V. ENVIRONMENTAL IMPACT ANALYSIS
D. GEOLOGY/SEISMIC HAZARDS

This section provides an analysis of impacts related to seismicity hazards such as fault rupture, ground shaking, landsliding, and liquefaction. The analysis, in part, is based on readily available geotechnical and seismic information and the findings and recommendations presented in prior geotechnical investigations including a report prepared for the renovation of the Los Angeles Memorial Coliseum by Law/Crandall, Inc., (December, 1991). Smith Emery Company prepared a report of Compacted Fill for the Coliseum, dated July 2, 1993, documenting earthwork activities during the preparation of the site for future renovation. Following this report, the Coliseum suffered extensive damage during the 1994 Northridge earthquake. Law/Crandall subsequently prepared additional geotechnical and structural analysis as contained in the Report of Foundation Investigation for the Los Angeles Memorial Coliseum Repair, dated April 1, 1994 and the Draft Report of Pile Load Testing for the Los Angeles Memorial Coliseum, dated August 18, 1994. These technical reports are incorporated into the EIR by reference and are available on file at the Los Angeles Memorial Coliseum Commission offices at 3939 S. Figueroa Street, Los Angeles California.

ENVIRONMENTAL SETTING

Grading and Excavation

The Project Site is located in the north central portion of the Central Block of the Los Angeles Basin, and is currently developed with the Los Angeles Memorial Coliseum and its associated structures. The Los Angeles Basin is an extensive northwest-trending structural downwarped trough filled to capacity with Cretaceous through Pleistocene age marine and non-marine sedimentary bedrock formations and capped with late Pleistocene and Holocene age alluvial deposits. Regional subsidence in the basin reaches over 30,000 feet of depth and, in the immediate site area, the sediments are approximately 10,000 feet thick. Basement rock beneath the basin floor consists of Mesozoic age intrusive granitic rock types. Structural subsidence of the basin has been continuous throughout most of the Tertiary period, though relatively short periods of uplift are evident. Regional uplift continues to occur to the present time, with the most recent inland seas regressing oceanward approximately 120,000 years ago.

The floor of the Los Angeles Basin is generally flat and represents a vast alluvial outwash plain. Prominent mountain ranges and a series of hills bound the basin to the north, south and east, with the coastline of the Pacific Ocean forming the western boundary. As the basin subsided, the adjacent uplands were elevated by both faulting and folding processes that, in some cases, continue today. As the uplands were elevated, erosion slowly degraded them and streams transported the debris to the basin floor where they have remained as alluvial deposits.

The rugged, east-west trending Santa Monica Mountains lie roughly 10 miles northwest of the Project Site. The Elysian Park and Repetto Hills, which are of relatively low relief, lie approximately 2.5 miles northeast of the site. Located approximately 3.0 miles to the west are a series of discontinuous northwest-trending low hills associated with the Newport-Inglewood Structural Zone. The Baldwin Hills are located approximately 3.5 miles west of the Project Site. The coastline is located 9.9 miles to the southwest of the site at its closest approach.

Though the area around the Coliseum has been completely urbanized, the main drainage systems remain near their natural prehistoric course locations. The Los Angeles River is the closest main drainage to the site and is located approximately 3.5 miles to the east. The river flows southward to the Pacific Ocean in the vicinity of the Los Angeles Harbor and drains all of the San Fernando Valley and a major portion of the Los Angeles Basin inclusive of the area immediately surrounding the Project Site. Surface drainage in the vicinity of the site is controlled by street drainage and storm drains that flow to the improved Los Angeles River channel. The Coliseum was constructed on an alluvial surface that lies in the middle reaches of the Los Angeles River fan. Prior to urbanization, a very broad alluvial fan was slowly being deposited across the Los Angeles Basin floor by the meandering Los Angeles River. The fan building process has all but stopped due to the construction of paved surfaces and structures and the improvements to the drainages themselves. Local surfaces are not prone to erosion or deposition in the site area due to the intervening presence of these alterations.

