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1. INTRODUCTION

1.1. Overview

In order to comply with State Guidelines for General Plan Documents and for Environmental Impact Reports (EIRs) and to provide a sound and consistent understanding of the geotechnical issues effecting land use planning decisions in the City of West Hollywood (the City), it is necessary to look at a broad range of potential geologic, soils, and seismic related hazards. This document is a technical background report designed to support the City planning staff with the preparation of the Safety Element of the City of West Hollywood General Plan. As such, it contains current information on the geologic and seismic conditions within and around the City, which could potentially affect the City and its residents in the event of a major earthquake in Southern California. The potential seismically-induced effects include:

- Ground shaking (strong earthquake ground motions)
- Surface fault rupture (both primary and subsidiary)
- Liquefaction and dynamic settlement
- Co-seismic uplift and folding
- Earthquake-induced landslides
- Ground lurching and cracking

The potential geologic and soils hazards to the City include:

- Compressible, collapsible, or expansive soils
- Landslides and slope instability
- Groundwater conditions
- Subsidence
- Flooding from dam failure
- Flooding from tsunami and seiche

Within the City of West Hollywood, the seismic hazards which present the greatest threat to property and public safety are surface fault rupture, ground shaking, and liquefaction and related ground failure phenomena.

The technical issues outlined above should be taken into account as the City fills in and re-develops. Existing building codes and land use requirements generally can address most of the hazards present in the geologic setting of the City. As additional, more accurate, geology, soils, and seismic information have been developed since the previous Geologic-Seismic Report was prepared for the City (dated January, 2002) for inclusion in the General Plan, it is possible to better define the various hazard areas and to consider them in future development. Sources of the information used to compile this technical report include regional geologic reports and maps (including the Seismic Hazard Reports prepared by the California Geological Survey) and site-specific fault rupture hazard studies (summarized herein in Table 1) and geotechnical and engineering geology reports that have been submitted to the City for new developments.

1.2. Geologic and Seismic Hazard Planning Considerations

For planning purposes, geologic and seismic hazards are significant considerations in the selection of development locations, affect the process through which a safe project is developed, and define the various studies necessary to design a project to mitigate these two broad types of natural hazards. The Safety Element of the General Plan provides guidance to accomplish these steps and information useful to initiate the development planning process.

Geologic hazards can typically be evaluated by careful direct observation and testing to determine the extent of the hazard(s) and by subsequent development of remediation or avoidance strategies. Geologic hazards typically include potentially unstable slopes, landslides, mudflows, erodible soils, expansive and compressible soils, and shallow groundwater. Seismic hazards result from the primary effects of an earthquake (strong ground shaking and surface fault rupture) and the secondary effects caused by the earthquake shaking (liquefaction, seismically-induced settlement, landslides, ground fissures, etc.)

Laws, regulations, and codes are established by the State and local agencies to help ensure that proper precautions are taken during project planning and in advance of development to minimize unreasonable levels of property damage, injuries, or fatalities. The primary applicable regulatory measures include:

- The 1972 Alquist–Priolo Special Studies Zones Act
- The 1970 California Environmental Quality Act
- The 1990 Seismic Hazards Mapping Act
- The 1999 Natural Hazards Disclosure Act
- The 2007 California Building Code

In addition to these broad regulatory guidelines, there are also technical guidelines developed by the State (California Geological Survey, CGS) and the County of Los Angeles to assist technical professionals in preparation of geotechnical and geologic reports. Examples of such guideline documents include:

- CGS Note 44 – Recommended Guidelines for Preparing Engineering Geologic Reports, 1986 [currently under revision];
- CGS Note 49 – Guidelines for Evaluating the Hazard of Surface Fault Rupture, 1998
- CGS Special Publication 117 – Guidelines for Evaluating and Mitigating Seismic Hazards in California, 2008;
- County of Los Angeles, Department of Public Works – Manual for Preparation of Geotechnical Reports.

In addition, the Southern California Earthquake Center at the University of Southern California has prepared recommended procedures for analyzing and mitigating both liquefaction and landslides to complement Special Publication 117. These recommended procedure documents include:

- Recommended Procedures for Implementation of DMG Special Publication 117 - Guidelines For Analyzing and Mitigating Liquefaction Hazards in California, dated March 1999;
- Recommended Procedures for Implementation of DMG Special Publication 117 - Guidelines for Analyzing and Mitigating Landslide Hazards in California, dated February 2002.

In summary, the potential for geologic and seismic hazards must be considered in all phases of the development process. Building codes and general plan documents provide regulations, specifications, and strategies to address most hazard conditions, provided the studies are performed to recognize the hazards and to define the potential severity and mechanisms.

2. SETTING

Taken together, geologic and seismic hazard conditions in the City of West Hollywood are similar to most cities in southern California. The following sections provide descriptions of the key geologic and seismic conditions which may impact the City.

2.1. Physiographic Setting

The City is located along the northern boundary of the Los Angeles Basin, at the base of the Hollywood Hills, which are part of the broader reaching Santa Monica Mountains. The City is situated on an alluvial fan complex shed from the southern flank of the Santa Monica Mountains. The northern portion of the City spans the southern base of the Santa Monica Mountains, which are composed of igneous and meta-sedimentary rock materials. The Santa Monica Mountains are located along the southern boundary of the Transverse Ranges Geomorphic Province which is dominated by east-west trending north over south thrust faults. The Santa Monica-Hollywood-Raymond Fault Zone represents the northern structural boundary between the Santa Monica Mountains and the Los Angeles Basin to the south. The southern portions of the City are within the northern portions of the Hollywood Basin, a small sedimentary depression (<1 km thick) that abuts the Santa Monica–Hollywood Fault Zone on the north (Hildenbrand et. al., 2001). The geometry of the Hollywood Basin is poorly known.

The City is approximately 3 miles long in a west-east direction and 0.5 to 1.3 miles wide in a north-south direction. The topography within the City is relatively flat and subdued, and slopes gently towards the south except at the extreme northern margin of the City, which is at the base of the mountains. The maximum elevation is about 550 feet near Larabee Street in the north part of the City and the minimum elevation is about 170 feet near San Vicente Boulevard in the south part. The average downslope gradient from north to south, not including the base of the mountains, is about 6 percent in the northern third of the City and about 2 percent in the remaining southern portion of the City.

2.2. Geologic Setting

Key aspects of the geologic conditions that contribute to geologic hazards in the City include: the general physiography of the landforms, the geologic materials underlying the City, the geologic structure of the bedrock, and groundwater conditions. In developing the geologic characterization of the City, original geologic mapping by Dibblee (1991a and 1991b) was reviewed to help understand the distribution of geologic materials underlying the City. The Geology Map, Figure 1, is based on the Quaternary Geologic Map of the Hollywood and Beverly Hills Quadrangles presented in the Seismic Hazard Evaluation of the Hollywood Quadrangle (CDMG, 1998a) and the Beverly Hills Quadrangle (CDMG, 1998b). The principal geologic materials exposed within the City include limited areas of undocumented fills, alluvial sediments, and granitic and metamorphic bedrock, as described by Dibblee (1991a and 1991b).

Minor accumulations of undocumented fill, ranging in thickness from a few feet to up to about 20 feet, are common at sites along the Sunset Boulevard corridor. The undocumented fills generally consist of mixtures of sand, silt, and clay typically derived from local sources. Identification and mitigation of areas of undocumented fills during site investigations and construction is critical for satisfactory performance of structures to be built over the fill.

A majority of the City is located on alluvial soils derived from materials shed from the adjacent Santa Monica Mountain range. The alluvial sediments occur in deposits that are vertically and horizontally cut into each other as a result of periods of stream erosion and subsequent alluvial deposition. The alluvial soils consist of a mixture of sand, silt, clay, and gravels that are punctuated with a series of buried and stacked relic soils. The buried soils are generally conspicuous as reddish brown in color and typically are clay-enriched due to extended exposure at the ground surface. The alluvium and sequences of stacked and buried soils are thickest along southern City boundary and gradually thin toward the north. The alluvial soils are typically coarser-grained (sandier) near the base of the hills and become finer-grained (silty and clayey) in the southern portion of the City.

A finding from several of the fault rupture hazard investigations performed in the City, as summarized in Table 1, is the presence of a relatively thin veneer of beach sand and smooth rounded gravel and cobbles overlying a gently sloping bedrock surface near the north side of the City, and close to Sunset Boulevard. The presence of marine deposits over the smooth bedrock surface was recognized in studies by William Lettis & Associates (WLA, 1998: Map reference 7) and by Law/Crandall (2001; Map reference 13). The Consultants interpreted these findings to represent evidence of an old marine shoreline and buried wave-cut platform abraded into the underlying bedrock. Further, WLA (1998) interprets the marine wave-cut platform as the cause of the aligned base of the Hollywood Hills rather than the trace of the Hollywood Fault.

As shown on Figure 1, the northernmost portions of the City are underlain by bedrock consisting of intrusive igneous rocks (typically quartz diorite) and meta-sedimentary rocks (typically slate). The quartz diorite is generally weathered and weak in the upper few feet of exposures and becomes very hard with depth. Planes of weakness within the quartz diorite are typically oriented to the north-northwest and dip towards northeast which is generally favorable in terms of slope stability. No significant landslides have been mapped in the slopes along the north side of the City (Los Angeles County Seismic Safety Element, 1990, Plate 5).

Prior to development, a marsh existed within the alluvial plain currently incorporated as part of the City. The withdrawal of groundwater via pumping in the 1920’s from this area contributed to the drying of the marsh. Organic rich sediments containing soft clays were likely deposited in this area while the marsh was present. The approximate historical extent of the marsh is shown on Figure 1 and Figure 3.

2.3. Geo-Tectonic Setting

The City is located in a highly active seismic region of southern California. Earthquakes occur when zones of weakness, or faults, in the Earth's crust move past one another in an abrupt sudden way. Figure 2 shows the City relative to the mapped active and potentially active faults in southern California. The earthquake activity in the region stems from the relative movement of two major crustal plates: the Pacific and the North American Plates. The Pacific Plate, which includes the southwestern portion of California, including the Los Angeles Basin, is moving to the northwest relative to the North American Plate, which consists of the vast majority of the North American Continent. The San Andreas Fault, which lies about 35 miles northeast of the City, forms the boundary between the two plates.

While the San Andreas Fault accommodates much of the relative motion between the two plates, a significant amount of strain is accumulating along other faults in Southern California. For example, the Transverse Ranges, which include the Santa Monica Mountains, the Verdugo Hills, and the San Gabriel Mountains, formed as a result of localized tectonic compression centered north of Los Angeles. These mountains are currently experiencing uplift, primarily due to the release of strain during earthquakes.

The most significant geo-tectonic structures in the City are the Hollywood and Santa Monica Faults which trend generally east-west. Episodic tectonic activity began on these structures in middle Miocene time and has continued into the Quaternary period. The most hazardous fault to the City is the Hollywood Fault, a reverse fault that is deeply buried, concealed by dense urbanization, and directly underlies portions of the City. The approximately 15-km-long Hollywood Fault is the eastern segment of the larger Santa Monica-Hollywood Fault System that represents the boundary between the northern Los Angeles Basin and the Santa Monica Mountains (Dolan and others, 1997; Figure 2). An apparent left en echelon offset of the Hollywood and Santa Monica Faults west of the City suggests that the northwest-trending Newport-Inglewood Fault segments the Santa Monica-Hollywood Fault System west of the City (Crook and others, 1983; Wright, 1991; Dolan and Sieh, 1992).

The Hollywood Fault, which traverses the cities of Beverly Hills, West Hollywood and Hollywood, is responsible for uplift of the Hollywood Hills. For this reason, most geologists prior to the 1990's characterized the Hollywood Fault as predominantly a northward-dipping reverse fault. In the City of West Hollywood, active deposition of numerous small alluvial fans at the mountain front and a lack of fan incision has been interpreted to be the result of late Quaternary uplift of the Santa Monica Mountains along the Hollywood Fault (Dolan and others, 1997; Dolan and Sieh, 1992; Crook and others, 1983). The fault dips steeply to the north and has juxtaposed pre-Tertiary granitic and metamorphic, and Tertiary sedimentary rocks over younger sedimentary deposits of the northern Los Angeles basin. A state-sponsored fault evaluation has not been conducted to define an Earthquake Fault Zone (formerly known as Alquist-Priolo special studies zone) along this fault due to the dense urbanization.

2.4. Groundwater Conditions

The depth to groundwater varies considerably across the City, and historically has changed significantly because of groundwater pumping and urbanization impacts. The historic high groundwater level in the City is generally represented in a study by Mendenhall (1905). In the 20th century, groundwater levels in the City dropped significantly although groundwater levels appear to have been rising more recently. The most recent comprehensive evaluation of shallow groundwater elevations in the City was performed by California Division of Mines and Geology (CDMG, which has been renamed the California Geological Survey [CGS]) as part of the Seismic Hazards Mapping Act for the Hollywood and Beverly Hills Quadrangles. The historic high depth to groundwater contours from the CDMG Seismic Hazard Evaluation of the Hollywood and Beverly Hills Quadrangles (CDMG, 1998a and 1998b) are shown on Figure 3.

As summarized in Table 1- Summary of Fault Rupture Hazard Studies, groundwater is generally encountered in borings at depths ranging from 10 to 20 feet to deeper than 245 feet. Groundwater is commonly found to be higher on the north side of the Hollywood Fault than on the south side of the fault because the fault acts as a barrier within the alluvial sediments to groundwater flow towards the south. Examples of this condition were found in fault studies performed at 1414 Harper Ave. (Schell, 1998; Map reference 11) and at 8430 Sunset Blvd. (Law/Crandall, 2001; Map reference 13) where groundwater was encountered at 20 to 26 feet on the north side of the fault and was not encountered to significant depths on the south side of the fault. In addition, a confined water bearing zone was encountered at 8703 West Knoll Drive (Earth Consultants International, 2003; Map reference 18) where groundwater was initially encountered at depths of about 7 to 10 feet at the time of drilling but eventually rose to within 1 foot of the ground surface.

3. SEISMIC CONDITIONS

The seismic conditions of the City are controlled by the active tectonics of the southern California area and by the presence of nearby active faults. Fault-generated earthquake ground shaking from nearby significant faults is a critical consideration due to its widespread effects and to the potential for severe damage resulting in economic losses and the possible injury or even death to persons in the City.

The City is located in a highly active seismic region of southern California. Earthquakes can cause damage to property directly by ground displacement from fault rupture and strong ground shaking or indirectly as strong ground shaking causes ground failures such as landslides, liquefaction, or lateral spread). Figure 2 shows the City relative to the mapped active and potentially active faults in southern California.

Our understanding of the potential earthquake related risks to the City have improved greatly in the past two decades. Previously, the San Andreas Fault was thought to present the largest earthquake hazard to the City because of its' relatively short recurrence interval and potential for large magnitude earthquakes. A greater risk is posed to the City from the smaller and more proximal faults such as the Hollywood Fault zone. The Hollywood Fault zone is characterized as being active, but a state sponsored fault evaluation report has not been conducted to define an Alquist-Priolo (fault rupture) special studies zone along this fault.

3.1. Faults

Faults are characterized as generally planar discontinuities or fractures along which there has been displacement of the sides relative to one another and parallel to the fracture. Numerous regional and several local faults with long histories and many episodes of displacement are capable of producing severe earthquakes, i.e., greater than magnitude 6.0, that could affect the City. "Active" faults and "potentially active" faults, as defined by the California Geological Survey (CGS), must be considered as geologic structures capable of producing surface fault rupture. Active faults are defined as demonstrating displacement of Holocene-age materials (i.e. less than 11,000 years old) and/or documented historic seismicity. Potentially active faults are defined as demonstrating displacement of Pleistocene-age materials (i.e. 11,000 to 1.6 million years ago.)

The Hollywood Fault has not produced any damaging earthquakes during the historical period and has had relatively minor microseismic activity. If the entire 15 km long Hollywood Fault ruptured by itself, it could produce a moment magnitude Mw ~6.6 earthquake (Dolan and others, 1997). However, if the fault ruptured together with other faults to the west (Santa Monica, Malibu Coast) or to the east (Raymond), then earthquakes much larger than Mw ~6.6 could result. Assuming a minimum slip rate of 0.35 mm/yr for the Hollywood Fault, Dolan and others (1997) estimate a recurrence interval of approximately 4,000 years for a Mw6.6 event. Although the timing of the most recent rupture of the Hollywood Fault is currently poorly constrained, trench and borehole data suggest that the last rupture occurred approximately 7,000 years ago (Dolan and others, 1997).

Since adoption of a fault precaution zone around the Hollywood Fault by the City, 28 site-specific fault studies have been performed for proposed projects in the City. These reports are summarized in Table 1 and the locations shown on Figure 4. Several of the studies have identified faults within the Hollywood Fault system that offset Holocene-aged sediments, and are therefore considered active. Figure 4 also shows the interpreted locations of the main Hollywood Fault as well as the subsidiary faults that have been shown to be active. Based on fault studies performed in the City, the Hollywood Fault has been interpreted to have a strong lateral component of displacement. The linear trace of the Hollywood Fault and steep dips found in exposures and borings (65 to 90 degrees) suggest that motion along the fault may be largely strike-slip (Dolan and others, 1997 and Law/Crandall, 2001). Other westerly trending faults in the Transverse Ranges exhibit a left-lateral component of slip such as the San Fernando, Raymond, and Malibu Coast Faults. Thus, the orientation of the Hollywood Fault suggests that the horizontal component of slip also should be left-lateral. Based on a comparison between geodetic and geologic data, Walls and others (1998) suggested that this fault is one of several faults that accommodate left-lateral slip along the northern margin of the Los Angeles basin, allowing for the relative westward translation of the Santa Monica Mountains.

The Hollywood Fault and other significant nearby and regional faults are shown on Figure 2 and listed in Table 2, along with pertinent geo-seismic characteristic. The faults that are considered to most influence the seismic exposure of the City include the Hollywood Fault, Santa Monica Fault, Newport-Inglewood Fault , and the Upper Elysian Blind Thrust faults. The earthquake ground shaking hazards are discussed below.

3.2. Earthquakes and Historic Seismicity

Earthquakes generally occur on known, mapped faults such as those described above and summarized in Table 2 – Characteristics of Major Faults within 60-Kilometers of City of West Hollywood. Numerous regional and several local faults with long histories and many episodes of displacement are capable of producing severe earthquakes, greater than magnitude 6.0, that could affect the City. Reliable instrumental seismic records suitable for accurately locating the sources of earthquakes have only been available since 1932. Earthquakes that occurred during the previous 150 years of habitation of the greater Los Angeles area are documented only by subjective personal accounts and some limited experimental instrumental data. Therefore, the location of earthquakes prior to 1932 is very subjective and poorly constrained. Figure 2 – Regional Fault and Seismicity Map, shows the location of significant faults along with the locations of historic earthquakes with magnitudes of 5 or greater.

No historic large earthquakes have occurred in or very near the City. Overall the instrumental recorded seismicity of the northern Los Angeles Basin is relatively low. However, the City has experienced significant ground shaking from 6 earthquake events since 1933. These include:

- 1933 Long Beach earthquake (M6.4) attributed to the Newport-Inglewood Fault,
- 1971 San Fernando earthquake (M6.6) attributed to the San Fernando fault zone,
- 1987 Whittier Narrows earthquake (M5.9) attributed to the east-striking Puente Hills blind thrust fault (Hauksson and Jones, 1989; Shaw and Shearer, 1999),
- 1988 Pasadena earthquake (M5.0) on the Raymond fault (Jones et al, 1990),
- 1994 Northridge earthquake (M6.7) on the Northridge Hill blind thrust,
- 2001 West Hollywood earthquake (M4.2) attributed to the Newport-Inglewood fault near Beverly Hills (Hauksson et al, 2001).

Historic earthquakes that have occurred within a 100 kilometer radius of the City are also listed in Table 3. It is notable that most of the historic earthquakes listed on Table 2 and Table 3 represent relatively small events when compared to the “upper bound” earthquakes attributed to a given fault in the literature.

4. SEISMIC HAZARDS

4.1. Overview

For the seismic component of the Safety Element of the General Plan, the minimum list of potential seismic hazards that must be considered is:

- Primary
    - Surface fault rupture
    - Ground shaking (strong earthquake ground motions)

- Secondary
    - Liquefaction
    - Lateral spread
    - Seismically induced settlement
    - Seismically induced landslides

Flooding from earthquake-induced dam failure dam failure is not expected in the City because there are no significant surface impoundments upstream of the City. Tsunami hazards from seismically induced sea waves are not expected in the City due to its elevation and distance from the Pacific Ocean. Similarly, there are no significant impounded water bodies within or adjacent to the City that are subject to seiche hazards. The following subsections discuss the potential seismic hazards that could affect the City.

4.2. Primary Seismic Hazards

4.2.1. Surface Fault Rupture

Ground surface rupture is a serious threat to structures and infrastructure that span active faults. Ground surface rupture has historically occurred in southern California and topographic relief and paleo-earthquake studies in the City suggests that the Hollywood fault has produced ground surface rupture in the past. Within the City, the Hollywood Fault is considered capable of producing surface fault rupture during future earthquake events.

Rupture of the Hollywood Fault could result in as much as about 1.5 feet of lateral offset and 3 feet of thrust offset near the point of nucleation. It is, however, believed that an earthquake on the Hollywood Fault would nucleate a few miles underground, and that the rupture would have to propagate to the surface through varying thicknesses of overlying poorly consolidated alluvial sediments (overburden). The actual surface rupture that would accompany offset of the Hollywood Fault may be substantially less and vary considerably at different locations in the City; some areas may exhibit no offset, whereas other areas may experience offset that approaches the above listed values. Surface rupture of the Hollywood Fault would not be anticipated in areas where the fault is overlain by more than about 200 feet of previously unfaulted overburden deposits.

Figure 4 shows the approximate trace of the Hollywood Fault projecting south of Sunset Boulevard through the City. The location of the fault is based on information from a variety of sources, including: site specific fault studies performed in the City (refer to Table 1 and Figure 4), subsurface borings, groundwater barriers, and abrupt breaks in surface topography. Given that the most recent rupture of the Hollywood fault in the West Hollywood area probably occurred about 7,000 years ago, surface evidence in the form of scarps that may have formed at that time have been degraded or buried by more recent sedimentation, and paved or built over by development.

The City has defined two fault precaution zones for future development as shown on Figure 4. The first precaution zone, FP-1, comprises a region approximately 200 feet north and 500 feet south of the interpreted main Hollywood Fault location. A wider precaution zone is prescribed to the south of the fault because of the greater uncertainty in the location and width of the fault zone due to the thick cover of alluvial sediments. **New development in the FP-1 zone is required to conduct a fault location investigation, to verify that the main trace or a recently active splay of the fault does not project through critical site structures or facilities.**

The second zone, FP-2, comprises a region approximately 200 feet south of the FP-1 zone. For properties in this zone, the fault rupture hazard is considered to be significant, but considerably less than for properties in the FP-1 zone. Furthermore, geologic study of the potential for fault rupture may not be practical for properties within zone FP-2 because of the significant thickness of alluvium overlying rock. **New development in the FP-2 zone will require either a fault location investigation, to verify that the main trace or a recently active splay of the fault does not project through critical site structures or facilities, or default provisions for a strengthened foundation system.**

Structures or habitable buildings must be a minimum of 50 feet from the fault, measured between the closest portion of the fault to the closest edge of the structure or building foundation.

Figure 4 also shows the approximate surface trace of the Santa Monica Fault, located near the southwest portion of the City. The fault trace indicated on Figure 4 represents the surface projection of the fault, which is believed buried beneath at least 1,000 feet of overburden in this area. The Santa Monica fault is not considered a significant ground surface rupture hazard east of Beverly Hills (Dolan, 2000). As a result of the thickness of sediments and lack of surface expression of the fault, no fault precaution zone within the City is recommended at this time for the Santa Monica Fault.

4.2.2. Ground Shaking

The Hollywood Fault and a number of the regional faults, as shown on Figure 2 and described in Table 2, are the main contributors to the seismic exposure of the City and the surrounding region. Updated maximum magnitude estimates and other parameters for these faults are available from the California Geological Survey (e.g., Wills et al, 2008). The effect of an earthquake originating on any given source fault will depend primarily on the earthquake magnitude (amount of energy released) and upon the hypocentral distance from the City. In general, the more distant the source fault is from the effected area and the smaller the magnitude of the potential earthquake, the smaller the expected ground shaking effect. The effects of an earthquake and the severity of ground shaking are often quantified as a fraction of gravitational acceleration (g). Therefore, ground motion expressed as 0.5g is equivalent to 50 percent of the force of gravity.

Based on Table 2, the faults considered to present the most adverse ground shaking affects to the City for their estimated maximum earthquakes would be:

- The Hollywood Fault,
- Santa Monica Fault,
- Elysian Park Fault,

- Newport Inglewood fault.

4.2.3. Peak Ground Acceleration

The peak ground acceleration (PGA) is a quantitative measure of the severity of ground shaking. During an earthquake, the PGA is typically measured in three orthogonal directions, two horizontal (PHGA) and one vertical (PVGA) by a seismometer. The maximum of the two horizontal components is noted as the Maximum Horizontal Acceleration (MHA). PGA is expressed in units of "g," (a fraction or percentage of gravitational acceleration)

Ground accelerations can be evaluated for a given location using information about nearby seismic source faults, the distance to a source fault, and an attenuation relationship. An attenuation relationship provides an estimate of the propagation of the ground shaking as a function of the seismic event, seismic source type, i.e., fault, the distance from the seismic event, and the soil conditions at the investigated site. A seismic event can be characterized deterministically or probabilistically. In probabilistic formulation, the event affecting a site is derived from contributions from multiple seismic sources and is characterized by related statistical probability of occurrence within a given time period or by a recurrence interval. In deterministic formulation, the event is defined by a sole seismic source. In geotechnical engineering a probabilistic seismic event with a 10 percent probability of occurrence in 50 years, e.g., 475-year recurrence period is often considered for evaluation of slope stability, seismically induced settlement, lateral earth forces, and liquefaction susceptibility. Both deterministic and probabilistic estimates of future ground motion parameters may be considered for proposed projects in the City, however the recent trend in geotechnical applications leans more towards the probabilistic approach.

The recommended PHGA with 10 percent probability of exceedance in 50 years (i.e. 475 year return period) for key locations along and within the City perimeter are shown on Figure 5. The PHGA were herein determined using the USGS deaggregation website *http://eqint.cr.usgs.gov/deaggint/2008/* utilizing the new generation attenuation models (NGA) and 2008 USGS/CGS California Fault Model as described by Petersen et al. (2008). The presented PHGA are based on generalized soil profiles within the City limits. For the shallow bedrock near the base of the mountains along the northern edge of the City the soil profile within the upper 100 feet was characterized by shear wave velocity of 500 m/sec; for the regions with the deepening alluvium adjacent to the mountains the shear wave velocity of 375 m/sec was utilized, and for the deep alluvium in the majority of the City the shear wave velocity of 250 m/sec was selected. As shown on Figure 5, the estimated peak ground accelerations range from 0.55g for sites along the north side of the City to 0.50g for sites situated in the alluvial basin along the south side of the City. For sites located in between the shown locations, the design values may be linearly interpolated.

4.2.4. Modified Mercalli Intensity Scale

The Modified Mercalli Intensity (MMI) scale, provided in Table 4, is based on actual observations of earthquake effects at specific points. While an earthquake can have only one magnitude, it can have numerous intensities depending on the distance from the earthquake and specific site conditions and topography. The intensity is highest near the epicenter, and it gradually decreases with increasing distance from the epicenter. However, because intensity is so dependent on the ground and structural conditions of a particular area, it may vary considerably at two points that are equidistant from an epicenter. The MMI scale characterizes observations and damage in 12 levels. As indicated on Table 4, the higher the number, the greater the damage. Modified Mercalli Intensity (MMI) corresponding to the PGA values presented on Figure 5 will generally be VIII. For comparison, the estimated MMI experienced in the City from the ground shaking associated with the 1994 Northridge earthquake was IX.

4.2.5. CBC Design Spectra

Section 1613 of the 2007 California Building Code (2007 CBC), as amended by Los Angeles County, provides guidelines for the development of a standardized horizontal response spectrum for seismic design of structures and building. For hospitals, other critical facilities, and state-owned or leased property, Section 1613A of the 2007 CBC applies. This spectrum is considered to be a minimum design basis. The hazard level associated with a CBC design corresponds to a Maximum Considered Earthquake (MCE) ground motion. MCE is defined in high seismicity regions near known faults, i.e., California, as a maximum seismic event on nearby source (deterministic earthquake) attenuated by the median ground motion attenuation relations increased by 50 percent In moderate and high seismicity regions, MCE is defined as an event having a 2 percent probability of exceedance within a 50 year period. (return period 2500 years) (FEMA 450 - NEHRP Recommended Provisions, 2003).

Selection of a CBC design response spectrum involves identifying the following:

- Locating the site on spectral accelerations maps for short periods (S_s) and 1-second period (S_1) published in the 2007 CBC, Figures 1613.5 (3) and (4).

  Given that the Hollywood and Santa Monica Faults are within 2 km of any site in the City, the design response spectra is dominated by these two faults and only relative minor variations in the governing spectral acceleration values exist.

- Site classification (site class) according the site soil profile as per Section 1613.5.

  The spectral values obtained in the previous step are developed for Site Class D. Consequently, the values must be modified depending on the actual site conditions. The site profile types within the City include soft rock, i.e., Site Class C, at the base of the mountains and deep stiff soil, Site Class D, in the majority of the City. Some sites on granitic rock may be classified as rock or hard rock, i.e., Site Class B or C, respectively. The designers must carefully evaluate the soil profile type based on the average blowcounts (SPT N-value), undrained strength of the soil, or shear wave velocity in the upper 100 ft. to designate the appropriate CBC site Class.

Based on the above, for structures for which the 2007 CBC seismic design response spectrum is applicable, and site-specific ground motion procedure is not used. Figure 6 provides guidelines for the selection of appropriate governing spectral accelerations for various portions of the City.

4.3. Secondary Seismic Hazards

4.3.1. Liquefaction

Liquefaction and liquefaction-induced settlement of saturated soils can be caused by moderate to strong ground shaking during earthquakes. Research and historical data indicate that saturated or near saturated loose, relatively clean granular soils are susceptible to liquefaction, whereas the stability of most cohesive soils consisting of clayey silt, silty clay and clay is not adversely affected by ground shaking. When liquefaction occurs, the materials experience a substantial loss of shear strength and behave like a viscous liquid. Liquefaction can cause structural distress or failure due to excessive settlement, a loss of bearing capacity in the foundation soils, and the potential buoyancy effects on buried structures, such as pipelines or vaults.

There are 3 conditions that need to be present for liquefaction to occur and they are all present within the City limits. First, strong ground shaking of relatively long duration, as from a magnitude M6 or greater earthquake is typically required. Such an earthquake can be expected to affect the City as a result of an earthquake on any of the nearby active faults in the area. The second condition, loose or poorly consolidated youthful sediments consisting primarily of silty sand and sand, occurs in much of the alluvial plain emanating from Laurel Canyon as shown on Figure 3. The third condition, water-saturated sediments within about 50 feet of the ground surface, is also known to exist under the alluvial plain within the City.

The areas within the City considered to be susceptible to liquefaction during strong earthquake ground shaking are delineated on Figure 3 – Seismic Hazard Zone Map. The liquefaction zones indicated on Figure 3 were derived from the CGS Seismic Hazard Zone maps for the Hollywood and Beverly Hills Quadrangles.

Details of the required investigation, analysis and reporting requirements to evaluate the potential for liquefaction and potential mitigation are provided in SP-117 and Recommended Procedures.

4.3.2. Seismically Induced Settlement

Loose sands tend to densify when subjected to earthquake shaking. Subsurface densification is manifested at the ground surface in the form of settlement. Both dry and saturated sands can experience seismically-induced settlement. Dry sand densifies rapidly, usually by the end of an earthquake. Saturated sands require minutes or hours to densify after an earthquake. Earthquake-induced settlement can cause distress to structures supported on shallow foundations and/or create downdrag on pile foundations.

Seismically-induced settlements are a potential hazard for most sites within the City. Therefore, this hazard should be evaluated for all properties, for saturated and unsaturated soil profiles, in the City.

4.3.3. Lateral Spread

Lateral spread refers to lateral displacement of surficial blocks of sediment as a result of liquefaction in the underlying layer. If the underlying layer liquefies, gravitational forces plus inertial forces from an earthquake may cause a mass of material to move downslope or toward a free face slope. Given the presence of sloping ground conditions throughout much of the City, lateral spread may prove to be a significant hazard for sites in the northern portion of the City.

Lateral spread should be evaluated in cases where the potential for liquefaction is considered to be moderate or higher (Youd et. al., 2002).

4.3.4. Earthquake Induced Landslides

According to the CGS, landslides triggered by strong earthquake ground shaking have historically been a cause of significant earthquake-induced damage. The State of California Seismic Hazard Mapping Program delineates the approximate areas considered susceptible to earthquake-induced landslides and other modes of slope failure (e.g., rockfalls in the northeast portion of the City). The areas considered most susceptible to earthquake-induced landslide are on moderately to steeply inclined slopes and on or adjacent to existing landslide deposits, especially if the underlying materials consist of loose soil or weak, fractured bedrock. Figure 3 - Seismic Hazard Zone Map highlights areas identified by the CGS as exhibiting a potential for earthquake-induced landsliding in light blue. Such areas in the City are limited to the northwest portion of the City near Larrabee Street and Horn Avenue.

The methodology used by the CGS to produce the mapping shown on Figure 3 considered the estimated level of earthquake ground-shaking, generalized geologic material strength characteristics, and the slope gradient. For the evaluation of the Hollywood Quadrangle, the CGS selected a design earthquake strong-motion record with a modal magnitude of M6.4 to M6.9, modal distance of 2.5 to 6.4 kilometers, and a peak ground acceleration of 0.43 to 0.59g. The delineated areas aren't necessarily inherently unstable, but the maps provide a basis for the requirement to further investigate these hillside areas when planning for new development. There is no available data to suggest that any landslides in the City have been triggered by past earthquakes, therefore the basis for the mapping of potential earthquake-induced landslide areas is the slope gradient and material underlying the slope.

5. GEOLOGIC AND SOILS HAZARDS

5.1. Overview

For the geologic component of the Safety Element the minimum list of potential hazards that should be considered include:

- Slope Instability (landslides and mudslides)
- Expansive Soils
- Collapsible Soils
- Ground Subsidence

Subsidence due to groundwater withdrawal is possible due substantial pumping; however, there are no major aquifers within the City of West Hollywood that are used for potable water, nor are any production wells reported in the City by the Metropolitan Water District (2007).

5.2. Slope Instability

Slope instability or landsliding can occur under static (non-earthquake) conditions due to moisture influx, erosion or loss of toe support, and other factors. The potential for landslides and shallow mudslides is a potential geologic hazard in the hilly portions of the City, north of Sunset Boulevard. No pre-existing landslides have been mapped in the City by the CGS or by Los Angeles County in the Seismic Safety Element (Leighton and Assoc. 1990). The available data suggests that the slopes at, or potentially affecting, the northern margin of the City are relatively stable.

One of the most common forms of slope instability in southern California are debris flows or mudslides, which are shallow landslides of water-saturated soil and rock fragments that travel downslope as a muddy slurry. Debris flows commonly form after heavy rainfall onto relatively steep slopes underlain by colluvial soils and weak weathered bedrock. Damaging debris flows can occur during intense rainfall, and particularly when runoff is concentrated by misdirected drainage from road, large paved areas, or blocked or damaged drainage swales. Hillsides left denuded by brushfires are very susceptible to debris flows during heavy rainstorms. According to the USGS Landslide Fact Sheet (2005), hillsides in southern California generally become susceptible to debris flows after 10 inches of seasonal rainfall has accumulated. Subsequent intense rainfall totaling more than 2 inches in 4 to 6 hours can typically trigger debris flows. Although the likelihood of debris flows begins to decline after several days of dry weather, deeper-seated bedrock landslides can be initiated weeks or months following a period of prolonged rainfall as the precipitation percolates into the rockmass.

Mudslides are considered to be a significant hazard to properties at the base of undeveloped or unimproved slopes in the Santa Monica Mountains. Within the City, this hazard, then, is confined to only a few properties, all located north of Sunset Boulevard.

5.3. Expansive Soils

Fine-grained native soils, bedrock, and man-placed fill soils, consisting predominantly of silt and clay, may contain clay minerals that are susceptible to expansion upon addition of water and contraction under drying conditions. Certain clay minerals with high plasticity have higher potential for expansion. These materials can affect performance of foundations, slabs, and exterior improvements to properties.

Expansive materials may exist in various areas of the City. Clay-rich soils are more prevalent in the southern part of the City, south of Santa Monica Boulevard. Current provisions in building codes are considered to be suitable for design at sites with expansive soils. Therefore, designs should include proper characterization of the hazard through soils investigations and follow building codes and local experience. In some cases, the expansive soil may need to be overexcavated and recompacted wet of optimum moisture content to mitigate the expansive potential.

5.4. Collapsible Soils

Collapsible soils are characterized as typically young, loose deposits that have the potential for significant abrupt volumetric change when wetted. An increase in surface water infiltration such as from heavy irrigation or prolonged rainfall or from a rise in the groundwater, combined with the weight of a structure, can initiate settlement. These materials typically affect foundations, slabs, and exterior improvements to properties.

Collapsible soils are known to exist within the City. However, the severity of this hazard in the City is only considered to be low to moderate. Current provisions in building codes are considered to be suitable for design at sites with collapsible expansive soils. Therefore, designs should include proper characterization of the hazard through soils investigations and follow building codes and local experience. In some cases, the collapsible soil may need to be overexcavated and recompacted to mitigate the collapse hazard.

5.5. Ground Subsidence

Ground subsidence is typically associated with regional changes in ground surface elevation associated with seismic warping, lowering of groundwater through pumping, and removal of oil and natural gas through pumping.

Seismic warping or uplift is occurring beneath the City based on global geodetic data. However, these movements are distributed over large areas and, as a consequence, rarely produce damage.

Given the recent trend for water conservation and controlled groundwater pumping and the consequent rise in groundwater, the hazard for ground subsidence from groundwater lowering is expected to be very low.

The nearest oil fields to the City are the Salt Lake and Beverly Hills/Cheviot fields. Only marginal activity currently exists within the Salt Lake field, located along the southern margin of the City along Beverly Boulevard. Water injection and flooding operations as part of secondary recovery are believed to have largely mitigated subsidence hazard in the City.

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Table 1
Summary of Fault Rupture Hazard Studies (1997 to 2009)
City of West Hollywood

Map Reference No.	Site Address	Report Date	Consultant	Faults Encountered	Depth to Groundwater	No. of Probes	Report Citation
1	8569 Sunset Blvd.	Jun. 1997, Dec. 1997	Byers	None Encountered	Not Encountered (reported at 56 to 60 feet in nearby wells)	7 H.S.A. 2 slant under Sunset Blvd.	J. Byers Group, 1997. "*Geologic and Soils Engineering Exploration, Proposed Retail/Commercial Building, Portion of Lot 3, Tract 2662, 8569 Sunset Boulevard, West Hollywood, California*". Consultant report prepared for Plaza Development, Dated June 16, 1997, 23 pages. J. Byers Group, 1997. "*Addendum Geologic and Soils Engineering Report, Proposed Retail/Commercial Building, Portion of Lot 3, Tract 2662, 8569 Sunset Boulevard, West Hollywood, California*". Consultant report prepared for Plaza Development, Dated December 29, 1997, 10 pages.
2	8410 Sunset Blvd.	Dec. 1997	AES	Fault across southern portion of property (active)	30 to 43 feet	5 H.S.A. 1 B.A.	Applied Earth Science, 1997. "*Geological Fault Study, Proposed Commercial/Residential Building, 8410 Sunset Boulevard, West Hollywood, California*". Consultant Report Prepared for Plaza Development, Dated December 18, 1997, 16 pages.
3	8305 Sunset Blvd.	34819	ECI/AES	Minor shears, no active faults	Not available	11 H.S.A.	Earth Consultants International, 1999. "*Fault Investigation for the Property Located at 8305 Sunset Boulevard in the City of West Hollywood, Los Angeles County, California*". Consultants report prepared for Venice Investments.
4	SE corner of Sunset and La Cienega Blvd. (Petersen Bldg.)	Jan 98, Mar. 98	Harza/WLA	2 northern strands (inactive) and a southern fault (fault 1, potentially active)	30 to 85 feet	18 H.S.A. 2 B.A.	Harza, 1998. "*Fault Rupture Hazard Investigation, Proposed After Sunset Project, Southeast corner of Sunset and La Cienega Boulevards, West Hollywood, California*". Consultant report prepared for Griffin Reality LLC, Dated January 28, 1998, 30 pages. William Lettis & Assoc., 1998. "*Supplemental Fault Rupture Hazard Investigation, After SunsetProject, SE Corner of Sunset and La Cienega Blvds., West Hollywood, California*". Consultants report prepared for Griffin Realty II, LLC. dated March 2, 1998, 4 pages.
5	8950 Sunset Blvd.	Mar. 98	AES	None Encountered	24 to 41 feet	9 H.S.A. 1 in Sunset 1 in Hilldale	Applied Earth Science, 1998. "*Geological Fault Study, Proposed Commercial Building, 8950-8970 Sunset Boulevard, West Hollywood, California*". Consultant Report Prepared forOlympic Holding, Dated March 23, 1998, 8 pages.
6	8430 Sunset Blvd. (House of Blues)	Jan. 1999 (superseded by ref. 13)	Jeff Johnson	Fault Interpreted based on stratigraphy and groundwater discordance	25 feet, N side, 100 feet, S side of site	1 H.S.A.	Jeffrey A. Johnson, Inc., 1999. "*Fault Location Investigation, Proposed Parking Structure House of Blues, 8430 Sunset Blvd. West Hollywood, California*". Consultants report prepared for the House of Blues, dated January 31, 1999, 25 pages.
7	SW Corner of Sunset & Alta Loma (Sunset Millenium)	Oct. 1998	WLA	2 fault strands (determined to be inactive)	21 to 72 feet	50 H.S.A. 5 B.A.	William Lettis & Assoc., Inc., 1998. "*Fault Rupture Hazard Investigation for the Sunset Millenium, West Hollywood, California*". Consultant report prepared for Maefield Development, Dated October 7, 1998, 28 pages.
8	9016-9034 Sunset Blvd.	Feb. 1999	WLA	None Encountered	24 to 43 feet	12 H.S.A. 12 CPT	William Lettis & Assoc., Inc., 1999. "*Fault Rupture Hazard Investigation for the Proposed Sunset Place Project Site, Sunset Boulevard between Doheny and Hammond Street, West Hollywood, California*. Consultant report prepared for Griffin Reality II, LLC, Dated February 17, 1999, 18 pages.

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9	1200 Alta Loma (Sunset Marquis Hotel)	Aug. 1999	ECI	1 Fault Bisects study. Found inactive on site trends towards (fault 1)	28 to 107 feet	13 H.S.A. 2 B.A.	Earth Consultants International, 1999. "*Fault Rupture Hazard Investigation of the Sunset Marquis Hotel Expansion Project*". Consultant report prepared for Raleigh Enterprises, Dated August 1999, 40 pages .
10	1016, 1018, and 1020 Hilldale Ave.	July 1998	Advanced Geotechniqu es	None Encountered	15 to 18 feet	5 H.S.A.	Advanced Geotechniques, 1998. "*Geological Fault Study Proposed Residential Buildings, 1016, 1018, and 1020 Hilldale Avenue, West Hollywood, California*". Consultant report prepared for Harvard Investment Group, Inc., Dated July 8, 1998, 11 pages.
11	1011, 1404, and 1414 Harper Ave.	Oct. 1998	Bruce Schell	1 Fault across northern portion of Sunset Blvd.	26 feet (N side of fault), No groundwater to 245 feet on S side of fault	5 H.S.A., 2 Mud Rotary	Bruce A. Schell, 1998. "*Surface Fault Rupture Investigation, 1404 & 1414 Harper Avenue, City of West Hollywood, Los Angeles County, California*". Consultant report prepared for Lefevre Corporation, Dated October 22, 1998, 22 pages.
12	8626 Holloway Dr. (Pacific Hills School)	April 2000, Aug. 2000	GeoSystems	Continuous alluvial stratigraphy No Fault Encountered	13 to 32 feet	10 H.S.A.	GeoSystems, 2000. "*Fault Rupture Hazard Investigation for Proposed 4-Story Classroom Building with Basement, 8626 Holloway Drive, West Hollywood, California*". Consultant report prepared for Pacific Hills School, dated April 6, 2000. GeoSystems, 2000. "*Response to City of West Hollywood Geotechnical, Geology, and Seismic Review Sheet dated April 26, 2000 for for Pacific Hills School, 8626 Holloway Drive, West Hollywood, California*". Consultants report prepared for Pacific Hills School, dated August 18, 2000, 5 pages.
13	8430 Sunset Blvd.	June 2001	Law/ Crandall	2 northern strands (inactive) and 50 foot wide southern zone of faults (active) 2-3 ft vert. sep. on marine platform, sediments overlying date to ~9ka	20 to 41 feet on N side of fault, no water encountered on south side of fault	25 H.S.A.	Law/Crandall, 2001. "*Report of Fault Rupture Hazard Investigation, Proposed Sunset / Olive Mixed Use Development, West Hollywood, California*". Consultant report prepared for Gold Mountain Enterprises, LLC, dated June 26, 2001, 48 pages.
14	8788 Shoreham Drive	'May 2001	ECI	None Encountered	51 to 56 feet	7 H.S.A.	Earth Consultants International, 2001. "*Report, Study of the Potiential for Surface Fault Rupture at the Property on 8788 Shoreham Drive in the City of West Hollywood, Los Angeles County, California".* Consultant report prepared for Mr. Kleinman, dated May 1, 2001, 17 pages.
15	1146 N Hacienda Place	Aug. 2001	Subsurface Designs	None Encountered	66 to 78 feet	5 H.S.A.	Subsurface Designs, Inc., 2001. "*Fault Rupture Hazard Investigation, Proposed Condominium Complex, 1146 North Hacienda, West Hollywood, California*". Consultant report prepared for Mr. Benezry, dated August 27, 2001, 7 pages.
16	8480, 8490 Sunset Blvd. (Sunset Millenium, East Parcel)	Aug 2000	WLA	Supplemental Investigation to Log #4. Fault 1 considered to be inactive. (See log # 19)	35 to 47 feet	10 H.S.A. (Supplemental)	William Lettis & Assoc., Inc., 2000. "*Fault Rupture Hazard Investigation of Fault 1, East Parcel of Sunset Millenium Project, City of West Hollywood, California*". Consultant report prepared for Latham & Watkins, dated August 22, 2000, 17 pages.

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17	1433-1437 Havenhurst Dr.	Oct. 2001	ECI	None Encountered	Not Encountered	5 H.S.A.	Earth Consultants International, 2001. "*Fault Investigation for the Property at 1433-37 Havenhurst Drive, in the City of West Hollywood, Los Angeles County, California".* Consultant report prepared for West Hollywood Community Housing Corporation, dated October 19, 2001 Supplemental report submitted January 31, 2002, 3 pages.
18	8703 West Knoll Dr.	June 03	ECI	None Encountered	approx. 1 foot (possible confined conditions)	2 H.S.A.	Earth Consultants International, 2003. "*Report, Study of the Potiential for Surface Fault Rupture in the Southern Portion, Plus 50 feet South of a Proposed Development at 8703 West Knoll Drive in the City of West Hollywood, Los Angeles County, California".* Consultant report prepared for Mr. Shooshani, dated June 4, 2003, 26 pages.
19	8480, 8490 Sunset Blvd. (Sunset Millenium, East Parcel)	Apr. 2004	WLA	Supplemental Investigation to Log #4 and Log #16. Fault 1 found to be active.	41 to 45 feet	3 B.A. (supplemental)	William Lettis & Assoc., Inc., 2004. "*Summary of Fault Rupture Hazard Investigations of Fault 1, East Parcel of Sunset Millenium Project (Petersen Property), City of West Hollywood, California*". Consultant report prepared for Sunset Millenium, LLC, dated April 16, 2004, 17 pages.
20	1136-42 La Cienega Blvd.	'May 2004	Fugro	None Encountered	Not Encountered	11 CPTS 2 H.S.A. (supplemental)	Fugro West, Inc., 2004. "*Fault Rupture Hazard Study of 1136 and 1142 La Cienega Blvd., West Hollywood, California*". Consultant report prepared for Mr. Habibi, Dated May 17, 2004, 4 pages. Fugro West, Inc., 2005. "*Response to 2nd Review Letter, Fault Rupture Hazard Study of 1136 and 1142 La Cienega Blvd., West Hollywood, California*". Consultant Report Prepared for Mr. Fudenberg, Dated February 25, 2005, 6 pages.
21	1152 North La Cienega Blvd.	Nov. 2004	Land Phase, Inc.	None Encountered	Not Encountered	2 H.S.A. 5 CPTs	Land Phase Inc., 2004. "*Results of Fault Rupture Hazard Study, Hollywood Fault Zone, Proposed 8-unit Condominium Building, 1152 North La Cienega Blvd., West Hollywood, California*". Consultant report prepared For Mr. Niami, dated November 10, 2004, 23 pages.
22a	1019 San Vicente Blvd.	Aug. 2004	Fugro	None Encountered	13 to 20 feet	2 H.S.A. 9 CPTs	Fugro West, Inc, 2004. "*Report of Fault Rupture Hazard Study, 1019 San Vicente Blvd., West Hollywood, California*". Consultant report prepared for Mr. Fudenberg, dated August 11, 2004, 5 pages.
22b	1019 San Vicente Blvd.	Dec. 2004	MACTEC	None Encountered	23 to 33 feet	4 H.S.A. (supplemental)	MACTEC, 2004. "*Report of Fault Rupture Hazard Investigation, Proposed Residential Development, 1019 San VicenteBlvd., West Hollywood, California*". Consultant report prepared for San Vicente LLP, Inc., dated December 7, 2004, 15 pages.
23	1137 Hacienda Pl.	Nov. 2004	Fugro	None Encountered	81 feet	1 H.S.A., 5 CPTs	Fugro West, Inc, 2004. "*Report of Fault Rupture Hazard Study, 1137 Hacienda Pl., West Hollywood, California*". Consultant report prepared for YOR Apparel, LLC, dated September 20, 2004, 7 pages.

