



WESTSIDE SUBWAY EXTENSION

Geotechnical and Hazardous Materials Technical Report



August 2010

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1.0 INTRODUCTION

This section describes the purpose, scope, and standards and methodology used to evaluate subsurface conditions and potential issues associated with the Westside Subway Extension study.

1.1 Purpose

The purpose of this report is to address geotechnical, subsurface, seismic, and hazardous materials issues and their potential impacts on the proposed project alternatives. It also covers the topics of surface fault rupture, seismic ground shaking, differential seismic settlement, liquefaction, subsidence, hazardous subsurface gases, and hazardous materials. Strands of the active Santa Monica fault cross Study Alternatives 1 through 5 and MOS 2.

Of particular importance to the project is the subsurface gas (methane and hydrogen sulfide) hazard along the study alternatives. This hazard led to the 1986 federal legislation that banned use of federal funds for subway construction in the high potential methane zone. Based in part on the conclusions reached by a panel of experts assembled by the American Public Transportation Association (APTA, 2005) this legislation has been repealed by Congress. However, the subsurface gas hazard continues to be recognized as a key geotechnical design consideration for the project and as such, the history and current state of knowledge of this hazard is given particular emphasis in this report.

The report provides a review and evaluation of previously published and unpublished geologic and hydro geologic information developed in other tasks, including geotechnical studies along the project alternatives, and describes the surveys that have been conducted as part of this task. The evaluation focuses on the potential impacts of subsurface geologic and groundwater conditions identified along the alignments of the study alternatives.

1.2 Scope

The report provides a review and evaluation of previously published and unpublished geologic, hydrogeologic information including geotechnical studies along the project alternatives. The evaluation focuses on the potential impacts of subsurface geologic, and groundwater conditions along the project alignments of the study alternatives. The report also includes a review of readily available information regarding potential impacts to the study alternatives from hazardous materials.

1.3 Standards of Methodology

1.3.1 Methodology Overview

The methodology for the assessment of the impacts of geologic and seismic hazards and hazardous materials included the following:

- Review and evaluation of reports and data collected during previous geotechnical investigations of the study corridor.



- Review of pertinent geologic maps and reports for the site and vicinity published by the California Geological Survey and other authors.
- Discussion of the geologic, seismic, groundwater, and soil engineering aspects of the study corridor.
- Performing visual reconnaissance observations of existing site conditions and activities, and a drive-by survey of the area within 200 foot radius of the alignments to observe types of general land use.
- Reviewing a federal, state, and local database list search provided by Environmental Data Resources, Inc., (EDR) of Milford, Connecticut of known or potential hazardous waste sites or landfills, and sites currently under investigation for environmental violations. The EDR Reports are included as Appendix B.
- Conducting inquiries via review of accessible databases maintained on-line by State Water Resources Control Board (GeoTracker), Department of Toxic Substances Control (ENVIROSTOR), and California Solid Waste Information System (SWIS) for information regarding environmental violations or incidents, and/or the status of enforcement actions at facilities identified as having potential environmental concerns that may affect the alignments.
- Reviewing and interpreting available historical aerial photographs, Sanborn® Fire Insurance Maps, and historical topographic maps of the alignments and vicinity for evidence of previous site activities and development that would suggest the potential presence of hazardous substances at the site.
- Describing the research and site reconnaissance performed and presenting findings and professional opinions regarding the potential for adverse environmental impacts for the project.

The hazardous materials section focuses on the tunneling portions of the alternative alignments and the proposed maintenance yards. The station locations are included in the Draft Site Assessment Study Report dated December 10, 2009 (Task 10.03).

This methodology is not intended to be a parcel-level due diligence assessment for the purpose of property acquisition or transfer. Therefore, for the purpose of this report, only facilities with confirmed releases are discussed further in the following sections. Criteria for further evaluating the potential impact of a listed facility are summarized below.

1.3.2 ASTM Standard

The format and content of the hazardous materials portion of this report is in general accordance with the American Society for Testing and Materials (ASTM) *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM Standard Designation E 1527-05).

The ASTM Standard Practice for Environmental Site Assessments (Standard E 1527-05) was approved in November 2005. ASTM Standard E 1527-05 was established and updated to reflect industry requirements brought about by AAI.



The goal of the ASTM Standard is to identify Recognized Environmental Conditions (RECs). By definition under ASTM designation E 1527-05, the term “recognized environmental condition” is defined as the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, ground water or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include de minimis conditions (conditions that may be visually obvious such as an oil stain in a parking lot but not materially important as representative of a serious condition) that generally do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. Conditions determined to be de minimis are not RECs.

Although the scope for the hazardous materials portion of this report is in general accordance with ASTM Standard E 1527-05, several deviations from the standard occurred since this was not intended to be a parcel by parcel study and access onto the properties was not provided. Therefore, interviews with property personnel were not performed and observations were made from public right-of-ways and other publically accessible areas.

The hazardous materials study focused on a review of environmental regulatory agency database records and reasonably ascertainable historical information sources (e.g., historical aerial photographs, fire insurance maps, and historical topographic maps) to evaluate whether prior land uses have used or stored hazardous materials in close proximity to the project area. A drive-by survey was also performed from within right-of ways and other publicly accessible areas to document property conditions and activities.



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2.0 PROJECT DESCRIPTION

This chapter describes the alternatives that have been considered to best satisfy the Purpose and Need and have been carried forward for further study in the Draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR). Details of the No Build, Transportation Systems Management (TSM), and the five Build Alternatives (including their station and alignment options and phasing options (or minimum operable segments [MOS]) are presented in this chapter.

2.1 No Build Alternative

The No Build Alternative provides a comparison of what future conditions would be like if the Project were not built. The No Build Alternative includes all existing highway and transit services and facilities, and the committed highway and transit projects in the Metro LRTP and the SCAG RTP. Under the No Build Alternative, no new transportation infrastructure would be built within the Study Area, aside from projects currently under construction or projects funded for construction, environmentally cleared, planned to be in operation by 2035, and identified in the adopted Metro LRTP.

2.2 TSM Alternative

The TSM Alternative emphasizes more frequent bus service than the No Build Alternative to reduce delay and enhance mobility. The TSM Alternative contains all elements of the highway, transit, Metro Rail, and bus service described under the No Build Alternative. In addition, the TSM Alternative increases the frequency of service for Metro Bus Line 720 (Santa Monica–Commerce via Wilshire Boulevard and Whittier Boulevard) to between three and four minutes during the peak period.

In the TSM Alternative, Metro Purple Line rail service to the Wilshire/Western Station would operate in each direction at 10-minute headways during peak and off-peak periods. The Metro Red Line service to Hollywood/Highland Station would operate in each direction at five-minute headways during peak periods and at 10-minute headways during midday and off-peak periods.

2.3 Build Alternatives

The Build Alternatives are considered to be the “base” alternatives with “base” stations. Alignment (or segment) and station options were developed in response to public comment, design refinement, and to avoid and minimize impacts to the environment.

The Build Alternatives extend heavy rail transit (HRT) service in subway from the existing Metro Purple Line Wilshire/Western Station. HRT systems provide high speed (maximum of 70 mph), high capacity (high passenger-carrying capacity of up to 1,000 passengers per train and multiple unit trains with up to six cars per train), and reliable service since they operate in an exclusive grade-separated right-of-way. The subway will operate in a tunnel at least 30 to 70 feet below ground and will be electric powered.

Furthermore, the Build Alternatives include changes to the future bus services. Metro Bus Line 920 would be eliminated and a portion of Line 20 in the City of Santa Monica would be eliminated since it would be duplicated by the Santa Monica Blue Bus Line 2.



Metro Rapid Bus Line 720 would operate less frequently since its service route would be largely duplicated by the Westside Subway route. In the City of Los Angeles, headways (time between buses) for Line 720 are between 3 and 5 minutes under the existing network and will be between 5 and 11.5 minutes under the Build Alternatives, but no change in Line 720 would occur in the City of Santa Monica segment. Service frequencies on other Metro Rail lines and bus routes in the corridor would be the same as for the No Build Alternative.

2.3.1 Alternative 1—Westwood/UCLA Extension

This alternative extends the existing Metro Purple Line from the Wilshire/Western Station to a Westwood/UCLA Station (Figure 2-1). From the Wilshire/Western Station, Alternative 1 travels westerly beneath Wilshire Boulevard to the Wilshire/Rodeo Station and then southwesterly toward a Century City Station. Alternative 1 then extends from Century City and terminates at a Westwood/UCLA Station. The alignment is approximately 8.60 miles in length.

Alternative 1 would operate in each direction at 3.3-minute headways during morning and evening peak periods and at 10-minute headways during midday. The estimated one-way running time is 12 minutes 39 seconds from the Wilshire/Western Station.

2.3.2 Alternative 2—Westwood/Veterans Administration (VA) Hospital Extension

This alternative extends the existing Metro Purple Line from the Wilshire/Western Station to a Westwood/VA Hospital Station (Figure 2-2). Similar to Alternative 1, Alternative 2 extends the subway from the Wilshire/Western Station to a Westwood/UCLA Station. Alternative 2 then travels westerly under Veteran Avenue and continues west under the I-405 Freeway, terminating at a Westwood/VA Hospital Station. This alignment is 8.96 miles in length from the Wilshire/Western Station.

Alternative 2 would operate in each direction at 3.3-minute headways during the morning and evening peak periods and at 10-minute headways during the midday, off-peak period. The estimated one-way running time is 13 minutes 53 seconds from the Wilshire/Western Station.

2.3.3 Alternative 3—Santa Monica Extension

This alternative extends the existing Metro Purple Line from the Wilshire/Western Station to the Wilshire/4th Station in Santa Monica (Figure 2-3). Similar to Alternative 2, Alternative 3 extends the subway from the Wilshire/Western Station to a Westwood/VA Hospital Station. Alternative 3 then continues westerly under Wilshire Boulevard and terminates at the Wilshire/4th Street Station between 4th and 5th Streets in Santa Monica. The alignment is 12.38 miles.

