

APPENDIX C

PRELIMINARY GEOTECHNICAL EVALUATION

**PRELIMINARY GEOTECHNICAL EVALUATION
HARBOR-UCLA MEDICAL CENTER MASTER PLAN
1000 WEST CARSON STREET
TORRANCE, CALIFORNIA**

PREPARED FOR:
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April 29, 2015
Project No. 209023003

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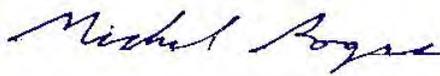
Subject: Preliminary Geotechnical Evaluation
Harbor-UCLA Medical Center Master Plan
1000 West Carson Street
Torrance, California

Dear Mr. Cook:

In accordance with your request and authorization, Ninyo & Moore has performed a preliminary geotechnical evaluation for the Harbor-UCLA Medical Center Master Plan project located at 1000 West Carson Street in Torrance, California. Our evaluation was conducted in general accordance with the scope of services presented in our proposal dated February 13, 2013. This report presents our findings and conclusions regarding the subject site. We understand that the results of this evaluation will be utilized in the preparation of environmental planning documents for the project.

We appreciate the opportunity to provide geotechnical consulting services for this project.

Sincerely,
NINYO & MOORE



Michael Rogers, PG, CEG
Senior Geologist

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1. INTRODUCTION

In accordance with your request and authorization, we have performed a preliminary geotechnical evaluation for the Harbor-UCLA Medical Center Master Plan project (project) located at 1000 West Carson Street in an unincorporated portion of Los Angeles County in the community of Torrance, California (Figure 1). We have performed a geotechnical evaluation of the site geologic conditions and the impacts associated with potential geologic and seismic hazards for inclusion in the environmental planning documents for the project.

The purpose of our preliminary geotechnical evaluation was to assess the geologic conditions at the site and develop preliminary conclusions regarding potential geologic and seismic impacts associated with the project in accordance with the California Environmental Quality Act (CEQA). Where appropriate, recommendations to mitigate potential geologic hazards, as noted in this report, have been provided. Our geotechnical evaluation was based on review of readily available geologic and seismic data and published geotechnical literature pertinent to the project site, and site reconnaissance.

2. SCOPE OF SERVICES

Ninyo & Moore's scope of services has included review of geotechnical background materials, geologic reconnaissance of the project area, and geotechnical analysis. Specifically, we have performed the following tasks:

- Review of readily available topographic and geologic maps, published geotechnical literature, geologic and seismic data, soil data, groundwater data, aerial photographs, and in-house information.
- Review of geotechnical aspects of project plans and documents pertaining to the site.
- Geotechnical site reconnaissance by a representative from Ninyo & Moore conducted on February 16, 2015, to observe and document the existing surface conditions at the project site.
- Compilation and analysis of existing geotechnical data pertaining to the 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 report presenting the results of our study, as well as our conclusions regarding the project's geologic and seismic impacts, and recommendations to address the impacts to be included in the environmental planning documents.

3. PROJECT DESCRIPTION

Based on our understanding, the proposed project involves the development of a new long-term master plan to guide future medical campus development and delivery of health care services and health-related community programs. Future development under the master plan would include demolition of approximately 710,000 square feet of existing structures; renovation of approximately 240,000 square feet of existing structures; and construction of approximately 1,400,000 square feet of new facilities, including parking structures, outpatient buildings, an inpatient bed tower, a diagnostic and treatment building, retail space, and a central plant.

4. SITE DESCRIPTION

The project site is located in the Torrance coastal plain west of the Los Angeles River and north of the Los Angeles Harbor. Topography of the site slopes gently down toward the east ranging from an approximate elevation of 40 feet above mean sea level (MSL) near the eastern portion of the project area to an approximate elevation of 50 feet above MSL in the western part of the project area.

The medical center campus is approximately 72 acres and is bounded by West Carson Street to the north, South Vermont Avenue to the east, West 220th Street to the south and South Normandie Avenue to the west (Figure 1). The project is currently improved with a complex of buildings and related improvements dating back to the 1940s. The improvements include an inpatient hospital, outpatient clinics, research/development and education facilities, community/public service areas, and a parking structure (Figure 2). Additionally, the site is improved with paved roads, parking areas, landscaped areas, retaining walls, and developed pedestrian open space. A Los Angeles County Flood Control District rectangular, concrete, open channel extends along the south edge of the project site from South Normandie Avenue toward the east approximately 0.4 mile adjacent to 220th Street.

5. GEOLOGY

5.1. Regional Geology

The project site is located within the Peninsular Ranges Geomorphic Province of southern California. This geomorphic province encompasses an area that extends approximately 125 miles from the Transverse Ranges and the Los Angeles Basin south to the Mexican border, and beyond another approximately 775 miles to the tip of Baja California. The Peninsular Ranges province varies in width from approximately 30 to 100 miles and is characterized by northwest-trending mountain range blocks separated by similarly trending northwest-trending faults (Norris and Webb, 1990).

The project is situated in the Los Angeles Basin, a region divided into four structural blocks that include uplifted zones and synclinal depressions. The structural blocks are generally bounded by fault systems. The project site is situated in the southwestern block of the seaward part of the basin which is bounded by the Newport-Inglewood zone of deformation. This block is a combination of folds and faults and is characterized by overlapping staggering anticlinal hills. The Newport-Inglewood and Palos Verdes are major active fault systems located in the proximity of the project site. The predominant tectonic activity associated with these and other faults within this regional tectonic framework is right-lateral, strike-slip and/or reverse movement (Norris and Webb, 1990).

5.2. Site Geology

Regional geologic maps indicate that the site is underlain by late to middle Pleistocene-age alluvial flood plain deposits generally comprised of dissected gravel, sand, silt, and clay-bearing alluvium (Saucedo, et al., 2003). A regional geologic map of the site vicinity is shown on Figure 3.

5.3. Groundwater

The site is located within the west coast sub-basin of the Los Angeles Coastal Groundwater Basin. Historic groundwater monitoring well data from the State of California Water Resources Control Board's GeoTracker website (State of California, 2015) were reviewed

for wells located on adjacent properties east and north of the site. Based on the groundwater measurements in these wells from 2007 to 2014, groundwater levels at these locations have ranged from approximately 48 to 60 feet below the ground surface. The historic high groundwater in the site vicinity indicated in the Los Angeles County Safety Element is approximately 30 feet deep (Leighton & Associates, Inc., 1990).