The Coliseum was constructed on a relatively flat surface at an elevation of approximately 175 feet above sea level. The natural surface gradient slopes down to the southwest at roughly 25 feet per mile. The interior floor of the Coliseum (the field level) was excavated approximately 30 feet below the natural ground surface. In 1994 the field level was lowered an additional 11 feet to allow for additional seating areas within the bowl. The field level is presently at an average elevation of 135 feet above sea level. The alluvium on which the Coliseum was constructed is of Pleistocene and Holocene age and has been accumulating for at least one million years. These deposits extend downward to a depth of approximately 3,000 feet below the surface. Based on data from water wells, the alluvium consists of unconsolidated beds of silt, sand, gravel, and minor clay that are mixed and discontinuous. This alluvial sequence forms the groundwater aquifers in the Los Angeles Basin.

Underlying the alluvium is a thick section of Tertiary age bedrock that was deposited in a mostly marine environment. This sequence consists of consolidated strata inclusive of sandstone, siltstone, and shale. These bedrock units have been assigned to the Pico, Repetto, Puente, and Topanga Formations. None of these formations are exposed near the site, although they do crop out in the upland areas surrounding the basin. Petroleum products are often found in these formations but are generally associated with structural folds and faults. Numerous oil fields exist in the Los Angeles Basin, but none lie in proximity to the project location. The closest oil field to the site is the Las Cienegas Oil Field, located approximately ½ mile north of the Project Site, north of Jefferson Boulevard.[1]

The Tertiary age bedrock sequence has an approximate thickness of 17,000 feet in the site area based on deep oil well data. Collectively, the alluvium and bedrock deposits are approximately 20,000 feet thick beneath the site and are underlain by a granitic basement of Mesozoic age. Figure V.D-1 shows the distribution of alluvial, bedrock, and basement deposits in the greater Los Angeles Basin area relative to the site.

Since bedrock is not exposed near the site, little detailed information is available about the structure of the bedrock or basement materials. However, indirect information from oil and water well drilling and geophysical studies do provide a reasonable indication of the composition of the structure. The general and regional structure of the Los Angeles Basin consists of a northwest- to southeast-trending syncline or trough with the site lying on the northeast side of the syncline axis. The bedrock to either side of the syncline dips toward the center or axis of the structure. Bedrock beneath the site is therefore dipping toward the southwest at presumably shallow to moderately steep angles. The alluvium is also bedded but much younger and is known to dip toward the southwest at very shallow angles, corresponding to the ground surface gradient.

Groundwater

The Los Angeles Basin contains a well-utilized groundwater aquifer system. Many hundreds of water wells have been drilled in the basin to supply groundwater. The quality of this groundwater is tested by numerous agencies. Generally, groundwater is found in the alluvial sequence and can be unconfined, confined or perched. In the site area, the groundwater is considered unconfined, meaning that there are no natural deposits that prevent the vertical flow of groundwater. The water table beneath the Coliseum lies at an approximate depth of 225 feet. This water surface fluctuates seasonally responding to the infiltration of water and pumpage. Extended upward and downward trends also occur during droughts or peak storm periods. The highest stand of the groundwater table was recorded in 1932 with a depth of 55 feet below the ground surface in the Coliseum area.

Perched groundwater is also known to exist in the area, and is a common occurrence throughout the basin and is not considered an important aquifer source. The groundwater in the near-surface Lakewood Formation is generally of poor quality. Groundwater in the underlying San Pedro Formation is extensively utilized for good quality water supply throughout most of the basin. Although water wells are located in the vicinity of the Coliseum, imported water supplies, rather than groundwater, are used for domestic use and irrigation. None of the existing structures on the Project Site are currently in contact

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[1] *City of Los Angels Environmental and Public Facilities Maps - Oil Field & Oil Drilling Areas in the City of Los Angeles, Los Angeles City Planning Department, September 1996.*

with the water table. Sanitary effluent from the Project Site is currently disposed of off-site through the City sewer system for treatment and disposal into the ocean (for more detail, see Section V.H.3 of this EIR, Sanitary Sewers).

