39	1.00	150%	5	5	125	4235	1810	2425	0.93	4.7
	12	35.0		sc	47	m	y	90	1	1.00	1.39	1.00	150%	10	5	125	4360	1872	2488	0.92	9.2
	13	36.0	44	sw-sm	5	m	y	90	1	1.00	1.39	1.00	150%	92	5	125	4485	1934	2551	0.91	83.6
	14	39.0	56	sw-sm	5	s	n	90	1	1.00	1	1.30	150%	109	5	135	4890	2122	2768	0.87	95.4

Red font indicates actual fines content from laboratory test results

FINES CORRECTION		CSR & LIQUEFACTION TRIGGERING RESULT													SATURATED SETTLEMENT			
Fines Correction	$(N1)_{60\text{-clean-sand}}$	PGA	M	Groundwater Depth During EARTHQUAKE (ft)	Avg Unit Wt Above Sample (pcf)	Total Overburden Stress (psf)	Pore Pressure (psf)	Effective Overburden Stress (psf)	rd	CSR	CRR7.5	MSF	Ksig	FS	Volumetric Strain (%)	Layer Thickness (ft)	Layer Settlement (in)	Cumulative Settlement (in)
80.5	100	0.43	6.8	0	120	360	187	173	0.99	0.58		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
7.7	57	0.43	6.8	0	125	735	374	361	0.99	0.56		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
2.4	89	0.43	6.8	0	125	985	499	486	0.98	0.56		1.28	1.00	N160cs>=30	0.00	2.0	0.00	0.00
5.0	25	0.43	6.8	0	125	1360	686	674	0.98	0.55	0.29	1.28	1.00	0.68	1.21	3.0	0.44	0.44
5.8	38	0.43	6.8	0	125	1610	811	799	0.97	0.55		1.28	1.00	N160cs>=30	0.00	2.0	0.00	0.44
6.2	35	0.43	6.8	0	125	1985	998	987	0.97	0.54		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.44
0.9	83	0.43	6.8	0	125	2235	1123	1112	0.96	0.54		1.28	1.00	N160cs>=30	0.00	2.5	0.00	0.44
0.0	26	0.43	6.8	0	125	2860	1435	1425	0.95	0.53	0.31	1.28	1.00	0.75	1.14	5.0	0.69	1.12
7.1	19	0.43	6.8	0	125	3610	1810	1800	0.93	0.52	0.20	1.28	1.00	non-liquefiable	0.00	2.5	0.00	1.12
7.3	17	0.43	6.8	0	125	3860	1934	1926	0.92	0.51	0.18	1.28	1.00	0.45	1.79	2.0	0.43	1.55
6.3	11	0.43	6.8	0	125	4235	2122	2113	0.90	0.50	0.12	1.28	1.00	non-liquefiable	0.00	3.0	0.00	1.55
6.8	16	0.43	6.8	0	125	4360	2184	2176	0.89	0.50	0.17	1.28	0.99	0.44	1.86	2.5	0.56	2.11
0.0	84	0.43	6.8	0	125	4485	2246	2239	0.88	0.49		1.28	0.99	N160cs>=30	0.00	1.0	0.00	2.11
0.0	95	0.43	6.8	0	135	4890	2434	2456	0.86	0.48		1.28	0.96	N160cs>=30	0.00	3.0	0.00	2.11

Calculation of Liquefaction Potential Using SPT Data
Youd et al. (2001)

All calculations per 10/01 Journal of Geotech.
Soil types CL, CH, or MH will return a "non-liquefiable" FS
Sampler types: **s** = SPT OR **m** = Modified California
Liner: **y** = liners used or no room for liners OR **n** = room for liners but no liners used

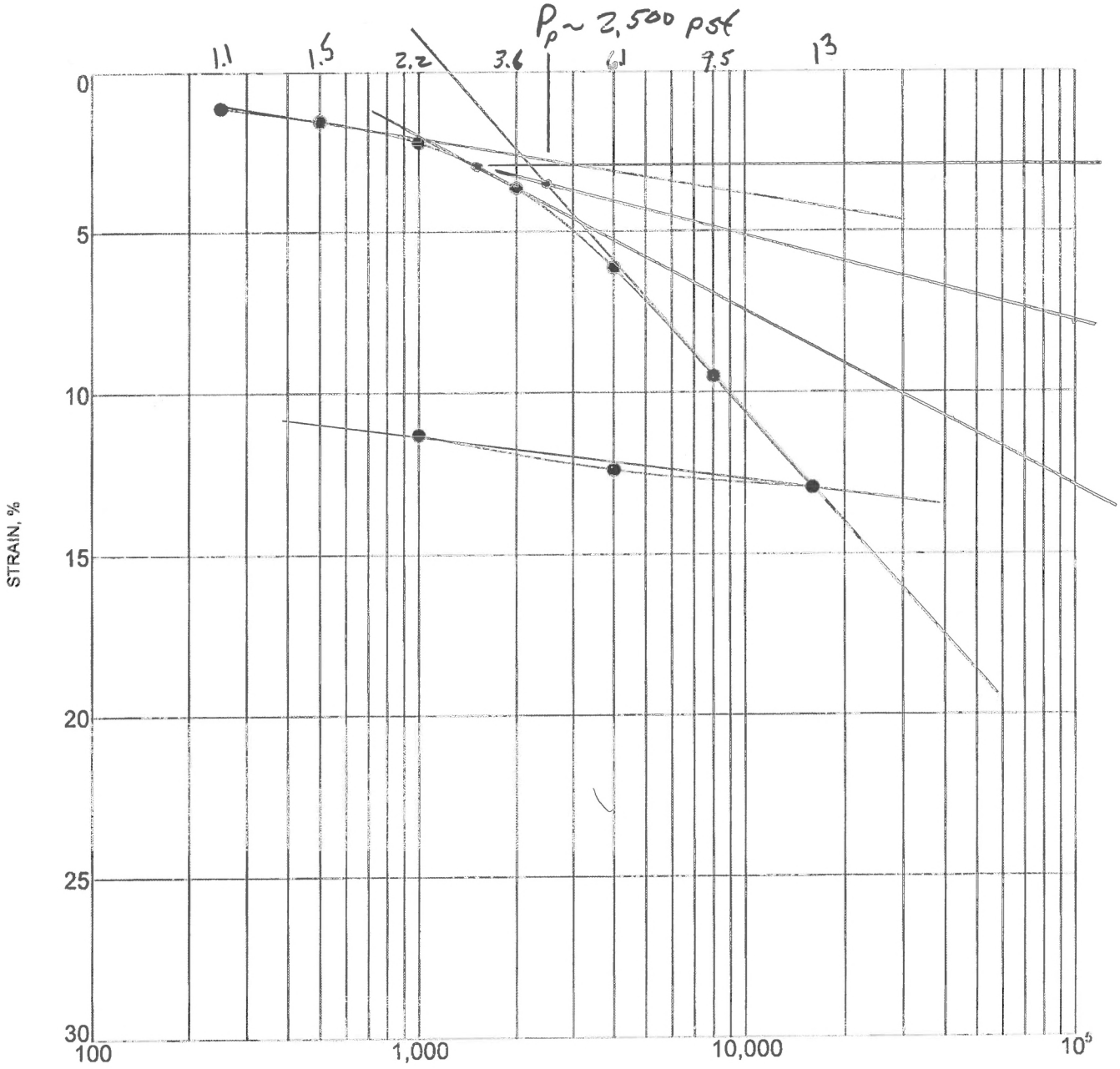
Non-Standard samplers Conversion to SPT
N = N'(WH/4200)(2.0**2-1.375**2)/(OD**2-ID**2)

