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Ref: 00000-5004

July 23, 2013

VIA E-MAIL AND COURIER

The Honorable Herb Wesson, President
Members of the Los Angeles City Council
c/o: Office of the City Clerk
200 N. Spring Street
City Hall, Room 395
Los Angeles, CA 90012

Re: Millennium Hollywood Project
CPC-2008-3440-AC-CUB-CU-AV-HD; CPC-2013-103-DA
VTT-71837; ENV-2011-0675-EIR
Council File No. 13-0593-S1
Hearing Date: Wednesday, July 24, 2013, Item No. 21

Subject: Seismic Fault Study Review

Dear President Wesson and Members of the City Council:

This office represents HEI/GC Hollywood & Vine Condominiums, LLC and the Hollywood & Vine Residences Association, the owner and homeowners association, respectively, of the W Hollywood Hotel & Residences at 6250 Hollywood Boulevard, Los Angeles, California 90028, and we submit this letter on their behalf. At the Planning and Land Use Management Committee hearing of June 18, 2013, substantial testimony was submitted by others questioning the accuracy of the seismic fault study, and in particular challenging the location of an active fault line as depicted in the project Environmental Impact Report.

Hence, our client retained the services of a licensed engineering geologist to review this issue. Attached is his report. The report concludes that there is "a high probability" that a seismic fault runs through the Millennium Project Site.

As such, on behalf of our client, and in accordance with our expert's recommendations, we request that prior to project approval, further study be done in order to preclude the presence of active faults below the Millennium Project site.

Very truly yours,

KEVIN K. MCDONNELL of
Jeffer Mangels Butler & Mitchell LLP

KKM:kkm
Enclosures
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Jeffer, Mangels, Butler and Mitchell LLP
1900 Avenue of the Stars, 7th Floor
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July 22, 2013

Attention: Mr. Kevin McDonnell

SUBJECT: **Review of Fault Investigation Report for the "Hollywood Millennium" Project; North Vine Street, South of Yucca Street; prepared by Langan Engineering and Environmental Services, dated November 30, 2012**

Introduction

At the request of Mr. Kevin McDonnell of Jeffer, Mangels, Butler and Mitchell LLP, Southwestern Engineering Geology has completed a review of a fault investigation report prepared in support of a development project proposed on either side of Vine Street, just south of Yucca Street in the Hollywood area of the City of Los Angeles, California. The development is known as the "Hollywood Millennium Project". The November 30 fault study (Langan, 2012 b) was prepared by Langan Engineering and Environmental Services (Langan) as a follow-up to a geotechnical report prepared for the project in May of 2012 by the same firm (Langan 2012a). We understand that you have requested this review as an interested party for an independent assessment of the adequacy of the fault study to address the potential for future fault rupture below the proposed development.

The undersigned geologist has been practicing as an engineering geologist in southern California for over thirty years, and has been a licensed Professional Geologist and a Certified Engineering Geologist since 1987. A resume is attached.

This letter is organized in four parts. The Introduction outlines our intent and scope of work, and provides brief site and project descriptions. The introduction is followed by a brief history of the evolution of our understanding of the Hollywood fault, a technical review of the investigations completed at the Millennium Project site, and ultimately by a brief summary statement of principal conclusions.

This review was completed solely to provide you with objective, professional input regarding the adequacy of Langan studies to address the potential for future ground rupture beneath the proposed project. The review utilized those materials provided to us by you or otherwise readily available either in our reference library or via the internet. These materials included the Langan reports, other geotechnical studies performed in nearby areas, a variety of aerial photographs, and studies published in professional geologic literature. Our intent is to briefly summarize our current understanding of the Hollywood fault in the vicinity of the project, and to offer professional opinions regarding specifics of the fault study in light of that understanding. Our review did not consider and does not address geotechnical issues that may affect the proposed development other than the issue of fault rupture hazard.

Site Description

The Hollywood Millennium Project is proposed on a 4.47 acre parcel located on either side of North Vine Street, just south of Yucca Street in the Hollywood area of Los Angeles, California. The "West Site" is bounded by Ivar Avenue on the west, Vine Street on the east, and Yucca Street on the north. The northerly boundary includes a car rental facility located near the intersection of Yucca Street and Ivar Avenue, but excludes a commercial building located at the intersection of Yucca Street and Vine Street. Overall the site slopes generally to the south; with more dramatic changes in grade accommodated by a low, south-facing slope just south of the rental car facility, and by retaining walls up to ten feet high along the south side of the existing, offsite commercial building.

The site is currently in use primarily as a parking lot. The southerly boundary is coincident with the southerly limits of the lot.

The "East Site" is located between Vine Street and Argyle Street south of Yucca Street. The East Site is also currently in use as a parking lot, but also includes the Capitol Records building in the northwestern part. As with the West Site, the southern boundary of the East Site is roughly coincident with the existing parking lot. The commercial building at the corner of Yucca and Argyle is excluded. The boundaries of the project are noted on the Boring Location Plans from Langan 2012b reproduced here as Figure 1.

Proposed Development

We understand that the proposed construction includes tower complexes for mixed retail, hotel, commercial and residential use. Multiple towers of various heights ranging up to 585 feet are proposed on both sites, with up to six levels of subterranean. The structures will provide over 1,100,000 square feet of developed floor area.

Hollywood Fault

The Hollywood fault is part of a zone of east-trending faults that extends from Pasadena to offshore of Malibu. This zone marks the southern boundary of the western Transverse Ranges Geomorphic Province of California. The Hollywood fault extends in this system from east of downtown Hollywood to Beverly Hills, and accommodates reverse oblique movement that uplifts granitic and sedimentary rocks of the Santa Monica Mountains over the alluvial material that underlies the north edge of the Los Angeles basin and downtown Hollywood.

The location of the Hollywood fault has been poorly defined in the past. Exploration at suspected fault locations in support of engineered projects is challenging. Extensive urbanization commonly precludes the use of trenching that would allow for direct observation of the subsurface. As a result, clear exposures of the Hollywood fault are limited; our understanding of the fault structure and location typically lacks detail at the site-specific scale.

Hoots (1931) mapped the fault along the base of the steep mountain front west of La Brea Avenue, and into the foothills east of La Brea Avenue. Dibblee (1991) mapped the Hollywood fault in much the same location as Hoots, but included a southern strand he designated the Santa Monica fault. This strand is depicted to splay south from the Hollywood fault at about Fairfax Avenue, extend roughly along Franklin Avenue to Vermont Avenue, and then northeastward beyond Interstate 5.

Crook and Proctor (1992) compiled a summary of information derived from six points of exploration along the Santa Monica and Hollywood faults. These sites included a location on Caheunga Boulevard where a series of deep borings were excavated during exploration for the L. A. Metrorail subway in 1981. These borings clearly constrained that a fault had to exist well south of Franklin Avenue. Additional borings were excavated on Cahuenga Boulevard south of Yucca Street and north of Hollywood Boulevard to help refine the fault location. One of these intercepted about ten feet of sheared sandstone at a depth of 122 feet. This sheared material was interpreted as fault gouge and used to constrain the location of the fault.

Dolan et. al. (1997) prepared a study that utilized old topographic maps that pre-date urbanization to conduct a geomorphic analysis of the Hollywood fault. Their analysis identified a series of scarps in the alluvial fan extending across Hollywood south of the Santa Monica Mountains. They suggest that these scarps are the result of uplift along faults located substantially south of the immediate mountain front. They combine their geomorphic analysis with direct observations of fault exposures, and reported groundwater anomalies to present a convincing argument that the alluvial scarps are the result of faulting and that the most recent episode of fault movement likely occurred sometime between 4,000 and 20,000 years ago. As a part of this study, the Cahuenga Boulevard Metro Rail borings were demonstrated to lie along the projection of well-defined geomorphic scarps and groundwater anomalies. The fault interpreted from these data reasonably projects eastward from Cahuenga Boulevard, through the Hollywood Millenium Project to a prominent scarp previously located between Argyle Street and Gower Street (Figure 2). A map recently published by the California Geological Survey (Bedrossian

and Roffers, 2012) presents the most through-going splay of the Hollywood fault as a buried feature along a similar alignment, though somewhat north of the Caheunga Boulevard fault mapped by Dolan (1997) and Crook and Proctor (1992). Figure 3 shows the pertinent part of this recent publication.

