Appendix D

Geotechnical Study

LGC Valley, Inc.

Geotechnical Consulting

GEOTECHNICAL STUDY FOR THE PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT FOR THE ZONE 2 LANDSLIDE MORATORIUM ORDINANCE REVISION WITHIN THE CITY OF RANCHO PALOS VERDES, CALIFORNIA

Dated: March 29, 2011

Project No. 103002-01

Prepared For:

Rincon Consultants, Inc.
180 North Ashwood Avenue
Ventura, California 93003

28532 Constellation Road • Valencia • CA 91355 • (661) 702-8474 • Fax (661) 702-8475

LGC Valley, Inc.
Geotechnical Consulting

March 29, 2011 Project No. 103002-01

Mr. Abe Leider
Rincon Consultants, Inc.
180 North Ashwood Avenue
Ventura, California 93003

Subject: ***Geotechnical Study for Preparation of an Environmental Impact Report for the Zone 2 Landslide Moratorium Ordinance Revision within the City of Rancho Palos Verdes, California.***

In accordance with your request, LGC Valley, Inc. (LGC) has performed a geotechnical study for preparation of an Environmental Impact Report (EIR) for the Zone 2 Landslide Moratorium Ordinance Revision which would allow a Landslide Moratorium Exception for all of the existing 47 undeveloped lots within the Zone 2 Area. These 47 lots are the focus of this geotechnical study.

The purpose of our work was to review the available literature provided to us from the City of Rancho Palos Verdes archives and synthesize the data into a summary of the geologic and geotechnical history of the Zone 2 area and surrounding property relevant to this study. Our work was performed to determine the potential geotechnical/geologic impacts to Zone 2 and the surrounding area from development of all 47 undeveloped lots.

The work provided herein is intended to be as comprehensive an analysis as possible without reiterating in great detail the intricacies of the site and surrounding Rancho Palos Verdes peninsula. Thus, by its nature, the information provided herein is incomplete, but should provide a useful understanding for the purposes of the EIR.

If you have any questions regarding our report, please contact this office. We appreciate this opportunity to be of service.

Respectfully submitted,

LGC VALLEY, INC.

Matthew Hawley, CEG 2122
President

Basil Hattar, GE 2734
Principal Engineer

PROFESSIONAL GEOLOGIST MATTHEW HAWLEY No. 2122 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER BASIL HATTAR 2734 Expires 06/30/12 GEOTECHNICAL STATE OF CALIFORNIA

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Appendices

1.0 EXECUTIVE SUMMARY

The Zone 2 area, located within the Abalone Cove Landslide Abatement District (ACLAD), resides within the 900-acre Ancient Portuguese Bend Landslide complex of Rancho Palos Verdes. Historical movement of the Abalone Cove and Portuguese Bend landslides immediately adjacent to Zone 2 reflect the on-going instability of the area and the general threat to property located atop landslide features. Though no recent landslide activity has occurred within Zone 2, slight creep-type movement may be occurring in local areas of Zone 2 as a result of the loss of support from the slow, down slope movement of the adjacent Abalone Cove and/or Portuguese Bend landslides.

Several ground water control methods, especially within the Abalone Cove landslide appear to have significantly reduced landslide movement and possibly creep-type movement within Zone 2. These water control processes have reduced movement within the Abalone Cove Landslide to minute displacements on the order of fractions of an inch/year, and such displacement is not considered a threat to life and limb. Rather, these very small movements tend to create nuisance –type cracking and displacements that over time, can result in higher than average maintenance costs to local home owners.

Because the Abalone Cove and Portuguese Bend landslides are quite thick, the depth to the basal rupture surface is deep. Thus small amounts of earth grading at the ground surface and the weight of homes atop the landslides in response to lot development will have a negligible effect to overall stability. However, as indicated above, groundwater resulting from additional home sites could have serious consequences if not strictly controlled. Several recommendations with regard to water collection devices, control of water to streets and other structures, and the addition of all future home owners within Zone 2 into ACLAD, which encourages the development of additional monitoring and/or pumping wells, should be mandatory. This recommendation is imperative because Zone 2 is and always will be a community linked by a common geological risk, and ground water control is the only reasonable geotechnical mitigation technique available to control the potential for landslides and ground movement in the Zone 2 area.

It is our conclusion that the development of the 47 lots within Zone 2 will not have a negative impact to the gross stability of either Zone 2 or adjacent areas, provided the recommendations of the architectural standards adopted by the Portuguese Bend Community Association and the City's Landslide Moratorium Exception Conditions are implemented into all future design and construction. However, it should be plainly understood that because of the inherent potential for instability within adjacent landslides and the fact that Zone 2 is atop a landslide, that should additional significant movement occur in adjacent areas, it is our opinion the loss of support currently provided from the Abalone Cove and Portuguese Bend Landslides could result in significant structural damage within Zone 2.

2.0 INTRODUCTION

2.1 Purpose and Scope of Services

The main purpose of our work was to review the available literature provided to us from the City of Rancho Palos Verdes archives and synthesize the data into a summary of the geologic and geotechnical history of the Zone 2 area and surrounding property relevant to this study. Our work was performed to determine the potential geotechnical/geologic impacts to Zone 2 and the surrounding area from development of all 47 undeveloped lots.

The work provided herein is intended to be as comprehensive an analysis as possible without reiterating in great detail the intricacies of the site and surrounding Rancho Palos Verdes peninsula. Thus, by its nature, the information provided herein is incomplete, but should provide a useful understanding for the purposes of the EIR.

This report includes the results of geotechnical/geologic study, and provides our conclusions, opinions and recommendations to address the potential geotechnical/geologic impacts to Zone 2 and the surrounding area and the limitations and potential mitigations for development of the 47 undeveloped lots in Zone 2.

Our scope of services for preparation of this document included:

- Review of geotechnical reports, geologic maps and other documents relevant to the site (Appendix A).
- Perform a site visit to observe the existing condition.
- Preparation of this report presenting our findings, conclusions, opinions and recommendations with respect to the evaluated geologic and geotechnical conditions at the site.

2.2 Site Description and Exiting conditions

The subject Zone 2 area is located in a gated community north of the intersection of Narcissa Drive and Palos Verdes Drive South in the Portuguese Bend area of the Palos Verdes Peninsula, within the City of Rancho Palos Verdes, County of Los Angeles, California. Zone 2 consists of approximately 112-acres with a total of 111 individual lots, of which there are 64 developed lots, and 47 undeveloped/underdeveloped lots. Zone 2 is currently located within the City’s Landslide Moratorium Area (LMA).

Generally the developed lots are improved with single-family residences and associated improvements, built prior to the landslide moratorium, with the largest developed lot in Zone 2 being occupied by the Portuguese Bend Riding Club that was established prior to the City's incorporation in 1973. Zone 2 consists of a number of interior private streets that service the site, and it is our understanding that these streets are maintained by the Portuguese Bend Community Association. The remaining 47 undeveloped lots range from nearly flat to gently sloping, with moderate vegetation, and some lots contain small structures (i.e. non-habitable structures).

3.0 GEOTECHNICAL/GEOLOGIC CONDITIONS

3.1 Regional Geology

Zone 2 is located within the southern flank of the Palos Verdes Peninsula, a northwest-trending dome-shaped ridge, nine miles long by five miles wide, which bounds the southwest margin of the Los Angeles Coastal Plain (Ehlig, 1982). The peninsula is bordered by the Pacific Ocean on the south and west, the Los Angeles and Long Beach Harbors on the east, and the greater Los Angeles metropolitan area on the north. The peninsula rose from the sea during Early Pleistocene time through the combined effects of local and regional uplift. As the peninsula emerged, platforms or benches were eroded into all sides of the uplift by waves, creating a series of at least thirteen nearly level terraces (Bryant, 1982). Though located around the entire peninsula, these marine-cut terraces are especially pronounced on the southern and western sides of the peninsula as these areas face the Pacific Ocean.

The peninsula rises to an elevation of approximately 1,480 feet and the result of this uplift are several canyons that cut into and through the terraces, ancient landslides, and underlying bedrock. Canyons along the southern margin of the peninsula, including the Altamira Canyon and Portuguese Canyon just to the east of Zone 2, drain to the ocean forming notches into wave eroded bluffs that rise on the order of 100 to 150 feet in height from the beach. Recent landsliding has altered the course of the mouths of these canyons and lowered the overall profile of the bluffs as compared to adjacent more resistant bluffs and points.

The retreating coast line in this area of the peninsula has created two points, Portuguese Point and Inspiration Point that protrude into the ocean from the main terrace (Terrace 3 of Bryant, 1982) upon which Palos Verdes Drive South extends. These points, interpreted to be the result of more resistant basalt intrusions, are located at the ocean interface and have created three coves just south of Zone 2. Abalone Cove lies west of Portuguese Point, while Portuguese Cove (or Portuguese Bend) lies east of Inspiration Point. Between the points is Harden Cove. The sea floor within these coves is relatively gentle and at low tide, bedrock outcrops can be viewed within the surf zone.

Because of the tilt of the overall land surface from the ridgeline to the top of the bluffs just above the beach, nearly everywhere (except local portions of areas affected by recent landsliding) views a spectacular panorama of the Pacific Ocean and nearby Channel Islands.

3.2 Geologic Setting

The marine Middle Miocene to Early Pliocene Monterey formation constitutes the exposed bedrock over most of the Palos Verdes Peninsula (Ehlig, 1982a). The Altamira Shale Member of the Monterey formation is the lowest of three distinct phases of the Monterey formation in the area and is the source of the Ancient Portuguese Bend Landslide (APBL), and all subsequent landslides within the APBL including the Recent Portuguese Bend Landslide (PBL) and the Abalone Cove Landslide (ACL). Through much study, the Altamira Shale is further sub-divided into three distinct lithofacies or zones of distinct deposition and thus rock types; these are: the Portuguese Tuff, the Cherty Lithofacies and the Phosphatic Lithofacies. Of these three, the Portuguese Tuff is the most prominent and encountered unit in the area, and is typically used as a reference point in discussing stratigraphy. Because of its thickness, estimated at between 50 feet and 75 feet (L&A, 2001;

Neblett, 2001; Ehlig, 1982a), and its composition, an altered ash tuff to bentonite clay, it is also commonly considered to have the greatest potential of impact to the slope stability of the local area.

Overall, the local Altamira Shale generally consists of siltstone, tuffaceous siltstone, shale, and tuff that are often intruded by basaltic dikes, sills and flows (L&A, 2001). Thick beds of dolostone (an altered limestone) were also recorded in the area along with the Portuguese Tuff. Other ash tuff beds were also recorded, many of these also altered to bentonite clay.

The dome shape of the peninsula is interpreted as a broad doubly-plunging anticline along the south side of the northwest-trending Palos Verdes fault (Ehlig, 1982a). Overall, the south-facing Palos Verdes Peninsula bedrock bedding is inclined at approximately 20 degrees or more toward the south or the ocean, with local superimposed northwest to west trending folds that give an overall rippling effect to this sheet of rock. Several reviewers interpret some of these folds as the result of emplacement of volcanic intrusions into the Altamira Shale while others identify these folds as the result of local and regional compressional tectonics.

3.3 Geologic Units

The main geologic units at the site and surrounding area are the Monterey formation and ancient and recent landslide deposits. Surficial units of marine and non-marine terrace soils, along with alluvium, colluvium and fill mantle the thicker deposits of landslide and bedrock.

3.3.1 Artificial Fill

Local areas of artificial fill are interpreted throughout the Zone 2 area. Fill soil thickness is likely variable from a few inches to perhaps on the order of ten feet or more in response to the filling of low points, swales or grabens from ancient landsliding events in order to create roads and/or pads. The quality of the fill is uncertain as only a couple of reviewed documents indicated observation and testing of placed soils for subsequent housing construction. It is possible that some of the minor cracking observed within roadways, trenches and within lots in the Zone 2 area is due to settlement of poorly compacted fill soils.

3.3.2 Colluvium

Colluvium is located at the ground surface in areas unaffected by grading activities and is the in-situ development of soil from the underlying materials. The colluvium or topsoil is composed of dark brown to black silty clay and clayey silt and is prone to shrinkage and cracking when drying (L&A, 2001). It is fair to interpret that the colluvium is thicker in low areas such as swales and grabens and thinner on steep hillsides and likely has an average thickness on the order of three feet for gently dipping surfaces in the study area.

Laboratory testing reported in individual lot investigations indicate that the topsoil is expansive. Expansive soils are very hard on structures and may also be responsible for some of the cracking observed in the Zone 2 area, especially within roadways.

3.3.3 Alluvium

Alluvium is the down slope migration of particles by moving water that is typically confined within the elongated troughs of streams and canyons. Alluvium may be fine to coarse-grained and even consist of cobbles and boulders. Alluvium is generally confined to the active stream channels that cut across the southern flank of the peninsula and are interpreted at approximately ten feet or less in thickness in the adjacent Altamira and Portuguese Canyons. Thinner deposits are interpreted within the short streams that feed into these primary canyons.

