Appendix IS-4

Geotechnical Evaluation

Report of Geotechnical Evaluation
For Environmental Impact Report

Proposed Bloc Residential Tower

700 South Flower Street, 700 West 7th Street, and 711 and 775 South Hope Street
Los Angeles, California

Prepared for:

NREA-TRC 700 LLC
Los Angeles, California

Project 4953-20-0571
May 6, 2022

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May 6, 2022
Wood Project 4953-20-0571

NREA-TRC 700 LLC
c/o Mr. Peter Hudnut
Director, Investments
National Real Estate Advisors
700 South Flower Street, Suite 450
Los Angeles, California 90017

Subject: **Letter of Transmittal**
Report of Geotechnical Evaluation for Environmental Impact Report
Proposed Bloc Residential Tower
700 South Flower Street, 700 West 7th Street, and 711 and 775 South Hope Street
Los Angeles County, California

Dear Mr. Hudnut:

We (Wood Environment & Infrastructure Solutions, Inc., Wood) are pleased to submit our report of geotechnical evaluation for use in preparing the environmental impact report for the proposed Bloc Residential Tower located at 700 South Flower Street, 700 West 7th Street, and 711 and 775 South Hope Street in the City of Los Angeles, California. The scope of our work was performed in general accordance with our proposal dated September 26, 2019, the Professional Services Agreement dated August 20, 2020, and the Request for Budget Authorization, dated March 30, 2021, which was authorized on April 1, 2021.

Structural information was provided to us by Messrs Ryan Wilkerson and Elie-Issa El-Khoury, of Nabih Youssef & Associates, the structural engineers for the project.

Note that this report is only intended for the purpose of complying with the California Environmental Quality Act (CEQA) and the recommendations provided in this report are preliminary and not intended for design purposes. A geotechnical engineering and geologic report for the design of structures will need to be prepared at a later date.

It has been a pleasure to be of professional service to you. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,

Wood Environment & Infrastructure Solutions, Inc.

Pierre Romo
Senior Geologist

Rosalind Munro
Principal Engineering Geologist

Reviewed by:

Mark A. Murphy
Principal Geotechnical Engineer
Project Manager

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(Electronic copies submitted)

Report of Geotechnical Evaluation
For Environmental Impact Report
Proposed Bloc Residential Tower

700 South Flower Street
Los Angeles, California

Prepared for:

NREA-TRC 700 LLC

Los Angeles, California

Wood Environment & Infrastructure Solutions, Inc.

Los Angeles, California

May 6, 2022

Project 4953-20-0571

Table of Contents

Table

Figures

1.0 SCOPE

This report presents the results of our geotechnical evaluation in support of the environmental impact report for the proposed Bloc residential tower in downtown Los Angeles, California. The location of the project site is illustrated on Figure 1, Site Vicinity Map. The project site is defined as the entire city block bounded by Flower Street, Hope Street, 7th Street, and 8th Street. The locations of the new project features that require foundation recommendations are shown in relation to the existing structure and our prior explorations borings on Figure 2, Plot Plan.

The primary purpose of this study is to provide geologic/geotechnical information for incorporation into the Environmental Impact Report (EIR) to be prepared for the proposed Bloc residential tower. The results of our study are presented in this report. Our report is based on our prior geotechnical investigation for the existing podium building that contains parking and retail uses, our geotechnical observations and testing during the original site development by our predecessor firm LeRoy Crandall, and review of available published and unpublished geologic and seismic literature pertinent to the Project Site. The City of Los Angeles Safety Element of the General Plan (1996) and the Seismic Safety Element of the County of Los Angeles General Plan (2015) were reviewed as part of our scope. The reports we reviewed as part of our evaluation are listed in Section 5.0, References.

The assessment of general site environmental conditions for the presence of contaminants in the soils and groundwater of the site was beyond the scope of our services.

Our professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No other warranty, express or implied, is made as to the professional advice included in this report. This report has been prepared for NREA-TRRC 700 LLC and their consultants to be used solely in the preparation of an EIR for of the proposed project located at 700 South Flower Street in Los Angeles, California. This report has not been prepared for use by other parties, and may not contain sufficient information for purpose of other parties or other uses.

2.0 SITE CONDITIONS AND PROJECT DESCRIPTION

The Bloc Residential Tower is located on the southern portion of a larger mixed-use development known as The Bloc located in the Financial District of Downtown Los Angeles (Development Area). The Applicant proposes to construct 466 residential units within a high-rise tower and signs included in The Bloc Supplemental Use District (case number CPC-2018-6388-SN) (Project). The Project is located within a 186,674-square-foot site (4.285-acre) known as The Bloc located at 700 South Flower Street, 700 West 7th Street, and 711 and 775 South Hope Street (Project Site) in the City of Los Angeles (City). The residential tower address will be 775 South Hope Street. The Project Site comprises an entire City block that is currently developed with hotel, office and commercial/retail uses and associated parking and contains a portal to the 7th Street/Metro Center rail station. The proposed residential development would occur within the southern half of the Project Site, within the Development Area. The existing hotel, office, and commercial/retail uses would be retained, with the exception of approximately 24,342 square feet of existing commercial (theater and retail) uses that would be removed and replaced with residential uses (including the new residential lobby).

The proposed project will construct 466 residential dwelling units in a residential development located within and above an existing commercial/parking podium building. The rooftop parking level of the existing nine-story podium building would be enclosed, and two additional levels of parking would be added, increasing the podium to 12 stories. A new 41-story residential tower would extend above the 12-story podium. The two existing basement levels below the podium, which extend approximately 26 feet below the surrounding grade, would be retained.

The new tower will be of reinforced concrete construction and it will be structurally separate from the existing parking structure; the parking structure decks will be demolished within the tower area to accommodate the structurally separate tower and the new tower foundations. The existing spread footing foundation bottoms within the proposed tower area extend from between 4 feet and 12½ feet below the top of the existing floor slab.

Based on preliminary loading information, the structural engineer has estimated that the proposed tower will impose an average bearing pressure of approximately 25,500 pounds per square foot if supported on a mat foundation extending to the limits of the tower footprint. In addition, some of the columns supporting the existing structure will need to resist new gravity loads as a result of the 2 additional levels to be added as part of the proposed project; other columns that do not extend to the upper levels of the existing parking structure will not need to resist new gravity loads. Based on preliminary loading information, the typical existing parking structure dead-plus-live column load is estimated to be 1,800 kips; it is estimated that some of these columns will need to resist an additional dead-plus-live load of approximately 1,200 kips.

3.0 Geology

3.1 Geologic Setting

The project site is located in Downtown Los Angeles within the northern portion of the Los Angeles Basin. The Los Angeles Basin is within the Peninsular Ranges Geomorphic Province, just south of the province boundary with the southern portion of the Transverse Ranges geomorphic Province. The basin is a major elongated northwest-trending structural depression that has been filled with sediments up to 13,000 feet thick since middle Miocene time (Poland, 1959). The Peninsular Ranges province is characterized by northwest/southeast trending alignments of mountains and hills and intervening basins, reflecting the influence of northwest trending major faults and folds controlling the general geologic structural fabric of the region. In contrast, the Transverse Ranges are characterized by east-west trending geologic structures and mountain ranges that include the Santa Ynez, San Gabriel, San Bernardino, and Santa Monica Mountains, Elysian Hills, and associated valleys.

Locally, the project site is located south of the Bunker Hill area of Downtown Los Angeles and situated in the southern portion of the Elysian Hills with ground elevation ranging from approximately 260 to 270 feet above mean sea level (AMSL). The Elysian Hills comprise the low-lying hills located southeast of the eastern end of the Santa Monica Mountains. The Elysian Hills are formed by folding above the active buried (blind) Upper Elysian Park thrust fault. The Hollywood fault separates the northwestern end of the Elysian Hills from the Santa Monica Mountains (Oskin et al, 2000; Lamar, 1970; Dibblee and Ehrenspeck, 1991 and 1989; Hoots, 1930). Bedrock underlying the Elysian Hills is comprised largely of Miocene-and Pliocene-age sedimentary bedrock.

The project site in relation to local topography is shown on Figure 1. The limits of the project site are shown on Figure 2. Local geology is shown on Figure 3, Local Geologic Map. The regional geologic conditions around the project site, including the distribution of geologic units, are shown on Figure 4, Regional Geologic Map. The project site in relation to major regional faults and earthquake epicenters is shown on Figure 5, Regional Fault and Seismicity Map. The flood hazards are depicted in Figure 6, Flood Hazard Map.

3.2 Geologic Materials

According to published geologic maps and reports, the site is underlain by Holocene- to late Pleistocene-age alluvial sediments deposited by the ancestral Los Angeles River and its tributaries [Campbell et al., 2014; California Division of Mines and Geology (CDMG), 1998].

Exploratory borings drilled in 1969 for the original foundation investigation by LeRoy Crandall and Associates (a Wood legacy company) encountered fill soils of up to 8 feet thick (LeRoy Crandall and Associates, 1970). The fill soils were removed by the basement excavation (LeRoy Crandall and Associates, 1972). We expect localized areas of artificial fill may be present from subsequent construction, grading, and utility installations.

Holocene-age alluvium is present in the subsurface as a variably thick unit above the Fernando Formation bedrock. The alluvium consists of poorly consolidated, interlayered silty clays, sandy silts, clayey sands, and silty sands with some sand layers having gravel and cobbles. Alluvium was encountered in our original borings to the total depths of 70 to 78 feet below ground surface (bgs).

Beneath the alluvial deposits, sedimentary bedrock of the Pliocene-age Fernando Formation was encountered in our original borings for the existing adjacent buildings to the north (LeRoy Crandall and Associates, 1970). The bedrock-alluvium contact dips to the south and is deeper than 70 feet below the existing parking structure. The

Fernando Formation encountered in those borings consisted of dark grey, unoxidized, massive siltstone. According to the many geotechnical explorations Wood and its legacy companies have drilled in the downtown Los Angeles area, bedding within the Fernando Formation dips to the southeast to southwest between approximately 5 and 40 degrees. The Fernando Formation is estimated to be approximately 700 feet thick beneath the project site and is underlain by the Miocene age Puente Formation.