Figure 1 Geologic Map

Subsidence

Several areas in the greater Los Angeles Basin have experienced subsidence in recent history, due largely to the withdrawal of oil resources and, to a much lesser degree, the withdrawal of groundwater. Known areas where subsidence has occurred lie near existing oil fields and/or water well fields, all at a considerable distance from the Project Site. The nearest such area to the site is the Wilmington Oil Field, located approximately 13 miles directly south of the Project Site, where up to 28 feet of subsidence occurred during the 1960's.

Flooding

Flooding in the Los Angeles Basin is rare, but does occur during periods of major storm runoff. The Los Angeles County Flood Control District has developed an extensive storm sewer system, which has been purged several times during the past 100 years and which has generally functioned as designed. The Coliseum site is located in FEMA Community Panels No. 060137-0080D, effective February 4, 1987, and No. 060137-0081C dated December 2, 1980. These areas are designated as Zone C, areas of minimal flood hazard, where flood insurance is not mandatory. Although the Coliseum field itself is a depressed area, it has been provided with sufficient means to drain accumulated surface water. Furthermore, based on a review of the City's Environmental and Public Facilities Maps, the Coliseum is not located in a 100-year or 500-year flood plain area.[2]

Geotechnical and Foundation Investigations

In December 1991, Law/Crandall Inc. prepared a geotechnical investigation for the renovation plans at the Coliseum. The 1991 investigation was prepared for a specific design plan as proposed in 1991. That design was never fully implemented. The present design plan for the Coliseum is based substantially on the same design concept as previously envisioned, though the plans are being refined and modified by the project Architect. It should be noted that as the architectural design plans are modified, a review and update of the prior geotechnical investigations should be evaluated for conformity and feasibility.

Smith Emery Company prepared a report of Compacted Fill for the Coliseum, dated July 2, 1993, documenting earthwork activities during the preparation of the site for future renovation. Following this report, the Coliseum suffered extensive damage during the 1994 Northridge earthquake. Law/Crandall subsequently prepared additional geotechnical and structural analysis as contained in the Report of Foundation Investigation for the Los Angels Memorial Coliseum Repair, dated April 1, 1994 and the Draft Report of Pile Load Testing for the Los Angeles Memorial Coliseum, dated August 18, 1994. These technical reports are incorporated into the EIR by reference and are available on file at the

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[2] *City of Los Angels Environmental and Public Facilities Maps – 100 and 500-Year Floodplains In the City of Los Angeles,, Los Angeles City Planning Department, March, 1994.*

Los Angeles Memorial Coliseum Commission offices at 3939 S. Figueroa Street, Los Angeles California.

Seismic Hazards

Fault Rupture Potential

Active and potentially active faults have been mapped adjacent to, within, and beneath areas in the City of Los Angeles. A potentially active fault is a fault that has demonstrated surface displacement of Quaternary age deposits (within the last 1.6 million years). An active fault is one that has had surface displacement within Holocene times (the last 11,000 years) or is included in an Alquist-Priolo Earthquake Fault Zone as established by the California Division of Mines and Geology. Faults that have not experienced movement within the past 1.6 million years are generally considered inactive.

The Project Site is located in the north central portion of the Central Block of the Los Angeles Structural Basin. As discussed previously, the Central Block is a fault-bound basin characterized by an alluvial lowland plain, bounded on the west by the Santa Monica Mountains and associated Santa Monica Fault; on the north by the Elysian and Repetto Hills and Elysian Park Fault; on the northeast by the Puente Hills and Whittier Fault; on the east by the Santa Ana Mountains; on the southeast by the San Joaquin Hills; and on the southwest by the Newport-Inglewood Fault zone.