3.3.4 Landslides

Landslides occur throughout the peninsula, but none are more prominent than those of the approximately 900-acre Ancient Portuguese Bend Landslide complex and surrounding areas. In general, these landslides are the result of inclined bedding to the south that becomes unsupported due to erosion from beach waves and intrusion from water run-off. As landslides fail into the beach zone due to loss of support from erosion, the material up-slope from these areas loses support and becomes susceptible to landsliding as well. Further instability comes from the now fractured nature of the landslide material which allows more water to infiltrate into the landslide mass, adding weight, creating buoyancy and further decreasing clay strength, while erosion from beach processes at the toe restrict the landslide masses from natural buttressing. The overall effect is a series of landslides that “shingle” up slope nearly to the crest of the anticline that forms the backbone of the peninsula.

Many reviewers of the history of the peninsula suggest that the initial landsliding that occupies the bulk of the area observed today occurred approximately 120,000 years ago with possibly initial movements as early as 500,000 years ago (Lass and Eagen, 1982). Studies of the South Shore landslide (Ray, 1982) yielded dates of approximately 16,200 years old, and historical landsliding of the PBL and ACL indicate that mass movements still occur in the area today. Thus it is reasonable to conclude that landsliding occurs nearly continuously, at least in geologic terms, throughout the APBL complex and that landsliding is a very real potential that will continue into the future.

Overall, the various landslides are interpreted or known to be founded on the weak bentonite clay beds that comprise within the Altamira Shale and all landslides appear to fail in a down slope direction toward the ocean. Because of numerous land movements, head scarps and grabens of varying length, height and arc occur throughout the APBL area. Over time, erosion wore down these initially sharp angled features into subdued hills and depressions. Coupled with the formation of terraces over much time, the APBL has a gently rolling, hilly appearance except in the areas of recent landsliding.

3.3.5 Non-marine Terrace Deposits

In the study area, non-marine terrace deposits are crudely-stratified and poorly compacted deposits primarily derived from slope wash, creep effects and cliff talus. These deposits can include all grain sizes and may range from ten feet to up to approximately 100 feet in thickness (L&A, 2001). Commonly, non-marine deposits immediately overly marine deposits and may extend across several terraces without interruption. Though many of the individual lot reports reviewed for this study did not indicate the occurrence of these deposits, it is likely that they exist in several areas across Zone 2.

3.3.6 Marine Terrace Deposits

Marine terrace deposits are sediments deposited on the wave cut abrasion platform at about sea level and by sea forces, as compared to alluvial or non-marine terrace deposits which are typically deposited or acted upon by running “fresh” water sources. As these deposits are generated at sea level and deposited by ocean processes, the make-up of these soils is commonly beach sands, gravels and cobbles with lesser finer-grained material. Shell and shell hash is common and the gravels and cobbles tend to have well rounded shapes due to re-working by wave action.

Because of the continued uplift of the peninsula, marine terrace deposits may be located well above current sea level and likely at the base of any of the thirteen terraces cut into the side of the peninsula dome. However, because these deposits are typically mantled by non-marine terraces and the anticipated depths of remedial removals for home sites within Zone 2 will be minimal, it is unlikely, though not improbable, that these soils will be encountered during lot grading.

3.4 Historical Landslides

The preponderance of the documents reviewed interpret that the APBL moved as a translational-type landslide along a pre-existing weak layer(s) likely composed of bentonite clay that is inclined toward the ocean. Some geologic reviewers interpret that the APBL initially moved as a single sheet (Steiner, 2004) in part because of the lateral continuity of the entire landslide complex, and then broke into smaller landslides shortly thereafter. Others hypothesize that landsliding occurred in several relatively smaller stages that then migrated up-slope as a series of landslides as successive parcels of land became unsupported from the down-slope failures.

Recent historical movement and ground water data such as that identified in the ACL and PBL, among others, generally supports this later interpretation as these slides occurred along seaward dipping strata, that appears to have begun within the beach zone with very high water levels high up-slope (though the PBL really accelerated when grading activities created an imbalance in that area). Reports that leech fields, seepage pits and cesspools were in common practice for residences atop the APBL indicate primary sources for ground water build-up which would be a primary catalyst for movement.

Though both of these slides generally moved "at once", surface monument data as well as historical data indicate that the first and greater movement occurs at the toe of the slide and then decreases up-slope such that the slides "shingle" up-slope with the toe area showing a greater "rubble" appearance than those areas higher up. This is generally because the pieces of rock at the toe become over-turned as the landslide mass breaks up across bedding and through the surf zone and then subsequently over-run by blocks higher in the landslide mass as the entire mass moves down slope. The result is an area of severely over-turned, broken down and rotated blocks in the toe area of the landslide that tends to decrease in severity rather rapidly up slope becoming large blocks separated by extensional tears, gaps and down drops. The larger tears, gaps and down drops ultimately show at the ground surface as scarps and sags that separate the large "intact" blocks of bedrock from each other. Thus the material near the toe of the landslide has a distinctly different and chaotic structure with very low strength as compared to the landslide debris higher up hill which is more intact and has a greater inherent strength.

As indicated above, the movement of lower land masses subsequently decreases support of the land higher up creating distinct zones within each landslide that are progressively less broken and therefore stronger up slope. So it should not be misconstrued that the larger uphill masses are severely weak and comparable to the rubble observed at the landslide toe. Rather these very large blocks still provide significant support to up-slope property because it remains fairly intact.

Because of the proximity to the Zone 2 area and the inherent make-up of uphill blocks, significant support from the ACL is provided to Zone 2. Therefore, it is our opinion that further down slope movement of the PBL and especially the ACL be kept at minimums as much as possible in order to provide long term support to the developments planned in Zone 2.

3.4.1 Abalone Cove Landslide

The Abalone Cove Landslide (ACL) has been reviewed and analyzed by many geotechnical firms and geologists (see References). This landslide is the re-activation of part of the APBL complex and is relevant for the Zone 2 area because it abuts Zone 2 immediately to the south. Movement of the ACL initiated in 1974 and continued significant movement until 1985 encompassing a total of approximately 85 acres. A reduction of the ground water level within the slide mass began in early 1980 and movement had nearly stopped near the end of 1985 (Ehlig and Bean, 1982; Ehlig 1982).

Beginning in 1994 a series of survey monuments were installed across the ACL and Zone 2. The monuments were set-up to be reviewed through Global Positioning Satellite networks (GPS) and recordings have been collected at least through 2006 (GeoKinetics, 2007). The data from these monuments indicates small amounts of movement occurred even through that report's most recent readings just prior to submittal. Interpretations vary as to causation of the movement, ranging from slope creep, stress relaxation of the landslide from the primary movement that occurred between 1974 and 1985, continued creep movement along the basal rupture surface of the landslide, effects from high rainfall, damage or disturbance to monuments, to possible error in data points or some combination thereof.

Between the twelve year time frame of 1994 to 2006, movement of the ACL (from data provided by GeoKinetics, 2007) indicates the magnitude of displacement at the toe of the ACL is approximately 1.9 feet, the mid-portion 0.8 feet, and the head area approximately 0.6 feet. This movement roughly correlates to a yearly slip of 1.9 inches, 0.8 inches and 0.6 inches, respectively, though the movement is not steady on a year-to-year basis. Instead, the data appears to indicate that movement occurs in pulses typically regulated by rainfall.

Though significant in terms of the potential for cracking and separations to structures, flatwork and other block or concrete structures, the movement within the ACL is slow over enough time that it is not considered by most geologists as a hazard to life and limb as long as the abatement activities (ground water dewatering and monitoring) within the ACL continue.

The overall relevance of movement of the ACL to the subject site is the interpreted loss of support to the up-slope Zone 2 area. Monuments within Zone 2 indicate average movement of approximately 0.3 inches/year or 3 inches/10 year period. This rate likely fluctuates from spot-to-spot within Zone II, with those areas further away from the ACL receiving even less movement and those closer to the ACL with slightly more, but it provides a simplistic basis from which to judge how property will be regulated in terms of repairs over the long term and that life and limb are not truly in jeopardy provided this rate and the geologic conditions regulating it does not significantly change.

3.4.1.1 <u>Landslide Moratorium Ordinance</u>

Because the ACL area contained numerous home sites and the boundaries of the affected areas were unclear at the time of initial and even continued landsliding, a Landslide Moratorium Ordinance was adopted in 1978. This ordinance was adopted also in part because it was uncertain if the slide could be controlled or prevented from spreading into areas beyond the area characterized by visible surface cracks (Ehlig, 1992).

Shortly after the adoption of the Landslide Moratorium Ordinance, a geotechnical investigation of the ACL was sponsored by the City. The subsequent report by Robert Stone and Associates (1979) provided recommendations for removal of ground water and noted the lack of youthful landslides uphill (Zone 2) of the ACL. The report indicated that there were only two naturally occurring processes capable of destabilizing the slides uphill from the active ACL. One was loss of support on the downhill side as a result of movement of the ACL, and the other was a rise in the water table. From these conclusions, the report recommended against further development in Zone 2 until slide movement was stopped within the ACL, the water table was lowered, and surface drainage was improved.

Within Zone 2, pumping wells have lowered the ground water table, drainage has been improved, and all but the slightest movement has ceased on the adjacent ACL. With the exception of differences of opinion with regard to why or even if there is true land movement in ACL and Zone 2, it appears that these conditions have generally been met, and that the uncertainty with regard to landslide control has been abated. Thus provided additional measures to control of ground water, reduce water infiltration and limiting earth grading are taken into consideration during the development of Zone 2 parcels, Zone 2 can be developed in as safe a manner as conditions allow.

3.4.2 __Portuguese Bend Landslide__

The 260-acre active Portuguese Bend Landslide (PBL) has been moving continuously since re-activation in 1956. Like the ACL, the PBL is a portion of the much larger APBL complex, however its' rate of movement is estimated at approximately 3 feet per year versus the fraction of an inch per year for the ACL (Steiner, 2004b). The cause of reactivation was due to over-burden fill and loss of support from cut operations located nearly 2,500 feet from the beach during the construction of Crenshaw Boulevard extension (Vonder Linden, 1972). However, other reviewed reports indicate movement was observed along the toe of the landslide some time between 1931 and 1947, the time between coastal photographs that show a change between no movement and a landslide scarp. Thus, initial movement likely occurred during the early time frame stated above and was exacerbated due to construction activities years later.

Eventually, the landslide displaced Palos Verdes Drive South, eliminated the extension of Crenshaw Boulevard, damaged a pier just east of Inspiration Point, and affected approximately 160 homes of which about 134 were destroyed (Steiner, 2004b). The remaining home owners moved to nearby areas that were more stable or created clever methods to account for ground movements such as continuous use of hydraulic jacks and timbers to keep their foundations level.

Excavation shafts explored by geologists into the PBL located the basal rupture surface on a sheared bentonite clay bed located about 30 to 40 feet above the Portuguese Tuff (Steiner, 2004b). Studies indicate that the movement is complex in that the western margin of the PBL moves over inactive landslide debris of the APBL while the eastern portion moves over in-place bedrock.

Similar to the ACL, the PBL is composed of rubble within the toe areas and numerous large blocks up-slope that move at different rates. Ehlig (1992) divided the landslide into five semi-independent subslides. Like the ACL, the seaward portion of the slide mass moves at a faster rate than those parcels further away from the coast and all parcels accelerate after periods of high rainfall.

Steiner (2004b) indicates that the rate of movement of the landslide reached a whopping 1.5 inches per day after seasons of high rainfall and that only through continued redistribution of landslide mass in three distinct pulses between 1986 to 1995 did the movement reduced to 0.05 inches per day. However, lapses in maintenance, increased infiltration of water into the landslide, weight at the head of the slide due to other landslides and additional weight due to alluvial build-up led to additional failures.

Over several decades, numerous attempts to stabilize the landslide have failed. These include: the installation of 23 steel-reinforced concrete caissons; earth re-distribution across the landslide; the installation of dewatering wells, attempts to control beach erosion through the installation of gabions, drainage improvements, and the sealing of fissures. Additional ideas for an elaborate system of drains, shear keys and walls have been proposed. However, the landslide still moves.

3.5 <u>Groundwater</u>

According to Ehlig and Bean (1982) the 80-acre ACL began moving in February 1976, while the upper portion did not appear to start moving until the spring of 1978. Groundwater was concluded to be the most likely agent responsible for the slide movement and subsequent to the numerous cesspools and other septic systems initially in the area, the rise in the water table is directly attributed to rainfall which apparently has both an immediate and delayed effect on groundwater conditions and therefore slope stability conditions. The data and graphs prepared by Ehlig and Bean indicate a strong positive correlation between ground water levels in the slide mass and the rate of movement. GeoKinetics (2007) also show this correlation in their analysis of GPS monitoring stations.

The dewatering system installed in the ACL as part of the recommendations by Robert Stone and Associates (1979) was effective in lowering the ground water table and slowing the rate of land movement. Correlations between ground water pumping and a decline in the rate of movement of the slide began immediately after the start of dewatering. Subsequent wells further reduced movement to negligible amounts.