Groundwater levels may be influenced by seasonal variations, precipitation, irrigation, soil/rock types, groundwater pumping, and other factors and are subject to fluctuations. Shallow perched conditions may be present.

6. FAULTING AND SEISMICITY

6.1. Regional Seismicity

The project area is located in a seismically active area, as is the majority of southern California, and the potential for strong ground motion at the site is considered significant. Table 1 lists selected principal known active faults within approximately 30 miles of the project area and the maximum moment magnitude (M_{max}) as published by the California Geological Survey (CGS) (Cao, et al., 2003). The fault distances in Table 1 are measured from the approximate center of the project area.

Figure 4 shows the approximate site location relative to the principal faults in the region. The active Newport-Inglewood fault is located approximately 3.4 miles northeast of the approximate center of the site. The active Palos Verdes fault is located approximately 3.7 miles southwest of the approximate center of the site. Blind thrust faults are low-angle faults at depths that do not break the surface and are, therefore, not shown on Figure 4. Although blind thrust faults do not have a surface trace, they can be capable of generating damaging earthquakes and are included in Table 1.

Table 1 – Principal Regional Active Faults

Fault	Approximate Fault-to-Site Distance ¹ miles (kilometers)	Maximum Moment Magnitude ² (M_{max})
Newport-Inglewood (Los Angeles Basin)	3.4 (5.5)	7.1
Palos Verdes	3.7 (5.9)	7.3
Puente Hills Blind Thrust	10.3 (16.5)	7.1
Upper Elysian Park Blind Thrust	16.7 (26.8)	6.4
Santa Monica	16.9 (27.1)	6.6
Elsinore	18.1 (29.1)	6.7
Hollywood	18.6 (30.0)	6.4
Malibu	19.1 (30.7)	6.7
Anacapa-Dume	19.8 (31.9)	7.5
Raymond	20.5 (32.9)	6.5
Verdugo	22.2 (35.7)	6.9
San Joaquin Hills Blind Thrust	22.7 (36.5)	6.6
Sierra Madre	26.9 (43.3)	7.2
San Jose	27.8 (44.7)	6.4
Clamshell-Sawpit	29.3 (47.1)	6.5
Notes:		
¹ USGS, 2008		
² Cao, et al., 2003		

7. METHODOLOGY FOR GEOLOGIC IMPACT AND HAZARD ANALYSES

As outlined by the CEQA, the proposed project has been evaluated with respect to potential geologic and seismic impacts associated with the project. Evaluation of impacts due to potential geologic and seismic hazards is based on our review of readily available published geotechnical literature and geologic and seismic data pertinent to the proposed project, and site reconnaissance. The references and data reviewed include, but are not limited to, the following:

- Geologic maps and fault maps from the CGS and United States Geological Survey (USGS).
- Topographic maps from the USGS.
- State of California Earthquake Fault Zone Maps.
- State of California Seismic Hazards Zones Reports and Maps.
- Aerial photographs.

- Seismic data from the CGS and USGS.
- Geotechnical publications by the CGS and USGS.
- Los Angeles County Safety Element.

8. THRESHOLDS OF SIGNIFICANCE

According to Appendix G of the CEQA guidelines (California Environmental Resources Evaluation System [CERES], 2005a, 2005b), a project is considered to have a geologic impact if its implementation would result in or expose people/structures to potential substantial adverse effects, including the risk of loss, injury, or death involving hazards involving one or more of the geologic conditions presented in Table 2. Table 2 also presents the impact potential as defined by CEQA associated with each of the geologic conditions discussed in the following sections.

Table 2 – Summary of Potential Geologic Impacts/Hazards

Geologic Condition	Impact Potential ¹			
	Potentially Significant Impact	Less than Significant with Mitigation Incorporation	Less than Significant Impact	No Impact
Earthquake Fault Rupture			X	
Strong Seismic Ground Shaking		X		
Seismically Related Ground Failure, Including Liquefaction			X	
Landslides				X
Substantial Soil Erosion			X	
Subsidence				X
Compressible/Collapsible Soils		X		
Expansive Soils		X		
Corrosive Soils		X		
Shallow Groundwater			X	
Note: ¹ Reference: CERES, 2005, Appendix G – Environmental Checklist Form, Final Text, dated October 26. Website: http://ceres.ca.gov/topic/envlaw/ceqa/guidelines/appendices.html				

9. CONCLUSIONS AND RECOMMENDATIONS FOR POTENTIAL GEOLOGIC AND SEISMIC IMPACTS/HAZARDS

Based on our review of geologic and seismic background information, and geotechnical site reconnaissance, implementation of the proposed project is not anticipated to have a significant impact on the geologic environment. However, future development within the project area may be subjected to potential impacts from geologic and seismic hazards. Potential impacts on the proposed project based on our evaluation are provided in the following sections.

The potential geologic and seismic hazards described below may be addressed by employing sound engineering practice in the design and construction of future development in the project area. This practice includes the implementation of appropriate geotechnical recommendations prior to the design and construction of the facilities in the project area. Typical methods to reduce potential hazards that may be encountered during the construction of future improvements are described in the following sections. Where appropriate, recommendations to mitigate potential geologic hazards are provided. Prior to design of future improvements, detailed subsurface geotechnical evaluation should be performed to address the site-specific conditions at the locations of the planned improvements and to provide detailed recommendations for design and construction.

9.1. Surface Fault Rupture

Surface fault rupture is the offset or rupturing of the ground surface by relative displacement across a fault during an earthquake. Based on our review of referenced geologic and fault hazard data and site reconnaissance, the project site is not transected by known active or potentially active faults. The active Newport-Inglewood fault is located approximately 3.4 mile northeast of the approximate center of the site; and the active Palos Verdes fault is located approximately 3.7 miles southwest of the approximate center of the site. The site is not located within a State of California Earthquake Fault Zone (State of California, 1977). Therefore, the potential for surface rupture is relatively low. However, lurching or cracking of the ground surface as a result of nearby seismic events is possible.