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24	8265 Fountain Ave.	Mar. 2006	Fugro	None Encountered	Not Encountered	2 H.S.A. 18 CPTs	Fugro West, Inc., 2006. "*Report of Fault Rupture Hazard Study, 8265 Fountain Avenue, West Hollywood, California*" Consultant report prepared for Copa, LLC, dated March 1, 2006, 7 pages. Fugro West, Inc., 2006. "*Addendum to Fault Rupture Hazard Study Report Issued March 1, 2006, 8265 Fountain Avenue, West Hollywood, California*" Consultant report prepared for Copa, LLC, dated April 21, 2006, 5 pages.
25	1351 Havenhurst Dr.	Feb. 2005	Fugro	None Encountered	Not Encountered	1 H.S.A. 13 CPTs	Fugro West, Inc., 2005. "*Report of Fault Rupture Hazard Study, 1351 Havenhurst Dr., West Hollywood, California*". Consultant report prepared for Havenhurst LLC, dated February 15, 2005, 6 pages.
26	9040 & 9056 Sunset Blvd.	June 2007 April 1999	WLA/ECI	None Encountered (Used findings from Log #8)	N.A.	WLA used data from Log #8 ECI 3 H.SA.	William Lettis & Assoc., Inc., 2007. "*Findings for the Fault Rupture Hazard Issues at 9040 & 9056 Sunset Boulevard, West Hollywood*". Consultant report prepared for Weintraub Financial Services, dated June 25, 2007, 2 pages. Earth Consultants International, 1999. "Fault Investigation for the Property at 9056 West Sunset Boulevard, City of West Hollywood, Los Angeles County, California". Consultant report prepared for Mr. Saparzadeh, dated April 19, 1999.
27	8600 W. Sunset Blvd.	Aug. 2007	WLA	Flt 3N, 2, & 3S (inactive)	46 to 65 Feet	7 H.S.A. 10 CPTs	William Lettis & Assoc., Inc., 2007. "*Fault Rupture Hazard Investigation, Sunset Plaza Project, 8600 W. Sunset Boulevard, West Hollywood, California*". Consultant report prepared for Montgomery Management Company, Dated August 23, 2007, 13 pages.
28	8801 Sunset Blvd.	Feb. 2009	VB&B	None Encountered	19 to 28 feet	5 H.S.A. 11 CPTs	Van Beveren & Butelo, 2009. "*Report of Geologic Fault Hazard Investigation, Proposed Office Building and Subterranean Parking, 8801 Sunset Boulevard, West Hollywood, California*". Consultant report prepared for Centrum Properties, dated February 24, 2009, 13 pages.

TABLE 2
CHARACTERISTICS OF FAULTS CONSIDERED SIGNIFICANT TO SEISMIC SHAKING HAZARD

Fault/Fault Segment Name	Fault Style(1)	Approximate Closest Distance to City(2) (km)	Notable Historic Earthquake Surface Wave Magnitude, Ms (yr.)	Estimated "Upper Bound" Moment Magnitude, Mw(3)*	Estimated Slip Rate (millimeters per year)
Santa Monica System					
Hollywood	OBL	0	--	6.7	1
Santa Monica	OBL	0.5	5 (1979, 1989)	6.4 – 6.8	0.5 – 1
Blind Thrust	TH	15	--	7.1	0.5 – 1
Malibu Coast	OBL	23	--	6.7	0.3
Newport-Inglewood System					
Inglewood Segment	RL	5.0	4.9 (1920)	7.2	0.5 – 1
Peralta Hills System					
Las Cienegas	R	8.6	--	6.7	
Elysian Park Thrust					
Los Angeles Segment	TH	11	--	6.7	0.6 – 1
Verdugo-Eagle Rock System	R	14	--	6.9	0.5
Whittier-Elsinore System					
West LA Blind Thrust	TH	14	--	6.8	2.5
East LA Blind Thrust	TH	22	--	7.0	
Puente Hills Thrust					
Los Angeles Segment	TH	15	--	7.0	0.7
Raymond	OBL	15	~6 (1855)	6.8	0.5 – 1.5
Northridge Hills	R	18	--	6.6	0.5 – 1.5
Sierra Madre System					1 – 2
Dunsmore	R	20	--	7.2	
San Fernando	R	21	6.4 (1971)	6.7	
Mission Hills	R	23	--	6.2	
Sierra Madre	R	27	5.8 (1991)	7.2	
Oak Ridge System					3.5 - 6
Northridge Blind Thrust	TH	25	6.7 (1994)	6.9	
Palos Verdes-Coronado Bank System					
Santa Monica Bay to LA Harbor	OBL	25	3.9 (1972)	7.3	3
San Gabriel (Western Part)	RL	26	--	7.3	1
Anacapa-Dume	OBL	33	5.0 (1979)	7.2	3
San Andreas System					varies by segment
Mojave Segment	RL	57	~8 (1857)(3)	6.8 – 8.0	22 - 36

Notes:
(1) Fault Styles: RL = Right Lateral; R = Reverse; TH = Thrust; OBL = Oblique
(2) Closest distance as defined by Abrahamson and Silva (1997)
(3) As reported by Dolan et al. (1995), Rubin et al. (1998) and Shaw and Shearer (1999), Petersen et al. (2008), Wills et al. (2008).
* Reported value could be larger if rupture is simultaneous with adjacent fault.

TABLE 3
SUMMARY OF HISTORIC EARTHQUAKES WITH MAGNITUDES GREATER THAN 5.0 AND EPICENTRAL DISTANCES OF LESS THAN 100 KM

Date	Earthquake (Fault Name where Known)	Latitude (ºN)	Longitude (ºW)	Magnitude	Epicentral Distance (km)
Jan. 17, 1994	Northridge (Northridge Blind Thrust)	34.21	118.54	6.7	20
July 11, 1855	Pasadena area (Raymond?)	34.1	118.1	~6	~21
Oct. 1, 1987	Whittier-Narrows (Puente Hills Blind Thrust)	34.06	118.08	5.9	27
Aug. 31, 1930	Santa Monica Bay	33.95	118.63	5.2	27
Jan. 19, 1989	Malibu	33.92	118.63	5.2	29
Jan. 1, 1979	Malibu	33.94	118.68	5.1	32
Nov. 14, 1941	San Pedro area (Newport-Inglewood?)	33.78	118.25	5.4	35
Feb. 9, 1971	San Fernando (San Fernando)	34.41	118.40	6.6	36
June 28, 1991	Sierra Madre (Sierra Madre)	34.26	118.00	5.8	39
Feb. 21, 1973	Point Mugu (Anacapa)	34.06	119.04	5.9	60
Feb. 28, 1990	Upland (San Jose)	34.14	117.7	5.4	62
Sept. 12, 1970	Lytle Creek	34.27	117.54	5.4	79
July 22, 1899	Cajon Pass	34.25	117.5	~5.7	~80
Sept. 4, 1981	North of Sta. Barbara Is.	33.66	119.09	5.9	82
Oct. 23, 1916	Tejon Pass	34.90	118.90	6.0	89
May 15, 1910	Lake Elsinore area (Elsinore)	33.7	117.4	6.0	99

TABLE 4
MODIFIED MERCALLI INTENSITY SCALE

MMI	EFFECTS	PHGA (g)	APPROXIMATE RICHTER SCALE MAGNITUDE
I.	Not felt. Marginal and long period effects of large earthquakes.	< 0.0017	Below 3.0
II.	Felt by persons at rest, on upper floors, or favorably placed.	0.0017-0.014	3.0-3.9
III.	Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.	0.0017-0.014	4.0-0.9
IV.	Hanging objects swing. Vibration like passing of heavy trucks; or sensation of a jolt like a heavy ball striking the walls. Standing motor cars rock. Windows, dishes, doors rattle. Glasses clink. Crockery clashes. In the upper range of IV, wooden walls and frame creak.	0.014-0.039	4.0-4.9
V.	Felt outdoors; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing, close, open. Shutters, pictures move. Pendulum clocks stop, start, change rate.	0.039-0.092	4.0-4.9
VI.	Felt by all. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Knickknacks, books, etc. off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster and masonry D cracked. Small bells ring (church, school). Trees, bushes shaken (visibly, or heard to rustle).	0.092-0.18	5.0-5.9
VII.	Difficult to stand. Noticed by drivers of motor cars. Hanging objects quiver. Furniture broken. Damage to masonry D, including cracks. Weak chimneys broken at roof line. Fall of plaster, loose bricks, stones, tiles, cornices (also unbraced parapets and architectural ornaments). Some cracks in masonry C. Waves on ponds; water turbid with mud. Small slides and caving in along sand or gravel banks. Large bells ring. Concrete irrigation ditches damaged.	0.18-0.34	6.0-6.9
VIII.	Steering of motor cars affected. Damage to masonry C; partial collapse. Some damage to masonry B; none to masonry A. Fall of stucco and some masonry walls. Twisting, fall of chimneys, factory stacks, monuments, towers, elevated tanks. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Decayed pilling broken off. Branches broken from trees. Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes.	0.34-0.65	
IX.	General panic. Masonry D destroyed; masonry C heavily damaged, sometimes with complete collapse; masonry B seriously damaged. (General damage to foundations.) Frame structures, if not bolted, shifted off foundations. Frames racked. Conspicuous cracks in ground. In alluvial areas sand and mud ejected, earthquake fountains, sand craters.	0.65-1.24	7.0-7.9
X.	Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land. Rails bent slightly.	> 1.24	
XI.	Rails bent greatly. Underground pipelines completely out of service.		8.0-8.9
XII.	Damage nearly total. Large rock masses displaced. Lines of sight and level distorted. Objects thrown into the air.		

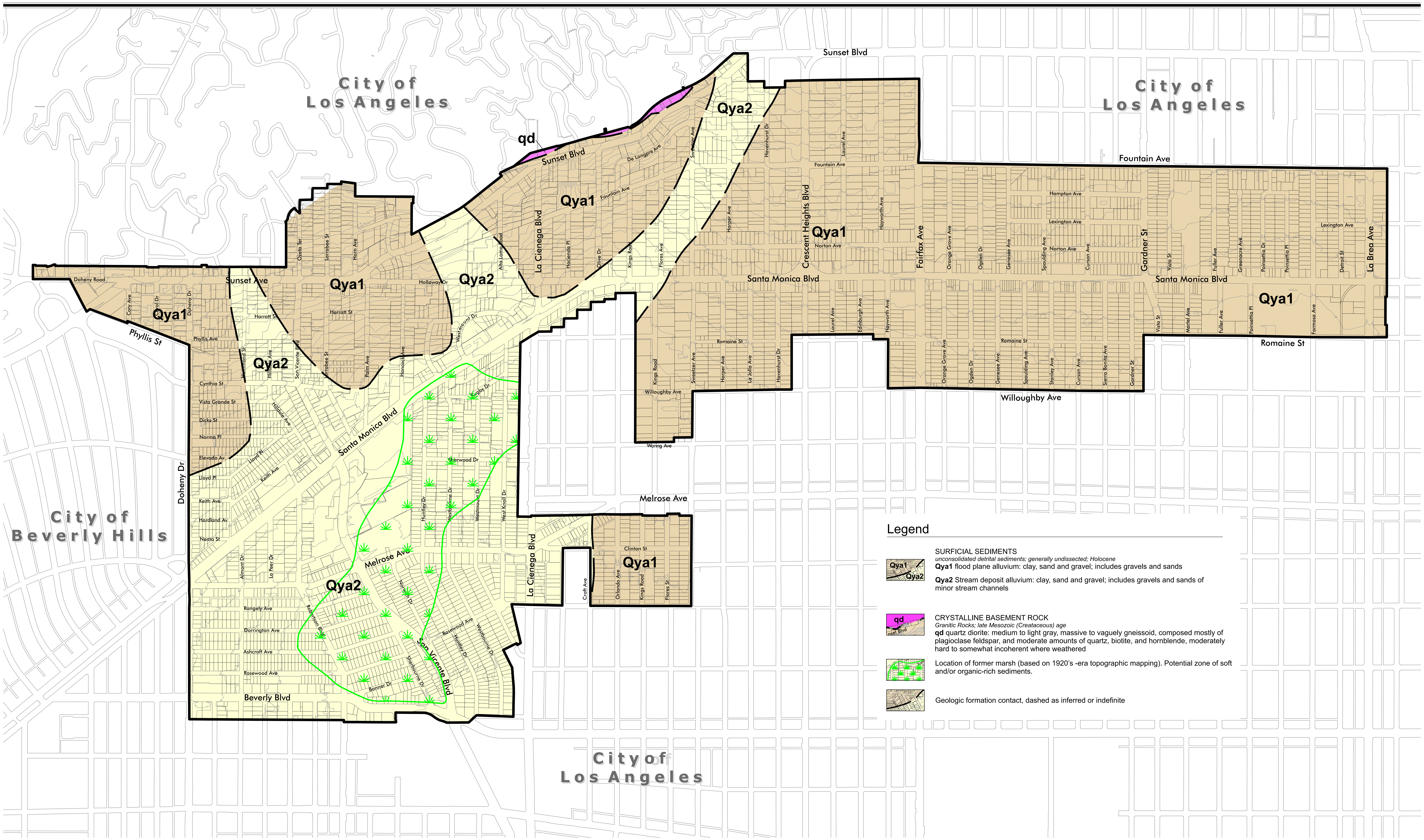
Masonry A: Good workmanship, mortar, and design; reinforced, especially laterally and bound together by using steel, concrete, etc.; designed to resist lateral forces.

Masonry B: Good workmanship and mortar; reinforced, but not designed in detail to resist lateral forces.

Masonry C: Ordinary workmanship and mortar; no extreme weaknesses like failing to tie in at corners, but neither reinforced nor designed against horizontal forces.

Masonry D: Weak materials, such as adobe; poor mortar; low standards of workmanship; weak horizontally.

Source: http://earthquake.usgs.gov/earthquakes/



Source: Geologic mapping from Quaternary Geologic Map Presented in CDMG Seismic Hazard Evaluation of the Hollywood Quadrangle (CDMG 1998a) and Beverly Hills Quadrangle (1998b)

City of West Hollywood General Plan

Feet: 0 600 1200 1800 2400

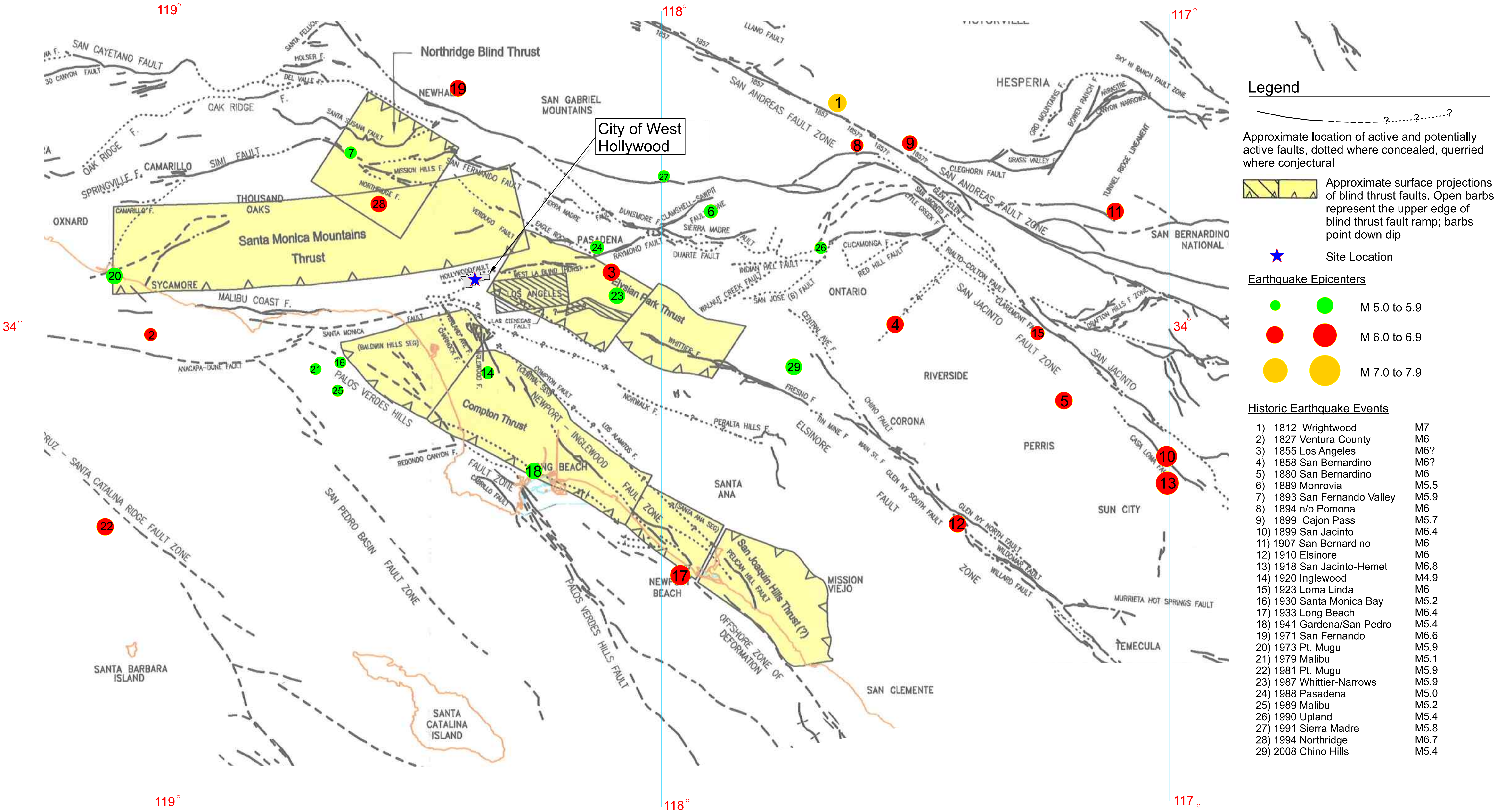
NOTE: ALL LOCATIONS, DIRECTIONS AND DIMENSIONS ARE APPROXIMATE

KFM GEOSCIENCE
1360 Valley Vista Drive
Diamond Bar, CA 91765
Phone (909) 860-5096

Geology Map

Project Name: City of West Hollywood - Seismic Safety Element

Project Number: cWH 08-14E | DATE: March 2010 | DRAFTED: AHM | REVIEWED: EHS | CHECKED: PS | FIGURE NO: 1



City of West Hollywood General Plan

0 10 20 MILES

References:

Base Map:
USGS Southern California, Based on USGS 1:1,000,000 Los Angeles Map (NI-11), (drawn from Topo! CD-Rom)

Earthquake Epicenters:
CDMG SP 116, Fig. 1, Page 10.

Fault Locations:
CDMG Map Number 6, 1994
Green and Kennedy 1987 and 1988; Ziony and Jones 1989; Hauksson 1990; wright 1991; Jennings 1994; Dolan, et al. 1995, Grant et al. 1999

NOTE: ALL LOCATIONS, DIRECTIONS AND DIMENSIONS ARE APPROXIMATE

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Diamond Bar, CA 91765
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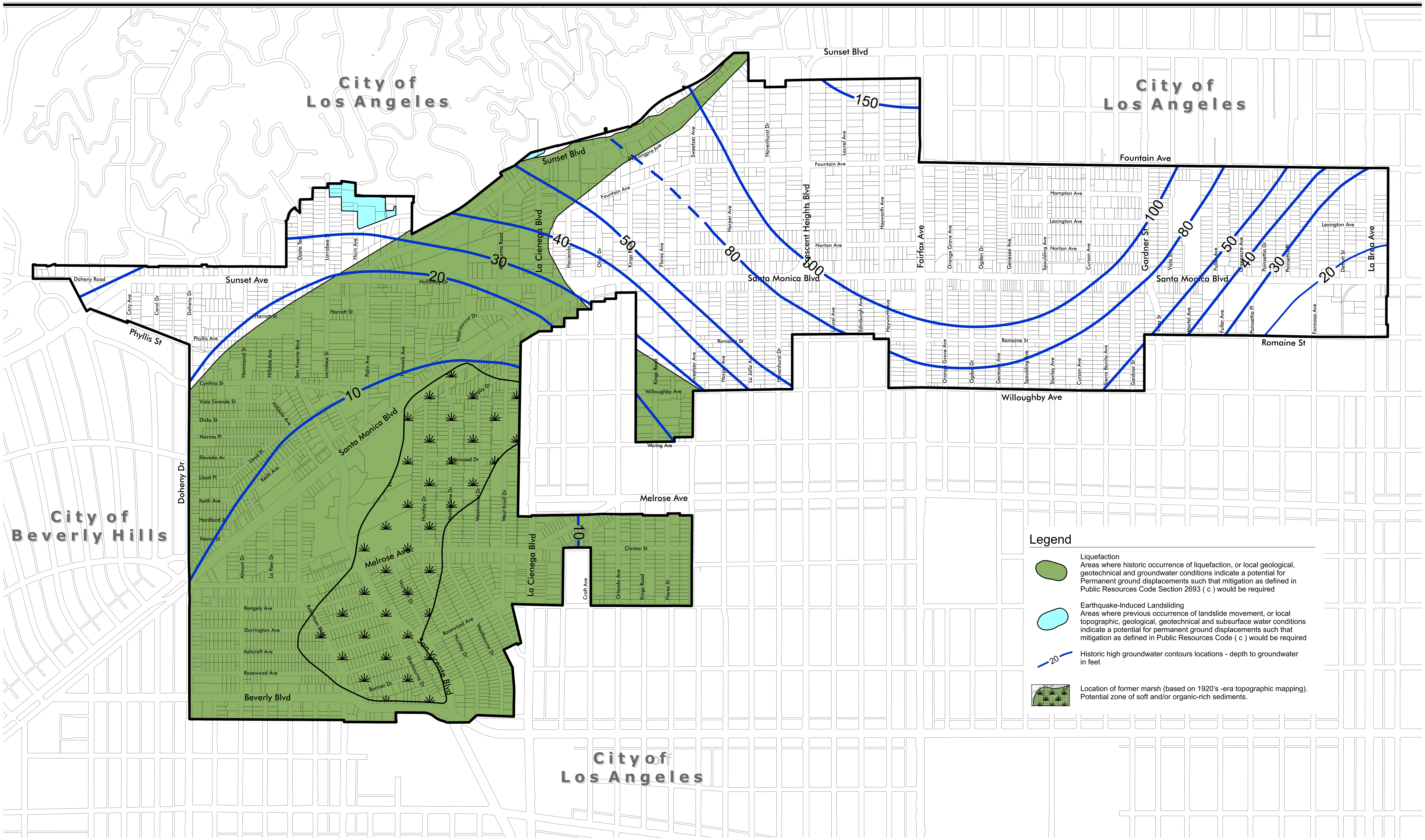
Regional Fault and Seismicity Map

Project Name: City of West Hollywood - Seismic Safety Element
Project Number: cWH 08-14E | DATE: March 2010 | DRAFTED: AHM | REVIEWED: EHS | CHECKED: PS | FIGURE NO: 2



Source mapping from CDMG Seismic Hazard Zone Map ofthe Hollywood Quadrangle (CDMG 1999a) and Beverly Hills Quadrangle (1999b)

City of West Hollywood General Plan

Feet
0 600 1200 1800 2400

NOTE: ALL LOCATIONS, DIRECTIONS AND DIMENSIONS ARE APPROXIMATE

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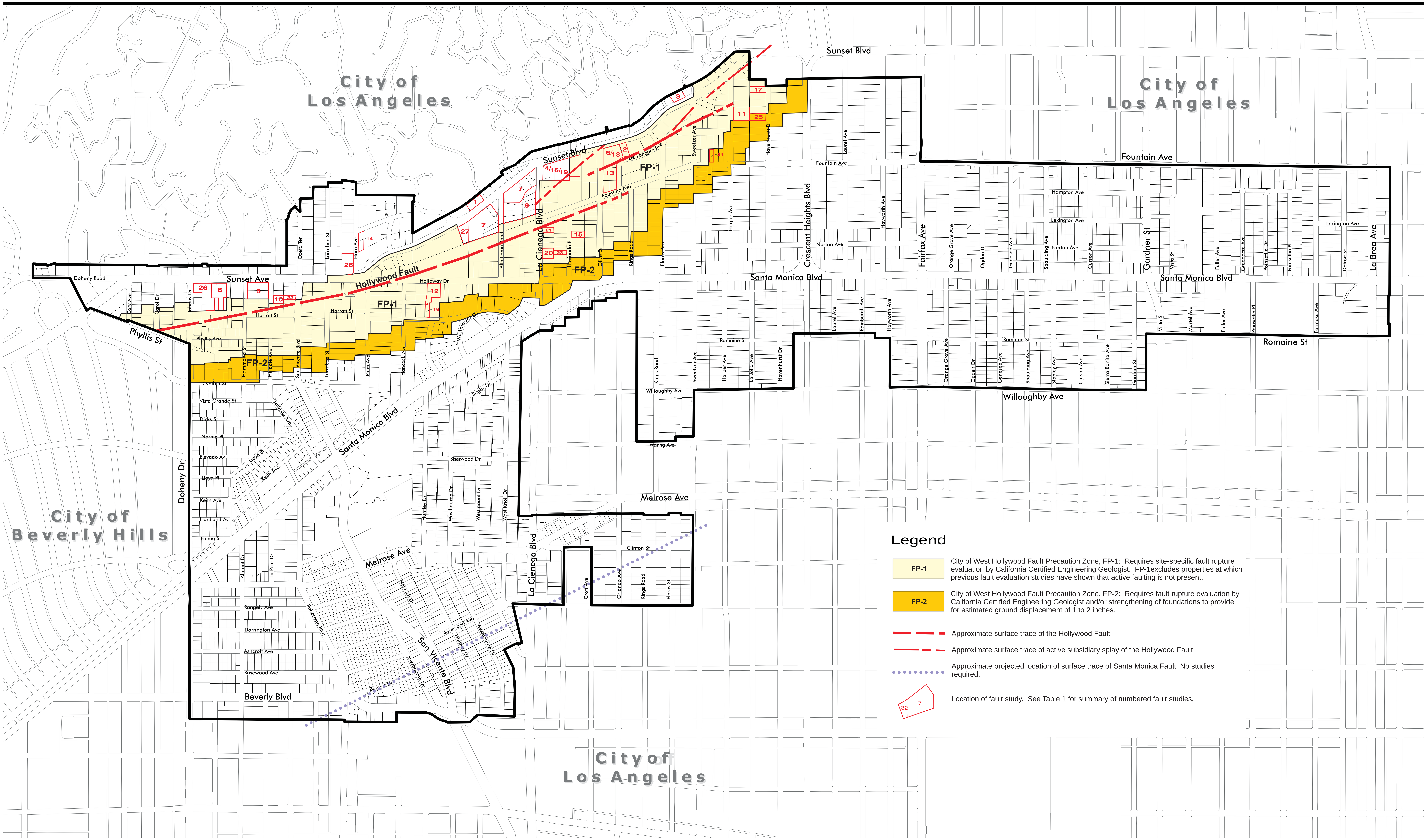
Seismic Hazard Zones Map

Project Name: City of West Hollywood - Seismic Safety Element
Project Number: cWH 08-14E
DATE: March 2010
DRAFTED: AHM
REVIEWED: EHS
CHECKED: PS
FIGURE NO: 3



City of West Hollywood General Plan

0 600 1200 1800 2400 Feet

NOTE: ALL LOCATIONS, DIRECTIONS AND DIMENSIONS ARE APPROXIMATE

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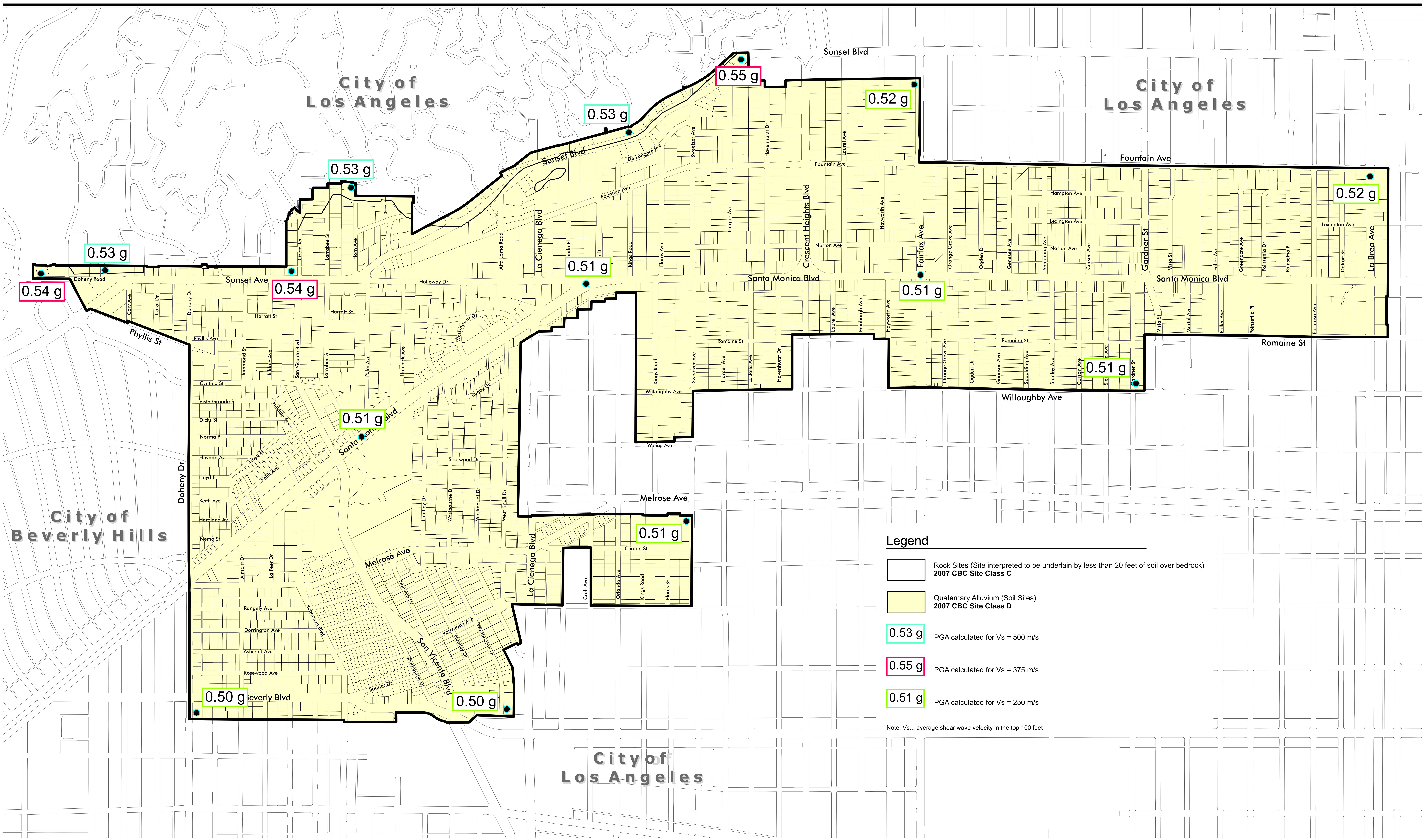
City Fault Location and Precaution Zone Map

Project Name: City of West Hollywood - Seismic Safety Element

Project Number:	DATE:	DRAFTED:	REVIEWED:	CHECKED:	
cWH 08-14E	March 2010	AHM	EHS	PS	FIGURE NO: 4



City of West Hollywood General Plan

Feet 0 600 1200 1800 2400

NOTE: ALL LOCATIONS, DIRECTIONS AND DIMENSIONS ARE APPROXIMATE

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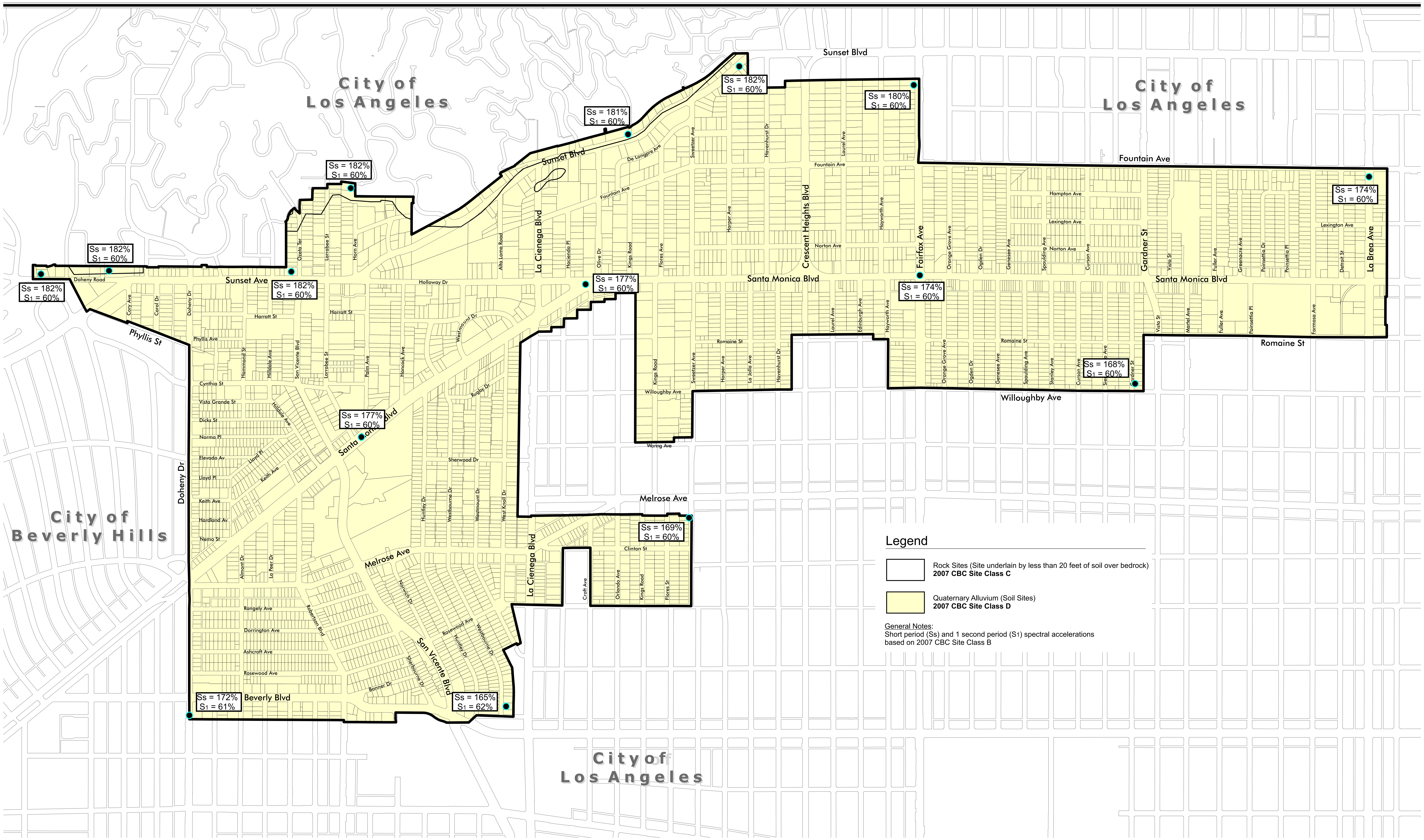
Peak Ground Acceleration Map
10% Probability of Exceedance in 50 years, i.e., 475-year Return Period

Project Name: City of West Hollywood - Seismic Safety Element						
Project Number: cWH 08-14E	DATE: March 2010	DRAFTED: AHM	REVIEWED: EHS	CHECKED: PS	FIGURE NO: 5	



City of West Hollywood General Plan

0 600 1200 1800 2400 Feet

NOTE: ALL LOCATIONS, DIRECTIONS AND DIMENSIONS ARE APPROXIMATE

KFM GEOSCIENCE
1360 Valley Vista Drive
Diamond Bar, CA 91765
Phone (909) 860-5096

Guidelines for 2007 California Build Code Governing Spectral Accelerations for Seismic Design Response Spectrum per 2007 CBC

Project Name: City of West Hollywood - Seismic Safety Element					
Project Number: cWH 08-14E	DATE: March 2010	DRAFTED: AHM	REVIEWED: EHS	CHECKED: PS	FIGURE NO: 6

APPENDIX E

NOISE BACKGROUND REPORT

NOISE BACKGROUND REPORT
FOR THE
CITY OF WEST HOLLYWOOD GENERAL PLAN
WEST HOLLYWOOD, CALIFORNIA

Prepared for:

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June 2010

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INTRODUCTION

This background report creates a foundation for updating the goals, policies, and programs of the Noise Element of the *City of West Hollywood General Plan*. The Noise Element provides a basis for comprehensive local policies to control and abate environmental noise and to protect the citizens of the City of West Hollywood (City) from excessive noise exposure.

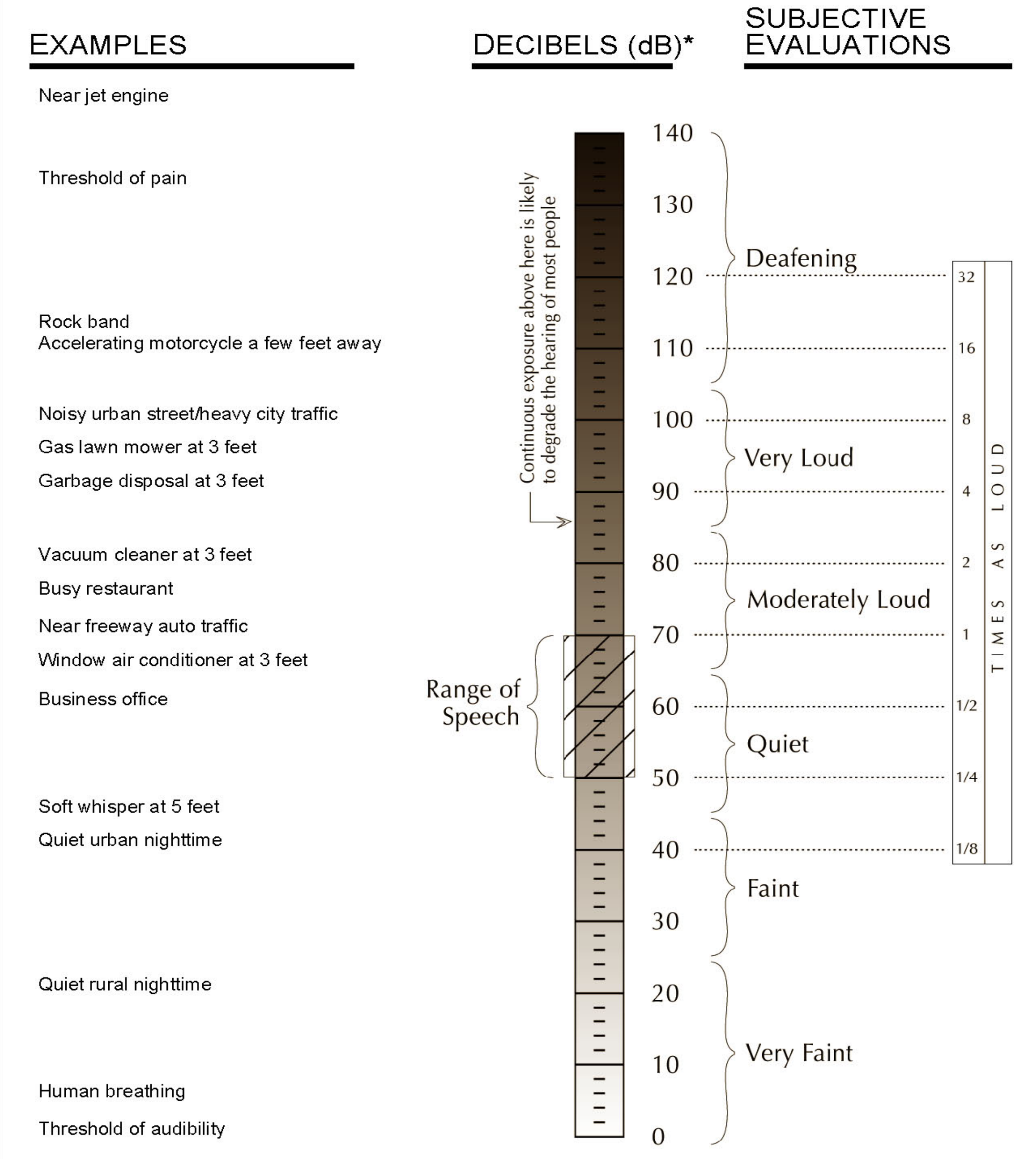
Unregulated noise can cause stress and strain on the general well-being of the City's residents. With proper planning, mitigation, and cooperation, unwanted noise can be managed to preserve the overall well-being of the people within the City.

The responsibility of the local governments is to "analyze and quantify" noise levels and the extent of noise exposure through actual measurement and/or the use of noise modeling. To do this, technical data relating to mobile and point sources must be collected, synthesized, and mapped. These data are used to develop a set of noise control policies and programs that minimizes incompatible land use and serves as a basis for land use decisions. The element must include implementation measures and possible solutions to existing and foreseeable noise problems. Furthermore, the policies and standards must be sufficient to serve as a guideline for compliance with control requirements for sound transmission and directly correlate to the land use, circulation, and housing elements.

The noise element is used to guide decisions concerning land use and the location of new roads and transit facilities since these are common sources of excessive noise levels. The noise levels from existing land uses, including commercial and light industrial activities, must be closely analyzed to ensure compatibility, especially where residential and other sensitive receptors have encroached into areas previously occupied by these uses.

ACOUSTIC FUNDAMENTALS

Acoustics is the scientific study that evaluates perception, propagation, absorption, and reflection of sound waves. Sound is a mechanical form of radiant energy, transmitted by a pressure wave through a solid, liquid, or gaseous medium. Sound that is loud, disagreeable, unexpected, or unwanted is generally defined as noise; consequently, the perception of sound is subjective in nature and can vary substantially from person to person. Common sources of environmental noise and noise levels are presented in Figure 1.



* dB are "average" values as measured on the A-scale of a sound-level meter.
From Concepts in Architectural Acoustics: M. David Egan, McGraw Hill, 1972 and U.S. Department of Housing and Urban Development, Office of Community Planning and Development "The Noise Guidebook."

Source: **<<Source will be supplied in next submittal>>**

Figure 1
Common Noise Sources and Levels

A sound wave is initiated in a medium by a vibrating object (e.g., vocal chords, the string of a guitar, the diaphragm of a radio speaker). The wave consists of minute variations in pressure, oscillating above and below the ambient atmospheric pressure. The number of pressure variation cycles occurring per second is referred to as the frequency of the sound wave and is expressed in hertz (Hz), which is equivalent to one complete cycle per second.

Directly measuring sound pressure fluctuations would require the use of a very large and cumbersome range of numbers. To avoid this and have a more usable numbering system, the decibel (dB) scale was introduced. A sound level expressed in decibels is the logarithmic ratio of two like pressure quantities, with one pressure quantity being a reference sound pressure. For sound pressure in air the standard reference quantity is generally considered to be 20 micropascals, which directly corresponds to the threshold of human hearing. The use of the decibel is a convenient way to handle the millionfold range of sound pressures to which the human ear is sensitive. A decibel is logarithmic; it does not follow normal algebraic methods and cannot be directly added. For example, a 65-dB source of sound, such as a truck, when joined by another 65-dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by 3 dB). A sound level increase of 10 dB corresponds to 10 times the acoustical energy, and an increase of 20 dB equates to a hundredfold increase in acoustical energy.

The loudness of sound perceived by the human ear depends primarily on the overall sound pressure level and frequency content of the sound source. The human ear is not equally sensitive to loudness at all frequencies in the audible spectrum. To better relate overall sound levels and loudness to human perception, frequency-dependent weighting networks were developed. The standard weighting networks are identified as A through E. There is a strong correlation between the way humans perceive sound and A-weighted sound levels (dBA). For this reason the A-weighted sound level can be used to predict community response to noise from the environment, including noise from transportation and stationary sources. Sound levels expressed as dB in this section are considered dBA, unless noted otherwise.

Noise can be generated by a number of sources, including mobile sources (transportation noise sources) such as automobiles, trucks, and airplanes and stationary sources (nontransportation noise sources) such as construction sites, machinery, and commercial and industrial operations. As acoustic energy spreads through the atmosphere from the source to the receiver, noise levels attenuate (decrease) depending on ground absorption characteristics, atmospheric conditions, and the presence of physical barriers (e.g., walls, building façades, berms). Noise generated from mobile sources generally attenuates at a rate of 3dB (typical for hard surfaces, such as asphalt) to

4.5 dB (typical for soft surfaces, such as grasslands) per doubling of distance, depending on the intervening ground type. Stationary noise sources spread with more spherical dispersion patterns that attenuate at a rate of 6 to 7.5 dB per doubling of distance.

Atmospheric conditions such as wind speed, turbulence, temperature gradients, and humidity may additionally alter the propagation of noise and affect levels at a receiver. Wind speed will bend the path of sound to "focus" it on the downwind side and make a "shadow" on the upwind side of the source. At short distances, up to 164 feet, the wind has minor influence on the measured sound level. For longer distances, the wind effect becomes appreciably greater. Temperature gradients create effects similar to those of wind gradients, except that they are uniform in all directions from the source. On a sunny day with no wind, temperature decreases with altitude, giving a shadow effect for sound. On a clear night, temperature may increase with altitude, focusing sound on the ground surface (Caltrans2009).

The presence of a large object (e.g., barrier, topographic feature, and intervening building façade) between the source and the receptor can also alter the propagation of noise and provide significant attenuation of noise levels at the receiver. The amount of noise level reduction or "shielding" provided by a barrier primarily depends on the size of the barrier, the location of the barrier in relation to the source and receivers, and the frequency spectra of the noise. Natural barriers such as berms, hills, or dense woods and human-made features such as buildings and walls may be effective noise barriers.

Noise Descriptors

The intensity of environmental noise fluctuates over time, and several different descriptors of time-averaged noise levels are used. The selection of a proper noise descriptor for a specific source depends on the spatial and temporal distribution, duration, and fluctuation of both the noise source and the environment. The noise descriptors most often used to describe environmental noise are defined below.

- **L_{max} (Maximum Noise Level):** The highest noise level occurring during a specific period of time.
- **L_{min} (Minimum Noise Level):** The lowest noise level during a specific period of time.
- **Peak:** The highest weighted or unweighted instantaneous peak-to-peak value occurring during a measurement period.

- **L_n (Statistical Descriptor):** The noise level exceeded n percent of a specific period of time, generally accepted as an hourly statistic. An L_{10} would be the noise level exceeded 10 percent of the measurement period.
- **L_{eq} (Equivalent Noise Level):** L_{eq} represents an average of the sound energy occurring over a specified period. Effectively, the varying sound level over a specified period contains the same acoustical energy as a steady-state sound level that in that same period.
- **L_{dn} (Day-Night Noise Level):** The 24-hour L_{eq} with a 10-dB "penalty" applied during nighttime noise-sensitive hours, 10 p.m. through 7 a.m. The L_{dn} attempts to account for the fact that noise during this specific period of time is a potential source of disturbance with respect to normal sleeping hours.
- **CNEL (Community Noise Equivalent Level):** Similar to the L_{dn} described above, but with an additional 5-dB "penalty" for the noise-sensitive hours between 7 p.m. to 10 p.m., which are typically reserved for relaxation, conversation, reading, and watching television. If the same 24-hour noise data are used, the CNEL is typically 0.5 dB higher than the L_{dn}.
- **SEL (Sound Exposure Level):** The cumulative exposure to sound energy over a stated period of time.

Effects of Noise on Humans

Excessive and chronic exposure to elevated noise levels can result in auditory and nonauditory effects on humans. Auditory effects of noise on people are those related to temporary or permanent hearing loss caused by loud noises. Nonauditory effects of exposure to elevated noise levels are those related to behavioral and physiological effects. The nonauditory behavioral effects of noise on humans are associated primarily with the subjective effects of annoyance, nuisance, and dissatisfaction, which lead to interference with activities such as communications, sleep, and learning. The nonauditory physiological health effects of noise on humans have been the subject of considerable research attempting to discover correlations between exposure to elevated noise levels and health problems such as hypertension and cardiovascular disease. The mass of research infers that noise-related health issues are predominantly the result of behavioral stressors and not a direct noise-induced response. The extent to which noise contributes to nonauditory health effects remains a subject of considerable research with no definitive conclusions.

