# 4.1 GEOLOGY AND SOILS

This section of the EA/EIR presents the results of an analysis of existing conditions, as well as projected geology and soil conditions following completion of the project, and is based on a geotechnical investigation report conducted by Converse Consultants. A complete copy of the geotechnical investigation report prepared for this project by Converse Consultants (May 2003) is contained within **Appendix 4.1** of this EA/EIR.

## 4.1.1 AFFECTED ENVIRONMENT

### Regulatory Framework

#### *Executive Order 12699*

Executive Order (EO) 12699 directs federal agencies to incorporate cost-effective seismic safety measures in all new buildings that are constructed, leased, assisted, or regulated by the Federal Government. The purposes of these requirements are to reduce risk to occupants of buildings leased for federal uses or purchased or constructed with federal assistance, to reduce risk to lives of persons who would be affected by earthquake failures of federally assisted or regulated buildings, and to protect public investment, all in a cost-effective manner.

### Regional Geology

The project area is located near the northern edge of the Los Angeles Basin (Basin), a short distance south east of the Elysian Park Hills. The Elysian Park Hills, along with the Repetto Hills to the north and east of the project area, comprise a group of low hills at the northern edge of the Basin. The highest point in this line of hill is Mt. Washington, at an elevation of 846 feet. These hills and adjacent lowlands comprise a heavily populated portion of metropolitan Los Angeles.

The Los Angeles Basin is a geologic area underlain by a thick (several thousand feet) sequence of Tertiary aged sedimentary rocks. From the oldest to the youngest, these rocks are represented by the Topanga Formation, Puente Formation (also known as the Monterey Formation), and Fernando Formation. Each formation is comprised of rock layers, alternating between sandstone, conglomerate, and siltstone. Tertiary marine sedimentary rocks are exposed in the Elysian and Repetto Hills. Younger Quaternary (Holocene) alluvial fan deposits cover the bedrock formations in many areas, such as the project area. These deposits consist predominantly of sand and silt, along with smaller amounts of gravel and clay.

## Local Geology and Subsurface Conditions

Converse Consultants conducted a field exploration in March 2003 including the drilling of six exploratory borings to depths ranging from 27 to 81.5 feet below the existing ground surfaces. Based on these borings, the project site contains undocumented fill materials ranging from 2.5 feet to 15 feet below the existing ground surfaces. These fill materials are predominately clayey sand, silty sand, sandy silt, and are generally dense and firm.

Sedimentary bedrock consisting of interbedded siltstone, claystone, and sandstone was encountered below the surface fill material. These natural materials are generally dense and stiff. Based on observations of the geologic structure, the bedrock generally dips at an angle varying from 40 to 55 degrees from horizontal in a southerly direction.

No surface water was present at the time the field reconnaissance was performed for the geotechnical investigation report. Groundwater was encountered during boring exploration at different depths ranging from 16 to 65 feet below the existing ground surface. The groundwater is believed to be a localized perched condition and not an indication of regional conditions.

## Faults and Seismicity

The Hall of Justice site does not lie within a California Fault Rupture Hazard Zone. However, the Hall of Justice site, as is all of Southern California, is located within a seismically active area. Faults capable of generating strong to very strong motion within the project area are summarized in **Table 4.1-1, Faults in Vicinity of Project Area.**

**Table 4.1-1**
**Faults in Vicinity of Project Area**

| Fault | Approximate Distance from Project Area (Kilometers) | Moment Magnitude ($M_w$) |
|---|---|---|
| Hollywood | 6.8 | 6.5 |
| Raymond | 7.5 | 6.5 |
| Verdugo | 11.1 | 6.7 |
| Newport-Inglewood (LA Basin) | 12.9 | 6.9 |
| Santa Monica | 15.5 | 6.6 |
| Sierra Madre (Central) | 18.2 | 7.0 |

*Source: Converse Consultants, May 5, 2003.*

Seismic ground shaking conditions for the project site were determined by reviewing selected geologic maps, published information, and a deterministic evaluation using the FRISKSP computer program.

FRISKSP provides deterministic estimates of peak horizontal ground acceleration (pga) on the basis of the location of the site relative to the mapped location of nearby faults and published fault parameters associated with the occurrence of a maximum probable earthquake and upper bound earthquake event on these faults.

