5.5 GEOLOGY AND SOILS

This section of the EIR evaluates the potential for implementation of the Proposed Project to impact geological and soil resources. The analysis in this section is based in part on the following technical report(s):

- *Geohazard Study Report, Los Angeles County Men's Central Jail (Men's Central Jail Site), 441 Bauchet Drive, Los Angeles, California*, Converse Consultants, March 26, 2015.
- *Geohazard Study Report, Los Angeles County Men's Central Jail (Off-Site Parking Structure), 739 North Spring Street, Los Angeles, California 90012*, Converse Consultants, February 10, 2015.

Complete copies of these studies are included in Appendix F to this EIR.

5.5.1 Environmental Setting

5.5.1.1 REGULATORY SETTING

California Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was signed into state law in 1972. Its primary purpose is to mitigate the hazard of fault rupture by prohibiting the location of structures for human occupancy across the trace of an active fault. The act delineates Earthquake Fault Zones along faults that are "sufficiently active" and "well defined." The act also requires that cities and counties withhold development permits for sites within an earthquake fault zone until geologic investigations demonstrate that the sites are not threatened by surface displacement from future faulting. Pursuant to this act, structures for human occupancy are not allowed within 50 feet of the trace of an active fault.

Seismic Hazard Mapping Act

The Seismic Hazard Mapping Act (SHMA) was adopted by the state in 1990 to protect the public from the effects of nonsurface fault rupture earthquake hazards, including strong ground shaking, liquefaction, seismically induced landslides, or other ground failure caused by earthquakes. The goal of the act is to minimize loss of life and property by identifying and mitigating seismic hazards. The California Geological Survey prepares seismic hazard zone maps and provides them to local governments. These maps identify areas susceptible to amplified shaking, liquefaction, earthquake-induced landslides, and other ground failures. SHMA requires responsible agencies to only approve projects within seismic hazard zones following a site-specific investigation to determine if the hazard is present, and if so, the inclusion of appropriate mitigation(s). In addition, the SHMA requires real estate sellers and agents at the time of sale to disclose whether a property is within one of the designated seismic hazard zones.

California Building Code

The 2014 County of Los Angeles Building Code (Title 26) is based on the 2013 California Building Code (CBC) and the 2012 International Building Code.

Current law states that every local agency enforcing building regulations, such as cities and counties, must adopt the provisions of the CBC within 180 days of its publication. The publication date of the CBC is established by the California Building Standards Commission, and the code is in Title 24, Part 2 of the California Code of Regulations. The most recent building standard adopted by the legislature and used throughout the state is the 2013 version of the CBC (effective January 1, 2014), often with local, more-restrictive amendments that are based on local geographic, topographic, or climatic conditions. These codes provide minimum standards to protect property and public safety by regulating the design and construction of excavations, foundations, building frames, retaining walls, and other building elements to mitigate the effects of seismic shaking and adverse soil conditions. The CBC contains provisions for earthquake safety based on factors including occupancy type, the types of soil and rock onsite, and the strength of ground shaking with specified probability of occurring at a site.

Los Angeles County Building Code

County-owned and -operated capital projects are subject to review through the County's plan check process. Beginning January 1, 2014, all plans submitted for plan check are checked in accordance with the 2014 County Building Code (Title 26), Electrical Code (Title 27), Green Building Standards Code (Title 31), Mechanical Code (Title 29), Plumbing Code (Title 28), and Residential Code (Title 30). Title 26, Building Code, of the County Code adopts the CBC, with amendments to make it more stringent on some issues that directly affect the County.

Soils Investigation Requirements

Requirements for soils investigations for subdivisions requiring tentative and final maps, and for other specified types of structures, are in California Health and Safety Code Sections 17953 to 17955 and in Section 1802 of the CBC. Testing of samples from subsurface investigations is required, such as from borings or test pits. Studies must be done as needed to evaluate slope stability, soil strength, position and adequacy of load-bearing soils, the effect of moisture variation on load-bearing capacity, compressibility, liquefaction, differential settlement, and expansiveness.

