City of Long Beach

Riverwalk Residential Development Project

Cultural Resources Study

U.S.G.S. *Long Beach, CA* quadrangle

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Riverwalk Residential Development Project

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EXECUTIVE SUMMARY

Rincon Consultants was retained by the City of Long Beach to conduct a cultural resources study for the Riverwalk Residential Development Project in the City of Long Beach, Los Angeles County, California. This study has been conducted to assist the City of Long Beach with preparation of an Environmental Impact Report for the proposed project in accordance with requirements of the California Environmental Quality Act (CEQA). This study includes a cultural resources records search, Native American scoping, an intensive pedestrian survey of the project site, evaluation of a historic built environment resource, and preparation of this report.

Background research conducted for this study found no previously recorded cultural resources or resources important to Native Americans within the project site. The research identified one previously recorded cultural resource, Rancho Los Cerritos (CA-LAN-696/H), within a 0.5-mile radius of the project. This resource is a registered California Historical Landmark and contained at least one historic-age human burial as well as a variety of prehistoric and historic-age artifacts. Rincon identified one built environment resource within the project site, the Will J. Reid Scout Park. Rincon recommends this resource not eligible for listing in the California Register of Historical Resources (CRHR). Given the presence of CA-LAN-696/H near to the project and the relatively low level of previous ground disturbance throughout much of the project site, Rincon recommends archaeological monitoring of all construction-related ground disturbing activities. Measures for archaeological monitoring as well as unanticipated discoveries are described below.

ARCHAEOLOGICAL MONITORING

Rincon recommends archaeological monitoring of all project-related ground disturbing activities. Archaeological monitoring should be performed under the direction of an archaeologist meeting the Secretary of the Interior's Professional Qualifications Standards for archaeology (NPS 1983). If archaeological resources are encountered during ground-disturbing activities, work within a 50-foot radius must halt and the find evaluated for significance under CEQA. The qualified archaeologist may reduce or stop monitoring dependent upon observed conditions. If Native American resources are encountered, a Native American consultant should be retained to participate in the treatment of the resource as well as to provide Native American monitoring services for the remainder of ground disturbing activities.

UNANTICIPATED DISCOVERY OF CULTURAL RESOURCES

If cultural resources are encountered during ground-disturbing activities when an archaeological monitor is not present, work within a 50-foot radius must halt and an archaeologist meeting the Secretary of the Interior's Professional Qualifications Standards for archaeology (NPS 1983) must be contacted immediately to evaluate the find. If the discovery proves to be significant under CEQA, additional work such as data recovery excavation may be warranted.

UNANTICIPATED DISCOVERY OF HUMAN REMAINS

The discovery of human remains is always a possibility during ground disturbing activities. If human remains are found, the State of California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the county coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. In the event of an unanticipated discovery of human remains, the county coroner must be notified immediately. If the human remains are determined to be prehistoric, the coroner will notify the Native American Heritage Commission, which will determine and notify a most likely descendant. The most likely descendent shall complete the inspection of the site within 48 hours of notification and may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials.

1.0 INTRODUCTION

Rincon Consultants (Rincon) was retained by the City of Long Beach to conduct a cultural resources study for the Riverwalk Residential Development Project in the City of Long Beach, Los Angeles County, California. This study has been conducted to assist the City of Long Beach with preparation of an Environmental Impact Report for the proposed project in accordance with requirements of the California Environmental Quality Act (CEQA). This study includes a cultural resources records search, Native American scoping, intensive pedestrian survey of the project site, evaluation of cultural resources, and preparation of this report.

1.1 PROJECT DESCRIPTION

The proposed project would develop a residential subdivision on 10.56 acres at 4747 Daisy Avenue in Long Beach. The proposed subdivision would consist of 131 residential lots inside a gated community bordered by the Union Pacific Railroad on the south, the Los Angeles River on the west and an existing residential neighborhood on the north and east. The proposed community would include a private recreation center; meeting center; pool, spa and turf area; "tot lot;" and private access to the pedestrian path along the Los Angeles River, all of which would be managed by the future homeowners association. Project preparation would entail the removal of vegetation and all existing buildings and structures within the project site, and the importation of 30,000-40,000 cubic yards of fill dirt.

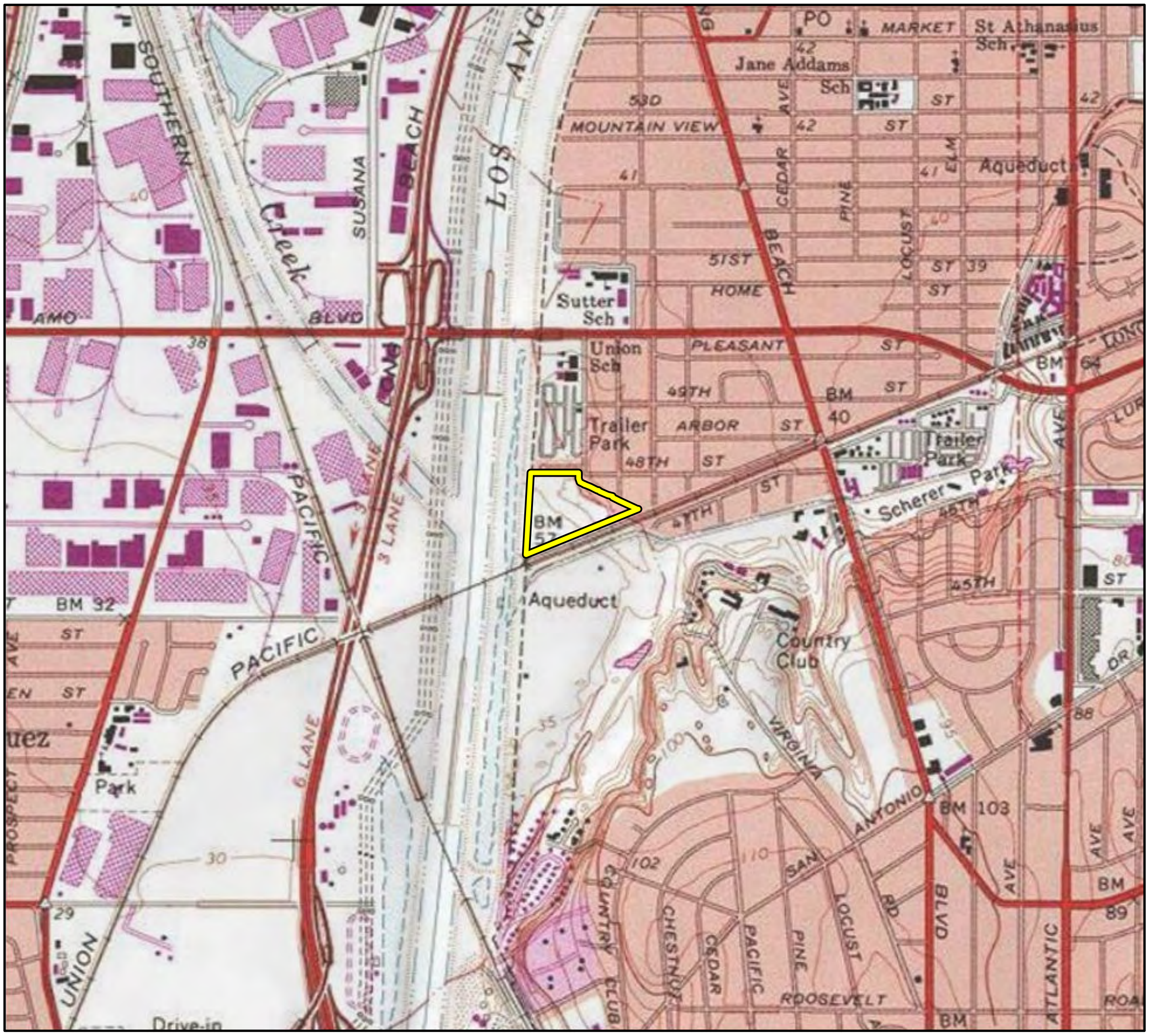
1.2 REGULATORY SETTING

CEQA requires a lead agency to determine whether a project may have a significant effect on historical resources (Public Resources Code [PRC], Section 21084.1). A *historical resource* is a resource listed, or determined to be eligible for listing, in the California Register of Historical Resources (CRHR); a resource included in a local register of historical resources; or any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant (State CEQA Guidelines, Section 15064.5[a][1-3]).

A resource shall be considered historically significant if it meets any of the following criteria:

1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2) Is associated with the lives of persons important in our past;
3) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4) Has yielded, or may be likely to yield, information important in prehistory or history.

In addition, if a project can be demonstrated to cause damage to a unique archaeological resource, the lead agency may require reasonable efforts to permit any or all of these resources to be preserved in place or left in an undisturbed state. To the extent that resources cannot be left undisturbed, mitigation measures are required (PRC, Section 21083.2[a], [b], and [c]).



Imagery provided by National Geographic Society, ESRI and its licensors © 2014. Long Beach Quadrangle. The topographic representation depicted in this map may not portray all of the features currently found in the vicinity today and/or features depicted in this map may have changed since the original topographic map was assembled.

Project Boundary

0 1,000 2,000
Feet
1:24,000
N

Project Location Map

Figure 1

City of Long Beach

PRC, Section 21083.2(g) defines a unique archaeological resource as an artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information;
2) Has a special and particular quality such as being the oldest of its type or the best available example of its type; or
3) Is directly associated with a scientifically recognized important prehistoric or historic event or person.

1.3 PERSONNEL

Rincon Cultural Resources Principal Investigator Robert Ramirez, M.A., Registered Professional Archaeologist (RPA), served as principal investigator for the study, managed this cultural resource study, conducted the pedestrian survey, and coauthored this report. Architectural Historian James W. Steely of SWCA Environmental Consultants provided oversight for the built environment resources evaluation and co-authored this report. Rincon archaeologist Hannah Haas, B.A., conducted the cultural resources records search and Native American scoping, and coauthored this report. Rincon Cultural Resources Program Manager Kevin Hunt, B.A., edited this report. GIS Analyst Kevin Howen, B.A., prepared the figures found in this report. Rincon Vice President Duane Vander Pluym, D. Env., reviewed this report for quality control.

2.0 ENVIRONMENTAL SETTING

The project site is situated within a highly urbanized section of the City of Long Beach. The project site is primarily open space covered by ornamental lawn interspersed with trees of various species. The project is located adjacent to the confluence of the channelized courses of the Los Angeles River and Compton Creek on the western boundary of the project site, with residential neighborhoods on the north and east, and the Union Pacific Railroad line to the south. To the south of the railroad is the Rancho Los Cerritos Adobe. Elevation within the project site is approximately 11 meters (35 feet) above mean sea level (AMSL).

3.0 CULTURAL SETTING

3.1 PREHISTORY

During the twentieth century, many archaeologists developed chronological sequences to explain prehistoric cultural changes within all or portions of southern California (c.f., Jones and Klar 2007; Moratto 1984). Wallace (1955, 1978) devised a prehistoric chronology for the southern California coastal region based on early studies and focused on data synthesis that included four horizons: Early Man, Milling Stone, Intermediate, and Late Prehistoric. Though initially lacking the chronological precision of absolute dates (Moratto 1984:159), Wallace's (1955) synthesis has been modified and improved using thousands of radiocarbon dates obtained by southern California researchers over recent decades (Byrd and Raab 2007:217; Koerper and Drover 1983; Koerper et al. 2002; Mason and Peterson 1994). The prehistoric chronological sequence for southern California presented below is a composite based on Wallace (1955) and Warren (1968) as well as later studies, including Jones and Klar (2007).

3.1.1 Early Man Horizon (ca. 10,000 – 6,000 B.C.)

Numerous pre-8000 B.C. sites have been identified along the mainland coast and Channel Islands of southern California (c.f., Erlandson 1991; Johnson et al. 2002; Jones and Klar 2007; Moratto 1984; Rick et al. 2001:609). The Arlington Springs site on Santa Rosa Island produced human femurs dated to approximately 13,000 years ago (Arnold et al. 2004; Johnson et al. 2002). On nearby San Miguel Island, human occupation at Daisy Cave (SMI-261) has been dated to nearly 13,000 years ago and included basketry greater than 12,000 years old, the earliest on the Pacific Coast (Arnold et al. 2004).

Although few Clovis or Folsom style fluted points have been found in southern California (e.g., Dillon 2002; Erlandson et al. 1987), Early Man Horizon sites are generally associated with a greater emphasis on hunting than later horizons. Recent data indicate that the Early Man economy was a diverse mixture of hunting and gathering, including a significant focus on aquatic resources in coastal areas (e.g., Jones et al. 2002) and on inland Pleistocene lakeshores (Moratto 1984). A warm and dry 3,000-year period called the Altithermal began around 6000 B.C. The conditions of the Altithermal are likely responsible for the change in human subsistence patterns at this time, including a greater emphasis on plant foods and small game.

3.1.2 Milling Stone Horizon (6000–3000 B.C.)

Wallace (1955:219) defined the Milling Stone Horizon as "marked by extensive use of milling stones and mullers, a general lack of well-made projectile points, and burials with rock cairns." The dominance of such artifact types indicate a subsistence strategy oriented around collecting plant foods and small animals. A broad spectrum of food resources were consumed including small and large terrestrial mammals, sea mammals, birds, shellfish, fishes, and other littoral and estuarine species, yucca, agave, and seeds and other plant products (Kowta 1969; Reinman 1964). Variability in artifact collections over time and from the coast to inland sites indicates that Milling Stone Horizon subsistence strategies adapted to environmental conditions (Byrd and Raab 2007:220). The Topanga Canyon site in the Santa Monica Mountains is considered one of the definitive Milling Stone Horizon sites within Los Angeles County.

Lithic artifacts associated with Milling Stone Horizon sites are dominated by locally available tool stone and in addition to ground stone tools such as manos and metates, chopping, scraping, and cutting tools are very common. Kowta (1969) attributes the presence of numerous scraper-plane tools in Milling Stone Horizon collections to the processing of agave or yucca for food or fiber. The mortar and pestle, associated with acorns or other foods processed through pounding, were first used during the Milling Stone Horizon and increased dramatically in later periods (Wallace 1955, 1978; Warren 1968).

Mortuary practices observed at Milling Stone Horizon sites include extended and loosely flexed burials. Flexed burials oriented north were common in Orange and San Diego counties, with reburials common in Los Angeles County (Wallace 1955, 1978; Warren 1968).

3.1.3 Intermediate Horizon (3000 B.C. – A.D. 500)

Wallace's Intermediate Horizon dates from approximately 3000 B.C.-A.D. 500 and is characterized by a shift toward a hunting and maritime subsistence strategy, as well as greater use of plant foods. During the Intermediate Horizon, a noticeable trend occurred toward greater adaptation to local resources including a broad variety of fish, land mammal, and sea mammal remains along the coast. Tool kits for hunting, fishing, and processing food and materials reflect this increased diversity, with flake scrapers, drills, various projectile points, and shell fishhooks being manufactured.

Mortars and pestles became more common during this transitional period, gradually replacing manos and metates as the dominant milling equipment. Many archaeologists believe this change in milling stones signals a change from the processing and consuming of hard seed resources to the increasing reliance on acorn (e.g., Glassow et al. 1988; True 1993). Mortuary practices during the Intermediate typically included fully flexed burials oriented toward the north or west (Warren 1968:2-3).

3.1.4 Late Prehistoric Horizon (A.D. 500–Historic Contact)

During Wallace's (1955, 1978) Late Prehistoric Horizon the diversity of plant food resources and land and sea mammal hunting increased even further than during the Intermediate Horizon. More classes of artifacts were observed during this period and high quality exotic lithic materials were used for small finely worked projectile points associated with the bow and arrow. Steatite containers were made for cooking and storage and an increased use of asphalt for waterproofing is noted. More artistic artifacts were recovered from Late Prehistoric sites and cremation became a common mortuary custom. Larger, more permanent villages supported an increased population size and social structure (Wallace 1955:223).

Warren (1968) attributes this dramatic change in material culture, burial practices, and subsistence focus to the westward migration of desert people he called the Takic, or Numic, Tradition in Los Angeles, Orange, and western Riverside counties. This Takic Tradition was formerly referred to as the "Shoshonean wedge" (Warren 1968), but this nomenclature is no longer used to avoid confusion with ethnohistoric and modern Shoshonean groups (Heizer 1978:5; Shipley 1978:88, 90). Modern Gabrielino/Tongva in Los Angeles County are generally considered by archaeologists to be descendants of these prehistoric Uto-Aztecan, Takic-speaking populations that settled along the California coast during the Late Prehistoric Horizon.

3.2 ETHNOGRAPHY

The project site is located within the traditional territory of the Native American group known as the Gabrielino. The name Gabrielino was applied by the Spanish to those natives that were attached to Mission San Gabriel (Bean and Smith 1978:538). Today, most contemporary Gabrielino prefer to identify themselves as Tongva, a term that will be used throughout the remainder of this section (King 1994:12).

Tongva territory included the Los Angeles basin and southern Channel Islands as well as the coast from Aliso Creek in the south to Topanga Creek in the north. Their territory encompassed several biotic zones, including Coastal Marsh, Coastal Strand, Prairie, Chaparral, Oak Woodland, and Pine Forest (Bean and Smith 1978).

The Tongva language belongs to the Takic branch of the Uto-Aztecan language family, which can be traced to the Great Basin region (Mithun 2004). This language family includes dialects spoken by the nearby Juaneño and Luiseño but is considerably different from those of the Chumash people living to the north and the Diegueño (including Ipai, Tipai, and Kumeyaay) people living to the south.

Tongva society was organized along patrilineal non-localized clans, a common Takic pattern. Each clan had a ceremonial leader and contained several lineages. The Tongva established large permanent villages and smaller satellite camps throughout their territory. Recent ethnohistoric work (O'Neil 2002) suggests a total tribal population of nearly 10,000, considerably more than earlier estimates of around 5,000 people (Bean and Smith 1978:540).

Tongva subsistence was oriented around acorns supplemented by the roots, leaves, seeds, and fruits of a wide variety of plants. Meat sources included large and small mammals, freshwater and saltwater fish, shellfish, birds, reptiles, and insects. (Bean and Smith 1978; Langenwalter et al. 2001; Kroeber 1925; McCawley 1996). The Tongva employed a wide variety of tools and implements to gather and hunt food. The digging stick, used to extract roots and tubers, was frequently noted by early European explorers (Rawls 1984). Other tools included the bow and arrow, traps, nets, blinds, throwing sticks and slings, spears, harpoons, and hooks. Like the Chumash, the Tongva made oceangoing plank canoes (known as a ti'at) capable of holding six to 14 people and used for fishing, travel, and trade between the mainland and the Channel Islands. Tule reed canoes were employed for near-shore fishing (Blackburn 1963; McCawley 1996:117-127).

Chinigchinich, the last in a series of heroic mythological figures, was central to Tongva religious life at the time of Spanish contact (Kroeber 1925:637–638). The belief in Chinigchinich was spreading south among other Takic-speaking groups at the same time the Spanish were establishing Christian missions. Elements of Chinigchinich beliefs suggest it was a syncretic mixture of Christianity and native religious practices (McCawley 1996:143-144).

Prior to European contact, deceased Tongva were either buried or cremated, with burial more common on the Channel Islands and the adjacent mainland coast and cremation on the remainder of the coast and in the interior (Harrington 1942; McCawley 1996:157). After pressure from Spanish missionaries, cremation essentially ceased during the post-contact period (McCawley 1996:157). Major Tongva villages located within Long Beach include Tevaaxa'anga, an inland village located near the Los Angeles River, and Ahwaanga and Povuu'nga which were coastal villages (Tongvapeople.com 2014).

3.3 HISTORY

The post-contact history of California is generally divided into three time spans: the Spanish period (1769–1822), the Mexican period (1822–1848), and the American period (1848–present). Each of these periods is briefly described below.

3.3.1 Spanish Period (1769–1822)

Spanish exploration of California began when Juan Rodriguez Cabrillo led the first European expedition into the region in 1542. For more than 200 years after his initial expedition, Spanish, Portuguese, British, and Russian explorers sailed the California coast and made limited inland expeditions, but they did not establish permanent settlements (Bean 1968; Rolle 2003). In 1769, Gaspar de Portolá and Franciscan Father Junipero Serra established the first Spanish settlement in what was then known as Alta (upper) California at Mission San Diego de Alcalá. This was the first of 21 missions erected by the Spanish between 1769 and 1823. It was during this time that initial Spanish settlement of the project vicinity began.

On September 8, 1771, Fathers Pedro Cambón and Angel Somera established the Mission San Gabriel de Arcángel near the present-day city of Montebello (Johnson et al. 1972). In 1775, the mission was moved to its current location in the City of San Gabriel due to better agricultural lands. The establishment of Mission San Gabriel marked the first sustained European occupation of the Los Angeles Basin. The mission, despite a slow start partially due to misconduct by Spanish soldiers, eventually became so prosperous it was known as "The Queen of the Missions" (Johnson et al. 1972).

In addition to Mission San Gabriel, the Spanish also established a pueblo (town) in the Los Angeles Basin known as El Pueblo de la Reina de los Angeles de la Porciúncula in 1781. This pueblo was one of only three pueblos established in Alta California and eventually became the City of Los Angeles (Robinson 1979). It was also during this period that the Spanish crown began to deed ranchos to prominent citizens and soldiers. To manage and expand their herds of cattle on these large ranchos, colonists enlisted the labor of the surrounding Native American population (Engelhardt 1927a). Native populations were also affected by the missions who were responsible for their administration as well as converting the population to Christianity (Engelhardt 1927b). The increased European presence during this period led to the spread of disease which devastated the native populations (McCawley 1996).

3.3.2 Mexican Period (1822–1848)

The Mexican Period commenced when news of the success of the Mexican War of Independence (1810-1821) against the Spanish crown reached California in 1822. This period saw the privatization of mission lands in California with the passage of the Secularization Act of 1833. This Act federalized mission lands and enabled Mexican governors in California to distribute former mission lands to individuals in the form land grants. Successive Mexican governors made more than 700 land grants between 1822 and 1846, putting most of the state's lands into private ownership for the first time (Shumway 2007).

During this time, the population of the pueblo of Los Angeles nearly doubled, rising from 650 to 1250 between 1822 and 1845 (Weber 1982:226). In 1842, gold was discovered by Francisco Lopez in Placerita Canyon on a rancho associated with Mission San Fernando (Guinn 1977; Workman 1935:26). The land within which the project site is located was once part of Rancho Los Nietos which rancho was granted to Manuel Nieto in 1874. His rancho would be later divided among his heirs, a portion of which became Rancho Los Cerritos which includes the project site (Shumway 2007).

The Mexican Period for the Los Angeles region ended in early January 1847. Mexican forces fought and lost to combined U.S. Army and Navy forces in the Battle of the San Gabriel River on January 8 and in the Battle of La Mesa on January 9 (Nevin 1978). On January 10, leaders of the pueblo of Los Angeles surrendered peacefully after Mexican General Jose Maria Flores withdrew his forces. Shortly thereafter, newly appointed Mexican Military Commander of California Andrés Pico surrendered all of Alta California to U.S. Army Lieutenant Colonel John C. Fremont in the Treaty of Cahuenga (Nevin 1978).

3.3.3 American Period (1848–Present)

The American Period officially began with the signing of the Treaty of Guadalupe Hidalgo in 1848, in which the United States agreed to pay Mexico $15 million for conquered territory including California, Nevada, Utah, and parts of Colorado, Arizona, New Mexico, and Wyoming. Settlement of the Los Angeles region increased dramatically in the early American Period. Los Angeles County was established on February 18, 1850, one of 27 counties established in the months prior to California becoming the 31st state.

The discovery of gold in northern California in 1848 led to the California Gold Rush, despite the first California gold being previously discovered in Placerita Canyon in 1842 (Guinn 1977; Workman 1935:26). By 1853, the population of California exceeded 300,000. Thousands of settlers and immigrants continued to immigrate to the state, particularly after the completion of the First Transcontinental Railroad in 1869. The U.S. Congress in 1854 agreed to let San Pedro become an official port of entry. By the 1880s, the railroads had established networks from the port and throughout the county, resulting in fast and affordable shipment of goods, as well as a means to transport new residents to the booming region (Dumke 1944). New residents included many health-seekers drawn to the area by the fabled climate in the 1870s–1880s.

Many ranchos in Los Angeles County were sold or otherwise acquired by Americans in the mid-1800s, and most were subdivided into agricultural parcels or towns. Nonetheless, ranching retained its importance and, by the late 1860s, Los Angeles was one of the top dairy production centers in the West (Rolle 2003). By 1876, the county had a population of 30,000 (Dumke 1944:7). Ranching was supplanted by farming and urban professions during the late nineteenth century due to droughts and increased population growth.

3.3.4 Long Beach

European settlement of what was later to become the City of Long Beach began as early as 1784 as part of a land grant given to Manuel Nieto that became Rancho Los Nietos (Shumway 2007).

After Nieto's death in 1804 the grant was divided between Nieto's heirs, forming five other ranchos including Rancho Los Cerritos and Rancho Los Alamitos. These two ranchos form the majority of what is now the City of Long Beach. The current project site is within former Rancho Los Cerritos lands, which was inherited by Nieto's daughter Manuela Cota. Following Manuela's death, Rancho Los Cerritos was sold to Jonathan Temple, a Los Angeles entrepreneur. Temple built a ranch house on the land approximately 0.25 mile from the current project site (P-19-000696; City of Long Beach 2010).

In 1866, Temple sold Rancho Los Cerritos to Thomas and Benjamin Flint and Lewellyn Bixby. The Bixby family bought Rancho Los Alamitos, combining the two and forming the Bixby Ranch. Beginning in the 1870s, Flint, Bixby, and Co., began selling the land. By 1884, Long Beach, then known as both the American Colony and Wilmore City, covered the southwestern portion of Rancho Los Cerritos. The failed Wilmore City development was purchased by Pomeroy and Mills, a San Francisco real-estate company, in 1884 and the community began to grow under its new name of Long Beach. Expansion of transportation networks sparked further growth and in 1888 Long Beach was incorporated as a city with a population of 800. Long Beach became a major producer of oil beginning in the 1920s with the drilling of the Signal Hill Oil Field. By 1950 the field produced more than 750 million barrels of crude, averaging more than 500,000 barrels of oil per acre, making it one of the richest oil fields in terms of production per acre in the world (Franks and Lambert 1985). Long Beach also became a tourist destination, transportation center, and shipping industry hub with the construction of the wharf and multiple piers. Today, Long Beach has the busiest port on the West Coast, just east of the former port of San Pedro (now the Port of Los Angeles) and is one of the most populous cities in the state of California (City of Long Beach 2010).

4.0 BACKGROUND RESEARCH

4.1 CALIFORNIA HISTORICAL RESOURCES INFORMATION SYSTEM

On August 5, 2014, Rincon conducted a search of the California Historical Resources Information System (CHRIS) at the South Central Coastal Information Center (SCCIC) at California State University, Fullerton. The search was conducted to identify all previously recorded cultural resources and previously conducted cultural resources work within a 0.5-mile radius around the project site. The CHRIS search included a review of the National Register of Historic Places (NRHP), the California Register of Historical Resources (CRHR) and State Historic Resources Inventory (SHRI), the California Points of Historical Interest list, the California Historical Landmarks list, and the Archaeological Determinations of Eligibility list. The records search also included a review of all available historic USGS 7.5- and 15-minute quadrangle maps.

4.1.1 Previously Conducted Cultural Resource Studies

The records search identified ten previous studies within a 0.5-mile radius of the project site (Table 1). Of these, one (LA-3102) included the project site. However, that study consisted of archival research and did not include a historical resources or pedestrian survey. The National Archaeological Database listings for these studies are included with the records search summary in Appendix A.

Table 1
Previous Studies Within 0.5-Mile Radius of Project Site

SCCIC Report No.	Author	Year	Study	Proximity to Project Site
LA-00358	Stickel, Gary E.	1976	An Archaeological and Paleontological Resource Survey of the Los Angeles River, Rio Hondo River, and the Whittier Narrows Flood Control Basin, Los Angeles, California	Outside
LA-00503	Dixon, Keith A.	1974	Archaeological Resources and Policy Recommendations of Long Beach	Outside
LA-02330	White, Robert S.	1989	An Archaeological Assessment of a 15-acre Parcel Near Quartz Hill, Los Angeles County Office Complex	Outside
LA-02882	McKenna, Jeanette A.	1993	Cultural Resources Investigations, Site Inventory, and Evaluations, the Cajon Pipeline Project Corridor, Los Angeles and San Bernardino Counties, California	Outside
LA-02970	Chamberlain, Pat and Jean Rivers-Council	1992	Cajon Pipeline Project Draft Environmental Impact Statement / Environmental Impact Report	Outside
LA-03102	McCawley, William, John Romani, and Dana Slawson	1994	The Los Angeles County Drainage Area Subsequent Environmental Impact Report	Within
LA-3422	Bissell, Ronald M.	1996	Cultural Resources Search in Support of the Rancho Los Cerritos Seismic Upgrade, Long Beach, Los Angeles County, California	Outside
LA-03570	Bissell, Ronald M.	1997	Cultural Resources Research in Support of the Rancho Los Cerritos Seismic Upgrade, Long Beach, Los Angeles County, California	Outside
LA-07950	Harper, Caprice D.	2006	Archaeological Survey Report for the Interstate 105 (I-105) Dewatering Wells Beneficial Re-Use of Groundwater Project, in the Cities of Paramount, Compton, Long Beach, and Carson, Los Angeles County, California	Outside
LA-11993	O'Neill, Laura	2012	Finding of No Adverse Effect for the Proposed Interstate 710 Corridor Project Between Ocean Boulevard and the State Route 60 Interchange	Outside

Source: South Central Coastal Information Center, 2014

4.1.2 Previously Recorded Cultural Resources

The SCCIC identified one previously recorded cultural resource under two different numbers within a 0.5-mile radius of the project site (Table 2). This resource is not located within the project site.

Table 2
Previously Recorded Cultural Resources Within 0.5-Mile Radius of Project Site

Primary Number	Description	NRHP/CRHR Eligibility Status	Recorded/Updated By and Year	Proximity to Project Site
19-000696	Rancho Los Cerritos	California Historical Landmark	W. S. Evans, Jr. 1974	Outside
19-179270	Rancho Los Cerritos California Historical Landmark Form	California Historical Landmark	T. Tibbetts 1990	Outside

Source: South Central Coastal Information Center, 2014

4.1.3 Historic Maps

Rincon reviewed historic maps provided by the SCCIC as part of the records search. A 1943 Downey, CA, Unites States Geological Survey (USGS) quadrangle map depicts the project site as generally open space with one building just outside the eastern edge. The area surrounding the project site appears to be a mixture of developed residential and open space. The channelized course of the Los Angeles River appears immediately west of the project site.

4.1.4 Boys Scouts of America Research

Rincon Principal Investigator, Robert Ramirez visited the BSA Long Beach Area Council headquarters on September 12, 2014. While there, Mr. Ramirez interviewed Long Beach Area Council Scout Executive/Chief Executive Officer (CEO) John Fullerton about the history of the Scout Camp. In addition to the oral interview, Mr. Fullerton provided camp records and other documents on the history of the Scout Camp. This information has been incorporated into the general discussion of the Scout Park (see Section 6.1).

4.2 NATIVE AMERICAN HERITAGE COMMISSION

Rincon Consultants initiated Native American coordination for this project August 5, 2014. As part of the process of identifying cultural resources within or near the project site, we contacted the Native American Heritage Commission (NAHC) to request a review of the Sacred Lands File (SLF). The NAHC faxed a response on August 12, 2014, and stated that a search of the SLF "failed to indicate the presence of Native American cultural resources in the immediate project area." The NAHC provided a list of five Native American contacts who may have knowledge of cultural resources in or near the project site. Rincon prepared and mailed letters (Appendix B) to each of the NAHC-listed contacts on August 18, 2014, requesting information regarding any Native American cultural resources within or immediately adjacent to the project site.

Mr. John Tommy Rosas of the Tongva Ancestral Territorial Tribal Nation replied via email on August 18, 2014. Mr. Rosas state the project site is located near a registered Tongva village site which makes the area culturally sensitive. Mr. Rosas has serious objections to the project due to potential negative impacts to Tongva cultural resources.

Mr. Andrew Salas of the Gabrielino/Tongva Band of Mission Indians replied by email on September 8, 2014. Mr. Salas states the project site lies within a culturally sensitive area and has requested to work respectfully with the proposed project to protect any and all cultural resources. Mr. Salas offered his groups' services as certified Native American monitors to be present during any and all ground disturbances.

Mr. Anthony Morales of the Gabrielino/Tongva Band of Mission Indians replied to our inquiry on September 10, 2014. Mr. Morales stated the proposed project is located in a culturally sensitive area due to its location next to the Los Angeles River. It is an area of concern and he recommends archaeological and Native American monitoring.

As of October 22, 2014, Rincon has not received any additional responses.

5.0 SURVEY METHODS

Rincon Principal Investigator Robert Ramirez conducted an intensive pedestrian survey of the 10.56-acre project site on September 12, 2014. The survey was conducted using transects oriented north-south spaced no greater than 10 meters apart.

During the survey, Mr. Ramirez examined all exposed ground surfaces for artifacts (e.g., flaked stone tools, tool-making debris, stone milling tools, ceramics, fire-affected rock [FAR]), ecofacts (marine shell and bone), soil discoloration that might indicate the presence of a cultural midden, soil depressions, and features indicative of the former presence of structures or buildings (e.g., standing exterior walls, postholes, foundations) or historic debris (e.g., metal, glass, ceramics). All extant buildings, structures, and objects were photographed using a digital camera for later analysis.

6.0 RESULTS

The intensive pedestrian survey did not identify any surficial archaeological resources within the project site. The survey did identify several extant buildings, structures, and objects within the project site. Archival research indicates these built environment features are components of a former Boy Scouts of America facility known as the Will J. Reid Scout Park. The Boy Scouts facility, consisting primarily of open space planted with lawns and trees with several buildings, structures, and objects spread throughout, encompasses the entire 10.56-acre project site (Figure 2). Archival research also indicates the facility was established in 1942 and is therefore considered a potential historical resource. Rincon recorded and evaluated the facility as part of this study; it is discussed in detail in Section 6.1 below. The facility was recorded on the appropriate California Department of Parks and Recreation (DPR) 523 forms (Appendix C).

Bare ground visibility during survey was good (approximately 70 percent) within the open space portions of the project site. Irrigation ceased some time ago, many trees have been cut down, and much of the lawn had dried up leaving patches of bare earth (Photograph 1). The southeastern corner of the project site is paved with asphalt and contains a complex of buildings and structures, thereby reducing bare ground visibility to near zero (Photograph 2).

Imagery provided by Google and its licensors © 2014.

Study Area

Figure 2

Photograph 1. Project site overview, facing southeast.

Photograph 2. Overview of southeastern corner of project site, facing southwest.

6.1 WILL J. REID SCOUT PARK

The Will J. Reid Scout Park (Scout Park) was established in 1941 when the Boy Scouts of America (BSA) Long Beach Area Council purchased the land from Long Beach resident William J. Reid (1889-1956). Mr. Reid, a prominent Long Beach resident and chairman of the board at Hancock Oil Company, gifted the BSA the money to purchase the land from himself (John Fullerton, personal communication 2014). Mr. Reid was actively involved with the BSA and served on the Long Beach Area Council's executive board. As a result of his efforts to help establish the Scout Park, the BSA named it after him.

The Scout Park encompasses 10.56 acres and was the fourth camp facility to be established within the Long Beach Area Council (John Fullerton, personal communication 2014). The Scout Park is primarily open space used for camping and other outdoor activities, but also contains several buildings and structures (Photograph 2). With some exceptions, the surviving buildings present Minimal Traditional Style compositions, painted brown to blend with the landscape and reflect the intended Rustic Camp atmosphere. The storage building is a board-and-batten clad warehouse; the restroom facilities are carefully detailed as a Mid-Century Modern buildings with extended ridge beam, shake-clad roof, and vented cupola; the Camp Master building is a small prefabricated shelter clad with pressed-board siding.

The southeastern corner of the Scout Park contains a complex of buildings and structures used for meetings and other activities. These include:

- Assembly hall built during the 1950s (Photograph 3).
- Training center built in 1974, composed of several classrooms, storage/supply rooms, toilets, kitchen, and dining hall, southwest of the assembly hall (Photograph 4).
- Ranger's office building built about 1969, across the paved parking lot from the assembly hall (Photograph 5).
- Swimming pool and changing room built in the 1950s, on the east side of the parking lot (Photograph 6 and 7).
- Storage building relocated to the Scout Park at an unknown date, immediately west of the training center (Photograph 8).

The remainder of the Scout Park grounds contains several smaller buildings consisting of:

- Camp Master building (Photograph 9) built between 1953 and 1972 (HistoricAerials 2014).
- Mobile home trailer (Photograph 10).
- Amphitheater, (Photograph 11) built in the 1960s.
- Two stand-alone restrooms (Photograph 12) built between 1953 and 1972 (HistoricAerials 2014).
- 17 water faucets scattered throughout the western quarter of the Scout Park.

Photograph 3. Assembly Hall, facing southeast.

Photograph 4. Training Center, facing south.

Photograph 5. Ranger's Office building, facing east.

Photograph 6. Swimming Pool, facing west.

Photograph 7. Changing Rooms, facing southeast.

Photograph 8. Storage Building, facing southeast.

Photograph 9. Camp Master building, facing northeast.

Photograph 10. Mobile home trailer, facing north.

Photograph 11. Amphitheater, facing southwest.

Photograph 12. Restroom, facing northwest.

Research indicates that several other buildings were within the Scout Park prior to the surviving compliment of buildings and structures. These included a clubhouse and several bungalows relocated from the nearby Cerritos Gun Club when it closed in 1941 (Knatz 2010). The clubhouse was torn down in 1974 and replaced by the current training center buildings (Knatz 2010). It is unknown when the bungalows were torn down. The ranger's office building replaced a previous building named Cerritos Hall. The former building is depicted in a 1953 aerial photograph of the Scout Park with the current ranger's office building in its place in a 1972 aerial image (HistoricAerials 2014).

Many of the trees that covered the western two-thirds of the Scout Park have been cut down and much of the lawn has dried up without irrigation (see Photograph 2). In 2013 the BSA sold the Scout Park to a developer for $ 6 million. The Long Beach Area Council now uses its one-mile square Camp Tahquitz in the San Bernardino Mountains and the Sea Scout Base in Long Beach (Mellen 2013).

7.0 EVALUATION OF SIGNIFICANCE

As detailed in Section 1.1, a resource is considered historically significant under CEQA if it meets at least one of the following four criteria for listing in the CRHR:

1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2) Is associated with the lives of persons important in our past;
3) Embodies the distinctive characteristics of a type, period, region or method of installation, or represents the work of an important creative individual, or possesses high artistic values; or
4) Has yielded, or may be likely to yield, information important in prehistory or history.

7.1 WILL J. REID SCOUT PARK

The Will J. Reid Scout Park consists of a 10.56-acre parcel used between 1941 and 2010 by the BSA's Long Beach Area Council for camping and other outdoor activities. Over those years, thousands of Boy Scouts attended the Scout Park and participated in numerous Scout related events and activities. The Scout Park, however, is not known to be associated with any significant events that made a particular or significant contribution to California's history or cultural heritage. Therefore, the Scout Park is recommended not eligible for CRHR listing under Criterion 1.

The Scout Park was established in 1941 with the help of industrialist William J. Reid, who was a prominent Long Beach resident and chairman of the board of Hancock Oil Company. He was actively involved with the Scout Park, providing the financial means for the BSA to establish the Scout Park, and serving on the Long Beach Area Council's executive board. Reid was a locally prominent citizen, as the Scout Park and a Long Beach High School were named after him; however, his civic contributions appear not to extend beyond local philanthropic activities, and other properties such as his residence and oil company office would better convey his significance. Research has not identified any other important individuals to associate with this property, so the Scout Park is recommended not eligible for CRHR listing under Criterion 2.

The surviving administrative and recreational group of buildings and structures within the Scout Park is not a concentration of distinctive examples of type or workmanship. Furthermore, the grounds of the Scout Park have been heavily altered in recent years, with most trees cut down and the lawns un-irrigated. These landscape aspects of the Scout Park were vital elements to its original appearance and use as a place for outdoor activities and events. Since the Scout Park does not convey significance under Criterion 3, Rincon recommends the Will J. Reid Scout Park as not eligible for listing in the CRHR.

No known historic or prehistoric archaeological deposits are within the Scout Park that would yield information important to prehistory or history. Therefore, the Scout Park is recommended not eligible for CRHR listing under Criterion 4 at this time.

8.0 MANAGEMENT RECOMMENDATIONS

This cultural resources study identified one built environment resource in the project site, the Will J. Reid Scout Park. The resource was evaluated for CRHR eligibility as part of this study and recommended not eligible. This study did not identify any previously recorded or newly identified prehistoric or historic archaeological resources, but research indicates it is in an archaeologically sensitive area. Rancho Los Cerritos (CA-LAN-696/H) is within a 0.5-mile radius of the project site. This resource is a registered California Historical Landmark and contains human burials as well as a variety of prehistoric and historic artifacts. Due to the presence of this resource near to the project site, Rincon recommends archaeological monitoring of all construction related ground disturbance.

8.1 ARCHAEOLOGICAL MONITORING

Rincon recommends archaeological monitoring of all construction-related ground disturbing activities. Archaeological monitoring should be performed under the direction of an archaeologist meeting the *Secretary of the Interior's Professional Qualifications Standards for archaeology* (NPS 1983). If archaeological resources are encountered during ground-disturbing activities, work within a 50-foot radius must halt and the find evaluated for significance under CEQA. The qualified archaeologist may reduce or stop monitoring dependent upon observed conditions. If Native American resources are encountered, a Native American consultant should be retained to participate in the treatment of the resource as well as to provide Native American monitoring services for the remainder of ground disturbing activities.

8.2 UNANTICIPATED DISCOVERY OF CULTURAL RESOURCES

If cultural resources are encountered during ground-disturbing activities when an archaeological monitor is not present, work within a 50-foot radius must halt and an archaeologist meeting the *Secretary of the Interior's Professional Qualifications Standards for archaeology* (NPS 1983) must be contacted immediately to evaluate the find. If the discovery proves to be significant under CEQA, additional work such as data recovery excavation may be warranted.

8.3 UNANTICIPATED DISCOVERY OF HUMAN REMAINS

The discovery of human remains is always a possibility during ground disturbing activities. If human remains are found, State of California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the county coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. In the event of an unanticipated discovery of human remains, the county coroner must be notified immediately. If the human remains are determined to be prehistoric, the coroner will notify the NAHC, which will determine and notify a most likely descendant (MLD). The MLD shall complete the inspection of the site within 48 hours of notification and may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials.

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Appendix A

Records Search Summary

Report List

LB Riverwalk

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
LA-00358	Paleo -	1976	Stickel, Gary E.	An Archaeological and Paleontological Resource Survey of the Los Angeles River, Rio Hondo River and the Whittier Narrows Flood Control Basin, Los Angeles, California	Environmental Research Archaeologists	19-000858, 19-001009, 19-001311
LA-00503		1974	Dixon, Keith A.	Archaeological Resources and Policy Recommendations of Long Beach		19-000102, 19-000131, 19-000231, 19-000232, 19-000233, 19-000234, 19-000235, 19-000236, 19-000270, 19-000271, 19-000272, 19-000273, 19-000274, 19-000275, 19-000306, 19-000484, 19-000683, 19-000693, 19-000694, 19-000695, 19-000696, 19-000697, 19-000698, 19
LA-02330		1989	White, Robert S.	An Archaeological Assessment of a 15-acre Parcel Near Quartz Ill, Los Angeles County Office Complex	Archaeological Associates, Ltd.	
LA-02882		1993	McKenna, Jeanette A.	Cultural Resources Investigations, Site Inventory, and Evaluations, the Cajon Pieline Project Corridor, Los Angeles and San Bernadino Counties, California	Mc Kenna et al.	19-000967, 19-001046
LA-02970		1992	Chamberlaine, Pat and Jean Rivers-Council	Cajon Pipeline Project Draft Environmental Impact Statement Environmental Impact Report	City of Adelanto, and Bureau of Land Management	19-000059, 19-000060, 19-000067, 19-000077, 19-000194, 19-000213, 19-000216, 19-000248, 19-000441, 19-000444, 19-000823, 19-000903, 19-000925, 19-000926, 19-000927, 19-000962, 19-001015, 19-001046, 19-001134, 19-001354, 19-001595, 56-000027, 56-000062, 56
LA-03102		1994	McCawley, William, John Romani, and Dana Slawson	The Los Angeles County Drainage Area Subsequent Environmental Impact Report	Greenwood and Associates	19-000693, 19-000696
LA-03422		1996	Bissell, Ronald M.	Cultural Resources Research in Support of the Rancho Los Cerritos Seismic Upgrade, Long Beach, Los Angeles County, California	RMW Paleo Associates, Inc.	19-000696
LA-03570		1997	Bissell, Ronald M.	Cultural Resources Research in Support of the Rancho Los Cerritos Seismic Upgrade, Long Beach, Los Angeles County, California	RMW Paleo Associates, Inc.	19-000696

Report List

LB Riverwalk

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
LA-07950		2006	Harper, Caprice D.	Archaeological Survey Report for the Interstate 105 (i-105) Dewatering Wells Beneficial Re-use of Groundwater Project, in the Cities of Paramount, Compton, Long Beach, and Carson, Los Angeles County, California	BonTerra Consulting	
LA-11993		2012	O'Neill, Laura	Findning of No Adverse Effect for the Proposed Interstate 710 Corridor Project Between Ocean Boulevard and the State Route 60 Interchange	Galvin Preservation Associates	

Appendix B

Native American Scoping

STATE OF CALIFORNIA Edmund G. Brown, Jr., Governor

NATIVE AMERICAN HERITAGE COMMISSION
1550 Harbor Blvd., ROOM 100
West SACRAMENTO, CA 95691
(916) 373-3710
Fax (916) 373-5471

August 12, 2014

Hannah Haas
Rincon Consultants, Inc.
5135 Avenida Encinas, Suite A
Carlsbad, CA 92008

Sent by Fax: (760) 918-9444
Number of Pages: 2

Re: Long Beach Riverwalk Project, Los Angeles County.

Dear Ms. Haas,

A record search of the sacred land file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe or group. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 373-3712.

Sincerely,

Katy Sanchez

Katy Sanchez
Associate Government Program Analyst

Native American Contact List
Los Angeles County
August 11, 2014

Tongva Ancestral Territorial Tribal Nation
John Tommy Rosas, Tribal Admin.
, Gabrielino Tongva
tattnlaw@gmail.com
(310) 570-6567

Gabrielino-Tongva Tribe
Linda Candelaria, Co-Chairperson
P.O. Box 180 Gabrielino
Bonsall , CA 92003
palmsprings9@yahoo.com
(626) 676-1184 Cell
(760) 636-0854 Fax

Gabrieleno/Tongva San Gabriel Band of Mission Indians
Anthony Morales, Chairperson
P.O. Box 693 Gabrielino Tongva
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(626) 483-3564 Cell
(626) 286-1262 Fax

Gabrieleno Band of Mission Indians
Andrew Salas, Chairperson
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Gabrielino /Tongva Nation
Sandonne Goad, Chairperson
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, CA 90086
sgoad@gabrielino-tongva.com
(951) 845-0443

Gabrielino-Tongva Tribe
Conrad Acuna,
P.O. Box 180 Gabrielino
Bonsall , CA 92003
(760) 636-0854 Fax

Gabrielino Tongva Indians of California Tribal Council
Robert F. Dorame, Tribal Chair/Cultural Resources
P.O. Box 490 Gabrielino Tongva
Bellflower , CA 90707
gtongva@verizon.net
(562) 761-6417 Voice/Fax

Gabrielino /Tongva Nation
Sam Dunlap, Cultural Resorces Director
P.O. Box 86908 Gabrielino Tongva
Los Angeles , CA 90086
samdunlap@earthlink.net
(909) 262-9351

Gabrielino-Tongva Tribe
Bernie Acuna, Co-Chairperson
P.O. Box 180 Gabrielino
Bonsall , CA 92003
bacuna1@gabrielinotribe.org
(619) 294-6660 Office
(310) 428-5690 Cell
(760) 636-0854 Fax

(760) 636-0854 F

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.
This list is only applicable for contacting local Native Americans with regard to the proposed Long Beach Riverwalk Project, Los Angeles County.

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August 18, 2014

John Tommy Rosas
Tongva Ancestral Territorial Tribal Nation
Email: tattnlaw@gmail.com

RE: Cultural Resources Study for the Long Beach Riverwalk Project, Los Angeles County, California

Dear Mr. Rosas:

Rincon Consultants has been retained to conduct a cultural resources study for the Long Beach Riverwalk Project, Los Angeles County, California. The proposed project would develop 10.56-acres into a residential subdivision at 4747 Daisy Avenue in north-central Long Beach (see enclosed map). The subdivision would include 131 lots containing 2 and 3-story homes. Amenities would include private recreation center including a meeting center, pool and spa and turf area, a tot lot, and private access to the pedestrian path along the Los Angeles River.

As part of the process of identifying cultural resources issues for this project, Rincon contacted the Native American Heritage Commission and requested a Sacred Lands File (SLF) search and a list of Native American tribal organizations and individuals who may have knowledge of sensitive cultural resources in or near the project area. The results stated that a search of the SLF "failed to indicate the presence of Native American cultural resources" within the project area but recommended that we consult with you directly regarding your knowledge of the presence of cultural resources that may be impacted by this project.

If you have knowledge of cultural resources that may exist within or near the project area, please contact me in writing at the above address or rramirez@rinconconsultants.com, or by telephone at (760) 918-9444, extension 215. Thank you for your assistance.

Sincerely,

Robert Ramirez, M.A., RPA
Cultural Resources Principal Investigator

Enclosure: Project Location Map

Appendix C

Resource Record

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary #
HRI #
Trinomial
NRHP Status Code

Other Listings
Review Code Reviewer Date

 ***Resource Name or #:** Will J. Reid Scout Park

P1. Other Identifier:
***P2. Location:** ☐Not for Publication ☑ Unrestricted ***a. County:** Los Angeles
and (P2b and P2c or P2d. Attach a Location Map as necessary.)
***b. USGS 7.5' Quad:** Long Beach **Date:** 2014 (electronic) **T** 4S; **R** 13W; **Sec** Unsectioned Rancho Los Cerritos; S.B. **B.M.**
c. Address: 4747 Daisy Avenue City: Long Beach Zip: 90805
d. UTM: Zone: ; mE/ mN (G.P.S.)
e. Other Locational Data: (e.g., parcel #, directions to resource, elevation, etc., as appropriate) Elevation:

***P3a. Description:**
The Will J. Reid Scout Park (Scout Park) is a 10.56-acre former Boy Scouts of America campground near the confluence of the Los Angeles River and Compton Creek. The Scout Park was established in 1941 when the Boy Scouts of America (BSA) Long Beach Area Council purchased the land from Long Beach resident William J. Reid (1889-1956). The Scout Park was the fourth camp facility to be established within the Long Beach Area Council and was used for camping and other outdoor activities but contains several buildings and structures. The southeast corner of the Scout Park contains a complex of buildings including an Assembly Hall built during the 1950s, Training Center builit in 1974, Ranger's Office built about 1969, a swimming pool and changing room built in the 1950s, and a storage building of unknown date (John Fullerton Pers comm 2014). The remainder of the Scout Park grounds contains several smaller buildings consisting of a Camp Master building built between 1953 and 1972, a mobile home trailer, an amphitheater built in the 1960s, and two restroom facilities built between 1953 and 1972 (John Fullerton pers comm 2014; HistoricAerials.com 2014). With some exceptions, the surviving buildings present Minimal Traditional Style compositions, painted brown to blend with the landscape and reflect the intended Rustic camp atmosphere. The storage building is a board-and-batten clad warehouse; the restroom facilities are carefully detailed as a Mid-Century Modern buildings with extended ridge beam, shake-clad roof, and vented cupola; the Camp Master building is a small prefabricated shelter clad with pressed-board siding.
***P3b. Resource Attributes:** (List attributes and codes) HP31: Urban Open Space; HP39: Recreational Facility
***P4. Resources Present:** ☑Building ☑Structure ☐Object ☑Site ☐District ☐Element of District ☐Other (Isolates, etc.)

P5b. Description of Photo: (View, date, accession #)
Will J. Reid Scout Camp entrance, facing south, 9/12/14

***P6. Date Constructed/Age and Sources:** ☑Historic ☐Prehistoric ☐Both
1941 (Boy Scouts of America)

***P7. Owner and Address:**
Integral Communities
888 San Clemente Drive, Suite 100
Newport Beach, CA 92660

***P8. Recorded by:** (Name, affiliation, and address)
R.Ramirez
Rincon Consultants
5135 Avenida Encinas Suite A
Carlsbad, CA 92008

***P9. Date Recorded**
9/12/2014

***P10. Survey Type:** (Describe)
Intensive Pedestrian

***P11. Report Citation:** Ramirez, R, H. Haas, and J.W. Steely. 2014. Cultural Resources Study for the Riverwalk Residential Development Project, Long Beach, Los Angeles, California. Report on file at the South Central Coast Information Center.

***Attachments:** ☐NONE ☑Location Map ☑Sketch Map ☑Continuation Sheet ☑Building, Structure, and Object Record ☐Archaeological Record ☐District Record ☐Linear Feature Record ☐Milling Station Record ☐Rock Art Record ☐Artifact Record ☐Photograph Record ☐ Other (List):

Primary #
HRI#

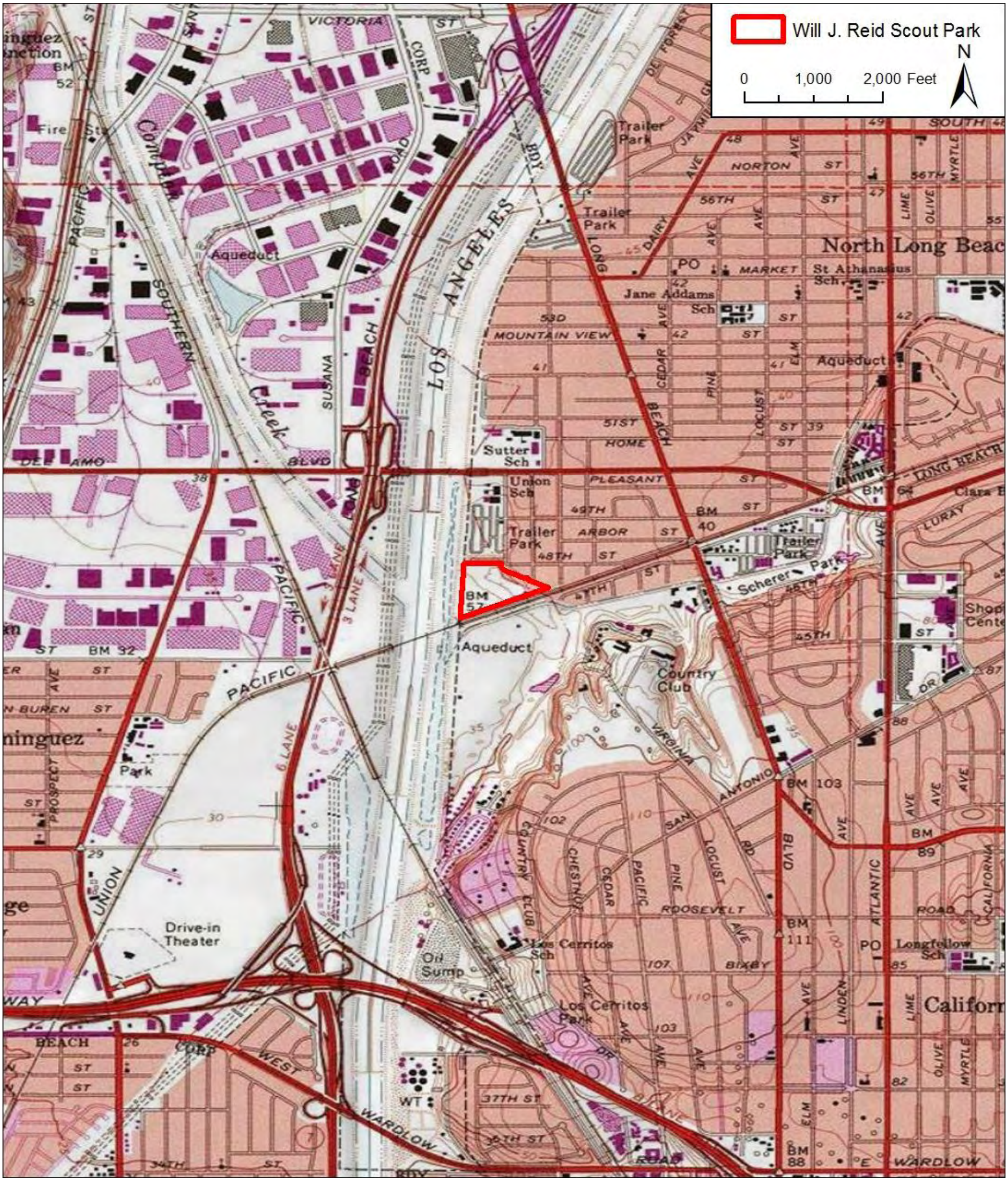
LOCATION MAP

Trinomial

***Resource Name or #:** Will J. Reid Scout Park

***Map Name:** Long Beach

***Scale:** 1:24,000 ***Date of Map:** 2014 (electronic)



***Required information**

BUILDING, STRUCTURE, AND OBJECT RECORD

***NRHP Status Code**

***Resource Name or #** (Assigned by recorder) Will J. Reid Scout Park

B1. Historic Name: Will J. Reid Scout Park
B2. Common Name: Will J. Reid Scout Park
B3. Original Use: Boy Scout Camp   B4. Present Use: Not in use
***B5. Architectural Style:**
***B6. Construction History:** (Construction date, alterations, and date of alterations)
Scout Camp established in 1941.

***B7. Moved?** ☑No ☐Yes ☐Unknown **Date:** **Original Location:**
***B8. Related Features:**
Complex of buildings in the southeast corner of 10.56-acre parcel consisting of an Assembly Hall, Tranining Center, Ranger's Office, Swimming Pool, Changing Room, and Storage Building. Other features include a Camp Master building, mobile home trailer, amphitheater, and two restroom facilities.

B9a. Architect: Unknown   b. Builder: Unkown
***B10. Significance: Theme:**   **Area:** Long Beach
Period of Significance: 1941-2010 **Property Type:** Recreational Facility **Applicable Criteria:** N/A
(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.)
The Will J. Reid Scout Park consists of a 10.56-acre parcel used between 1941 and 2010 by the BSA's Long Beach Area Council for camping and other outdoor activities. Over those years, thousands of Boy Scouts attended the Scout Park and participated in numerous Scout related events and activities. The Scout Park, however, is not known to be associated with any significant events that made a contribution to California's history or cultural heritage. Therefore, the Scout Park is recommended not eligible for California Register of Historical Resources (CRHR) listing under Criterion 1. The Scout Park was established in 1941 with the help of industrialist William J. Reid, who was a prominent Long Beach resident and chairman of the board of Hancock Oil Company. He was actively involved with the Scout Park, providing the financial means for the BSA to establish the Scout Park, and serving on the Long Beach Area Council's executive board. Reid was a locally prominent citizen, as the Scout Park and a Long Beach High School were named after him; however, his civic contributions appear not to extend beyond local philanthropic activities, and other properties such as his residence and oil company office would better convey his significance. Research has not identified any other important individuals to associate with this property, so the Scout Park is recommended not eligible for CRHR listing under Criterion 2.

The surviving administrative and recreational group of buildings and structures within the Scout Park is not a concentration of distinctive examples of type or workmanship. The grounds of the Scout Park have been heavily altered in recent years, with most trees cut down and the lawns un-irrigated. These landscape aspects of the Scout Park were vital elements to its original appearance and use as a place for outdoor activities and events. Since the Scout Park does not convey significance under Criterion 3, Rincon recommends the Will J. Reid Scout Park as not eligible for listing in the CRHR.

No known historic or prehistoric archaeological deposits are within the Scout Park that would yield information important to prehistory or history. Therefore, the Scout Park is recommended not eligible for CRHR listing under Criterion 4.

B11. Additional Resource Attributes: (List attributes and codes)
***B12. References:** John Fullerton, Exective Scout/CEO Long Beach Area Council; HistoricAerials.com, http://www.historicaerials.com/aerials.php?scale=2000&lon=-118.200684&lat=33.842014&year=2005 .
B13. Remarks:
***B14. Evaluator:** R.Ramirez and J.W. Steely
***Date of Evaluation:** 10/15/14

(This space reserved for official comments.)

(Sketch Map with north arrow required.)

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

Primary #
HRI#

SKETCH MAP

Trinomial

Page 4 of 10

*Resource Name or # Will J. Reid Scout Park

*Drawn By: C. Huff

*Date: 9/12/2014

DPR 523K (1/95)

*Required information

Photograph 1. Project site overview, facing southeast.

Photograph 2. Overview of southeastern corner of project site, facing southwest.

*Resource Name or # Will J. Reid Scout Camp

*Recorded by: R. Ramirez *Date: 9/12/14 ■ Continuation ☐ Update

Photograph 3. Assembly Hall, facing southeast

Photograph 4. Training Center, facing south

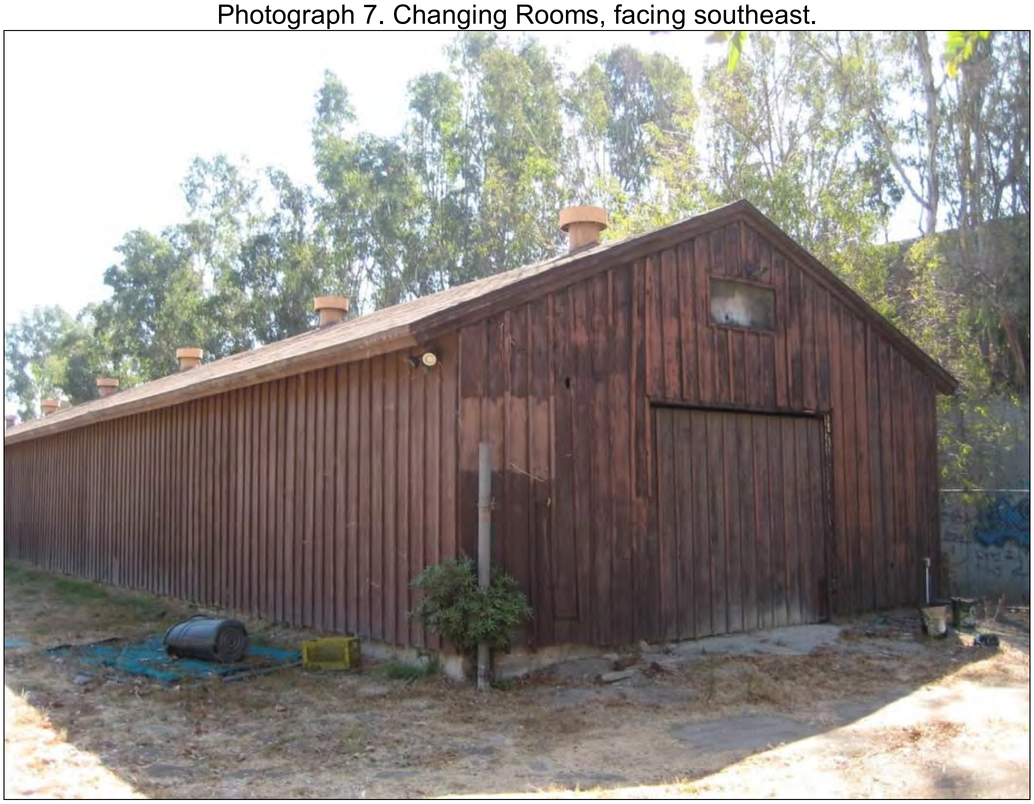
*Resource Name or # Will J. Reid Scout Camp

*Recorded by: R. Ramirez *Date: 9/12/14 ■ Continuation ☐ Update

Photograph 5. Ranger's Office building, facing east.

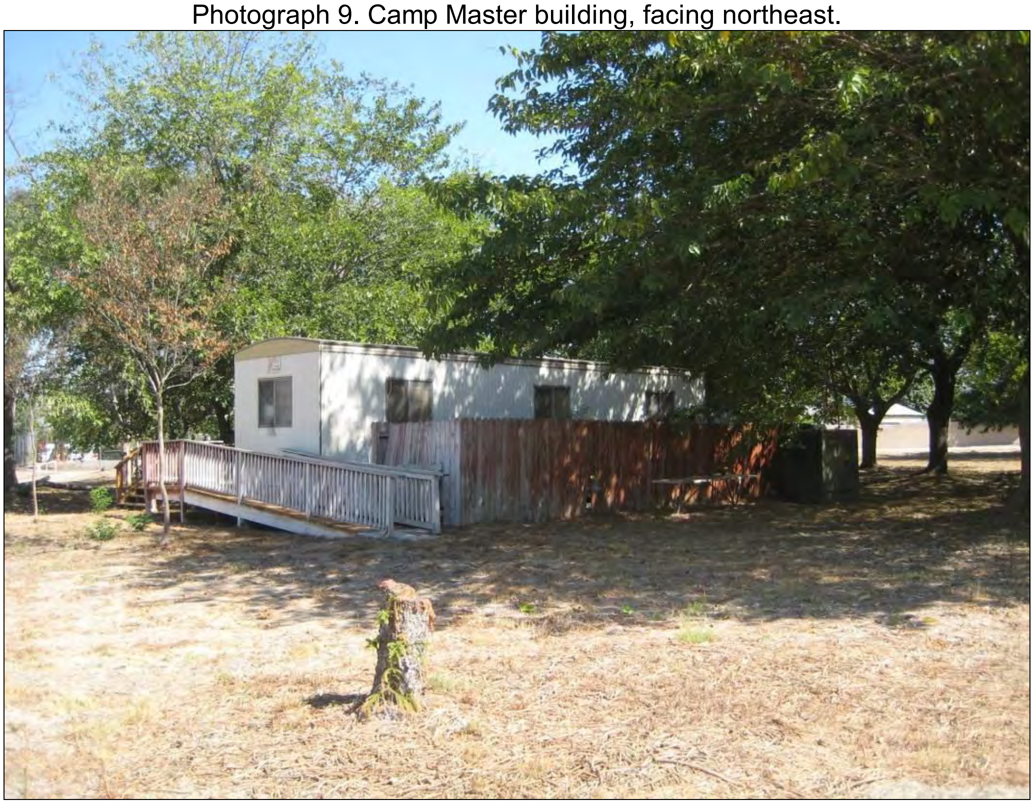
Photograph 6. Swimming Pool, facing west.

Photograph 7. Changing Rooms, facing southeast.



Photograph 8. Storage Building, facing southeast.

Photograph 9. Camp Master building, facing northeast.



Photograph 10. Mobile home trailer, facing north

Photograph 11. Amphitheater, facing southwest.

Photograph 12. Restroom, facing northwest.

Appendix E

Geotechnical Investigation

DESIGN-PHASE GEOTECHNICAL INVESTIGATION
PROPOSED 133-UNIT RESIDENTIAL DEVELOPMENT
(VESTING TENTATIVE TRACT NO. 72608), 4747 DAISY AVENUE
CITY OF LONG BEACH, CALIFORNIA.

INTEGRAL PARTNERS FUNDING, LLC

March 25, 2014

J.N. 13-443

PETRA GEOTECHNICAL, INC.
ORANGE COUNTY

3190 Airport Loop Drive, Suite J1
Costa Mesa, CA 92626
T: 714.549.8921 F: 714.549.1438

PETRA

past + present + future
it's in our science

Engineers, Geologists
Environmental Scientists

March 25, 2014
J.N. 13-443

Mr. Ed Galigher
INTEGRAL PARTNERS FUNDING, LLC
888 San Clemente Drive, Suite 100
Newport Beach, California 92660

Subject: **Design-Phase Geotechnical Investigation, Proposed 133-Unit Residential Development (Vesting Tentative Tract No. 72608), 4747 Daisy Avenue, City of Long Beach, California**

References: See attached list

Dear Mr. Galigher:

Petra Geotechnical, Inc. (Petra) is pleased to submit herewith our design-phase geotechnical investigation report for the proposed residential development to be located at 4747 Daisy Avenue in the city of Long Beach. This work was performed in general accordance with the scope of services outlined in our most recent contract amendment dated February 9, 2014. This report presents the results of our field investigation, laboratory testing and our engineering and geologic judgment, opinions, conclusions and recommendations pertaining to geotechnical design aspects of the proposed development.

It is a pleasure to be of continued service to you on this project. Should you have any questions regarding the contents of this report, or should you require additional information, please do not hesitate to contact us.

Respectfully submitted,

PETRA GEOTECHNICAL, INC.

Siamak Jafroudi, Ph.D., GE
President

SJ/lm

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DESIGN-PHASE GEOTECHNICAL INVESTIGATION
PROPOSED 133-UNIT RESIDENTIAL DEVELOPMENT
(VESTING TENTATIVE TRACT NO. 72608), 4747 DAISY AVENUE
CITY OF LONG BEACH, CALIFORNIA

PURPOSE AND SCOPE OF SERVICES

Petra Geotechnical, Inc. (Petra) is pleased to present the results of our geotechnical investigation of the subject property. The purposes of this investigation were to 1) obtain information regarding surface and subsurface geologic conditions within the project area, 2) evaluate the engineering properties of the onsite soil materials, and 3) provide conclusions and recommendations for design and construction of the proposed residential development. To accomplish these objectives, our scope of services included the following:

1. Review of available published and unpublished literature and maps pertaining to regional faulting, seismic hazards and soil and geologic conditions within and adjacent to the site that could have an impact on the proposed development.
2. Review of the referenced EIR-level study and seismic hazards evaluation prepared by our firm, as well as the current vesting tentative tract map for the site prepared by Kimley-Horn and Associates, Inc. (dated December 12, 2013).
3. Cursory reconnaissance of the subject site and surrounding areas.
4. Drilling, sampling and logging of five exploratory borings to depths ranging from 16.5 to 41.5 feet to supplement previous field work conducted by our firm during our EIR-level investigation.
5. Laboratory testing and analyses of representative samples of earth materials (bulk and relatively undisturbed) obtained from the borings to determine their engineering properties.
6. Performing a pilot soil infiltration study to support the preliminary design of an onsite storm water infiltration system.
7. Engineering and geologic analyses of the field and laboratory data as they pertain to the proposed construction.
8. Evaluation of faulting and seismicity of the region and the possible impact of regional seismicity on the site and the proposed construction.
9. Analysis of liquefaction and its potential impact on the site and proposed construction.
10. Preparation of this report presenting our findings, conclusions and recommendations for site grading and design of building foundation systems.