The active and potentially active faults which are deemed capable of producing fault rupture in the City of Los Angeles are shown in relation to the Project Site in Figure V.D-2. The maximum credible and probable earthquake from each of these faults is shown in Table V.D-1. According to the Draft EIR for the Los Angeles Citywide General Plan Framework, fault ruptures are not known to be present in the Central City planning area in which the site is located.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act of 1973 (Public Resources Code Section 2621 et seq.) represents the current State mandated approach to controlling development in active fault zones. There are two general requirements of this act: 1) the location of most structures for "human occupancy" may not be across the trace of active faults and 2) proposed developments within 1,000 feet of the established special study zones must have geologic/seismic reports done. The Project Site is not located in a state-defined Alquist-Priolo Earthquake Fault Zone or Special Study Area, and no active or potentially active faults are known to exist beneath the Project Site.[3]

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[3] *California Department of Conservation, Division of Mines and Geology, Digital Images of Official Maps of Alquist-Priolo Earthquake Fault Zones of California, Southern Region, 2000.*

Figure 2 Fault Location Map

Table V.D-1
Characteristics of Major Faults in the Project Vicinity

Fault Name	Type	Closest Distance to Site (km)	Estimated Slip Rate (mm/yr)	Estimated Maximum Earthquake Magnitude[a]	Estimated Earthquake Intensity at Site[b]
Very Highly Active					
San Andreas-1,857 Ruptures	strike-slip	37.8	34 ± 5.0	7.8	VIII
Highly Active					
Santa Susana	reverse	25.8	5.0 ± 2.0	6.6	VII
Cucamonga	reverse	32.3	5.0 ± 2.0	7.0	VII
Oak Ride	reverse	35.2	4.0 ± 2.0	6.9	VII
Sierra Madre	reverse	16.7	3.0 ± 1.0	7.0	VIII
Palos Verdes	strike-slip	13.0	3.0 ± 1.0	7.1	IX
Anacapa-Dume	reverse oblique	24.3	3.0 ± 2.0	7.3	VIII
Whittier	strike-slip	15.4	2.5 ± 1.0	6.8	VIII
Newport-Inglewood	strike-slip	4.0	1.5 ± 0.5	6.9	X
Compton	blind thrust	6.8	1.5 ± 1.0	6.8	X
Elysian Park	blind thrust	7.0	1.5 ± 1.0	6.7	X
Northridge	blind thrust	18.3	1.5 ± 1.0	6.9	IX
Moderately Highly Active					
Hollywood	reverse oblique	7.7	1.0 ± 0.5	6.4	IX
Santa Monica	reverse oblique	9.1	1.0 ± 0.5	6.6	IX
San Gabriel	strike-slip	21.0	1.0 ± 0.5	7.0	VIII
Chino	reverse oblique	28.8	1.0 ± 1.0	6.7	VII
Raymond	reverse oblique	8.8	0.5 ± 0.3	6.5	IX
Verdugo Hills	reverse	12.2	0.5 ± 0.5	6.7	IX
Clamshell-Sawpit	reverse	19.9	0.5 ± 0.5	6.5	VII
San Jose	reverse oblique	23.1	0.5 ± 0.5	6.5	VII

[a] *The maximum earthquake that may credible occur given the current understanding of regional tectonism*

[b] *Modified Mercalli scale. VI-VII: "Minor damage including cracks in chimneys and walks. Furniture moved and items knocked off shelves." VII-IX: "Moderate damage including toppled chimneys, cracked stucco, frames shifted on foundations. Damage more severe to weak walls and masonry." IX-X: "Major damage, including partial to complete collapse of weak masonry and frame buildings and moderate damage to stronger structures."*

Sources: GTC, 2000; CDMG, 1996 and California Science Center/California African American Museum Parking Structure FEIR, May 2001.

Ground Shaking

The most widespread, damaging effects of earthquakes are caused by strong ground shaking. The intensity of ground shaking at a given location depends on several factors, but primarily on the earthquake magnitude, the distance of the site from the earthquake's epicenter, and the response characteristics of the soil or bedrock units underlying the area. Strong ground shaking can catastrophically damage structures.