5.5.1.2 EXISTING CONDITIONS

Regional Geologic Setting

The Project Site is in the Peninsular Ranges Geomorphic Province, a northwest-trending series of mountain ranges and valleys. Within the Peninsular Ranges Geomorphic Province, the Project Site is in the Los Angeles Basin, a coastal plain extending from the Pacific Ocean on the south and west to the Santa Monica Mountains and Puente Hills on the north and east.

The Project Site is in the northern portion of the Central Block of the Los Angeles Basin. The Central Block is bounded on the north by the Santa Monica and Raymond Hill fault zones, on the northeast and east by the Whittier-Elsinore fault zone, and on the west-southwest by the Newport-Inglewood fault zone. This block is underlain by a deep structural synclinal depression. In the area of the Project Site, the depression is filled with

sedimentary bedrock assigned to the Puente Formation and is overlain by old alluvium deposited by the Los Angeles River.

Project Site Subsurface Condition

Based on the onsite exploratory soil borings, the Project Site soils consist of fill soils placed during previous site grading operations, natural alluvial soils, and sedimentary bedrock of the Puente Formation, as encountered in the borings drilled to a maximum depth explored of 91.5 feet below the ground surface (bgs). Borings that were drilled in the existing paved areas had up to 5 inches of asphalt concrete over up to 7 inches of base.

Borings that were drilled in the existing parking structure had up to 7.5 inches of concrete. The observed fill soils consist primarily of silty sands, clay, clayey sand, and sands. The depth of the fill ranges from approximately 4 to 15 feet. The alluvial sediments consist predominantly of silty sand, sand, gravelly sand, sandy silt, clay, and soils to a depth of approximately 75 feet bgs. Layers of high soils with sulfuric odors were encountered throughout the Project Site at depths ranging from 30 to 45 feet bgs.

Groundwater

The Project Site is in the northern portion of the Central Groundwater Basin of Los Angeles in an area identified as the Los Angeles Forebay. This forebay area lies in a zone of transition between the Los Angeles River Narrows to the north and the Central Groundwater Basin to the south. The area is bounded by the low-lying Elysian Park Hills to the west and the Repetto Hills to the east. The groundwater aquifers within the Los Angeles Forebay consist predominantly of water-bearing alluvial sediments deposited over time by the Los Angeles River. These deposits have mixed with finer sediments contributed by merging local streams from the surrounding Elysian Park and Repetto hills. The aquifer sediments that comprise the Los Angeles Forebay are considered to have a large available groundwater storage capacity. Bedrock of the middle Miocene Puente Formation underlies these sediments in the vicinity of the Los Angeles River Narrows and is exposed at various places in the low-lying hills that surround the area.

Groundwater was encountered during subsurface exploration at depths ranging from approximately 29 to 37 feet bgs. The historical high groundwater level is approximately 20 feet or more below the existing ground surface. The Project Site is also located between the Los Angeles City Oil Field to the north and the Union Station Oil Field to the south. Because these oil fields have impacted the groundwater quality with hydrogen sulfide, a "rotten egg" odor of hydrogen sulfide was noted in groundwater from borings.

In general, groundwater levels fluctuate with the seasons, and local zones of perched groundwater may be present at various depths due to local conditions or during rainy seasons. Groundwater conditions below any given site vary depending on numerous factors, including seasonal rainfall, local irrigation, and groundwater pumping, among other factors.

Subsurface Variations

The geotechnical study (in Appendix F to the EIR) identified some variations in the continuity and nature of subsurface conditions within the natural soils. Additional precaution is required prior to interpolating or extrapolating subsurface conditions between or beyond boring locations.

Faulting and Seismicity

Fault Surface Rupture and Active Faults

The Project Site is not within a currently designated State of California Earthquake Fault Zone (Alquist-Priolo Special Studies Zones) for surface fault rupture. No surface faults are known to project through or toward the Project Site. The closest known fault to the Project Site is the Raymond Fault, mapped approximately 4.1 miles north of the Project Site.

Raymond Fault

The Raymond Fault is seismically active, with an estimated slip rate of 1.5 millimeters per year, and moment magnitude (Mw) of 6.6. The Raymond Fault extends 15.5 miles from the Los Angeles River east to northeast across the San Gabriel Valley to a junction with the Sierra Madre Fault. The Raymond fault joins the Sierra Madre Fault south of Santa Anita Wash and south of the Clamshell-Sawpit Fault in the foothills of the San Gabriel Mountains above Arcadia.