Early in the development of the Portuguese Bend area septic systems, leach lines and cesspools installed as part of residential development on the APBL contributed high volumes of water directly into the landslide and were likely catalysts for inception of movement. The current sources of ground water are primarily rainfall. However, supplemental water may also result from infiltration from adjacent canyons, up-slope areas and broken pipes due to landsliding.

In their report for the city of Rancho Palos Verdes, Robert Stone & Associates (RSA, 1979) clearly described three ways in which ground water negatively affects a landslide mass. First, the water increases the plasticity of clay gouge along the slide surface and allows it to deform more freely with less frictional resistance. Once saturation occurs along a slide surface, the further accumulation of water decreases stability through the action of water pressure. The buoyancy effect of water reduces the weight of solid material pushing down on the slide surface; thus reducing frictional resistance to sliding. At the same time, fluid pressure acting in the direction of slide movement provides an additional driving force similar to water behind a dam. For the ACL, RSA (1979) concluded that evaluation of the driving force produced by the ground water head indicates it is the controlling factor causing the slide movement.

Nearly all the referenced reports indicate that not only is ground water the controlling factor in initiating slide movement, it is also the only factor that can be reasonably manipulated to minimize slide movement for all areas within the APBL complex. We are in agreement with this conclusion.

3.6 Surface Water

Based on our review of site studies for individual lots, typical lot drainage recommendations is to direct run-off toward the streets through controlled mechanisms such as roof gutters and down spouts. Because of the expansive soils in Zone 2, surface water runoff should be directed away from planned structures to reduce cracking that may occur to foundations and flatwork. This cracking may be misconstrued as a result from the effects of landsliding. Further, because of the underlying geologic conditions beneath the Zone 2 and adjacent areas, it is in the community's best interest to keep ground water low and under control.

Continuing with the above theme, storm water run-off should not be allowed to percolate into the ground in the Zone 2 area through the adoption of common BMP practices. Such local containment of first flush flows and idealized concepts of encouraging recharge of the ground water table in this area can lead to re-activation of the APBL.

3.7 Seismicity, Faulting and Related Effects

3.7.1 Seismicity

The main seismic parameters to be considered when discussing the potential for earthquake-induced damage on the site are the distances to the causative faults, earthquake magnitudes, and expected ground accelerations.

The Palos Verdes Fault is located approximately 4 miles (6.5 km) from the site and is considered to have the most significant effect at the site from a probabilistic design standpoint. The performance of the proposed development of the 47 lots within Zone 2 should be designed in accordance with the city of Palos Verdes and the latest adopted building code requirements. Given the building codes seismic zone construction requirements, no additional recommendations for strong seismic shaking mitigation are needed.

3.7.2 Seismic Design Criteria

Seismic design criteria for should be developed in accordance with the latest adopted California Building Code on a lot by lot basis.

3.7.3 Faulting

The subject site is <u>not</u> located within an Alquist-Priolo Earthquake Fault Zone and there are no known active or potentially active faults onsite. The possibility of damage due to ground rupture from earthquake fault rupture is considered nil since active faults are not known to cross the site.

Secondary effects of seismic shaking resulting from large earthquakes on the major faults in the southern California region, which may affect the site, include soil liquefaction and dynamic settlement. Other secondary seismic effects include shallow ground rupture, and seiches and tsunamis. In general, these secondary effects of seismic shaking are a possibility throughout the Southern California region and are dependant on the distance between the site and causative fault and the onsite geology. The major active fault that could produce these secondary effects is the Palos Verde Fault located approximately 4 miles (6.5 km) from the site. Other faults that may result in shaking to the site include the Newport Inglewood (LA Basin) Fault, Santa Monica Fault, Malibu Coast Fault, and Hollywood Fault among others. The subject site is located in a State of California Seismic Hazard Zone for landslides. Discussions regarding the secondary effects of large earthquake shaking are provided in the following sections.

3.7.4 Shallow Ground Rupture

The subject site may have a potential for shallow ground rupture due to the nearby Palos Verdes Fault and the inherent broken nature of the underlying APBL complex as an earthquake in the local area could result in differential movement along bedding planes and other areas of weakness. However, assessing the risk from this phenomenon is difficult due to the lack of available information and overall knowledge of the hazard. Overall, we do not considered shallow ground rupture to be a significant hazard, although it is a possibility at any site.

3.7.5 Liquefaction

Liquefaction is a seismic phenomenon in which loose, saturated, granular soils behave similarly to a fluid when subject to high-intensity ground shaking. Liquefaction occurs when three general conditions exist: 1) shallow groundwater; 2) low density non-cohesive (granular) soils; and 3) high-intensity ground motion. Liquefaction is typified by a buildup of pore-water pressure in the affected soil layer to a point where a total loss of shear strength occurs, causing the soil to behave as a liquid. Studies indicate that saturated, loose to medium dense, near surface cohesionless soils exhibit the highest liquefaction potential, while dry, dense, cohesionless soils and cohesive soils exhibit low to negligible liquefaction potential. Effects of liquefaction on level ground include potential seismic settlement, and sand boils.

Based on our review of the Seismic Hazard Zone Maps (CGS, 1999a, 1999b) for the Redondo Beach and San Pedro Quadrangles Zone 2 is not located within a Seismic Hazards Zone for Liquefaction. Previous geotechnical studies indicate the site is underlain by the ancient landslide consisting generally of the Altamira Shale with lesser deposits of various surficial soils. The shale is not considered susceptible to liquefaction however the thin surficial soils may be susceptible. Therefore, liquefaction potential on the project site likely varies from very low to nil.

3.7.6 Seismically Induced Settlement

Seismically induced settlements can occur due to liquefaction or within dry and partially saturated cohesionless materials due to densification as a result of ground shaking and redistribution of the soil particles. Uniform seismically induced settlements beneath a structure may cause minimal damage; however, due to variations in soil stratigraphy, soil densities, and confining conditions of the soils, seismic settlement is generally non-uniform (i.e. causes differential settlement) and can cause serious structural damage.

The project site is underlain by ancient landslide material composed of Altamira Shale and locally thin surficial deposits such as non-marine terrace soils and colluvium or alluvium. Based on our review of LME applications and soils reports for the first 16 undeveloped lots completed to date, the foundations for the undeveloped lots will be founded into newly placed fill over landslide soils or directly into the landslide material. Based on those studies, the underlying landslide material would not be prone to dynamic settlements. Due to the minimal thickness of proposed engineered fill beneath foundations, the potential for dynamic settlement is low.

3.7.7 Sand Boils and Ground Fissures

The possible effect of liquefaction on level ground includes surface manifestations such as sand boils, and ground fissures, although liquefaction may occur with no evidence of surface manifestation. During a seismic event, seismically induced excess pore pressures are commonly dissipated by the upward flow of pore water, which produces upward acting forces on soil particles. If the hydraulic gradient reaches a critical value, the vertical effective stress will drop to zero and the soil will be in a quick "liquefied" condition. In these cases the water velocity during a seismic event may be sufficient to carry soil particles to the surface causing sand boils and/or ground fissures.

Due to the lack of loose sandy soils underlying the site and a very low potential for liquefaction, the site is not considered to be susceptible to sand boils and ground fissures.

3.7.8 Lateral Spread

Lateral spread involves the lateral displacement of large surface blocks atop liquefiable soil due to liquefaction of subsurface layers. Lateral spread generally develops on gentle slopes (commonly less than three degrees) that move toward a free face such as a stream or channel. Due to the very low potential for liquefaction, we consider the potential for liquefaction induced lateral spreading at the site to be nil.

3.7.9 Tsunamis and Seiches

Based on the elevation of the proposed development at the site with respect to sea level and the lack of large nearby open bodies of water, the potential of seiche and/or tsunami is considered to be low.

3.7.10 Earthquake Induced Landslides

The project site is located within a Seismic Hazard Zone for earthquake induced landslides (CGS, 2001). Landslides occur when slopes become unstable and masses of earth material move down slope. Landslides are generally rapid events, often triggered during periods of rainfall or by earthquakes. Mudslides and slumps are a more shallow type of slope failure compared to landslides. These typically affect the upper soil horizons, and are commonly not along-bedding bedrock planes. Mudslides and slumps typically occur during or soon after periods of rainfall. Erosion can occur along manufactured slopes that are improperly designed or not adequately vegetated.

The size of a landslide can vary from minor slope scars to hundreds of acres of hillside land movement. The underlying bedrock bedding planes, groundwater level, steepness of a slope, and shear strengths of the soils all contribute to the stability of a hillside. Lateral erosion caused by natural or human-induced modifications to the contour of a hill, which includes grading, have the potential to destabilize a hillside.

As indicated above, the project site is located within a Seismic Hazard Zone for earthquake induced landslides. The project site and offsite areas are within the boundaries of the Ancient Portuguese Bend Landslide, and the site is upslope of the well investigated, studied and mapped ACL and PBL landslides. Depending on the intensity of seismic shaking, seismically-induced landsliding could occur in the subject area if ground shaking is very high. Therefore we conclude that the probability of seismically-induced landslides is at least a moderate risk.

3.8 Expansive Soils

Expansive soils expand with increases in moisture content and shrink with decreases in moisture content. Clayey soils are most susceptible to expansion. Within the Zone 2 area the upper site soils consist of fill, colluvium, and landslide material that contain expansive soils. These upper soils consist of clays, clayey silts, and silty clays which through laboratory testing performed as a part of individual lot investigations (see References) indicate the expansion potential is medium to high. Therefore, foundations for structures constructed on these soils should be designed based on the latest adopted building codes.

3.9 Corrosivity of Soils

A severely corrosive area is when any of the following conditions exist: the soil contains more than 500 ppm of chlorides, more than 2,000 ppm (0.2 percent) of sulfates, a minimum resistivity of less than 1,000 ohm-centimeters, or a pH of 5.5 or less. Based on the reviewed reports, site soils generally have a negligible soluble sulfate content and a potential for minimum resistivity less than 1,000 ohm-centimeters. Site specific testing should be completed on a lot by lot basis and concrete and corrosion design should be performed per the latest adopted building codes and American Concrete Institute (ACI) guidelines.

3.10 Slope Stability Analysis for Zone 2 Area

Geotechnical studies, investigations, and reviews of the APBL, PBL, and ACL have been performed by numerous geotechnical professionals over the years to determine and document the factor of safety of the ancient and active landslides within the subject area. There are many varying opinions regarding the overall stability within Zone 2. These opinions range from the area being at unity, i.e. factor of safety at or just below 1.0, (GeoKinetics, 2007), a factor of safety that is probably greater than 1.0 however is less than 1.5 (Cotton Shires, 2001) to a factor of safety of greater than 1.5 (Leighton, 2001 and 2006).

The primary factors used in determining a factor of safety for a site are: the profile of the ground surface; the geologic structure of the underlying bedrock or soils; the ground water table; and the strength of the soil column, plus the method of analysis. Secondary factors are also considered. For the subject area these include: previous earthwork and redistribution of land mass; erosion along the beach zone and a reduction in support to up-slope areas; and control of run-off and potential infiltration of water into the slide mass through ground fractures and other avenues.

Based on our review there appears to be general agreement in the topography of the area, ground water levels used in the slope stability analyses, the strength of the various soil units, the general location of the various rupture surfaces and the overall structure of site bedrock at depth. There is also general consensus that erosion along the beach zone contributes to instability, that instability generally decreases away from the beach zone and that control of ground water is fundamental for long term stability. Further, there is additional agreement between the various reviewers that any future development that may occur in the area should be bound by a set of conditions that range from becoming a part of the community abatement district to the control of run-off from roofs.

However, the items most in contention did not include the fundamental parameters into which a slope stability analysis is considered. Rather it was the *method* of analysis that created the greatest disparities between various geotechnical firms and reviewers. These methods, coupled with the interpretation of the GPS survey monument data resulted in wild swings between site failure (factor of safety less than 1.0) to a site viewed as grossly stable (factor of safety of 1.5 or greater).

Based on our review and experiences we are of the position that the site slope stability is likely somewhere higher than 1.0, but less than 1.5. This is the position taken by Cotton Shires (2001).

Also based on our review of the referenced documents, we conclude that the development of the 47 undeveloped lots within Zone 2 will not have a negative affect on the overall stability of the ancient or active landslides or the remainder of Zone 2, provided the development of the lots are designed within the guidelines of the conditions of approval and in accordance with the city of Palos Verdes and the latest adopted building codes, and provided additional measures with respect to control of ground water, reduction in infiltration of water and limiting of earth grading are taken into consideration during development.

4.0 CONCLUSIONS AND RECOMMENDATIONS

It is our conclusion that the development of the 47 lots within Zone 2 will not have a negative impact to the gross stability of either Zone 2 or adjacent areas, provided the recommendations of the architectural standards adopted by the Portuguese Bend Community Association and the City's Landslide Moratorium Exception Conditions are implemented into all future design and construction.

