Appendix E
Geological Report

Nuri Cho <nuri.cho@lacity.org>

VTT-82178, 1101-1115 S. Hill Street LADBS-Grading Report

CASEY JENSEN <casey.jensen@lacity.org> Mon, Jul 13, 2020 at 8:05 AM
To: Nuri Cho <nuri.cho@lacity.org>, Maria Reyes <maria.reyes@lacity.org>

7/13/2020

Planning,
The Grading Division of the Department of Building and Safety has reviewed the subject Vesting Tentative Tract Map No. VTT-82178 located at 1101-1115 S. Hill Steet
and it appears that geology/soils reports are not required prior to planning approval of the Tract Map as the property is located outside of a City of Los Angeles Hillside Area; is exempt or located outside of a State of California liquefaction, earthquake induced landslide, or fault-rupture hazard zone; and, does not require any grading or construction of an engineered retaining structure to remove potential geologic hazards.

Per Sec. 17.56 of the Los Angeles Municipal Code, each approved Tract Map recorded with the County Recorder shall contain the following statement; “The approval of this Tract Map shall not be construed as having been based upon geological investigation such as will authorize the issuance of building permits on the subject property. Such permits will be issued only at such time as the Department of Building and Safety has received such topographic maps and geological reports as it deems necessary to justify the issuance of such building permits.”

The applicant shall, "Comply with any requirements with the Department of Building and Safety, Grading Division for recordation of the final map and issuance of any permit."

If you have any questions, or need additional information, please let me know.
Thank you,
Casey

(213) 482-0490
Casey Lee Jensen, PG, CEG
Engineering Geologist Associate III
Los Angeles Department of Building and Safety
Grading Division, Mail Stop 115
221 N. Figueroa Street, 12th Floor, Suite 1200
Los Angeles, CA 90012
*Please note, I am out of the office every other Friday.

PRELIMINARY SITE GEOTECHNICAL AND GEOLOGIC ASSESSMENT REPORT

PROPOSED 40-STORY HIGH-RISE
MIXED-USE DEVELOPMENT PROJECT
1101-1115 S. HILL STREET AND 206-210 W. 11th STREET
LOS ANGELES, CALIFORNIA

PREPARED FOR:
Crown South Hill LLC
511 N. La Cienega Boulevard, Suite 206
West Hollywood, CA 90048

August 16, 2021

Prepared for:

Mr. Patrick Caruso
Crown South Hill, LLC
511 N. La Cienega Boulevard, Suite 206
West Hollywood, CA 90048

Prepared by:

AECOM
One California Plaza
300 South Grand Avenue
Los Angeles
CA, 90071
USA

T: +1 (213) 593 8100
F: +1 (213) 593 8178
aecom.com

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August 16, 2021

Mr. Patrick Caruso
Crown South Hill, LLC
511 N. La Cienega Boulevard, Suite 206
West Hollywood, CA 90048

Re: Preliminary Site Geotechnical and Geologic Assessment Report
Proposed 40-Story High-Rise Mixed-Use Development Project
1101-1115 South Hill Street and 206-210 West 11th Street
Los Angeles, California

Dear Mr. Caruso:

1. INTRODUCTION

1.1 GENERAL

This report presents the information and conclusion of a preliminary site geotechnical and geologic assessment conducted by AECOM Technical Services, Inc. (AECOM) in support of a 43-story high-rise development project (Project) located at 1101 to 1115 South Hill Street and 206-210 West 11th Street, Los Angeles, California. Our assessment included evaluation and identification of the potential impacts of the Project site's geologic and seismic conditions for inclusion in the environmental planning documents. The location of the Project site relative to adjacent major freeways, intersections and topographic features is shown on the Vicinity Map, Figure **1**.

1.2 PROJECT DESCRIPTION

We understand that the Project is a new mixed-use development consisting of 319 multi-family residential units, 160 TORS hotel rooms and ancillary hotel uses such as meeting rooms and up to 3,429 square feet (sf) of ground floor commercial uses. The Project proposes a 40-story (about 520 feet tall) building which would include one level of subterranean parking, one level of ground floor commercial uses, three levels of above ground parking, eight levels of TORS hotel guest rooms located on levels 6 through 13, and residential condominium units located on levels 14 through 38. The Project would also include a landscaped podium amenity deck on Level 5, indoor multi-purpose rooms and amenity space on Level 39 and a landscaped amenity roof deck on Level 40. The one-level subterranean parking will require an excavation down to approximately 20 to 25 feet below grade surface (bgs). In addition, a portion of the one-level subterranean parking will be deepened further to a maximum depth of 45 feet bgs for the construction of a fire water storage tank.

The Project site is located in the South Park District area of the Central City Community Plan and comprises approximately 0.67-acre. The site sits on a corner lot with frontage on South Hill Street to the east and West 11th Street to the north, and approximately 0.7 mile east of I-110 and 0.5 mile north of the Santa Monica Freeway (I-10).

The Project Site is surrounded by a mix of parking lots, residential buildings, hotels, commercial/office buildings, restaurants, and retail. The surrounding nearby buildings vary in height, consisting of mid-rise and high-rise structures. There are two one-story commercial buildings (Hill Grill and Blue Moon Hookah Lounge) and a small surface parking lot located at the north of the Project site, across West 11th Street. A one-story Bank of America branch is located immediately to the south of the Project Site. Across Hill Street, to the east, there is a seven-story mixed-use development project, Forest City Residential apartments. To the west there is an alley, across which is a surface parking lot. Currently, the Project site is occupied entirely by a concrete tilt-up building with a one-level basement up to about 23 feet deep bgs. A Plot Plan showing the footprint of proposed building is shown on Figure 2.

1.3 PURPOSE AND SCOPE OF WORK

AECOM has prepared this preliminary site geotechnical and geologic assessment report as a supporting document for inclusion to the environmental planning documents. The purpose of this preliminary site geotechnical and geologic assessment is to assess the geologic and seismic conditions at the Project site and to develop preliminary conclusions and mitigations recommendations regarding potential impacts from geologic and seismic hazards associated with the Project.

Our work was performed in general accordance with the latest California Environmental Quality Act (CEQA) guidelines; Environmental Checklist Form, Appendix G. Table 1 below presents a brief summary of the Project's potential impacts based on Section VI - Geology and Soils of Appendix G of the CEQA guidelines. Where applicable, recommendations to mitigate any identified potential geologic and seismic hazards are also provided in Section 4 of this report.

Table 1 - SUMMARY OF POTENTIAL GEOLOGIC/SEISMIC IMPACTS/HAZARDS

CEQA Checklist Questions	Impact Potential			
	Potentially Significant Impact	Less Than Significant with Incorporation of Project Design Features	Less Than Significant Impact	No Impact
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:			×	
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.			×	
ii) Strong seismic ground shaking?		×		
iii) Seismic-related ground failure, including liquefaction?			×	
iv) Landslides?				×
b) Result in substantial soil erosion or the loss of topsoil?				×
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?				×
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?				×
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?				×

Our services were performed in accordance with our proposals dated January 30, 2019 and July 19, 2021 and these proposals were authorized by Crown South Hill, LLC on January 31, 2019 and July 27, 2021, respectively. Our geotechnical and geologic assessment was based on review of readily available geologic and seismic data, our previous 2015 geotechnical investigation at the subject site, published geotechnical literature relevant to the subject site, and our previous experience within the South Park District, specifically within the city block enclosed by 11th Street, Grand Avenue, Pico Boulevard and Hill Street close to the Project site. Our scope included the following tasks:

- Review of readily available aerial photographs, topographic and geologic maps, published geotechnical literature, geologic and seismic data, soil data, groundwater data, and the geologic/geotechnical data obtained during previous geotechnical investigations in the near-vicinity of the Project site including the 2015 geotechnical investigation at the subject site.
- Review of geotechnical aspects of the current preliminary Project schemes and documents pertaining to the subject site.
- Compilation and analysis of existing geotechnical data pertaining to the subject site.
- Assessment of the general geologic conditions and seismic hazards affecting the area and evaluation of their potential impacts on the Project.
- Preparation of this preliminary geotechnical and geologic assessment report to present the results of our study, as well as our conclusions regarding the Project's geologic and seismic impacts, and recommendations to address/mitigate the impacts to be included in the environmental planning documents.

The above scope of work was performed following the aforementioned applicable CEQA and local City of Los Angeles guidelines. A review of the regulatory requirements for the Project indicates the City of Los Angeles has jurisdiction over the Project and therefore will be the Responsible Agency under CEQA.

1.4 PREVIOUS GEOTECHNICAL INVESTIGATION

AECOM performed a geotechnical investigation in 2015 at the subject site for a previous proposed high-rise development project. Field explorations included drilling 4 exploratory borings to depths ranging from approximately 90 to 120 feet bgs. The results of the investigation were summarized in a geotechnical data report dated July 31, 2015 and included logs of borings and results of geotechnical laboratory testing.

2. SITE CONDITIONS

2.1 GEOLOGY

2.1.1 Regional Geology

The Project site is located in the northernmost part of the Peninsular Ranges geomorphic province near the boundary of the Transverse Ranges geomorphic province. The Peninsular Range province is characterized by northwest-southeast trending alignments of mountain ranges and hills with intervening basins reflecting the influence of northwest trending major fault zones controlling the geologic structure of the region. A broad sediment-filled trough generally referred to as the Los Angeles Basin characterizes the northern portion of the Peninsular Ranges province. The Los Angeles Basin is an alluvial plain of low relief and was created by tectonic subsidence and subsequent deposition of sediments derived from ancestral streams from erosion along the flanks of the local mountains since the Pliocene time. Within this portion of the basin, thick accumulations of Quaternary age, non-marine to shallow marine deposits overlie marine Tertiary age sediments. The Palos Verdes Hills, located to the southwest of the Project site, are characterized by a complex sequence of Jurassic to Pleistocene age marine and non-marine sedimentary and metamorphic rock.