3.3 Groundwater

The site is within the Central Subbasin of the Coastal Plain of Los Angeles Groundwater Basin [California Division of Water Resources (DWR), 2003]. Based on information from the California Geological Survey (CGS, previously the California Division of Mines and Geology, CDMG), the historic-high groundwater level at the site is approximately 70 feet bgs (CDMG, 1998). Groundwater seepage was encountered in our 1969 geotechnical explorations at depths relatively consistent with the bedrock contact at 76, 65, and 54½ feet bgs. Localized seepage within the wedge of alluvium overlying the bedrock is representative of a perched groundwater condition that probably fluctuates with seasonal precipitation. Although the bedrock of the Fernando Formation is considered non-water bearing, perched groundwater may be present locally in fractures and along bedding planes in the bedrock.

3.4 Faults

Numerous faults in Southern California have been previously characterized as active or potentially active. The criteria for these major groups are based on criteria developed by the CGS for the Alquist-Priolo Earthquake Fault Zoning Program (Bryant and Hart, 2007). According to Bryant and Hart, an active fault is one with surface displacement within Holocene time (then defined as about the last 11,000 years); and a potentially active fault is a fault that has demonstrated surface displacement of Quaternary age deposits (last 1.6 million years) (Jennings and Bryant, 2010, Bryant and Hart, 2007). More recently the CGS has revised fault activity designations for the purpose of the Alquist-Priolo (A-P) Earthquake Fault Zoning Program (CGS, 2018a). A Holocene-active fault is one that has had surface displacement within Holocene time (now defined as about the last 11,700 years). A pre-Holocene fault is a fault that has been demonstrated to not have Holocene surface displacement. An age-undetermined fault is one where the recency of fault movement has not been determined.

The project site is underlain at depth by the Compton and Puente Hills blind thrust faults. Blind thrust faults are not exposed at the ground surface and are typically identified at depths greater than 3 kilometers. Therefore, these faults do not present a potential surface fault rupture hazard.

Many fault systems in California are considered to be active [Field et al., 2013; United States Geological Survey (USGS)-CGS, 2020] but are not currently included in an A-P Zone. The faults in the vicinity of the project site are shown on Figure 5, Regional Faults and Seismicity Map (Jennings and Bryant, 2010). A list of nearby active faults and the distance in miles between the project site and the nearest point on the fault, the maximum magnitude, and the slip rate for the fault is given in Table 1.

Active Faults

Hollywood Fault

The active Hollywood fault, located 4.5 miles north-northwest of the project site, trends approximately east-west near the base of the Santa Monica Mountains from the West Beverly Hills Lineament in the West Hollywood-

Beverly Hills area (Dolan et al., 1997 and Dolan et al., 2000a) to the Los Feliz area of Los Angeles. The fault is a groundwater barrier within Holocene sediments (Converse Ward Davis Dixon et al., 1981). Studies by several investigators (Dolan et al., 2000a; Dolan et al., 1997; and Crook et al., 1992) have indicated that the fault is active, based on geomorphic evidence, stratigraphic correlation and truncation between exploratory borings, and fault trenching studies. The Hollywood fault zone has been included in an Earthquake Fault Zone by the CGS (2022a and 2018c).

Until recently, the approximately 15 kilometer-long Hollywood fault zone was considered to be expressed as a series of linear scarps and faceted south-facing ridges along the south margin of the eastern Santa Monica Mountains and the Hollywood Hills. Multiple recent fault rupture hazard investigations have shown that the Hollywood fault zone is located south of the faceted ridges and bedrock outcrops along Sunset Boulevard (Harza, 1998, William Lettis & Associates, 1998a and 1998b). Active deposition of numerous small alluvial fans at the mountain front and a lack of fan incision suggest late Quaternary uplift of the Santa Monica Mountains along the Hollywood fault zone (Dolan et al., 2000a, Dolan et al., 1997, Crook et al., 1992 and 1987). The fault dips steeply to the north and has juxtaposed Tertiary and Cretaceous age rocks over young sedimentary deposits of the northern Los Angeles basin (Hernandez and Treiman, 2014a and 2014b, Hernandez, 2017). The Hollywood fault zone has not produced any damaging earthquakes during the historical period and has had relatively minor micro-seismic activity. An average slip rate of 0.9 millimeters per year and a maximum moment magnitude of 6.4 are estimated by the CGS (Cao et al., 2003; Field et al., 2013) for the Hollywood fault.

Raymond Fault

The active Raymond fault is located approximately 5.6 miles northeast of the project site. The fault is primarily a left-lateral strike-slip fault with a minor component of high-angle reverse offset, placing basement rocks north of the fault over alluvial sediments south of the fault (Hernandez, 2017). The Raymond fault has long been recognized as a groundwater barrier in the Pasadena/San Marino area and numerous geomorphic features along its entire length (such as fault scarps, sag ponds, springs, and pressure ridges) attest to the fault's activity during the Holocene epoch (last 11,700 years). Within the last 36,000 to 41,000 years, five to eight separate earthquake events have been recognized along the Raymond fault (Crook et al., 1987, Weaver and Dolan, 2000). The most recent fault movement, based on radiocarbon ages from materials collected in an excavation exposing the fault, occurred sometime between 2,160 ± 105 and 1,630 ± 100 years before present (LeRoy Crandall and Associates, 1978; Crook et al., 1987; Weaver and Dolan, 2000). An average slip rate of 2.0 millimeters per year and a maximum moment magnitude of 6.5 are estimated by the CGS (Cao et al., 2003; Field et al., 2013) for the Raymond fault.

Newport-Inglewood Fault Zone

The active North Los Angeles Basin section of Newport-Inglewood fault zone is located approximately 6 miles to the southwest of the project site. This fault zone is composed of a series of discontinuous northwest-trending en echelon faults extending from Ballona Gap southeastward past the Santa Ana River in Newport Beach, where it trends off-shore. This zone is reflected at the surface by a line of geomorphically young anticlinal hills and mesas formed by the folding and faulting of a thick sequence of Pleistocene age sediments and Tertiary age sedimentary rocks (Bryant, 1985; Barrows, 1974). Fault-plane solutions for 39 small earthquakes (between 1977 and 1985) show mostly strike-slip faulting with some reverse faulting along the north section (north of Dominguez Hills) and some normal faulting along the south section (south of Dominguez Hills to Newport Beach) (Treiman, 1993; Hauksson, 1987). Prior fault investigations by Law/Crandall (1993) in the Huntington Beach area indicate that the on-shore section of the Newport-Inglewood fault zone offsets Holocene age alluvial deposits in the vicinity of the Santa Ana River. An average slip rate of 1.0 millimeters per year and a maximum moment magnitude of 7.1 are estimated by the CGS (Cao et al., 2003; Field et al., 2013) for the Newport-Inglewood fault.

Verdugo Fault Zone

The active Verdugo fault zone, located approximately 6.8 miles north-northeast of the project site, is composed of several faults including the Verdugo fault, the San Rafael fault, and the Eagle Rock fault. The most recent documented activity along this fault occurs in the Holocene age alluvial deposits along the western flank of the Verdugo Mountains in the Burbank area (County of Los Angeles, 1990). Additionally, this portion of the fault is considered to have Holocene movement by the USGS and the State of California (Jennings and Bryant, 2010). An Alquist-Priolo Earthquake Fault Zone has not been established for the Verdugo fault. According to the CGS, the Verdugo fault is capable of a moment magnitude 6.9 earthquake and has a slip rate of 0.4 millimeters per year (Cao et al., 2003; Field et al., 2013).

Santa Monica Fault

The active Santa Monica fault, a left lateral, reverse oblique slip fault, is located approximately 8 miles west-northwest of the project site. The Santa Monica and Hollywood fault zones form a portion of the Transverse Ranges Southern Boundary fault system. The Transverse Ranges Southern Boundary fault system also includes the Malibu Coast-Anacapa-Dume faults to the west of the Santa Monica fault and the Raymond and Cucamonga faults to the east of the Hollywood fault (Dolan et al., 2000b). The Santa Monica fault zone is the western segment of the Santa Monica-Hollywood fault zone. The fault zone trends east-west from the Santa Monica coastline on the west to the Hollywood area on the east. Urbanization and development within the greater Los Angeles area has resulted in a poor understanding of the lateral extent, location, and rupture history of the Santa Monica fault zone. However, the surface expression of the Santa Monica fault zone includes fault-related geomorphic features, offset stratigraphy, and ground water barriers within late Quaternary deposits (Dolan et al., 2000b).

As of January 11, 2018, the Santa Monica fault zone has been included in an Earthquake Fault Zone within the Beverly Hills 7.5 minute Quadrangle by the CGS (2018b). An average slip rate of 1.0 millimeters per year and a maximum moment magnitude of 6.6 are estimated by the CGS (Cao et al., 2003; Field et al., 2013) for the Santa Monica fault.

Sierra Madre Fault Zone

The active Sierra Madre fault is located 12 miles northeast of the project site. This fault zone borders the southern front of the San Gabriel Mountains and consists of a series of discontinuous reverse faults that separate pre-Tertiary crystalline rocks on the north from Tertiary and Quaternary sedimentary deposits on the south. The various faults exhibit northerly dips from 15 degrees to vertical, with the crystalline rocks thrust upward toward the south over sediments as young as mid-Pleistocene age. The Sierra Madre fault zone extends approximately 50 miles along the southern flank of the San Gabriel Mountains from Big Tujunga Canyon on the west to Cajon Pass on the east. The fault zone, which includes the active Cucamonga fault, consists of a series of reverse fault segments that are believed to have been active at different times in the geologic past (Crook et al., 1987). The moderate M5.8 1991 Sierra Madre earthquake is believed to be a result of movement on a small portion of the Sierra Madre fault zone. Recent paleoseismic investigations by Rubin et al. (1998) in Altadena have shown that the Sierra Madre fault fails in large, infrequent earthquakes. The past two ruptures in Altadena produced about 4.5 to 5 meters of slip at the ground surface and occurred within the past approximately18,000 years. Farther east in San Dimas, Tucker and Dolan (2001) documented the occurrence of two large-slip earthquakes during the period between approximately 8,000 and 24,000 years ago. The most recent event on the eastern portion of the Sierra Madre fault zone occurred prior to about 8,000 years ago. The CGS considers the Sierra Madre fault to be capable of a moment magnitude 7.2 earthquake and estimates an annual slip rate of 2 millimeters per year (Cao et al. 2003; Field et al. 2013).