FIELD DATA									STANDARDIZED BLOW COUNTS						OVERBURDEN CORRECTION & CORRECTED BLOW COUNTS						
Boring Number	Sample No.	Sample Depth (ft)	Field Blow Count, N	USCS	%fines	Sampler Type	Liner	Hammer Efficiency (%)	CR_rods	CB_Borehole	ModCal / SPT conversion	CS_liner	CE_energy	N_{60}	Groundwater Depth During Sampling (ft)	Avg Unit Wt Above Sample (pcf)	Total Overburden Stress (psf)	Pore Pressure (psf)	Effective Overburden Stress (psf)	C_N	$(N1)_{60}$
RW-3	1	3.0	9	sm	20	s	n	90	0.75	1.00	1	1.13	150%	11	5	120	360	0	360	1.70	19.5
	2	6.0	21	sm	20	s	n	90	0.75	1.00	1	1.23	150%	29	5	125	735	62.4	672.6	1.70	49.3
	3	8.0	34	sm	6	m	y	90	0.75	1.00	1.39	1.00	150%	53	5	125	985	187.2	797.8	1.63	86.6
	4	11.0	10	sm	20	s	n	90	0.80	1.00	1	1.14	150%	14	5	125	1360	374.4	985.6	1.47	20.0
	5	13.0	14	sm	20	m	y	90	0.80	1.00	1.39	1.00	150%	23	5	125	1610	499.2	1110.8	1.38	32.2
	6	16.0	15	sm	20	s	n	90	0.85	1.00	1	1.18	150%	23	5	125	1985	686.4	1298.6	1.28	28.8
	7	18.0	38	sp-sm	8	m	y	90	0.85	1.00	1.39	1.00	150%	67	5	125	2235	811.2	1423.8	1.22	82.1
	8	23.0	14	sp-sm	5	s	n	90	0.95	1.00	1	1.17	150%	23	5	125	2860	1123	1737	1.10	25.8
	9	29.0	6	cl	75	m	y	90	0.95	1.00	1.39	1.00	150%	12	5	125	3610	1498	2112	1.00	11.9
	10	31.0		sc	47	m	y	90	0.95	1.00	1.39	1.00	150%	10	5	125	3860	1622	2238	0.97	9.7
	11	34.0		cl	75	m	y	90	1	1.00	1.39	1.00	150%	5	5	125	4235	1810	2425	0.93	4.7
	12	35.0		sc	47	m	y	90	1	1.00	1.39	1.00	150%	10	5	125	4360	1872	2488	0.92	9.2
	13	36.0	44	sw-sm	5	m	y	90	1	1.00	1.39	1.00	150%	92	5	125	4485	1934	2551	0.91	83.6
	14	39.0	56	sw-sm	5	s	n	90	1	1.00	1	1.30	150%	109	5	135	4890	2122	2768	0.87	95.4