Alternative 3 would operate in each direction at 3.3-minute headways during the morning and evening peak periods and operate with 10-minute headways during the midday, off-peak period. The estimated one-way running time is 19 minutes 27 seconds from the Wilshire/Western Station.

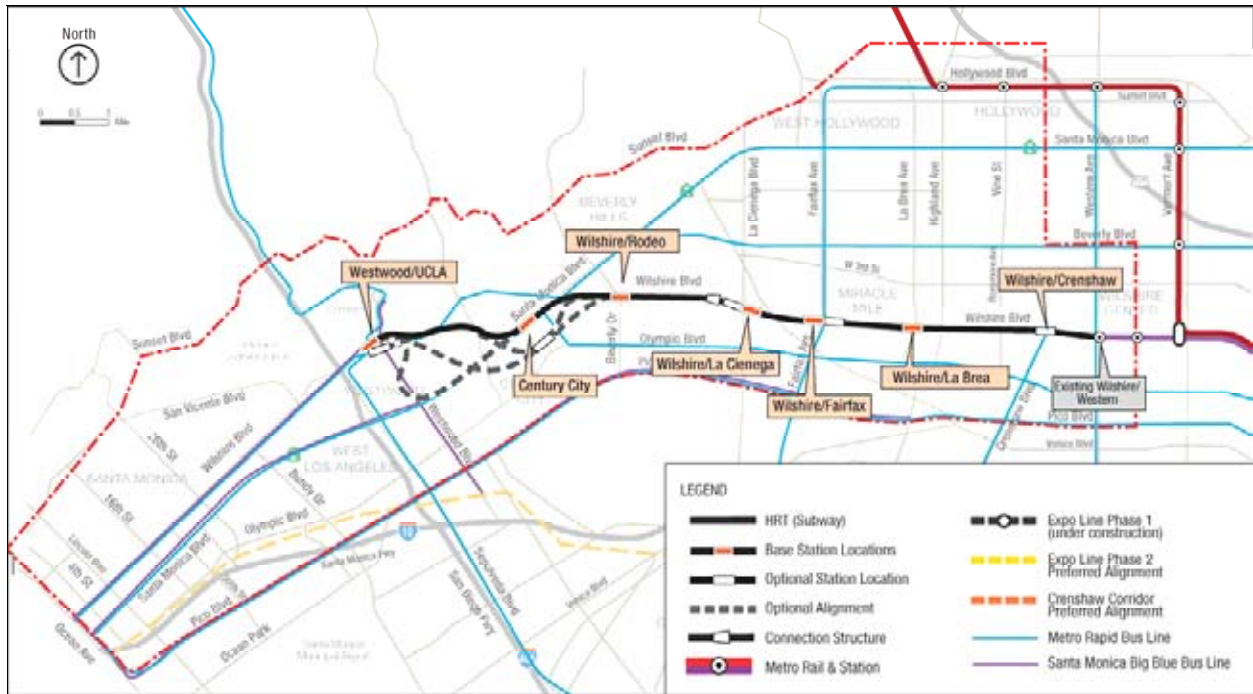


Figure 2-1. Alternative 1—Westwood/UCLA Extension

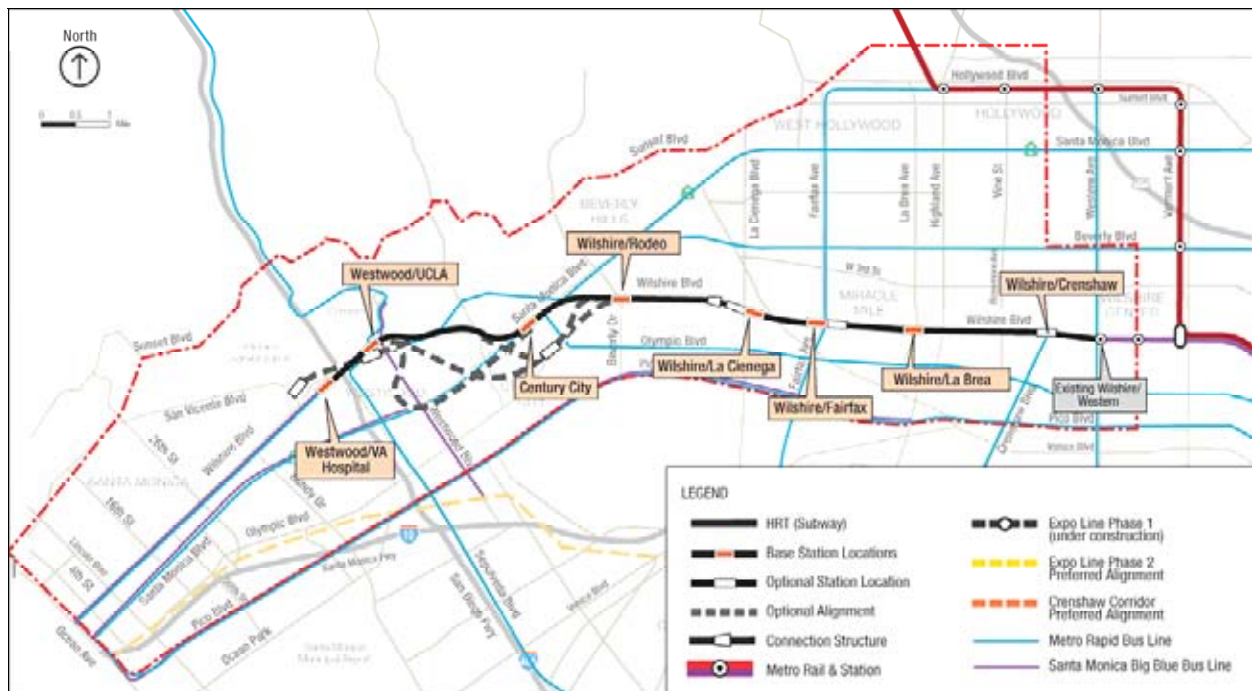


Figure 2-2. Alternative 2—Westwood/Veterans Administration (VA) Hospital Extension

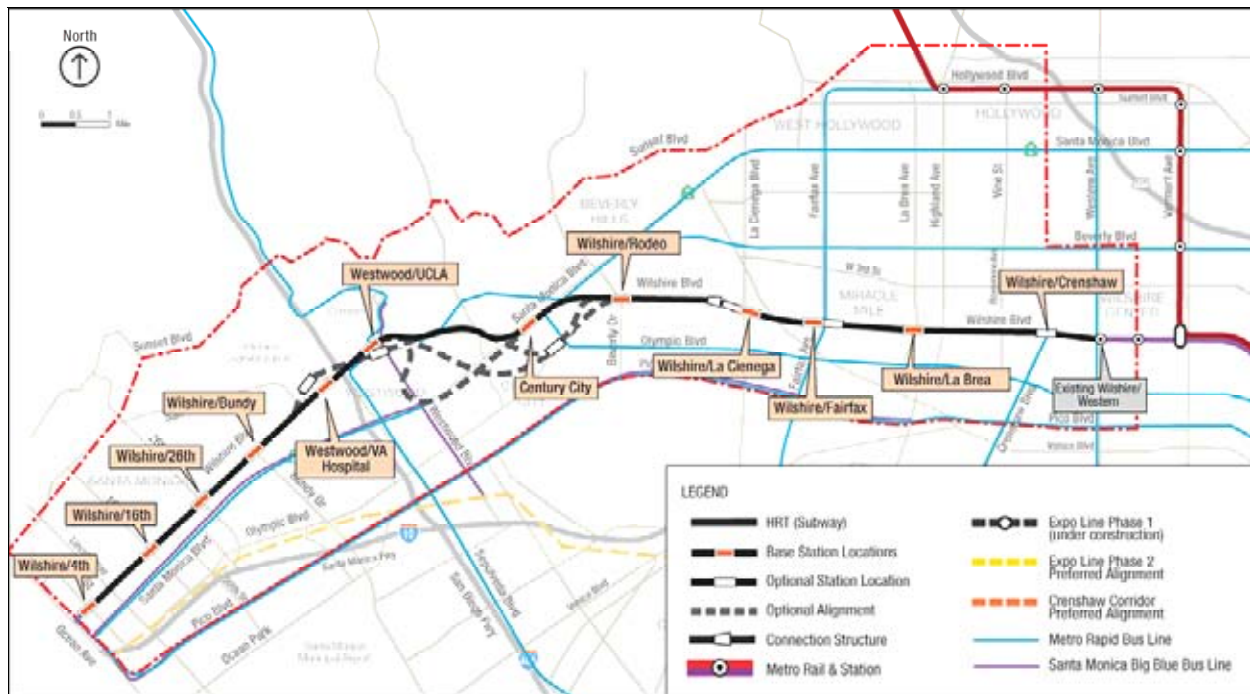


Figure 2-3. Alternative 3—Santa Monica Extension

2.3.4 Alternative 4—Westwood/VA Hospital Extension plus West Hollywood Extension

Similar to Alternative 2, Alternative 4 extends the existing Metro Purple Line from the Wilshire/Western Station to a Westwood/VA Hospital Station. Alternative 4 also includes a West Hollywood Extension that connects the existing Metro Red Line Hollywood/Highland Station to a track connection structure near Robertson and Wilshire Boulevards, west of the Wilshire/La Cienega Station (Figure 2-4). The alignment is 14.06 miles long.

Alternative 4 would operate from Wilshire/Western to a Westwood/VA Hospital Station in each direction at 3.3-minute headways during morning and evening peak periods and 10-minute headways during the midday off-peak period. The West Hollywood extension would operate at 5-minute headways during peak periods and 10-minute headways during the midday, off-peak period. The estimated one-way running time for the Metro Purple Line extension is 13 minutes 53 seconds, and the running time for the West Hollywood from Hollywood/Highland to Westwood/VA Hospital is 17 minutes and 2 seconds.