Whittier Fault

The active Whittier fault is located approximately 13 miles east-southeast of the project site. The northwest-trending Whittier fault extends along the south flank of the Puente Hills from the Santa Ana River on the southeast to Whittier Narrows on the northwest. According to Yeats, 2004, and Treiman, 1991, the Whittier fault turns more northwesterly at Whittier Narrows becoming the East Montebello fault beneath the Whittier Narrows towards the Alhambra Wash. The East Montebello fault is approximately 7.9 miles east of the project site. The main Whittier fault trace is a high-angle reverse fault, with the north side uplifted over the south side at an angle of approximately 70 degrees, although late Quaternary movement has been nearly pure strike slip and total right displacement may be around 8 to 9 kilometers (Yeats, 2004). In the Brea-Olinda Oil Field, the Whittier fault displaces Pleistocene age alluvium, and Carbon Canyon Creek is offset in a right lateral sense by the Whittier fault. The CGS considers the Whittier fault to be capable of a moment magnitude 6.8 earthquake and estimates an annual slip rate of 2.5 millimeters per year (Cao et al. 2003; Field et al. 2013).

San Andreas Fault Zone

The active Mojave section of the San Andreas fault zone is located about 35 miles northeast of the project site. This fault zone is California's most prominent structural feature, trending in a general northwest direction for almost the entire length of the state. The southern section of the fault is approximately 450 kilometers long and extends from the Transverse Ranges west of Tejon Pass on the north to the Mexican border and beyond on the south. The last major earthquake along the San Andreas fault zone in Southern California was the 1857 Magnitude 8.3 Fort Tejon earthquake. The CGS considers the Mojave Section to be capable of a moment magnitude 7.4 earthquake and estimates an annual slip rate of 34 millimeters per year (Cao et al., 2003; Field et al., 2013).

Blind Thrust Faults

Compton Thrust

The active Compton Thrust has been defined from seismic reflection profiles and borehole data (Leon et al., 2009) as a northeast-dipping structure. The Compton Thrust is located below the project site. The surface projection of the Compton Thrust upper limb is approximately 17 miles southwest of the project site. This blind thrust fault system extends approximately 28 miles from southwest Los Angeles County to northern Orange County in a southeastern direction. The Compton Thrust is not exposed at the ground surface and does not present a potential for surface fault rupture. Several uplift events have been observed by investigating deformed Holocene layers along buried fold scarps (Leon et al., 2009). The cumulative uplift from the observed events ranged from 2 to 6 feet or approximately 4 to 14 feet of thrust displacement with moment magnitudes of 7.0 to 7.4 (Leon et al., 2009). Slip rate is estimated to be 0.9 millimeters per year (Field et al., 2013

Puente Hills Blind Thrust Fault

The active Puente Hills Blind Thrust (PHBT) is defined based on seismic reflection profiles, petroleum well data, and precisely located seismicity (Shaw et al., 2002). The PHBT is located below the project site. The closest point to the surface projection of the PHBT upper limb is approximately 3.5 miles southwest (USGS-CGS, 2020). This blind thrust extends eastward from downtown Los Angeles to Brea in northern Orange County. The PHBT includes three north-dipping segments, named from east to west the Coyote Hills segment, the Santa Fe Springs segment, and the Los Angeles segment. These segments are overlain by folds expressed at the surface as the Coyote Hills, Santa Fe Springs Anticline, and the Montebello Hills. The Santa Fe Springs segment of the PHBT was the causative fault of the October 1, 1987 Whittier Narrows (Shaw et al., 2002) and March 29, 2014 La Habra earthquakes. The PHBT 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 system and the occurrence of the Whittier Narrows earthquake, the PHBT is considered an active fault capable of generating future earthquakes beneath the Los Angeles Basin. An average slip rate of 0.9 millimeter per year and a moment magnitude of 7.1 are estimated by the CGS (Cao et al., 2003; Field et al., 2013), for a multiple segment fault rupture of the Puente Hills Blind Thrust; a single segment fault rupture may produce an earthquake of moment magnitude 6.5 to 6.6.

Upper Elysian Park Thrust

The Upper Elysian Park fault is a blind thrust fault that overlies the Los Angeles and Santa Fe Springs sections of the Puente Hills Thrust (Oskin et al., 2000 and Shaw et al., 2002). The eastern edge of the Upper Elysian Park fault is defined by the northwest-trending Whittier fault zone. The vertical surface projection of the Upper Elysian Park fault upper limb is approximately 1.3 miles northeast of the project site (USGS-CGS, 2020). Like other blind thrust faults in the Los Angeles area, the Upper Elysian Park fault is not exposed at the surface and does not present a potential surface rupture hazard; however, the Upper Elysian Park fault should be considered an active feature capable of generating future earthquakes. An average slip rate of 1.9 millimeters per year and a maximum moment magnitude of 6.4 are estimated by Cao et al. (2003) and Field et al. (2013) for the Upper Elysian Park fault.

Northridge Thrust

The active Northridge Thrust, as defined by Petersen et al. (1996), is a deep thrust fault that is considered the eastern extension of the Oak Ridge fault. The closest point to the surface projection of the Northridge Thrust fault is approximately 15 miles northwest. The Northridge Thrust is located beneath the majority of the San Fernando Valley and was the causative fault of the January 17, 1994, moment magnitude 6.7 Northridge earthquake. This thrust fault is not exposed at the surface and does not present a potential surface fault rupture hazard. However, the Northridge Thrust is an active feature that can generate future earthquakes. According to the CGS (Cao et al., 2003; Field et al., 2013), the Northridge Thrust is capable of a moment magnitude 7.0 earthquake and has a slip rate of 1.5 millimeters per year.

3.5 Geologic-Seismic Hazards

Surface Fault Rupture

The project site is not within a currently established Alquist-Priolo Earthquake Fault Zone (A-P Zone) for surface fault rupture hazard (CGS, 2022a; 2014). An A-P Zone is an area which requires geologic investigation to evaluate whether the potential for surface fault rupture is present near an active fault (CGS, 2018a). An active fault is a fault with surface displacement within the last 11,700 years (Holocene). The closest Earthquake Fault Zone, established for the Hollywood fault, is located approximately 4.5 miles north-northwest of the project site (CGS, 2022a and 2014). Blind thrust faults are not exposed at the ground surface and are typically identified at depths greater than 3 kilometers. Therefore, these faults do not present a potential surface fault rupture hazard.

Based on the available geologic data, active faults with the potential for surface fault rupture are not known to be located directly beneath or projecting toward the project site. Therefore, the potential for surface rupture due to fault plane displacement propagating to the surface at the project site during the design life of the proposed development is considered low.

Seismicity

Earthquake Catalog Data

The seismicity of the region surrounding the project site was determined from research of a computer catalog of seismic data compiled by the Southern California Earthquake Data Center (SCEDC, 2022). This database includes earthquake data compiled by the California Institute of Technology for 1932 to 2022. We have also utilized data from 1769 to 1931 compiled by CGS (CDMG, 2001). The search for earthquakes that occurred within 100 kilometers (62.1 miles) of the project site indicates that 447 earthquakes of Magnitude 4.0 and greater occurred between 1932 and 2022; 34 earthquakes of Magnitude 6.0 or greater occurred between 1769 and 1931. Faults and epicenters of earthquakes greater than Magnitude 5 in the greater Los Angeles area are shown in Figure 5.

A number of earthquakes of moderate to major magnitude have occurred in the Southern California area within about the last 114 years. A partial list of these earthquakes is included in the following table.

Earthquake (Oldest to Youngest)	Date of Earthquake	Magnitude	Distance to Epicenter (mi)	Direction to Epicenter
San Bernardino Mtns.	September 20, 1907	5.8	66	ENE
Lake Elsinore	May 15, 1910	6.0	54	SE
San Jacinto-Hemet area	April 21, 1918	6.8	75	ESE
Loma Linda area	July 23, 1923	6.2	57	E
Long Beach	March 11, 1933	6.4	35	SSE
Tehachapi	July 21, 1952	7.5	78	NW
San Fernando	February 9, 1971	6.6	27	NW
Whittier Narrows	October 1, 1987	5.9	10	SE
Sierra Madre	June 28, 1991	5.8	21	NNE
Landers	June 28, 1992	7.3	104	ENE
Big Bear	June 28, 1992	6.3	82	ENE
Northridge	January 17, 1994	6.7	19	NW
Hector Mine	October 16, 1999	7.1	120	NE
Sierra El Mayor	April 4, 2010	7.2	227	SE
La Habra	March 29, 2014	5.1	21	SE
Borrego Springs	June 10, 2016	5.2	113	SE
Ridgecrest	July 6, 2019	7.1	124	NNE

Liquefaction and Seismically-Induced Settlement

Liquefaction is the process in which loose granular soils below the ground-water table temporarily lose strength during strong ground shaking as a consequence of increased pore pressure and, thereby, reduced effective stress. The vast majority of liquefaction hazards are associated with sandy soils and silty soils of low plasticity (CGS, 2008). Potentially liquefiable soils (based on composition) must be saturated or nearly saturated to be susceptible to liquefaction (CGS, 2008).

Significant factors that affect liquefaction include water level, soil type, particle size and gradation, relative density, confining pressure, intensity of shaking, and duration of shaking. These factors must be evaluated on a site-specific basis to assess the potential for ground failure caused by liquefaction at the project site. Liquefaction potential has been found to be the greatest where the ground water level is shallow and submerged loose, fine sands occur within a depth of about 50 feet or less. Liquefaction potential decreases with increasing grain size and clay and gravel content but increases as the ground acceleration and duration of shaking increase.