Red font indicates actual fines content from laboratory test results

FINES CORRECTION		CSR & LIQUEFACTION TRIGGERING RESULT													SATURATED SETTLEMENT			
Fines Correction	$(N1)_{60\text{-clean-sand}}$	PGA	M	Groundwater Depth During EARTHQUAKE (ft)	Avg Unit Wt Above Sample (pcf)	Total Overburden Stress (psf)	Pore Pressure (psf)	Effective Overburden Stress (psf)	rd	CSR	CRR7.5	MSF	Ksig	FS	Volumetrc Strain (%)	Layer Thickness (ft)	Layer Settlement (in)	Cumulative Settlement (in)
80.5	100	0.64	6.8	0	120	360	187	173	0.99	0.86		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
7.7	57	0.64	6.8	0	125	735	374	361	0.99	0.84		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.00
2.4	89	0.64	6.8	0	125	985	499	486	0.98	0.83		1.28	1.00	N160cs>=30	0.00	2.0	0.00	0.00
5.0	25	0.64	6.8	0	125	1360	686	674	0.98	0.82	0.29	1.28	1.00	0.46	1.21	3.0	0.44	0.44
5.8	38	0.64	6.8	0	125	1610	811	799	0.97	0.82		1.28	1.00	N160cs>=30	0.00	2.0	0.00	0.44
6.2	35	0.64	6.8	0	125	1985	998	987	0.97	0.81		1.28	1.00	N160cs>=30	0.00	3.0	0.00	0.44
0.9	83	0.64	6.8	0	125	2235	1123	1112	0.96	0.80		1.28	1.00	N160cs>=30	0.00	2.5	0.00	0.44
0.0	26	0.64	6.8	0	125	2860	1435	1425	0.95	0.79	0.31	1.28	1.00	0.50	1.14	5.0	0.69	1.12
7.1	19	0.64	6.8	0	125	3610	1810	1800	0.93	0.77	0.20	1.28	1.00	non-liquefiable	0.00	2.5	0.00	1.12
7.3	17	0.64	6.8	0	125	3860	1934	1926	0.92	0.76	0.18	1.28	1.00	0.30	1.79	2.0	0.43	1.55
6.3	11	0.64	6.8	0	125	4235	2122	2113	0.90	0.75	0.12	1.28	1.00	non-liquefiable	0.00	3.0	0.00	1.55
6.8	16	0.64	6.8	0	125	4360	2184	2176	0.89	0.74	0.17	1.28	0.99	0.29	1.86	2.5	0.56	2.11
0.0	84	0.64	6.8	0	125	4485	2246	2239	0.88	0.74		1.28	0.99	N160cs>=30	0.00	1.0	0.00	2.11
0.0	95	0.64	6.8	0	135	4890	2434	2456	0.86	0.71		1.28	0.96	N160cs>=30	0.00	3.0	0.00	2.11

Appendix D
Electrical Building
Settlement Calculations



$C_{cc} = 0.118$

$C_{RR} = 0.01$

Sample inundated at 500 psf

	Sample Location		Classification	DD,pcf	MC,%
●	RW-1	26.1	LEAN CLAY WITH SAND (CL)		

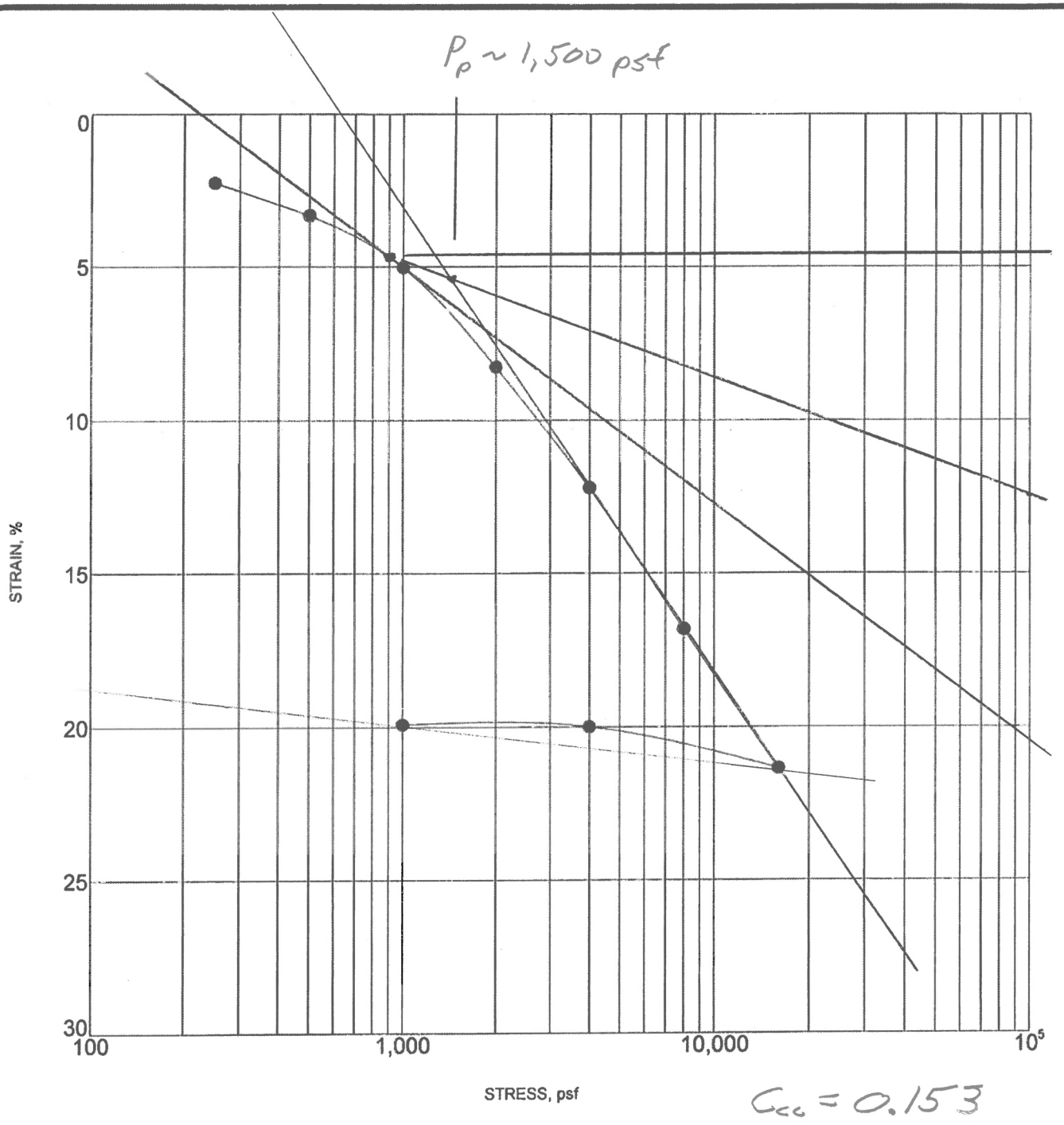
PROJECT: VENICE AUXILARY PUMP PLANT

PROJECT NO.: 2500.06I

GPI

CONSOLIDATION TEST RESULTS

FIGURE C-10



$C_{cc} = 0.153$

$C_{cR} = 0.012$

Sample inundated at 500 psf

	Sample Location		Classification	DD,pcf	MC,%
●	RW-2	26.8	FAT CLAY (CH)		