The Maximum Probable Earthquake (MPE) is defined in Section 1631A.2 of the 1997 edition of the Uniform Building Code (UBC) as "having a 10-percent probability of being exceeded in 50 years." This probability of exceedance also can be expressed as the 475-year event. Criteria for determining the MPE include: the regional seismicity and known past seismic activity; the types of faults considered; the seismic recurrence factor for the area; and, the computed probability of seismic activity associated with the faults located within area. Based on the FRISKSP computer program, the MPE would be capable of resulting in a peak ground acceleration of 0.50g (g equals 32 feet per second).

The Upper Bound Earthquake (UBE) is defined in the California Building Code (CBC) Section 1631A.2.6 "...as the motion having a 10-percent probability of being exceeded in a 100-year period or maximum level of motion which may ever be expected at the building site within the known geologic framework." This probability of exceedance also can be expressed as a 950-year event. Criteria for determining the UBE event include the seismic history of the vicinity, the geologic province in which the faults under consideration are located, fault lengths, faulting mechanisms and regional geologic structure. Based on the FRISKSP computer program, the UBE would be capable of resulting in a peak ground acceleration of 0.60g.

## Geologic Hazards

Potential hazards on the site could result from a combination of local seismicity and existing soil conditions on the site. The types of hazards investigated during the geotechnical feasibility of the project site include liquefaction, fault rupture, landslides, settlement, tsunamis/seiches, and earthquake-induced flooding. The potential existence of these geo-hazards at the project site is discussed in the following paragraphs.

### *Liquefaction*

Liquefaction describes the phenomenon in which ground shaking works cohesionless, water saturated soil particles (generally fine grain sands) into tighter packing, thus creating excess pore space. Liquefaction typically occurs in earthquake prone areas where the groundwater level is less than 50 feet below the ground surface, and where the soils are composed of young alluvium. Materials below the

project site where ground water was encountered consisted generally of dense and stiff bedrock. Liquefaction potential at the project site; therefore, is considered to be low.

### *Surface Fault Rupture*

Fault rupture is the displacement of ground surface created by movement along a fault plane during an earthquake. As discussed previously, the closest active and potentially active fault is the Hollywood approximately 6.8 km from the project site. As a result, the potential for surface rupture is considered low.

### *Landslides*

The potential for seismically induced landslides and/or other types of slope failure such as lateral spreading on or adjacent to slope areas, is considered to be very low due to the absence of slopes on or adjacent to the project site.

### *Seismically Induced Settlement*

Seismically induced settlement occurs in loose, dry, granular soils in response to strong ground shaking. The energy created by strong ground shaking events can cause soils to condense and settle into a tighter arrangement. Soil settling can have deleterious effects to overlying foundations, structures, roadways, etc. Material underlying footings on the project sites are predominately sedimentary bedrock that is not sensitive to seismically induced settlement.

### *Expansive Soils*

Expansive soils expand when wet and contract when dry, and are typically rich in clays. If constructed over expansive soils, building foundations, concrete slabs, and roads can be cracked and heavily damaged during shrink-swell periods. The geotechnical report prepared by Converse Consultants indicates that soils on the project site have a medium expansion potential.

### *Tsunami and Seiches*

A tsunami is a tidal wave produced by off-shore seismic activity, while a seiche is a harmonic wave in an enclosed water body caused seismic activity. The proposed project site is not located near an ocean,

lakes, or reservoir. The potential for tsunamis and/or seiches affecting the project site is considered to be very low.

### *Earthquake Induced Flooding*

Earthquake induced flooding is caused by failure of dam or other water-retaining structures up gradient of a site as a result of an earthquake. There are no significant up gradient lakes or reservoirs in proximity of the project sites that have the potential to cause flooding.

## 4.1.2 THRESHOLDS OF SIGNIFICANCE

The County of Los Angeles Initial Study (**Appendix 1.0**) suggests that a project would result in a significant geotechnical impact if it would meet any of the following criteria:

(a) Is the project site in an active or potentially active fault zone or Alquist-Priolo Earthquake Fault Zone?

(b) Is the project site located in an area containing a major landslide?

(c) Is the project site located in an area having high slope instability?

(d) Is the project site subject to subsidence, high groundwater, or hydrocompaction?

(e) Is the proposed project considered a sensitive use (school, hospital, public assembly site) located in close proximity to a significant geotechnical hazard?

(f) Will the project entail substantial grading and/or alteration of topography including slopes of over 25 percent?

According to the Initial Study, the Hall of Justice project site is relatively flat and no potential for landslides exist; the project is not considered a sensitive use that would be exposed to geotechnical hazards; and would not include the alteration of slopes of over 25 percent. As a result, the following impact analysis will only evaluate the project's potential geotechnical impacts to relative to criteria (a), (c), and (d).