According to the City of Los Angeles NavigateLA database (City of Los Angeles, 2022) and the California Geologic Survey (CGS, 2022a and 2018c), project site is not within an area identified as having a potential for liquefaction. The alluvial soils encountered in the borings drilled at the site (LeRoy Crandall, 1970) were stiff and/or dense are not susceptible to liquefaction or seismically-induced settlement and groundwater was not present in the upper 50 feet beneath the site (CGS, 2018c, and LeRoy Crandall, 1970), therefore the potential for liquefaction and seismically-induced settlement is considered low.

Slope Stability

The project site is within a heavily urbanized area with gentle south and southeast surface gradient. There are no known landslides at the project site, nor is the project site in the path of any known or potential landslides (CGS, 2022b). According to the City of Los Angeles NavigateLA (2022) and the CGS (2022a and 2018c) the project site is not within an area identified as having the potential for seismic slope instability, therefore the potential for seismic slope instability is considered low.

Tsunamis, Inundation, and Seiches

The project site is located approximately 13 miles from the coastline and at an elevation ranging approximately between 260 and 270 feet above mean sea level (NAVD 88). Therefore, tsunamis (seismic sea waves) are not considered a hazard at the project site.

According to the City of Los Angeles Seismic Safety Element of the General Plan (1996) and the California Office of Emergency of Services (CalOES, 2007), the project site is not located within a potential inundation area for an earthquake-induced dam failure. Furthermore, there are no large bodies of water that could adversely affect the project site in the event of earthquake-induced dam failures or seiches (wave oscillations in an enclosed or semi-enclosed body of water).

Flooding

According to the Federal Emergency Management Agency (FEMA) the site encompasses flood Zone X with flood depths. Zone X with depth is an area within the 0.2% annual chance flood with average flood depths of less than 1 foot or with drainage areas of less than one square mile (FEMA, 2018). Figure 6 presents the FEMA flood zones within the site.

Expansive, Collapsible, and Corrosive Soils

Expansive soils shrink and swell significantly as they lose and gain moisture. The resulting volumetric changes can heave and crack lightly loaded foundations and structures. Soils are generally classified as having low, moderate, and high expansive potentials, where the type and percentage of clay particles present in the soil are indicative of the soil's expansion potential. Predominantly fine-grained soils containing a high percentage of clays are potentially expansive, whereas predominantly coarse-grained soils such as sands and gravels are generally non-expansive.

Coarse-grained, low expansive soils tend to dominate in higher energy sedimentary environments (e.g., alluvial channels) whereas lower energy sedimentary environments (e.g., estuaries, marshes, and alluvial floodplains) may deposit fine-grained soils. The alluvial soils at the project site are predominantly sands with lesser silts and clays and, hence, are anticipated to be primarily of low expansion potential. However, the fine-grained alluvial soils may be moderately expansive.

Collapsible soils consist primarily of sand- and silt-sized particles arranged in a loose structure held together by water-soluble cementing agents. In a dry state, the cementing agents lead to a strong soil with relatively low compressibility. However, upon wetting and softening of the cementing agents, the loose soil structure can collapse and the soil would become weaker and more compressible. The alluvial soils encountered in the borings drilled at the site were stiff and/or dense and not susceptible to collapse.

Soil corrosivity involves the measure of the potential of corrosion for steel and concrete caused by contact with some types of soil. Knowledge of potential soil corrosivity is often critical for the effective design parameters associated with cathodic protection of buried steel and concrete mix design for plain or reinforced concrete buried project elements. Factors—including soil composition, soil and pore water chemistry, moisture content, and pH—affect the response of steel and concrete to soil corrosion. Soils with high moisture content, high electrical conductivity, high acidity, high sulfates, and high dissolved salts content are most corrosive. Generally, sands and silty sands do not present a corrosive environment. Clay soils, including those that contain interstitial salt water, can be highly corrosive. Localized areas of corrosive soils may be present at the project site, which could react adversely to buried steel and concrete.

Soil Erosion

Erosion includes detachment and transportation of soil materials by wind or water. Rainfall and potential surface runoff may produce different types of erosion. Potentially erosive conditions are identified as areas having a combination of potentially erosive soils and uncovered slopes. The site is currently either paved or occupied by the existing structure. Therefore the potential for soil erosion is negligible.

Volcanic Hazards

Due to the distance between the project site and known active volcanic areas, there are no significant potential impacts related to volcanic hazards. The proposed development will not result in or expose people to significant impacts related to volcanic hazards.

Radon

According to the CGS, the project site is located in an area of low radon gas potential (CGS, 2022c). Therefore, the potential for indoor levels above 4.0 picocuries per liter is considered low. A radon assessment is beyond the scope of this report.

3.6 Geologic Conclusions

Based on the available geologic data, active or potentially active faults with the potential for surface fault rupture are not known to be located directly beneath or projecting toward the project site. Therefore, the potential for surface rupture due to fault plane displacement propagating to the surface at the project site during the design life of the project is considered low.

Although the project site could be subjected to strong ground shaking in the event of an earthquake, this hazard is common in Southern California and the effects of ground shaking can be mitigated by proper engineering design and construction in conformance with current building codes and engineering practices.

The project site is relatively level and the absence of nearby slopes precludes slope stability hazards. The project site is located between the Los Angeles City and Los Angeles Downtown Oil Fields; therefore, a remote possibility exists of encountering undocumented wells during excavations. Any well encountered would need to be appropriately abandoned in accordance with the current requirements of CalGEM. The potential for other geologic hazards such as liquefaction, seismically-induced settlement, slope stability, flooding, tsunamis, seiches, erosion, expansive soils, collapsible soils, corrosive soils, subsidence, volcanic hazards, and radon affecting the project site is considered low.

4.0 SUMMARY OF POTENTIAL GEOLOGIC-SEISMIC IMPACTS AND MITIGATION MEASURES

4.1 General

As part of the standard conditions of approval for the development as a whole, the proposed project will be designed and built in compliance with City of Los Angeles Building Code requirements. The City of Los Angeles will require that the results of a comprehensive geotechnical investigation be submitted as part of the permitting process for the Project. The City of Los Angeles will require that the specific design recommendations presented in the comprehensive geotechnical report be incorporated into the design and construction of the proposed project, including recommendations for foundation support, grading, excavation, shoring, and seismic design parameters. Proper engineering design and conformance with recommendations presented in the comprehensive geotechnical report for the proposed project, in compliance with current Building Codes as required by the City of Los Angeles, will ensure the potential geotechnical impacts identified herein are less than significant.

4.2 Seismicity and Ground Shaking

The location of the project site relative to known active or potentially active faults indicates the project site could be subjected to significant ground shaking caused by earthquakes. This hazard is common in Southern California and the effects of ground shaking can be mitigated by proper engineering design and construction in conformance with current building codes and engineering practices.

4.3 Settlement

Building settlements will depend on the magnitude of the structural loads. Building foundations will be designed to result in settlement of less than the following amounts in accordance with guidelines of the City of Los Angeles Department of Building and Safety:

- Mat Foundations – 4 inches
- Spread Footing Foundations – 1½ inches
- Pile Foundations – ½ inch

Based on the preliminary loading estimates provided, some of the existing parking structure columns that will support additional gravity loading will impose new dead-plus-live load bearing pressures of up to 14,000 pounds per square foot. This bearing pressure is anticipated to be acceptable, provided that the estimated additional settlement of these columns under the new loads, which is estimated to range between approximately ½ and ¾ inch, is acceptable. The existing parking structure columns that will not support additional gravity loads as a result of the additional levels will undergo some settlement due to the influence of the adjacent columns/foundations which will support additional loads; we estimate that the settlement of such columns would be on the order of approximately 0.15 inch.

Based on the preliminary loading information, the estimated settlement of a mat foundation supporting the proposed tower may exceed the maximum allowable value of 4 inches. In addition, mat foundation settlements nearing 4 inches combined with the settlement of adjacent existing footings induced by the influence of the mat foundation may result in unacceptable differential settlements both within the existing structure and between the existing structure and the proposed tower. Therefore, the proposed tower may need to be supported on drilled cast-in-place concrete pile foundations; preliminary axial capacities for drilled piles are presented on Figure 7, Preliminary Drilled Pile Capacities. However, the feasibility of a mat foundation to support the proposed tower could be revisited, if desired, as the design progresses and the structural features and loads for the project are finalized.

4.4 Slope Stability

The project site is not within an area identified to have a potential for seismic slope instability. There are no known landslides near the project site, nor is the project site in the path of any known or potential landslides. Topographically, the project site is relatively level. In order to excavate for new foundations/pile caps/grade beams and new utilities, the sides of the excavations should be sloped back at 1:1 (horizontal to vertical) or shored for safety, unshored excavations should not extend below a plane drawn at 1½:1 (horizontal to vertical) extending downward from adjacent existing footings. Where space is not available, shoring will be required. If shoring is required, excavation walls may be supported using conventional soldier beams with lagging and tied-back with anchors, if necessary. As an alternative to tie-back anchors, rakers or cross-lot bracing could be used. The shoring should be designed to limit the deflection at the top of shoring to ½ inch or less as necessary to protect adjacent structures or utilities in streets adjacent to the site.

4.5 Expansive and Corrosive Soils

The expansion potential of soils at the project site is expected to range from low to medium. Corrosivity testing of onsite soils will need to be performed to determine the corrosion potential of the soils. New structures and new project site improvements will need to be designed to resist the effects of expansive and corrosive soils. The mitigations for expansive soils could include excavation and replacement of upper soils (for any expansive soils at the street level), deepening of foundations, cement treatment, and/or moisture conditioning of the upper soils. The mitigations for corrosive soils could include isolation of utilities from soils with barriers or wrappings, cathodic isolation, and/or cathodic protection.