The degree to which noise results in annoyance and interference is highly subjective and may be influenced by several nonacoustic factors. The number and effect of these nonacoustic environmental and physical factors vary depending on individual characteristics of the noise environment such as sensitivity, level of activity, location, time of day, and length of exposure. One key aspect in the prediction of human response to changes in noise environments is the individual level of adaptation to an existing noise environment. The greater the change in the noise levels that are attributed to a new noise source relative to the environment an individual has become accustomed to, the less tolerable the new noise source will be to the individual.

With respect to how humans perceive and react to changes in noise levels, a 1-dB increase is imperceptible, a 3-dB increase is barely perceptible, a 6-dB increase is clearly noticeable, and a 10-dB increase is subjectively perceived as approximately twice as loud (Egan 1972). These subjective reactions to changes in noise levels were developed on the basis of test subjects' reactions to changes in the levels of steady-state pure tones or broad-band noise and to changes in levels of a given noise source. It is probably most applicable to noise levels in the range of 50 to 70 dB as this is the usual range of voice and interior noise levels. For these reasons, a permanent noise level increase of 3 dB or greater is typically considered substantial in terms of the degradation of the existing noise environment.

Vibration

Vibration is the periodic oscillation of a medium or object with respect to a given reference point. Sources of vibration include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) and those introduced by human activity (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, (e.g., machinery) or transient in nature (e.g., explosions). Vibration levels can be depicted in terms of amplitude and frequency relative to displacement, velocity, or acceleration.

Vibration amplitudes are commonly expressed in peak particle velocity (PPV) or root-mean-square (RMS) vibration velocity. PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is typically used in the monitoring of transient and impact vibration and has been found to correlate well to the stresses experienced by buildings (FTA 2006:**7**-1 through 7-8; Caltrans 2004:5–7). PPV and RMS vibration velocity are normally described in inches per second.

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. The response of the human body to vibration relates well to average vibration amplitude; therefore, vibration impacts on humans are evaluated in terms of RMS vibration velocity. Similar to airborne sound, vibration velocity can be expressed in decibel notation as vibration decibels (VdB). The logarithmic nature of the decibel serves to compress the broad range of numbers required to describe vibration.

Typical outdoor sources of perceptible groundborne vibration include construction equipment, steel-wheeled trains, and traffic on rough roads. Although the effects of vibration may be imperceptible at low levels, effects may result in detectable vibrations and slight damage to nearby structures at moderate and high levels, respectively. At the highest levels of vibration, damage to structures is primarily architectural (e.g., loosening and cracking of plaster or stucco coatings) and rarely results in damage to structural components. The range of vibration that is relevant to this analysis occurs from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings (FTA 2006:8-1 through 8-8).

REGULATORY CONTEXT

Various private and public agencies have established noise guidelines and standards to protect citizens from potential hearing damage and other adverse physiological and social effects associated with noise. The following federal, state, and local regulations discussed below are applicable to the proposed project regarding noise and vibration standards.

Federal Plans, Policies, Regulations, and Laws

The U.S. Environmental Protection Agency's (EPA's) Office of Noise Abatement and Control was originally established to coordinate federal noise control activities. After its inception, EPA's Office of Noise Abatement and Control issued the Federal Noise Control Act of 1972, establishing programs and guidelines to identify and address the effects of noise on public health, welfare, and the environment. In 1981, EPA administrators determined that subjective issues such as noise would be better addressed at lower levels of government, thereby allowing more individualized control for specific issues by designated federal, state, and local government agencies. Consequently, in 1982 responsibilities for regulating noise control policies were transferred to designated federal agencies and state and local governments. However, noise control guidelines and regulations contained in EPA rulings in prior years remain in place.

State Plans, Policies, Regulations, and Laws

The State of California has adopted noise standards in areas of regulation not preempted by the federal government. State standards regulate noise levels of motor vehicles, sound transmission through buildings, occupational noise control, and noise insulation.

Title 24 of the California Code of Regulations, also known as the California Building Standards Code, establishes building standards applicable to all occupancies throughout the state. The code provides acoustical regulations for both exterior-to-interior sound insulation as well as sound and impact isolation between adjacent spaces of various occupied units. Title 24, Part 2, Chapter 12, Section 1207.11.2, states that interior noise levels generated by exterior noise sources shall not exceed 45 dB L_{dn}, in any habitable room.

Though not adopted by law, the *General Plan Guidelines 2003*, published by the California Governor's Office of Planning and Research (OPR), provides guidance for the compatibility of projects within areas of specific noise exposure. Table 1 presents acceptable and unacceptable community noise exposure limits for various land use categories. The guidelines also present adjustment factors that may be used to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

Local Plans, Policies, Regulations, and Ordinances

West Hollywood General Plan

Goal 17A – Prevent and mitigate the adverse impacts of noise on the City's residents.

- Objective 17.1 – Minimize the impact of traffic-generated noise on residential and other noise sensitive land uses.
  - Policy 17.1.1 – Require development in areas where the ambient noise level exceeds 65 dB(A) to incorporate special treatment measures into project design to reduce interior noise levels. In addition to measures called out in the Uniform Building Code and State Noise Insulation Standards (California Administrative Code, Title 24), the following standard should be required, of new development in these areas:
    a. use sufficient glazing for all sliding glass doors and all windows;
    b. use insulation between walls and other appropriate measures to adequately reduce noise to acceptable levels (I17.1 and I17.5).

Table 1
Land Use Noise Compatibility Guidelines

Land Use Category	Community Noise Exposure (CNEL/L_{dn}, dB)			
	Normally Acceptable[1]	Conditionally Acceptable[2]	Normally Unacceptable[3]	Clearly Unacceptable[4]
Residential-Low Density Single Family, Duplex, Mobile Home	<60	55–70	70–75	75+
Residential-Multiple Family	<65	60–70	70–75	75+
Transient Lodging, Motel, Hotel	<65	60–70	70–80	80+
School, Library, Church, Hospital, Nursing Home	<70	60–70	70–80	80+
Auditorium, Concert Hall, Amphitheater		<70	65+	
Sports Arenas, Outdoor Spectator Sports		<75	70+	
Playground, Neighborhood Park	<70		67.5–75	72.5+
Golf Courses, Stable, Water Recreation, Cemetery	<75		70–80	80+
Office Building, Business Commercial and Professional	<70	67.5–77.5	75+	
Industrial, Manufacturing, Utilities, Agriculture	<75	70–80	75+	

Notes: CNEL = Community Noise Equivalent Level; dB = A-weighted decibels; L_{dn} = day-night average noise level.
[1] Specified land use is satisfactory, based on the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
[2] New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.
[3] New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design. Outdoor areas must be shielded.
[4] New construction or development should generally not be undertaken.
Source: OPR 2003:244–254

- Policy 17.1.2 – Encourage noise sensitive uses, including schools, libraries, hospitals, religious facilities and residential uses, to incorporate walls and other sound barriers where feasible to do so (I17.1 and I17.6).
- Policy 17.1.3 – Discourage through traffic in residential neighborhoods by the use of cul-de-sacs and one-way streets (I17.19).
- Policy 17.1.4 – Require that new development minimize the noise impacts of trips it generates on residential neighborhoods by controlling the location of driveways and parking (I17.8).

- Policy 17.1.5 – Actively enforce existing sections of the California Vehicle Code related to mufflers and modified exhaust systems (I17.13).
- Policy 17.1.6 – Require new equipment and vehicles purchased by the City of West Hollywood to comply with noise performance standards consistent with the best available noise reduction technology (I17.14).
- Policy 17.1.7 – Encourage employers to participate in van-pools and other demand management programs to reduce traffic and noise impacts in the city (I17.5).
- Policy 17.1.8 – Work with local agencies to provide public transit services which reduce traffic and noise (I17.20).
- Policy 17.1.9 – Work with public transit agencies to ensure that the equipment they use does not generate excessive noise levels (I17.20).

▪ Objective 17.2: – Minimize noise spillover from commercial uses into adjacent residential neighborhoods.

- Policy 17.2.1 – Adopt and enforce a standard for exterior noise levels for all commercial uses which prevents adverse levels of discernible noise on adjacent residential properties (I17.1, I17.3, and I17.8). (Res. 452, 6-20-1988)
- Policy 17.2.2 – Require a landscaped buffer between a commercial or mixed-use structure and any adjoining residential parcel in accordance with the requirements of policies 1.39.1 and 1.39.2 (I17.1). (Res. 95-1395, 1-17-1995)
- Policy 17.2.3 – Require that automobile and truck access to commercial properties located adjacent to residential parcels be located at the maximum practical distance from the residential parcel (I17.3).
- Policy 17.2.4 – Require that all parking for commercial uses adjacent to residential areas be enclosed within a structure or on surface lots whose hours of operation shall be limited (I17.3 and I17.6).
- Policy 17.2.5 – Require that parking lot and structures be designed to minimize noise impacts on-site and adjacent uses; including the use of materials which mitigate sound transmission and configuration of interior spaces to minimize sound amplification and transmission (I17.3).
- Policy 17.2.6 – Require that noise from entertainment uses not be discernible from ambient noise at a distance of fifty (50) feet from the establishment in which it is

being conducted or within ten (10) feet of a residence, whichever is more restrictive (I17.1 and I17.6).

- Policy 17.2.7 – Provide for increased police enforcement to minimize noise-related disturbances in residential neighborhoods adjacent to concentrations of entertainment uses and require that such uses monitor the activities of patrons who are waiting in line or loitering outside of the establishment (I17.11).
- Policy 17.2.8 – Require that entertainment uses, restaurants and bars control the activities of their patrons on-site and within reasonable and legally justifiable proximity to minimize noise impacts on adjacent residences (I17.10).
- Policy 17.2.9 – Discourage the development of new nightclubs, discotheques, and other high noise-generating uses adjacent to residential areas, unless it can be demonstrated that adequate measures can be employed to mitigate impacts of on-site operations and off-site customer access (I17.2).
- Policy 17.2.10 – Prohibit the development of new nightclubs, discotheques, and other high noise-generating uses adjacent to senior citizen housing, schools, health care facilities, and other noise-sensitive uses (I17.2).
- Policy 17.2.11 – Prohibit the use of the leaf blowers, motorized lawn mowers, parking lot sweepers, or other high noise equipment on commercial properties between 8 p.m. and 8 a.m. if their activity will result in noise which adversely affects adjacent residential parcels (I17.3).
- Policy 17.2.12 – Require that truck deliveries to commercial properties abutting residential uses be limited to 8 a.m. to 8 p.m. unless there is no feasible alternative or there are overriding transportation benefits by scheduling deliveries at another hour (I17.4).
- Policy 17.2.13 – Encourage commercial uses which abut residential properties to employ techniques to mitigate noise impacts from truck deliveries, such as the use of a sound wall or enclosure of delivery area (I17.9).
- Policy 17.2.14 – Require the posting of signs in all commercial uses which request that all employees and customers minimize the noise they generate on their departure between 8 p. m. and 7 a. m. (I17.1).

▪ Objective 17.3 – Minimize the noise impacts of commercial-related parking overflow in residential areas.

- Policy 17.3.1 – Continue the existing and initiate, where appropriate, a residential permit parking system in residential areas containing large amounts of commercial-related parking spillover (I17.15).

- Policy 17.3.2 – Require businesses which generate substantial parking overflow into residential areas to participate in the development of municipal parking structures (I17.16).

▪ Objective 17.4 – Minimize the noise impacts associated with the development of residential units above ground floor commercial uses in designated "Mixed-Use" areas.

- Policy 17.4.1 – Require that commercial uses developed as part of a mixed-use project (with residential) not be noise intensive (I17.1).

- Policy 17.4.2 – Design mixed-use structures to prevent transfer of noise from the commercial to the residential use (I17.1 and I17.6).

- Policy 17.4.3 – Require common walls and floors between commercial and residential uses be constructed to minimize the transmission of noise and• vibration (I17.1).

▪ Objective 17.5 – Minimize the impacts of construction noise on adjacent uses.

- Policy 17.5.1 – Require that construction activities which may impact adjacent residential units be limited to 8 a.m. to 7 p.m. during weekdays, except under special circumstances approved by the City; limited to interior construction between 8 a.m. and 7 p.m. on Saturdays; and prohibited on Sundays (I17.4).

- Policy 17.5.2 – Require that construction activities incorporate feasible and practical techniques which minimize the noise impacts on adjacent uses (I17.4 and I17.17).

▪ Objective 17.6 – Ensure that base line information regarding the noise environment of the City is maintained.

- Policy 17.6.1 – Monitor and update data regarding the City's current and projected noise levels (I17.26).

- Policy 17.6.2 – Employ state-of-the-art advances in noise impact mitigation as they become available (I17.28).

▪ Objective 17.7 – Minimize the noise impacts of helicopter overflights on West Hollywood residents.

- Policy 17.7.1 – Discourage the overflight of police and emergency helicopters in residential areas of the City (I17.21).
- Policy 17.7.2 – Allow the development of heliports or helipads only when it can be demonstrated that noise impacts on adjacent residential uses can be adequately mitigated (I17.9).
- Policy 17.7.3– Require that helicopters which utilize City of West Hollywood airspace fly in compliance with Federal Air Regulations (FAR) Part 91 rules, maintain noise alleviating altitudes until landing, and utilize noise abatement procedures, except when these rules must be disregarded for safety and emergency reasons (I17.22).
- Policy 17.7.4 – Establish the City's commercial streets as the principal' helicopter flight corridors and require use of, these, except as may be required for safety and emergency reasons (I17.23).
- Policy 17.7.5 – Require that helicopter takeoff and landing patterns be limited to commercial areas (I17.23).
- Policy 17.7.6 – Discourage helicopter-training flights over, the City between 11:00 p.m. and 7:00 a.m. (I17.22).

▪ Objective 17.8 – Minimize noise spillover of transit and other uses on public properties into adjacent residential neighborhoods.

- Policy 17.8.1 – Require the Southern California Transit District to control and buffer, as necessary, its operations at its maintenance yards to minimize noise impacts on adjacent residential neighborhoods (I17.24).
- Policy 17.8.2 – Encourage public agencies and institutions located in the City to incorporate appropriate measures to contain noise generated by their activities on-site (I17.25).

▪ Objective 17.9 – Ensure that buildings are constructed soundly to prevent adverse noise transmission between differing uses located• in the same structure and individual residences in multifamily buildings.

- Policy 17.9.1 – Establish design criteria for commercial buildings which prevents transmission of significant and unacceptable noise between individual tenants and businesses (I17.1).

- Policy 17.9.2 – Establish design criteria for multi-family buildings which prevents transmission of significant and unacceptable noise between individual residential units (I17.1).

City of West Hollywood Municipal Code, Title 9 Public Peace, Morals, and Safety

Article 1 – Prohibited Conduct and Offenses

Chapter 9.04 General Offenses

9.04.080 Noisy Hawking and Advertising Prohibited.

No person on a street or sidewalk, or in any doorway or entrance set back less than ten feet from the front property line, shall make or cause to be made in any manner any loud or raucous noise for the purpose of advertising, announcing or calling attention to any goods, wares or merchandise, or to any show, exhibition, entertainment or event.

(Ord. 85-102U Section 1 (part), 1985: Ord. 85-102 Section 1 (part), 1985: prior code Section 4109)

Article 2 – Miscellaneous

Chapter 9.08 Noise

9.08.010 Short Title.

This chapter may be cited as the “Noise Control Ordinance” of the City of West Hollywood.

(Ord. 85-21 (part), 1985: prior code Section 4300)

9.08.020 Purpose and Findings.

The city is a densely developed community. Residential dwelling units are located in close proximity to one another and commercial activities often adjoin residential housing. This pattern of land use development makes it almost inevitable that everyday noise will be audible to one degree or another. The purpose of this chapter is to strike a balance between normal, everyday noises that are unavoidable in an urban environment and those noises that are so excessive and annoying to persons of ordinary sensitivity that they must be curtailed in order to protect the comfort and tranquility of all persons who live and work in the city.

(Ord. 07-769U Section 1, 2007: Ord. 07-768 Section 1, 2007: Ord. 85-21 (part), 1985: prior code Section 4301)

9.08.030 Definitions.

The following words, phrases and terms as used in this chapter shall have the meanings indicated as follows:

1. "City Manager" shall mean the City Manager of the City of West Hollywood or the City Manager's designee.

2. "Construction" shall mean any of the following:

   A. The operation of any tool, machine or equipment including, but not limited to vehicles and helicopters, to carry out any work for which a building permit is required, including, but not limited to, demolition, grading, excavating, or construction;

   B. Performing any construction, maintenance or repair on buildings, structures or utilities or any work preparing the site for construction or repair including, but not limited to, staging, grading, excavation, and demolition;

   C. Any painting using motorized equipment or any painting that is part of the construction activity for which a building permit has been issued;

   D. The loading or unloading of construction equipment, materials, or supplies from vehicles at or near the site of the construction activity;

   E. The staging or idling, at or near the site of construction activity, of any construction vehicle or any vehicles bringing construction equipment, materials or supplies to the site of the construction;

   F. The staging or idling, at or near the site of construction activity, of any food services vehicle providing food services to persons working at a site of construction activity or the use of a horn or other device by a food services vehicle to alert customers that the vehicle has arrived.

3. "Emergency machinery, vehicle or alarm" shall mean any machinery, vehicle or alarm used, employed, performed or operated in an effort to protect, provide or restore safe conditions in the community or for the citizenry or work by private or public utilities when restoring utility service.

4. "Emergency work" shall mean any work performed for the purpose of preventing or alleviating the physical trauma or property damage threatened or caused by an emergency or work by private or public utilities when restoring utility services.

5. “Weekday” shall mean any day, Monday through Friday, which is not a legal holiday.

(Ord. 09-808 Section 1, 2009; Ord. 85-21 (part), 1985: prior code Section 4302)

9.08.040 Prohibited Noises – General Standard.

Unless otherwise permitted in this chapter, no person shall make, permit to be made or cause to suffer any noises, sounds or vibrations that in view of the totality of the circumstances are so loud, prolonged and harsh as to be annoying to reasonable persons of ordinary sensitivity and to cause or contribute to the unreasonable discomfort or disturbance of any persons within the vicinity. When considering whether a noise, sound or vibration is unreasonable within the meaning of this section, the following factors shall be taken into consideration:

a. The volume and intensity of the noise, particularly as it is experienced within a residence or place of business;

b. Whether the noise is prolonged and continuous;

c. How the noise contrasts with the ambient noise level;

d. The proximity of the noise source to residential and commercial uses;

e. The time of day;

f. The anticipated duration of the noise; and

g. Any other relevant circumstances or conditions.

(Ord. 07-769U Section 2, 2007: Ord. 07-768 Section 2, 2007: Ord. 95-435 Section 3, 1995: Ord. 85-21 (part), 1985: prior code Section 4303)

9.08.050 Prohibited Noises – Specific Examples.

Notwithstanding any other provisions of this chapter, the following acts and the causing or permitting thereof, are declared to be in violation of this chapter:

a. *Radios, Phonographs, Etc.* The using, operating or permitting to be played, used or operated between the hours of 10:00 p.m. and 8:00 a.m. of any radio, musical instrument, phonograph, television set, or instrument or device similar to those heretofore specifically mentioned for the production or reproduction of sound in volume sufficiently loud as to be plainly audible at a distance of fifty feet or more therefrom.

b. *Band or Orchestral Rehearsals.* The conducting of or carrying on, or allowing the conducting or carrying on of band or orchestral concerts or rehearsals or practices between the hours of 10:00 p.m. and 8:00 a.m. sufficiently loud as to be plainly audible at a distance of fifty feet or more therefrom.

c. *Engines, Motors and Mechanical Devices Near Residential District.* The sustained, continuous or repeated operation or use between the hours of 10:00 p.m. and 8:00 a.m. of any motor or engine or the repair, modification, reconstruction, testing or operation of any automobile, motorcycle, machine, contrivance, or mechanical device or other contrivance or facility unless such motor, engine, automobile, motorcycle, machine or mechanical device is enclosed within a sound insulated structure so as to prevent noise and sound from being plainly audible at a distance of fifty feet or more from such structure, or at a distance of ten feet or more from any residence.

d. *Motor Vehicles.* Racing the engine of any motor vehicle or needlessly bringing to a sudden start or stop of any motor vehicle.

e. *Loading and Unloading.* Loading, unloading, opening, closing or other handling of boxes, containers, building materials, solid waste and recycling containers or similar objects between the hours of 10:00 p.m. and 8:00 a.m. in such manner as to cause unreasonable noise disturbance, excluding normal handling of solid waste and recycling containers by a franchised collector pursuant to Title 15.

f. *Construction.* Construction between the hours of 7:00 p.m. and 8:00 a.m. on weekdays; or at any time on Saturdays (except, between the hours of 8:00 a.m. and 7:00 p.m., interior construction is permissible); or at any time on Sunday, New Year's Day, Martin Luther King Day, President's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, the day after Thanksgiving and Christmas Day; all except as provided in subsection (d) of Section 9.08.060.

g. *Non-Emergency Signaling Devices.* Sounding or permitting the sounding of any electronically amplified signal from any bell, chime, siren, whistle or similar device, intended primarily for non-emergency purposes, from any place, for more than ten consecutive seconds in any hourly period.

   Houses of religious worship shall be exempt from the operation of this provision.

   Sound sources included within this provision which are not exempted under Section 9.08.060 may be exempted by a variance issued by the City Manager.

h. *Emergency Signaling Devices.*

   1. The intentional sounding, or permitting the sounding, outdoors of any emergency signaling device including fire, burglar, civil defense alarm, siren, whistle or similar

emergency signaling device, for testing, except as provided in subdivision (2) of this subsection.

2. Testing of an emergency signaling device shall not occur before 8:00 a.m. or after 10:00 p.m. Any such testing shall use only the minimum cycle test time. In no case shall such test time exceed sixty seconds. Testing of the emergency signaling system shall not occur more than once in each calendar month.
3. Sounding or permitting the sounding of any exterior burglar or fire alarm unless such alarm is terminated within fifteen minutes of activation.
4. Sounding or permitting the sounding of any motor vehicle alarm unless such alarm is terminated within five minutes of activation.
5. Sounding or permitting the sounding of any motor vehicle alarm more than three times of any duration in any twenty-four-hour period.

i. *Noises by Animals.* No person shall permit any animal that is kept or maintained upon any premises owned, occupied or controlled by such person to permit such animal to emit any noise, sound, or cry which interferes with the comfortable enjoyment of life and property by any individual. It is hereby declared a public nuisance to keep, maintain or permit an animal which emits such noise upon any lot or parcel of land. A violation of this section is subject to the provisions of Sections 1.08.030 through 1.08.070 of this code.

j. *Leaf Blowers.* The use or operation or allowing the use or operation of any portable machine powered with a combustion or gasoline engine used to blow leaves, dirt and other debris off sidewalks, driveways, lawns and other surfaces.

k. *Commercial Establishments Adjacent to Residential Property.* Notwithstanding any provision of this code to the contrary, continuous, repeated or sustained noise from the premises of any commercial establishment which is adjacent to one or more residential dwelling units, including any outdoor area part of or under the control of the establishment, between the hours of 10:00 p.m. and 8:00 a.m. that is plainly audible from the residential dwelling unit's property line.

l. *Loud Parties or Gatherings.* Generating any noise from a party, event or other gathering of people on private property (whether from a home, a commercial business or any other location in the city) that is determined by a law enforcement officer at the scene to constitute a threat to public peace, health and safety or a violation of this code or state law due to the magnitude of the crowd, the volume of noise, the level of disturbance to the surrounding neighborhood, unruly behavior, excessive traffic or destruction of property generated by the party or gathering. The city shall enforce this subsection as follows:

1. The law enforcement officer at the scene shall take such actions and give such direction as is necessary to investigate or abate the violation or condition and shall advise the responsible person that, if additional law enforcement (which term includes Fire Department) personnel are required to respond to abate the condition, the responsible person and the owner or occupant of the property shall be held liable for the cost of providing such services. Such direction and advice shall be given to the person responsible for the party or gathering or to the owner or occupant of the property involved. Such direction may include such measures as concluding the party, dispersing the crowd, shutting off or reducing the volume of music or any other measure necessary to eliminate the disturbance.
2. If the condition is not voluntarily abated in the time period requested by the law enforcement officer and, if additional city or law enforcement (which term includes Fire Department) personnel are required in order to disperse the party or gathering, quell any disturbance, direct traffic, cite illegally parked vehicles or otherwise respond, then the responsible person and the owner or occupant of the property shall be required to reimburse the city for costs pursuant to Section 9.08.090 of this code.

Violation of this subsection by the person responsible for the party and/or the owner or occupant of the property shall be a misdemeanor.

(Ord. 09-808 Section 2, 2009; Ord. 07-769U Section 3, 2007; Ord. 07-768 Section 3, 2007; Ord. 04-690 Section 1, 2004: Ord. 97-507 Section 12, 1997: Ord. 95-435 Section 4, 1995: Ord. 94-412 Section 1, 1994: Ord. 92-354 Section 2, 1992: Ord. 90-270 Section 2, 1990: Ord. 90-270U Section 2, 1990: Ord. 87-139 Section 2, 1987: Ord. 86-123 Section 2, 1986: Ord. 85-85 Section 2, 1985: Ord. 85-21 (part), 1985: prior code Section 4304)

<u>9.08.060 Exemptions.</u>

The following activities shall be exempt from the provisions of this chapter:

a. *Emergency Exemption.* The emission of sound for the purpose of alerting persons to the existence of an emergency or the emission of sound in the performance of emergency work. For the purposes of this section, “emergency” means a condition that constitutes an immediate threat to public safety, health or welfare or to property.

b. *Warning Devices.* Warning devices necessary for the protection of public safety as for example, police, fire and ambulance sirens and train horns.

c. *Outdoor Activities.* Activities conducted on public playgrounds, fully licensed and approved child day care facilities within residential areas as permitted by law, and public or private school grounds, including but not limited to school athletic and school entertainment events.

d. *Construction; Special Circumstances.* The provisions of Section 9.08.050 do not apply to any person who performs construction, repair, excavation or earthmoving work if and to the extent that the City Manager has given express prior written permission to perform such work at times prohibited in Section 9.08.050. In order to be given such permission, the person must submit to the City Manager an application in writing, stating the reasons for the request and the facts upon which such reasons are based. The City Manager may grant or conditionally grant such permission if the City Manager, City Engineer, Code Enforcement Officer or Building Official has found that:

   1. The work proposed to be done is necessary to protect or promote public safety or welfare or is otherwise in the public interest; or

   2. Hardship, including but not limited to unreasonable delay due to weather, acts of God or labor strikes, would result from the interruption thereof during the hours and days specified in Section 9.08.060; or

   3. The building or structure involved is devoted or intended to be devoted to a use immediately incidental to public defense.

   Any applicant dissatisfied with the decision of the City Manager may appeal to the City Council by filing a notice of appeal with the City Clerk within ten days after notice of the City Manager's decision. The City Council shall, within thirty days of filing the appeal, affirm, reverse or modify the decision of the City Manager.

   The provisions of Section 9.08.050 do not apply to the construction, repair, or excavation during prohibited hours as may be necessary for the preservation of life or property, when such necessity arises during such hours as the offices of the city are closed, or where such necessity requires immediate action prior to the time at which it would be possible to obtain a permit pursuant to this section. The person doing such construction, repair or excavation shall obtain a permit therefore within one business day of

e. *Outdoor Gatherings, Public Dances, Shows and Sporting Events.* Provided the events are conducted pursuant to a permit issued by the City Manager.

(Ord. 95-435 Section 6, 1995: Ord. 85-21 (part), 1985: prior code Section 4305)

9.08.070 Enforcement.

A violation of this chapter is subject to the administrative penalty provisions of Sections 1.08.030 through 1.08.070 of this code. The City Manager shall have primary responsibility, with such assistance of the Sheriff's Department as may be necessary or desirable, for the enforcement of the noise regulations contained herein. Nothing in this chapter shall preclude the City Manager from seeking to obtain voluntary compliance by way of warning, notice, or informational materials.

(Ord. 97-507 Section 13, 1997: Ord. 95-435 Section 6, 1995: Ord. 85-21 (part), 1985: prior code Section 4306)

9.08.080 Additional Remedies – Motor Vehicle Alarms.

a. *Deactivation.* In addition to the remedies set forth in this chapter, the Sheriff's Department may undertake such procedures as are reasonably necessary to deactivate a motor vehicle alarm generating noise in violation of this chapter. If the Sheriff's Department is unable to deactivate the alarm, the Sheriff may cause the motor vehicle to be removed according to the procedure set forth in Section 22651.5 of the California Vehicle Code.

b. *Removal.* Any costs associated with the removal or storage of a motor vehicle pursuant to subsection (a) of this section and any costs incurred by the city in connection therewith shall be paid by the registered owner of the motor vehicle.

(Ord. 92-354 Section 3, 1992: prior code Section 4307)

9.08.090 Additional Remedies – Recovery of Law Enforcement Costs for Certain Repeat Offenders.

a. This section shall apply to the following people:

    1. The animal owner or custodian who has received more than one citation pursuant to subsection (i) of Section 9.08.050;

    2. The person or persons responsible for a party or gathering described in paragraph i. of Section 9.08.050, or the owner or occupant of the property on which the party or gathering is held, or, if any such person is a minor, the parents or legal guardians of the minor.

b. The persons denoted in subsection (a) of this section shall be jointly and severally liable for the following costs incurred by the city:

1. The actual cost to the city of law enforcement (which term includes Fire Department) services, excluding the initial response provided by city or law enforcement (which term includes Fire Department) personnel, necessary to abate a violation of Section 9.08.050;

2. Damage to public property resulting from such law enforcement (which term includes Fire Department) response; and

3. Injuries to any city personnel or law enforcement (which term includes Fire Department) personnel involved in such law enforcement (which term includes Fire Department) response.

c. The Sheriff's Department shall accurately compute the cost of providing such services in accordance with the schedule of rates and charges for personnel and equipment contained in the law enforcement services agreement and advise the City Manager of such costs as well as any other costs of damage to public property or injuries to personnel resulting from the law enforcement (which term includes Fire Department) response. The City Manager shall bill said costs (and any additional such costs of the city) to the person or persons specified above in subsection (a) of this section. Payment shall be due and payable within thirty days of the billing date. If the amount due is not paid, the city may collect the debt, as well as any fees and costs incurred in its collection, pursuant to all applicable provisions of law.

d. The remedies set forth in this section are not exclusive and may be used in addition to those set forth elsewhere in this code or by law.

(Ord. 92-354 Section 7, 1992: prior code Section 4308)

ROADWAY TRAFFIC SOURCE NOISE

Traffic noise is the dominant noise source in West Hollywood and is influenced by major roads such as Sunset Boulevard, Santa Monica Boulevard, La Brea Avenue, and Fountain Avenue. Existing vehicle traffic noise levels in the City were modeled using the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA-RD-77-108) and traffic data provided by the project traffic consultant (Fehr & Peers 2010). The FHWA model has been modified to use CALVENO reference noise factors for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receptor, and ground attenuation factors. Vehicle classification mix and vehicle speeds on study area roadways were based on field observations. Caltrans data were also available and used for vehicle mix data for state facilities (Caltrans 2009:13).

Table 2 summarizes the modeled traffic noise levels, provides noise levels at 75 feet from the centerline of each major roadway within the City, and lists distances from the roadway centerlines to the 60-dB, 65-dB, and 70-dB L_{dn} traffic noise contours. Figure 2 shows the traffic noise contours for roadways within the City. These traffic noise modeling results are based on existing average daily traffic (ADT) volumes. As shown in Table 2, the location of the 65 dB L_{dn} contour ranges from 76 to 487 feet from the centerline of the modeled roadways. The extent to which existing land uses in the project area are affected by existing traffic noise depends on their respective proximity to the roadways and their individual sensitivity to noise.

Table 2
Summary of Modeled Existing Traffic Noise Levels in the Planning Area

Roadway	Segment		L_{dn}, 75 Feet from Roadway Centerline (dB)	Distance (feet) from Roadway Centerline to L_{dn} Contour		
	From	To		70 dB	65 dB	60 dB
Beverly Boulevard	Doheny Drive	Robertson Boulevard	71	87	275	869
Beverly Boulevard	Robertson Boulevard	La Cienega Boulevard	72	116	368	1,163
Crescent Heights Boulevard	Santa Monica Boulevard	Romaine Street	69	55	175	552
Crescent Heights Boulevard	Sunset Boulevard	Santa Monica Boulevard	70	80	254	802
Doheny Drive	Santa Monica Boulevard	Beverly Boulevard	65	24	76	240
Doheny Drive	Beverly Boulevard	Alden Drive	66	31	97	305
Doheny Drive	Sunset Boulevard	Santa Monica Boulevard	66	33	103	326
Fairfax Avenue	Santa Monica Boulevard	Willoughby Avenue	70	73	230	728
Fairfax Avenue	Sunset Boulevard	Santa Monica Boulevard	70	75	237	749
Fountain Avenue	La Cienega Boulevard	Crescent Heights Boulevard	70	77	244	772
Fountain Avenue	Crescent Heights Boulevard	Fuller Avenue	71	83	264	834
Fountain Avenue	Fuller Avenue	Sycamore Avenue	71	85	269	852
La Brea Avenue	Santa Monica Boulevard	Romaine Street	70	68	216	684
La Brea Avenue	Sunset Boulevard	Santa Monica Boulevard	70	66	210	664
La Cienega Boulevard	Santa Monica Boulevard	Beverly Boulevard	70	71	223	706
La Cienega Boulevard	Sunset Boulevard	Santa Monica Boulevard	70	72	227	718
Melrose Avenue	Robertson Boulevard	La Cienega Boulevard	70	72	227	718

Roadway	Segment		$L_{dn,}$ 75 Feet from Roadway Centerline (dB)	Distance (feet) from Roadway Centerline to L_{dn} Contour		
	From	To		70 dB	65 dB	60 dB
Melrose Avenue	La Cienega Boulevard	N. Sweetzer Avenue	72	115	364	1,150
Robertson Boulevard	Beverly Boulevard	Alden Drive	68	47	147	466
Robertson Boulevard	Santa Monica Boulevard	Beverly Boulevard	66	28	88	278
San Vicente Boulevard	Santa Monica Boulevard	Beverly Boulevard	70	72	227	718
San Vicente Boulevard	Sunset Boulevard	Santa Monica Boulevard	68	43	137	434
Santa Monica Boulevard	Doheny Drive	La Cienega Boulevard	73	137	433	1,368
Santa Monica Boulevard	La Cienega Boulevard	Crescent Heights Boulevard	72	123	390	1,234
Santa Monica Boulevard	Westbourne Drive	La Cienega Boulevard	73	145	460	1,454
Santa Monica Boulevard	Crescent Heights Boulevard	Formosa Avenue	72	111	351	1,111
Santa Monica Boulevard	Formosa Avenue	Sycamore Avenue	72	109	344	1,088
Sunset Boulevard	Crescent Heights Boulevard	Formosa Avenue	73	154	487	1,539
Sunset Boulevard	Doheny Drive	La Cienega Boulevard	73	140	443	1,401
Sunset Boulevard	La Cienega Boulevard	Crescent Heights Boulevard	73	142	450	1,422

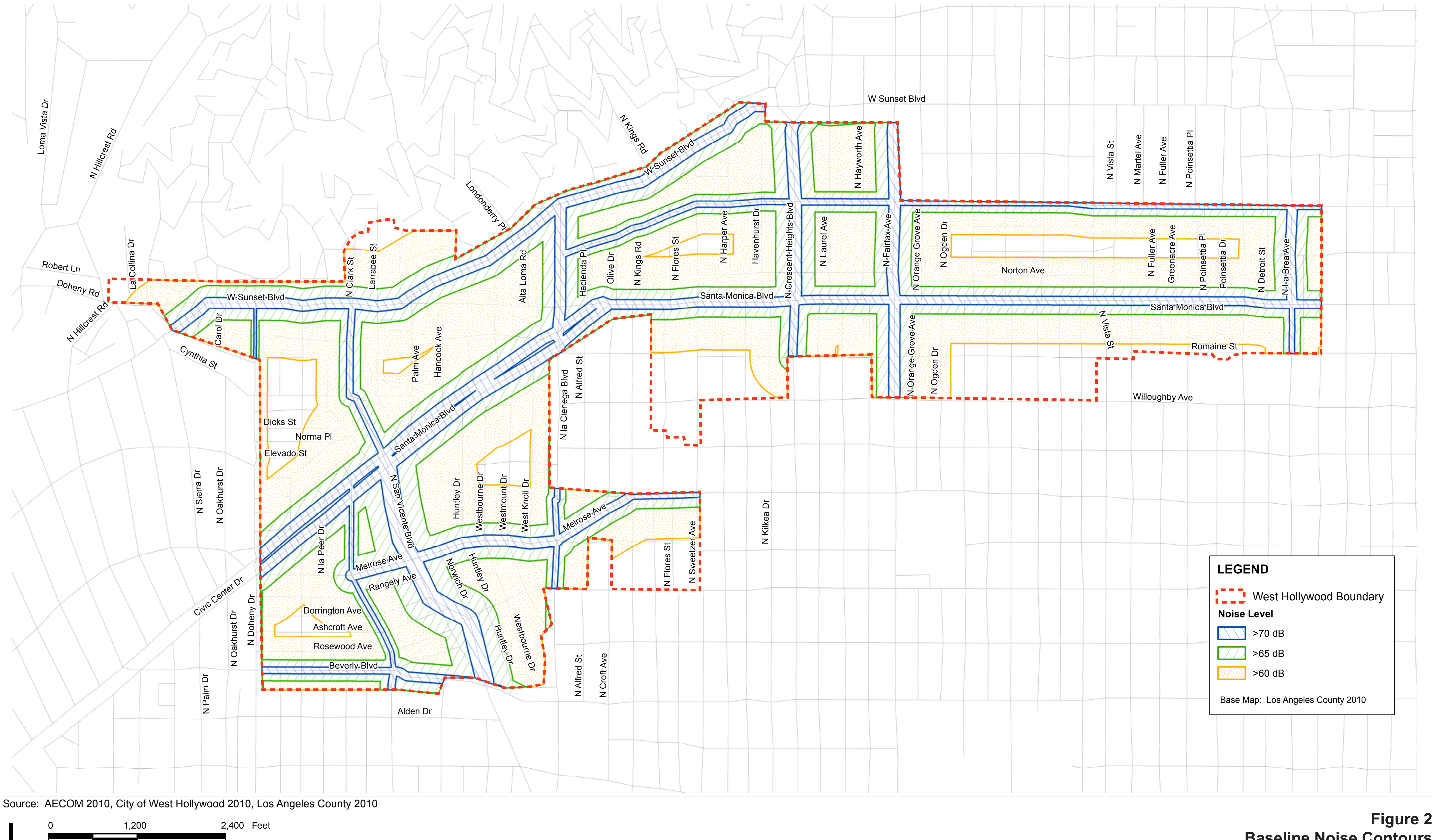
Notes: dB = A-weighted decibels; CNEL = Community Noise Equivalent Level
Source: Modeled by AECOM 2010

AIRCRAFT FLYOVER NOISE

Airports that are either public or serve a scheduled airline are required to have a comprehensive land use plan (CLUP) prepared by the airport land use commission (ALUC). The purpose of ALUC is to:

- Protect public health, safety, and welfare through the adoption of land use standards that minimize the public's exposure to safety hazards and excessive levels of noise.
- Prevent the encroachment of incompatible land uses around public-use airports, thereby preserving the utility of these airports into the future.

The adoption and implementation of a CLUP embodies the land use compatibility guidelines for height, noise, and safety. The Los Angeles County ALUC was established as the ALUC for public use airports in Los Angeles County (Los Angeles County ALUC 2004).



Source: AECOM 2010, City of West Hollywood 2010, Los Angeles County 2010

Figure 2
Baseline Noise Contours

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The closest airports in the vicinity of West Hollywood include Burbank/Glendale/Pasadena Airport, located approximately 7 miles to the north, and Santa Monica Municipal Airport, located approximately 7 miles to the southwest. Burbank Airport was established in 1930 as a private field and is now owned and operated by the Burbank-Glendale-Pasadena Airport Authority. This is a scheduled air carrier airport with a total size of 435 acres, containing 310 based aircraft, and has an ADT count of 600 operations. Burbank Airport maintains an active airfield on the premises and the 65-dB CNEL noise contour is approximately 5.5 miles from the nearest City boundary line (Los Angeles County ALUC 2004:4, 13). Santa Monica Airport began in 1926 when the City of Santa Monica purchased 158 acres of land adjacent to Ocean Park Boulevard for use as an airport. The airport is a general aviation airport and the oldest operating air field in Los Angeles County. The airport is approximately 225 acres in size, has approximately 550 based aircraft, and has an ADT count of 520 operations. Santa Monica Airport maintains an active airfield on the premises and the 70-dB CNEL noise contour is approximately 6 miles from the nearest City boundary line (Los Angeles County ALUC 2004:7, 21).

STATIONARY SOURCE NOISE

A significant stationary source of noise that exists in West Hollywood is the CEMEX ready mix concrete facility located at 1000 N La Brea Avenue. Adjacent land uses to CEMEX are not considered noise sensitive. Commercial corridors extending along major arterials (e.g., Sunset Boulevard, Santa Monica Boulevard) are also considered sources of stationary noise. Noise sources associated with these commercial uses would include rooftop heating, ventilation, and air conditioning units; parking lot movements; and loading dock activities.

COMMUNITY NOISE SURVEY

In the City of West Hollywood, the primary noise source is vehicle traffic. Ambient noise levels in the area are influenced by traffic on major roads such as Sunset Boulevard and Santa Monica Boulevard. A community noise survey was conducted to document existing ambient noise within noise-sensitive communities. Noise-sensitive receptors were defined as residential land uses, churches, theaters, and schools.

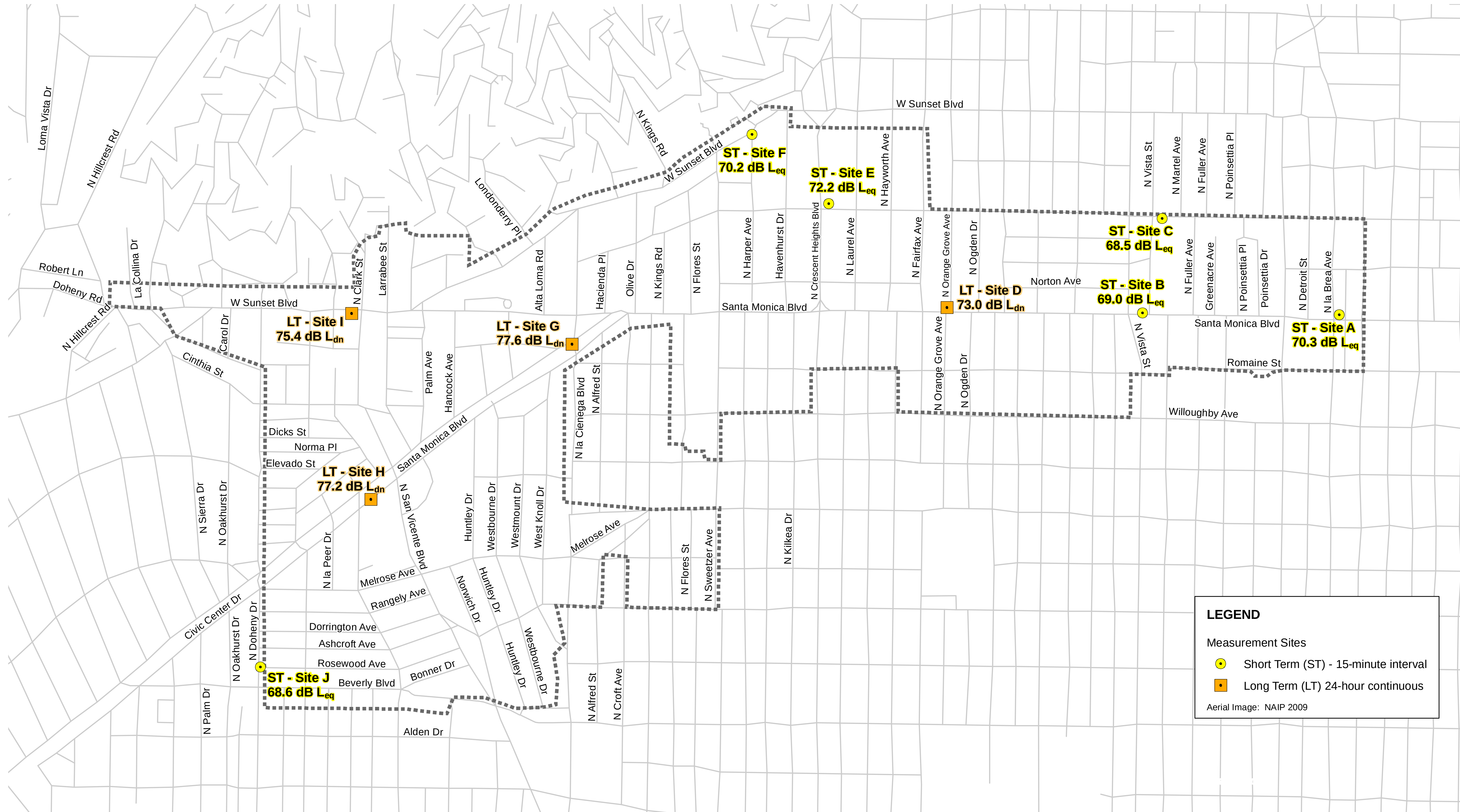
A community noise survey was conducted on January 27 through January 29, 2010, to document the existing noise environment at noise-sensitive receptors within the City and existing noise sources. The dominant noise source identified during the ambient noise survey was traffic from the local area roadway network. Measurements of noise levels were taken in accordance with American National Standards Institute (ANSI) standards at six locations using a Larson Davis Laboratories (LDL) Model 820 precision integrating sound-level meter. Continuous 24-hour, long-term monitoring of noise levels was conducted at four locations within the City using an LDL Model 820 sound-level meter. The sound-level meters were calibrated before and after use with an LDL Model CAL200 acoustical calibrator to ensure that the measurements would be accurate. The equipment used meets all pertinent specifications of the ANSI for Type 1 sound-level meters (ANSI S1.4-1983[R2006]).

Community noise survey locations are shown in Figure 3. The L_{eq}, L_{max}, L_{10}, L_{50}, and L_{90} values were taken at each short-term ambient noise measurement location presented in Table 3. During the survey, average daytime ambient noise levels ranged from 68.5 dB to 72.2 dB L_{eq}, with maximum noise levels that ranged from 79.1 dB to 93.4 dB L_{max}. Maximum noise levels (L_{max}) were attributable to back-up alarms, car horns, buses, and modified mufflers.

Table 3
Summary of Monitored Short-Term Daytime Ambient Noise Levels

Site	Location	Date/Time	Noise Sources	A-Weighted Sound Level (dBA)				
				L_{eq}	L_{max}	L_{10}	L_{50}	L_{90}
A	Intersection of North La Brea Avenue and Santa Monica Boulevard	January 29, 2010 1:250–1:40 pm	Traffic, pedestrians	70.3	83.0	72.9	68.7	64.8
B	Intersection of North Vista Street and Santa Monica Boulevard	January 29, 2010 1:46–2:01 pm	Traffic, pedestrians, parking lot, music	69.0	80.7	71.9	67.0	59.0
C	Intersection of North Vista Street and Fountain Avenue	January 29, 2010 2:05–2:20 pm	Traffic, music, leaf blower	68.5	79.1	71.3	68.0	60.1
E	Intersection of North Crescent Heights Boulevard and Fountain Avenue	January 29, 2010 2:32–2:47 pm	Traffic, music	72.2	93.4	73.6	69.0	63.1
F	Intersection of North Harper Avenue and Sunset Boulevard	January 29, 2010 2:57–3:12 pm	Traffic, pedestrians	70.2	81.6	73.5	68.6	61.6
J	Intersection of North Doheny Drive and Rosewood Avenue	January 29, 2010 3:27–3:42 pm	Traffic	68.6	86.7	71.5	65.8	60.2

Notes: dBA = A-weighted decibels; L_{eq} = equivalent noise level; L_{max} = maximum noise level; L_n = noise level exceeded n percent of a specific period of time.
Monitoring locations correspond to those depicted in Figure 3.
Source: Data collected by AECOM 2010



Source: AECOM 2010

0 1,200 2,400 Feet

Figure 3
Noise Measurement Locations

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The L_{dn}, L_{eq}, L_{max}, L_{50}, and L_{90} values were taken at each long-term ambient noise measurement location presented in Table 4. During the survey, 24-hour ambient noise levels ranged from 73.0 dB to 77.6 dB L_{dn}, with maximum noise levels that ranged from 83.3 dB to 92.3 dB L_{max}.