Therefore, from a geotechnical perspective, it is our opinion that the future development assumptions for Zone 2 should include at least the following types of considerations prior to grading and construction:

- Conform to the City of Rancho Palos Verdes Landslide Moratorium Ordinance (Rancho Palos Verdes Municipal Code Chapter 15.20).
- Less than 1,000 cubic yards of grading (cut and fill combined) per lot, with no more than 50 cubic yards of imported fill per lot;
- The property should agree to participate in ACLAD and/or other recognized or approved districts whose purpose is to maintain the land in a geologically stable condition. No proposed building activity may cause lessening of stability in the zone.
- Prior to issuance of a building permit, a geotechnical report must be submitted to and approved by the City's geotechnical reviewers indicating what, if any, lot-local and immediately adjacent geologic hazards must be addressed and/or corrected prior to, or during construction. Said report shall specify foundation designs based on field and laboratory studies.
- All houses shall connect to a public sanitary sewer system. Any necessary easements must be provided.
- Storm drainage improvements to reduce lot infiltration of run-off should be designed and approved by the City prior to issuance of building permits.
- All lot drainage deficiencies, if any, identified by the City staff must be corrected. The design of pools, ponds and sumps will be subject to City review and approval.
- Runoff from all buildings and paved areas must be collected and directed to the street or to an approved drainage course as approved by the City Engineer.
- All other relevant building code requirements must be met.

5.0 LIMITATIONS

Our geotechnical/geologic services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can and do occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties.

In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control.

APPENDIX A

References

Geological, Geotechnical and Hydrologic Reports, Correspondence, Memoranda

Bryant, M.E., 1982a, Geomorphology, Neotectonics, and Ages of Marine Terraces, Palos Verdes Peninsula, *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

_______, 1982b, Geology of the Livingston Quarry Area, Rancho Palos Verdes, California *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

California Geological Survey, 1999, Seismic Hazard Zones Map, San Pedro Quadrangle, dated March 25, 1999.

Cotton, Shires & Associates, Inc., 2001, Technical Review of Geologic/Geotechnical Data, Abalone Cove Landslide and Zone 2 Areas, Project No. EC0041, dated September 12, 2001.

_______, 2002a, Technical Review of Geologic/Geotechnical Data, Abalone Cove Landslide and Zone 2 Areas, Project No. EC0041, dated January 14, 2002.

_______, 2002b, Response to Questions Raised by Council Member Douglas Stern, Abalone Cove Zone 2, Rancho Palos Verdes, California, Project No. EC0041, dated January 30, 2002.

Cummings, D., 1997, Statement of Dr. David Cummings, letter of assessment regarding the lifting of the Zone 2 moratorium, dated April 3, 1997.

Ehlig, K.A., and Bean, R.T., 1982, Dewatering of the Abalone Cove Landslide, City of Rancho Palos Verdes, Los Angeles County, California, *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

Ehlig, P.L., 1982a, The Palos Verdes Peninsula: Its Physiography, Land Use and Geologic Setting, *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

_______, 1982b, Mechanics of the Abalone Cove Landslide Including the Role of Ground Water in Landslide Stability and a Model for Development of Large Landslides n the Palos Verdes Hills, *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

_______, 1986, Conditions for Lifting the Moratorium Status Within the Existing Landslide Moratorium Area, Tentative Draft Memorandum, dated November 9, 1986.

APPENDIX A (cont.)

References

______, 1990, Response to Leighton and Associates letter of 1/3/90 titled: "Proposed Geotechnical Standards for Removal of Lands from the Landslide Moratorium Area, Portuguese Bend and Abalone Cove", Memorandum, dated January 8, 1990.

______, 1992, Comments on Slosson memo of 12/21/91 titled: "Status of Work Status", Memorandum, dated February 10, 1992.

______,1993, Memorandum, Suggested Guidelines for Permitting Development in the Moratorium Area, dated May 26, 1993.

Impact Sciences, Inc., 1996a, Relaxation of Development Restrictions in "Area 2" of Abalone Cove Landslide Moratorium Area, Fourth Screencheck Draft, Initial Study, dated January 17, 1996.

______, 1996b, Relaxation of Development Restrictions in "Area 2" of Abalone Cove Landslide Moratorium Area, Third Screencheck Initial Study, dated September 20, 1996.

Kerwin, S.T., 1982, Land Stability in the Klondike Canyon Area, *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

Lass, G.L., and Eagen, J.T., 1982, Introduction to the Ancient Abalone Cove Landslides, *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

Leighton and Associates, Inc., 2001, Supplemental Geotechnical Investigation Point View Parcel, City of Rancho Palos Verdes, California, Project No. 950129-003, dated January 31, 2001.

______, 2006, Global Stability of Certain Residential Lots in the Northerly Portion of Zone 2 within the Ancient Portuguese Bend Landslide Complex, Project No. 601395-001, dated July 6, 2006.

Mann, J.F., 1989, Memorandum, Kelvin Canyon Spring, dated December 1, 1989.

Meehan, M. and Frankian, R.T., 1984, DRAFT, Feasibility of Stabilizing Abalone Cove Landslide, Report of the Technical Panel, dated December 10, 1984.

Neblett & Associates, Inc., Preliminary Geologic and Geotechnical Engineering Report and Grading Plan Review, Point View Development Site – Rancho Palos Verdes, California, Project No. 279-000-03, dated December 29, 2000, Volumes I and II.

References

Novak, G.A., 1982, Mineralogy and Chemistry of Bentonite from the Abalone Cove and Portuguese Bend Landslides, Southern California, *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

Peer Review Group, 2001a, Minutes, Zone II Advisory Committee, dated May 8, 2001.

_______, 2001b, Minutes, Zone II Advisory Committee, dated August 7, 2001.

_______, 2001c, Minutes, Zone II Advisory Committee, dated August 14, 2001.

Rancho Palos Verdes, 2001a, Review of Geologic/Geotechnical Data Zone II, dated April 3, 2001.

_______, 2001b, Status of Review of Geologic and Geotechnical Data for Zone II, dated September 18, 2001.

Ray, M.E., 1982, Geologic Investigation, Grading Stabilization Measures, and Development of the South Shores Landslide, *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

Ray, M.E., and Bishop, K.M., 2001, Zone 2, Peer Review Board Comments on Technical Review Report, Job No. 010025, dated October 17, 2001.

Robert Stone & Associates, Inc., 1979, Final Report, Geotechnical Investigation of Abalone Cove Landslide, Rancho Palos Verdes, Los Angeles County, California, Job No. 1372-00, dated February 28, 1979.

Rowell, H.C., 1982, Chronostratigraphy of the Monterey Formation of the Palos Verdes Hills, *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

South Bay Engineering Corporation, 1982, Report on Methods of Preventing Storm Water Infiltration in Altamira Canyon, Job No. L-1201-1, dated January 29, 1982.

Steiner, E.A., 2004a, The Ancient Portugues Bend Landslide Complex *in* Palos Verdes Peninsula: Fabulous Geology in a Beautiful Setting, Los Angeles Basin Geological Society, Field Trip, dated June 26, 2004.

_______, 2004b, The Portuguese Bend Landslide *in* Palos Verdes Peninsula: Fabulous Geology in a Beautiful Setting, Los Angeles Basin Geological Society, Field Trip, dated June 26, 2004.

References

Stern, D.W., 2001 (?), Questions on September 12, 2001 Zone 2 Report *prepared by* Cotton, Shires & Associates.

Vonder Linden, K., 2001, Building Moratorium in Zone 2, City of Rancho Palos Verdes, Los Angeles County, California, dated October 26, 2001.

Vonder Linden, K., and Lindvall, C.E., 1982, The Portuguese Bend Landslide, *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

TRIAL MATERIAL

GeoKinetics, 2007, Monks vs City of Rancho Palos Verdes, Geokinetics Trial Exhibits, dated January 18, 2007.

Impact Sciences, Inc., 1995, Relaxation of Development Restrictions in "Zone 2" of Abalone Cove Landslide Moratorium Area, dated September 5, 1995, cover page and pages 13 through 16 only.

Ryan, Hunter & Pa'u Court Reproters, 2006, Deposition of: Glenn Tofani, Tuesday, September 26, 2006, 3:03 P.M., Volume 2, Case No. YS010425.

Sarnoff Court Reporters and Legal Technologies, 2006a, Deposition of John H. Foster, Irvine, California, Thursday, May 4, 2006, No. YS010425, YC046655, Job No. 47390.

_______, 2006b, Deposition of Iraj Poormand, Irvine, California, Tuesday, May 9, 2006, No. YC010425; YS04665, Job No. 47391.

_______, 2006b, Deposition of Iraj Poormand, Irvine, California, Wednesday, September 20, 2006, Volume 2, No. YS010425; YC04665, Job No. 53592.

SINGLE FAMILY - LOT REPORTS, ALL LANDSLIDE ZONES

Bauer Property

Los Angeles County, 1969, Geologic Review Sheet, Lot 27, Tract 14500, 60 Narcissa Drive, Palos Verdes, B.W. Pipkin, report dated May 5, 1969, Review Sheet dated May 19, 1969.

APPENDIX A (cont.)

References

Beall Property

T.I.N. Engineering Company, 2002a, Limited Soil Engineering Investigation and Report for Proposed House Additions and House Remodeling at #4 Thyme Place, Rancho Palos Verdes, California, File No. 020746, dated March 25, 2002.

_______, 2002b, Addendum Letter No. 1 – Response to City' Geotechnical Comments, Reference 3, for Proposed House Additions and House Remodeling at #4 Thyme Place, Rancho Palos Verdes, California, File No. 020746, dated July 5, 2002.

_______, 2003, Supplemental Letter No. 1 for Proposed House Additions at #4 Thyme Place, Rancho Palos Verdes, California, File No. 020746, dated March 29, 2003.

Zeiser Kling Consultants, Inc., 2002, City of Rancho Palos Verdes Geotechnical Report Response Checklist, #4 Thyme Place, Rancho Palos Verdes, California, Project No. 97082-698, dated July 19, 2002.

Bishay Property

T.I.N. Engineering Company, 2006, Limited Soil Engineering Investigation and Report for Remedial Repairs of Existing Distressed House at #2 Figtree Road, Rancho Palos Verdes, California, File No. 061411, dated August 12, 2006 (Missing all Plates).

_______, 2008, Limited Soil Opinion Letter for Existing Distressed Residential Building at #2 Figtree Road, Rancho Palos Verdes, California, File No. 061411, dated September 30, 2008.

_______, 2009, Addendum Letter No. 1 – Response to City Geotechnical Comments, dated March 9, 2009, for Proposed Residential Development at #2 Figtree Road, Rancho Palos Verdes, California, File No. 061411, dated March 12, 2009.

Douglas Property

Brian A. Robinson & Associates, Inc., 1999a, Supplemental Geotechnical Letter for a Proposed Addition at 33 Sweet Bay Road, Rancho Palos Verdes, California, 90275, Job Order 02021, dated August 24, 1999.

_______, 1999b, Supplemental Geotechnical Letter (#2) For a Proposed Addition at 33 Sweet Bay Road, Rancho Palos Verdes, California, 90275, Job Order 02021, dated September 20, 1999.

_______, 2000, Field Observation Memo, 33 Sweetbay Road, Rancho Palos Verdes, dated February 9, 2000.

APPENDIX A (cont.)

References

Frank Property

Keene, A.G., Geologic Evaluation #82 Narcissa Drive for Additional Grading, Decking, Foundation Enclosure and Jacuzzi, dated January 14, 1990.

Robert Stone and Associates, Inc., 1988, Geology and Soil Investigation, Proposed Relocation of the Gene Frank Residence, 82 West Narcissa Drive, City of Rancho Palos Verdes, California, Job No. 3829-00, dated February 9, 1988.

Greene Property

Ehlert, K.W., 2001a, Report of Geologic Investigation, Proposed New Residential Construction, #6 Sweetbay Road, Rancho Palos Verdes, California, Project No. 4811-01, dated July 30, 2001.

_______, 2001b, Response to City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, #6 Sweetbay Road, Rancho Palos Verdes, California, Project No. 4811-01R, dated September 7, 2001.

SWN Soiltech Consultants, Inc., 2001, Report of Soils Engineering Investigation Proposed Residential Development 6 Sweetbay Road, Rancho Palos Verdes, California, Project No. 4579-01, dated July 30, 2001.

Zeiser Kling Consultants, Inc., City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, 6 Sweetbay Road, Rancho Palos Verdes, Project No. 97082-602, dated August 29, 2001.

Goodale-Colstad Property

County of Los Anglese, 1968, Geologic Review Sheet, Lot 56, Tract 14500, No. 1 Figtree Road, Palos Verdes, dated July 22, 1968.

Horeczko Property

Rostron, J.T., and Smith C.D., 1976, County of Los Angeles Letter, Lot 36, Tract 14500, Portuguese Bend, dated March 25, 1976.

Horeczko, G., 1976, Letter to Mr. Arthur Keene, County Engineer, dated March 3, 1976.