2.1.2 Site Geology

The Project site is located within the central block of the Los Angeles Basin, consisting of a south-westward-dipping gently sloping alluvial plain developed by continued uplift and subsequent filling of sediments derived from headward erosion along the flanks of the Santa Monica Mountains, San Gabriel Mountains, Repetto Hills, and the Elysian Hills. The central block of the Los Angeles Basin is interrupted to the west by a series of left-stepping echelon pattern of domal hills. These hills that were formed due to folding and deformation produced by the Newport-Inglewood Fault Zone and are expressed on the surface as the Baldwin, Dominguez, and Signal Hills extending south-easterly from the Santa Monica Mountains on the north to the San Joaquin Hills in the Newport Beach area to the south. The central block is bounded by the Santa Monica Mountains to the north and the eastern margin is bounded by the Whittier Fault.

The Project study area is reported by Dibblee (1991) as blanketed by Holocene-age, undissected, unconsolidated alluvial deposits over 200 feet thick overlying Fernando formation bedrock. Dibblee (1991) describes the alluvial sediments as fine to medium-grained silty sand and sand with trace fine gravels interbedded with discontinuous flood plain fine-grained sediments consisting of clay and silt. A Geologic Map of the Project vicinity is shown in Figure **3**.

2.1.3 Geologic Units – Alluvium

Based on the previous geotechnical investigations conducted at and within near-vicinity of the Project site, the subsurface soils at the Project site are anticipated to consist predominantly of variable alluvium with alternating layers of silty sand, poorly graded sands and gravels with some isolated layers of clays and silts. This alluvium has been characterized as generally having medium dense to very dense sands and interbedded clays/silts with stiff to hard consistencies up to a maximum drilled depth of about 120 feet bgs. The proposed bottom depths of the one-level subterranean parking at approximately 20 to 25 feet bgs plus a deepened area to 45 feet bgs for the fire water storage tank are anticipated to encounter dense to very dense sands and silty sands with gravels and stiff to very stiff clay.

2.2 GROUNDWATER

The Project site is located within the Los Angeles Forebay Area of Central Groundwater Basin which underlies the central Coastal Plain of Los Angeles Groundwater Basin (California Department of Water Resources [DWR], Bulletin 118, updated in 2004).

According to the Seismic Hazard Zone Report 026 for the Hollywood 7.5-Minute Quadrangle, the historically highest groundwater in the vicinity of the Project site has been inferred to be between 100 and 120 feet bgs, shown on Historically Highest Ground Water, Figure 4 (California Division of Mines and Geology [CDMG], 1998).

However, the information of groundwater data collected from the State Water Resources Control Board's GEOTRACKER website indicates that in 2010, groundwater was reported between depths of 32 and 45 feet in two (2) 50-foot deep monitoring wells located approximately 990 and 1000 feet north of the Project site, respectively. We estimated these two (2) monitoring wells north of the Project site were monitoring the groundwater that is perched above the regional groundwater aquifer.

Our exploratory borings drilled in 2015 at the Project site to depths of 90 to 120 feet bgs did not encounter any groundwater. However, previous exploratory borings by others drilled to a maximum depth of 160 feet bgs in the near vicinity of the Project site encountered occasional minor seepage between approximately 27 and 37 feet bgs. We believe these minor seepages are within sandy zones that are perched on the silty or clayey soil layers. The silty and/or clay soil layers were not frequently encountered and were observed to be very isolated based on our 2015 borings at the Project site.

The variations in groundwater depths could be the result of seasonal rainfall fluctuations especially during and immediately after periods of heavy rainfall. High groundwater levels can result in changed conditions.

3. GEOLOGICAL AND SEISMIC HAZARDS EVALUATION

3.1 GENERAL

Geological and seismic hazards are those hazards that could impact a site due to the surrounding geologic and seismic conditions. Geological hazards include expansive/collapsible soils, compressible soils, corrosive soils, oil wells, methane gas, subsidence/erosion, and flooding. Seismic hazards include phenomena that occur during an earthquake such as surface fault rupture, ground shaking, liquefaction, seismic-induced landslide/ mudflow, seismic-induced flooding, and tsunamis/seiches. The potential impact of those hazards to the Project site has been assessed and is summarized in the following sections. Our assessment of these hazards was based on guidelines established by California Geological Survey (CGS; formerly California Division of Mines and Geology [CDMG]) as outlined in its Special Publication 117A (2008). Mitigations to any identified hazards at the Project site are discussed in Section 4.

3.2 GEOLOGICAL HAZARDS

3.2.1 Expansive Soil and Collapsible Soils

Expansive soils are fine-grained soils that can undergo a significant increase in volume with an increase in water content and a significant decrease in volume with a decrease in water content. Changes in the water content of an expansive soil can result in severe distress to structures constructed upon the soil.

Based on the available data of previous soil investigations within the near vicinity of Project site, majority of onsite soils are sandy materials which consists of medium dense to very dense silty sand, poorly graded sand with silt and gravel, and well-graded sand with gravel and cobble. There were isolated interbedded clayey layers consisting of stiff to hard lean clay that may have a medium expansion potential. The building will have different foundation levels at approximately 20 to 25 feet bgs and at 45 feet bgs and we anticipate the foundation subgrade at these depths will consist of sand, silty sand, silt and clay. With proper foundation design to account for expansiveness of the clay soils will be adequate to mitigate the potential of expansive soil hazard at this Project site.

Collapsible soils undergo settlement upon wetting, even without the application of additional load. Water weakens or destroys the bonds between soil particles and severely reduces the bearing capacity of the soil. Typical collapsible soils are lightly colored, with low plasticity and relatively low densities. As mentioned in Section 2.1.3, the alluvial soils at depths of 20 to 25 feet bgs and at depths greater 45 feet bgs predominantly consist of very dense silty sand, poorly graded sand with silt and gravel, sandy silt, well-graded sand with gravel and stiff to very stiff silty clay and lean clay. Therefore, the potential impacts due to collapsible soils are expected to be negligible.

3.2.2 Compressible Soils

Artificial fill and near-surface alluvial deposits may be compressible, particularly with the addition of water. Where present, these materials may be subject to load-induced settlement and are not suitable for support of foundations, slabs-on-grade, paving or new compacted fills. The construction of the one-level subterranean parking garage will remove approximately 20 to 25 feet of existing soils plus an additional deepening to 45 feet bgs below the subterranean parking for the fire water storage tank. These excavation depths will remove all the near-surface fill and compressible soils and the subgrade soils at and below those planned excavation depths are generally dense to very dense and stiff to very stiff; so therefore, the potential for compressible soil hazard at the Project site is negligible.

3.2.3 Corrosive Soils

Based on the available results of corrosion tests from the previous soil investigations within the near-vicinity of the Project site, the top 5 feet of surface soils and the soil at 20 to 25 feet bgs are moderately corrosive to corrosive to ferrous metals, and sulfate attack to exposed concrete is considered moderate corrosive to negligible. Therefore, the soils at the Project site are likely to exhibit similar corrosive properties.

3.2.4 Oil Wells

The Project site is shown on the 1991 Dibblee's Geologic Map to be within the Los Angeles Downtown Oil Field (See Figure 3). Based on the District 1 Map 119 presented on the California Division of Oil, Gas and Geothermal Resources (DOGGR) website, the Project site is located within the boundary of the Los Angeles Downtown Oil Field as shown on the Oil, Gas, & Geothermal Map, Figure **5**. The well locations shown are generally considered approximate.

There are reportedly two (2) groups of oil/gas wells in the south vicinity of the Project site. One group which includes three (3) unknown wells is located at 1243 S. Olive Street, Los Angeles, CA 90015. These wells are located approximately 700 to 970 feet southwest of the Project site and had reportedly been plugged and built over by a new residential building (OLiVE DTLA) in 2016. Another group which includes 29 oil/gas wells, and belonging to NASCO Petroleum, LLC, is located at 1331 S. Broadway, Los Angeles, CA 90015, approximately 1220 to 1240 feet south of the Project site. These wells are either active or idle except for one that is reportedly plugged.

According to the DOGGR records, there are no active or abandoned oil/gas wells shown within the footprint of the Project site. The likelihood of encountering an abandoned oil/gas well during construction is low. However, the DOGGR well locations are approximate and location errors are possible. Although the likelihood of encountering an abandoned oil well is low, mitigation is recommended in the event an oil well is encountered during construction.

3.2.5 Methane

Methane gas is a naturally occurring gas associated with the decomposition of organic materials. In high-enough concentrations between 50,000 parts per million (ppm) and 150,000 ppm by volume in the presence of oxygen, methane can be considered as an explosion hazard.

The Project site is located within an area delineated by the City of Los Angeles Department of Building & Safety (LADBS) as a 'Methane Zone' as shown on LADBS Methane and Methane Buffer Zone Map, Figure **6**. Therefore, there is potential for methane gases at the subject site and the City of Los Angeles will require a subsurface methane investigation in accordance with LADBS Ordinance No. 175790. If methane is encountered, then a permanent gas control system may be necessary beneath proposed building at the Project site.

3.2.6 Subsidence

The extraction of water or petroleum from sedimentary source rocks can cause the permanent collapse of pore space previously occupied by the removed fluid. The compaction of subsurface sediment caused by fluid withdrawal will cause subsidence of the ground surface overlying a pumped reservoir. If the volume of water or petroleum is sufficiently great, the amount of resulting subsidence may be sufficient to damage nearby engineered structures.