Table 4
Summary of Measured 24-hour Long-Term Ambient Noise Levels

				Average Measured Hourly Noise Levels, dBA					
				Daytime (7 a.m.–10 p.m.)			Nighttime (10 p.m.–7 a.m.)		
Site	**Location**	**Date**	**L_{dn}**	**L_{eq}**	**L_{max}**	**L_{50}**	**L_{eq}**	**L_{max}**	**L_{50}**
D	North Fairfax Avenue and Santa Monica Boulevard	1/27/10–1/28/10	73.0	68.7	87.6	66.1	66.1	83.3	62.5
G	La Cienega Boulevard and Santa Monica Boulevard	1/28/10–1/29/10	77.6	72.0	92.3	69.9	71.0	91.3	66.5
H	North Robertson Boulevard and Santa Monica Boulevard	1/28/10–1/29/10	77.2	70.3	89.0	67.2	70.8	86.6	66.5
I	Sunset Boulevard and San Vincente Avenue	1/27/10–1/28/10	75.4	70.1	89.3	66.9	68.8	86.1	64.0

Notes: dB = A-weighted decibels; L_{dn} = day-night average noise level; L_{eq} = the equivalent hourly average noise level; L_{max} = maximum noise level; L_{50} = the noise level exceeded 50% of a specific period of time; L_{90} = the noise level exceeded 90% of a specific period of time.
Monitoring locations correspond to those depicted in Figure 3.
Source: Data collected by AECOM 2010

NOISE-SENSITIVE LAND USES

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Additional land uses such as parks, historic sites, cemeteries, and recreation areas are also considered sensitive to exterior noise levels. Schools, places of worship, hotels, libraries, nursing homes, retirement residences, and other places, where low interior noise levels are essential, are also considered noise-sensitive land uses. The majority of noise-sensitive land uses within the City are residential, of which there are nine senior housing complexes (Figure 4). Additional sensitive land uses include 17 schools and learning centers, eight places of worship, and six parks within the City of West Hollywood (see Figure 4).

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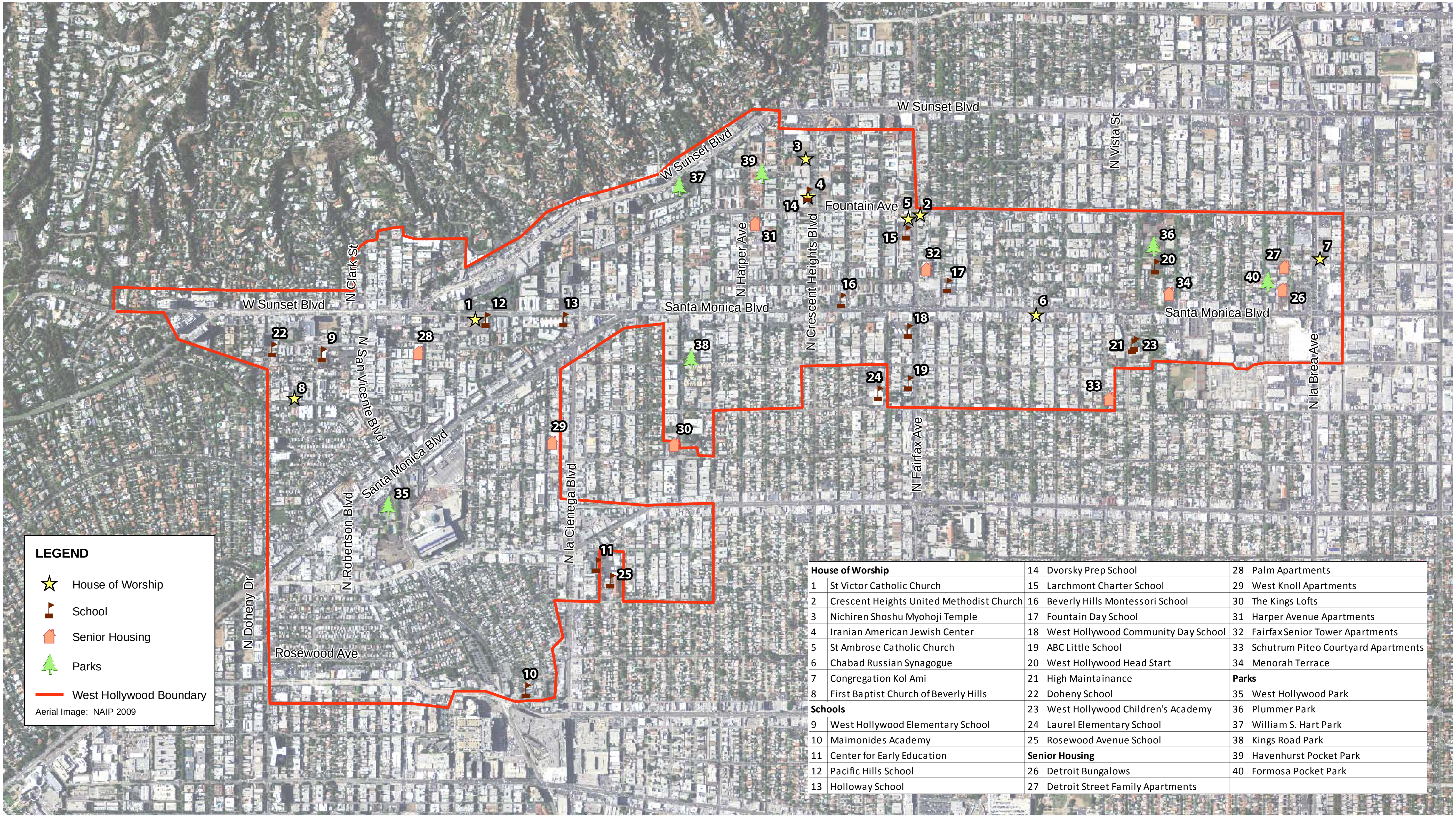

House of Worship		14	Dvorsky Prep School	28	Palm Apartments
1	St Victor Catholic Church	15	Larchmont Charter School	29	West Knoll Apartments
2	Crescent Heights United Methodist Church	16	Beverly Hills Montessori School	30	The Kings Lofts
3	Nichiren Shoshu Myohoji Temple	17	Fountain Day School	31	Harper Avenue Apartments
4	Iranian American Jewish Center	18	West Hollywood Community Day School	32	Fairfax Senior Tower Apartments
5	St Ambrose Catholic Church	19	ABC Little School	33	Schutrum Piteo Courtyard Apartments
6	Chabad Russian Synagogue	20	West Hollywood Head Start	34	Menorah Terrace
7	Congregation Kol Ami	21	High Maintainance	**Parks**	
8	First Baptist Church of Beverly Hills	22	Doheny School	35	West Hollywood Park
Schools		23	West Hollywood Children's Academy	36	Plummer Park
9	West Hollywood Elementary School	24	Laurel Elementary School	37	William S. Hart Park
10	Maimonides Academy	25	Rosewood Avenue School	38	Kings Road Park
11	Center for Early Education	**Senior Housing**		39	Havenhurst Pocket Park
12	Pacific Hills School	26	Detroit Bungalows	40	Formosa Pocket Park
13	Holloway School	27	Detroit Street Family Apartments		

Source: AECOM 2010, City of West Hollywood 2010, Los Angeles County 2010

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Figure 4
Noise-Sensitive Land Uses and Parks

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APPENDIX F

TRAFFIC STUDY

FEHR & PEERS
TRANSPORTATION CONSULTANTS

TECHNICAL MEMORANDUM

Date: June 22, 2010

To: Terri Slimmer

From: Brian Welch and Reid Keller

Subject: TRAVEL FORECASTS AND TRAFFIC IMPACT REPORT FOR THE WEST HOLLYWOOD GENERAL PLAN UPDATE

SM09-2221.02

INTRODUCTION

The City of West Hollywood General Plan update pursues the community's goal of a vibrant and livable City that is not dependant on the personal automobile for mobility through thoughtful allocation of new development and the introduction of innovative Travel Demand Management (TDM) programs.

The City built a travel demand model to quantify and understand the implications of these measures on travel. The City model, developed in the TransCAD Transportation Geographic Information System (GIS) software, was successfully calibrated and validated to current conditions.[1] Although there are seasonal variations in traffic in West Hollywood, the model was calibrated and validated to average mid-week traffic. The land use data and roadway network reflect 2008 conditions. The resulting model represents travel during a period when people in West Hollywood are participating in their normal day-to-day activities.

The West Hollywood travel demand model contains a number of innovative features that allow it to capture the effects of land use and policy initiatives on transportation and traffic congestion. These include the effects of potential development patterns, urban design factors, alternative transportation networks, parking management, and transportation demand management (TDM) programs. Also included is a more detailed analysis of how development patterns affect trip making and travel. This is assessed using a modeling strategy that includes an analysis of density, diversity, design, and destinations associated with the built environment, known collectively as the 4Ds.

The travel demand model provides metrics and indicators (traffic volumes, levels of service, VMT, etc.) that document the plan's ability to meet various transportation-related goals, objectives, and policies. In many cases these goals aim to decrease automobile use while promoting other modes. The extent to which policies that encourage transit usage or walking and biking are successful will be reflected in decreased reliance on the automobile for travel. Quantification of the expected mode shift that could result from the introduction of a robust and comprehensive TDM program, and the effect that this will have on automobile use is covered in this memo. In addition, indicators and results from the model will be used to support forthcoming CEQA documentation.

[1] For details regarding the model development, including calibration and validation statistics, please refer to *West Hollywood Model Development Report* (Fehr & Peers, 2010).

This technical memorandum presents a comparison between the West Hollywood General Plan Update Proposed General Plan, Existing (2008) conditions, and the three alternative horizon year (2035) scenarios for a variety performance measures. The alternative scenarios include the Existing General Plan (No Project), the Transit Oriented Development (TOD) Focus Alternative, and the Extensive TDM Alternative.

This memo presents the following:

- A discussion of existing automobile circulation in West Hollywood
- Descriptions of the Proposed General Plan and future year alternative scenarios
- A brief overview of the Travel Demand Model
- A brief overview of how the forecast data was prepared using the Travel Demand Model
- A comparison of key performance measures, including intersection levels of service (LOS), daily and peak hour roadway segment volumes, vehicle miles traveled (VMT), vehicle hours traveled (VHT), vehicle trips (VT), average trip length, and Greenhouse Gas (GHG) emissions
- Intersection impact analysis.

EXISTING CONDITIONS

Automobile Circulation

The City of West Hollywood General Plan circulation element defines the functional classification of major roadways inside the City boundaries. Traditionally, functional classification has been applied to automobile traffic and describes the extent to which a given roadway segment fulfills its two general purposes of mobility and access. Most local jurisdictions define five or more functional classifications, ranging from local streets, which primarily provide access, to freeways, which primarily provide mobility. The City of West Hollywood specifically defines only three classes of roadways; arterial, collector, and local. This limited classification is reasonable in West Hollywood, a geographically small city with few different types of roadways. Figure 1 illustrates the current roadway functional classification system.

Major east-west vehicle thoroughfares with the City include Santa Monica Boulevard, Sunset Boulevard, and Fountain Avenue which serve not only local trips but a significant number of regional trips. In the north-south direction, La Brea Avenue and La Cienega Boulevard serve regional as well as local trips.

Existing Automobile Traffic in West Hollywood

West Hollywood has a limited supply of roadway and intersection capacity, and there is high demand throughout the day for automobile travel within, to, and through the City. Additionally, many operational conditions contribute to traffic friction, including a large number of closely-spaced traffic signals and most major corridors being lined with commercial land uses and on-street parking. The result is congestion experienced in West Hollywood not just during the traditional a.m. and p.m. peak periods, but for long periods throughout the day.

The City of West Hollywood is a built out city situated in the midst of a highly urbanized area. Cut-though traffic - trips with neither a beginning nor an end in the City - accounts for a sizeable portion of vehicle trips in West Hollywood. Additionally, West Hollywood attracts trips from all over the Southern California area as a regional destination for entertainment and shopping.

Therefore, much of the traffic in West Hollywood can be attributed to sources over which the City has little control, in the case of cut-through traffic, or that are vital to the City's ongoing economic success, such as attracting regional visitors. Additionally, because the City is built out, increasing roadway capacity may not feasible or even desirable.

The following issues contribute to the congested traffic conditions experienced in West Hollywood:

- A variety of factors contribute to a high demand for vehicular travel in and through the City. Regional trips are attracted to West Hollywood's jobs, entertainment, and shopping amenities. Additionally, the City is surrounded by a broad mixture of land uses that interact with one another, sending automobile traffic through the streets of West Hollywood, which consumes limited roadway and intersection capacity.

- West Hollywood is situated in a region where the automobile is the dominant form of transportation. Although the City itself is relatively compact and amenable to alternative modes of transportation, its regional context suggests that the automobile will be the dominant mode of transportation in the City as well. Trips from and through the City from neighboring jurisdictions, as well as trips by West Hollywood residents from the City to other areas generally rely on the automobile.

- Traffic carrying capacity along most major and minor streets, especially Sunset and Santa Monica Boulevards, is limited by commercial uses along each corridor with on-street parking and large numbers of traffic signal installations.

- Parking is allowed along most major streets in the City. While supplying parking to supplement deficiencies in off-street parking availability, on-street parking reduces the available right-of-way for traffic carrying lanes, and vehicles attempting to access this parking often block a lane of travel while they execute the parking maneuver. The City has addressed this problem by imposing peak period parking restrictions along certain corridors.

GENERAL PLAN HORIZON YEAR (2035) ALTERNATIVES

The West Hollywood General Plan update explores four future policy and land use alternatives, defined as follows:

- **Proposed General Plan** - This is the preferred project and it includes increased development potential along the commercial corridors. In some areas, increases in allowable height and Floor Area Ratio (FAR) are being proposed. In other areas no increases to FAR or height are being proposed, but policy incentives such as shared parking and parking districts are expected to spur additional development. Proposed development bonuses for desirable development characteristics, such as affordable housing and green buildings, may increase the maximum intensity of eligible parcels.

- **No Project/Existing General Plan** – This alternative assumes that the Proposed General Plan is not adopted and that the existing General Plan remains in effect. No new policies for issues such as climate change, parking, or TDM are created as part of the

General Plan. As a result of the assumptions, this alternative has less overall growth than the proposed General Plan but does not meet other General Plan objectives such as encouraging a wider diversity of housing and increasing development opportunities in transit-rich areas. The alternative also does not address climate change in a comprehensive way as no policies exist in the current General Plan to reduce GHG emissions.

- **TOD Focus Alternative** – This alternative focuses new development around two transit nodes, La Brea Avenue & Santa Monica Boulevard and Fairfax Avenue & Santa Monica Boulevard. The focused development occurs by maintaining the existing General Plan land use designations in all areas of the city except for the transit nodes where the FAR and maximum allowable height would be increased on some parcels. This alternative assumes that the new "subway to the sea" will open toward the end of the General Plan time horizon and that future development under this General Plan will be focused only in these areas. Policies to encourage development in the TOD areas – such as parking reductions, TDM, etc – are included in the alternative. Policies are also created to discourage development in areas outside of the two designated growth areas. This alternative has the least amount of new growth of the future alternatives being considered as part of the General Plan update.

- **Extensive Transportation Demand Management (TDM) Alternative** - This alternative uses the same land use assumptions as the Proposed General Plan, but introduces more aggressive TDM policies. The TDM policies will require a significant number of existing and new trips to be taken using transit, biking and walking. The overall amount of development is expected to be the same as the Proposed General Plan but the TDM program would reduce traffic congestion.

MODEL OVERVIEW

As noted, the forecasts for this memo were prepared using the West Hollywood Travel Demand Model developed by Fehr & Peers on the TransCAD platform. The travel demand model is based on three core components:

- A **land use** database – In this case a parcel level database provided by the City with detailed information on the type and amount of development on each parcel, stratified into multiple categories. Land use databases were prepared by the City for existing conditions and projected amounts and locations of future residential and non-residential growth. Existing and future land use outside the City of West Hollywood was drawn from the Southern California Association of Governments (SCAG) regional travel demand model.

- A **highway and roadway network** database – The highway and roadway network in this case was based on the City's GIS roadway centerline file. The model roadway network includes all roadway facilities in the City of West Hollywood as well as relevant roads in Los Angeles and Beverly Hills bordering West Hollywood.

  As is typical for urban-area models, the model network focuses on larger facilities and does not attempt to replicate travel patterns on local residential streets, but does include them to distribute traffic. The travel model includes 22 external stations to represent travel to and from areas outside the City. These stations, located on streets that provide access into and out of the model area, capture the traffic entering, exiting, and passing through the model area.

- A table of **trip generation rates** – Initial rates were researched from sources including SCAG, the National Household Travel Survey, the San Diego Association of Governments (SANDAG), and the Institute of Transportation Engineers (ITE). Trip generation rates were then calibrated to match the existing trip-making characteristics of West Hollywood.

The model was validated and calibrated to standards set by Caltrans, the Federal Highway Administration (FHWA), and Fehr & Peers. Once the model met the required set of calibration and validation criteria, the land use database was modified to reflect future development growth. This growth can be attributed to two sources:

1. Currently pending, approved, and under construction development projects and;

2. Forecasts of future growth and development to occur by the horizon year (Year 2035) under the various future land use scenarios.

Interactions between the study area and the outside world were addressed through the process of balancing trip productions with trip attractions. At one extreme, a job-rich area needs to import people from outside to fill those jobs and use the services they are providing. At the other extreme, a housing-rich area needs to export residents from the study area to work and shop. West Hollywood is a bit different; while it has a mix of jobs and housing, most workers still leave the area for employment and most employees live outside the area.

The West Hollywood Model balancing was calibrated to existing conditions. The change in land use associated with the various future land use scenarios did not substantially alter the existing jobs/housing mix, and absent strong policy goals that require new housing to be filled by area workers, the existing commuting patterns are likely to remain the same. As such, the existing balancing was used.

In addition to land use database changes, funded roadway projects are usually added to the highway network database. However, as a built-out city, West Hollywood will not likely have any major new capacity adding roadway projects. Similarly, Capital Improvement Programs for the cities of Beverly Hills and Los Angeles do not indicate any funded improvements in the areas of those jurisdictions covered by the travel model. Therefore, the existing roadway network was carried forward for the future forecasts.

PREPARATION OF THE FORECAST DATA

Trip Adjustments for Land Use and Policy Strategies

The West Hollywood Travel Model contains a number of enhancements that allow it to capture the effects of land use and policy initiatives on transportation and traffic congestion. These include the effects of potential development patterns, urban design factors, alternative transportation networks, parking management, and Travel Demand Management (TDM) programs. Also included is a more detailed analysis of how the fabric of urban design affects trip-making and travel. This is assessed using a modeling strategy known as the 4Ds.

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4Ds: Overview

The following narrative, prepared by Reid Ewing[2], summarizes the 4D process and is included to provide an overview of the approach:

> Some of today's most vexing problems—sprawl, congestion, oil dependence, climate change—are prompting states and localities to turn to land planning and urban design for help in reducing automobile use. Many have concluded that roads cannot be built fast enough to keep up with travel demands induced by road building itself and by the sprawling development patterns it spawns. Travel demand must somehow be moderated.
>
> The potential to moderate travel demand through changes in the built environment is the subject of more than 150 empirical studies. It has become the most heavily researched subject in urban planning.
>
> In travel research, urban development patterns have come to be characterized by "D" variables.

Density is measured in terms of activity level per unit area. Density is measured on a population and employment basis. Population and employment density per acre are summed to compute an overall "activity density."

Diversity is related to the number of different land uses in an area, and the degree to which they are "balanced" when comparing (1) regional employment and regional population with (2) local employment and local population.

Design includes street network characteristics within a neighborhood. Street networks vary from dense urban grids of highly interconnected, straight streets to sparse suburban networks of curving streets forming "loops and lollipops." Street accessibility is measured in terms of number of intersections per square mile.

Destination accessibility is synonymous with regional accessibility. It is represented by the number of jobs or other attractions (for example shopping opportunities) reachable within a given travel time, which tends to be highest at central locations and lowest at peripheral ones. The gravity model of trip attraction measures regional accessibility.

The 4Ds compare the built environment characteristics of the future scenarios to the existing (2008) conditions on the ground. For each of the "D" variables, there is an associated elasticity, derived from numerous studies, which is used to adjust the vehicle trip generation of each TAZ. The elasticities utilized in the West Hollywood model are as follows:

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[2] *Travel and the Built Environment* (Reid Ewing)

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Variable	**Vehicle Trip Elasticity**
Density	-0.04
Diversity	MXD[3]
Design	-0.02
Destination	-0.03

In practice, elasticity is a measure of the percentage change that occurs in an independent variable (vehicle trips) as a result of a percentage change in an influential variable (density, diversity, design, or destinations). For example, if vehicle trips decrease by 0.04% for each 1% increase in density, then vehicle trips are said to have an elasticity of -0.04 with respect to density.

Because the 4Ds are based on physical characteristics of the built environment, the calculation of these variables is an exercise in spatial modeling, and the process is performed outside of the travel demand model using GIS desktop software. GIS files with land use data and the location of intersections are used as inputs. A "D" variable value for each TAZ is the output.

The density and diversity "D" variables for each TAZ take into account not only the total land use within that zone, but the land use that is within a ¼-mile radius of that zone. The ¼-mile radius is assumed to be a reasonably conservative distance that people can easily walk. This process is designed to account for land uses, such as neighborhood commercial land uses, that are "right across the street" for a person on foot or bicycle, but would require a trip of a much longer distance if the traveler followed the model network. Thus, these variables are calculated to take into account the experience of a person on foot or bike.

The design variable looks at street connectivity and sidewalk design. More connected streets (as opposed to cul-de-sacs, for instance) generally allow for more direct walking and cycling, making these modes more attractive. The design variable uses the number of intersections within ¼ mile. West Hollywood, as a built-out city with small block lengths, a dense grid network, and near complete sidewalk connectivity, already reflects many of the ideal urban design characteristics that the design "D" looks for. The level of data precision does not allow the measurement of the types of changes West Hollywood would likely experience, such as sidewalk widening and treatments, or the addition of shade trees. As a result, the design "D" does not result in substantial vehicle trip reductions in West Hollywood since most of the mode shift associated with it has already been achieved.

The destinations "D" is calibrated in the model structure. West Hollywood is a small city and all areas have about the same level access to regional destinations. The geographic distribution of these regional commercial centers is not anticipated to change to any great extent, and consequently future year scenarios carry forward the current rates for the destinations "D."

The total amount of new growth projected for West Hollywood is relatively modest compared to the quantity of existing development given the 27-year time horizon. Growth attributable to the General Plan update land use scenarios can be summarized as follows:

---

[3] West Hollywood diversity reductions were calculated using the Mixed Use District (MXD) methodology. The MXD method predicts a decrease in Home Based Work (HBW), Home Based Other (HBO), and Non-Home Based (NHB) trips from ITE trip rates. The initial reduction from ITE trip rates was assumed to have already been part of the model calibration process. As such, the reduction was calculated using the existing land use data, and then the future scenario land use data. Any further change from existing conditions was used as the reduction in vehicle trips for the future scenarios.

	Proposed General Plan Change from Existing	No Project Change from Existing	TOD Focus Alternative Change from Existing	Extensive TDM Alternative Change from Existing
Population	18.3%	17.3%	14.1%	18.3%
Total Employment	19.9%	18.1%	11.3%	19.9%
Retail	9.4%	9.4%	9.9%	9.4%
Office	24.0%	20.6%	8.7%	24.0%
Other	32.7%	32.4%	27.8%	32.7%

The 4D effects, as noted, apply to areas that change between two scenarios, in this case existing and future conditions. When the amount of change anticipated is modest, the 4D effects will therefore be somewhat muted due to the relatively small amount of change compared to the base condition.

In addition, since the 4D effects measure change from a base condition, those communities with initially (1) higher density, (2) better diversity, (3) stronger design, and (4) establishment as a destination – compared to regional and national averages – will show less overall impact of the Ds when comparing base conditions with future conditions. In other words, if existing West Hollywood transformed from a low density, wholly residential, poorly connected, remote community to something just the opposite in the future, the Ds would significantly alter trip generation between existing and future conditions. However, as the model effort shows, West Hollywood's base condition is characterized by beneficial densities, good diversity, excellent design, and a strong role as a destination. It is therefore much more difficult to realize high trip reductions attributable to the Ds.

While the D reductions are relatively modest, they in no way indicate a lack of 4D effectiveness in West Hollywood. In fact, the City is already experiencing many of the benefits attributable to the D factors, and the Proposed General Plan furthers that trend.

Within West Hollywood, people make significantly different transportation choices when they travel to districts with a greater density and diversity of land uses. The Proposed General Plan makes the most of these differences by focusing efforts to reduce auto use in areas where people are already likely to be less reliant on automobile use. The beneficial relationship between West Hollywood's existing 4D qualities with policy-based trip reduction strategies, as discussed below, is significant.

Policy-Based Trip Reduction Strategies: Overview

In addition to a land use plan, the West Hollywood Proposed General Plan contains a number of policy initiatives and TDM strategies aimed at strengthening West Hollywood's alternative transportation network and encouraging travelers to shift modes. A potential range of policies was outlined by City staff and the effect of these policies was investigated and reported in *West Hollywood General Plan Update Trip Reduction Impacts* (Nelson\Nygaard, 2010). The entire report is included as Appendix B.

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Analytical Methodology Employed

The following text, supplied by Nelson\Nygaard, provides an overview of the analytical methodology used to evaluate the various policy options and TDM programs:

- The potential range of transportation policies and programs under three different General Plan policy alternatives was outlined by Nelson\Nygaard in discussion with City staff and the full project team. (Please see Appendix B). Nelson\Nygaard then worked with the full City and consultant team to refine and operationalize these policy alternatives based on past and current experience in West Hollywood. For example, some existing policies and programs are evaluated based on status quo implementation or expanded implementation, and for new policies or programs, a modest or robust implementation framework was considered. Some policies and programs evaluated would primarily affect vehicle trips associated with new development (such as TDM requirements for new development projects), while others could also reduce existing traffic congestion (such as subsidized transit and more comprehensive parking pricing/cash-out program).
- Based on the best available research tailored to local conditions in West Hollywood, Nelson\Nygaard derived planning-level, order-of-magnitude estimates of the reductions in peak-hour vehicle trips that could be anticipated with the a) continuation of existing policies and programs and b) implementation of new policies and programs that research has shown to have a proven effect on mode choice and travel behavior.
- The reductions were quantified based on whether a trip was a commuter trip purpose or a non-commuter trip purpose and if a trip was a new trip or an existing trip. In addition, trips ending in different areas were reduced by different levels based on an analysis of the likely effectiveness of different strategies in different geographic areas. For many policy strategies, trips ending in the Commercial Corridor or TOD areas were reduced by a greater percentage than trips ending in the residential area based on the assessment that certain strategies would have a greater effect on reducing peak hour vehicle trips in some areas and a lesser effect in others (please see Figure 2 for location of the Area Types).

Nelson\Nygaard estimates of the likely peak-hour vehicle trip reduction impacts of Proposed General Plan, the TOD Focus Alternative, and the Extensive TDM Alternative policies and programs were drawn from their own library of best practice case studies as well as a literature review. Wherever possible, the estimates were based on quantitative data (empirically derived or modeled). When appropriate, professional judgment was used to refine the estimates as appropriate for the West Hollywood context, based on experience in developing and analyzing vehicle trip reduction strategies. At every step of the analysis, the assumptions and analysis were conservative to avoid overstating potential benefits. At the same time, the inverse error of being overly conservative and thereby understating potential benefits was avoided.

The analysis represents the highest and best professional standards of transportation planning. The team is confident in the validity and accuracy of these conclusions for purposes of deriving planning-level, order-of-magnitude estimates of the likely peak hour vehicle trip reduction benefits of future scenario transportation policies and programs.

Overview of Analytical Outputs

Appendix B contains a detailed explanation of the methodology utilized and outputs of the analysis. Highlights are provided below.

Summary of Outputs

Nelson\Nygaard's findings suggest that West Hollywood can certainly reduce per capita vehicle trips with the implementation of trip reduction strategies. While the precise impacts of specific trip reduction policies can vary depending on a number of factors, peer-reviewed empirical evidence, real-world experience of West Hollywood and other peer communities, and basic economic theory provide overwhelming support for our findings in this report that a concerted and comprehensive effort to promote mode shift and reduce vehicle trips can be effective. The order-of-magnitude estimates of likely trip reduction impacts for the three different policy scenarios and each potential policy are summarized below.[4]

Aggregate Impacts[5]

The cumulative estimates of trip reductions for each of the three General Plan alternatives were developed using a non-additive methodology.[6] The aggregate order of magnitude reductions in peak hour vehicle trips that result from implementation of a comprehensive package of strategies discussed in *West Hollywood General Plan Update Trip Reduction Impacts Analysis* are summarized below, with the full findings presented in Appendix B. Figure 2 shows the boundaries of the area types used in this analysis.

- **Existing General Plan.** In the "No Project" scenario, there will likely be no reduction in peak hour vehicle trips (relative to existing):

  Commuter Trips

  - Commercial Corridors: 0%
  - TOD Zones: 0%
  - Residential Zones: 0%

  Non-Commuter Trips

  - Commercial Corridors: 0%
  - TOD Zones: 0%
  - Residential Zones: 0%

- **Proposed General Plan.** In the Proposed General Plan, there will likely be moderate reductions in peak hour vehicle trips (relative to existing) as follows[7]:

  Commuter Trips

  - Commercial Corridors: 20.4%

4 The full analysis and findings, including definitions of area types and trip types, are presented in Appendix B.
5 The full findings are presented in Appendix B.
6 For more information on the non-additive methodology, refer to the section titled "Non-additive impacts".
7 All percentage reduction numbers represent a weighted average for new and existing trips. The net increase in HBW attractions was used as a proxy for new commuter trips, while the net increase in HBO and NHB was used a proxy for new non-commuter trips. In practice, through redevelopment of existing buildings, it is likely that some existing trips will be arriving at new, more TDM friendly buildings in the future. The resulting number therefore represents a conservative estimate of overall trip reductions.

- TOD Zones: 23.2%
- Residential Zones: 12%

Non-Commuter Trips

- Commercial Corridors: 3.0%
- TOD Zones: 5.7%
- Residential Zones: 1.8%

- **TOD Focus Alternative.** In the TOD Focus Alternative, there will likely be moderate reductions in peak hour vehicle trips (relative to existing) as follows[8]:

  Commuter Trips

  - Commercial Corridors: 30.1%
  - TOD Zones: 32.0%
  - Residential Zones: 10.0%

  Non-Commuter Trips

  - Commercial Corridors: 5.0%
  - TOD Zones: 10.4%
  - Residential Zones: 2.5%

- **Extensive TDM Alternative.** In the Extensive TDM Alternative, there will likely be moderate reductions in peak hour vehicle trips (relative to existing) as follows[9]:

  Commuter Trips

  - Commercial Corridors: 36.0%
  - TOD Zones: 37.0%
  - Residential Zones: 19.6%

  Non-Commuter Trips

  - Commercial Corridors: 12.6%

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[8] All percentage reduction numbers represent a weighted average for new and existing trips. The net increase in HBW attractions was used as a proxy for new commuter trips, while the net increase in HBO and NHB was used a proxy for new non-commuter trips. In practice, through redevelopment of existing buildings, it is likely that some existing trips will be arriving at new, more TDM friendly buildings in the future. The resulting number therefore represents a conservative estimate of overall trip reductions.

[9] All percentage reduction numbers represent a weighted average for new and existing trips. The net increase in HBW attractions was used as a proxy for new commuter trips, while the net increase in HBO and NHB was used a proxy for new non-commuter trips. In practice, through redevelopment of existing buildings, it is likely that some existing trips will be arriving at new, more TDM friendly buildings in the future. The resulting number therefore represents a conservative estimate of overall trip reductions.

- TOD Zones: 12.7%
- Residential Zones: 6.9%

Stand-Alone Impacts[10]

The order-of-magnitude reductions in peak hour vehicle trips that result from implementation of individual strategies are discussed in Appendix B. In general, the most effective individual trip reduction strategies—when evaluated in isolation—will likely be a continuation and/or enhancement of the following policies and programs:

- Public parking management/pricing to discourage commuter parking
- Parking cash-out programs, including a local ordinance and/or local enforcement of existing State law
- Subsidized transit
- Transit system improvements
- Carpooling incentives
- Telecommuting and alternative work schedules

Some strategies will certainly have an impact on reducing peak-hour commuter vehicle trips (e.g., enhancements to pedestrian and bicycle facilities), but those impacts could not be quantified at this time. For more information see "Impacts of Some Strategies not Quantifiable with Available Information" below.

Impacts of some strategies were not quantifiable with available information

The estimated reduction in peak-hour vehicle trips can be quantified with greater certainty for some policies and programs due to available data, while others do not lend themselves to easy quantification due to lack of data or other unknown variables. Where there was not enough available data to quantify the likely impact, we indicated in our analysis that the impact was "not known" or "not applicable." It must be stated emphatically that such a designation does not necessarily mean that a strategy has no impact on reducing vehicle trips in reality. Instead, these designations mean that:

- The impact on peak-hour trips is not significant enough to model (e.g., the impact could fall within the margin of error);
- In our professional opinion there is no solid basis (e.g., empirical research or published case studies) for documenting the precise trip reduction impacts; or
- We believe the 4D (density, design, diversity, destinations) traffic model adjustments conducted by Fehr & Peers will adequately account for the impacts of this strategy.

We have therefore excluded the impacts of certain strategies from this analysis in order to avoid the risk of misstating the likely benefits or to avoid "double counting" the benefits (e.g., pedestrian improvements adequately accounted for under "street network connectivity" factor of the 4D traffic model adjustments).

[10] The full analysis and findings are presented in Appendix B.

It should also be noted that for certain measures, such as unbundled parking and carsharing, reductions in household vehicle ownership were calculated rather than peak hour vehicle trip reductions. While there is undoubtedly a correlation between vehicle ownership and peak hour vehicle trips (e.g., lower auto ownership rates correlate with lower trip generation rates), there is currently insufficient research available to offer an estimate of the exact nature of that relationship. For this reason we have taken a conservative approach and assumed that each proposed policy either affects vehicle trip generation rates or vehicle ownership rates, but not both. In addition, for those strategies where we were only able to quantify vehicle ownership reductions, we have been conservative and assumed that those impacts are already accounted for by trip reduction strategies that we were able to quantify.

Non-Additive Impacts for Each Policy Alternative

The cumulative estimates of trip reductions for each of the three General Plan alternatives were developed using a non-additive methodology. This was done for several reasons, including:

- Evaluative research of vehicle trip reduction strategies often attempts to isolate the stand-alone effects of implementing these strategies in order to understand the actual relationship of the independent and dependent variables. Often it is difficult to isolate these effects because in reality, multiple changes to the transportation system occur concurrently.
- Because trip reduction strategies often support one another in creating high-quality alternatives to auto commuting, multiple strategies implemented jointly can leverage greater impacts when compared to stand-alone implementation. For example, constructing the Subway to the Sea and offering subsidized transit fares will increase transit ridership (and reduce vehicle trips) to a greater degree than one or other in isolation.
- Conversely, some trip reduction strategies are mutually exclusive. For example, Nelson\Nygaard considered telecommuting to be a mutually-exclusive strategy from other TDM strategies (since telecommuters cannot by definition commute by transit, carpooling, bicycling, etc.). These impacts were therefore “netted out” of the cumulative estimates for certain policy alternatives.
- The stand-alone estimates of the effectiveness of strategies such as pricing of public parking were reduced in the cumulative estimates, given that the City of West Hollywood can only directly influence the pricing structure of the on-street parking and off-street lots and garages which are under its jurisdiction. Since the City has jurisdiction over an estimated 30% percent of the publically-available parking within West Hollywood’s boundaries, the impact of parking pricing in the cumulative trip reduction estimates were reduced to account for this.
- When estimating the cumulative impacts of multiple transit-related strategies (e.g., subsidized transit fares, fare-free transit zones, transit system improvements), the stand-alone impacts for each individual strategy were adjusted by varying degrees depending on the area type and General Plan alternative. This was done based on professional judgment and common sense to reflect the fact that, while these are complementary transit measures that have increased efficacy when implemented together, there is a

practical limit to how many vehicle trips can reasonably be expected to be converted to transit trips in West Hollywood even under the most aggressive policy scenario.[11]

Putting It All Together

Figure 3 illustrates the total trip reductions achieved during the p.m. peak hour for the horizon year scenarios. These trip reductions are attributable to the 4Ds and TDM measures as described above.

As the figure shows, scenarios such as the Proposed General Plan and Extensive TDM Alternative, with more development in areas with stronger TDM measures, see the greatest reductions in trip generation.

Development of the Forecast Volumes

The development of the forecast volumes for this analysis followed the approach presented in *National Cooperative Highway Research Program (NCHRP) Report 255* (Transportation Research Board, 1982). This approach is the accepted professional standard for preparing traffic forecasts for urbanized area planning applications.

The NCHRP Report 255 approach involves post-processing model data and applying the growth to existing counts collected in the field. The first step in the process is to run the validated base year model and collect data for the desired segments and intersection turning movements. The model is then updated with future year land use changes and highway network improvements and run again. The data for the same study segments and turning movements is again collected from the future year model run.

The data from both model runs is then compared and applied to the existing counts using one of two methods depending on the relationship between the count and base year model volume at that location:

- The difference method directly applies the difference between the future and base year model runs to the existing count. This method is used when the existing count and the existing model volume are similar at the location being forecast.

- The ratio method factors the existing counts by the ratio of the future year data to the base year data. This method is used when the difference between the existing count and the existing model volume is comparatively large. In this case, numeric changes can be overstated at the location being forecast, and using the ratio is more appropriate.

PEAK HOUR INTERSECTION LEVEL OF SERVICE ANALYSIS

Table 1 and Figure 4 illustrate existing intersection LOS at 42 major signalized intersections throughout the City during the a.m. and p.m. peak hours. These intersections were analyzed according to the Highway Capacity Manual (HCM) methodology using the Synchro software

[11] These constraints include financial, technical, or political limitations on the ability to implement more aggressive TDM strategies. Nelson\Nygaard therefore believes that it is prudent to acknowledge these real-world implementation constraints when developing the cumulative trip reduction estimates by recognizing that there is likely a practical limit to the total trip reductions that can be achieved even in the most aggressive implementation scenario.

package.[12] LOS definitions for signalized intersections are shown in Table 2 and stop-controlled intersections in Table 3.

The following figures and tables illustrate intersection LOS at the study intersections for the horizon year scenarios:

- Proposed General Plan: Figure 5, Table 4
- No Project: Figure 6, Table 5
- TOD Focus Alternative: Figure 7, Table 6
- Extensive TDM Alternative: Figure 8, Table 7

Figures 9 and 10 chart the frequency distribution of LOS during the a.m. and p.m. peak hours, respectively, for the existing year (2008) and all horizon year (2035) scenarios. These figures depict the level of vehicular congestion in the City under each scenario. More intersections towards the LOS A-C side of the chart indicate less congestion, while more intersections operating towards the LOS F side of the chart indicate greater vehicular congestion. Figure 11 highlights the number of intersections operating at LOS F during the a.m. and p.m. peak hours for all scenarios, where more LOS F intersections indicate greater vehicle congestion.

Comparing the Scenarios: What Does it All Mean?

In all scenarios, including existing conditions, congestion levels are generally better during the a.m. peak hour than the p.m. peak hour in both analysis years. All future scenarios lead to an increase in traffic at the study intersections. The p.m. peak hour particularly shows a trend towards worse LOS between 2008 and 2035 under all future scenarios, with a greater frequency of intersections operating at LOS F.

It should be noted that through trips will continue to grow regardless of decisions made in West Hollywood as development in the surrounding jurisdictions continues to grow. Therefore all future scenarios will see some growth in congestion regardless of the quantity of development or TDM programs implemented.

However, amongst the various future scenarios the increases in congestion vary substantially. The major difference between these scenarios can be attributed to the scope of TDM programs being proposed and the trip purpose, commute or non-commute, that these programs influence. The reduced level of future development does have some effect on congestion with the TOD Focus Alternative, but not to the extent as the TDM measures do in the Proposed General Plan and Extensive TDM Alternative.

Currently, commute trips account for roughly 20% of West Hollywood's daily total. Commute trips climb as high as 44% during the a.m. peak hour. TDM programs that target commute trips are an effective way of reducing a.m. peak hour congestion.

During the p.m. peak hour, commute trips make up 27% of the total. This number is somewhat lower than the average American city and can be attributed to the concentration of retail, restaurant, and nightlife land uses in the West Hollywood. While TDM programs targeting

[12] Source: *Highway Capacity Manual* (Transportation Research Board, 2000).

commute trips are still effective in reducing p.m. peak hour congestion, scenarios with more aggressive TDM programs aimed at non-commute trips tend to show lower levels of congestion during this time period.

West Hollywood already enjoys a diverse mix of land uses surrounding the residential areas. Residents are generally able, if they so choose, to meet their basic day-to-day needs without driving. Depending on their destination in the City, many of West Hollywood's visitors can take transit or park once and walk between their destinations.

West Hollywood can continue to build on its success in these areas by clustering development at key transit nodes and along commercial corridors. These are the development patterns seen in the Proposed General Plan and the alternatives. Doing so not only brings more goods and services into reach of more residents, but also increases the effectiveness of TDM programs. For instance, placing more development near transit nodes, while increasing the price of parking for residents (through unbundling) or visitors (through on and off-street pricing) allows for growth with lower per-capita trip making.

DAILY AND PEAK HOUR ROADWAY SEGMENT TRAFFIC VOLUMES

Figures 12 and 13 illustrate daily and peak hour roadway segment volumes respectively for existing conditions. These volumes are also shown in Tables 8 and 9. Daily and peak hour roadway segment volumes for the horizon year scenarios are illustrated in the following tables and figures:

- Proposed General Plan: Figure 14 (daily), Figure 15 (peak hour), Table 8
- No Project: Figure 16 (daily), Figure 17 (peak hour), Table 8
- TOD Focus Alternative: Figure 18 (daily), Figure 19 (peak hour), Table 9
- Extensive TDM Alternative: Figure 20 (daily), Figure 21 (peak hour), Table 9

Roadway Segment Volumes: Understanding the Outputs of the Travel Forecast

West Hollywood is a small and generally built-out city. Although there are some areas with a greater concentration of land use, and others with a lesser concentration of land use, the entire city has a fair amount of development. There is no one specific place towards which people head into in the morning, and out of in the evening. As a major activity center in the middle of the greater Los Angeles region, it is not surprising that high volumes of traffic move in all directions at all times of day in and through West Hollywood.

The tables and figures illustrate that in general, development under the horizon year scenarios will not substantially alter the overall pattern of traffic on West Hollywood streets, though all study segments will see some increase in vehicular traffic. Some segments with relatively lower existing volumes, such as Doheny Drive or San Vicente Boulevard south of Sunset Boulevard, will see a greater percentage increase in volumes. However, the absolute gain in traffic volume will usually be lower than the larger streets. Similarly, streets with greater existing volumes tend to see a lower percentage increase, but a greater absolute gain in volumes.

As with the intersection LOS analysis, the strength of the TDM programs being implemented is the major difference between the future land use scenarios in the aggregate. Specific concentrations of development influence traffic levels at certain locations. Similarly, scenarios that cluster development around transit nodes benefit from not only increased effectiveness of the TDM measures, but the creation of even more walkable neighborhoods that allow people to meet their day-to-day needs without the use of an automobile.

VEHICLE MILES TRAVELED (VMT)

In accordance with policy guidance[13] provided by the SB 375 Regional Targets Advisory Committee, the following trip types and percentages are included in the tabulation of daily trips:

- Internal to External: Trips beginning inside the City and ending outside the City (50%)
- External to Internal: Trips beginning outside the City and ending inside the City (50%)
- Internal to Internal: Trips beginning and ending inside the City (100%)
- External to External: Trips beginning outside the City and ending outside the City (0%)

Figure 22 illustrates estimated daily VMT, quantified as described above, for existing conditions and all future year scenarios. Due to anticipated growth in both population and employment, total daily VMT is forecast to increase by 14% with the Proposed General Plan.

VMT can also be viewed on a per capita basis. Daily VMT per West Hollywood resident is projected to decline by 3.8% with the Proposed General Plan compared to existing conditions.

Since West Hollywood would also experience employment growth under the Proposed General Plan, it is worthwhile to look at VMT per combined population and employment. Daily VMT per combined population and employment, shown in Figure 23, is forecast to decrease by 4.3% with the Proposed General Plan compared to existing conditions. Although VMT is projected to increase overall, the projected rate of VMT increase is less than the rate of population and employment growth, resulting in a lower level of VMT per capita.

OTHER PERFORMANCE MEASURES: VEHICLE HOURS OF TRAVEL (VHT), VEHICLE TRIP GENERATION (VT), AND AVERAGE TRIP LENGTH

In addition to roadway segment volumes and intersection LOS, other performance measures are often analyzed when considering the effects of different general plan development scenarios. These measures include:

- **Vehicle Hours Traveled** (VHT) – a measure of total time spent traveling in and to the City of West Hollywood affected by factors including length of trip making, amount of trip making and congestion levels.

[13] *Recommendations of the Regional Targets Advisory Committee Pursuant to Senate Bill 375*, September 30, 2009.

- **Vehicle Trips** (VT) – the total number of vehicle trips made in the City of West Hollywood (including into and out of the City, but not including through trips).

- **Average Trip Length** – calculated by dividing the total VMT by the total number of vehicle trips. Note that while VMT only includes half of the IX and XI trip making (the other half being attributed to the other jurisdiction) the average trip length includes the full trip length.

Table 10 reports these performance measures for the base year (2008) and all horizon year (2035) scenarios for trips with one or both ends in the study area.

GREENHOUSE GAS EMISSIONS ANALYSIS

The quantity of GHG emissions from automobiles is strongly correlated to fuel consumption. Fuel consumption is strongly correlated to the amount of driving (VMT) and the driving speed. Other factors, ranging from temperature to driver behavior to the average fuel efficiency of the overall vehicle fleet, influence fuel consumption and GHG emissions. A comprehensive analysis of GHG emissions for existing conditions and all future scenarios was previously performed and a separate memorandum prepared. That analysis is attached as Appendix A.

INTERSECTION IMPACT ANALYSIS

Traffic Impact Thresholds of Significance

The City of West Hollywood adopted traffic impact *thresholds of significance* that expose the potential impact of development projects on traffic congestion. These thresholds were designed to address the unique traffic situation in West Hollywood and provide members of the public and decision makers with accurate information in Traffic Impact Studies (TIS) prepared for development projects in the City.

The West Hollywood traffic impact criteria are highly detailed by necessity to address the City's complex traffic situation. The criteria are as follows:

Commercial Corridor Signalized Intersections – If the intersection is formed by two commercial corridors, an impact is considered significant if the following criteria are met:

- The addition of project traffic results in a LOS D and an increase in delay of 12 seconds or greater.
- The addition of project traffic results in a LOS E or F and an increase in delay of 8 seconds or greater.

  For purposes of the TIS the following are considered commercial corridors:

  - Sunset Boulevard
  - Santa Monica Boulevard
  - Melrose Avenue
  - Beverly Boulevard
  - Doheny Drive
  - Robertson Boulevard
  - San Vicente Boulevard (at and/or South of Santa Monica Boulevard)

- La Cienega Boulevard
- Fairfax Avenue
- La Brea Avenue

Other Signalized and/or 4-way Stop Intersections - Significant impacts will occur if the following criteria are met:

- The addition of project traffic results in a LOS D and an increase in delay of 8 seconds or greater.
- The addition of project traffic results in a LOS E or F and an increase in delay of 5 seconds or greater.

Unsignalized Intersections (and/or 1-way or 2-way stops) - Significant impacts will occur if the following criteria are met:

- The addition of project traffic results in a LOS D, E, or F and an increase in delay of 5 seconds or greater.

Proposed General Plan Traffic Impact Analysis and Mitigation Discussion

Table 4 shows the potential significant traffic impacts that would occur with implementation of the Proposed General Plan and the locations of these impacts are mapped in Figure 24. While the number of impacted intersections may seem large, it is important to consider that the significance thresholds were designed with sufficient detail to capture the impacts of individual development projects, while the various General Plan update scenarios include *all* development potential in the City. Similarly, intersections most likely to experience increase traffic congestion were selected as analysis locations. Therefore, the percentage of impacted intersections shown here may not reflect the percentage of impacted intersection citywide with implementation of the Proposed General Plan, and should represent a worst-case scenario.

Traffic impacts occurring at study intersections are discussed below. The built environment in the study area creates minimal opportunity for physical roadway or intersection widening. Potential improvements, if feasible, are presented below for each impacted location. Due to limited right-of way in the study area, the impacted intersections would remain at unacceptable levels of service with the proposed General Plan, resulting in a significant and unavoidable impact.

- Doheny Drive & Sunset Boulevard: This intersection is projected to degrade one service level during both the a.m. and p.m. peak hours with buildout of the proposed General Plan. During the a.m. peak hour, the intersection would worsen from LOS D under existing. Increases in traffic volumes along Sunset Boulevard and Doheny Drive would result in increased delay for westbound and northbound drivers. During the p.m. peak hour, the increase in average delay would be approximately 20 seconds due to traffic volume increases and additional delay for vehicles traveling north and south on Doheny Drive and westbound on Sunset Boulevard. Increasing the green time for vehicles traveling on Doheny Drive would reduce delays for northbound and southbound traffic but would further delay eastbound and westbound vehicles traveling on Sunset Boulevard. Operations at this intersection could be improved by providing an exclusive westbound right-turn lane. However, the bus stop located at this corner in addition to limited right-of-way makes this improvement infeasible. There is no feasible mitigation for this intersection LOS impact within the existing right-of-way, and taking additional right-of-way for vehicular traffic would be infeasible.