Kolodge Property

Los Angeles County, 1969, Geologic Review Sheet, 31 Sweetbay Road, Portuguese Bend, Pacific Soils Engineering, dated February 4, 1969, Review Sheet dated May 13, 1969.

APPENDIX A (cont.)

References

Mattis Property

Los Angeles County, 1968a, Portion lots 46 & 47, Tract 14500, #3 Thyme Place, Portuguese Bend, Pacific Soils Engineering, Inc., dated January 2, 1968, Review Sheet dated January 11, 1968.

______, Geologic Review Sheet, 1968b, Portion lots 46 & 47, Tract 14500, #3 Thyme Place, Portuguese Bend, Pacific Soils Engineering, Inc., dated January 2, 1968, Review Sheet dated January 25, 1968.

Mattis, T.J., 1967, Letter to Pacific Soils Engineering, Inc., dated December 28, 1967.

Pacific Soils Engineering, Inc., 1968a, Portion of Lots 46 and 47, Tract No. 14500; located at #3 Thyme Place, Portuguese Bend, California, Work Order 7261, dated January 2, 1968.

______, 1968b, Portion Lots 46 and 47, Tract No. 14500; located at #3 Thyme Place, Portuguese Bend, California, Work Order 7261, dated January 16, 1968.

______, 1968c, Portion of Lots 46 and 47, Tract No. 14500; located at #3 Thyme Place, Portuguese Bend, California, Work Order 7261, dated February 13, 1968.

O'Neill Property

Clute, W.S., 1960a, Geological Report, Property of Henry O'Neill Lot 72, Tract No. 14500, Palos Verdes Hills, Los Angeles County, as of March 1960, dated March 25, 1960.

______, 1960b,Supplemental Letter No. 1 to Accompany: - Geological Report, Property of Henry O'Neill Lot 72, Tract No. 14500, Palos Verdes Hills, Los Angeles County, as of March 1960, dated June 14, 1960.

Paolucci Property

Harrington Geotechnical Engineering, Inc., 2008, Geotechnical Investigation for Design and Construction of Addition to Single-Family Residence at 24 Narcissa Drive, Rancho Palos Verdes, California, Project No. 08-01-2809, dated May 13, 2008, Revised May 15, 2008.

Freeberg/Petak Property

Keith W. Ehlert, 2000, Consulting Engineering Geologist, Report of Geologic and Geotechnical Engineering Investigation, Proposed Residential Improvements #25 Sweetbay Road, Rancho Palos Verdes, California, Project No. 4600-00, dated May 4, 2000.

References

Pipkin, B.W., 1969, Improvements at 25 Sweetbay Road, Portuguese Bend, California, owner: Dr. Dale D. Freeberg, dated July 15, 1969.

SWN Soiltech Consultants, Inc., 2001, Notice of Field Observation, dated October 7, 2001.

Zeiser Kling Consultants, Inc., 2000, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, 25 Sweetbay, Rancho Palos Verdes, California, Project No. 97082-392, dated May 24, 2000.

Rudolfi Property

Pacific Soils Engineering, Inc., Art Studio, 6 Fig Tree Road, Work Order 6717, dated November 16, 1966.

Siegel Property

Dale Hinkle, P.E., Inc., 2002a, Report of Geotechnical Investigation for Proposed Home Remodel and Additions 38 Cinnamon Lane – Rancho Palos Verdes, dated September 5, 2002.

_______, 2002b, Response to City of Rancho Paolos Verdes Review Letter 38 Cinnamon Lane – Rancho Palos Verdes, dated October 15, 2002.

Zeiser Kling Consultants, Inc., 2002, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, 38 Cinnamon Lane, Rancho Palos Verdes, California, Project No. 97082-745, dated September 19, 2002.

Smith Property

Los Angeles County, 1959, Lettergram, Lot 72, Tract No. 14500 (No. 20 Narcissa Drive), Palos Verdes, prepared by Douglas R. Brown, Senior Engineering Geologist, dated January 11, 1959.

Tretheway Property (1 Cinnamon Lane)

RSA Associates, Inc., 1990a, Geological Report of Remedial Work Regarding Re-leveling of House and Garage at the above location prepared by Keene Associates, dated July 8, 1990, Job No. 4558-J24, dated October 12, 1990.

_______, 1990b,

APPENDIX A (cont.)

References

Vanderhoof Property

AGI Geotechnical, Inc., 1994, Foundation Excavation Review, Proposed Addition, 29 Sweetbay Road, Rancho Palos Verdes, California, Project No. 3-1337-00, dated April 11, 1994.

Dale Hinkle, P.E. Inc., 1993, Review of Geotechnical Report dated April 16, 1993 prepared by AGI Geotechnical, 29 Sweetbay Road, dated November 15, 1993.

______, 1994a, Review of Report and Response Letter Prepared by A.G.I. Geotechnical, Inc., Dated April 16, 1993, and December 7, 1993, 29 Sweetbay Road, dated March 11, 1994.

______, 1994b, Review of Geotechnical Reports by AGI Geotechnical, Inc., Dated April 16, 1993 and February 14, 1994, 29 Sweetbay Road, dated March 28, 1994.

MONKS PLAINTIFF'S lOTS – LOT REPORTS, ZONE 2 EXCLUSIVE

Agahee LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Lot 14, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Riding Club Area, Rancho Palos Verdes, California, Work Order 393310-01, dated January 25, 2010.

Coastline Geotechnical Consultants, Inc., 2009a, Geotechnical Engineering Investigation Report Proposed Residential Development, Lot 14, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2786C-099, dated October 16, 2009.

______, 2009b, Correction to Geotechnical Report Proposed Residential Development Lot 14, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2786C-099, dated October 23, 2009.

______, 2010a, Response to Geotechnical Engineering Report Review Checklist from the City of Rancho Palos Verdes, Proposed Residential Development, Lot 14, Block 3, Tract 14195, Cinnamon Lane, Rancho Palos Verdes, California, Project No. 2786C-110, dated January 28, 2010.

______, 2010b, Clarification of Site Development Proposed Residential Development, Lot 14, Block 3, Tract 14195, Cinnamon Lane, Rancho Palos Verdes, California, Project No. 2786C-020, dated February 24, 2010.

Zeiser Kling Consultants, Inc., 2009, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 14, Tract 14195, Cinnamon Lane, Rancho Palos Verdes, California, Project No. 97082-1888, dated November 13, 2009.

References

_______, 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 14, Tract 14195, Cinnamon Lane, Rancho Palos Verdes, California, Project No. 97082-1888, dated February 15, 2010.

_______, 2010b, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 14, Tract 14195, Cinnamon Lane, Rancho Palos Verdes, California, Project No. 97082-1888, dated March 1, 2010.

Barnett LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Lot 14, Block 4, Tract 14195, Fruit Tree Road, Portuguese Bend Riding Club Area, Rancho Palos Verdes, California, Work Order 398610-01, dated February 11, 2010.

Coastline Geotechnical Consultants, Inc., 2009, Geotechnical Engineering Investigation Report Proposed Residential Development, Lot 14, Block 4, Tract 14195, Fruit Tree Road, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2796C-119, dated November 4, 2009.

_______, 2010, Response to Geotechnical Engineering Investigation Report Review Checklist from the City of Rancho Palos Verdes, Proposed Residential Development, Lot 14, Block 4, Tract 14195, Fruit Tree Road, Rancho Palos Verdes, California, Project No. 2796C-020, dated February 20, 2010.

Zeiser Kling Consultants, Inc., 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 14, Tract 14195, Fruit Tree Road, Rancho Palos Verdes, California, Project No. 97082-1915, dated January 29, 2010.

_______, 2010b, City of Rancho Palos Verdes Geotechnical Report Response Checklist, Lot 14, Tract 14195, Fruit Tree Road, Rancho Palos Verdes, California, Project No. 97082-1915, dated February 25, 2010.

Broz LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Lot 4, Block 3, Tract 14195, Narcissa Drive, Portuguese Bend Riding Club Area, Rancho Palos Verdes, California, Work Order 398910-01, dated May 15, 2010.

Coastline Geotechnical Consultants, Inc., 2010a, Geotechnical Engineering Investigation Report Proposed Residential Development, Lot 4, Block 3, Tract 14195, Narcissa Drive, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2816C-119, dated February 17, 2010.

<u>References</u>

_______, 2010, Response to Geotechnical Engineering Investigation Report Review Checklist from the City of Rancho Palos Verdes, Proposed Residential Development, Lot 4, Block 3, Tract 14195, Narcissa Drive, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2816C-050, dated May 18, 2010.

Zeiser Kling Consultants, Inc., 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 4, Narcissa Drive, Rancho Palos Verdes, California, Project No. 97082-1921, dated March 3, 2010.

_______, 2010b, City of Rancho Palos Verdes Geotechnical Report Response Checklist, Lot 16, Narcissa Drive, Rancho Palos Verdes, California, Project No. 97082-1921, dated May 28, 2010.

Case LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Lot 16, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Riding Club Area, Rancho Palos Verdes, California, Work Order 400410-01, dated May 5, 2010.

Coastline Geotechnical Consultants, Inc., 2009, Geotechnical Engineering Investigation Report Proposed Residential Development, Lot16, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2790C-099, dated October 19, 2009.

_______, 2010, Response to Geotechnical Engineering Investigation Report Review Checklist from the City of Rancho Palos Verdes, Proposed Residential Development, Lot16, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2790C-030, dated May 10, 2010.

Zeiser Kling Consultants, Inc., 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 16, Tract 14195, Cinnamon Lane, Rancho Palos Verdes, California, Project No. 97082-1919, dated February 22, 2010.

_______, 2010b, City of Rancho Palos Verdes Geotechnical Report Response Checklist, Lot 16, Tract 14195, Cinnamon Lane, Rancho Palos Verdes, California, Project No. 97082-1919, dated May 20, 2010.

Chung LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Parcel 1 of Parcel Map 8947, Vanderlip Drive, Portuguese Bend Riding Club Area, Rancho Palos Verdes, California, Work Order 393510-01, dated February 24, 2010.

References

Coastline Geotechnical Consultants, Inc., 2010, Geotechnical Engineering Investigation Report Proposed Residential Development, Lot1, Parcel Map as per BK 149, Pg. 53-54 Vanderlip Drive, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2830C-010, dated March 17, 2010.

Zeiser Kling Consultants, Inc., 2010, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 1, Parcel 8947 Vanderlip Drive, Rancho Palos Verdes, California, Project No. 97082-1937, dated April 5, 2010.

Clark LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Lot 17, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Riding Club Area, Rancho Palos Verdes, California, Work Order 397210-01, dated February 24, 2010.

Coastline Geotechnical Consultants, Inc., 2010, Geotechnical Engineering Investigation Report Proposed Residential Development, Lot 17, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2826C-129, dated February 23, 2010.

Zeiser Kling Consultants, Inc., 2010, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 17, Tract 14195, Cinnamon Lane, Rancho Palos Verdes, California, Project No. 97082-1923, dated February 25, 2010.

Compton LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Lot 18, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Riding Club Area, Rancho Palos Verdes, California, Work Order 397210-01, dated March 28, 2010.

Coastline Geotechnical Consultants, Inc., 2010a, Geotechnical Engineering Investigation Report Proposed Residential Development, Lot 18, Tract 14195, Cinnamon Lane, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2820C-129, dated February 18, 2010.

_______, 2010b, Response to Geotechnical Engineering Report Review Checklist from the City of Rancho Palos Verdes, Proposed Residential Development, Lot 18, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2820C-030, dated March 26, 2010.

Zeiser Kling Consultants, Inc., 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 18, Cinnamon Lane, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1924, dated March 10, 2010.

References

______, 2010b, City of Rancho Palos Verdes Geotechnical Report Response Checklist, Lot 18, Cinnamon Lane, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1924, dated April 5, 2010.

Haber LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Lot 22, Block 3, Tract 14195, Plumtree Road, Portuguese Bend Riding Club Area, Rancho Palos Verdes, California, Work Order 399310-01, dated May 3, 2010.

Coastline Geotechnical Consultants, Inc., 2009, Geotechnical Engineering Investigation Report Proposed Residential Development, Lot 22, Tract 14195, Plumbtree Road, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2804C-099, dated December 1, 2009.

______, 2010, Response to Geotechnical Engineering Report Review Checklist from the City of Rancho Palos Verdes, Proposed Residential Development, Lot 22, Block 3, Tract 14195, Plumbtree Road, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2804C-050, dated May 18, 2010.

Zeiser Kling Consultants, Inc., 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 22, Plumbtree Road, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1931, dated March 12, 2010.

______, 2010b, City of Rancho Palos Verdes Geotechnical Report Response Checklist, Lot 22, Plumbtree Road, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1931, dated May 26, 2010.

Kiss LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Lot 9 of Tract 14500, Sweetbay Road, Portuguese Bend Riding Club Area, Rancho Palos Verdes, California, Work Order 393410-01, dated February 11, 2010.