Millenium Project Investigations

Geotechnical investigations were conducted as part of the planning process for the Millenium Project development. Studies were conducted by Langan Engineering and Environmental Services. A geotechnical study was conducted in May of 2012, and was followed by a fault investigation in November of 2012.

Summary of Geotechnical Study

The geotechnical study was conducted primarily to provide a characterization of subsurface geotechnical conditions below each parcel for the purposes of providing preliminary assessment of feasible foundation systems and geotechnical aspects of construction (Langan 2012a). The study included four borings designated LB-1 through LB-4, spaced across the two parcels and excavated to depths ranging from 60 to 100 feet (Figure 1). Borings LB-1, LB-2 and LB-4 encountered similar materials consisting primarily of interbedded sand, silty sand, clayey sand and clay. Groundwater was encountered in each of these borings at depths ranging from 51 to 58 feet. Below 20 feet, Boring LB-3 encountered a nearly continuous section of clay 40 feet thick, and did not encounter groundwater to a depth of 61.5 feet. On Page 4-5 of the report, the area around Boring LB-3 is identified as possibly requiring different engineering parameters for certain types of foundations due to the different geotechnical conditions encountered in that area.

The geotechnical study provides a discussion of the fault rupture hazard on Page 6 of 11 under "Mapped Faults". The discussion states that the site is not within an Alquist-Priolo Special Studies Zone Area, but that it is located near a boundary of a Fault Rupture Study Zone included in the Safety Element of the City of Los Angeles. The discussion also states that two sources identify the Hollywood fault as being about 0.4 miles from the site. These include the California Division of Mines and Geology (currently the California Geological Survey) "Active Near-Source Fault Zones Map" and the City of Los Angeles "ZIMAS" system (http://zimas.lacity.org).

Commentary on Ground Rupture Aspects of the Geotechnical Study

Site-fault distance

The geotechnical study was not intended to be a fault rupture hazard study. The discussion presented of the fault rupture hazard is on a level commonly employed and generally considered acceptable for sites that lie well beyond (1000's of feet or more) the influences of known, well-documented faults. The Langan discussion references two sources that identify the site as nearly one-half mile from the Hollywood fault. The ZIMAS system does return a site-fault distance of about ½ mile; however, does not indicate the map location of the reference fault. In my opinion, this limits the utility of the information leaving it inappropriate for use in evaluating the potential for ground rupture at a site. The other reference is a bit outdated in any case, but also tends to be more a tool for determining engineering factors for seismic design rather than a detailed map of fault surface traces.

Conventional published geologic maps would have made more appropriate references. Dibblee's map of the Hollywood Quadrangle is well-known and readily available. Reference to this map would have immediately identified the Santa Monica fault within about 700 feet of the property. The interactive, 2010 Fault Activity Map of California prepared by the California Geological Survey is also readily available online. Although the ability to "zoom" this map is limited, at the highest zoom available, a branch of the Hollywood fault appears to be located near, if not directly beneath the Hollywood Millennium project. A web search of the "Hollywood fault" would have returned numerous links to the more detailed studies outlined above. Any one of these references, and certainly their combined influence would have alerted the consultant to the inaccuracy of the other references, and the need for a detailed ground-rupture hazard assessment at the site.

Reliance on Fault Study Zones
The consultant states that the site is outside an Alquist-Priolo Special Studies Zone (known now as "California Earthquake Fault Zones") and also just outside a Fault Rupture Study Area (FRSA) included in the Safety Element of the City of Los Angeles General Plan. The Alquist-Priolo Act of 1972 mandates that the State Geologist establish "appropriately wide zones" along faults judged to be "sufficiently active and well defined". Within these zones, fault rupture hazard studies would be required prior to permitting new construction. There currently is no Earthquake Fault Zone established along the Hollywood fault.

The referenced map from the City of Los Angeles safety element is presented at a very small scale, includes only selected streets, and does not indicate the Hollywood Freeway. Accurately locating a site on this map is challenging, and in fact the position of the site indicated by the consultant on Langan Figure 4 appears to be hundreds of feet north of the actual location. If located accurately, it appears that the site would lie on the boundary of the City of Los Angeles FRSA. Regardless of the actual site location relative to either zone, all such zones are simply regulatory entities based on planning-level assessments intended to mandate studies where sites lie within certain distances of known faults. A site location inside a zone mandates a study. A site location outside a zone is no guarantee that the hazard does not exist or does not need to be addressed, and does not relieve the consultant of the responsibility to exercise professional judgement. The need for a ground rupture hazard assessment must be independently evaluated for each site, even when located outside any regulatory zone.

Suggestive Geotechnical Data (Abrupt Soil Character Changes; Possible Groundwater Barriers)
The geotechnical data developed for the site in the Lagan report includes two elements that together suggest a need for a fault rupture study. Borings LB-1, LB-2 and LB-4 all encountered similar subsurface conditions and all encountered groundwater within 50 to 58 feet of the surface. Boring LB-3 is located south of the other borings. LB-3 encountered distinctly different soil conditions and did not encounter groundwater to a depth of 61.5 feet below ground surface. These conditions suggest the possibility of a subsurface discontinuity consistent with a fault between the two locations. Inasmuch as the fault identified in Cahuenga Boulevard projects through the site, the differences noted between these borings require a more detailed evaluation to better define the nature of the discontinuity.

Summary of the Fault Rupture Hazard Study
A fault rupture hazard study was completed by Langan in November of 2012 (Langan, 2012b). The introduction indicates the study was required by the City of Los Angeles after it was determined that the site was "located within 500 feet of the Hollywood fault trace "as mapped by the California Geologic Survey (CGS) and the United States Geological Survey (USGS)". The study presents a fairly generic description of the site geology, and a discussion of groundwater that is based almost entirely on the Historic High Groundwater Level map presented as Plate 1.2 of the California Geological Survey, Seismic Hazard Report for the Hollywood Quadrangle (CDMG, 1998). Groundwater data from the May Langan geotechnical study is not addressed.

The report continues with a discussion of local faults with a focus on the Hollywood fault. This discussion begins by repeating the site-fault distance of 0.4 miles based on the two references discussed previously, and provides additional comments that "the fault acts as a groundwater barrier with higher groundwater levels north of the fault than south of the fault, and the fault juxtaposes Tertiary-aged bedrock or Pleistocene-aged older alluvial deposits against Holocene aged alluvial deposits of the Los Angeles basin." No specific references are provided for either of these statements. These statements are followed by a paragraph that states the Hollywood fault is typically reported to be located south of Franklin Avenue and north of Yucca Street in the vicinity of the site, with one study indicating the fault could be located south of Yucca Street. Once again, specific references for these statements are not provided. The report concludes the discussion of the Hollywood fault with brief descriptions of published studies by Crook and Proctor (1992) and Dolan et. al. (1997), and several consultant studies completed along North Highland Avenue just north of Franklin Avenue.

The discussion of local faults concludes with a brief statement that they reviewed aerial photographs taken between 1952 and 1998, that they were unable to discern evidence of faulting within the site, and that they concluded that the Hollywood fault trends east-west beyond the northern limit of the site.

The field exploration in support of the fault investigation study was conducted only on the West Site. Exploration consisted of a linear array of six sonic borings oriented in a north-south direction, beginning about 60 feet north of the southern property line, and extending about 162 feet to the north. Two of the borings were drilled vertically and four were battered (inclined) toward the south. The inclined borings were carried to lengths of 100 to 115 feet equating to depths of about 90 to 100 feet below the surface and were spaced at intervals of roughly 50 feet. The two vertical borings were carried to depths of fifty feet and were located within 10 to 20 feet on either side of Boring 2.