As mentioned in Section 3.2.4, the Project site is located within the Los Angeles Downtown Oil Field Zone as shown in Figure **5**. Although a detailed study has not been performed for this report, it is anticipated that the current minor extractions from oil and/or water wells in the vicinity would not result in measurable subsidence at the Project Site, barring a significant increase in extraction in the future. While continued subsidence related to these activities may occur, the relatively small magnitude of subsidence distributed over a broad area should not adversely affect the proposed construction. Therefore, the potential for subsidence is not considered a significant geologic hazard to the Project.

3.2.7 Sedimentation and Erosion

The Project will include construction that will encompass the entire site with concrete structures, and it is not anticipated to result in significant impacts associated with sedimentation or erosion. Grading, excavation, and other earth-moving activities could potentially result in erosion and sedimentation during construction. For grading performed in the "rainy season", generally October to April, provisions should include erosion control. Construction activities should be performed in accordance with the requirements of the City of Los Angeles Building Code, as well as those of the Regional Water Quality Control Board through the City's Department of Public Works, Bureau of Sanitation, Watershed Protection Division.

3.2.8 Flooding

According to City of Los Angeles Safety Element Department of City Planning Los Angeles, 1996, (100-Year & 500-Year Flood Plains, Exhibit F), the Project site is not located within either 100-Year or 500-Year flood plain areas. Therefore, the possibility of flooding at the Project site is very minimal. However, the Project civil engineer should verify the flooding potential.

3.3 Seismic Hazards

3.3.1 Surface Fault Rupture

The Alquist-Priolo (A-P) Earthquake Fault Zoning Act is a State law that regulates development projects near active faults to mitigate the hazard of surface fault rupture. CGS defines an active fault as one that has had surface displacement within Holocene time (about the last 11,000 years), and a sufficiently active fault as one that has evidenced of surface displacement along one or more of its segments or branches (CDMG, 1997). CGS considers a fault to be well defined if its trace is clearly detectable as a physical feature at or just below the ground surface.

As in most of southern California, the Project site is located in a seismically active area. Based on our review of the map of Earthquake Zones of Required Investigation for the Hollywood Quadrangle (Figure 7), the Project site is not located within an A-P Earthquake Fault Zone as defined by the State of California (Hart and Bryant, 2007). The closest A-P-zoned faults to the

Project site is the Hollywood Fault located approximately 5.1 miles (8.2 kilometers) to the north and the Newport-Inglewood fault zone which is located approximately 5.7 miles (9.2 kilometers) to the west to southwest.

There are no active faults delineated by CGS that have been recognized as crossing or projecting toward the Project site (Hart and Bryant, 2007). Surface fault rupture is considered unlikely at the Project site.

3.3.2 Seismic Ground Shaking

Strong ground motion occurs as energy is released during an earthquake. The intensity of ground motion is dependent upon the distance to the fault rupture, the earthquake magnitude, and the geologic conditions underlying and surrounding the site. Seismic ground shaking will induce kinematic and inertia loads to the proposed structures for the Project.

The Los Angeles Basin, as well as most of southern California, is located within a complex zone of faults and folds resulting from compressional forces occurring along a bend within the boundary between the Pacific and North American tectonic plates. Numerous generally east-west to northwest trending faults have formed as a result of these north-south compressional forces acting within this area.

The Regional Fault Map, as shown on Figure **8**, includes the location of active and potentially active faults, within the general vicinity of the site. Most of the larger earthquakes have been associated with larger faults that have been mapped at the ground surface. Several moderate to large earthquakes in the region have also occurred on deep-seated buried thrust faults in this geological complex region of southern California. The most recent significant earthquake was the magnitude 6.7 Northridge earthquake, which occurred on a shallowly south dipping thrust fault that underlies much of the San Fernando Valley. The 1971 San Fernando earthquake had a moment magnitude of 6.4 that involved surface rupture and occurred on a northerly dipping thrust fault that dips from the northern side of the San Fernando Valley. Other significant earthquakes that produced significant shaking include the 1987 magnitude 5.9 (Mw) Whittier earthquake, and the 1933 magnitude 5.5 (Mw) Long Beach earthquake.

The characteristics of the nearby faults are summarized in Table 2. Several major faults within the near vicinity of the Project site are characterized by a combination of blind thrusting, right-lateral strike-slip, and reverse faulting and are described in more details in the following subsections.

Puente Hills Thrust

The Puente Hills Blind Thrust fault is defined based on seismic reflection profiles, petroleum well data, and precisely located seismicity (Shaw et al., 2002). This blind thrust fault system extends eastward from downtown Los Angeles to Brea and includes three north-dipping segments, named from east to west as the Coyote Hill segments, the Santa Fe Springs segments, and the Los Angeles segment. The Los Angeles segment of the Puente Hills Blind Thrust fault lies directly beneath downtown Los Angeles and the near-vicinity of Project site.

The Puente Hills Blind Thrust fault is not exposed at the ground surface and does not present a potential for surface fault rupture. However, based on deformation of late Quaternary age sediments above, this fault is considered an active fault capable of generating future earthquakes beneath the Los Angeles Basin. An average slip rate of 0.7 mm/yr and a maximum earthquake magnitude of 6.92 are estimated using the Leonard 2010 magnitude-area scaling relations.

Elysian Park Thrust

The Elysian Park Thrust consists of a series of shallowly north and northeast-dipping blind thrusts that extend from Orange County through downtown Los Angeles and westward beneath the Santa Monica Mountains. The thrust system is not exposed at the surface but is buried under the unconsolidated alluvial sediments of the Los Angeles Basin. These subsurface thrust faults are capped and structurally reflected at the surface known as the Elysian Park anticline. Recent studies suggest that the fault experiences an average slip rate of 1.5mm/year and is capable of producing a Magnitude 6.7 earthquake.

San Vicente Fault

The San Vicente blind fault is located in the northern Los Angeles fault system and extends through the Salt Lake oil fields is an early to late Miocene age extensional north-dipping normal fault. In the early Pliocene contraction of the Los Angeles Basin began resulting in the reactivation of normal faults with the initiation of monoclinal and secondary compressional structures. The San Vicente blind fault is believed to account for approximately 20% of the structural relief in the northern Los Angeles shelf. Deformation modelling (Schneider, 1996) based on the length and thickness of growth strata suggests the northern Los Angeles fault system is growing at a reverse slip rate of 1.5 to 1.9 mm per year.

Hollywood Fault

The Project site is located near several active or potentially active faults that comprise parts of the Transverse Ranges Southern Boundary fault system, an east-west-trending system of reverse, oblique-slip, and strike slip faults that extends for more than 124 miles (200 kilometers) along the southern edge of the Transverse Ranges (Dolan et al., 2000). The 15-kilometer-long Hollywood fault is located just south of the faceted ridges and bedrock outcrops of the south margin of the eastern Santa Monica Mountains along Sunset Boulevard. Studies by several investigators (Dolan and Sieh, 1992) have indicated that the fault is active, based on geomorphic evidence, stratigraphic correlation between exploratory borings, and fault trenching studies. Although it is considered to be a Holocene fault (indicating displacement within the past 10,000 years) the Hollywood fault has not produced any moderate or large earthquakes in the historical record.

Newport-Inglewood Fault Zone

The Newport-Inglewood fault zone (NIFZ) is about 47 miles (75 km) long and consists of a series of right lateral strike-slip faults that trends northwest-southeast forming an alignment of hills from Newport Mesa to Cheviot Hills along the western side of the Los Angeles Basin. The NIFZ is characterized at the surface by a belt of domal hills and mesas formed by the folding and faulting of thick sequences of Pleistocene age sediments and Tertiary age sedimentary rocks (Barrows, 1974). The fault was the source of the 1933 Long Beach earthquake (M 6.4). The recurrence interval is estimated on the order of a thousand years or more (Schell, 1991; Freeman et al., 1992; Shlemon et al., 1995; Grant et al., 1997). The slip rate on the Newport-Inglewood fault is not fully constrained but appears to be approximately 0.5 to 1 mm/yr in the north, and increasing to 0.5 to 1.5 mm/yr in the south (USGS, 2015). The NIFZ produced the 1933 Long Beach event that had a moment magnitude (Mw) of about 6.4.

Table 2 - MAJOR FAULT CHARACTERIZATION IN THE PROJECT VICINITY

FAULT	APPROXIMATE DISTANCE[1] (kilometers)	APPROXIMATE DISTANCE[1] (miles)	TYPE OF FAULT[2]	MAXIMUM EARTHQUAKE MAGNITUDE[3] (Mw)
Puente Hills	0.57	0.35	Blind Thrust	6.92
Elysian Park	1.32	0.82	Thrust	6.72
San Vicente	4.80	2.98	Blind Thrust	6.17
North Salt Lake	7.80	4.85	Reverse	5.82
Santa Monica	7.91	4.92	Reverse	6.63
Hollywood	8.42	5.23	Reverse/ Strike Slip Component	6.54
Raymond	9.65	5.99	Reverse Oblique	6.55
Newport-Inglewood	10.18	6.33	Strike Slip	6.99
Verdugo	13.06	8.11	Reverse	6.75
Sierra Madre	20.05	12.46	Reverse	7.01
Whittier	20.21	12.56	Reverse-Oblique	6.83
Malibu Coast	24.43	15.18	Reverse	6.48
Palos Verdes	25.61	15.91	Strike Slip	7.15
Compton	26.11	16.22	Blind Thrust	7.29
Anacapa-Dume	26.98	16.77	Reverse	7.05
Northridge Hills	27.48	17.08	Reverse	6.86
San Gabriel	27.63	17.17	Strike Slip	7.08
Redondo Canyon	28.19	17.52	Reverse	6.49
Northridge	31.78	19.75	Blind Thrust	6.74
Santa Susana	32.33	20.09	Thrust	6.73

Notes:
1. Distance to fault, R_x, which is defined as the perpendicular distance from the site to the surface projection of the top of fault.
2. Fault characterization based on Field et al., 2013.
3. The maximum earthquake magnitude is estimated using the Leonard 2010 magnitude-area scaling relations.
- Fault data based on Uniform California Earthquake Rupture Forecast, Version 3 (Field et al., 2013).