PROJECT: VENICE AUXILARY PUMP PLANT

PROJECT NO.: 2500.06I

GPI

CONSOLIDATION TEST RESULTS

FIGURE C-11

BORING RW-1

INITIAL VERTICAL STRESS AT BOTTOM OF FOOTING (PSF) = 200
DESIGN BEARING PRESSURE (PSF) = 1,500
ACTUAL BEARING VALUE (PSF) = 1,500
FOOTING EMBEDMENT DEPTH = 2
FOOTING WIDTH (FT) = 25
STRESS DIST (BOUSSINESQ(1)/WESTERGAARD(2)) 1

GROUNDWATER LEVEL DEPTH (FT) = 0

LAYER NUMBER	DRY UNIT WEIGHT (PCF)	MOIST. CONT. %	DEPTH TO TOP OF LAYER (FT)	DEPTH TO MIDDLE OF LAYER (FT)	DEPTH TO BOTTOM OF LAYER (FT)	LAYER THICK. (FT)	TOTAL PRESSURE AT MID-DEPTH (PSF)	EFF. PRESSURE AT MID-DEPTH (PSF)	Pc (PSF)	COM-PRESSION RATIO (Cc/1+eo)	RE-COM-PRESSION RATIO (Ce/1+eo)
1	91	27	0	1	2	2	115.57	53.17	53.17	0	0
2	91	27	2	4.5	7	5	520.065	239.265	239.265	0	0
3	91	27	7	9.5	12	5	1097.915	505.115	505.115	0	0
4	99	24	12	14.5	17	5	1693.74	788.94	788.94	0	0
5	95	24	17	20	23	6	2354.04	1106.04	1106.04	0	0
6	95	24	23	24	25	2	2825.24	1327.64	1327.64	0	0
7	79	43	25	26	27	2	3056.01	1433.61	1433.61	0.118	0.01
8	100	18	27	27.75	28.5	1.5	3257.48	1525.88	1525.88	0	0
9	103	25	28.5	29	29.5	1	3410.355	1600.755	1600.76	0.118	0.01
10	110	17	29.5	30.5	31.5	2	3603.43	1700.23	1700.23	0	0
11	126	11	31.5	33.25	35	3.5	3976.885	1902.085	1902.09	0.118	0.01
12	126	11	35	37.5	40	5	4571.29	2231.29	2231.29	0	0

BORING RW-1

LAYER NUMBER	DEPTH TO MIDDLE OF LAYER FROM BASE OF FOOTING(FT)	B/Z	Po' (PSF)	EXCAV. AND/OR DEWATER	Po' AFTER EXCA	INFLU-ENCE FACTOR	DELTA P	AREA FILL LOAD (PSF)	Po' + DELTA P + AREA FILL	LAYER THICK-NESS (FEET)	LAYER SETTLE-MENT (INCHES)
1	0	N/A	53.17	0	53.17	0.000	0	0	53.17	2	0.00
2	2.5	10	239.265	0	239.265	0.994	1491.6	0	1730.87	5	0.00
3	7.5	3.33333	505.115	0	505.115	0.888	1332	0	1837.12	5	0.00
4	12.5	2	788.94	0	788.94	0.701	1051.2	0	1840.14	5	0.00
5	18	1.38889	1106.04	0	1106.04	0.428	641.4	0	1747.44	6	0.00
6	22	1.13636	1327.64	0	1327.64	0.380	570	0	1897.64	2	0.00
7	24	1.04167	1433.61	0	1433.61	0.336	504	0	1937.61	2	0.24
8	25.75	0.97087	1525.88	0	1525.88	0.288	432	0	1957.88	1.5	0.00
9	27	0.92593	1600.755	0	1600.755	0.288	432	0	2032.76	1	0.08
10	28.5	0.87719	1700.23	0	1700.23	0.241	361.5	0	2061.73	2	0.00
11	31.25	0.8	1902.085	0	1902.085	0.241	361.5	0	2263.59	3.5	0.18
12	35.5	0.70423	2231.29	0	2231.29	0.200	300	0	2531.29	5	0.00

TOTAL CONSOLIDATION SETTLEMENT (INCHES)	0.50
60 % settlement	0.30

BORING RW-2

INITIAL VERTICAL STRESS AT BOTTOM OF FOOTING (PSF) = 200
DESIGN BEARING PRESSURE (PSF) = 1,500
ACTUAL BEARING VALUE (PSF) = 1,500
FOOTING EMBEDMENT DEPTH = 2
FOOTING WIDTH (FT) = 25
STRESS DIST (BOUSSINESQ(1)/WESTERGAARD(2)) 1