9.2. Seismic Ground Shaking

Earthquake events from one of the regional active or potentially active faults near the project area could result in strong ground shaking which could affect the project area. The level of ground shaking at a given location depends on many factors, including the size and type of earthquake, distance from the earthquake, and subsurface geologic conditions. The type of construction also affects how particular structures and improvements perform during ground shaking.

In order to evaluate the level of ground shaking that might be anticipated in the project area, site-specific analysis was performed. The 2013 California Building Code recommends that the design of structures be based on spectral response accelerations in the direction of maximum horizontal response (5 percent damped) having a 1 percent probability of collapse in 50 years. Such spectral response accelerations represent the Risk-Targeted Maximum Considered Earthquake (MCE_R) ground motion. The horizontal peak ground acceleration (PGA) that corresponds to the MCE_R for the site was calculated as 0.65g using the USGS (USGS, 2014) seismic design tool (web-based). The mapped and design PGA were estimated to be 0.62g and 0.43g, respectively, using the USGS (2014) calculator and the American Society of Civil Engineers 7-10 Standard. These estimates of ground motion do not include near-source factors that may be applicable to the design of structures on site.

This potential level of ground shaking could have high impacts on future improvements in the project area without appropriate design mitigation, and should be considered during the detailed design phase of the project. Mitigation of the potential impacts of seismic ground shaking can be achieved through project structural design. Structural elements of future improvements can be designed to resist or accommodate appropriate site-specific ground motions and to conform to the current seismic design standards. Appropriate structural design and mitigation techniques would reduce the impacts related to seismic ground shaking to low levels.

9.3. Liquefaction

Liquefaction is the phenomenon in which loosely deposited granular soils located below the water table undergo rapid loss of shear strength due to excess pore pressure generation when subjected to strong earthquake-induced ground shaking. Ground shaking of sufficient duration results in the loss of grain-to-grain contact due to rapid rise in pore water pressure causing the soil to behave as a fluid for a short period of time. Liquefaction is known generally to occur in saturated or near-saturated cohesionless soils at depths shallower than 50 feet. Factors known to influence liquefaction potential include composition and thickness of soil layers, grain size, relative density, groundwater level, degree of saturation, and both intensity and duration of ground shaking. The potential damaging effects of liquefaction include differential settlement, loss of ground support for foundations, ground cracking, heaving and cracking of slabs due to sand boiling, buckling of deep foundations due to liquefaction-induced ground settlement.

According to Seismic Hazard Zones Maps published by the State of California (California Department of Conservation, Division of Mines and Geology [CDMG], 1998), the site is not located within an area considered susceptible to liquefaction (Figure 5). Furthermore, based on the recent groundwater depths on the order of 48 to 60 feet in the site vicinity, the potential for liquefaction at the site is considered relatively low. However, the site could be subject to seismically induced dynamic settlement, which would be analyzed with site-specific subsurface evaluation during the detailed design phase of the project.

Assessment of the potential for liquefaction and seismically induced dynamic settlement would be evaluated prior to detailed design and construction of project improvements and incorporated into the design, as appropriate. Structural design and mitigation techniques would be developed to reduce the impacts related to liquefaction to low levels. Therefore, the potential impacts due to liquefaction are considered to be minimal with incorporation of techniques such as structural design, in-situ ground modification, or supporting foundations with piles at depths designed specifically for liquefaction.

To evaluate the potential liquefaction hazard for the proposed project, subsurface evaluation could be performed. Site-specific geotechnical evaluations to assess the liquefaction and dynamic settlement characteristics of the on-site soils would include drilling of exploratory borings, evaluation of groundwater depths, and laboratory testing of soils.

Methods for construction in areas with potential liquefaction hazard may include in-situ ground modification, removal of liquefiable layers and replacement with compacted fill, or support of project improvements with piles at depths designed specifically for liquefaction. Pile foundations can be designed for liquefaction hazard by supporting the piles in dense soil or bedrock below the liquefiable zone or other appropriate methods as evaluated during the site-specific evaluation. Additional recommendations for mitigation of liquefaction may include densification by installation of stone columns, vibration, deep dynamic compaction, and/or compaction grouting.

9.4. Landslides

Landslides, slope failures, and mudflows of earth materials generally occur where slopes are steep and/or the earth materials are too weak to support themselves. Earthquake-induced landslides may also occur due to seismic ground shaking. Landslides are not shown at the site on the geologic maps reviewed. The project site has been extensively developed and is primarily covered with pavements, hardscape and structures. The site includes some graded slopes associated with landscaping and pedestrian areas. An area northwest of the hospital contains a slope that descends approximately 25 feet toward the edge of the building. This slope is landscaped and lined at the bottom edge with a drainage system.

Accordingly, the potential for future landslides or mudflows to affect developments within the project areas is relatively low, and significant impacts related to landslides or mudflows within the project area are not anticipated. Slopes created for future developments within the project area should also be designed to reduce the potential for landslides or mudflows.

9.5. Soil Erosion

Soil erosion refers to the process by which soil or earth material is loosened or dissolved and removed from its original location. Erosion can occur by varying processes and may occur in the project area where bare soil is exposed to wind or moving water (both rainfall and surface runoff). The processes of erosion are generally a function of material type, terrain steepness, rainfall or irrigation levels, surface drainage conditions, and general land uses.

Based on our review of geologic references and site reconnaissance, the materials exposed at the surface of the project site include clays and silty sand soils. Sandy soils typically have low cohesion, and have a relatively higher potential for erosion from surface runoff when exposed in cut slopes or utilized near the face of fill embankments. Surface soils with higher amounts of clay tend to be less erodible as the clay acts as a binder to hold the soil particles together.

Future construction at the project site would result in ground surface disruption during excavation, grading, and trenching that would create the potential for erosion to occur. However, a Storm Water Pollution Prevention Program (SWPPP) incorporating Best Management Practices (BMPs) for erosion control would be prepared prior to the start of construction in accordance with governing agencies. In addition, the topographic gradients at the project site are relatively gentle. During long-term operation of future developments at the project site, surface drainage provisions, as appropriate, would reduce the potential for soil erosion at the site. Therefore, potential soil erosion would be reduced with incorporation of appropriate BMPs.