The two most consistent databases for assessing ground shaking hazard potential in the City of Los Angeles are the California Division of Mines and Geology (CDMG) (1988) planning scenario study for a major earthquake (magnitude greater than 7.0) on the Newport-Inglewood Fault Zone (NIFZ) and the Caltrans (1992) estimates of peak horizontal acceleration from maximum credible earthquakes for rock and stiff- soil sites.[4] The CDMG scenario utilizes the Modified Mercelli Intensity (MMI) scale standard, a modeled seismic intensity distribution. The MMI intensity values are presented as VII, VIII, and IX, where IX is considered a high hazard, VIII is moderate, and VII is low. However, an episode of VII intensity could severely damage an unreinforced structure, cause parapets and building fronts to fall on to sidewalks, and tumble chimneys through roofs. According to the January 1995 Draft Environmental Impact Report for the Los Angeles Citywide General Plan Framework, the Central City Subregion should reach an intensity of VIII (moderate) from the Newport-Inglewood Fault Zone scenario earthquake. Furthermore, according to the Caltrans scenario, the Central City Subregion could experience peak ground acceleration (PGA) of greater than 0.5 to 0.6g[5] from a large earthquake on any of the nearby faults. This is considered a high hazard, since it is greater than minimum levels upon which building code standards are based, although the Project Site would not be exposed to any greater risk from groundshaking than any other site in the Central City subregion.

ENVIRONMENTAL IMPACTS

Thresholds of Significance

A significant geologic or seismic impact would occur if the project has the potential to pose an increased threat to public safety or destruction of property by exposing people, property, or infrastructure to seismically-induced hazards that can not reasonably be reduced to acceptable levels of safety with modern geotechnical engineering practices.

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4 *Los Angeles Citywide General Plan Framework Draft EIR, January 1995*.

5 *"g" is the force associated with PGA.*

Project Impacts

Implementation of the Proposed Project would include the construction of new seating decks, bringing the majority of the seats closer to the field. The existing exterior concrete wall of the Coliseum would be preserved, with new construction on the interior being attached to the exterior wall. The existing 35-foot earth berm supporting the elevated concourse level would be removed to grade inside the exterior wall, with a new concrete structure built in the same location. Project uses, building sizes and locations, designs, and building heights for the Proposed Project are discussed in detail in Section II.C of this report, Project Characteristics.

Implementation of the Proposed Project would result in the excavation and removal from the site of approximately 250,000 cubic yards of soil and demolition debris material.

Several types of foundation systems may be considered for support of the proposed structures to be developed as part of the Proposed Project. Examples of these foundation systems may include the use of spread footings, mat-type foundations, and cast-in-place piles. For preliminary design, shallow spread footings may be designed using an allowable bearing value of 1,500 pounds per square foot for a footing of 12 inches in width and depth of embedment. This allowable bearing value may be increased by 300 pounds per square foot (or by 20 percent) for each additional foot of depth and width to a maximum bearing value of 4,500 pounds per square foot. Higher maximum bearing values may be permissible after an additional soil and foundation investigation is performed and the specific location and loading of structures become known. Total settlement and differential settlement should be within tolerable design limits, generally less than 0.5 inch and 0.25 inch, respectively. Other construction details, including design curves and other information pertinent to the deep foundation consisting of cast-in-place friction piles would be expected to be fully developed during the geotechnical investigation phase of the actual construction period. However, based upon preliminary investigations, it is expected that some difficulty may be encountered during the drilling operation due to the presence of some gravel, cohesionless sand, and scattered cobbles in the soils underlying the site. However, this difficulty should be overcome through the utilization of casing. The proposed design includes the excavation of the lower concourse underneath the northern and southern portions of the stadium at an elevation of approximately 12 feet below the street level. In addition, the design includes the excavation in the southwest portion of the site to a depth of approximately 22 feet below street level. In these areas, it would be desirable to utilize spread footings where necessary.