GROUNDWATER LEVEL DEPTH (FT) = 0

LAYER NUMBER	DRY UNIT WEIGHT (PCF)	MOIST. CONT. %	DEPTH TO TOP OF LAYER (FT)	DEPTH TO MIDDLE OF LAYER (FT)	DEPTH TO BOTTOM OF LAYER (FT)	LAYER THICK. (FT)	TOTAL PRESSURE AT MID-DEPTH (PSF)	EFF. PRESSURE AT MID-DEPTH (PSF)	Pc (PSF)	COM-PRESSION RATIO (Cc/1+eo)	RE-COM-PRESSION RATIO (Ce/1+eo)
1	93	19	0	1	2	2	110.67	48.27	48.27	0	0
2	93	19	2	4.5	7	5	498.015	217.215	217.215	0	0
3	103	22	7	9.5	12	5	1088.84	496.04	496.04	0	0
4	103	22	12	14.5	17	5	1717.14	812.34	812.34	0	0
5	100	24	17	21	25	8	2527.29	1216.89	1216.89	0	0
6	56	76	25	26.75	28.5	3.5	3195.77	1526.57	1526.57	0.153	0.012
7	80	40	28.5	29.5	30.5	2	3480.25	1639.45	1639.45	0.118	0.01
8	121	16	30.5	31.5	32.5	2	3732.61	1767.01	1767.01	0	0
9	121	16	32.5	33.25	34	1.5	3978.24	1903.44	1903.44	0	0
10	121	16	34	37	40	6	4504.59	2195.79	2195.79	0	0
11	128	9	40	42.5	45	5	5274.47	2622.47	2622.47	0	0
12	128	9	45	47.5	50	5	5972.07	3008.07	3008.07	0	0

BORING RW-2

LAYER NUMBER	DEPTH TO MIDDLE OF LAYER FROM BASE OF FOOTING(FT)	B/Z	Po' (PSF)	EXCAV. AND/OR DEWATER	Po' AFTER EXCA	INFLU-ENCE FACTOR	DELTA P	AREA FILL LOAD (PSF)	Po' + DELTA P + AREA FILL	LAYER THICK-NESS (FEET)	LAYER SETTLE-MENT (INCHES)
1	0	N/A	48.27	0	48.27	0.000	0	0	48.27	2	0.00
2	2.5	10	217.215	0	217.215	0.994	1491.6	0	1708.82	5	0.00
3	7.5	3.33333	496.04	0	496.04	0.888	1332	0	1828.04	5	0.00
4	12.5	2	812.34	0	812.34	0.701	1051.2	0	1863.54	5	0.00
5	19	1.31579	1216.89	0	1216.89	0.428	641.4	0	1858.29	8	0.00
6	24.75	1.0101	1526.57	0	1526.57	0.336	504	0	2030.57	3.5	0.51
7	27.5	0.90909	1639.45	0	1639.45	0.288	432	0	2071.45	2	0.16
8	29.5	0.84746	1767.01	0	1767.01	0.241	361.5	0	2128.51	2	0.00
9	31.25	0.8	1903.44	0	1903.44	0.241	361.5	0	2264.94	1.5	0.00
10	35	0.71429	2195.79	0	2195.79	0.200	300	0	2495.79	6	0.00
11	40.5	0.61728	2622.47	0	2622.47	0.149	224.1	0	2846.57	5	0.00
12	45.5	0.54945	3008.07	0	3008.07	0.110	165	0	3173.07	5	0.00

TOTAL CONSOLIDATION SETTLEMENT (INCHES) 0.67

60 % settlement 0.40

BORING RW-3

INITIAL VERTICAL STRESS AT BOTTOM OF FOOTING (PSF) = 200
DESIGN BEARING PRESSURE (PSF) = 1,500
ACTUAL BEARING VALUE (PSF) = 1,500
FOOTING EMBEDMENT DEPTH = 2
FOOTING WIDTH (FT) = 25
STRESS DIST (BOUSSINESQ(1)/WESTERGAARD(2)) 1

GROUNDWATER LEVEL DEPTH (FT) = 0

LAYER NUMBER	DRY UNIT WEIGHT (PCF)	MOIST. CONT. %	DEPTH TO TOP OF LAYER (FT)	DEPTH TO MIDDLE OF LAYER (FT)	DEPTH TO BOTTOM OF LAYER (FT)	LAYER THICK. (FT)	TOTAL PRESSURE AT MID-DEPTH (PSF)	EFF. PRESSURE AT MID-DEPTH (PSF)	Pc (PSF)	COM-PRESSION RATIO (Cc/1+eo)	RE-COM-PRESSION RATIO (Ce/1+eo)
1	118	8	0	1	2	2	127.44	65.04	65.04	0	0
2	118	8	2	4.5	7	5	573.48	292.68	292.68	0	0
3	118	8	7	9.5	12	5	1210.68	617.88	617.88	0	0
4	100	23	12	14.5	17	5	1836.78	931.98	931.98	0	0
5	97	25	17	20	23	6	2508.03	1260.03	1260.03	0	0
6	75	46	23	26	29	6	3200.28	1577.88	1577.88	0.118	0.01
7	100	25	29	30	31	2	3653.78	1781.78	1781.78	0	0
8	118	14	31	32.25	33.5	2.5	3946.93	1934.53	1934.53	0.118	0.01
9	117	13	33.5	34.5	35.5	2	4247.29	2094.49	2094.49	0	0
10	128	10	35.5	37.75	40	4.5	4696.3	2340.7	2340.7	0	0
11	128	10	40	42.5	45	5	5365.1	2713.1	2713.1	0	0
12	128	10	45	47.5	50	5	6069.1	3105.1	3105.1	0	0