Puente Hills Blind Thrust Fault

The Puente Hills Blind Thrust Fault could potentially affect the Project Site. The potential for damage from earthquakes along a zone of north-dipping blind thrust faults in the northern Los Angeles Basin was illustrated by the Mw 6.0 Whittier earthquake event on October 1, 1987. Thrust faults are low-angle reverse faults that generally have no surface trace and express tectonic deformation as folding and uplift of ridges and hillsides. Thrust faults produced the Santa Monica Mountains; the Elysian, Repetto, and Montebello hills; and the Puente Hills. Details concerning the Puente Hills Blind Thrust are limited by the fact that the thrust fault is buried 2 to 8 miles below the ground surface—thus the term "blind" thrust fault. Conventional fault-finding trenches, boreholes, and paleoseismic dating methods, which are used at the surface, have limited use for investigating deeply buried thrust fault structures. The geometry and location of the blind thrust fault structures and thrust ramps are based on interpretation of oil well data, seismic and strong motion data solutions, high resolution geophysical data, paleoseismic studies, and structural model analyses. The Puente Hills Blind Thrust has been interpreted to be about 26.1 miles long and 11.81 miles wide, with a depth range of 2 to 8 miles bgs. The thrust fault dips northward from the Montebello Hills and Puente Hills beneath the San Gabriel Basin. Paleoseismic studies of the Puente Hills Blind Thrust have indicated the occurrence of at least four large (Mw 7.2 to 7.5) earthquakes on this fault during the past 11,000 years. The Puente Hills Blind Thrust may continue northward beneath the San Gabriel Basin as a thrust fault, but this fault plane does not appear to have been reactivated seismically in the 1987 Whittier Narrows earthquake and may lie beneath the seismogenic zone.

Liquefaction

Liquefaction is a sudden decrease in the strength of cohesionless soils due to dynamic or cyclic shaking. Saturated soils behave temporarily as a viscous fluid and, consequently, lose their capacity to support structures. The potential for liquefaction decreases with increasing clay and gravel content, but increases as the ground acceleration and duration of shaking increase. Liquefaction potential is greatest where the groundwater level and loose sands occur within 50 feet of the ground surface.

The Project Site is in a potential liquefaction zone per the State of California Seismic Hazard Zones Map for the Los Angeles Quadrangle Seismic Hazard Zones Map.

Settlement

The Project Site exhibits seismically induced settlement associated with soils above the levels of the highest recorded groundwater. The estimated potential for seismically induced settlement ranges from approximately 0.90 to 1.8 inches, with potential differential settlement ranging from approximately 0.45 to 0.9 inch. The primary area of earthquake-induced settlement is expected in the unsaturated upper 20 feet, ranging from 0.9 to 1.5 inches. The saturated depths from 20 to 50 feet are estimated to have a liquefaction settlement ranging from 0.1 to 0.4 inches.

Lateral Spreading

Seismically induced lateral spreading involves primarily lateral movement of earth materials due to ground shaking. It differs from slope failure because complete ground failure involving large movement does not occur due to the relatively smaller gradient of the initial ground surface. Lateral spreading is demonstrated by near-vertical cracks with predominantly horizontal movement of the soil mass involved. The topography at the Project Site and in the immediate vicinity of the site is relatively flat, with no nearby descending slopes or embankments. Under these circumstances, the potential for lateral spreading at the Project Site is considered negligible.

Landslides

The Project Site is relative flat and not near any hillside terrain. In the absence of significant ground slopes, the potential for seismically induced landslides to affect the Project Site is considered negligible.

Ground Subsidence

Significant ground subsidence occurred in the Santa Fe Springs oil field in the 1950s and 1960s but was slowed greatly in the 1960s by pumping large amounts of water or steam into oil reservoir rock (DRP 1990). The City of Los Angeles requires monitoring and mitigation measures to prevent significant subsidence related to oil and gas extraction and mining activities, under its Surface Mining Operations Districts ordinance (Section 13.03, City of Los Angeles Municipal Code).