3.3.3 Liquefaction/Liquefaction-Induced Lateral Spreading

Liquefaction is a phenomenon whereby saturated, granular soils lose their inherent shear strength due to excess pore water pressure build-up, such as that generated during repeated cyclic loading from an earthquake. A low relative density and loose consistency of the granular materials, shallow ground-water table, long duration and high acceleration of seismic shaking are some of the factors favorable to cause liquefaction.

According to the Earthquake Zones of Required Investigation Map for the Hollywood 7.5-Minute Quadrangle (Figure **7**), the Project site is not located within the liquefaction zone area. Due to the dense to very dense native soils and the depth to historical high groundwater greater than 100 feet, the potential for liquefaction is considered remote at the Project site.

According to publications by Bartlett and Youd (1995), conditions such as free-face, sloping ground surfaces and liquefiable layers are factors contributing to lateral spread displacement of the ground during strong motion events. The Project site does not have free-face, sloping surface that is unsupported. The site has very low susceptibility of liquefaction; therefore, the risk of lateral spread displacement is remote.

3.3.4 Earthquake-Induced Landslide/Mudflow

Hazards associated with seismic-induced slope instability include landslides and mudflows. According to the Earthquake Zones of Required Investigation Map (Figure **7**), the Project site is not located within areas designated by CGS where previous occurrence of landslide movement or local topographic, geological, geotechnical and subsurface conditions indicate a potential for permanent ground displacement to the event that mitigation would be required. The Project site is located in a relatively flat, low-lying sediment-filled plain. The potential for slope stability hazards at the Project site is negligible.

3.3.5 Earthquake-Induced Flooding

Earthquake-induced flooding occurs when nearby water retaining structures, such as dams or storage tanks, are breached or damaged during an earthquake. The City of Los Angeles General Plan Safety Element, Exhibit G (1996) identifies the Project Site west and north of a potential inundation area. The Los Angeles County Safety Element (1990), Plate 6, identified the Project Site just north and west of, and outside, a “dam or debris basin flood area”. The Hansen Dam Reservoir has been identified by the Los Angeles County Safety Element (1990) as a potential source being located approximately 17 miles to the northwest of the Project Site. However, there appears to be minimal risk of earthquake-induced flooding at the Project site due to the following:

- The Project Site being just outside the dam inundation area.
- In general, there are engineering controls in place that are established by state and local agencies to monitor the dam safety in accordance with the National Dam Safety Act (Public Law 92-367) to ensure that these structures are designed and constructed properly as well as receive regular inspections, maintenance and design retrofits, to reduce the potential for earthquake-induced failures.
- In addition to the site distance, there are also numerous drainage channels and spreading grounds between the source and the Project site, including the Los Angeles River, that would intercept and divert flood waters that would result from a breach of the Hansen Dam or similar water-storage structures upstream.
- The latest 2017 LA City Hazard Mitigation Plan has early-warning provisions and programs to increase public awareness for such an event. This plan includes measures to further reduce risk from hazards.

Moreover, the Project would not exacerbate potential dam failure or the possibility of flooding as a result of dam failure.

3.3.6 Tsunamis/Seiches

Tsunamis are great sea waves (commonly called a tidal wave) produced by a significant undersea disturbance. The Project Site is located approximately 12.4 miles from the Pacific Ocean shoreline. According to City of Los Angeles Safety Element (Department of City Planning, Los Angeles, 1996, Inundation & Tsunami Hazard Areas, Exhibit G), the Project site is not located within the potential tsunami hazard area. As a result, tsunamis are not considered a significant hazard to the Project Site.

A seiche is an oscillation of a body of water in an enclosed or semi-enclosed basin, such as a reservoir, harbor, lake, or storage tank, resulting from earthquakes or other large environmental disturbances. Given its distance to the nearest reservoir, seiches are not considered a hazard at the Project site.

4. RECOMMENDATIONS

4.1 MITIGATIONS TO HAZARDS

Recommendations to mitigate the potential aforementioned geologic and seismic hazards are presented in following sections. As required by the current City of Los Angeles Building Code a full design-level geotechnical investigation that addresses these geologic and seismic hazards in greater detail will be performed to support the proposed Project permitting, design and construction. The report of the investigation will be submitted to City of Los Angeles Department of Building and Safety for review and approval and will be part of the Project specifications.

Geotechnical observation and testing during the implementation of the mitigations will be required during the temporary excavations, foundation construction, and any other geotechnical-related construction activities as a means of ensuring that impact risks, if any, can be reduced to less than significant. The following design recommendations/features discussed in this section would be incorporated into the project's design and construction. No significant impacts related to geologic and seismic hazards are anticipated with the incorporation of these design features/ recommendations.

4.1.1 Corrosive Soils

Mitigation of corrosive soil conditions may involve the use of concrete that is resistant to sulfate exposure. Corrosion protection for metals may be needed for underground foundations or structures in areas where corrosive groundwater or soil could potentially cause deterioration. Typical mitigation techniques include epoxy and metallic protective coatings, the use of alternative (corrosion resistant) materials, and selection of the appropriate type of cement and water/cement ratio. These design and construction features and elements would be incorporated into the project's design and would be performed following the latest Building Code during the design phase and will be reviewed and approved by the governing agency. Therefore, with incorporation of project design features, potential hazardous impacts related to corrosive soils are anticipated to be less than significant.

4.1.2 Oil Wells

Although the likelihood is low, should any known or previously undiscovered oil production wells be encountered at the Project site during construction activities, the Applicant or construction manager should halt work in the immediate area and notify DOGGR and the City of Los Angeles Fire Department immediately. Any such wells should be abandoned or re-abandoned in accordance with the requirements of DOGGR and the Los Angeles Fire Department.

4.1.3 Methane

Since the Project site is located in a City of Los Angeles Methane Zone and overlies the Los Angeles Downtown oil field, there is a potential for methane and other volatile gases to occur beneath the Project site. Therefore, AECOM recommends that mitigation provisions be included, following the LADBS requirements for soil-gas testing and design of methane mitigation systems, during the Project's design and construction phases in accordance with City of Los Angeles' Methane Mitigation Ordinance No. 175790.

4.1.4 Groundwater

Based on the Project design, the maximum depth of proposed excavation and earthwork for the Project could extend approximately 45 feet bgs. The regional historical high groundwater level is greater than 100 feet bgs at the Project site. Therefore, the groundwater is not expected to impact foundation construction. However, sporadic groundwater seepage within a sandy zone perched on a silty or clayey soil layer has been reported from nearby excavations. The impact of minor perched groundwater seepage between approximate depths of 25 and 40 feet bgs should be anticipated during construction. It is anticipated that the perched groundwater would dissipate relatively quickly, once encountered.

4.1.5 Seismic Ground Shaking

Potential impacts of seismic ground shaking can be reduced to less than significant through appropriate site-specific ground motion analysis and Project structural design. The proposed tower would be designed using the Los Angeles Tall Buildings Structural Design Council 2001 edition, "An Alternative Procedure for Seismic Analysis and Design of Tall Buildings Located in the Los Angeles Region". With this design approach, a site-specific ground motion based on the latest seismic design standard would be developed for Project structural design. The proposed podium and subterranean structures would be designed in accordance with LADBS prescribed methods that are based on the California Building Code 2019 and ASCE 7-16. These appropriate structural design approaches would be the recommended mitigation techniques to reduce the impacts related to seismic ground shaking to comply with the building code requirements.

4.2 Anticipated Geotechnical Factors

The Project site is currently occupied by a concrete tilt-up building with a one-level basement up to approximately 23 feet bgs. Preliminary geotechnical factors that could affect the feasibility of the Project are addressed in following sections.

4.2.1 Site Disturbance due to Demolition

The existing structure has a basement that occupies the entire Project site. Due to the space between the current building line and the property line being very limited, we anticipate potential challenges during demolition of the existing basement structure. Specially considered demolition techniques and provisions will be needed to avoid adverse impacts to adjacent properties and surrounding public streets. Presence of old, abandoned shoring elements should be anticipated to avoid interference with the new shoring system that will be required for Project.

Considering the proposed excavation for the 2-level subterranean parking garage to about 45 feet bgs, temporary shoring with soldier piles supported by either tied-back or inner support struts are anticipated. The design and construction team should also anticipate the need to obtain permission from City of Los Angeles for any shoring systems and elements that extend beyond the Project property lines.

4.2.2 On-Site Material

Onsite excavations will generate a significant percentage of relatively large-sized particles since gravels and cobbles were encountered extending to approximately 25 feet bgs in the near-vicinity of the Project site. Such large-sized particles will generally be unsuitable for re-use as fill. As such, excavated onsite soils will most likely require processing (exclusion and removal of large-sized particles) in order to satisfy standard specifications for acceptable fill materials.

4.2.3 Field Infiltration Characteristics

Due to the deep groundwater and the sandy nature of the subsurface soils, the Project site is generally considered suitable for stormwater infiltration. However, the proposed Project will be designed to occupy the entire property; therefore, both stormwater infiltration and biofiltration systems could be precluded from a design standpoint. The use of drywells discharging into suitable sandy/granular soil layers may be considered for this Project.