Core from the borings was logged in detail with each described soil unit assigned a Munsell Color value. Data from the borings was plotted on a subsurface profile (Figure 4) where three main geologic units were interpreted. These included a blanket of man-made artificial fill across the surface, underlain by natural Younger Alluvium resting above natural Older Alluvium. Attempts appear to have been made to correlate individual soil horizons within each unit, and to characterize their lateral continuity; however, these correlations are poorly constrained.

The upper sections of each boring encountered sections of loose to medium-dense sands that typically were described with 10YR hues indicating brown and yellowish brown colorations. These materials overlie deeper, generally more consolidated Older Alluvium. Although not specifically discussed in the report, it appears that a shift toward greater clay content combined with a shift toward more red, 7.5YR and 5YR Munsell hues were used to identify the top of the Older Alluvium. Based on the identification of this contact in the individual borings, an upper surface is depicted on the subsurface profile. This contact is depicted as a very gently southerly inclined surface dropping in elevation from about 370ft at B4 to 367ft at B-6 (a horizontal distance of about 80 feet), with an abrupt rise to an elevation of 370ft through B2 and B5, and a fairly steep ramp descending to an elevation of about 357ft at Boring B1. The surface is depicted as continuous with no distinct offsets.

Groundwater is depicted as a fairly uniform surface along the line of borings, with a gentle inclination toward the north. Soils encountered in Borings B2 through B5 are generally similar interbedded sequences of sand, silty and clayey sand, and clay with significant gravel encountered at the north end of the line at the bottom of Boring B-4. These conditions contrast with soils in B1 where an interval primarily of clay was encountered between 42 and 82 feet in the boring.

Radiocarbon dates were obtained for numerous horizons within each boring. Individual charcoal fragments were not recovered from the core; therefore, all dates reported are sediment dates. Although some anomalous dates were reported and discussed, in general the soil age dating confirmed that materials assigned to Younger Alluvium (above the interpreted contact) are consistently Holocene in age, and that with one exception attributed to contamination, the materials assigned to Older Alluvium (below the interpreted contact) are consistently older than Holocene.

The results of the fault investigation are summarized in four principal findings. These included 1) that visual shears were not observed in the core samples, and that as such, the irregularities in the contact between the Younger and Older Alluvium were interpreted as erosional features rather than as faults; 2) Langan considers the location of fault traces postulated by Dolan et. al. to be poorly defined; 3) Evidence of groundwater barriers between borings was not observed within the site and 4) that detailed examination of the cores revealed no evidence of shearing and that Younger Alluvium consistently overlies Older Alluvium. Based on these findings it is concluded that active faulting is not present within the limits of their investigation on the site.

Commentary on the Fault Rupture Hazard Study

Summary of Previous Work

The discussions presented of both the Crook and Proctor study and the Dolan et. al study are dismissive and generally incomplete. Langan characterizes the 10 feet of sheared material encountered in Metro Rail Boring 28B as a possible "rock fragment", and seems to suggest that additional borings should have been conducted to evaluate this possibility.

As described by Crook and Proctor (1992), Metro Rail Boring 28B penetrated 122 feet of fluvial sediments before encountering the 10 foot zone containing breccia of sheared sandstone, gravelly alluvium and siltstone bedrock. Below approximately 132 feet, the boring continued in fluvial alluvium to a depth of 205 feet. A ten foot boulder consisting of sheared and brecciated fragments of multiple rock types contained in an otherwise normal sequence of fluvial sediments consisting of clay, silt and sand is simply not consistent with normal depositional processes. The suggestion that the conclusions at this location were based on "limited subsurface data" or that additional sampling should have been completed to confirm the origin of the "rock fragment" misses the point of Boring B28. Other borings excavated along Cahuenga Boulevard to depths in excess of 200 feet had already demonstrated that a fault had to be present. Boring B28 *was* the "additional exploration" excavated specifically to evaluate that possibility.

The 1997 study by Dolan et. al. consists of over twenty, 3-column pages of fine print published in a highly respected professional journal. The paper is generally considered something of a seminal study with respect to the Hollywood fault. Langan summarizes this landmark paper as follows:

"Dolan et. al. (1997) performed an aerial photograph review and concluded that two possible fault scarps were present east and west of the Site. Due to the potential fault scarps, they inferred that buried traces of the Hollywood fault could traverse the Site. Their conclusions are based on geomorphic data available at the time and did not include a subsurface investigation to confirm if buried traces were present."

Langan asserts that the Dolan work was based on, and to a certain degree implies that it was limited to review of aerial photographs, seemingly with the implication that the interpreted fault is not sufficiently constrained to warrant a study at the Millennium Site. As a point of fact, the Dolan paper does not discuss the use of aerial photographs. The geomorphic analysis for that study was completed using topographic maps prepared prior to much of the local urbanization. More importantly, the fault identified below Cahuenga Boulevard is constrained by the Metro Rail Borings, groundwater anomalies, and well defined, south-facing scarps. The point of a research paper of this type is to develop and disseminate geologic information so that it can be incorporated into practical applications. Langan seems to suggest both here and in their conclusions that unless the research included exploration directly on the Millennium property, that the results are poorly constrained and not relevant to the Millennium project. This position seems to have resulted in Langan failing to incorporate very valuable data readily available in the public record. This data has a very direct and important role in any evaluation of the fault rupture hazard for this project.

Program of Field Exploration

The text of the Langan report does little to communicate the analysis underlying the program of field exploration implemented at the Millennium site. The combined Millennium sites extend nearly 500 feet in a north-south direction. The linear array of borings that comprise the fault investigation extend only over about 150 feet of that distance and are located only on the West Site. The reason for this limited investigation is not discussed.

There is a blue line on the map at the north end of the boring array with a label that indicates it is the "Northern Limit of the Fault Investigation." There is no discussion in the text of the report to explain the lack of investigation north of this line. The project description indicates that a 220 foot high tower will be located in the "northwest portion of the west site". Based on this understanding of the project, and given the need to establish a setback from active faults, it is difficult to understand how the defined limits of the fault study will provide sufficient data to accommodate development at the northwest corner of the west parcel.

Similarly there is a yellow line at the south end of the boring array that is labelled "Southern Limit of 500 Foot Offset from Hollywood Fault Trace". As noted above, the location of a site outside regulatory limits that mandate exploration does not relieve the professional geologist of the obligation to properly evaluate a hazard. In any event, the consultant should clearly identify which Hollywood fault trace forms the basis for the yellow line. In the introduction to the report, the consultant indicates that he must explore the area within 500 feet of the Hollywood fault trace as mapped by CGS and the USGS. The USGS reference is a digital fault and fold database that can be displayed on Google Earth. This database plots the Hollywood fault about 100 feet north of Yucca Street at Ivar Avenue. This fault is plotted north of Franklin Avenue on Langan Plate 1. Nonetheless, the yellow line is consistent with the correct fault location. The CGS reference (Geologic Compilation of Quaternary Surficial Deposits in Southern California) was revised in July of 2012. The location of the Hollywood fault on earlier versions of this reference is not known (the older reference is not available); however, the current version of the publication maps the Hollywood fault passing just south of Yucca within the northern boundary of the site and north of the current limits of the fault investigation (Figure 3). This fault location would seem to mandate exploration across the entirety of the property.

Regardless of which mapped trace is considered appropriate to define a 500-foot limit for mandatory exploration, the overarching consideration is that a preponderance of evidence supports a significant fault one block west of the Millennium development beneath Cahuenga Boulevard, and that the fault extends to the surface somewhere between Yucca Street and Hollywood Boulevard. Variations in dip angle and fault trend complicate efforts to establish a precise surface trace or eastward projection; a robust program of field exploration designed to evaluate the possibility of a fault anywhere beneath the Millennium Project seems warranted.