5.5.1.3 SPRING STREET PARKING STRUCTURE SITE (OPTION 1)

Faults

No surface faults are known to project through or toward the SPSS Site, and the site is not in an Alquist-Priolo Earthquake Fault Zone. The nearest known surface fault to the SPSS Site is the Raymond Fault approximately 4.1 miles to the north.

Site Soils

Site soils consist of fill soils placed during previous site grading operations and natural alluvial soils, as encountered in the borings drilled to depths of up to 70 feet bgs. Borings that were drilled in the existing parking lot had up to five inches of asphalt over up to three inches of base. The observed fill soils consist primarily of sandy clay and silty sands. The depth of the fill ranges from approximately 4 to 5 feet. The alluvial sediments consist predominantly of silty sand, sandy clay, clay and other soils to approximately 70 feet bgs. Layers of high-moisture and low-density compressible clay were encountered throughout the SPSS Site at depths ranging from 30 to 70 feet bgs.

Groundwater

Groundwater was encountered at approximately 45 feet bgs in one of the borings. The historical high groundwater level of 20 feet bgs was used in the geotechnical evaluation.

Liquefaction

The SSPS Site is in a zone of required investigation for liquefaction. Soils above the historically high groundwater level of 20 feet bgs are considered susceptible to liquefaction. Estimated seismically induced settlement onsite is 0.93 inch, and estimated differential settlement is 0.47 inch.

Lateral Spreading

The topography of the SPSS Site and surrounding area is relatively flat; thus, the potential for lateral spreading at the SPSS Site is considered negligible.

5.5.1.4 VIGNES LOT (OPTION 2)

Faults

No surface faults are known to project through or towards the Vignes Lot, and the site is not in an Alquist-Priolo Earthquake Fault Zone. The nearest known surface fault to the Vignes Lot is the Raymond Fault approximately 4.1 miles to the north.

Site Soils

Site soils consist of natural alluvium, although fill material may also exist on the property. No site-specific geotechnical report was readily available for the Vignes Lot. Based on a review of the geohazard report for the adjoining MCJ east of the Vignes Lot, the alluvial sediments consist predominantly of silty sand, sand,

gravelly sand, sandy silt, and clay soils to a depth of approximately 75 feet bgs. The site soils at the Vignes Lot may vary somewhat from the observations at the neighboring MCJ.

Groundwater

The historical high groundwater level is reported to be 20 feet bgs. Based on a review of the geohazard report for the adjoining MCJ east of the Vignes Lot, groundwater was encountered at depths ranging from 29 to 37 feet bgs. The depth to groundwater at the Vignes Lot may vary somewhat from what was observed at the neighboring MCJ.

Liquefaction

The Vignes Lot is in a zone of required investigation for liquefaction. Soils above the historically high groundwater level of 20 feet bgs are considered susceptible to liquefaction. Although no site-specific geotechnical report was readily available for the Vignes Lot, a geohazard report was performed in 2015 for the adjoining MCJ east of the Vignes Lot. For the neighboring MCJ, the estimated potential seismically induced settlement ranges from approximately 0.90 to 1.8 inches with potential differential settlement ranging from 0.45 to 0.9 inch. Actual estimates of seismically induced settlement and differential settlement for the Vignes Lot should be based on site-specific observations.

Lateral Spreading

The topography of the Vignes Lot and surrounding area is relatively flat; thus, the potential for lateral spreading at the Vignes Lot is considered negligible.

5.5.2 Thresholds of Significance

According to Appendix G of the CEQA Guidelines, a project would normally have a significant effect on the environment if the project would:

G-1 Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault. (Refer to Division of Mines and Geology Special Publication 42.)

ii) Strong seismic ground shaking.

iii) Seismic-related ground failure, including liquefaction.

iv) Landslides.

G-2 Result in substantial soil erosion or the loss of topsoil.

G-3 Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.

G-4 Be located on expansive soil, as defined in Table 18-1B of the Uniform building Code, creating substantial risks to life or property.

G-5 Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water.