Geology

Impacts associated with implementation of the Proposed Project on the site's geologic formations, inclusive of the near surface alluvial deposits, are expected to be minimal. The surface soils would be disturbed during grading but only to limited depths. Natural surface drainages have previously been modified when the Coliseum was originally constructed, and all new proposed drainages would be compatible with the existing system. Due to the relatively flat topography of the site, proposed grading would have little topographic impact. No well-defined natural or man-made drainages exist on the site, thus the potential for flooding would remain minimal.

The relatively flat topography of the site and surrounding area preclude the possibility of landslides resulting from project development. Cut and fill slopes are expected to remain essentially unchanged for the proposed new development. No evidence of subsidence in the vicinity of the site was noted during the literature review and the generally dense nature of the site's soils would minimize the likelihood of local subsidence. All soil surfaces, whether natural or artificial, would be concealed and protected by asphalt or concrete covers or would be landscaped to limit erosion by wind and water. Laboratory testing indicated that the surface soils within the foundation area of the proposed development are not expansive, collapsible, or compressible. Therefore, implementation of the Proposed Project is not expected to produce any adverse impacts relative to non-seismic geotechnical issues.

Grading and Excavation

During grading activities, noise and dust impacts would result from the use of heavy equipment to excavate, load, and transport earth materials off-site. The hauling of excavated materials to either fill-dirt receptor sites or regional landfills would require an estimated total of 20,000 truck trips over a six-month period. Dust raised during grading would have an incremental short-term adverse impact on local and regional air quality (for more detail, see Section V.B of this report, Air Quality). In addition, the excavation and hauling of earth materials would temporarily increase noise levels in the immediate area for the expected 18 to 20 month duration of project construction activities (for more detail, see Section V.F of this report, Noise). At this time, no export haul route has been identified since the ultimate destination of the materials to be removed from the site is not yet known. However, any regional transport of removed materials from the site would utilize the nearby Harbor Freeway (Interstate 110) via Martin Luther King Jr. Boulevard, and would avoid local residential streets. Development of the Proposed Project would not result in the loss of any material resources. All uncontaminated graded materials would be transported off-site to either one of several local Class III landfills or an as-of-yet-unidentified receptor site needing imported fill material. If landfills are utilized as receptor site(s) for this material, project implementation would incrementally contribute to the ultimate exhaustion of local landfills. Landfills would only be considered as a last resort disposal option for materials from the site (for more detail, see Section V.H.4 of this report, Solid Waste and Disposal). Discarded building and/or earth materials containing any hazardous materials, primarily asbestos, would be disposed of in accordance with all applicable local, state, and federal regulations. Without mitigation, impacts to landfill capacities by the disposal of graded materials could result in a significant impact.

Groundwater

The shallow aquifer below the Project Site is of generally low quality and the pumping of groundwater locally for use at the Coliseum is not being proposed as part of the Proposed Project. As stated previously, though water wells do lie in the vicinity of the Coliseum, imported water supplies, rather than wells, are used for domestic use and irrigation. All grading and construction activities expected to be associated with the Proposed Project would take place above the present continuous groundwater table and above the historic high groundwater table, and none of the existing or proposed structures associated with the Coliseum facility would be in contact with the water table. Groundwater is not expected to be encountered during grading or construction; however, perched groundwater or saturated soil conditions may exist in scattered areas underneath the site. Implementation of the Proposed Project is not expected to produce any adverse impacts relative to groundwater.

Liquefaction

In addition to ground shaking at the Coliseum site, the potential for other secondary effects caused by earthquakes was evaluated, including seismically-induced liquefaction, subsidence, landsliding, and flooding. Due to the depth of the groundwater table (approximately 225 feet below the surface of the Project Site) and the relatively high density of the soils underlying the site area, the potential for soil liquefaction is considered very remote. A major regional earthquake may cause a very small amount of subsidence across the basin, although the amount of subsidence expected would likely be non-differential and extremely small. The Project Site is located far enough from the closest uplands to preclude a hazard of induced landsliding. Similarly, the site is high and/or far enough from the coastline or any large inland body of water to preclude any dangers from tsunami or seiche waves or inundation from the breaching of an up-gradient reservoir. Therefore, the Proposed Project would not be subject to significant impacts caused by seismically-induced liquefaction.