BORING RW-3

LAYER NUMBER	DEPTH TO MIDDLE OF LAYER FROM BASE OF FOOTING(FT)	B/Z	Po' (PSF)	EXCAV. AND/OR DEWATER	Po' AFTER EXCA	INFLU-ENCE FACTOR	DELTA P	AREA FILL LOAD (PSF)	Po' + DELTA P + AREA FILL	LAYER THICK-NESS (FEET)	LAYER SETTLE-MENT (INCHES)
1	0	N/A	65.04	0	65.04	0.000	0	0	65.04	2	0.00
2	2.5	10	292.68	0	292.68	0.994	1491.6	0	1784.28	5	0.00
3	7.5	3.33333	617.88	0	617.88	0.888	1332	0	1949.88	5	0.00
4	12.5	2	931.98	0	931.98	0.701	1051.2	0	1983.18	5	0.00
5	18	1.38889	1260.03	0	1260.03	0.428	641.4	0	1901.43	6	0.00
6	24	1.04167	1577.88	0	1577.88	0.336	504	0	2081.88	6	0.65
7	28	0.89286	1781.78	0	1781.78	0.241	361.5	0	2143.28	2	0.00
8	30.25	0.82645	1934.53	0	1934.53	0.241	361.5	0	2296.03	2.5	0.12
9	32.5	0.76923	2094.49	0	2094.49	0.200	300	0	2394.49	2	0.00
10	35.75	0.6993	2340.7	0	2340.7	0.149	224.1	0	2564.8	4.5	0.00
11	40.5	0.61728	2713.1	0	2713.1	0.149	224.1	0	2937.2	5	0.00
12	45.5	0.54945	3105.1	0	3105.1	0.110	165	0	3270.1	5	0.00

TOTAL CONSOLIDATION SETTLEMENT (INCHES) 0.77

60 % settlement 0.46

Appendix E
Analyses of Cutoff Depths

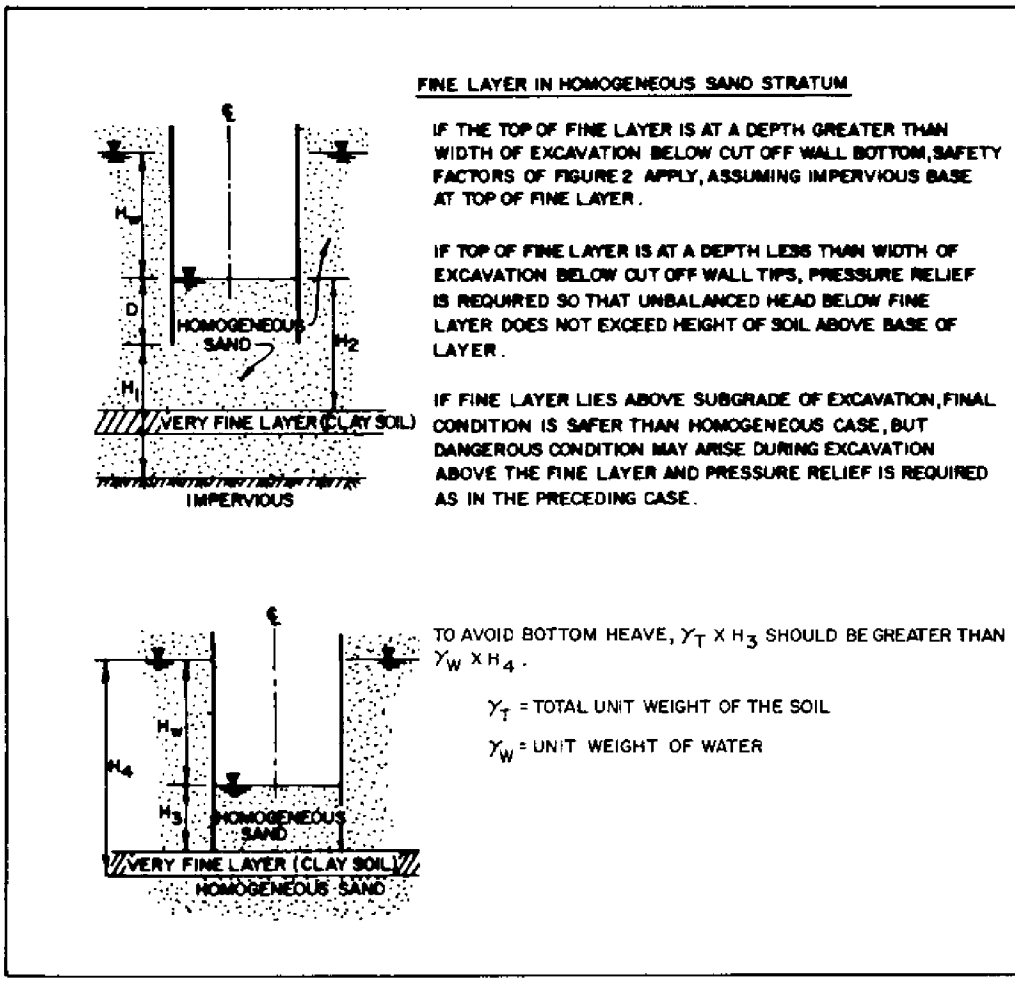


FIGURE 3 (continued)
Penetration of Cut Off Wall Required to Prevent Piping in Stratified Sand

Evaluation of Cutoff Depths

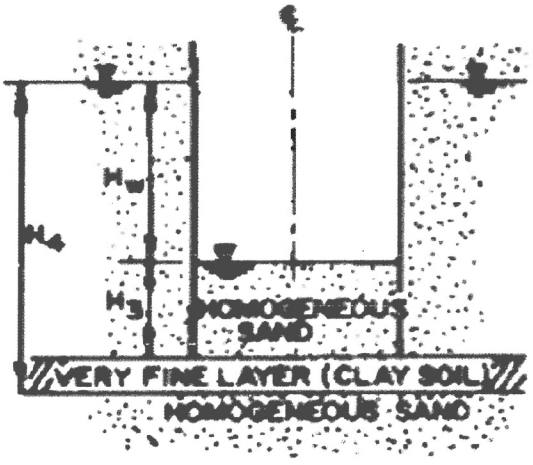
Header Pipe Excavation

INPUT

Ground Surface Elevation =	5	Feet
Groundwater Elevation =	5	Feet
Total Unit Weight of Soil =	120	pcf
Unit Weight of Water =	62.4	pcf
Pipe Invert Elevation =	-4.75	Feet
Bottom of Excavation Elev =	-5.75	Feet
Depth of Dewatering =	-8.75	Feet
Depth to top of Impervious Layer =	25	
Thickness of Impervious Layer =	3	