- San Vicente Boulevard & Sunset Boulevard: This intersection is projected to degrade from LOS D under existing conditions to LOS E with buildout of the proposed General Plan and experience an increase in average delay of 25 seconds during the p.m. peak hour. The increase in delay is primarily due to additional vehicles making the northbound right-turn movement from San Vicente Boulevard onto Sunset Boulevard during the p.m. peak hour. This intersection already provides an exclusive northbound right-turn lane plus a shared northbound left/through/right-turn lane, and right-of-way is not available to provide additional northbound capacity. Increasing the amount of green time for the northbound approach would improve the average delay at the intersection; however, the intersection would continue to operate at LOS E during the p.m. peak hour. Limited right-of-way makes improvements to this intersection infeasible. There is no feasible mitigation for this intersection LOS impact within the existing right-of-way, and taking additional right-of-way for vehicular traffic would be infeasible.

- La Cienega Boulevard/Miller Drive & Sunset Boulevard: This intersection is projected to degrade from LOS E under existing p.m. peak hour conditions to LOS F with buildout of the proposed General Plan (average delay increase of 31 seconds). The high level of delay at the intersection is primarily caused by heavy eastbound and westbound traffic volumes along Sunset Boulevard and for the westbound left-turn movement from Sunset Boulevard onto La Cienega Boulevard. The westbound left-turn movement currently operates under protected-permissive phasing, and extending the green time would reduce delays for these vehicles. However, an increase in green time for the westbound left-turn movement would result in decreased green time for eastbound through vehicles, which already experience substantial delays during peak travel hours. Limited right-of-way makes improvements to this intersection infeasible. There is no feasible mitigation for this intersection LOS impact within the existing right-of-way, and taking additional right-of-way for vehicular traffic would be infeasible.

- Crescent Heights Boulevard & Sunset Boulevard: This intersection currently operates at LOS E during both the a.m. and the p.m. peak hours and would continue to operate at LOS E with buildout of the General Plan (10-second increase in average delay during the a.m. peak hour and 14-second increase in average delay during the p.m. peak hour). LOS E operations are caused by high traffic volumes along Sunset Boulevard and on southbound Crescent Heights Boulevard under existing and future conditions. The increase in delay at this intersection is primarily due to traffic volume increases along Sunset Boulevard in both the eastbound and westbound directions during the peak hours. Limited right-of-way makes improvements to this intersection infeasible. This intersection is located outside the jurisdiction of West Hollywood, within the City of Los Angeles.

- La Cienega Boulevard & Fountain Avenue: This intersection operates at LOS D and LOS F under existing conditions during the a.m. and p.m. peak hours, respectively, and is projected to degrade to LOS E during the a.m. peak hour and continue to operate at LOS F during the p.m. peak hour with buildout of the proposed General Plan. The increase in average delay is expected to be 9 seconds during the a.m. peak hour and 48 seconds during the p.m. peak hour. During the a.m. peak hour, the additional delay is caused by increased volumes and congestion for vehicles traveling westbound on Fountain Avenue and turning onto southbound La Cienega Boulevard. Increases in p.m. peak hour delay are primarily due to vehicles traveling northbound on La Cienega Boulevard and turning onto Fountain Avenue. Limited right-of-way makes improvements to this intersection infeasible. There is no feasible mitigation for this intersection LOS impact within the existing right-of-way, and taking additional right-of-way for vehicular traffic would be infeasible.

- Crescent Heights Boulevard & Fountain Avenue: This intersection operates at LOS F under existing conditions during the a.m. peak hour and is projected to continue to operate at LOS F with buildout of the proposed General Plan with an increase in average delay of 15 seconds. During the p.m. peak hour, this intersection currently operates at LOS D and would degrade to LOS E with an increase in delay of 22 seconds with the proposed General Plan. During the a.m. peak hour, the poor LOS is due to high traffic volumes on westbound Fountain Avenue and southbound Crescent Heights Boulevard. Conversely, during the p.m. peak hour the intersection experiences high traffic volumes on eastbound Fountain Avenue and northbound Crescent Heights Boulevard. This intersection could be improved by providing exclusive right-turn lanes on Fountain Avenue for vehicles turning onto Crescent Heights Boulevard. The width of the curb lane currently allows some vehicles to make a right turn on red even if a vehicle traveling through the intersection is stopped. While striping the right-turn pockets would provide reduced delay for vehicles turning onto Crescent Heights Boulevard, the intersection would continue to operate at LOS F during the a.m. peak hour and LOS E during the p.m. peak hour. Limited right-of-way makes improvements to this intersection infeasible. There is no feasible mitigation for this intersection LOS impact within the existing right-of-way, and taking additional right-of-way for vehicular traffic would be infeasible.

- Fountain Avenue & Fairfax Avenue: This intersection currently operates at LOS E during both peak hours and is projected to degrade to LOS F during the a.m. and p.m. peak hours with buildout of the proposed General Plan (average delay increase of 30 seconds during the a.m. peak hour and 44 seconds during the p.m. peak hour). Poor operations are partially caused by heavy left-turn movements from Fountain Avenue onto Fairfax Avenue with peak volumes exceeding 200 vehicles per hour in both the eastbound and westbound directions. Modifying the existing permissive left-turn phasing to protected permissive would improve the delay for left-turning vehicles. An additional improvement at this location is the striping of a right-turn lane on southbound Fairfax Avenue for vehicles turning onto Fountain Avenue. During the a.m. peak hour, nearly 300 vehicles make this turning movement and additional demand would occur with the proposed General Plan. The width of the southbound curb lane currently allows some vehicles to make a right turn on red even if a vehicle traveling through the intersection is stopped. While providing protected-permissive left-turn phasing on Fountain Avenue and striping the southbound right-turn pocket on Fairfax Avenue would provide reduced delay for applicable movements, the intersection would continue to operate at LOS E during the a.m. peak hour and LOS F during the p.m. peak hour.

- Gardner Street & Fountain Avenue: This intersection currently operates at LOS E during the a.m. peak hour and is expected to degrade to LOS F with buildout of the proposed General Plan (average delay increase of 31 seconds). During the p.m. peak hour, the intersection currently operates at LOS F and would continue to operate at LOS F with an increase in average delay of 100 seconds with the proposed General Plan. The poor operations at this intersection are due to high traffic volumes along Gardner Avenue. Limited right-of-way makes improvements to this intersection infeasible. There is no feasible mitigation for this intersection LOS impact within the existing right-of-way, and taking additional right-of-way for vehicular traffic would be infeasible.

- La Brea Avenue & Fountain Avenue: This intersection currently operates at LOS E during the a.m. peak hour and is expected to continue to operate at LOS E with buildout of the proposed General Plan while experiencing a 16-second increase in average delay. During the p.m. peak hour, the intersection is expected to degrade from LOS D operations under existing conditions to LOS E with the proposed General Plan with an average delay increase of 14 seconds. The poor operations at this intersection are primarily due to high delays for eastbound and westbound vehicles traveling on Fountain Avenue. Increasing the green time for these vehicles, including providing permissive protected left-turn phasing, worsens the overall average intersection delay by degrading operations for north-south traffic on La Brea Avenue. Limited right-of-way makes improvements to this intersection infeasible. This intersection is located outside the jurisdiction of West Hollywood, within the City of Los Angeles.

- Holloway Drive/Horn Avenue & Sunset Boulevard: This intersection currently operates at LOS D during the a.m. and p.m. peak hours and is expected to degrade to LOS E with buildout of the proposed General Plan. The increase in average delay with the General Plan exceeds the City's threshold for significant impacts with an increase of 17 seconds during the a.m. peak hour and 15 seconds during the p.m. peak hour. The approaches with the highest delay at this intersection are northbound Holloway Drive and southbound Horn Avenue. Increasing green times for the north-south movements would improve delay for these vehicles; however, the high traffic volumes on Sunset Boulevard would result in poor east-west operations and worsen overall intersection operations. Limited right-of-way makes improvements to this intersection infeasible. There is no feasible mitigation for this intersection LOS impact within the existing right-of-way, and taking additional right-of-way for vehicular traffic would be infeasible.

- La Cienega Boulevard & Holloway Drive: This intersection currently operates at LOS C during the a.m. peak hour and LOS E during the p.m. peak hour. With buildout of the proposed General Plan, this intersection would degrade to LOS D during the a.m. peak hour and experience an increase in average delay of 13 seconds. During the p.m. peak hour, the intersection would continue to operate at LOS E with an increase in average delay of 12 seconds. LOS D operations during the a.m. peak hour are primarily due to high southbound traffic volumes along La Cienega Boulevard including the southbound right-turn movement volume of over 600 vehicles (under both existing and proposed General Plan conditions). LOS E conditions during the p.m. peak hour are caused by high traffic volumes along northbound La Cienega Boulevard in addition to a high demand for the eastbound left-turn movement from Holloway Drive to La Cienega Boulevard (over 500 vehicles under both existing and proposed General Plan conditions). An exclusive southbound right-turn lane is already provided at this intersection and the eastbound left-turn movement already operates with protected-permissive signal phasing. Limited right-of-way makes improvements to this intersection infeasible. There is no feasible mitigation for this intersection LOS impact within the existing right-of-way, and taking additional right-of-way for vehicular traffic would be infeasible.

- Doheny Drive & Cynthia Street: This is a shared intersection between the City of West Hollywood and the City of Beverly Hills. This intersection is unsignalized with stop signs on Cynthia Street and free-flow traffic along Doheny Drive. The poor operations at this location, LOS C in the a.m. peak hour and LOS F in the p.m. peak hour, are due to 90 vehicles traveling through the intersection along Cynthia Street in the westbound direction during the a.m. peak hour and 50 vehicles traveling in the eastbound direction during the p.m. peak hour. Vehicles turning left from westbound Cynthia Street to southbound Doheny Drive are prohibited during the peak hours. The reported increase in delay with the proposed General Plan is reflecting the worst-case movement at the intersection (the east-west through movements). If the delay for all vehicles traveling through the intersection is considered, this location currently operates at LOS B or better during the peak hours and is expected to continue to operate at LOS B during the peak hours with buildout of the Proposed General Plan. The traffic volumes at this location do not warrant the installation of a traffic signal.

- Doheny Drive & Santa Monica Boulevard & Melrose Avenue: This 5-legged intersection serves as the western gateway to the City of West Hollywood and experiences substantial congestion during both the a.m. and p.m. peak hours with LOS F conditions for the majority of vehicles traveling through the intersection during peak hours. High traffic volumes along Santa Monica Boulevard cause delays for north-south traffic along Doheny Drive. Traffic volumes are particularly high in the westbound direction in the a.m. peak hour and in the eastbound direction during the p.m. peak hour along Santa Monica Boulevard. Limited right-of-way makes improvements to this intersection infeasible. There is no feasible mitigation for this intersection LOS impact within the existing right-of-way, and taking additional right-of-way for vehicular traffic would be infeasible.

- Robertson Boulevard & Santa Monica Boulevard: This intersection currently operates at LOS C during the a.m. and p.m. peak hours. With buildout of the proposed General Plan, operations are expected to degrade by two service levels during both peak hours resulting in LOS E conditions during the a.m. peak hour (22-second increase in average delay) and LOS E during the p.m. peak hour (24-second increase in average delay). The degraded LOS at this intersection is primarily due to high traffic volumes along Santa Monica in both the eastbound and westbound directions. Limited right-of-way makes improvements to this intersection infeasible. There is no feasible mitigation for this intersection LOS impact within the existing right-of-way, and taking additional right-of-way for vehicular traffic would be infeasible.

- San Vicente & Santa Monica Boulevard: This intersection currently operates at LOS D during the a.m. peak hour and LOS E during the p.m. peak hour. Traffic operations are projected to degrade by one service level with buildout of the proposed General Plan to LOS E during the a.m. peak hour (20-second increase in average delay) and LOS F during the p.m. peak hour (40-second increase in average delay). The increase in delay with the General Plan is caused by additional vehicles traveling on Santa Monica Boulevard during both peak hours. Traffic volume increases on San Vicente Boulevard also worsen delay for north-south vehicles during the p.m. peak hour. Limited right-of-way makes improvements to this intersection infeasible. There is no feasible mitigation for this intersection LOS impact within the existing right-of-way, and taking additional right-of-way for vehicular traffic would be infeasible.

- La Cienega Boulevard & Santa Monica Boulevard: This intersection currently operates at LOS F during the a.m. peak hour and is expected to worsen with buildout of the proposed General Plan with an increase in average delay of 20 seconds. During the p.m. peak hour, this intersection operates at LOS E and is expected to degrade to LOS F with an increase in average delay of 23 seconds. Additional delay during the a.m. peak hour is caused primarily by increases in traffic volumes on westbound Santa Monica Boulevard and on southbound La Cienega Boulevard. During the p.m. peak hour, operations worsen at each approach to the intersection as a result of increased traffic volumes. Limited right-of-way makes improvements to this intersection infeasible. There is no feasible mitigation for this intersection LOS impact within the existing right-of-way, and taking additional right-of-way for vehicular traffic would be infeasible.

- Croft Avenue/Holloway Drive & Santa Monica Boulevard: This intersection currently operates at LOS C during the p.m. peak hour and is expected to degrade to LOS D with buildout of the proposed General Plan with an increased in average delay of 19 seconds. The increase in delay is primarily due to additional congestion at the intersection of Croft Avenue/Santa Monica Boulevard and Holloway Drive. These movements could be improved by increasing the amount of green time provided. However, the high traffic volumes along Santa Monica Boulevard would be adversely affected by this change. A westbound right-turn lane is already provided for vehicles traveling on Santa Monica Boulevard to Holloway Drive (over 200 vehicles during the p.m. peak hour). Additional turn lanes are not feasible due to right-of-way constraints. There is no feasible mitigation for this intersection LOS impact within the existing right-of-way, and taking additional right-of-way for vehicular traffic would be infeasible.

- Crescent Heights Boulevard & Santa Monica Boulevard: This intersection currently operates at LOS D during the a.m. peak hour and LOS F during the p.m. peak hour. With buildout of the proposed General Plan, operations are expected to degrade to LOS E during the a.m. peak hour with an increase in average delay of 20 seconds and stay at LOS F during the p.m. peak hour with an increase in average delay of 24 seconds. Poor LOS at this intersection is due to high volumes along Santa Monica Boulevard during both peak hours, on southbound Crescent Heights Boulevard during the a.m. peak hour, and on northbound Crescent Heights Boulevard during the p.m. peak hour. The northbound left-turn movement from Crescent Heights Boulevard to Santa Monica Boulevard is currently prohibited during the p.m. peak hour (3:00–7:00 p.m.). Exclusive right-turn lanes are provided for the westbound and southbound right-turn movements. Additional turn lanes are not feasible due to right-of-way constraints. There is no feasible mitigation for this intersection LOS impact within the existing right-of-way, and taking additional right-of-way for vehicular traffic would be infeasible.

- Fairfax Avenue & Santa Monica Boulevard: This intersection currently operates at LOS E during the a.m. peak hour and LOS F during the p.m. peak hour. With buildout of the proposed General Plan, the intersection is expected to continue to operate at LOS E and LOS F during the a.m. and p.m. peak hours, respectively, with an increase in average delay of 20 seconds during the a.m. peak hour and 73 seconds during the p.m. peak hour. This intersection could be improved by providing an exclusive right-turn lane on southbound Fairfax Avenue for vehicles turning onto Santa Monica Boulevard. The width of the curb lane currently allows some vehicles to make a right turn on red even if a vehicle traveling through the intersection is stopped. While striping the right-turn pocket would reduce delay for vehicles turning onto Santa Monica Boulevard, the intersection would continue to operate at LOS E during the a.m. peak hour and LOS F during the p.m. peak hour.

- Gardner Street & Santa Monica Boulevard: This intersection currently operates at LOS C during the p.m. peak hour and is expected to degrade to LOS D with buildout of the General Plan with an increase in average delay of 12 seconds. The increase in delay is primarily due to high traffic volumes along Santa Monica Boulevard. In addition, the eastbound left-turn movement from Santa Monica Boulevard onto Gardner Street has a volume ranging from 160 to 170 vehicles (under existing conditions and with the General Plan) during the p.m. peak hour. Providing protected-permissive phasing for the eastbound left-turn movement during the p.m. peak hour would improve delay for these vehicles. However, overall intersection operations would remain at LOS D during the p.m. peak hour with the proposed General.

- Formosa Avenue & Santa Monica Boulevard: This intersection currently operates at LOS D and is expected to degrade to LOS E with an increase in average delay of 23 seconds with buildout of the General Plan during the p.m. peak hour. The increase in delay is primarily due to heavy traffic volumes on Santa Monica Boulevard. Limited right-of-way and potential loss of parking along Formosa Avenue make improvements to this intersection infeasible. There is no feasible mitigation for this intersection LOS impact within the existing right-of-way, and taking additional right-of-way for vehicular traffic would be infeasible.

- La Brea Avenue & Santa Monica Boulevard: This intersection currently operates at LOS E during the a.m. and p.m. peak hours. With buildout of the proposed General Plan, operations would remain at LOS E during the a.m. peak hour (average delay increase of 21 seconds) and worsen to LOS F during the p.m. peak hour (average delay increase of 30 seconds). The additional delay during both peak hours is due to heavy traffic volumes along Santa Monica Boulevard and La Brea Avenue. During peak hours, parking along La Brea is restricted to provide three northbound and southbound travel lanes. In addition, protected-permissive phasing is provided for each left-turn movement at this intersection. Limited right-of-way makes improvements to this intersection infeasible. There is no feasible mitigation for this intersection LOS impact within the existing right-of-way, and taking additional right-of-way for vehicular traffic would be infeasible

- .La Cienega Boulevard & Melrose Avenue: This intersection currently operates at LOS E during the a.m. peak hour and is expected to continue to operate at LOS E with buildout of the proposed General Plan (average delay increase of 9 seconds). Poor operations are due to high traffic volumes along southbound La Cienega Boulevard during the a.m. peak hour along with a high demand for the westbound left-turn movement from Melrose Avenue onto La Cienega Boulevard (over 300 vehicles under both existing and proposed General Plan conditions). The westbound left-turn movement already operates with protected signal phasing. Limited right-of-way makes improvements to this intersection infeasible. There is no feasible mitigation for this intersection LOS impact within the existing right-of-way, and taking additional right-of-way for vehicular traffic would be infeasible.

- Doheny Drive & Beverly Boulevard: This intersection currently operates at LOS D during the a.m. and p.m. peak hours. With buildout of the proposed General Plan, operations are expected to degrade by one service level during both peak hours to LOS E with an increase in average delay of 26 seconds during the a.m. peak hour and 24 seconds during the p.m. peak hour. The worsened LOS is primarily due to heavy traffic volumes along Beverly Boulevard and increased delay on Doheny Drive with buildout of the proposed General Plan. A protected left-turn phase is currently provided for vehicles traveling on westbound Beverly Boulevard and turning left onto Doheny Drive (approximately 250 vehicles during the a.m. peak hour and 150 vehicles during the p.m. peak hour). Limited right-of-way makes improvements to this intersection infeasible. There is no feasible mitigation for this intersection LOS impact within the existing right-of-way, and taking additional right-of-way for vehicular traffic would be infeasible.

- San Vicente Boulevard & Beverly Boulevard: This is a shared intersection between the City of West Hollywood and the City of Los Angeles. This intersection currently operates at LOS D during the p.m. peak hour and is expected to degrade to LOS E with buildout of the proposed General Plan with an increase in average delay of 20 seconds. LOS E operations are primarily due to high left-turn volumes for vehicles traveling on San Vicente Boulevard, both northbound (over 230 vehicles) and southbound (over 160 vehicles), and making a left-turn onto Beverly Boulevard. Delay could be reduced by provided protected-permissive phasing for these left-turn movements during the p.m. peak hour; however, the intersection would continue to operate at LOS E with the proposed General Plan.

- La Cienega Boulevard & Beverly Boulevard: This intersection currently operates at LOS E during the a.m. peak hour and is expected to degrade to LOS F with buildout of the proposed General Plan with an increase in average delay of 21 seconds. During the p.m. peak hour, the intersection currently operates at LOS F and would continue to operate at LOS F with an increase in average delay of 23 seconds with the proposed General Plan. Poor operations at this intersection are due to high peak hour traffic volumes along westbound Beverly Drive and southbound La Cienega Boulevard during the a.m. peak hour and on eastbound Beverly Drive and northbound La Cienega Boulevard during the p.m. peak hour. An exclusive northbound right-turn lane is already provided along with a right-turn overlap phase to serve the high p.m. peak hour demand for this movement (approximately 400 vehicles under existing and proposed General Plan conditions). A protected left-turn phase is provided for vehicles traveling on eastbound Beverly Boulevard to northbound La Cienega Boulevard (over 250 vehicles under existing and General Plan conditions during the p.m. peak hour). Limited right-of-way makes improvements to this intersection infeasible. This intersection is located outside the jurisdiction of West Hollywood, within the City of Los Angeles.

CONGESTION MANAGEMENT PROGRAM IMPACT ANALYSIS

Los Angeles Metro's Congestion Management Plan (CMP) for Los Angeles County designates certain freeway segments and arterial roadways as CMP facilities. West Hollywood is not served directly by any of the region's freeways, so there are no CMP freeway segments within City. Two intersections are designated CMP arterial monitoring locations:

- Doheny Drive & Santa Monica Boulevard
- La Cienega Boulevard & Santa Monica Boulevard

The CMP specifies a standard of LOS E for CMP freeway and intersection monitoring locations.

CMP Impact Analysis

The Los Angeles Congestion Management Program defines a significant impact to a CMP arterial monitoring location as follows:

> "For purposes of the CMP, a significant impact occurs when the proposed project increases traffic demand on a CMP facility by 2 percent of capacity (V/C ≥ 0.02), causing LOS F (V/C > 1.00); if the facility is already at LOS F, a significant impact occurs when the proposed project increases traffic demand on a CMP facility by 2 percent of capacity (V/C ≥ 0.02)."

Table 11 presents existing and Proposed General Plan intersection operating conditions at the two CMP arterial monitoring locations in the City of West Hollywood. As shown in the table, both intersections would operate at LOS F during at least one peak hour, and both intersections would see a change of 0.02 V/C or greater.

Implementation of the Draft General Plan Update would result in exceeding, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways. This is a potentially significant impact. As there is no feasible mitigation within the existing right-of-way, and taking additional right-of-way for vehicular traffic may conflict with a number of other policies, the impact would remain significant and unavoidable. However, it should be noted the Proposed General Plan places a strong emphasis on multimodal circulation, transit-oriented development, and TDM, which are measures intended to provide additional transportation choices and reduce impacts on local and regional facilities. Implementation of the proposed goals and policies of the Proposed General Plan would improve mobility within the City.

Comparative Impacts of Future Alternative Scenarios

The same study intersections analyzed for significant traffic impacts for the Proposed General Plan were analyzed for the each of the General Plan alternative scenarios and the results are shown in the following tables and figures:

- No Project: Figure 25, Table 6
- TOD Focus Alternative: Figure 26, Table 7
- Extensive TDM Alternative: Figure 27, Table 8

Figure 28 illustrates the number of significantly impacted locations during both peak hours for all future scenarios. As shown, the No Project Alternative results in the greatest number of significantly impacted intersections, while the Extensive TDM Alternative results in the fewest intersection impacts. This difference can be explained largely by the presence of TDM strategies, in the case of the Extensive TDM Alternative, or absence of TDM strategies in the case of the No Project Scenario. The difference between the Proposed General Plan and the TOD Focus Alternative is largely a function of the decreased level of overall development in the later.

Table 11 reports the CMP analysis results for all of the future alternative scenarios. All of the scenarios would result in the same CMP impacts as the Proposed General Plan. As stated, there is no feasible mitigation, so these impacts would remain significant and unavoidable.

CONCLUSIONS

The preceding forecast data for West Hollywood General Plan Update illustrate:

- The strong TDM program and purposeful clustering of land uses around major corridors and transit nodes leads to superior performance in nearly all documented metrics.

- The TDM programs that lead to mode shift are most effective during the peak hours and most effective in reducing vehicle commute trips. As mentioned, commute trips constitute a significant portion of a.m. peak hour trips, a still significant but lesser portion p.m. peak hour trips, and a relatively small percentage of daily trips. TDM programs targeting commute trips are an effective way to reduce a.m. peak hour congestion, while a combination of strategies targeting both commute and non-commute trips are necessary to reduce p.m. peak hour congestion and daily metrics such as VMT.

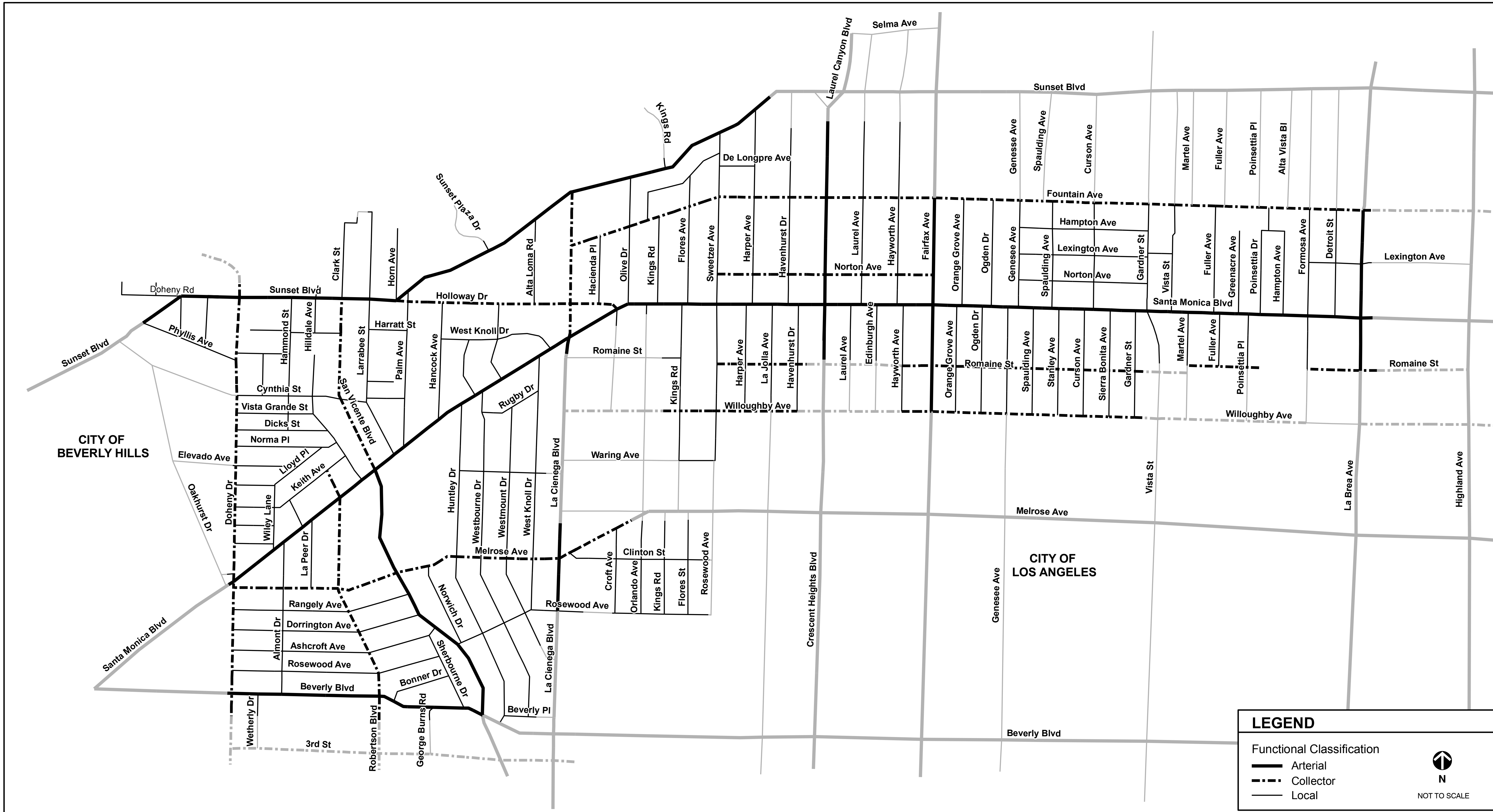
- Intersections would be significantly and unavoidably impacted under all future scenarios. The Proposed General Plan would create 22 a.m. peak hour impacts and 26 p.m. peak hour impacts. Mitigating these impacts is not feasible as doing so would conflict with a number of other City policies and goals. However, the proposed General Plan places a strong emphasis on multimodal circulation, transit-oriented development, and TDM, which are measures intended to provide additional transportation choices and reduce impacts on local and regional facilities. Implementation of the proposed goals and policies of the Proposed General Plan would improve mobility within the City.

ATTACHMENTS

FIGURES:

TABLES:

APPENDICES:



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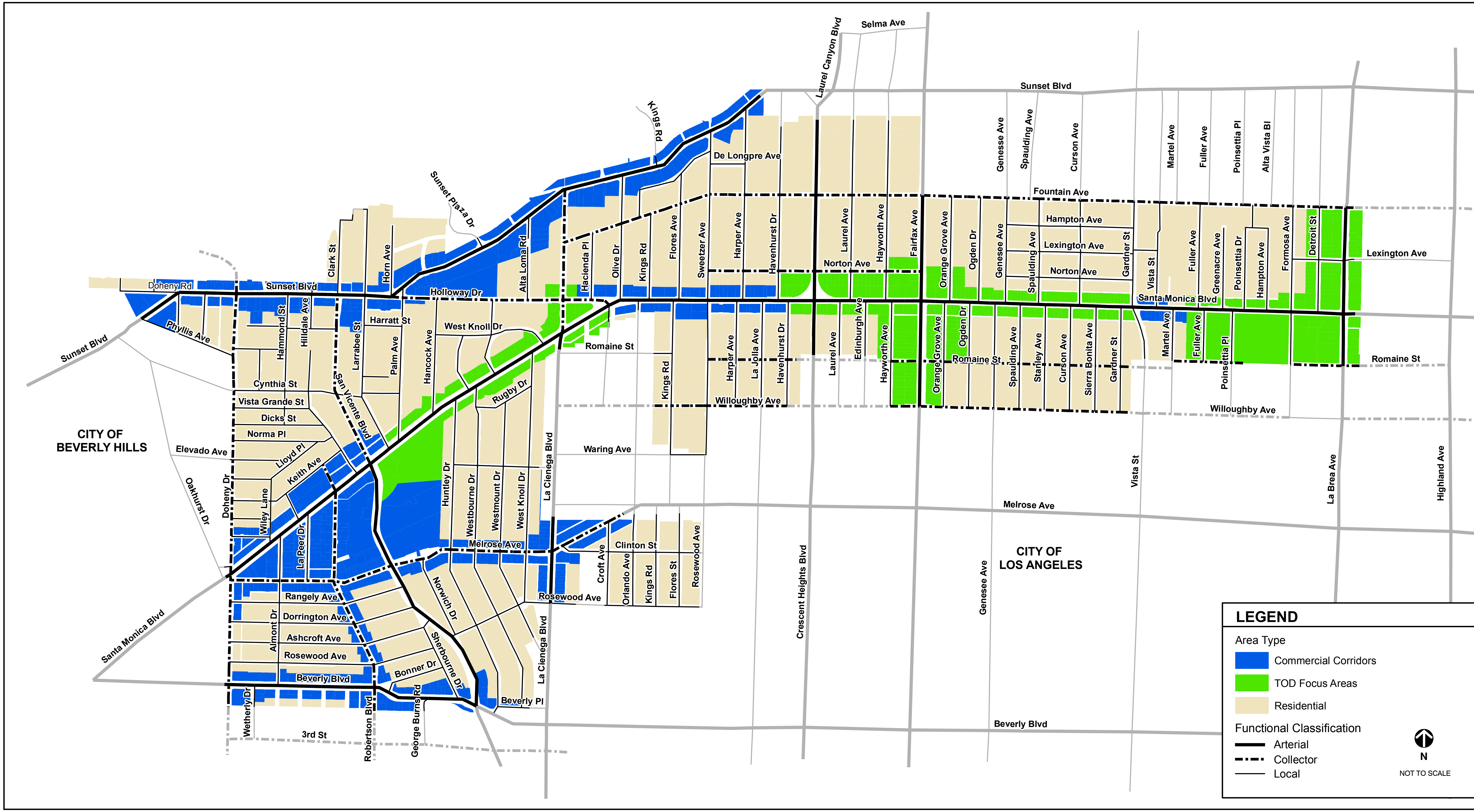
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE
ROADWAY FUNCTIONAL CLASSIFICATION

FIGURE 1



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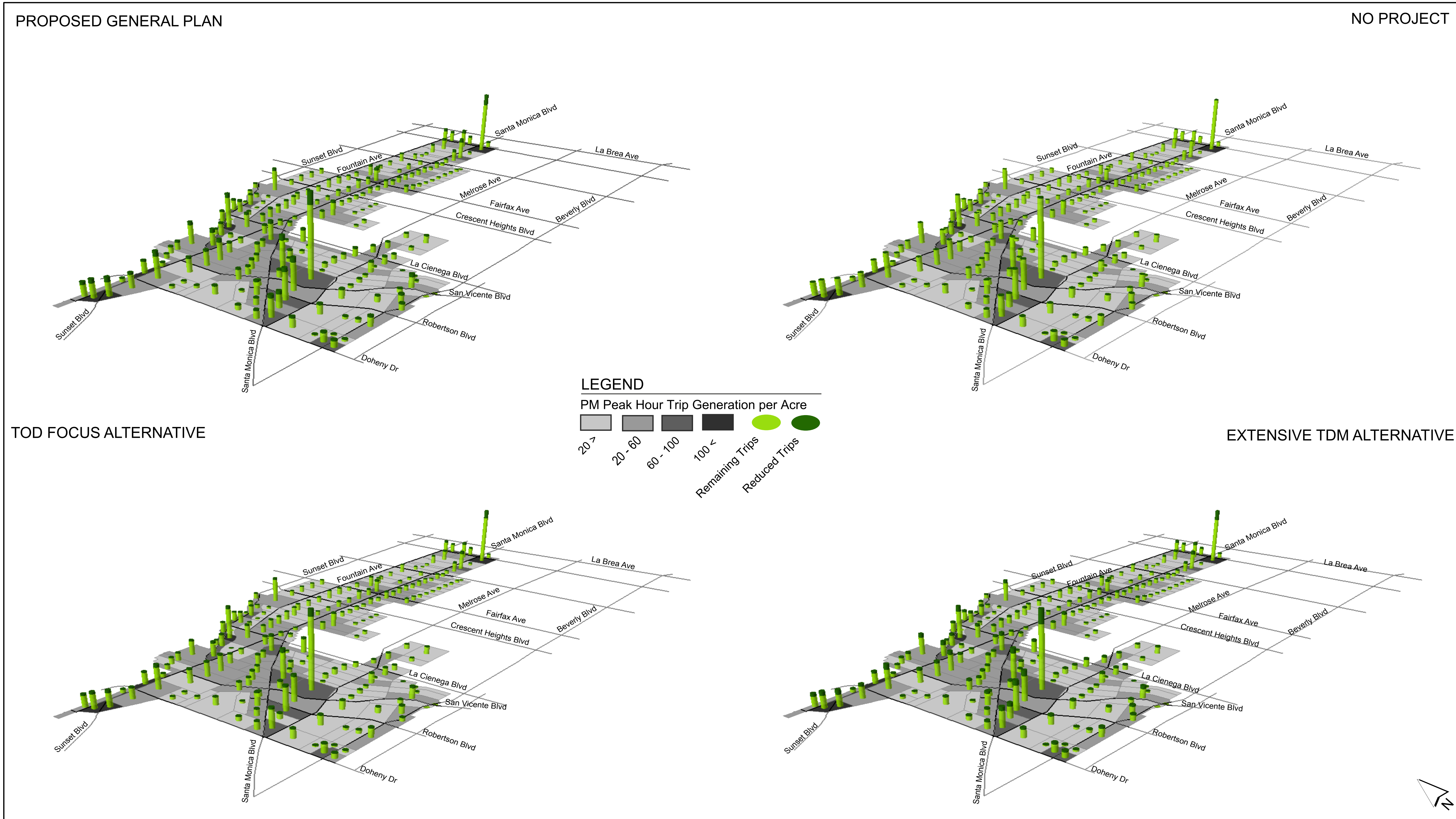
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE
TRIP REDUCTION ANALYSIS AREA TYPES

FIGURE 2



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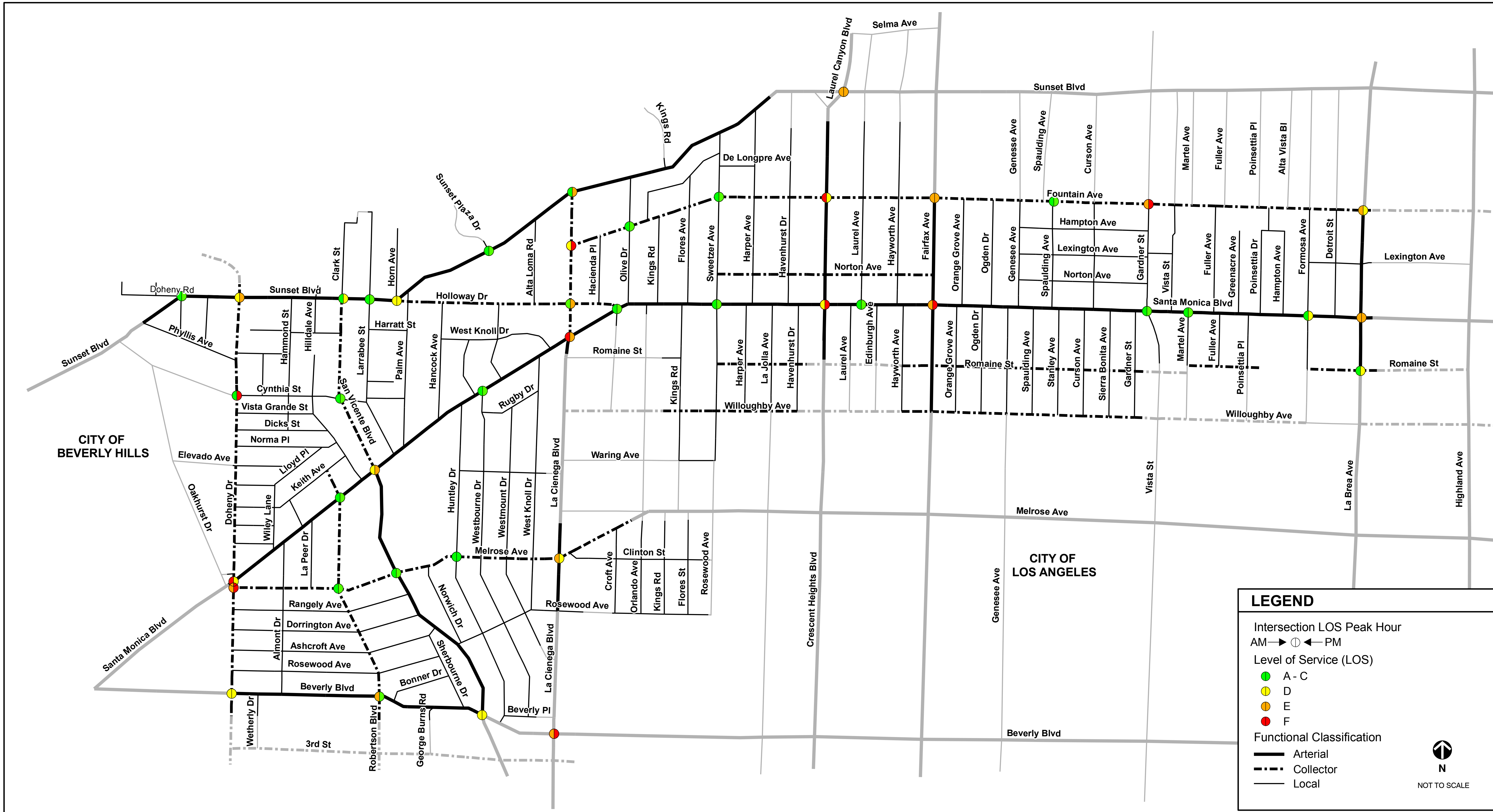
PM PEAK HOUR TRIP GENERATION WITH AND WITHOUT TRIP REDUCTIONS

FIGURE 3



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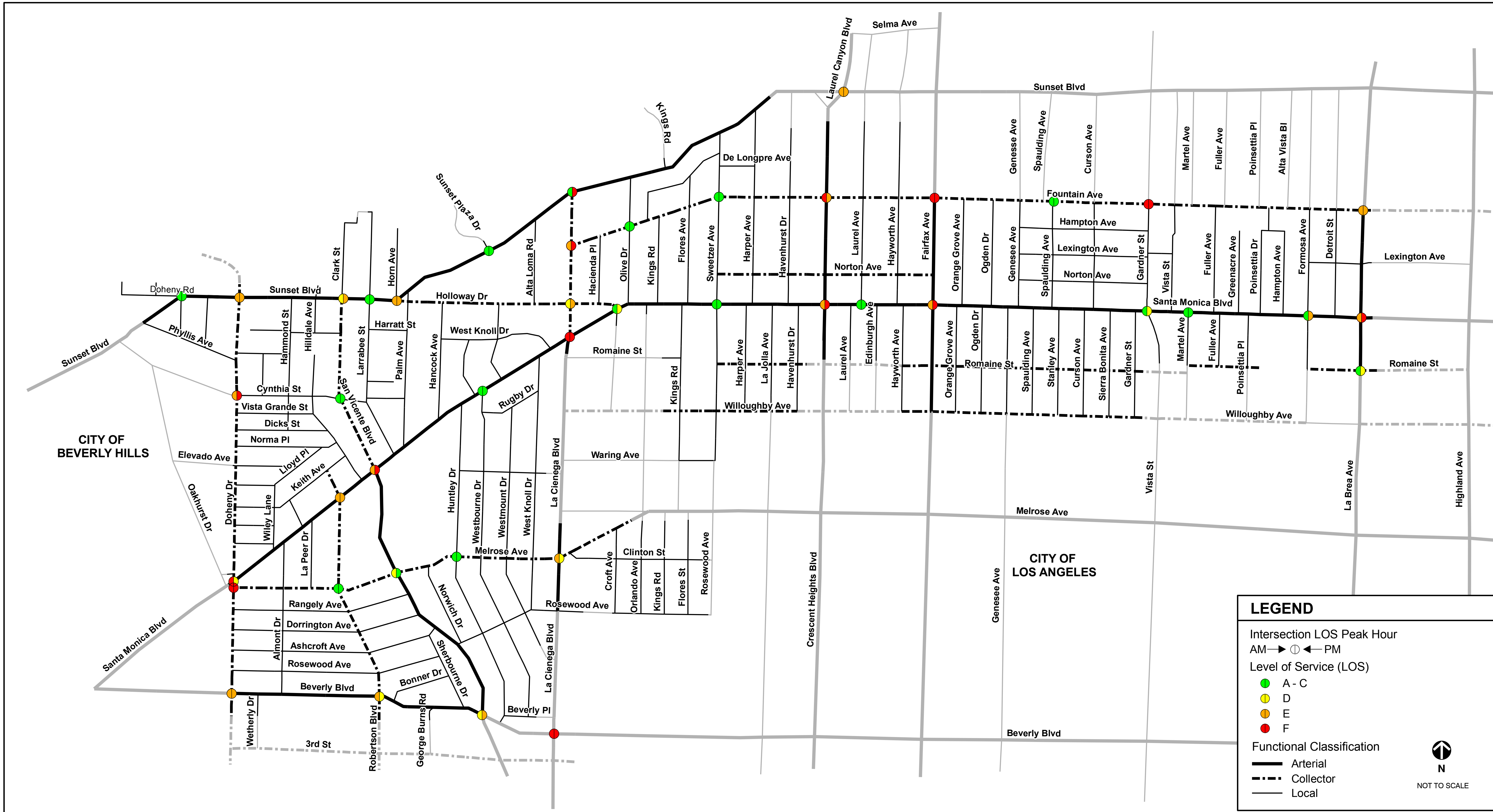
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE
EXISTING (YEAR 2008) INTERSECTION LEVELS OF SERVICE

FIGURE 4



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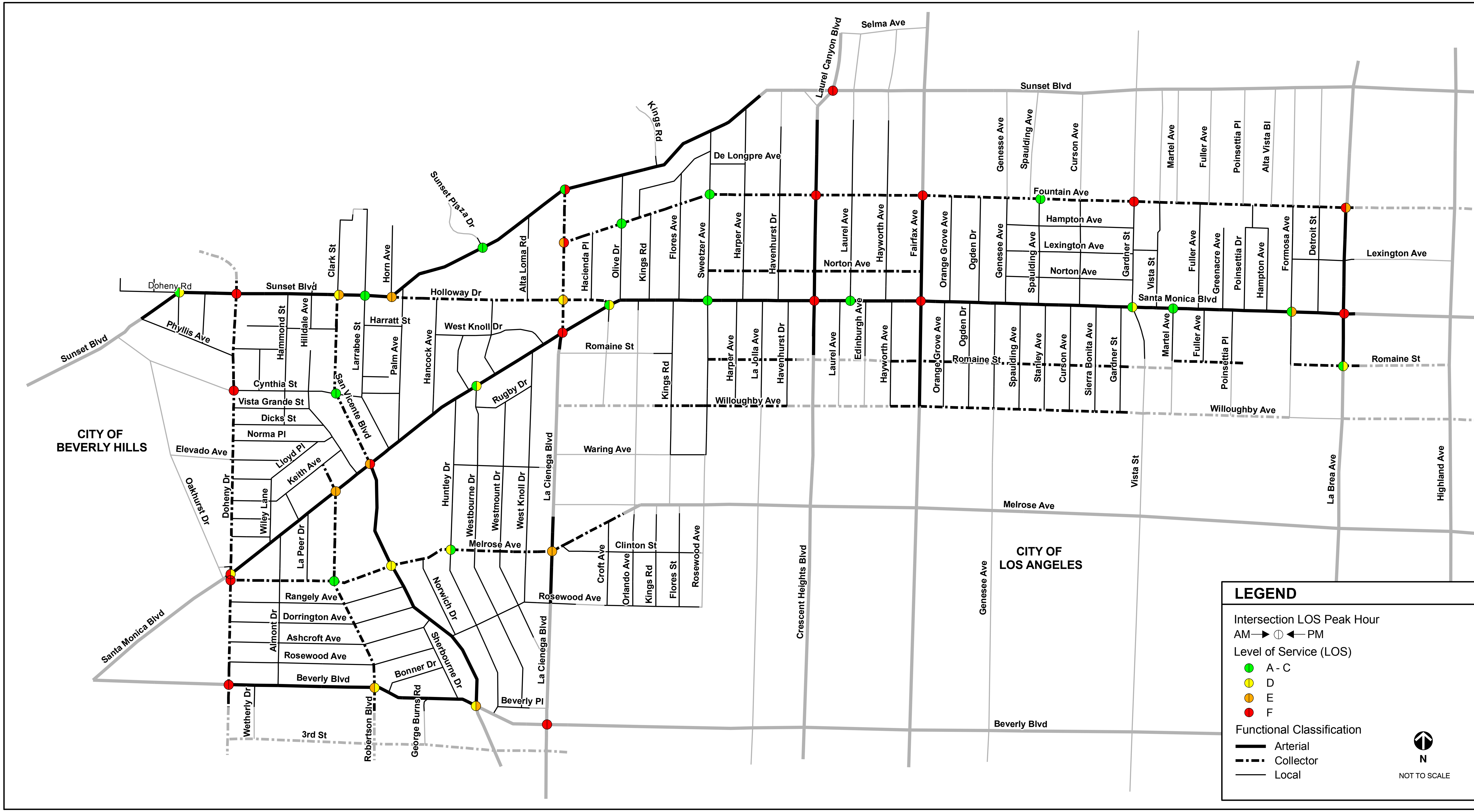
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE
PROPOSED GENERAL PLAN (YEAR 2035) INTERSECTION LEVELS OF SERVICE