4.6 Flooding

According to the Federal Emergency Management Agency (FEMA) the site encompasses flood Zone X with flood depths. Zone X with depth is an area within the 0.2% annual chance flood with average flood depths of less than 1 foot or with drainage areas of less than one square mile (FEMA, 2018). The proposed development needs to be designed to withstand hazards associated with the 500-year flood in accordance with the City of Los Angeles Building Code requirements.

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Table 1

Major Named Holocene and Late Quaternary Faults in Southern California

Table 1
Major Named Faults Considered to be Active in Southern California

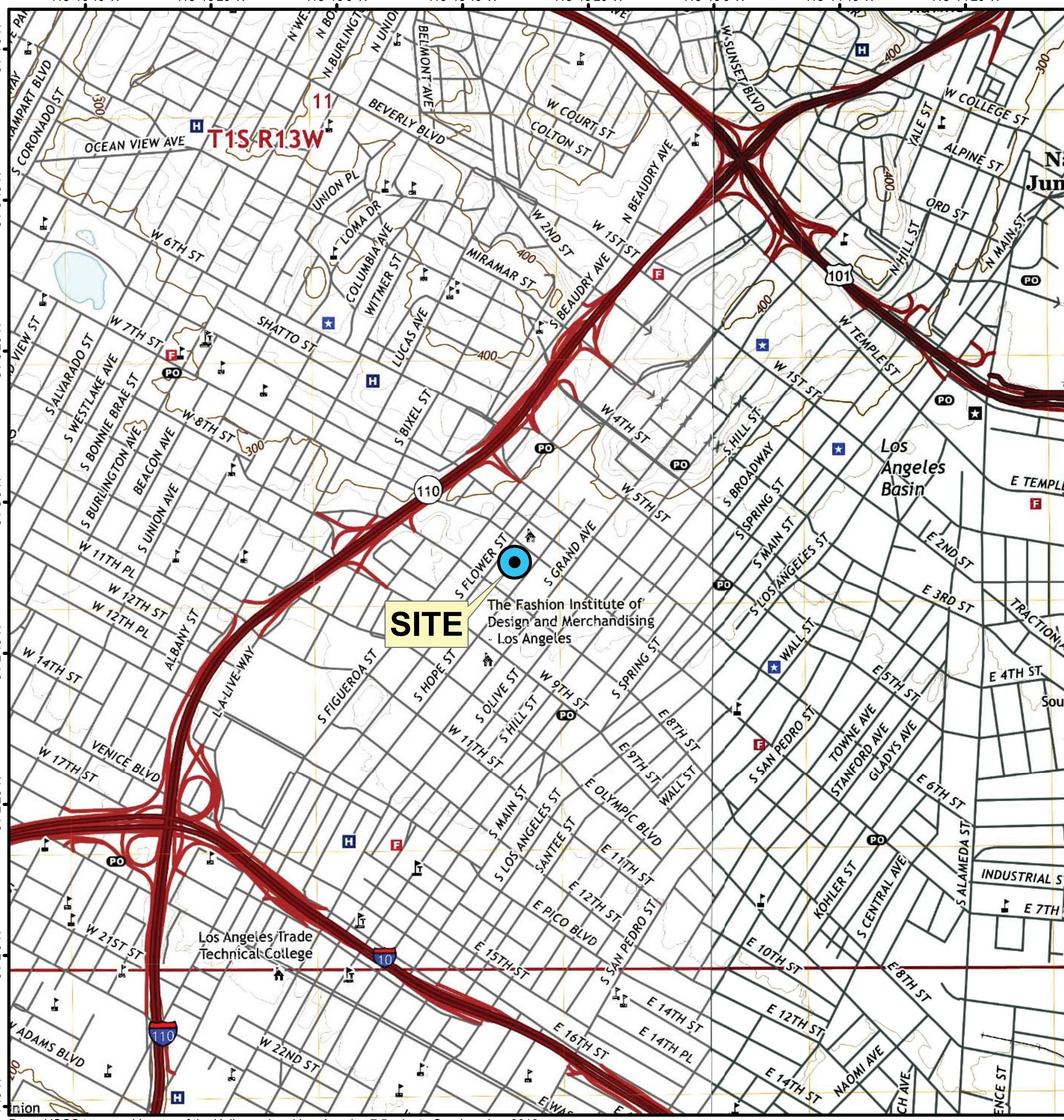
Fault (in increasing distance)	Maximum Magnitude (Mw)	Fault Geometry	Slip Rate (mm/yr.)	Sources	Distance From Site (miles)	Direction From Site
Puente Hills Blind Thrust	7.1	BT	0.9	(a,b)	(3.5)*	SW
Compton Blind Thrust	7.6	BT	0.6	(a,b)	(17)*	SW
Upper Elysian Park Thrust	6.4	BT	1.9	(a,b)	(1.3)**	NE
Hollywood	6.4	RO	0.9	(a,d)	4.5	NNW
Raymond	6.5	RO	2.0	(a,c)	5.6	NE
Newport-Inglewood	7.1	SS	1.0	(a,c)	6.0	SW
Verdugo	6.9	RO	0.4	(a,c)	6.8	NNE
Santa Monica	6.6	RO	1.0	(a,e)	8.0	WNW
Sierra Madre	7.2	RO	2.0	(a,c)	12	NE
Whittier	6.8	SS	2.5	(a,c)	13	ESE
Northridge Thrust	7.0	BT	1.5	(a,b)	15**	NW
Clamshell-Sawpit	6.5	RO	0.4	(a,c)	16	NE
San Gabriel	7.2	SS	0.4	(a,c)	16	NNE
Palos Verdes	7.3	SS	3.0	(a,c)	18	SW
San Jose	6.4	RO	0.5	(a,c)	22	ESE
Malibu Coast	6.7	RO	0.3	(a,c)	22	W
San Joaquin Hills Thrust	6.6	BT	0.6	(a,b)	31**	SE
San Andreas (Mojave Section)	7.4	SS	34.0	(a,c)	35	NE

(a) Cao et al., 2003; Field et al., 2013
(b) Working Group on California Earthquake Probabilities, 2019
(c) USGS-CGS, 2020
(d) California Geological Survey, 2017
(e) California Geological Survey 2018c
SS Strike Slip
RO Reverse Oblique
BT Blind Thrust
(*) Site is within the surface projection of thrust fault. Value in parenthesis is distance to projected upper limb.
(**) Distance from thrust fault surface projection (upper limb)

Prepared by: PER 3/16/21
Checked by: RM 5/5/22

Figure 1

Site Vicinity Map



Base: USGS topographic map of the Hollywood and Los Angeles 7.5-minute Quadrangles, 2018

0 2,000 4,000 Feet

0 0.2 0.4 0.8 Miles

N W E S

wood.

SITE VICINITY MAP

Wood
Environment & Infrastructure Solutions, Inc.
6001 Rickenbacker Road
Los Angeles, California 90040
T: 323.889.5300
www.woodplc.com

LAT:	34.04802
LON:	-118.25866
SCALE:	1:24,000
DRAWN:	PER
CHECK:	RM
DATE:	3/16/2021

Proposed Bloc Residential Tower
700 South Flower Street
Los Angeles, California

FIGURE: 1

PROJECT: 4953-20-0571

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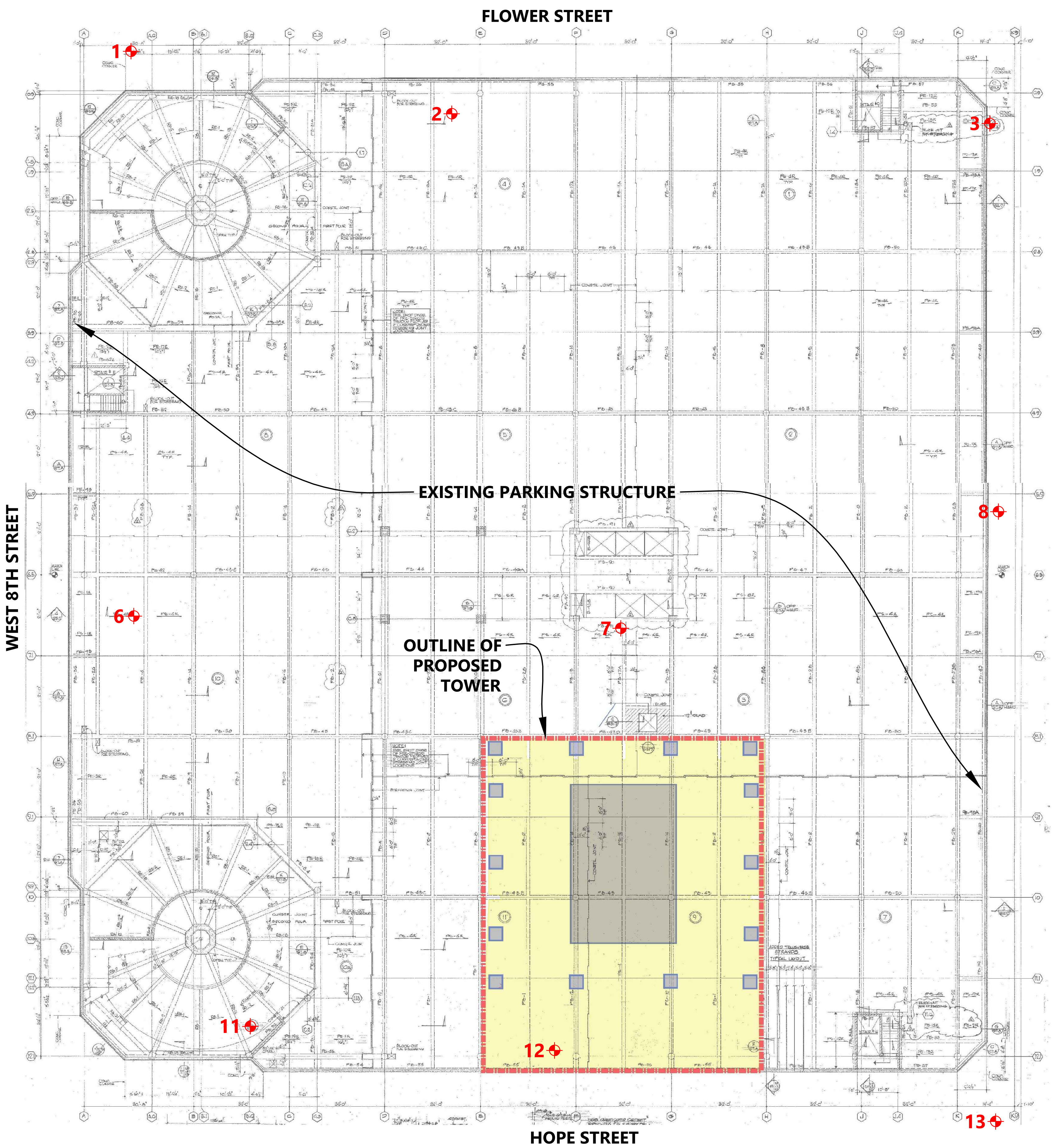
Figure 2

Plot Plan

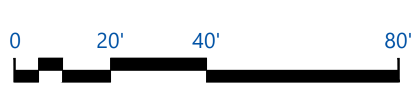


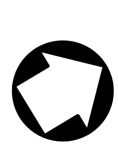
LEGEND

13 Approximate Location of Prior Boring (our Job No. A-69251)

REFERENCE:

Page 19 of Progress Drawings by Nabih Youssef & Associates, Option 3 - Tapered Tower Concept, dated September 2, 2020





wood.