LOCATION AND SITE DESCRIPTION

Site Location

The area considered under the purview of this report consists of an approximately 10½-acre parcel located immediately east of the Los Angeles River within the westerly portion of the city of Long Beach. The location of the site with respect to nearby roadways and other landmarks is shown on Figure 1. The irregularly-shaped parcel is bounded by an earthen levy, a settling basin and the Los Angeles River to the west, existing single-family residential properties and associated access streets to the north and northeast, and concrete channel and an elevated Union Pacific Railroad easement to the southeast. An aerial image depicting the property and these boundary areas is shown on Figure 2.

Current Site Usage

The subject site is currently occupied by a recently decommissioned Will J. Reid Scout Park camp facility that was originally founded in the 1940's. Existing facilities associated with the former camp operations include the following structures located within the extreme easterly portion of the site:

- A 2,400 square foot, single-story scout hall
- A 3,300 square foot, single-story classroom building
- A 2,025 square foot, single-story aquatics room
- A 2,400 square-foot, single-story ranger's residence
- A 3,500 square foot, single-story storage barn
- A 75-foot-long by 38-foot-wide, concrete-lined swimming pool (currently empty and non-operational)

All of the building structures listed above are wood-framed with either raised wood floors or concrete floor slabs constructed on grade. According to building permit information obtained from the City of Long Beach Development Services Department, all were constructed during the period between 1946 and 1984. In addition to these existing improvements, the following structures are present within the central and westerly portions of the property:

- Two 500 square foot, single-story restroom buildings
- A 150 square foot, single-story camp master's quarters
- A 400 square foot, single-story modular food service building
- A 55-foot by 50-foot, tiered concrete amphitheater

It appears that most, if not all, of the structures listed above were built during the same time period as the remainder of the structures within the site. Appurtenant non-building structures within the site include approximately 30,000 square feet of asphalt-paved parking area, concrete pedestrian walkways and patio-type slabs, an existing water supply well (located within the east-central portion of the site), an approximately 4-foot-high masonry block retaining wall along the southeasterly property boundary, an electrical transformer enclosure, and buried utility infrastructure.

Vegetation within the vacant areas of the property consists of a low growth of weeds and grasses, as well as numerous tree stumps that remain following initial site clearing activities that were recently performed. Small landscaped planter areas are located adjacent to the existing ranger's residence.

Topography

The topographic information included on the vesting tentative tract map shows that the majority of the subject site is located within a closed depression with surface drainage generally directed toward the center of the site. In general, the property exhibits a variable topography with surface elevations ranging from a high of approximately 38 feet above mean sea level in the area of the existing scout hall building (within the extreme easterly corner of the site), to a low of approximately 30 feet at the lowest level of the amphitheater. A relatively gentle northwest-southeast-trending slope approximately 8 feet in height traverses the westerly one-third of the site.

As mentioned previously, the site is bounded to the west by an approximately 8-foot-high levy that parallels the adjacent concrete-lined Los Angeles River channel. In addition, and approximately 15- to 20-foot-high earthen embankment is located just to the south of the southerly boundary of the subject property. Tracks belonging to the Union Pacific Railroad are located atop this embankment. Offsite and approximately 30 feet to the south of the existing scout activity buildings, to toe of this embankment, is supported by an approximately 15-foot-high concrete retaining wall.

PROPOSED CONSTRUCTION AND GRADING

General Project Design

The current vesting tentative tract map for the site (dated December 12, 2013) indicates that the proposed development will consist of a 133-unit, single-family residential tract that will occupy approximately 10 acres of the 10½-acre site. The remaining ½ acre will be set aside for use as a recreation area. Associated exterior improvements are expected to include asphalt-paved access streets, concrete driveways and pedestrian sidewalks, surface and subsurface drainage controls, perimeter fencing, common landscaped areas, extensive underground infrastructure, and required storm water quality devices (possibly including a water quality basin to be located within the recreation area). A sewer lift station will also be constructed within the extreme northerly portion of the site. Primary vehicular access to the development will tentatively be provided by means of a paved road that will enter the tract from Daisy Avenue. An auxiliary maintenance and emergency entrance will also be provided from the Oregon Street terminus.

Structural details for the proposed dwellings are unknown at the present time; however, it is anticipated that the buildings will be one to two stories in height and of wood frame construction with floor slabs constructed on grade. For this type of construction, it is anticipated that relatively light foundation loads will be imposed on the subgrade soils.

Proposed Grading

Although no definitive grading plan is currently available for the proposed development, comparison of the existing surface elevation contours and proposed pad grades shown on the current vesting tentative tract map (dated December 12, 2013) suggests that mass grading of the site will generally involve placement of between 1 and 8 feet of compacted fill as required to establish the proposed finished grade elevations. Minor cuts of 2 feet or less will be required within the existing parking lot area along the northeast site boundary. Ultimate fill thicknesses throughout the site will be greater due to the required remedial grading (i.e., removal and recompaction of existing unsuitable surficial soils) as recommended in subsequent sections of this report. Local grade changes will likely be accommodated by low-height graded slopes and possibly retaining walls. No graded slopes of significant height are anticipated at this time.

INVESTIGATION PROGRAM

Prior to performing our investigation of the site, we researched and reviewed published geotechnical reports and maps for the area of the subject site and conducted a surface reconnaissance. Following completion of this initial research, a subsurface exploration and laboratory-testing program was initiated in order to characterize soil and geologic conditions within the project site. Details pertaining to our field methodology and laboratory test procedures are presented in the following sections.

Aerial Photograph Review

We performed an aerial photograph review as part of our EIR-level geotechnical study to assess previous land use and determine whether geomorphic features are present within or adjacent to the site that would be suggestive of active faulting, gross instability, or significant previous grading activity. A list of the photographs reviewed is provided in Table I, below. All photos were black-and-white orthographic images, and most were stereo-paired.

Table I
Aerial Photographs Reviewed

Date	Flight Series	Frame No.
10-19-53	AXJ-13K	217, 218
10-6-67	4-38	24 (single)
1-31-70	61-6	240, 241
3-17-78	78049	152, 153
5-12-79	FCLA 10	113, 114
7-7-88		19211, 19211A
1-27-86	F	338, 339
6-12-90	C84-15	7, 8
1-24-92	C85-5	28, 29
6-9-93	C93-14	144, 145
1-29-95	C103-34	145, 146
10-16-97	C118-34	114 (single)
2-24-99	C134-34	10, 11

Based on the results of our review, it appears that the subject site has been occupied by the recently decommissioned Will J. Reid Scout Park facility since its original construction during the mid 1940's. The photograph images did not reveal any obvious evidence of major earthwork activities, active faulting, landsliding, or other significant geotechnical constraints at the site.

Subsurface Exploration

Our initial subsurface exploration was performed on August 26, 2013 and included advancing four cone penetrometer (CPT) soundings to a maximum depth of approximately 50 feet below the surface using standard truck-mounted CPT equipment provided by Kehoe Testing and Engineering of Huntington Beach, California. The information obtained in this manner was later supplemented by drilling five exploratory borings within the site to depths of 16½ and 41½ feet below the surface on March 4, 2014. The exploratory borings were drilled utilizing a truck-mounted, hollow-stem auger drill rig provided by 2R Drilling of Chino, California. One additional small-diameter soil boring was drilled to a depth of 3 feet within the proposed recreation area at the extreme easterly corner of the site for purposes of conducting a pilot soil percolation study.

Earth materials encountered in our exploratory borings were classified and logged in accordance with Unified Soil Classification System procedures. The approximate locations of the CPT soundings (identified herein as CPT-1 through CPT-4) and exploratory borings (B-1 through B-5) are shown on the attached exploration map (Plate 1). Descriptive CPT and boring logs are presented in Appendix A of this report.

Our subsurface exploration included the collection of bulk (disturbed) and relatively undisturbed samples of subsurface soil materials from borings B-1 through B-4 for laboratory testing purposes. Bulk samples consisted of a composite of earth materials retrieved at selected depth intervals from the borings. Relatively undisturbed samples were collected using a 3-inch outside-diameter, modified California split-spoon soil sampler lined with 1-inch high brass rings. The sampler was driven to a depth of 18 inches with successive 30-inch drops of a hydraulically operated, 140-pound automatic trip hammer. Blow counts for each 6-inch driving increment were recorded on the exploration logs. The central portions of the driven core samples were placed in sealed containers and transported to our laboratory for testing.

Where deemed appropriate based on the CPT data collected, Standard Penetration (SPT) tests were also performed at selected depth intervals in accordance with the American Society for Testing Materials (ASTM) Standard Procedure D 1586. This method consists of mechanically driving an unlined standard split-barrel sampler 18 inches into the soil with successive 30-inch drops of the 140-pound automatic trip hammer. Blow counts for each 6-inch driving increment were recorded on the exploration logs. The number of blows required to drive the standard split-spoon sampler for the last 12 of the 18 inches was identified as the uncorrected standard penetration resistance (N). Disturbed soil samples from the unlined standard split-spoon samplers were placed in plastic bags and transported to our laboratory for testing.

Laboratory Testing

To evaluate the engineering properties of the onsite soils, a number of laboratory tests were performed on selected samples considered representative of the materials encountered during our investigation. Laboratory tests included the determination of in-place moisture content and unit dry density, maximum dry density and optimum moisture content, expansion potential, consolidation characteristics, and general soil corrosivity screening including soluble sulfate and chloride content, soil pH and minimum resistivity. The data generated during our laboratory testing has been incorporated into the findings and conclusions presented in subsequent sections of this report.

FINDINGS

Regional and Local Geologic Setting

Regional Physiographic Setting

The subject site is located within the Los Angeles Basin, northwest-trending alluviated lowland situated at the north end of the Peninsular Ranges geomorphic province of coastal southern California. This basin, which is the surface expression of a deep structural trough, has been subdivided into four primary structural blocks that are distinguished from one another by contrasting basement rock types and stratigraphy. These structural blocks are generally separated by zones of faulting along which movement has been occurring intermittently since middle Miocene time (Yerkes et al., 1965).

More specifically, the subject property is located within the southerly portion of the Downey Plain, a broad lowland area that comprises a large portion of the Central Block of the Los Angeles Basin. This plain is bounded by the Santa Monica Mountains to the north, the Puente Hills and Santa Ana Mountains to the northeast and east, and a northwest-trending alignment of hills and mesas to the west and southwest which represent surface expressions of uplift along the Newport-Inglewood fault. In the area of the subject site, the soils that form this extensive alluvial plain are composed primarily of alluvial materials deposited as a result of sedimentation along the Los Angeles River.

Area Geology

The distribution, thicknesses and characteristics of near-surface soils in Los Angeles County have been previously mapped by other investigators at a scale of 1:48,000 for purposes of seismic zonation. Based on our review of published maps, the northern portion of the city of Long Beach is underlain by unconsolidated, generally fine-grained, Holocene-age alluvial fan and valley deposits. These geologically young materials extend locally to depths in excess of 150 feet, and are underlain by semi-consolidated older alluvium or sedimentary bedrock of the late Quaternary-age Lakewood formation. Relatively minor thicknesses of artificial fill are likely to occur locally where the previously existing natural ground surfaces have been modified during urbanization of the area.

Local Geology and Subsurface Conditions

As shown on the exploration logs included in Appendix A, our subsurface investigation revealed that the area of proposed development is underlain predominantly by late Quaternary-age alluvial fan deposits that extend below the maximum depth explored (41.5 feet). These materials consist of discontinuous, interlayered medium-dense to dense, dry to slightly moist, fine-grained sands and silty sands, and firm to very stiff, dry to very moist silts, sandy silts, silty clays and low-plasticity clays. Laboratory testing of representative samples of the more granular materials (i.e., sands and silty sands) yielded in-place dry densities ranging from 85.0 to 110.6 pounds per cubic foot and moisture contents ranging from 1.3 to 26.0 percent. The fine-grained alluvial soils (including silts, sandy silts, silty clays and clays) exhibited in-place dry densities ranging from 76.8 to 110.9 pounds per cubic foot and moisture contents ranging from 5.2 to 23.3 percent.

In all five of our exploratory borings, the native alluvial materials described above were found to be capped by an approximately 1½- to 3-foot-thick mantle of artificial fill that was presumably placed during original grading operations within the site. Given the previous usage of the site, it is unlikely that the onsite fill materials were placed in accordance with current grading standards and certified by a geotechnical professional. For this reason, all existing onsite fill is classified as "undocumented" for purposes of this investigation.

Groundwater

Groundwater was not encountered in our boring during at the time of our field investigation in the area of the subject site to the maximum depth of 41.5 feet below ground surface. The extent of shallow groundwater in the vicinity of the subject site is described in general terms in the referenced Seismic Hazard Zone report for the Long Beach quadrangle published by the California Division of Mines and Geology (CDMG, 1998). Based on information provided in that report, the subject property is located within an area where shallow groundwater (i.e., groundwater existing at a depth of 40 feet or less below the ground surface) would typically be expected to occur. The historical highest groundwater depth for the site is approximately 30 feet below the surface based on our review of Plate 1.2 of the referenced CDMG seismic hazard zone report.

A review of local area well data maintained by the California Department of Water Resources indicates that one water supply well (Well No. 04S13W01N003S) is located approximately 0.8 kilometers north of the subject site has been included in a groundwater depth monitoring program since March, 2000. During the monitoring period, the shallowest groundwater reading obtained was 4.8 feet above sea level. Extrapolated to the subject site, this represents a 14-year groundwater high of approximately 29.2 feet below the surface. This correlates well with the anticipated historical high groundwater level published in the referenced CDMG seismic hazard zone report.

Tectonic Setting

Regional Surface Fault Systems

The geologic structure of Southern California is dominated by northwest-trending faults associated with the San Andreas system. Faults such as the Newport-Inglewood, the Whittier-Elsinore, the San Jacinto, and various segments of the San Andreas Fault itself are all major faults associated with this system. They are all known to be seismically active, and most are known to have ruptured the ground surface in historic time. Also within the southern California region are a number of west-trending, low-angle reverse (thrust) faults that are similarly active. The majority of these faults occur as north-dipping planes which trend along the south-facing flanks of the Transverse Ranges. Among the known active thrust faults in the region include the Cucamonga, Sierra Madre, Santa Monica, and Hollywood faults.

Concealed Faults

Another category of fault known as the "blind thrust" became recognized as a significant seismic hazard as a result of the 1987 moment magnitude (Mw) 6.0 Whittier Narrows earthquake. Blind thrusts are concealed beneath the earth's surface and are defined as dip-slip faults that tend to fold and/or uplift the near surface sediments during moderate to large magnitude earthquakes (Shaw and Suppe, 1996). In 1994 the Mw 6.7 Northridge earthquake occurred along what researchers have interpreted as a south-dipping thrust ramp beneath the San Fernando Valley. Together, these events caused more than $25 billion in property damage and clearly demonstrate the risks that blind thrusts pose to the greater Los Angeles metropolitan area.

Recent structural models of the Los Angeles basin suggest that deep-seated, blind thrust sheets underlie portions of Orange and Los Angeles Counties. These structures are apparently accommodating north-south compression with slip rates of several millimeters per year (Hauksson, 1992; Petersen and Wesnouski, 1994). The Puente Hills and Upper Elysian Park blind thrust systems represent two such blind thrusts that are reported to extend below and in close proximity to the site (Dolan et al., 2003, Shaw et al., 2002, and Oskin et al. 2000). A similar system underlies the San Joaquin Hills (Grant et al., 1999). Structural models and seismicity values for these three blind thrust systems and the Northridge blind thrust have been incorporated into the California Geological Survey seismic model, which was updated in April 2003 (Cao, et al., 2003).

Nearby Seismic Sources

Published geologic maps and literature indicate that the site lies within 45 kilometers of a number of significant active and potentially active faults that, in addition to the various segments of the more distant San Andreas Fault zone, are considered capable of generating strong ground motion at the subject site. The names and locations of these faults relative to the subject property are provided in Table II. The locations of these faults are graphically depicted on Figure 3.

Table II
Significant Nearby Seismic Sources

Fault Name	Approximate Distance/ Direction From Site	Source Type[1]	Slip Rate (mm/yr)[2]	Maximum Magnitude[2,3]
Newport-Inglewood	0.7 kilometers southwest	B	1.0	6.9 (7.2 – 7.5)[4]
Puente Hills Blind Thrust	9.7 kilometers northeast	B	0.7	7.1
Palos Verdes	11.5 kilometers southwest	B	3.0	7.1 (7.3-7.7)[5]
Whittier	24.2 kilometers northeast	B	2.5	6.8 (7.0)[5]
Upper Elysian Park	25.0 kilometers north-northwest	B	1.3	6.4 (6.7)[5]
San Joaquin Hills Thrust	31.0 kilometers southeast	B	0.5	6.6 (7.1)[5]
Raymond	31.9 kilometers north	B	0.5	6.5 (6.8)[5]
Hollywood	32.2 kilometers northwest	B	1.0	6.5 (6.7)[5]
Santa Monica	32.6 kilometers northwest	B	1.0	6.6 (6.8 – 7.4)[5]
Verdugo	35.3 kilometers northwest	B	0.5	6.7 (6.9)[5]
San Jose	37.2 kilometers northeast	B	0.5	6.5 (6.7)[5]
Sierra Madre	42.3 kilometers northwest	B	3.0	7.0 (7.3)[5]
Chino-Central Ave.	42.9 kilometers northeast	B	1.0	6.7
Clamshell-Sawpit	43.4 kilometers north-northeast	B	0.5	6.5 (6.7)[5]

Notes:
1) As classified according to 2001 California Building Code Table 16-U.
2) Per CGS 2002 fault data file (Cao et al, 2003).
3) Moment Magnitude (M_W).
4) The expected magnitude on the Newport-Inglewood fault according to the 2008 USGS fault files ranges from 7.2 to 7.5 depending on the cascade models chosen (EZ-FRISK 2010).
5) 2008 USGS fault file (EZ-FRISK 2010)

Based on a review of published geotechnical maps and literature pertaining to regional faulting, the closest known fault considered capable of causing strong ground motion at the subject site is the onshore segment of the Newport-Inglewood fault. Located approximately 0.7 kilometer southwest of the subject site, the Newport Inglewood fault consists of a series of parallel and en-echelon, northwest-trending faults and folds that extend from the southern edge of the Santa Monica Mountains southeast to the offshore area of Newport Beach. This zone has a history of moderate to high seismic activity and has produced numerous earthquakes greater than magnitude 4.0, including the March 11, 1933 magnitude 6.3 Long Beach earthquake (which was actually centered near the city of Newport Beach). At the time of the 1933 earthquake, secondary effects of strong ground shaking including sand boils, ground fissures, and liquefaction were noted in the city of Long Beach, as well as in the city of Huntington Beach along Pacific Coast Highway near the Huntington Beach Pier and in the Bolsa Chica area.

In addition, subsurface fault displacement of a few inches was documented following the October 21, 1941 earthquake (magnitude 4.9) and the June 18, 1944 earthquake (magnitude 4.5), both of which occurred along the Newport-Inglewood fault in the Dominguez Hills area (Barrows, 1974). Various segments of the Newport-Inglewood fault have been included within the boundaries of an Alquist-Priolo fault rupture hazard zone.

Five additional faults that are considered to be significant seismogenic sources are located in relatively close proximity to the subject site and thus warrant mention in this report. These include the San Joaquin Hills thrust fault, the Palos Verdes fault, the Puente Hills blind thrust and the Whittier fault. Descriptions of these faults are provided in the following paragraphs:

Puente Hills Blind Thrust Fault

Located approximately 9.7 kilometers northeast of the site, the Puente Hills blind thrust lies buried about two miles beneath the surface and dips to the north at approximately 25 degrees (Shaw et al., 2002; Dolan et al, 2003). The fault extends approximately 40 kilometers from the City of Brea to downtown Los Angeles and consists of the Coyote Hills, Santa Fe Springs and Los Angeles segments. According to research, this fault generated the 1987 Mw 5.9 Whittier Narrows earthquake (Hauksson and Stein, 1989), which caused an estimated $358 million in property damage. This earthquake occurred at a depth of approximately six miles and was followed by an aftershock of slightly lower magnitude three days later.

Palos Verdes Fault

The Palos Verdes fault is located approximately 11.5 kilometers to the southwest of the subject site and is generally described in terms of three individual segments, namely the San Pedro Bay, the onshore, and the Santa Monica Bay segments (Ziony, 1985). All segments are believed to possess a reverse or reverse right oblique sense of motion. References reviewed as part of this report indicate that the San Pedro Bay portion of the fault has been shown to displace Holocene sedimentary materials; however, evidence for Holocene activity along the onshore and Santa Monica Bay segments is currently in dispute. Nonetheless, in light of the increased amount of seismicity that has been attributed to the Santa Monica Bay segment, the Palos Verdes Hills fault has been classified as active.

Whittier Fault

At its closest approach, the Whittier fault is located approximately 24.2 kilometers northeast of the subject site. It is one of the most prominent structural features in the Los Angeles Basin and occurs as three subparallel strands that form a zone approximately 1.2 kilometers wide and about 74 kilometers long. Topographic expression of this zone is marked by a distinct linear valley with offset drainages along the valley margins. Published investigations reveal that this fault offsets Holocene stratigraphy just east of the city of Whittier, as well as to the northwest of Brea Canyon (Leighton and Associates, 1990). For this reason, this fault is considered active and is included within the boundaries of an Alquist-Priolo Earthquake Fault zone.

Most sources report a relatively low level of seismic activity along the eastern portion of the Whittier fault with earthquake magnitudes rarely exceeding Richter Magnitude 5.0. However, on September 3, 2002, a magnitude

4.6 earthquake occurred northeast of Yorba Linda in Orange County that has been attributed to a small conjugate fault related to the Whittier fault zone (Hauksson and Hutton, 2002). Another moderate earthquake having a Richter Magnitude of 5.4 occurred in the same general area on July 28, 2008 and was also initially attributed to the Whittier fault; however, subsequent analysis suggests that this seismic event was associated with a newly postulated feature that has been referred to as the "Yorba Linda Trend." Researchers currently suspect that this feature consists of a one- to two-mile-wide fault system that traverses the area where the Whittier, Elsinore and Chino Hills faults intersect near the northern end of the Santa Ana Mountains.

Upper Elysian Park Seismic Zone

Although generally not classified as an active fault by the common definition, published literature indicates that the subject site is located roughly 25 kilometers southeast of the Elysian Park seismic zone which, as mentioned previously, belongs to a group of features known as "buried (or blind) thrust faults" due to the fact that they are expressed at the surface as broad uplifted folds rather than as distinct scarps or surface traces. The seismic risk posed by buried faults, in terms of recurrence interval and maximum credible magnitude, has not yet been well established; however, it is generally accepted that the Elysian Park seismic zone is responsible for the moderate-sized 1987 Whittier Narrows earthquake. Consequently, the potential for future earthquakes along this fault with magnitudes larger than 6.0 cannot be precluded.

San Joaquin Hills Thrust Fault

Recent studies by various researchers have suggested that the hilly terrain that characterizes the San Joaquin Hills in central and southern Orange County is the result of late Quaternary folding associated with tectonic uplift along an active thrust fault. Recognition of this potentially seismogenic blind thrust extends the known area of active blind thrusts and fault-related folding present in Los Angeles County southward into coastal Orange County (Grant et al., 1999). Recent blind thrust earthquakes, including the 1987 magnitude 5.9 Whittier Narrows and the 1994 magnitude 6.7 Northridge events, have demonstrated the significance of these features with respect to the tectonic setting of southern California. Although the San Joaquin Hills thrust has not been observed directly at the surface, structural modeling indicates that this fault has a slip rate of approximately 0.5 millimeters per year that yields a recurrence interval of 1,650 to 3,100 years for moderate-sized earthquakes.

Historical Seismicity

As is the case with most locations in Southern California, the subject site is located in a region that is characterized by moderate to high seismic activity. The project site and vicinity have experienced strong ground shaking due to earthquakes on a number of occasions in historic time. Some of the more significant historic seismic events for which detailed ground motion data are available are listed in Table III, along with the corresponding approximate epicentral distances to the subject site, the calculated moment magnitude, and the approximate peak horizontal site accelerations based on various published earthquake databases. The locations of selected earthquake epicenters with respect to the subject site are shown graphically on Figure 4.

Table III
Significant Historic Earthquakes

Earthquake Events	Approximate Epicentral Distance From Site (kilometers)	Moment Magnitude (Mw)	Approximate Site Acceleration (g)[1]	Approximate Modified Mercalli Intensity[2]
Calexico/Sierra El Mayor (April 4, 2010)	319	7.2	0.01	IV
Inglewood (May 18, 2009)	16.4	4.7	0.18	VII
Chino Hills (July 29, 2008)	42.3	5.4	0.06	V
Hector Mine (October 16, 1999)	197.1	7.1	0.02	IV
Northridge (Jan. 17, 1994)	51.6	6.7	0.08	V
Whittier Narrows (Oct. 1, 1987)	26.8	5.9	0.25	VII
Sylmar (Feb. 9, 1971)	65.9	6.4	0.05	V
Landers (June 28, 1992)	167.3	7.6	0.04	V
Big Bear (June 28, 1992)	132.7	6.7	0.03	IV
Kern County (July 21, 1952)	148.8	7.7	0.05	V
Long Beach (March 11, 1933)	33.0	6.3	0.10	VI
Glen Ivy Hot Springs (May 15, 1910)	75.6	6.0	0.03	IV
Lytle Creek (July 30, 1894)	75.2	6.0	0.03	IV
Los Angeles (July 11, 1855)	30.1	6.3	0.12	VI
Wrightwood (Dec. 8, 1812)	77.5	7.0	0.06	V

Notes: [1] Maximum free-field site accelerations for the Calexico/Sierra El Mayor, Inglewood, Chino Hills, Northridge, Whittier Narrows, Landers and Big Bear earthquakes are based on CDMG Office of Strong Motion Studies published accelerogram data for CSMIP Station No. 14242, located approximately 0.4 kilometer southeast of the subject site. For the Hector Mine earthquake, the maximum site acceleration is based on the published accelerogram data for CGS CSMIP Station No. 14560, located approximately 7.7 kilometers south of the subject site. Site accelerations for all other listed are estimated based on the results of a computerized database search using a program developed by T.F. Blake (Eqsearch V3.0, 2000). For purposes of the computerized site acceleration estimates, the attenuation relationship developed by Bozorgnia, Campbell and Niazi (1999) for Holocene soil sites was considered appropriate.

[2] Based on Wald, D.J. et. al., 1999.

Active Fault Zonation

No portion of the subject site is located within the boundaries of an Earthquake Fault Zone as defined by the State of California in the Alquist-Priolo Earthquake Fault Zoning Act (Hart and Bryant, 1997). The site is; however, located approximately ½ of a mile to the north-northeast of the earthquake fault zone that has been established around the known active traces of the Newport-Inglewood fault.

On the basis of our review of the current revision of the Seismic Safety Element of the City of Long Beach General Plan, the subject site is not located within a City-designated "Caution Zone" wherein additional subsurface investigation would be required to determine the presence and level of activity of suspected active branches of the Newport-Inglewood fault (City of Long Beach, 1988).

Secondary Seismic Hazards – Ground Failure

Secondary effects of seismic activity that are typically considered as possible hazards to a particular site include several types of ground failure. The general types of ground failure that can occur at a particular site as a consequence of severe ground shaking include landsliding, ground subsidence, ground lurching, shallow ground rupture, lateral spreading, liquefaction, and soil strength loss. The probability of occurrence of each type of ground failure depends on the severity of the earthquake, distance from the causative fault, topography, soil and groundwater conditions, in addition to other factors.

Of the seismically induced ground failure modes listed above, liquefaction and liquefaction-related surface phenomena appear to be the primary concerns with respect to the subject site. Based on our review of the published Seismic Hazard Zone Report for the U.S.G.S. Long Beach 7.5-minute quadrangle (CDMG, 1998), the subject site lies within a designated Liquefaction Hazard Zone (see Figure 5). Given the essentially flat topography that characterizes the northern portion of the city of Long Beach, the site has not been included within a State-designated seismically-induced landslide hazard zone.

Areas of potential liquefaction have also been identified in the Seismic Safety Element of the City of Long Beach General Plan and categorized in terms of general liquefaction susceptibility (i.e., minimal, low, moderate and significant). Review of Plate 7 of the Seismic Safety Element indicates that the subject site is located within a City-designated area of "Minimal" liquefaction potential (City of Long Beach Department of Planning and Building, 1988).

Site-Specific Liquefaction Analysis

Liquefaction occurs when dynamic loading of a saturated sand or silt causes pore-water pressures to increase to levels where grain-to-grain contact is lost and material temporarily behaves as a viscous fluid. Liquefaction can cause settlement of the ground surface, settlement and tilting of engineered structures, flotation of buoyant buried structures and fissuring of the ground surface. A common surface manifestation of liquefaction is the formation of sand boils, short-lived fountains of soil and water that emerge from fissures or vents and leave freshly deposited conical mounds of sand or silt on the ground surface.

Assessment of liquefaction potential for a particular site requires knowledge of a number of regional as well as site-specific parameters including the estimated design earthquake magnitude, the distance to the assumed causative fault and the associated probable peak horizontal ground acceleration at the site, subsurface stratigraphy and soil characteristics. Parameters such as distance to causative faults and estimated probable peak horizontal ground acceleration were determined using published references and by utilizing online computer programs by the U.S. Geological Survey (USGS). Stratigraphy and soil characteristics were determined by means of a site-specific subsurface investigation combined with appropriate laboratory analysis of representative samples of onsite soils. The site-specific ground motion analysis is attached in Appendix C of this report.

As noted previously herein, groundwater did not encounter at the time of our field investigation in the area of proposed construction to a maximum depth of 41.5 feet below ground surface. Groundwater depths according with published maps which indicate that the historic high groundwater level in the vicinity of the site is less than 40 feet below the ground surface (CDMG, 1998). In accordance with current standards of practice, we have assumed a historical high groundwater level of 30 feet below the surface for purposes of our analysis.

A variety of computer programs are available that were developed specifically for liquefaction and seismic settlement analyses. For purposes of this study, we selected the commercially available software program Cliq Version 1.7.1.14 (Geologismiki, 2012) that implements updated versions of the NCEER procedure as recommended by Dr. Peter Robertson (2010). The procedures were based on the methods originally recommended by Seed and Idriss (1982). Our analysis was performed solely using CPT data due to the fact that the CPT provides *continuous* penetration resistance data as opposed to than borehole data that must be averaged over discrete sampling increments (e.g., 5 or 10 feet).

Surface Manifestation of Liquefaction

Using the methods outlined by Ishihara (1985), and considering the depth of the liquefiable layers identified by the results of our CPT testing and a historic high groundwater depth of 30 feet, the thickness of the non-liquefiable layers above the liquefiable zone appears to be sufficient to prevent surface manifestation of liquefaction (such as sand boils, ground fissures, etc).

Seismically Induced Settlement

Based on the results of our site-specific study, the maximum estimated total dynamic vertical settlement was calculated to vary from approximately ½ inches to 2½ inches across the site. Supporting calculations are provided in Appendix D of this report. It should be noted owing to the existing groundwater table level and the local groundwater usage, it is expected that the actual ground settlement during a major ground shaking to be lower than these maximum predicted values.

The maximum differential settlement is estimated to be on the order of less than 1½ inches over a horizontal span of 40 feet. Predicted values of maximum seismically induced settlement are provided in Table IV, below.

Table IV
CPT-Based Maximum Seismically Induced Settlement

CPT Location	Estimated Settlement, in
CPT-1	¾
CPT-2	½
CPT-3	1¾
CPT-4	2½

Lateral Spreading

Lateral spreading is an additional hazard associated with liquefaction and refers to the movement of liquefied soil in a downslope direction or toward an open face. This site is located in close proximity to a settling basin, the Los Angeles River and a concrete channel. Therefore, it may be plausible to assume lateral spreading to occur at the site, especially, in the settling basin/Los Angeles River direction.

Based on the exploration and sounding data, the site is underlain by potentially liquefiable sands and silty sands that are discontinuous and interlayered between non-liquefiable clay layers. Our analysis indicates that the site, at an approximate elevation that corresponds to Mean Sea Level, is susceptible to as much as 12 inches of lateral spreading most likely in the direction of the adjacent Los Angeles River. Table V below details the results of our analysis.

As shown in Table V, lateral spreading/movement of the site during or immediately after a strong earthquake is estimated to be on the order of 12 inches at shallow depths. It should be noted that the bottom of the adjacent Los Angeles River is at an approximate elevation of 25 feet, MSL with the depth of the adjacent settling basin somewhat below the river bottom. As such, a majority of the lateral spreading zones are significantly (15± feet) deeper the bottom of the river.

Table V
CPT-Based Maximum Predicted Lateral Spreading

CPT Location	Surface Elevation*	Spreading Elevation	Estimated Lateral Spread, in
CPT-1	31	-13 to -14	3
		-18 to -19	1½
CPT-2	38	-3 to -6	8½
CPT-3	38	8 to 6	12
		2 to 1	5
		-3 to -5	8
CPT-4	33	2 to -1	7
		-2 to - 7	12

* Note: The Bottom of Adjacent Los Angeles River is at Approximate Elevation of 25 Feet, MSL

It should be noted owing to the existing groundwater table level and the local groundwater usage, it is expected that the actual lateral spreading during a major ground shaking to be lower than these maximum predicted values. Further, as stated earlier, Plate 7 of the Seismic Safety Element indicates that the subject site is located within a City-designated area of "Minimal" liquefaction potential. As such, the probability of the lower layers to contribute to the surface lateral spreading during a strong ground shaking is considered very low. Additionally, CGS Special Publication 117A suggests that it is possible to design foundations of sufficient strength to withstand lateral displacements on the order of 0.5 meter (approximately 20 inches) or less. Post-tensioned slab foundations or strengthened conventional foundations are considered to be viable alternatives given the anticipated level of lateral movement at the subject site. Critical utility service connections should also be designed to accommodate the potential lateral movement.

Seismically-Induced Flooding

The types of seismically induced flooding which may be considered as potential hazards to a particular site normally includes flooding due to a tsunami (seismic sea wave), a seiche, or failure of a major reservoir or other water retention structure upstream of the site. Since the site lies 6 miles inland from the Pacific Ocean at an average elevation of approximately 35 feet above sea level, and since it does not lie in close proximity to an enclosed body of water, the probability of flooding from a tsunami or seiche is considered to be very low. In addition, the site is not located within a designated tsunami inundation area as identified on the published Tsunami Inundation Map for the Long Beach Quadrangle (CEMA, 2009).

Four major flood control dams lie between 11 and 30 miles upstream of the city of Long Beach. These include the Sepulveda Basin, Hansen Basin, Whittier Narrows Basin and Santa Fe Basin flood control facilities. In the event that a seismically-induced failure of either the Sepulveda or Hansen facilities were to occur when these facilities were filled to capacity, most if not all of the resulting flood waters would be expected to dissipate prior to reaching the Long Beach city limits. However, flood inundation maps prepared by the Army Corps of Engineers indicate that a failure of the Hansen Dam could cause extensive shallow flooding in the northern and western portions of Long Beach (City of Long Beach, 1988). In addition, failure of the Whittier Narrows Dam, when filled to capacity, could cause flooding along the easterly and westerly perimeter areas of the city of Long Beach.

The potential for seismically-induced flooding within the boundaries of the city of Long Beach is addressed in Section 6.7 of the Seismic Safety Element of the City's General Plan. That section includes a low-resolution map showing the limits of anticipated maximum flood inundation based on an assumed breach of the afore-mentioned major upstream flood control facilities. Based on our review of that map, no portion of the subject property is located within any of the established seismically-induced flood inundation limits.

Flooding Not Related to Seismicity

As part of this investigation, we conducted an independent review of the applicable FEMA flood insurance rate map for the area of the subject site (Map No. 06037C1955F, effective September 26, 2008). This map indicates that the site of the proposed construction is located within an area that is designated as "Zone X." This designation corresponds to an area that is located within the 0.2 percent annual chance floodplain, an area with a 1 percent annual chance flood with an average depth of less than 1 foot or with a drainage area of less than 1 square mile, and areas protected by levees from the 1 percent annual chance flood.

Strong Ground Motion

The site is located in a seismically active area of southern California and will likely be subjected to strong seismically-related ground shaking during the anticipated life span of the project. Structures within the site should therefore be designed and constructed to resist the effects of strong ground motion in accordance with the most current edition of the California Building Code (CBC).

CONCLUSIONS AND RECOMMENDATIONS

General Feasibility

From a soils engineering and engineering geologic point of view, the subject property is considered suitable for the proposed development provided the following recommendations are incorporated into the design criteria and project specifications. In addition, the proposed grading and construction are not expected to affect the stability of adjoining properties in an adverse manner provided grading and construction are performed in accordance with current standards of practice, all applicable grading ordinances, and the recommendations presented in this report.

Grading Plan Review

This report has been prepared without the aid of a finalized grading plan, a foundation plan, or detailed specifications pertaining to the proposed grading and construction. In the absence of these documents, the proposed construction concept has been assumed based on the preliminary grading plan that was provided to our firm for purposes of this investigation. **As such, the recommendations provided in this report should be considered tentative until a finalized precise grading plan and foundation plan are available and reviewed by our firm.** Additional recommendations and/or modification of the recommendations provided herein might be necessary depending upon the results of our precise grading and foundation plan review.

Primary Geotechnical Considerations

There are several geotechnical conditions inherent to the property that may adversely impact the gross stability of the building sites if not mitigated as part of site grading and building design. These adverse conditions are discussed in the following paragraphs.

Compressible Near-Surface Soils

Our laboratory program included selective testing of representative samples of onsite fill and native soils for in-place dry density and compressibility. The results of these tests indicate that near-surface soils are subject to variable degrees of compressibility under saturated conditions. Due to the inherent nature of pressure distribution through particulate media (e.g., soils), the compressibility of the near-surface soil layers is expected to contribute significantly to the overall foundation settlement. Therefore, in order to reduce the potential for building distress as a result of excessive differential settlement, it is recommended that the existing fill and near-surface alluvial soils in all proposed structural areas be overexcavated and replaced as property compacted fill in order to provide a more uniform bearing condition. Recommendations for remedial grading are provided in the "Earthwork and Grading" section of this report.

Seismically-Induced Settlement and Related Surface Effects

The presence of granular soil layers, together with a shallow historic high groundwater level and nearby fault systems, which are considered capable of causing strong ground motion, render the site susceptible to liquefaction and dynamic settlement. However, given the fact that maximum estimated dynamic angular distortion ratio (approximately 1:240) is within commonly accepted construction tolerances for contemporary residential foundation systems, it is the opinion of our firm that the potential detrimental effects of liquefaction-induced differential settlement can be reduced to a less than significant level for engineering purposes through the use of properly designed and constructed, post-tensioned or strengthened conventional concrete foundation systems for the proposed dwelling structures.

Foundations for residential structures may lose a portion of the available bearing capacity during a strong seismic event that results in surface manifestation of liquefaction; however, it is the opinion of this firm that the detrimental effects of potential bearing failure can also be reduced to a less than significant level through proper remedial grading combined with the use of a properly designed post-tensioned or strengthened conventional concrete foundation system. Specific recommendations for site grading and building foundation design should be provided in the comprehensive design-phase geotechnical report.

Boundary Conditions

Maximum remedial removal depths within the subject site are anticipated to be approximately 4 feet below the existing ground surface. Based on the relatively non-cohesive nature of on-site soils, temporary backcut slopes adjacent to these boundaries will generally be restricted to a slope ratio of 1:1 (horizontal to vertical) or flatter. If encroachment into these adjacent properties is not possible during grading, a relatively narrow wedge of compressible soil will be left in place along the tract perimeter that will extend into the site to a horizontal distance equal to the vertical depth of the required remedial removals. If unsuitable soils are left in place, some degree of distress may result to the proposed improvements if they are constructed within the zone of influence of these unsuitable soils (generally regarded as a 1:1 projection upward from the bottom of the temporary backcut slope). In areas where existing offsite structures are to be protected in place, temporary backcut slopes should start at a minimum distance of 2 feet from the edge of existing footings.

If unsuitable soils are left in place, some degree of distress may result to improvements proposed along the boundaries that will be located within the zone of influence of these soils. Considering the location of the proposed dwelling structures as shown on the conceptual site plan, the foundations of these structures are anticipated to be located beyond the zone of influence of unsuitable soils that will be left in-place. However, the foundations for masonry block walls that may be proposed along the property boundaries may be underlain by unsuitable soils left in place along the property boundaries. Specific recommendations for these conditions are provided in the subsequent sections of this report.

Strong Ground Motion

The subject site is located in a seismically active area of southern California. The type and magnitude of seismic hazards that may affect the site are dependent on both the distance to causative faults and the intensity and duration of the seismic event. Although the probability of primary surface rupture is considered low, ground shaking hazards posed by earthquakes occurring along regional active faults do exist and should be taken into account in the design and construction of the proposed facilities within the subject site.

Subsurface Obstructions

Buried pipelines associated with present and previous utility services may exist within the areas of proposed grading and construction. In addition, other unknown subsurface structures may be encountered during grading. All surface and buried structures encountered during grading within the limits of proposed grading and construction should be removed in their entirety, and the resulting cavities backfilled as described in the "Earthwork and Grading" section of this report.

Earthwork and Grading

General Specifications

All earthwork should be performed in accordance with current industry standards of practice in the area, with all applicable requirements of the City of Long Beach municipal code, as well as with current standards of practice in the industry and the recommendations provided in this report.

Site Clearing

All structural materials associated with the existing buildings and appurtenant exterior improvements (including the existing swimming pool, hardscape features and buried utilities) should be demolished and removed from the site. Clearing operations should also include the removal of all landscape vegetation. Trees and large shrubs, when removed, should be grubbed out to include their stumps and major root systems. During site grading, laborers should be provided to clear from fill soils any roots, tree branches, and other deleterious materials missed during initial clearing and grubbing operations.

Although none were encountered within the site during the subsurface investigation by our firm, any seepage pits, cisterns, leach lines or similar structures that may exist within the areas of proposed grading and construction should be cleaned out, backfilled with concrete slurry, gravel or clean sand that is jetted into place, and then capped with filter fabric and a minimum of 5 feet of compacted onsite soils. Any concrete septic tanks or leach lines should likewise be excavated and removed from the site.

Our firm should be notified at the appropriate times to observe general clearing operations. Should any unusual soil conditions or buried structures be encountered during demolition operations or grading that are not described or anticipated herein, these conditions should be brought to the immediate attention of our firm for corrective recommendations.

Water Well Abandonment

As described previously in this report, an active water well is located within the central portion of the project site. As part of clearing operations, this well should be located and abandoned in accordance with the requirements of the local oversight agencies including the City of Long Beach Department of Health and Human Services and the Los Angeles County Department of Public Health (as applicable).

Contaminant-Affected Soils

If hydrocarbon-affected soils or soils affected by other potentially hazardous materials are encountered during grading, it is recommended that the earthwork within this area be terminated pending further evaluation by the project environmental consultant.

Processing of Existing Ground

Our subsurface investigation revealed that near-surface soils within the areas of proposed construction exhibit relatively low in-place densities and contain locally abundant organic material (i.e., roots) associated with the existing turf and other landscape vegetation. These soils are subject to compression under the proposed loadings and, if unmitigated, may result in adverse differential settlement beneath the proposed residences and exterior hardscape features. In addition, it is expected that the near-surface soils will be considerably disturbed during removal of existing site improvements and landscaping. Therefore, in order to create a uniform compacted fill mat across the site and reduce the potential for settlement-related distress to the proposed building foundations and exterior improvements, it is recommended that the surficial soil materials be over-excavated and replaced as properly compacted fill.

Based on field observations and laboratory test results, removal depths on the order of 4 feet below existing grades, or 2 feet below the bottoms of proposed structural footings, **whichever is deeper,** should generally be anticipated. In order to provide adequate support for perimeter improvements such as hardscape, sidewalks and paved streets, the limits of overexcavation and recompaction should essentially extend from tract boundary to tract boundary (exclusive of park areas where no rigid, settlement-sensitive improvements are proposed); however, consideration should be given to the protection of adjacent offsite improvements such as existing walls to be protected in place, sidewalks and active underground utilities. Remedial grading and ground preparation should be performed prior to placing any new fills.

It must be emphasized that the anticipated depths of remedial grading provided in the above paragraph are estimates only and are based on conditions observed at the boring locations. Subsurface conditions can and usually do vary between points of exploration. For this reason, the actual removal depths will have to be determined on the basis of in-grading observations and testing performed by a representative of the project geotechnical consultant.

Excavation Characteristics

Based on the results of our subsurface investigation, the existing fill and native materials within the site are expected to be readily excavatable using conventional earthmoving equipment; however, as indicated on the exploration logs, soils exhibiting relatively high moisture contents and relatively low in-place densities were encountered at depths as shallow as 6.5 feet below existing grades during our subsurface investigation. Therefore, since remedial excavations extending to a depth of approximately 4 feet below existing grades will be required, excavation and soil compaction may become difficult using conventional rubber-tired earthmoving equipment. Under these conditions, track-mounted equipment may be required.

Stability of Temporary Excavation Sidewalls

During remedial grading of the site, temporary excavations with sidewalls varying up to approximately 4 feet in height are expected to be created. Based on the non-cohesive nature of near-surface soils within the site, temporary backcut slopes adjacent to the property boundaries will generally be restricted to a slope ratio of 1:1 or flatter. In areas where existing offsite structures are to be protected in place, temporary backcut slopes should be maintained at a minimum distance of 2 feet from the edge of existing footings.

Temporary excavation sidewalls that are cut to the above configurations are expected to remain sufficiently stable during grading; however, all temporary excavations should be observed by a representative of the project geotechnical consultant for any evidence of potential instability. Depending upon the results of these observations, revised temporary slope configurations may become necessary. Other factors that should be considered with respect to the stability of temporary excavation sidewalls include construction traffic and storage of materials on or near the tops of the slopes, construction scheduling, and weather conditions at the time of construction. All applicable requirements of the California Construction and General Industry Safety Orders, the Occupational Safety and Health Act of 1970, and the Construction Safety Act should also be followed. No temporary excavations along the property lines should be left open without proper protections to mitigate safety hazards. **The grading contractor is solely responsible for ensuring the safety of construction personnel and the general public.**

Mitigation of Boundary Conditions

Where the horizontal limits of remedial grading are constrained by existing offsite improvements, it is likely that a narrow wedge of compressible soil material will be left in place along the perimeter tract boundaries that will extend into the site to a horizontal distance equal to the vertical depth of remedial grading. If unsuitable soils are left in place, some degree of distress may result to the proposed perimeter improvements if they are constructed within the zone of influence of these soils (generally regarded as a 1:1 projection from the outside bottom edge of these soils up to the surface). Taking into account the anticipated depth of remedial grading, the zone of influence if these materials may be on the order of 7 feet wide as measured inward from the site perimeter.

To facilitate removals and protect offsite improvements along the tract boundary, slot-cutting techniques may be used by the grading contractor. Alternatively, or in conjunction with slot cutting, deepened foundations or shallow caissons could be used to transfer the foundation load of the proposed structures or walls below the projected influence zone of the unsuitable soil that is left in place.

In areas where foundations for proposed tract perimeter walls will be underlain entirely by compacted fill soils but the lateral extent of remedial grading is limited due to perimeter constraints, reduced allowable bearing pressure and passive pressure may be utilized to provide adequate foundation support without the use of deepened foundations. The actual width of the zone of influence of unsuitable soil to be left in place depends on the required depth of removals during rough grading and should be evaluated on a lot-by-lot basis. Based on this evaluation, the appropriate mitigative measures for improvements within the zone of influence should be provided after completion of rough grading and during the geotechnical review of the precise grading plans.

Fill Placement

Following removal of unsuitable surficial materials, exposed bottom surfaces in areas approved for placement of fill should be first scarified to a depth of 6 inches, watered or air dried as necessary to achieve optimum moisture conditions, and compacted to a minimum relative compaction of 90 percent. All fills should be placed in 6- to 8-inch-thick maximum lifts, watered or air dried as necessary to achieve slightly above-optimum (but preferable no more than 2 percent over optimum) moisture conditions, and then compacted to a minimum relative compaction of 90 percent. The laboratory maximum dry density and optimum moisture content for each change in soil type should be determined in accordance with ASTM Test Method D 1557.

Fill Slope Construction and Stability

As previously mentioned, low-height fill slopes may be constructed within the tract to accommodate elevation changes between individual lots, or between specific lots and the adjacent access streets and neighboring residential properties. If planned, slope inclinations should be maintained at 2:1 (horizontal to vertical) or flatter. The finish surfaces of the fill slopes should be compacted to a minimum relative compaction of 90 percent. To achieve this, we recommend that the slopes be overfilled and backrolled during construction and then trimmed back to the compacted inner core. This procedure is typically provides uniformly compacted slope surfaces. Properly maintained fill slopes constructed in accordance with the recommendations presented above are expected to be both grossly and surficially stable and are expected to remain so under normal climatic conditions.

Imported Soils

If imported soils are required to complete the planned grading, these soils should consist of clean materials devoid of rock exceeding a maximum dimension of 12 inches, as well as organics, trash and similar deleterious materials. Imported soils should also exhibit an expansion index no greater than 21. Prospective import soils should be observed, tested and approved by the geotechnical consultant **prior to importing the soils to the site.** It is recommended that the project environmental consultant should also be notified so that they can confirm the suitability of the proposed import material from an environmental standpoint.

Geotechnical Observations and Testing During Grading

A representative of our firm should observe exposed bottom surfaces in each remedial removal area **prior to placing fill** in order to document adequate bearing conditions. In addition, a representative of our firm should be present onsite during grading operations to observe proper placement and adequate compaction of all fills, as well as to document compliance with the other recommendations presented herein.

Volumetric Changes - Bulking, Shrinkage and Subsidence

Volumetric changes in earth quantities will occur when onsite soils are excavated and replaced as properly compacted fill. Based on in-place densities of earth materials encountered during our investigation, a shrinkage factor on the order of 6 to 10 percent may be anticipated. The actual shrinkage that will occur during grading will depend on the average degree of relative compaction achieved. A maximum subsidence of approximately 0.15 feet may be anticipated as a result of the scarification and recompaction of the exposed bottom surfaces within the removal areas.

The above estimates of shrinkage and subsidence are intended for use by project planners in estimating earthwork quantities and should not be considered absolute values. Contingencies should be made for balancing earthwork quantities based on actual shrinkage and subsidence that will occur during grading.

Post-Grading Considerations

Utility Trenches

All utility trench backfill should be compacted to a minimum relative compaction of 90 percent. Onsite earth materials cannot be densified adequately by flooding and jetting techniques. Therefore, trench backfill materials should be placed in lifts no greater than approximately 12 inches in thickness, watered or air-dried as necessary to achieve near optimum moisture conditions, and then mechanically compacted in place to a minimum relative compaction of 90 percent. A representative of the project geotechnical consultant should probe and test the backfills to verify adequate compaction.

As an alternative for shallow trenches where pipe or utility lines may be damaged by mechanical compaction equipment, such as under building floor slabs, imported clean sand having a sand equivalent (SE) value of 30 or greater may be utilized. The sand backfill materials should be watered to achieve near optimum moisture conditions and then tamped into place. No specific relative compaction will be required; however, observation, probing, and if deemed necessary, testing should be performed by a representative of the project geotechnical consultant to document that an adequate degree of compaction has been achieved.

If clean, imported sand is to be used for backfill of exterior utility trenches, it is recommended that the upper 12 inches of trench backfill materials consist of properly compacted onsite soil materials. This is to mitigate infiltration of irrigation and rainwater into granular trench backfill materials.

Where an exterior and/or interior utility trench is proposed in a direction parallel to a building footing, the bottom of the trench should not extend below a 1:1 (horizontal to vertical) plane projected downward from the bottom edge of the adjacent footing. Where this condition occurs, the adjacent footing should be deepened or the utility constructed and the trench backfilled and compacted prior to footing construction. Where utility trenches cross under a building footing, these trenches should be backfilled with on-site soils at the point where the trench crosses under the footing to reduce the potential for water to migrate under the floor slabs.

Precise Grading and Site Drainage

It is likely that surface drainage systems consisting of sloping concrete flatwork and graded earth swales will be constructed on the subject site to collect and direct all surface water to the adjacent streets. In addition, the ground surface around the proposed buildings should be sloped to provide a positive drainage gradient away from the structures. The purpose of the drainage systems is to prevent ponding of surface water within the level areas of the site and against building foundations and associated site improvements. It is recommended that the following recommendations be implemented during construction:

1. Area drains should be extended into all planters and landscape areas that are located within 10 feet of building foundations, retaining walls, and masonry block walls to mitigate excessive infiltration of water into the foundation soils.
2. Section 1804.3 of the 2013 California Building Code requires that "the ground immediately adjacent to the foundation shall be sloped away from the building at a slope of not less than one unit vertical in 20 units horizontal (5 percent slope) for a minimum distance of 10 feet (3048 mm) measured perpendicular to the face of the wall." Further, "swales used for this purpose shall be sloped a minimum of 2 percent where located within 10 feet (3048 mm) of the building foundation." These provisions fall under the purview of the design civil engineer. However, exceptions to allow modifications to these criteria are provided within the same section of the code as "Where climatic or soil conditions warrant, the slope of the ground away from the building foundations is permitted to be reduced to not less than one unit in 48 units horizontal (a 2 percent slope)." This exemption provision appears to fall under the purview of the Geotechnical Engineer-of-Record.

3. It is our understanding that the state-of-the-practice for projects in various cities and unincorporated areas of Los Angeles County, as well as throughout Southern California, has been to construct earthen slopes at 2 percent gradient away from the foundations and at 1 percent minimum for earthen swale gradients. Structures constructed and properly maintained under those criteria have performed satisfactorily. Therefore, considering the semi-arid climate, site soil conditions and an appropriate irrigation regime, **Petra** considers that the implementation of 2 percent slopes away from the structures and 1 percent swales to be suitable for the subject lots.

4. It should be emphasized that the all surface drainage controls must be properly maintained and unobstructed, and that future improvements not alter established gradients unless replaced with suitable alternative drainage systems. Further, where the flowline of any swale exists within five feet of a building structure, the adjacent footings shall be deepened appropriately to maintain minimum embedment requirements as measured from the flowline elevation of the swale.

5. Concrete flatwork surfaces located within 10 feet of building foundations should be inclined at a minimum gradient of 2 percent away from building foundation and similar structures. Concrete flatwork surfaces located more than 10 feet from building foundations may be inclined at a minimum gradient of 1 percent away from building foundation and similar structures. Neither rain nor excess irrigation water should be allowed to collect or pond against building foundations.

6. For the landscape areas, a watering program should be implemented that maintains a uniform, near optimum moisture condition in the soils. Overwatering and subsequent saturation of the soils will cause excessive soil expansion and heave and, therefore, should be avoided. However, allowing the soils to dry out will cause excessive soil shrinkage. As an alternative to a conventional irrigation system, drip irrigation systems are strongly recommended for all planter areas.

7. Although no grading plan is currently available for review, it is assumed that the proposed finished grade elevations around the site perimeter will closely match existing offsite grades. No slopes of significant height are currently anticipated. This, combined with the fact that onsite soils are somewhat cohesive in nature, would preclude substantial soil erosion or loss of topsoil within the developed site. There is the potential for localized erosion during grading operations; however, it is expected that this will be mitigated through the implementation of a Storm Water Pollution Prevention Plan (SWPPP) for the site as required by the oversight agencies.

Ground Acceleration and Seismic Design

Earthquake loads on earthen structures and buildings are a function of ground acceleration which may be determined from the site-specific acceleration response spectrum. To provide the design team with the parameters necessary to construct the site-specific acceleration response spectrum for this project, we used two computer applications that are available on the United States Geological Survey (USGS) website, http://geohazards.usgs.gov/.

Specifically, the Design Maps website http://geohazards.usgs.gov/designmaps/us/application.php was used to calculate the ground motion parameters. And, the 2008 PSHA Interactive Deaggregation website http://geohazards.usgs.gov/deaggint/2008/ was used to determine the appropriate earthquake magnitude.

To run the above computer applications, site latitude, longitude, risk category and knowledge of "Site Class" are required. The site class definition depends on the average shear wave velocity, Vs_{30}, within the upper 30 meters (approximately 100 feet) of site soils. A shear wave velocity of 285 meters per second for the upper 100 feet was used for the site based on engineering experience and judgment and the CPT data.

The following table, Table VI, provides parameters required to construct the site-specific acceleration response spectrum based 2013 CBC guidelines. A summary of Code approach and a printout of the computer output are attached in Appendix E.

Table VI
Seismic Design Parameters

Ground Motion Parameters	Reference	Parameter Value	Unit
Latitude (North)	-	33.84194	°
Longitude (West)	-	-118.20085	°
Site Class Definition	Table 20.3-1, ASCE 7-10	D	-
Assumed Risk Category	Table 1604.5, CBC 2013	II	-
M_w - Earthquake Magnitude	Section 1803.5.12.2, CBC 2013	6.75	-
S_s - Mapped Spectral Response Acceleration	Figure 1613.3.1(1), CBC 2013	1.654	g
S_1 - Mapped Spectral Response Acceleration	Figure 1613.3.1(2), CBC 2013	0.613	g
F_a - Site Coefficient	Table 1613.3.3(1), CBC 2013	1.0	-
F_v - Site Coefficient	Table 1613.3.3(2), CBC 2013	1.5	-
S_{MS} - Adjusted Maximum Considered Earthquake Spectral Response Acceleration	Equation 16-37, CBC 2013	1.654	g
S_{M1} - Adjusted Maximum Considered Earthquake Spectral Response Acceleration	Equation 16-38, CBC 2013	0.920	g
S_{DS} - Design Spectral Response Acceleration	Equation 16-39, CBC 2013	1.103	g
S_{D1} - Design Spectral Response Acceleration	Equation 16-40, CBC 2013	0.613	g
T_o - $(0.2\ S_{D1}/\ S_{DS})$	Section 11.3, ASCE 7-10	0.111	s
T_s - $(S_{D1}/\ S_{DS})$	Section 11.3, ASCE 7-10	0.556	s
T_L - Long Period Transition Period	Figure 22-12, ASCE 7-10	8	s
F_{PGA} - Site Coefficient	Figure 22-7, ASCE 7-10	1.0	-
PGA_M - Peak Ground Acceleration at MCE [1]	Equation 11.8-1, ASCE 7-10	0.627	g
PGA – Design Level – $(0.4\ S_{DS}$ [2])	Equation 11.4-5, ASCE 7-10	0.44	g
C_{RS} - Short Period Risk Coefficient	Figure 22-17, ASCE 7-10	0.966	-
C_{R1} - Long Period Risk Coefficient	Figure 22-18, ASCE 7-10	0.984	-
Seismic Design Category [3]	Section 1613.3.5, CBC 2013	D	-

[1] PGA Calculated at the MCE return period of 2475 years (2 percent chance of exceedance in 50 years).

[2] PGA Calculated at the Design Level of 2/3 of MCE which is approximately equivalent to a return period of 475 years (10 percent chance of exceedance in 50 years).

[3] Seismic Design Category may be calculated by the structural engineer in accordance with the alternate design procedures of Section 1613.3.5.1 based on structural characteristics in addition to the ground motion parameters, this may supersede the category listed herein.

References: USGS Seismic Design Web Application – http://geohazards.usgs.gov/designmaps/us/application.php
USGS 2008 Interactive Deaggregation Tool - https://geohazards.usgs.gov/deaggint/2008/

Allowable Bearing Capacity, Estimated Settlement and Lateral Resistance

Allowable Soil Bearing Capacity

Continuous Footings

An allowable soil bearing capacity of 1,500 pounds per square foot may be utilized for design of continuous footings founded at a minimum depth of 12 inches below the lowest adjacent final grade. This value may be increased by 20 percent for each additional foot of depth and by 10 percent for each additional foot of width, to a maximum value of 2,500 pounds per square foot. The recommended allowable bearing value includes both dead and live loads, and may be increased by one-third for short duration wind and seismic forces.

Pad Footings

An allowable soil bearing capacity of 1,500 pounds per square foot may be utilized for design of isolated 24-inch-square footings founded at a minimum depth of 12 inches below the lowest adjacent final grade. This would apply to pad footings that are not a part of the building slab system and which are intended for support of such features as roof overhangs, second-story decks, patio covers, etc. This value may be increased by 20 percent for each additional foot of depth and by 10 percent for each additional foot of width, to a maximum value of 2,500 pounds per square foot. The recommended allowable bearing value includes both dead and live loads, and may be increased by one-third for short duration wind and seismic forces.

Footing Settlement Estimates

Based on the allowable bearing values provided above, total static settlement of the footings under the anticipated loads is expected to be on the order of 1 inch. Static differential settlement is expected to be less than ¾ of an inch over a horizontal span of 40 feet. The majority of settlement is likely to take place as footing loads are applied or shortly thereafter.

It should be noted that the settlement estimates provided above do not take into consideration the settlement that may occur as a result of seismically-induced liquefaction. As was stated previously in this report, the results of our site-specific study indicate that the maximum estimated total dynamic vertical settlement for the site is approximately 2½ inches. The maximum dynamic differential settlement between exploratory points was estimated to be approximately 1½ inches over a horizontal span of approximately 40 feet, with a corresponding equivalent angular distortion ratio of less than 1:240. The project architect and/or structural engineer should determine whether these seismically-induced settlement values should be considered as additive to the static settlement estimates provided in the previous paragraph.

Lateral Resistance

A passive earth pressure of 150 pounds per square foot per foot of depth, to a maximum value of 1,500 pounds per square foot, may be used to determine lateral bearing resistance for footings. In addition, a coefficient of friction of 0.25 times the dead load forces may be used between concrete and the supporting soils to determine lateral sliding resistance. The above values may be increased by one-third when designing for transient wind or seismic forces. It should be noted that the above values are based on the condition where footings are cast in direct contact with compacted fill or competent native soils. In cases where the footing sides are formed, all backfill placed against the footings upon removal of forms should be compacted to at least 90 percent of the applicable maximum dry density.

Footing and Slab-on-Grade Design and Construction Considerations

Given the granular nature of near-surface soils within the site, it is likely that these materials exhibit expansion potentials that are within the Very Low range (Expansion Index from 0 to 20). As such, the design of slabs-on-grade is considered to be exempt from the procedures outlined in Sections 1803.5.3 and 1808.6.2 of the 2013 CBC and may be performed using any method deemed rational and appropriate by the project structural engineer. However, given the potential for earthquake-induced liquefaction and associated settlement at the site, the following minimum guidelines are presented for design and construction of footings and slabs on-grade the project site.

The design and construction recommendations that follow are based on the above soil conditions and may be considered for reducing the effects of variability in composition and behavior within the site soils and long-term differential settlement. These recommendations have been developed on the basis of the previous experience of this firm on projects with similar soil conditions. Although construction performed in accordance with these recommendations has been found to reduce post-construction movement and/or distress, they generally do not positively eliminate all potential effects of variability in soils characteristics and future settlement.

It should also be noted that the recommendations for reinforcement provided herein are performance-based and intended only as guidelines to achieve adequate performance under the anticipated soil conditions. The project structural engineer, architect and/or civil engineer should make appropriate adjustments to reinforcement type, size and spacing to account for internal concrete forces (e.g., thermal, shrinkage and expansion) as well as external forces (e.g., applied loads) as deemed necessary. Consideration should also be given to minimum design criteria as dictated by local building code requirements.

Strengthened Conventional Slabs-on-Grade System

Given the potential for liquefaction-induced total and differential settlement within the site, we recommend that footings and floor slabs be designed and constructed in accordance with the following minimum criteria.

Footings

1. Exterior continuous footings supporting one- and two-story structures should be founded at a minimum depth of 18 inches below the lowest adjacent final grade. Interior continuous footings may be founded at a minimum depth of 12 inches below the tops of the adjacent finish floor slabs.

2. All continuous footings should have minimum widths of 12 and 15 inches for one-story and two-story construction, respectively. All continuous footings should be reinforced with a minimum of four No. 4 bars, two top and two bottom.

3. A minimum 12-inch-wide grade beam founded at the same depth as adjacent footings should be provided across garage entrances or similar openings (such as large doors or bay windows). The grade beam should be reinforced in a similar manner as provided above.

4. Interior isolated pad footings, if required, should be a minimum of 24 inches square and founded at a minimum depth of 12 inches below the bottoms of the adjacent floor slabs. Pad footings should be reinforced with a minimum of No. 4 bars spaced a maximum of 18 inches on centers, both ways, placed near the bottoms of the footings.

5. Exterior isolated pad footings intended for support of roof overhangs such as second-story decks, patio covers and similar construction should be a minimum of 24 inches square, and founded at a minimum depth of 18 inches below the lowest adjacent final grade. The pad footings should be reinforced with No. 4 bars spaced a maximum of 18 inches on centers, both ways, placed near the bottoms of the footings. Exterior isolated pad footings may need to connect to adjacent pad and/or continuous footings via tie beams at the discretion of the project structural engineer.

6. The spacing and layout of the interior concrete grade beam system required below floor slabs should be determined by the project architect or structural engineer in accordance with the WRI publication using the effective plasticity index value provided previously.

7. The minimum footing dimensions and reinforcement recommended herein may be modified (increased or decreased subject to the constraints of Chapter 18 of the 2013 CBC) by the structural engineer responsible for foundation design based on his/her calculations and engineering experience and judgment.

Building Floor Slabs

1. Concrete floor slabs should be a minimum 4 inches thick and reinforced with a minimum No. 3 bars spaced a maximum of 18 inches on centers, both ways. All slab reinforcement should be continued and bent into the footings and supported on concrete chairs or brick to ensure the desired placement near mid-depth.

2. Living area concrete floor slabs should be underlain with a moisture vapor retarder consisting of a minimum 10-mil-thick polyethylene or polyolefin membrane that meets the minimum requirements of ASTM E96 and ASTM E1745 for vapor retarders (such as Husky Yellow Guard®, Stego® Wrap, or equivalent). All laps within the membrane should be sealed, and at least 2 inches of clean sand should be placed over the membrane to promote uniform curing of the concrete. To reduce the potential for punctures, the membrane should be placed on a pad surface that has been graded smooth without any sharp protrusions. If a smooth surface cannot be achieved by grading, consideration should be given to lowering the pad finished grade an additional inch and then placing a 1-inch-thick leveling course of sand across the pad surface prior to the placement of the membrane.

   At the present time, some slab designers, geotechnical professionals and concrete experts view the sand layer below the slab (blotting sand) as a place for entrapment of excess moisture that could adversely impact moisture-sensitive floor coverings. As a preventive measure, the potential for moisture intrusion into the concrete slab could be reduced if the concrete is placed directly on the vapor retarder. However, if this sand layer is omitted, appropriate curing methods must be implemented to ensure that the concrete slab cures uniformly. A qualified materials engineer with experience in slab design and construction should provide recommendations for alternative methods of curing and supervise the construction process to ensure uniform slab curing. Additional steps would also need to be taken to prevent puncturing of the vapor retarder during concrete placement.

3. Garage floor slabs should be a minimum 4 inches thick and reinforced in a similar manner as living area floor slabs. Garage slabs should also be poured separately from adjacent wall footings with a positive separation maintained using ¾-inch-minimum felt expansion joint materials. To control the propagation of shrinkage cracks, garage floor slabs should be quartered with weakened plane joints.

4. Prior to placing concrete, the subgrade soils below living area floor slabs should be prewatered to achieve a moisture content that is at least 1.3 times the optimum moisture content. This moisture should penetrate to a depth of approximately 18 inches into the subgrade.

5. The minimum dimensions and reinforcement recommended herein for building floor slabs may be modified (increased or decreased subject to the constraints of Chapter 18 of the 2013 CBC) by the structural engineer responsible for foundation design based on his/her calculations, engineering experience and judgment.

Post-Tensioned Slab-on-Grade System

Given the very low expansion potential exhibited by onsite soils, any rational and appropriate procedure may be chosen by the project structural engineer for the design of post-tensioned slabs-on-grade; however, consideration should be given to the potential for earthquake-induced soil liquefaction and associated total and differential settlement. Should the design engineer choose to follow the most current procedure published by the Post-Tensioning Institute (PTI), the minimum design criteria are provided in Table VII.

Table VII
Post-Tensioned Slab-on-Grade Design Parameters for PTI Procedure
Very Low Expansion Potential

Soil Information	
Approximate Depth of Constant Suction, feet	9
Approximate Soil Suction, pF	3.9
Inferred Thornthwaite Index:	-20
Average Edge Moisture Variation Distance, e_m in feet: Center Lift Edge Lift	 9.0 4.7
Anticipated Swell, y_m in inches: Center Lift Edge Lift	 0.20 0.40

Modulus of Subgrade Reaction

The modulus of subgrade reaction for design of load bearing partitions may be assumed to be 125 pounds per cubic inch.

Minimum Design Recommendations

The soil values provided above may be utilized by the project structural engineer to design post-tensioned slabs-on-ground in accordance with Section 1808.6.2 of the 2013 CBC and the PTI publication. Thicker floor slabs and larger footing sizes may be required for structural reasons and should govern the design if more restrictive than the minimum recommendations provided below:

1. Perimeter footings for both one-story and two-story structures should be founded at a minimum depth of 15 inches below the lowest adjacent finished ground surface. Interior footings may be founded at a minimum depth of 12 inches below the tops of the finish floor slabs. All continuous footings should be reinforced with a minimum of four No. 4 bars, two top and two bottom. Alternatively, post-tensioned tendons may be utilized in perimeter continuous footings in lieu of the reinforcement bars.