5.5.3 Plans, Programs, and Policies

5.5.3.1 REGULATORY REQUIREMENTS

RR GEO-1 The Project will be designed and constructed in accordance with the Los Angeles County Building Code, which adopts the California Building Code (CBC), which is based on the International Building Code (IBC). New construction, alteration, or rehabilitation shall comply with applicable ordinances set forth by the County and/or by the most recent County building and seismic codes in effect at the time of Project design. In accordance with Section 1803.2 of the 2013 CBC, a geotechnical investigation is required that must evaluate soil classification, slope stability, soil strength, position and adequacy of load-bearing soils, the effect of moisture variation on soil-bearing capacity, compressibility, liquefaction, and expansiveness, as necessary, determined by the County Building Official. The geotechnical investigation must be prepared by registered professionals (i.e., California Registered Civil Engineer or Certified Engineering Geologist). Recommendations of the report, as they pertain to structural design and construction recommendations for earthwork, grading, slopes, foundations, pavements, and other necessary geologic and seismic considerations, must be incorporated into the design and construction of the Project.

RR HYD-1 The Project will be constructed in accordance with the National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with the Construction and Land Disturbance Activities, Order No 2009- 0009-DWQ, NPDES No. CAS000002 (or the latest approved Construction General Permit). Compliance requires filing a Notice of Intent (NOI); a Risk Assessment; a Site Map; a Storm Water Pollution Prevention Plan (SWPPP) and associated Best Management Practices (BMPs); an annual fee; and a signed certification statement.

5.5.4 Environmental Impacts

The following impact analysis addresses the thresholds of significance identified above. The applicable thresholds are identified in brackets after the impact statement.

Impact 5.5-1: The Proposed Project would not expose people or structures to adverse seismic-related hazards including surface rupture and ground shaking. [Threshold G-1.i, G-1.ii, and G-1.iv]

Impact Analysis:

Ground Rupture

The Project Site is not in a currently designated Alquist-Priolo Special Studies Zones for surface fault rupture. The Project Site is not underlain by a known surface faults; the closest known fault to the Project Site is the Raymond Fault, approximately 4.1 miles north of the Project Site. Therefore, the Proposed Project would not be exposed to surface rupture hazards.

Ground Shaking

The intensity of ground shaking at a given location depends primarily upon the earthquake magnitude, the distance from the earthquake source, and the site response characteristics, which are dependent upon the subsurface soil conditions. Therefore, a smaller-magnitude earthquake closer to a site could induce greater shaking than a larger-magnitude earthquake further away. The intensity of ground shaking at a given location depends on several factors, but primarily on the earthquake magnitude, the distance from the epicenter to the site of interest, and the response characteristics of the soils or bedrock units underlying the site. In southern California, there is no way to avoid earthquake hazards. Based on 2013 CBC Section 1616A.1.3, a site-specific ground motion analysis was conducted and determined that the Project Site has a horizontal peak ground acceleration of 2.522 g (gravities) with 2 percent probability of being exceeded in 50 years.

The CBC and County Building Code provide the appropriate building design criteria needed to protect the structural integrity of structures and infrastructure against damage and collapse (RR GEO-1). In accordance with Section 1803.2 of the 2013 CBC, a geotechnical investigation is required that must evaluate soil classification, slope stability, soil strength, position and adequacy of load-bearing soils, the effect of moisture variation on soil-bearing capacity, compressibility, liquefaction, and expansiveness, as determined by the County Building Official. The geotechnical investigation must be prepared by registered professionals (i.e., California Registered Civil Engineer or Certified Engineering Geologist). Recommendations of the report, as they pertain to structural design and construction recommendations for earthwork, grading, slopes, foundations, pavements, and other necessary geologic and seismic considerations, must be incorporated into the design and construction of the Proposed Project.

Seismic design criteria and requirements in the CBC would allow structures and infrastructure to withstand seismic ground shaking and reduce hazards to persons and property. The CBC also requires that the recommendations of the geotechnical report, prepared by registered professionals (i.e., California Registered Civil Engineer or Certified Engineering Geologist), be incorporated into the design and construction of the Project. Compliance with RR GEO-1 would ensure that the Proposed Project would not expose people or structures to potential substantial adverse effects from ground shaking hazards.