With the implementation of BMPs incorporated in the project SWPPP during future construction, water- and wind-related soil erosion can be limited and managed within construction site boundaries. Examples of these procedures could include surface drainage measures for erosion due to water, such as the use of erosion prevention mats or geofabrics, silt fencing, sandbags and plastic sheeting, and temporary drainage devices. Positive surface drainage should be accommodated at project construction sites to allow surface runoff to flow away from site improvements or areas susceptible to erosion. To reduce wind-related

erosion, wetting of soil surfaces and/or covering exposed ground areas and soil stockpiles could be considered during construction operations, as appropriate. The use of soil tackifiers may be considered to reduce the potential for water- and wind-related soil erosion.

During long-term operation of future developments in the project area, soil erosion can be mitigated through site drainage design and maintenance practices. Design procedures can be performed to reduce soil erosion such as appropriate surface drainage design of roadways and facilities to provide for positive surface runoff. These design procedures would address reducing concentrated run-off conditions that could cause erosion and affect the stability of project improvements.

9.6. Subsidence

Subsidence is characterized as a sinking of the ground surface relative to surrounding areas, and can generally occur where deep soil deposits are present. Subsidence in areas of deep soil deposits is typically associated with regional groundwater withdrawal or other fluid withdrawal from the ground such as oil and natural gas. Subsidence can result in the development of ground cracks and damage to subsurface vaults, pipelines and other improvements.

Historic subsidence occurred in the City of Long Beach, but is not known to have occurred at the project site. The County of Los Angeles Safety Element (1990) does not indicate mapped areas of subsidence. Therefore, the potential for subsidence in the project area is relatively low.

9.7. Compressible/Collapsible Soils

Compressible soils are generally comprised of soils that undergo consolidation when exposed to new loading, such as fill or foundation loads. Soil collapse is a phenomenon where the soils undergo a significant decrease in volume upon increase in moisture content, with or without an increase in external loads. Buildings, structures and other improvements may be subject to excessive settlement-related distress when compressible soils or collapsible soils are present.

Based on our background review, the project area is underlain by older alluvial deposits. The alluvial deposits underlying the site are generally unconsolidated, reflecting a depositional history without substantial loading, and may be subject to collapse. Older, undocumented fill soils related to previous development may be present at the project site and, if so, may be potentially compressible/collapsible. Due to the presence of potentially compressible/collapsible soils at the site, there is a potential for differential settlement to cause damage to project improvements. The potential impacts of settlement are significant without appropriate mitigation during detailed project design and construction.

Since future development within the project area will involve construction of new improvements that would be constructed upon the existing soils, potential settlement and/or collapsible soils will be a consideration in the detailed design and construction of project improvements. Assessment of the potential for soils prone to settlement would be evaluated prior to detailed design and construction of project improvements and mitigation techniques would be developed, as appropriate, to reduce the impacts related to settlement to low levels.

To evaluate the potential for settlement to affect future project components, surface reconnaissance and subsurface evaluation would be performed. During the detailed design phase of the project, site-specific geotechnical evaluations would be performed to assess the settlement potential of the on-site natural soils and undocumented fill. This may include detailed surface reconnaissance to evaluate site conditions, and drilling of exploratory borings or test pits and laboratory testing of soils, where appropriate, to evaluate site conditions.

Examples of possible mitigation measures for soils with the potential for settlement include removal of the compressible/collapsible soil layers and replacement with compacted fill; surcharging to induce settlement prior to construction of improvements; allowing for a settlement period after or during construction of new fills; and specialized foundation design, including the use of deep foundation systems to support structures. Varieties of in-situ soil improvement techniques are also available, such as dynamic compaction (heavy tamping) or compaction grouting.

9.8. Expansive Soils

Expansive soils include clay minerals that are characterized by their ability to undergo significant volume change (shrink or swell) due to variations in moisture content. Sandy soils are generally not expansive. Changes in soil moisture content can result from rainfall, irrigation, pipeline leakage, surface drainage, perched groundwater, drought, or other factors. Volumetric change of expansive soil may cause excessive cracking and heaving of structures with shallow foundations, concrete slabs-on-grade, or pavements supported on these materials.

Based on our background review and site reconnaissance, the near-surface soils in the project site are generally clayey and sandy silt soils. Sandy soils typically have a low expansion potential. However, clayey soils are typically expansive. Constructing project improvements on soils known to be potentially expansive could have a significant impact on future improvements.

Detailed assessment of the potential for expansive soils would be evaluated during the design phase of the project and mitigation techniques would be developed, as appropriate, to reduce the impacts related to expansive soils to low levels. Therefore, the potential impacts due to expansive soils would be reduced to low levels with incorporation of techniques such as overexcavation and replacement with non-expansive soil, soil treatment, moisture management, and/or specific structural design for expansive soil conditions developed during design of the project.

9.9. Corrosive Soils

The project site is located in a geologic environment that could potentially contain soil conditions that are corrosive to concrete and metals. Corrosive soil conditions may exacerbate the corrosion hazard to buried conduits, foundations, and other buried concrete or metal improvements. Corrosive soils could cause premature deterioration of these underground structures or foundations. Constructing future project improvements on corrosive soils could have a substantial impact to the project. Assessment of the potential for corrosive soils would be evaluated during the detailed design phase of the project through

soil testing procedures, and mitigation techniques would be developed, as appropriate, to reduce the impacts related to corrosive soils to low levels.

To evaluate the potential for corrosive soils to affect future project improvements, subsurface evaluation, including laboratory testing, would need to be performed. Evaluation of the corrosive soil potential can be accomplished by the testing and analysis of soils at foundation design depths. The laboratory tests conducted on the soils prior to construction and improvement plan preparation would include corrosivity tests to evaluate the corrosivity of the subsurface soils. Review of these data by a corrosion engineer would result in corrosion protection measures suitable for the project. Evaluation of the potential corrosive soils hazard would be performed prior to detailed design and construction so that, in the event the hazard exists, mitigation techniques can be implemented.

Mitigation of corrosive soil conditions may involve the use of concrete 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. Specific measures to reduce the potential effects of corrosive soils would be developed in the detailed design phase.