Seismicity

Since no known or mapped active, potentially active, or inactive faults, if projected, would trend toward or directly through the Project Site area, and the Coliseum does not lie in an Alquist-Priolo Special Study Zone, the potential for direct surface fault rupture on the site is considered very unlikely. Thus, impacts associated with implementation of the Proposed Project relative to the seismic displacement of structures on the site would be less than significant. In the event that any of the active faults within the greater Los Angeles area were to rupture, an earthquake would be generated which would, in all likelihood, result in potentially significant ground shaking on the Project Site. However, development of the Proposed Project would not increase the likelihood of the occurrence of a seismic event affecting the site. The Proposed Project would not be anticipated to adversely impact any portion of the City's Seismic Safety Plan, as it would be consistent with the relevant policies of the Plan, which include the upgrading of public facilities to meet the risk requirements for seismic safety and the preservation of the architectural character of buildings and structures important to the cultural heritage of the City, consistent with life safety considerations. Therefore, the Proposed Project would not result in any significant seismic impacts.

Ground Shaking

The degree of ground shaking experienced on the site would depend on the location of the earthquake's epicenter relative to the site, and the earthquake's magnitude. When a fault moves, it may or may not cause surface displacement, but it most likely will cause ground shaking, the amount of which depends on many geologic and tectonic parameters. Eleven faults, shown in Table V.D-1, were identified that could influence the site relative to earthquake ground shaking. Additional faults outside the local area, such as the San Andreas would also have the potential to create moderately strong ground motion effects in the project area. As mentioned previously, the maximum magnitude event capable of occurring along a given fault under the current scientific framework of tectonics is the maximum credible earthquake. In determining the maximum credible earthquake, little regard is given to probability of occurrence. It should be noted that present building codes and construction practices are intended to minimize structural damage to buildings and loss of life as a result of a moderate or major earthquake. While it is impossible to totally prevent structural damage to buildings and loss of life as a result of seismic events, adherence to all applicable building codes and regulations and site specific engineering specifications can reduce such impacts to less than significant levels. A significant impact posing an increased threat to public safety or destruction of property by ground shaking is not expected to occur with the development of the Proposed Project.

CUMULATIVE IMPACTS

As with the Proposed Project, development of the identified related projects could require the extensive export of graded earth materials off-site. Although the degree of impact associated with any single related project would have to be analyzed on a project-by-project basis as each project is reviewed by the appropriate City and/or State agencies, the cumulative generation of this graded material could contribute to the ultimate exhaustion of local landfills, if landfills are chosen as material receptors. If landfills are utilized as receptor site(s) for project-generated materials, then the project, together with the related projects, would be considered to have a cumulatively adverse impact on landfill capacities in Los Angeles County. No cumulatively adverse soil impacts would be anticipated relative to any local property proposed for development with a related project in conjunction with the Proposed Project due to the potentially concurrent construction and operation of the project and related projects, provided all are implemented with design mitigations appropriate for each property. Each related project would need to be evaluated by the appropriate agencies on a case-by-case basis in order to determine the mitigations appropriate for each project.

No adverse geotechnical impacts are anticipated relative to proposed development on any local property due to the potentially concurrent construction and operation of the Proposed Project and related projects, provided that all are implemented with appropriate design mitigation. The Proposed Project and related projects would continue to be subject to ground shaking in the event of an earthquake, as would most other areas of Los Angeles. Assuming adherence to the applicable building codes and regulations, potential significant adverse impacts from a major earthquake would be reduced, but not eliminated.