2. A 12-inch-wide grade beam founded at the same depth as adjacent footings should be provided across the garage entrances or similar openings (such as large doors or bay windows). The grade beam should be reinforced in a similar manner as provide above.

3. Exterior isolated pad footings intended for support of roof overhangs such as second-story decks, patio covers and similar construction should be a minimum of 24 inches square, and founded at a minimum depth of 18 inches below the lowest adjacent final grade. The pad footings should be reinforced with No. 4 bars spaced a maximum of 18 inches on centers, both ways, placed near the bottoms of the footings. Exterior isolated pad footings may need to connect to adjacent pad and/or continuous footings via tie beams at the discretion of the project structural engineer.

4. The thickness of the floor slabs should be determined by the project structural engineer with consideration given to the expansion potential of the on-site soils; however, we recommend that a minimum slab thickness of 4 inches to be considered.

5. As an alternative to designing 4-inch-thick post-tensioned slabs with perimeter footings as described in Items 1 and 2 above, the structural engineer may design the foundation system using a thickened slab design. The minimum thickness of this uniformly thick slab should be 10 inches. The engineer in charge of post-tensioned slab design may also opt to use any combination of slab thickness and footing embedment depth as deemed appropriate based on their engineering experience and judgment.

6. Living area concrete floor slabs should be underlain with a moisture vapor retarder consisting of a minimum 10-mil-thick polyethylene or polyolefin membrane that meets the minimum requirements of ASTM E96 and ASTM E1745 for vapor retarders (such as Husky Yellow Guard®, Stego® Wrap, or equivalent). All laps within the membrane should be sealed, and at least 2 inches of clean sand should be placed over the membrane to promote uniform curing of the concrete. To reduce the potential for punctures, the membrane should be placed on a pad surface that has been graded smooth without any sharp protrusions. If a smooth surface cannot be achieved by grading, consideration should be given to lowering the pad finished grade an additional inch and then placing a 1-inch-thick leveling course of sand across the pad surface prior to the placement of the membrane.

   At the present time, some slab designers, geotechnical professionals and concrete experts view the sand layer below the slab (blotting sand) as a place for entrapment of excess moisture that could adversely impact moisture-sensitive floor coverings. As a preventive measure, the potential for moisture intrusion into the concrete slab could be reduced if the concrete is placed directly on the vapor retarder. However, if this sand layer is omitted, appropriate curing methods must be implemented to ensure that the concrete slab cures uniformly. A qualified materials engineer with experience in slab design and construction should provide recommendations for alternative methods of curing and supervise the construction process to ensure uniform slab curing. Additional steps would also need to be taken to prevent puncturing of the vapor retarder during concrete placement.

7. Presaturation of the subgrade below floor slabs will not be required; however, prior to placing concrete, the subgrade below all dwelling and garage floor slab areas should be thoroughly moistened to achieve a moisture content that is at least equal to or slightly greater than optimum moisture content to a minimum depth of 18 inches below the bottoms of the slabs.

8. The minimum footing dimensions and reinforcement recommended herein may be modified (increased or decreased subject to the constraints of Chapter 18 of the 2013 CBC) by the structural engineer responsible for foundation design based on his/her calculations, engineering experience and judgment.

General Corrosivity Screening

As a screening level study, limited chemical and electrical tests were performed on representative samples of onsite soils to identify potential corrosive characteristics of these soils. The following sections present the test results and an interpretation of current codes and guidelines that are commonly used in our industry as they relate to the adverse impact of chemical contents of the site soils and their associated moisture on various components of the proposed structures in contact with site soils.

A variety of test methods are available to quantify corrosive potential of soils for various elements of construction materials. Depending on the test procedures adopted, characteristics of the leachate that is used to extract the target chemicals from the soils and the test equipment; the results can vary appreciably for different test methods in addition to those caused by variability in soil composition. The testing procedures referred to herein are considered to be typical for our industry and have been adopted and/or approved by many public or private agencies. In drawing conclusions from the results of our chemical and electrical laboratory testing and providing mitigation guidelines to reduce the detrimental impact of corrosive site soils on various components of the structure in contact with site soils, heavy references were made to 2013 CBC and American Concrete Institute, 2011 Structural Concrete Building Code (ACI 318-11). Where relevant information was not available in these codes, references were made to guidelines developed by California Department of Transportation (Caltrans), mainly because their risk tolerance for highway bridges are considered comparable to those for residential or commercial structures and that Post Tensioning Institute (PTI), in part, accepts and uses Caltrans' relevant corrosivity criteria for post-tensioned slabs on-grade.

It should be noted that **Petra** does not practice corrosion engineering; therefore, the test results, opinion and engineering judgment provided herein should be considered as general guidelines only. Additional analyses would be warranted, especially, for cases where buried metallic building materials (such as copper and cast or ductile iron) in contact with site soils are planned for the project. In many cases, the project geotechnical engineer is not informed of these choices. Therefore, for conditions where such elements are considered, we recommend that the project design professionals (i.e., the architect and/or structural engineer) consider recommending a qualified corrosion engineer to conduct additional sampling and testing of near-surface soils during the final stages of site grading to provide a complete assessment of soil corrosivity. Recommendations to mitigate the detrimental effects of corrosive soils on buried metallic and other building materials that may be exposed to corrosive soils should be provided by the corrosion engineer as deemed appropriate.

Concrete in Contact with Site Soils

Soils containing soluble sulfates beyond certain threshold levels as well as acidic soils are considered to be detrimental to long-term integrity of concrete placed in contact with such soils. For the purpose of this study, soluble sulfates (SO_4) concentration in soils determined in accordance with California Test Method No. 417. The soil soluble sulfate severity rating is adopted from ACI 318 publication. Soil acidity, as indicated by hydrogen-ion concentration (pH), was determined in accordance with California Test Method No. 643. The soil acid severity rating is adopted from The United States Department of Agriculture, Natural Resources Conservation Service classification.

The results of our limited in-house laboratory tests indicate that on-site soils contain a water-soluble sulfate content of 0.03 percent by weight. Based on Article 1904.1 of Section 1904 of the 2013 CBC, concrete that will be exposed to sulfates in site soil should be assigned exposure classes in accordance with the durability requirements of ACI 318.

Based on the test results and in reference to Table 4.2.1 of ACI 318-11, an exposure class of **S0** is appropriate for onsite soils. Accordingly, a severity level of **Not Applicable** for exposure to sulfate may be expected for concrete placed in contact with the onsite soil materials. As such, Table 4.3.1 of ACI 318-11 provides that no restriction for cement type or maximum water-cement ratio for the fresh concrete would be required. However, this table indicates that the concrete minimum unconfined compressive strength should not be less than 2,500 psi.

The results of limited in-house testing of representative samples indicate that soils within the subject site are neutral with respect to pH (a pH of 7.2). Based on this finding and according to Section 8.22.2 of Caltrans' 2003 Bridge Design Specifications (2003 BDS) requirements (which consider the combined effects of soluble sulfates and soil pH), a commercially available Type V or Type II Modified cement may be used.

The guidelines provided herein should be evaluated and confirmed, or modified, in its entirety by the project structural engineer and the contractor responsible for concrete placement for concrete used in exterior and interior footings, interior slabs on-ground, garage slabs walls foundation and concrete exposed to weather such as driveways, patios, porches, walkways, ramps, steps, curbs, etc.

Metals Encased in Concrete

Soils containing a soluble chloride concentration beyond a certain threshold level are considered corrosive to metallic elements such as reinforcement bars, tendons, cables, bolts, etc. that are encased in concrete that, in turn, is in contact with such soils. For the purpose of this study, soluble chlorides (Cl) in soils were determined in accordance with California Test Method No. 422.

Based on Article 1904.1 of Section 1904 of the 2013 CBC, concrete that will be exposed to chlorides from "*deicing chemicals, salt, saltwater, brackish water, seawater or spray from these sources, where concrete has steel reinforcement*" should be assigned exposure classes in accordance with the durability requirements of ACI 318. Table 4.2.1 of ACI 318-11 states that an exposure class of **C0** with a severity designation of **Not Applicable** is appropriate for reinforced concrete that remains dry or protected from moisture. Similarly, an exposure class of **C1** with a severity designation of **Moderate** is appropriate for reinforced concrete that is exposed to moisture but not to external sources of chlorides. And, lastly, an exposure class of **C2** with a severity designation of **Severe** is appropriate for reinforced concrete that is exposed to moisture and external sources of chlorides as enumerated above.

Based on our understanding of the project, it is our professional opinion that an exposure class of **C1** with a severity designation of **Moderate** is appropriate for a majority of reinforced concrete, to be placed at the site, that are in contact with site soils. It should be noted, however, that an exposure class of **C2** with a severity designation of **Severe** is more appropriate for reinforced concrete that is planned for pool walls and decking, should such features be considered for the project.

The results of our limited laboratory tests performed indicate that onsite soils contain a water-soluble chloride concentration of 83 parts per million (ppm). Article 1904.2 of Section 1904 of the 2013 CBC requires that concrete mixtures conform to the most restrictive maximum water-cementitious material ratios, maximum cementitious admixture, minimum air-entrainment and minimum specified concrete compressive strength requirements of ACI 318 based on the exposure classes assigned in Article 1904.1. No maximum water/cement ratio for the fresh concrete is prescribed by ACI 318 for class **C1** (or **Moderate** severity) exposure condition. However, Table 4.3.1 of ACI 318-11indicates that concrete minimum unconfined compressive strength, f'_c, should not be less than 2,500 psi. For class **C2** (or **Severe**) exposure condition, Table 4.3.1 of ACI 318-11requires that the maximum water/cement ratio of the fresh concrete should not exceed 0.40 and concrete minimum unconfined compressive strength, f'_c, should not be less than 5,000 psi.

Metallic Elements in Contact with Site Soils

Elevated concentrations of soluble salts in soils tend to induce low level electrical currents in metallic objects in contact with such soils. This process promotes metal corrosion and can lead to distress to building metallic components that are in contact with site soils. The minimum electrical resistivity measurement provides a simple indication of relative concentration of soluble salts in the soil and, therefore, is widely used to estimate soil corrosivity with regard to metals. For the purpose of this investigation, the minimum resistivity in soils is measured in accordance with California Test Method No. 643. The soil corrosion severity rating is adopted from the Handbook of Corrosion Engineering by Pierre R. Roberge.

The minimum electrical resistivity for onsite soils was found to be 2,500 ohm-cm based on limited testing. The result indicates that on-site soils are **Highly Corrosive** to ferrous metals and copper. As such, any ferrous metal or copper components of the subject buildings (such as cast iron or ductile iron piping, copper tubing, etc.) that are expected to be placed in direct contact with site soils should be protected against detrimental effects of highly corrosive soils based on recommendations provided by a qualified corrosion engineer.

Masonry Block Screen Walls

Where there is sufficient space to perform remedial grading beyond the property boundaries, the footings for the masonry block screen walls may be designed in accordance with the bearing and lateral resistance values provided previously for building footings. However, where remedial grading cannot encroach into the adjacent properties, a reduced bearing value of 1,200 pounds per square foot may be used for 12-inch-wide continuous footings founded at a minimum depth of 12 inches below the lowest adjacent final grade. No increase in bearing value may be used for wider or deeper footings for this condition. The recommended allowable bearing value includes both dead and live loads, and may be increased by one-third for short duration wind and seismic forces. In addition, a reduced passive earth pressure of 100 pounds per square foot per foot of depth, to a maximum value of 1,000 pounds per square foot, may be used to resist lateral loads.

A coefficient of friction of 0.30 times the dead load forces may still be used between concrete and the supporting soils to determine lateral sliding resistance. The above values may be combined without reduction provided the lateral sliding resistance does not exceed one-half the dead load. An increase of one-third of the above values may also be used when designing for short duration wind or seismic forces.

As a minimum, the wall footings should be embedded at a minimum depth of 12 inches below the lowest adjacent final grade. The footings should also be reinforced with a minimum of two No. 4 bars, one top and one bottom. In order to reduce the potential for unsightly cracking related to the possible effects of differential settlement and/or expansion, positive separations (construction joints) should also be provided in the block walls at each corner and at horizontal intervals of approximately 20 to 25 feet. The separations should be provided in the blocks and not extend through the footings. The footings should be poured monolithically with continuous rebars to serve as effective "grade beams" below the walls.

Retaining Wall Design Recommendations

Allowable Bearing and Lateral Resistance

Retaining wall footings or masonry block screen wall footings retaining soil may be designed using the allowable bearing and lateral resistance values recommended previously for design of masonry block walls; however, when calculating the passive resistance, the resistance of the upper six inches of supporting soils should be ignored in areas where the footings will not be covered with concrete flatwork, or where the thickness of soil covering the footings is less than 12 inches.

Active and At-Rest Earth Pressures

As of the date of this report, it is uncertain whether retaining walls will be backfilled with on-site soils or imported granular materials. For this reason, active and at-rest pressures are provided below for both conditions.

1. Onsite Soils Used for Wall Backfill

   Onsite earth materials have a low expansion potential. Therefore, if these onsite materials are used as backfill, active earth pressures equivalent to fluids having densities of 40 and 63 pounds per cubic foot should be used for design of cantilevered walls retaining a level backfill and ascending 2:1 backfill, respectively. For walls that are restrained at the top, at-rest earth pressures of 60 and 95 pounds per cubic foot (equivalent fluid pressures) should be used. The above values are for retaining walls that have been supplied with a proper subdrain system (see Figure RW-1). All walls should be designed to support any adjacent structural surcharge loads imposed by other nearby walls or footings in addition to the active and at-rest earth pressures.

2. Imported Sand, Pea Gravel, or Rock Used for Wall Backfill

   Imported clean sand exhibiting a sand equivalent value (SE) of 30 or greater, pea gravel, or crushed rock may be used for wall backfill, to reduce the lateral earth pressures provided these granular backfill materials extend behind the walls to a minimum horizontal distance equal to one-half the wall height. In addition, the sand, pea gravel, or rock backfill materials should extend behind the walls to a minimum horizontal distance of 2 feet at the base of the wall or to a horizontal distance equal to the heel width of the footing, whichever is greater (see Figures RW-2 and RW-3). For the above conditions, cantilevered walls retaining a level backfill and ascending 2:1 backfill may be designed to resist active earth pressures equivalent to fluids having densities of 30 and 41 pounds per cubic foot, respectively. For walls that are restrained at the top, at-rest earth pressures equivalent to fluids having densities of 45 and 62 pounds per cubic foot are recommended for design of restrained walls supporting a level backfill and ascending 2:1 backfill, respectively. These values are also for retaining walls supplied with a proper subdrain system. Furthermore, as with native soil backfill, the walls should be designed to support any adjacent structural surcharge loads imposed by other nearby walls or footings in addition to the recommended active and at-rest earth pressures.

It is recommended that retaining wall plans and structural details be provided to this firm for review prior to commencement of the grading and construction phases of the project.

Earthquake Loads on Retaining Walls

For sites that fall under Seismic Design Categories D, E and F, Section 1803.5.12 of the 2013 CBC requires the determination of seismically-induced lateral loads on retaining walls that will support more than 6 feet of backfill. It should be noted that, although both the 2013 CBC and 2009 IBC can be interpreted as requiring seismic design for these retaining walls, many municipalities consider seismic design for retaining walls within residential projects to be overly conservative. As a result, some building code subcommittees are enforcing revised policies. For example, the City of Los Angeles requires that only walls greater than 12 feet high need to be designed for lateral earthquake loads. Similarly, the County of Los Angeles requires that walls greater than 8 feet high (for non R-3) or 12 feet high (for R-3) shall be designed for lateral earthquake loads. Therefore, the project structural engineer should consult with the City of Long Beach building official to confirm the City's policy regarding new retaining walls that may be proposed within the site.

The 2013 CBC allows that the peak ground acceleration (PGA) may be assumed equal to $S_{Ds}/2.5$. This gives a PGA value of 0.44g for this site (1.103g/2.5). This value was used in the Seed and Whitman (1970) simplified calculation for level conditions behind retaining structures. According to the research of Sitar, et al. (2012), the simplified Seed and Whitman calculation is appropriate for use for cantilever retaining walls.

From the County of Los Angeles Department of Public Works Manual for the Preparation of Geotechnical Reports (Dec., 2006), the horizontal ground acceleration value (k_h) for cantilever retaining walls may be assumed to be equal to half of the peak ground acceleration. Thus, $k_h = ½ (a_g) = (0.5)(0.44g) = 0.22g$.

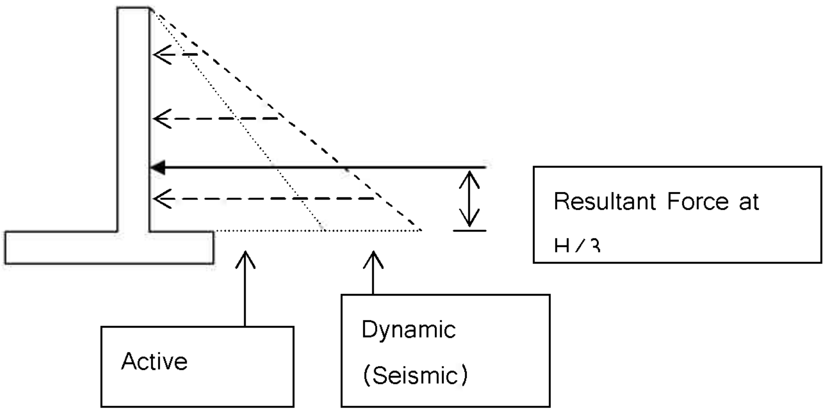
From Seed and Whitman (1970), the lateral load on a retaining structure can be determined by the following equation:

$$P_D = \Upsilon (3/4) K_h$$

where P_D = Dynamic Lateral Earth Pressure,
Υ = weight of soil = 120 pcf, and
K_h = horiz. ground acceleration

thus, $P_D = (120 \text{ pcf}) (3/4) (0.22) \approx 20 \text{ pcf}$.

For cantilever retaining walls, Sitar, et al. (2012) indicates that the seismic earth pressures have a triangular distribution with the largest load occurring at the bottom of the wall. The distribution of the seismic lateral load for both types of walls is as follows:



Geotechnical Observation and Testing

All grading and construction phases associated with retaining wall construction, including backcut excavations, footing trenches, installation of the subdrainage systems, and placement of backfill should be observed and tested by a representative of this firm.

Subdrainage

Perforated pipe and gravel subdrains should be installed behind all retaining walls to prevent entrapment of water in the backfill (see Figures RW-1 through RW-3). Perforated pipe should consist of 4-inch-minimum diameter PVC Schedule 40, or SDR-35, with the perforations laid down. The pipe should be encased in a 1-foot-wide column of ¾-inch to 1½-inch open-graded gravel. If on-site soils are used as backfill, the open-graded gravel should extend above the wall footings to a minimum height equal to one-third the wall height or to a minimum height of 1.5 feet above the footing, whichever is greater. If imported sand, pea gravel, or crushed rock is used as backfill, subdrain details shown on Figures RW-2 and RW-3 should be utilized. The open-graded gravel should be completely wrapped in filter fabric consisting of Mirafi 140N or equivalent. Solid outlet pipes should be connected to the subdrains and then routed to a suitable area for discharge of accumulated water.

If a limited area exists behind the walls for installation of a pipe and gravel subdrain, a geotextile drain mat such as Mirafi Miradrain, or equivalent, can be used in lieu of drainage gravel. The drain mat should extend the full height and lengths of the walls and the filter fabric side of the drain mat should be placed up against the backcut. The perforated pipe drain line placed at the bottom of the drain mat should consist of 4-inch minimum diameter PVC Schedule 40 or SDR-35. The filter fabric on the drain mat should be peeled back and then wrapped around the drain line.

Waterproofing

The portions of retaining walls supporting backfill should be coated with an approved waterproofing compound or covered with a similar material to inhibit infiltration of moisture through the walls.

Wall Backfill

Recommended active and at-rest earth pressures for design of retaining walls are based on the physical and mechanical properties of the on-site soil materials. However, since the on-site soil materials are locally silty, they may be difficult to compact when placed in the relatively confined areas located between the walls and temporary backcut slopes. Therefore, to facilitate compaction of the backfill, consideration should be given to using sand, pea gravel, crushed rock, or select imported or onsite granular soils that exhibit a **Very Low** expansion potential (Expansion Index of less than 20) behind the proposed retaining walls. For this condition, the reduced active and at-rest pressures provided previously for sand, pea gravel, or crushed rock backfill may be considered in wall design provided they are installed as shown on Figures RW-2 and RW-3.

Where the onsite soils materials are used as backfill behind the proposed retaining walls, the backfill materials should be placed in approximately 6- to 8-inch-thick maximum lifts, watered as necessary to achieve near optimum moisture conditions, and then mechanically compacted in place to a minimum relative compaction of 90 percent. Flooding or jetting of the backfill materials should be avoided. A representative of the project geotechnical consultant should observe the backfill procedures and test the wall backfill to document that adequate compaction has been achieved.

If imported pea gravel or rock is used for backfill, the gravel should be placed in approximately 2- to 3-foot-thick lifts, thoroughly wetted but not flooded, and then mechanically tamped or vibrated into place. A representative of the project geotechnical consultant should observe the backfill procedures and probe the backfill to determine that an adequate degree of compaction is achieved.

To mitigate the potential for the direct infiltration of surface water into the backfill, imported sand, gravel, or rock backfill should be capped with at least 12 inches of on-site soil. Filter fabric such as Mirafi 140N or equivalent, should be placed between the soil and the imported gravel or rock to prevent fines from penetrating into the backfill.

Exterior Concrete Flatwork

As is indicated on the exploration logs included in Appendix A, near-surface soils within the site consist of interlayered granular (sandy) and fine-grained soils (silty or clayey) which tend to exhibit variable expansion potentials. Upon completion of precise grading operations within proposed flatwork areas, the exposed subgrade soils will consist of a blend of these materials and thus are likely to exhibit locally variable expansive characteristics. Due to project scheduling constraints, it is not typically feasible to collect additional samples of subgrade soils for testing to verify expansion index immediately prior to pouring concrete. For this reason, it is recommended that all the exterior concrete flatwork including pedestrian sidewalks, vehicular access roads, and large decorative slabs within quad areas be designed by the project architect with consideration given to reducing the potential for cracking and uplift that can develop in expansive soils.

The guidelines that follow are based on the assumption that no time allowance will be made for the collection and testing of verification samples of flatwork subgrade soils prior to placement of steel reinforcement and concrete pouring. These guidelines should be considered as minimums and are subject to review and revision by the project architect, structural engineer and/or landscape consultant as deemed appropriate. If time will be allowed in the project schedule for verification sampling and testing prior to the concrete pour, the test results generated may dictate that a somewhat less conservative design could be used.

Pedestrian Flatwork Areas

To reduce the potential of unsightly cracking related to the effects of locally expansive soils, it is suggested that concrete sidewalks, patio-type slabs and subslabs to be covered with decorative pavers be a minimum of 4 inches thick and provided with saw cuts or expansion joints every 10 feet or less. It is further suggested that concrete slabs and sidewalks be reinforced with a minimum of No. 3 bars spaced 18 inches on centers, both ways. Alternatively, the slab reinforcement may consist of welded wire mesh of the sheet type (not rolled) with 6x6/W2.9xW2.9 designation in accordance with the Wire Reinforcement Institute (WRI). All reinforcement should be positioned near the middle of the slabs by means of concrete chairs or brick. *Note: The minimum reinforcement suggested in this report does not account for thermal and shrinkage characteristics of reinforced concrete. Additional steel reinforcement may be required by the project architect and/or structural engineer to account for these characteristics.*

Edge Beams

Where the outer edges of concrete flatwork are to be bordered by landscaping, it is recommended that consideration be given to the use of edge beams (thickened edges) to prevent excessive infiltration and accumulation of water under the slabs. Edge beams, if used, should be 6 to 8 inches wide, extend 8 inches below the tops of the finish slab surfaces, and be reinforced with a minimum of two No. 4 bars, one top and one bottom. Edge beams are not mandatory; however, their inclusion in flatwork construction adjacent to landscaped areas is expected to significantly reduce the potential for vertical and horizontal movements and subsequent cracking of the flatwork related to the effects of high uplift forces that can develop in expansive soils.

Concrete Driveways and Pavement

Concrete pavement may be desirable at site entry points and trash collection areas. For concrete pavement that will be designed based on an unlimited number of applications of an 18-kip single-axle load, it is suggested that the pavement have a minimum thickness of 6 inches and a minimum 28-day compressive strength of 3,000 pounds per square inch. In addition, the pavement should have a minimum reinforcement of No. 3 bars spaced a maximum of 16 inches on center (each way), and individual slabs should be doweled together at control joints. Control joints should be spaced at maximum 10-foot intervals. A modulus of subgrade reaction of 125 pounds per cubic foot may be used for design purposes. Concrete pavement should be placed on 6 inches of aggregate base compacted to 95 percent relative compaction (ASTM D 1557).

The R-value and traffic index that form the basis of these recommendations have been assumed based on the predominant engineering characteristics of near-surface soils. We recommend that bulk samples of the actual subgrade materials be retrieved for laboratory analysis after rough grading is completed. Once actual as-graded conditions are confirmed, modified design recommendations may be required.

Subgrade Preparation

As a further measure to mitigate cracking and/or shifting of concrete flatwork, the subgrade soils below concrete flatwork areas should be compacted to a minimum relative compaction of 90 percent per ASTM D1557 and then thoroughly moistened prior to placing concrete. Where concrete driveways are proposed, the upper 6 inches of subgrade soil should be compacted to a minimum 95 percent relative compaction. The moisture content of the soils should be at least 1.3 times the optimum moisture content and penetrate to a minimum depth of 12 inches into the subgrade. Flooding or ponding of the subgrade is not considered feasible to achieve the above moisture conditions since this method would likely require construction of numerous earth berms to contain the water.

Therefore, moisture conditioning should be achieved with sprinklers or a light spray applied to the subgrade over a period of several days just prior to pouring concrete. A representative of the project geotechnical consultant should observe and document the density and moisture content of the soils, and the depth of moisture penetration prior to pouring concrete.

Drainage

Drainage from patios and other flatwork areas should be directed to local area drains and/or graded earth swales designed to carry runoff water to the adjacent streets or other approved drainage structure. The concrete flatwork should also be sloped at a minimum gradient of one percent away from building foundations, retaining walls, masonry garden walls and slope areas.

Tree Wells

Tree wells are not recommended in concrete flatwork areas since they introduce excessive water into the subgrade soils or allow root invasion, both of which can cause heave of the flatwork.

Asphalt Pavement Design

Due to the remedial grading that will be performed within the site, the existing near-surface soils will be processed and blended with deeper soils resulting in a compacted fill material that may exhibit considerably different subgrade strength characteristics than those that presently exist at the surface within the site. In addition, imported soils may also be required to establish the proposed subgrade elevations. Therefore, representative samples of the subgrade soils within street areas should be obtained for R-Value testing at or near the completion of grading. A separate letter providing recommendations for structural pavement sections within the site will then be submitted by our firm based on the results of these tests. It should be noted that the City of Long Beach minimum pavement section thickness might supersede the calculated sections provided by our firm.

Field Percolation Testing

Storm Water Infiltration System

It is our understanding that an onsite storm water percolation system may be constructed in order to achieve the required best management practices for the project. To support the design of the proposed storm water dissipation system, this investigation included performing a pilot percolation study within the proposed recreation area at the extreme easterly corner of the site. This study was performed concurrently with the previously described field exploration program on March 4, 2014 and included drilling one percolation test boring (identified herein as B-2A). The percolation test boring was drilled to an approximate depth of 3 feet below the existing ground surface using a hollow-stem drilling rig. Test data are summarized in Appendix E of this report. The approximate location of the percolation test is shown on Plate 1. **It should be noted that the percolation rate provided below is representative of the location tested and may vary considerably over relatively small horizontal distances. Once the finalized location and depth of the proposed storm water infiltration system have been determined, it is recommended that supplemental testing be performed to assess percolation rates at that specific location.**

Following drilling, a four-inch-diameter (I. D.) perforated P.V.C. pipe was placed in the test hole. Gravel (3/8- to ¾-inch) was then placed within the annular space between the pipe and boring wall. Clean tap water was subsequently added to the boring to pre-soak the sidewall soils prior to commencement of the percolation testing.

The percolation test was conducted by filling the test boring with clean tap water to a depth of approximately 12 inches below the surface. The water level was measured at approximately 30-second to 10-minute intervals (due to the relatively fast infiltration rate), and then refilled to approximately the initial water elevation. From these readings, the percolation characteristics of the underlying native alluvial soils were estimated. The percolation test results are summarized in Table VIII, below:

Table VIII
Preliminary Percolation Test Data

Test Boring No.	Soil Type (USCS)	Depth of Borehole (feet)	Absorption Rate (gallons/ft^2/day)
B-2A	Sand/(SP)	3.0	95

Summary of Findings and Recommendations

1. One percolation test was conducted for this study to provide preliminary information to support the design of a storm water infiltration system that may be located within the proposed recreation area at the easterly corner of the site.

2. Approximately 2½ feet of artificial fill was encountered at the borehole location. Beneath the fill, native alluvial deposits were encountered to the maximum borehole depth (3 feet).

3. It should be noted that the granular native soils existing below a depth of 2½ feet were targeted for this test. Therefore, the test data provided above is representative of this sandy native soil unit only and should not be used for the design of any storm water infiltration system that does not penetrate into this soil layer.

4. Based on information obtained from this boring and the borings drilled in other areas of the subject site, the uppermost 5 feet of native materials consist predominantly of interlayered medium-dense sands and silty sands, and firm sandy silts and silty clays.

5. Groundwater was not encountered in any of the exploratory borings drilled within the subject site to the maximum depth explored (41½ feet).

6. An absorption rate of 95 gallons/day/ft^2 was obtained at the time of our study. Using the conversion factor published in the County of Orange Water Quality Management Plan, Technical Appendix VII, this data yields a minimum tested infiltration rate of approximately 13 inches per hour for the site.

7. It should be noted that the percolation test was conducted with relatively clean water. Nuisance water, which contains sediments and other impurities, may reduce the soil absorption rate.

8. The storm water system should be designed according to the standards set by the City of Long Beach, the County of Los Angeles, or other applicable jurisdictional agency. An appropriate safety factor should be used for preliminary design calculations.

9. All storm water infiltration areas should be maintained at a minimum horizontal distance of 10 feet away from any existing or proposed structural footings.

10. It may be considered prudent to designate a backup area for conditions where the main storm water absorption area has either lost its full absorption capacity, or an overflow of storm water takes place.

GRADING AND FOUNDATION PLAN REVIEW

It must be emphasized that the recommendations provided throughout this report are based solely on the preliminary grading plan no finalized grading plans, structural plans or details were available for review as of the date of this report. As such, the conclusions and recommendations provided herein should be considered as tentative. Once such plans and details become available, our firm should be retained to review these documents to determine the applicability of our recommendations to the actual construction proposed. Additional recommendations and/or modification of the recommendations provided herein will be provided if necessary depending on the results of the grading plan and/or structural plan review.

FUTURE IMPROVEMENTS AND GRADING

If additional improvements are considered in the future, our firm should be notified so that we may provide design recommendations to mitigate movement, settlement and/or tilting of the structures. Potential problems can develop when drainage on the pads is altered in any way such as placement of fill and construction of new walkways, patios, landscape walls, or planters. Therefore, it is recommended that we be engaged to review the final design drawings, specifications and grading plan prior to any new construction. If we are not provided the opportunity to review these documents with respect to the geotechnical aspects of new construction and grading, it should not be assumed that the recommendations provided herein are wholly or in part applicable to the proposed construction.

REPORT LIMITATIONS

This report is based on the proposed project and geotechnical data as described herein. The materials encountered on the project site, described in other literature, and utilized in our laboratory investigation are believed representative of the project area, and the conclusions and recommendations contained in this report are presented on that basis. However, soil materials can vary in characteristics between points of exploration, both laterally and vertically, and those variations could affect the conclusions and recommendations contained herein. As such, observation and testing by a geotechnical consultant during the grading and construction phases of the project are essential to confirming the basis of this report.

This report has been prepared consistent with that level of care being provided by other professionals providing similar services at the same locale and time period. The contents of this report are professional opinions and as such, are not to be considered a guarantee or warranty. This report should be reviewed and updated after a period of one year or if the project concept changes from that described herein.

The information contained herein has not been prepared for use by parties or projects other than those named or described herein. This report may not contain sufficient information for other parties or other purposes.

This report is subject to review by the controlling authorities for this project. Should you have any questions, please do not hesitate to call.

Respectfully submitted,

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FIGURES

SITE LOCATION MAP

SITE AERIAL VIEW MAP

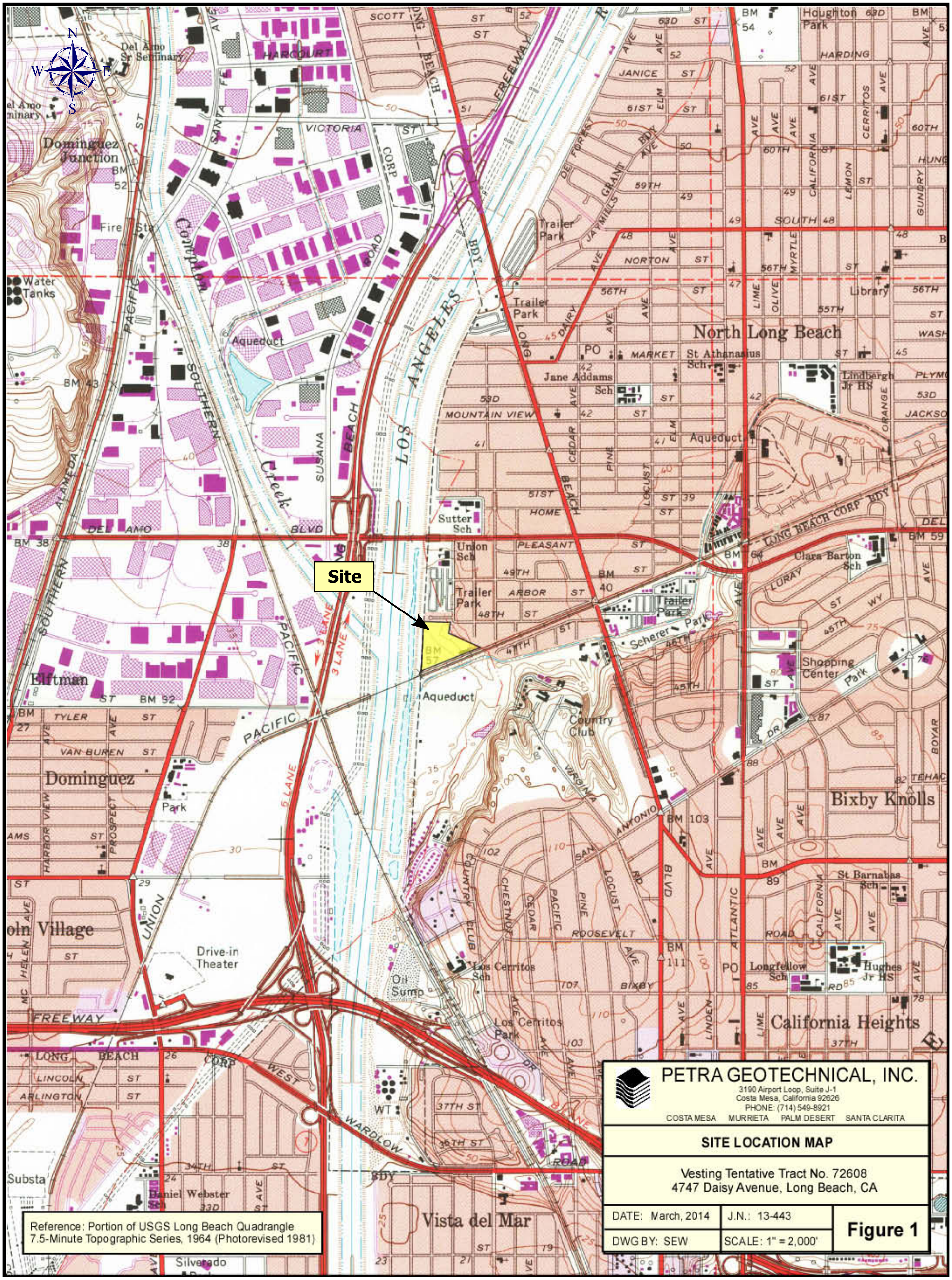
REGIONAL FAULT ACTIVITY MAP

EARTHQUAKE EPICENTERS MAP

SEISMIC HAZARD ZONES MAP

RETAINING WALL

PETRA



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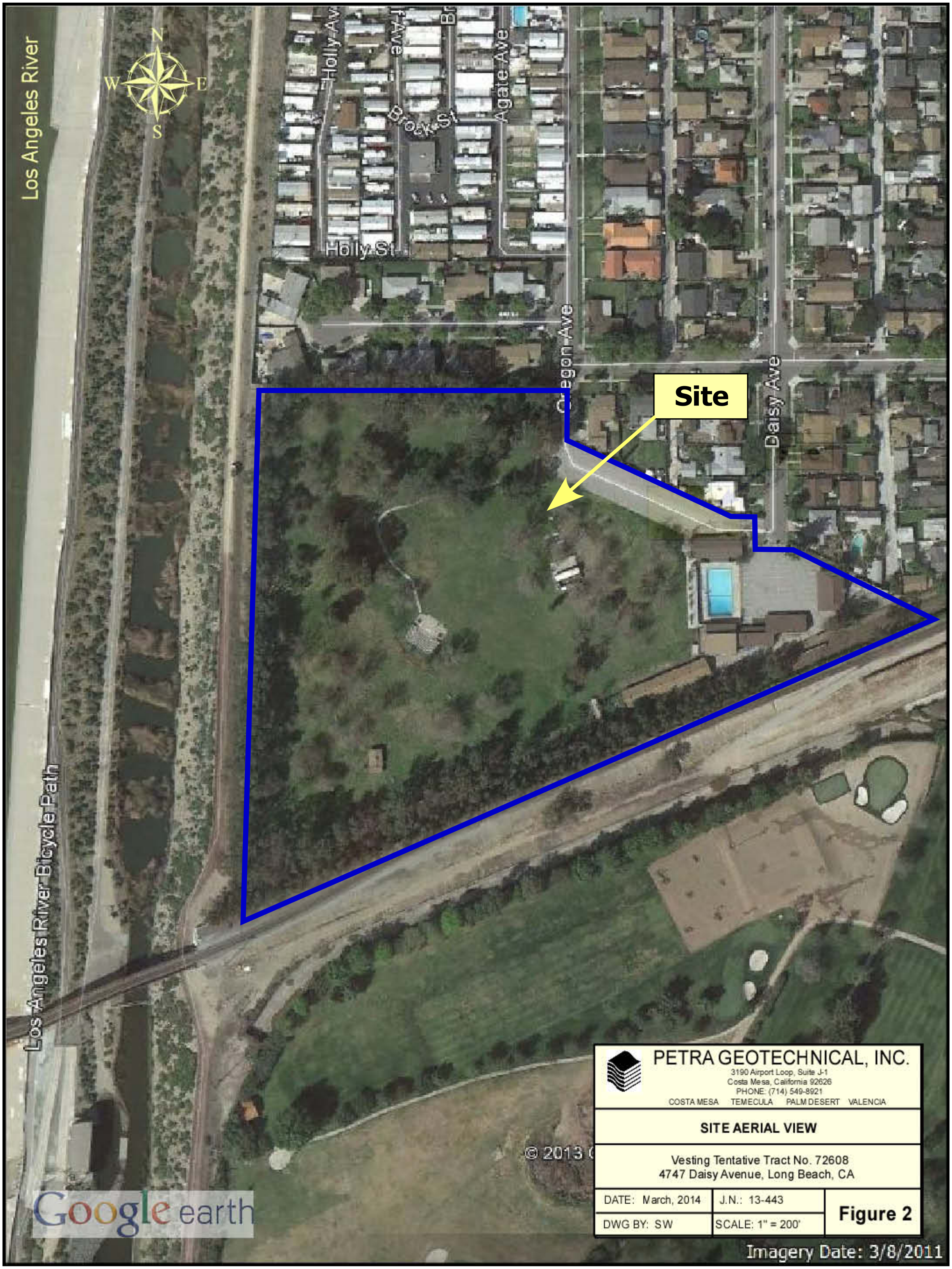
COSTA MESA MURRIETA PALM DESERT SANTA CLARITA

SITE LOCATION MAP

Vesting Tentative Tract No. 72608
4747 Daisy Avenue, Long Beach, CA

DATE: March, 2014	J.N.: 13-443	**Figure 1**
DWG BY: SEW	SCALE: 1" = 2,000'	


Los Angeles River
N
S
W
E
Holly Ave
Brock St
Agate Ave
Holly St
Oregon Ave
Daisy Ave
Site
Los Angeles River Bicycle Path
Google earth
© 2013
Imagery Date: 3/8/2011
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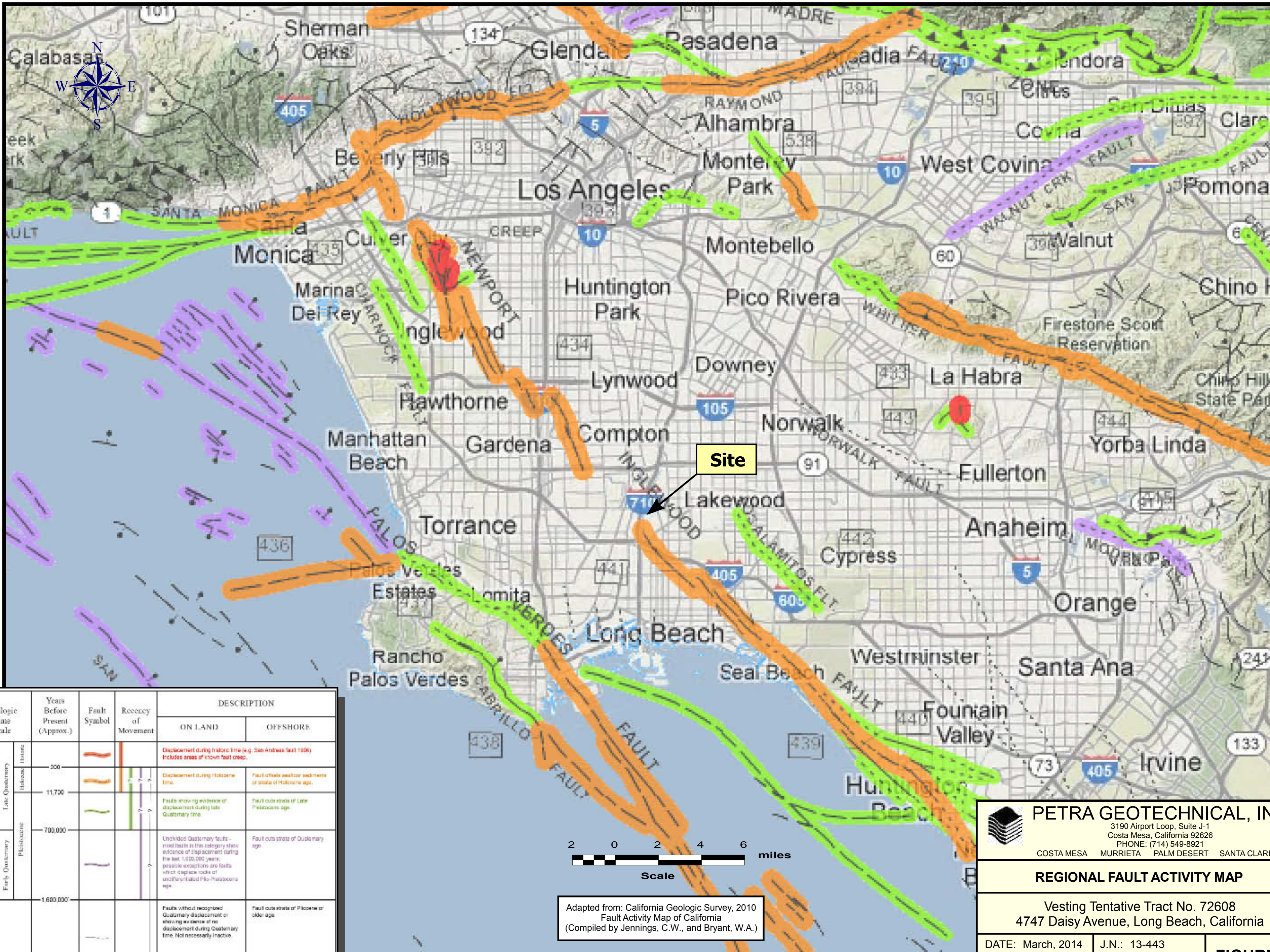
SITE AERIAL VIEW
Vesting Tentative Tract No. 72608
4747 Daisy Avenue, Long Beach, CA
DATE: March, 2014
J.N.: 13-443
DWG BY: SW
SCALE: 1" = 200'
Figure 2



Geologic Time Scale			Years Before Present (Approx.)	Fault Symbol	Recency of Movement	DESCRIPTION: ON LAND	DESCRIPTION: OFFSHORE
Quaternary	Late Quaternary	Historic				Displacement during historic time (e.g. San Andreas fault 1906) Includes areas of known fault creep.	
		Holocene	200			Displacement during Holocene time.	Fault offsets seafloor sediments or strata of Holocene age.
		Pleistocene	11,700			Faults showing evidence of displacement during late Quaternary time.	Fault cuts strata of Late Pleistocene age.
	Early Quaternary		700,000			Undivided Quaternary faults - most faults in this category show evidence of displacement during the last 1,600,000 years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age.	Fault cuts strata of Quaternary age.
Pre-Quaternary			1,600,000 / 4.5 billion (Age of Earth)			Faults without recognized Quaternary displacement or showing evidence of no displacement during Quaternary time. Not necessarily inactive.	Fault cuts strata of Pliocene or older age.

Adapted from: California Geologic Survey, 2010
Fault Activity Map of California
(Compiled by Jennings, C.W., and Bryant, W.A.)

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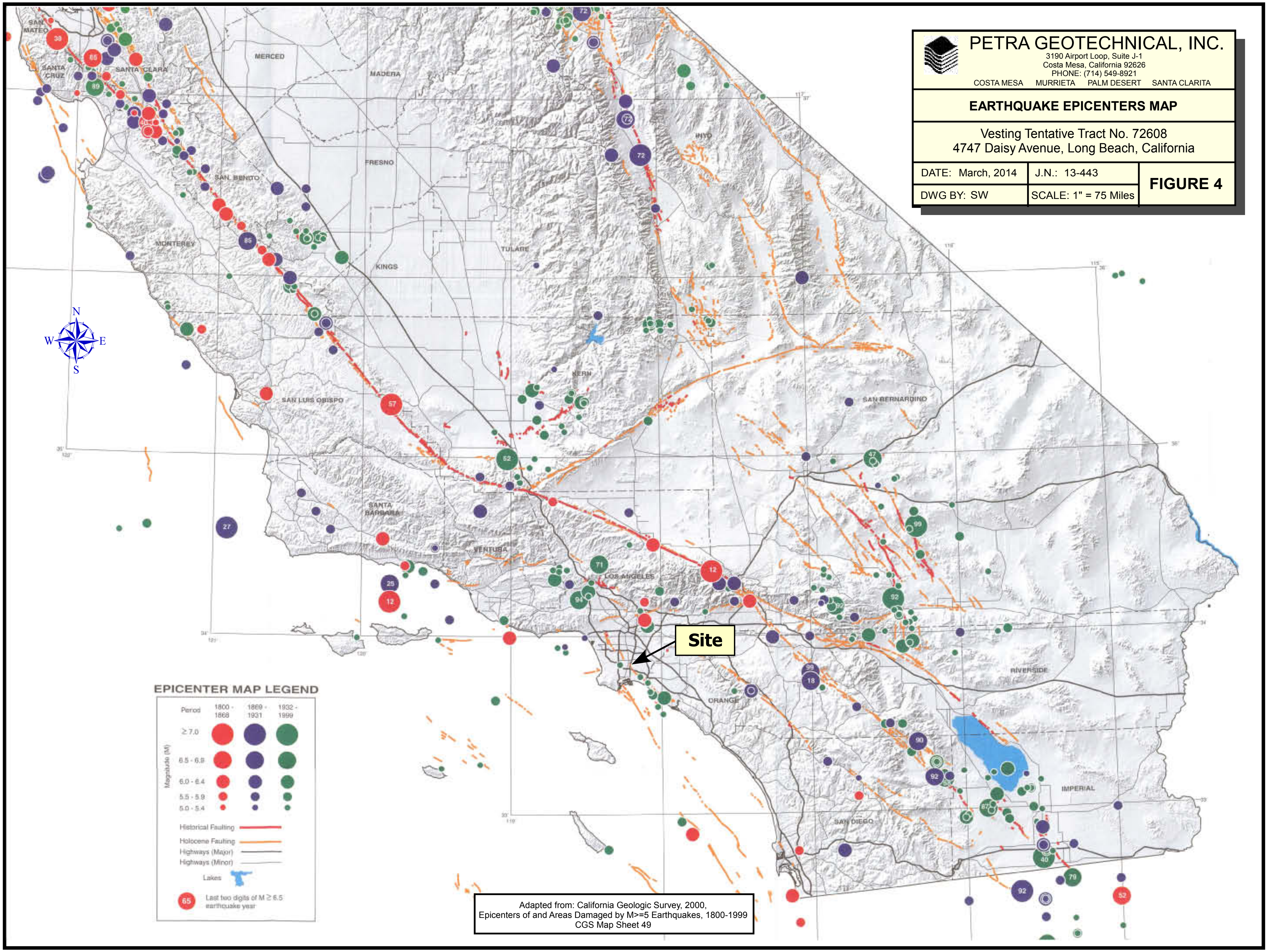
REGIONAL FAULT ACTIVITY MAP

Vesting Tentative Tract No. 72608
4747 Daisy Avenue, Long Beach, California

DATE: March, 2014	J.N.: 13-443	**FIGURE 3**
DWG BY: SW	SCALE: See Map	



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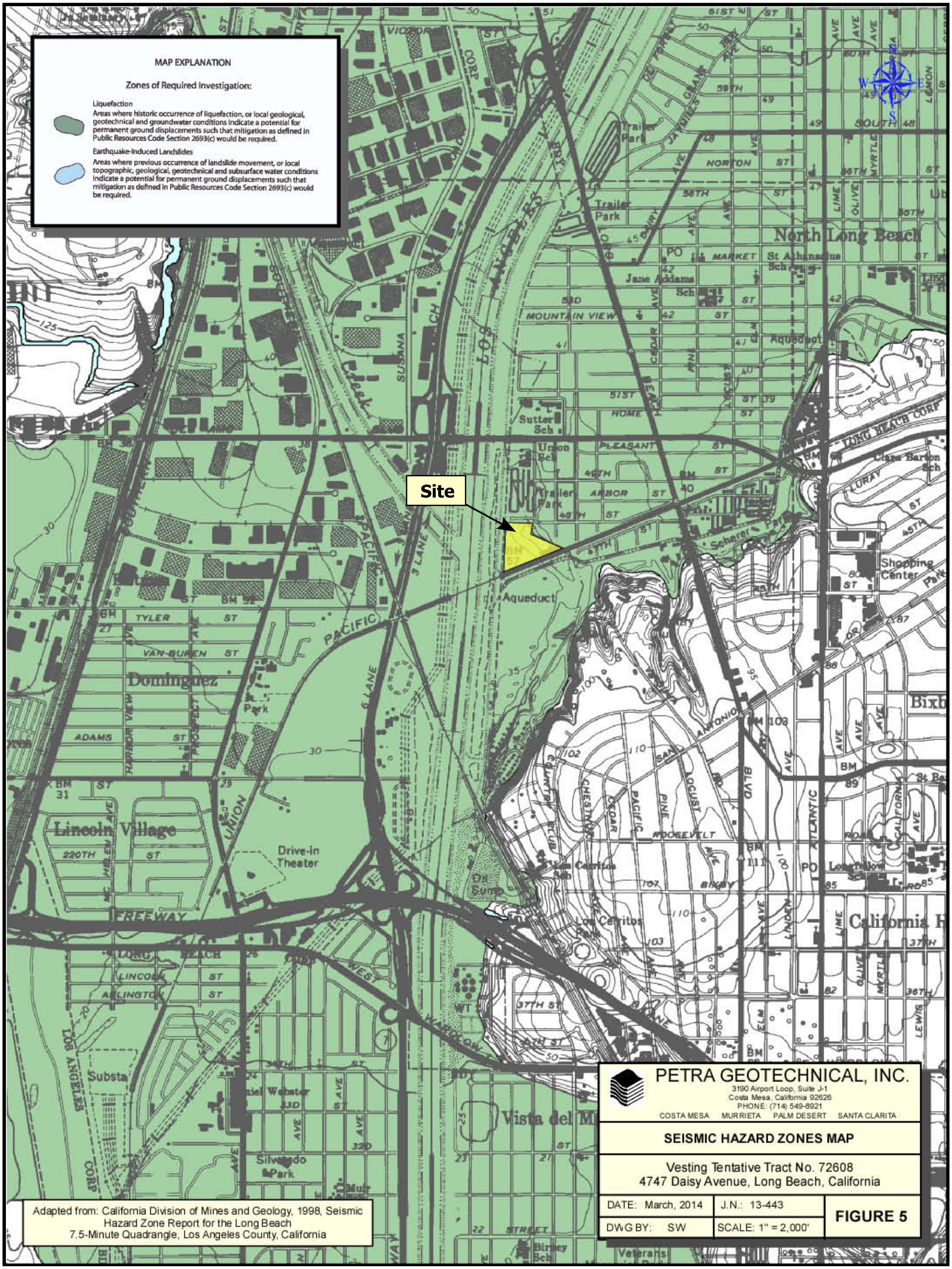
COSTA MESA MURRIETA PALM DESERT SANTA CLARITA
EARTHQUAKE EPICENTERS MAP
Vesting Tentative Tract No. 72608
4747 Daisy Avenue, Long Beach, California
DATE: March, 2014
J.N.: 13-443
FIGURE 4
DWG BY: SW
SCALE: 1" = 75 Miles
Site
N
S
E
W
SAN MATEO
SANTA CRUZ
SANTA CLARA
MERCED
MADERA
FRESNO
SAN BENITO
MONTEREY
KINGS
TULARE
INYO
KERN
SAN LUIS OBISPO
SAN BERNARDINO
SANTA BARBARA
VENTURA
LOS ANGELES
ORANGE
RIVERSIDE
SAN DIEGO
IMPERIAL
EPICENTER MAP LEGEND
Period
1800 - 1868
1869 - 1931
1932 - 1999
Magnitude (M)
≥ 7.0
6.5 - 6.9
6.0 - 6.4
5.5 - 5.9
5.0 - 5.4
Historical Faulting
Holocene Faulting
Highways (Major)
Highways (Minor)
Lakes
Last two digits of M ≥ 6.5 earthquake year
Adapted from: California Geologic Survey, 2000,
Epicenters of and Areas Damaged by M>=5 Earthquakes, 1800-1999
CGS Map Sheet 49



MAP EXPLANATION
Zones of Required Investigation:
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.
Site
North Long Beach
Dominguez
Lincoln Village
Drive-in Theater
Aqueduct
Shopping Center
California H
Vista del M
N
S
E
W
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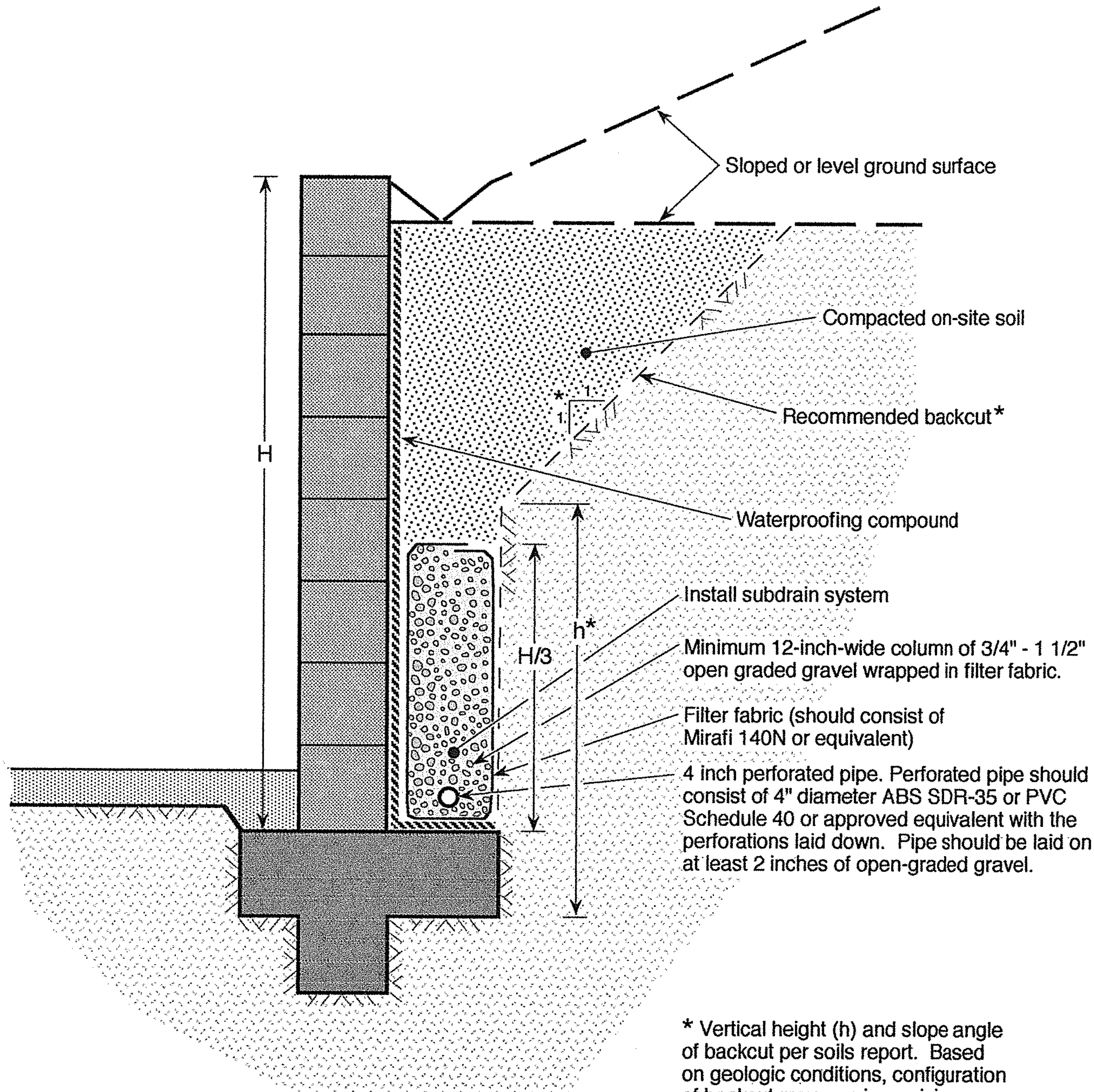
SEISMIC HAZARD ZONES MAP
Vesting Tentative Tract No. 72608
4747 Daisy Avenue, Long Beach, California
DATE: March, 2014
J.N.: 13-443
DWG BY: SW
SCALE: 1" = 2,000'
FIGURE 5
Adapted from: California Division of Mines and Geology, 1998, Seismic Hazard Zone Report for the Long Beach 7.5-Minute Quadrangle, Los Angeles County, California

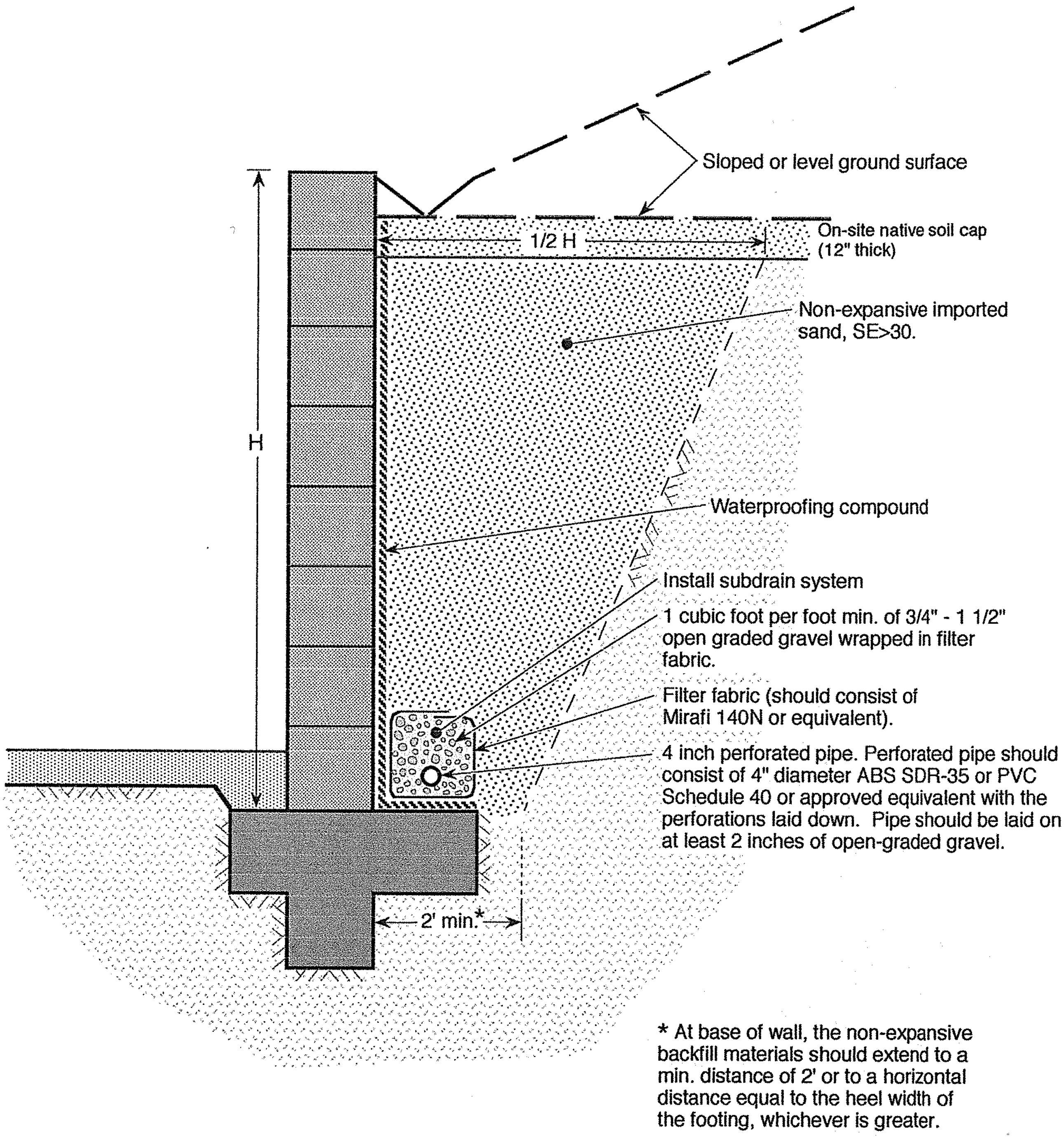
NATIVE SOIL BACKFILL



* Vertical height (h) and slope angle of backcut per soils report. Based on geologic conditions, configuration of backcut may require revisions (i.e. reduced vertical height, revised slope angle, etc.)

PETRA	RETAINING WALL BACKFILL AND SUBDRAIN DETAILS	FIGURE RW-1

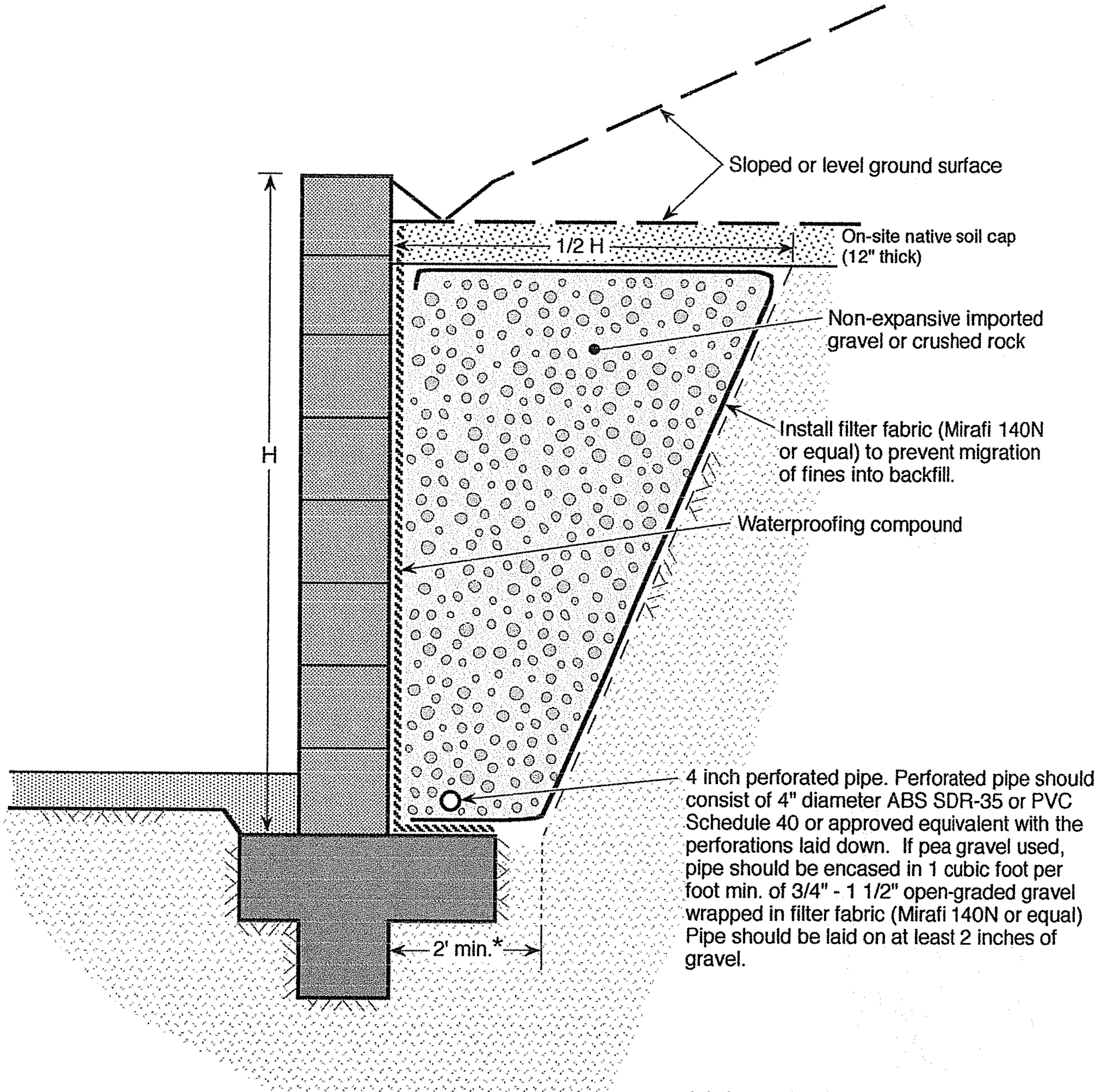
IMPORTED SAND BACKFILL



* At base of wall, the non-expansive backfill materials should extend to a min. distance of 2' or to a horizontal distance equal to the heel width of the footing, whichever is greater.

PETRA	RETAINING WALL BACKFILL AND SUBDRAIN DETAILS	FIGURE RW-2

IMPORTED GRAVEL OR CRUSHED ROCK BACKFILL



* At base of wall, the non-expansive backfill materials should extend to a min. distance of 2' or to a horizontal distance equal to the heel width of the footing, whichever is greater.