9.10. Groundwater

Based on our background review, groundwater levels in the vicinity of the project site may vary from approximately 48 to 60 feet below the ground surface. The depth to historic high groundwater is approximately 30 feet. Future improvements in the project area are anticipated to consist of excavations and site grading for new medical, office and retail structures, pedestrian areas, landscaping, open space areas, and parking area improvements. Based on the recent depth of groundwater in the project area and the anticipated depth of these construction activities, groundwater would not have a significant impact on excavations for future project improvements. However, areas of shallower perched groundwater may be encountered during excavations. Groundwater levels may be influenced

by seasonal variations, precipitation, irrigation, soil/rock types, groundwater pumping, and other factors and are subject to fluctuations.

Wet or saturated soil conditions encountered in excavations during construction for the project can cause instability of the excavations, and present a constraint to the construction of foundations. Excavations for foundations in areas with shallow perched groundwater may need to be cased/shored and/or dewatered to maintain stability of the excavations and provide access for construction. Wet soils encountered in excavations below the groundwater can be difficult for the contractor to handle.

Further study, including subsurface exploration, would be performed during the detailed design phase of future improvements to evaluate the presence of groundwater, seepage, and/or perched groundwater at the site and the potential impacts on design and construction of project improvements. Assessment of the potential for shallow groundwater would be evaluated during the design phase of the project and mitigation techniques would be developed, as appropriate, to reduce the impacts related to shallow groundwater to low levels. Therefore, the potential impacts due to groundwater would be reduced with incorporation of techniques such as construction dewatering.

10. LIMITATIONS

The purpose of this study was to evaluate geotechnical conditions and potential geologic and seismic hazards at the site by reviewing readily available geotechnical data, and performing a site reconnaissance to provide a preliminary geotechnical report which can be utilized in the preparation of environmental documents for the project.

The geotechnical analyses presented in this report have been conducted in accordance with current engineering practice and the standard of care exercised by reputable geotechnical consultants performing similar tasks in this area. No other warranty, implied or expressed, is made regarding the conclusions, recommendations, and professional opinions expressed in this report. Our preliminary conclusions and recommendations are based on a review of readily available geotechnical literature, geologic and seismic data, and an analysis of the observed

conditions. Variations may exist and conditions not observed or described in this report may be encountered.

11. REFERENCES

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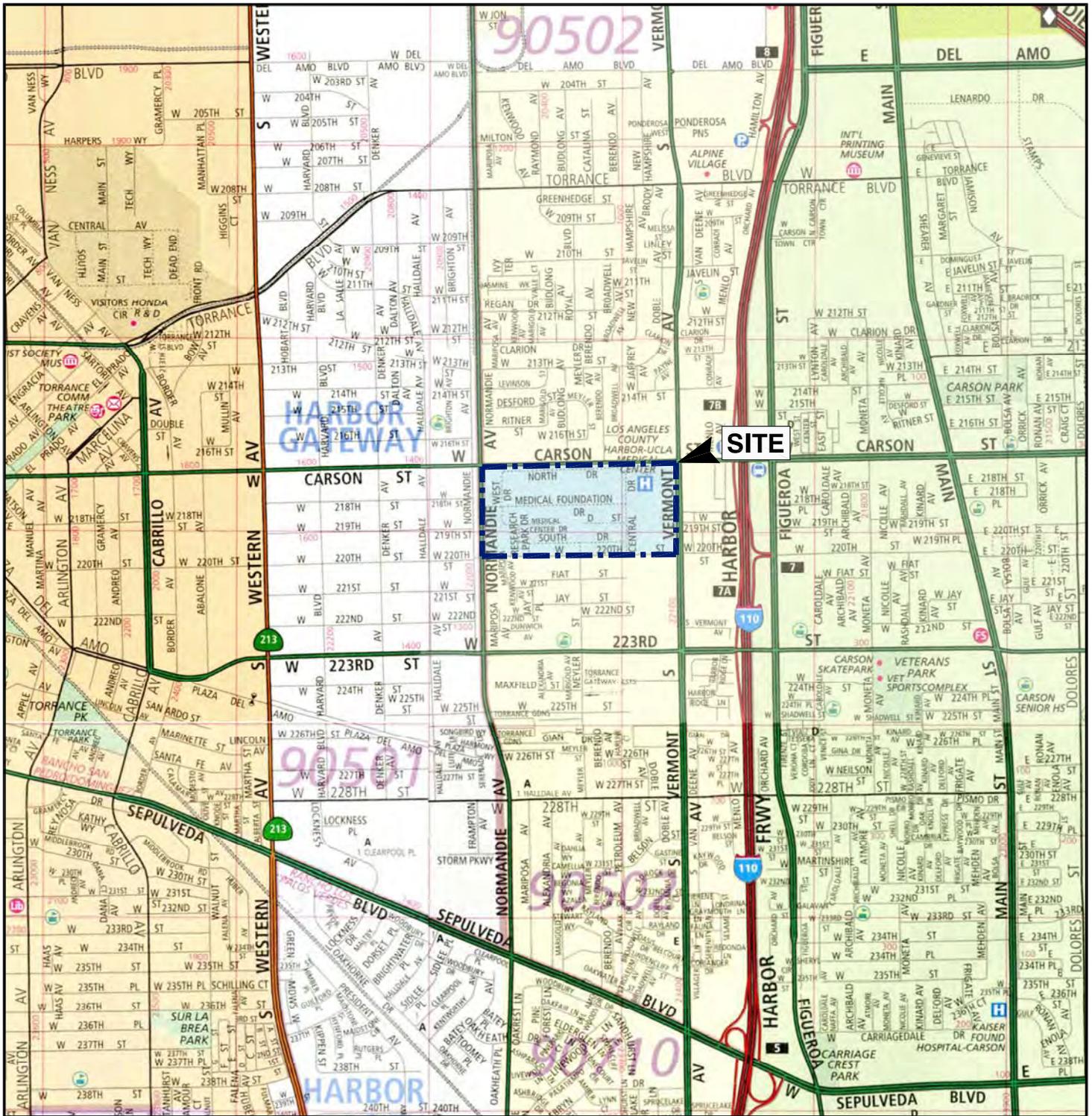
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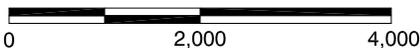
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SCALE IN FEET



NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.
Map © Rand McNally, R.L.07-S-129

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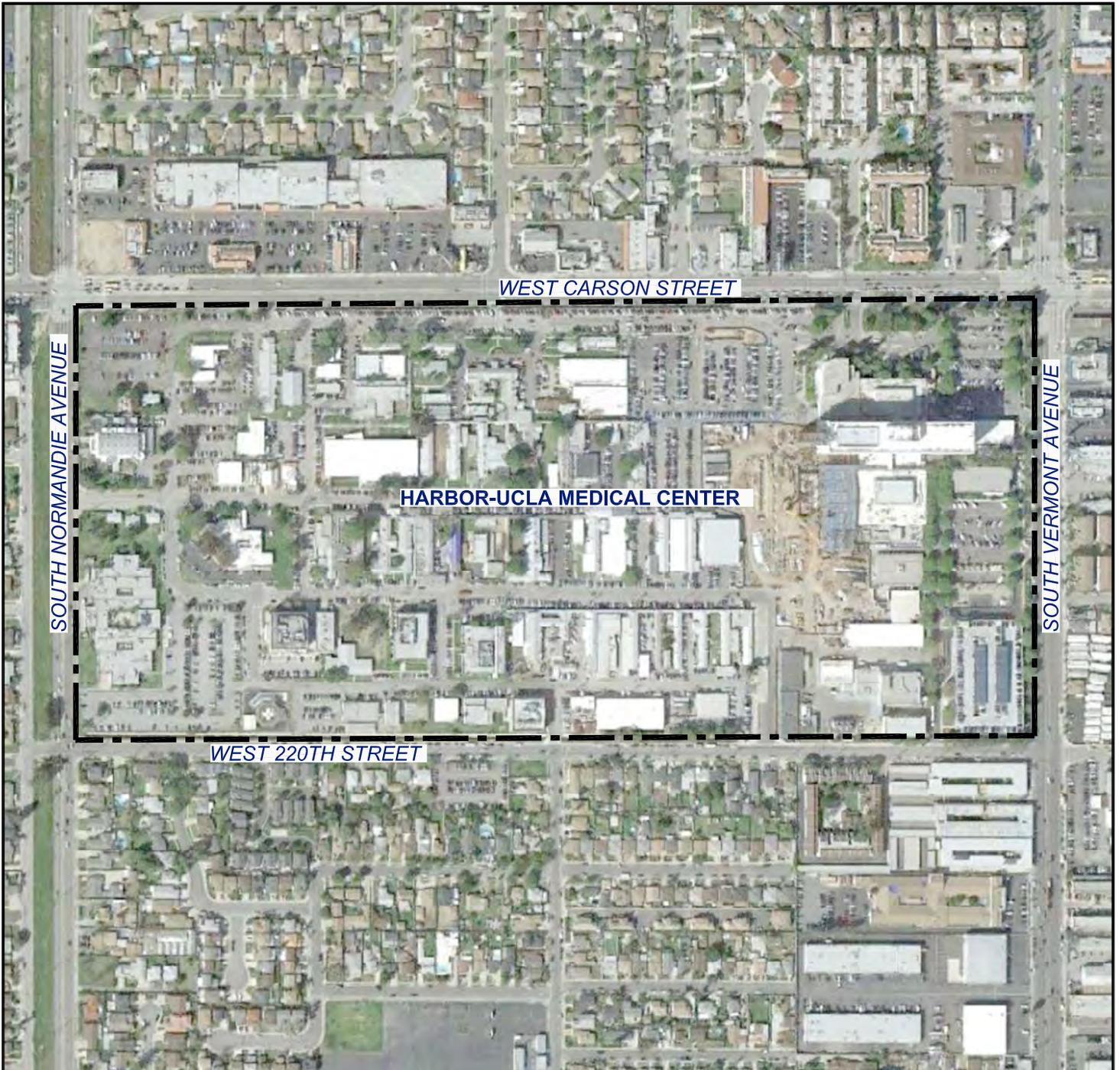
SITE LOCATION

FIGURE

PROJECT NO.	DATE
209023003	4/15

HARBOR-UCLA MEDICAL CENTER MASTER PLAN
1000 WEST CARSON STREET
TORRANCE, CALIFORNIA

1



REFERENCE: GOOGLE EARTH IMAGERY, 2015.