Interpreted Subsurface Profile A – A'

The text of the report provides little commentary regarding the interpretation and analysis supporting the subsurface profile presented on Plate 2 of the report. Nonetheless, the boundary between the Holocene Younger Alluvium and the Pleistocene Older Alluvium appears to have been readily identifiable in the core samples and tends to be supported by the radiocarbon soil dates. The boundary identified in the borings resolves into a well defined, continuous surface at the north end of the subsurface profile. However, at the south end of the profile, the core data suggests irregularities in this surface that amount to an abrupt overall step in the surface about 10 feet down to the south. The consultant interprets this step in the surface as simple manifestations of an erosional contact. The lack of visible shears in the core is cited as justification for this interpretation. There is very little discussion in the report regarding the condition of the core or the core handling procedures, and there are no photographs provided of the core. Much of the cored material is quite sandy. Shears related to faulting may very well not be preserved in this type of material. Furthermore, the step is accompanied by a dramatic change in the composition of the subsurface materials. Where Borings 2 through 6 encountered primarily sand, silty sand and clayey sand with relative few, thin intervals of clay, Boring B1 extended through 40 feet of clay virtually uninterrupted. This data is reminiscent of the geotechnical study where materials encountered in LB-3 were markedly different than the other three borings located more to the north. Additional exploration in the form of trenching or additional, closely spaced borings appears warranted in this area to better resolve the nature of the irregularity defined in this contact.

Groundwater

Measurement of groundwater levels in inclined borings can be challenging relative to the comparatively simple task of dropping a tape down a vertical hole. This might lead to difficulty in making accurate readings. The level of groundwater observed in the borings is a critical element to the interpretation of the fault study. It is noted that in all borings, the core – particularly in the coarser-grained intervals, is commonly described as "wet" below the reported groundwater level. This is not the case in Boring B1. Groundwater is reported at a depth of 50.5 feet, yet no samples are described as "wet" until reaching a depth of 92 feet. "Very fine- to coarse-grained sand" at 82 feet is described as "slightly moist to moist". Samples are not consistently described as "wet" until reaching a depth of about 100 feet. These data raise concerns that the measurement of groundwater levels in B1 may have been in error. The possibility exists that a seep at the 50-foot level in the boring may have been mistaken for an established groundwater level, and that instead, there exists a steep drop in the groundwater level between B5 and

B1, and that the actual groundwater level in the inclined Boring B1 is at a depth of 90 feet (approximately 80 feet below the ground surface) and consistent with regional historic high groundwater levels.

The text of the report indicates that groundwater levels were measured in each boring at the completion of drilling and that each boring was backfilled with grout. There is no discussion of leaving the holes open or of returning to measure groundwater after a 24 hour period. The logs for B1, B2 and B3 each indicate that groundwater was measured in the boring after a 24hour period. This note on the logs seems to be in conflict with the reported field procedure. Additional commentary regarding the measurement of groundwater and in particular the method by which groundwater was measured in the inclined borings may help to resolve some of these issues.

The consultant's discussion of groundwater on Page 3 is based entirely on published groundwater levels reported by the California Geological Survey. These reported "Historic High" groundwater levels are substantially deeper than those encountered on the site. The consultant does report the onsite findings on Page 7, but other than to note the fact that onsite water levels are substantially higher than previously recorded historic high levels, the consultant offers no discussion of this fairly remarkable finding. The possibility that the anomalously high levels occur because water is impounded behind a fault located southerly of the fault study is not discussed. Instead the consultant offers a conclusion that evidence of groundwater barriers between borings was not observed within the site. Not only does this statement fail to consider one of the most likely implications of the high groundwater beneath the site, it would seem to be in conflict with the evidence for a possible groundwater barrier between Boring LB-3 and the other borings excavated during the original geotechnical study. Nothing in the fault study effectively addresses this issue.

Summary and Conclusions

Based upon a review of the Langan geotechnical and fault investigation studies, various published indicating locations for the Hollywood fault and published studies of the Hollywood fault, we respectfully submit the following concluding statements:

1. The discussion provided in the Langan fault investigation is not sufficient to adequately determine if the extent of the fault study is suitable for the proposed development. Based on our current understanding of the proposed project, it appears that additional exploration is warranted both to the north and the south of the November 2012 study.

2. The data developed by the Langan fault investigation suggests a possible offset in the contact between the Younger and Older Alluvial units between Sonic Borings B1 and B6. This offset appears to be associated with an abrupt juxtaposition of different materials in the deeper subsurface. The erosional contact interpreted at this location by Langan is not constrained by the available data.

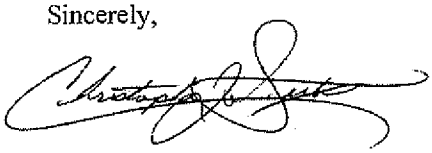
3. The evaluation of groundwater levels below the property is incomplete. Additional exploration utilizing vertical borings to completely characterize groundwater conditions beneath the entire site would appear to be a critical element of an evaluation of the fault rupture hazard.

4. There remains some lack of consensus regarding the location of the Hollywood fault in the vicinity of the Millennium Project. The USGS plots the fault just north of Yucca Street; the most recent CGS map indicates the fault is just south of Yucca street. Both of these surface traces would seem to be too far north to accommodate the fault identified under Cahuenga Boulevard and the projection of this fault with the scarps identified in the 1997 study by Dolan et. al.

5. A preponderance of evidence supports a high probability that the fault identified in Metro Rail Boring B28 extends east from Cahuenga Boulevard and through the Millennium Project Site. This probability in combination with anomalies noted in the onsite data developed during the Langan Studies argues for a rigorous effort to provide sufficient exploration to uniquely preclude the presence of active faults below the Millennium Project site.

This opportunity to be of service is appreciated. Should you have any questions concerning this letter, please give me a call.

Sincerely,



Christopher J. Sexton
Professional Geologist No. 4612
Certified Engineering Geologist No.1441

Attachments:

References

Figure 1 - Boring Location Map
Figure 2 - Dolan et. al. Fault Study Map
Figure 3 – Portion of CGS Special Report 217
Figure 4 – Subsurface Profile

Resume

References

Bedrossian, T. L. and Roffers, P. D.; 2012; Geologic Compilation of Quaternary Surficial Deposits in Southern California, Los Angeles 30' x 60' Quadrangle; A Project for the Department of Water Resources by the California Geological Survey; California Geological Survey, Special Report 217 (Revised); plt 9 (Plate 9 is available at http://www.conservation.ca.gov/cgs/fwgp/Documents/plate9_los_angeles.pdf).

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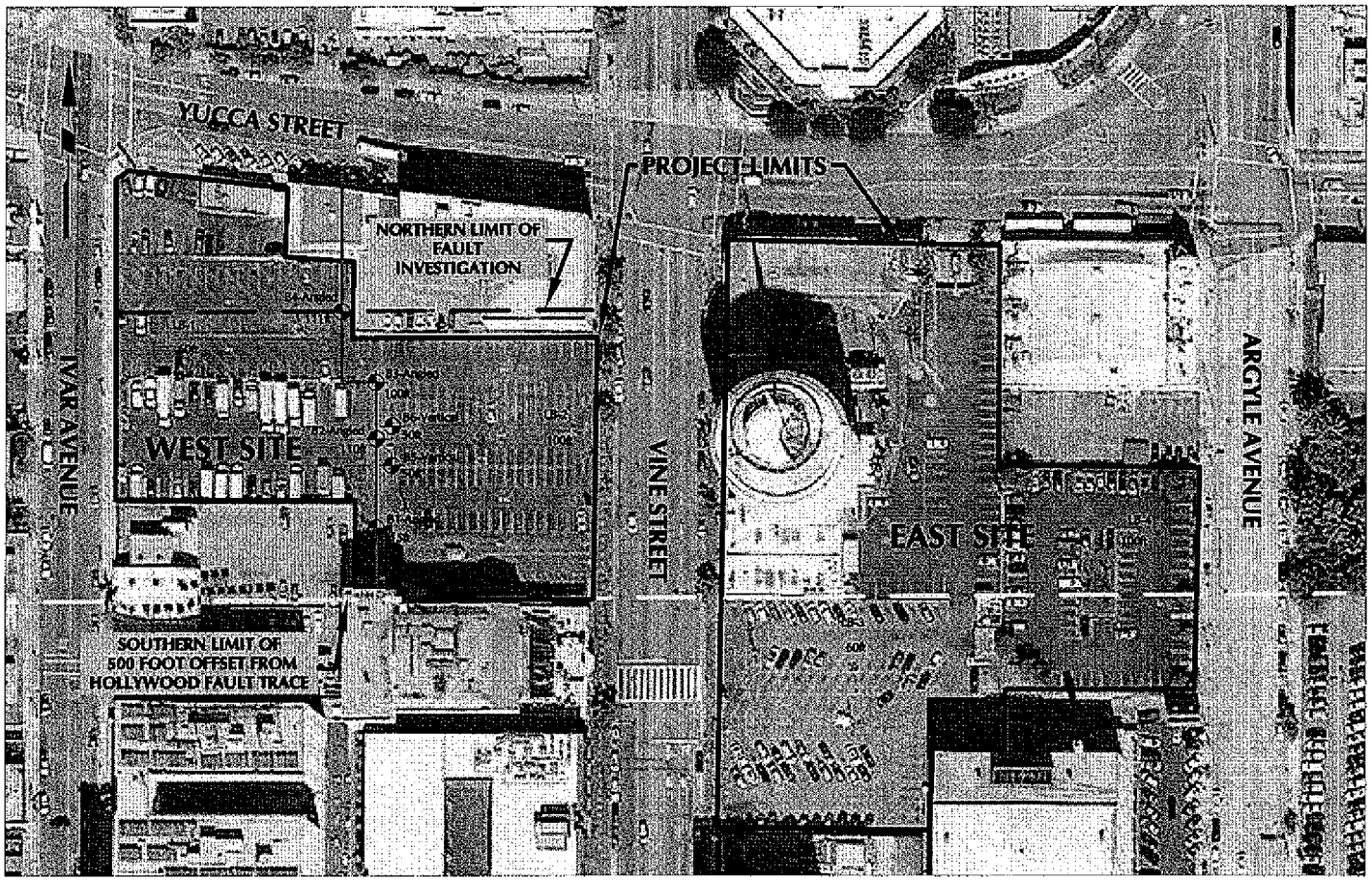