4.2.4 Anticipated Foundation Conditions

Based on the data from the previous geotechnical investigation at the Project site and those from previous projects within the near vicinity of Project site, the soil materials at the anticipated Project foundation levels, at 20 to 25 feet bgs and approximately 45 feet bgs, are considered dense to very dense or stiff to very stiff. As mentioned before, the dense to very dense soils consist primarily of sand containing varying amounts of gravels and cobbles and the stiff to very stiff soils consist of silt and clay. There are upper and intermediate layers of weaker and relatively more compressible silts, silty sands and clays; however, these soils will be removed during the mass excavation.

It is anticipated that the proposed high-rise tower may be supported on a mat foundation established in the very dense and very stiff undisturbed natural soils. The podium portion over the one-level subterranean parking may be supported on spread and/or continuous footings established in the very dense and stiff to very stiff natural soils.

A site-specific geotechnical investigation will be required for the proposed Project by LADBS. The geotechnical investigation should include subsurface explorations and appropriate soil and field testing. The report should provide recommendations for foundation support, grading, excavation, shoring, and seismic design parameters needed for design and construction of the proposed Project.

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6. LIMITATIONS

AECOM has evaluated the site geotechnical conditions and potential geologic and seismic hazards at the Project site by reviewing readily available geotechnical data, and performing a limited site reconnaissance to provide this preliminary geotechnical and geologic assessment report which can be utilized in the preparation of environmental documents for the Project.

Geotechnical engineering and the geologic sciences are characterized by uncertainty. Professional judgments presented herein are based partly on our understanding of the proposed construction, and partly on our general experience. Our engineering work and judgments rendered meet current professional standards; we do not guarantee the performance of the Project in any respect.

- o0o –

It has been a pleasure to assist you with this Project. We look forward to being of further assistance as design and construction phases begin. Should you have any questions regarding this report, please contact us.

Very truly yours,

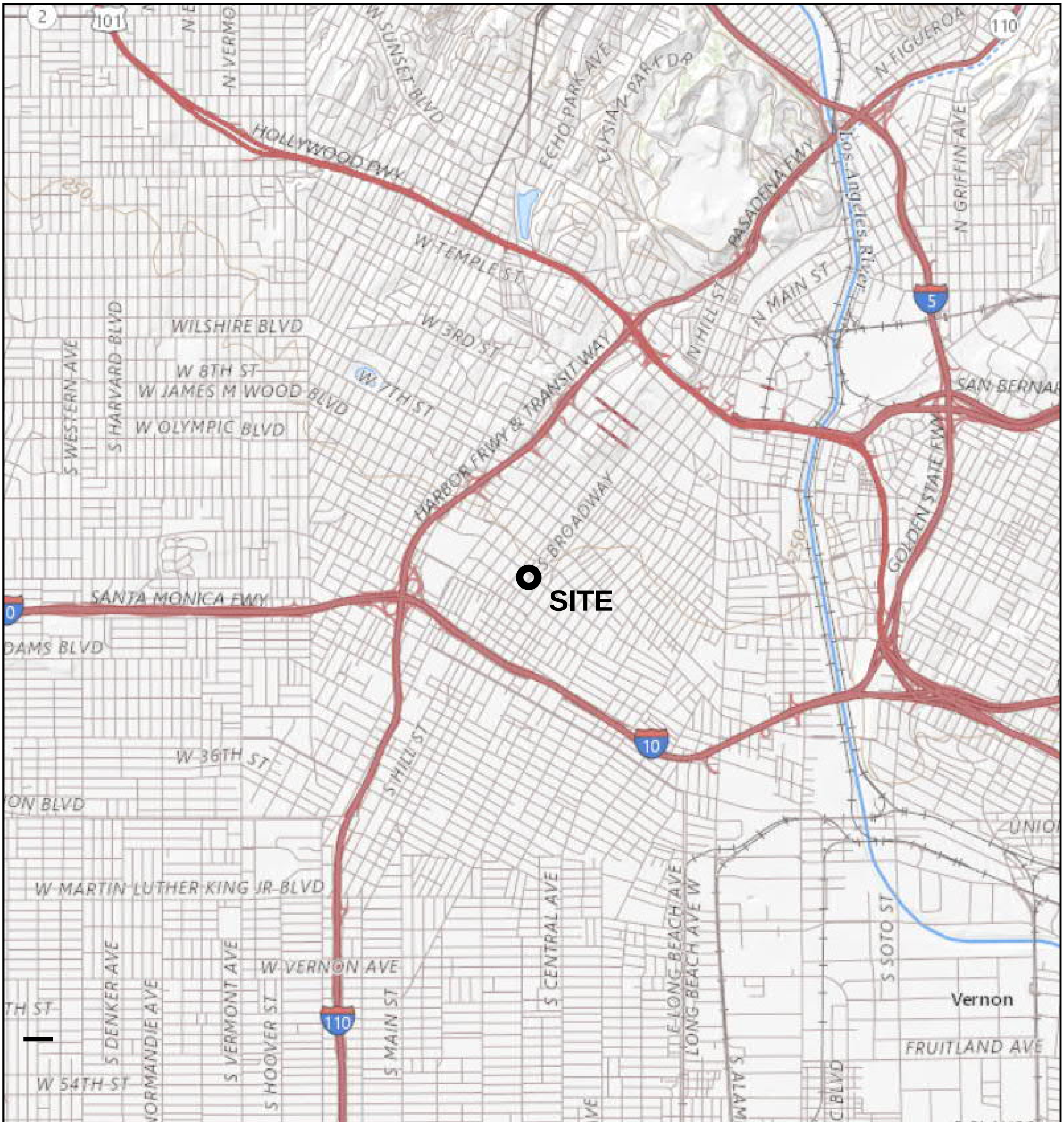
AECOM

C. Garry Lay, P.E., G.E.
Principal Engineer

Arnel M. Bicol, P.E., G.E.
Principal Engineer

Joseph P. Gratzer, P.G., C.E.G.
Certified Engineering Geologist

FIGURES



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Site Location

0 0.5 1 2

1 INCH = 1 MILE

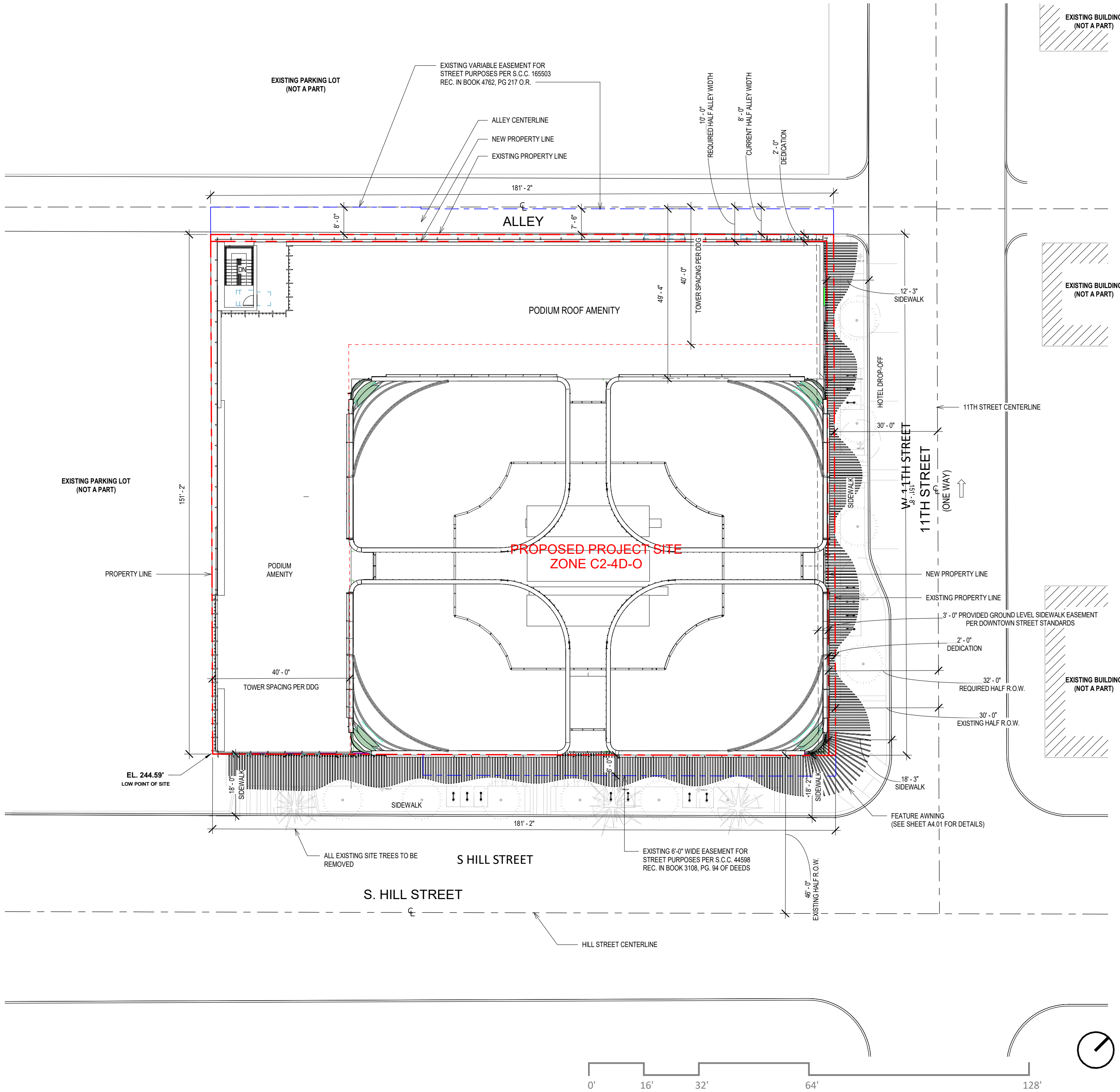
Basemap: United State Geologic Study (USGS), "USGS Topo" [map]. The National Map. 1:63,360. USGS, October 2018.