PETRA	RETAINING WALL BACKFILL AND SUBDRAIN DETAILS	FIGURE RW-3

APPENDIX A

EXPLORATION LOGS

CPT TEST DATA

PETRA

Key to Soil and Bedrock Symbols and Terms

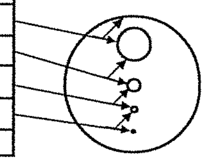
PETRA

Unified Soil Classification System

Coarse-grained Soils > 1/2 of materials is larger than #200 sieve	The No. 200 U.S. Standard Sieve is about the smallest particle visible to the naked eye	**GRAVELS** more than half of coarse fraction is larger than #4 sieve	Clean Gravels (less than 5% fines)	**GW**	Well-graded gravels, gravel-sand mixtures, little or no fines
				GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
			Gravels with fines	**GM**	Silty Gravels, poorly-graded gravel-sand-silt mixtures
				GC	Clayey Gravels, poorly-graded gravel-sand-clay mixtures
		SANDS more than half of coarse fraction is smaller than #4 sieve	Clean Sands (less than 5% fines)	**SW**	Well-graded sands, gravelly sands, little or no fines
				SP	Poorly-graded sands, gravelly sands, little or no fines
			Sands with fines	**SM**	Silty Sands, poorly-graded sand-gravel-silt mixtures
				SC	Clayey Sands, poorly-graded sand-gravel-clay mixtures
Fine-grained Soils > 1/2 of materials is smaller than #200 sieve		**SILTS & CLAYS** Liquid Limit Less Than 50		**ML**	Inorganic silts & very fine sands, silty or clayey fine sands, clayey silts with slight plasticity
				CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
				OL	Organic silts & clays of low plasticity
		SILTS & CLAYS Liquid Limit Greater Than 50		**MH**	Inorganic silts, micaceous or diatomaceous fine sand or silt
				CH	Inorganic clays of high plasticity, fat clays
				OH	Organic silts and clays of medium-to-high plasticity
Highly Organic Soils				**PT**	Peat, humus swamp soils with high organic content

Grain Size

Description		Sieve Size	Grain Size	Approximate Size
Boulders		>12"	>12"	Larger than basketball-sized
Cobbles		3 - 12"	3 - 12"	Fist-sized to basketball-sized
Gravel	coarse	3/4 - 3"	3/4 - 3"	Thumb-sized to fist-sized
	fine	#4 - 3/4"	0.19 - 0.75"	Pea-sized to thumb-sized
Sand	coarse	#10 - #4	0.079 - 0.19"	Rock salt-sized to pea-sized
	medium	#40 - #10	0.017 - 0.079"	Sugar-sized to rock salt-sized
	fine	#200 - #40	0.0029 - 0.017"	Flour-sized to sugar-sized to
Fines		Passing #200	<0.0029"	Flour-sized and smaller



Laboratory Test Abbreviations

MAX	Maximum Dry Density	MA	Mechanical (Particle Size) Analysis
EXP	Expansion Potential	AT	Atterberg Limits
SO4	Soluble Sulfate Content	#200	#200 Screen Wash
RES	Resistivity	DSU	Direct Shear (Undisturbed Sample)
pH	Acidity	DSR	Direct Shear (Remolded Sample)
CON	Consolidation	HYD	Hydrometer Analysis
SW	Swell	SE	Sand Equivalent
CL	Chloride Content	OC	Organic Content
RV	R-Value	COMP	Mortar Cylinder Compression

Modifiers

Trace	< 1 %
Few	1 - 5%
Some	5 - 12 %
Numerous	12 - 20 %

Sampler and Symbol Descriptions

- Approximate Depth of Seepage
- Approximate Depth of Standing Groundwater
- Modified California Split Spoon Sample
- Standard Penetration Test
- Bulk Sample
- Shelby Tube
- No Recovery in Sampler

Bedrock Hardness

Soft	Can be crushed and granulated by hand; "soil like" and structureless
Moderately Hard	Can be grooved with fingernails; gouged easily with butter knife; crumbles under light hammer blows
Hard	Cannot break by hand; can be grooved with a sharp knife; breaks with a moderate hammer blow
Very Hard	Sharp knife leaves scratch; chips with repeated hammer blows

Notes:

Blows Per Foot: Number of blows required to advance sampler 1 foot (unless a lesser distance is specified). Samplers in general were driven into the soil or bedrock at the bottom of the hole with a standard (140 lb.) hammer dropping a standard 30 inches unless noted otherwise in Log Notes. Drive samples collected in bucket auger borings may be obtained by dropping non-standard weight from variable heights. When a SPT sampler is used the blow count conforms to ASTM D-1586

EXPLORATION LOG

Project: VTT 72608		Boring No.: B-1
Location: 4747 Daisy Ave, Long Beach		Elevation: +/- 31
Job No.: 13-443	Client: Integral Communities	Date: 3/4/14
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: SHW

Depth (Feet)	Material Description	Water	Samples: Blows Per 6 Inches	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
0	**ARTIFICIAL FILL (af)** Silty Sand (SM): Grayish-brown; very moist; loose; very fine- to fine-grained sand; with some clay. @2': becomes brown; moist.					
3	**YOUNG ALLUVIAL FAN DEPOSITS (Qyf)** Sand (SP): Off-White; dry to slightly moist; medium dense; fine-grained sand; with no fines.		6 11 11	1.3	99.5	MAX
5	@5': becomes slightly moist.		4 4 8	2.0	91.6	
7	@7': becomes off-white to light gray.		6 12 16	1.8	105.2	
8.5	Silt (ML): Light gray; dry to slightly moist; stiff; with limonite staining.					
10			8 10 14	18.7	95.1	
15	Sand (SP): Light gray light brown; slightly moist; dense; very fine-grained sand.		7 20 30	2.3	101.4	
16.5	Total Depth = 16.5 Feet No Groundwater Encountered Boring Backfilled with Cuttings.					

EXPLORATION LOG

Project: **VTT 72608**			Boring No.: **B-2**
Location: **4747 Daisy Ave, Long Beach**			Elevation: **+/- 38**
Job No.: **13-443**	Client: **Integral Communities**		Date: **3/4/14**
Drill Method: **Hollow-Stem Auger**	Driving Weight: **140 lbs / 30 in**		Logged By: **SHW**

Depth (Feet)	Lithology	Material Description	Water	Samples: Blows Per 6 Inches	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
0		**ASPHALTIC CONCRETE (A/C)** 4" thick, no aggregate base.							MAX EXP AT HYD SO4 pH RES CL
		ARTIFICIAL FILL (af) Clayey Silt (ML): Brown; moist; firm; slightly micaceous; with few very fine-grained sand.		3 4 7			7.1	92.2	
		YOUNG ALLUVIAL FAN DEPOSITS (Qyf) Sand (SP): Light gray; moist; medium dense; very fine-grained sand; with few silt.		3 6 9			26.0	87.0	
5		Silty Clay (CL): Dark olive brown; very moist; firm.							
		Sand (SP): Light gray light brown; moist; medium dense; very fine-grained sand; with some silt.		4 7 6			2.6	91.8	
10		Silty Clay (CL): Dark olive gray olive brown; very moist; stiff; with limonite staining and some very fine-grained sand.		6 11 16			17.0	110.9	
15		Sand (SP): Light gray light brown; slightly moist; dense; very fine-grained sand; with few silt.		12 19 23			6.0	100.6	
		Total Depth = 16.5 Feet No Groundwater Encountered Boring Backfilled with Cuttings.							
20									

EXPLORATION LOG - V3 13-443.GPJ PETRA.GDT 3/19/14

Petra Geotechnical, Inc.

EXPLORATION LOG

Project: VTT 72608		Boring No.: B-2A	
Location: 4747 Daisy Ave, Long Beach		Elevation: +/- 38	
Job No.: 13-443	Client: Integral Communities	Date: 3/4/14	
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: SHW	

Depth (Feet)	Lithology	Material Description	Water	Samples: Blows Per 6 Inches	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		ASPHALTIC CONCRETE (A/C) 3" thick; no aggregate base.							
		ARTIFICIAL FILL (af) Clayey Silt (ML): Olive gray; moist; firm; micaceous; with few very fine-grained sand.							
		YOUNG ALLUVIAL FAN DEPOSITS (Qyf) Sand (SP): Light gray; moist; medium dense; very fine-grained sand; with few to some silt.							
5		Total Depth = 3 Feet No Groundwater Encountered Boring Converted to Perc Hole and A/C Patched.							
10									
15									
20									

EXPLORATION LOG - V3 13-443.GPJ PETRA.GDT 3/19/14

PLATE A-3

EXPLORATION LOG

Project: **VTT 72608**		Boring No.: **B-3**
Location: **4747 Daisy Ave, Long Beach**		Elevation: **+/- 38**
Job No.: **13-443**	Client: **Integral Communities**	Date: **3/4/14**
Drill Method: **Hollow-Stem Auger**	Driving Weight: **140 lbs / 30 in**	Logged By: **SHW**

Depth (Feet)	Lith- ology	Material Description	Water	Samples: Blows Per 6 Inches	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		ARTIFICIAL FILL (af) Silty Sand (SM): Dark olive gray; very moist; loose; very fine-grained sand; with some clay.							
		YOUNG ALLUVIAL FAN DEPOSITS (Qyf) Sand (SP): Light gray off-white; dry to slightly moist; medium dense; very fine-grained sand; with few silt. @3': with increasing silt.		5 11 11			1.4	110.6	
				7 5 10			15.0	81.4	
5		Sandy Silt (ML): Light grayish-brown; slightly moist; firm; very fine-grained sand.							
		@6': becomes light gray; with limonite staining; increasing sand.		7 9 13			9.7	95.6	CON
10		Sand (SP): Off-White to light gray; dry to slightly moist; medium dense; very fine-grained sand; with limonite staining; no fines.		10 13 18			2.0	100.4	
15		@15': becomes dense.		12 17 24			1.8	99.6	
20		@20': becomes white to light gray; slightly moist; very fine- to fine-grained sand.		12 16 23			3.7	94.1	
		Total Depth = 21.5 Feet No Groundwater Encountered Boring Backfilled with Cuttings.							

PLATE A-4

Petra Geotechnical, Inc.

EXPLORATION LOG

Project: **VTT 72608**		Boring No.: **B-4**	
Location: **4747 Daisy Ave, Long Beach**		Elevation: **+/- 38**	
Job No.: **13-443**	Client: **Integral Communities**	Date: **3/4/14**	
Drill Method: **Hollow-Stem Auger**	Driving Weight: **140 lbs / 30 in**	Logged By: **SHW**	

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per 6 Inches	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
0		**ARTIFICIAL FILL (af)** Silty Sand (SM): Brown; very moist; loose; very fine-grained sand; with roots to 1/2".				X			MAX DSR
		YOUNG ALLUVIAL FAN DEPOSITS (Qyf) Sand (SP): Off-White light gray; slightly moist; medium dense; very fine-grained sand; with no fines.		4 6 7	X	X	4.3	85.0	
5		@5': with increasing silt. Sandy Silt (ML): Light gray; dry to slightly moist; stiff; very fine-grained sand.		7 9 12	X		4.6	89.7	CON
		Silty Clay (CL): Light gray; dry to slightly moist; stiff; porous; with limonite staining; root casts.		5 6 8	X		23.3	76.8	
10		@10': becomes dark olive gray.		6 13 21	X		5.2	110.9	
		Silty Sand (SM): Olive brown; dry to slightly moist; medium dense; very fine-grained sand.							
15		@15': becomes off-white to light gray; with decreasing silt.		8 12 20	X		1.9	93.2	
		Sand (SP): White light gray; dry to slightly moist; dense; very fine-grained sand.							
20		@20': same as above.		18 23 30	X		2.0	100.3	

PLATE A-5

EXPLORATION LOG

Project: **VTT 72608**		Boring No.: **B-4**	
Location: **4747 Daisy Ave, Long Beach**		Elevation: **+/- 38**	
Job No.: **13-443**	Client: **Integral Communities**	Date: **3/4/14**	
Drill Method: **Hollow-Stem Auger**	Driving Weight: **140 lbs / 30 in**	Logged By: **SHW**	

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per 6 Inches	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		@25': becomes very fine- to fine-grained sand.		21 26 26			2.1	103.9	
				11 15 15					
30		@30': becomes dark brown; slightly moist; medium dense; very fine-grained; with abundant organic material. @31': white; dry to slightly moist; dense; very fine-grained sand; no organics.		5 13 35			15.7	92.4	
35		@ 35': becomes medium dense; moist; fine- to coarse-grained sand; with limonite staining and 2-3" thick, gray clay interbeds.		5 5 8					
		<u>Interlayered Sand and Clay (SP/CL)</u>: Bluish-gray; very moist to wet; dense/very stiff; very fine-grained sand.							
40		@ 40': same as above.		5 16 30			20.7	99.2	
45		Total Depth = 41.5 Feet No Groundwater Encountered Boring Backfilled with Cuttings.							

PLATE A-7

EXPLORATION LOG

Project: **VTT 72608**		Boring No.: **B-5**
Location: **4747 Daisy Ave, Long Beach**		Elevation: **+/- 34**
Job No.: **13-443**	Client: **Integral Communities**	Date: **3/4/14**
Drill Method: **Hollow-Stem Auger**	Driving Weight: **140 lbs / 30 in**	Logged By: **SHW**

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per 6 Inches	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		ARTIFICIAL FILL (af) Silty Sand (SM): Grayish-brown; very moist; loose; very fine-grained sand.							
		Sand (SP): Gray; dry to slightly moist; loose; very fine-grained sand; with buried wood fragments (buried fire pit) and old bricks.							
5		**YOUNG ALLUVIAL FAN DEPOSITS (Qyf)** Sand (SP): Light gray light brown; slightly moist; loose; very fine-grained sand; with few silt.		3 4 6			2.7	87.4	
		@7': same as above.		3 5 7			3.1	88.5	
10		@10': same as above.		4 6 11			3.5	92.0	
15		Sandy Silt (ML): Light gray; slightly moist; very stiff; very fine-grained sand.		8 13 27			13.1	100.0	
		Total Depth = 16.5 Feet No Groundwater Encountered Boring Backfilled with Cuttings.							
20									

EXPLORATION LOG - V3 13-443.GPJ PETRA.GDT 3/19/14

PLATE A-7

13-443

SUMMARY

OF

CONE PENETRATION TEST DATA

Project:

4747 Daisy Avenue
Long Beach, CA
August 26, 2013

Prepared for:

Mr. Scott Winslow
Petra Geotechnical, Inc.
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Prepared by:

KTE

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SUMMARY

OF

CONE PENETRATION TEST DATA

1. INTRODUCTION

This report presents the results of a Cone Penetration Test (CPT) program carried out for the project located at 4747 Daisy Avenue in Long Beach, California. The work was performed by Kehoe Testing & Engineering (KTE) on August 26, 2013. The scope of work was performed as directed by Petra Geotechnical, Inc. personnel.

2. SUMMARY OF FIELD WORK

The fieldwork consisted of performing CPT soundings at four locations to determine the soil lithology. Groundwater measurements and hole collapse depths provided in **TABLE 2.1** are for information only. The readings indicate the apparent depth to which the hole is open and the apparent water level (if encountered) in the CPT probe hole at the time of measurement upon completion of the CPT. KTE does not warranty the accuracy of the measurements and the reported water levels may not represent the true or stabilized groundwater levels.

LOCATION	DEPTH OF CPT (ft)	COMMENTS/NOTES:
CPT-1	50	Hole open to 30.0 ft (dry)
CPT-2	50	Hole open to 30.0 ft (dry)
CPT-3	50	Hole open to 31.0 ft (dry)
CPT-4	50	Hole open to 29.5 ft (dry)

TABLE 2.1 - Summary of CPT Soundings

3. FIELD EQUIPMENT & PROCEDURES

The CPT soundings were carried out by **KTE** using an integrated electronic cone system manufactured by Vertek. The CPT soundings were performed in accordance with ASTM standards (D5778). The cone penetrometers were pushed using a 30-ton CPT rig. The cone used during the program was a 15 cm^2 cone and recorded the following parameters at approximately 2.5 cm depth intervals:

- Cone Resistance (qc)
- Sleeve Friction (fs)
- Dynamic Pore Pressure (u)
- Inclination
- Penetration Speed
- Pore Pressure Dissipation (at selected depths)

At location CPT-3, shear wave measurements were obtained at approximately 10-foot intervals. The shear wave is generated using an air-actuated hammer, which is located inside the front jack of the CPT rig. The cone has a triaxial geophone, which recorded the shear wave signal generated by the air hammer.

The above parameters were recorded and viewed in real time using a laptop computer. Data is stored at the KTE office for future analysis and reference. A complete set of baseline readings was taken prior to each sounding to determine temperature shifts and any zero load offsets. Monitoring base line readings ensures that the cone electronics are operating properly.

4. CONE PENETRATION TEST DATA & INTERPRETATION

The Cone Penetration Test data is presented in graphical form in the attached Appendix. These plots were generated using the CPeT-IT program. Penetration depths are referenced to ground surface. The soil classification on the CPT plots is derived from the attached CPT Classification Chart (Robertson) and presents major soil lithologic changes. The stratigraphic interpretation is based on relationships between cone resistance (qc), sleeve friction (fs), and penetration pore pressure (u). The friction ratio (Rf), which is sleeve friction divided by cone resistance, is a calculated parameter that is used along with cone resistance to infer soil behavior type. Generally, cohesive soils (clays) have high friction ratios, low cone resistance and generate excess pore water pressures. Cohesionless soils (sands) have lower friction ratios, high cone bearing and generate little (or negative) excess pore water pressures.

Tables of basic CPT output from the interpretation program CPeT-IT are provided for CPT data averaged over one foot intervals in the Appendix. Spreadsheet files of the averaged basic CPT output and averaged estimated geotechnical parameters are also included for use in further geotechnical analysis. We recommend a geotechnical engineer review the assumed input parameters and the calculated output from the CPeT-IT program. A summary of the equations used for the tabulated parameters is provided in the Appendix.

It should be noted that it is not always possible to clearly identify a soil type based on qc, fs and u. In these situations, experience, judgement and an assessment of the pore pressure data should be used to infer the soil behavior type.

If you have any questions regarding this information, please do not hesitate to call our office at (714) 901-7270.

Sincerely,

KEHOE TESTING & ENGINEERING

Richard W. Koester, Jr.
General Manager

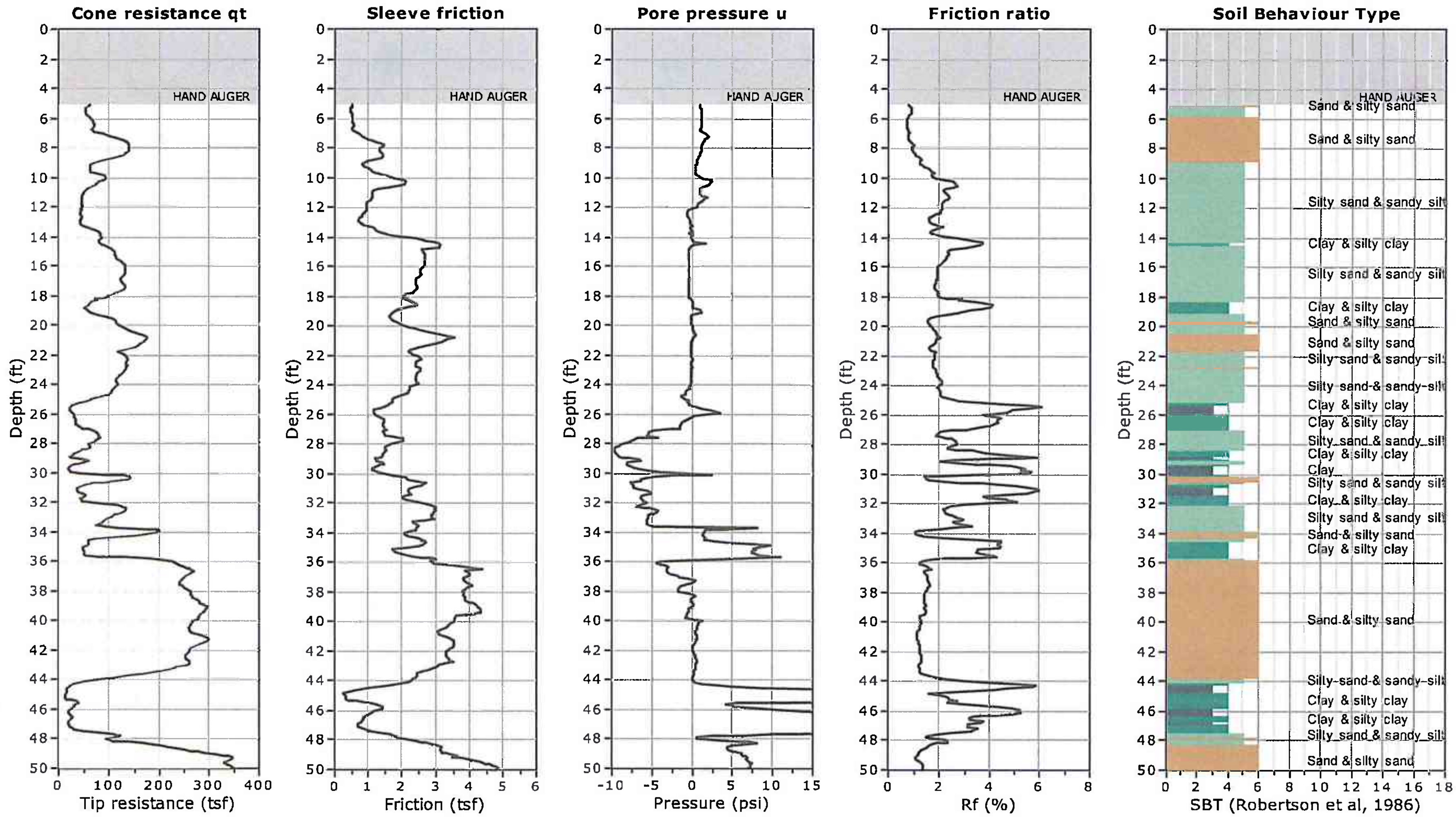
09/13/13-ds-4105

APPENDIX

Kehoe Testing and Engineering
714-901-7270
rich@kehoetesting.com
www.kehoetesting.com

Project: Petra Geotechnical
Location: 4747 Daisy Ave. Long Beach, CA

CPT: CPT-1
Total depth: 50.59 ft, Date: 8/26/2013
Cone Type: Vertek



Kehoe Testing and Engineering
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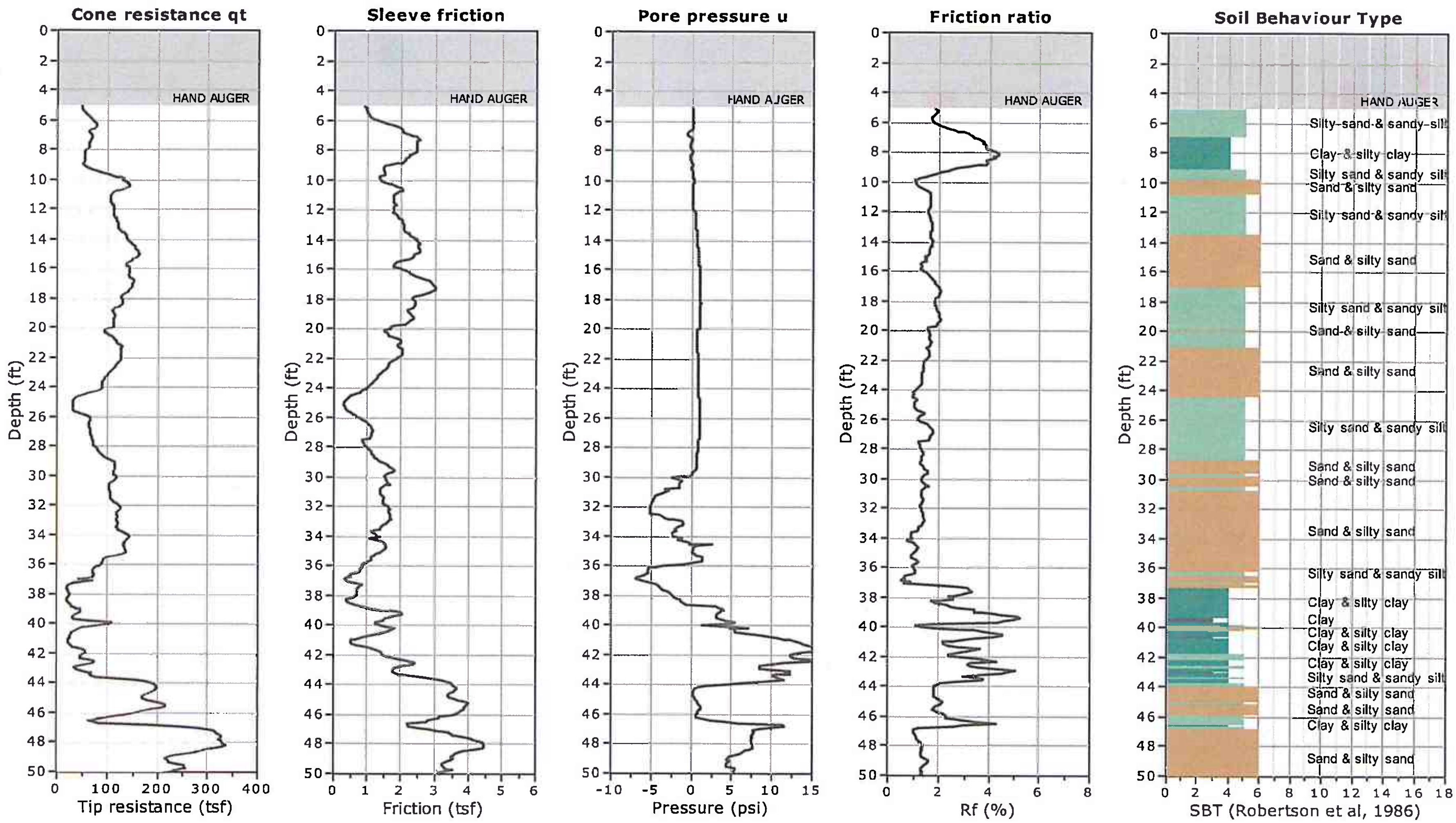
Project: Petra Geotechnical
Location: 4747 Daisy Ave. Long Beach, CA

CPT: CPT-2
Total depth: 50.76 ft, Date: 8/26/2013
Cone Type: Vertek



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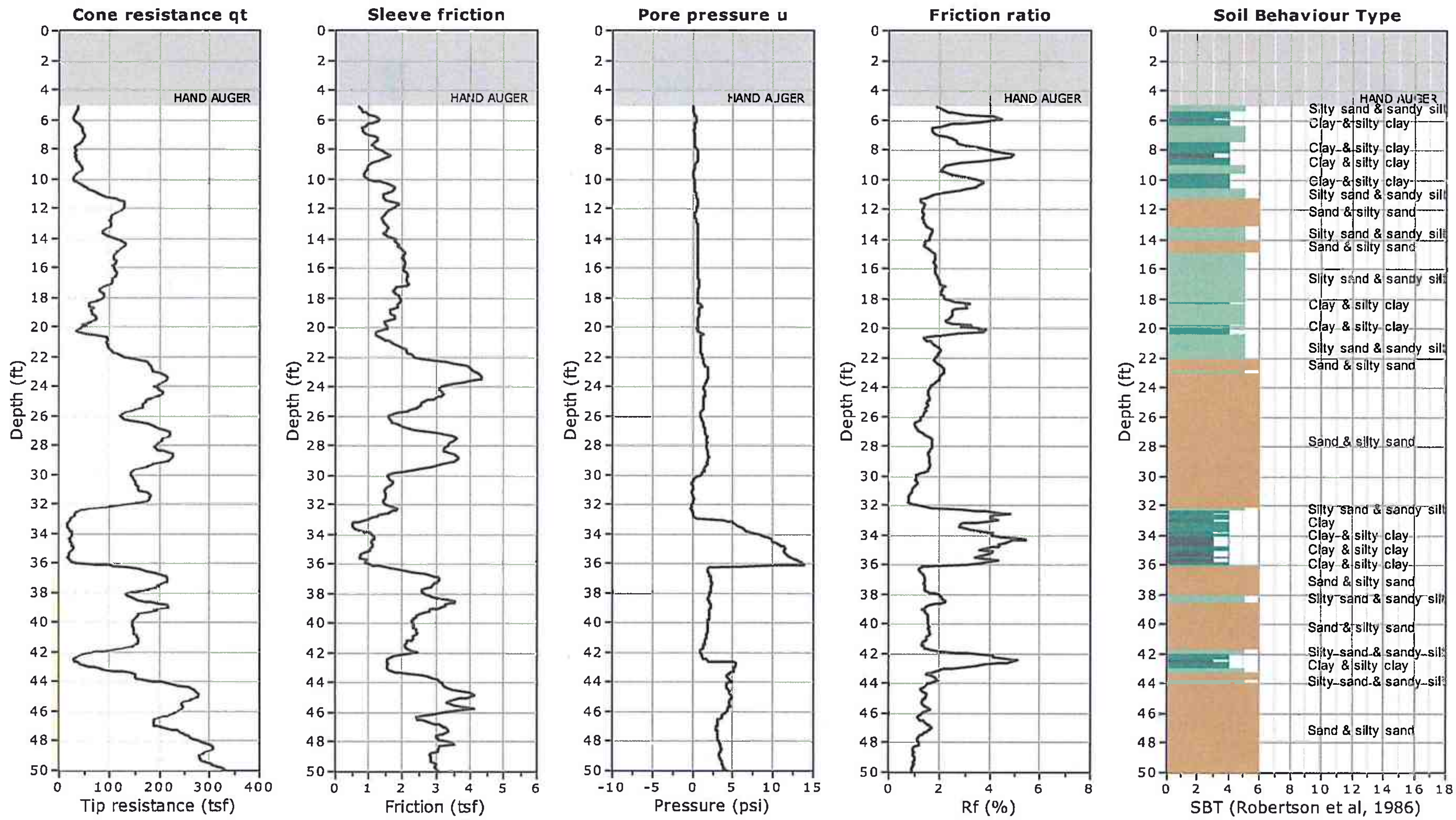
Project: Petra Geotechnical
Location: 4747 Daisy Ave. Long Beach, CA

CPT: CPT-3
Total depth: 50.56 ft, Date: 8/26/2013
Cone Type: Vertek



CPeT-IT v.1.7.6.3 - CPTU data presentation & interpretation software - Report created on: 8/27/2013, 6:24:12 PM
Project file: C:\PetraLBeach8-13\CPeT Data\Plot Data\Plots.cpt

Kehoe Testing and Engineering
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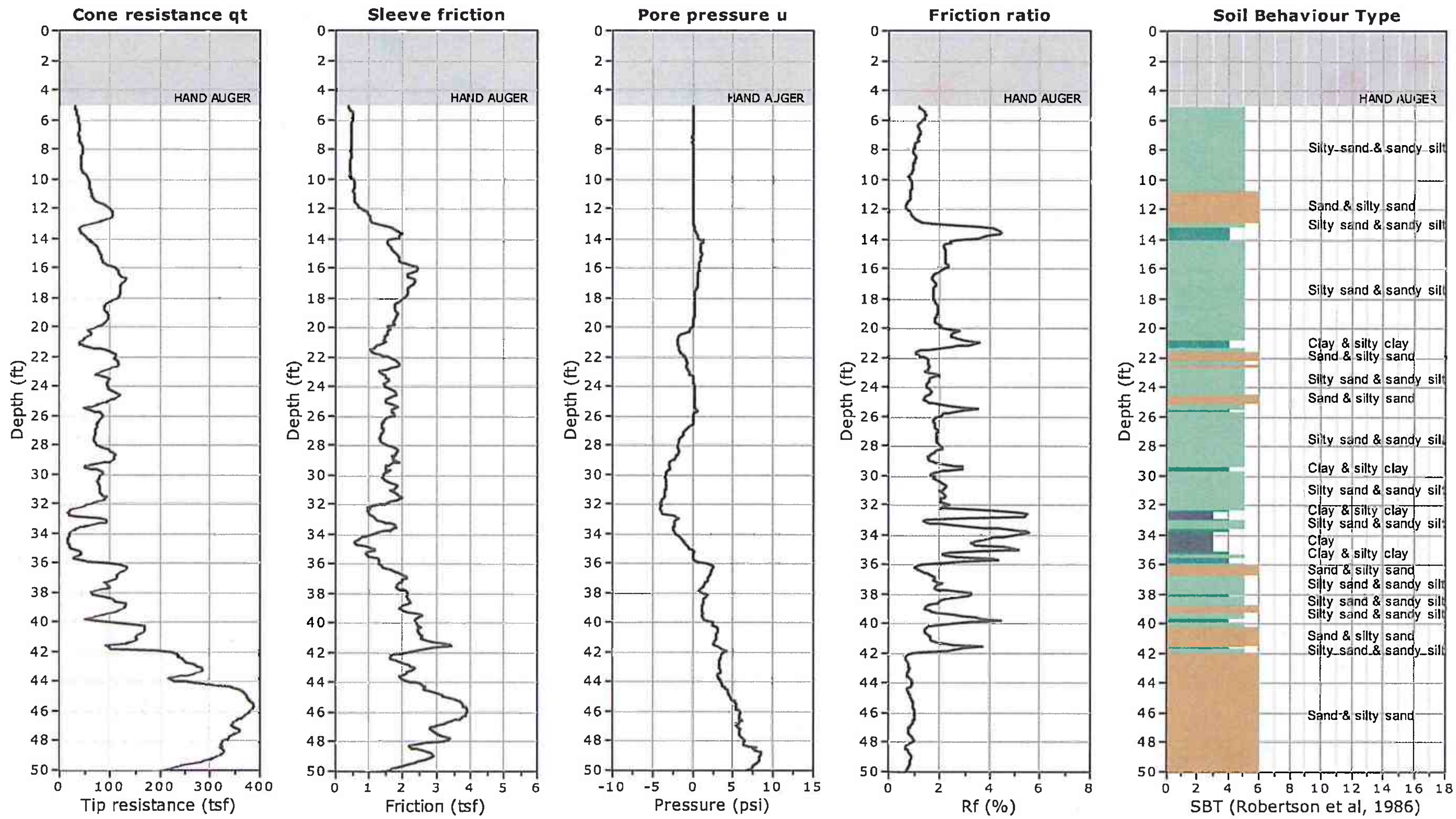
Project: Petra Geotechnical
Location: 4747 Daisy Ave. Long Beach, CA

CPT: CPT-4
Total depth: 50.48 ft, Date: 8/26/2013
Cone Type: Vertek



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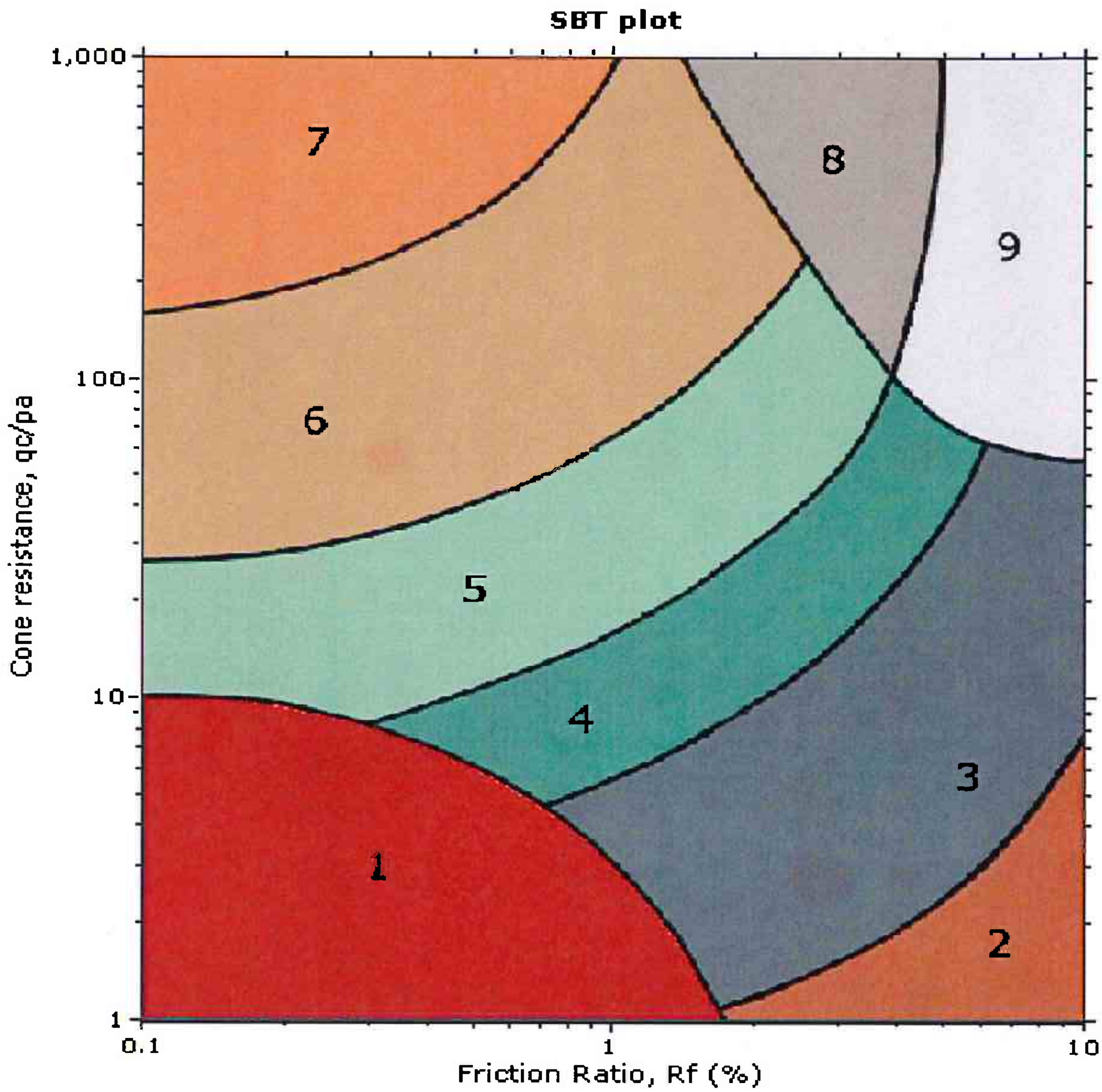


SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

	CPT-1	In situ data											Basic output data									
Depth (ft)	qc (tsf)	fs (tsf)	u (psi)	Other	qt (tsf)	Rf(%)	SBT	Ic SBT	ã (pcf)	ó,v (tsf)	u0 (tsf)	ó',vo (tsf)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn
1	82.1	0.64	0.47	0.78	82.1058	0.7795	6	1.9321	117.757	0.05888	0	0.0589	1393.5	0.78	0.0004	6	0.4987	2	1.6952	155.0822
2	68.7	0.38	0.32	0.55	68.7039	0.5531	6	1.91689	113.508	0.11563	0	0.1156	593.16	0.554	0.0003	6	0.4896	2	1.6645	129.6433
3	138.7	1.15	0.98	0.83	138.712	0.8291	6	1.76788	123.3241	0.17729	0	0.1773	781.38	0.8301	0.0005	6	0.4491	2	1.5506	261.8536
4	122.7	1.3	0.78	1.06	122.71	1.0594	6	1.87778	123.9222	0.23926	0	0.2393	511.88	1.0615	0.0005	6	0.4959	2	1.6656	231.4892
5	63.1	0.55	0.91	0.88	63.1111	0.8715	6	2.0536	116.0064	0.29726	0	0.2973	211.31	0.8756	0.001	6	0.556	2	1.8161	118.7287
6	64.2	0.5	1.09	0.78	64.2133	0.7787	6	2.02008	115.3512	0.35493	0	0.3549	179.92	0.783	0.0012	6	0.5558	1.8351	1.8091	110.7504
7	78.1	0.67	1.23	0.86	78.1151	0.8577	6	1.97381	117.9707	0.41392	0	0.4139	187.72	0.8623	0.0011	6	0.5545	1.6827	1.7985	123.5663
8	142.3	1.21	1.15	0.85	142.314	0.8502	6	1.76649	123.7588	0.4758	0	0.4758	298.11	0.8531	0.0006	6	0.4975	1.4883	1.6413	199.5
9	69.7	0.87	0.73	1.25	69.7089	1.2481	5	2.11165	119.6043	0.5356	0	0.5356	129.15	1.2577	0.0008	6	0.6274	1.5329	1.9747	100.2154
10	94.8	1.78	1.22	1.88	94.8149	1.8773	5	2.12931	125.5926	0.5984	0	0.5984	157.45	1.8893	0.0009	5	0.6485	1.4472	2.0219	128.8649
11	49.6	1.12	0.85	2.25	49.6104	2.2576	5	2.39011	120.6229	0.65871	0	0.6587	74.315	2.288	0.0013	5	0.7514	1.4278	2.2842	66.0532
12	44.6	0.96	0	2.14	44.6	2.1525	5	2.41171	119.2353	0.71833	0	0.7183	61.089	2.1877	0	5	0.7694	1.3472	2.3242	55.86963
13	43.5	0.72	-0.39	1.67	43.4952	1.6554	5	2.3485	117.0692	0.77686	0	0.7769	54.988	1.6855	-7E-04	5	0.7555	1.2629	2.2803	50.98689
14	84.8	2.1	-0.41	2.48	84.795	2.4766	5	2.24886	126.5298	0.84013	0	0.8401	99.931	2.5013	-4E-04	5	0.7299	1.1834	2.2047	93.89396
15	111.1	2.62	-0.46	2.36	111.094	2.3584	5	2.15303	128.8075	0.90453	0	0.9045	121.82	2.3777	-3E-04	5	0.7029	1.1165	2.1261	116.2741
16	133.5	2.61	-0.43	1.96	133.495	1.9551	5	2.03912	129.2275	0.96914	0	0.9691	136.75	1.9694	-2E-04	5	0.668	1.0604	2.0266	132.8148
17	125.3	2.37	-0.36	1.89	125.296	1.8915	5	2.04717	128.3671	1.03333	0	1.0333	120.25	1.9073	-2E-04	5	0.6789	1.0162	2.0475	119.343
18	97.8	1.92	-0.35	1.97	97.7957	1.9633	5	2.13349	126.2221	1.09644	0	1.0964	88.194	1.9855	-3E-04	5	0.7203	0.9747	2.1483	89.07615
19	57.3	1.8	1.06	3.14	57.313	3.1407	4	2.44189	124.4465	1.15866	0	1.1587	48.465	3.2055	0.0014	4	0.849	0.9258	2.4783	49.13367
20	122.1	2.13	0	1.75	122.1	1.7445	5	2.02938	127.5229	1.22242	0	1.2224	98.884	1.7621	0	5	0.695	0.9045	2.066	103.3343
21	172.9	3.29	0.05	1.9	172.901	1.9028	6	1.95642	131.5525	1.2882	0	1.2882	133.22	1.9171	2E-05	5	0.6724	0.8761	1.9984	142.0886
22	131.2	2.4	-0.13	1.83	131.198	1.8293	5	2.02292	128.5714	1.35249	0	1.3525	96.005	1.8483	-7E-05	5	0.7071	0.8407	2.0813	103.1614
23	133	2.54	-0.21	1.91	132.997	1.9098	5	2.03267	129.0195	1.41699	0	1.417	92.859	1.9304	-1E-04	5	0.718	0.8108	2.1017	100.8294
24	118.2	2.34	-0.28	1.98	118.197	1.9798	5	2.07894	128.1317	1.48106	0	1.4811	78.805	2.0049	-2E-04	5	0.7443	0.7786	2.1625	85.88193
25	64.9	1.69	-0.84	2.61	64.8897	2.6044	5	2.34646	124.288	1.5432	0	1.5432	41.049	2.6679	-1E-03	4	0.8622	0.7223	2.4645	43.24
26	30.7	1.19	2.69	3.87	30.7329	3.8721	4	2.70119	119.8986	1.60315	0	1.6032	18.17	4.0852	0.0067	3	1	0.66	2.8706	18.17029
27	56.3	1.54	-2.14	2.74	56.2738	2.7366	5	2.40597	123.2604	1.66478	0	1.6648	32.802	2.8201	-0.003	4	0.9029	0.6642	2.5561	34.27892
28	59.9	1.62	-8.72	2.71	59.7933	2.7093	5	2.38392	123.7789	1.72667	0	1.7267	33.629	2.7899	-0.011	4	0.901	0.6432	2.5435	35.29976
29	35.3	1.19	-7.44	3.39	35.2089	3.3798	4	2.6178	120.2302	1.78679	0	1.7868	18.705	3.5605	-0.016	3	1	0.5922	2.8231	18.70515
30	53.6	1.64	-0.18	3.06	53.5978	3.0598	4	2.45479	123.6019	1.84859	0	1.8486	27.994	3.1691	-3E-04	4	0.9457	0.59	2.6459	28.85504
31	38.3	2.25	-7.24	5.9	38.2114	5.8883	3	2.75991	125.0905	1.91113	0	1.9111	18.994	6.1983	-0.014	3	1	0.5537	2.9751	18.99408
32	76.7	2.66	-5.82	3.47	76.6288	3.4713	5	2.38576	128.0125	1.97514	0	1.9751	37.797	3.5631	-0.006	4	0.9259	0.5611	2.5779	39.58583
33	102.9	2.93	-5.63	2.85	102.831	2.8493	5	2.23658	129.4372	2.03986	0	2.0399	49.411	2.907	-0.004	5	0.8693	0.5652	2.4203	53.83831
34	194.8	2.02	0.82	1.04	194.81	1.0369	6	1.72594	128.2744	2.104	0.0312	2.0728	92.969	1.0482	0.0001	6	0.6616	0.6409	1.8726	116.7243
35	48.1	2.11	7.26	4.38	48.1889	4.3786	4	2.59738	125.1863	2.16659	0.0624	2.1042	21.872	4.5847	0.01	3	1	0.5029	2.842	21.87173
36	227.8	2.77	-3.98	1.21	227.751	1.2162	6	1.7309	130.9658	2.23207	0.0936	2.1385	105.46	1.2283	-0.002	6	0.6664	0.6257	1.877	133.3601
37	252	3.88	-1.64	1.54	251.98	1.5398	6	1.78212	133.6781	2.29891	0.1248	2.1741	114.84	1.554	-1E-03	6	0.6871	0.6097	1.9271	143.8669
38	264.2	3.81	-1.59	1.44	264.181	1.4422	6	1.74707	133.6602	2.36574	0.156	2.2097	118.48	1.4552	-0.001	6	0.6758	0.6079	1.893	150.4267
39	292.6	4.27	0.1	1.46	292.601	1.4593	6	1.72429	134.7434	2.43311	0.1872	2.2459	129.2	1.4716	-6E-04	6	0.668	0.6049	1.8679	165.8764
40	267.5	3.49	0.98	1.3	267.512	1.3046	6	1.7095	133.0488	2.49964	0.2184	2.2812	116.17	1.3169	-6E-04	6	0.6676	0.5988	1.8625	149.9652
41	288	3.35	0.62	1.16	288.008	1.1632	6	1.65056	132.9293	2.5661	0.2496	2.3165	123.22	1.1736	-7E-04	6	0.6463	0.6026	1.8022	162.5679
42	260.8	3.34	0.15	1.28	260.802	1.2807	6	1.71016	132.6654	2.63244	0.2808	2.3516	109.78	1.2937	-0.001	6	0.6749	0.5833	1.8728	142.3265
43	254.3	3.06	0.46	1.21	254.306	1.2033	6	1.69625	131.9633	2.69842	0.312	2.3864	105.43	1.2162	-0.001	6	0.6734	0.5783	1.8645	137.5097
44	64.9	2.25	0.07	3.47	64.9009	3.4668	4	2.43463	126.3825	2.76161	0.3432	2.4184	25.694	3.6209	-0.005	4	1	0.4375	2.7219	25.69427
45	13.2	0.31	69	2.2	14.0446	2.2073	4	2.82031	108.1462	2.81568	0.3744	2.4413	4.5996	2.7607	0.4091	3	1	0.4334	3.2619	4.59958
46	22.8	1.17	10.82	5.1	22.9324	5.1019	3	2.87584	119.0604	2.87521	0.4056	2.4696	8.1216	5.8333	0.0186	3	1	0.4285	3.2403	8.12161
47	20.7	0.62	34.47	2.94	21.1219	2.9353	4	2.74886	114.2133	2.93232	0.4368	2.4955	7.2889	3.4085	0.1124	3	1	0.424	3.1416	7.2889
48	91.2	2.29	0.34	2.52	91.2042	2.5109	5	2.23127	127.3413	2.99599	0.468	2.528	34.893	2.5961	-0.005	4	0.9248	0.4469	2.5053	37.25475
49	307.7	3.61	6.19	1.17	307.776	1.1729	6	1.6355	133.6382	3.06281	0.4992	2.5636	118.86	1.1847	-2E-04	6	0.6607	0.5573	1.809	160.4847
50	351.6	4.78	6.96	1.36	351.685	1.3592	6	1.6525	136.0176	3.13082	0.5304	2.6004	134.04	1.3714	-8E-05	6	0.6666	0.5492	1.8199	180.8972

	CPT-2	In situ data										Basic output data								
Depth (ft)	qc (tsf)	fs (tsf)	u (psi)	Other	qt (tsf)	Rf(%)	SBT	Ic SBT	ã (pcf)	ó,v (tsf)	u0 (tsf)	ó',vo (tsf)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn
1	39.8	0.43	0.02	1.09	39.8002	1.0804	5	2.27182	113.081	0.05654	0	0.0565	702.92	1.0819	4E-05	6	0.6255	2	2.0285	75.12221
2	61.7	0.83	0.11	1.34	61.7014	1.3452	5	2.17339	118.9623	0.11602	0	0.116	530.81	1.3477	0.0001	6	0.5975	2	1.9475	116.4065
3	67.8	1.32	0.02	1.96	67.8002	1.9469	5	2.24604	122.587	0.17732	0	0.1773	381.37	1.952	2E-05	5	0.6336	2	2.0348	127.8186
4	40.3	1	-0.14	2.49	40.2983	2.4815	4	2.48526	119.2866	0.23696	0	0.237	169.06	2.4962	-3E-04	5	0.7255	2	2.2685	75.72257
5	47.2	0.86	-0.06	1.82	47.1993	1.8221	5	2.34662	118.5686	0.29624	0	0.2962	158.33	1.8336	-9E-05	5	0.6738	2	2.1255	88.65451
6	70.7	1.3	-0.06	1.84	70.6993	1.8388	5	2.2159	122.5774	0.35753	0	0.3575	196.74	1.8481	-6E-05	5	0.632	1.9852	2.0079	131.9757
7	66.9	2.26	-0.75	3.39	66.8908	3.3786	4	2.41748	126.4886	0.42078	0	0.4208	157.97	3.4	-8E-04	5	0.7205	1.9434	2.2319	122.0836
8	56.9	2.45	-0.06	4.31	56.8993	4.3059	4	2.54227	126.6847	0.48412	0	0.4841	116.53	4.3428	-8E-05	9	0.7783	1.8378	2.3745	97.9866
9	53.1	1.69	-0.06	3.18	53.0993	3.1827	4	2.46961	123.7989	0.54602	0	0.546	96.248	3.2158	-8E-05	5	0.7613	1.6547	2.3243	82.18512
10	131.9	1.37	0.22	1.04	131.903	1.0386	6	1.84864	124.4822	0.60826	0	0.6083	215.85	1.0435	0.0001	6	0.5476	1.3541	1.7558	168.0265
11	107.8	1.79	0.11	1.66	107.801	1.6605	5	2.05218	125.9466	0.67123	0	0.6712	159.6	1.6709	7E-05	6	0.6319	1.3332	1.969	134.9809
12	109.1	1.76	0.13	1.61	109.102	1.6132	5	2.03967	125.8522	0.73416	0	0.7342	147.61	1.6241	9E-05	6	0.6364	1.2619	1.9729	129.2362
13	119.9	2.07	0.44	1.73	119.905	1.7264	5	2.0316	127.2696	0.79779	0	0.7978	149.3	1.7379	0.0003	6	0.6427	1.199	1.9816	134.9667
14	139.4	2.45	0.61	1.76	139.407	1.7574	6	1.99224	128.8703	0.86223	0	0.8622	160.68	1.7684	0.0003	6	0.637	1.1393	1.9581	149.174
15	162.4	2.39	0.77	1.47	162.409	1.4716	6	1.89061	129.0614	0.92676	0	0.9268	174.24	1.48	0.0003	6	0.6066	1.0837	1.8706	165.3911
16	144.6	2.02	0.94	1.39	144.612	1.3969	6	1.90894	127.5476	0.99053	0	0.9905	144.99	1.4065	0.0005	6	0.621	1.0418	1.9008	141.4123
17	150.3	2.96	1	1.97	150.312	1.9692	5	2.00724	130.4377	1.05575	0	1.0558	141.37	1.9832	0.0005	5	0.6661	1.0015	2.0111	141.2695
18	127.8	2.31	0.98	1.8	127.812	1.8073	5	2.02684	128.228	1.11987	0	1.1199	113.13	1.8233	0.0006	5	0.6816	0.9621	2.0438	115.1934
19	112.5	2.28	1.02	2.03	112.512	2.0264	5	2.10098	127.8214	1.18378	0	1.1838	94.045	2.048	0.0007	5	0.7182	0.9226	2.1317	97.0677
20	89	1.64	0.87	1.85	89.0107	1.8425	5	2.1433	124.8391	1.2462	0	1.2462	70.426	1.8686	0.0007	5	0.7435	0.8855	2.1903	73.44425
21	119	1.98	0.61	1.67	119.007	1.6638	5	2.02242	126.926	1.30966	0	1.3097	89.869	1.6823	0.0004	5	0.7028	0.8608	2.0754	95.75003
22	127.5	1.89	0.77	1.48	127.509	1.4822	6	1.96569	126.7539	1.37304	0	1.373	91.867	1.4984	0.0004	5	0.6879	0.8359	2.0281	99.64956
23	103.9	1.35	0.77	1.3	103.909	1.2992	6	1.99068	123.7928	1.43493	0	1.4349	71.414	1.3174	0.0005	5	0.7063	0.8064	2.0695	78.09804
24	89.1	0.93	0.85	1.05	89.1104	1.0437	6	1.97985	120.6912	1.49528	0	1.4953	58.595	1.0615	0.0007	5	0.7111	0.782	2.0745	64.75151
25	30.8	0.31	0.94	1.01	30.8115	1.0061	5	2.34908	110.0624	1.55031	0	1.5503	18.874	1.0594	0.0023	5	0.8781	0.7151	2.5052	19.77413
26	62.8	0.72	0.94	1.14	62.8115	1.1463	5	2.12478	117.9655	1.60929	0	1.6093	38.031	1.1764	0.0011	5	0.7858	0.7193	2.2564	41.60508
27	66.1	1.13	0.94	1.72	66.1115	1.7092	5	2.2167	121.3883	1.66999	0	1.67	38.588	1.7535	0.0011	5	0.8282	0.6853	2.3587	41.73571
28	75.1	1	0.69	1.34	75.1085	1.3314	5	2.10424	120.8052	1.73039	0	1.7304	42.406	1.3628	0.0007	5	0.7894	0.6782	2.2507	47.0349
29	110.5	1.42	0.69	1.28	110.508	1.285	6	1.96768	124.3128	1.79254	0	1.7925	60.649	1.3062	0.0005	5	0.7369	0.6781	2.1052	69.67346
30	117.3	1.51	-1.96	1.29	117.276	1.2876	6	1.94931	124.9074	1.855	0	1.855	62.222	1.3083	-0.001	5	0.7355	0.6617	2.0938	72.18323
31	105.2	1.36	-3.33	1.3	105.159	1.2933	6	1.9855	123.8759	1.91694	0	1.9169	53.858	1.3173	-0.002	5	0.7583	0.6372	2.1459	62.17744
32	124.9	1.63	-5.12	1.3	124.837	1.3057	6	1.93375	125.6194	1.97975	0	1.9798	62.057	1.3267	-0.003	5	0.7415	0.6284	2.0941	72.96616
33	119.4	1.62	-1.04	1.36	119.387	1.3569	6	1.95932	125.4655	2.04248	0	2.0425	57.452	1.3806	-6E-04	5	0.7589	0.6071	2.132	67.32266
34	120.9	1.34	-2.3	1.11	120.872	1.1086	6	1.89578	124.1072	2.10453	0.0312	2.0733	57.283	1.1283	-0.002	5	0.7376	0.6089	2.072	68.34273
35	137.1	1.43	0.16	1.04	137.102	1.043	6	1.83743	124.8901	2.16698	0.0624	2.1046	64.115	1.0598	-4E-04	6	0.7155	0.6114	2.0102	77.96764
36	83.1	0.88	-4.82	1.06	83.041	1.0597	6	2.00795	120.1148	2.22703	0.0936	2.1334	37.88	1.0889	-0.005	5	0.7968	0.5719	2.2199	43.68258
37	69.2	0.43	-5.78	0.62	69.1293	0.622	6	1.94072	114.4276	2.28425	0.1248	2.1595	30.955	0.6433	-0.008	5	0.779	0.5737	2.17	36.23979
38	25.1	0.64	-2.25	2.54	25.0725	2.5526	4	2.65283	114.8638	2.34168	0.156	2.1857	10.4	2.8156	-0.014	3	1	0.4841	2.9672	10.39986
39	43.5	1.58	3.86	3.63	43.5473	3.6282	4	2.57108	122.8227	2.40309	0.1872	2.2159	18.568	3.8402	0.0022	3	1	0.4775	2.8463	18.56776
40	94.4	1.38	0.08	1.46	94.401	1.4619	5	2.05597	123.7195	2.46495	0.2184	2.2466	40.923	1.501	-0.002	5	0.8245	0.5375	2.2786	46.70509
41	23.5	0.5	12.37	2.11	23.6514	2.114	4	2.62386	112.9152	2.52141	0.2496	2.2718	9.301	2.3663	0.0303	3	1	0.4658	2.9662	9.30096
42	53.3	1.36	12.52	2.54	53.4532	2.5443	5	2.40066	122.2255	2.58252	0.2808	2.3017	22.101	2.6734	0.0122	4	0.9816	0.4663	2.6841	22.41958
43	32.6	1.71	10.57	5.23	32.7294	5.2247	3	2.77035	122.7048	2.64387	0.312	2.3319	12.902	5.6838	0.0149	3	1	0.4538	3.0766	12.90185
44	190.4	3.52	4.24	1.85	190.452	1.8482	6	1.91991	132.2828	2.71002	0.3432	2.3668	79.323	1.8749	-2E-04	5	0.7653	0.5401	2.1083	95.82264
45	171.6	3.7	0.62	2.15	171.608	2.1561	5	2.00036	132.3936	2.77621	0.3744	2.4018	70.293	2.1915	-0.002	5	0.8025	0.518	2.2016	82.64948
46	152.5	3.58	0.7	2.35	152.509	2.3474	5	2.06139	131.8646	2.84214	0.4056	2.4365	61.426	2.392	-0.002	5	0.8328	0.4993	2.2768	70.62141
47	268.4	2.81	7.46	1.05	268.491	1.0466	6	1.63479	131.472	2.90788	0.4368	2.4711	107.48	1.0581	0.0004	6	0.6561	0.5732	1.8084	143.8789
48	329.7	4.49	7.31	1.36	329.789	1.3615	6	1.66928	135.4028	2.97558	0.468	2.5076	130.33	1.3739	0.0002	6	0.6669	0.5625	1.8323	173.7324
49	218.1	3.54	4.42	1.62	218.154	1.6227	6	1.83885	132.6555	3.04191	0.4992	2.5427	84.6	1.6457	-8E-04	5	0.747	0.5195	2.0384	105.6078
50	216.2	3.05	5.15	1.41	216.263	1.4103	6	1.79432	131.5441	3.10768	0.5304	2.5773	82.705	1.4309	-8E-04	6	0.7334	0.5205	1.9983	104.8583

	CPT-3	In situ data										Basic output data								
Depth (ft)	qc (tsf)	fs (tsf)	u (psi)	Other	qt (tsf)	Rf(%)	SBT	Ic SBT	ã (pcf)	ó,v (tsf)	u0 (tsf)	ó',vo (tsf)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn
1	54.6	0.44	0.06	0.8	54.6007	0.8059	5	2.08726	114.0204	0.05701	0	0.057	956.74	0.8067	8E-05	6	0.5544	2	1.8416	103.0967
2	36.6	0.49	0.06	1.34	36.6007	1.3388	5	2.35426	113.8323	0.11393	0	0.1139	320.27	1.343	0.0001	5	0.6617	2	2.1163	68.96613
3	35.7	0.59	0.14	1.66	35.7017	1.6526	5	2.41641	115.1306	0.17149	0	0.1715	207.18	1.6606	0.0003	5	0.6905	2	2.1848	67.15803
4	45.3	0.89	0.2	1.96	45.3025	1.9646	5	2.38112	118.7195	0.23085	0	0.2309	195.24	1.9746	0.0003	5	0.684	2	2.1603	85.19281
5	37.1	0.68	0.06	1.85	37.1007	1.8329	5	2.4302	116.2631	0.28898	0	0.289	127.38	1.8472	0.0001	5	0.7035	2	2.2042	69.58033
6	31.3	1.3	0.41	4.16	31.305	4.1527	4	2.71572	120.5904	0.34928	0	0.3493	88.628	4.1995	0.001	4	0.8226	2	2.5093	58.51149
7	51.2	1.03	0.24	2.02	51.2029	2.0116	5	2.34697	120.087	0.40932	0	0.4093	124.09	2.0278	0.0003	5	0.6869	1.9201	2.1443	92.17314
8	33.3	1.35	0.44	4.05	33.3054	4.0534	4	2.68882	121.0177	0.46983	0	0.4698	69.888	4.1114	0.001	4	0.8222	1.9494	2.4928	60.49535
9	42	1.01	0.25	2.4	42.0031	2.4046	5	2.4627	119.4605	0.52956	0	0.5296	78.317	2.4353	0.0004	5	0.7525	1.6834	2.3033	65.98383
10	27.3	1.01	0.25	3.72	27.3031	3.6992	4	2.72654	118.4099	0.58877	0	0.5888	45.373	3.7808	0.0007	4	0.8602	1.6558	2.5786	41.80387
11	79.7	1.29	0.37	1.61	79.7045	1.6185	5	2.14013	122.8133	0.65017	0	0.6502	121.59	1.6318	0.0003	5	0.6592	1.3786	2.0435	102.9968
12	124.8	1.64	0.44	1.31	124.805	1.3141	6	1.93575	125.6635	0.713	0	0.713	174.04	1.3216	0.0003	6	0.595	1.2647	1.8669	148.3243
13	104.6	1.49	0.53	1.42	104.606	1.4244	6	2.01554	124.531	0.77527	0	0.7753	133.93	1.435	0.0004	6	0.6328	1.2175	1.9584	119.4735
14	113.3	1.8	0.71	1.59	113.309	1.5886	5	2.02327	126.1089	0.83832	0	0.8383	134.16	1.6004	0.0005	6	0.645	1.162	1.9819	123.5175
15	112.9	2.08	0.63	1.84	112.908	1.8422	5	2.07003	127.1582	0.9019	0	0.9019	124.19	1.8571	0.0004	5	0.671	1.1131	2.0428	117.8313
16	109	2	0.72	1.83	109.009	1.8347	5	2.07943	126.7855	0.9653	0	0.9653	111.93	1.8511	0.0005	5	0.6828	1.0647	2.0659	108.7152
17	104.9	2.17	0.82	2.07	104.91	2.0684	5	2.12839	127.2889	1.02894	0	1.0289	100.96	2.0889	0.0006	5	0.7096	1.02	2.1285	100.143
18	87.9	1.92	0.57	2.19	87.907	2.1841	5	2.19896	125.9621	1.09192	0	1.0919	79.507	2.2116	0.0005	5	0.7451	0.9768	2.2138	80.14684
19	65.6	1.61	0.63	2.46	65.6077	2.454	5	2.32507	123.96	1.1539	0	1.1539	55.857	2.4979	0.0007	5	0.8029	0.9328	2.3579	56.81968
20	43	1.54	0.46	3.59	43.0056	3.5809	4	2.57107	122.6046	1.2152	0	1.2152	34.39	3.6851	0.0008	4	0.9089	0.8818	2.6285	34.82607
21	90.8	1.7	0.85	1.87	90.8104	1.872	5	2.14185	125.1509	1.27778	0	1.2778	70.069	1.8988	0.0007	5	0.7468	0.8686	2.1948	73.49768
22	132.5	2.39	1.11	1.81	132.514	1.8036	5	2.01547	128.5652	1.34206	0	1.3421	97.739	1.822	0.0006	5	0.703	0.8461	2.0718	104.889
23	188.8	4.17	1.76	2.21	188.822	2.2084	6	1.98269	133.5017	1.40881	0	1.4088	133.03	2.225	0.0007	5	0.6947	0.8197	2.0415	145.1803
24	191.2	3.16	1.38	1.65	191.217	1.6526	6	1.88141	131.5031	1.47456	0	1.4746	128.68	1.6654	0.0005	6	0.6623	0.8027	1.9491	143.9381
25	172.2	2.63	1.21	1.53	172.215	1.5272	6	1.88537	129.9045	1.53952	0	1.5395	110.86	1.5409	0.0005	6	0.6717	0.7774	1.9656	125.3884
26	120.1	1.55	1	1.29	120.112	1.2905	6	1.94241	125.157	1.60209	0	1.6021	73.972	1.3079	0.0006	5	0.7049	0.7465	2.045	83.60532
27	213.5	2.74	1.49	1.28	213.518	1.2833	6	1.76688	130.7287	1.66746	0	1.6675	127.05	1.2934	0.0005	6	0.6364	0.7487	1.857	149.9005
28	191.7	3.31	1.67	1.72	191.72	1.7265	6	1.89524	131.8489	1.73338	0	1.7334	109.6	1.7422	0.0006	6	0.6936	0.7101	1.9992	127.4974
29	218.6	3.53	1.76	1.62	218.622	1.6147	6	1.83659	132.64	1.7997	0	1.7997	120.48	1.6281	0.0006	6	0.6756	0.6985	1.9434	143.1334
30	143.4	1.47	0.91	1.02	143.411	1.025	6	1.81791	125.2017	1.8623	0	1.8623	76.007	1.0385	0.0005	6	0.682	0.6801	1.9524	90.97711
31	159.6	1.46	-0.06	0.91	159.599	0.9148	6	1.75028	125.4126	1.92501	0	1.925	81.908	0.926	-3E-05	6	0.6604	0.6735	1.8879	100.3666
32	134.3	1.52	-0.13	1.13	134.298	1.1318	6	1.86808	125.2863	1.98765	0	1.9877	66.566	1.1488	-7E-05	6	0.7156	0.6369	2.0249	79.64079
33	21.5	0.85	3.89	3.96	21.5476	3.9448	3	2.82284	116.5706	2.04594	0	2.0459	9.5319	4.3586	0.0144	3	1	0.5172	3.1083	9.53189
34	26.8	1.1	8.28	4.1	26.9014	4.089	4	2.76008	118.9984	2.10544	0.0312	2.0742	11.954	4.4362	0.0228	3	1	0.5101	3.0348	11.95422
35	28	1.05	11.55	3.73	28.1414	3.7312	4	2.7191	118.7679	2.16482	0.0624	2.1024	12.356	4.0421	0.0296	3	1	0.5033	2.9987	12.35553
36	59.6	1.05	13.83	1.76	59.7693	1.7568	5	2.25767	120.6051	2.22512	0.0936	2.1315	26.997	1.8247	0.0157	5	0.9025	0.5315	2.496	28.90486
37	216.4	3.15	2.24	1.45	216.427	1.4555	6	1.80457	131.782	2.29102	0.1248	2.1662	98.853	1.471	0.0002	6	0.6985	0.6063	1.9578	122.6924
38	135.4	2.67	2.07	1.97	135.425	1.9716	5	2.03764	129.4288	2.35573	0.156	2.1997	60.494	2.0065	-5E-05	5	0.8026	0.5558	2.2272	69.89481
39	216.4	2.97	2.18	1.37	216.427	1.3723	6	1.78506	131.3515	2.42141	0.1872	2.2342	95.786	1.3878	-1E-04	6	0.6974	0.5938	1.9466	120.091
40	144.4	2.32	1.81	1.61	144.422	1.6064	6	1.9532	128.5576	2.48568	0.2184	2.2673	62.602	1.6345	-6E-04	5	0.7755	0.5538	2.1475	74.28299
41	156.7	2.28	1.67	1.46	156.72	1.4548	6	1.89753	128.6297	2.55	0.2496	2.3004	67.019	1.4789	-8E-04	5	0.7553	0.5562	2.0903	81.0442
42	66	2.3	0.86	3.48	66.0105	3.4843	4	2.43113	126.5847	2.61329	0.2808	2.3325	27.18	3.6279	-0.003	4	0.9904	0.4571	2.7015	27.38637
43	69.2	1.55	5.19	2.23	69.2635	2.2378	5	2.28039	123.8143	2.6752	0.312	2.3632	28.177	2.3277	0.0009	4	0.9342	0.4721	2.5509	29.70711
44	203.3	3.19	4.59	1.57	203.356	1.5687	6	1.84688	131.7224	2.74106	0.3432	2.3979	83.664	1.5901	-6E-05	5	0.7384	0.5466	2.0337	103.6317
45	276.1	3.88	4.87	1.4	276.16	1.405	6	1.7263	133.9016	2.80801	0.3744	2.4336	112.32	1.4194	-9E-05	6	0.6871	0.5643	1.8945	145.77
46	234.6	3.04	4.21	1.29	234.652	1.2955	6	1.74328	131.7191	2.87387	0.4056	2.4683	93.903	1.3116	-4E-04	6	0.7012	0.5521	1.9273	120.9438
47	193.9	3.28	2.85	1.69	193.935	1.6913	6	1.88517	131.8103	2.93978	0.4368	2.503	76.307	1.7173	-0.001	5	0.7645	0.5178	2.0892	93.46103
48	280.9	3.4	3.31	1.21	280.941	1.2102	6	1.67075	132.9771	3.00626	0.468	2.5383	109.5	1.2233	-8E-04	6	0.6746	0.5542	1.8487	145.5622
49	258.2	2.83	3.29	1.1	258.24	1.0959	6	1.66097	131.429	3.07198	0.4992	2.5728	99.18	1.1091	-0.001	6	0.6765	0.5483	1.8491	132.213
50	323.1	3.09	3.97	0.96	323.149	0.9562	6	1.553	132.619	3.13829	0.5304	2.6079	122.71	0.9656	-8E-04	6	0.6315	0.5657	1.7266	171.099