CALCULATIONS

Elevation of Top of Impervious Layer = -20



H_4 =	28	
Hw =	13.75	
H_3 =	14.25	(Calc from Bottom of Excavation)
Total unit Wieght * H_3 =	1710	
Unit Weight of Water * H_4 =	1747.2	

Unsafe, provide pressure relief

Evaluation of Cutoff Depths

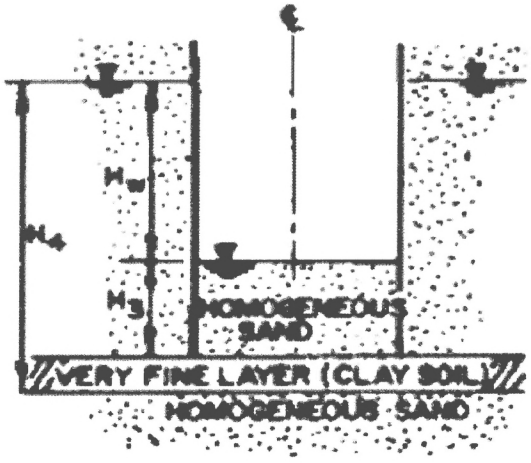
Sewer Pipe Excavation

INPUT

Ground Surface Elevation =	5	Feet
Groundwater Elevation =	5	Feet
Total Unit Weight of Soil =	120	pcf
Unit Weight of Water =	62.4	pcf
Pipe Invert Elevation =	-7.37	Feet
Bottom of Excavation Elev =	-8.37	Feet
Depth of Dewatering =	-11.37	Feet
Depth to top of Impervious Layer =	25	
Thickness of Impervious Layer =	3	

CALCULATIONS

Elevation of Top of Impervious Layer = -20



H_4 =	28	
Hw =	16.37	
H_3 =	11.63	(Calc from Bottom of Excavation)
Total unit Weight * H_3 =	1395.6	
Unit Weight of Water * H_4 =	1747.2	

Unsafe, provide pressure relief

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LOS ANGELES, CA 90012

FRANK BUSH
GENERAL MANAGER

GEOLOGY AND SOILS REPORT APPROVAL LETTER

September 15, 2016

LOG # 93303-01
SOILS/GEOLOGY FILE - 2
LIQ

City of Los Angeles
1149 S. Broadway, Suite 600
Los Angeles, CA 90015

TRACT:	SILVER STRAND (MP 7-83)
BLOCK:	4
LOTS:	4 and 5
LOCATION:	133 E. Hurricane Street

CURRENT REFERENCE REPORT/LETTER	REPORT No.	DATE OF DOCUMENT	PREPARED BY
Response Report	14-103	06/27/2016	Geotechnical Engineering Group

PREVIOUS REFERENCE REPORT/LETTER(S)	REPORT No.	DATE OF DOCUMENT	PREPARED BY
Dept. Correction Letter	93303	06/13/2016	LADBS
Geology/Soils Report	14-103	12/14/2015	Geotechnical Engineering Group
Geotechnical Data Report	2500.06I	09/29/2015	Geotechnical Professionals Inc.

The Grading Division of the Department of Building and Safety has reviewed the referenced reports providing recommendations for the proposed Venice Auxiliary Pumping Plant. The proposed project includes the construction of an auxiliary 32 by 55 feet pumping plant (wetwell/valve vault), 25 by 50 feet electrical building, 21 foot square diversion structure, new 23 foot long 66-inch diameter sewer pipeline, and new 42-inch discharge line. The elevation of the proposed structures varies from 5 to 26 feet below sea level. The earth materials at the subsurface exploration locations consist of up to 4 feet of uncertified fill underlain by alluvium. The consultants recommend to utilize continuous, solid impervious shoring and possibly jet grouting to act as a groundwater cut-off and to support the proposed structures on mat-type foundations bearing on native undisturbed soils.

The site is located in a designated liquefaction hazard zone as shown on the Seismic Hazard Zones map issued by the State of California. The Liquefaction study included as a part of the report demonstrates that the site soils are subject to liquefaction. To mitigate the earthquake induced settlements it is proposed to use a mat foundation. The requirements of the 2014 City of Los Angeles Building Code have been satisfied.

The referenced reports are acceptable, provided the following conditions are complied with during site development:

(Note: Numbers in parenthesis ( ) refer to applicable sections of the 2014 City of LA Building Code. P/BC numbers refer the applicable Information Bulletin. Information Bulletins can be accessed on the internet at LADBS.ORG.)

1. The geologist and soils engineer shall review and approve the detailed plans prior to issuance of any permits. This approval shall be by signature on the plans that clearly indicates the geologist and soils engineer have reviewed the plans prepared by the design engineer and that the plans include the recommendations contained in their reports. (7006.1)

2. All recommendations of the reports that are in addition to or more restrictive than the conditions contained herein shall be incorporated into the plans.

3. A copy of the subject and appropriate referenced reports and this approval letter shall be attached to the District Office and field set of plans. Submit one copy of the above reports to the Building Department Plan Checker prior to issuance of the permit. (7006.1)

4. A grading permit shall be obtained for all structural fill and retaining wall backfill. (106.1.2)

5. All man-made fill shall be compacted to a minimum 90 percent of the maximum dry density of the fill material per the latest version of ASTM D 1557. Where cohesionless soil having less than 15 percent finer than 0.005 millimeters is used for fill, it shall be compacted to a minimum of 95 percent relative compaction based on maximum dry density (D1556). Placement of gravel in lieu of compacted fill is allowed only if complying with Section 91.7011.3 of the Code. (7011.3)

6. Existing uncertified fill shall not be used for support of footings, concrete slabs or new fill. (1809.2, 7011.3)

7. Drainage in conformance with the provisions of the Code shall be maintained during and subsequent to construction. (7013.12)