FIGURE 5



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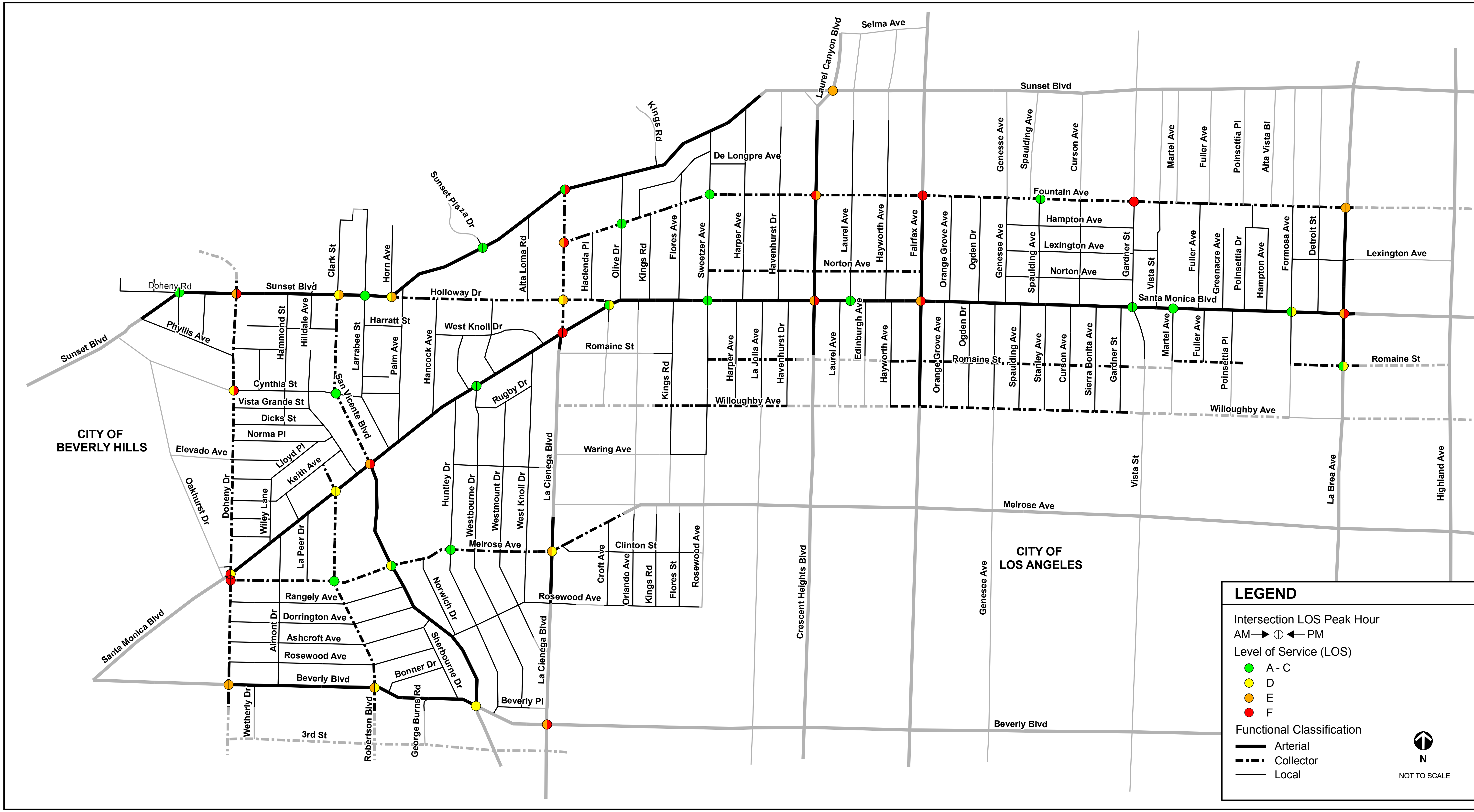
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE
NO PROJECT (YEAR 2035) INTERSECTION LEVELS OF SERVICE

FIGURE 6



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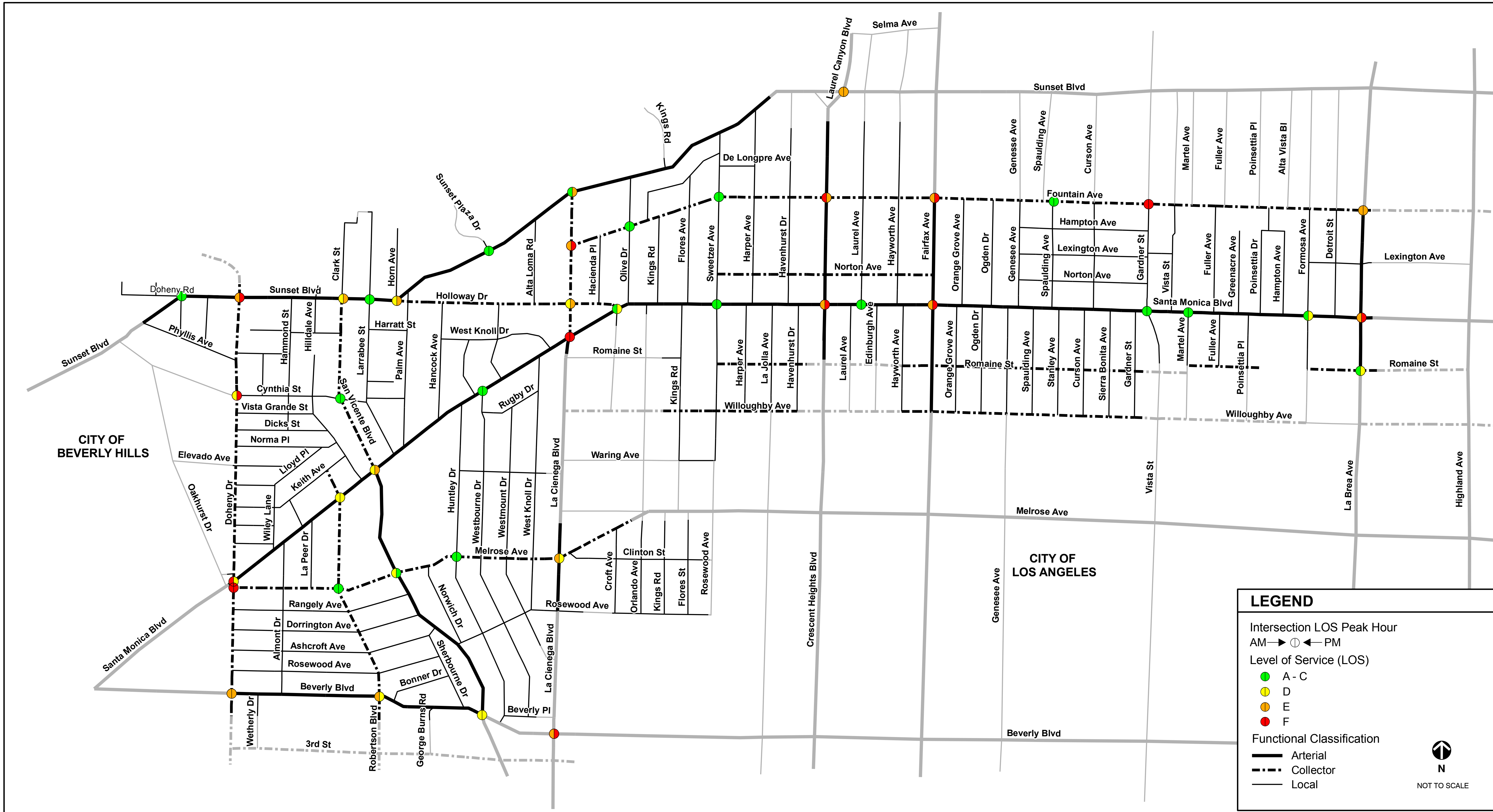
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE
TOD FOCUS ALTERNATIVE (YEAR 2035) INTERSECTION LEVELS OF SERVICE

FIGURE 7



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CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE
EXTENSIVE TDM ALTERNATIVE (YEAR 2035) INTERSECTION LEVELS OF SERVICE
FIGURE 8

FIGURE 9
AM PEAK HOUR STUDY INTERSECTION LOS DISTRIBUTION

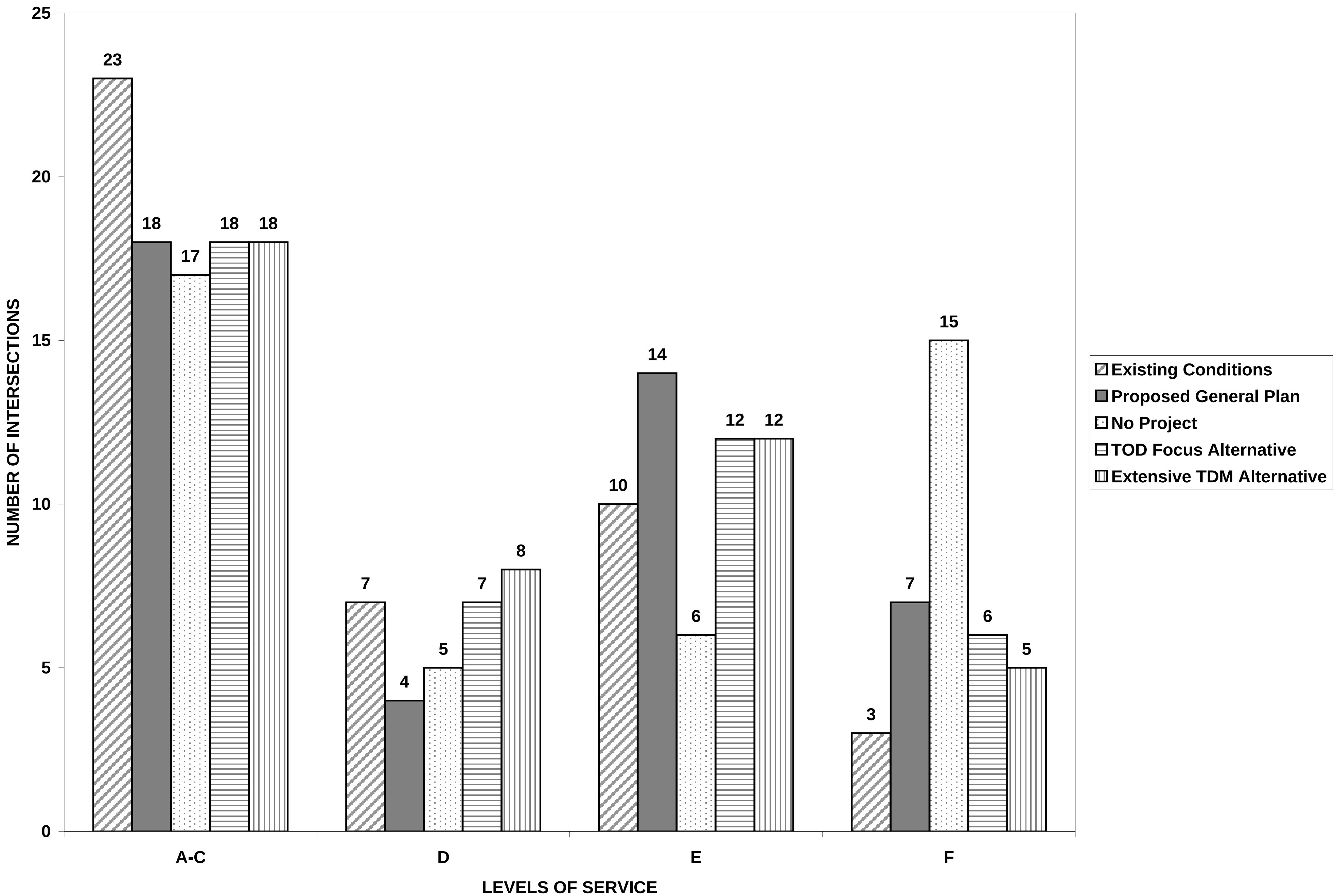


FIGURE 10
PM PEAK HOUR STUDY INTERSECTION LOS DISTRIBUTION

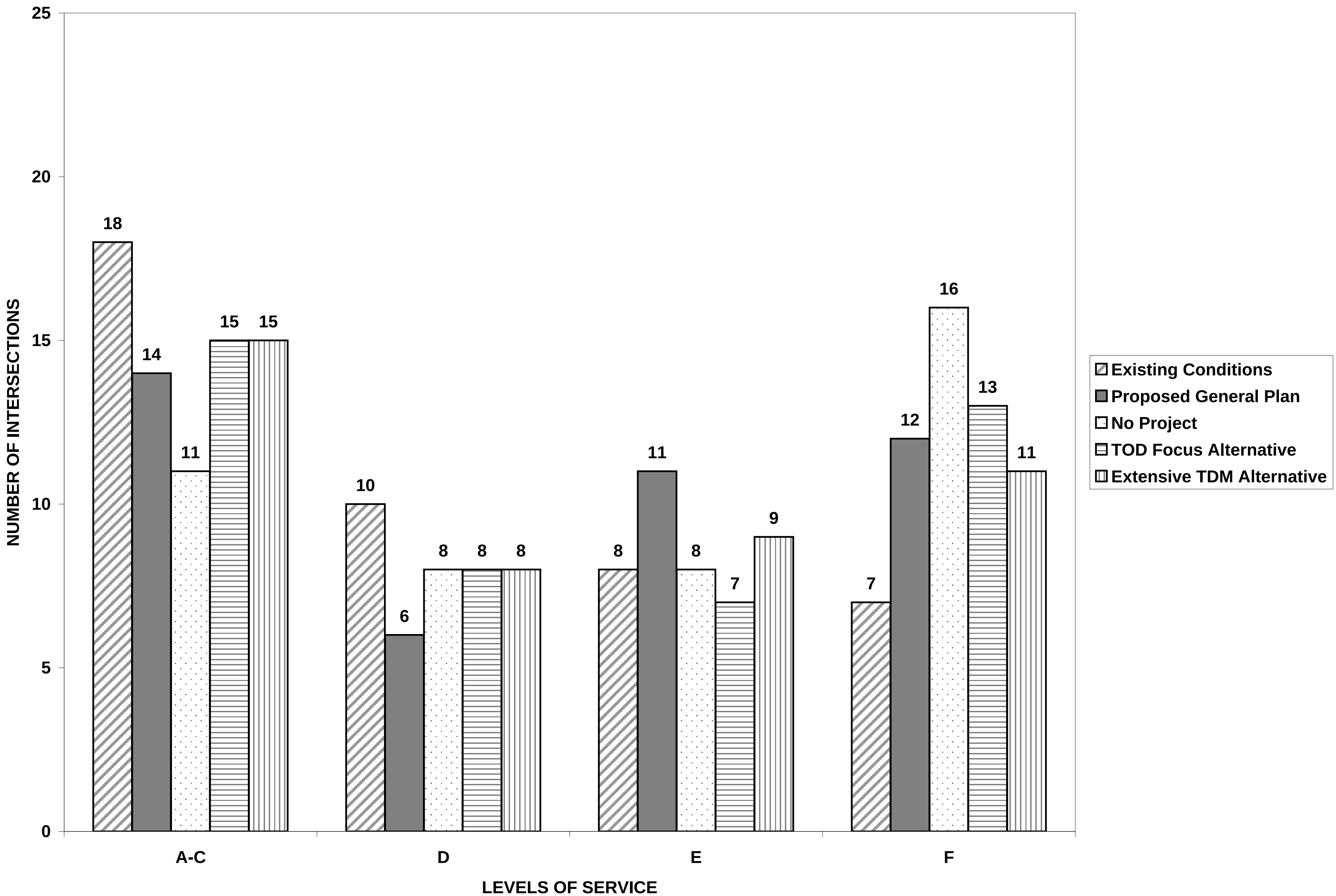
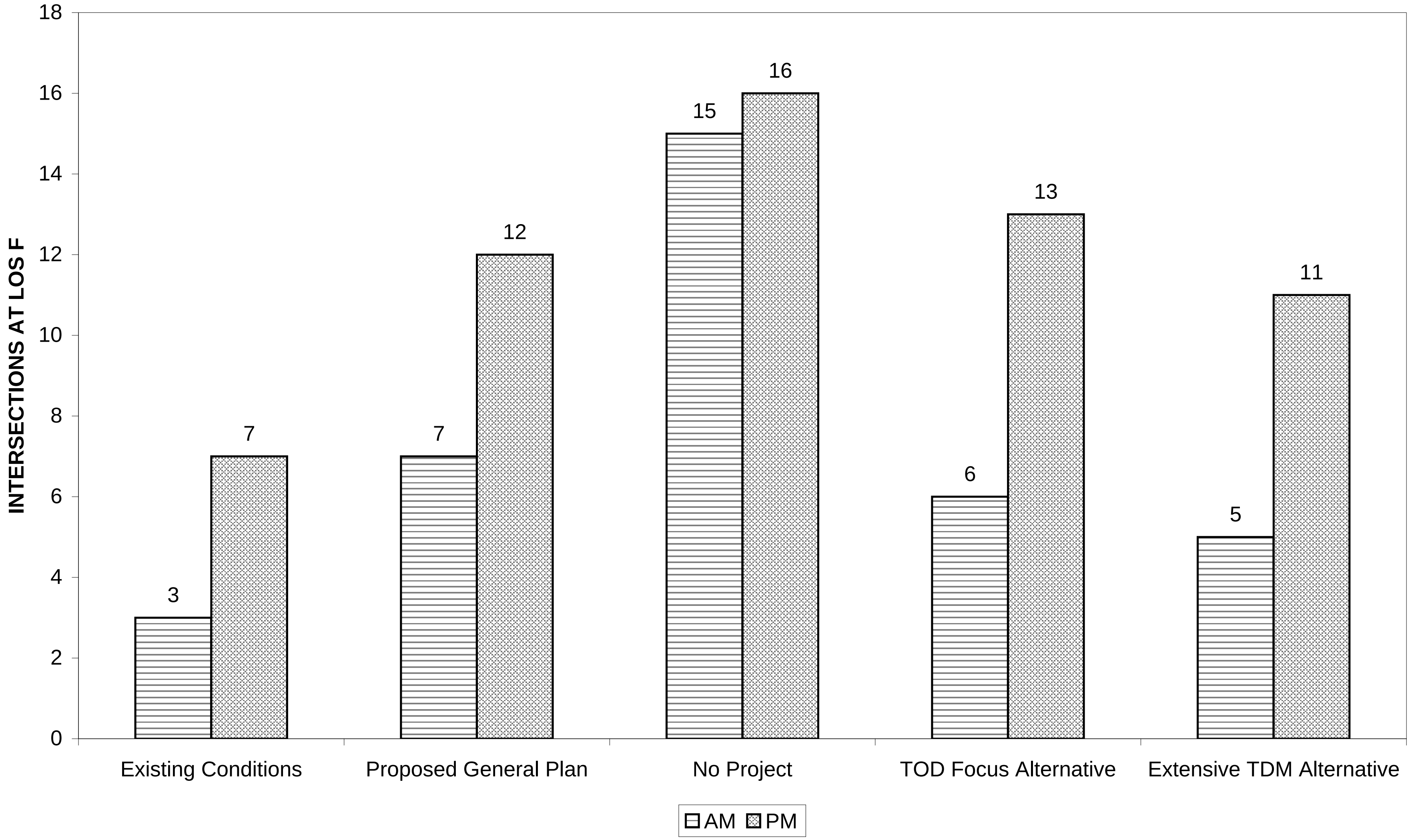
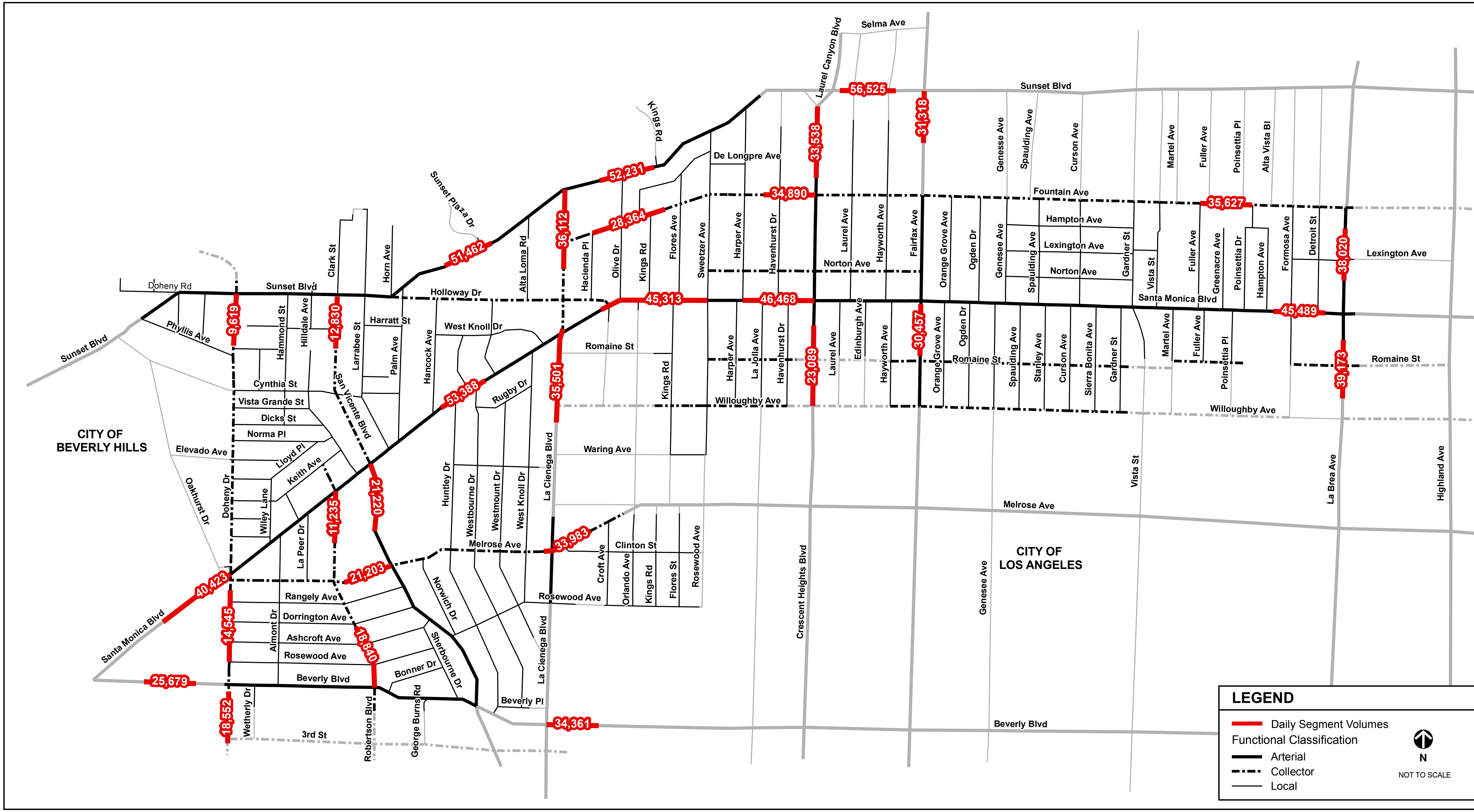


FIGURE 11
NUMBER OF INTERSECTIONS AT LOS F





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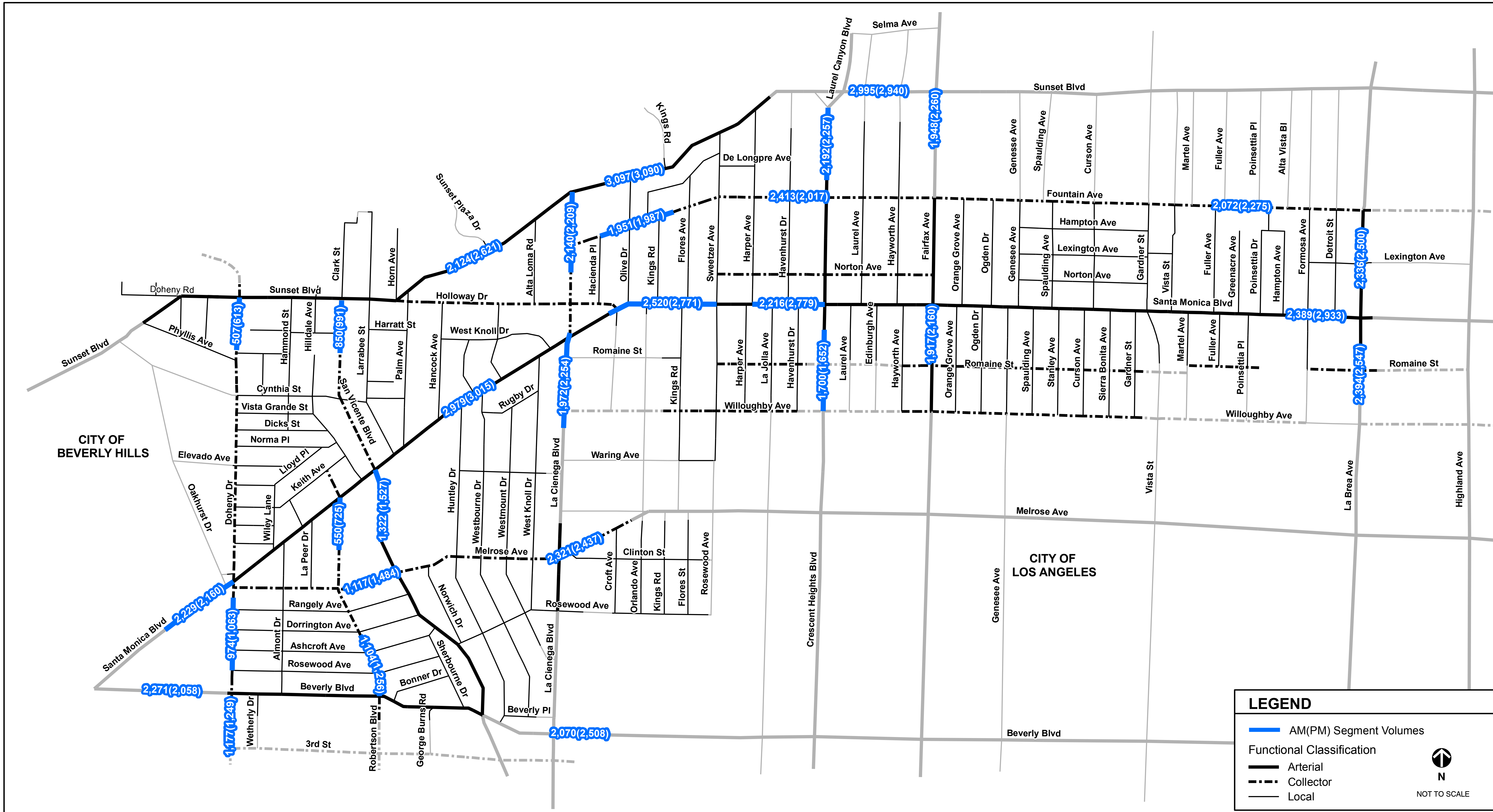
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE
DAILY SEGMENT VOLUMES - EXISTING

FIGURE 12



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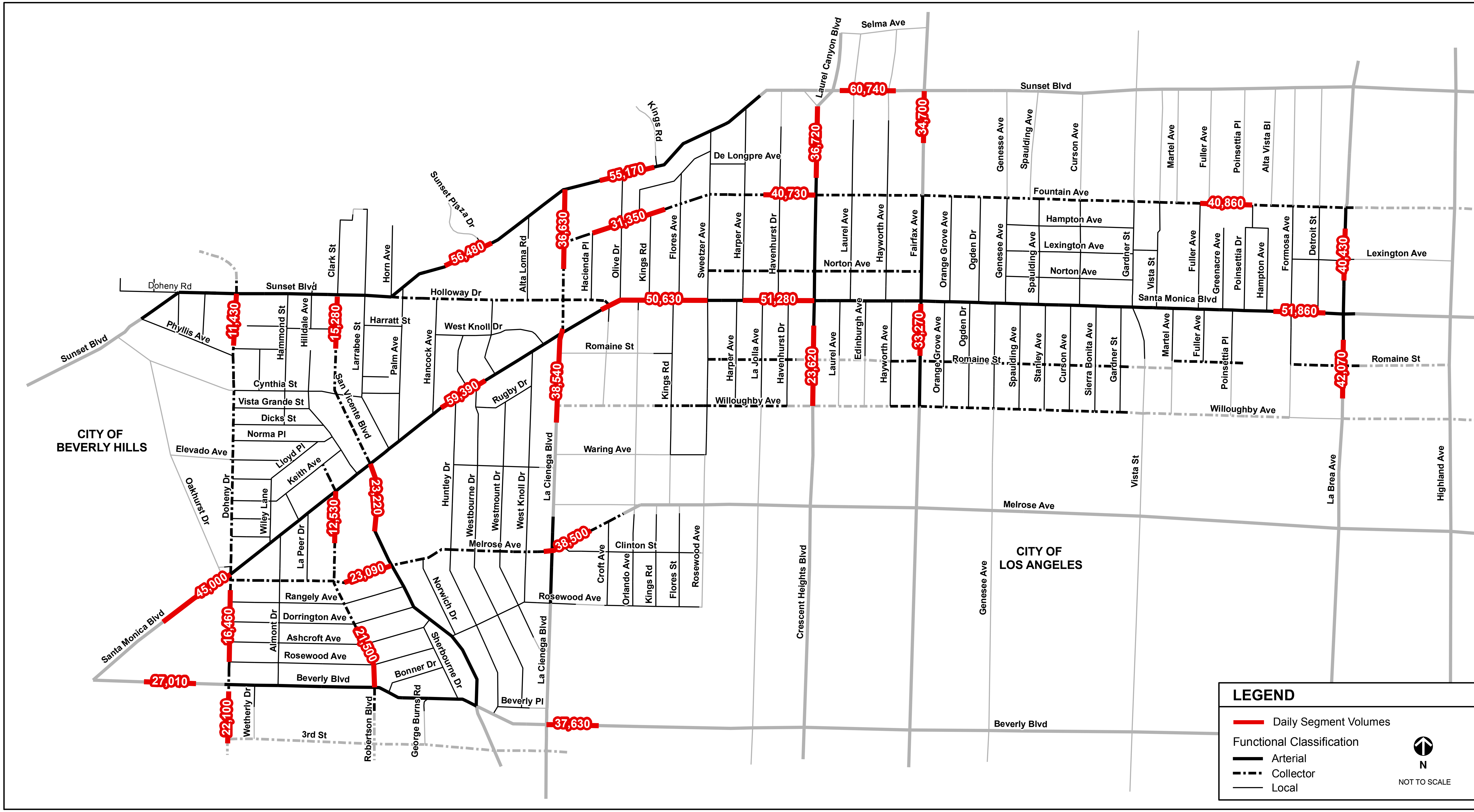
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE
PEAK HOUR SEGMENT VOLUMES - EXISTING
FIGURE 13



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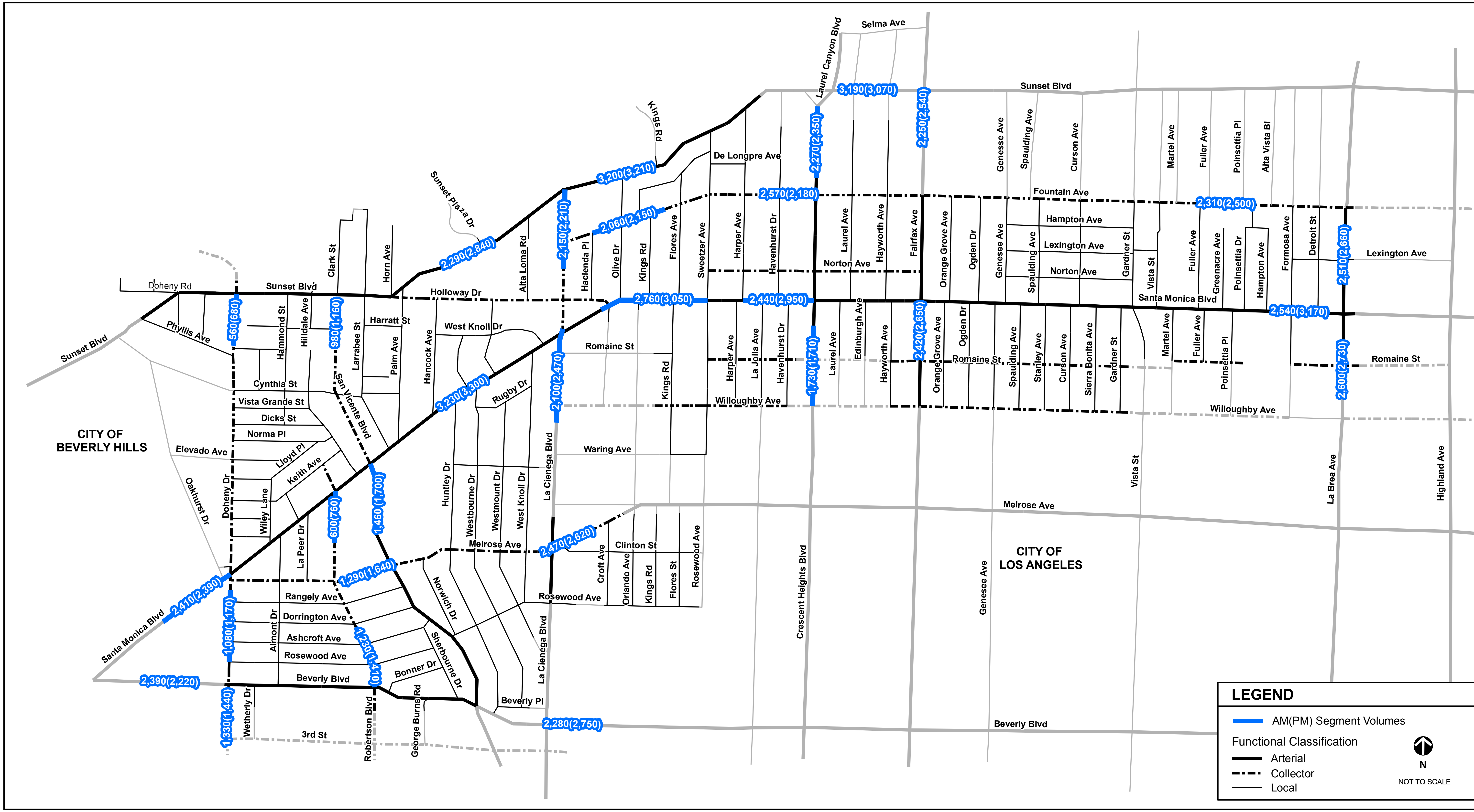
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE
DAILY SEGMENT VOLUMES - PROPOSED GENERAL PLAN

FIGURE 14



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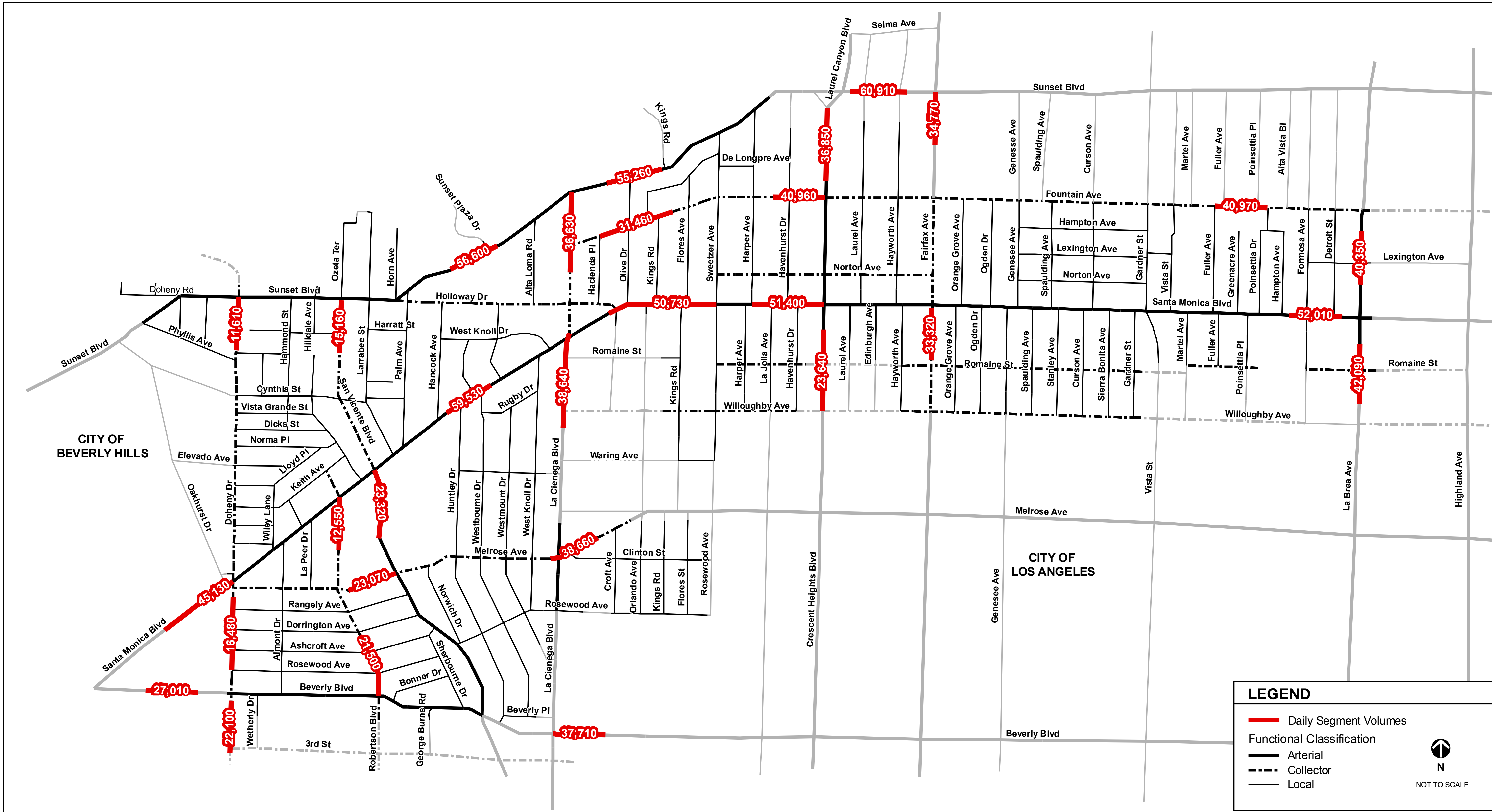
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE
PEAK HOUR SEGMENT VOLUMES - PROPOSED GENERAL PLAN

FIGURE 15



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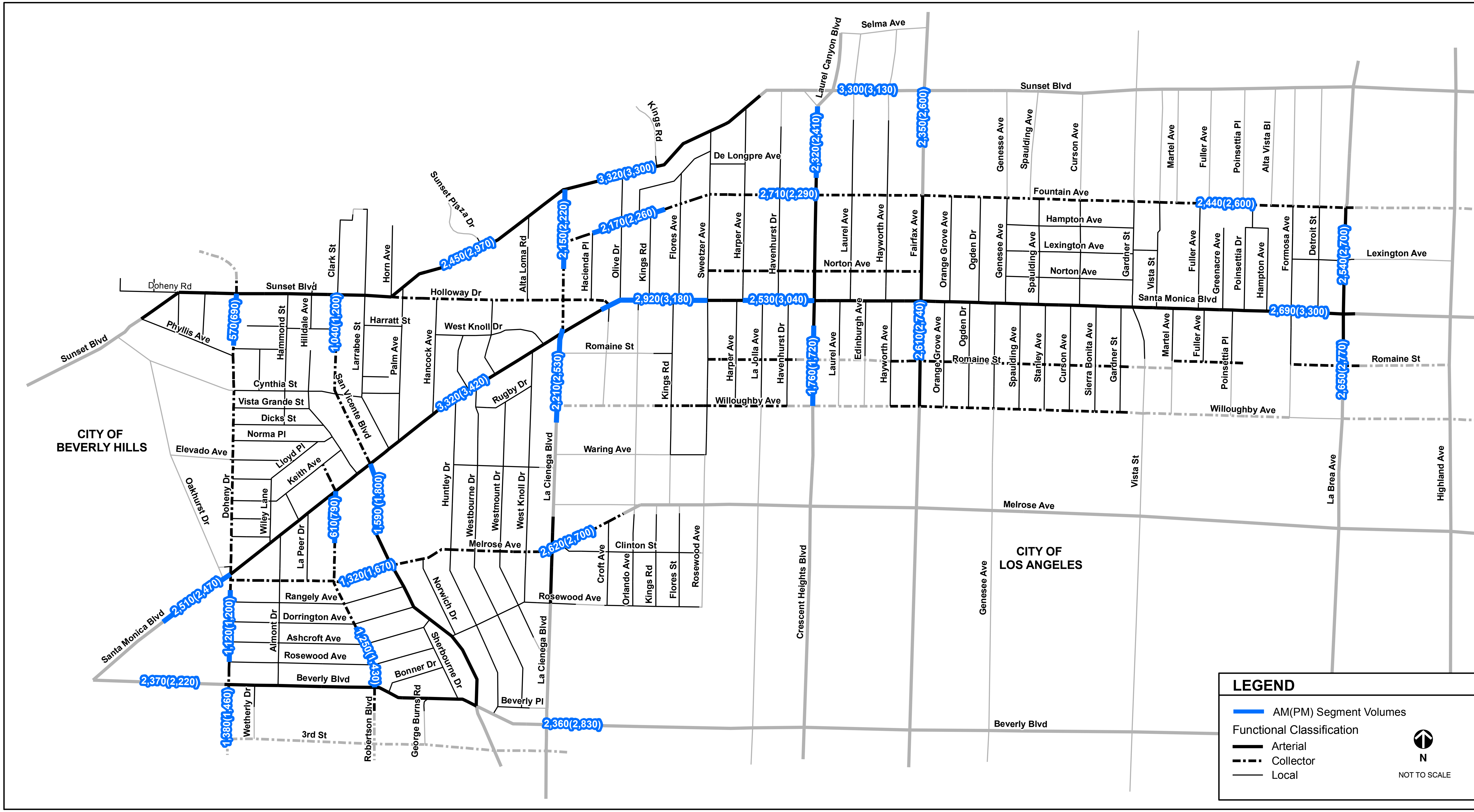
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE
DAILY SEGMENT VOLUMES - NO PROJECT

FIGURE 16



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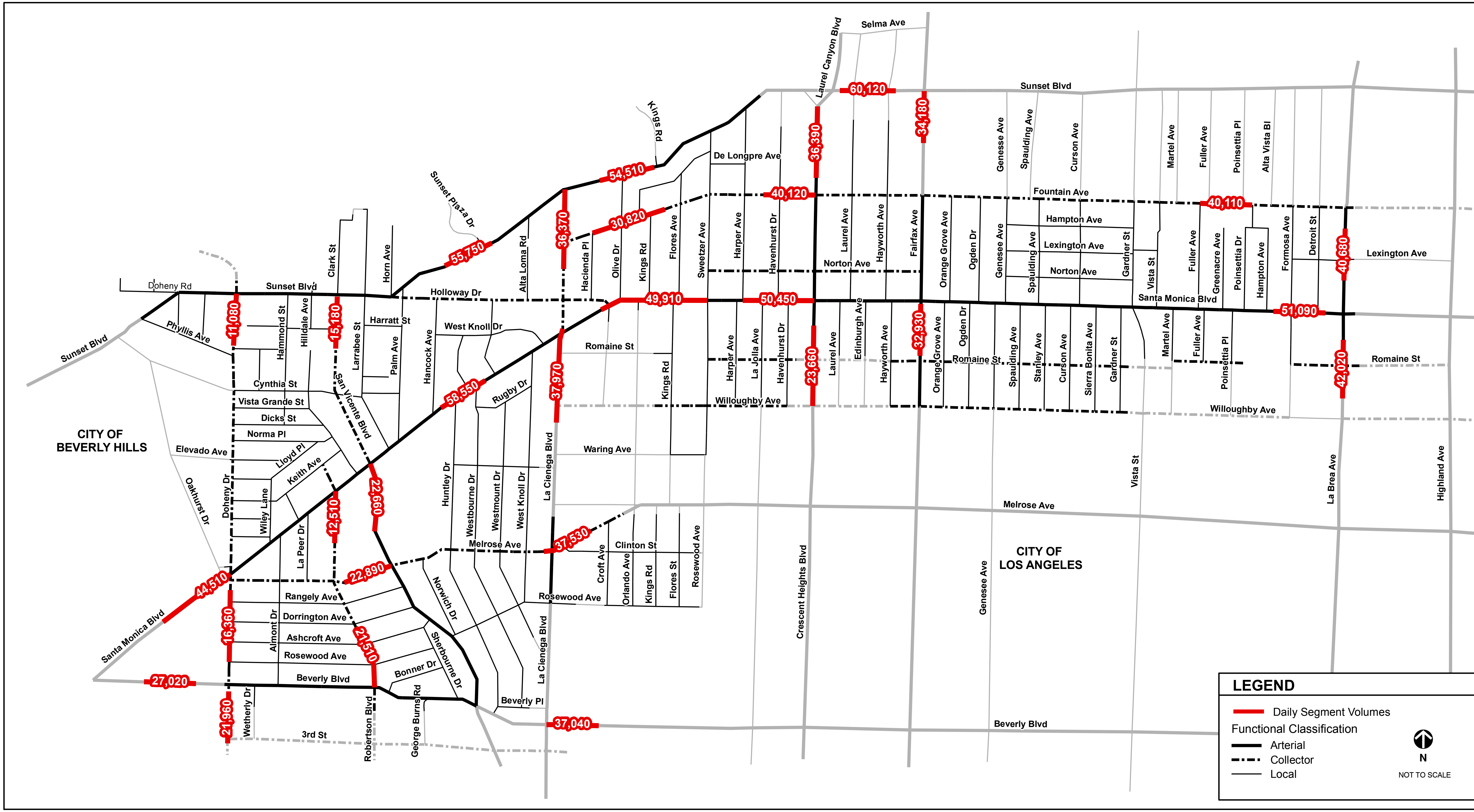
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE
PEAK HOUR SEGMENT VOLUMES - NO PROJECT

FIGURE 17



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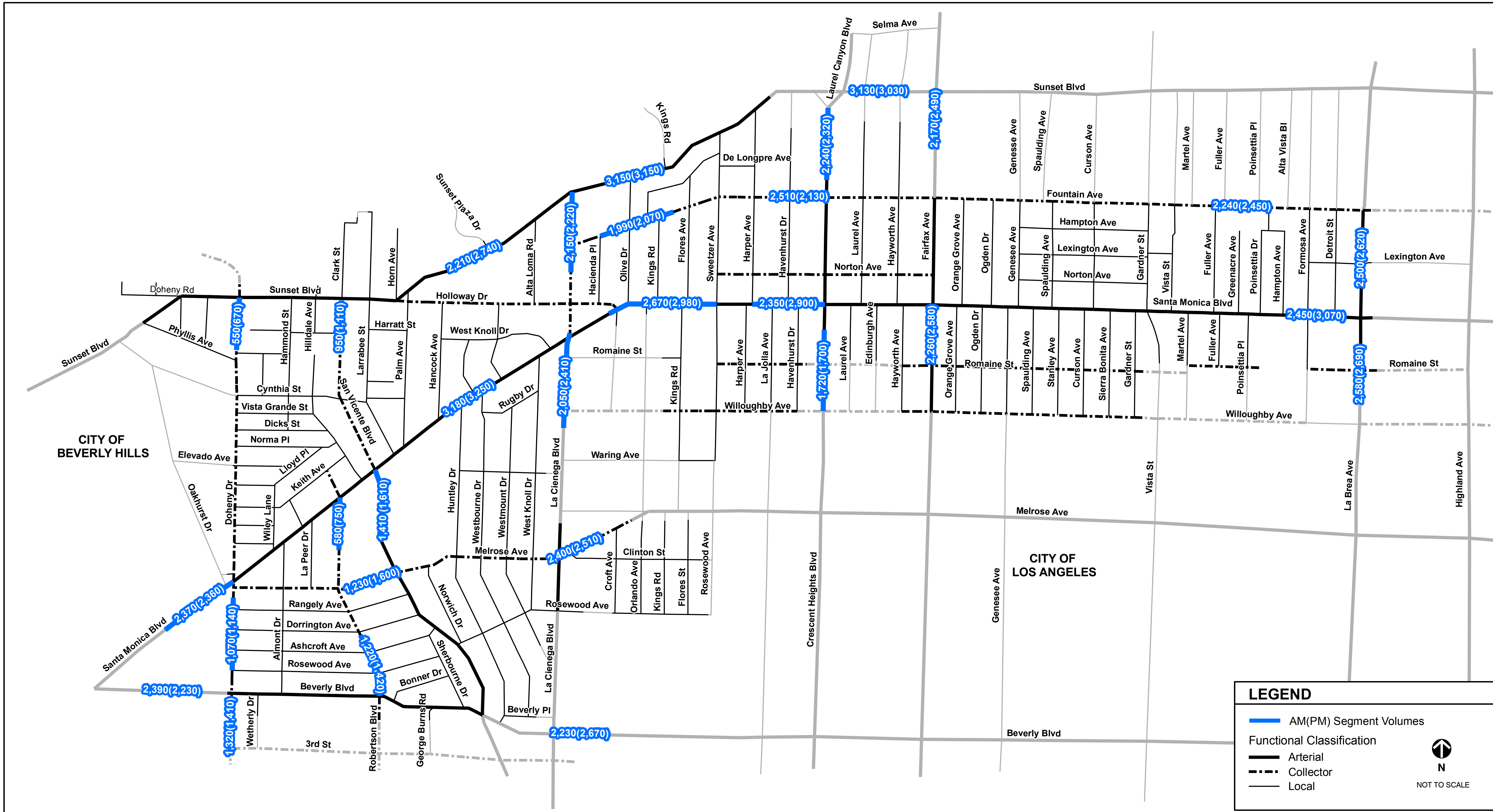
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE
DAILY SEGMENT VOLUMES - TOD FOCUS ALTERNATIVE