	CPT-4	In situ data										Basic output data								
Depth (ft)	qc (tsf)	fs (tsf)	u (psi)	Other	qt (tsf)	Rf(%)	SBT	Ic SBT	ã (pcf)	ó,v (tsf)	u0 (tsf)	ó',vo (tsf)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn
1	129.1	1.32	0.12	1.02	129.101	1.0225	6	1.85104	124.1578	0.06208	0	0.0621	2078.6	1.0229	7E-05	6	0.4772	2	1.6386	243.9059
2	68.2	0.65	0.03	0.95	68.2004	0.9531	6	2.04841	117.4179	0.12079	0	0.1208	563.63	0.9548	3E-05	6	0.5469	2	1.814	128.6817
3	46.9	0.83	-0.16	1.77	46.898	1.7698	5	2.34083	118.2932	0.17993	0	0.1799	259.64	1.7766	-3E-04	5	0.6651	2	2.1172	88.30499
4	27	0.42	-0.16	1.56	26.998	1.5557	5	2.50006	111.9622	0.23592	0	0.2359	113.44	1.5694	-4E-04	5	0.7235	2	2.2634	50.58487
5	31.8	0.36	-0.07	1.14	31.7991	1.1321	5	2.36459	111.2335	0.29153	0	0.2915	108.08	1.1426	-2E-04	5	0.6726	2	2.1228	59.55462
6	37.5	0.51	-0.07	1.35	37.4991	1.36	5	2.34956	114.1842	0.34862	0	0.3486	106.56	1.3728	-1E-04	5	0.6728	2	2.1164	70.22066
7	38.7	0.47	-0.1	1.21	38.6988	1.2145	5	2.3103	113.6634	0.40546	0	0.4055	94.445	1.2274	-2E-04	5	0.6676	1.8972	2.0931	68.65983
8	45.7	0.45	-0.07	0.98	45.6991	0.9847	5	2.19953	113.7507	0.46233	0	0.4623	97.845	0.9948	-1E-04	6	0.6403	1.6992	2.0177	72.64417
9	44.3	0.44	-0.07	1	44.2991	0.9933	5	2.21288	113.5104	0.51909	0	0.5191	84.341	1.005	-1E-04	6	0.6566	1.5962	2.0535	66.04354
10	58.7	0.5	-0.06	0.86	58.6993	0.8518	5	2.07413	115.1322	0.57665	0	0.5767	100.79	0.8603	-7E-05	6	0.6187	1.4558	1.9465	79.96562
11	64.8	0.55	0.03	0.85	64.8004	0.8488	6	2.03765	116.0708	0.63469	0	0.6347	101.1	0.8572	3E-05	6	0.6161	1.3701	1.9322	83.08386
12	101.3	0.78	0.12	0.77	101.301	0.77	6	1.85504	119.7169	0.69455	0	0.6946	144.85	0.7753	9E-05	6	0.5602	1.266	1.7781	120.3698
13	59.5	1.22	0.08	2.06	59.501	2.0504	5	2.30325	121.6921	0.75539	0	0.7554	77.768	2.0768	0.0001	5	0.736	1.2815	2.2318	71.14811
14	57.9	1.59	0.83	2.74	57.9102	2.7456	5	2.39795	123.5641	0.81717	0	0.8172	69.866	2.7849	0.0011	5	0.7819	1.2239	2.3441	66.03828
15	81.3	1.81	1.06	2.23	81.313	2.226	5	2.22875	125.3402	0.87984	0	0.8798	91.417	2.2503	0.001	5	0.7278	1.1437	2.1944	86.9392
16	111.3	2.47	0.69	2.22	111.308	2.2191	5	2.13298	128.3808	0.94404	0	0.944	116.91	2.238	0.0005	5	0.7004	1.0832	2.1148	112.9791
17	124.7	2.34	0.6	1.87	124.707	1.8764	5	2.04602	128.2624	1.00817	0	1.0082	122.7	1.8917	0.0004	5	0.6754	1.0332	2.0413	120.7866
18	114.7	2.01	0.22	1.75	114.703	1.7524	5	2.04971	126.9462	1.07164	0	1.0716	106.03	1.7689	0.0001	5	0.6848	0.9913	2.0581	106.4604
19	94.2	1.85	0.22	1.96	94.2027	1.9639	5	2.14507	125.859	1.13457	0	1.1346	82.03	1.9878	0.0002	5	0.7297	0.9504	2.1682	83.59099
20	70.2	1.66	-0.2	2.37	70.1976	2.3648	5	2.29276	124.3487	1.19674	0	1.1967	57.657	2.4058	-2E-04	5	0.7959	0.9067	2.3341	59.12448
21	41.4	1.48	-2.04	3.58	41.375	3.577	4	2.58292	122.2195	1.25785	0	1.2579	31.893	3.6892	-0.004	4	0.9201	0.8529	2.6525	32.33717
22	110.3	1.59	-0.97	1.44	110.288	1.4417	6	2.0024	125.1353	1.32042	0	1.3204	82.525	1.4592	-6E-04	5	0.6971	0.857	2.0589	88.25163
23	82.2	0.68	-0.52	0.83	82.1936	0.8273	6	1.94672	118.2032	1.37952	0	1.3795	58.581	0.8414	-5E-04	6	0.6854	0.8338	2.0215	63.67938
24	97.3	1.5	0.22	1.54	97.3027	1.5416	5	2.06195	124.4035	1.44172	0	1.4417	66.491	1.5648	0.0002	5	0.7355	0.7965	2.1444	72.15975
25	96.5	1.46	0.2	1.51	96.5025	1.5129	5	2.05902	124.1855	1.50382	0	1.5038	63.172	1.5369	0.0002	5	0.7414	0.7706	2.153	69.18371
26	85.6	1.71	0.06	1.99	85.6007	1.9977	5	2.1799	125.0497	1.56634	0	1.5663	53.65	2.0349	5E-05	5	0.7972	0.7315	2.2905	58.09337
27	71.8	1.41	-0.95	1.96	71.7884	1.9641	5	2.23031	123.209	1.62795	0	1.628	43.098	2.0097	-1E-03	5	0.8267	0.7004	2.3603	46.43846
28	76.9	1.6	-1.96	2.09	76.876	2.0813	5	2.22587	124.301	1.6901	0	1.6901	44.486	2.1281	-0.002	5	0.8313	0.6775	2.3646	48.14273
29	107.2	1.74	-2.49	1.62	107.17	1.6236	5	2.04717	125.725	1.75296	0	1.753	60.136	1.6506	-0.002	5	0.7635	0.6801	2.1802	67.76088
30	80	1.43	-3.55	1.79	79.9566	1.7885	5	2.16833	123.5749	1.81475	0	1.8148	43.059	1.83	-0.003	5	0.8226	0.6416	2.3275	47.38378
31	81.2	1.68	-3.47	2.07	81.1575	2.0701	5	2.20728	124.7902	1.87714	0	1.8771	42.235	2.1191	-0.003	5	0.8444	0.6163	2.3771	46.17393
32	54.2	1.26	-4.1	2.33	54.1498	2.3269	5	2.37039	121.6983	1.93799	0	1.938	26.941	2.4133	-0.006	4	0.9243	0.5716	2.5783	28.20356
33	91.8	1.25	-2.05	1.36	91.7749	1.362	5	2.04457	122.9268	1.99945	0	1.9995	44.9	1.3924	-0.002	5	0.7931	0.6037	2.227	51.21983
34	21	1.04	-2.06	4.98	20.9748	4.9583	3	2.8965	117.981	2.05844	0.0312	2.0272	9.3311	5.4979	-0.009	3	1	0.5219	3.1769	9.33106
35	25.7	1.22	-0.29	4.72	25.6965	4.7477	3	2.81824	119.6442	2.11827	0.0624	2.0559	11.469	5.1743	-0.004	3	1	0.5147	3.0903	11.46873
36	110.6	1.33	1.97	1.2	110.624	1.2023	6	1.94794	123.8363	2.18018	0.0936	2.0866	51.972	1.2264	0.0004	5	0.7613	0.5964	2.1326	61.11886
37	113	2.03	1.97	1.8	113.024	1.7961	5	2.06183	126.9827	2.24368	0.1248	2.1189	52.283	1.8325	0.0002	5	0.808	0.5706	2.2513	59.74075
38	57.7	2.16	1.15	3.75	57.7141	3.7426	4	2.49392	125.7976	2.30658	0.156	2.1506	25.764	3.8984	-0.001	4	0.9963	0.4933	2.7412	25.83106
39	128.6	1.85	1.03	1.44	128.613	1.4384	6	1.95384	126.6184	2.36988	0.1872	2.1827	57.838	1.4654	-9E-04	5	0.7701	0.5726	2.1438	68.31532
40	90.7	2.4	2.54	2.65	90.7311	2.6452	5	2.2493	127.6719	2.43372	0.2184	2.2153	39.858	2.7181	-4E-04	4	0.8972	0.5153	2.4717	43.00375
41	154	2.56	2.86	1.66	154.035	1.662	6	1.9451	129.4351	2.49844	0.2496	2.2488	67.384	1.6894	-3E-04	5	0.7689	0.5601	2.1325	80.20913
42	213.7	2.1	3.66	0.98	213.745	0.9825	6	1.6811	128.7848	2.56283	0.2808	2.282	92.541	0.9944	-8E-05	6	0.6624	0.601	1.8486	119.9544
43	276.6	2.38	3.34	0.86	276.641	0.8603	6	1.56245	130.3297	2.628	0.312	2.316	118.31	0.8686	-3E-04	6	0.6135	0.6184	1.7159	160.148
44	253.2	2.43	3.46	0.96	253.242	0.9596	6	1.62334	130.2663	2.69313	0.3432	2.3499	106.62	0.9699	-4E-04	6	0.6422	0.599	1.7871	141.8441
45	374.9	3.39	4.64	0.9	374.957	0.9041	6	1.49362	133.6596	2.75996	0.3744	2.3856	156.02	0.9108	-1E-04	6	0.5855	0.6213	1.6337	218.5402
46	378.1	3.9	5.81	1.03	378.171	1.0313	6	1.53682	134.7059	2.82731	0.4056	2.4217	154.99	1.0391	3E-05	6	0.6049	0.606	1.6803	214.966
47	344.1	2.84	5.42	0.83	344.166	0.8252	6	1.48629	132.1554	2.89339	0.4368	2.4566	138.92	0.8322	-1E-04	6	0.591	0.6079	1.6392	196.0591
48	324.3	2.97	6.51	0.91	324.38	0.9156	6	1.53742	132.3384	2.95956	0.468	2.4916	129	0.924	0	6	0.6153	0.5904	1.6986	179.3482
49	316	2.92	8.38	0.92	316.103	0.9238	6	1.54757	132.1512	3.02563	0.4992	2.5264	123.92	0.9327	0.0003	6	0.623	0.5815	1.7144	172.0525
50	205.7	1.47	6.84	0.71	205.784	0.7143	6	1.59634	126.0824	3.08867	0.5304	2.5583	79.231	0.7252	-2E-04	6	0.6572	0.5598	1.8	107.2349

4747 Daisy Ave
Long Beach, CA

CPT Shear Wave Measurements

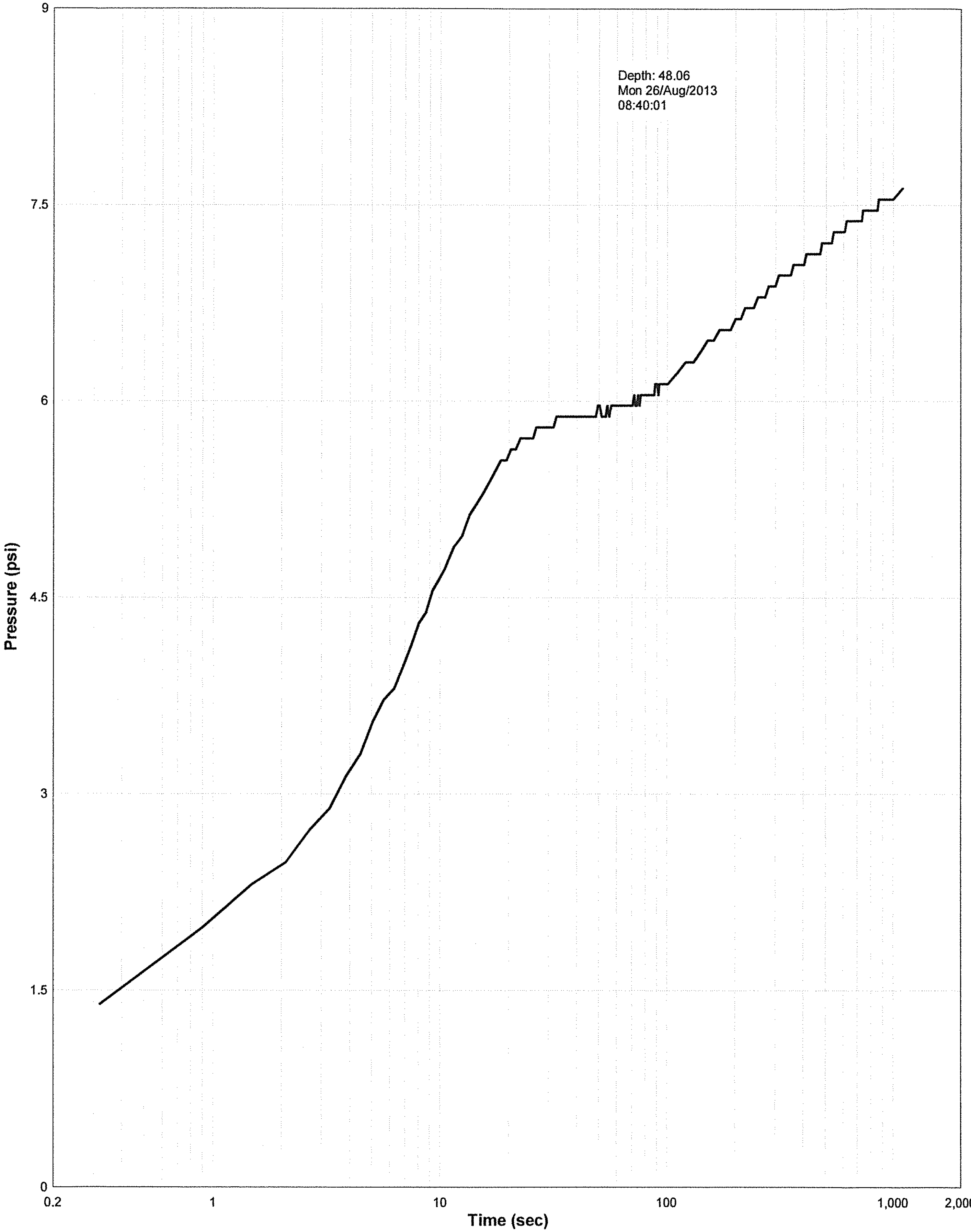
CPT-3	Tip Depth (ft)	Geophone Depth (ft)	Travel Distance (ft)	S-Wave Arrival (msec)	S-Wave Velocity from Surface (ft/sec)	Interval S-Wave Velocity (ft/sec)
	10.10	9.10	10.38	12.65	820.80	
	19.98	18.98	19.63	22.98	854.11	894.91
	30.08	29.08	29.51	32.60	905.11	1026.94
	39.99	38.99	39.31	43.46	904.49	902.63
	49.48	48.48	48.74	51.79	941.05	1131.80

Shear Wave Source Offset = 5 ft

S-Wave Velocity from Surface = Travel Distance/S-Wave Arrival
Interval S-Wave Velocity = (Travel Dist2-Travel Dist1)/(Time2-Time1)

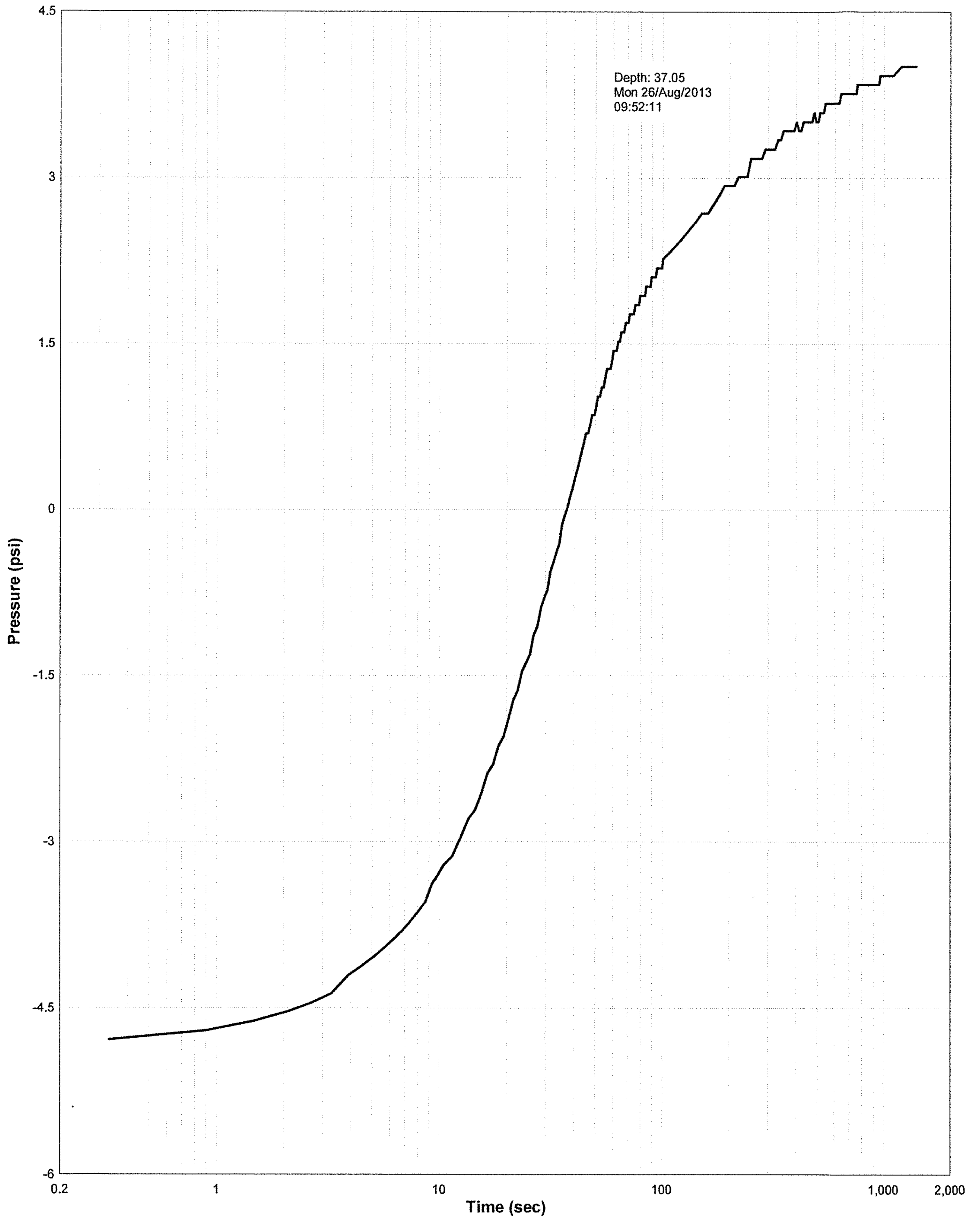
Petra Geotechnical, Inc. CPT-1

Kehoe Testing



Petra Geotechnical, Inc. CPT-2

Kehoe Testing



Presented below is a list of formulas used for the estimation of various soil properties. The formulas are presented in SI unit system and assume that all components are expressed in the same units.

:: Unit Weight, g (kN/m³) ::

$$g = g_w \cdot \left(0.27 \cdot \log(R_f) + 0.36 \cdot \log(\frac{q_t}{p_a}) + 1.236\right)$$

where g_w = water unit weight

:: Permeability, k (m/s) ::

$I_c < 3.27$ and $I_c > 1.00$ then $k = 10^{0.952-3.04 \cdot I_c}$

$I_c \leq 4.00$ and $I_c > 3.27$ then $k = 10^{-4.52-1.37 \cdot I_c}$

:: N_{SPT} (blows per 30 cm) ::

$$N_{60} = \left(\frac{q_c}{P_a}\right) \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

$$N_{1(60)} = Q_{tn} \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

:: Young's Modulus, Es (MPa) ::

$$(q_t - \sigma_v) \cdot 0.015 \cdot 10^{0.55 \cdot I_c + 1.68}$$

(applicable only to $I_c < I_{c\_cutoff}$)

:: Relative Density, Dr (%) ::

$$100 \cdot \sqrt{\frac{Q_{tn}}{k_{DR}}}$$

(applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: State Parameter, ψ ::

$$\psi = 0.56 - 0.33 \cdot \log(Q_{tn,cs})$$

:: Peak drained friction angle, φ (°) ::

$$\varphi = 17.60 + 11 \cdot \log(Q_{tn})$$

(applicable only to SBT_n: 5, 6, 7 and 8)

:: 1-D constrained modulus, M (MPa) ::

If $I_c > 2.20$

$a = 14$ for $Q_{tn} > 14$

$a = Q_{tn}$ for $Q_{tn} \leq 14$

$M_{CPT} = a \cdot (q_t - \sigma_v)$

If $I_c \leq 2.20$

$M_{CPT} = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 \cdot I_c + 1.68}$

:: Small strain shear Modulus, Go (MPa) ::

$$G_0 = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 \cdot I_c + 1.68}$$

:: Shear Wave Velocity, Vs (m/s) ::

$$V_s = \left(\frac{G_0}{\rho}\right)^{0.50}$$

:: Undrained peak shear strength, Su (kPa) ::

$N_{kt} = 10.50 + 7 \cdot \log(F_r)$ or user defined

$$S_u = \frac{(q_t - \sigma_v)}{N_{kt}}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Remolded undrained shear strength, Su(rem) (kPa) ::

$S_{u(rem)} = f_s$ (applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Overconsolidation Ratio, OCR ::

$$k_{OCR} = \left[\frac{Q_{tn}^{0.20}}{0.25 \cdot (10.50 \cdot + 7 \cdot \log(F_r))}\right]^{1.25}$$ or user defined

$OCR = k_{OCR} \cdot Q_{tn}$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: In situ Stress Ratio, Ko ::

$$K_0 = 0.1 \cdot \left(\frac{q_t - \sigma_v}{\sigma'_{vo}}\right)$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Soil Sensitivity, S_t ::

$$S_t = \frac{N_S}{F_r}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Effective Stress Friction Angle, φ' (°) ::

$$\varphi' = 29.5° \cdot B_q^{0.121} \cdot (0.256 + 0.336 \cdot B_q + \log Q_t)$$

(applicable for $0.10 < B_q < 1.00$)

References

- Robertson, P.K., Cabal K.L., Guide to Cone Penetration Testing for Geotechnical Engineering, Gregg Drilling & Testing, Inc., 4th Edition, July 2010
- Robertson, P.K., Interpretation of Cone Penetration Tests - a unified approach., Can. Geotech. J. 46(11): 1337–1355 (2009)

APPENDIX B

LABORATORY TEST PROCEDURES

LABORATORY TEST DATA

CONSOLIDATION TEST RESULTS

PETRA

LABORATORY TEST PROCEDURES

Soil Classification

Soils encountered within the exploratory borings were classified and described utilizing the visual-manual procedures of the Unified Soil Classification System, and in general accordance with Test Method ASTM D 2488. The assigned group symbols are presented on the exploration logs, Appendix A.

In Situ Moisture and Density

Moisture content and dry density of the in place soils were determined in representative strata in accordance with test method ASTM D 2216. Test data are presented in the exploration logs, Appendix A.

Laboratory Maximum Dry Density/Optimum Moisture

The maximum dry density and optimum moisture content of the near-surface soil materials were determined for a selected sample in accordance with Method A of ASTM D 1557. The results of this test are presented on Plate B-1.

Expansion Potential

A preliminary expansion index test was performed on a selected sample in accordance with Test Method ASTM 4829. The results of this test are presented on Plate B-1.

Soluble Sulfates and Chlorides

Chemical analyses were performed on a selected sample of near-surface soils to determine preliminary soluble sulfate and chloride contents in accordance with California Test Method Nos. 417 and 422, respectively. Test results are presented on Plate B-1.

pH and Minimum Resistivity

pH and minimum resistivity tests were performed on a selected sample of near-surface site soils to provide a preliminary evaluation of their corrosive potential to concrete and metallic construction materials. These tests were performed in accordance with California Test Method Nos. 532 and 643, respectively. The results of these tests are included in Plate B-1.

Consolidation

Settlement predictions under anticipated loads were made on the basis of one-dimensional consolidation tests. These tests were performed in general accordance with Test Method ASTM D 2435. Axial loads were applied in several increments to a laterally restrained 1-inch-high sample. Loads were applied in a geometric progression by doubling the previous load, and the resulting deformations were recorded at selected time intervals. The test samples were inundated at the approximate in-situ overburden pressure in order to evaluate the effect of a sudden increase in moisture content (hydroconsolidation potential). Results of these tests are graphically presented on Plates B-2 through B-4.

PLATE B-1 - ADDITIONAL LABORATORY DATA SUMMARY*															
Boring Number	Sample Depth (ft)	Soil Description	Max. Dry Density[1] (pcf)	Optimum Moisture[1] (%)	Expansion Index[2]	CBC Soil Classification[3]	Atterberg Limits[4]			Sulfate Content[5] (%)	Chloride Content[6] (ppm)	pH[7]	Minimum Resistivity[7] (Ohm-cm)	Percent Passing No. 200 Sieve[8]
							LL	PL	PI					
B-1	3 - 6	Sand (SP)	102	8.5	-	-	-	-	-	-	-	-	-	-
B-2	0 - 5	Clayey Silt with Sand (ML/SP)	112	13.5	-	-	-	-	-	0.03	83	7.2	2,500	-
B-4	0 - 5	Silty Sand/Sand (SM/SP)	114	14.5	Less than 20	-	-	-	-	-	-	-	-	-

*Note:

Test Procedures:

[1] Per ASTM Test Method D 1557
[2] Per ASTM Test Method D 4829
[3] Per 2013 California Building Code Section 1803.5.3
[4] Per ASTM Test Method D 4318
[5] Per Caltrans Test Method 417
[6] Per Caltrans Test Method 422
[7] Per Caltrans Test Method 643
[8] Per ASTM Test Method D 1140

Laboratory data pertaining to in-place soil moisture content and dry density are provided on the exploration logs included in Appendix A of this report.

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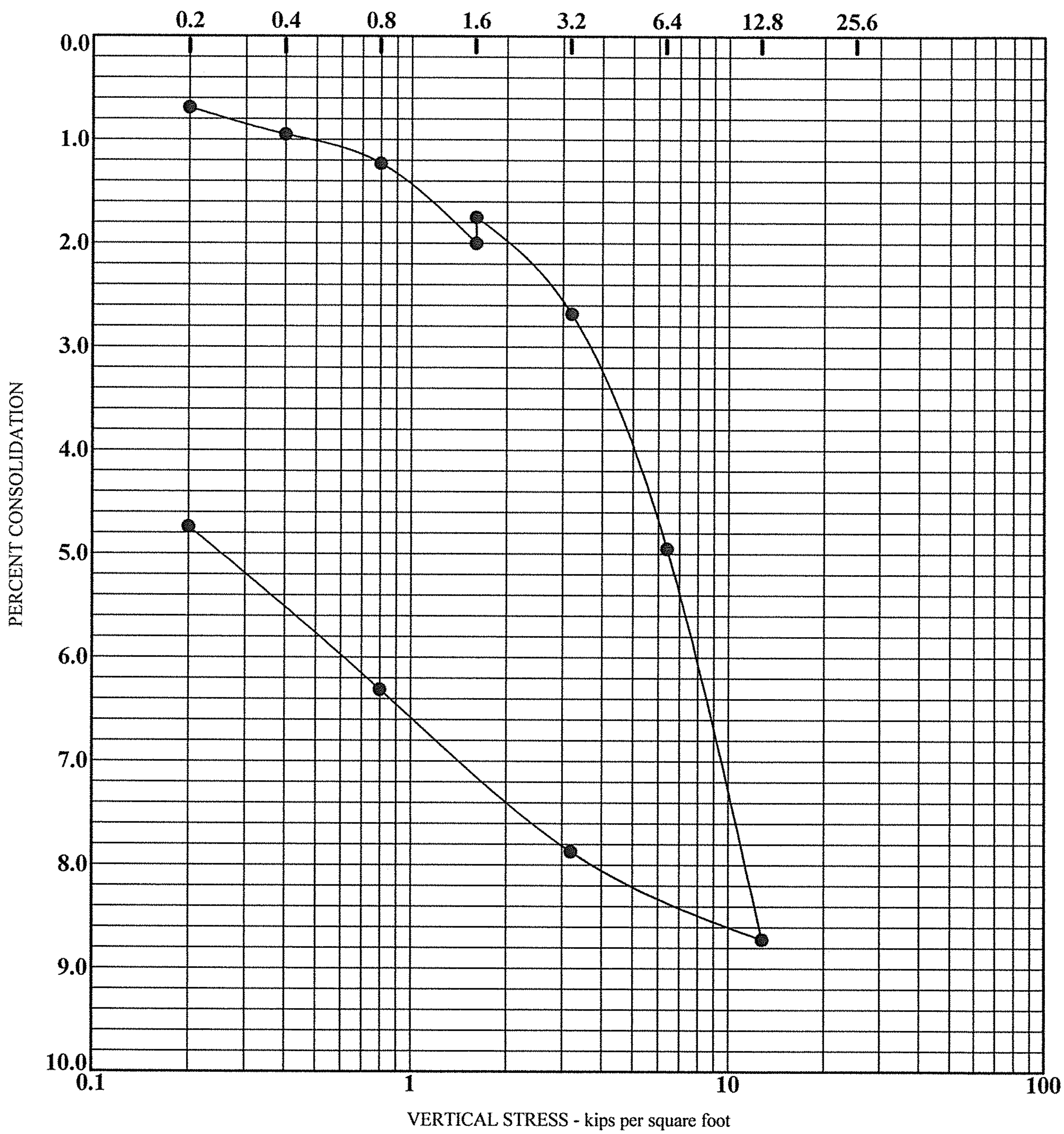
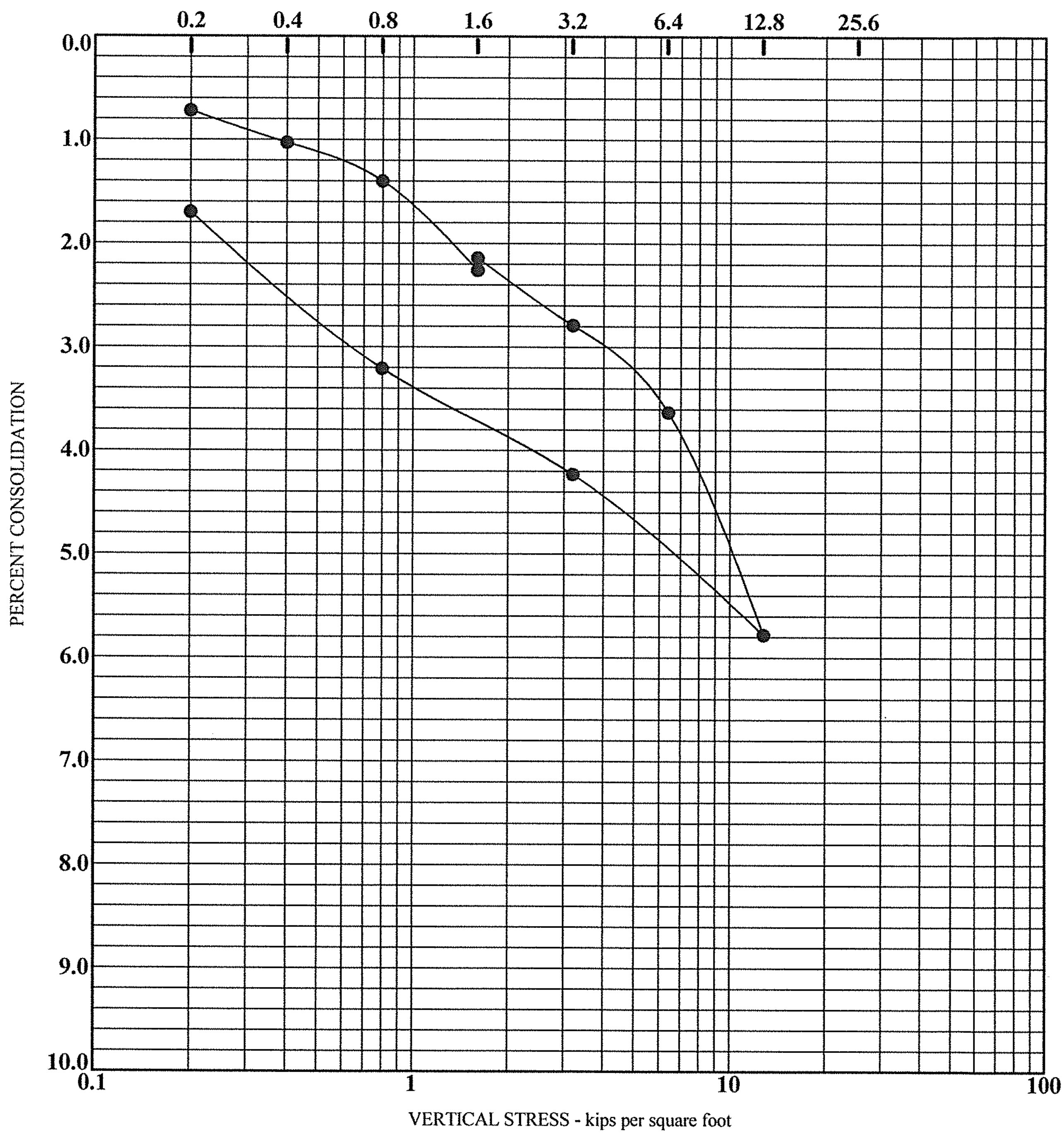
SAMPLE LOCATION	MATERIAL DESCRIPTION	INITIAL DENSITY (pcf)	INITIAL MOISTURE (%)	INITIAL SATURATION (%)	INUNDATED LOAD (ksf)
● B-3 @ 6.0	Sandy Silt (ML)				



J.N. 13-443	CONSOLIDATION TEST RESULTS	March, 2014
PETRA GEOTECHNICAL, INC.		PLATE B-2

SAMPLE LOCATION	MATERIAL DESCRIPTION	INITIAL			INUNDATED
		DENSITY (pcf)	MOISTURE (%)	SATURATION (%)	LOAD (ksf)
● B-4 @ 5.0	Sandy Silt (ML)				



CONSOLIDATION - STRAIN 13-443.GPJ PETRA.GDT 3/25/14

J.N. 13-443	CONSOLIDATION TEST RESULTS	March, 2014
PETRA GEOTECHNICAL, INC.		PLATE B-3

APPENDIX C

GROUND MOTION ANALYSIS

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USGS Design Maps Detailed Report

ASCE 7-10 Standard (33.84194°N, 118.20085°W)

Site Class D – "Stiff Soil", Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1[1] S_S = 1.654 g

From Figure 22-2[2] S_1 = 0.613 g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Chapter 20.

Table 20.3–1 Site Classification

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index *PI* > 20, • Moisture content *w* ≥ 40%, and • Undrained shear strength $\bar{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk-Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4-1: Site Coefficient F_a

Site Class	Mapped MCE $_R$ Spectral Response Acceleration Parameter at Short Period				
	$S_S \le 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \ge 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_S

For Site Class = D and S_S = 1.654 g, F_a = 1.000

Table 11.4-2: Site Coefficient F_v

Site Class	Mapped MCE $_R$ Spectral Response Acceleration Parameter at 1-s Period				
	$S_1 \le 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \ge 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 0.613 g, F_v = 1.500

Equation (11.4-1): $S_{MS} = F_aS_S = 1.000 \times 1.654 = 1.654$ g

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Equation (11.4-2): $S_{M1} = F_vS_1 = 1.500 \times 0.613 = 0.920$ g

---

Section 11.4.4 — Design Spectral Acceleration Parameters

Equation (11.4-3): $S_{DS} = ⅔ S_{MS} = ⅔ \times 1.654 = 1.103$ g

---

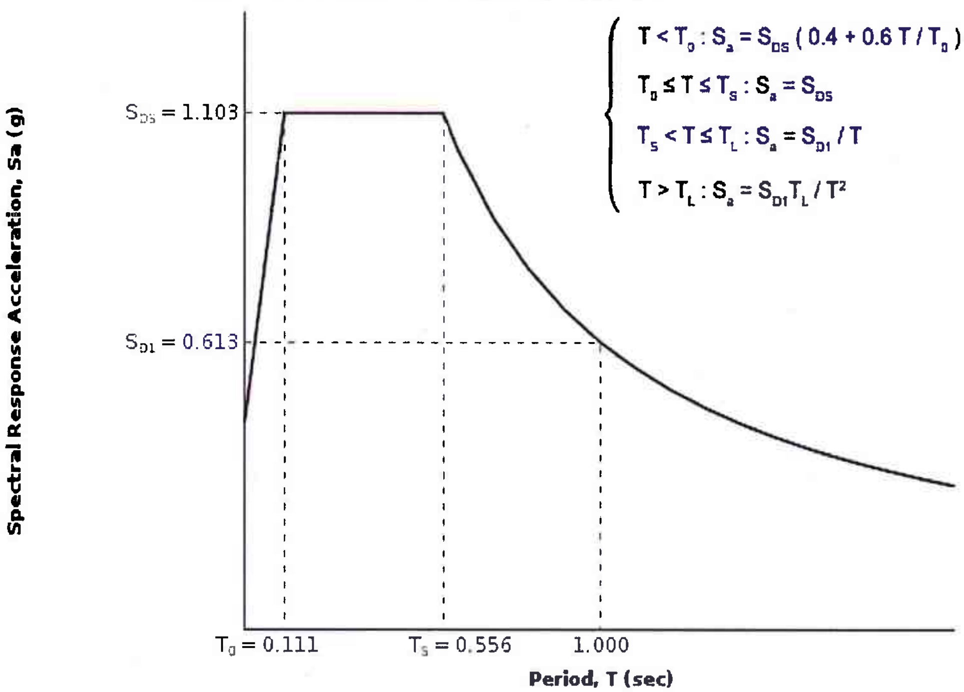
Equation (11.4-4): $S_{D1} = ⅔ S_{M1} = ⅔ \times 0.920 = 0.613$ g

---

Section 11.4.5 — Design Response Spectrum

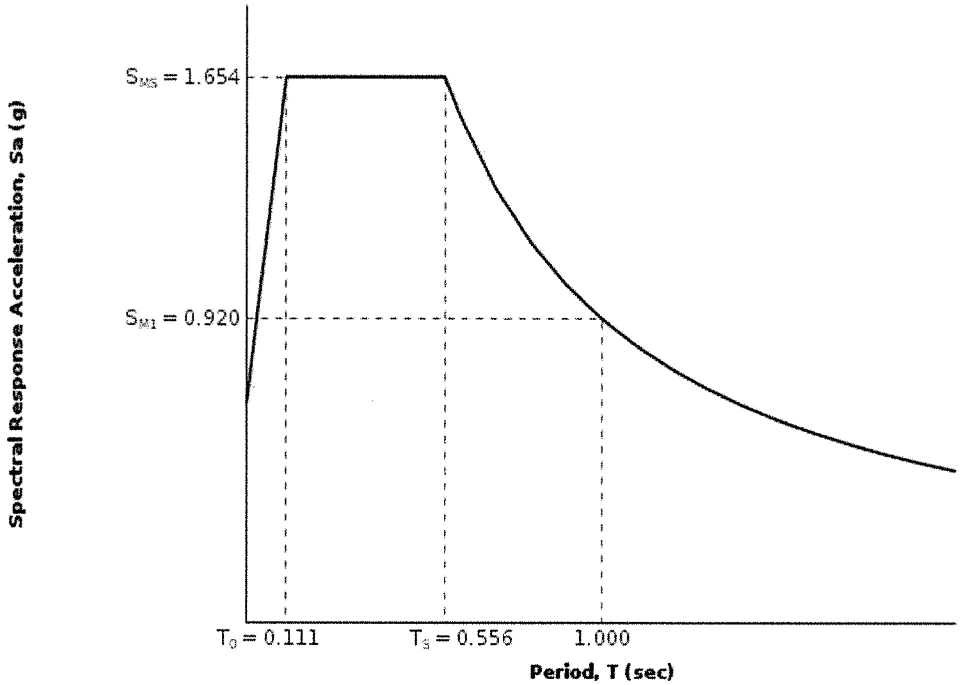
From Figure 22-12[3] $T_L = 8$ seconds

Figure 11.4-1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7[4] PGA = 0.627

Equation (11.8-1): $PGA_M = F_{PGA}PGA = 1.000 \times 0.627 = 0.627$ g

Table 11.8-1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of PGA

For Site Class = D and PGA = 0.627 g, F_{PGA} = 1.000

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17[5] C_{RS} = 0.966

From Figure 22-18[6] C_{R1} = 0.984

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 1.103 g, Seismic Design Category = D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.613 g, Seismic Design Category = D

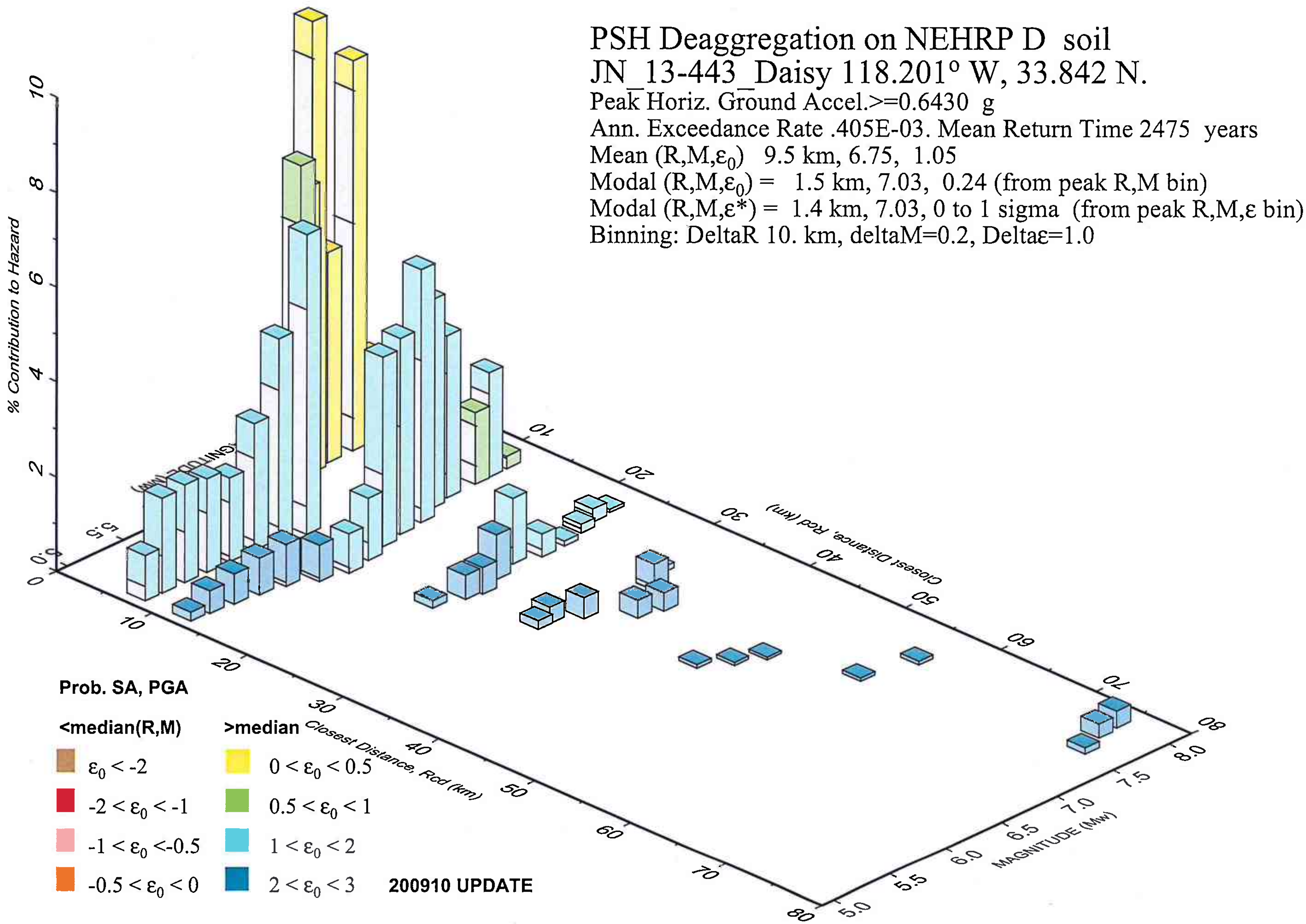
Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = D

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 22-1*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. *Figure 22-2*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. *Figure 22-12*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. *Figure 22-7*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. *Figure 22-17*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. *Figure 22-18*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf



GMT 2014 Mar 18 20:58:41 Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 287. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted

```
*** Deaggregation of Seismic Hazard at One Period of Spectral Accel. ***
*** Data from U.S.G.S. National Seismic Hazards Mapping Project, 2008 version ***
PSHA Deaggregation. %contributions. site: JN_13-443_Daisy long: 118.201 W., lat: 33.842 N.
 Vs30(m/s)= 287.0 (some WUS atten. models use Site Class not Vs30).
NSHMP 2007-08  See USGS OFR 2008-1128. dM=0.2 below
Return period: 2475  yrs. Exceedance PGA =0.6430   g. Weight * Computed_Rate_Ex 0.405E-03
#Pr[at least one eq with median motion>=PGA in 50 yrs]=0.00173
#This deaggregation corresponds to Mean Hazard w/all GMPEs
```

DIST(KM)	MAG(MW)	ALL_EPS	EPSILON>2	1<EPS<2	0<EPS<1	-1<EPS<0	-2<EPS<-1	EPS<-2
7.3	5.05	0.955	0.656	0.300	0.000	0.000	0.000	0.000
12.1	5.05	0.188	0.188	0.000	0.000	0.000	0.000	0.000
7.3	5.20	2.012	1.231	0.781	0.000	0.000	0.000	0.000
12.3	5.20	0.481	0.481	0.000	0.000	0.000	0.000	0.000
7.3	5.40	2.072	1.003	1.069	0.000	0.000	0.000	0.000
12.5	5.40	0.638	0.638	0.000	0.000	0.000	0.000	0.000
7.3	5.60	1.982	0.736	1.206	0.040	0.000	0.000	0.000
12.8	5.60	0.783	0.769	0.013	0.000	0.000	0.000	0.000
7.3	5.80	1.775	0.526	1.132	0.117	0.000	0.000	0.000
13.2	5.80	0.884	0.801	0.083	0.000	0.000	0.000	0.000
7.3	6.02	2.674	0.732	1.735	0.206	0.000	0.000	0.000
14.5	5.99	0.774	0.698	0.077	0.000	0.000	0.000	0.000
7.6	6.21	4.276	1.089	2.880	0.307	0.000	0.000	0.000
15.1	6.20	0.831	0.713	0.118	0.000	0.000	0.000	0.000
23.7	6.22	0.160	0.160	0.000	0.000	0.000	0.000	0.000
8.4	6.40	6.336	1.589	4.159	0.588	0.000	0.000	0.000
14.7	6.41	1.323	0.945	0.378	0.000	0.000	0.000	0.000
24.4	6.45	0.505	0.505	0.000	0.000	0.000	0.000	0.000
31.8	6.47	0.178	0.178	0.000	0.000	0.000	0.000	0.000
5.5	6.59	7.312	1.241	3.931	2.120	0.019	0.000	0.000
13.9	6.61	3.999	2.461	1.537	0.000	0.000	0.000	0.000
24.8	6.57	0.564	0.563	0.000	0.000	0.000	0.000	0.000
31.7	6.57	0.351	0.351	0.000	0.000	0.000	0.000	0.000
3.5	6.80	6.427	0.693	2.892	2.769	0.073	0.000	0.000
13.4	6.80	4.138	1.867	2.271	0.000	0.000	0.000	0.000
23.8	6.77	0.944	0.868	0.077	0.000	0.000	0.000	0.000
33.0	6.77	0.440	0.440	0.000	0.000	0.000	0.000	0.000
44.9	6.77	0.081	0.081	0.000	0.000	0.000	0.000	0.000
1.5	7.03	9.497	0.775	3.480	4.663	0.579	0.000	0.000
13.1	7.01	5.337	1.924	3.114	0.299	0.000	0.000	0.000
22.9	7.00	1.389	1.047	0.342	0.000	0.000	0.000	0.000
35.9	7.00	0.370	0.368	0.002	0.000	0.000	0.000	0.000
46.6	6.96	0.063	0.063	0.000	0.000	0.000	0.000	0.000
1.2	7.20	4.432	0.343	1.557	2.172	0.360	0.000	0.000
12.1	7.19	4.396	1.187	2.797	0.412	0.000	0.000	0.000
23.6	7.19	0.489	0.331	0.159	0.000	0.000	0.000	0.000
36.5	7.19	0.381	0.355	0.025	0.000	0.000	0.000	0.000
47.7	7.15	0.051	0.051	0.000	0.000	0.000	0.000	0.000
1.2	7.42	8.210	0.615	2.794	4.108	0.693	0.000	0.000
11.6	7.37	3.412	0.799	2.108	0.505	0.000	0.000	0.000
23.6	7.40	0.106	0.059	0.047	0.000	0.000	0.000	0.000
33.6	7.35	0.557	0.457	0.100	0.000	0.000	0.000	0.000
55.2	7.35	0.059	0.059	0.000	0.000	0.000	0.000	0.000
1.1	7.61	1.768	0.137	0.645	0.842	0.144	0.000	0.000
11.6	7.62	1.503	0.268	0.846	0.389	0.000	0.000	0.000
23.0	7.60	0.186	0.085	0.100	0.000	0.000	0.000	0.000
32.0	7.54	0.110	0.085	0.025	0.000	0.000	0.000	0.000
75.7	7.60	0.130	0.130	0.000	0.000	0.000	0.000	0.000
1.1	7.71	0.577	0.042	0.195	0.290	0.050	0.000	0.000
11.5	7.75	2.192	0.449	1.413	0.329	0.000	0.000	0.000
22.3	7.76	0.276	0.116	0.159	0.000	0.000	0.000	0.000
56.4	7.76	0.077	0.076	0.000	0.000	0.000	0.000	0.000
74.6	7.82	0.297	0.297	0.000	0.000	0.000	0.000	0.000
11.5	7.91	0.265	0.046	0.172	0.046	0.000	0.000	0.000
22.1	7.93	0.061	0.021	0.038	0.002	0.000	0.000	0.000

74.4	7.99	0.349	0.349	0.000	0.000	0.000	0.000	0.000

Summary statistics for above PSHA PGA deaggregation, R=distance, e=epsilon:
Contribution from this GMPE(%): 100.0
Mean src-site R= 9.5 km; M= 6.75; eps0= 1.05. Mean calculated for all sources.
Modal src-site R= 1.5 km; M= 7.03; eps0= 0.24 from peak (R,M) bin
MODE R*= 1.4km; M*= 7.03; EPS.INTERVAL: 0 to 1 sigma % CONTRIB.= 4.663

Principal sources (faults, subduction, random seismicity having > 3% contribution)

Source Category:	% contr.	R(km)	M	epsilon0 (mean values).
California B-faults Char	40.58	8.8	7.17	0.85
California B-faults GR	28.27	7.4	6.83	0.90
California A-faults	3.72	36.4	7.33	2.00
CA Compr. crustal gridded	27.43	9.1	5.95	1.38

Individual fault hazard details if its contribution to mean hazard > 2%:

Fault ID	% contr.	Rcd(km)	M	epsilon0	Site-to-src azimuth(d)
Palos Verdes Char	5.85	11.5	7.26	1.19	-147.5
Newport-Inglewood, alt 1 Char	4.62	1.6	7.14	0.21	-137.3
Newport-Inglewood, alt 2 Char	5.05	0.7	7.14	0.13	-119.8
Puente Hills (Santa Fe Springs)	4.32	9.7	6.51	1.35	38.6
Palos Verdes Connected Char	3.90	11.5	7.71	0.98	-147.6
Newport Inglewood Connected alt	3.97	1.6	7.50	0.17	-137.3
Newport Inglewood Connected alt	4.37	0.7	7.50	0.08	-119.8
Palos Verdes GR	4.54	12.3	6.93	1.44	-148.9
Newport-Inglewood, alt 1 GR	5.45	2.5	6.83	0.39	-140.9
Newport-Inglewood, alt 2 GR	5.87	1.9	6.83	0.32	-122.8
Newport Inglewood Connected alt2	2.08	2.4	6.99	0.33	-129.6

#*********End of deaggregation corresponding to Mean Hazard w/all GMPEs *********#

PSHA Deaggregation. %contributions. site: JN_13-443_Daisy long: 118.201 W., lat: 33.842 N.
Vs30(m/s)= 287.0 (some WUS atten. models use Site Class not Vs30).
NSHMP 2007-08 See USGS OFR 2008-1128. dM=0.2 below
Return period: 2475 yrs. Exceedance PGA =0.6430 g. Weight * Computed_Rate_Ex 0.161E-03
#Pr[at least one eq with median motion>=PGA in 50 yrs]=0.00240
#This deaggregation corresponds to Boore-Atkinson 2008

DIST(KM)	MAG(MW)	ALL_EPS	EPSILON>2	1<EPS<2	0<EPS<1	-1<EPS<0	-2<EPS<-1	EPS<-2
7.1	5.05	0.078	0.078	0.000	0.000	0.000	0.000	0.000
7.2	5.20	0.202	0.202	0.000	0.000	0.000	0.000	0.000
7.2	5.40	0.253	0.253	0.001	0.000	0.000	0.000	0.000
12.0	5.42	0.026	0.026	0.000	0.000	0.000	0.000	0.000
7.2	5.60	0.291	0.264	0.027	0.000	0.000	0.000	0.000
12.6	5.61	0.067	0.067	0.000	0.000	0.000	0.000	0.000
7.3	5.80	0.312	0.257	0.056	0.000	0.000	0.000	0.000
13.4	5.81	0.123	0.123	0.000	0.000	0.000	0.000	0.000
7.1	6.02	0.584	0.431	0.153	0.000	0.000	0.000	0.000
14.9	5.99	0.156	0.156	0.000	0.000	0.000	0.000	0.000
7.3	6.21	0.956	0.648	0.309	0.000	0.000	0.000	0.000
15.2	6.20	0.207	0.207	0.000	0.000	0.000	0.000	0.000
24.1	6.22	0.077	0.077	0.000	0.000	0.000	0.000	0.000
8.2	6.40	1.468	0.826	0.642	0.000	0.000	0.000	0.000
14.9	6.41	0.365	0.355	0.011	0.000	0.000	0.000	0.000
24.6	6.45	0.274	0.274	0.000	0.000	0.000	0.000	0.000
31.7	6.47	0.175	0.175	0.000	0.000	0.000	0.000	0.000
4.7	6.60	2.723	0.517	1.333	0.871	0.002	0.000	0.000
13.7	6.60	1.369	0.923	0.446	0.000	0.000	0.000	0.000
24.8	6.57	0.356	0.356	0.000	0.000	0.000	0.000	0.000
31.8	6.57	0.348	0.348	0.000	0.000	0.000	0.000	0.000
43.3	6.59	0.025	0.025	0.000	0.000	0.000	0.000	0.000
3.0	6.80	2.739	0.300	1.160	1.258	0.022	0.000	0.000
13.3	6.79	1.677	0.848	0.829	0.000	0.000	0.000	0.000
23.6	6.77	0.711	0.636	0.075	0.000	0.000	0.000	0.000
33.0	6.77	0.432	0.432	0.000	0.000	0.000	0.000	0.000
44.8	6.77	0.078	0.078	0.000	0.000	0.000	0.000	0.000
1.4	7.03	4.315	0.297	1.578	2.215	0.224	0.000	0.000

13.0	7.01	2.401	0.855	1.471	0.075	0.000	0.000	0.000
22.8	6.99	1.110	0.796	0.313	0.000	0.000	0.000	0.000
36.0	7.00	0.357	0.355	0.002	0.000	0.000	0.000	0.000
46.4	6.96	0.056	0.056	0.000	0.000	0.000	0.000	0.000
56.2	6.99	0.033	0.033	0.000	0.000	0.000	0.000	0.000
1.2	7.20	2.017	0.123	0.717	1.035	0.143	0.000	0.000
11.8	7.19	2.094	0.547	1.359	0.189	0.000	0.000	0.000
23.5	7.19	0.382	0.248	0.133	0.000	0.000	0.000	0.000
36.6	7.19	0.326	0.301	0.025	0.000	0.000	0.000	0.000
47.6	7.15	0.049	0.049	0.000	0.000	0.000	0.000	0.000
55.5	7.19	0.041	0.041	0.000	0.000	0.000	0.000	0.000
1.2	7.42	3.714	0.224	1.312	1.914	0.265	0.000	0.000
11.6	7.36	1.781	0.409	1.143	0.230	0.000	0.000	0.000
23.4	7.40	0.078	0.041	0.038	0.000	0.000	0.000	0.000
33.9	7.35	0.436	0.340	0.096	0.000	0.000	0.000	0.000
55.2	7.35	0.059	0.059	0.000	0.000	0.000	0.000	0.000
74.4	7.37	0.046	0.046	0.000	0.000	0.000	0.000	0.000
1.1	7.61	0.746	0.044	0.259	0.388	0.055	0.000	0.000
11.7	7.59	0.491	0.099	0.315	0.078	0.000	0.000	0.000
23.1	7.61	0.147	0.059	0.088	0.000	0.000	0.000	0.000
32.3	7.54	0.078	0.057	0.021	0.000	0.000	0.000	0.000
56.1	7.57	0.035	0.035	0.000	0.000	0.000	0.000	0.000
75.7	7.60	0.130	0.130	0.000	0.000	0.000	0.000	0.000
1.1	7.71	0.256	0.015	0.089	0.134	0.019	0.000	0.000
11.5	7.74	1.331	0.235	0.850	0.246	0.000	0.000	0.000
22.4	7.76	0.176	0.059	0.117	0.000	0.000	0.000	0.000
56.4	7.76	0.072	0.071	0.000	0.000	0.000	0.000	0.000
74.6	7.82	0.297	0.297	0.000	0.000	0.000	0.000	0.000
11.5	7.91	0.108	0.021	0.078	0.009	0.000	0.000	0.000
22.1	7.93	0.038	0.011	0.025	0.002	0.000	0.000	0.000
74.4	7.99	0.329	0.329	0.000	0.000	0.000	0.000	0.000
74.2	8.20	0.039	0.039	0.000	0.000	0.000	0.000	0.000

Summary statistics for above PSHA PGA deaggregation, R=distance, e=epsilon:
Contribution from this GMPE(%): 39.8
Mean src-site R= 11.7 km; M= 6.96; eps0= 1.09. Mean calculated for all sources.
Modal src-site R= 1.4 km; M= 7.03; eps0= 0.22 from peak (R,M) bin
MODE R*= 1.3km; M*= 7.03; EPS.INTERVAL: 0 to 1 sigma % CONTRIB.= 2.215

Principal sources (faults, subduction, random seismicity having > 3% contribution)

Source Category:	% contr.	R(km)	M	epsilon0 (mean values).
California B-faults Char	18.40	10.3	7.21	0.91
California B-faults GR	12.86	7.8	6.86	0.91
California A-faults	3.14	38.6	7.34	1.99
CA Compr. crustal gridded	5.38	10.0	6.14	1.61

Individual fault hazard details if its contribution to mean hazard > 2%:

Fault ID	% contr.	Rcd(km)	M	epsilon0	Site-to-src azimuth(d)
Palos Verdes Char	3.04	11.5	7.25	1.17	-147.5
Newport-Inglewood, alt 1 Char	2.15	1.6	7.14	0.19	-137.3
Newport-Inglewood, alt 2 Char	2.28	0.7	7.14	0.14	-119.8
Puente Hills (Santa Fe Springs)	1.00	9.7	6.53	1.56	38.6
Palos Verdes Connected Char	1.90	11.5	7.71	1.00	-147.6
Newport Inglewood Connected alt	1.76	1.6	7.50	0.20	-137.3
Newport Inglewood Connected alt	1.95	0.7	7.50	0.11	-119.8
Palos Verdes GR	2.48	12.5	6.93	1.44	-148.9
Newport-Inglewood, alt 1 GR	2.61	2.5	6.82	0.37	-140.9
Newport-Inglewood, alt 2 GR	2.76	2.0	6.82	0.31	-122.8
Newport Inglewood Connected alt2	0.98	2.7	6.98	0.36	-129.6

#*********End of deaggregation corresponding to Boore-Atkinson 2008 *********#

PSHA Deaggregation. %contributions. site: JN_13-443_Daisy long: 118.201 W., lat: 33.842 N.
Vs30(m/s)= 287.0 (some WUS atten. models use Site Class not Vs30).
NSHMP 2007-08 See USGS OFR 2008-1128. dM=0.2 below
Return period: 2475 yrs. Exceedance PGA =0.6430 g. Weight * Computed_Rate_Ex 0.463E-04

#Pr[at least one eq with median motion>=PGA in 50 yrs]=0.00000
#This deaggregation corresponds to Campbell-Bozorgnia 2008

DIST(KM)	MAG(MW)	ALL_EPS	EPSILON>2	1<EPS<2	0<EPS<1	-1<EPS<0	-2<EPS<-1	EPS<-2
7.2	5.05	0.145	0.145	0.000	0.000	0.000	0.000	0.000
7.3	5.20	0.374	0.364	0.010	0.000	0.000	0.000	0.000
12.0	5.21	0.028	0.028	0.000	0.000	0.000	0.000	0.000
7.3	5.40	0.481	0.401	0.081	0.000	0.000	0.000	0.000
12.1	5.41	0.086	0.086	0.000	0.000	0.000	0.000	0.000
7.3	5.60	0.492	0.357	0.135	0.000	0.000	0.000	0.000
12.3	5.60	0.135	0.135	0.000	0.000	0.000	0.000	0.000
7.3	5.80	0.419	0.287	0.131	0.000	0.000	0.000	0.000
12.7	5.80	0.148	0.148	0.000	0.000	0.000	0.000	0.000
7.3	6.02	0.560	0.434	0.125	0.000	0.000	0.000	0.000
14.0	5.99	0.121	0.121	0.000	0.000	0.000	0.000	0.000
7.7	6.21	0.975	0.642	0.333	0.000	0.000	0.000	0.000
15.0	6.20	0.134	0.134	0.000	0.000	0.000	0.000	0.000
23.2	6.23	0.012	0.012	0.000	0.000	0.000	0.000	0.000
8.5	6.40	1.692	0.815	0.877	0.000	0.000	0.000	0.000
14.6	6.41	0.248	0.238	0.010	0.000	0.000	0.000	0.000
24.4	6.46	0.066	0.066	0.000	0.000	0.000	0.000	0.000
8.0	6.59	1.078	0.403	0.675	0.000	0.000	0.000	0.000
14.1	6.60	0.607	0.478	0.129	0.000	0.000	0.000	0.000
24.8	6.56	0.077	0.077	0.000	0.000	0.000	0.000	0.000
6.1	6.79	0.523	0.249	0.274	0.000	0.000	0.000	0.000
13.8	6.79	0.548	0.387	0.161	0.000	0.000	0.000	0.000
25.1	6.75	0.055	0.055	0.000	0.000	0.000	0.000	0.000
2.1	7.03	0.541	0.238	0.292	0.012	0.000	0.000	0.000
13.9	6.97	0.590	0.348	0.243	0.000	0.000	0.000	0.000
26.8	6.97	0.017	0.017	0.000	0.000	0.000	0.000	0.000
36.6	7.07	0.007	0.007	0.000	0.000	0.000	0.000	0.000
1.2	7.20	0.245	0.098	0.139	0.008	0.000	0.000	0.000
13.9	7.14	0.276	0.138	0.138	0.000	0.000	0.000	0.000
29.1	7.14	0.015	0.015	0.000	0.000	0.000	0.000	0.000
34.8	7.20	0.008	0.008	0.000	0.000	0.000	0.000	0.000
1.1	7.42	0.450	0.180	0.257	0.013	0.000	0.000	0.000
12.1	7.35	0.061	0.054	0.007	0.000	0.000	0.000	0.000
31.7	7.35	0.024	0.024	0.000	0.000	0.000	0.000	0.000
1.1	7.61	0.090	0.036	0.052	0.003	0.000	0.000	0.000
11.5	7.58	0.011	0.011	0.000	0.000	0.000	0.000	0.000
30.7	7.53	0.006	0.006	0.000	0.000	0.000	0.000	0.000
1.1	7.71	0.031	0.012	0.018	0.001	0.000	0.000	0.000
11.5	7.75	0.042	0.042	0.000	0.000	0.000	0.000	0.000

Summary statistics for above PSHA PGA deaggregation, R=distance, e=epsilon:
Contribution from this GMPE(%): 11.4
Mean src-site R= 9.0 km; M= 6.41; eps0= 1.55. Mean calculated for all sources.
Modal src-site R= 8.5 km; M= 6.40; eps0= 1.31 from peak (R,M) bin
MODE R*= 8.8km; M*= 6.40; EPS.INTERVAL: 0 to 1 sigma % CONTRIB.= 0.877

Principal sources (faults, subduction, random seismicity having > 3% contribution)

Source Category:	% contr.	R(km)	M	epsilon0 (mean values).
California B-faults Char	3.74	9.8	6.89	1.54
CA Compr. crustal gridded	5.64	8.3	5.99	1.52

Individual fault hazard details if its contribution to mean hazard > 2%:

Fault ID	% contr.	Rcd(km)	M	epsilon0	Site-to-src azimuth(d)
Palos Verdes Char	0.09	11.5	7.25	2.15	-147.5
Newport-Inglewood, alt 1 Char	0.26	1.6	7.15	1.33	-137.3
Newport-Inglewood, alt 2 Char	0.27	0.7	7.15	1.32	-119.8
Puente Hills (Santa Fe Springs)	1.28	9.7	6.50	1.42	38.6
Palos Verdes Connected Char	0.06	11.5	7.71	2.11	-147.6
Newport Inglewood Connected alt	0.22	1.6	7.50	1.31	-137.3
Newport Inglewood Connected alt	0.23	0.7	7.50	1.29	-119.8
Palos Verdes GR	0.00	0.0	0.00	0.00	-148.9
Newport-Inglewood, alt 1 GR	0.18	1.9	6.89	1.64	-140.9

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Newport-Inglewood, alt 2 GR          0.19      1.2    6.89     1.62     -122.8
Newport Inglewood Connected alt2     0.07      1.1    7.07     1.51     -129.6
#*********End of deaggregation corresponding to Campbell-Bozorgnia 2008  *********#