LEGEND:

- APPROXIMATE PROJECT LIMITS
- HOLLOWSTEM BORING (LANGAN PRELIMINARY GEOTECHNICAL ENGINEERING STUDY, 2012)
- LB-4 / 100ft — BORING IDENTIFICATION / BORING LENGTH
- SONIC BORING (LANGAN, 2012)
- B6-Vertical/ Angled / 111ft — BORING IDENTIFICATION / BORING LENGTH
- CROSS SECTION (A–A') (2012)
- SOUTHERN LIMIT OF 500 FOOT OFFSET FROM HOLLYWOOD FAULT TRACE
- NORTHERN LIMIT OF FAULT INVESTIGATION (LANGAN FAULT INVESTIGATION, 2012)

NOTES:

1. BASE MAP TAKEN FROM DATADOORS DESKTOP ON 8 AUGUST 2012.
2. SITE LIMITS ARE APPROXIMATE.
3. BORINGS B1–B4 WERE DRILLED BETWEEN 16 JULY AND 21 JULY 2012 UNDER FULL–TIME OBSERVATION OF LANGAN PERSONNEL.
4. BORINGS B5–B6 WERE DRILLED ON 11 OCTOBER 2012 UNDER FULL–TIME OBSERVATION OF LANGAN PERSONNEL.
5. SUBSURFACE PROFILE A–A' IS SHOWN ON PLATE 2.

Boring Location Plan

Figure 1

(From Langan, 2012B)

LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES
18662 MacArthur Boulevard, Suite 458
Irvine, CA 92612-1200
P: 949.255.8640 F: 949.255.8041
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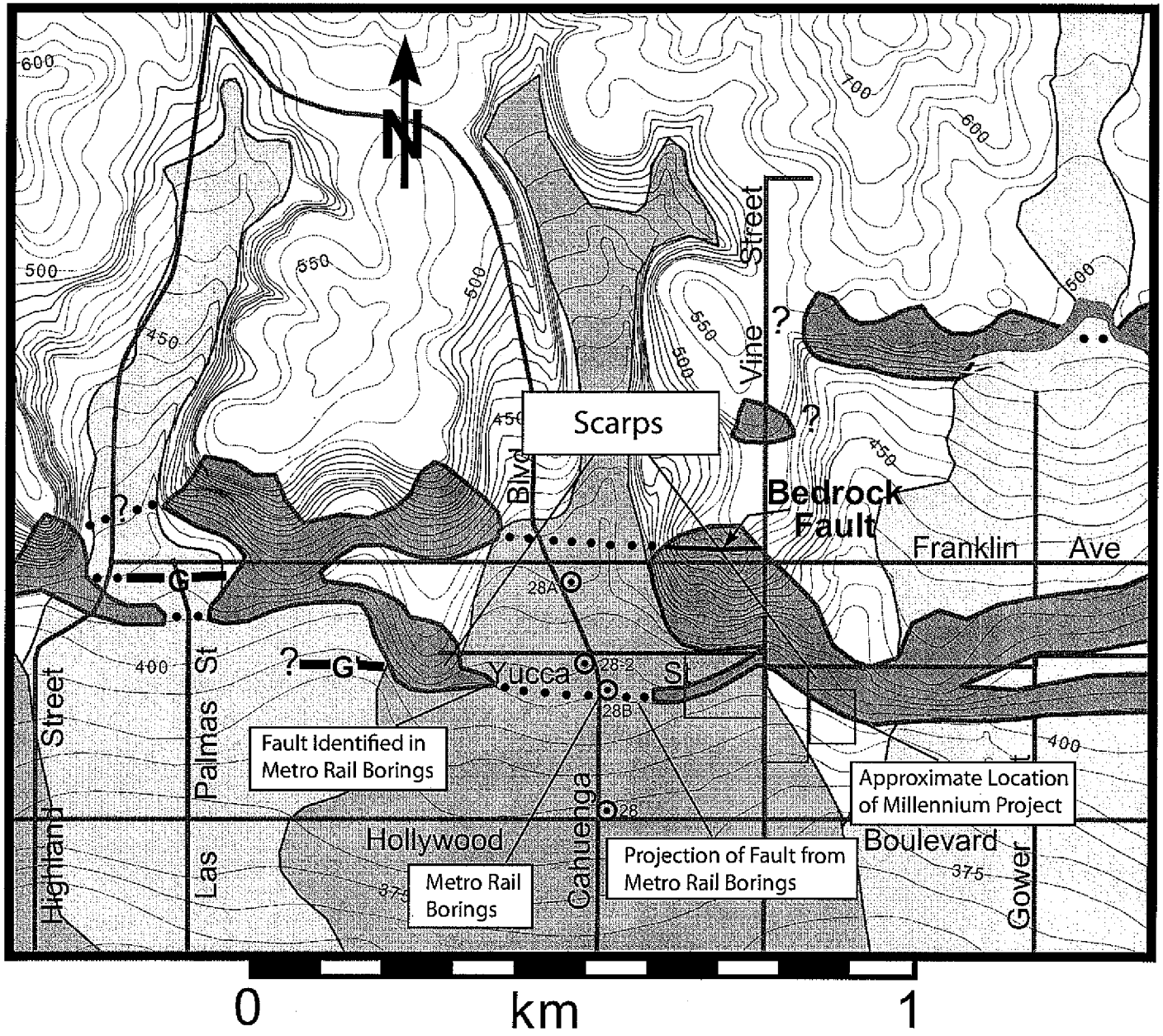
NEW JERSEY PENNSYLVANIA NEW YORK CONNECTICUT FLORIDA VIRGINIA CALIFORNIA ABU DHABI DUBAI ATHENS DOHA ISTANBUL

Project	FAULT INVESTIGATION HOLLYWOOD LOS ANGELES COUNTY CALIFORNIA
Drawing Title	BORING & CROSS SECTION LOCATION MAP
Project No.	700019502
Date	11–30–2012
Scale	NOT TO SCALE
Drawn By	SAC
Submission Date	11–30–2012
Drawing No.	5
Sheet	1 of 1