## 4.1.3 POTENTIAL IMPACTS OF ALTERNATIVES

### Alternative 1 – No Project Alternative

Under the No Project Alternative, the project site would remain in its present state. No impacts to geology and soils would occur with the implementation of this alternative. Thus, impacts are considered to be less than significant.

### Alternative 2 – Repair and Reuse Alternative (Proposed Alternative)

#### *Faults and Seismicity*

The proposed project site, as with virtually all sites within the State of California, would be subjected to ground shaking from earthquakes. Based upon the seismologic and geologic conditions surrounding the site, the maximum level of ground motion that could ever be experienced at the project site with a MPE would be 0.50 g and with UBE would be 0.60g.[1] Nonetheless, the design of the new parking structure would be in conformance with the 1997 edition of the UBC, Seismic Zone 4 and the Hall of Justice building would be seismically retrofitted to prevent significant damage from ground shaking during seismic events resulting from movement on any of the faults or fault systems discussed within this EA/EIR. As a result, the effects resulting from ground shaking would be reduced to a minimum and is considered to be less than significant.

#### *Liquefaction*

Materials below the project site where ground water was encountered consisted generally of dense and stiff bedrock. Liquefaction potential at the project site is considered to be low.[2] Thus, potential impacts would be less than significant.

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1 Converse Consultants, Geotechnical Investigation Report, *Los Angeles County Hall of Justice, Los Angeles, California,* May 5, 2003.

2 Converse Consultants, Geotechnical Investigation Report, *Los Angeles County Hall of Justice, Los Angeles, California,* May 5, 2003.

### *Surface Fault Rupture*

The project site is not located in a California Fault Rupture Hazard Zone.[3] There are no active faults projecting toward or extending across the project site. Thus, potential impacts would be less than significant.

### *Landslides*

The potential for seismically induced landslides and/or other types of slope is considered to be very low due to the absence of slopes on or adjacent to the project site. Thus, potential impacts would be less than significant.

### *Seismically Induced Settlement*

Material underlying footings on the project site are predominately sedimentary bedrock that is not sensitive to seismically induced settlement.[4] Thus, potential impacts would be less than significant.

### *Expansive Soils*

The geotechnical report prepared by Converse Consultant indicates that soils on the project site have a medium expansion potential. As a result, the geotechnical report indicates that special design and construction techniques for expansive soil conditions are recommended during earthwork, the placement of foundations, and slabs-on-grade. Adherence with these recommendations would reduce potential impacts to a less than significant level.

### *Tsunami and Seiches*

The proposed project site is not located near an ocean, lakes, or reservoir. The potential for tsunamis and/or seiches affecting the project site is considered to be very low. Thus, potential impacts would be less than significant.

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3 Ibid.

4 Ibid.

### *Earthquake Induced Flooding*

There are no significant up gradient lakes or reservoir in proximity of the project site that have the potential to cause flooding. Thus, potential impacts would be less than significant.

### *Executive Order 12699*

Executive Order (EO) 12699 directs federal agencies to incorporate cost-effective seismic safety measures in all new buildings that are constructed, leased, assisted, or regulated by the Federal Government. FEMA would be providing funds to seismically upgrade an existing building, not a new building. Consequently, this EO is not applicable to the proposed project. Nonetheless, these seismic safety measures would be cost effective and provide for increased building safety.

## Alternative 3 – Adaptive Reuse of the Existing Building to Secretary of Interior Standards

Implementation of this alternative would result in the same impacts described under Alternative 2. Impacts associated with surface fault rupture, landslides, seismically induced settlement, tsunami, seiches, and earthquake induced flooding would be less than significant. Faulting and seismic ground shaking impact would be reduced to a less than significant level through retrofitting the building and development of the new parking garage per UBC standards. Expansive soil impact would be reduced through adherence to the recommendations contained within the geotechnical report.

## 4.1.4 MITIGATION MEASURES (ALTERNATIVES 2 AND 3)

The following mitigation measures are required for both Alternatives 2 and 3:

**GS-1** All structures shall be designed in accordance with the Uniform Building Code (UBC) and applicable County codes to ensure safety in the event of an earthquake.

**GS-2** All recommendations contained in the project geotechnical engineering report shall be incorporated into the project to minimize impacts associated with site grading and structural design.

## 4.1.5 ADVERSE IMPACTS AFTER MITIGATION

Impacts under both Alternative 2 and 3 would be less than significant.