2.3.5 Alternative 5—Santa Monica Extension plus West Hollywood Extension

Similar to Alternative 3, Alternative 5 extends the existing Metro Purple Line from the Wilshire/Western Station to the Wilshire/4th Station and also adds a West Hollywood Extension similar to the extension described in Alternative 4 (Figure 2-5). The alignment is 17.49 miles in length. Alternative 5 would operate the Metro Purple Line extension in each direction at 3.3-minute headways during the morning and evening peak periods and 10-minute headways during the midday, off-peak period. The West Hollywood extension would operate in each direction at 5-minute headways during peak periods and 10-

minute headways during the midday, off-peak period. The estimated one-way running time for the Metro Purple Line extension is 19 minutes 27 seconds, and the running time from the Hollywood/Highland Station to the Wilshire/4th Station is 22 minutes 36 seconds.

2.3.6 Stations and Segment Options

HRT stations consist of a station “box,” or area in which the basic components are located. The station box can be accessed from street-level entrances by stairs, escalators, and elevators that would bring patrons to a mezzanine level where the ticketing functions are located. The 450-foot platforms are one level below the mezzanine level and allow level boarding (i.e., the train car floor is at the same level as the platform). Stations consist of a center or side platform. Each station is equipped with under-platform exhaust shafts, over-track exhaust shafts, blast relief shafts, and fresh air intakes. In most stations, it is anticipated that only one portal would be constructed as part of the Project, but additional portals could be developed as a part of station area development (by others). Stations and station entrances would comply with the *Americans with Disabilities Act of 1990*, Title 24 of the California Code of Regulations, the California Building Code, and the Department of Transportation Subpart C of Section 49 CFR Part 37.

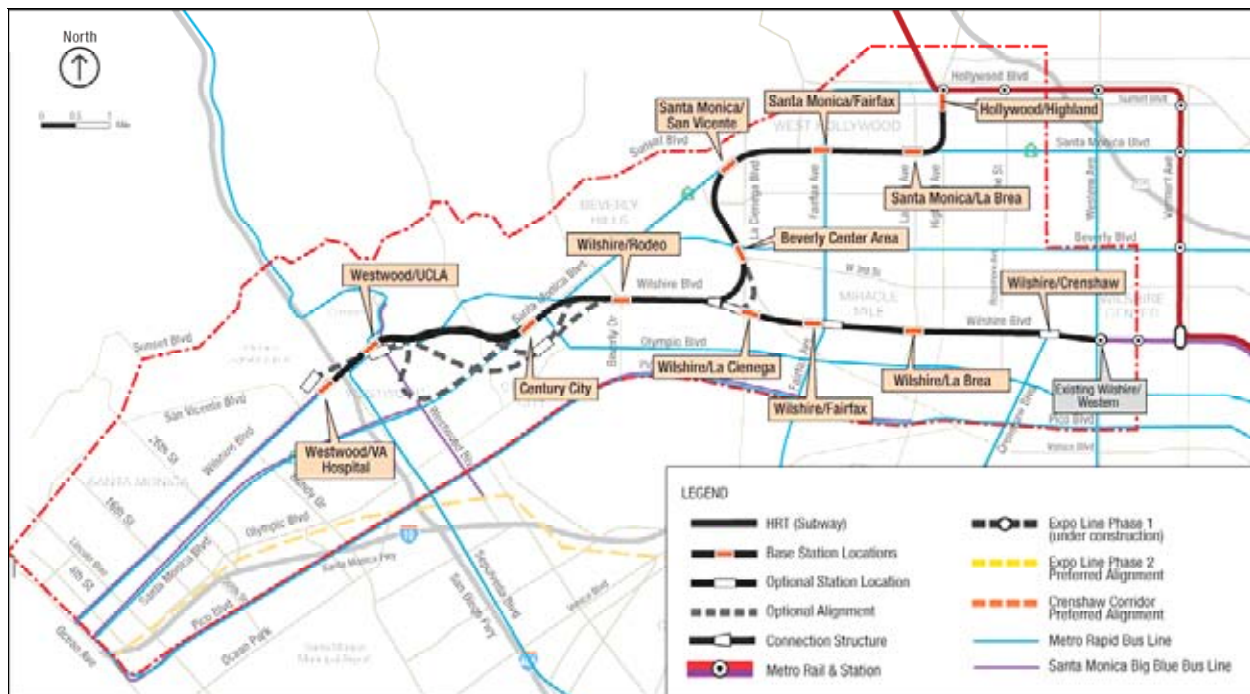


Figure 2-4. Alternative 4—Westwood/VA Hospital Extension plus West Hollywood Extension

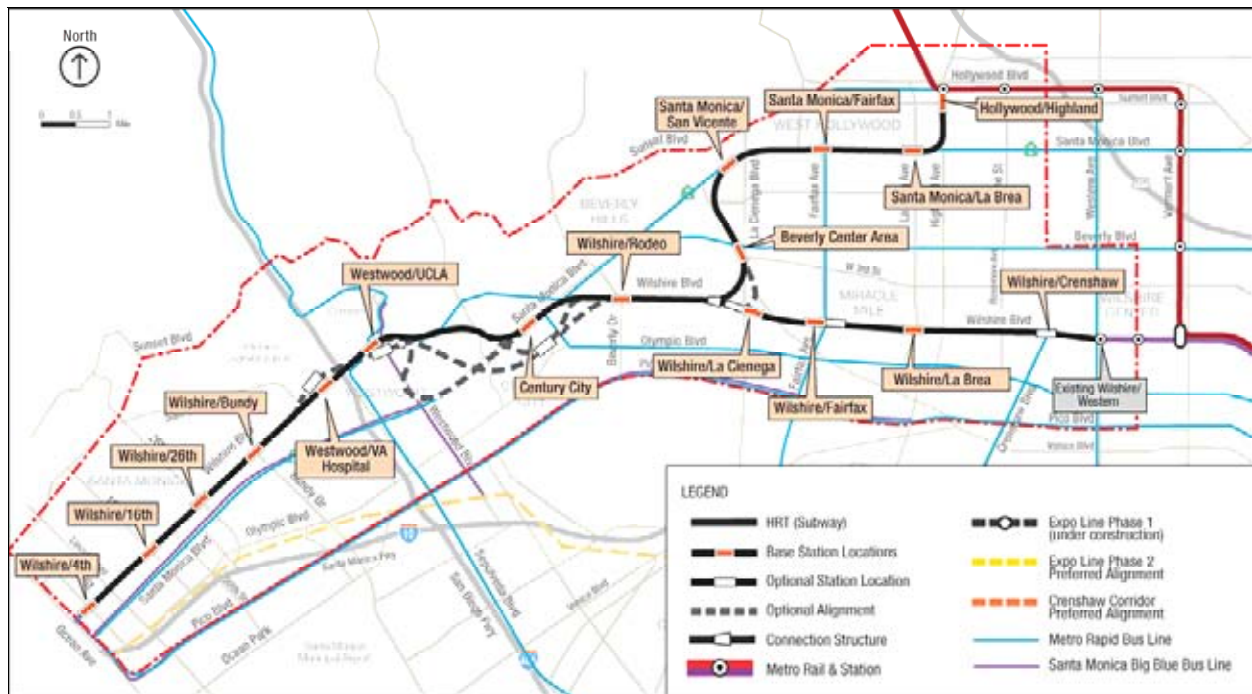


Figure 2-5. Alternative 5—Santa Monica Extension plus West Hollywood Extension

Platforms would be well-lighted and include seating, trash receptacles, artwork, signage, safety and security equipment (closed-circuit television, public announcement system, passenger assistance telephones), and a transit passenger information system. The fare collection area includes ticket vending machines, fare gates, and map cases.

Table 2-1 lists the stations and station options evaluated and the alternatives to which they are applicable. Figure 2-6 shows the proposed station and alignment options. These include:

- Option 1—Wilshire/Crenshaw Station Option
- Option 2—Fairfax Station Option
- Option 3—La Cienega Station Option
- Option 4—Century City Station and Alignment Options
- Option 5—Westwood/UCLA Station Option
- Option 6—Westwood/VA Hospital Station Option

Table 2-1. Alternatives and Stations Considered

Stations	Alternatives				
	1 Westwood/ UCLA Extension	2 Westwood/ VA Hospital Extension	3 Santa Monica Extension	4 Westwood/ VA Hospital Extension Plus West Hollywood Extension	5 Santa Monica Extension Plus West Hollywood Extension
Base Stations					
Wilshire/Crenshaw	•	•	•	•	•
Wilshire/La Brea	•	•	•	•	•
Wilshire/Fairfax	•	•	•	•	•
Wilshire/La Cienega	•	•	•	•	•
Wilshire/Rodeo	•	•	•	•	•
Century City (Santa Monica Blvd)	•	•	•	•	•
Westwood/UCLA (Off-street)	•	•	•	•	•
Westwood/VA Hospital		•	•	•	•
Wilshire/Bundy			•		•
Wilshire/26th			•		•
Wilshire/16th			•		•
Wilshire/4th			•		•
Hollywood/Highland				•	•
Santa Monica/La Brea				•	•
Santa Monica/Fairfax				•	•
Santa Monica/San Vicente				•	•
Beverly Center Area				•	•
Station Options					
1—No Wilshire/Crenshaw	•	•	•	•	•
2—Wilshire/Fairfax East	•	•	•	•	•
3—Wilshire/La Cienega (Transfer Station)	•	•	•	•	•
4—Century City (Constellation Blvd)	•	•	•	•	•
5—Westwood/UCLA (On-street)	•	•	•	•	•
6—Westwood/VA Hospital North		•	•	•	•