Dolan et. al. Fault Study Map

Showing scarps, Metro Rail Boring locations and groundwater anomalies

Adapted from Dolan et. al. 1997

Figure 2

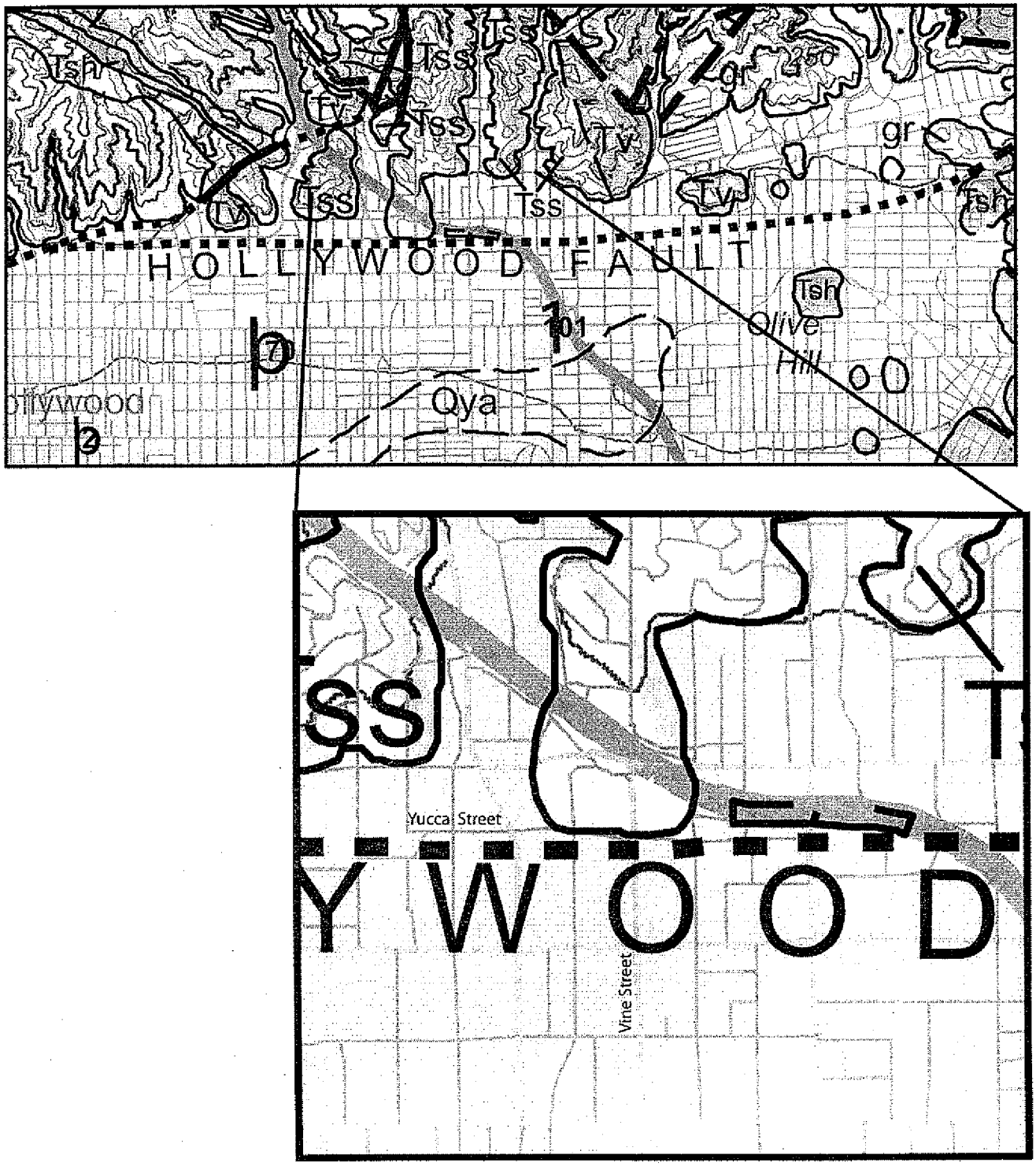
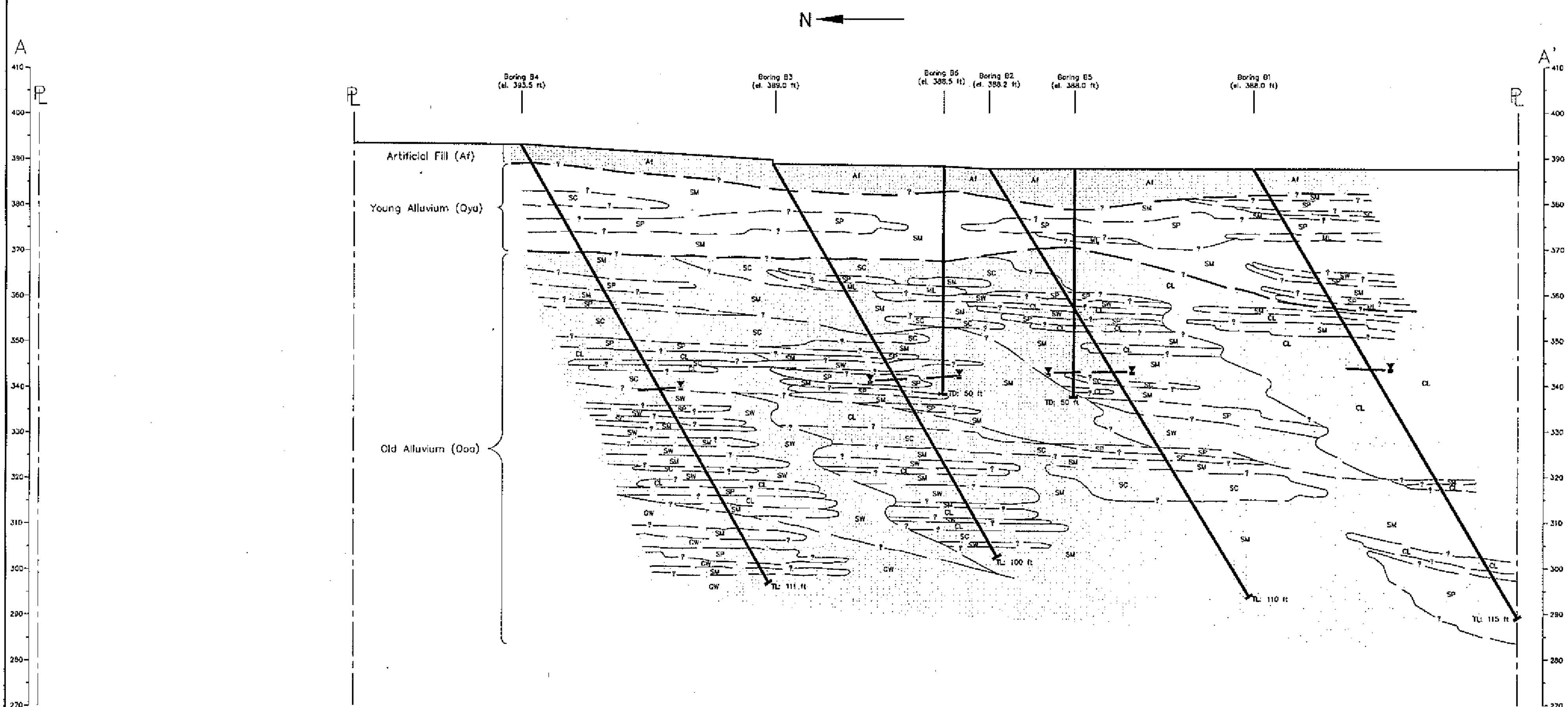


Figure 3
Portion of CGS Special Report 217
Adapted from Bedrossian and Roffers (2012)



NOTES:

1. BORINGS B1 THROUGH B4 WERE DRILLED BY CASCADE DRILLING UNDER THE FULL-TIME OBSERVATION OF LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC. BETWEEN 17 JULY AND 21 JULY 2012.
2. BORINGS B5 AND B6 WERE DRILLED BY BC[2] ENVIRONMENTAL UNDER THE FULL-TIME OBSERVATION OF LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC. ON 11 OCTOBER 2012.