MITIGATION MEASURES

The following mitigation measures are required in order to effect a reduction in the severity of potential on-site impacts resulting from seismic events occurring on Southern California faults:

1. All structures to be constructed or renovated as part of the Proposed Project shall be designed as required by either the Uniform Building Code for structures within Seismic Zone 4, or other pertinent State and/or City building codes (such as Division 23, Section 91.2305 of the City of Los Angeles Building Code), to withstand the expected ground motions.

2. A comprehensive geotechnical investigation shall be prepared to the satisfaction of the responsible State and/or City reviewing agencies. The investigation shall verify the soil conditions under the proposed structures and derive the pile capacities.

3. All grading activities shall be in compliance with specific recommendations and requirements provided in the geotechnical report prepared for the Proposed Project, subject to review and approval by the appropriate State and/or City responsible agencies.

4. A copy of the foundation report and/or supplements and approval letter shall be attached to the State and/or City office and field sets of plans, with one copy of the foundation report and/or supplements submitted to the State and/or City plan checker prior to the issuance of the permit.

5. During construction, all grading shall be carefully observed, mapped, and tested by the project engineer. All grading shall be performed under the supervision of a certified engineering geologist and/or soils engineer in accordance with the applicable provisions of the State and/or City Building Codes to the satisfaction of the State and/or City building and safety authorities. The responsible engineer shall review and approve the foundation plan and/or the excavation/shoring plan prior to the issuance of any permits.

6. Artificial fills in the existing 35-foot earth berm shall not be considered suitable for the support of foundations unless excavated, recompacted, and tested to be in compliance with the applicable State and/or City Grading Codes.

7. The geologist or the soils engineer shall inspect and approve all fill and subdrain placement areas prior to placing fill.

8. Haul route approval for the transport of graded and excavated earth materials and removed building materials to receptor sites and/or local landfills shall be obtained from the City of Los Angeles Department of Building and Safety and/or other responsible City agencies. Haul routes for the transport of such materials shall be established, where possible, through non-residential areas so as to minimize the effects of noise, and shall maximize, where possible, the distance traveled on major arterials.

9. Discarded building and/or earth materials containing any hazardous materials, primarily asbestos, shall be disposed of in accordance with all applicable local, state, and federal regulations.

10. To the maximum extent feasible, uncontaminated graded materials shall be transported off-site to a receptor site needing imported fill material. Landfills shall only be considered as a last resort disposal option for materials from the site.

11. Prior to the issuance of building permits, if the soils and/or perched groundwater beneath the site are found to be contaminated, the City of Los Angeles Fire Department shall be notified and provided with a summary of all local, state, county, and federally required remediation activities and submit evidence of compliance.

12. Where encountered on the site, perched groundwater or saturated soils should be removed to the extent feasible or necessary.

LEVEL OF IMPACT AFTER MITIGATION

Implementation of the Proposed Project would require the grading, excavation, and removal from the site of approximately 250,000 cubic yards of earth and building materials, which would result in short-term incremental dust and noise impacts around the Project Site and along the chosen haul route. If landfills are utilized as receptor site(s) for this material, project implementation would incrementally contribute to the ultimate exhaustion of local landfills. Implementation of the recommended mitigation measures would reduce, but not eliminate, these impacts. With implementation of the foregoing mitigation measures, project construction and operation would not be expected to have any unavoidable significant adverse impacts on subsurface soils at the Project Site. Temporary soil disruption would occur during excavation and construction activities.

With implementation of the foregoing mitigation measures, project construction and operation would not be expected to have any unavoidable significant adverse effects on the natural terrain or local geology. As with most other areas of Southern California, the Proposed Project is subject to potential ground shaking as a result of seismic events. In event of a major earthquake, this ground shaking could result in significant impacts for the Project Site and surrounding area. However, with the implementation of recommended mitigation measures, including compliance with applicable building codes, the potential risk would be reduced to an acceptable level consistent with similar stadiums and public facilities in the Southern California area.

Any potentially significant impacts associated with geology and soils would be less than significant after implementation of the above listed mitigation measures.