FIGURE 18



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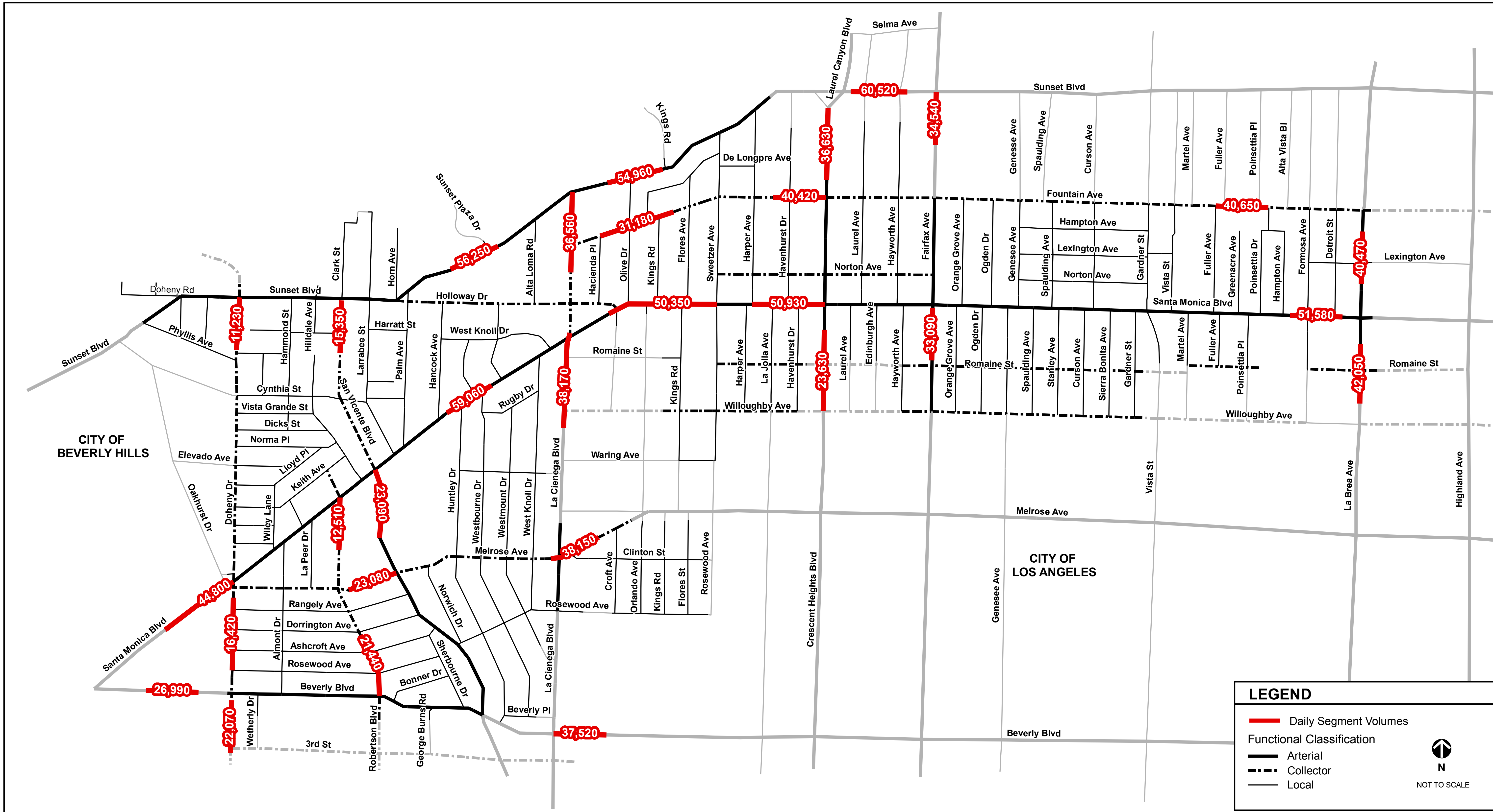
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE
PEAK HOUR SEGMENT VOLUMES - TOD FOCUS ALTERNATIVE

FIGURE 19



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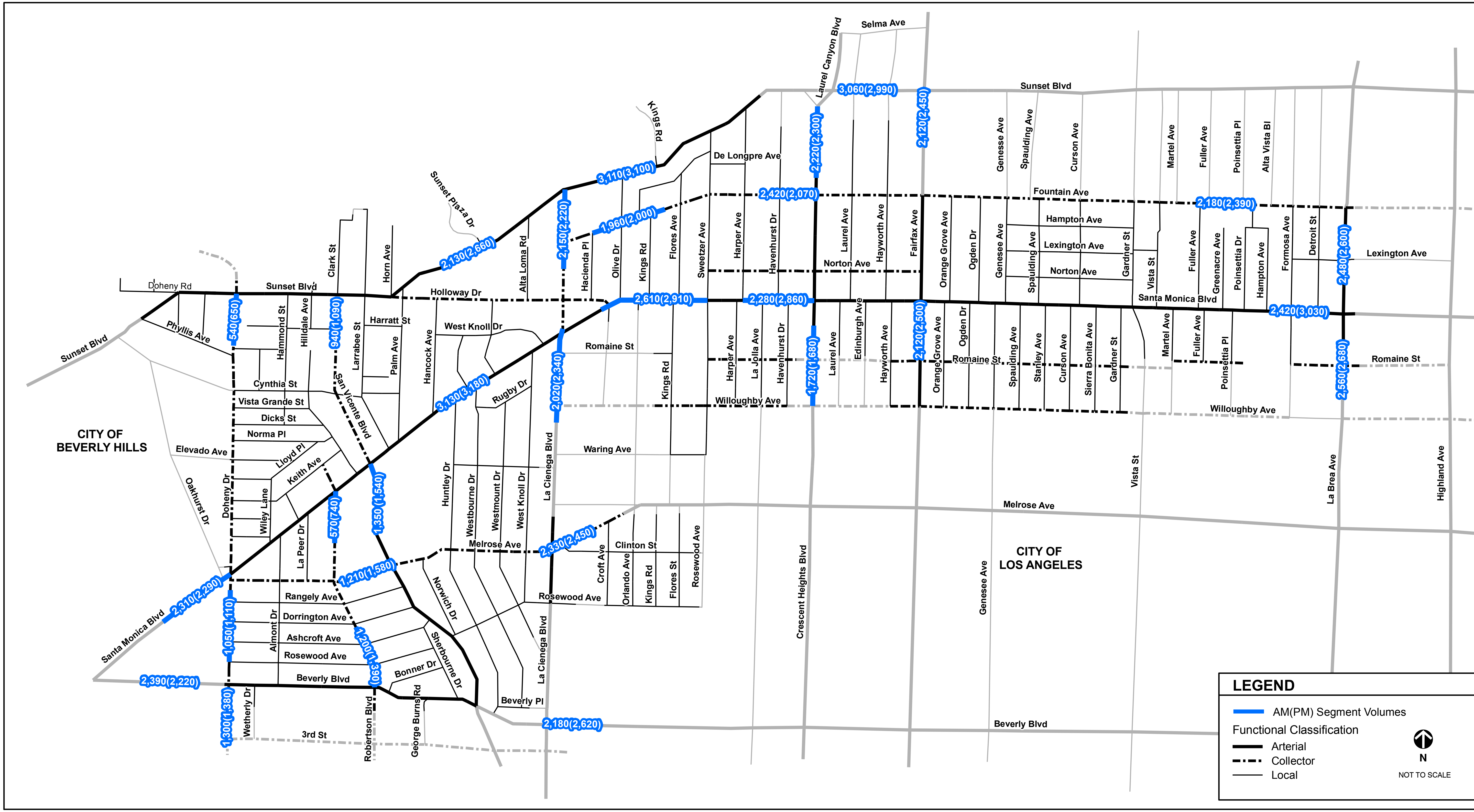
DAILY SEGMENT VOLUMES - EXTENSIVE TDM ALTERNATIVE

FIGURE 20



CITY OF WEST HOLLYWOOD GENERAL PLAN
PEAK HOUR SEGMENT VOLUMES - EXTENSIVE TDM ALTERNATIVE
FIGURE 21

FEHR & PEERS
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FIGURE 22
TOTAL DAILY VEHICLE MILES TRAVELED (VMT)

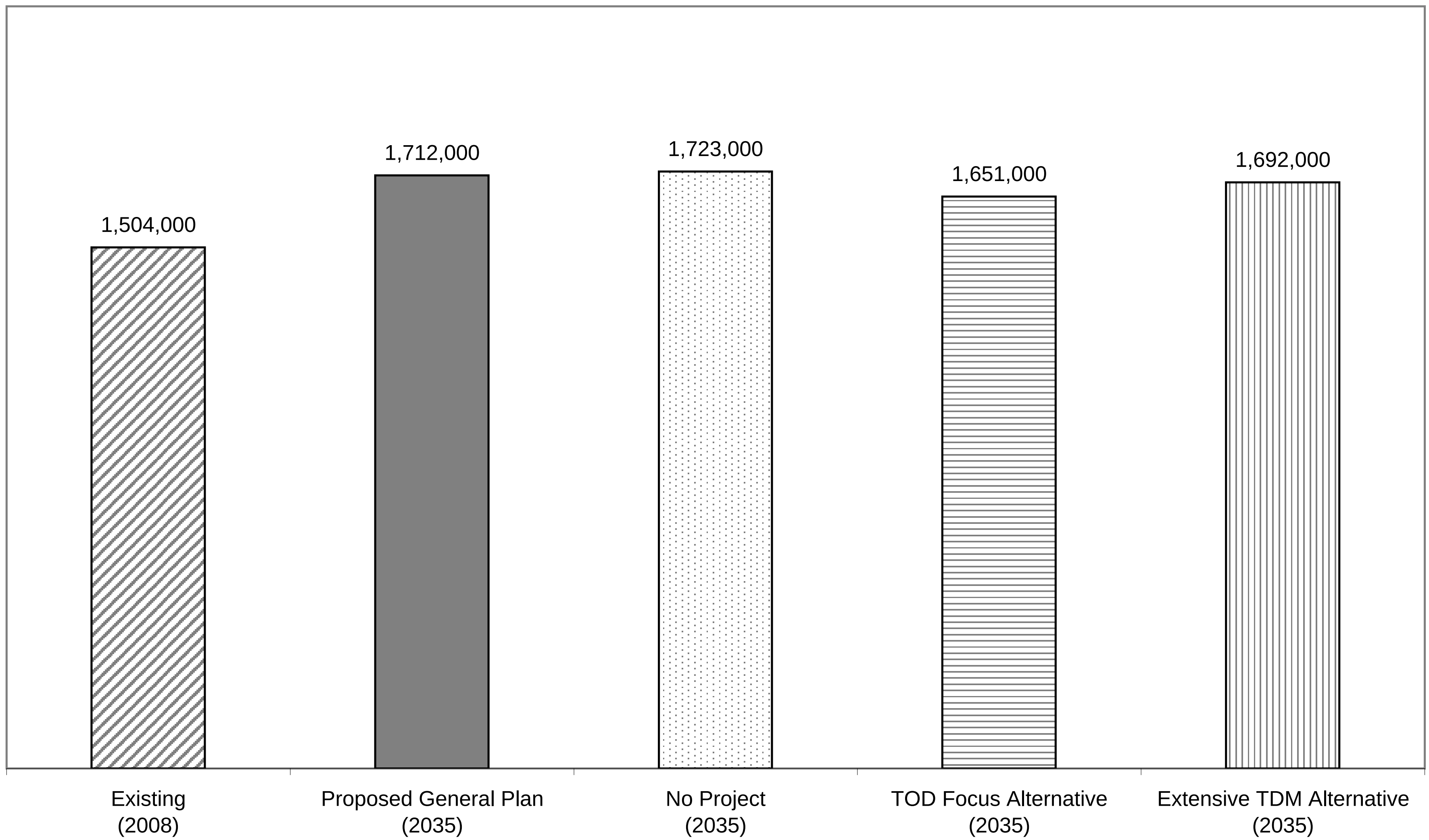
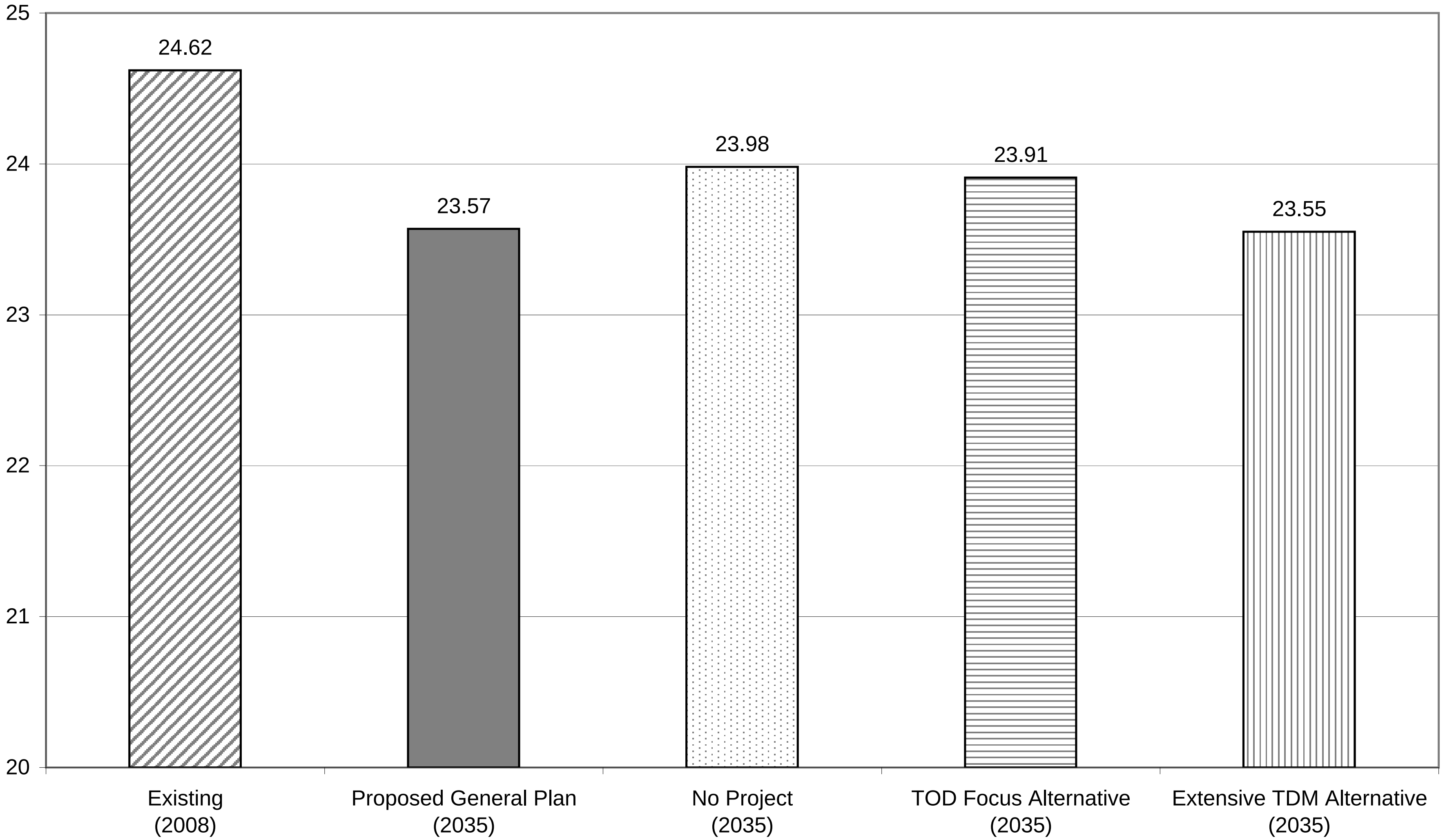
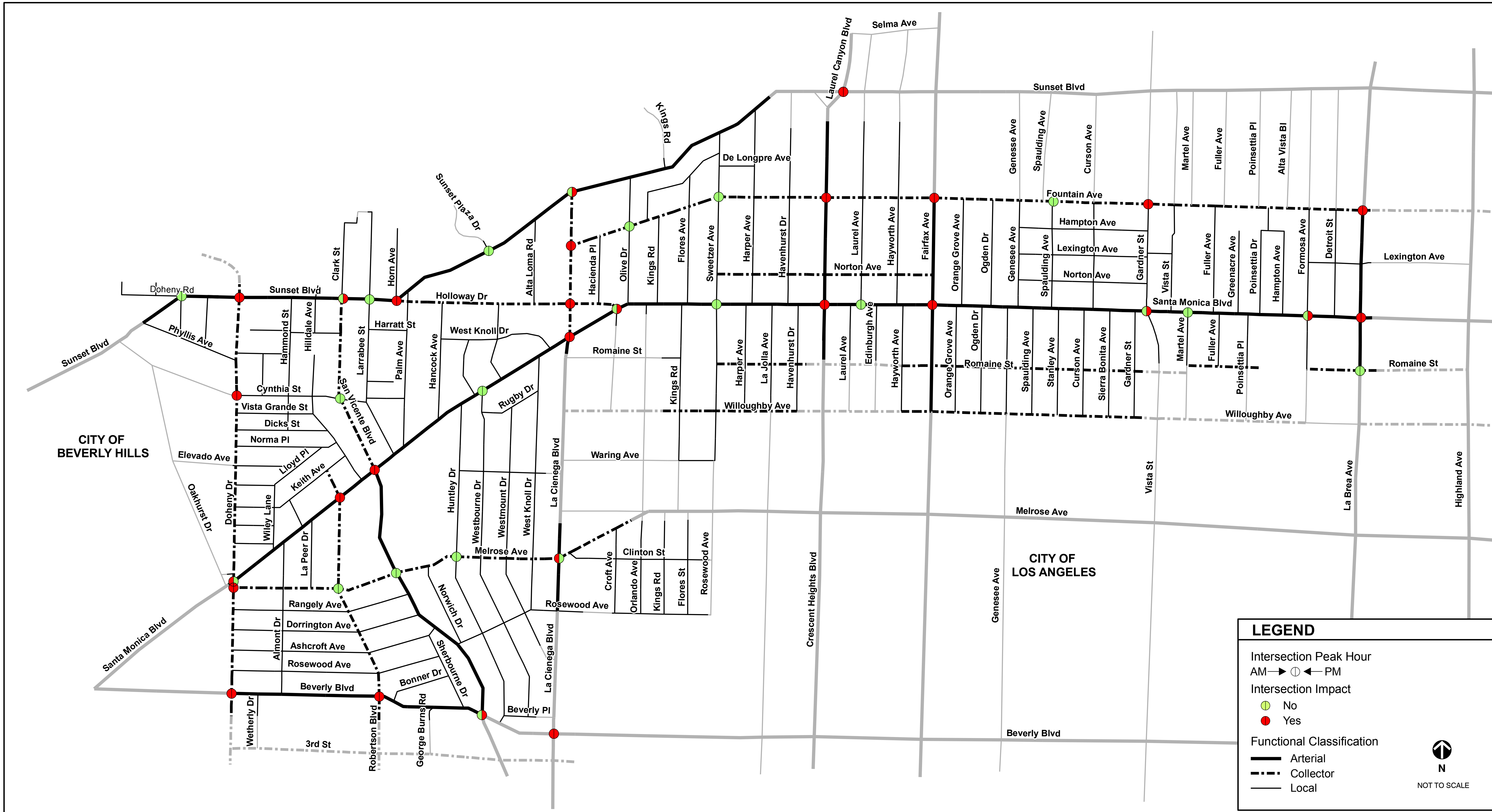


FIGURE 23
VMT PER CAPITA (WHERE CAPITA = POPULATION + EMPLOYMENT)





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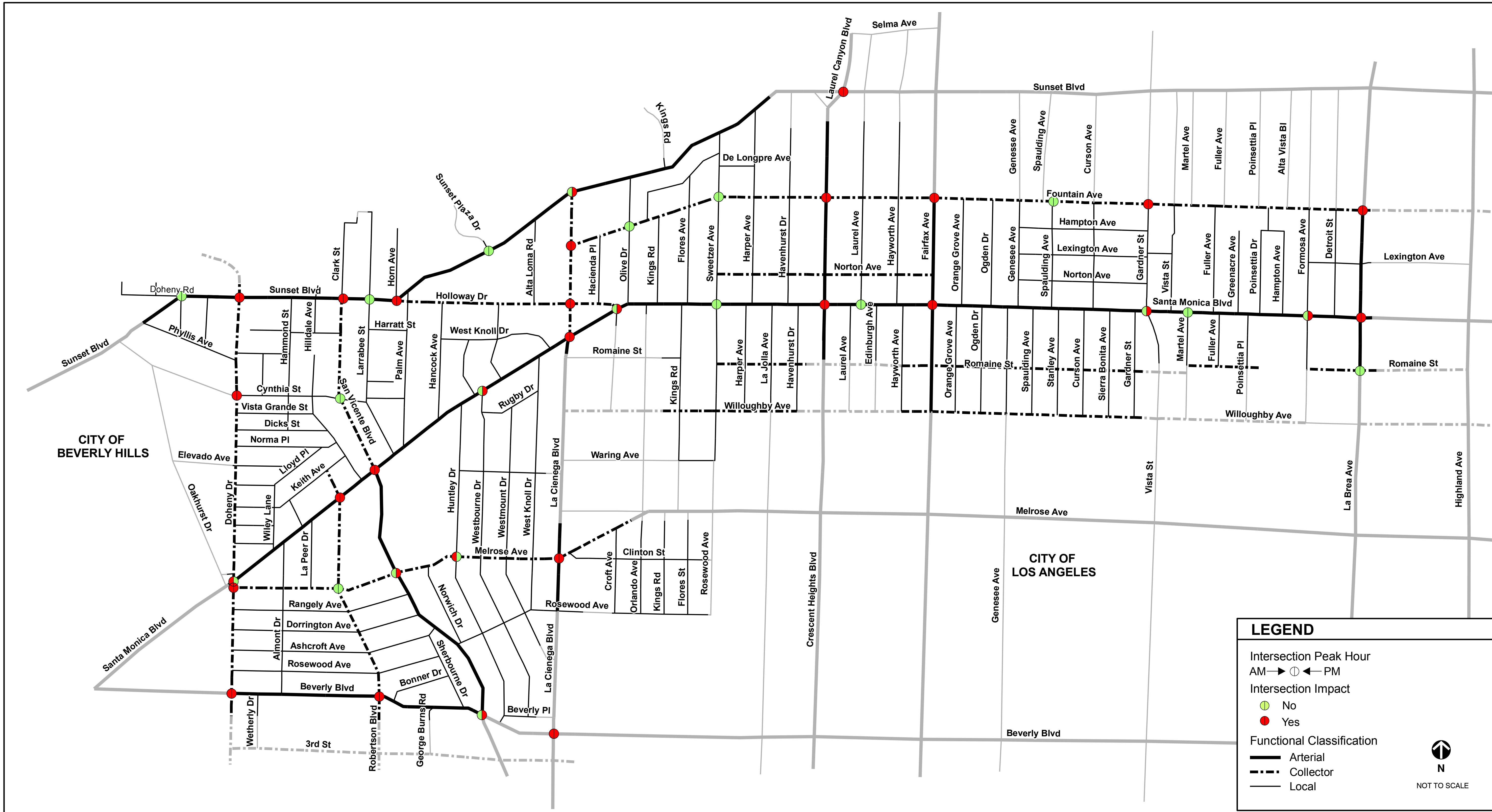
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE
PROPOSED GENERAL PLAN INTERSECTION IMPACTS

FIGURE 24



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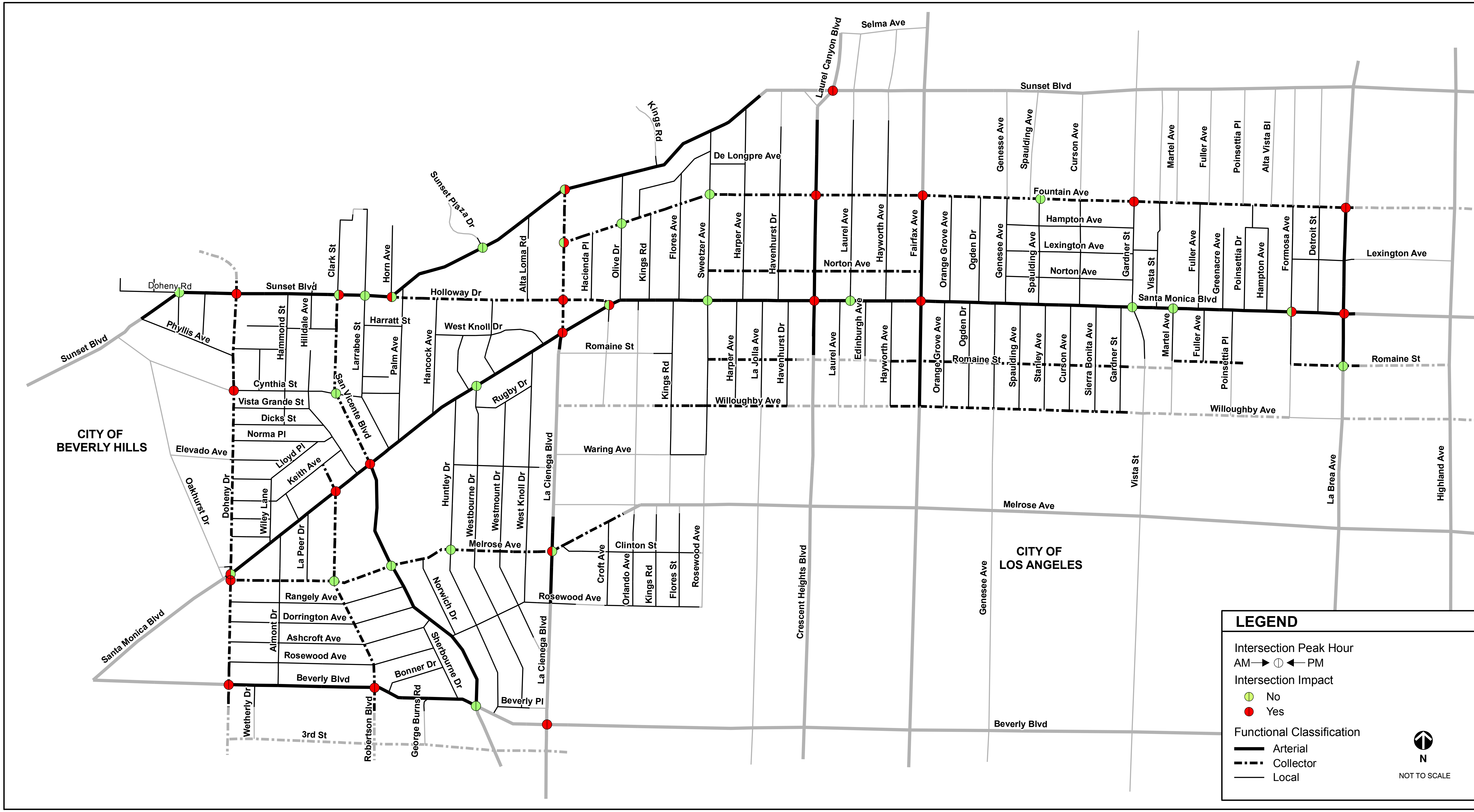
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE
NO PROJECT INTERSECTION IMPACTS

FIGURE 25



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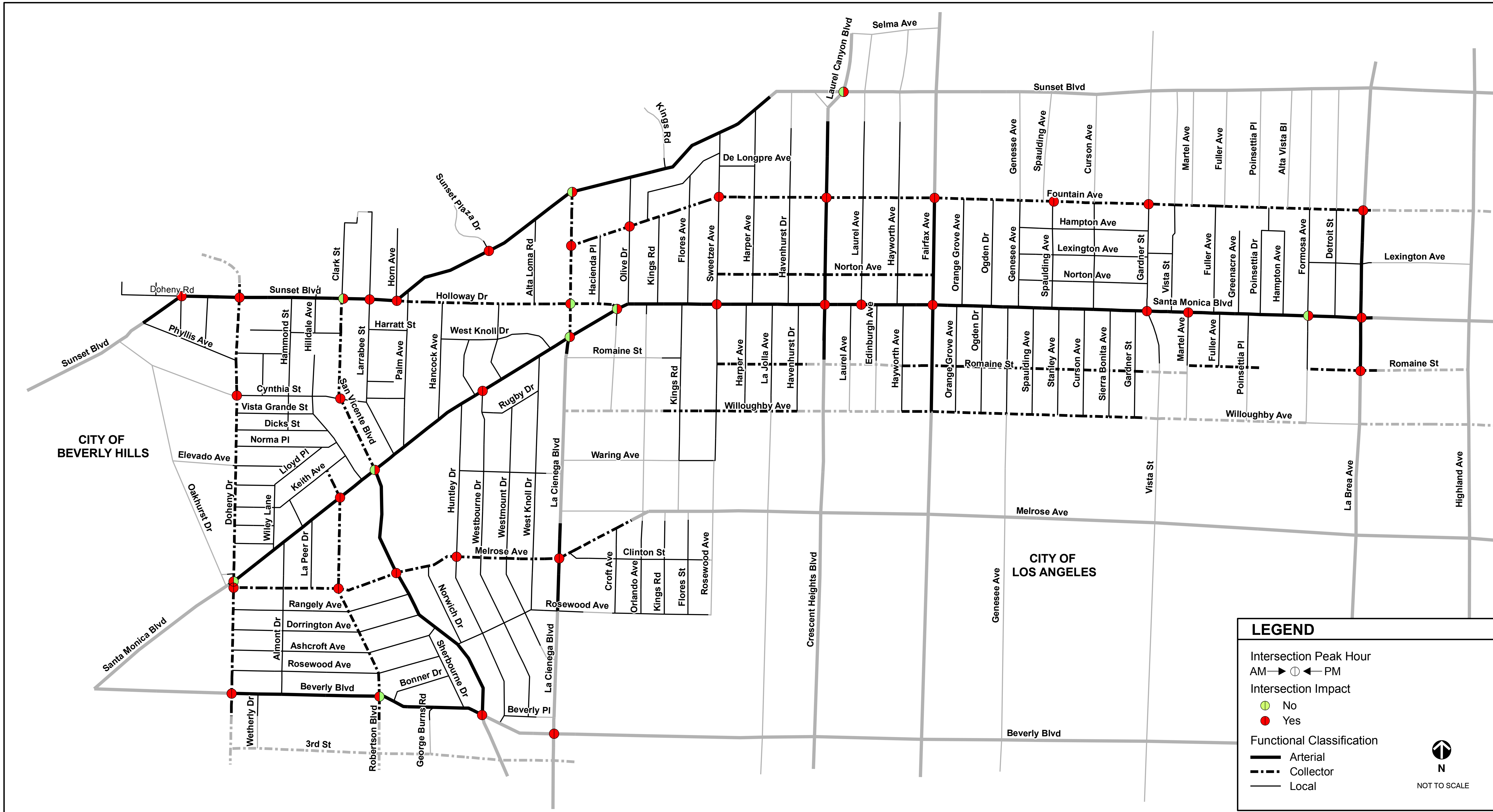
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE
TOD FOCUS ALTERNATIVE INTERSECTION IMPACTS

FIGURE 26



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CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE
EXTENSIVE TDM ALTERNATIVE INTERSECTION IMPACTS

FIGURE 27

FIGURE 28
NUMBER OF SIGNIFICANT INTERSECTION IMPACTS

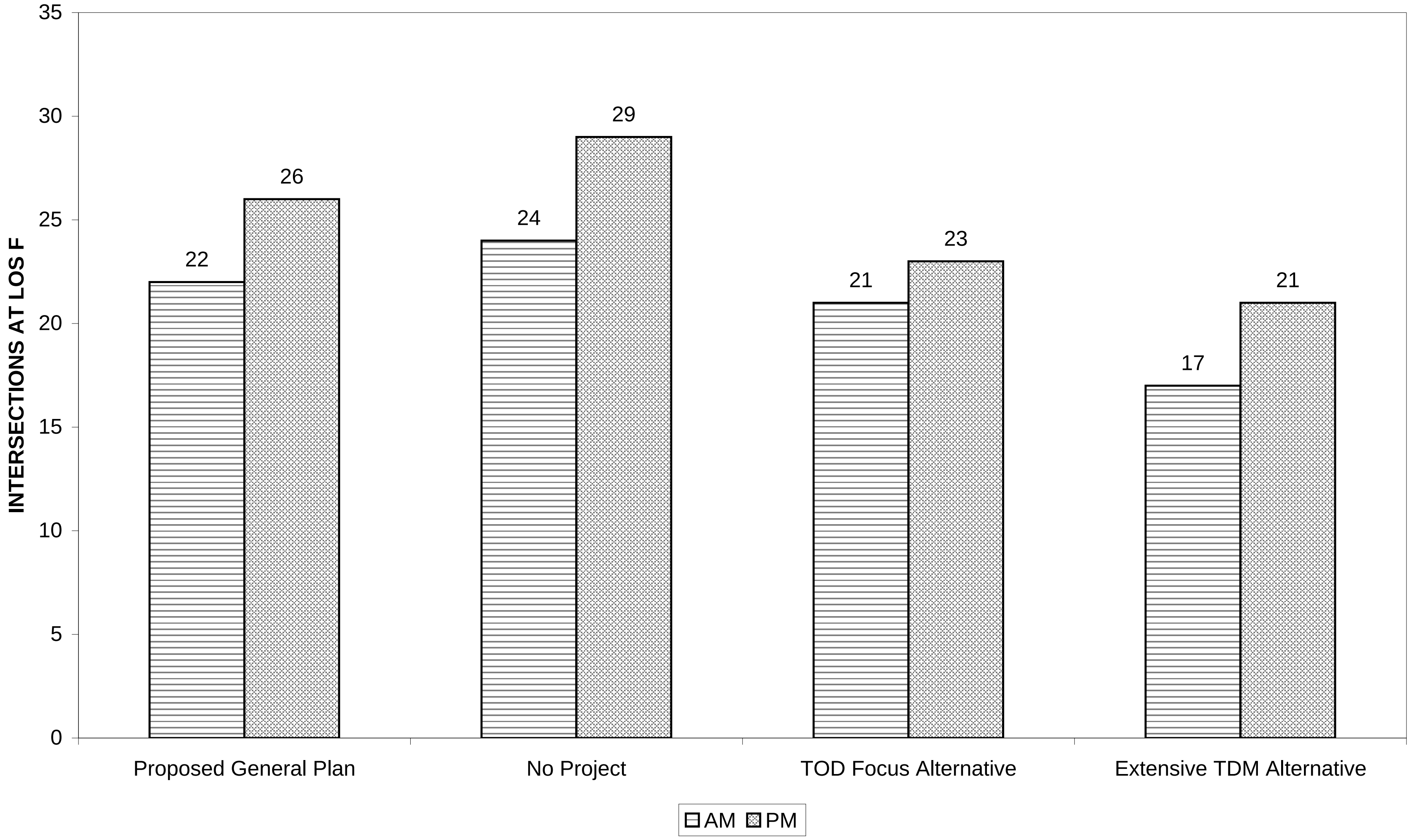


TABLE 1
EXISTING LEVELS OF SERVICE
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE STUDY INTERSECTIONS

Int	North/South Street	East/West Street	AM Delay [c]	AM LOS*	PM Delay [c]	PM LOS*
1	Doheny Rd/Cory Av	Sunset Bl	23	C	28	C
2	Doheny Dr	Sunset Bl	52	D	60	E
4	San Vicente Bl	Sunset Bl	33	C	36	D
5	Larrabee St	Sunset Bl	7	A	10	B
6	Sunset Plaza Dr	Sunset Bl	9	A	14	B
7	La Cienega Bl / Miller Dr	Sunset Bl	19	B	59	E
9	Crescent Heights Bl	Sunset Bl	58	E	60	E
11	La Cienega Bl	Fountain Av	54	D	192	F
12	Olive Dr	Fountain Av	6	A	4	A
14	Sweetzer Av	Fountain Av	9	A	12	B
15	Crescent Heights Bl	Fountain Av	98	F	49	D
17	Fairfax Av	Fountain Av	66	E	58	E
18	Spaulding Av	Fountain Av	5	A	5	A
20	Gardner St	Fountain Av	56	E	190	F
24	La Brea Av	Fountain Av	64	E	50	D
26	Holloway Dr/Horn Av	Sunset Bl	40	D	54	D
27	La Cienega Bl	Holloway Dr	30	C	58	E
28	Doheny Dr	Cynthia St [a]	21	C	52	F
29	San Vicente Bl	Cynthia St	15	B	20	C
30	Doheny Dr	Santa Monica Bl (WB) [b]	98	F	39	D
	Doheny Dr	Melrose Av/SM Bl (EB) [b]	65	E	191	F
32	Robertson Bl	Santa Monica Bl	35	C	33	C
33	San Vicente Bl	Santa Monica Bl	42	D	61	E
34	Westbourne Dr	Santa Monica Bl	16	B	18	B
35	La Cienega Bl	Santa Monica Bl	83	F	77	E
36	Croft Av/Holloway Dr	Santa Monica Bl	15	B	32	C
39	Sweetzer Av	Santa Monica Bl	14	B	18	B
41	Crescent Heights Bl	Santa Monica Bl	54	D	111	F
42	Laurel Av	Santa Monica Bl	10	A	11	B
43	Fairfax Av	Santa Monica Bl	60	E	82	F
46	Gardner St	Santa Monica Bl	19	B	25	C
47	Martel Av	Santa Monica Bl	8	A	15	B
49	Formosa Av	Santa Monica Bl	10	A	36	D
50	La Brea Av	Santa Monica Bl	59	E	71	E
54	Robertson Bl	Melrose Av	15	B	13	B
55	San Vicente Bl	Melrose Av	34	C	23	C
56	Huntley Dr	Melrose Av	26	C	7	A
57	La Cienega Bl	Melrose Av	60	E	40	D
61	Doheny Dr	Beverly Bl	45	D	48	D
63	Robertson Bl	Beverly Bl	61	E	34	C
65	San Vicente Bl	Beverly Bl	40	D	39	D
66	La Cienega	Beverly Bl	64	E	84	F
72	La Brea Av	Romaine St	11	B	51	D

notes:

[a] Intersection is controlled by stop signs on the minor approach only and delay is reported for the worst case movement

[b] Intersection is controlled by two signals on one controller. Delay and LOS are reported for each signal

[c] Beyond a certain point intersection delay can no longer be accurately calculated. The intersection is said to be overflowing.
For signalized intersections, average delay beyond 200 seconds is reported as OVFL
For unsignalized intersections, worst case approach delay beyond 50 seconds is reported as OVFL

* At some intersections, field-collected traffic count data may represent only the number of vehicles that proceed through the intersection, rather than including the actual demand, which can be in queue upstream. Any traffic counts conducted under these conditions may under-represent the true demand for the intersection, and the actual LOS may be worse than represented above.

TABLE 2
LEVEL OF SERVICE DEFINITIONS FOR SIGNALIZED INTERSECTIONS

Level of Service	Average Approach Delay in Seconds	Definition
A	< 10	EXCELLENT. No Vehicle waits longer than one red light and no approach phase is fully used.
B	>10-20	VERY GOOD. An occasional approach phase is fully utilized; many drivers begin to feel somewhat restricted within groups of vehicles.
C	>20-35	GOOD. Occasionally drivers may have to wait through more than one red light; backups may develop behind turning vehicles.
D	>35-55	FAIR. Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.
E	>55-80	POOR. Represents the most vehicles intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.
F	>80	FAILURE. Backups from nearby locations or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Tremendous delays with continuously increasing queue lengths.

Source: *Highway Capacity Manual. Transportation Research Board, 2000*
Source for descriptions:
Transportation Research Circular No. 212, Interim Materials on Highway Capacity
Transportation Research Board, 1980.

TABLE 3 LEVEL OF SERVICE DEFINITIONS FOR STOP-CONTROLLED INTERSECTIONS	
Level of Service	**Average Total Delay (seconds per vehicle)**
A	< 10.0
B	> 10.0 and < 15.0
C	> 15.0 and < 25.0
D	> 25.0 and < 35.0
E	> 35.0 and < 50.0
F	> 50.0

Source: *Highway Capacity Manual*
Transportation Research Board, 2000

			Existing (2008) AM		Existing (2008) PM		Future (2035) Proposed Project AM		Future (2035) Proposed Project PM		AM Impact Analysis		PM Impact Analysis	
Int	North/South Street	East/West Street	Delay [c]	LOS	Delay [c]	LOS	Delay [c]	LOS	Delay [c]	LOS	Change in Delay	Impact?	Change in Delay	Impact?
1	Doheny Rd/Cory Av	Sunset Bl	23	C	28	C	26	C	34	C	4	No	7	No
2	Doheny Dr	Sunset Bl	52	D	60	E	73	E	80	E	22	**Yes**	20	**Yes**
4	San Vicente Bl	Sunset Bl	33	C	36	D	42	D	61	E	9	No	25	**Yes**
5	Larrabee St	Sunset Bl	7	A	10	B	9	A	11	B	2	No	1	No
6	Sunset Plaza Dr	Sunset Bl	9	A	14	B	11	B	22	C	2	No	8	No
7	La Cienega Bl / Miller Dr	Sunset Bl	19	B	59	E	25	C	90	F	7	No	31	**Yes**
9	Crescent Heights Bl	Sunset Bl	58	E	60	E	69	E	74	E	10	**Yes**	14	**Yes**
11	La Cienega Bl	Fountain Av	54	D	192	F	63	E	240	F	9	**Yes**	48	**Yes**
12	Olive Dr	Fountain Av	6	A	4	A	9	A	6	A	2	No	2	No
14	Sweetzer Av	Fountain Av	9	A	12	B	12	B	14	B	2	No	1	No
15	Crescent Heights Bl	Fountain Av	98	F	49	D	113	F	71	E	15	**Yes**	22	**Yes**
17	Fairfax Av	Fountain Av	66	E	58	E	96	F	101	F	30	**Yes**	44	**Yes**
18	Spaulding Av	Fountain Av	5	A	5	A	6	A	6	A	1	No	1	No
20	Gardner St	Fountain Av	56	E	190	F	87	F	289	F	31	**Yes**	100	**Yes**
24	La Brea Av	Fountain Av	64	E	50	D	80	E	64	E	16	**Yes**	14	**Yes**
26	Holloway Dr/Horn Av	Sunset Bl	40	D	54	D	57	E	69	E	17	**Yes**	15	**Yes**
27	La Cienega Bl	Holloway Dr	30	C	58	E	42	D	70	E	13	**Yes**	12	**Yes**
28	Doheny Dr	Cynthia St [a]	21	C	52	F	38	E	110	F	17	**Yes**	59	**Yes**
29	San Vicente Bl	Cynthia St	15	B	20	C	17	B	28	C	1	No	8	No
30	Doheny Dr	Santa Monica Bl (WB) [b]	98	F	39	D	114	F	41	D	16	**Yes**	2	No
	Doheny Dr	Melrose Av/SM Bl (EB) [b]	65	E	191	F	247	F	208	F	182	**Yes**	17	**Yes**
32	Robertson Bl	Santa Monica Bl	35	C	33	C	57	E	56	E	22	**Yes**	24	**Yes**
33	San Vicente Bl	Santa Monica Bl	42	D	61	E	63	E	102	F	20	**Yes**	40	**Yes**
34	Westbourne Dr	Santa Monica Bl	16	B	18	B	20	B	31	C	4	No	13	No
35	La Cienega Bl	Santa Monica Bl	83	F	77	E	103	F	100	F	20	**Yes**	23	**Yes**
36	Croft Av/Holloway Dr	Santa Monica Bl	15	B	32	C	18	B	51	D	3	No	19	**Yes**
39	Sweetzer Av	Santa Monica Bl	14	B	18	B	17	B	21	C	2	No	3	No
41	Crescent Heights Bl	Santa Monica Bl	54	D	111	F	74	E	135	F	20	**Yes**	24	**Yes**
42	Laurel Av	Santa Monica Bl	10	A	11	B	11	B	11	B	1	No	1	No
43	Fairfax Av	Santa Monica Bl	60	E	82	F	79	E	155	F	20	**Yes**	73	**Yes**
46	Gardner St	Santa Monica Bl	19	B	25	C	21	C	37	D	2	No	12	**Yes**
47	Martel Av	Santa Monica Bl	8	A	15	B	9	A	17	B	1	No	2	No
49	Formosa Av	Santa Monica Bl	10	A	36	D	14	B	59	E	4	No	23	**Yes**
50	La Brea Av	Santa Monica Bl	59	E	71	E	80	E	101	F	21	**Yes**	30	**Yes**
54	Robertson Bl	Melrose Av	15	B	13	B	17	B	15	B	2	No	2	No
55	San Vicente Bl	Melrose Av	34	C	23	C	42	D	32	C	8	No	9	No
56	Huntley Dr	Melrose Av	26	C	7	A	35	C	8	A	9	No	1	No
57	La Cienega Bl	Melrose Av	60	E	40	D	69	E	50	D	9	**Yes**	10	No
61	Doheny Dr	Beverly Bl	45	D	48	D	71	E	72	E	26	**Yes**	24	**Yes**
63	Robertson Bl	Beverly Bl	61	E	34	C	75	E	50	D	14	**Yes**	16	**Yes**
65	San Vicente Bl	Beverly Bl	40	D	39	D	44	D	59	E	4	No	20	**Yes**
66	La Cienega	Beverly Bl	64	E	84	F	85	F	107	F	21	**Yes**	23	**Yes**
72	La Brea Av	Romaine St	11	B	51	D	14	B	46	D	3	No	-5	No

notes:

[a] Intersection is control by stop signs and delay is reported for the worst case movement

[b] Intersection is controlled by two signals on one controller. Delay and LOS are reported for each signal

[c] Beyond a certain point intersection delay can no longer be accurately calculated. The intersection is said to be overflowing.
For signalized intersections, average delay beyond 200 seconds is reported as OVFL
For unsignalized intersections, worst case approach delay beyond 50 seconds is reported as OVFL

TABLE 5
FUTURE NO PROJECT LEVELS OF SERVICE
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE STUDY INTERSECTIONS

			Existing (2008) AM		Existing (2008) PM		Future (2035) No Project AM		Future (2035) No Project PM		AM Impact Analysis		PM Impact Analysis	
Int	North/South Street	East/West Street	Delay [c]	LOS*	Delay [c]	LOS*	Delay [c]	LOS*	Delay [c]	LOS*	Change in Delay	Impact?	Change in Delay	Impact?
1	Doheny Rd/Cory Av	Sunset Bl	23	C	28	C	29	C	37	D	7	No	9	No
2	Doheny Dr	Sunset Bl	52	D	60	E	82	F	84	F	30	**Yes**	25	**Yes**
4	San Vicente Bl	Sunset Bl	33	C	36	D	49	D	76	E	15	**Yes**	39	**Yes**
5	Larrabee St	Sunset Bl	7	A	10	B	10	A	12	B	2	No	2	No
6	Sunset Plaza Dr	Sunset Bl	9	A	14	B	11	B	26	C	2	No	12	No
7	La Cienega Bl / Miller Dr	Sunset Bl	19	B	59	E	28	C	110	F	10	No	51	**Yes**
9	Crescent Heights Bl	Sunset Bl	58	E	60	E	81	F	80	F	22	**Yes**	20	**Yes**
11	La Cienega Bl	Fountain Av	54	D	192	F	73	E	276	F	19	**Yes**	84	**Yes**
12	Olive Dr	Fountain Av	6	A	4	A	10	A	6	A	4	No	2	No
14	Sweetzer Av	Fountain Av	9	A	12	B	12	B	14	B	3	No	2	No
15	Crescent Heights Bl	Fountain Av	98	F	49	D	123	F	81	F	25	**Yes**	32	**Yes**
17	Fairfax Av	Fountain Av	66	E	58	E	112	F	124	F	46	**Yes**	67	**Yes**
18	Spaulding Av	Fountain Av	5	A	5	A	6	A	7	A	1	No	1	No
20	Gardner St	Fountain Av	56	E	190	F	88	F	300	F	33	**Yes**	111	**Yes**
24	La Brea Av	Fountain Av	64	E	50	D	90	F	68	E	26	**Yes**	18	**Yes**
26	Holloway Dr/Horn Av	Sunset Bl	40	D	54	D	61	E	76	E	21	**Yes**	22	**Yes**
27	La Cienega Bl	Holloway Dr	30	C	58	E	47	D	72	E	18	**Yes**	14	**Yes**
28	Doheny Dr	Cynthia St [a]	21	C	52	F	60	F	176	F	39	**Yes**	124	**Yes**
29	San Vicente Bl	Cynthia St	15	B	20	C	17	B	28	C	2	No	8	No
30	Doheny Dr	Santa Monica Bl (WB) [b]	98	F	39	D	119	F	42	D	22	**Yes**	3	No
	Doheny Dr	Melrose Av/SM Bl (EB) [b]	65	E	191	F	228	F	211	F	163	**Yes**	21	**Yes**
32	Robertson Bl	Santa Monica Bl	35	C	33	C	63	E	71	E	28	**Yes**	38	**Yes**
33	San Vicente Bl	Santa Monica Bl	42	D	61	E	79	E	119	F	36	**Yes**	58	**Yes**
34	Westbourne Dr	Santa Monica Bl	16	B	18	B	22	C	40	D	6	No	22	**Yes**
35	La Cienega Bl	Santa Monica Bl	83	F	77	E	123	F	112	F	40	**Yes**	35	**Yes**
36	Croft Av/Holloway Dr	Santa Monica Bl	15	B	32	C	19	B	53	D	4	No	21	**Yes**
39	Sweetzer Av	Santa Monica Bl	14	B	18	B	19	B	23	C	4	No	5	No
41	Crescent Heights Bl	Santa Monica Bl	54	D	111	F	82	F	143	F	28	**Yes**	32	**Yes**
42	Laurel Av	Santa Monica Bl	10	A	11	B	11	B	12	B	2	No	1	No
43	Fairfax Av	Santa Monica Bl	60	E	82	F	104	F	166	F	45	**Yes**	84	**Yes**
46	Gardner St	Santa Monica Bl	19	B	25	C	21	C	43	D	3	No	17	**Yes**
47	Martel Av	Santa Monica Bl	8	A	15	B	9	A	17	B	1	No	2	No
49	Formosa Av	Santa Monica Bl	10	A	36	D	15	B	68	E	5	No	32	**Yes**
50	La Brea Av	Santa Monica Bl	59	E	71	E	89	F	115	F	30	**Yes**	44	**Yes**
54	Robertson Bl	Melrose Av	15	B	13	B	18	B	17	B	3	No	4	No
55	San Vicente Bl	Melrose Av	34	C	23	C	43	D	35	D	9	No	12	**Yes**
56	Huntley Dr	Melrose Av	26	C	7	A	53	D	8	A	27	**Yes**	2	No
57	La Cienega Bl	Melrose Av	60	E	40	D	77	E	61	E	17	**Yes**	21	**Yes**
61	Doheny Dr	Beverly Bl	45	D	48	D	81	F	83	F	36	**Yes**	35	**Yes**
63	Robertson Bl	Beverly Bl	61	E	34	C	78	E	52	D	17	**Yes**	18	**Yes**
65	San Vicente Bl	Beverly Bl	40	D	39	D	46	D	72	E	6	No	33	**Yes**
66	La Cienega	Beverly Bl	64	E	84	F	94	F	112	F	30	**Yes**	29	**Yes**
72	La Brea Av	Romaine St	11	B	51	D	14	B	46	D	3	No	-5	No

notes:

[a] Intersection is control by stop signs and delay is reported for the worst case movement

[b] Intersection is controlled by two signals on one controller. Delay and LOS are reported for each signal

[c] Beyond a certain point intersection delay can no longer be accurately calculated. The intersection is said to be overflowing.
For signalized intersections, average delay beyond 200 seconds is reported as OVFL
For unsignalized intersections, worst case approach delay beyond 50 seconds is reported as OVFL

* At some intersections, field-collected traffic count data may represent only the number of vehicles that proceed through the intersection, rather than including the actual demand, which can be in queue upstream. Any traffic counts conducted under these conditions may under-represent the true demand for the intersection, and the actual LOS may be worse than represented above.