Coastline Geotechnical Consultants, Inc., 2009, Geotechnical Engineering Investigation Report Proposed Residential Development, Lot 9, Tract 14500, Sweetbay Road, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2792C-099, dated November 2, 2009.

______, 2010, Response to Geotechnical Engineering Report Review Checklist from the City of Rancho Palos Verdes, Proposed Residential Development, Lot 9, Tract 14500, Sweetbay Road, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2792C-020, dated February 22, 2010.

APPENDIX A (cont.)

References

Zeiser Kling Consultants, Inc., 2009, City of Rancho Palos Verdes Geotechnical Report Response Checklist, Sweetbay Road, Lot 9, Tract 14500, Rancho Palos Verdes, California, Project No. 97082-1901, dated December 14, 2009.

______, 2010, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Sweetbay Road, Lot 9, Tract 14500, Rancho Palos Verdes, California, Project No. 97082-1901, dated March 2, 2010.

Monks – Lot 20, LME

Coastline Geotechnical Consultants, Inc., 2009, Updated Geotechnical Engineering Report, Lot 20, Block3, Tract 14195, Plumbtree Road, Zone 2, Portuguese Bend Area, Rancho Palos Verdes, California, Project No., 2787C-099, dated September 21, 2009.

Zeiser Kling Consultants, Inc., 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 20, Plumbtree Road, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1927, dated March 10, 2010.

______, 2010b, City of Rancho Palos Verdes Geotechnical Report Response Checklist, Lot 20, Plumbtree Road, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1927, dated April 6, 2010.

Monks - Lot 21 LME

Coastline Geotechnical Consultants, Inc., 2009, Updated Geotechnical Engineering Report, Lot 21, Block3, Tract 14195, Plumbtree Road, Zone 2, Portuguese Bend Area, Rancho Palos Verdes, California, Project No., 2788C-099, dated September 21, 2009.

Zeiser Kling Consultants, Inc., 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 21, Plumbtree Road, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1929, dated March 11, 2010.

______, 2010b, City of Rancho Palos Verdes Geotechnical Report Response Checklist, Lot 21, Plumbtree Road, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1929, dated April 6, 2010.

Monks/Tabor LME

Ehlert, K.W., 2000, Report of Geologic and Geotechnical Engineering Investigation, Proposed Residential Development, Three Undeveloped Lots – Lots 19, 20 and 21, Tract 14195, Narcissa Drive, Rancho Palos Verdes, California, Project No. 4496-00, dated September 12, 2000.

References

Ruth LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Lot 13, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Riding Club Area, Rancho Palos Verdes, Cailfornia, Work Order 399410-01, dated April 28, 2010.

Coastline Geotechnical Consultants, Inc., 2009, Geotechnical Engineering Investigation Report Proposed Residential Development, Lot 13, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2791C-099, dated October 17, 2009.

_______, 2010, Response to Geotechnical Engineering Report Review Checklist from the City of Rancho Palos Verdes, Proposed Residential Development, Lot 13, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Area, Rancho Palos Verdes, California, Project No., 2791C-050, dated May 10, 2010.

Zeiser Kling Consultants, Inc., 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 13 Cinnamon Lane, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1928, dated March 10, 2010.

_______, 2010b, City of Rancho Palos Verdes Geotechnical Report Response Checklist, Lot 13 Cinnamon Lane, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1928, dated May 20, 2010.

Smith LME

Coastline Geotechnical Consultants, Inc., 2009a, Updated Geotechnical Engineering Report, Lot 3, Block 3, Tract 14195, Narcissa Dreive, Zone 2, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2789C-099, dated September 21, 2009.

_______, 2009b, Slope Stability Calculations, Proposed Residential Development, Lot 3, Block 3, Tract 14195, Narcissa Drive, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2789C-099, dated October 23, 2009.

Zeiser Kling Consultants, Inc., 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 3, Narcissa Drive, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-645, dated March 3, 2010.

_______, 2010b, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 3, Narcissa Drive, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-645, dated April 6, 2010.

APPENDIX A (cont.)

References

Stewart LME

Coastline Geotechnical Consultants, Inc., 2009, Geotechnical Engineering Investigation Report, Proposed Residential Development, Lot 7, Block 4, Tract 14195, Fruit Tree Road, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2794C-099, dated November 24, 2009.

Zeiser Kling Consultants, Inc., 2010, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, 7 Fruit Tree Road, Lot7, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1881, dated January 28, 2010.

Tabor LME

Coastline Geotechnical Consultants, Inc., 2009a, Updated Geotechnical Engineering Report Lot 19, Block 3, Tract 14195, Narcissa Drive/Cinnamon Lane, Rancho Palos Verdes, California, Project No. 2785C-099, dated September 18, 2009.

______, 2009b, Response to Geotechnical Engineering Investigation Report Review Checklist from the City of Rancho Palos Verdes, Updated Geotechnical Engineering Report Lot 19, Block 3, Tract 14195, Narcissa Drive/Cinnamon Lane, Rancho Palos Verdes, California, Project No. 2785C-129, dated December 24, 2009.

Zeiser Kling Consultants, Inc., 2009, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, NW Corner Narcissa and Cinnamon, Lot 19, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1881, dated October 30, 2009.

______, 2010, City of Rancho Palos Verdes Geotechnical Report Response Checklist, NW Corner Narcissa and Cinnamon, Lot 19, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1881, dated January 21, 2009.

Teh LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Lot 8 of Tract 14500, Sweetbay Road, Portuguese Bend Riding Club Area, Rancho Palos Verdes, California, W.O. 394510-01, dated February 14, 2010.

Coastline Geotechnical Consultants, Inc., 2009, Geotechnical Engineering Investigation Report Proposed Residential Development Lot 8, Tract 14500, Sweetbay Road Portuguese Bend Area Rancho Palos Verdes, California, Project No. 2793C-099, dated November 3, 2009.

______, 2010, Response to Geotechnical Engineering Report Review, Checklist from the City of Rancho Palos Verdes Proposed Residential Development Lot 8, Tract 14500, Sweetbay Road, Rancho Palos Verdes, California, Project No. 2793C-020, dated February 9, 2010.

References

Zeiser Kling Consultants, Inc., 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Sweetbay Road, Lot 8, Tract 14500, Rancho Palos Verdes, California, Project No. 97082-1907, dated January 4, 2010.

_______, 2010b, City of Rancho Palos Verdes Geotechnical Report Response Checklist, Sweetbay Road, Lot 8, Tract 14500, Rancho Palos Verdes, California, Project No. 97082-1907, dated March 10, 2010.

_______, 2010c, City of Rancho Palos Verdes Geotechnical Report Resonse Checklist, Sweetbay Road, Lot 8, Tract 14500, Rancho Palos Verdes, California, Project No. 97082-1907, dated March 23, 2010.

Geological, Geotechnical and Hydrologic Reports, Correspondence, Memoranda

Bryant, M.E., 1982a, Geomorphology, Neotectonics, and Ages of Marine Terraces, Palos Verdes Peninsula, *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

_______, 1982b, Geology of the Livingston Quarry Area, Rancho Palos Verdes, California *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

California Geological Survey, 1998a, Seismic Hazard Zone Report for the Redondo Beach 7.5-Minute Quadrangle, Los Angeles County, California, SHZR 031, dated 1998.

_______, 1998b, Seismic Hazard Zone Report for the San Pedro 7.5-Minute Quadrangle, Los Angeles County, California, SHZR 033, dated 1998.

_______, 1999a, Seismic Hazard Zones Map, San Pedro Quadrangle, dated March 25, 1999.

_______, 1999b, Seismic Hazard Zones Map, Redondo Beach Quadrangle, dated March 25, 1999.

Cotton, Shires & Associates, Inc., 2001, Technical Review of Geologic/Geotechnical Data, Abalone Cove Landslide and Zone 2 Areas, Project No. EC0041, dated September 12, 2001.

_______, 2002a, Technical Review of Geologic/Geotechnical Data, Abalone Cove Landslide and Zone 2 Areas, Project No. EC0041, dated January 14, 2002.

_______, 2002b, Response to Questions Raised by Council Member Douglas Stern, Abalone Cove Zone 2, Rancho Palos Verdes, California, Project No. EC0041, dated January 30, 2002.

APPENDIX A (cont.)

References

Cummings, D., 1997, Statement of Dr. David Cummings, letter of assessment regarding the lifting of the Zone 2 moratorium, dated April 3, 1997.

Ehlig, K.A., and Bean, R.T., 1982, Dewatering of the Abalone Cove Landslide, City of Rancho Palos Verdes, Los Angeles County, California, *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

Ehlig, P.L., 1982a, The Palos Verdes Peninsula: Its Physiography, Land Use and Geologic Setting, *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

_______, 1982b, Mechanics of the Abalone Cove Landslide Including the Role of Ground Water in Landslide Stability and a Model for Development of Large Landslides n the Palos Verdes Hills, *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

_______, 1986, Conditions for Lifting the Moratorium Status Within the Existing Landslide Moratorium Area, Tentative Draft Memorandum, dated November 9, 1986.

_______, 1990, Resonse to Leighton and Associates letter of 1/3/90 titled: "Proposed Geotechnical Standards for Removal of Lands from the Landslide Moratorium Area, Portuguese Bend and Abalone Cove", Memorandum, dated January 8, 1990.

_______, 1992a, Answers to General Questions Pertaining to the Portuguese Bend Landslide Complex, dated August 14, 1992.

_______, 1992b, Comments on Slosson memo of 12/21/91 titled: "Status of Work Status", Memorandum, dated February 10, 1992.

_______,1993, Memorandum, Suggested Guidelines for Permitting Development in the Moratorium Area, dated May 26, 1993.

Impact Sciences, Inc., 1996a, Relaxation of Development Restrictions in "Area 2" of Abalone Cove Landslide Moratorium Area, Fourth Screencheck Draft, Initial Study, dated January 17, 1996.

_______, 1996b, Relaxation of Development Restrictions in "Area 2" of Abalone Cove Landslide Moratorium Area, Third Screencheck Initial Study, dated September 20, 1996.

APPENDIX A (cont.)

References

Kerwin, S.T., 1982, Land Stability in the Klondike Canyon Area, *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

Lass, G.L., and Eagen, J.T., 1982, Introduction to the Ancient Abalone Cove Landslides, *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

Leighton and Associates, Inc., 2001, Supplemental Geotechnical Investigation Point View Parcel, City of Rancho Palos Verdes, California, Project No. 950129-003, dated January 31, 2001.

_______, 2006, Global Stability of Certain Residential Lots in the Northerly Portion of Zone 2 within the Ancient Portuguese Bend Landslide Complex, Project No. 601395-001, dated July 6, 2006.

Mann, J.F., 1989, Memorandum, Kelvin Canyon Spring, dated December 1, 1989.

Meehan, M. and Frankian, R.T., 1984, DRAFT, Feasibility of Stabilizing Abalone Cove Landslide, Report of the Technical Panel, dated December 10, 1984.

Neblett & Associates, Inc., Preliminary Geologic and Geotechnical Engineering Report and Grading Plan Review, Point View Development Site – Rancho Palos Verdes, California, Project No. 279-000-03, dated December 29, 2000, Volumes I and II.

Novak, G.A., 1982, Mineralogy and Chemistry of Bentonite from the Abalone Cove and Portuguese Bend Landslides, Southern California, *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

Peer Review Group, 2001a, Minutes, Zone II Advisory Committee, dated May 8, 2001.

_______, 2001b, Minutes, Zone II Advisory Committee, dated August 7, 2001.

_______, 2001c, Minutes, Zone II Advisory Committee, dated August 14, 2001.

Rancho Palos Verdes, 2001a, Review of Geologic/Geotechnical Data Zone II, dated April 3, 2001.

_______, 2001b, Status of Review of Geologic and Geotechnical Data for Zone II, dated September 18, 2001.

APPENDIX A (cont.)

References

Ray, M.E., 1982, Geologic Investigation, Grading Stabilization Measures, and Development of the South Shores Landslide, *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

Ray, M.E., and Bishop, K.M., 2001, Zone 2, Peer Review Board Comments on Technical Review Report, Job No. 010025, dated October 17, 2001.

Robert Stone & Associates, Inc., 1979, Final Report, Geotechnical Investigation of Abalone Cove Landslide, Rancho Palos Verdes, Los Angeles County, California, Job No. 1372-00, dated February 28, 1979.

Rowell, H.C., 1982, Chronostratigraphy of the Monterey Formation of the Palos Verdes Hills, *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

South Bay Engineering Corporation, 1982, Report on Methods of Preventing Storm Water Infiltration in Altamira Canyon, Job No. L-1201-1, dated January 29, 1982.

Steiner, E.A., 2004a, The Ancient Portugues Bend Landslide Complex *in* Palos Verdes Peninsula: Fabulous Geology in a Beautiful Setting, Los Angeles Basin Geological Society, Field Trip, dated June 26, 2004.

_______, 2004b, The Portuguese Bend Landslide *in* Palos Verdes Peninsula: Fabulous Geology in a Beautiful Setting, Los Angeles Basin Geological Society, Field Trip, dated June 26, 2004.