SCALE IN FEET



NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

LEGEND



SITE AERIAL

FIGURE

2

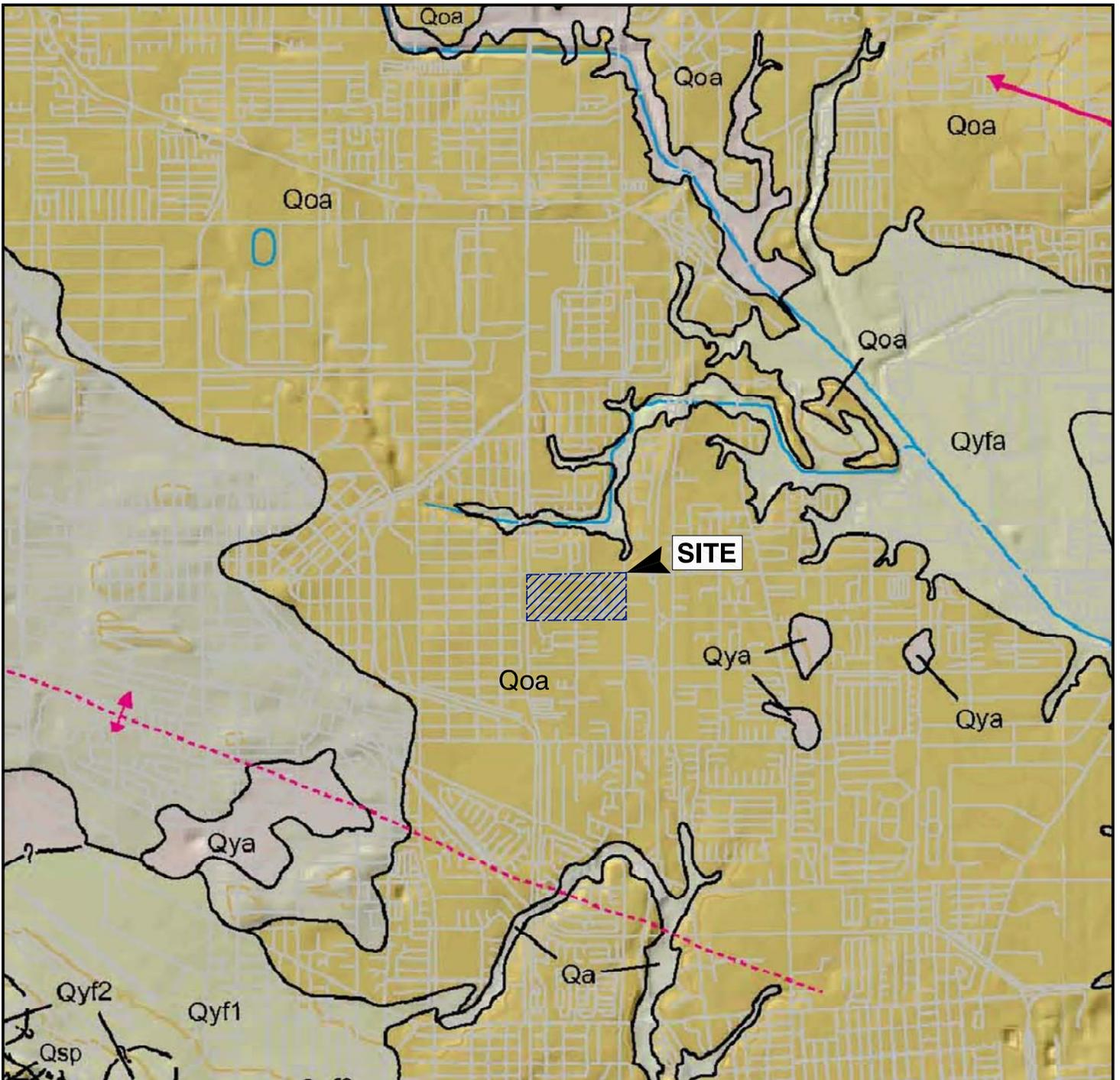
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DATE

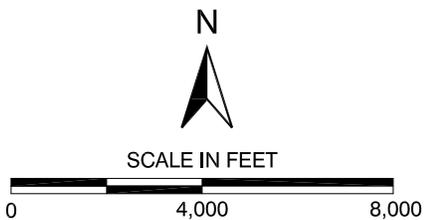
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TORRANCE, CALIFORNIA

209023003

4/15



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NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

LEGEND	
Qa	ALLUVIAL FLOOD PLAIN DEPOSITS
Qya	YOUNG ALLUVIAL FLOOD PLAIN DEPOSITS
Qyfa	YOUNG ALLUVIAL FAN AND VALLEY DEPOSITS
Qoa	OLDER ALLUVIAL FLOOD PLAIN DEPOSITS