LEGEND:

TD	Total Depth of Boring (Approximate)
TL	Total Length of Boring (Approximate)
PL	Property Line (Approximate)
el.	Elevation (Approximate)
— ? —	Geologic Contact (Approximate)
———	Boring Path (Approximate)
— — —	Property Line (Approximate)
——— ▽	Groundwater (Approximate)

UNITS:

Af	Artificial Fill
Qya	Young Alluvium (< 11,000 years old)
Qoa	Old Alluvium (> 11,000 years old)
SM	Silty SAND
SC	Clayey SAND
SP	Poorly Graded SAND
SW	Well Graded SAND
GW	Well Graded GRAVEL
GP	Poorly Graded GRAVEL
ML	SILT
CL	CLAY

Subsurface Profile

Figure 4

(From Langan, 2012B)

SCALE IN FEET

LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES

Project: FAULT INVESTIGATION
HOLLYWOOD
LOS ANGELES COUNTY, CALIFORNIA

Plate Title: SUBSURFACE PROFILE A-A'

Project No. 700019502
Date 11-30-2012
Scale 1" = 10'
Drawn By SAC
Submission Date 11-30-2012

Plate No. 2

Sheet 1 of 1

Christopher J. Sexton, C.E.G.

Certified Engineering Geologist

Education

M. S., Geological Sciences, California State University, Los Angeles, 1990
(Geologic Structure of the Liebre Fault Zone South of Bald Mountain)
B. S., Geological Sciences, California State University, Northridge, 1983
(Geochemistry and Tectonic Implications of Mid-Miocene Shallow Intrusions on the Palos Verdes Peninsula and along the Laguna Beach Coastline)

Registration & Professional Affiliations

Professional Geologist, California, #4612
Registered Geologist, Idaho, #681
Certified Engineering Geologist, California, #1441
Certified Engineering Geologist, Oregon, #1148
Member, Association of Engineering Geologists

Professional History

Southwestern Engineering Geology, Simi Valley, Principal Geologist, 1993-present
Diaz-Yourman & Associates, Engineering Geologist, 2008-present
GeoDynamics, Principal Geologist, 2005-present
Bing Yen & Associates, Inc., Camarillo, Senior Geologist, 1999-2005
Advanced Geotechnical Services, Inc., Camarillo, Senior Geologist, 1993-2003
California State University, Los Angeles, Assistant Professor, 1994
West Coast Geotechnical, Westlake Village, Chief Geologist, 1991-1993
Leighton & Associates, Inc., Westlake Village, Project Geologist, 1990-1991
Allan E. Seward Engineering Geology, Inc., Newhall, Senior Project Geologist, 1983-1990
MESA^2, Inc., Marine and Environmental Sciences, Northridge, Staff Geologist, 1981 - 1982

Representative Experience

Mr. Sexton has over 30 years of experience providing engineering geology services in diverse geologic and environmental settings from Santa Monica and San Gabriel Mountains to the California Desert, and the California Coastline from San Luis Obispo to San Clemente. His expertise includes geological site characterization, land review, technical/peer review for municipalities, earthquake damage assessments, forensics, geotechnical construction monitoring, instrumentation, fault studies, and evaluation and remediation of landslides and other geologic hazards. These studies included drilling and trenching operations using many different types of full-sized and limited access drilling rigs and sampling equipment. Mr. Sexton has extensive experience producing detailed logs of fault trenches, rock-core and drill cuttings, and downhole observations in hundreds of bucket auger borings to depths as great as 160 feet. Project environments range from beachfronts and level sites to difficult-access hillside areas.

Over the last 20 years, Mr. Sexton has provided consulting engineering geology services to over 40 respected engineers, geologists and developers throughout southern California. His studies have ranged from "due diligence" reviews in support of purchase decisions to detailed geologic site characterization, slope instrumentation and geologic review for municipalities. Mr. Sexton has provided technical peer-review of hundreds of projects ranging from simple residential additions to large tracts with over 1000 homes situated in complex terrain including active faults, deep landslides, and combinations of collapsible, expansive and liquefiable soils.

Project experience

- Served as principle geologic reviewer on hundreds of projects as technical reviewer for the Cities of Simi Valley, Moorpark, Agoura Hills, Hidden Hills, Malibu, Calabasas, Camarillo, Palmdale, Santa Clarita and

others. Tasks included detailed peer review of fault investigation studies for large residential and commercial developments in the Simi-Santa Rosa, Camarillo, San Gabriel and San Andreas fault zones. Primary editor in the development of "Guidelines for the Preparation of Geotechnical Reports for the City of Palmdale, California". Provided testimony in 2006 to the California State Mining and Geology Board during challenges to the current interpretation of the Alquist-Priolo Special Studies Act. These challenges resulted in clarification from the State regarding the intention of the Act, and establishment of a working group to re-visit requirements of the Act. (1999-2013).

- Served as principle geologic reviewer on over 60 projects as technical reviewer for Monterey County (2011).

- Project Geologist for a fault trenching study for a large residential development proposed along the San Andreas Fault in Palmdale, California.

- Completed fault rupture hazard study as part of a package of feasibility assessments for a major freeway interchange and surrounding developments proposed in the City of Camarillo, California. High groundwater and unconsolidated materials precluded conventional trenching. Instead, 131 CPT soundings totaling a lineal footage of nearly 7500 feet were interpreted to identify potential fault offsets in shallow stratigraphy. Project was completed by Bing Yen and Associates, Inc. for the City of Camarillo (2004).

- Supervised field exploration, radiocarbon dating, analysis, and report preparation for a fault study in support of a 120-acre, major mall development in the City of Simi Valley, California. Coordinated excavation and detailed logging of approximately 7500 lineal feet of shallow fault trenches, two alluvial trenches that extended to depths up to 50 feet and involved earth quantities of about 300,000 yd^3, as well as hollow-stemmed and bucket-auger borings. Project was completed by Bing Yen and Associates, Inc. for the City of Simi Valley (2002).

- Provided third-party technical review of two controversial fault-rupture hazard studies in the City of Camarillo where applicants had retained counsel to challenge the technical conclusions of the City reviewer, and the legal basis for City policies regarding construction in fault zones. The first of these resulted in a presentation and petition to the California State Mining and Geology Board (SMGB) requesting clarification of the intent of the Alquist-Priolo Special Studies Act. Ultimately these efforts resulted in the SMGB establishing a Technical Advisory Committee to review the act and recommend policy changes (2006 & 2007).

- Provided second-party review for the Triunfo Sanitation District of preliminary feasibility level assessments of five alternative sites proposed for relocating a municipal water tank off of a large landslide (2005).

- Supervised drilling and installation of inclinometers as part of a detailed investigation of a landslide covering about 10 acres in Bel Air Estates, California. The landslide affects approximately 15 estate properties and a Los Angeles Department of Water and Power water line. Provided detailed geologic logging of hollow-stem auger and rock-core holes that extended to depths of about 90 feet. Supervised installation of inclinometer casings and groundwater monitoring wells. The project was completed by Geomatrix Consultants and AMEC for the Los Angeles Department of Water and Power (2006–2013).

- Provided initial engineering and geologic assessment of damages to well over 100 residential structures in support of claims adjustment for major insurance companies. Many of these were completed as part of "rapid-response" efforts provided by insurance companies following the 1994 Northridge Earthquake. Others were completed as part of a judicially mandated "Independent Readjustment Program" to assist in reassessing earthquake damage claims nearly ten years old. Insurance assessment projects have been completed with Rogers/Pacific, GeoSyntec Consultants, and Snyder and Wilson Engineering between 1994 and 2013.

- Provided field supervision and downhole geologic logging to depths exceeding 120 feet to assess the mechanism and cause of failure where a landslide collapsed 600 feet of a major roadway at the southwest corner of the Palos Verdes Peninsula, California (White Point). Project was completed by Shannon and Wilson for the City of Los Angeles (2011-2012).