Landslides

Marginally stable slopes (including existing landslides) may be subject to landslides caused by earthquakes. The landslide hazard depends on many factors, including existing slope stability, shaking potential, and presence of existing landslides. The Project Site is flat and surrounded by relatively flat terrain. No slopes susceptible to potential landslides are located near the Project Site and no impacts related to landslides are anticipated.

Spring Street Parking Structure Site (Option 1)

Ground Rupture

The SSPS Site is also not in a designated Alquist-Priolo Special Studies Zone, and the nearest known fault is the Raymond Fault, approximately 4.1 miles to the north. Implementation of the Proposed Project would not expose Project-related population to substantial hazards from surface rupture of a known active fault. Therefore, the Proposed SSPS would not be exposed to surface rupture hazards.

Ground Shaking

Similar to the Proposed Project, the SPSS would be subject to the seismic design criteria and requirements in the CBC. The CBC also requires that the recommendations of the geotechnical report, prepared by registered professionals (i.e., California Registered Civil Engineer or Certified Engineering Geologist), be incorporated into the design and construction of the Proposed Project. Compliance with RR GEO-1 would ensure that construction on the SPSS would not expose people or structures to potential substantial adverse effects from ground shaking hazards.

Landslides

Similar to the Project Site, the SPSS Site is flat and surrounded by relatively flat terrain. No slopes susceptible to potential landslides are located near the Project area and no impacts related to landslides are anticipated.

Vignes Lot (Option 2)

Ground Rupture

The Vignes Lot is not in a designated Alquist-Priolo Special Studies Zone, and the nearest known fault is the Raymond Fault, approximately 4.1 miles to the north. Implementation of the Proposed Project would not expose Project-related population to substantial hazards from surface rupture of a known active fault. Therefore, the proposed Vignes Lot parking structure would not be exposed to surface rupture hazards.

Ground Shaking

Similar to the Proposed Project, the Vignes Lot would be subject to the seismic design criteria and requirements in the CBC. The CBC also requires that the recommendations of the geotechnical report, prepared by registered professionals (i.e., California Registered Civil Engineer or Certified Engineering Geologist), be incorporated into the design and construction of the Proposed Project. Compliance with RR

GEO-1 would ensure that construction on the Vignes Lot would not expose people or structures to potential substantial adverse effects from ground shaking hazards

Landslides

Similar to the Project Site, the Vignes Lot is flat and surrounded by relatively flat terrain. No slopes susceptible to potential landslides are located near the Project area and no impacts related to landslides are anticipated.

Level of Significance before Mitigation: With implementation of RR GEO-1, Impact 5.5-1 would be less than significant.

Impact 5.5-2: The Proposed Project would not expose people or structures to substantial hazards from unstable geologic units or soil. [Threshold G-1iii and G-3]

Impact Analysis:

Liquefaction and Seismically Induced Settlement, Subsidence, or Collapse

The Project Site is in a potential liquefaction zone in the Los Angeles Quadrangle Seismic Hazard Zones Map (CGS 1999). The liquefaction analyses performed for the first 50 feet below ground surface determined that the Project Site is not susceptible to liquefaction. However, the analyses indicated seismically induced settlement associated with soils above the levels of recorded historically highest groundwater.

The estimated potential seismically induced settlement ranges from approximately 0.90 to 1.8 inches, with potential differential settlement ranging from approximately 0.45 to 0.9 inches. The primary area of earthquake-induced settlement is expected to occur in the unsaturated upper 20 feet, ranging from 0.9 to 1.5 inches. The saturated depths ranging from 20 to 50 feet are estimated to have a liquefaction settlement ranging from 0.1 to 0.4 inches.

The phenomenon of widespread land sinking, or subsidence, is generally related to substantial overdraft of groundwater or petroleum reserves from underground reservoirs. Collapsible soils may appear strong and stable in their natural (dry) state, but they rapidly consolidate under wetting, generating large and often unexpected settlements.

As required by RR GEO-1, prior to the completion of final engineering design plans, the Proposed Project's design and construction must give consideration to the effects of potential subsidence and collapsible soils. This could include remedial grading in specific areas to prepare the site to support the proposed structures; to provide a relative uniform-bearing material below shallow foundations; and/or to allow for over-excavation and recompaction below planned foundations. Compliance with RR GEO-1 would ensure that the potential for impacts associated with subsidence and collapsible soils would be less than significant.