VICINITY MAP

40-STORY HIGH-RISE MIXED-USE DEVELOPMENT
1101-1115 SOUTH HILL STREET; 206-210 WEST 11TH STREET
LOS ANGELES, CALIFORNIA 90015
FOR: CROWN INTERNATIONAL HOLDINGS GROUP

AECOM

FIGURE 1



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Existing Building To Be Demolished

PLOT PLAN

40-STORY HIGH-RISE MIXED-USE DEVELOPMENT
1101-1115 SOUTH HILL STREET; 206-210 WEST 11TH STREET
LOS ANGELES, CALIFORNIA 90015
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FIGURE 2

af
Qg Qc
Qa Qf

SURFICIAL SEDIMENTS

Unconsolidated detrital sediments; generally undissected

af *Artificial fill*
Qg *Gravel and sand of major stream channels*
Qc *Clay and sand of pre-development marshlands*
Qa *Alluvium: clay, sand and gravel, includes gravel and sand of minor stream channels*
Qf *Alluvium: clay, sand and gravel derived from Verdugo Mountains*

Qae Qop
Qoa

OLDER SURFICIAL SEDIMENTS

Unconsolidated to weakly consolidated; dissected and eroded where elevated; late Pleistocene age

Qae *Similar to* **Qa***, but slightly elevated and dissected; includes alluvial fan sediments*
Qop *Paleosoil in Baldwin Hills (Fox Hills residual paleosoil of Weber et al. 1982); moderately indurated, erosion-resistant, gray to rusty brown pebbly and sandy paleosoil or "hardpan" on* **Qoa**
Qoa *Older alluvium, gray to light brown pebble-gravel, sand, silt and clay of detritus derived from Santa Monica Mountains; similar to* **Qae***, but slightly consolidated; in Baldwin Hills designated as Baldwin Hills sandy gravel (Weber et al, 1982), where it is much dissected and eroded*

Tfr

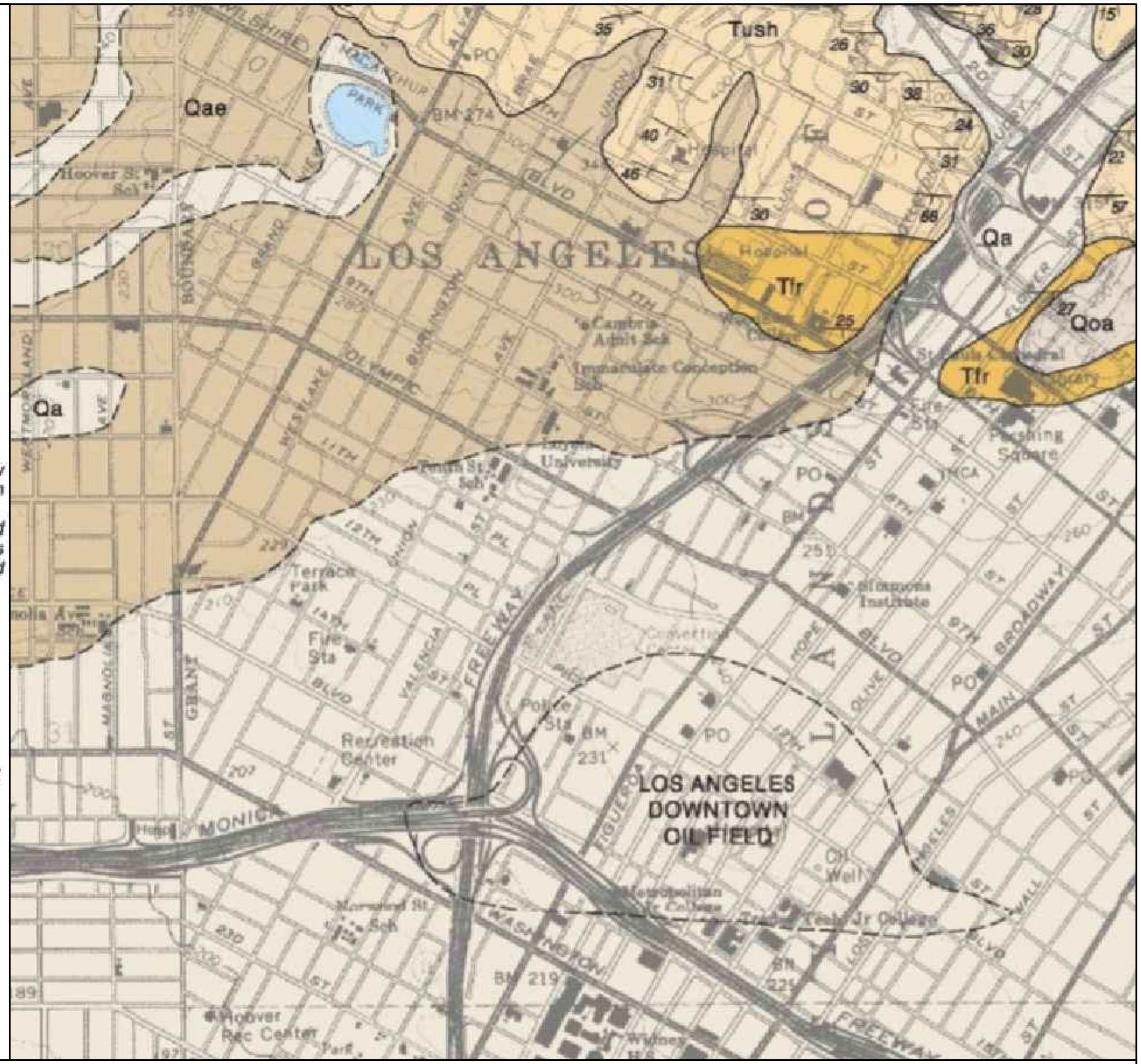
FERNANDO FORMATION
(Of Lamar 1970)
Marine clastic; early Pliocene age (Repettian Stage)

Tfr *Repetto Member (Lamar 1970): in downtown Los Angeles, consolidated but crumbly gray to greenish-gray claystone-siltstone, in part sandy; vaguely bedded, locally fossiliferous*

Tush

UNAMED SHALE
(Included in Puente Formation by Lamar 1970, and Weber 1980; equivalent to upper Modelo Formation of Hoots 1931; upper Modelo Formation of Durrell 1954, in Santa Monica Mountains; and to Sisquoc Shale of Dibblee 1989, in Ventura Basin)
Marine clastic; late Miocene age ("Delmontian" and upper Mohnian Stages)

Tush *Gray to light brown, thin-bedded silty clay shale, soft and crumbly; locally contains scattered hard calcareous nodules; in places contains laminae of fine grained soft sandstone*



Legend

Site Location

N

0 1/8 1/4 1/2

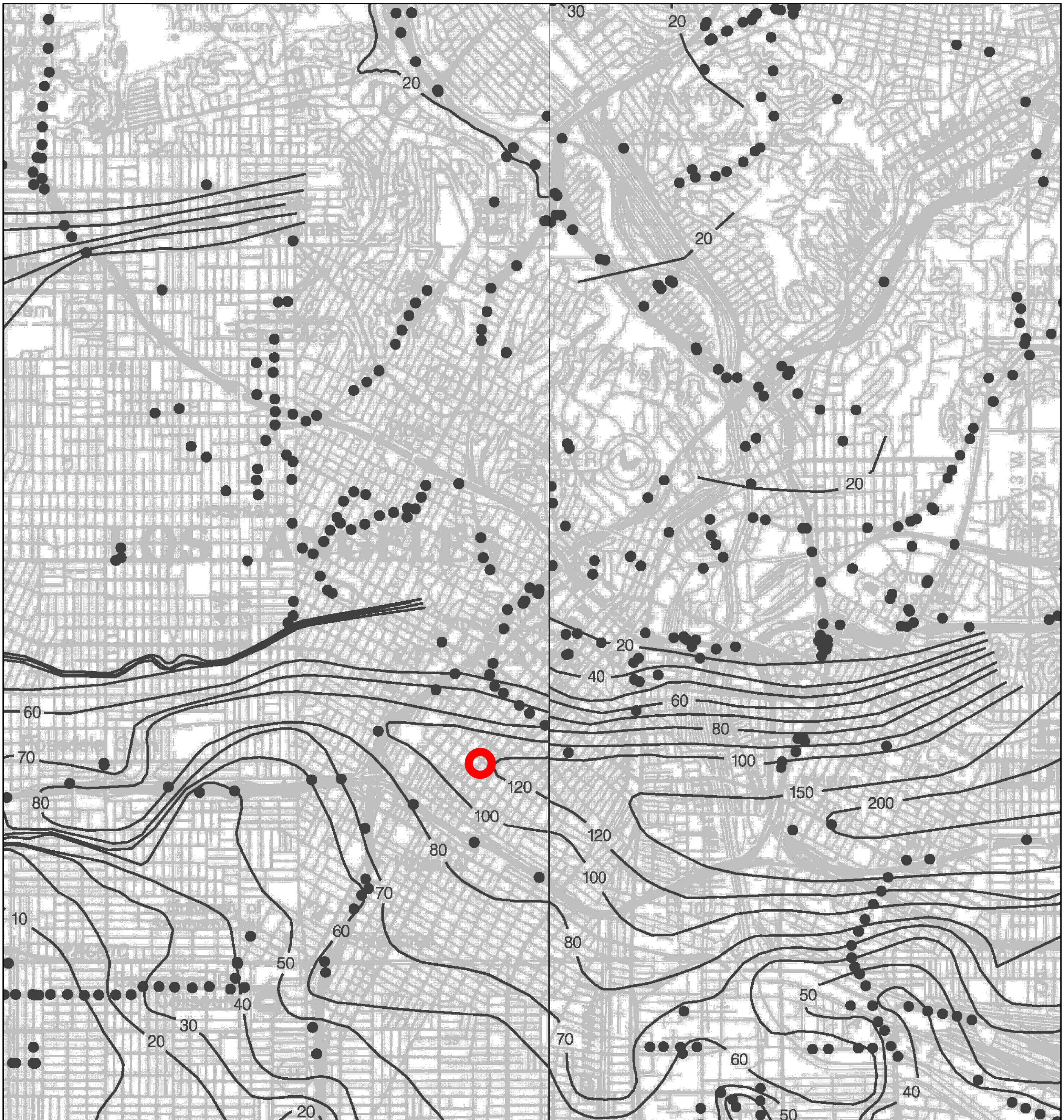
1 INCH = 1/4 MILE

GEOLOGIC MAP

40-STORY HIGH-RISE MIXED-USE DEVELOPMENT
1101-1115 SOUTH HILL STREET; 206-210 WEST 11TH STREET
LOS ANGELES, CALIFORNIA 90015
FOR: CROWN INTERNATIONAL HOLDINGS GROUP