PSHA Deaggregation. %contributions. site: JN_13-443_Daisy long: 118.201 W., lat: 33.842 N.
 Vs30(m/s)= 287.0 (some WUS atten. models use Site Class not Vs30).
NSHMP 2007-08  See USGS OFR 2008-1128. dM=0.2 below
Return period: 2475  yrs. Exceedance PGA =0.6430   g. Weight * Computed_Rate_Ex 0.197E-03
#Pr[at least one eq with median motion>=PGA in 50 yrs]=0.00279
#This deaggregation corresponds to Chiou-Youngs 2008
```

DIST(KM)	MAG(MW)	ALL_EPS	EPSILON>2	1<EPS<2	0<EPS<1	-1<EPS<0	-2<EPS<-1	EPS<-2
7.3	5.05	0.732	0.596	0.135	0.000	0.000	0.000	0.000
12.1	5.05	0.184	0.184	0.000	0.000	0.000	0.000	0.000
7.3	5.20	1.436	1.096	0.340	0.000	0.000	0.000	0.000
12.3	5.20	0.447	0.447	0.000	0.000	0.000	0.000	0.000
7.3	5.40	1.337	0.913	0.424	0.000	0.000	0.000	0.000
12.6	5.40	0.526	0.526	0.000	0.000	0.000	0.000	0.000
7.3	5.60	1.199	0.710	0.488	0.000	0.000	0.000	0.000
13.0	5.60	0.581	0.581	0.000	0.000	0.000	0.000	0.000
7.4	5.80	1.045	0.515	0.530	0.000	0.000	0.000	0.000
13.3	5.80	0.613	0.611	0.002	0.000	0.000	0.000	0.000
7.4	6.02	1.530	0.713	0.817	0.000	0.000	0.000	0.000
14.5	5.99	0.498	0.489	0.008	0.000	0.000	0.000	0.000
7.7	6.21	2.320	0.901	1.419	0.000	0.000	0.000	0.000
15.1	6.20	0.490	0.478	0.012	0.000	0.000	0.000	0.000
23.3	6.21	0.069	0.069	0.000	0.000	0.000	0.000	0.000
8.3	6.40	3.199	0.931	2.229	0.039	0.000	0.000	0.000
14.6	6.41	0.710	0.625	0.085	0.000	0.000	0.000	0.000
24.1	6.44	0.166	0.166	0.000	0.000	0.000	0.000	0.000
5.3	6.59	3.486	0.506	1.935	1.029	0.016	0.000	0.000
13.9	6.61	1.913	1.073	0.840	0.000	0.000	0.000	0.000
24.7	6.57	0.134	0.134	0.000	0.000	0.000	0.000	0.000
3.6	6.80	3.196	0.329	1.498	1.319	0.051	0.000	0.000
13.3	6.81	1.863	0.782	1.081	0.000	0.000	0.000	0.000
23.9	6.77	0.163	0.163	0.000	0.000	0.000	0.000	0.000
1.5	7.03	4.634	0.298	1.627	2.355	0.354	0.000	0.000
13.0	7.01	2.418	0.742	1.452	0.224	0.000	0.000	0.000
22.8	7.01	0.264	0.237	0.027	0.000	0.000	0.000	0.000
1.2	7.20	2.171	0.123	0.701	1.129	0.218	0.000	0.000
12.1	7.19	2.097	0.570	1.305	0.223	0.000	0.000	0.000
23.8	7.21	0.104	0.077	0.027	0.000	0.000	0.000	0.000
36.0	7.18	0.039	0.039	0.000	0.000	0.000	0.000	0.000
1.2	7.42	4.113	0.221	1.282	2.183	0.428	0.000	0.000
11.6	7.37	1.586	0.345	0.966	0.275	0.000	0.000	0.000
32.4	7.36	0.100	0.096	0.003	0.000	0.000	0.000	0.000
1.1	7.61	0.864	0.047	0.277	0.450	0.089	0.000	0.000
11.6	7.60	0.638	0.128	0.351	0.158	0.000	0.000	0.000
22.4	7.61	0.053	0.033	0.020	0.000	0.000	0.000	0.000
31.4	7.53	0.026	0.021	0.005	0.000	0.000	0.000	0.000
1.1	7.71	0.290	0.015	0.088	0.156	0.031	0.000	0.000
11.5	7.75	1.182	0.202	0.744	0.236	0.000	0.000	0.000
22.2	7.76	0.084	0.050	0.035	0.000	0.000	0.000	0.000
11.5	7.91	0.155	0.024	0.095	0.037	0.000	0.000	0.000

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Summary statistics for above PSHA PGA  deaggregation, R=distance, e=epsilon:
Contribution from this GMPE(%):   48.8
 Mean src-site R=     7.9 km; M= 6.65; eps0=    0.90. Mean calculated for all sources.
Modal src-site R=     1.5 km; M= 7.03; eps0=    0.12 from peak (R,M) bin
 MODE R*=   1.3km; M*= 7.03; EPS.INTERVAL: 0 to 1 sigma  % CONTRIB.=  2.355

Principal sources (faults, subduction, random seismicity having > 3% contribution)
Source Category:                   % contr.  R(km)     M   epsilon0 (mean values).
California B-faults Char             18.44     7.1   7.20    0.64
California B-faults GR               13.36     6.7   6.83    0.77
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CA Compr. crustal gridded          16.42     9.1   5.87    1.26
Individual fault hazard details if its contribution to mean hazard > 2%:
Fault ID                          % contr.   Rcd(km)  M   epsilon0 Site-to-src azimuth(d)
Palos Verdes Char                   2.72     11.5   7.26    1.17    -147.5
Newport-Inglewood, alt 1 Char       2.21      1.6   7.14    0.10    -137.3
Newport-Inglewood, alt 2 Char       2.50      0.7   7.14   -0.01    -119.8
Puente Hills (Santa Fe Springs)     2.04      9.7   6.51    1.20      38.6
Palos Verdes Connected Char         1.94     11.5   7.71    0.93    -147.6
Newport Inglewood Connected alt     1.99      1.6   7.50    0.03    -137.3
Newport Inglewood Connected alt     2.18      0.7   7.50   -0.07    -119.8
Palos Verdes GR                     2.05     12.0   6.93    1.44    -148.9
Newport-Inglewood, alt 1 GR         2.66      2.6   6.82    0.34    -140.9
Newport-Inglewood, alt 2 GR         2.92      1.9   6.83    0.24    -122.8
Newport Inglewood Connected alt2    1.03      2.2   6.98    0.22    -129.6
#*********End of deaggregation corresponding to Chiou-Youngs 2008        *********#

******************** Southern California ****************************************
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APPENDIX D

LIQUEFACTION ANALYSIS

PETRA

GeoLogismiki
Geotechnical Engineers
Merarhias 56
http://www.geologismiki.gr

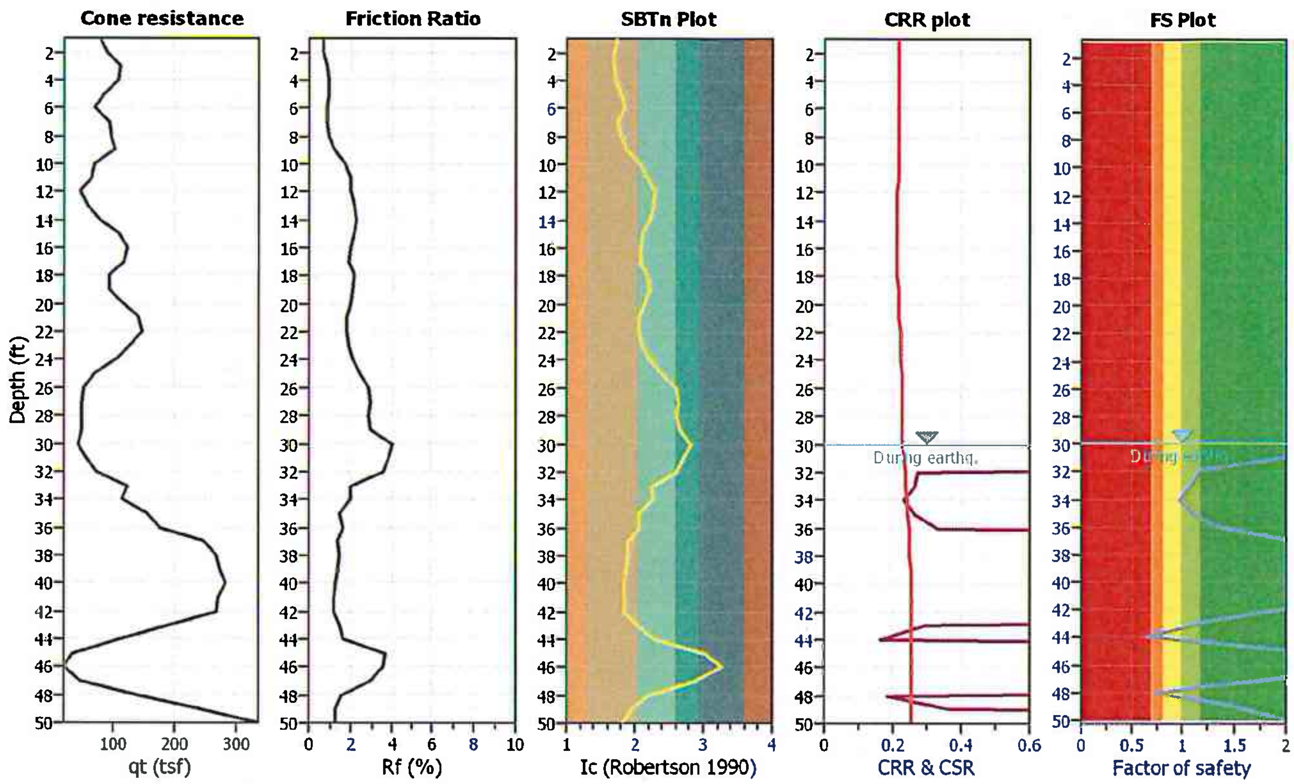
LIQUEFACTION ANALYSIS REPORT

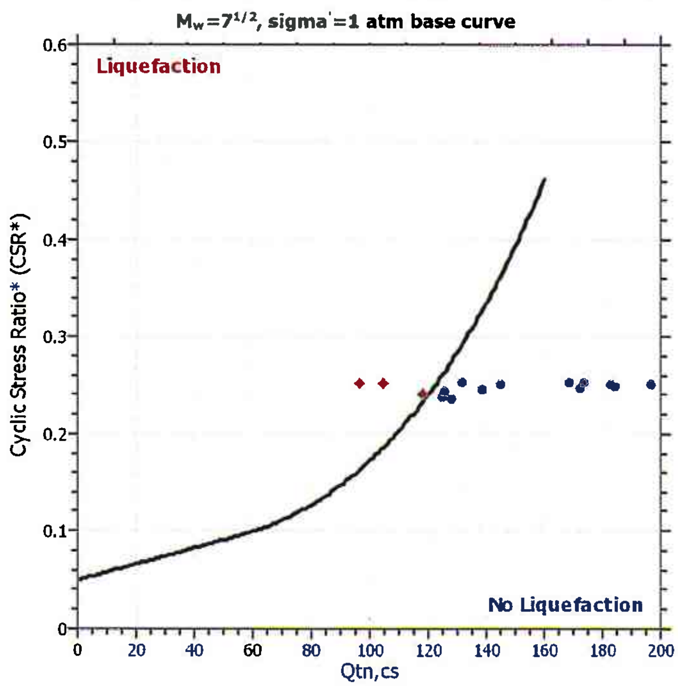
Project title : Integral Communities **Location : 4747 Daisy Avenue, Long Beach, CA**

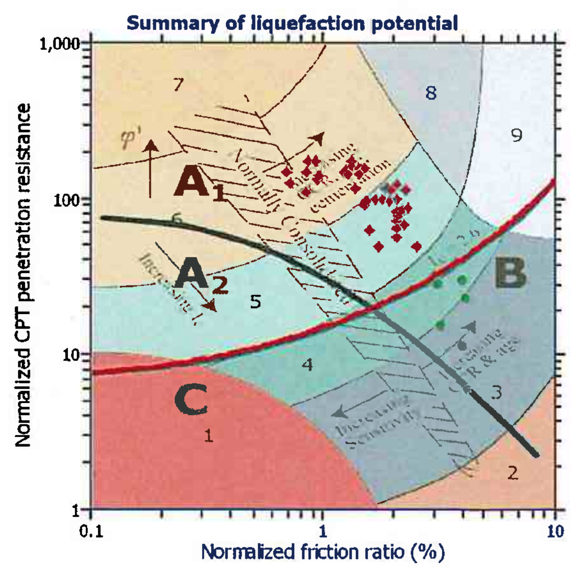
CPT file : CPT-01

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	44.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	30.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.75	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.44	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

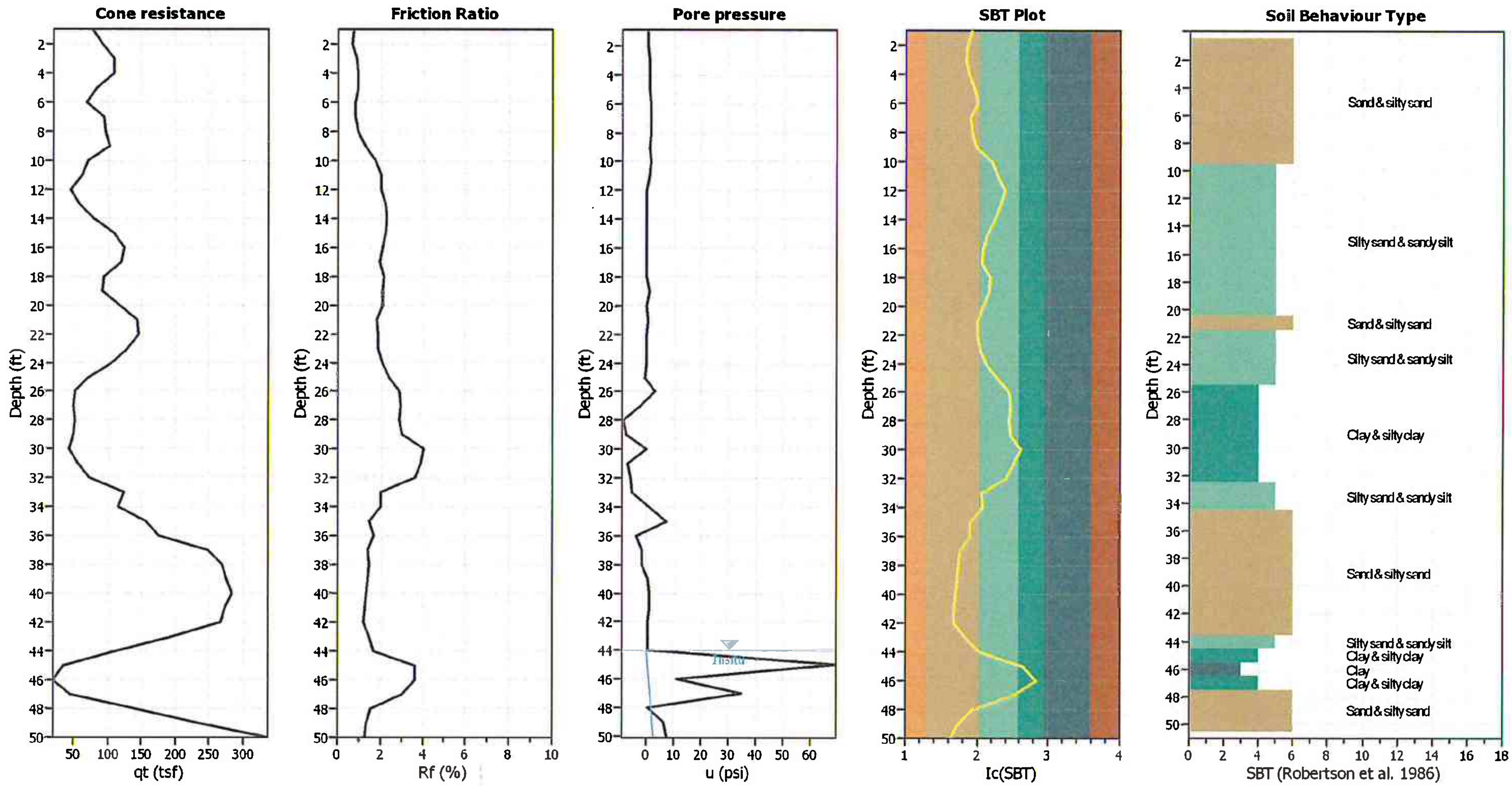






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



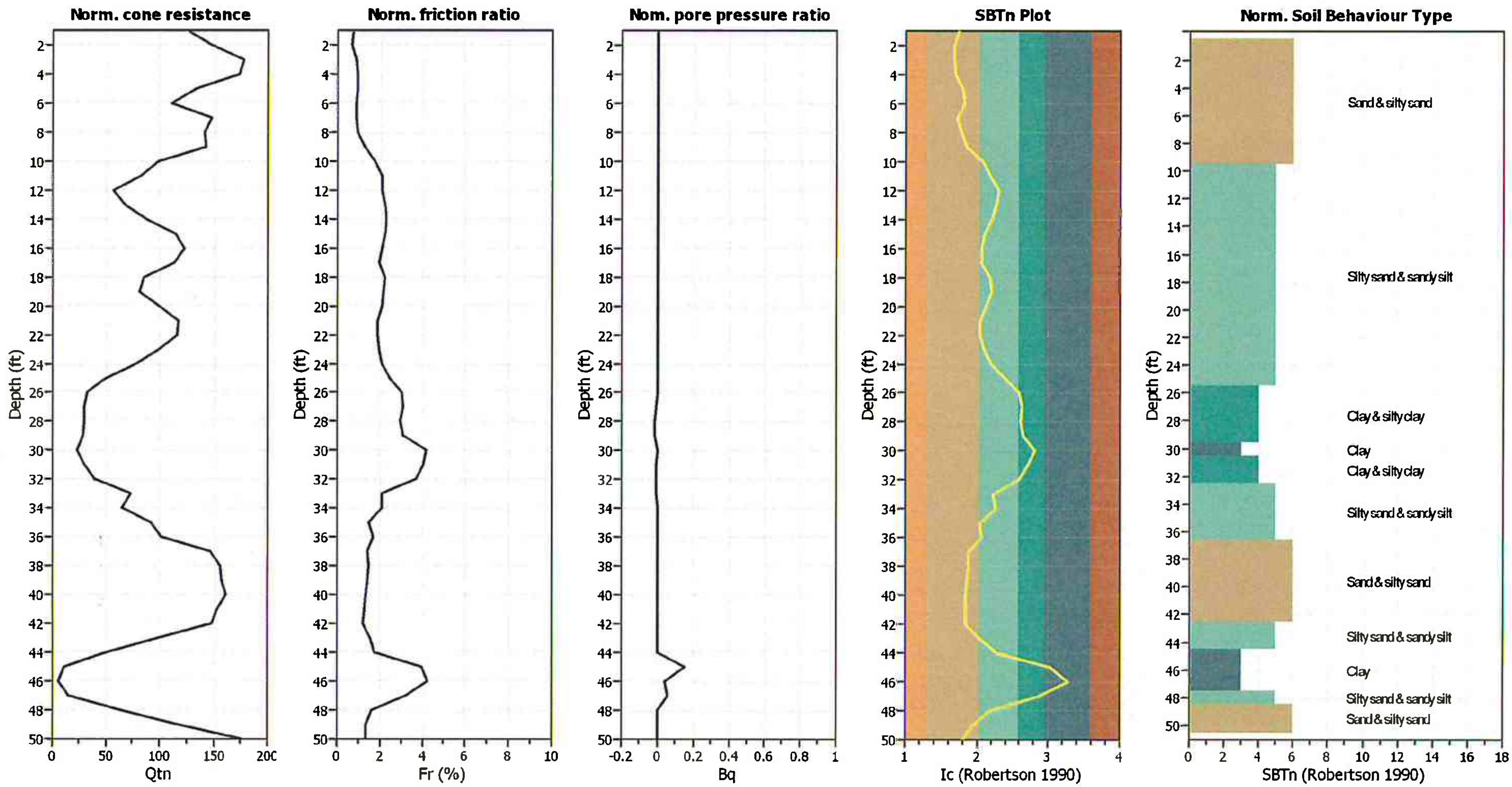
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	30.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.75	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	44.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to
- 9. Very stiff fine grained

CPT basic interpretation plots (normalized)



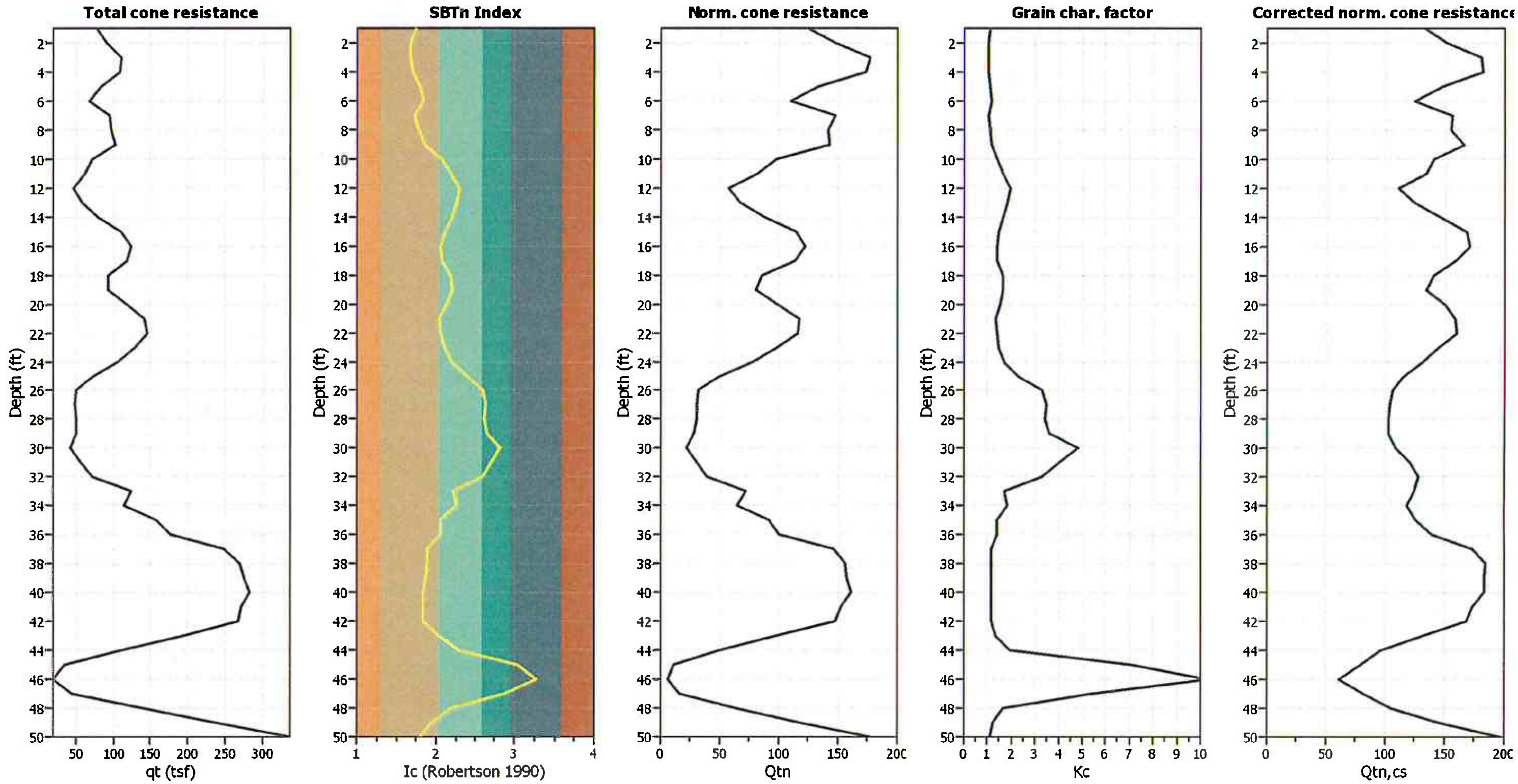
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	30.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.75	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	44.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

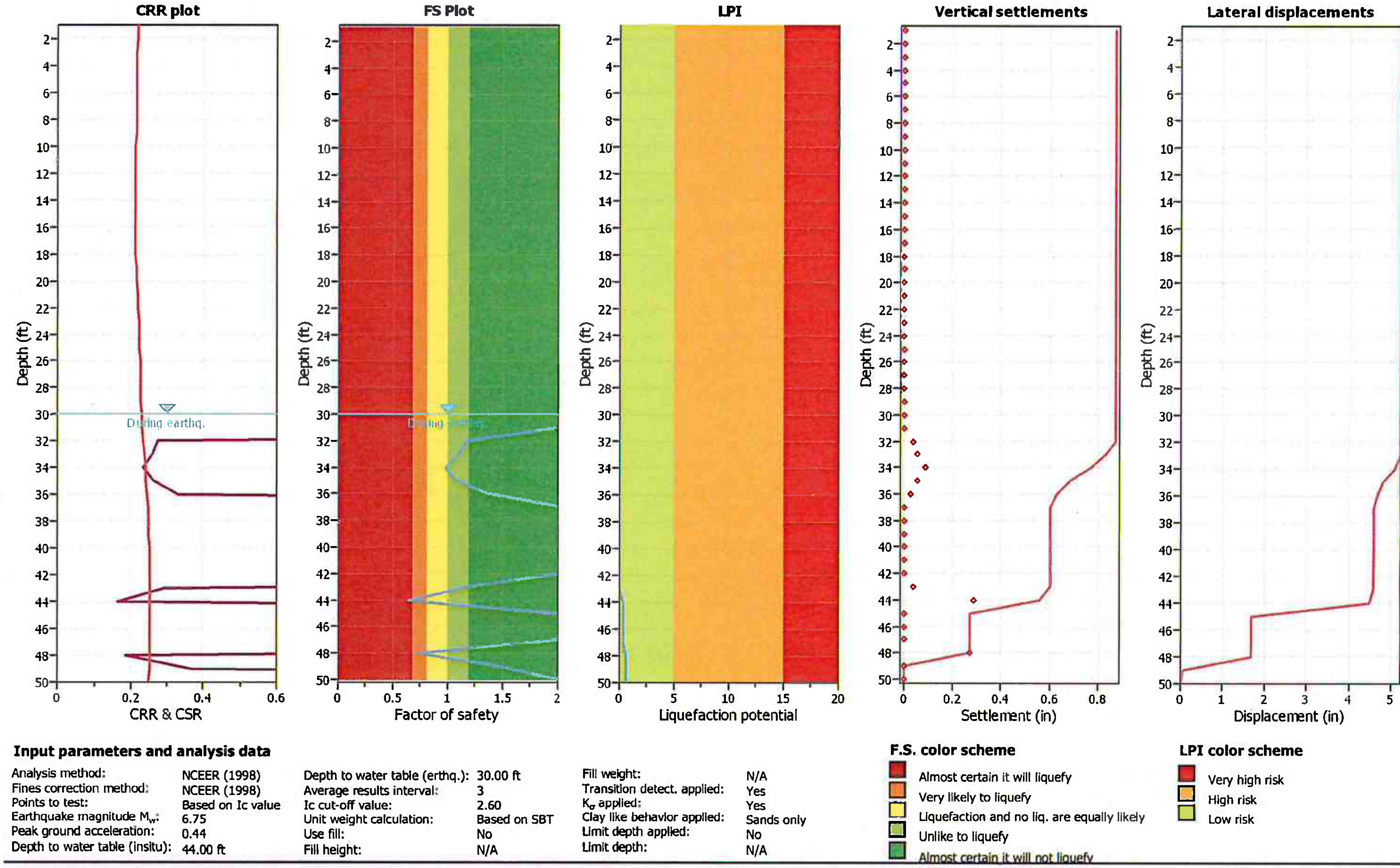
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	30.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.75	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	44.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	30.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.75	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	44.00 ft	Fill height:	N/A	Limit depth:	N/A

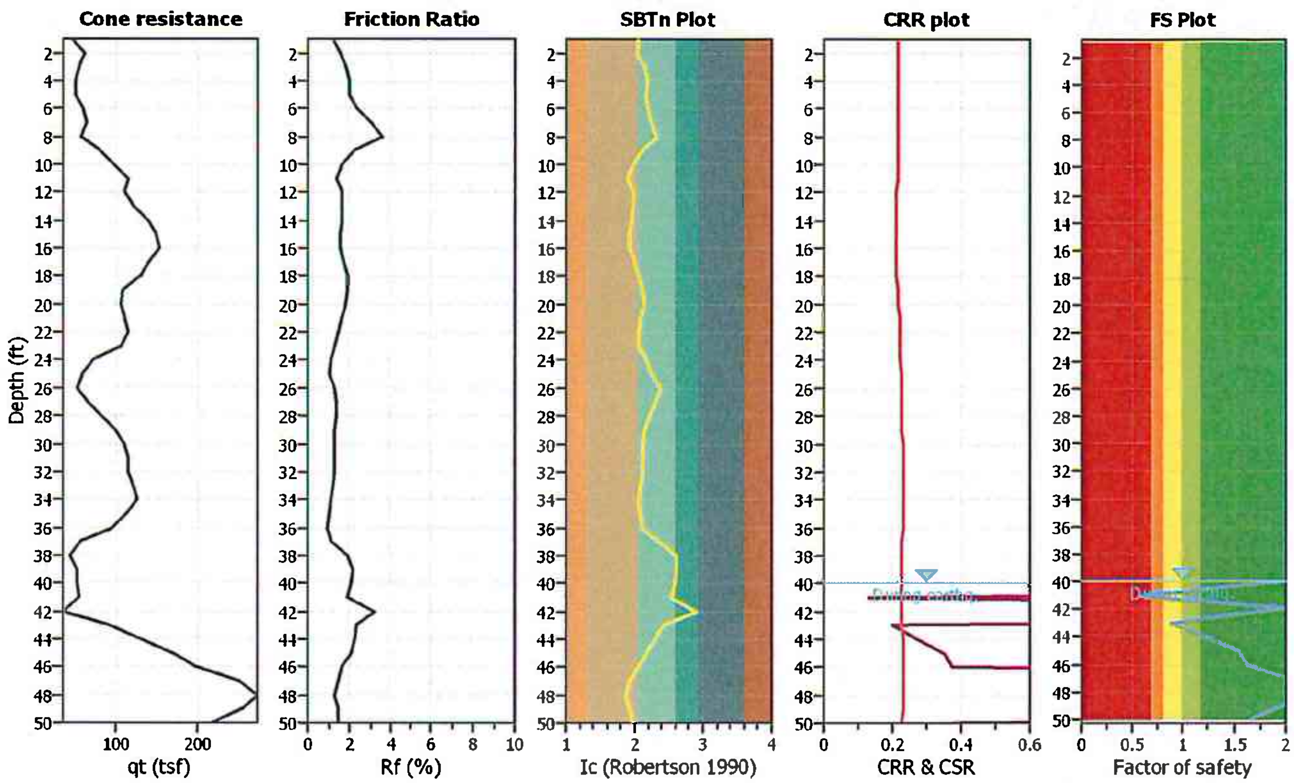
LIQUEFACTION ANALYSIS REPORT

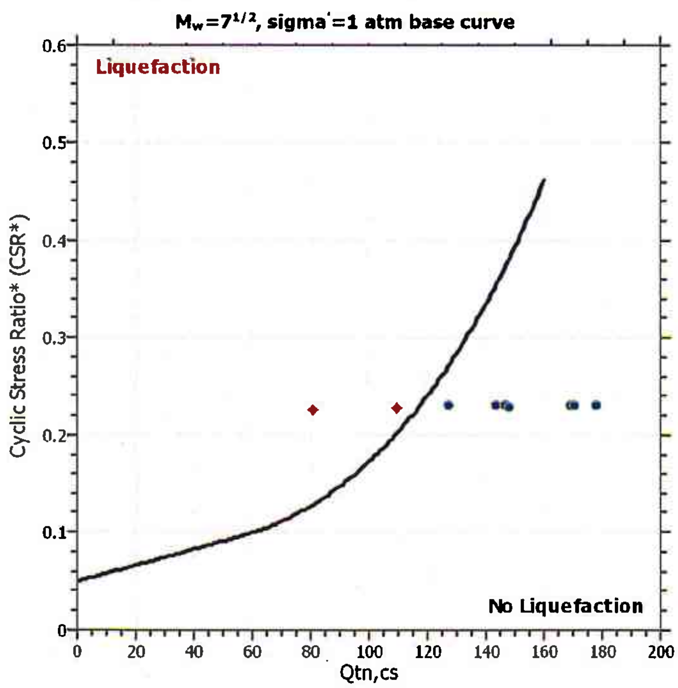
Project title : Integral Communities **Location : 4747 Daisy Avenue, Long Beach, CA**

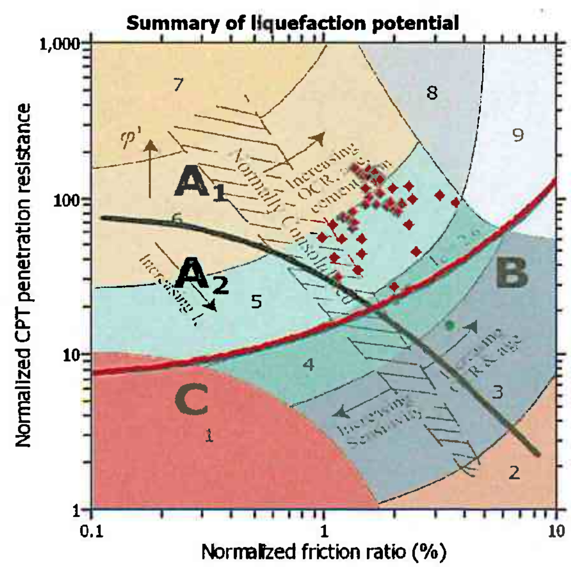
CPT file : CPT-02

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	32.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	40.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.75	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.44	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

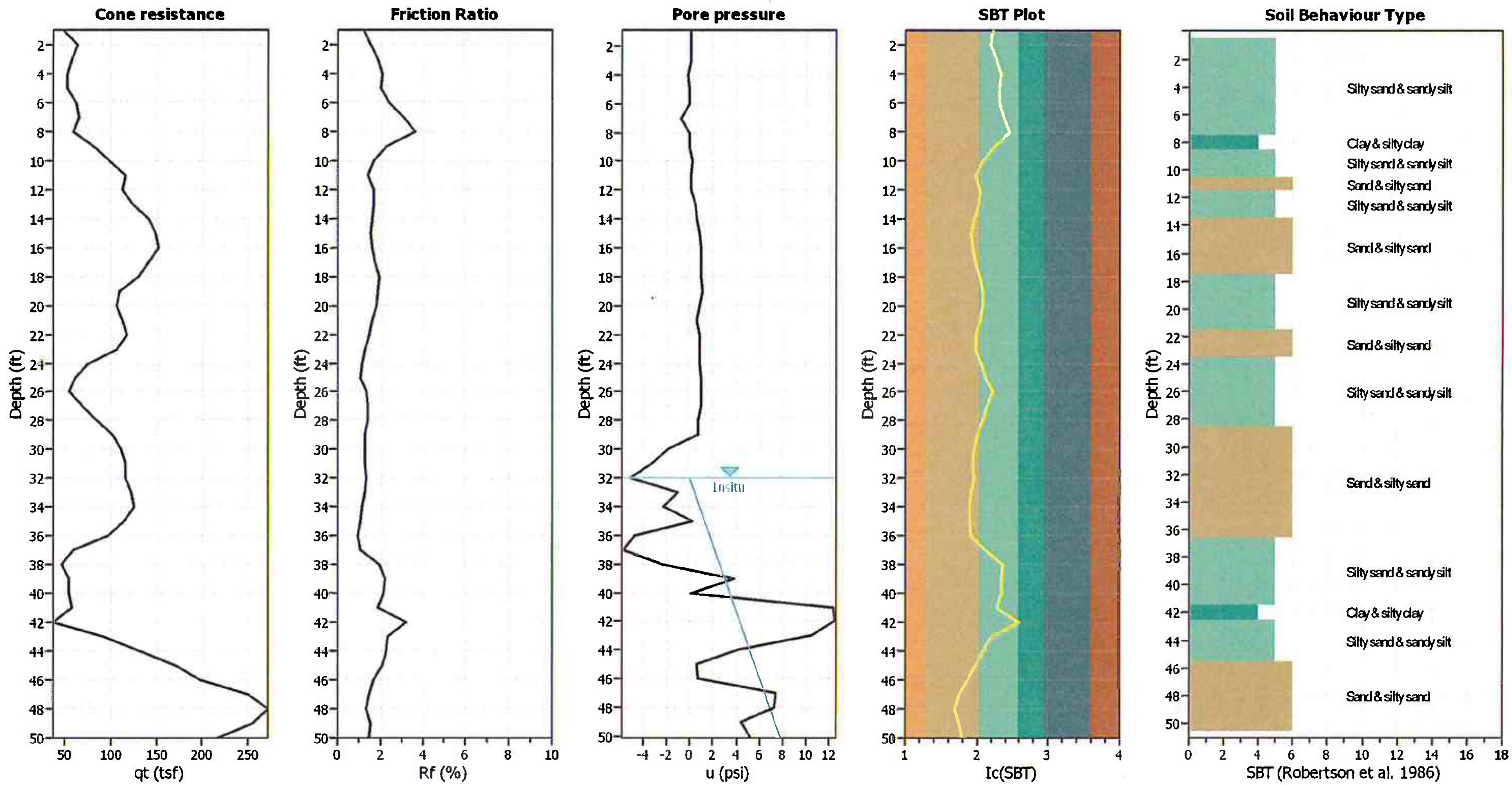






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



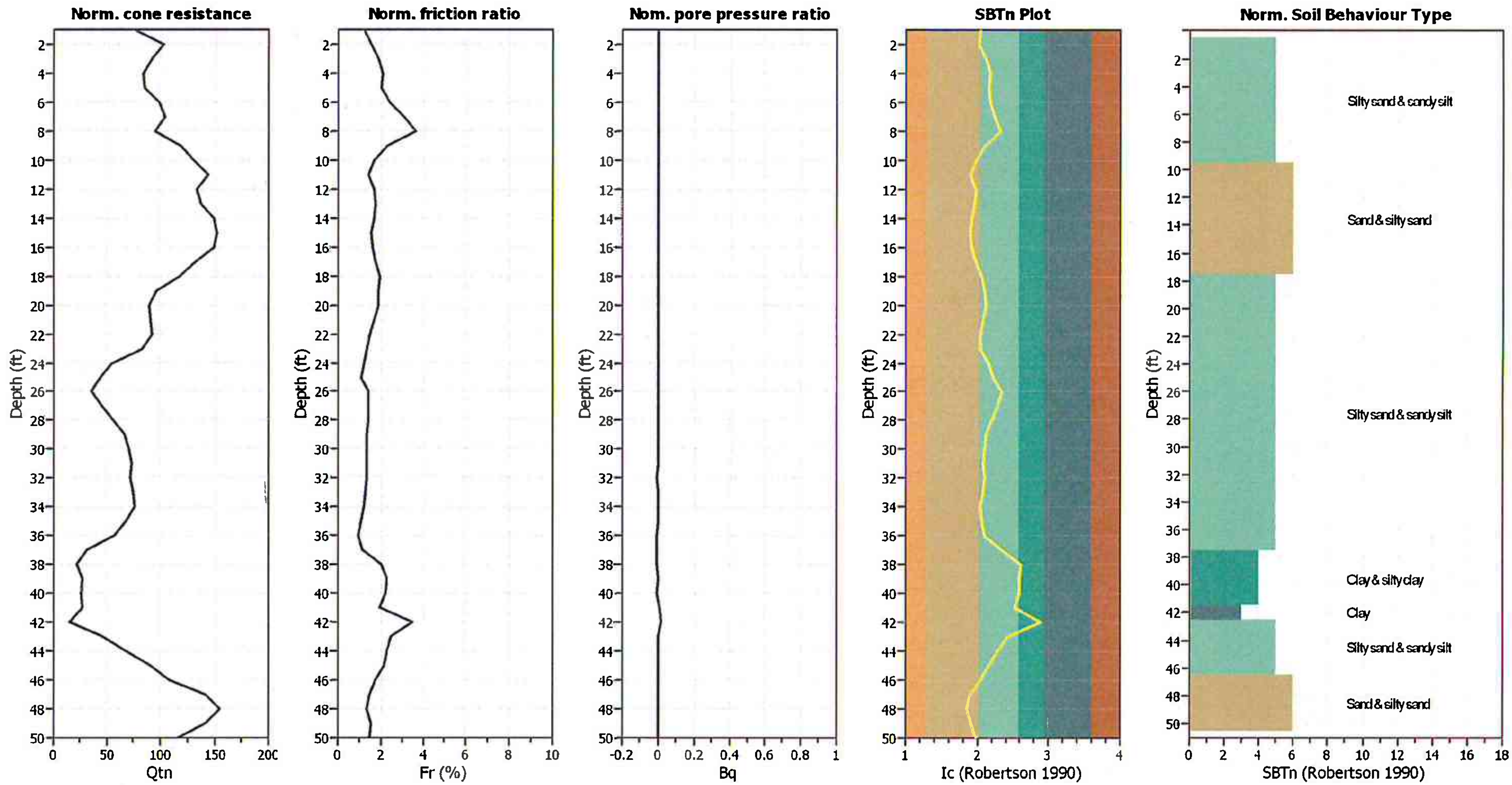
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	40.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.75	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	32.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



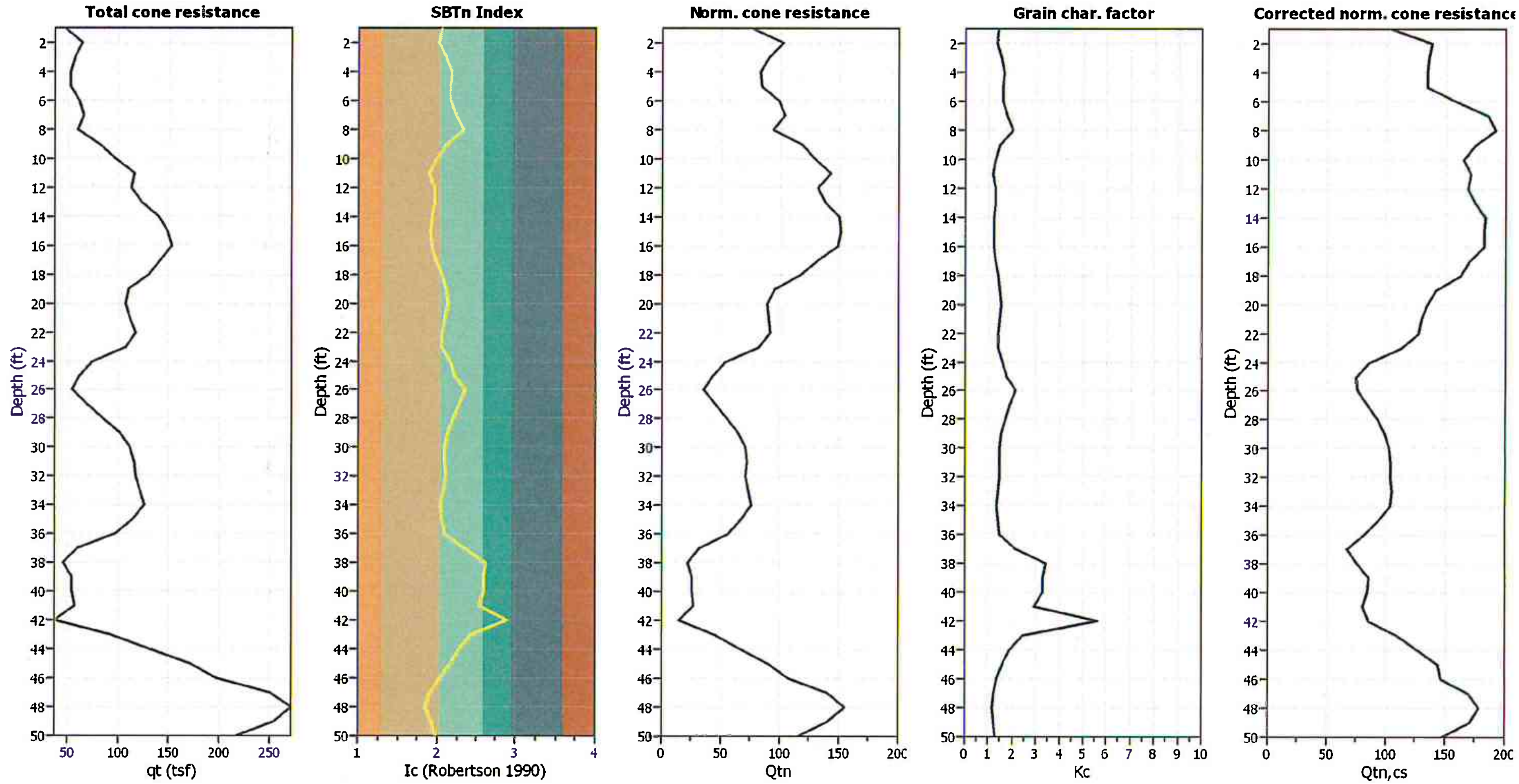
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	40.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.75	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	32.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

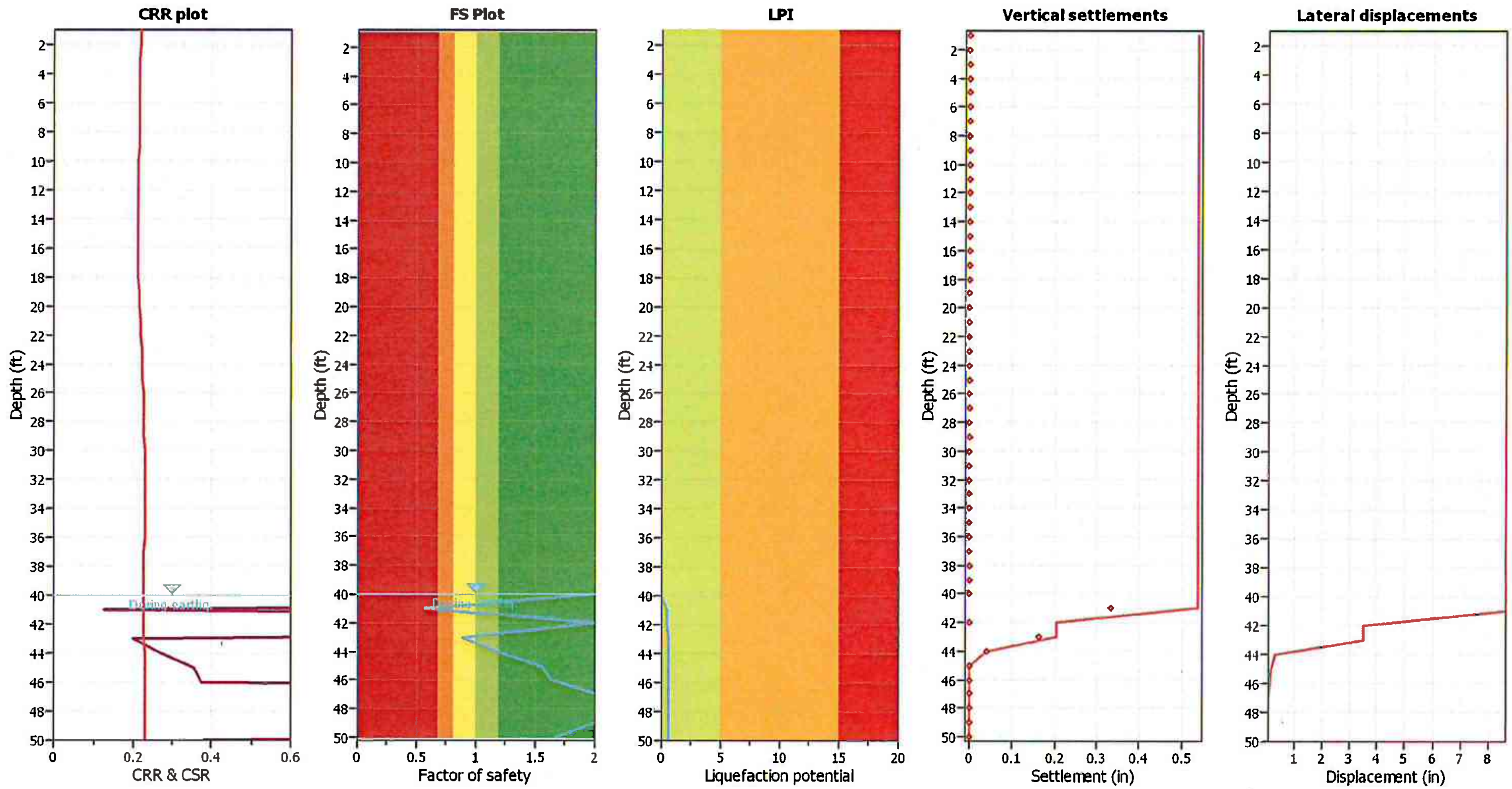
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	40.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.75	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	32.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	40.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.75	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	32.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

LIQUEFACTION ANALYSIS REPORT

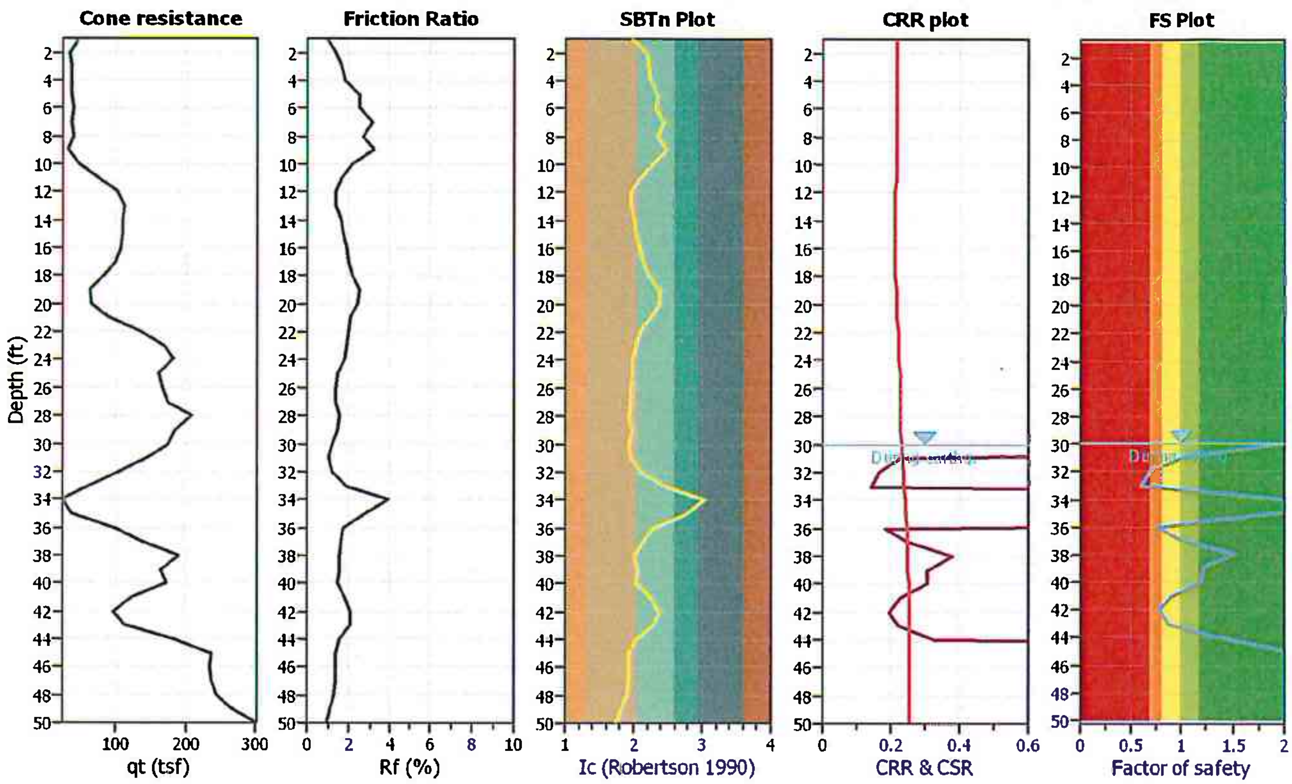
Project title : Integral Communities

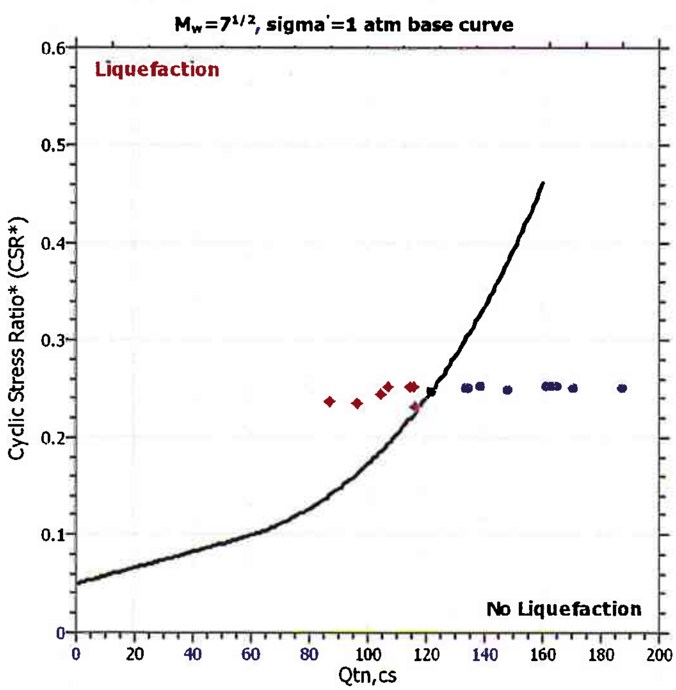
Location : 4747 Daisy Avenue, Long Beach, CA

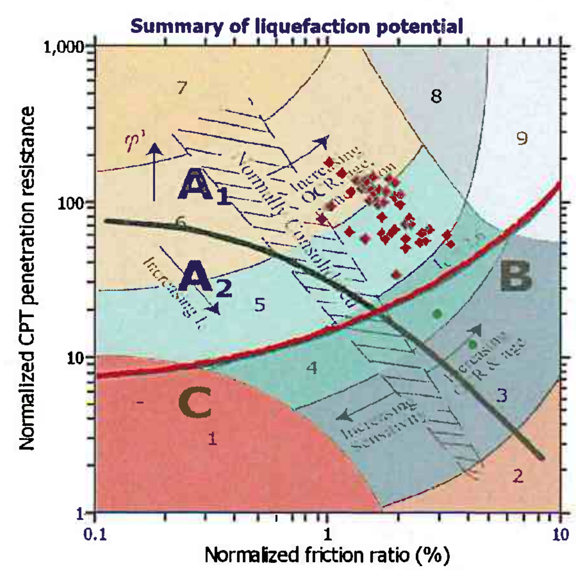
CPT file : CPT-03

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	30.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	30.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.75	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.44	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

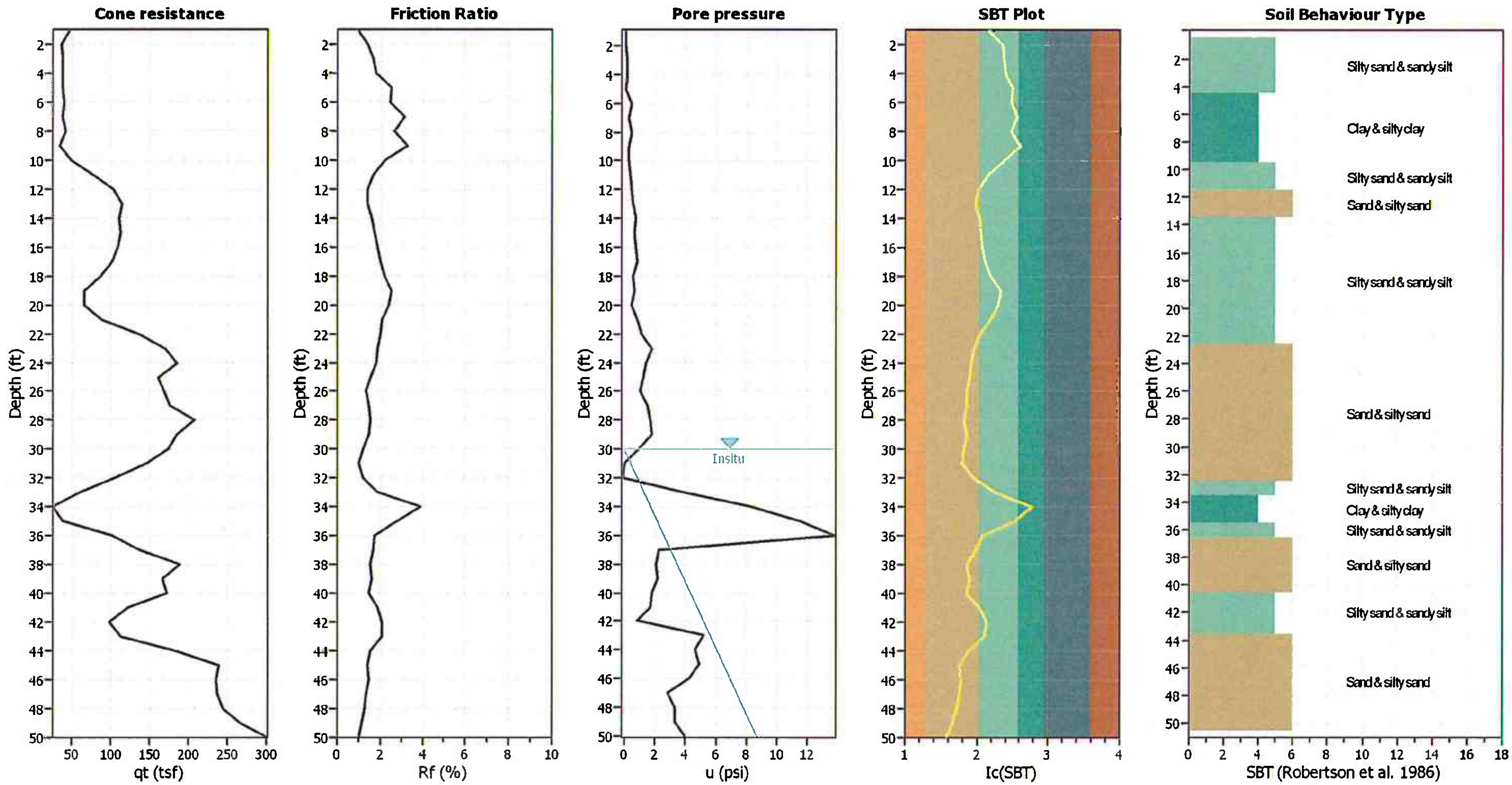






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



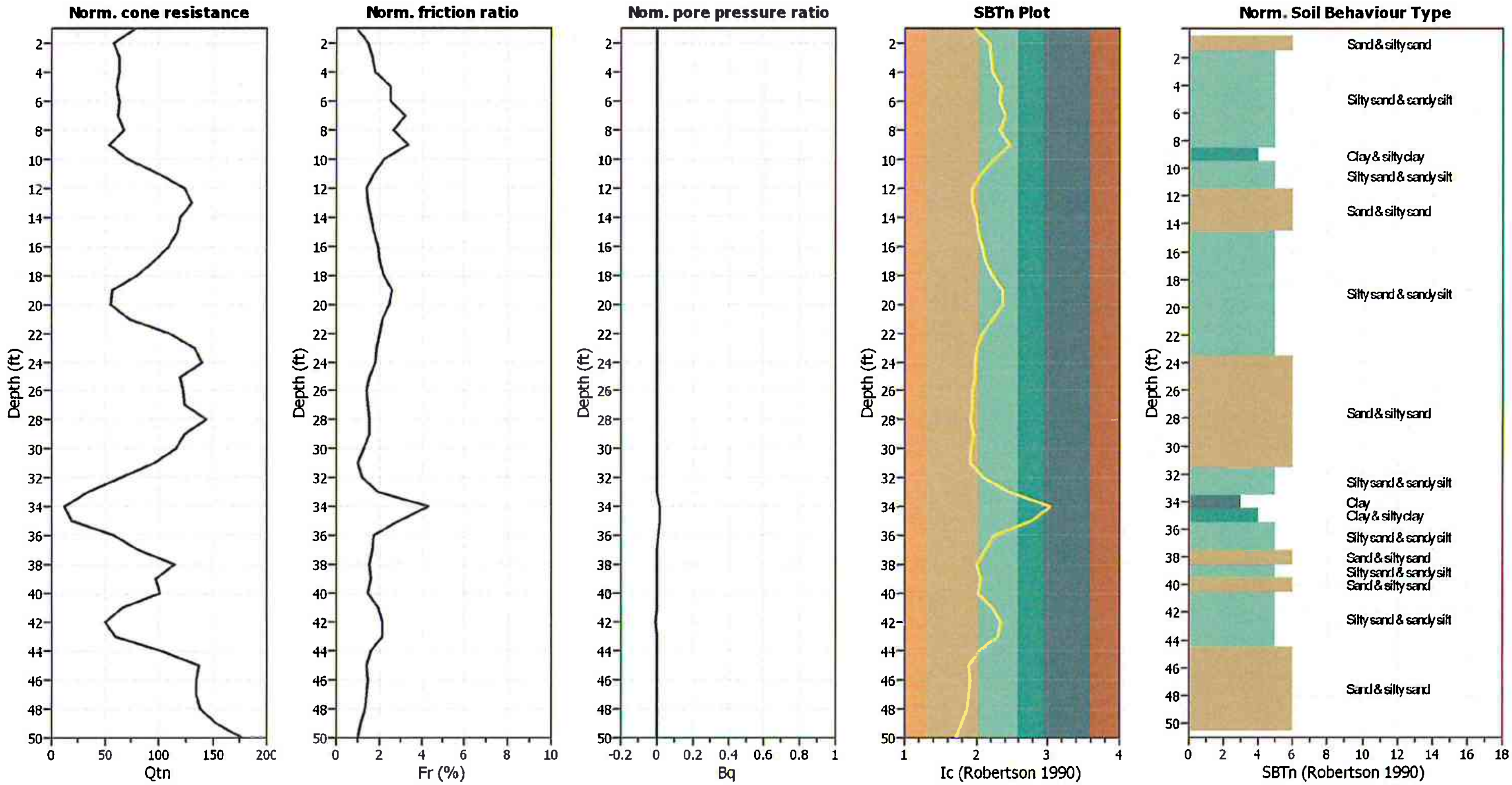
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	30.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.75	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	30.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



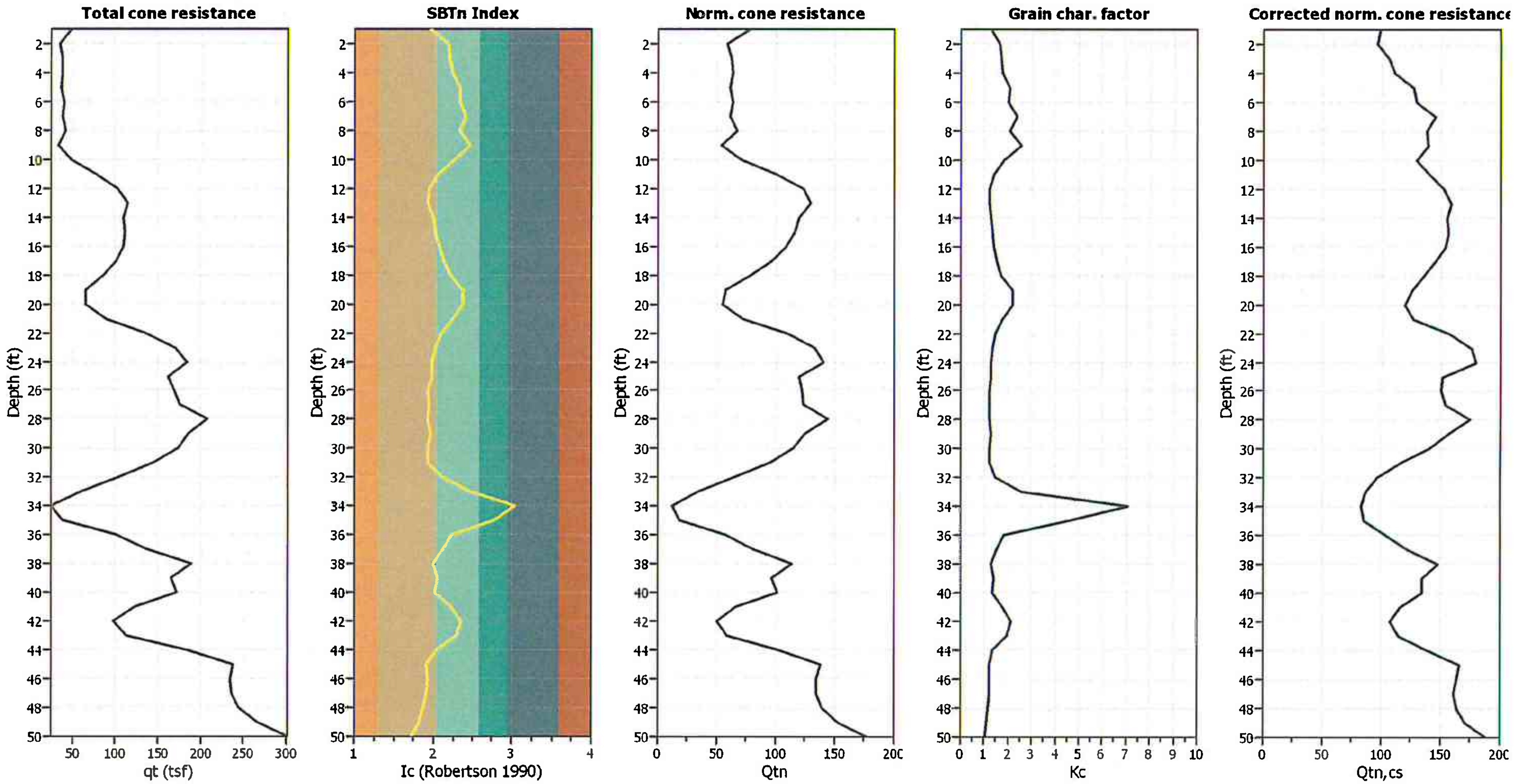
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	30.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.75	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	30.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

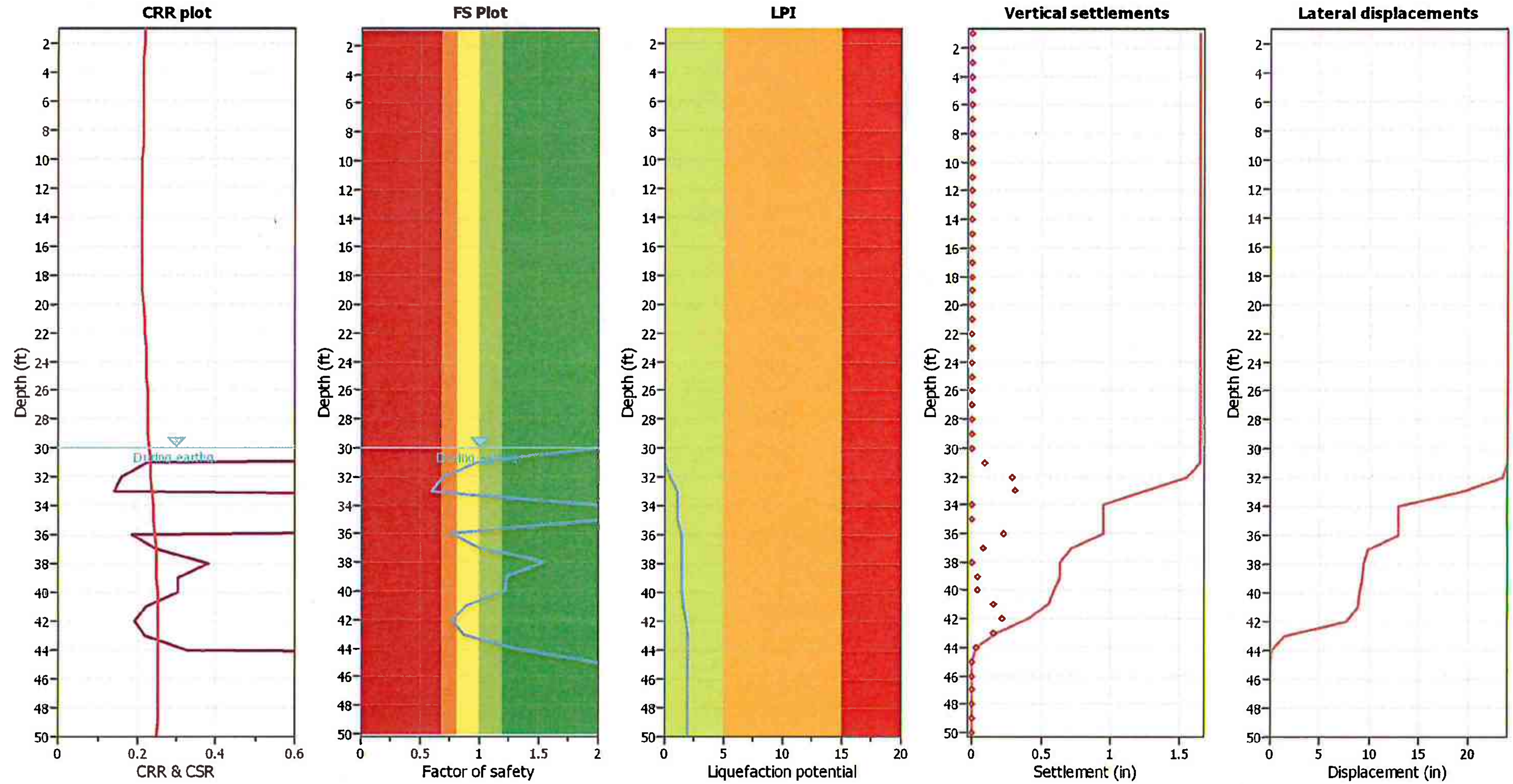
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	30.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.75	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	30.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	30.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.75	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	30.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

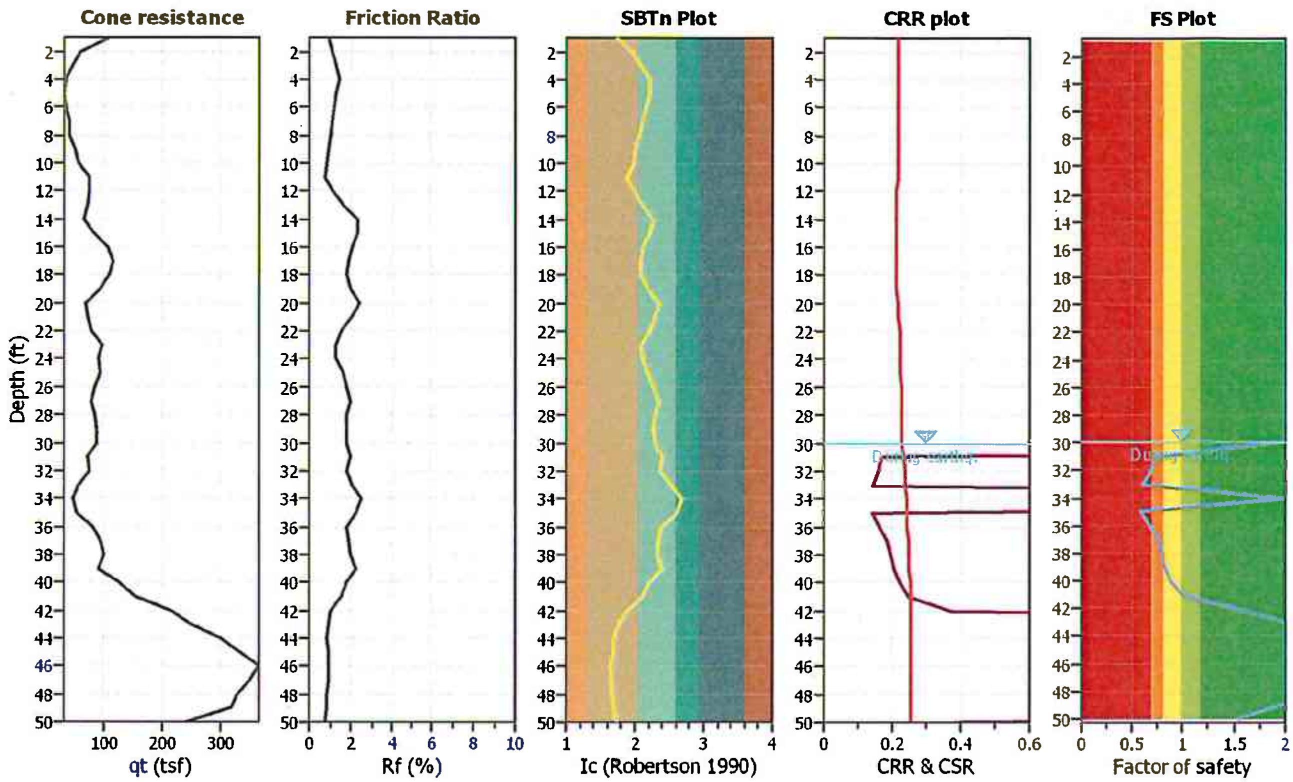
LIQUEFACTION ANALYSIS REPORT

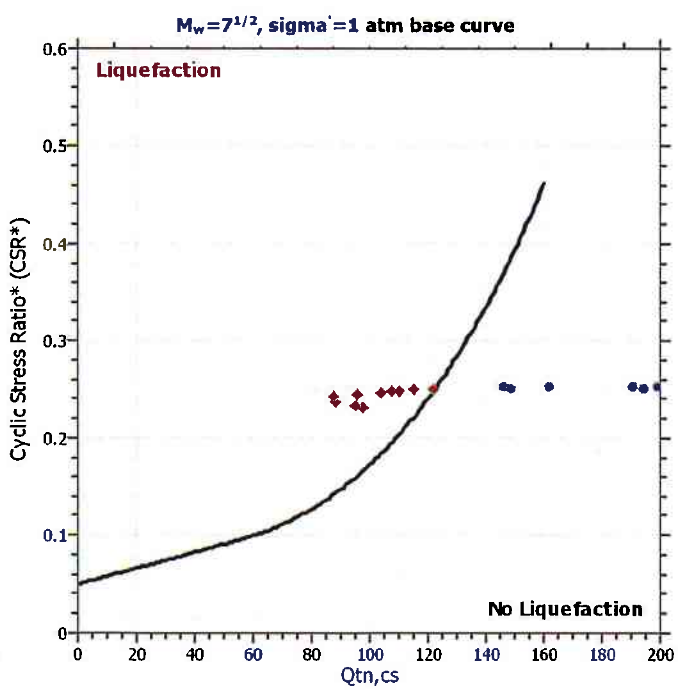
Project title : Integral Communities **Location : 4747 Daisy Avenue, Long Beach, CA**

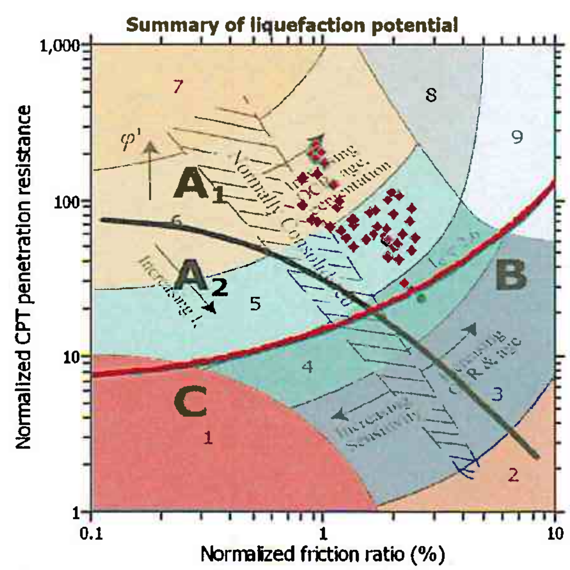
CPT file : CPT-04

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	34.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	30.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.75	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.44	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

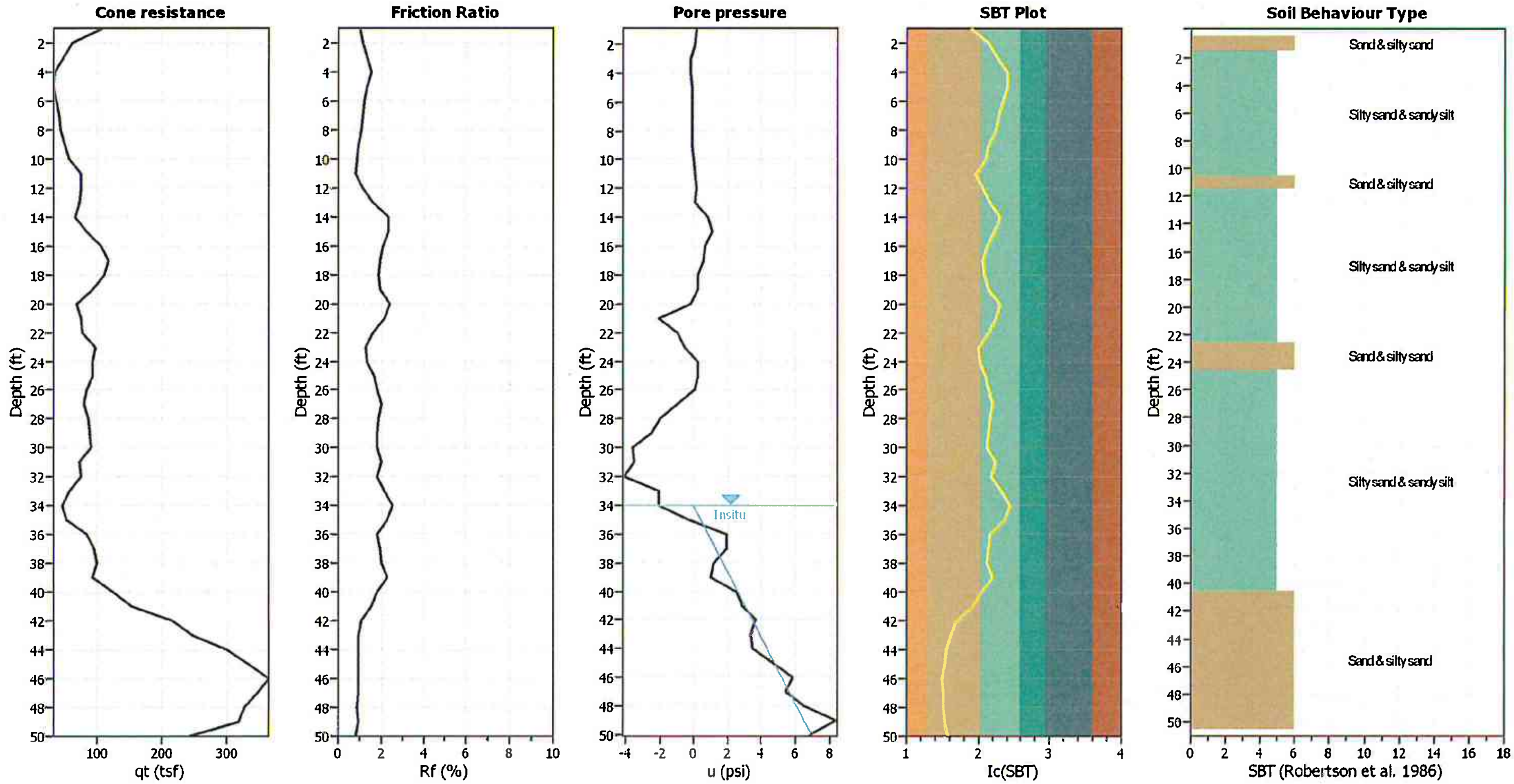






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



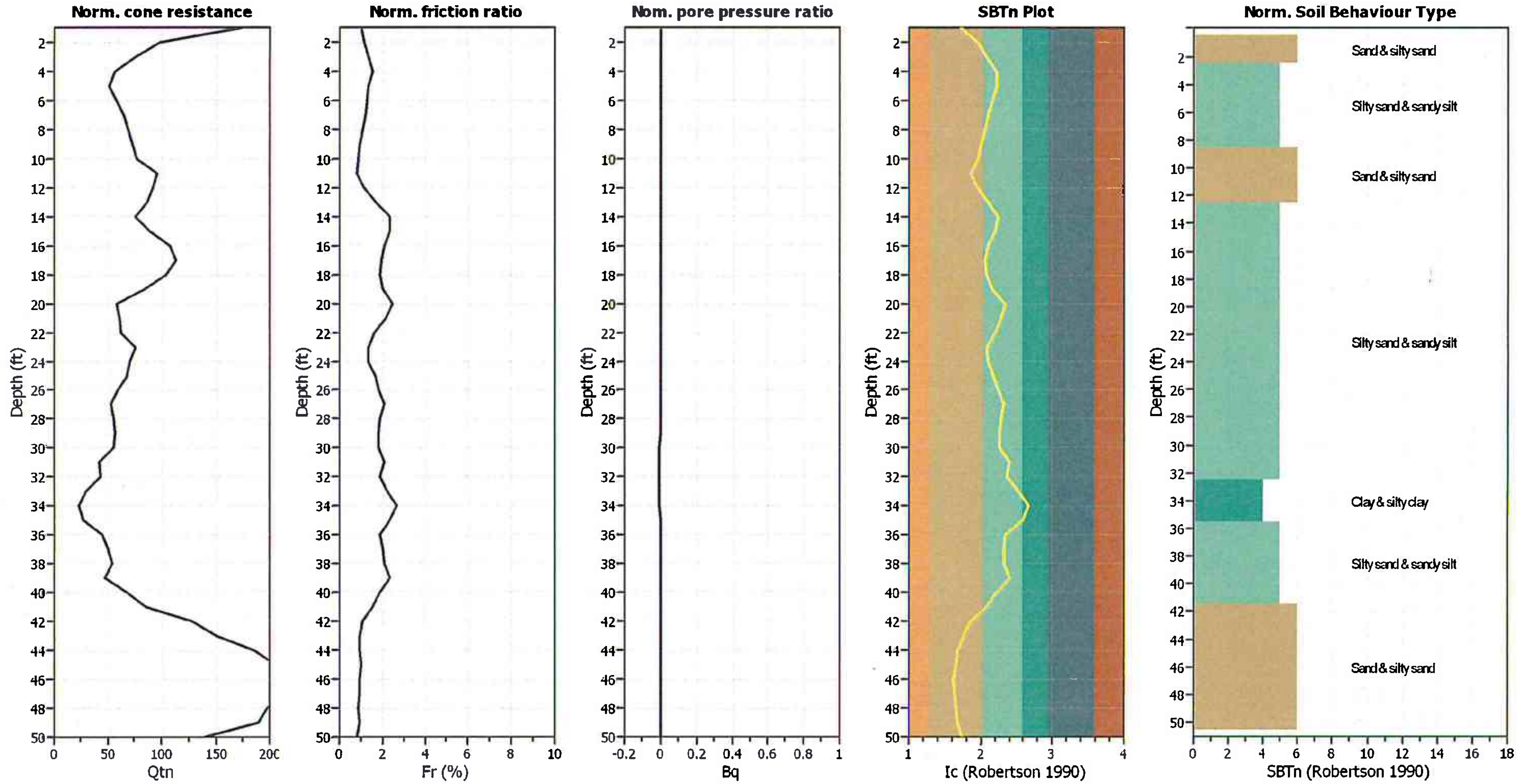
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	30.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.75	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	34.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



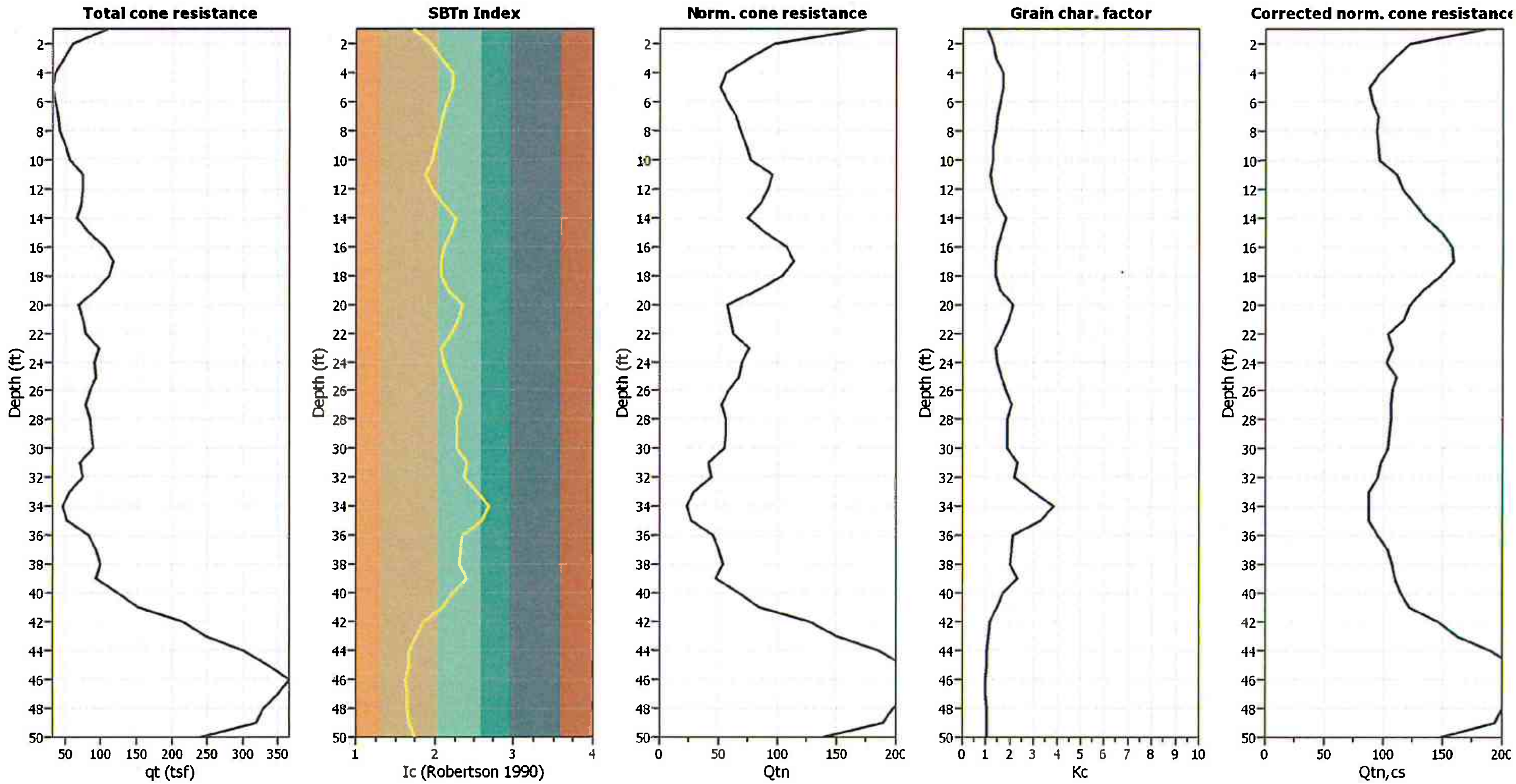
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	30.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.75	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	34.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

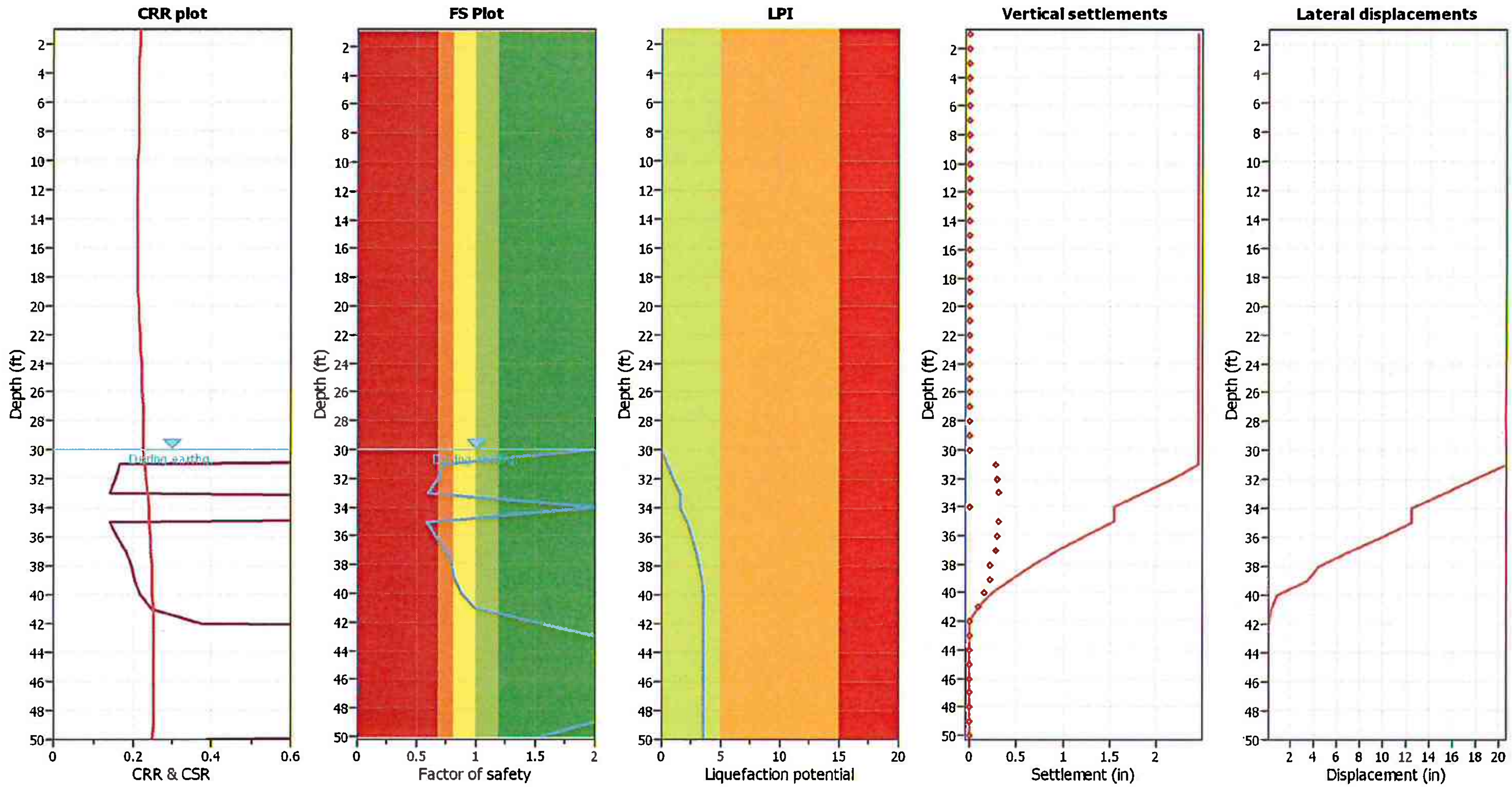
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	30.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.75	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	34.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	30.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.75	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	34.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

APPENDIX E

SOIL PERCOLATION TEST DATA

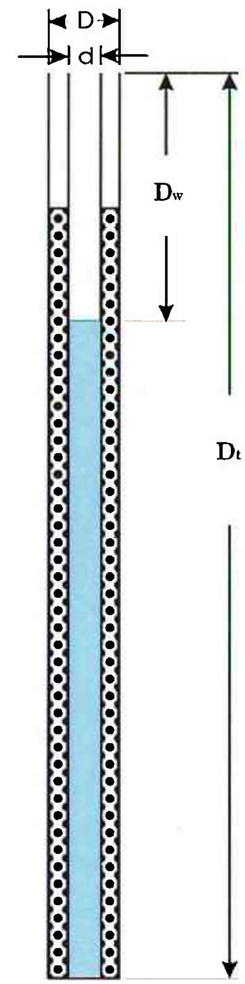
PETRA

PERCOLATION TEST SUMMARY

Job No. 13-443
Project Name: TriPointe Homes - Daisy Avenue, Long Beach
Date: March 4, 2014

Test Number: B-2A

Depth to Bottom,ft (D_t): 3
Diameter of Hole, in (D): 8
Diameter of Pipe, in (d): 3
Agg. Correction (% Voids): 39



Time Interval (min)	Depth to Water Surface Dw (ft)		Change in Head (in)	Perc Rate min/in	Perc Rate gal/day/ft^2
	1st Reading	2nd Reading			
10	1.15	2.43	15.36	0.65	79.44
10	1.10	2.41	15.72	0.64	79.28
10	1.11	2.46	16.20	0.62	83.48
10	1.12	2.53	16.92	0.59	89.79
10	1.17	2.60	17.16	0.58	95.33
10	1.12	2.57	17.40	0.57	93.73
10	1.15	2.61	17.52	0.57	96.95

Perc. Rate: **0.57 Minutes/Inch**
96.95 gal/day/ft^2

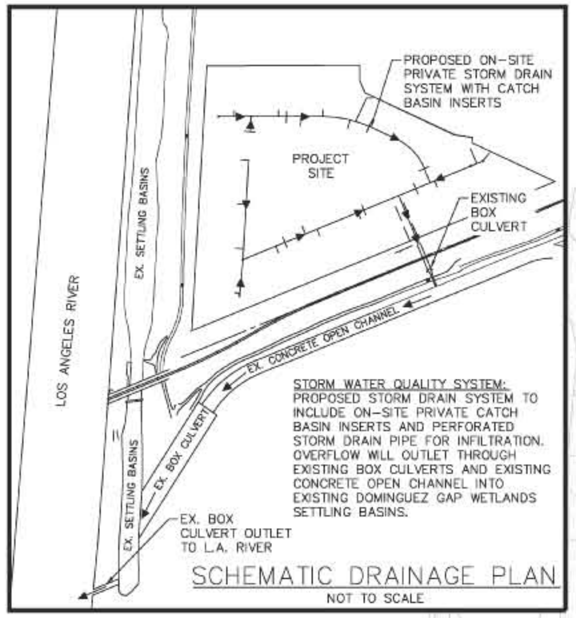
Infiltration Rate: **13.62 Inches/Hour**
(Porchet Method)

PETRA GEOTECHNICAL, INC.

Plate E-1

VESTING TENTATIVE TRACT NO. 72608

IN THE CITY OF LONG BEACH, COUNTY OF LOS ANGELES
STATE OF CALIFORNIA
DECEMBER 12, 2013



SCHEMATIC DRAINAGE PLAN
NOT TO SCALE

LEGEND:

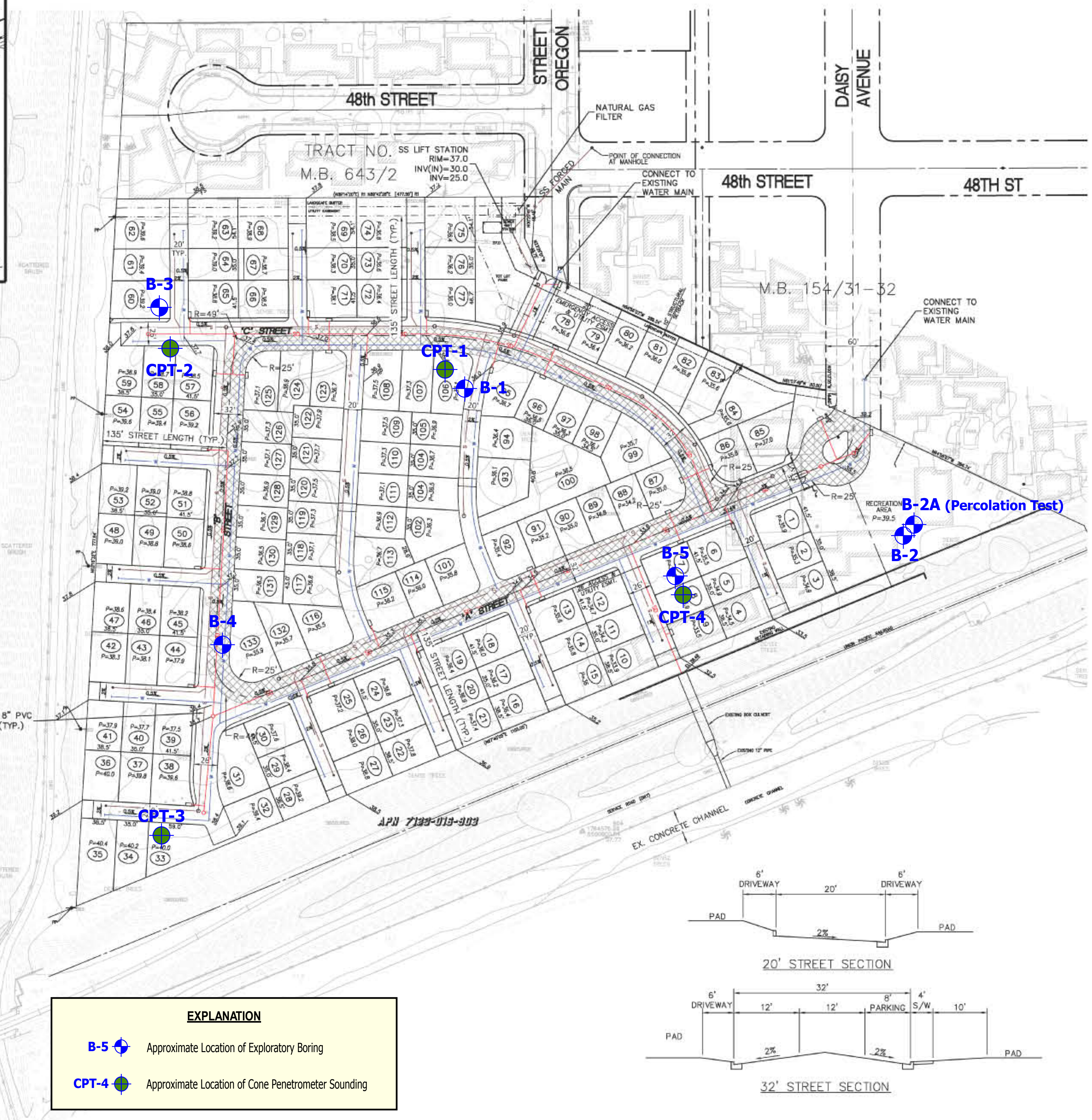
- BLOCK WALL
- CHAIN-LINK FENCE
- WROUGHT IRON FENCE
- WOOD FENCE
- UNDERGROUND GAS
- W — UNDERGROUND WATER
- SD — STORM DRAIN
- S — UNDERGROUND SEWER
- BUILDING PERIMETER
- WATER VALVE
- LIGHT POLE
- POWER POLE
- GUY WIRE
- UNIT NUMBER
- SEWER MANHOLE
- PROPERTY LINE
- BOUNDARY
- RIGHT OF WAY
- EASEMENT
- CENTERLINE
- CURB AND GUTTER
- 24' FIRELANE

ABBREVIATIONS:

BFP	BACKFLOW PREVENTOR
CLF	CHAIN LINK FENCE
EPB	ELECTRIC PULL-BOX
ET	ELECTRIC TRANSFORMER
FDC	FIRE DEPARTMENT CONNECTION
FH	FIRE HYDRANT
GPB	GAS PULL-BOX
GVT	GAS VAULT
MB	MAIL BOX
TPB	TELEPHONE PULL-BOX
UTCN	TRAILOR/MODULAR UTILITY CONNECTIONS
WM	WATER METER
WV	WATER VALVE

NORTH

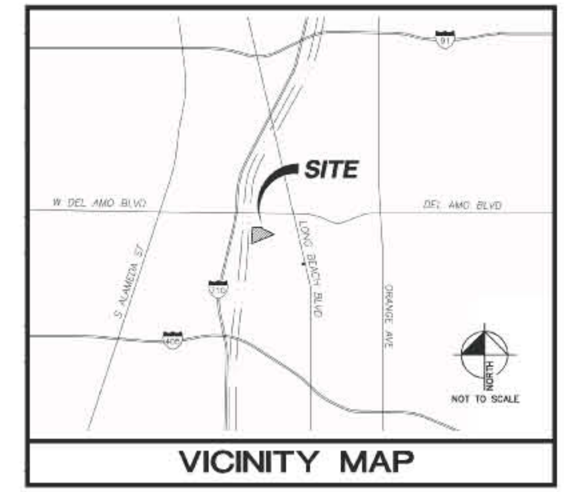
GRAPHIC SCALE IN FEET
0 30 60 120



EXPLANATION

B-5 Approximate Location of Exploratory Boring

CPT-4 Approximate Location of Cone Penetrometer Sounding



VICINITY MAP

OWNERS:

THE LONG BEACH PROJECT, LLC
888 SAN CLEMENTE, SUITE 100
NEWPORT BEACH, CA 92660
PHONE: (949) 720-3612

ENGINEER:

KIMLEY-HORN AND ASSOCIATES
6800 OWENSMOUTH AVE., SUITE 410
CANOGA PARK, CA 91303
PHONE: (747) 900-8381
EMAIL: JON.WAKENHUT@KIMLEY-HORN.COM

APN:

7133-016-005

ZONING:

1. EXISTING LAND USE:
   INACTIVE BOY SCOUT SITE
2. PROPOSED LAND USE:
   RESIDENTIAL SINGLE FAMILY DWELLINGS
3. EXISTING ZONING: (I) INSTITUTIONAL
4. PROPOSED ZONING: TBD
5. WATER SERVICE PROVIDED BY: LONG BEACH WATER DEPARTMENT
6. SANITARY SEWER SERVICE PROVIDED BY:LONG BEACH WATER DEPARTMENT
7. ELECTRIC SERVICE PROVIDED BY: LONG BEACH GAS & ELECTRIC DEPARTMENT
8. GAS SERVICE PROVIDED BY: LONG BEACH GAS & ELECTRIC DEPARTMENT
9. TELEPHONE SERVICE PROVIDED BY: AT&T
10. CABLE SERVICE PROVIDED BY: TIME WARNER CABLE
11. ALL PROPOSED UTILITIES TO BE UNDERGROUND.
12. DRAINAGE FACILITIES TO BE DESIGNED IN ACCORDANCE WITH THE MASTER PLAN OF DRAINAGE, CITY OF LONG BEACH.
13. ALL GRADING TO CONFORM TO THE CITY OF LONG BEACH GRADING AND EXCAVATION CODE.
14. ALL SLOPES SHALL BE 2:1 UNLESS OTHERWISE NOTED.
15. THIS PROPERTY IS WITHIN THE DOMINGUEZ GAP SPREADING GROUNDS OF COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS SPREADING GROUND FACILITIES.

PROPOSED DEVELOPMENT:

PROPOSED SINGLE FAMILY RESIDENTIAL COMPLEX WITH 133 DWELLING UNITS.

AREA:

EXISTING AREA = 460,093 S.F. (10.56 ACRES)

20' STREET SECTION

32' STREET SECTION

Kimley-Horn and Associates, Inc.

6800 OWENSMOUTH AVENUE, SUITE 410 CANOGA PARK, CA 91303 TEL NO. (747) 900-8100 FAX NO. (818) 208-8883

PETRA GEOTECHNICAL, INC.
3190 AIRPORT LOOP DRIVE, SUITE J-1
COSTA MESA, CALIFORNIA 92626
PHONE: (714) 549-9821
COSTA MESA MURRIETA PALM DESERT SANTA CLARITA

EXPLORATION MAP

Vesting Tentative Tract No. 72608
4747 Daisy Ave., Long Beach, CA

SCALE:
see plan

DWG BY	SW
J.N.	13-443
DATE	March 2014

Plate 1

Appendix F

Phase I Environmental Site Assessment

ASTM PHASE I ENVIRONMENTAL SITE ASSESSMENT
WILL J. REID SCOUT CAMP
BOY SCOUTS OF AMERICA
4747 DAISY AVENUE
LONG BEACH, CALIFORNIA

by

Haley & Aldrich, Inc.
Walnut Creek, California

for

Integral Partners Funding, LLC
Newport Beach, California

File No. 40189-000
July 2013

HALEY & ALDRICH

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24 July 2013
File No. 40189-000

Integral Partners Funding, LLC
3 San Joaquin Plaza, Suite 100
Newport Beach, California 92660

Attention: Mr. Spencer Oliver

Subject: ASTM Phase I Environmental Site Assessment
Will J. Reid Scout Camp
Boy Scouts of America
4747 Daisy Avenue
Long Beach, California

Dear Mr. Oliver:

The enclosed report presents the results of a Phase I Environmental Site Assessment (Phase I ESA) conducted at the above-referenced property, which is located at 4747 Daisy Avenue in Long Beach, California (herein referred to as the "subject site"). This work was performed by Haley & Aldrich, Inc. (Haley & Aldrich), in accordance with our proposal to Integral Partners Funding, LLC (Integral) dated 18 June 2013 ("Agreement") as authorized by Integral on 2 July 2013. As indicated in our proposal, this Phase I ESA was conducted using practices consistent with the American Society for Testing and Materials (ASTM) E 1527-05 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process (ASTM E 1527-05 Standard) as referenced in 40 Code of Federal Regulations (CFR) Part 312 (the All Appropriate Inquiries [AAI] Rule).

The objective of a Phase I ESA is to identify known and suspect "recognized environmental conditions" (RECs), historical RECs (HRECs), and *de minimis* conditions associated with the subject site, as defined in the ASTM E 1527-05 Standard, by evaluating site history, existing observable conditions, current site use, and current and former uses of adjoining properties as well as potential releases at surrounding properties that may impact the subject site.

Our conclusions regarding the presence and potential impact of RECs on the subject site are intended to help the user evaluate the "business environmental risk" associated with the subject site, as defined in the ASTM E 1527-05 Standard and discussed in Section 1.1 of this report.

Thank you for the opportunity to perform these services for you. Please do not hesitate to contact us if you have any questions or comments.

Sincerely yours,
HALEY & ALDRICH, INC.

David Schlotterbeck, REA
Senior Environmental Scientist

James Schwartz, PG
Client Leader

Enclosures

\\WNC\Common\40189-Daisy Ave Long Beach\Deliverable\2013-0724-HAI-Integral-Daisy Long Beach Phase I ESA-F.docx

ASTM PHASE I ENVIRONMENTAL SITE ASSESSMENT
WILL J. REID SCOUT CAMP
BOY SCOUTS OF AMERICA
4747 DAISY AVENUE
LONG BEACH, CALIFORNIA

By

Haley & Aldrich, Inc.
Walnut Creek, California

The undersigned declare the following:

We declare that, to the best of my professional knowledge and belief, we meet the definition of Environmental Professional as defined in 40 CFR Part 312, §312.10.

We have the specific qualifications based on education, training, and experience to assess the nature, history, and setting of the subject site and "develop opinions and conclusions regarding conditions indicative of releases or threatened releases." We have developed and performed "all appropriate inquiries" (AAI) in conformance with the standards and practices set forth in 40 CFR Part 312.

David Schlotterbeck, REA
Senior Environmental Scientist

James Schwartz, PG
Client Leader

for

Integral Partners Funding, LLC
Newport Beach, California

File No. 40189-000

HALEY & ALDRICH

EXECUTIVE SUMMARY

Haley & Aldrich has performed a Phase I Environmental Site Assessment (Phase I ESA) on the Will J. Reid Scout Camp – Boy Scouts of America property located at 4747 Daisy Avenue in Long Beach, California (herein referred to as the "subject site"). The subject site has been identified by the Los Angeles County Assessor's office as assessor parcel number (APN) 7133-016-005 and according to review of historical references and an interview with the Key Site Manager, the subject site has been used as a Boy Scouts of America campground since the early 1940s.

The objective of a Phase I ESA is to identify known and suspect recognized environmental conditions (RECs), historical RECs (HRECs), and *de minimis* conditions associated with the subject site, as defined in the American Society for Testing and Materials (ASTM) E 1527-05 Standard and in Section 1.1 of this report.

No data gaps were identified during the performance of this Phase I ESA. Thus, it is our opinion that sufficient information was obtained to identify subject site conditions indicative of releases or threatened releases of hazardous substances and petroleum hydrocarbons.

Based on the results of this Phase I ESA, our findings are as follows:

KNOWN OR SUSPECT RECOGNIZED ENVIRONMENTAL CONDITIONS

The ASTM E 1527-05 Standard defines a REC as "the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, ground water, or surface water of the property." A material threat is defined by the ASTM E 1527-05 Standard as "a physically observable or obvious threat which is reasonably likely to lead to a release that, in the opinion of the environmental professional, is threatening and might result in impact to public health or the environment."

This Phase I ESA has revealed no evidence of RECs in connection with the subject site.

HISTORICAL RECs

The ASTM E 1527-05 Standard defines an HREC as an environmental condition "which in the past would have been considered a recognized environmental condition, but which may or may not be considered a recognized environmental condition currently."

This Phase I ESA has revealed no evidence of HRECs in connection with the subject site.

DE MINIMIS CONDITIONS

The ASTM E 1527-05 Standard defines *de minimis* conditions as those conditions which "do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies." The ASTM E 1527-05 Standard notes that "conditions determined to be *de minimis* are not recognized environmental conditions."

This Phase I ESA has revealed no evidence of *de minimis* conditions in connection with the subject site.

NON-SCOPE CONSIDERATIONS

Based on review of historical references available for the subject site and interviews with the Key Site Manager, the buildings on-site were constructed prior to 1979 and, thus, asbestos may be present in construction materials. The presence of asbestos in on-site structures is not a REC, but it is an environmental issue that may affect worker safety, particularly in a demolition scenario. The United States Environmental Protection Agency (EPA) defines asbestos containing material (ACM) as material containing greater than 1 percent asbestos. Both the National Emission Standards for Hazardous Air Pollutants and the South Coast Air Quality Management District (SCAQMD) require that ACM classified as friable or which may become friable be identified and removed prior to demolition activities. Under SCAQMD rules, an asbestos survey and notification to the SCAQMD will be required prior to demolition. Additionally, there is the likelihood that lead-based paints were applied to the structures based on the construction date. Although by definition, the potential presence of lead-based paint at the subject site is not considered a REC, it is another environmental issue that may affect worker safety; therefore, a lead-based paint survey may be appropriate prior to demolishing building materials at the subject site.

SUMMARY AND RECOMMENDATIONS

In summary, based on the results of this Phase I ESA, we have identified no RECs associated with the subject site. Haley & Aldrich recommends no further environmental investigation at the subject site at this time. However, although not considered a REC, the groundwater well located adjacent to the meeting trailer near the central portion of the subject site can act as a conduit to the subsurface and underlying groundwater. If the future use of the subject site does not include the maintenance and use of this groundwater supply well, Haley & Aldrich recommends that the well be properly abandoned according to local and state regulations.

The remainder of this report contains additional information regarding the Phase I ESA, the resulting findings summarized above, and limitations affecting this report.

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LIST OF FIGURES

1. INTRODUCTION

The enclosed report presents the results of a Phase I Environmental Site Assessment (Phase I ESA) conducted on the Will J. Reid Scout Camp – Boy Scouts of America property located at 4747 Daisy Avenue in Long Beach, California (herein referred to as the "subject site"). The subject site has been identified by the Los Angeles County Assessor's office as assessor parcel number (APN) 7133-016-005 and consists of approximately 9.66 acres of land currently used as a Boy Scouts of America facility. This work was performed by Haley & Aldrich, Inc. (Haley & Aldrich), in accordance with our proposal to Integral Partners Funding, LLC (Integral) dated 18 June 2013 ("Agreement") as authorized by Integral on 2 July 2013 (Appendix A). As indicated in our proposal, this Phase I ESA was conducted using practices consistent with the American Society for Testing and Materials (ASTM) E 1527-05 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process (ASTM E 1527-05 Standard) as referenced in 40 Code of Federal Regulations (CFR) Part 312 (the All Appropriate Inquiries [AAI] Rule).

1.1 Objective

The objective of a Phase I ESA is to identify known and suspect "recognized environmental conditions" (RECs), historical RECs (HRECs), and *de minimis* conditions associated with the subject site by evaluating site history, existing observable conditions, current site use, and current and former uses of adjoining properties as well as potential releases at surrounding properties that may impact the subject site. RECs are defined in the ASTM E 1527-05 Standard as "the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water at the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include *de minimis* conditions that generally do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies." A material threat is defined by the ASTM E 1527-05 Standard as "a physically observable or obvious threat which is reasonably likely to lead to a release that, in the opinion of the environmental professional, is threatening and might result in impact to public health or the environment."

Consistent with ASTM E 1527-05 Section 12.5 (Report Format), and for the purposes of this assessment, those RECs that have been identified as being present with respect to the subject site are referred to as Known Recognized Environmental Conditions (KRECs), and those RECs that have been identified as being likely present with respect to the subject site are referred to as Suspect Recognized Environmental Conditions (SRECs). The ASTM E 1527-05 Standard defines HRECs as environmental conditions "which in the past would have been considered a recognized environmental condition, but which may or may not be considered a recognized environmental condition currently."

Our conclusions are intended to help the user evaluate the "business environmental risk" associated with the subject site, defined in the ASTM E 1527-05 Standard as "a risk which can have a material environmental or environmentally-driven impact on the business associated with the current or planned use of a parcel of commercial real estate, not necessarily limited to those environmental issues required to be investigated in this practice. Consideration of business environmental risk issues may involve addressing one or more non-scope considerations…"

The completion of this Phase I ESA is only one component of the process required to satisfy the AAI Rule. In addition, the user must adhere to a set of user responsibilities as defined by the ASTM E 1527-05 Standard and the AAI Rule. User responsibilities are discussed in Section 5.3 of this report. A user seeking protection from Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) liability as an innocent landowner, bona fide prospective purchaser, or contiguous property owner must complete all components of the AAI process in addition to meeting ongoing obligations. AAI components, CERCLA liability relief, and ongoing obligations are discussed in the AAI Rule and in Appendix XI of the ASTM E 1527-05 Standard.

1.2 Site Identification

The subject site is a triangular-shaped parcel located south of the intersection of Oregon Avenue and 48th Street in Long Beach, California (Figure 1). According to the Los Angeles County Assessor's Office, the subject site occupies approximately 9.66 acres of land identified as APN 7133-016-005 and is owned by Long Beach Area Council, Boy Scouts of America.

1.3 Scope of Services

Haley & Aldrich performed the following scope of services to complete this Phase I ESA. These services were performed either by, or under the direct supervision of, an environmental professional as defined by the AAI Rule.

1. Conducted visual observations of site conditions, and of abutting property use, to evaluate the nature and type of activities that have been or are being conducted at and adjoining to the subject site, in terms of the potential for release or threat of release of hazardous substances or petroleum products.

2. Reviewed federal, state, tribal, and local environmental database information within the ASTM-specified distance from the subject site using a database service to access records. Used 7.5-minute topographic maps to evaluate the subject site's physical setting.

3. Reviewed state environmental files pertaining to the subject site and nearby sites with the potential to impact the subject site.

4. Reviewed the following sources of historical use information: aerial photographs, topographic maps, and city directories (Appendix B).

5. Contacted state and local agencies regarding the subject site and surrounding properties and structures.

6. Interviewed the Key Site Manager.

7. Interpreted the information and data assembled as a result of the above work tasks, and formulated conclusions regarding the potential presence and impact of RECs, including HRECs.

1.4 Non-Scope Considerations

The ASTM E 1527-05 Standard includes the following list of “additional issues” that are non scope considerations outside of the scope of the ASTM Phase I ESA practice: asbestos-containing materials, radon, lead-based paint, lead in drinking water, wetlands, regulatory compliance, cultural and historic resources, industrial hygiene, health and safety, ecological resources, endangered species, indoor air quality, bio-agents, and mold. These items were not included in this Phase I ESA of the subject site.

A limited assessment of the presence of polychlorinated biphenyls (PCBs) is included in the ASTM work scope. Accordingly, our assessment of the presence of PCBs is limited to those potential sources specified in the ASTM E 1527-05 Standard as “electrical or hydraulic equipment known or likely to contain PCBs…to the extent visually and or physically observed or identified from the interview or records review.”

1.5 Exceptions and Deviations

1.5.1 Deviations

Haley & Aldrich completed this Phase I ESA in substantial conformance with the ASTM E 1527-05 Standard. In our opinion, no additions were made to or deviations and deletions made from the ASTM work scope in completing this Phase I ESA.

1.5.2 Data Gaps

No data gaps were identified during the performance of this Phase I ESA. Thus, it is our opinion that sufficient information was obtained to identify subject site conditions indicative of releases or threatened releases of hazardous substances and petroleum hydrocarbons. Our opinion is limited by the conditions prevailing at the time our work is performed and the applicable regulatory requirements in effect.

1.5.3 Limitations

Our work for this project was performed in accordance with the standards and practices set forth in 40 CFR Part 312 and is consistent with the ASTM E 1527-05 Standard for Phase I ESAs. Several organizations other than ASTM, such as professional associations ASFE and AGWSE, have also developed guidelines or standards for environmental site assessments. The Phase I ESA presented in this report may vary from the specific guidelines or standards required by other organizations.

This Phase I ESA was prepared pursuant to an Agreement dated 2 July 2013 between Integral and Haley & Aldrich, which Agreement is attached hereto and is made a part of this report. All uses of this report are subject to, and deemed accepting of, the conditions and restrictions contained in the Agreement. The observations and conclusions described in this report are based solely on the Scope of Services provided pursuant to the Agreement. Haley & Aldrich has not performed any additional observations, investigations, studies, or other testing not specified in the Agreement. Haley & Aldrich shall not be liable for the existence of any condition the discovery of which would have required the performance of services not authorized under the Agreement.

This report is prepared for the exclusive use of Integral in connection with establishing current environmental conditions at the subject site, prior to Integral potentially acquiring the subject site. There are no intended beneficiaries other than Integral. Haley & Aldrich shall owe no duty whatsoever to any other person or entity on account of the Agreement or the report. Use of this report by any person or entity other than Integral for any purpose whatsoever is expressly forbidden unless such other person or entity obtains written authorization from Integral and from Haley & Aldrich. Use of this report by such other person or entity without the written authorization of Integral and Haley & Aldrich shall be at such other person's or entity's sole risk, and shall be without legal exposure or liability to Haley & Aldrich.

Use of this report by any person or entity, including by Integral, for a purpose other than establishing current environmental conditions at the subject site is expressly prohibited unless such person or entity obtains written authorization from Haley & Aldrich indicating that the report is adequate for such other use. Use of this report by any person or entity for such other purpose without written authorization by Haley & Aldrich shall be at such person's or entity's sole risk and shall be without legal exposure or liability to Haley & Aldrich.

This report reflects site conditions observed and described by records available to Haley & Aldrich as of the date of report preparation. The passage of time may result in significant changes in site conditions, technology, or economic conditions, which could alter the findings and/or recommendations of the report. Accordingly, Integral and any other party to whom the report is provided recognize and agree that Haley & Aldrich shall bear no liability for deviations from observed conditions or available records after the time of report preparation.

Use of this report by any person or entity in violation of the restrictions expressed in this report shall be deemed and accepted by the user as conclusive evidence that such use and the reliance placed on this report, or any portions thereof, is unreasonable, and that the user accepts full and exclusive responsibility and liability for any losses, damages, or other liability which may result.

2. SITE DESCRIPTION

2.1 Site Ownership and Location

2.1.1 Name of Site Owner

According to the Los Angeles County Assessor's Office, the owner of the subject site is listed as Long Beach Area Council, Boy Scouts of America.

2.1.2 Name of Site Operator

The subject site is currently operated by the Boy Scouts of America.

2.1.3 Project Locus Map

The United States Geological Survey (USGS) topographic map reviewed during this Phase I ESA for the subject site is the Long Beach, CA Quadrangle, dated 1981 (see Figure 1). The USGS topographic map was used as the source for subject site setting information. The subject site is located in Los Angeles County.

2.2 Site and Vicinity Description

Figure 2 is a Site Plan of the subject site and shows relevant features of the subject site and immediately adjoining properties, as described below.

- The subject site consists of approximately 9.66 acres of land identified as APN 7133-016-005. According to the City of Long Beach Planning Department, the subject site is located in an area zoned as "I" for Institutional.

- The area in the vicinity of the subject site is generally characterized as residential and recreational.

- The subject site is bounded to the north, east, and northeast by single-family residential development; to the south by the Southern Pacific Railroad tracks, beyond which is 4602 North Virginia Road, Virginia Country Club; and to the west by the Los Angeles River, Dominguez Gap Wetlands, and a bike path.

2.3 Physical Setting

Subsurface explorations were not performed for this Phase I ESA; therefore, subject site geology and hydrology is described on the basis of readily available public information, and/or based upon our experience and understanding of subsurface conditions in the subject area.

2.3.1 Topography

Topographically, the subject site is relatively flat at an elevation of approximately 40 feet above mean seal level. Locally, the surrounding topography slopes gradually to the west-southwest, towards the Los Angeles River and the Pacific Ocean, approximately 8 miles south of the subject site.

2.3.2 Geology

The subject site is located on the physiographic feature known as the Downey Plain, a broad alluvial plain formed by the ancestral Los Angeles and Rio Hondo-San Gabriel River systems. The Downey Plain extends from the Bologna Gap southward across the central lowland of the coastal plain. Soils beneath the subject site consist of approximately 50 feet of Quaternary alluvial sediments that overlie the Pleistocene-age Lakewood Formation. Shallow sediments in the vicinity of the subject site consist of silt and sandy silt to approximately 25 feet below ground surface (bgs). Below 25 feet, the sediment consists of poorly graded sand (Environmental Resolutions, 2005).

2.3.3 Hydrology

According to information obtained through the review of documents on the California State Water Resources Control Board – GeoTracker website (http://geotracker.waterboards.ca.gov), and prepared for investigations completed in the vicinity of the subject site, the uppermost aquifer in the Lakewood Formation is the Artesia Aquifer which occurs at an estimated depth ranging from 75 to 105 feet bgs. A thin aquiclude separates the Artesia Aquifer from the deeper Gage Aquifer, which occurs at depths ranging from 125 to 155 feet bgs. Based on groundwater monitoring activities at a gasoline service station located at the intersection of Long Beach and Del Amo Boulevards, approximately ½ mile northeast of the subject site, the depth to groundwater in May 2013 ranged from 27.9 to 28.5 feet bgs and the groundwater gradient was to the south-southwest (URS, 2013).

According to the Environmental Data Resources, Inc. (EDR) Database Report, the southern half of the subject site is located within a 500-year flood zone. There are no public water supply wells within a 1-mile radius of the subject site.

2.3.4 Oil and Gas Fields

The subject site is located between the Dominguez and Long Beach Oil Fields. The EDR report indicates that there are 38 oil/gas wells located within a 1-mile radius of the subject site. Four of these oil/gas wells are located within 500 feet of the subject site and have been identified by the California Division of Oil, Gas, & Geothermal Resources (DOGGR) as "Plugged and Abandoned – Dry Holes." Generally, a "dry hole" occurs when oil bearing zones are not penetrated during drilling activities and the resulting hole is "plugged and abandoned." Based on the subject site's location outside of the boundaries of the Dominguez and Long Beach Oil Fields and the lack of active oil production in the immediate vicinity of the subject site, it is Haley & Aldrich's opinion that the noted oil exploration within a 1-mile radius of the subject site is not a REC. Copies of DOGGR Los Angeles Area Oil Fields Map and Wildcat Map W1-6 are included in Appendix C.

3. PREVIOUS REPORTS

Haley & Aldrich has not reviewed, nor were provided by Integral or the Key Site Manager, existing environmental reports for the subject site.

4. SITE HISTORY

Haley & Aldrich assessed past usage of the subject site and/or adjoining properties through a review of aerial photographs dated 1928, 1938, 1947, 1956, 1960, 1968, 1976, 1989, 1994, 2005, 2009, 2010, and 2012; topographic maps dated 1986, 1901, 1902, 1930, 1947, 1951, 1964, 1972, and 1981; and city directories. Sanborn Fire Insurance Map coverage was not available for the subject site. Copies of historical references reviewed are included in Appendix B.

4.1 Past Usage of the Subject Site

Aerial Photograph Review

In the reviewed 1928 and 1938 aerial photographs, the subject site appears to have been located within the flood plain of the Los Angeles River, before the river was contained within the present-day concrete channel west of the subject site. In the 1947 and 1956 aerial photographs, the shape of the subject site's parcel is visible and several structures are visible on the eastern portion of the subject site. A swimming pool is visible on the eastern portion of the subject site in the 1956 aerial photograph. In the 1960 aerial photograph the central, western, and southern portions of the subject site remain undeveloped. In the 1968 aerial photograph, a rectangular structure is visible along the southeastern property line near the eastern corner of the subject site. Additionally, 10 square features are visible aligned in two rows near the central portion of the subject site. These features are not visible in the later photographs and may have been campsites or tents. In the 1976 through 2012 aerial photographs, the primary areas of development consist of several structures, a parking lot, and a swimming pool on the eastern portion of the subject site; and several small structures or storage sheds near the central and southwestern portions of the subject site.

Topographic Map Review

There are no structures, tanks, or wells depicted on the subject site on the 1896 through 1951 topographic maps. On the 1896 through 1930 topographic maps, portions of the unchanneled Los Angeles River are depicted in the immediate vicinity of the subject site. On the 1964 through 1981 topographic maps a single, rectangular structure is depicted along the southeastern property line, near the eastern corner of the subject site.

City Directory Review

City directories for the subject site address were available between 1948 and 2006. Listed occupants for 4747 Daisy Avenue are listed below.

- Will J. Reid Scout Park (1948, 1952, 1963, 1969, 1975, 1980, and 1985)
- Boy Scouts of America Downey – Camp Rio Hondo (1950)
- Boy Scouts of America Long Beach (1957, 1960, and 1964)
- Boy Scouts of America Long Beach Area Council (1985)
- Longview Private School (1985, 1991, 1995, 2000, and 2006)

4.2 Past Usage of Adjoining Properties

Aerial Photograph Review

In the reviewed 1928 and 1938 aerial photographs, the adjoining properties appear to be primarily undeveloped. Several unimproved roads surrounding early residential development are visible to the north and northeast of the subject site. In the 1938 aerial photograph, the alignment for the railroad tracks are visible on the adjoining property to the south and the flow of the Los Angeles River has been channeled adjoining to the west of the subject site. In the 1947 and 1956 aerial photographs, additional residential development is visible to the north, east and northeast of the subject site; and a golf course is visible on the southern side of the railroad tracks to the south of the subject site. Beginning in the 1960 aerial photograph, the Los Angeles River is visible within a concrete-lined channel to the west of the subject site. There do not appear to be any significant changes on the adjoining properties in the 1960 through 2012 aerial photographs.

Topographic Map Review

There are no structures or areas of development depicted on the adjoining properties on the 1896 through 1930 topographic maps; the Los Angeles River is depicted to the north, south, and west of the subject site. On the 1930 topographic map, a "California Edison Company Transmission Line" is depicted to the west of the subject site. On the 1947 through 1981 topographic maps, the adjoining properties to the northeast and east of the subject site are shaded indicating an area of significant residential development and labeled as "North Long Beach", and the Union Pacific Railroad tracks are depicted to the south of the subject site. On the 1951 through 1981 topographic maps, the "Casa de Rancho Los Cerritos," "Virginia Country Club," and/or "Country Club" is depicted on the adjoining property to the south of the subject site.

City Directory Review

The adjoining properties to the north, east, and northeast are developed with single-family residential dwellings and the Virginia Country Club on the adjoining property to the south at 4602 Virginia Road are not covered in the EDR City Directory Abstract.

5. ENVIRONMENTAL RECORDS REVIEW

5.1 Standard Environmental Records Review

Haley & Aldrich used the electronic database service EDR to complete the environmental records review. The database search was used to identify properties that may be listed in the referenced agency records, located within the ASTM-specified approximate minimum search distances as shown in the table below. Section 5.1.1 presents a description of each database searched.

Database Searched	Approximate Minimum Search Distance	Subject Site Listed?	Number of Facilities within Search Distance
NPL Sites	1 mile	No	0
Delisted NPL Sites	0.5 mile	No	0
CERCLIS Sites	0.5 mile	No	0
CERCLIS-NFRAP Sites	0.5 mile	No	**1**
Federal ERNS	Site only	No	0
RCRA non-CORRACTS TSD Facilities	0.5 mile	No	0
RCRA CORRACTS TSD Facilities	1 mile	No	**1**
RCRA Generators	Site & Adjoining	No	0
RCRA –Non Generators	Site & Adjoining	No	0
Federal Institutional Controls/Engineering Controls	Site Only	No	0
US Brownfield	0.5 mile	No	0
State and Tribal Equivalent NPL Sites (RESPONSE)	1 mile	No	0
State and Tribal Equivalent CERCLIS Sites ENVIROSTOR	0.5 mile	No	**7**
State and Tribal Registered Storage Tanks	Site & Adjoining	No	0
State FID Underground Storage Tank	Site & Adjoining	No	0
SWEEPS Underground Storage Tank	Site & Adjoining	No	0
Historical UST Registrations (HIST UST)	Site & Adjoining	No	0
HAZNET	Site Only	No	0
State and Tribal Landfills and Solid Waste Disposal Sites (WMUDS/SWAT)	0.5 mile	No	0
State and Tribal Leaking Storage Tanks (LUST)	0.5 mile	No	0
State and Tribal Institutional Controls/Engineering Controls	Site Only	No	0
State and Tribal Voluntary Cleanup Sites (VCP)	0.5 mile	No	0
State and Tribal Brownfield Sites	0.5 mile	No	0
State Spills, Leaks, Investigation and Cleanup (SLIC)	0.5 mile	No	0

Database Searched	Approximate Minimum Search Distance	Subject Site Listed?	Number of Facilities within Search Distance
Recycling Facilities in California (SWRCY)	0.25 mile	No	0
HIST CORTESE	0.5 mile	No	0
State Dry Cleaner Facilities	0.25 mile	No	0
State California Hazardous Materials Incident Report System (CHMIRS)	Site Only	No	0
State No Further Action Determination (NFA)	0.25 mile	No	0
State – Unconfirmed Properties Referred to Another Agency (REF)	0.25 mile	No	0
State – School Property Evaluation Program (SCH)	0.25 mile	No	0
State – Properties Needing Further Evaluation (NFE)	0.25 mile	No	0
HIST CAL-SITES	1 mile	No	0
Consent	1 mile	No	0
RESPONSE	1 mile	No	0
HAZNET	Site only	No	0
EMI	Site Only	No	0
Notify 65	1 mile	No	0

Haley & Aldrich also searched the Orphan Site List provided in the EDR report for the subject site and facilities adjoining the subject site. Orphan sites are those that, due to incorrect or incomplete addresses, could not be mapped. There are no Orphan sites listed for the subject site or facilities adjoining the subject site. The complete environmental database report is provided in Appendix C.

5.1.1 Descriptions of Databases Searched

Numerous regulatory databases were searched during this Phase I ESA. Each database reviewed is described in the EDR report presented in Appendix C. Those databases required by the ASTM E 1527-05 Standard are identified below.

1. **NPL Sites:** The National Priorities List (NPL) is a list of contaminated sites that are considered the highest priority for cleanup by the U.S. Environmental Protection Agency (USEPA).

2. **Delisted NPL Sites:** The Delisted NPL is a list of formal NPL sites formerly considered the highest priority for cleanup by the USEPA that met the criteria of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) for deletion from the NPL because no further response was appropriate.

3. **CERCLIS Sites:** The Comprehensive Environmental Response, Compensation, and Liability Act Information System (CERCLIS) list identifies sites which are suspected to have contamination and require additional investigation to assess whether they should be considered for inclusion on the NPL.

4. **CERCLIS-NFRAP Sites:** CERCLIS-NFRAP status indicates that a site was once on the CERCLIS List but has No Further Response Actions Planned (NFRAP). Sites on the CERCLIS-NFRAP List were removed from the CERCLIS List in February 1995 because, after an initial investigation was performed, no contamination was found, contamination was removed quickly, or the contamination was not significant enough to warrant NPL status.

5. **Federal ERNS:** The Federal Emergency Response Notification System (ERNS) list tracks information on reported releases of oil and hazardous materials.

6. **FINDS:** This Facility Registry System points to other sources such as permit compliance, emissions tracking, and enforcement docket cases which are listed for the site.