8. The applicant is advised that the approval of this report does not waive the requirements for excavations contained in the State Construction Safety Orders enforced by the State Division of Industrial Safety. (3301.1)

9. Temporary excavations that remove lateral support to the public way, adjacent property, or adjacent structures shall be supported by shoring, as recommended. Note: Lateral support shall be considered to be removed when the excavation extends below a plane projected downward at an angle of 45 degrees from the bottom of a footing of an existing structure, from the edge of the public way or an adjacent property. (3307.3.1)

10. Prior to the issuance of any permit which authorizes an excavation where the excavation is to be of a greater depth than are the walls or foundation of any adjoining building or structure and located closer to the property line than the depth of the excavation, the owner of the subject site shall provide the Department with evidence that the adjacent property owner has been given a 30-day written notice of such intent to make an excavation. (3307.1)

11. Prior to the issuance of the permits, the soils engineer and the structural designer shall evaluate all applicable surcharge loads for the design of the retaining walls and shoring.

12. Unsurcharged temporary excavation may be cut vertical up to 4 feet. For excavations over 4 feet up to 8 feet, the lower 4 feet may be cut vertically and the portion of the excavation above 4 feet shall be trimmed back at a gradient not exceeding 1:1 (horizontal to vertical), as recommended. Unsurcharged temporary excavation greater than 8 feet should be shored, as recommended.

13. Shoring shall be designed for the lateral earth pressures as specified on page 5 of the 06/27/2016 report; all surcharge loads shall be included into the design.

14. Shoring shall be designed for a maximum lateral deflection of 1 inch, provided there are no structures within a 1:1 plane projected up from the base of the excavation. Where a structure is within a 1:1 plane projected up from the base of the excavation, shoring shall be designed for a maximum lateral deflection of ½ inch, or to a lower deflection determined by the consultant that does not present any potential hazard to the adjacent structure.

15. A shoring monitoring program shall be implemented to the satisfaction of the soils engineer.

16. All foundations shall derive entire support from native undisturbed soils, as recommended and approved by the geologist and soils engineer by inspection.

17. This letter approves exclusively the option in which the structure is designed to withstand hydrostatic pressures, as a measure to control groundwater under permanent conditions. (1805.1.3)

18. Slabs placed on approved compacted fill shall be at least 3½ inches thick and shall be reinforced with ½-inch diameter (#4) reinforcing bars spaced maximum of 16 inches on center each way.

19. Concrete floor slabs placed on expansive soil shall be placed on a 4-inch fill of coarse aggregate or on a moisture barrier membrane.

20. The seismic design shall be based on a Site Class D, as recommended. All other seismic design parameters shall be reviewed by LADBS building plan check.

21. Retaining walls shall be designed for the lateral earth pressures specified in the section titled "8.13 Retaining Walls" starting on page 19 of the 12/14/2015 report. All surcharge loads shall be included into the design.

22. All retaining walls shall be provided with a standard surface backdrain system and all drainage shall be conducted to the street in an acceptable manner and in a non-erosive device. (7013.11)

23. With the exception of retaining walls designed for hydrostatic pressure, all retaining walls shall be provided with a subdrain system to prevent possible hydrostatic pressure behind the wall. Prior to issuance of any permit, the retaining wall subdrain system recommended in the soil report shall be incorporated into the foundation plan which shall be reviewed and approved by the soils engineer of record. (1805.4)

24. Installation of the subdrain system shall be inspected and approved by the soils engineer of record and the City grading/building inspector. (108.9)

25. Basement walls and floors shall be waterproofed/damp-proofed with an L.A. City approved "Below-grade" waterproofing/damp-proofing material with a research report number. (104.2.6)

26. The structure shall be connected to the public sewer system. P/BC 2014-027

27. All roof and pad drainage shall be conducted to the street in an acceptable manner. (7013.10)

28. All concentrated drainage shall be conducted in an approved device and disposed of in a manner approved by the LADBS. (7013.10)

29. Prior to issuance of a permit involving de-watering, clearance shall be obtained from the Department of Public Works and from the California Regional Water Quality Control Board.
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30. Any recommendations prepared by the geologist and/or the soils engineer for correction of geological hazards found during grading shall be submitted to the Grading Division of the Department for approval prior to utilization in the field. (7008.2, 7008.3)

31. The geologist and soils engineer shall inspect all excavations to determine that conditions anticipated in the report have been encountered and to provide recommendations for the correction of hazards found during grading. (7008 & 1705.6)

32. Prior to the pouring of concrete, a representative of the consulting soils engineer shall inspect and approve the footing excavations. The representative shall post a notice on the job site for the LADBS Building Inspector and the Contractor stating that the work so inspected meets the conditions of the report, but that no concrete shall be poured until the City Building Inspector has also inspected and approved the footing excavations. A written certification to this effect shall be filed with the Grading Division of the Department upon completion of the work. (108.9 & 7008.2)

33. Prior to excavation, an initial inspection shall be called with LADBS Inspector at which time sequence of construction, shoring, underpinning, pile installation, protection fences and dust and traffic control will be scheduled. (108.9.1)

34. Prior to the placing of compacted fill, a representative of the soils engineer shall inspect and approve the bottom excavations. The representative shall post a notice on the job site for the City Grading Inspector and the Contractor stating that the soil inspected meets the conditions of the report, but that no fill shall be placed until the LADBS Grading Inspector has also inspected and approved the bottom excavations. A written certification to this effect shall be included in the final compaction report filed with the Grading Division of the Department. All fill shall be placed under the inspection and approval of the soils engineer. A compaction report together with the approved soil report and Department approval letter shall be submitted to the Grading Division of the Department upon completion of the compaction. In addition, an Engineer's Certificate of Compliance with the legal description as indicated in the grading permit and the permit number shall be included. (7011.3)

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