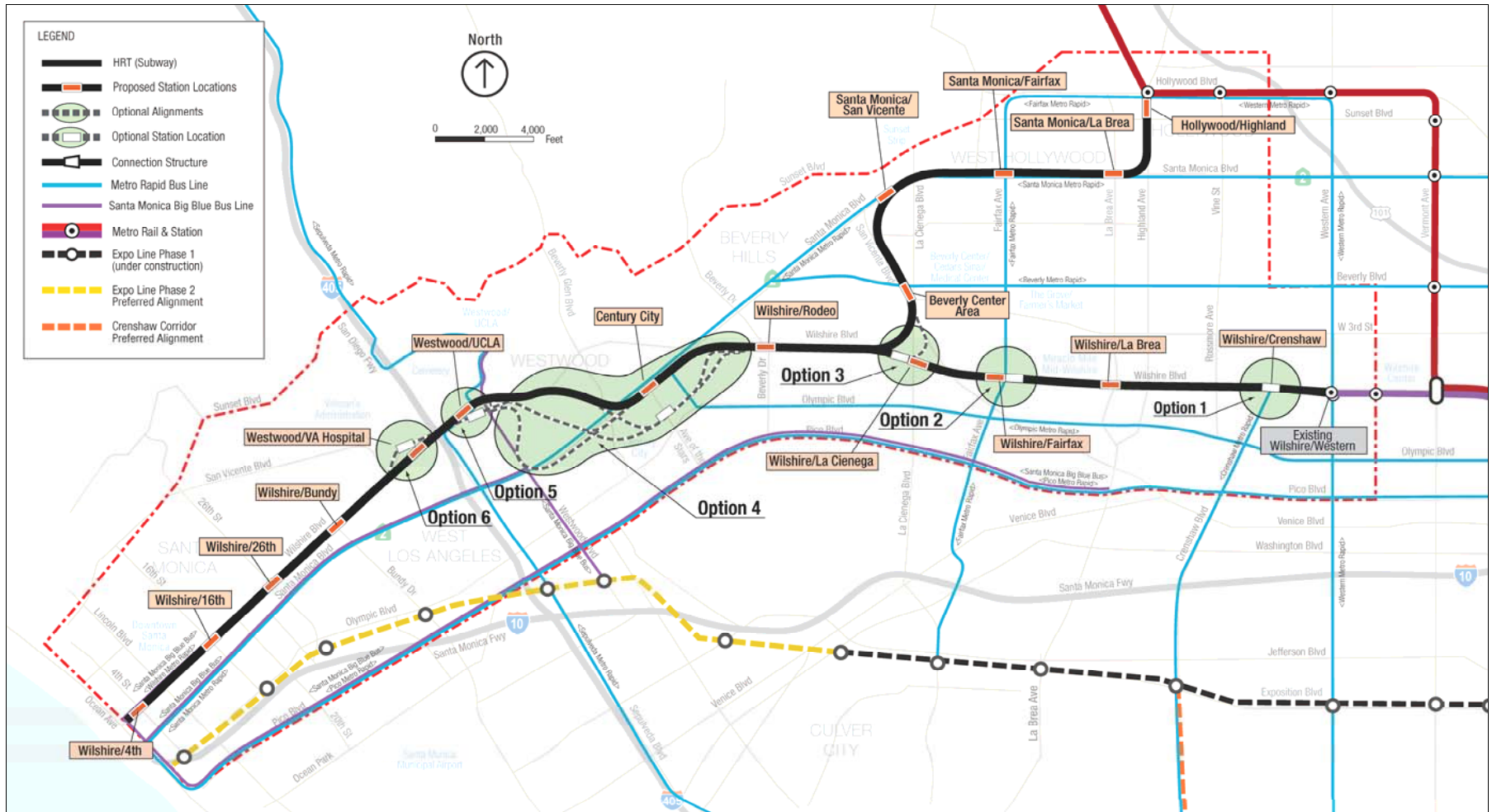


Figure 2-6. Station and Alignment Options

WESTSIDE SUBWAY EXTENSION



2.3.7 Option 1—Wilshire/Crenshaw Station Option

Base Station: Wilshire/Crenshaw Station—The base station straddles Crenshaw Boulevard, between Bronson Avenue and Lorraine Boulevard.

Station Option: Remove Wilshire/Crenshaw Station—This station option would delete the Wilshire/Crenshaw Station. Trains would run from the Wilshire/Western Station to the Wilshire/La Brea Station without stopping at Crenshaw. A vent shaft would be constructed at the intersection of Western Avenue and Wilshire Boulevard (Figure 2-7).

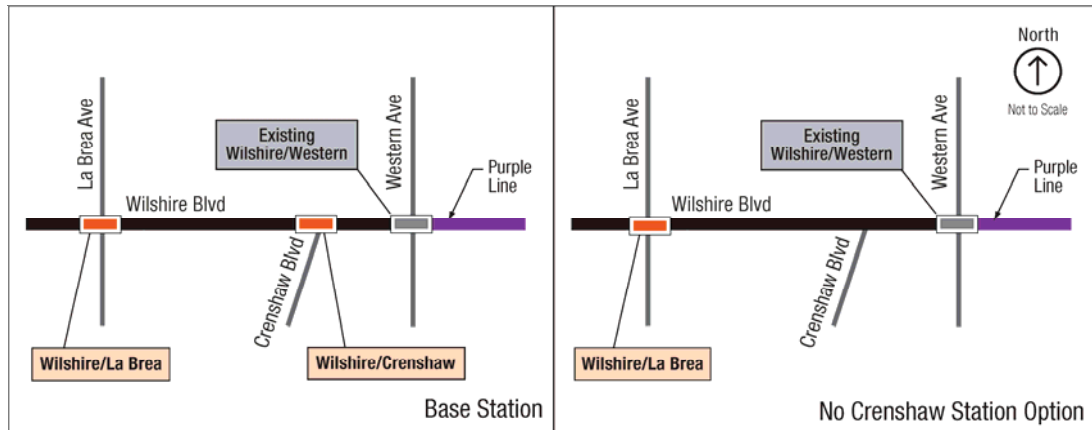


Figure 2-7. Option 1—No Wilshire/Crenshaw Station Option

2.3.8 Option 2—Wilshire/Fairfax Station East Option

Base Station: Wilshire/Fairfax Station—The base station is under the center of Wilshire Boulevard, immediately west of Fairfax Avenue.

Station Option: Wilshire/Fairfax Station East Station Option—This station option would locate the Wilshire/Fairfax Station farther east, with the station underneath the Wilshire/Fairfax intersection (Figure 2-8). The east end of the station box would be east of Orange Grove Avenue in front of LACMA, and the west end would be west of Fairfax Avenue.

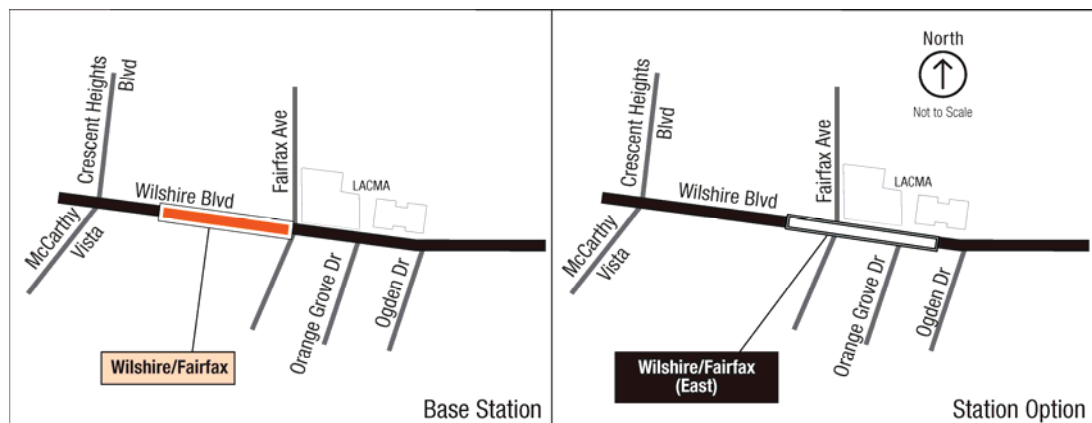


Figure 2-8. Option 2—Fairfax Station Option

2.3.9 Option 3—Wilshire/La Cienega Station Option

Base Station: Wilshire/La Cienega Station—The base station would be under the center of Wilshire Boulevard, immediately east of La Cienega Boulevard. A direct transfer between the Metro Purple Line and the potential future West Hollywood Line is not provided with this station. Instead, a connection structure is proposed west of Robertson Boulevard as a means to provide a future HRT connection to the West Hollywood Line.

Station Option: Wilshire/La Cienega Station West with Connection Structure—The station option would be located west of La Cienega Boulevard, with the station box extending from the Wilshire/Le Doux Road intersection to just west of the Wilshire/ Carson Road intersection (Figure 2-9). It also contains an alignment option that would provide an alternate HRT connection to the future West Hollywood Extension. This alignment portion of Option 3 is only applicable to Alternatives 4 and 5.

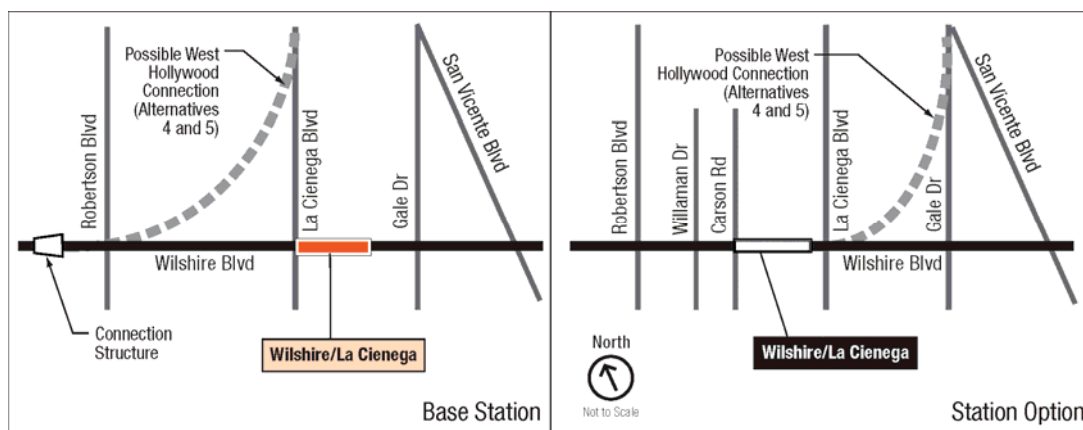


Figure 2-9. Option 3—La Cienega Station Option

2.3.10 Option 4—Century City Station and Segment Options

Century City Station and Beverly Hills to Century City Segment Options

Base Station: Century City (Santa Monica) Station—The base station would be under Santa Monica Boulevard, centered on Avenue of the Stars.