In summary, the County's building regulations provide building design criteria to protect structural integrity and infrastructure against geologic hazards. The CBC and County Building Code require the preparation of a geotechnical investigation to identify the geologic characteristics on specific locations where structures and

infrastructure are proposed and to develop engineering and structural recommendations and measures, prepared by registered professionals (i.e., California Registered Civil Engineer or Certified Engineering Geologist), including measures to reduce hazards from liquefaction, subsidence, and collapsible soils, and other soil characteristics so as to maintain structural integrity of the Proposed Project. Impacts would be less than significant.

Lateral Spreading

The topography at the Project Site and in the immediate vicinity of the site is relatively flat, with no nearby descending slopes or embankments. Under these circumstances, the potential for lateral spreading at the Project Site is considered negligible, and no impacts would occur.

Spring Street Parking Structure Site (Option 1)

Liquefaction and Seismically Induced Settlement, Subsidence, or Collapse

The SPSS is in a zone of required investigation for liquefaction. Soils above the historically high groundwater level of 20 feet bgs are considered susceptible to liquefaction. Estimated seismically induced settlement onsite is 0.93 inch, and estimated differential settlement is 0.47 inch. As required by RR GEO-1, prior to the completion of final engineering design plans, the SSPS's design and construction must give consideration to the effects of potential subsidence and collapsible soils. Impacts would be less than significant.

Lateral Spreading

The topography of the SPSS Site and surrounding area is relatively flat; thus, the potential for lateral spreading at the SPSS Site is considered negligible, and no impacts would occur.

Vignes Lot (Option 2)

Liquefaction and Seismically Induced Settlement, Subsidence, or Collapse

The Vignes Lot is in a zone of required investigation for liquefaction. Soils above the historically high groundwater level of 20 feet bgs are considered susceptible to liquefaction. As required by RR GEO-1, prior to the completion of final engineering design plans, the Vignes Lot parking structure's design and construction must give consideration to the effects of potential subsidence and collapsible soils based on site-specific data. Impacts would be less than significant.

Lateral Spreading

The topography of the Vignes Lot and surrounding area is relatively flat; thus, the potential for lateral spreading at the Vignes Lot is considered negligible, and no impacts would occur.

Level of Significance before Mitigation: With implementation of RR GEO-1, Impact 5.5-2 would be less than significant.

Impact 5.5-3: Project construction would not cause substantial soil erosion. [Threshold G-2]

Impact Analysis: The Project Site has been previously disturbed by the current MCJ development. Implementation of the Proposed Project would require grading, exposing onsite soils susceptible to erosion impact, especially during heavy rains. However, reduction of the erosion potential would be accomplished through compliance with RR HYD-1 requiring a Storm Water Pollution Prevention Plan (SWPPP), which specifies best management practices (BMPs) for temporary erosion controls. Such measures typically include temporary catchment basins and/or sandbagging to control runoff and contain sediment transport within the Project Site. Therefore, implementation of RR HYD-1 would prevent construction activities from resulting in significant adverse impacts associated with substantial soil erosion and/or loss of topsoil. Impacts relating to erosion would be less than significant. A comprehensive discussion of erosion can be found in Section 5.7, *Hydrology and Water Quality*.

Spring Street Parking Structure Site (Option 1)

The SSPS Site is currently paved and used for a surface parking lot. Proposed Project would require grading, exposing onsite soils susceptible to erosion impact, especially during heavy rains. However, reduction of the erosion potential would be accomplished through compliance with RR HYD-1 requiring a SWPPP, which specifies BMPs for temporary erosion controls. Therefore, implementation of RR HYD-1 would prevent construction activities from resulting in significant adverse impacts associated with substantial soil erosion and/or loss of topsoil. Impacts relating to erosion would be less than significant.