Wood
Environment & Infrastructure Solutions, Inc.,
6001 Rickenbacker Rd, Los Angeles, CA 90040
Phone (323) 889-5300 Fax (323) 721-6700

Proposed Bloc Residential Tower
700 South Flower Street
Los Angeles, California

LT,LNG:	
PREPARED BY:	VMN
SCALE:	1" = 40'
BY:	MM
CHKD:	MM
DATE:	05/18/2021

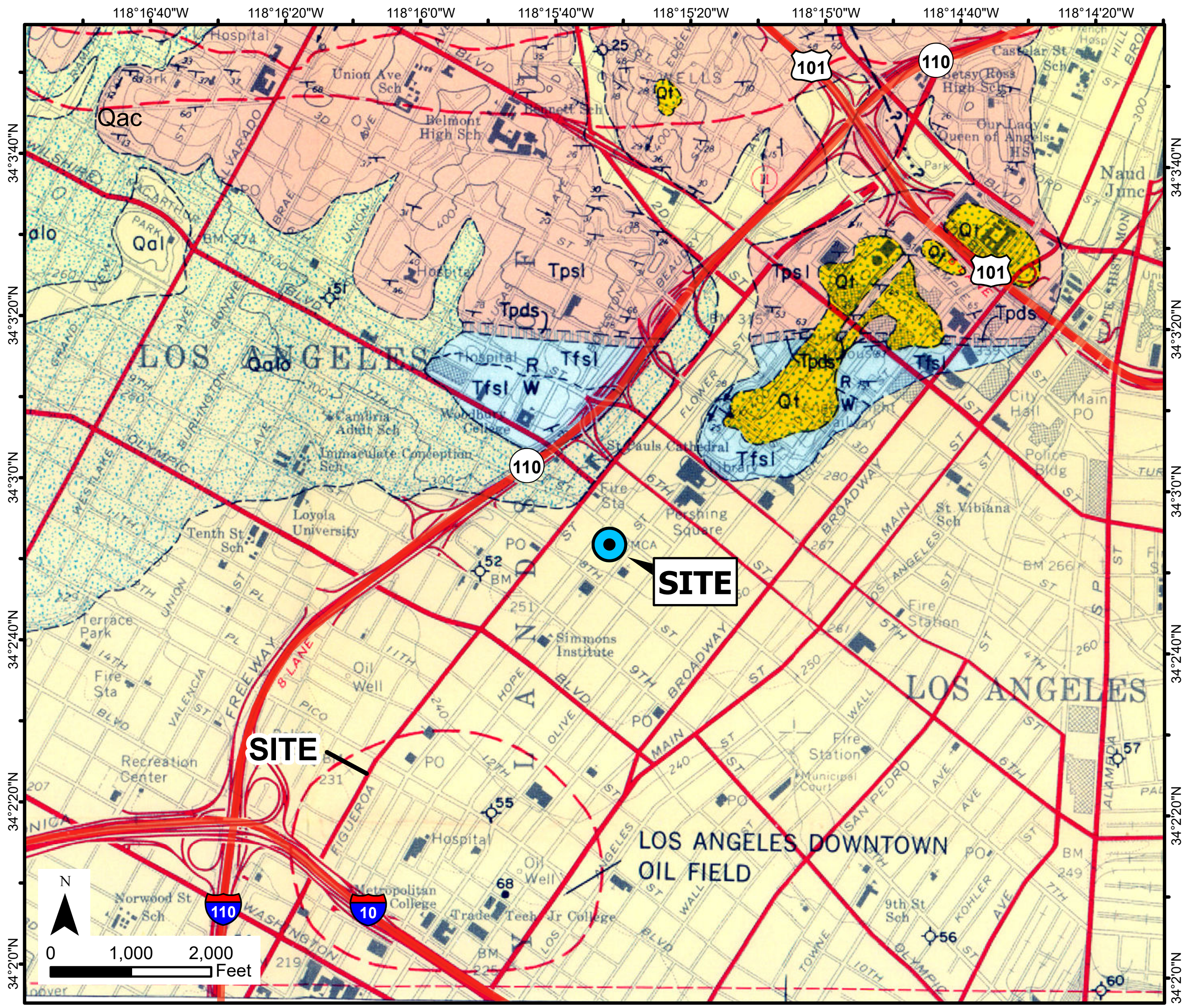
Plot Plan

FIGURE NO. 2

PROJECT NO. 4953-20-0571

Figure 3

Local Geologic Map



Geologic Units

Unit - Description (Age)

Qal - Alluvium. Silt, sand, and gravel (Holocene)
Qalo - Old alluvium. Silt, sand, and gravel forming alluvial plain and terrace deposits (Pleistocene)
Qt - Terrace Deposits. Silt, sand, and gravel forming alluvial terrace and dissected alluvial plain deposits (Pleistocene)
Tfcg - Fernando Formation, Conglomerate, light to red brown
Tfsl - Fernando Formation. Siltstone, massive (Pliocene)
Tpds - Puente Formation. Diatomaceous shale, punky, dull white (Late Miocene)
Tpsl - Puente Formation. Siltstone, well bedded (Late Miocene)

Contacts:

- contact, location accurate
- contact, location approximate
- contact, location concealed
- contact, location inferred
- fault, location accurate
- fault, location approximate
- fault, location concealed
- fault, location inferred

Symbols:

- 23 Inclined Bedding
- 18 Inclined Bedding approx.
- 21 Overturned Bedding
- Vertical Bedding
- Horizontal Bedding
- 39 Inclined Foliation
- Foliation approx.
- Vertical Foliation

Folds:

- Anticline
- Syncline

Reference: Lamar, D.L., 1970, "Geology of the Elysian Park-Repetto Hills area, Los Angeles County, California," California Division of Mines and Geology Special Report 101, 45 p., map in pocket (1:24:000).

wood.

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LOCAL GEOLOGY MAP

LAT:	34.04802
LON:	-118.25866
SCALE:	1:24,000
DRAWN:	PER
CHECK:	RM
DATE:	3/16/2021

Proposed Bloc Residential Tower
700 South Flower Street
Los Angeles, California

FIGURE: **3**

PROJECT: 4953-20-0571

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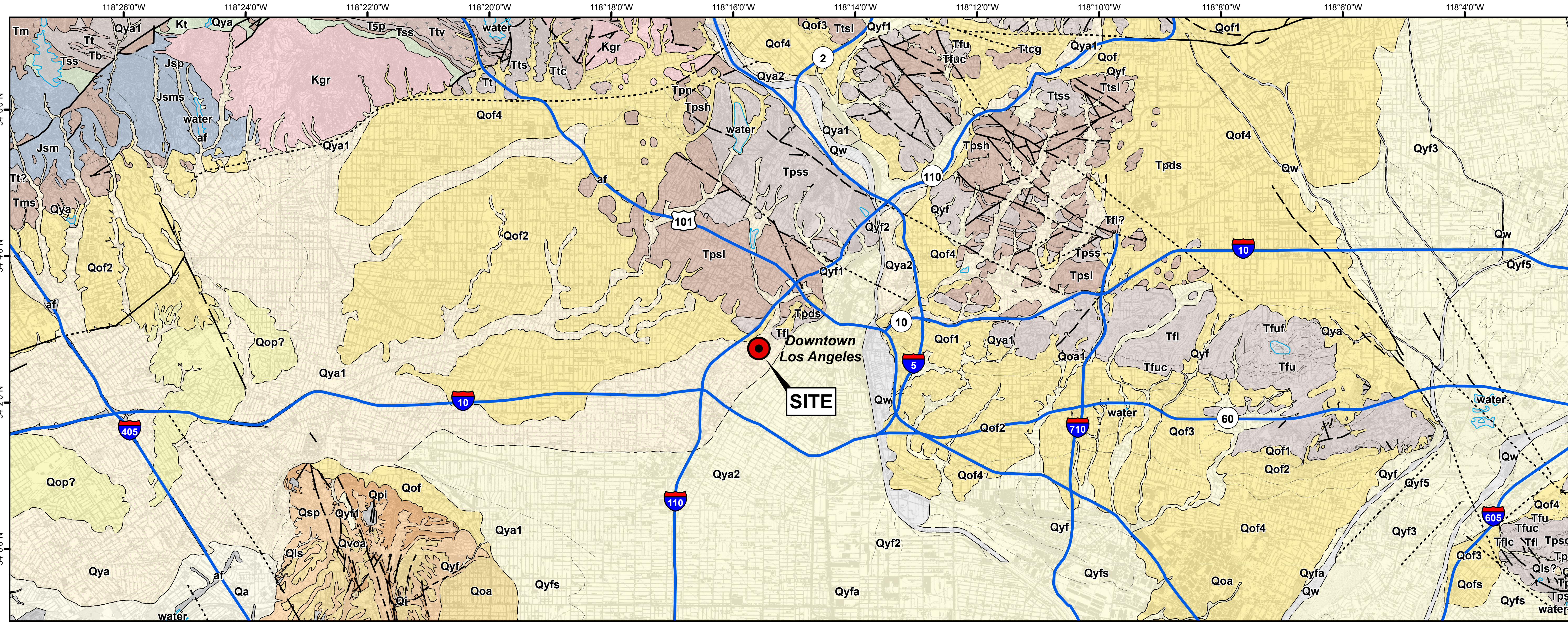
Figure 4