Station Option: Century City (Constellation) Station—With Option 4, the Century City Station has a location option on Constellation Boulevard (Figure 2-10), straddling Avenue of the Stars and extending westward to east of MGM Drive.

Segment Options: Three route options are proposed to connect the Wilshire/Rodeo Station to Century City (Constellation) Station: Constellation North and Constellation South. As shown in Figure 2-10, the base segment to the base Century City (Santa Monica) Station is shown in the solid black line and the segment options to Century City (Constellation) Station are shown in the dashed grey lines.

Century City to Westwood Segment Options

Three route options considered for connecting the Century City and Westwood stations include: East, Central, and West. As shown in Figure 2-10, each of these three segments would be accessed from both Century City Stations and both Westwood/UCLA Stations. The base segment is shown in the solid black line and the options are shown in the dashed grey lines.

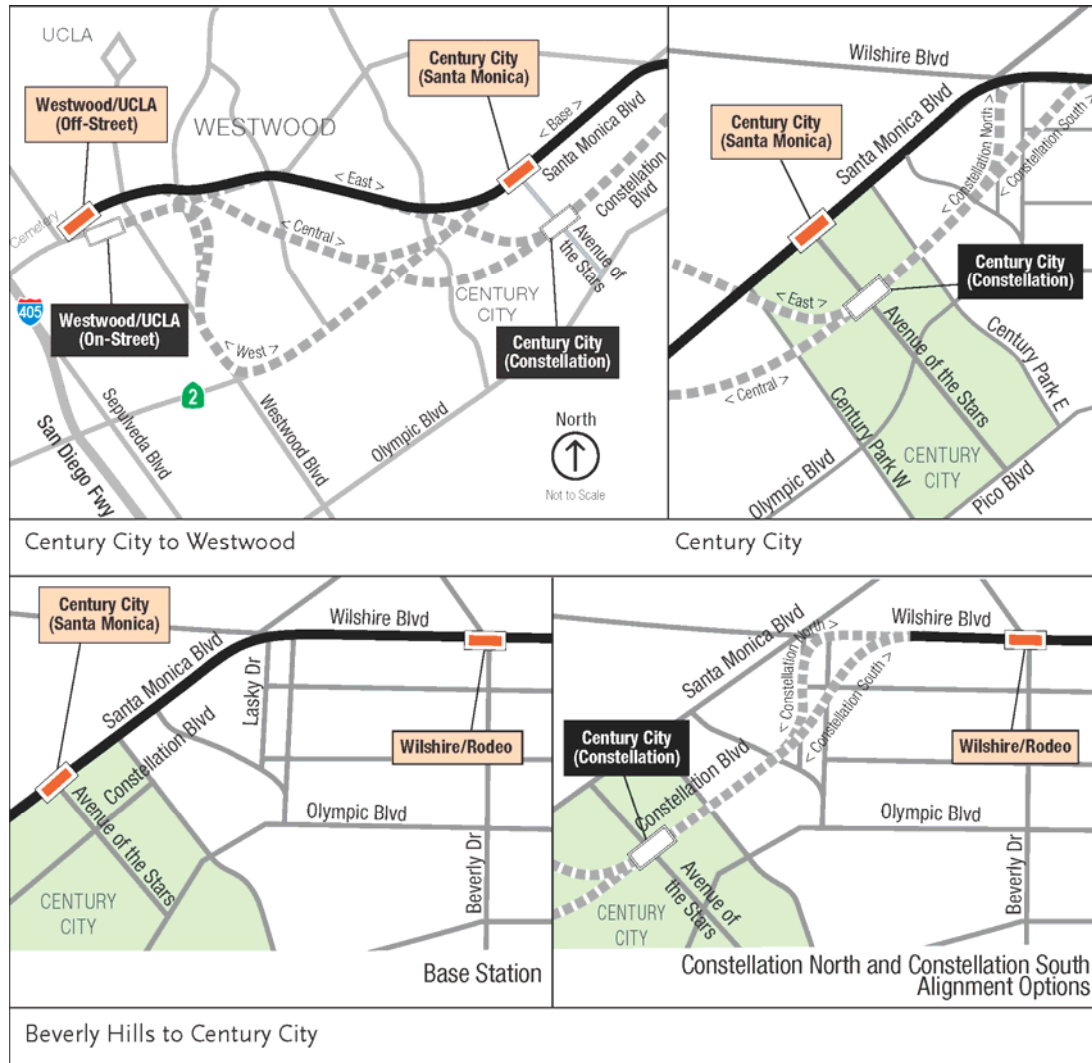


Figure 2-10. Century City Station Options

2.3.11 Option 5—Westwood/UCLA Station Options

Base Station: Westwood/UCLA Station Off-Street Station Option—The base station is located under the UCLA Lot 36 on the north side of Wilshire Boulevard between Gayley and Veteran Avenues.

Station Option: Westwood/UCLA On-Street Station Option—This station option would be located under the center of Wilshire Boulevard, immediately west of Westwood Boulevard (Figure 2-11).

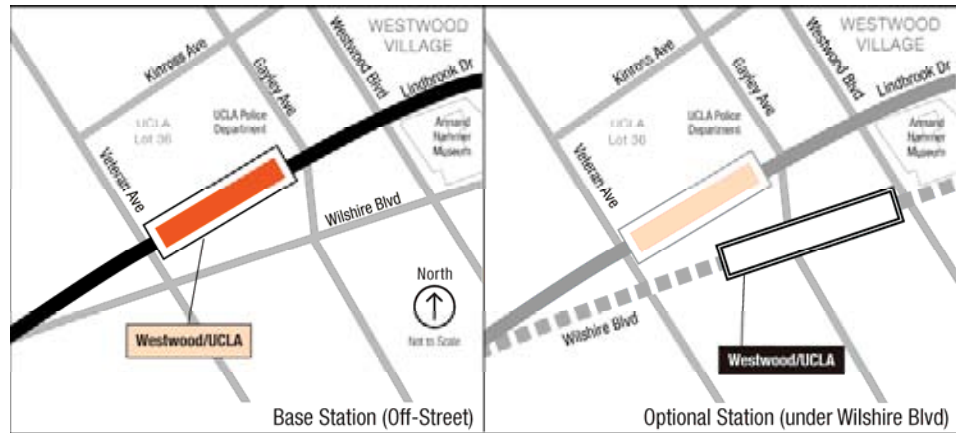


Figure 2-11. Option 5—Westwood/UCLA Station Options

2.3.12 Option 6—Westwood/VA Hospital Station Option

Base Station: Westwood/VA Hospital—The base station would be below the VA Hospital parking lot on the south side of Wilshire Boulevard in between the I-405 exit ramp and Bonsall Avenue.
Station Option: Westwood/VA Hospital North Station—This station option would locate the Westwood/VA Hospital Station on the north side of Wilshire Boulevard between Bonsall Avenue and Wadsworth Theater. (Shown in Figure 2-12)

To access the Westwood/VA Hospital Station North, the alignment would extend westerly from the Westwood/UCLA Station under Veteran Avenue, the Federal Building property, the I-405 Freeway, and under the Veterans Administration property just east of Bonsall Avenue.

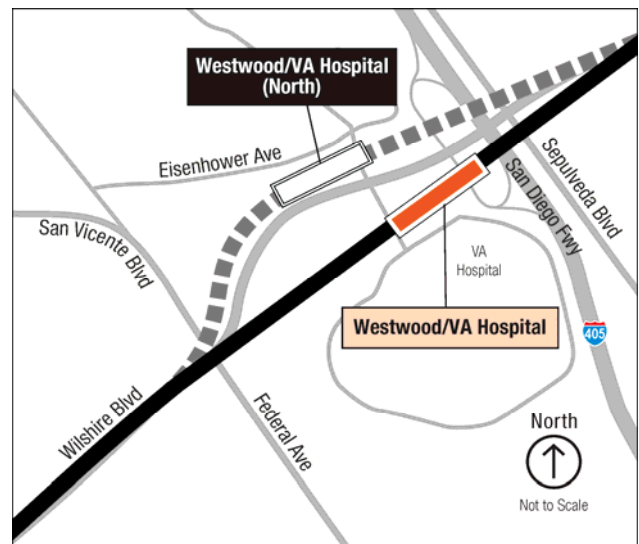


Figure 2-12. Option 6—Westwood/VA Hospital Station North

2.4 Base Stations

The remaining stations (those without options) are described below.

Wilshire/La Brea Station—This station would be located between La Brea and Cloverdale Avenues.

Wilshire/Rodeo Station—This station would be under the center of Wilshire Boulevard, beginning just west of South Canon Drive and extending to El Camino Drive.



Wilshire/Bundy Station—This station would be under Wilshire Boulevard, east of Bundy Drive, extending just east of Saltair Avenue.

Wilshire/26th Station—This station would be under Wilshire Boulevard, with the eastern end east of 26th Street and the western end west of 25th Street, midway between 25th Street and Chelsea Avenue.

Wilshire/16th Station—This station would be under Wilshire Boulevard with the eastern end just west of 16th Street and the western end west of 15th Street.