Stern, D.W., 2001 (?), Questions on September 12, 2001 Zone 2 Report *prepared by* Cotton, Shires & Associates.

Vonder Linden, K., 2001, Building Moratorium in Zone 2, City of Rancho Palos Verdes, Los Angeles County, California, dated October 26, 2001.

Vonder Linden, K., and Lindvall, C.E., 1982, The Portuguese Bend Landslide, *in* Landslides and Landslide Abatement, Palos Verdes Peninsula, Southern California, Geological Society of America, Guidebook and Volume, dated 1982.

TRIAL MATERIAL

GeoKinetics, 2007, Monks vs City of Rancho Palos Verdes, Geokinetics Trial Exhibits, dated January 18, 2007.

References

Impact Sciences, Inc., 1995, Relaxation of Development Restrictions in "Zone 2" of Abalone Cove Landslide Moratorium Area, dated September 5, 1995, cover page and pages 13 through 16 only.

Ryan, Hunter & Pa'u Court Reproters, 2006, Deposition of: Glenn Tofani, Tuesday, September 26, 2006, 3:03 P.M., Volume 2, Case No. YS010425.

Sarnoff Court Reporters and Legal Technologies, 2006a, Deposition of John H. Foster, Irvine, California, Thursday, May 4, 2006, No. YS010425, YC046655, Job No. 47390.

______, 2006b, Deposition of Iraj Poormand, Irvine, California, Tuesday, May 9, 2006, No. YC010425; YS04665, Job No. 47391.

______, 2006b, Deposition of Iraj Poormand, Irvine, California, Wednesday, September 20, 2006, Volume 2, No. YS010425; YC04665, Job No. 53592.

SINGLE FAMILY - LOT REPORTS, ALL LANDSLIDE ZONES

Bauer Property

Los Angeles County, 1969, Geologic Review Sheet, Lot 27, Tract 14500, 60 Narcissa Drive, Palos Verdes, B.W. Pipkin, report dated May 5, 1969, Review Sheet dated May 19, 1969.

Beall Property

T.I.N. Engineering Company, 2002a, Limited Soil Engineering Investigation and Report for Proposed House Additions and House Remodeling at #4 Thyme Place, Rancho Palos Verdes, California, File No. 020746, dated March 25, 2002.

______, 2002b, Addendum Letter No. 1 – Response to City' Geotechnical Comments, Reference 3, for Proposed House Additions and House Remodeling at #4 Thyme Place, Rancho Palos Verdes, California, File No. 020746, dated July 5, 2002.

______, 2003, Supplemental Letter No. 1 for Proposed House Additions at #4 Thyme Place, Rancho Palos Verdes, California, File No. 020746, dated March 29, 2003.

Zeiser Kling Consultants, Inc., 2002, City of Rancho Palos Verdes Geotechnical Report Response Checklist, #4 Thyme Place, Rancho Palos Verdes, California, Project No. 97082-698, dated July 19, 2002.

APPENDIX A (cont.)

References

Bishay Property

T.I.N. Engineering Company, 2006, Limited Soil Engineering Investigation and Report for Remedial Repairs of Existing Distressed House at #2 Figtree Road, Rancho Palos Verdes, California, File No. 061411, dated August 12, 2006 (Missing all Plates).

_______, 2008, Limited Soil Opinion Letter for Existing Distressed Residential Building at #2 Figtree Road, Rancho Palos Verdes, California, File No. 061411, dated September 30, 2008.

_______, 2009, Addendum Letter No. 1 – Response to City Geotechnical Comments, dated March 9, 2009, for Proposed Residential Development at #2 Figtree Road, Rancho Palos Verdes, California, File No. 061411, dated March 12, 2009.

Douglas Property

Brian A. Robinson & Associates, Inc., 1999a, Supplemental Geotechnical Letter for a Proposed Addition at 33 Sweet Bay Road, Rancho Palos Verdes, California, 90275, Job Order 02021, dated August 24, 1999.

_______, 1999b, Supplemental Geotechnical Letter (#2) For a Proposed Addition at 33 Sweet Bay Road, Rancho Palos Verdes, California, 90275, Job Order 02021, dated September 20, 1999.

_______, 2000, Field Observation Memo, 33 Sweetbay Road, Rancho Palos Verdes, dated February 9, 2000.

Frank Property

Keene, A.G., Geologic Evaluation #82 Narcissa Drive for Additional Grading, Decking, Foundation Enclosure and Jacuzzi, dated January 14, 1990.

Robert Stone and Associates, Inc., 1988, Geology and Soil Investigation, Proposed Relocation of the Gene Frank Residence, 82 West Narcissa Drive, City of Rancho Palos Verdes, California, Job No. 3829-00, dated February 9, 1988.

Greene Property

Ehlert, K.W., 2001a, Report of Geologic Investigation, Proposed New Residential Construction, #6 Sweetbay Road, Rancho Palos Verdes, California, Project No. 4811-01, dated July 30, 2001.

_______, 2001b, Response to City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, #6 Sweetbay Road, Rancho Palos Verdes, California, Project No. 4811-01R, dated September 7, 2001.

APPENDIX A (cont.)

References

SWN Soiltech Consultants, Inc., 2001, Report of Soils Engineering Investigation Proposed Residential Development 6 Sweetbay Road, Rancho Palos Verdes, California, Project No. 4579-01, dated July 30, 2001.

Zeiser Kling Consultants, Inc., City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, 6 Sweetbay Road, Rancho Palos Verdes, Project No. 97082-602, dated August 29, 2001.

Goodale-Colstad Property

County of Los Anglese, 1968, Geologic Review Sheet, Lot 56, Tract 14500, No. 1 Figtree Road, Palos Verdes, dated July 22, 1968.

Horeczko Property

Rostron, J.T., and Smith C.D., 1976, County of Los Angeles Letter, Lot 36, Tract 14500, Portuguese Bend, dated March 25, 1976.

Horeczko, G., 1976, Letter to Mr. Arthur Keene, County Engineer, dated March 3, 1976.

Kolodge Property

Los Angeles County, 1969, Geologic Review Sheet, 31 Sweetbay Road, Portuguese Bend, Pacific Soils Engineering, dated February 4, 1969, Review Sheet dated May 13, 1969.

Mattis Property

Los Angeles County, 1968a, Portion lots 46 & 47, Tract 14500, #3 Thyme Place, Portuguese Bend, Pacific Soils Engineering, Inc., dated January 2, 1968, Review Sheet dated January 11, 1968.

_______, Geologic Review Sheet, 1968b, Portion lots 46 & 47, Tract 14500, #3 Thyme Place, Portuguese Bend, Pacific Soils Engineering, Inc., dated January 2, 1968, Review Sheet dated January 25, 1968.

Mattis, T.J., 1967, Letter to Pacific Soils Engineering, Inc., dated December 28, 1967.

Pacific Soils Engineering, Inc., 1968a, Portion of Lots 46 and 47, Tract No. 14500; located at #3 Thyme Place, Portuguese Bend, California, Work Order 7261, dated January 2, 1968.

_______, 1968b, Portion Lots 46 and 47, Tract No. 14500; located at #3 Thyme Place, Portuguese Bend, California, Work Order 7261, dated January 16, 1968.

References

______, 1968c, Portion of Lots 46 and 47, Tract No. 14500; located at #3 Thyme Place, Portuguese Bend, California, Work Order 7261, dated February 13, 1968.

O'Neill Property

Clute, W.S., 1960a, Geological Report, Property of Henry O'Neill Lot 72, Tract No. 14500, Palos Verdes Hills, Los Angeles County, as of March 1960, dated March 25, 1960.

______, 1960b,Supplemental Letter No. 1 to Accompany: - Geological Report, Property of Henry O'Neill Lot 72, Tract No. 14500, Palos Verdes Hills, Los Angeles County, as of March 1960, dated June 14, 1960.

Paolucci Property

Harrington Geotechnical Engineering, Inc., 2008, Geotechnical Investigation for Design and Construction of Addition to Single-Family Residence at 24 Narcissa Drive, Rancho Palos Verdes, California, Project No. 08-01-2809, dated May 13, 2008, Revised May 15, 2008.

Freeberg/Petak Property

Keith W. Ehlert, 2000, Consulting Engineering Geologist, Report of Geologic and Geotechnical Engineering Investigation, Proposed Residential Improvements #25 Sweetbay Road, Rancho Palos Verdes, California, Project No. 4600-00, dated May 4, 2000.

Pipkin, B.W., 1969, Improvements at 25 Sweetbay Road, Portuguese Bend, California, owner: Dr. Dale D. Freeberg, dated July 15, 1969.

SWN Soiltech Consultants, Inc., 2001, Notice of Field Observation, dated October 7, 2001.

Zeiser Kling Consultants, Inc., 2000, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, 25 Sweetbay, Rancho Palos Verdes, California, Project No. 97082-392, dated May 24, 2000.

Rudolfi Property

Pacific Soils Engineering, Inc., Art Studio, 6 Fig Tree Road, Work Order 6717, dated November 16, 1966.

Siegel Property

Dale Hinkle, P.E., Inc., 2002a, Report of Geotechnical Investigation for Proposed Home Remodel and Additions 38 Cinnamon Lane – Rancho Palos Verdes, dated September 5, 2002.

References

______, 2002b, Response to City of Rancho Paolos Verdes Review Letter 38 Cinnamon Lane – Rancho Palos Verdes, dated October 15, 2002.

Zeiser Kling Consultants, Inc., 2002, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, 38 Cinnamon Lane, Rancho Palos Verdes, California, Project No. 97082-745, dated September 19, 2002.

Smith Property

Los Angeles County, 1959, Lettergram, Lot 72, Tract No. 14500 (No. 20 Narcissa Drive), Palos Verdes, prepared by Douglas R. Brown, Senior Engineering Geologist, dated January 11, 1959.

Tretheway Property (1 Cinnamon Lane)

RSA Associates, Inc., 1990a, Geological Report of Remedial Work Regarding Re-leveling of House and Garage at the above location prepared by Keene Associates, dated July 8, 1990, Job No. 4558-J24, dated October 12, 1990.

______, 1990b,

Vanderhoof Property

AGI Geotechnical, Inc., 1994, Foundation Excavation Review, Proposed Addition, 29 Sweetbay Road, Rancho Palos Verdes, California, Project No. 3-1337-00, dated April 11, 1994.

Dale Hinkle, P.E. Inc., 1993, Review of Geotechnical Report dated April 16, 1993 prepared by AGI Geotechnical, 29 Sweetbay Road, dated November 15, 1993.

______, 1994a, Review of Report and Response Letter Prepared by A.G.I. Geotechnical, Inc., Dated April 16, 1993, and December 7, 1993, 29 Sweetbay Road, dated March 11, 1994.

______, 1994b, Review of Geotechnical Reports by AGI Geotechnical, Inc., Dated April 16, 1993 and February 14, 1994, 29 Sweetbay Road, dated March 28, 1994.

MONKS PLAINTIFF'S lOTS – LOT REPORTS, ZONE 2 EXCLUSIVE

Agahee LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Lot 14, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Riding Club Area, Rancho Palos Verdes, California, Work Order 393310-01, dated January 25, 2010.

APPENDIX A (cont.)

References

Coastline Geotechnical Consultants, Inc., 2009a, Geotechnical Engineering Investigation Report Proposed Residential Development, Lot 14, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2786C-099, dated October 16, 2009.

_______, 2009b, Correction to Geotechnical Report Proposed Residential Development Lot 14, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2786C-099, dated October 23, 2009.

_______, 2010a, Response to Geotechnical Engineering Report Review Checklist from the City of Rancho Palos Verdes, Proposed Residential Development, Lot 14, Block 3, Tract 14195, Cinnamon Lane, Rancho Palos Verdes, California, Project No. 2786C-110, dated January 28, 2010.

_______, 2010b, Clarification of Site Development Proposed Residential Development, Lot 14, Block 3, Tract 14195, Cinnamon Lane, Rancho Palos Verdes, California, Project No. 2786C-020, dated February 24, 2010.

Zeiser Kling Consultants, Inc., 2009, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 14, Tract 14195, Cinnamon Lane, Rancho Palos Verdes, California, Project No. 97082-1888, dated November 13, 2009.

_______, 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 14, Tract 14195, Cinnamon Lane, Rancho Palos Verdes, California, Project No. 97082-1888, dated February 15, 2010.

_______, 2010b, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 14, Tract 14195, Cinnamon Lane, Rancho Palos Verdes, California, Project No. 97082-1888, dated March 1, 2010.

Barnett LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Lot 14, Block 4, Tract 14195, Fruit Tree Road, Portuguese Bend Riding Club Area, Rancho Palos Verdes, California, Work Order 398610-01, dated February 11, 2010.

Coastline Geotechnical Consultants, Inc., 2009, Geotechnical Engineering Investigation Report Proposed Residential Development, Lot 14, Block 4, Tract 14195, Fruit Tree Road, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2796C-119, dated November 4, 2009.