TABLE 6
FUTURE TOD FOCUS ALTERNATIVE LEVELS OF SERVICE
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE STUDY INTERSECTIONS

			Existing (2008) AM		Existing (2008) PM		Future (2035) TOD Alt AM		Future (2035) TOD Alt PM		AM Impact Analysis		PM Impact Analysis	
Int	North/South Street	East/West Street	Delay [c]	LOS*	Delay [c]	LOS*	Delay [c]	LOS*	Delay [c]	LOS*	Change in Delay	Impact?	Change in Delay	Impact?
1	Doheny Rd/Cory Av	Sunset Bl	23	C	28	C	26	C	34	C	4	No	7	No
2	Doheny Dr	Sunset Bl	52	D	60	E	73	E	81	F	21	**Yes**	22	**Yes**
4	San Vicente Bl	Sunset Bl	33	C	36	D	42	D	56	E	8	No	19	**Yes**
5	Larrabee St	Sunset Bl	7	A	10	B	9	A	11	B	2	No	1	No
6	Sunset Plaza Dr	Sunset Bl	9	A	14	B	11	B	20	B	2	No	6	No
7	La Cienega Bl / Miller Dr	Sunset Bl	19	B	59	E	25	C	81	F	7	No	22	**Yes**
9	Crescent Heights Bl	Sunset Bl	58	E	60	E	65	E	72	E	7	**Yes**	12	**Yes**
11	La Cienega Bl	Fountain Av	54	D	192	F	57	E	213	F	2	No	21	**Yes**
12	Olive Dr	Fountain Av	6	A	4	A	8	A	6	A	1	No	2	No
14	Sweetzer Av	Fountain Av	9	A	12	B	11	B	13	B	2	No	1	No
15	Crescent Heights Bl	Fountain Av	98	F	49	D	107	F	67	E	9	**Yes**	18	**Yes**
17	Fairfax Av	Fountain Av	66	E	58	E	86	F	93	F	20	**Yes**	35	**Yes**
18	Spaulding Av	Fountain Av	5	A	5	A	6	A	6	A	1	No	1	No
20	Gardner St	Fountain Av	56	E	190	F	84	F	258	F	28	**Yes**	69	**Yes**
24	La Brea Av	Fountain Av	64	E	50	D	75	E	62	E	11	**Yes**	13	**Yes**
26	Holloway Dr/Horn Av	Sunset Bl	40	D	54	D	53	D	57	E	13	**Yes**	3	No
27	La Cienega Bl	Holloway Dr	30	C	58	E	39	D	63	E	9	**Yes**	5	**Yes**
28	Doheny Dr	Cynthia St [a]	21	C	52	F	33	D	102	F	12	**Yes**	50	**Yes**
29	San Vicente Bl	Cynthia St	15	B	20	C	17	B	27	C	1	No	7	No
30	Doheny Dr	Santa Monica Bl (WB) [b]	98	F	39	D	112	F	41	D	14	**Yes**	2	No
	Doheny Dr	Melrose Av/SM Bl (EB) [b]	65	E	191	F	224	F	233	F	159	**Yes**	42	**Yes**
32	Robertson Bl	Santa Monica Bl	35	C	33	C	51	D	50	D	16	**Yes**	17	**Yes**
33	San Vicente Bl	Santa Monica Bl	42	D	61	E	57	E	88	F	15	**Yes**	27	**Yes**
34	Westbourne Dr	Santa Monica Bl	16	B	18	B	19	B	26	C	3	No	8	No
35	La Cienega Bl	Santa Monica Bl	83	F	77	E	93	F	92	F	10	**Yes**	15	**Yes**
36	Croft Av/Holloway Dr	Santa Monica Bl	15	B	32	C	17	B	44	D	2	No	12	**Yes**
39	Sweetzer Av	Santa Monica Bl	14	B	18	B	16	B	21	C	1	No	3	No
41	Crescent Heights Bl	Santa Monica Bl	54	D	111	F	71	E	131	F	18	**Yes**	20	**Yes**
42	Laurel Av	Santa Monica Bl	10	A	11	B	10	B	11	B	1	No	0	No
43	Fairfax Av	Santa Monica Bl	60	E	82	F	73	E	150	F	13	**Yes**	68	**Yes**
46	Gardner St	Santa Monica Bl	19	B	25	C	20	C	33	C	2	No	8	No
47	Martel Av	Santa Monica Bl	8	A	15	B	9	A	17	B	1	No	2	No
49	Formosa Av	Santa Monica Bl	10	A	36	D	14	B	52	D	4	No	16	**Yes**
50	La Brea Av	Santa Monica Bl	59	E	71	E	77	E	92	F	18	**Yes**	21	**Yes**
54	Robertson Bl	Melrose Av	15	B	13	B	17	B	15	B	2	No	2	No
55	San Vicente Bl	Melrose Av	34	C	23	C	41	D	29	C	7	No	6	No
56	Huntley Dr	Melrose Av	26	C	7	A	32	C	8	A	6	No	1	No
57	La Cienega Bl	Melrose Av	60	E	40	D	68	E	47	D	8	**Yes**	6	No
61	Doheny Dr	Beverly Bl	45	D	48	D	73	E	70	E	28	**Yes**	22	**Yes**
63	Robertson Bl	Beverly Bl	61	E	34	C	75	E	47	D	15	**Yes**	14	**Yes**
65	San Vicente Bl	Beverly Bl	40	D	39	D	45	D	50	D	5	No	11	No
66	La Cienega	Beverly Bl	64	E	84	F	80	E	100	F	16	**Yes**	16	**Yes**
72	La Brea Av	Romaine St	11	B	51	D	14	B	45	D	3	No	-6	No

notes:

[a] Intersection is control by stop signs and delay is reported for the worst case movement

[b] Intersection is controlled by two signals on one controller. Delay and LOS are reported for each signal

[c] Beyond a certain point intersection delay can no longer be accurately calculated. The intersection is said to be overflowing.
For signalized intersections, average delay beyond 200 seconds is reported as OVFL
For unsignalized intersections, worst case approach delay beyond 50 seconds is reported as OVFL

* At some intersections, field-collected traffic count data may represent only the number of vehicles that proceed through the intersection, rather than including the actual demand, which can be in queue upstream. Any traffic counts conducted under these conditions may under-represent the true demand for the intersection, and the actual LOS may be worse than represented above.

TABLE 7
FUTURE EXTENSIVE TDM ALTERNATIVE LEVELS OF SERVICE
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE STUDY INTERSECTIONS

			Existing (2008) AM		Existing (2008) PM		Future (2035) TDM Alt AM		Future (2035) TDM Alt PM		AM Impact Analysis		PM Impact Analysis	
Int	North/South Street	East/West Street	Delay [c]	LOS*	Delay [c]	LOS*	Delay [c]	LOS*	Delay [c]	LOS*	Change in Delay	Impact?	Change in Delay	Impact?
1	Doheny Rd/Cory Av	Sunset Bl	23	C	28	C	26	C	31	C	3	No	3	No
2	Doheny Dr	Sunset Bl	52	D	60	E	72	E	82	F	20	**Yes**	22	**Yes**
4	San Vicente Bl	Sunset Bl	33	C	36	D	39	D	58	E	6	No	22	**Yes**
5	Larrabee St	Sunset Bl	7	A	10	B	9	A	11	B	1	No	1	No
6	Sunset Plaza Dr	Sunset Bl	9	A	14	B	11	B	17	B	2	No	3	No
7	La Cienega Bl / Miller Dr	Sunset Bl	19	B	59	E	24	C	67	E	6	No	8	**Yes**
9	Crescent Heights Bl	Sunset Bl	58	E	60	E	63	E	68	E	4	No	8	**Yes**
11	La Cienega Bl	Fountain Av	54	D	192	F	56	E	192	F	1	No	0	No
12	Olive Dr	Fountain Av	6	A	4	A	8	A	5	A	2	No	1	No
14	Sweetzer Av	Fountain Av	9	A	12	B	11	B	13	B	2	No	1	No
15	Crescent Heights Bl	Fountain Av	98	F	49	D	103	F	60	E	5	**Yes**	11	**Yes**
17	Fairfax Av	Fountain Av	66	E	58	E	77	E	84	F	12	**Yes**	27	**Yes**
18	Spaulding Av	Fountain Av	5	A	5	A	6	A	6	A	0	No	1	No
20	Gardner St	Fountain Av	56	E	190	F	85	F	261	F	29	**Yes**	72	**Yes**
24	La Brea Av	Fountain Av	64	E	50	D	72	E	59	E	8	**Yes**	9	**Yes**
26	Holloway Dr/Horn Av	Sunset Bl	40	D	54	D	55	D	66	E	14	**Yes**	12	**Yes**
27	La Cienega Bl	Holloway Dr	30	C	58	E	38	D	62	E	8	**Yes**	4	No
28	Doheny Dr	Cynthia St [a]	21	C	52	F	31	D	119	F	10	**Yes**	67	**Yes**
29	San Vicente Bl	Cynthia St	15	B	20	C	17	B	28	C	1	No	8	No
30	Doheny Dr	Santa Monica Bl (WB) [b]	98	F	39	D	108	F	40	D	10	**Yes**	1	No
	Doheny Dr	Melrose Av/SM Bl (EB) [b]	65	E	191	F	223	F	223	F	158	**Yes**	32	**Yes**
32	Robertson Bl	Santa Monica Bl	35	C	33	C	49	D	49	D	14	**Yes**	17	**Yes**
33	San Vicente Bl	Santa Monica Bl	42	D	61	E	51	D	80	E	9	No	19	**Yes**
34	Westbourne Dr	Santa Monica Bl	16	B	18	B	18	B	25	C	3	No	7	No
35	La Cienega Bl	Santa Monica Bl	83	F	77	E	88	F	87	F	5	No	10	**Yes**
36	Croft Av/Holloway Dr	Santa Monica Bl	15	B	32	C	17	B	44	D	2	No	12	**Yes**
39	Sweetzer Av	Santa Monica Bl	14	B	18	B	15	B	21	C	1	No	3	No
41	Crescent Heights Bl	Santa Monica Bl	54	D	111	F	68	E	117	F	14	**Yes**	6	**Yes**
42	Laurel Av	Santa Monica Bl	10	A	11	B	10	A	11	B	0	No	0	No
43	Fairfax Av	Santa Monica Bl	60	E	82	F	70	E	144	F	11	**Yes**	61	**Yes**
46	Gardner St	Santa Monica Bl	19	B	25	C	20	B	33	C	1	No	7	No
47	Martel Av	Santa Monica Bl	8	A	15	B	9	A	17	B	1	No	2	No
49	Formosa Av	Santa Monica Bl	10	A	36	D	13	B	51	D	3	No	15	**Yes**
50	La Brea Av	Santa Monica Bl	59	E	71	E	73	E	88	F	14	**Yes**	17	**Yes**
54	Robertson Bl	Melrose Av	15	B	13	B	16	B	15	B	2	No	2	No
55	San Vicente Bl	Melrose Av	34	C	23	C	40	D	27	C	6	No	4	No
56	Huntley Dr	Melrose Av	26	C	7	A	30	C	8	A	4	No	1	No
57	La Cienega Bl	Melrose Av	60	E	40	D	66	E	45	D	6	No	5	No
61	Doheny Dr	Beverly Bl	45	D	48	D	70	E	68	E	25	**Yes**	20	**Yes**
63	Robertson Bl	Beverly Bl	61	E	34	C	73	E	44	D	12	**Yes**	11	No
65	San Vicente Bl	Beverly Bl	40	D	39	D	45	D	46	D	5	No	7	No
66	La Cienega	Beverly Bl	64	E	84	F	78	E	94	F	14	**Yes**	11	**Yes**
72	La Brea Av	Romaine St	11	B	51	D	14	B	45	D	3	No	-6	No

notes:

[a] Intersection is control by stop signs and delay is reported for the worst case movement

[b] Intersection is controlled by two signals on one controller. Delay and LOS are reported for each signal

[c] Beyond a certain point intersection delay can no longer be accurately calculated. The intersection is said to be overflowing.
For signalized intersections, average delay beyond 200 seconds is reported as OVFL
For unsignalized intersections, worst case approach delay beyond 50 seconds is reported as OVFL

* At some intersections, field-collected traffic count data may represent only the number of vehicles that proceed through the intersection, rather than including the actual demand, which can be in queue upstream. Any traffic counts conducted under these conditions may under-represent the true demand for the intersection, and the actual LOS may be worse than represented above.

TABLE 8
FUTURE (YEAR 2035) NO PROJECT SCENARIO & PROPOSED PROJECT SCENARIO FORECAST ROADWAY SEGMENT VOLUMES
CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE STUDY SEGMENTS

Roadway	Segment	Existing (Year 2008)			Future (Year 2035) Proposed Project			Future (Year 2035) No Project		
		ADT	AM	PM	ADT	AM	PM	ADT	AM	PM
Beverly Boulevard	W/O Doheny	25,679	2,271	2,058	27,010	2,380	2,240	27,010	2,460	2,350
Beverly Boulevard	E/O La Cienega Boulevard	34,361	2,070	2,508	37,960	2,320	2,770	37,960	2,360	2,870
Crescent Heights Boulevard	S/O Santa Monica Boulevard	23,089	1,700	1,652	23,640	1,730	1,720	23,640	1,790	1,660
Crescent Heights Boulevard	S/O Sunset Boulevard	33,538	2,192	2,257	36,860	2,270	2,350	36,860	2,300	2,270
Doheny Drive	S/O Santa Monica Boulevard	14,545	974	1,063	16,490	1,100	1,180	16,490	1,100	1,190
Doheny Drive	S/O Beverly	18,552	1,177	1,249	22,120	1,330	1,450	22,120	1,410	1,480
Doheny Drive	S/O Sunset Boulevard	9,619	507	613	11,560	550	680	11,560	610	720
Fairfax Avenue	S/O Santa Monica Boulevard	30,457	1,917	2,160	33,330	2,410	2,660	33,330	2,180	2,470
Fairfax Avenue	S/O Sunset Boulevard	31,318	1,948	2,260	34,770	2,270	2,550	34,770	2,080	2,580
Fountain Avenue	E/O La Cienega Boulevard	28,364	1,951	1,987	31,580	2,070	2,180	31,580	2,060	2,000
Fountain Avenue	@ Crescent Heights	34,890	2,413	2,017	41,050	2,600	2,200	41,050	2,820	2,180
Fountain Avenue	@ Fuller Av	35,627	2,072	2,275	41,040	2,330	2,520	41,040	2,260	2,420
La Brea Avenue	S/O Santa Monica Boulevard	39,173	2,394	2,547	42,100	2,610	2,730	42,100	2,760	2,880
La Brea Avenue	S/O Sunset Boulevard	38,020	2,336	2,500	40,310	2,510	2,660	40,310	2,450	2,620
La Cienega Boulevard	S/O Santa Monica Boulevard	35,501	1,972	2,254	38,990	2,130	2,490	38,990	2,250	2,530
La Cienega Boulevard	S/O Sunset Boulevard	36,112	2,140	2,209	36,420	2,150	2,220	36,420	2,200	2,490
Melrose Avenue	E/O Robertson Bl	21,203	1,117	1,484	23,070	1,300	1,640	23,070	1,290	1,610
Melrose Avenue	E/O La Cienega Boulevard	33,983	2,321	2,437	38,830	2,510	2,620	38,830	2,550	2,810
Robertson Boulevard	S/O Beverly	18,840	1,104	1,256	21,500	1,230	1,410	21,500	1,260	1,510
Robertson Boulevard	S/O Santa Monica Boulevard	11,235	550	725	12,490	590	760	12,490	560	740
San Vicente Boulevard	S/O Santa Monica Boulevard	21,220	1,322	1,527	23,230	1,480	1,700	23,230	1,460	1,690
San Vicente Boulevard	S/O Sunset Boulevard	12,830	850	991	15,260	1,000	1,160	15,260	900	1,060
Santa Monica Boulevard	W/O Doheny	40,423	2,229	2,160	45,050	2,430	2,380	45,050	2,410	2,240
Santa Monica Boulevard	E/O La Cienega Boulevard	45,313	2,520	2,771	50,800	2,810	3,080	50,800	3,120	3,460
Santa Monica Boulevard	@ Westbourne Dr	53,388	2,979	3,015	59,600	3,220	3,330	59,600	3,280	3,300
Santa Monica Boulevard	@Crescent Heights Bl	46,468	2,216	2,779	51,550	2,460	2,960	51,550	2,770	3,190
Santa Monica Boulevard	@Formosa Av	45,489	2,389	2,933	52,090	2,570	3,190	52,090	2,870	3,430
Sunset Boulevard	E/O Crescent Heights Bl	56,525	2,995	2,940	60,980	3,210	3,080	60,980	3,220	2,990
Sunset Boulevard	@ Sunset Plaza	51,462	2,124	2,621	56,680	2,320	2,850	56,680	2,560	3,130
Sunset Boulevard	E/O La Cienega Boulevard	52,231	3,097	3,090	55,360	3,220	3,230	55,360	3,330	3,640

TABLE 9 FUTURE (YEAR 2035) TOD FOCUS ALTERNATIVE & EXTENSIVE TDM ALTERNATIVE FORECAST ROADWAY SEGMENT VOLUMES CITY OF WEST HOLLYWOOD GENERAL PLAN UPDATE STUDY SEGMENTS										
		Existing (Year 2008)			Future (Year 2035) TOD Alternative			Future (Year 2035) TDM Alternative		
Roadway	Segment	ADT	AM	PM	ADT	AM	PM	ADT	AM	PM
Beverly Boulevard	W/O Doheny Drive	25,679	2,271	2,058	27,020	2,390	2,230	26,990	2,390	2,220
Beverly Boulevard	E/O La Cienega Boulevard	34,361	2,070	2,508	37,040	2,230	2,670	37,520	2,180	2,620
Crescent Heights Boulevard	S/O Santa Monica Boulevard	23,089	1,700	1,652	23,660	1,720	1,700	23,630	1,720	1,680
Crescent Heights Boulevard	S/O Sunset Boulevard	33,538	2,192	2,257	36,390	2,240	2,320	36,630	2,220	2,300
Doheny Drive	S/O Santa Monica Boulevard	14,545	974	1,063	16,360	1,070	1,140	16,420	1,050	1,110
Doheny Drive	S/O Beverly Boulevard	18,552	1,177	1,249	21,960	1,320	1,410	22,070	1,300	1,380
Doheny Drive	S/O Sunset Boulevard	9,619	507	613	11,080	550	670	11,230	540	650
Fairfax Avenue	S/O Santa Monica Boulevard	30,457	1,917	2,160	32,930	2,260	2,580	33,090	2,120	2,500
Fairfax Avenue	S/O Sunset Boulevard	31,318	1,948	2,260	34,180	2,170	2,490	34,540	2,120	2,450
Fountain Avenue	E/O La Cienega Boulevard	28,364	1,951	1,987	30,820	1,990	2,070	31,180	1,960	2,000
Fountain Avenue	@ Crescent Heights Boulevard	34,890	2,413	2,017	40,120	2,510	2,130	40,420	2,420	2,070
Fountain Avenue	@ Fuller Avenue	35,627	2,072	2,275	40,110	2,240	2,450	40,650	2,180	2,390
La Brea Avenue	S/O Santa Monica Boulevard	39,173	2,394	2,547	42,020	2,580	2,690	42,050	2,560	2,680
La Brea Avenue	S/O Sunset Boulevard	38,020	2,336	2,500	40,680	2,500	2,620	40,470	2,480	2,600
La Cienega Boulevard	S/O Santa Monica Boulevard	35,501	1,972	2,254	37,970	2,050	2,410	38,170	2,020	2,340
La Cienega Boulevard	S/O Sunset Boulevard	36,112	2,140	2,209	36,370	2,150	2,220	36,560	2,150	2,220
Melrose Avenue	E/O Robertson Boulevard	21,203	1,117	1,484	22,890	1,230	1,600	23,080	1,210	1,580
Melrose Avenue	E/O La Cienega Boulevard	33,983	2,321	2,437	37,530	2,400	2,510	38,150	2,330	2,450
Robertson Boulevard	S/O Beverly Boulevard	18,840	1,104	1,256	21,510	1,220	1,420	21,440	1,200	1,390
Robertson Boulevard	S/O Santa Monica Boulevard	11,235	550	725	12,510	580	750	12,510	570	740
San Vicente Boulevard	S/O Santa Monica Boulevard	21,220	1,322	1,527	22,660	1,410	1,610	23,090	1,350	1,540
San Vicente Boulevard	S/O Sunset Boulevard	12,830	850	991	15,180	950	1,110	15,350	940	1,090
Santa Monica Boulevard	W/O Doheny Drive	40,423	2,229	2,160	44,510	2,370	2,360	44,800	2,310	2,290
Santa Monica Boulevard	E/O La Cienega Boulevard	45,313	2,520	2,771	49,910	2,670	2,980	50,350	2,610	2,910
Santa Monica Boulevard	@ Westbourne Drive	53,388	2,979	3,015	58,550	3,180	3,250	59,060	3,130	3,180
Santa Monica Boulevard	@Crescent Heights Boulevard	46,468	2,216	2,779	50,450	2,350	2,900	50,930	2,280	2,860
Santa Monica Boulevard	@Formosa Avenue	45,489	2,389	2,933	51,090	2,450	3,070	51,580	2,420	3,030
Sunset Boulevard	E/O Crescent Heights Boulevard	56,525	2,995	2,940	60,120	3,130	3,030	60,520	3,060	2,990
Sunset Boulevard	@ Sunset Plaza Drive	51,462	2,124	2,621	55,750	2,210	2,740	56,250	2,130	2,660
Sunset Boulevard	E/O La Cienega Boulevard	52,231	3,097	3,090	54,510	3,150	3,150	54,960	3,110	3,100

TABLE 10 DAILY PERFORMANCE MEASURES				
Scenario	VMT	VHT	Trip Gen (VT)	Average Trip Length
Existing	1,503,718	44,557	354,967	7.02
Proposed Project	1,726,427	56,004	409,341	6.99
No Project	1,737,545	56,440	411,077	7.00

TABLE 11 INTERSECTION LEVELS OF SERVICE FOR CMP IMPACT ANALYSIS						
Scenario	**Street Names**	**Peak Hour**	**Scenario V/C**	**Scenario LOS**	**Change in V/C**	**Significant Impact?**
Existing Conditions	Doheny Drive & Santa Monica Boulevard	AM	1.053	F	N/A	N/A
		PM	0.984	E	N/A	N/A
	La Cienega Boulevard & Santa Monica Boulevard	AM	0.989	E	N/A	N/A
		PM	0.799	C	N/A	N/A
Proposed General Plan	Doheny Drive & Santa Monica Boulevard	AM	1.111	F	0.058	**Yes**
		PM	1.019	F	0.035	**Yes**
	La Cienega Boulevard & Santa Monica Boulevard	AM	1.058	F	0.069	**Yes**
		PM	0.889	D	0.090	No
No Project	Doheny Drive & Santa Monica Boulevard	AM	1.144	F	0.091	**Yes**
		PM	1.057	F	0.073	**Yes**
	La Cienega Boulevard & Santa Monica Boulevard	AM	1.119	F	0.130	**Yes**
		PM	0.918	E	0.119	No
TOD Focus Alternative	Doheny Drive & Santa Monica Boulevard	AM	1.101	F	0.048	**Yes**
		PM	1.013	F	0.029	**Yes**
	La Cienega Boulevard & Santa Monica Boulevard	AM	1.028	F	0.039	**Yes**
		PM	0.856	D	0.057	No
Extensive TDM Alternative	Doheny Drive & Santa Monica Boulevard	AM	1.074	F	0.021	**Yes**
		PM	1.014	F	0.030	**Yes**
	La Cienega Boulevard & Santa Monica Boulevard	AM	1.016	F	0.027	**Yes**
		PM	0.826	D	0.027	No

APPENDIX A:

FEHR & PEERS TECHNICAL MEMORANDUM:

CITY OF WEST HOLLYWOOD GENERAL PLAN GREENHOUSE GAS EMISSIONS ANALYSIS

APPENDIX A:
MEMORANDUM

Date: March 19, 2010

To: Terri Slimmer, City of West Hollywood

From: Brian Welch, Reid Keller, and Peter Carter

Subject: ***City of West Hollywood General Plan Greenhouse Gas Emissions Analysis***

SM09-2221.02

INTRODUCTION

This technical memorandum describes vehicle emissions for City of West Hollywood General Plan update scenarios. The principal factors influencing vehicle emissions are described, followed by an explanation of emission pollutants and the models used to calculate them. Summary statistics are provided in tables and figures for comparing and evaluating each scenario.

VARIABLES AFFECTING VEHICLE EMISSIONS

The volume of vehicle emissions is influenced by a number of variables, including the types of vehicles in circulation, how often they are used, and how far they are driven. These variables correspond to the following inputs: vehicle population, daily vehicle trips, and vehicle miles traveled (VMT).

VMT

VMT is an output derived from the City of West Hollywood's travel demand model. In addition, because the speed of vehicle travel affects the rate of emissions (Figure 1), driving distances are summed based on vehicle speeds.

Daily Vehicle Trips

The City's travel demand model also outputs daily vehicle trips. While the City's model includes both the City itself and a buffer area surrounding the City, through trips that neither begin nor end inside the City are not counted as part of the daily trip total. This memorandum is based on results for the incorporated City limits.

In accordance with policy guidance[1] provided by the SB 375 Regional Targets Advisory Committee, the following trip types and percentages are included in the tabulation of daily trips:

[1] *Recommendations of the Regional Targets Advisory Committee Pursuant to Senate Bill 375*, September 30, 2009.

- Internal to External: Trips beginning inside the City and ending outside the City (50%)
- External to Internal: Trips beginning outside the City and ending inside the City (50%)
- Internal to Internal: Trips beginning and ending inside the City (100%)
- External to External: Trips beginning outside the City and ending outside the City (0%)

Vehicle Population

Vehicle population was calculated from the most recent National Household Travel Survey (NHTS) produced by the U.S. Department of Transportation in 2002. The City's vehicle population in the existing scenario was calculated by summing the number of cars in each census tract, based on household auto ownership statistics. For future scenarios, the existing vehicle population was factored in proportion to the number of dwelling units in the City.

The types of vehicles within a vehicle population and their geographic location also affect emissions rates. For this analysis, ambient temperature, relative humidity, vehicle population, fleet composition, fleet growth rates, mileage accrual rates, vehicle age distribution, smog check regulations, fuel properties, and altitude were based on data for Los Angeles County.[2] For the chosen calendar year, the existing vehicle model year and 44 model years prior are analyzed.[3]

EMISSION POLLUTANTS

About a third of all greenhouse gases produced in the U.S. come from the transportation sector, and the Environmental Protection Agency estimates that about 60% of all transportation emissions come from personal automobile use.[4] The following greenhouse gases were included in this emissions analysis:

- Carbon dioxide (CO_2)
- Organic gases (all organic gases emitted into the atmosphere, including methane, CH_4)
- Carbon monoxide (CO)
- Oxides of nitrogen (NOx)
- Oxides of sulfur (SOx)

In addition to greenhouse gases, this analysis includes the following particulate matter pollutant because of its link to vehicle traffic and its detrimental effects on human health and the environment:

- Particulate matter (PM10)

[2] *California: California Air Resources Board's Emissions Inventory Series*, Volume 1, Issue 7, p. 3.
[3] *Emfac2007/Version 2.30: Calculating Emission Inventories for Vehicles in California*, California Air Resources Board.
[4] *Inventory of U.S. Greenhouse Gas Emissions and Sinks*, U.S. EPA, April 15, 2009, p. ES-8.

EMFAC2007

This analysis uses Emfac2007 to estimate emissions pollutants. As the most recent edition of emissions modeling software created by the California Air Resources Board (CARB), Emfac2007 provides the best estimates of existing and future greenhouse gas emissions. Emfac2007 uses emissions rates for different types of vehicles in conjunction with travel activity statistics to calculate vehicle-based emissions in tons per day.

As described in CARB's *Emfac2007/Version 2.30: Calculating Emission Inventories for Vehicles in California*, Emfac2007 accounts for the following emission processes in its emissions inventory:

- Running exhaust: emissions that come out of the vehicle tailpipe while it is traveling on the road.

- Idle exhaust: emissions that come out of the vehicle tailpipe while it is operating but not traveling any significant distance. This process captures emissions from heavy-duty vehicles that idle for extended periods of time while loading or unloading goods. Idle exhaust is calculated only for heavy-duty trucks.

- Starting exhaust: tailpipe emissions that occur as a result of starting a vehicle. These emissions are independent of running exhaust emissions and can be thought of as a slug of emissions associated with starting a vehicle. The magnitude of these emissions is dependent on how long the vehicle has been sitting prior to starting. Starting emissions are only estimated for gasoline fueled vehicles.

- Diurnal: Hydrocarbon (HC) emissions that occur when rising ambient temperatures cause fuel evaporation from vehicles sitting throughout the day. These losses are from leaks in the fuel system, fuel hoses, connectors, and as a result of breakthrough of vapors from the carbon canister. If a vehicle is sitting for a period of time, emissions from the first 35 minutes are counted as hot soak (discussed below) and emissions from the remaining period are counted as diurnal emissions, provided that the ambient temperature is increasing during the remaining period of time.

- Resting loss: these losses occur while the vehicle is sitting and are caused by fuel permeation through rubber and plastic components. Emissions are counted as resting loss emissions if the vehicle has not been operated for 35 minutes and vehicle is still stationary, but the ambient temperature is either constant or decreasing.

- Hot soak: evaporative HC emissions that occur immediately after a trip end due to fuel heating and the fact that the engine remains hot for a short time after being switched off. In older, carbureted vehicles these emissions are attributed to vapor losses from the carburetor float bowl. In newer, fuel-injected vehicles, these vapor losses come from leaky fuel injectors or from fuel hoses.

- Running losses: evaporative HC emissions that occur when hot fuel vapors escape from the fuel system or overwhelm the carbon canister while the vehicle is operating.

- Tire wear: particulate matter emissions from tires as a result of wear.

- Brake wear: particulate matter emissions from brake use.

Future year assumptions in Emfac2007 reflect changes in the overall vehicle fleet as determined by historical trends and geographic location. For example, vehicle survival rates determine how quickly vehicles fall out of the fleet and must be replaced. Because cars and trucks have different mileage accrual rates, their rate of survival can cause a shift in the vehicle fleet. Emfac2007 does not include predictions about changes in fuel type or fuel economy beyond what already exists in the market. However, Emfac2007 does assume a shift toward a greater number of low emissions vehicles in future years.

CT-EMFAC

CT-EMFAC is used in this analysis to better estimate the quantity of sulfur oxides. Because such small quantities of SOx are produced, Emfac2007's estimates of SOx are affected by the model's rounding of outputs to two decimal places. CT-EMFAC produces more precise reports of SOx emissions that extend to six decimal places. Comparing percentage changes in SOx with percentage changes in other emissions suggests that for SOx, the estimates produced by CT-EMFAC come closer to accurately representing the change between existing and future scenarios.

CT-EMFAC is not used to predict other emissions in this analysis because it only includes running emissions and omits idle exhaust, hot soaks, and other causes of vehicle emissions. However, because the large majority of emissions are running emissions, CT-EMFAC represents an accurate estimation of vehicle emissions for the purpose regulatory requirements, including the California Environmental Quality Act (CEQA).[5]

CT-EMFAC is a project-level emissions analysis tool developed by Caltrans and UC Davis. It uses the same emissions factors as Emfac2007. As stated in *CT-EMFAC: A Computer Model to Estimate Transportation Project Emissions*, the model includes the following emissions processes:

- Running exhaust: pollutants emitted from the vehicle tailpipe while it is traveling.
- Running losses: evaporative total organic gas (TOG) emissions that occur when hot fuel vapors escape from the fuel system or overwhelm the carbon canister while the vehicle is operating.

ANALYSIS

Table 1 contains output values from Emfac2007 and CT-EMFAC when the vehicle fleet is held constant at calendar year 2008. Holding the calendar year constant for future year scenarios allows all changes in emissions to be attributed to differences in scenarios rather than to changes in the vehicle fleet. Values are shown in units of tons produced per day.

Figure 2 looks at output values from Table 1 as a percentage of existing emissions. For each emission, Figure 2 shows how much each scenario would increase emissions compared to the exiting baseline.

Table 2 contains emissions model outputs produced using future year vehicle fleets. Year 2035 is used for all scenarios except Alternative 3, which assumes Year 2020. Figure 3 compares values in Table 2 to existing emissions. The projected decrease in the emission of organic gases, carbon

[5] *CT-EMFAC: A Computer Model to Estimate Transportation Project Emissions,* Caltrans/UC Davis, December 10, 2007.

monoxide, oxides of nitrogen, and particulate matter reflects CARB's assumptions about a cleaner running vehicle fleets in 2035 and 2020. The emission of carbon dioxide and oxides of sulfur continues to increase, despite less polluting vehicle fleets, because they are inherent by-products of the internal combustion engine used in the majority of cars and trucks.

Figure 4 shows VMT per capita, where capita equals population plus employment. VMT is the primary driver of GHG emissions, and normalizing VMT based on people and jobs illustrates the comparative effectiveness of each scenario at reducing driving. Although VMT is expected to increase in absolute terms, the projected rate of VMT increase in the City of West Hollywood is less than the rate of population and employment growth, resulting in lower levels of VMT per capita.

FIGURE 1
EMFAC CO2 EMISSIONS CURVE

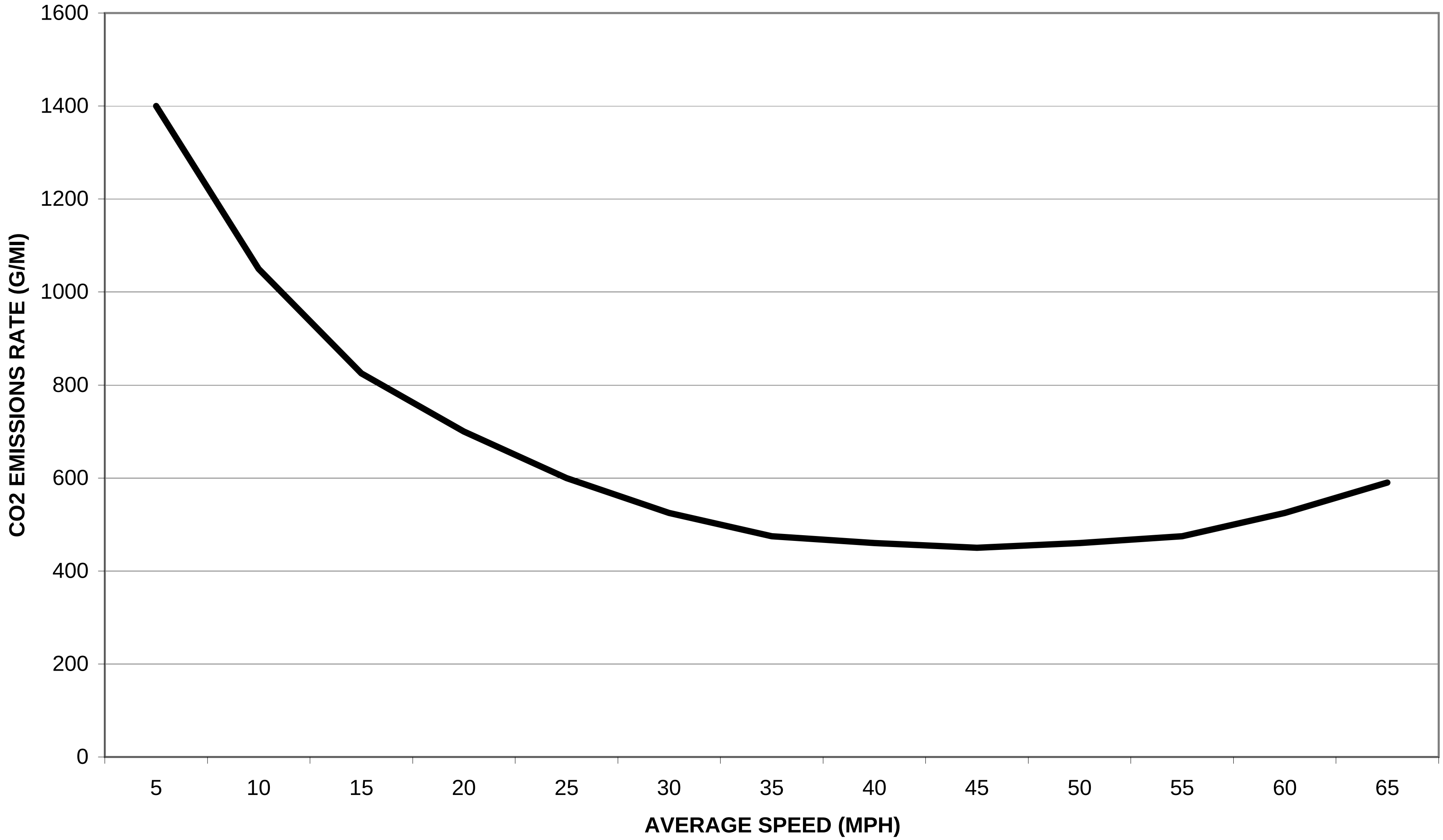


TABLE 1
EMFAC EMISSIONS ESTIMATES WITH VEHICLE FLEET HELD CONSTANT (CALENDAR YEAR 2008 FOR ALL SCENARIOS)
IN TONS PER DAY

	Existing	No Project	Proposed Project	Alternative 1	Alternative 2	Alternative 3
	2008	**2008**	**2008**	**2008**	**2008**	**2008**
Organic Gas Emissions (including CH4)	1.24	1.64	1.50	1.44	1.48	1.38
Carbon Monoxide Emissions (CO)	10.40	13.30	12.33	11.87	12.17	11.45
Oxides of Nitrogen Emissions (NOx)	2.01	2.57	2.36	2.27	2.33	2.19
Carbon Dioxide Emissions (CO2)	990	1,190	1,210	1,160	1,190	1,110
Particulate Matter Emissions (PM10)	0.08	0.11	0.11	0.10	0.11	0.10
Oxides of Sulfur Emissions (SOx), Emfac2007	0.01	0.01	0.01	0.01	0.01	0.01
Oxides of Sulfur Emissions (SOx), CT-EMFAC	0.008544	0.010507	0.010438	0.010023	0.010295	0.009612

FIGURE 2
PERCENTAGE CHANGE COMPARED TO EXISTING EMISSIONS ESTIMATES
WITH VEHICLE FLEET HELD CONSTANT (CALENDAR YEAR 2008 FOR ALL SCENARIOS)

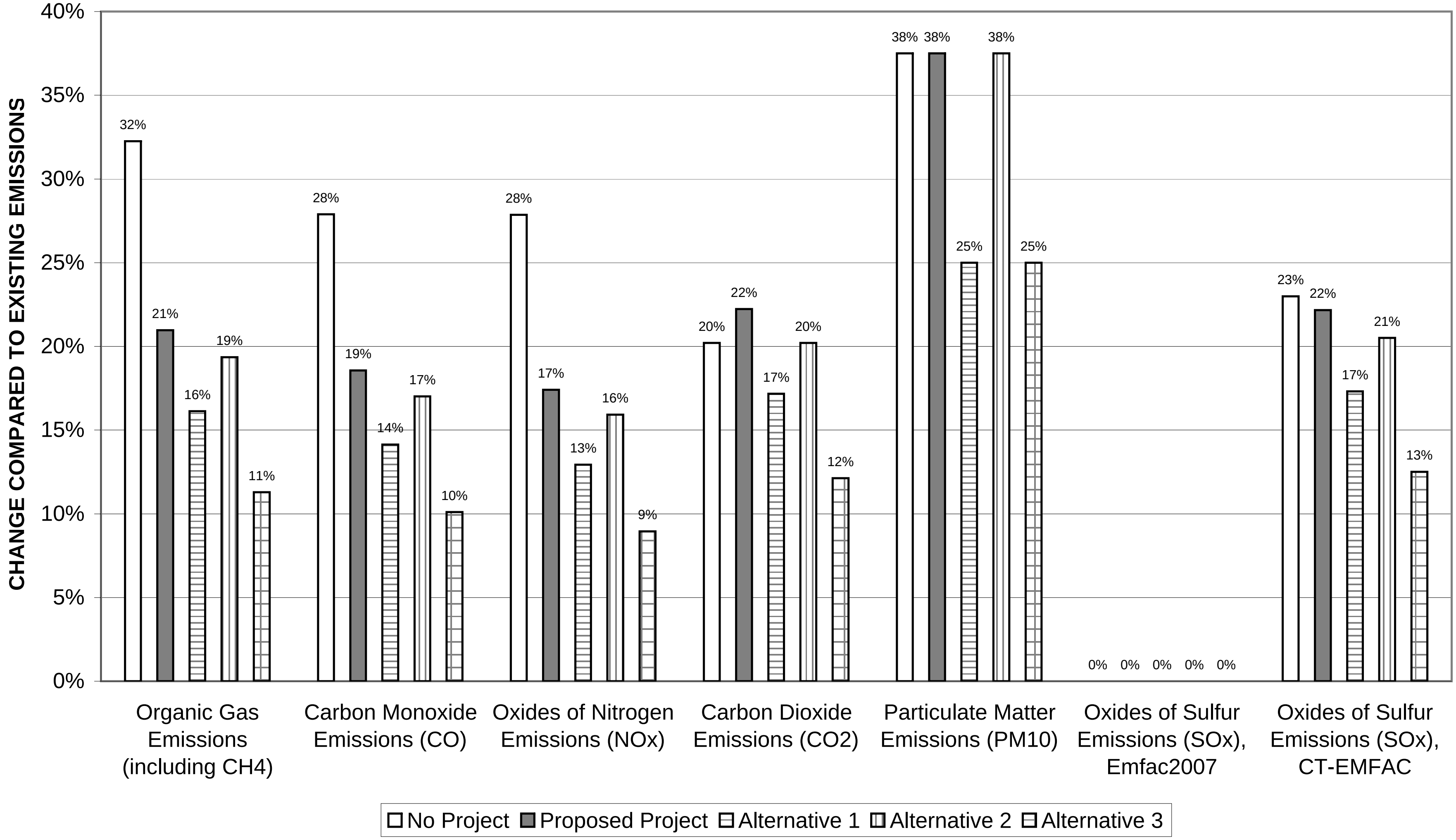
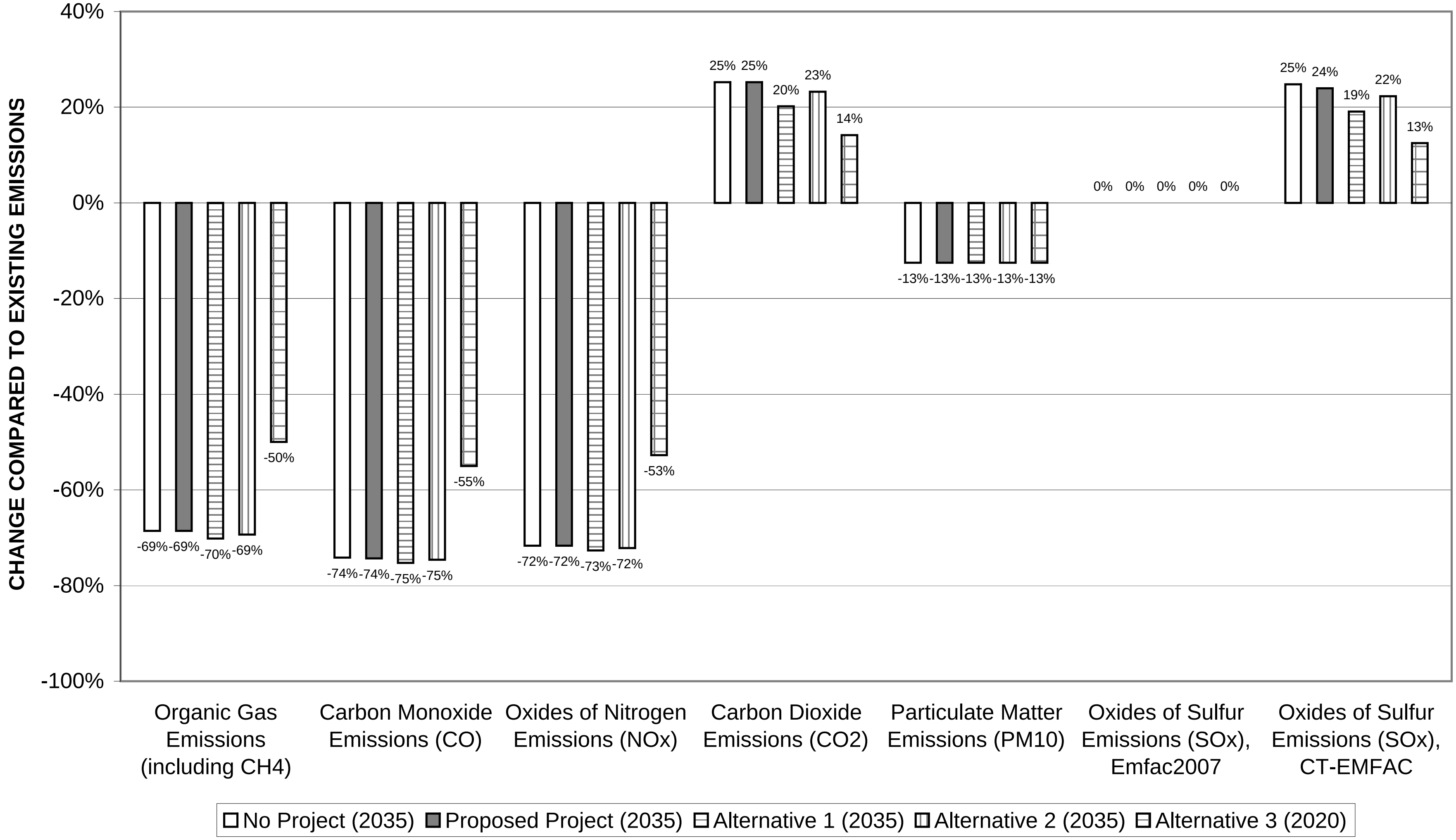


TABLE 2
EMISSIONS ESTIMATES WITH FUTURE VEHICLE FLEET
IN TONS PER DAY

	Existing	No Project	Proposed Project	Alternative 1	Alternative 2	Alternative 3
	2008	2035	2035	2035	2035	2020
Organic Gas Emissions (including CH_4)	1.24	0.39	0.39	0.37	0.38	0.62
Carbon Monoxide Emissions (CO)	10.40	2.69	2.67	2.57	2.64	4.68
Oxides of Nitrogen Emissions (NO_x)	2.01	0.57	0.57	0.55	0.56	0.95
Carbon Dioxide Emissions (CO_2)	990	1,240	1,240	1,190	1,220	1,130
Particulate Matter Emissions (PM_{10})	0.08	0.07	0.07	0.07	0.07	0.07
Oxides of Sulfur Emissions (SO_x), Emfac2007	0.01	0.01	0.01	0.01	0.01	0.01
Oxides of Sulfur Emissions (SO_x), CT-EMFAC	0.008544	0.010662	0.010591	0.010175	0.010449	0.009612

FIGURE 3
PERCENTAGE CHANGE COMPARED TO EXISTING EMFAC EMISSIONS ESTIMATES
WITH FUTURE VEHICLE FLEET



APPENDIX B:

NELSON\NYGAARD TECHNICAL MEMORANDUM:

WEST HOLLYWOOD GENERAL PLAN UPDATE TRIP REDUCTION IMPACTS ANALYSIS