Ninyo & Moore

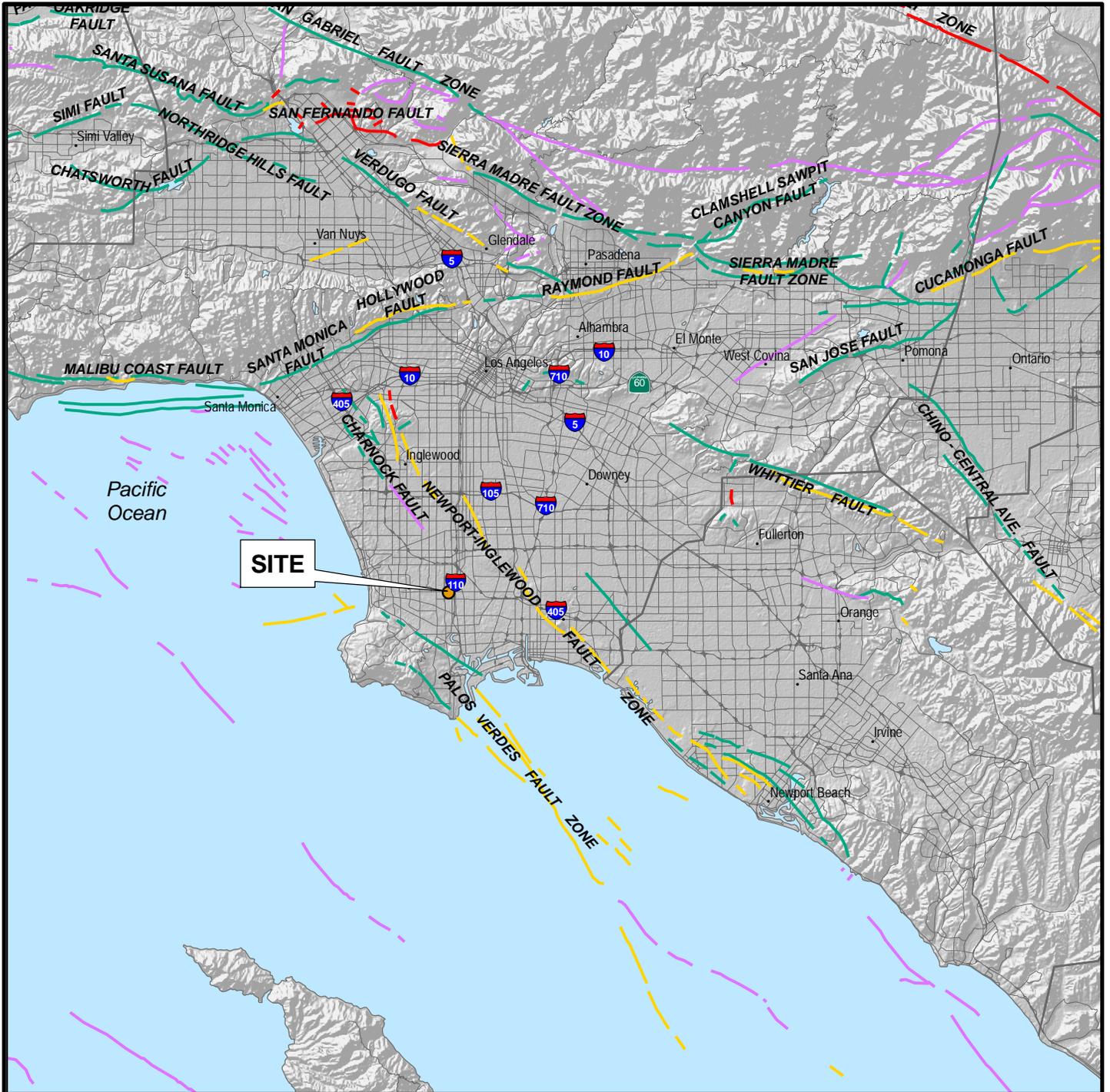
REGIONAL GEOLOGY

FIGURE

PROJECT NO.	DATE
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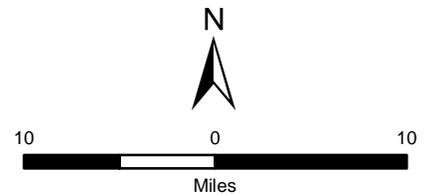
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3



GIS DATA SOURCE: CALIFORNIA GEOLOGICAL SURVEY (CGS); ENVIRONMENTAL SYSTEMS RESEARCH INSTITUTE (ESRI)
 REFERENCE: JENNINGS, 2010, FAULT ACTIVITY MAP OF CALIFORNIA.

LEGEND	
FAULT ACTIVITY:	
— HISTORICALLY ACTIVE	— LATE QUATERNARY
— HOLOCENE ACTIVE	— QUATERNARY
— COUNTY BOUNDARIES	



NOTE: DIMENSIONS, DIRECTIONS, AND LOCATIONS ARE APPROXIMATE

Ninyo & Moore

FAULT LOCATIONS

FIGURE

PROJECT NO.

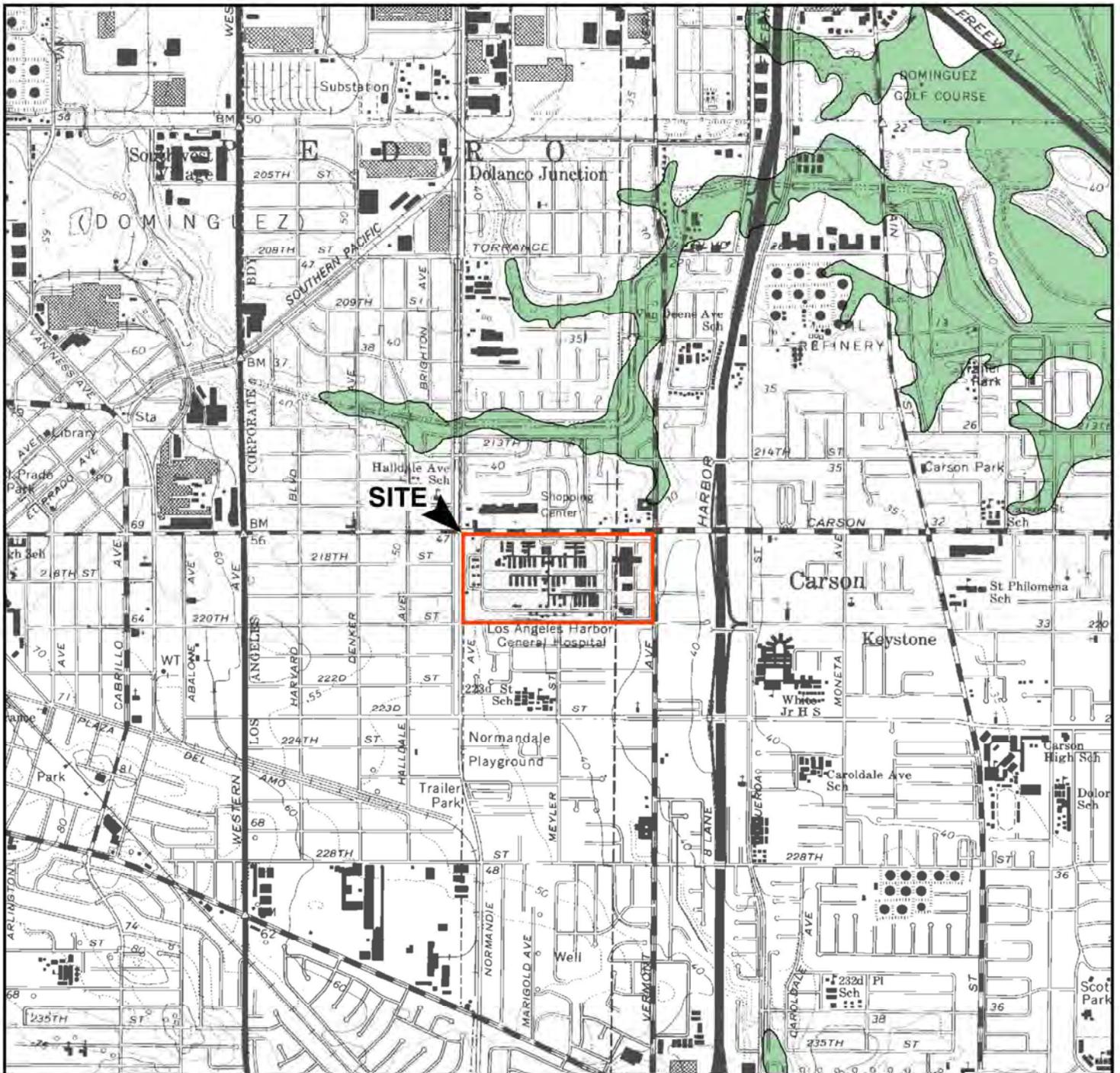
DATE

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4/15

4



REFERENCE: CALIFORNIA DEPARTMENT OF CONSERVATION, DIVISION OF MINES AND GEOLOGY, STATE OF CALIFORNIA, 1999, SEISMIC HAZARD ZONES MAP OFFICIAL REVISED MAP TORRANCE QUADRANGLE, 7.5-MINUTE SERIES: SCALE 1:24,000.



SCALE IN FEET

0 2,000 4,000

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

LEGEND



LIQUEFACTION:

Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

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SEISMIC HAZARD ZONES

FIGURE

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