AECOM

FIGURE 3



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Site Location

N

NO SCALE

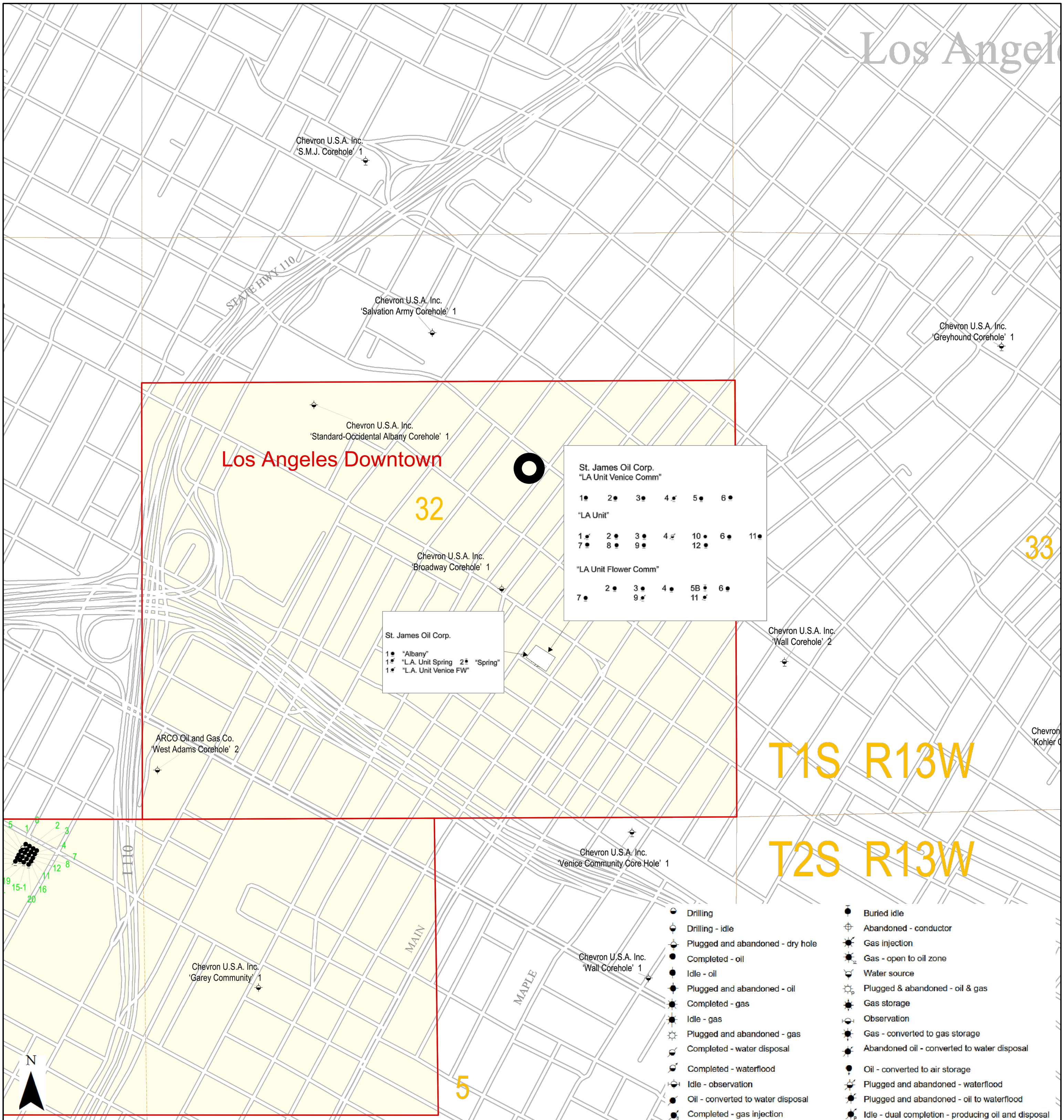
HISTORICALLY HIGHEST GROUND WATER

40-STORY HIGH-RISE MIXED-USE DEVELOPMENT
1101-1115 SOUTH HILL STREET; 206-210 WEST 11TH STREET
LOS ANGELES, CALIFORNIA 90015
FOR: CROWN INTERNATIONAL HOLDINGS GROUP

*Basemap (left): California Division of Mines and Geology (DMG), "Seismic Hazard Zone Report for the Hollywood 7.5-Minute Quadrangle, Los Angeles County, California" Plate 1.2 [map]. DMG, 1998.

AECOM

FIGURE 4



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Site Location

0 600 1,200 2,400

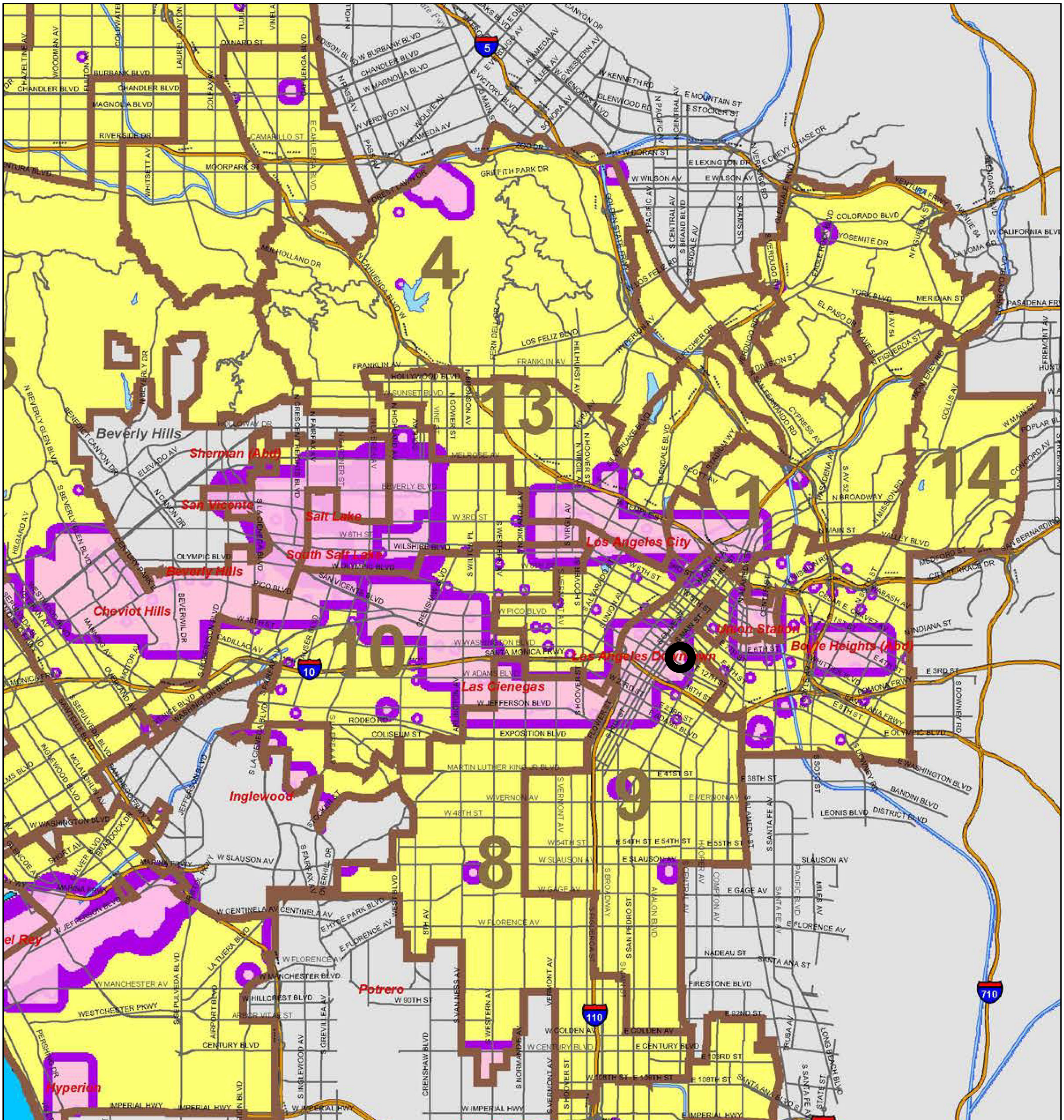
1 INCH = 1,200 FEET

OIL, GAS, & GEOTHERMAL MAP

40-STORY HIGH-RISE MIXED-USE DEVELOPMENT
1101-1115 SOUTH HILL STREET; 206-210 WEST 11TH STREET
LOS ANGELES, CALIFORNIA 90015
FOR: CROWN INTERNATIONAL HOLDINGS GROUP