Wilshire/4th Station—This station would be under Wilshire Boulevard and 4th Street in Santa Monica.

Hollywood/Highland Station—This station would be located under Highland Avenue and would provide a transfer option to the existing Metro Red Line Hollywood/Highland Station under Hollywood Boulevard.

Santa Monica/La Brea Station—This station would be under Santa Monica Boulevard, just west of La Brea Avenue, and would extend westward to the center of the Santa Monica Boulevard/Formosa Avenue.

Santa Monica/Fairfax Station—This station is under Santa Monica Boulevard and would extend from just east of Fairfax Avenue to just east of Ogden Drive.

Santa Monica/San Vicente Station—This station would be under Santa Monica Boulevard and would extend from just west of Hancock Avenue on the west to just east of Westmount Drive on the east.

Beverly Center Area Station—This station would be under San Vicente Boulevard, extending from just south of Gracie Allen Drive to south of 3rd Street.

2.5 Other Components of the Build Alternatives

2.5.1 Traction Power Substations

Traction power substations (TPSS) are required to provide traction power for the HRT system. Substations would be located in the station box or in a box located with the crossover tracks and would be located in a room that is about 50 feet by 100 feet in a below grade structure.

2.5.2 Emergency Generators

Stations at which the emergency generators would be located are Wilshire/La Brea, Wilshire/La Cienega, Westwood/UCLA, Westwood/VA Hospital, Wilshire/26th, Highland/Hollywood, Santa Monica/La Brea, and Santa Monica/San Vicente. The emergency generators would require approximately 50 feet by 100 feet of property in an off-street location. All would require property acquisition, except for the one at the Wilshire/La Brea Station which uses Metro's property.

2.5.3 Mid-Tunnel Vent Shaft

Each alternative would require mid-tunnel ventilation shafts. The vent shafts are emergency ventilation shafts with dampers, fans, and sound attenuators generally placed at both ends of a station box to exhaust smoke. In addition, emergency vent shafts could be used for station cooling and gas mitigation. The vent shafts are also required in tunnel segments with more than 6,000 feet between stations to meet fire/life safety requirements. There would be a connecting corridor between the two tunnels (one for



each direction of train movement) to provide emergency egress and fire-fighting ingress. A vent shaft is approximately 150 square feet; with the opening of the shaft located in a sidewalk and covered with a grate about 200 square feet.

Table 2-2. Mid-Tunnel Vent Shaft Locations

Alternative/Option	Location
Alternatives 1 through 5, MOS 2	Part of the connection structure on Wilshire Boulevard, west of Robertson Boulevard
Alternatives 2 through 5	West of the Westwood/VA Hospital Station on Army Reserve property at Federal Avenue and Wilshire Boulevard
Option 4 via East route	At Wilshire Boulevard/Manning Avenue intersection
Option 4 to Westwood/UCLA Off-Street Station via Central route	On Santa Monica Boulevard just west of Beverly Glen Boulevard
Option 4 to Westwood/UCLA On-Street Station via Central route	At Santa Monica Boulevard/Beverly Glen Boulevard intersection
Options 4 via West route	At Santa Monica Boulevard/Glendon Avenue intersection
Options 4 from Constellation Station via Central route	On Santa Monica Boulevard between Thayer and Pandora Avenues
Option from Constellation Station via West route	On Santa Monica Boulevard just east of Glendon Avenue

2.5.4 Trackwork Options

Each Build Alternative requires special trackwork for operational efficiency and safety (Table 2-3):

- Tail tracks—a track, or tracks, that extends beyond a terminal station (the last station on a line)
- Pocket tracks—an additional track, or tracks, adjacent to the mainline tracks generally at terminal stations
- Crossovers—a pair of turnouts that connect two parallel rail tracks, allowing a train on one track to cross over to the other
- Double crossovers—when two sets of crossovers are installed with a diamond allowing trains to cross over to another track

Table 2-3. Special Trackwork Locations

Station	1	2	3	4	5
	Westwood/ UCLA Extension	Westwood/ VA Hospital Extension	Santa Monica Extension	Westwood/ VA Hospital Extension Plus West Hollywood Extension	Santa Monica Extension Plus West Hollywood Extension
Special Trackwork Locations—Base Trackwork Alternatives					
Wilshire/Crenshaw	None	None	None	None	None
Wilshire/La Brea	Double Crossover	Double Crossover	Double Crossover	Double Crossover	Double Crossover
Wilshire/Fairfax	None <i>MOS 1 Only: Terminus Station with Tail tracks</i>	None <i>MOS 1 Only: Terminus Station with Tail tracks</i>	None <i>MOS 1 Only: Terminus Station with Tail tracks</i>	None <i>MOS 1 Only: Terminus Station with Tail tracks</i>	None <i>MOS 1 Only: Terminus Station with Tail tracks</i>
Wilshire/La Cienega	None	None	None	None	None
<i>Station Option 3 - Wilshire/La Cienega West</i>	Turnouts	Turnouts	Turnouts		
Wilshire/Robertson Connection Structure	Equilateral Turnouts - for future West Hollywood connection	Equilateral Turnouts - for future West Hollywood connection	Equilateral Turnouts - for future West Hollywood connection	Equilateral Turnouts	Equilateral Turnouts
Wilshire/Rodeo	None	None	None	None	None
Century City	Double Crossover <i>MOS2 Only: Terminus Station with Double Crossover and tail tracks</i>	Double Crossover <i>MOS2 Only: Terminus Station with Double Crossover and tail tracks</i>	Double Crossover <i>MOS2 Only: Terminus Station with Double Crossover and tail tracks</i>	Double Crossover <i>MOS2 Only: Terminus Station with Double Crossover and tail tracks</i>	Double Crossover <i>MOS2 Only: Terminus Station with Double Crossover and tail tracks</i>
Westwood/UCLA	End Terminal with Double Crossover and tail tracks	Double Crossover	Double Crossover	Double Crossover	Double Crossover
Westwood/VA Hospital	N/A	End Terminal with Turnouts and tail tracks	Turnouts	End Terminal with Turnouts and tail tracks	Turnouts
Wilshire/Bundy	N/A	N/A	None	N/A	None
Wilshire/26th	N/A	N/A	None	N/A	None
Wilshire/16th	N/A	N/A	None	N/A	None
Wilshire/4th	N/A	N/A	End Terminal with Double Crossover. Pocket Track with Double Crossover, Equilateral Turnouts and tail tracks	N/A	End Terminal with Double Crossover, Pocket Track with Double Crossover, Equilateral Turnouts and tail tracks
Hollywood/ Highland	N/A	N/A	N/A	Double Crossover and tail tracks	Double Crossover and tail tracks
Santa Monica/La	N/A	N/A	N/A	None	None

Station	1	2	3	4	5
	Westwood/ UCLA Extension	Westwood/ VA Hospital Extension	Santa Monica Extension	Westwood/ VA Hospital Extension Plus West Hollywood Extension	Santa Monica Extension Plus West Hollywood Extension
Brea					
Santa Monica/Fairfax	N/A	N/A	N/A	None	None
Santa Monica/ San Vicente	N/A	N/A	N/A	Double Crossover	Double Crossover
Beverly Center	N/A	N/A	N/A	None	None
Additional Special Trackwork Location (Optional Trackwork)					
Wilshire/Fairfax	Double Crossover	Double Crossover	Double Crossover	Double Crossover	Double Crossover
Wilshire/La Cienega	Double Crossover	Double Crossover	Double Crossover	Double Crossover	Double Crossover
Wilshire/ Rodeo	Pocket Track	Pocket Track	Pocket Track	Pocket Track	Pocket Track
Wilshire/26th	N/A	N/A	Double Crossover	N/A	Double Crossover

2.5.5 Rail Operations Center

The existing Rail Operations Center (ROC), shown on the figure below, located in Los Angeles near the intersection of Imperial Highway and the Metro Blue Line does not have sufficient room to accommodate the new transit corridors and line extensions in Metro’s expansion program. The Build Alternatives assume an expanded ROC at this location.

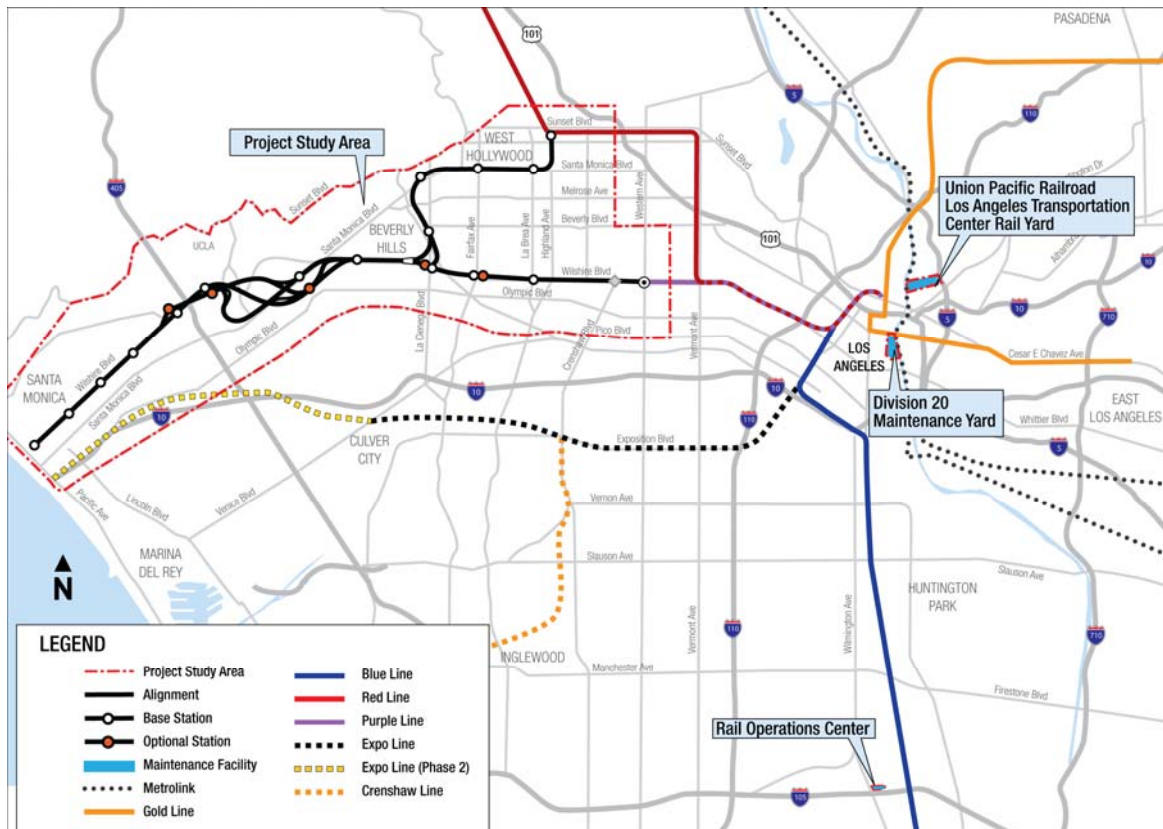


Figure 2-13: Location of the Rail Operations Center and Maintenance Yards



2.5.6 Maintenance Yards

If any of the Build Alternatives are chosen, additional storage capacity would be needed. Two options for providing this expanded capacity are as follows:

The first option requires purchasing 3.9 acres of vacant private property abutting the southern boundary of the Division 20 Maintenance and Storage Facility, which is located between the 4th and 6th Street Bridges. Additional maintenance and storage tracks would accommodate up to 102 vehicles, sufficient for Alternatives 1 and 2. The second option is a satellite facility at the Union Pacific (UP) Los Angeles Transportation Center Rail Yard. This site would be sufficient to accommodate the vehicle fleet for all five Build Alternatives. An additional 1.3 miles of yard lead tracks from the Division 20 Maintenance and Storage Facility and a new bridge over the Los Angeles River would be constructed to reach this yard (**Error! Reference source not found.**).



Figure 2-15. UP Railroad Rail Bridge



Figure 2-15. Maintenance Yard Options

2.6 Minimum Operable Segments

Due to funding constraints, it may be necessary to construct the Westside Subway Extension in shorter segments. A Minimum Operable Segment (MOS) is a phasing option that could be applied to any of the Build Alternatives.

**2.6.1 MOS 1—Fairfax Extension**

MOS 1 follows the same alignment as Alternative 1, but terminates at the Wilshire/Fairfax Station rather than extending to a Westwood/UCLA Station. A double crossover for MOS 1 is located on the west end of the Wilshire/La Brea Station box, west of Cloverdale Avenue. The alignment is 3.10 miles in length.

2.6.2 MOS 2—Century City Extension

MOS 2 follows the same alignment as Alternative 1, but terminates at a Century City Station rather than extending to a Westwood/UCLA Station. The alignment is 6.61 miles from the Wilshire/Western Station.



3.0 AFFECTED ENVIRONMENT

This section describes the topographic and geologic setting of the project area. It includes a description of the regional geology and a characterization of the local stratigraphic conditions, geologic faults, groundwater and natural gas conditions that are anticipated along the project alignments. It also includes a discussion of the geologic and seismic hazards that may be encountered along the study alternatives.

3.1 Topography

The study alternatives are located on the relatively flat coastal plane of the Los Angeles basin, approximately ½ to 3 miles south of the Santa Monica Mountains. In the study area the elevations range from about 85 feet above mean sea level (msl) at the west side of the study area to about 400 feet above msl at the northeast side of the study area..

The topography in the area of the alignment alternatives that runs westerly along Wilshire Boulevard from the intersection with Western Avenue slopes gently to the west at about a 0.5 percent gradient from an elevation of 200 feet msl to an elevation of 140 feet msl at the intersection with La Brea Avenue. From that intersection, the terrain rises to the west and northwest at a gradient of about 1.5 to 2 percent to an elevation of about 260 feet msl at the Santa Monica Boulevard intersection. Southwesterly from that intersection and westerly through Westwood, much of the terrain gently undulates multi-directionally at elevations ranging from about 240 feet to 340 feet msl until the intersection with the 405 Freeway which lies at an elevation of 260 feet msl. From that point southwesterly through West Los Angeles and Santa Monica the terrain slopes to the south and southwest at gradients ranging from about 2 to 4 percent to the westerly terminus of the study area in Santa Monica which lies at an elevation of 85 feet msl.

The topography in the area of the alignment alternatives that originate at the Hollywood/Highland Station in Hollywood slopes gently south and southwesterly at gradients ranging from about 2 to 3 percent and elevations ranging from about 380 to 210 feet msl until the intersection of Santa Monica and San Vicente Boulevards. From that intersection southeast along San Vicente Boulevard to the intersection with Wilshire Boulevard the topography slopes very gently to the south and southeast at gradients ranging from about 0.5 to 2.3 percent and elevations ranging from 210 to 140 feet msl.

3.2 Geology

This section presents a summary of the regional geologic setting and a description of the various geologic units and structures that would be encountered along the alignment alternatives.

3.2.1 Regional Geologic Setting

The study area is located in the northwestern portion of the Los Angeles Basin, immediately south of the Santa Monica Mountains. The study area is located at the north end of the Peninsular Ranges physiographic province, near the southern boundary of the Transverse Ranges physiographic province. The dominant structural features of the Peninsular Ranges are northwesterly trending ranges, valley, and fault zones such as the



nearby Newport-Inglewood fault zone. In contrast, the Transverse Ranges are characterized by east-west trending structural features such as the Santa Monica Mountains and the Hollywood and Santa Monica faults. The Santa Monica and Hollywood faults are considered the boundary between these two physiographic provinces in the study area.

The Los Angeles Basin is an elongate northwest trending, sediment filled structural trough that is nearly 6 miles deep. It is bounded on the north by the Santa Monica Mountains, on the east by the Elysian, Repetto and Puente Hills and on the southeast and south by the Santa Ana Mountains, and the San Joaquin Hills. The basin began to take its present shape in the Late Miocene (about 7 million years ago) by subsidence between the right-oblique Whittier and Palos Verdes faults, and the left oblique Santa Monica fault system (Wright, 1991). At the surface the basin is an alluvial coastal plain of generally low relief that slopes gradually seaward towards the south, southwest and west. It is a prolific petroleum basin that has a long history of petroleum production since the end of the 19th century. Significant oil discoveries in the immediate vicinity of the study area include the Los Angeles, Las Cienagas, Beverly Hills, Cheviot Hills, Sawtelle, San Vicente, Inglewood and the Salt Lake oil fields. Within the Salt Lake Oil field are the La Brea tar pits which are a surficial tar deposit and one of the world's most valuable fossil sites. Paleontologists have recovered almost 1.5 million vertebrate and 2.5 million invertebrate fossils of Holocene and late Pleistocene animals entrapped in the tar deposits (Bilodeau and others, 2007).

The areal distribution of surficial geologic units and Quaternary faults in the northern Los Angeles Basin in the vicinity of the study area is shown on Figure 3-1, Regional Geologic Map. As shown on Figure 3-1, the surficial geology in the immediate study area is characterized by Quaternary alluvial sediments. These alluvial sediments were shed from the south flank of the adjacent Santa Monica Mountains. The Santa Monica Mountains are an uplifted mountain block that is comprised of Mesozoic age igneous and metamorphic rocks which are overlain by Tertiary sedimentary rocks along its flanks. The Santa Monica Mountains are being uplifted along active faults such as the Santa Monica and Hollywood faults.

To the south of the study area, the generally flat alluvial surface of the Los Angeles basin is interrupted by the Baldwin Hills (Figure 3-1). The Baldwin Hills are the surface expression of tectonic deformation that is occurring along the active Newport-Inglewood fault zone. The Baldwin Hills are the northernmost of a chain of anticlinal uplifts that form a range of low hills and oil fields that trend about N45°W through the Los Angeles basin.

The Quaternary alluvium shown at the surface within the study area is underlain at project depths (i.e. tunnel invert depth) by Miocene to Pleistocene age terrestrial and marine sedimentary formations that are described in the following sections.