Vignes Lot (Option 2)

The Vignes Lot is currently paved and vacant. The Proposed Project would require grading, exposing onsite soils susceptible to erosion impact, especially during heavy rains. However, reduction of the erosion potential would be accomplished through compliance with RR HYD-1 requiring a SWPPP, which specifies BMPs for temporary erosion controls. Therefore, implementation of RR HYD-1 would prevent construction activities from resulting in significant adverse impacts associated with substantial soil erosion and/or loss of topsoil. Impacts relating to erosion would be less than significant

Level of Significance before Mitigation: With implementation of RR HYD-1, Impact 5.5-4 would be less than significant.

Impact 5.5-4: The Proposed Project would not be located on expansive soils creating substantial risks to life or property. [Threshold G-4]

Impact Analysis: Highly expansive soils swell when they absorb water and shrink as they dry and can cause structural damage to building foundations and roads. Thus, they are less suitable for development than nonexpansive soils. To evaluate the expansion potential of material at the Project Site, 11 representative bulk samples were tested, and the test identified very low expansion potential. No significant impacts related to expansive soils would occur.

Spring Street Parking Structure Site (Option 1)

The upper five feet of soils onsite are considered moderately expansive. As required by RR GEO-1, prior to the completion of final engineering design plans, the SSPS's design and construction must give consideration of the effects of expansive soils. No significant impacts are anticipated.

Vignes Lot (Option 2)

As required by RR GEO-1, prior to the completion of final engineering design plans, the Vignes Lot parking structure's design and construction must give consideration of the effects of expansive soils based on site-specific data. No significant impacts are anticipated.

Level of Significance before Mitigation: With implementation of RR GEO-1, Impact 5.5-3 would be less than significant.

Impact 5.5-5: The Proposed Project would not require the use of septic tanks. [Threshold G-5]

Impact Analysis: The Proposed Project would include upgrades to existing sewer laterals and sewer mains, and the Proposed Project would not use septic tanks or other alternative wastewater disposal systems. No impact would occur.

Spring Street Parking Structure Site (Option 1)

No bathroom facilities are proposed at the SSPS, and use of septic tanks is not required. No impact would occur.

Vignes Lot (Option 2)

No bathroom facilities are proposed at the Vignes Lot, and use of septic tanks is not required. No impact would occur.

Level of Significance before Mitigation: No impacts related to Impact 5.5-5 would occur.

5.5.5 Cumulative Impacts

Geology and soils impacts related to the Proposed Project would be specific to that site and its users and would not be common or contribute to the impacts (or shared with, in an additive sense) on other sites. Compliance with applicable State and local building regulations would be required of all development in downtown Los Angeles. Individual projects would be designed and built in accordance with applicable standards in the CBC and the individual building regulations of local jurisdictions (see RR GEO-1), including pertinent seismic design criteria. Site-specific geologic hazards would be addressed by the Engineering Geologic Report, Supplemental Ground-Response Report, and/or Geotechnical Report required for each development project. These geologic investigations would identify the specific geologic and seismic characteristics on a site and provide guidelines for engineering design and construction to maintain the structural integrity of proposed structures and infrastructure. Therefore, compliance with applicable State

and local building regulations and standard engineering practices related to seismic and geologic hazard reduction would prevent significant cumulative adverse impacts associated with geologic and seismic hazards.

Impacts of the Proposed Project and other development projects on geology and soils would not be cumulatively considerable with compliance with existing regulations and implementation of site-specific mitigation measures.

5.5.6 Level of Significance Before Mitigation

The following impact would be no impact:

- **Impact 5.5-5** The Proposed Project would not require the use of septic tanks.

With implementation of RR GEO-1, the following impacts would be less than significant.

- **Impact 5.5-1** The Proposed Project would not expose people or structures to adverse seismic-related hazards including surface rupture and ground shaking.
- **Impact 5.5-2** The Proposed Project would not expose people or structures to substantial hazards from unstable geologic units or soil.
- **Impact 5.5-4** The Proposed Project would not be located on expansive soils creating substantial risks to life or property.

With implementation of RR HYD-1, the following impact would be less than significant.

- **Impact 5.5-3** Project construction would not cause substantial soil erosion.

5.5.7 Mitigation Measures

No mitigation measures are necessary because there were no significant impacts identified under the applicable thresholds.

5.5.8 Level of Significance After Mitigation

Because no mitigation measures are required, impacts are the same as described in Section 5.5.6.

5.5.9 References

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