Regional Geologic Map



Geologic Units

af - Artificial fill (latest Holocene)
Qa - Alluvial flood-plain deposits (late Holocene)
Qw - Very young wash deposits (late Holocene)
Qya - Young alluvial flood-plain deposits (Holocene/Late Pleistocene)
Qyf - Young alluvial fan and valley deposits (Holocene/late Pleistocene)
Qls - Landslide deposits (Holocene and Pleistocene)
Qoa - Old alluvial flood-plain deposits (late to middle Pleistocene)
Qof - Old alluvial fan deposits, undivided (late to middle Pleistocene)
Qofs - Old alluvial fan and valley deposits, silt (late to middle Pleistocene)
Qop - Old paralic deposits, undivided (late to middle Pleistocene)
Qvoa - Very old alluvium, undivided (middle to early Pleistocene)
Qi - Inglewood Formation, siltstone (early Pleistocene)
Qpi - Inglewood Formation, siltstone, fine sandstone (early Pleistocene)
Qsp - San Pedro Formation, sand and silty sand (early Pleistocene)
Tfl - Fernando Formation, silty sandstone and siltstone (Pliocene)
Tflc - Fernando Formation, conglomerate (Pliocene)
Tfu - Fernando Formation, upper member, silty sandstone (Pliocene)
Tfuc - Fernando Formation, sandstone, conglomerate (Pliocene)
Tfuf - Fernando Formation, fossiliferous sandstone (Pliocene)
Tpn - Puente Formation, siltstone, sandstone, shale (Pliocene and Miocene)
Tpsc - Puente Formation, Sycamore Canyon Member (Pliocene and Miocene)
Tpsh - Puente Formation, La Vida Member, shale (Miocene)
Tm - Modelo Formation, undivided, mudstone, siltstone, shale (late Miocene)
Tms - Modelo Formation, siltstone, clay shale (late Miocene)
Tpds - Puente Formation, diatomaceous shale (late Miocene)
Tpy - Puente FM, Yorba Member diatamaceous siltstone (late Miocene)
Tplv - Puente Formation, La Vida Member, siltstone (late Miocene)
Tps - Puente Formation, Soquel Member (late Miocene)
Tpsl - Puente Formation, siltstone and sandstone (late Miocene)
Tpss - Puente Formation, sandstone (late Miocene)
Tb - Basalt dikes, flows and breccias (Miocene)
Ttsl - Topanga Formation, siltstone/sandstone/siliceous shale (mid Miocene)
Ttss - Topanga Formation, sandstone (middle Miocene)
Ttcg - Topanga Group, conglomerate (middle Miocene)
Tt - Topanga Group, sedimentary/volcanic rocks (middle and early Miocene)
Tss - Santa Susana FM, clay and mudrock (early to late Paleocene)
Kgr - Granitic rocks (late Cretaceous)
Kt - Tuna Canyon Formation, undivided marine sandstone, siltstone and conglomerate (late Cretaceous)
Jsm - Santa Monica Slate (late Jurassic)
Jsms - Santa Monica Slate, spotted (late Jurassic)
Jsp - Santa Monica Slate, phyllite (late Jurassic)

Note: Some geologic units may have sub-units shown on map

Geologic Contacts and Symbols

contact, identity and existence certain, location accurate
contact, identity and existence certain, location approximate
contact, identity and existence certain, location concealed
fault, identity and existence certain, location accurate
fault, identity and existence certain, location approximate
fault, identity and existence certain, location concealed

(Queried where contacts are questionable)

Path: E:\Files\Work\GIS\4953_Geotech\2020\200571_The_Bloc_Tower\GIS\4953200571_Fig-4_Regional_Geology_Map.aprx

Reference:
Bedrossian, T.L., Roffers, P., Hayhurst, C.A., 2012, "Geologic Compilation of Quaternary Surficial Deposits in Southern California", California Geological Survey , vector spatial data, Special Report 217, December 2012.
Base:
USGS 7.5-minute topographic maps of the Beverly Hills, El Monte, Hollywood, Inglewood, Los Angeles, South Gate, Venice and Whittier Quadrangles.

0 1.5 3 4.5 6 Kilometers
0 1 2 3 4 Miles

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REGIONAL GEOLOGY MAP

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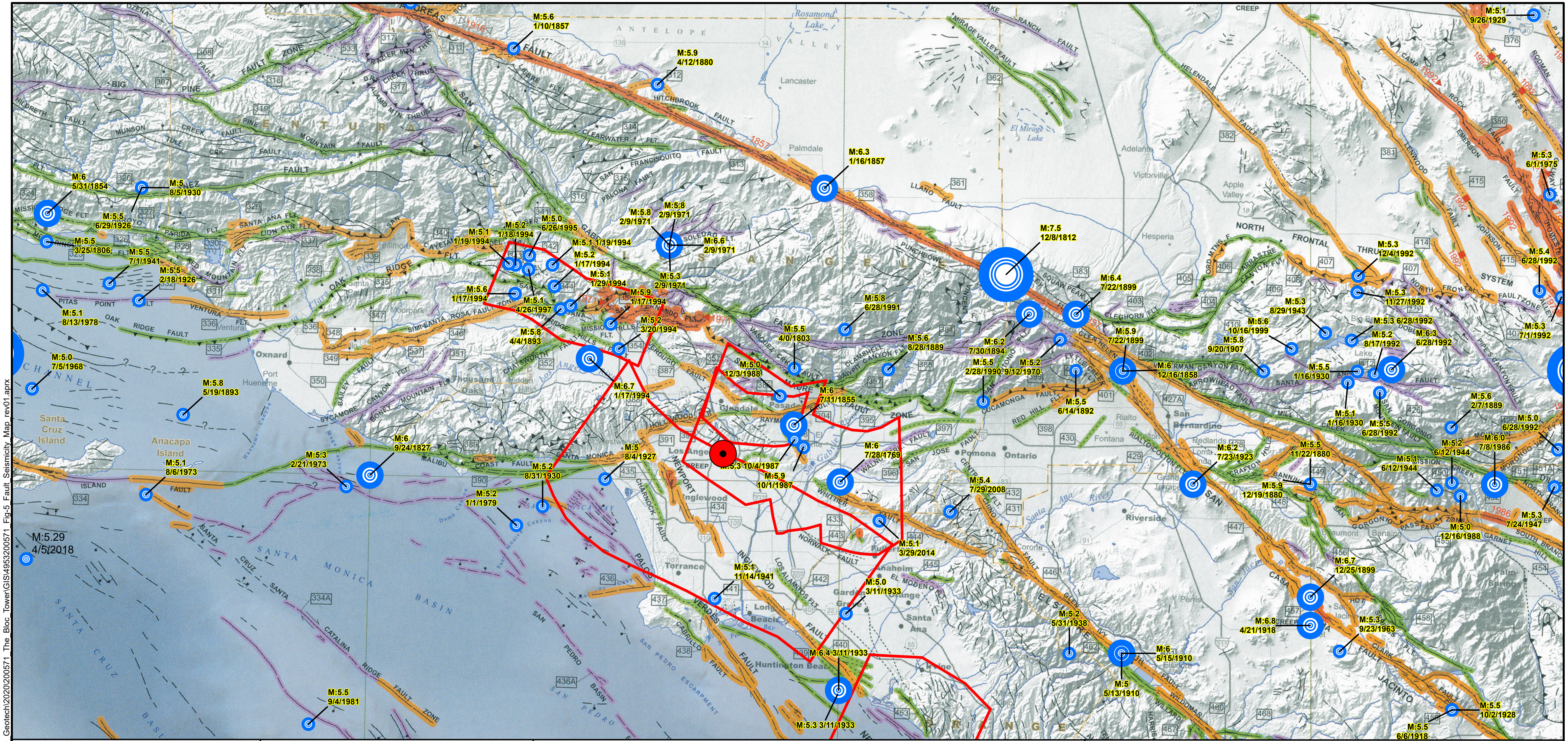
Los Angeles, California

FIGURE:
4

PROJECT:
4953-20-0571

Figure 5

Regional Fault and Seismicity Map



N W E S

0 1.5 3 km

0 1 2 mi

Earthquakes

Approximate Epicenter of Historic Earthquakes

Mag. ≥ 7.0

Mag. 6.0 - 6.9

Mag. 5.0 - 5.9

Faults

Historic Fault Displacement

Holocene Fault Displacement

Evidence of Late Quaternary Fault Displacement

Undifferentiated Quaternary Faults

Bar and ball on downthrown side (relative or apparent)

Arrows along fault indicate relative or apparent direction of lateral movement

Arrows on fault indicates direction of dip

Low angle fault with barbs on upper plate. Fault surface generally dips less than 45 but locally may have been subsequently steepened.