References

______, 2010, Response to Geotechnical Engineering Investigation Report Review Checklist from the City of Rancho Palos Verdes, Proposed Residential Development, Lot 14, Block 4, Tract 14195, Fruit Tree Road, Rancho Palos Verdes, California, Project No. 2796C-020, dated February 20, 2010.

Zeiser Kling Consultants, Inc., 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 14, Tract 14195, Fruit Tree Road, Rancho Palos Verdes, California, Project No. 97082-1915, dated January 29, 2010.

______, 2010b, City of Rancho Palos Verdes Geotechnical Report Response Checklist, Lot 14, Tract 14195, Fruit Tree Road, Rancho Palos Verdes, California, Project No. 97082-1915, dated February 25, 2010.

Broz LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Lot 4, Block 3, Tract 14195, Narcissa Drive, Portuguese Bend Riding Club Area, Rancho Palos Verdes, California, Work Order 398910-01, dated May 15, 2010.

Coastline Geotechnical Consultants, Inc., 2010a, Geotechnical Engineering Investigation Report Proposed Residential Development, Lot 4, Block 3, Tract 14195, Narcissa Drive, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2816C-119, dated February 17, 2010.

______, 2010, Response to Geotechnical Engineering Investigation Report Review Checklist from the City of Rancho Palos Verdes, Proposed Residential Development, Lot 4, Block 3, Tract 14195, Narcissa Drive, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2816C-050, dated May 18, 2010.

Zeiser Kling Consultants, Inc., 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 4, Narcissa Drive, Rancho Palos Verdes, California, Project No. 97082-1921, dated March 3, 2010.

______, 2010b, City of Rancho Palos Verdes Geotechnical Report Response Checklist, Lot 16, Narcissa Drive, Rancho Palos Verdes, California, Project No. 97082-1921, dated May 28, 2010.

Case LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Lot 16, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Riding Club Area, Rancho Palos Verdes, California, Work Order 400410-01, dated May 5, 2010.

APPENDIX A (cont.)

<u>References</u>

Coastline Geotechnical Consultants, Inc., 2009, Geotechnical Engineering Investigation Report Proposed Residential Development, Lot16, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2790C-099, dated October 19, 2009.

_______, 2010, Response to Geotechnical Engineering Investigation Report Review Checklist from the City of Rancho Palos Verdes, Proposed Residential Development, Lot16, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2790C-030, dated May 10, 2010.

Zeiser Kling Consultants, Inc., 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 16, Tract 14195, Cinnamon Lane, Rancho Palos Verdes, California, Project No. 97082-1919, dated February 22, 2010.

_______, 2010b, City of Rancho Palos Verdes Geotechnical Report Response Checklist, Lot 16, Tract 14195, Cinnamon Lane, Rancho Palos Verdes, California, Project No. 97082-1919, dated May 20, 2010.

Chung LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Parcel 1 of Parcel Map 8947, Vanderlip Drive, Portuguese Bend Riding Club Area, Rancho Palos Verdes, California, Work Order 393510-01, dated February 24, 2010.

Coastline Geotechnical Consultants, Inc., 2010, Geotechnical Engineering Investigation Report Proposed Residential Development, Lot1, Parcel Map as per BK 149, Pg. 53-54 Vanderlip Drive, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2830C-010, dated March 17, 2010.

Zeiser Kling Consultants, Inc., 2010, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 1, Parcel 8947 Vanderlip Drive, Rancho Palos Verdes, California, Project No. 97082-1937, dated April 5, 2010.

Clark LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Lot 17, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Riding Club Area, Rancho Palos Verdes, California, Work Order 397210-01, dated February 24, 2010.

Coastline Geotechnical Consultants, Inc., 2010, Geotechnical Engineering Investigation Report Proposed Residential Development, Lot 17, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2826C-129, dated February 23, 2010.

References

Zeiser Kling Consultants, Inc., 2010, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 17, Tract 14195, Cinnamon Lane, Rancho Palos Verdes, California, Project No. 97082-1923, dated February 25, 2010.

Compton LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Lot 18, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Riding Club Area, Rancho Palos Verdes, California, Work Order 397210-01, dated March 28, 2010.

Coastline Geotechnical Consultants, Inc., 2010a, Geotechnical Engineering Investigation Report Proposed Residential Development, Lot 18, Tract 14195, Cinnamon Lane, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2820C-129, dated February 18, 2010.

_______, 2010b, Response to Geotechnical Engineering Report Review Checklist from the City of Rancho Palos Verdes, Proposed Residential Development, Lot 18, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2820C-030, dated March 26, 2010.

Zeiser Kling Consultants, Inc., 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 18, Cinnamon Lane, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1924, dated March 10, 2010.

_______, 2010b, City of Rancho Palos Verdes Geotechnical Report Response Checklist, Lot 18, Cinnamon Lane, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1924, dated April 5, 2010.

Haber LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Lot 22, Block 3, Tract 14195, Plumtree Road, Portuguese Bend Riding Club Area, Rancho Palos Verdes, California, Work Order 399310-01, dated May 3, 2010.

Coastline Geotechnical Consultants, Inc., 2009, Geotechnical Engineering Investigation Report Proposed Residential Development, Lot 22, Tract 14195, Plumbtree Road, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2804C-099, dated December 1, 2009.

_______, 2010, Response to Geotechnical Engineering Report Review Checklist from the City of Rancho Palos Verdes, Proposed Residential Development, Lot 22, Block 3, Tract 14195, Plumbtree Road, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2804C-050, dated May 18, 2010.

References

Zeiser Kling Consultants, Inc., 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 22, Plumbtree Road, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1931, dated March 12, 2010.

______, 2010b, City of Rancho Palos Verdes Geotechnical Report Response Checklist, Lot 22, Plumbtree Road, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1931, dated May 26, 2010.

Kiss LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Lot 9 of Tract 14500, Sweetbay Road, Portuguese Bend Riding Club Area, Rancho Palos Verdes, California, Work Order 393410-01, dated February 11, 2010.

Coastline Geotechnical Consultants, Inc., 2009, Geotechnical Engineering Investigation Report Proposed Residential Development, Lot 9, Tract 14500, Sweetbay Road, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2792C-099, dated November 2, 2009.

______, 2010, Response to Geotechnical Engineering Report Review Checklist from the City of Rancho Palos Verdes, Proposed Residential Development, Lot 9, Tract 14500, Sweetbay Road, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2792C-020, dated February 22, 2010.

Zeiser Kling Consultants, Inc., 2009, City of Rancho Palos Verdes Geotechnical Report Response Checklist, Sweetbay Road, Lot 9, Tract 14500, Rancho Palos Verdes, California, Project No. 97082-1901, dated December 14, 2009.

______, 2010, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Sweetbay Road, Lot 9, Tract 14500, Rancho Palos Verdes, California, Project No. 97082-1901, dated March 2, 2010.

Monks – Lot 20, LME

Coastline Geotechnical Consultants, Inc., 2009, Updated Geotechnical Engineering Report, Lot 20, Block3, Tract 14195, Plumbtree Road, Zone 2, Portuguese Bend Area, Rancho Palos Verdes, California, Project No., 2787C-099, dated September 21, 2009.

Zeiser Kling Consultants, Inc., 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 20, Plumbtree Road, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1927, dated March 10, 2010.

References

______, 2010b, City of Rancho Palos Verdes Geotechnical Report Response Checklist, Lot 20, Plumbtree Road, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1927, dated April 6, 2010.

Monks - Lot 21 LME

Coastline Geotechnical Consultants, Inc., 2009, Updated Geotechnical Engineering Report, Lot 21, Block3, Tract 14195, Plumbtree Road, Zone 2, Portuguese Bend Area, Rancho Palos Verdes, California, Project No., 2788C-099, dated September 21, 2009.

Zeiser Kling Consultants, Inc., 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 21, Plumbtree Road, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1929, dated March 11, 2010.

______, 2010b, City of Rancho Palos Verdes Geotechnical Report Response Checklist, Lot 21, Plumbtree Road, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1929, dated April 6, 2010.

Monks/Tabor LME

Ehlert, K.W., 2000, Report of Geologic and Geotechnical Engineering Investigation, Proposed Residential Development, Three Undeveloped Lots – Lots 19, 20 and 21, Tract 14195, Narcissa Drive, Rancho Palos Verdes, California, Project No. 4496-00, dated September 12, 2000.

Ruth LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Lot 13, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Riding Club Area, Rancho Palos Verdes, Cailfornia, Work Order 399410-01, dated April 28, 2010.

Coastline Geotechnical Consultants, Inc., 2009, Geotechnical Engineering Investigation Report Proposed Residential Development, Lot 13, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2791C-099, dated October 17, 2009.

______, 2010, Response to Geotechnical Engineering Report Review Checklist from the City of Rancho Palos Verdes, Proposed Residential Development, Lot 13, Block 3, Tract 14195, Cinnamon Lane, Portuguese Bend Area, Rancho Palos Verdes, California, Project No., 2791C-050, dated May 10, 2010.

References

Zeiser Kling Consultants, Inc., 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 13 Cinnamon Lane, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1928, dated March 10, 2010.

_______, 2010b, City of Rancho Palos Verdes Geotechnical Report Response Checklist, Lot 13 Cinnamon Lane, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1928, dated May 20, 2010.

Smith LME

Coastline Geotechnical Consultants, Inc., 2009a, Updated Geotechnical Engineering Report, Lot 3, Block 3, Tract 14195, Narcissa Dreive, Zone 2, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2789C-099, dated September 21, 2009.

_______, 2009b, Slope Stability Calculations, Proposed Residential Development, Lot 3, Block 3, Tract 14195, Narcissa Drive, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2789C-099, dated October 23, 2009.

Zeiser Kling Consultants, Inc., 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 3, Narcissa Drive, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-645, dated March 3, 2010.

_______, 2010b, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Lot 3, Narcissa Drive, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-645, dated April 6, 2010.

Stewart LME

Coastline Geotechnical Consultants, Inc., 2009, Geotechnical Engineering Investigation Report, Proposed Residential Development, Lot 7, Block 4, Tract 14195, Fruit Tree Road, Portuguese Bend Area, Rancho Palos Verdes, California, Project No. 2794C-099, dated November 24, 2009.

Zeiser Kling Consultants, Inc., 2010, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, 7 Fruit Tree Road, Lot7, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1881, dated January 28, 2010.

Tabor LME

Coastline Geotechnical Consultants, Inc., 2009a, Updated Geotechnical Engineering Report Lot 19, Block 3, Tract 14195, Narcissa Drive/Cinnamon Lane, Rancho Palos Verdes, California, Project No. 2785C-099, dated September 18, 2009.

References

_______, 2009b, Response to Geotechnical Engineering Investigation Report Review Checklist from the City of Rancho Palos Verdes, Updated Geotechnical Engineering Report Lot 19, Block 3, Tract 14195, Narcissa Drive/Cinnamon Lane, Rancho Palos Verdes, California, Project No. 2785C-129, dated December 24, 2009.

Zeiser Kling Consultants, Inc., 2009, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, NW Corner Narcissa and Cinnamon, Lot 19, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1881, dated October 30, 2009.

_______, 2010, City of Rancho Palos Verdes Geotechnical Report Response Checklist, NW Corner Narcissa and Cinnamon, Lot 19, Tract 14195, Rancho Palos Verdes, California, Project No. 97082-1881, dated January 21, 2009.

Teh LME

Coast Geotechnical, Inc., 2010, Limited Geologic Investigation of Proposed Residence, Lot 8 of Tract 14500, Sweetbay Road, Portuguese Bend Riding Club Area, Rancho Palos Verdes, California, W.O. 394510-01, dated February 14, 2010.

Coastline Geotechnical Consultants, Inc., 2009, Geotechnical Engineering Investigation Report Proposed Residential Development Lot 8, Tract 14500, Sweetbay Road Portuguese Bend Area Rancho Palos Verdes, California, Project No. 2793C-099, dated November 3, 2009.

_______, 2010, Response to Geotechnical Engineering Report Review, Checklist from the City of Rancho Palos Verdes Proposed Residential Development Lot 8, Tract 14500, Sweetbay Road, Rancho Palos Verdes, California, Project No. 2793C-020, dated February 9, 2010.

Zeiser Kling Consultants, Inc., 2010a, City of Rancho Palos Verdes Geotechnical Investigation Report Review Checklist, Sweetbay Road, Lot 8, Tract 14500, Rancho Palos Verdes, California, Project No. 97082-1907, dated January 4, 2010.

_______, 2010b, City of Rancho Palos Verdes Geotechnical Report Response Checklist, Sweetbay Road, Lot 8, Tract 14500, Rancho Palos Verdes, California, Project No. 97082-1907, dated March 10, 2010.

_______, 2010c, City of Rancho Palos Verdes Geotechnical Report Resonse Checklist, Sweetbay Road, Lot 8, Tract 14500, Rancho Palos Verdes, California, Project No. 97082-1907, dated March 23, 2010.