- Provided detailed logs of cleanout excavations to characterize shallow stratigraphy exposed during construction of the Los Angeles Department of Water and Power Headworks Eastern Reservoir. Logged sonic borings for the Headworks Western Reservoir. The combined capacity of the two Headworks reservoirs will be approximately one-hundred, million gallons. Project was completed by AMEC for the Los Angeles Department of Water and Power (2011 and 2013).

- Provided field exploration in support of evaluating the feasibility of various cover designs for the Los Angeles Department of Water and Power Stone Canyon Reservoir, located above Bel Air in the Santa Monica Mountains north of Los Angeles. Provided detailed surface logging of approximately 800 feet of coreholes that extended to depths up to about 100 feet, detailed logging of shallow trenches and surface support during downhole examination of large diameter borings to depths of about 115 feet. Participated in downhole geophysics with Optical Televiewer, and installed and developed water-level monitoring wells in coreholes; including installation of vibrating wire piezometers. Project evaluated overall bedrock structure and groundwater conditions, helped define a complex unconformable contact between the Topanga Formation and Modelo Formation that extends beneath the existing dam, and developed subsurface definition of landslides that cover up to approximately 15 acres. Project was completed by AMEC for the Los Angeles Department of Water and Power (2010-2013).

- Provided field supervision and logging of trenches and rotary wash borings in support of a geotechnical study to provide recommendations for rehabilitation of gas pipeline foundations in an environmentally sensitive area of Santa Barbara County. Project was completed by Globus Engineering, Inc. for the Southern California Gas Company (2012).

- Participated in core logging, geophysical logging and geologic interpretation for the Los Angeles Department of Water and Power, Silver Lake Bypass Tunnel Project. Logged two core holes and assisted in developing cross sections in support of geotechnical evaluation of large diameter access shafts proposed to extend to depths of approximately 90 feet. Project was completed by AMEC for the Los Angeles Department of Water and Power (2011).

- Provided reconnaissance of engineering geology constraints for the Mountains Recreation & Conservation Authority (MRCA), involved in the development of facilities proposed at four coastal community parks in the geologically complex Malibu area of southern California (2006-2010).

- Provided geologic investigation and observation and mapping during grading to excavate cell expansions at the Calabasas and Sunshine Canyon Landfills. Investigations included detailed downhole logging of bucket-auger borings to depths of 80 feet. Identified critical geologic features in cell floors and in cut-slopes that extended to heights over 400 feet (2003-2007).

- Project Geologist through Globus Engineering, Inc. for several projects completed at the Southern California Gas Company at the Aliso Canyon Facility at the north edge of the San Fernando Valley. Projects included aggressive grading repair of access road failure that damaged and continued to threaten well-head facilities, and geologic/fault investigation of a proposed pad for new compressor facilities (2005-2006).

- On location for over four months east of Glamis, California to provide field assistance during groundwater characterization study in support of the proposed Los Angeles County Sanitation District's Mesquite Landfill. Completed detailed field mapping, well installation, and surface logging of nearly 4000 feet of rock core in 12 exploratory holes/monitoring wells that extended to depths of over 500 feet in sedimentary and complexly deformed metamorphic terrain. Supervised construction of monitoring wells. Provided input during interpretation of geophysical logging and critical review of cross sections during the final stages of report preparation. The project was completed by GeoSyntec Consultants for the Los Angeles County Sanitation District (2005).

- Provided services to GeoSyntec Consultants to log and supervise installation of inclinometers to monitor potential movements in large landslides being undercut by grading for residential developments on property adjacent to an access road for La Pata landfill in San Juan Capistrano (2005).

- Provided field assistance during investigation in support of an expansion to the Calabasas Landfill in Calabasas, California. Provided detailed field mapping, surface logging of coreholes that extended to depths up to about 300 feet, and downhole examination and logging of large diameter borings to depths of about 115 feet. Issues included groundwater levels and potential impacts of proposed grading on offsite landslides that cover approximately 100 acres. Participated in downhole geophysics for 10 coreholes. Geophysics included Optical Televiewer, Fluid Temperature and conductivity logs, resistivity and gamma logs, caliper logs, and Acoustic Televiewer logs. Supervised construction of monitoring wells. Monitored water levels in all wells and maintained water level logs. Project was completed by GeoSyntec Consultants for the Los Angeles County Sanitation District (2003).

- Project Geologist responsible for the design, installation, monitoring and interpretation of dozens of slope inclinometer installations.

- Project Geologist responsible for investigation and construction monitoring of a large landslide repair completed in complex geologic terrain along Valdez Road in Calabasas, California. The landslide covered an area of about 2 acres and impacted three homes and a public road that provided access to 13 residential properties. Repair was completed under a grant from FEMA and included nearly complete removal and export of the landslide debris to install a shear key above the affected residences, installation of an extensive subdrain and new stormdrain system, and reconstruction of the public road (1993-1994).

- Project Geologist for detailed assessment of sea-cliff retreat beneath a proposed residential tract in Santa Barbara, California. Investigation included an extensive review of historic aerial photographs of the sea-cliff dating back to 1928, surface mapping of bedrock outcrops exposed in the face of the sea cliff, down-hole geologic logging of six exploratory bucket-auger borings, review of logs for 38 borings excavated previously on the property, coordination with local professional and academic geologists and detailed geologic analysis to estimate rates of sea cliff retreat and establish acceptable setback distances for the proposed development (1990).

- Staff and project level work for commercial, industrial and residential development in the Ventura and Soledad Basins between 1983 and 1990. Completed geologic investigations for over 50 land parcels ranging up to 700 acres in size. Provided geologic observation and mapping during design and grading for large projects involving millions of cubic yards of earthwork to construct residential and commercial building pads using high cut-slopes, fill slopes and retaining walls. Conducted fault-activity studies along the Holser, San Andreas and San Gabriel faults. Supervised geologic investigation for large commercial development focused around a proposed United States Postal Service Facility in Santa Clarita, California. Infrastructure for this development included roadways, a bridge, a flood control channel and several water tank sites (1983-1990).

Publications

Sexton, C. J.; 1990; "An Overview of the Geology of the Soledad Basin, Northern Los Angeles County, California"; in Buckley, C. I. and Larson, R. A. ed. Geology and Engineering Geology of the Western Soledad Basin, Los Angeles County, California; AEG Field Trip Guidebook; November, 1990.

Larson, R. A. and Sexton, C. J.; 1992; "Investigation of a Low-Angle, Dip-Component, Translational Landslide, Haskell Canyon, Los Angeles County, California"; Proceedings of the 35th Annual Meeting of the Association of Engineering Geologists, presented Oct. 2-9, 1992.

Sexton, C. J.; 1998; "A Perspective on Standard of Care"; AEG News; Volume 41, Number 2; Spring 1998.

Sexton, C. J.; 1999; "Common Pitfalls in Reaching Geologic Conclusions for Small Residential Developments"; Program with Abstracts; 42nd Annual Meeting of the Association of Engineering Geologists; Presented September 27, 1999.

Sexton, C. J.; 2000; "Things Your Mother Never Told You: Post-Academic Skills and Knowledge Necessary to Survive as an Engineering Geologist"; Program with Abstracts; 43rd Annual Meeting of the Association of Engineering Geologists; Presented September 24, 2000.

Sexton, C. J.; 2007; "The California Alquist-Priolo Earthquake Fault Zoning Act – Challenges in Implementing State Policy at the Local Level"; Program with Abstracts; 50th Annual Meeting of the Association of Engineering Geologists; presented September 28, 2007

Sexton, C. J.; 2008; "Implementing the California Earthquake Fault Zoning Act– A Proposal for Change"; Environmental and Engineering Geoscience; February, 2008; Vol. 14, No. 1; pp. 43-51.

Schell, B. A. and Sexton, C. J.; 2009; "Newly Discovered Faults Associated with Ground Cracks of the 1971 San Fernando Earthquake"; Program with Abstracts, Seismological Society of America Annual Meeting, April 8-10, 2009.

Sexton, C. J. and Blake, T. F.; 2010; "Challenges in Peer Review of Fault Rupture Hazard Studies for Engineering Mitigation"; Environmental and Engineering Geoscience; February, 2010; Vol. 16, No. 1; pp. 41-46.