AECOM

FIGURE 5



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Site Location

N

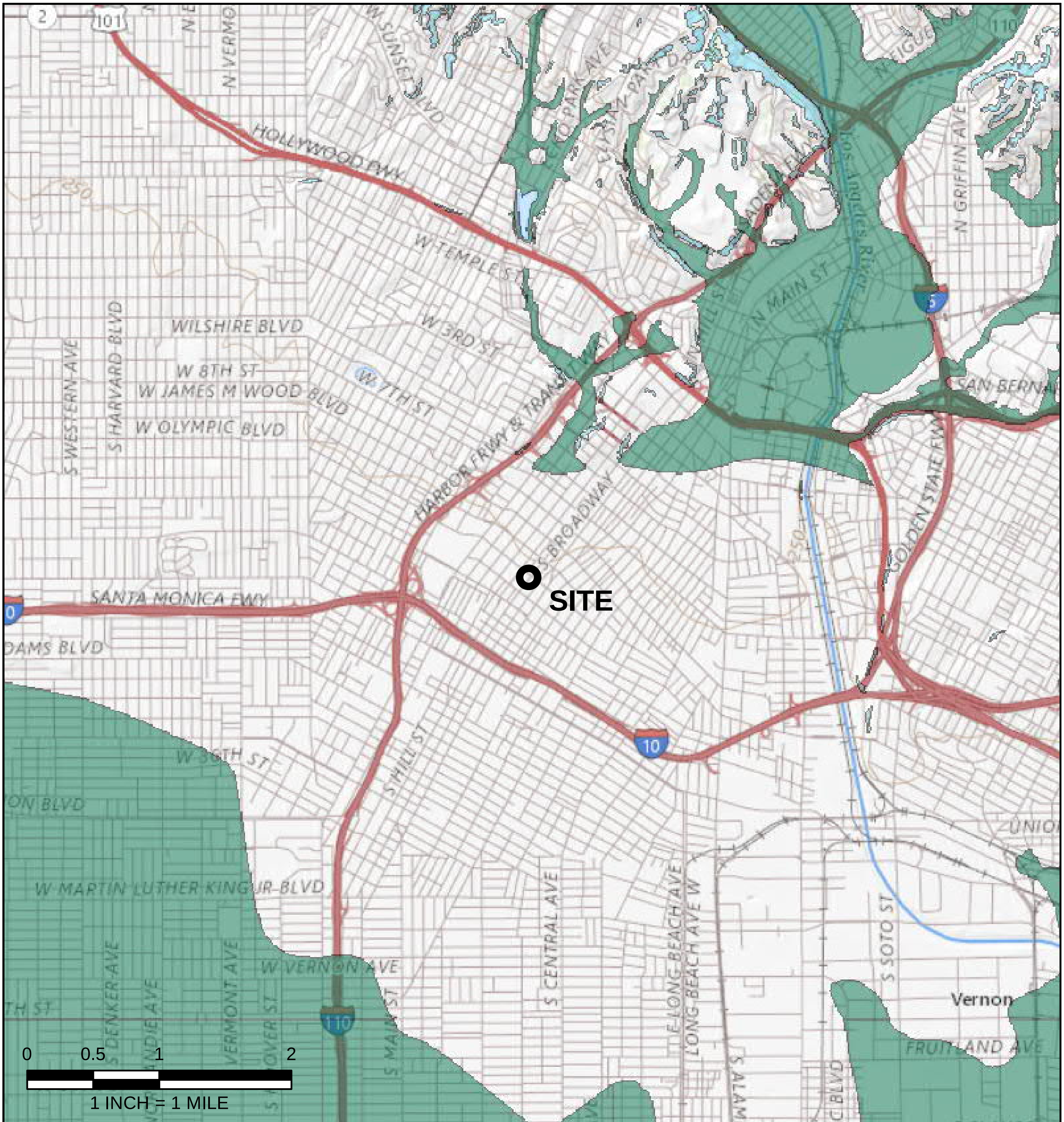
LADBS METHANE AND METHANE BUFFER ZONE MAP

40-STORY HIGH-RISE MIXED-USE DEVELOPMENT
1101-1115 SOUTH HILL STREET; 206-210 WEST 11TH STREET
LOS ANGELES, CALIFORNIA 90015
FOR: CROWN INTERNATIONAL HOLDINGS GROUP

NO SCALE

AECOM

FIGURE 6



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- Site Location
- Landslide Zones
- Liquefaction Zones

EARTHQUAKE ZONES OF REQUIRED INVESTIGATION

40-STORY HIGH-RISE MIXED-USE DEVELOPMENT
1101-1115 SOUTH HILL STREET; 206-210 WEST 11TH STREET
LOS ANGELES, CALIFORNIA 90015
FOR: CROWN INTERNATIONAL HOLDINGS GROUP

*Basemap: United State Geologic Study (USGS), "USGS Topo" [map]. The National Map. 1:63,360. USGS, October 2018.
Earthquake Zones of Required Investigation Maps:
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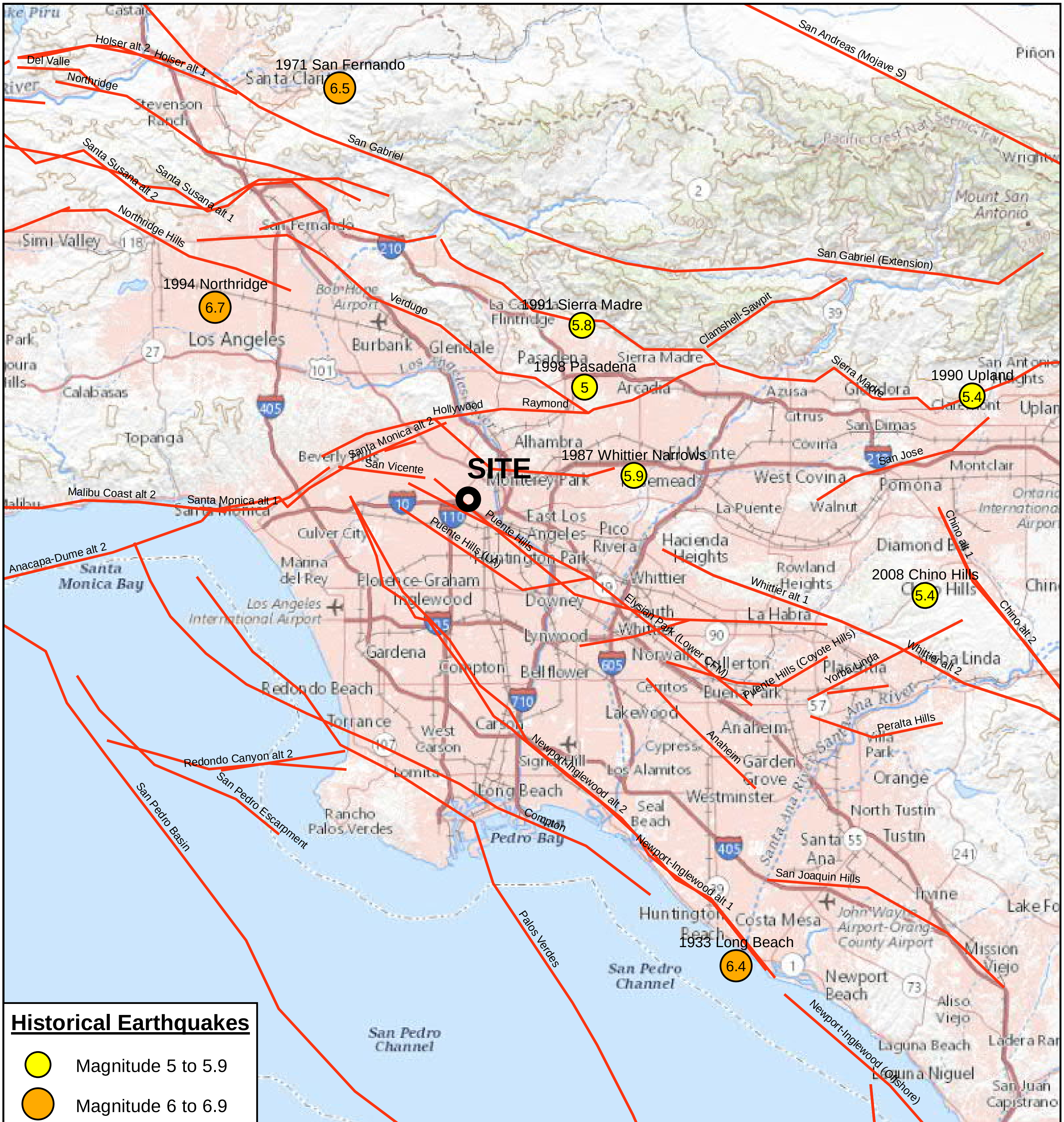
*California Geological Survey (CGS). Earthquake Zones of Required Investigation, Los Angeles Quadrangle [map]. CGS, 2017.

AECOM

FIGURE 7



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Site Location

Active Faults

0 5 10 20

1 INCH = 10 MILES

REGIONAL FAULT MAP

40-STORY HIGH-RISE MIXED-USE DEVELOPMENT
1101-1115 SOUTH HILL STREET; 206-210 WEST 11TH STREET
LOS ANGELES, CALIFORNIA 90015
FOR: CROWN INTERNATIONAL HOLDINGS GROUP

AECOM

FIGURE 8

*Basemap: United State Geologic Study (USGS), "USGS Topo" [map]. The National Map. 1:63,360. USGS, October 2018.
*Active Faults Source: Working Group on California Earthquake Probabilities, 2013, Uniform California earthquake rupture forecast, version 3 (UCERF3)—The time-independent model. http://pubs.usgs.gov/of/2013/1165/.