Site

Blind Thrust Faults (surface projection)

Blind Thrust Index:

1 Northridge Thrust

2 Compton Thrust

3 San Joaquin Hills Thrust

4 Upper Elysian Park Thrust

5 Puente Hills Thrust

REFERENCES:
Jennings, C.W. and Bryant, W.A., 2010,"Fault Activity Map of California," California Geological Survey, GDM-006, May 2010
Earthquake Catalogs: California Geological Survey, 1769-1932; Southern California Earthquake Data Center, 1932-2022.
Working Group on California Earthquake Probabilities (WGCEP), 2016, Fault Database Tools, <http://www.wgcep.org/tools-fault_db>

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REGIONAL FAULT AND SEISMICITY MAP

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DATE:	5/6/2022

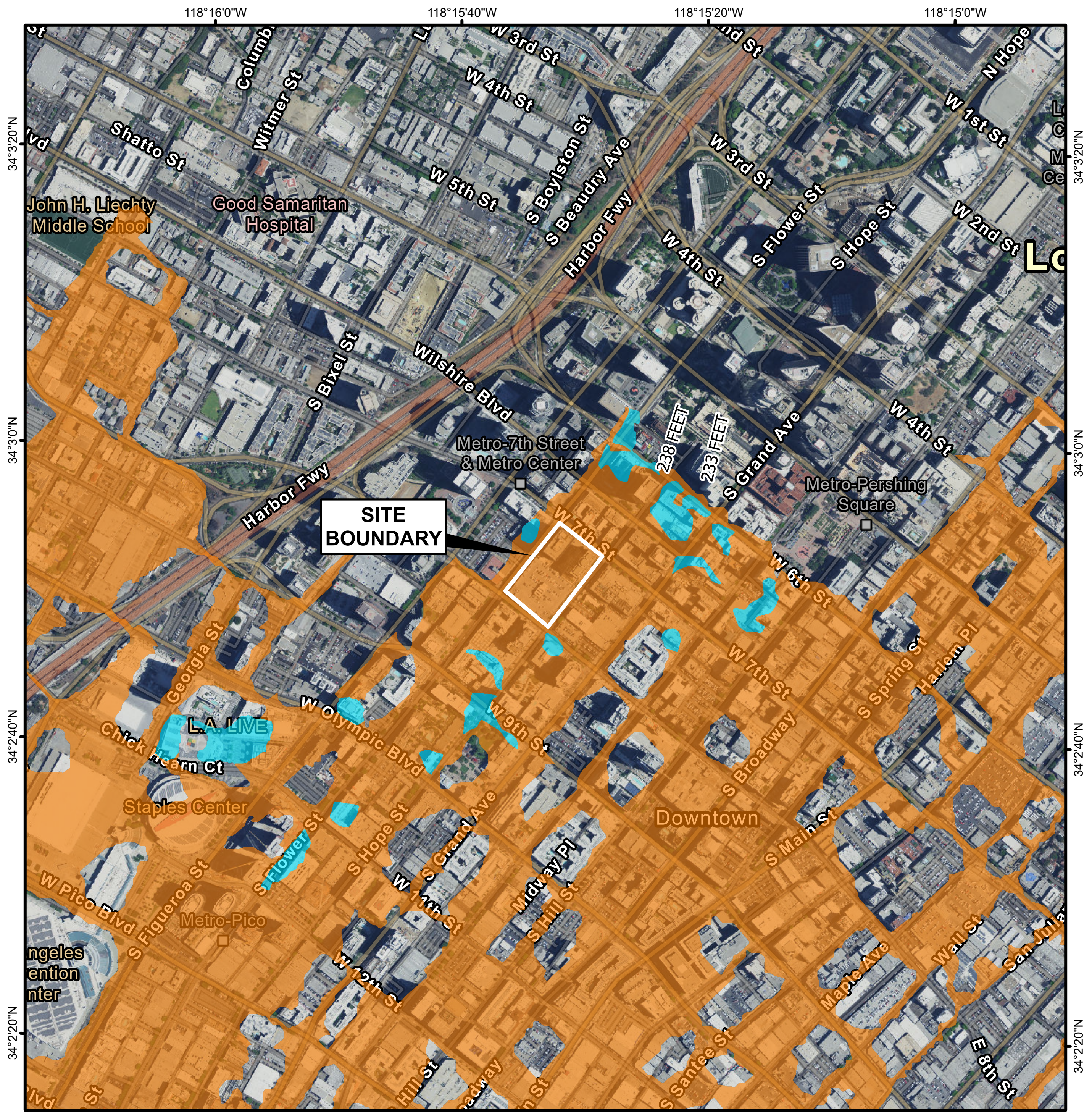
Proposed Bloc Residential Tower
700 South Flower Street
Los Angeles, California

FIGURE: 5

PROJECT: 4953-20-0571

Figure 6

Flood Hazard Map



Base: Esri Community Maps Contributors, County of Los Angeles, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA

Explanation

- 0.2% Annual Chance Flood Hazard Zone
- 0.1% Annual Chance Flood Hazard Zone (with base flood elevations)

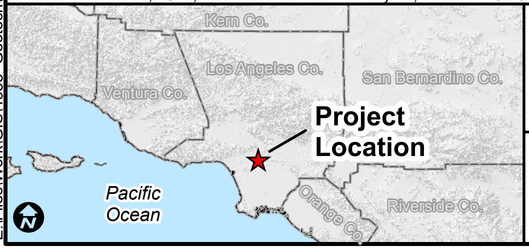
0 — 1,000 — 2,000 Feet

0 — 0.1 — 0.2 — 0.4 Miles

N S E W

Base: Los Angeles County, canvas layer, 2021

Source: FEMA, 2021, National Flood Hazard Layers, accessed 3-10-21



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FLOOD HAZARD MAP

LAT: LON:	34.04802 -118.25866
SCALE:	1:12,000
DRAWN:	PER
CHECK:	RM
DATE:	3/16/2021

Proposed Bloc Residential Tower
700 South Flower Street
Los Angeles, California

FIGURE: **6**

PROJECT: 4953-20-0571

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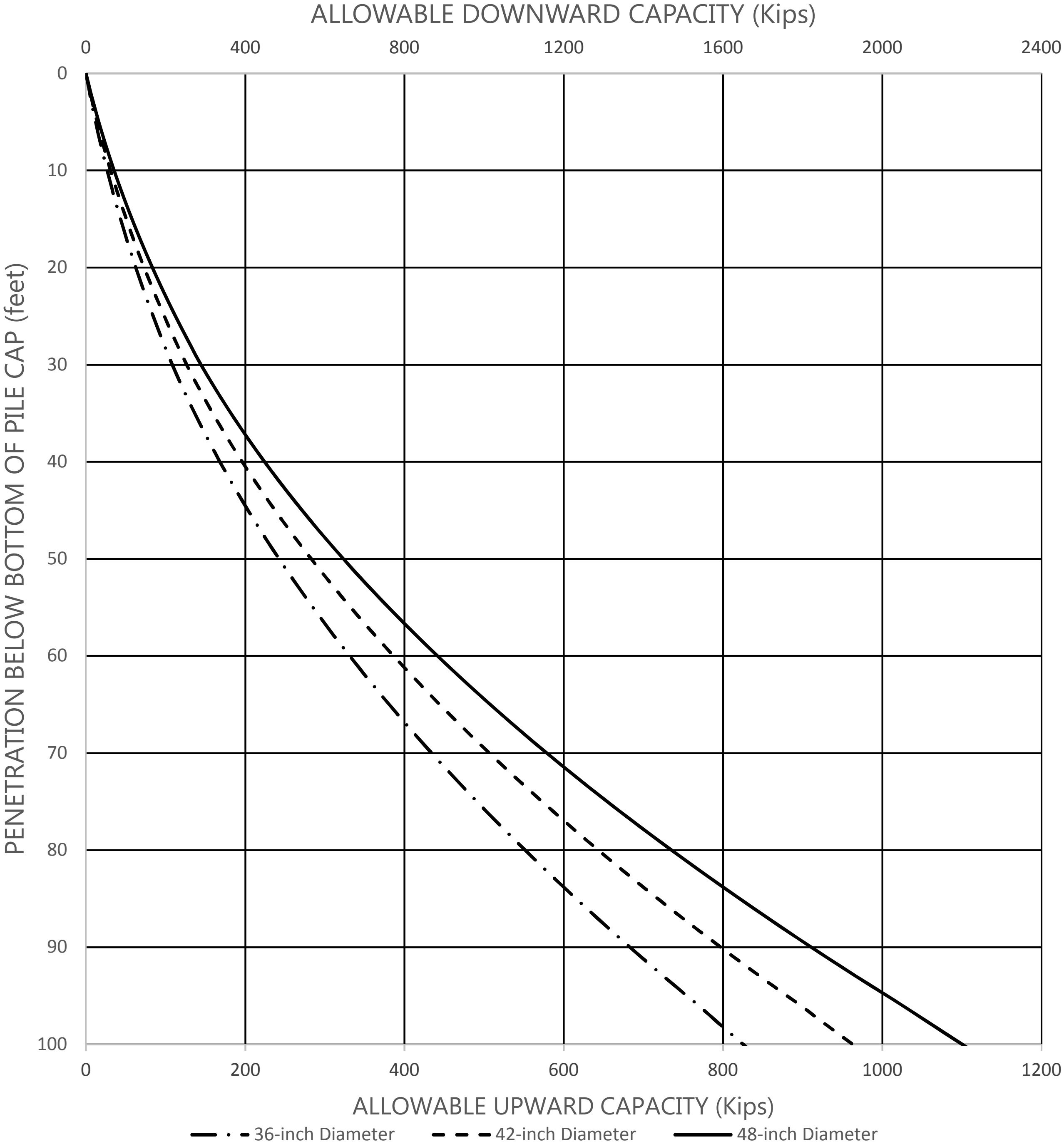
Figure 7

Preliminary Drilled Pile Capacities



NOTES:

(1) The indicated values refer to the total of dead plus live loads; a one-third increase may be used when considering wind or seismic loads.

(2) Piles in groups should be spaced a minimum of 3 pile diameters on center. Piles should be drilled and filled alternately with the concrete permitted to set at leat 8 hours before drilling an adjecent hole.

(3) The indicated values are based on the strength of the soils/bedrock; the actual capacity may be limited to lesser values

By: GA 9/9/2020
Chkd: MM 9/9/2020

Proposed Bloc Residential Tower 700 South Flower Street Los Angeles, California	wood.	**Preliminary Drilled Pile Capacities** Project No. 4953-20-0571 Figure 7