7. **HAZNET:** This is a list of hazardous waste manifests kept by the California Environmental Protection Agency (Cal EPA).

8. **RCRA non-CORRACTS TSD facilities:** The Resource Conservation and Recovery Act (RCRA) non-CORRACTS TSD Facilities List tracks facilities which treat, store, or dispose of hazardous waste and are not associated with corrective action activity.

9. **RCRA CORRACTS TSD facilities:** The RCRA CORRACTS TSD Facilities list catalogues facilities that treat, store, or dispose of hazardous waste and have been associated with corrective action activity.

10. **RCRA Generators:** The RCRA Generator list is maintained by the USEPA to track facilities that generate hazardous waste.

11. **Federal Institutional Controls/Engineering Controls:** The Federal Institutional Control list and Engineering Control list are maintained by the USEPA. Some Institutional Control and Engineering Control information may not be made publicly available and therefore will not be included on this registry.

12. **State and Tribal Equivalent NPL/CERCLIS Sites:** The ASTM E 1527-05 Standard requires searching "State and Tribal Equivalent CERCLIS Sites." In California, the equivalent CERCLIS is the Cal-Sites database, which is maintained by the Department of Toxic Substance Control (DTSC).

13. **State and Tribal Registered Storage Tanks:** In California, local regulatory agencies (e.g., County health departments and fire departments) and the State Water Resources Control Board (SWRCB) maintain lists of aboveground and underground storage tanks registered with those agencies (e.g., County health departments). For tribal property, the USEPA Region 9 maintains a list of underground storage tanks on Indian land.

14. **State and Tribal Landfills and Solid Waste Disposal Sites:** In California, the SWRCB in coordination with the RWQCBs and the Integrated Waste Management Board (IWMB) maintain lists of regulated waste disposal sites.

15. **State and Tribal Leaking Storage Tanks:** In California, the SWRCB in coordination with the RWQCBs maintain lists of Leaking Storage Tanks (LUST/LAST). The LUST/LAST lists are a listing of release sites that have an underground or aboveground storage tank listed as the source. For tribal property, the USEPA Region 9 maintains a list of leaking USTs on Indian land.

16. **State and Tribal Institutional Controls/Engineering Controls:** The USEPA maintains lists of sites with Institutional controls or Engineering controls in place. In addition, DTSC maintains a list of environmental deed restrictions.

17. **State and Tribal Voluntary Cleanup Sites:** In California, the DTSC, RWQCBs, and local regulatory agencies (e.g., County health departments) maintain lists of Voluntary Cleanup sites.

18. **State and Tribal Brownfield Sites:** In California, the DTSC maintains a list of Brownfield sites which includes any property where a redevelopment or re-use may be compromised by the presence or presumed presence of hazardous materials or petroleum.

19. **Other State Hazardous Waste Sites and Releases:** In California, the Cal/EPA including DTSC, and the SWRCB including RWQCBs have created and/or maintain databases that identify hazardous waste sites and locations of hazardous substance releases/spills. These databases include:

    - **SLIC** – The Spills, Leaks, Investigation and Cleanup (SLIC) database maintained by the RWQCBs identifies sites that are being investigated and/or remediated for known releases other than those associated with leaking USTs.

    - **AST** – A list of registered aboveground storage tanks from the RWQCB.

    - **AWP** – The Annual Workplan Sites list, formerly the Bond Expenditure Plan (BEP) list, maintained by DTSC, identifies known hazardous substance sites targeted for cleanup.

    - **CA FID UST** – Facility Inventory database contains a historical listing of active and inactive underground storage tank locations from the State Water Resources Control Board. This has not been updated since 1998.

    - **CORTESE** – The CORTESE Hazardous Waste and Substances Sites list includes a list of public drinking water wells with detectable levels of contamination, hazardous substance sites selected for remedial action, sites with known toxic material identified through the abandoned site assessment program, sites with USTs having a reportable release, and all solid waste disposal facilities from which there is known migration. The sites on this list were those included on the SWRCB Leaking Underground Storage Tank (LUST) list, the IWMB Solid Waste Information System (SWF/LF, also referred to as SWIS), and the DTSC Cal-Sites. The CORTESE listing is no longer updated.

- **ENVIROSTOR** – The DTSC database identifies sites that have known contamination or for which there may be reason to investigate further. It consists of NPL, state response, voluntary cleanup and school sites.

- **HIST UST** – Hazardous Substance Storage Container database is a historical listing of UST sites.

- **LUST** – GeoTracker's Leaking Underground Fuel Tank Report. LUST records contain an inventory of reported leaking underground storage tank incidents. This list was last updated on 6/17/2013.

- **NOTIFY 65** - Notify 65 records contain facility notifications about any release that could impact drinking water and thereby expose the public to a potential health risk. The data comes from the SWRCB's Proposition 65 database.

- **CHMIRS** - The California Hazardous Material Incident Report System (CHMIRS), maintained by the Cal/EPA Office of Emergency Services, contains information on reported hazardous material incidents (accidental releases or spills).

- **HIST CAL-SITES** – Formerly known as ASPIS, this database contains both known and potential hazardous substance sites. It has been replaced by ENVIROSTOR.

- **DRY CLEANERS** – The source of this list is the DTSC.

- **NFA** - No Further Action Determination (NFA) sites are properties for which DTSC has made a clear determination that the property does not pose a problem to the environment or to public health.

- **REF** - Unconfirmed Properties Referred to Another Agency (REF) sites are properties where contamination has not been confirmed and which were determined as not requiring direct DTSC Site Mitigation Program action or oversight. Accordingly, these sites have been referred to another state or local regulatory agency.

- **SCH** - School Property Evaluation Program (SCH) sites are proposed and existing school sites that are being evaluated by DTSC for possible hazardous materials contamination. In some cases, these properties may be listed in the Cal-Sites category depending on the level of threat to public health and safety or the environment they pose.

- **NFE** - Properties Needing Further Evaluation (NFE) are properties that are suspected of being contaminated. These are unconfirmed contaminated properties that need to be assessed using the Preliminary Endangerment Assessment (PEA) process. PEA in Progress indicates properties where DTSC is currently conducting a PEA. PEA Required indicates properties where DTSC has determined a PEA is required, but it is not currently underway.

- **SWEEPS UST** – This underground storage tank listing was maintained only in the 1980s.

- **UST** – Active UST facilities list is gathered from local regulatory agencies. This list was last updated on 6/17/2013.

5.1.2 Detailed Description of Relevant Subject Site Listings

The subject site was not listed on the databases searched.

5.1.3 Detailed Descriptions of Relevant Nearby Site Listings

As previously indicated, the database search identified a number of facilities on the database within the minimum search radii. However, with the exception of the oil and gas wells identified on the Physical Setting Source Map (following page A-7) and described in Section 2.3.4, it is Haley & Aldrich's opinion that based on the case status, distance and/or hydrogeologic gradient (south-southwest) of the identified facilities, there are no listed facilities that would have the potential to affect the subject site. Refer to the database report in Appendix C for complete listings.

5.2 Additional Environmental Records Review

To supplement the (ASTM E 1527-05 Standard) environmental record sources, we contacted the following federal, state, and local government agencies, and/or reviewed the following additional sources:

5.2.1 National Pipeline Mapping System

Haley & Aldrich reviewed available data using the Pipeline Information Management Mapping Application (PIMMA) on the National Pipeline Mapping System's website (www.npms.phmsa.dot.gov). According to PIMMA, the following "hazardous liquid pipelines" are located within the railroad easement adjoining to the southeast of the subject site: Department of Defense – Energy Support Center pipeline transporting Jet Fuel, a Plains Pipeline, L.P. pipeline transporting Crude Oil, and a Paramount Petroleum Corporation pipeline transporting a "Non-HVL (non-highly volatile liquid) Product." These pipelines are located on the southeastern side of the railroad easement and are unlikely to affect the subject site.

5.2.2 State Water Resources Control Board

Haley & Aldrich submitted a request to review available files with the Los Angeles RWQCB on 27 June 2013. On 8 July 2013, the RWQCB indicated that there are no records on file for the subject site address. Additionally, Haley & Aldrich accessed the State Water Resources Control Board's GeoTracker website for records associated with the subject site on 27 June 2013. There are no records for the subject site or adjoining properties on the GeoTracker website.

5.2.3 Department of Toxic Substances Control

Haley & Aldrich submitted a request to review available files with the DTSC on 27 June 2013. On 3 July 2013, the DTSC indicated that there are no records on file for the subject site address. Additionally, Haley & Aldrich accessed the DTSC's Envirostor website for records associated with the subject site on 27 June 2013. There are no records for the subject site or adjoining properties on the Envirostor website.

5.2.4 South Coast Air Quality Management District

Haley & Aldrich visited the South Coast Air Quality Management District (SCAQMD) web page (www.aqmd.gov) for information regarding permits, equipment type, notice of violation (NOV) and notice to comply (NTC) files for the subject site address. According to the SCAQMD Facility Information Module, there are no records on file for the subject site with the SCAQMD.

5.2.5 Los Angeles County Assessor's Office

Haley & Aldrich contacted the Los Angeles County Tax Assessor's Office on 27 June 2013. The subject site's APN is 7133-016-005 and is currently owned by Long Beach Area Council, Boy Scouts of America. A copy of the APN map is included in Appendix C.

5.2.6 City of Long Beach Department of Health and Human Services

Haley & Aldrich contacted the City of Long Beach Department of Health and Human Services on 27 June 2013 to request a file review for records related to USTs and the use, storage, and/or disposal of hazardous materials at the subject site. In a letter dated 8 July 2013, Mr. Nelson Kerr, a Hazardous Waste Operations officer with the City of Long Beach Department of Health and Human Services indicated that there are no records on file for the subject site with the City of Long Beach.

5.2.7 City of Long Beach Building & Safety/Planning Department

On 27 June 2013, Haley & Aldrich contacted the City of Long Beach Planning Department for zoning information on the subject site. According to the City of Long Beach, the subject site is zoned "I" for Institutional. A request was made with the City of Long Beach Building & Safety Department to review original building construction records for the subject site. Additionally, an EDR Building Permit Report, which provides City of Long Beach permit information for the subject site between 1980 and 2012, indicates the following permits are on file for the subject site.

CITY OF LONG BEACH BUILDING RECORDS

4747 Daisy Avenue		
Date	**Permit Type**	**Permit Description**
7/22/1946	Building Permit	Warehouse for Boy Scouts of America
10/27/1949		Training Center for Boy Scouts of America
4/27/1953		Swimming Pool (40' x 75')
6/12/1958		Dressing Room and Showers for Semi-Public Swimming Pool
3/8/1966		Two Cement Block Toilet Buildings
8/10/1987		Construction of 6' block wall

CITY OF LONG BEACH BUILDING RECORDS (Continued)

4747 Daisy Avenue		
Date	**Permit Type**	**Permit Description**
5/21/1996	Building Permit	Recover classrooms with 20-year roofing shingles; office with 30-year roofing shingles; and flat decks
11/30/1998		Remodel existing pool changing rooms and restrooms for handicapped
1/6/1999	Plumbing Permit	Remodel existing pool changing rooms and restrooms for handicapped
12/10/1999	Electrical Permit	Replaster pool and bring pool lights up to code
	Building Permit	
8/11/2000	Plumbing Permit	Install 100-gallon water heater and three faucets
12/15/2003	Building Permit	Tear off and re-roof with composite shingles
12/1/2004		Repair vehicle damage
5/3/2005	Electrical Permit	Upgrade electrical service and add five panels
9/10/2009		Install two dedicated circuits for swimming pool equipment, chemical controller, and feed pumps

5.3 Environmental Liens

According to EDR's Environmental LienSearch™ Report, dated 2 July 2013, there are no environmental liens or AULs for the subject site. This research was completed by EDR using the APN 7133-016-005 provided by Haley & Aldrich. A copy of EDR's Environmental LienSearch™ Report, which includes copies of the Grant Deeds and Corporation Grant Deed, is included in Appendix C.

6. SITE RECONNAISSANCE AND KEY PERSONNEL INTERVIEWS

A site reconnaissance to observe site conditions was conducted by Mr. David Schlotterbeck of Haley & Aldrich, Inc. on 10 July 2013. Access to the subject site was unobstructed and Haley & Aldrich personnel had access to all areas of the subject site, including the property boundaries, and observed adjoining property conditions from the subject site boundaries and/or public thoroughfares. No weather-related conditions or other conditions that would limit our ability to observe the subject site or adjoining properties occurred during our site visit. During the site reconnaissance, Haley & Aldrich interviewed Mr. Bryan Barron, onsite Caretaker for the subject site who has been identified by Integral as the Key Site Manager for this project. Mr. Barron has lived at the subject site in the on-site residential structure for approximately 2 years. Mr. Barron indicated that the subject site has been used as a Boy Scouts of America campground since approximately 1941. He further indicated that there are no aboveground or underground storage tanks (ASTs or USTs) containing hazardous materials located on the subject site and with the exception of pool maintenance chemicals and small quantities of gasoline, diesel fuel, and oil for landscape maintenance activities, hazardous materials and/or waste have not been used or stored at the subject site. Additional information provided by Mr. Barron during the site reconnaissance is summarized in Section 6.1.

ASTM E 1527-05 Standard Section 10.8 requires that, prior to the site visit**,** the current subject site owner or Key Site Manager and user, if different from the current owner or Key Site Manager, be asked if there are any helpful documents that can be made available for review. These consist of environmental site assessment reports, audits, permits, tank registrations, Material Safety Data Sheets, Community Right-to-Know plans, safety plans, hydrogeologic or geotechnical reports, or hazardous waste generator reports. Neither the Key Site Manager nor user were in possession of or aware of any historical documentation or existing environmental reports prepared for the subject site.

6.1 Subject Site Observations

6.1.1 Current Use of the Property

The subject site is a campground and meeting facility for the Boy Scouts of America.

6.1.2 General Description of Structures

The majority of the structures are located on the eastern portion of the subject site near the entrance to the property at the south end of Daisy Avenue. These structures consist of a residence, two meeting halls, classrooms, a barn, and a restroom/shower/changing room and surround an asphalt paved parking lot and swimming pool. These structures are constructed of concrete block and wood on a concrete foundation, with the exception of the barn which is primarily constructed of wood. The two restrooms on the western portion of the subject site are concrete block and wood and the cabin near the northeastern corner of the subject site is constructed of wood. Two metal storage containers are located, one each on the western side of the barn and on the south side of the southwestern restroom building. The storage containers are used to store camp supplies and recreational equipment used at the facility.

6.1.3 Potable Water Supply and Sewage Disposal System or Septic Systems

Potable water for the subject site is supplied by the City of Long Beach. According to Mr. Barron, the structures on the eastern portion of the subject site are connected to the municipal sewer system. The two restroom buildings on the western portion of the subject site are on a septic/leach field system. Mr. Barron indicated that a single groundwater well is located on the southern side of the meeting trailer on the central portion of the subject site. According to Mr. Barron, the water from the well was non-potable and was used for irrigation purposes at the subject site. Mr. Barron further stated that the well water was no longer used at the subject site since the City of Long Beach had recently claimed rights to the water.

6.1.4 Use of Petroleum Products and Hazardous Materials

A small amount of petroleum products (e.g., gasoline, diesel fuel, and oil) are used to fuel landscape maintenance equipment at the subject site.

6.1.5 Storage of Petroleum Products and Hazardous Materials (Storage Tanks, Drums)

Three 1-gallon plastic containers of gasoline, two 2½-gallon plastic containers of gasoline, two 5-gallon plastic containers of diesel fuel, one 5-gallon plastic container of tractor oil, and several small containers (less than 1 quart) of oil are stored in one of the interior rooms on the eastern end of the barn. The petroleum products appeared to be properly stored and there was no evidence of staining on the concrete floor of the barn.

6.1.6 Disposal of Petroleum Products and Hazardous Materials

The petroleum products are used in the landscape maintenance equipment at the subject site.

6.1.7 Storage Tanks

A 100-gallon storage tank containing chlorine and a 62-gallon storage tank containing muriatic acid are located in the pool pump room to the southwest of the swimming pool. According to Mr. Barron, the swimming pool maintenance equipment is planned for removal from the subject site for use at a different Boy Scouts of America facility. No staining was observed on the ground inside the pool pump room.

6.1.8 Odors

No unusual odors were noted during the site visit.

6.1.9 PCBs Associated with Electrical or Hydraulic Equipment

A pole-mounted transformer was observed along the northeastern property line near the parking lot, and a pad-mounted transformer was observed on the south side of the meeting trailer, adjacent to the water well located near the central portion of the subject site. No staining was observed on the transformers or on the ground surrounding the utility pole.

6.1.10 Unidentified Substance Containers

Two 5-gallon buckets containing an unknown black substance were observed on the western side of the barn. These 5-gallon buckets were sealed with some minor staining observed on the exterior of the containers. No staining was observed on the ground beneath the buckets.

6.1.11 Heating and Cooling System

The residence, meeting halls, and classrooms on the eastern portion of the subject site have electric air conditioning and natural gas heating.

6.1.12 Stains or Corrosion on Floors, Walls, or Ceilings

Minor staining was observed on the ceilings and walls of most of the structures at the subject site. The staining appeared to be the result of water intrusion.

6.1.13 Floor Drains and Sumps

Typical floor drains were observed associated with restrooms and showers at the facility.

6.1.14 Hydraulic Elevators

Hydraulic elevators were not observed at the subject site.

6.1.15 Vehicle Maintenance Lifts

Vehicle maintenance lifts were not observed at the subject site.

6.1.16 Emergency Generators and Sprinkler System Pumps

Emergency generators and sprinkler system pumps were not observed at the subject site.

6.1.17 Catch Basins

Catch basins were not observed at the subject site.

6.1.18 Dry Wells

Dry wells were not observed during the site visit.

6.1.19 Pits, Ponds, Lagoons, and Pools of Liquid

Evidence of pits, ponds, lagoons, and pools of liquid was not observed during the site visit.

6.1.20 Stained Soil or Pavement

Stained soil or pavement was not observed during the site visit.

6.1.21 Stressed Vegetation

With the exception of dry grass resulting from the lack of irrigation at the subject site, stressed vegetation was not observed during the site visit.

6.1.22 Solid Waste and Evidence of Waste Filling

Two small trash dumpsters are located on the eastern portion of the subject site. The containers were empty at the time of the site visit. According to Mr. Barron, the trash is picked up weekly by the City of Long Beach.

6.1.23 Wastewater and Stormwater Discharge

According to Mr. Barron, there are no storm drains or catch basins on the subject site. Stormwater runoff flows freely across the subject site.

6.1.24 Monitoring, Water Supply, or Irrigation Wells

A single groundwater well is located on the southern side of the meeting trailer located near the central portion of the subject site. Mr. Barron indicated that the well provided non-potable water used for irrigation at the subject site. The water from the well is no longer being used at the subject site since the City of Long Beach claimed water rights to the well.

7. FINDINGS AND CONCLUSIONS

Haley & Aldrich has performed a Phase I ESA on the Will J. Reid Scout Camp – Boy Scouts of America property located at 4747 Daisy Avenue in Long Beach, California ("subject site"). The subject site has been identified by the Los Angeles County Assessor's office as APN 7133-016-005 and according to review of historical references and an interview with the Key Site Manager, the subject site has been used as a Boy Scouts of America campground since the early 1940s.

The objective of a Phase I ESA is to identify known and suspect RECs, HRECs, and *de minimis* conditions associated with the subject site, as defined in the ASTM E 1527-05 Standard and in Section 1.1 of this report.

No data gaps were identified during the performance of this Phase I ESA. Thus, it is our opinion that sufficient information was obtained to identify subject site conditions indicative of releases or threatened releases of hazardous substances and petroleum hydrocarbons.

Based on the results of this Phase I ESA, our findings are as follows:

KNOWN OR SUSPECT RECOGNIZED ENVIRONMENTAL CONDITIONS

The ASTM E 1527-05 Standard defines a REC as "the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, ground water, or surface water of the property." A material threat is defined by the ASTM E 1527-05 Standard as "a physically observable or obvious threat which is reasonably likely to lead to a release that, in the opinion of the environmental professional, is threatening and might result in impact to public health or the environment."

This Phase I ESA has revealed no evidence of RECs in connection with the subject site.

HISTORICAL RECs

The ASTM E 1527-05 Standard defines an HREC as an environmental condition "which in the past would have been considered a recognized environmental condition, but which may or may not be considered a recognized environmental condition currently."

This Phase I ESA has revealed no evidence of HRECs in connection with the subject site.

DE MINIMIS CONDITIONS

The ASTM E 1527-05 Standard defines *de minimis* conditions as those conditions which "do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies." The ASTM E 1527-05 Standard notes that "conditions determined to be *de minimis* are not recognized environmental conditions."

This Phase I ESA has revealed no evidence of *de minimis* conditions in connection with the subject site.

NON-SCOPE COINSIDERATIONS

Based on review of historical references available for the subject site and interviews with the Key Site Manager, the buildings on-site were constructed prior to 1979 and, thus, asbestos may be present in construction materials. The presence of asbestos in on-site structures is not a REC, but it is an environmental issue that may affect worker safety, particularly in a demolition scenario. The United States EPA defines asbestos containing material (ACM) as material containing greater than 1 percent asbestos. Both the National Emission Standards for Hazardous Air Pollutants and the SCAQMD require that ACM classified as friable or which may become friable be identified and removed prior to demolition activities. Under SCAQMD rules, an asbestos survey and notification to the SCAQMD will be required prior to demolition. Additionally, there is the likelihood that lead-based paints were applied to the structures based on the construction date. Although by definition, the potential presence of lead-based paint at the subject site is not considered a REC, it is another environmental issue that may affect worker safety; therefore, a lead-based paint survey may be appropriate prior to demolishing building materials at the subject site.

SUMMARY AND RECOMMENDATIONS

In summary, based on the results of this Phase I ESA, we have identified no RECs associated with the subject site. Haley & Aldrich recommends no further environmental investigation at the subject site at this time. However, although not considered a REC, the groundwater well located adjacent to the meeting trailer near the central portion of the subject site can act as a conduit to the subsurface and underlying groundwater. If the future use of the subject site does not include the maintenance and use of this groundwater supply well, Haley & Aldrich recommends that the well be properly abandoned according to local and state regulations.

8. CREDENTIALS

This Phase I ESA report was prepared by David Schlotterbeck, who served as the Senior Environmental Scientist of this project. The report was completed under the direct supervision of James Schwartz, who served as the Officer-in-Charge and Client Leader of this project. Qualification information for the project personnel is provided below.

JAMES SCHWARTZ
Senior Geologist

James Schwartz, P.G., has over 18 years of professional experience in the environmental consulting industry. His background covers a wide variety of areas, including planning and management of small- and large-scale investigations, project site remediation, Brownfields redevelopment, litigation support, corporate management, client development, marketing, and detailed data analysis using databases and geographic information systems. Mr. Schwartz's expertise also involves a number of specialized fields, including vapor intrusion, stable and radiogenic isotope hydrology, and sewer issues. He has worked closely with clients, regulators, attorneys, testifying experts, information technology specialists, modelers, field contractors and other environmental professionals.

DAVID SCHLOTTERBECK
Senior Environmental Scientist

Mr. Schlotterbeck has over 13 years of experience in preparing Phase I ESAs, preliminary endangerment assessments, soil groundwater investigation work plans, remedial action work plans, and site closure reports. He has experience working with regulatory agencies to satisfy AAI due diligence requirements for Phase I ESAs throughout the United States. He has performed, as well as trained and managed personnel, in preparing Phase I and Phase II assessments for agricultural, industrial, manufacturing, automotive, retail, commercial and undeveloped properties. He has been responsible for managing and implementing soil and groundwater environmental investigations both to meet regulatory requirements and in support of litigation. His experience also includes management of underground storage tank removals, oversight for excavation and disposal of chemically impacted soils.

REFERENCES

1. Department of Toxic Substances Control, FOIA submitted by Haley & Aldrich, Inc., 27 June 2013.

2. Environmental Data Resources, Inc., Database Report, dated 27 June 2013.

3. Environmental Resolutions, Inc., *Remedial Action Plan, Mobil Service Station #18 MLJ, 5005 North Long Beach Boulevard, Long Beach, California*, 14 October 2005.

4. Haley & Aldrich, Inc., site visit conducted by Mr. David Schlotterbeck on 10 July 2013.

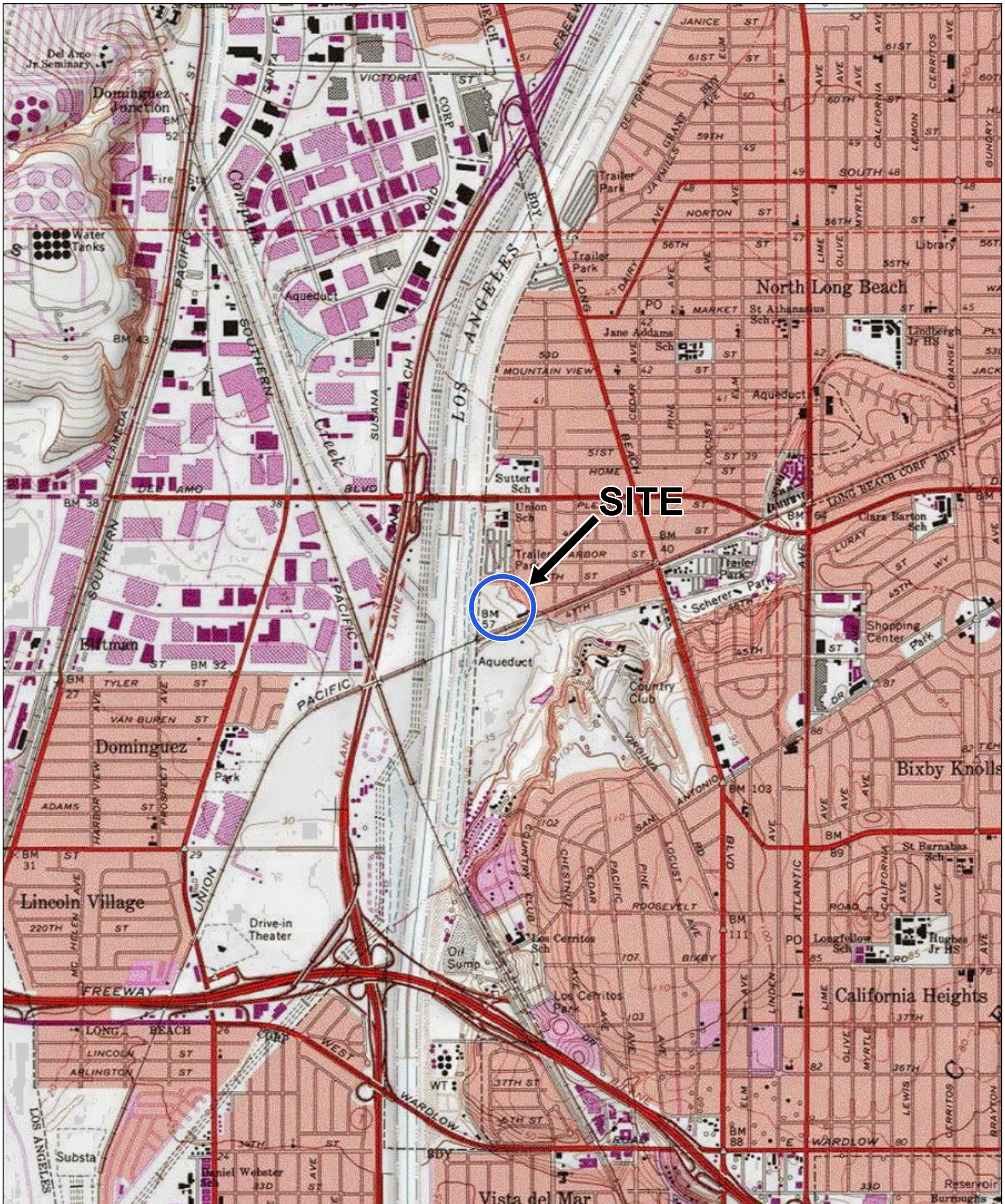
5. Long Beach Department of Human and Health Services, FOIA submitted by Haley & Aldrich, Inc., 27 June 2013.

6. Regional Water Quality Control Board, FOIA submitted by Haley & Aldrich, Inc., 27 June 2013.

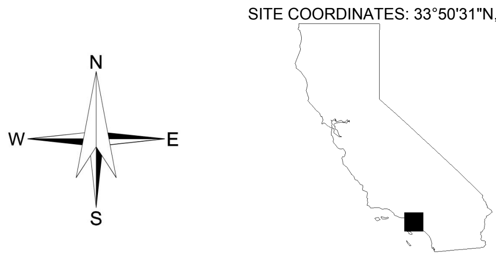
7. Topographic Map, Long Beach, United States Geological Survey 7.5 minute series, 1981.

8. URS, *Second Quarter 2013 Groundwater Monitoring Report, Circle K Store #2211164/Mobil Service Station #18 MLJ, 5005 North Long Beach Boulevard, Long Beach, California*, 7 June 2013.

FIGURES



SITE COORDINATES: 33°50'31"N,118°12'2"W



U.S.G.S. QUADRANGLE: LONG BEACH, CA

HALEY & ALDRICH

PHASE I ENVIRONMENTAL SITE ASSESSMENT
4747 DAISY AVENUE
LONG BEACH, CALIFORNIA

PROJECT LOCUS

SCALE: 1:24,000

JULY 2013

FIGURE 1

40189-000 1.PDF

LEGND

(dashed box)	SITE BOUNDARY	W	WATER WELL
RR	RESTROOM	T	TRANSFORMER
TR	STORAGE TRAILER		
AMP	AMPHITHEATER		
PPR	POOL PUMP ROOM		
RES	RESIDENCE		
CAB	CABIN		
CR	CLASS ROOMS		
MT	MEETING TRAILER		
MH	MEETING HALL		

NOTE:

- ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.-

N
W E
S

0 250
SCALE IN FEET

HALEY & ALDRICH

PHASE I ENVIRONMENTAL SITE ASSESSMENT
4747 DAISY AVENUE
LONG BEACH, CALIFORNIA

SITE PLAN

SCALE: 1:24,000
JULY 2013

FIGURE 2

Document Path: C:\Files\40189-000\40189-000-0002-SITE PLAN.mxd

APPENDIX A

Haley & Aldrich Proposal dated 18 June 2013

PROFESSIONAL SERVICES AGREEMENT

THIS PROFESSIONAL SERVICES AGREEMENT ("Agreement") is dated for reference purposes as of July 2, 2013, by and between INTEGRAL PARTNERS FUNDING, LLC, a California limited liability company ("Owner"), and HALEY & ALDRICH, INC., a Massachusetts corporation ("Professional").

RECITALS

A. Owner is considering the purchase of that certain real property located at 4747 Daisy Avenue, Long Beach, California (the "Site"), which Site, if acquired by Owner, will be developed into a residential project (the "Project").

B. Owner desires to engage Professional to provide certain environmental consulting services with respect to the Site as more particularly set forth herein.

NOW, THEREFORE, Professional and Owner agree as follows:

1. BASIC AGREEMENTS.

1.1 Basic Services. In compliance with all of the terms and conditions of this Agreement, the Professional shall provide those services specified in the "Scope of Services" attached hereto as Exhibit "A", which services are referred to herein as the "Basic Services". Professional shall meet with Owner from time to time as requested by Owner to discuss the progress of the Basic Services rendered to date and to ensure that Owner is satisfied with the scope and quality of the Basic Services. Owner may have a representative present at any meeting of Professional concerning the Project.

1.2 Subconsultants. Professional may retain professional consultants subject to the prior written approval of Owner ("Subconsultants"). The retention of the Subconsultants shall not diminish or reduce the obligations and duties of Professional hereunder. Unless Owner specifically approves, in each instance, that the payment to any Subconsultant is a reimbursable expense pursuant to Section 2.4 below, Owner shall not have any liability for the cost and expenses of any Subconsultant, and Professional solely shall be liable for any payment due to such Subconsultants from the Fees (as defined below) paid by Owner to Professional. Professional shall work with and coordinate its Basic Services with other consultants retained by Owner in connection with the design of the Project as a Basic Service hereunder, but Professional shall not be responsible for the content of their work.

1.3 Supervisor and Employees. Elie Haddad is the principal of the Professional and will supervise the Services (as hereinafter defined) provided under this Agreement and will represent Professional in all matters of coordination, decision and policy pertaining to Professional's professional services under this Agreement. Any replacement of said individual(s) shall be subject to Owner's prior written approval and Owner shall be permitted to terminate this Agreement, without penalty, in the event a satisfactory replacement is not immediately available. Owner, in its sole discretion, may direct Professional to remove an employee or Subconsultant performing work hereunder. Professional shall replace said employee or Subconsultant with another qualified employee or Subconsultant acceptable to Owner.

1.4 Standard of Performance. As a material inducement to Owner to enter into this Agreement, Professional hereby represents Professional has all applicable licenses to perform the Basic Services and is experienced in performing work or services similar to the Basic Services and, in light of such experience, Professional hereby covenants that it shall follow the standard of care of a Competent Consultant (as defined below) in performing all services required hereunder. "Competent Consultant" shall mean that all of Professional's services provided under and related to this Agreement shall represent Professional's judgment as an environmental engineer whose competence and professionalism equals that of environmental engineers performing services similar in scope and complexity to those required of Professional hereunder, for large corporate, governmental and institutional clients in the area where and at the time that the Professional practices.

1.5 Notice by Professional. The Professional shall notify the Owner immediately in writing if the Professional is aware or becomes aware of any omissions or deficiencies in the data or information supplied to the Professional by the Owner or any of its employees, agents, consultants or contractors.

1.6 Compliance with Laws. Professional shall comply with all applicable federal, state and local laws, ordinances, regulations and orders in performing the services hereunder.

1.7 Additional Services. The Owner shall have the right at any time during the performance of the services, without invalidating this Agreement, to order extra work beyond that specified in the Scope of Services or make changes by altering, adding to or deducting from said work ("Additional Services"). No Additional Services may be undertaken unless authorized by Owner in advance and in writing, nor shall Professional be entitled to any payment for work or services performed without such written agreement. Additional Services shall be paid for by the Owner as provided in Section 2.2. All services performed in connection with this Agreement may be referred to herein as the "Services." All terms and conditions under this Agreement applicable to Basic Services shall be applicable to all Services except as otherwise agreed to in writing by Owner and Professional.

2. COMPENSATION. The Owner shall compensate the Professional for the services to be performed in accordance with the terms and conditions of this Agreement as follows:

2.1 Basic Services. For Basic Services, as described in the Scope of Services, Professional shall be paid as set forth in the "Schedule of Compensation" attached hereto as Exhibit "B" (the "Basic Services Fee"). Said compensation shall be inclusive of all benefits, compensation costs and expenses unless specifically set forth to the contrary in this Section 2 or in the Schedule of Compensation.

2.2 Additional Services. For Additional Services, as described in Section 1.7 hereof, compensation shall be paid as set forth in the Schedule of Compensation or as otherwise set forth in a written agreement between Owner and Professional for such Additional Services (the

"Additional Services Fee" and, together with the Basic Services Fee and any other amounts owed by Owner pursuant to this Agreement, the "Fees").

2.3 No Compensation for Deficiencies. Notwithstanding anything contained in this Agreement to the contrary, no compensation shall be paid to or claimed by the Professional for services, whether as Additional Services or Basic Services, required to correct deficiencies in any documents prepared by or on behalf of the Professional, or attributable to defaults, failures, errors or omissions of the Professional, or conflicts in the design documents attributable to the Professional, or changes requested by the Professional, unless previously approved by the Owner.

2.4 Reimbursable Expenses. The Owner shall, in addition to the amounts described in Sections 2.1 and 2.2, if applicable, reimburse the Professional on the basis of actual cost for those out-of-pocket expenses specifically set forth on the Schedule of Compensation. All other costs, expenses or charges, including, but not limited to, reproduction costs for drawings and specifications for the Professional's internal purposes and coordination between the Professionals, daily working and commuting travel expenses, and all compensation and benefits paid to Professional's employees, incurred by the Professional in connection with the services provided hereunder, shall be paid by the Professional without reimbursement from the Owner. Notwithstanding anything in the Schedule of Compensation to the contrary, Professional shall not be entitled to reimbursement for such reimbursable expenses unless Owner pre-approves such expenses in writing.

2.5 Fees, Taxes, and Assessments. Professional shall pay its own income taxes, federal, state or city, and self-employment taxes. Professional shall have the sole obligation to pay for any fees, assessments and taxes, plus applicable penalties and interest, which may be imposed by law and arise from or are necessary for the Professional's performance of the services required by this Agreement, and Professional shall indemnify, defend and hold harmless the Owner against any such fees, assessments, taxes or penalties or interest assessed, levied or imposed against Owner hereunder.

2.6 Payment. Payment of the compensation set forth herein shall be made to Professional as set forth on Exhibit "B" attached hereto. Professional shall render an invoice (together with all applicable lien releases and other supporting documentation reasonably requested by Owner) to Owner for all expenses incurred by Professional for which Professional seeks payment. Upon timely submission by Professional, Owner shall pay Professional for all payments due and payable within thirty (30) days thereafter. Should a bona fide dispute arise with respect to an invoice submitted by Professional, or to the extent reasonably necessary to protect the Owner from loss for which the Professional is responsible, Owner shall pay the undisputed amount within the time period set forth on the Schedule of Compensation, but shall withhold the disputed amount until the matter is resolved.

3. PROJECT SCHEDULE. The Professional shall commence its work hereunder within five (5) days of the receipt of an authorization to proceed from Owner and shall complete the work on or before the target dates set forth in the "Project Schedule" promulgated by Owner from time to time; provided, however, that no such work shall be commenced until Owner has approved the insurance required to be obtained by Professional pursuant to Section 4.1.

Professional will perform the Services with due and reasonable diligence and expediency consistent with the standard of care of a Competent Consultant.

4. INSURANCE AND INDEMNIFICATION.

4.1 Insurance. Prior to commencing any work hereunder, Professional shall, at its sole cost and expense, fully comply with the terms and requirements of this Section. Professional shall maintain in full force and effect during the entire term of this Agreement the following policies of insurance written by insurance companies satisfactory to Owner:

(a) Workers' Compensation and Employers' Insurance. Workers' Compensation Insurance in an amount required by the laws of the state in which the Site is located and Employer's Liability Insurance in an amount not less than ONE MILLION DOLLARS ($1,000,000.00) combined single limit for all damages arising from each accident or occupational disease.

(b) Commercial General Liability Insurance. Commercial General Liability Insurance covering bodily injury, property damage, personal injury and advertising injury written on a per-occurrence and not a claims-made basis in an amount not less than ONE MILLION DOLLARS ($1,000,000.00) combined single limit and TWO MILLION DOLLARS ($2,000,000.00) in the aggregate.

(c) Automobile Liability Insurance. A policy of comprehensive automobile liability insurance written on a per-occurrence basis in an amount not less than ONE MILLION DOLLARS ($1,000,000.00) combined single limit covering all owned, non-owned, leased and hired vehicles used in connection with the Work.

(d) Professional Errors and Omissions Insurance. A policy of professional errors and omissions insurance in an amount not less than ONE MILLION DOLLARS ($1,000,000.00) per claim and ONE MILLION DOLLARS ($1,000,000.00) in the aggregate. Said errors and omissions insurance shall remain in effect until the date of final completion of the services hereunder plus ten (10) years. If Owner so elects and agrees to pay for the cost thereof, and if available, Professional shall procure and maintain in effect an additional Professional Errors and Omissions Insurance Policy covering this Site, and this Site only, of the same kind and for the same duration set forth above.

(e) Contractor's Pollution Liability Insurance. A policy that that will pay those sums that the Professional becomes legally obligated to pay as damages for bodily injury or property damage resulting from the discharge, dispersal, release, seepage, migration or escape of pollutants, including solid, liquid, gaseous or thermal irritant or contaminant. The contractor's pollution liability insurance policy shall have a policy limit of not less than TWO MILLION DOLLARS ($2,000,000.00) per occurrence.

(f) Umbrella Liability Insurance. Unless waived by Owner, such insurance shall provide coverage with limits of not less than TWO MILLION DOLLARS ($2,000,000) per occurrence and TWO MILLION DOLLARS $2,000,000 in the aggregate, in excess of the coverages listed in 4.1(a), (b), and (c) above.

(g) Other Insurance. Such other policies of insurance, including, but not limited to, casualty insurance, business interruption insurance and fidelity insurance, as may be required in the Scope of Services.

(h) General Provisions. All of the foregoing policies of insurance (except for the professional errors and omissions insurance) shall be primary insurance and any insurance maintained by Owner shall be excess and non-contributing. All of the forgoing policies, including workers compensation (but excluding professional errors and omissions insurance), shall contain a blanket waiver of subrogation endorsement, waiving all rights against Owner and any other party against whom the Named Insured has waived its rights of subrogation by a written contract prior to the loss. All policies of insurance required to be obtained by Professional hereunder shall be issued by insurance companies authorized to do business in the state in which the Site is located and rated not less than A:VIII or better (A:V for professional liability cover) in Best's Insurance Guide. Prior to commencing any work hereunder, Professional shall deliver to Owner and Owner shall have approved (i) certificate(s) of insurance evidencing the coverages specified herein covering all operations and (ii) additional insured endorsement(s) for each such policy (other than the worker's compensation and professional errors and omissions insurer) on an ISO Form CG 20 10 (3/97 or 10/01) and accompanied by form CG 20 37 (07/04) or substantially similar forms (and not a ISO Form CG 20 09) covering Owner, its parent, subsidiary and affiliated entities, and the fee owner of the Site (if different than Owner) as additional insureds. All such certificates will have the words "endeavor to" struck out of the "Cancellation" provision thereof and shall also have deleted from such provision any language that excuses the insurer from failing to provide any notice; provided, however, Owner will accept certificates of such insurance without the foregoing deletions if Professional has, despite commercially reasonable efforts, been unable to have such language deleted. If requested by Owner, Professional shall provide to Owner duplicate originals of the commercial general liability and umbrella policies. Such policies shall not be cancelled, endorsed, altered, non-renewed, reissued to effect a change in coverage or allowed to expire without the insurer providing Owner thirty (30) days prior written notice. Professional shall require the same minimum insurance as listed above from all its Subconsultants, if any. All such policies shall provide for severability of interests and shall provide that any act or omission of any one (1) of the insureds or additional insureds that would void or otherwise reduce coverage shall not reduce or void any coverage as to any of the other insureds or additional insureds. No cross suits exclusion will apply. None of the foregoing policies shall have a deductible amount greater than $25,000.00 without the prior written approval of Owner.

4.2 Indemnification.

(a) Professional shall indemnify, protect, defend (except to the extent limited by Section 4.2(b) below), save and hold Owner and its parent, affiliated and subsidiary entities and their respective principals, agents, employees, partners, directors, officers and anyone else acting for or on behalf of any of them (all of said parties are herein collectively referred to as the "Indemnitee") harmless from and against all liability, damage, loss, claims, demands, actions and expenses of any nature whatsoever, including, but not limited to, reasonable attorney's fees (collectively, "Claims"), only to the extent such Claims arise out of or are connected with, or are claimed to directly or indirectly arise out of or be connected with (except to the extent limited by Section 4.2(b) below): (i) the negligent act or omission of Professional, its officers, employees, invitees, licensees, independent contractors and agents (all of said parties are herein collectively referred to as the "Professional Parties"); (ii) the willful misconduct of any of the Professional Parties; (iii) the breach of any material provision of this Agreement by Professional; or (iv) the failure of any of the Professional Parties to comply with the laws, statutes, ordinances or regulations of any governmental or quasi-governmental authority in effect at the time any such services are rendered, except to the extent such loss or damage is attributable to the negligent acts or omissions or willful misconduct of such Indemnitee.

(b) Notwithstanding anything in Section 4.2(a) to the contrary, for Claims covered by Professional's policy of professional errors and omissions, or required to be maintained by Professional pursuant to this Agreement, (i) Professional's obligations pursuant to Section 4.2(a) above shall only apply to the extent the applicable Claim is "caused by" any of the events set forth in clauses (i) through (iv) in Section 4.2(a); (ii) Owner and Professional agree Professional has no obligation to provide an immediate defense of such Claims and (iii) Professional shall reimburse Indemnitee its share of defense costs only to the extent of Professional's actual indemnity obligation hereunder.

5. <u>RIGHTS AND REMEDIES</u>.

5.1 <u>Default by Professional</u>. In the event (i) Professional fails to expeditiously perform the services required to be performed hereby in a skilled and expeditious manner; or (ii) Professional, or any employee or agent of Professional, shall wrongfully file or record a lien against the Site or any property of Owner or any agent or employee of Owner; or (iii) any representation or certification made by Professional to Owner shall prove to be false or misleading on the date said representation or certification is made; or (iv) default shall be made in the observance or performance of any covenant, agreement or condition contained in this Agreement required to be kept, performed or observed by Professional; (v) Professional violates any laws, ordinances, rules, regulations or orders of any public authority in the performance of its duties hereunder; or (vi) Professional suffers bankruptcy; then, provided the event as described above is not cured within thirty (30) days after written notice from Owner to Professional, Owner may declare Professional to be in default hereunder. "Bankruptcy" shall be deemed to occur when Professional makes an assignment for the benefit of creditor, files a petition in bankruptcy court, voluntarily takes advantage of any bankruptcy or insolvency laws, or is adjudicated bankrupt or judicially insolvent, or if a petition or an answer is filed proposing the adjudication of such Professional as bankrupt. If Professional is in default under the provision of this Agreement pursuant to this Section, Owner may, in addition to any other right or remedy Owner may have, terminate the employment of Professional and take possession of all plans, specifications, drawings and other data theretofore prepared by Professional with respect to the services performed hereunder. Additionally, Owner may pursue any action available to it at law or in equity to obtain relief for actual damages suffered by reason of defaults, failures, or breaches of Professional hereunder.

5.2 Default by Owner. In the event Owner shall fail to perform its obligations pursuant to this Agreement after thirty (30) days' written notice from Professional to Owner, Professional may declare Owner to be in default hereunder and exercise any remedies available to it. Should Owner default in its obligations hereunder, Professional may terminate this Agreement. Upon such a termination, Professional may recover from Owner full payment for all work performed to the date of such termination and for all reimbursable amounts.

5.3 Termination by Owner Without Fault of Professional. Owner shall have the right to cancel and terminate this Agreement at any time whether or not a default exists hereunder, and Owner shall incur no penalty or liability to Professional or any other person by reason of such cancellation. If the cancellation is for no fault of Professional hereunder, Owner shall pay to Professional all sums due under this Agreement as a percent of work completed effective as of the date of termination, plus Owner approved out-of-pocket expenses actually incurred by Professional that are specifically set forth on the Schedule of Compensation. Upon receipt of notice of termination of the Agreement, Professional shall promptly take whatever reasonable steps are required to economically and efficiently transition any services remaining under the Agreement to Owner, as of such termination date, including but not limited to, delivery of all Work Product (as defined in Section 5.5) to Owner.

5.4 Transfers on Termination. In the event of termination of this Agreement, Professional and Owner shall forthwith return to the other all papers, materials and other properties of the other held by each for purposes of execution of this Agreement. In addition, each party will assist the other party in orderly termination of this Agreement and the transfer of all aspects hereof, tangible and intangible, as may be necessary for the orderly, non-disrupted business continuation of each party.

5.5 Work Product. All test data, survey results, models, renderings, drawings, plans and specifications prepared by the Professional in connection with the performance of services under this Agreement (collectively, "Work Product") are and shall remain the property of Professional, including all copyrights, rights of reproduction and other interests relating thereto, except as provided herein. Owner shall be entitled to retain copies, including reproducible copies, of the Work Product for information and reference in connection with Owner's use and development of the Project and for future phases of the Project. As to those Work Product subject or which will be subject to any form of intellectual property protection or other ownership, Professional hereby grants or causes or will cause to be granted to Owner a world-wide, paid up, nonexclusive license for the term of intellectual property protection or other ownership, for the Owner to use, reproduce and have reproduced, display and allow others to display and to publish and allow others, subject to the restrictions contained herein, to display and to publish, in any manner related to the Project or for future phases of the Project, such Work Product without further compensation to Professional or any third party and with the right to transfer such rights to a purchaser of the Site. If the Professional is in default under this Agreement and this Agreement is terminated by reason thereof, Owner shall be entitled to use the Work Product for completion of the Project by others without additional compensation. Submission or distribution of documents to meet official regulatory requirements or for similar purposes in connection with the Project is not be construed as publication in derogation of the Professional's reserved rights.

6. DISPUTE RESOLUTION.

6.1 Mediation. At Owner's sole election, any action, dispute, claim or controversy between the parties, whether sounding in contract, tort or otherwise, including all disputes arising out of or in connection with this Agreement and any related agreements or instruments and any transaction contemplated hereby ("Dispute" or "Disputes") shall be attempted to be settled in good faith by nonbinding mediation administered by the American Arbitration Association ("AAA") under its Construction Industry Mediation Rules before resorting to binding arbitration pursuant to Section 6.2 below. In the event of any inconsistency between such rules and these mediation provisions, these provisions shall supersede such rules. All statutes of limitations that would otherwise be applicable shall apply to any mediation proceeding under this Section. Except as otherwise provided, the mediator shall be selected in accordance with the Construction Industry Mediation Rules of the AAA. Any mediator selected under this Section shall be knowledgeable in the subject matter of the Dispute. Qualified retired judges with at least five (5) years mediation experience shall be selected through panels maintained by AAA, any court in which the Site is located or any private organization providing such services. The mediation shall be held within thirty (30) days of the date the demand for mediation is served on a party. The parties understand and agree that a representative from each side with full settlement authority will be present at the mediation conference. The mediation process is to be considered settlement negotiations for the purpose of all state and federal rules protecting disclosures made during such conferences from later discovery or use in evidence. The parties hereto agree that the provisions of California Evidence Code Section 1152 shall apply to any mediation conducted hereunder. All conduct, statements, promises, offers, view and opinions, oral or written, made during the mediation by any party or a party's agent, employee or attorney shall not be subject to discovery or admissible for any purpose, including impeachment, in any litigation, arbitration or other proceeding involving the parties. The mediator's fees and costs shall be divided equally among the parties.

6.2 Arbitration. If the Dispute cannot be resolved by mediation pursuant to Section 6.1 above, the Dispute shall be resolved by arbitration as set forth in this Section. Such disputes shall be resolved by binding arbitration in accordance with Title 9 of the U. S. Code and the Construction Industry Arbitration Rules of the AAA. In the event of any inconsistency between such rules and these arbitration provisions, these provisions shall supersede such rules. All statutes of limitation that would otherwise be applicable shall apply to any arbitration proceeding under this Section. In any arbitration proceeding subject to these provisions, the arbitrator is specifically empowered to decide (by documents only, or with a hearing, at the arbitrator's sole discretion) pre-hearing motions that are substantially similar to pre-hearing motions to dismiss and motions for summary adjudication. Judgment upon the award rendered may be entered in any court having jurisdiction. Except as otherwise provided, the arbitrator shall be selected in accordance with the Construction Industry Arbitration Rules of the AAA and shall not be the mediator previously appointed to hear the Dispute. Any arbitrator selected under this Section shall be knowledgeable in the subject matter of the Dispute. Qualified retired judges with at least five (5) years arbitration experience shall be selected through panels maintained by the AAA, any court in which the Site is located or any private organization providing such services. Initially, the fees and costs of the arbitrator shall be divided equally among the parties to the arbitration.

6.3 Survival; Applicability. The provisions of this Article shall survive any termination, amendment or expiration of this Agreement in which this section is contained, unless the parties otherwise expressly agree in writing. Should an action, Dispute, claim or controversy be brought against Owner and/or Professional by a third party who is not bound by a mediation or binding arbitration provision similar to the mediation and arbitration provisions contained herein, the terms of this Article shall not apply to such action, Dispute, claim or controversy.

6.4 Work During Disputes. Notwithstanding the fact that a Dispute, controversy, claim or question shall have arisen in the interpretation of any provision of this Agreement or the performance of the Services hereunder, Professional will not directly or indirectly stop or delay any of the Services.

7. MISCELLANEOUS.

7.1 Liens. Provided Owner has paid Professional the amounts owing hereunder when such sums are owed to Professional, should Professional or any subconsultant or employee of Professional make, record or file, or maintain any action on or respecting a claim of mechanic's or materialmen's lien, stop-notice, equitable lien, payment or performance bond or *lis pendens* (in each case, a "Lien"), Professional shall immediately and at its own expense procure, furnish and record appropriate statutory release bonds of bonding companies acceptable to Owner which will extinguish or expunge said claim, stop-notice or lis pendens. If Professional fails to do so within ten (10) days after receiving notice of the Lien, Owner will have the right to cause such lien to be removed and Professional shall indemnify, defend and hold harmless Owner against all liability, cost and expense incurred by Owner in causing such lien to be removed. Owner may retain out of any payment due Professional amounts sufficient to reimburse Owner for any such liability, cost and expense.

7.2 Professional Opinions. Professional shall, from time to time, provide opinions and statements to the Owner and to others as the Owner shall reasonably request provided that Professional determines that such opinions and statements are true and correct based upon the Services performed by Professional hereunder.

7.3 Personal Service Contract. This Agreement is entered into solely to provide for the design services set forth herein and to define the rights, obligations and liabilities of the parties hereto. This Agreement, and any document or agreement entered into in connection herewith, shall not be deemed to create any other relationship between Professional and Owner other than as expressly provided herein. Professional acknowledges that it is an independent contractor of Owner and not a partner or joint venturer of Owner or an employee or agent of Owner. Professional is free to pursue and accept other business opportunities so long as Professional's business ventures do not conflict with the provisions of this Agreement. Professional shall not at any time or in any manner represent that it or any of its agents or employees are agents or employees of Owner.

7.4 Prohibition on Assignment. The experience, knowledge, capability and reputation of Professional, its principals and employees were a substantial inducement for Owner to enter into this Agreement. Therefore, neither this Agreement nor any interest herein may be transferred, assigned, conveyed, hypothecated or encumbered, voluntarily or by operation of law, by Professional, whether for the benefit of creditors or otherwise, without the prior written approval of Owner. Transfers restricted hereunder shall include the transfer to any person or group of persons acting in concert of more than twenty-five percent (25%) of the present ownership and/or control of Professional, taking all transfers into account on a cumulative basis. In the event of any such unapproved transfer, this Agreement shall be void. No approved transfer shall release Professional of any liability hereunder without the express consent of Owner. Owner may assign all of its right, title and interest in and to the Agreement or any portion thereof without the prior written consent of the Professional. Not by way of limitation of the foregoing, Professional acknowledges that Owner may assign all of its right, title and interest in and to this Agreement to any party including, without limitation, third party purchasers, its lender(s) and/or equity partner(s) for security purposes and agrees to execute consents to such assignment as may be required by such third party purchasers, lender(s) and/or equity partner(s). Upon any such assignment, Owner shall be relieved of any liabilities or obligations occurring under this Agreement from and after the date of such assignment.

7.5 Information. The Owner shall provide information regarding its requirements for the services to be provided by the Professional.

7.6 Owner's Approval. Whenever provision is made herein for the approval or consent of Owner, or that any matter be to Owner's satisfaction, unless specifically stated to the contrary, such approval or consent shall be made by Owner in its sole discretion and determination.

7.7 Notices. Any notice which either party may desire to give to the other party must be in writing and shall be effective (i) when personally delivered by the other party or messenger or courier thereof; (ii) three (3) business days after deposit in the United States mail, registered or certified; (iii) twenty-four (24) hours after deposit before the daily deadline time with a reputable overnight courier or service; or (iv) upon receipt of a telecopy or fax transmission, provided a hard copy of such transmission shall be thereafter delivered in one of the methods described in the foregoing (i) through (iii); in each case postage fully prepaid and addressed to the respective parties as set forth below or to such other address and to such other persons as the parties may hereafter designate by written notice to the other parties hereto:

To Owner:	Integral Partners Funding, LLC 3 San Joaquin Plaza, Suite 100 Newport Beach, CA 92660 Attn: Evan Knapp and Caren Read Facsimile: 949-720-3613
To Professional:	Haley & Aldrich, Inc. 2033 N. Main Street, Suite 309 Walnut Creek, CA 94596 Attn: Elie Haddad Facsimile: 925-979-1456

7.8 Books and Records. Professional shall keep complete and detailed books and records relating to reimbursable expenses, Additional Services and services performed on the basis of a fixed rate on the basis of generally recognized accounting principles, consistently applied. These books and records shall be retained by the Professional at its head office for a period of at least three (3) years after the date of completion of the performance of this Agreement. The Owner shall have the right at all reasonable times to audit the books and records. If such audit discloses that Professional has charged and received more than it was entitled hereunder, Professional shall immediately reimburse to Owner the excess amount received together with interest thereon at ten percent (10%) per annum from the date such excess amount was received until repayment thereof.

7.9 Confidentiality. Professional, for itself and its employees and personnel, acknowledges, confirms and agrees that all information learned in the course of their employment and all data furnished by the Owner, all plans, drawings, computer programs, specifications, and other documents relating to the Site, Owner's business and the terms of this Agreement are and shall remain of a confidential nature. Any publicity or press releases with respect to the Site or the services hereunder shall be under the sole discretion and control of the Owner. Professional shall not divulge to any unauthorized person any confidential information concerning observations, conversations, discussions, correspondence, personnel records, business records, proprietary records. All matters concerning the Owner and its business operations, including, but not limited to, the identity of persons with whom it conducts business such as customers, vendors, manufacturers and suppliers, its research and development, its projects and contemplated projects, its financial affairs, its pricing structure and strategies and its procedures and practices shall be considered confidential. Such information remains the property of the Owner. Moreover, Professional shall not employ confidential business information in performing services for Owner that it has obtained by virtue of its relationship with any other company. These restrictions shall not apply to (a) information that is in the public domain through no wrongful act or omission of any of the Professional Parties, (b) was in Professional's lawful possession prior to the date of this Agreement and had not been first obtained by Professional either directly or indirectly from Owner or (c) information that is required to be disclosed by law or court order provided, however, that Professional first provides written notice to Owner prior to making any such disclosure.

7.10 Conflict of Interest. Professional shall not have any business or financial interest outside the Owner which in any way conflicts with the interests of the Owner or places Professional in a position where it can use the association with the Owner for direct or indirect gain to the possible detriment or embarrassment of the Owner. A conflict of interest may arise in a wide variety of circumstances and may be direct or indirect. A conflict of interest arises whenever the Professional's outside interests might affect or might reasonably be thought by others to affect the Professional's judgment or conduct in matters which involve the Owner. Professional agrees not to engage in such activity. Professional assumes any and all liability should any allegation of conflict of interest arise from the conduct of Professional, and Professional agrees to indemnify the Owner for any allegation of conflict of interest arising from the conduct of Professional.

7.11 Waiver. No waiver of any default hereunder shall be construed as a waiver of any subsequent breach.

7.12 Successors and Assigns. Subject to the restrictions in Section 7.4 above, the Owner and the Professional each binds himself, his partners, successors, permitted assigns and legal representatives to the other party to this Agreement and to the partners, successors, assigns and legal representatives of such other party with respect to all covenants of this Agreement.

7.13 Governing Law. This Agreement shall be construed in accordance with the laws of the state in which the Site is located.

7.14 Full Agreement. Each party acknowledges its full understanding of this Agreement and that there are no verbal promises, undertakings or agreements in connection herewith and that this Agreement may be modified only by a written agreement signed by all parties hereto. All previous negotiations and agreements between the parties hereto, with respect to the transaction set forth herein, are merged in this instrument which fully and completely express the parties' rights and obligations, and the covenants herein shall be binding upon and inure to the benefit of the parties hereto and their respective heirs, legal representatives, successors and assigns.

7.15 Partial Invalidity; Counterparts. If any term or provision of this Agreement shall be found to be illegal, unenforceable or in violation of the laws, statutes, ordinances or regulations of any public authority having jurisdiction thereof by a court of competent jurisdiction, then, notwithstanding such term or provision, this Agreement shall be and remain in full force and effect and such term shall be deemed stricken; provided, however, this Agreement shall be interpreted, when possible, so as to reflect the intentions of the parties as indicated by any such stricken term or provision. This Agreement may be executed in multiple counterparts, each of which shall be deemed an original and all of which together shall constitute one instrument. In order to facilitate the transaction contemplated herein, electronically mailed or facsimile signatures may be used in place of original signatures on this Agreement. Each party intends to be bound by the signatures on the electronically mailed or facsimiled document, are aware that the other party will rely on such signatures, and hereby waive any defenses to the enforcement of the terms of this Agreement based on the form of signature.

7.16 Survival. The terms, provisions, indemnities, representations and certifications contained in this Agreement, or inferable therefrom, shall survive the termination of this Agreement and the payment of the remuneration hereinabove provided.

7.17 Attorneys' Fees. In any action between the parties hereto seeking enforcement of any of the terms and provisions of this Agreement or in connection with the performance of the services hereunder, the prevailing party in such action shall be entitled to have and to recover from the other party its actual attorneys' fees, expert witness fees, arbitrator's fees, statutory costs, court costs and other expenses in connection with such action or proceeding.

7.18 Authority. Each individual executing this Agreement represents and warrants that he or she is duly authorized to execute and deliver this Agreement on behalf of the party to this Agreement.

7.19 Exhibits. Exhibits "A" and "B" attached hereto, are incorporated herein by this reference for the sole purposes of setting forth the scope of the Basic Services, the terms of payment for Basic Services and Additional Services and any schedule of performance of the Services. All other terms and conditions set forth in Exhibits "A" and "B" shall not be incorporated into this Agreement. In the event of any conflict or inconsistency between the terms and conditions of the body of this Agreement and the Exhibits attached hereto, the terms and conditions contained in the body of this Agreement shall prevail.

7.20 Waiver of Consequential Damages. Neither party, nor their parent, affiliated or subsidiary companies, nor the officers, directors, agents, employees or contractors of any of the foregoing, shall be liable to the other in any action or claim for incidental, indirect, special, collateral, consequential, exemplary or punitive damages arising out of or related to the Services or breach of this Agreement, whether the action in which recovery of damages is sought is based upon contract, tort (including, to the greatest extent permitted by law, the sole, concurrent or other negligence, whether active or passive, and strict liability of any protected individual or entity), statute or otherwise.

7.21 Limitation of Remedies. In recognition of the relative risks and benefits of the Project to both the Owner and the Professional, the risks have been allocated such that the Owner agrees, to the fullest extent permitted by law, to limit the liability of Professional in connection with this Agreement for any and all claims, losses, costs, damages of any nature whatsoever or expenses from any cause or causes, including attorneys' fees and costs and expert-witness fees and costs, so that the total aggregate liability of the Professional under this Agreement shall not exceed $1,000,000.

[signatures on following page]

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first above written.

INTEGRAL PARTNERS FUNDING, LLC,
a California limited liability company

By: KPMW Integral, LLC,
a California limited liability company
its Manager

By: [signature]
Name: C. Evan Knapp
Title: Authorized Signatory

"Owner"

HALEY & ALDRICH, INC.,
a Massachusetts corporation

By: [signature]
Name: Marya E. Gorczyca
Title: Senior Vice President

"Professional"

EXHIBIT "A"

SCOPE OF SERVICES

[See attached proposal letter from Professional dated June 18, 2013, and Attachments A, B and C thereto, together consisting of 9 pages.]

Haley & Aldrich, Inc
2033 N. Main Street
Suite 309
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18 June 2013

Integral Partners Funding, LLC
3 San Joaquin Plaza, Suite 100
Newport Beach, California 92660

Attention: Spencer Oliver

Subject: Proposal for Phase I Environmental Site Assessment
4747 Daisy Avenue
Long Beach, California

Dear Mr. Oliver:

Haley & Aldrich, Inc. is pleased to submit this proposal to provide environmental consulting services. This proposal presents our scope of work to perform a Phase I environmental site assessment (Phase I assessment) at the subject site described below using methods consistent with the ASTM E 1527-05 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process (ASTM E 1527-05 Standard) as referenced in 40 CFR Part 312 (the All Appropriate Inquiries [AAI] Rule.

The completion of these Phase I assessments are only one component of the process required to satisfy the AAI Rule. In addition, the user must adhere to a set of user responsibilities as defined by the ASTM E 1527-05 Standard and the AAI Rule. User responsibilities are discussed below. A user seeking protection from Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) liability as an innocent landowner, bona fide prospective purchaser, or contiguous property owner must complete all components of the AAI process in addition to meeting ongoing obligations. AAI components, CERCLA liability relief, and ongoing obligations are discussed in the AAI Rule and in Appendix XI of the ASTM E 1527-05 Standard.

PROJECT UNDERSTANDING AND BACKGROUND

It is our understanding that Integral Partners Funding, LLC (Integral) is considering acquisition of the subject site, and in connection with this proposed transaction, desires a Phase I assessment of the subject site consistent with the ASTM E 1527-05 Standard practices.

Haley & Aldrich understands the subject site consists of one 9.66-acre parcel located at 4747 Daisy Avenue in Long Beach, California. The parcel is identified by Assessor's Parcel Number (APN) 7133-016-005. The parcel is currently occupied by the Will J. Reid Scout Park and includes a pool, training center, picnic areas and overnight campsites.

EXHIBIT "A"

SCOPE OF SERVICES

[See attached proposal letter from Professional dated June 18, 2013, and Attachments A, B and C thereto, together consisting of 9 pages.]

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PROJECT OBJECTIVES

The objective of a Phase I assessment is to identify known and suspect "recognized environmental conditions" (RECs), historical RECs (HRECs), and *de minimis* conditions associated with the subject site by evaluating site history, existing observable conditions, current site use, and current and former uses of adjoining properties as well as potential releases at surrounding properties that may impact the subject site. RECs are defined in the ASTM E 1527-05 Standard as "the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water at the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include *de minimis* conditions that generally do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies." A material threat is defined by the ASTM E 1527-05 Standard as "a physically observable or obvious threat which is reasonably likely to lead to a release that, in the opinion of the environmental professional, is threatening and might result in impact to public health or the environment."

Consistent with ASTM E 1527-05 Section 12.5 (Report Format), and for the purposes of this assessment, those RECs that have been identified as being present with respect to the subject site are referred to as Known Recognized Environmental Conditions (KRECs), and those RECs that have been identified as being likely present with respect to the subject site are referred to as Suspect Recognized Environmental Conditions (SRECs). The ASTM E 1527-05 Standard defines HRECs as environmental conditions "which in the past would have been considered a recognized environmental condition, but which may or may not be considered a recognized environmental condition currently."

The ASTM E 1527-05 Standard requires an environmental professional's opinion of the potential impacts of RECs, HRECs, and *de minimis* conditions identified on a site during a Phase I assessment. Our conclusions regarding the potential impact of RECs, HRECs, and *de minimis* on the subject site are intended to help the user evaluate the "business environmental risk" associated with the subject site, defined in the ASTM E 1527-05 Standard as "a risk which can have a material environmental or environmentally-driven impact on the business associated with the current or planned use of a parcel of commercial real estate, not necessarily limited to those environmental issues required to be investigated in this practice. Consideration of business environmental risk issues may involve addressing one or more non-scope considerations..." The non-scope considerations listed in the ASTM E 1527-05 Standard are discussed below in the Authorization section of this proposal.

The Phase I assessment work scope has been developed to be consistent with the ASTM E 1527-05 Standard, based on our current understanding of the subject site. The Phase I assessment consists of four components: Records Review, Site Reconnaissance, Interviews, and Report Preparation. The scope of work specific to this project is attached (Attachment A).

USER RESPONSIBILITIES

The AAI Rule requires that the user of the report consider the following:

- Whether the user has specialized knowledge about previous ownership or uses of the subject site that may be material to identifying RECs;
- Whether the user has determined that the subject site's Title contains environmental liens or other information related to the environmental condition of the property, including engineering and institutional controls and Activity and Use Limitations (AULs), as defined by ASTM;
- Whether the user is aware of commonly known or reasonably ascertainable information about the subject site including whether or not the presence of contamination is likely on the subject site and to what degree it can be detected; and
- Whether the user has prior knowledge that the price of the subject site has been reduced for environmentally related reasons.

We request that you provide this information to us for inclusion in our report. Though it is not required by the AAI Rule or the ASTM E 1527-05 Standard that this information be provided to Haley & Aldrich, failure on the part of the user to obtain such information for their own records, should it be reasonably ascertainable, may invalidate the user's compliance with the AAI Rule for CERCLA liability protection in the future.

ESTIMATED FEE

Services described in this proposal will be conducted on a time-and-expense basis in accordance with the Professional Services Agreement and Standard Fee Schedule. We estimate the cost of consulting services related to the Phase I work scope under work items No. 1 through 5 in the Detailed Scope of Services Attachment to be approximately **$6,200.**

SCHEDULE

We will provide a verbal report on the property conditions and any environmental issues of note by 8 July 2013. A draft copy of the Phase I assessment report will be provided for your review by 12 July 2013.

Please note, however, that responses to agency records requests may not be received within the time frame allotted for this project. At your discretion, we can either wait for the response to the requests prior to finalizing our report, or we can supplement the report with the responses if they are received and contain information that would alter our conclusions.

AUTHORIZATION

Our work scope for this project will be performed in accordance with the standards and practices set forth in 40 CFR Part 312, and consistent with the ASTM E 1527-05 Standard for Phase I Environmental Site Assessments. Several organizations other than ASTM, such as the Federal Home Loan Bank Board, the Resolution Trust Corporation, and Professional Associations, have also developed "guidelines" or "standards" for environmental site assessments. The scope of work for the Phase I assessment outlined in Attachment I may vary from the specific guidelines or standards required by other organizations. If this project requires conformance with a specific guideline or standard other

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than ASTM, we will be pleased to review our proposal considering the specific requirements, and we will revise and resubmit this proposal, if necessary. Unless specifically referenced in this proposal, the work scope and report will not address other guidelines or standards.

No subsurface explorations or chemical analysis of environmental media (e.g., soils or groundwater) will be performed during this assessment. Therefore, our conclusions regarding the evidence of RECs will be based on observations of existing visible conditions, and on our interpretation of subject site history and site usage information. Further, our conclusions regarding the presence of hazardous substances and petroleum products may not be applicable to areas beneath existing structures, unless specific subsurface exploration, sampling, and/or analytical information is available and reviewed by us for such areas.

The ASTM E 1527-05 Standard includes the following list of "additional issues" that are non-scope considerations outside of the scope of the ASTM Phase I practice: asbestos-containing materials, radon, lead-based paint, lead in drinking water, wetlands, regulatory compliance, cultural and historic resources, industrial hygiene, health and safety, ecological resources, endangered species, indoor air quality, bio-agents, and mold. Assessment of these items is not included in our proposed work scope. A limited assessment of the presence of PCBs is included in the ASTM work scope. Accordingly, our assessment of the presence of PCBs is limited to those potential sources specified in the ASTM E 1527-05 Standard as "electrical or hydraulic equipment known or likely to contain PCBs, to the extent visually and or physically observed or identified from the interview or records review."

Our report will be prepared solely for the purposes stated in this proposal. Any opinions rendered pursuant to this Agreement are for the sole and exclusive use of Client, and are for the use of, or reliance upon, by any clients, lenders, and potential future purchasers, or any third parties subject to the terms and conditions of Haley & Aldrich's standard reliance letter, a template of which is attached hereto, which reliance letters shall be issued without charge. Any other use of this report without written authorization of Haley & Aldrich shall be at such other person's or entity's sole risk, and shall be without legal exposure or liability to Haley & Aldrich.

Thank you again for the opportunity to submit this proposal. We greatly enjoy working with you and look forward to assisting you with this project. Please do not hesitate to contact me at 408-204-8551 if you have any questions, comments or concerns.

Sincerely yours,
HALEY & ALDRICH, INC.

James P. Schwartz, P.G.
Client Leader

Attachments:
ASTM E 1527-05 Phase I Environmental Site Assessment, Detailed Scope of Services
Standard Fee Schedule
Reliance Letter Template

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ATTACHMENT A

ATTACHMENT A
18 June 2013
4747 Daisy Avenue, Newark, California

ASTM E 1527-05
PHASE I ENVIRONMENTAL SITE ASSESSMENT
DETAILED SCOPE OF SERVICES

1. Records Review - Haley & Aldrich will assemble and review readily available information on site history and usage as it relates to the presence of hazardous substances and petroleum products that would constitute RECs on the subject site. The ASTM E 1527-05 Standard lists standard and additional records for review.

   We will review information from the mandatory databases within the ASTM-specified approximate minimum search distances. The mandatory databases include: NPL; Delisted NPL; CERCLIS; CERCLIS NFRAP; ERNS; RCRA non-CORRACTS TSD; RCRA CORRACTS TSD; RCRA Generators; Federal Institutional and Engineering Controls; State and Tribal Landfills and Solid Waste Disposal Sites; State and Tribal equivalent NPL and CERCLIS Sites; State and Tribal Registered Storage Tanks; State and Tribal Leaking Storage Tanks; State and Tribal Institutional and Engineering Controls; State and Tribal Voluntary Clean-up Sites; and State and Tribal Brownfields Sites. We intend to use an electronic database service to provide a report summarizing information from the required records, and will rely on the database service to conform to ASTM requirements for currency of the information. Should the database search report identify listed sites with the potential to impact the subject site, Haley & Aldrich may review the federal or state files pertaining to the listed sites, as reasonably ascertainable and practically reviewable. The budget presented below does not include costs for review of files at more than one agency's office.

   As required by ASTM, a current 7.5-minute USGS topographic map or equivalent will be used to evaluate the physical setting in the subject site area, and will be supplemented by discretionary review of readily available information concerning surface topography, surface water, soil, bedrock, and groundwater conditions on and in the vicinity of the subject site.

   To complete the ASTM records review, Haley & Aldrich may contact one or more of the following agencies concerning the subject site: Health Department, Fire Department, Water Department, Zoning Board, and Engineering Department. We will contact the agencies for information concerning records related to storage, use, or release of hazardous substances or petroleum products that may constitute RECs on the subject site, and will document our contacts in writing.

   ASTM requires that "obvious uses" of the subject site be identified from the present back to the first developed use or back to 1940, whichever is earlier. In order to complete that task, Haley & Aldrich will review one or more of the following ASTM-listed standard historical sources: aerial photographs, fire insurance maps, property tax files, recorded land title records, USGS topographic maps, local street directories, building department records, and zoning/land use records. Haley & Aldrich may also review ASTM-listed "other historical sources" including newspaper archives, internet sites, and local libraries and historical societies.

Haley & Aldrich will review reports previously prepared for the subject site, if provided.

Pursuant to the ASTM E 1527-05 Standard, records identified by ASTM as "Additional" or "Other" will be reviewed when, in Haley & Aldrich's judgment, they are (1) reasonably ascertainable; (2) sufficiently useful, accurate, and complete; and (3) generally obtained pursuant to local good commercial or customary practice.

2. Site Reconnaissance - Haley & Aldrich will visit the subject site and view interior and exterior conditions to assess the nature and type of activities that have been conducted with respect to the potential for RECs to be present. Haley & Aldrich will observe and document visible evidence of current and past usage of the subject site, particularly related to potential filling, previous structures, sewage disposal systems, hazardous substances, petroleum products, storage tanks, and evidence of spills or releases of hazardous substances or petroleum products. Conditions of adjoining properties will also be observed from the subject site boundaries and/or public thoroughfares.

   We understand that you will make all areas of the subject site accessible to our representative(s) for the site visit. For budgeting purposes, we have assumed that all areas of the subject site will be made accessible and that the site reconnaissance will be conducted in one site visit.

   Our observations and conclusions related to the site reconnaissance may be limited by prevailing weather conditions or other conditions at the time of our site visit. Our report will include a discussion of factors limiting our site reconnaissance, if applicable.

3. Interviews with Owners and Occupants - The ASTM E 1527-05 Standard requires that interviews be performed with a "key site manager" (the owner or occupant of the subject site) and with representatives of building occupants. In accordance with ASTM, an interview will be conducted with a representative of each occupant if the building has five or fewer occupants. If the building contains more than five occupants, an interview will be conducted with those major occupants, as defined by ASTM, and those occupants whose operations could indicate RECs in connection with the subject site. We request that the current owner(s) or representative(s) be notified of our visit and asked to participate in an interview regarding subject site usage and history. If the subject site is abandoned, ASTM requires interviews with one or more owners or occupants of neighboring or nearby properties. Further, as required by the ASTM E 1527-05 Standard, we ask that you assemble and make available to Haley & Aldrich copies of previous environmental investigation reports and audits of the property, and other information related to storage, use, or release of hazardous substances or petroleum products at the site, such as environmental permits, registrations for tanks, material safety data sheets, or waste disposal records.

4. Interview with State and/or Local Government Officials - Haley & Aldrich may interview one or more state and/or local government officials in conjunction with the state and local government records review with the intention to obtain information indicating RECs in connection with the subject site.

5. Evaluation and Report - Haley & Aldrich will interpret the information and data assembled from work scope items No. 1 through No. 4 above, and will formulate conclusions regarding evidence of RECs at the subject site and their potential impact on the subject site. We will prepare two copies of a report summarizing the results of our assessment and discussing our

conclusions regarding the potential presence and impact of RECs in connection with the subject site, based on the work scope described above.

The report will be prepared in accordance with the standards and practices set forth in 40 CFR Part 312 (the AAI Rule), and consistent with the ASTM E 1527-05 Standard. Documentation supporting the conclusions presented will be appended to the report. As required by ASTM, our final report will include declarations that the Phase I assessment was conducted consistent with the scope and limitations of the ASTM E 1527-05 Standard, and the persons who signed the report meet the definition of environmental professional. In addition, the Phase I assessment report will indicate whether RECs were or were not identified in connection with the subject site, and whether there were data gaps. If data gaps were identified, Haley & Aldrich will indicate whether they are considered significant (i.e., affect our ability to identify conditions indicative of RECs).

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Haley & Aldrich, Inc.
Modified 28 October 2011
11-R5

Standard Fee Schedule

Fees for Services

Fees for services will be based on the time worked on the project by staff personnel plus reimbursable expenses. The fee will be computed as follows:

1. Labor related fees will be computed based on personnel billing rates in effect at the time the services are performed. Personnel billing rates for Additional Services only are subject to revision on, or about, 1 January and 1 July each year. The hourly rates are fully inclusive of fringe benefits, burden and fee. Current rates are as follows:

Classification	Hourly Rate($)
Office Support	75.00
Field/Lab Geol/Engr Tech (Gr. 1-3)	81.00
Field/Lab Geol/Engr Tech (Gr. 4-5)	88.00
Field/Lab Geol/Engr Tech (Gr. 6-8)	97.00
Graphics/GIS/Data Mgt	109.00
Senior Graphics/GIS/Data Mgt	120.00
Professional (Gr. 1)	96.00
Professional (Gr. 2)	101.00
Professional (Gr. 3)	114.00
Staff Professional (Gr. 4)	120.00
Staff Professional (Gr. 5)	138.00
Senior Professional (Gr. 6)	150.00
Senior Professional (Gr. 7)	164.00
Senior Professional (Gr. 8)	177.00
Vice President 1	202.00
Vice President 2	219.00
Senior Vice President	261.00

2. Overtime hours required by Owner will be charged at straight time rates. Fees for pretrial conferences, depositions and expert testimony will be billed at one and one-half (1.5) times the rates quoted above.

3. Direct non-salary expenses approved by Owner will be billed at our cost plus fifteen (15) percent or at H&A standard usage rates including:

   a) Transportation and subsistence expenses incurred for necessary travel, such as:

   (1) Use of personal or company vehicle at IRS allowed mileage rates;

   (2) Use of public carriers, airplanes, rental cars, trucks, boats, or other means of transportation;

   b) Telephone usage, including facsimile and cellular phone, local and long distance, and teleconferencing; in-house reproduction and printing costs for reports, drawings, and other project records (excluding those for internal use); mail, including standard postage and overnight document delivery; will be billed as a general communication fee at a rate of 1% of the labor charges.

   c) Shipping charges for water, soil and rock samples, field testing equipment, etc.

   d) Disposal costs for soil, rock, waste and/or water samples at $0.30 per ounce (fluid measure, sample container size). Rock core disposal will be at $20.00 per box.

   e) Expendable personal protective equipment required for work on the project site.

   f) Purchase of specialized equipment and rental of equipment from outside vendors.

   g) Other project-related expenses approved by Owner.

4. Subcontractors engaged to perform test borings or other field explorations, analytical chemical laboratory services, or other services required by the project will be billed at our cost plus fifteen (15) percent.

5. Specialized geotechnical, geophysical and environmental instrumentation, geotechnical laboratory tests and field supplies required by the project scope will be billed at H&A standard usage rates.

End of Standard Fee Schedule

ATTACHMENT C

On [date], Haley & Aldrich submitted the subject Report to [Client] for [summary of purpose] pursuant to a Professional Services Agreement between [Client] and Haley & Aldrich. Since the submittal of the Report, Haley & Aldrich has not been requested to verify the information, findings, and/or opinions set forth in the Report and/or other instruments of service prepared in connection therewith, nor to evaluate the necessity and/or advisability of any such verification.

The Services performed by Haley & Aldrich are subject to the terms and conditions expressed in the Report and Professional Services Agreement. [Relying Party] is hereby authorized to use and rely on the Report, subject to the terms, conditions and limitations referenced herein, and contingent on receipt by Haley & Aldrich of a signed copy of this letter, within 30 days, by an authorized representative of [Relying Party], signifying its acceptance of the foregoing.

EXHIBIT "B"

SCHEDULE OF COMPENSATION

1. Basic Services Fee. Owner shall pay Professional on a time-and-materials basis in an amount not to exceed SIX THOUSAND TWO HUNDRED AND NO/100 DOLLARS ($6,200.00) as set forth in Exhibit "A" attached hereto.

a. The sums set forth in Exhibit "A" will be billed to Owner in accordance with the hourly rates set forth in the fee schedule included in Exhibit "A" attached hereto.

b. All flat rates referred to above and in Exhibit "A" shall be inclusive of all benefits, compensation costs and expenses unless specifically set forth to the contrary herein.

2. Additional Services Compensation. Except as otherwise agreed, compensation for Additional Services shall be on a time and materials basis based on the hourly rates included in Exhibit "A" attached hereto.

3. Reimbursable Expenses. Subject to Owner's prior written approval in each instance, Owner shall reimburse Professional for the actual cost of the out-of-pocket expenses incurred by Professional, as set forth in the fee schedule included in Exhibit "A" attached hereto.

4. Payment. Payments for Services and reimbursable expenses shall be made within thirty (30) days following presentation of Professional's statement of services rendered with sufficient supporting data acceptable to Owner.

APPENDIX B

Historical Research Documentation