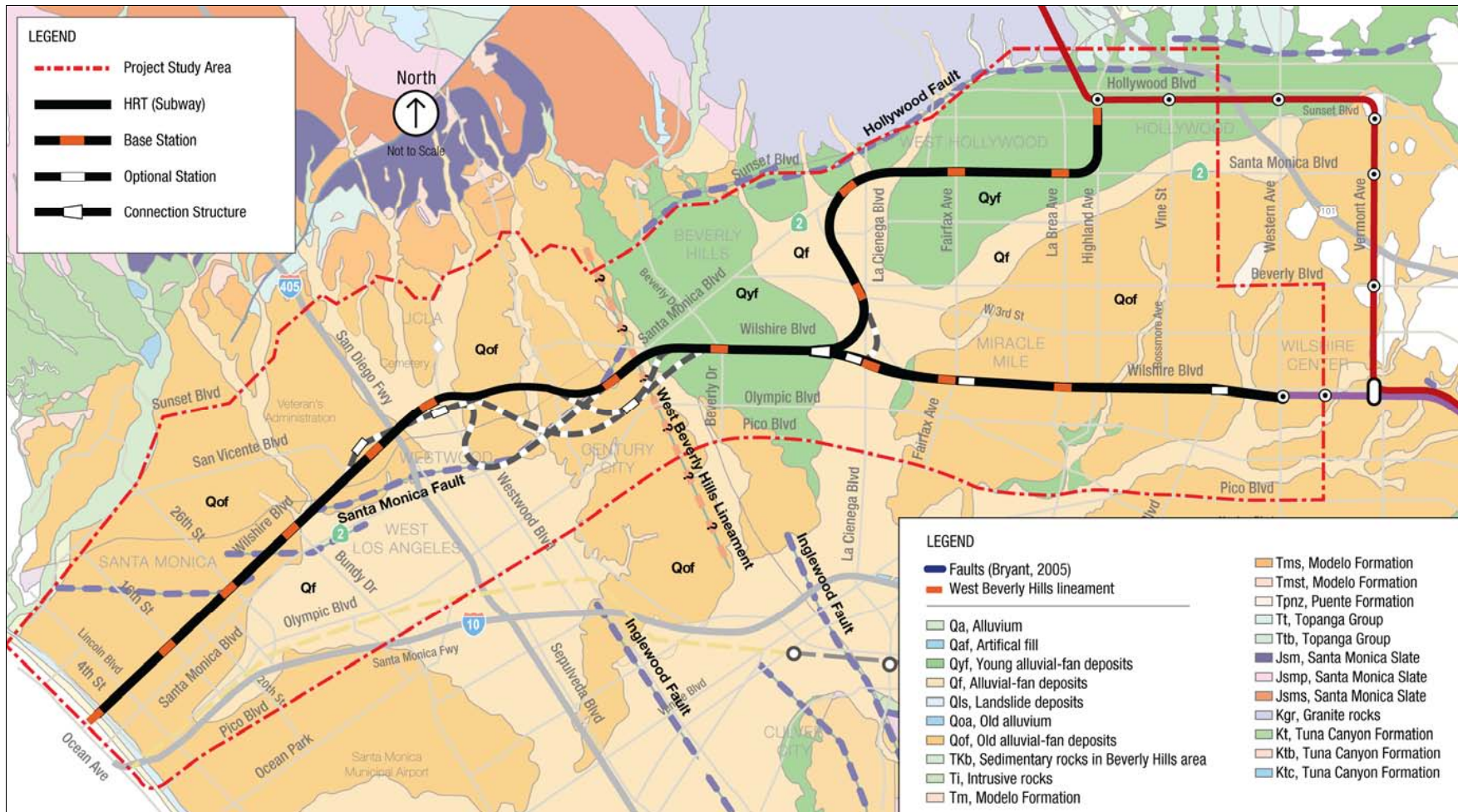


Figure 3-1: Regional Geological Map

WESTSIDE SUBWAY EXTENSION

**3.2.2 Study Area Geology**

The West Hollywood portion of Alternatives 4 and 5 will encounter Pleistocene age Lakewood Formation and older alluvial sediments overlain by variable thicknesses of Holocene (younger) alluvial sediments. The other alternatives will encounter several geologic units that range in age from Miocene to Holocene. The geologic units that may be encountered in tunnel excavations are, from oldest to youngest, the Miocene-age Puente Formation, the Pliocene-age Fernando Formation, the Pleistocene age San Pedro and Lakewood Formations, Pleistocene (older) alluvium, and Holocene (younger) alluvium. The Puente, Fernando and San Pedro Formations would be encountered at variable depths in the subsurface beneath a variable thickness of Holocene and late Pleistocene sediments (Lakewood Formation and older alluvium). The subsurface geologic formations and conditions occurring along the study alternatives are shown on the Plans and Profiles, Plates 1.1 through 1.36 included as Appendix A.

The general lithologic characteristics of the five geologic units that may be encountered along the alternatives are described in the following paragraphs, from youngest to oldest, and summarized on Table 3-1.

Younger Alluvium (regional geologic map symbols: Qay1 and Qay2; undifferentiated on geologic profiles, symbol: Qal)

Broad areas of Holocene-age (younger) alluvium (Qay1) deposited by alluvial fan processes and by streams of low to moderate energy overlay the western half of Beverly Hills, West Hollywood, and Hollywood (Figure 3-1). These younger alluvial fan deposits consist predominantly of sandy to silty clays and clayey sand with interlayers and lenses of sandy silt and gravelly sand.

Holocene-age (younger), stream-deposited alluvium (Qay2) is present within several relatively narrow, south-flowing drainage courses that cross the study area at several locations from near its east end westerly to the city of Santa Monica (Figure 3-1). Some of these drainage courses have incised into the underlying older alluvium and/or Lakewood Formation. Where encountered in prior and current exploratory borings this alluvium consisted of poorly consolidated, interlayered silts, clays, and silty sands with some sand layers and some gravel.



Table 3-1: Geologic Units

Age	Geologic Formation (age)	Age (1000's of years)	Symbol	Composition	Location in Project Area	Alternatives Underlain
Youngest	Younger Alluvium (Holocene)	Recent to 1-12	Qal1 Qal2	Poorly consolidated, interlayered silts, clays, and silty sands with some sand layers and gravel	Western half of Beverly Hills, West Hollywood - Hollywood/ Highland down to Wilshire Boulevard; La Jolla to Carmelina; and younger-alluvium-filled ravines from Western to La Jolla.	1-5
	Older Alluvium (Late Pleistocene)	12-80	Qao	Non-marine and marine sediments.	All areas	1-5
	Lakewood (Pleistocene)	12-80	Qalo	Upper portion: Interbedded silts and clays, sands, silty sands with some clayey sand layers. Lower portion: interlayered silts and sandy clays with some silty sand.	Hancock Park/La Brea Tar Pits area to an area between South Crescent Heights and South La Jolla Boulevards	1, 2 and 3
	San Pedro (Pleistocene)	2-500	Qsp	Fine-grained sand and silty sand with few interbeds of medium- to coarse-grained sand and some local silt layers. Some asphaltic sand found.	Wilshire Boulevard. from Western to La Jolla	1,2, and 3
	Fernando (Pliocene)	1,500-2,500	Tf	Predominantly massive siltstone and claystone with few rare sandstone interbed	Hancock Park Area, Windsor to Fairfax Avenue	1
Oldest	Puente (Miocene)	5,500-10,000	Tp	Massive siltstone and intervals of claystone that are Interbedded with thin sandstone and siltstone laminae	Near bottom of tunnel from Windsor to Fairfax	1

Older Alluvium and Lakewood Formation – undifferentiated (regional geologic map symbol: Qao; geologic profile symbol: Qalo/Lakewood Formation)

The older alluvial deposits (regional geologic map symbol Qao) consist of sediments deposited by former streams that had once flowed across the La Brea and Santa Monica Plains during late Pleistocene time. These deposits, derived mainly from the Santa Monica Mountains to the north, thicken to the south and west. As shown on Figure 3-1, these deposits are present at the ground surface or near ground-surface along the majority of Alternative 3 from its easterly terminus to about South La Jolla Street and then west of the 405 Freeway through the Sawtelle area and the city of Santa Monica to the west end of the alignment.

The older alluvial deposits overlie deposits of the late Pleistocene-age Lakewood Formation, which are comprised of non-marine and marine sediments. Since the older alluvial deposits and the underlying Lakewood Formation are compositionally similar and a clear contact between them is difficult to distinguish, they are shown undifferentiated on the geologic profiles (Plates 1.1 through 1.36).



The older alluvial deposits/Lakewood Formation generally consists of interbedded silts, clays, sands, and silty sands, with some clayey sand layers. The lower portion of the older alluvial deposits/Lakewood Formation consists primarily of interlayered silts and sandy clays with some silty sand. The older alluvial deposits/Lakewood Formation are generally dense where granular and very stiff to hard where consisting primarily of silts and clays (Task 10.02).

Asphaltic sands were encountered in the lower portion of this geologic unit in recent borings drilled in 2009 (Task 10.02) as well as in previous borings drilled by other consultants along Wilshire Boulevard in the Hancock Park/La Brea Tar Pits area from South Burnside Avenue on the east to between South Crescent Heights and South La Jolla Boulevards on the west (Plates 1. 6 to 1.8). Asphaltic (or tar) sands are a naturally occurring mixture of asphalt and sand.

San Pedro Formation (regional geologic map and geologic profile symbol: Qsp)

The San Pedro formation outcrops in the Baldwin Hills and occurs in the subsurface along the Westside Subway Extension. Based on recent study borings (Task 10.02), prior borings drilled for the Metro Rail alignment (CWDD/ESA/GRC, 1981) and other prior borings, marine and non-marine deposits of the early Pleistocene age San Pedro Formation unconformably underlie the undifferentiated Older Alluvium/Lakewood Formation at variable depths below the alignment. The San Pedro Formation in the vicinity of the alignment consists primarily of fine-grained sand and silty sand with few interbeds of medium- to coarse- grained sand and some local silt layers. Gravelly sand layers and shell fragments at the base of the formation have been reported in local areas. Asphaltic sand was encountered in the San Pedro Formation in several recent study borings (Task 10.02) and by CWDD/ESA/GRC (1981) along Wilshire Boulevard from just west of La Brea Avenue westerly to between Fairfax Avenue and Crescent Heights Boulevard (Plates 1. 5 through 1.7).

Based on preliminary tunnel depths, the San Pedro Formation will likely be encountered for the majority of the area along Wilshire Boulevard between Western Avenue to just east of Crescent Heights Boulevard (approximately from Station No. 0+00 to 165+00, Plates 1.1 through 1.7). Elsewhere, the San Pedro formation lies below preliminary tunnel excavation elevations.

Fernando Formation (geologic profile symbol: Tf)

Sedimentary bedrock of the Pliocene-age Fernando Formation unconformably underlies the San Pedro Formation from about Crenshaw Boulevard westward to the city of Santa Monica along Alternative 3 (Mactec, 2010). Where encountered in Mactec's current borings and prior borings along and adjacent to Alternative 3, the Fernando Formation consists predominantly of massive siltstone and claystone with few to rare sandstone interbeds. CWDD/ESA/GRC (1981) encountered a thick interval of massive silty sandstone in one of their borings at Wilshire Boulevard and Curson Avenue (the Fernando Formation is below the preliminary tunnel elevation at this location). Petroleum odors and thin asphaltic seams were also identified in this interval in this boring.



Based on current and prior borings and the preliminary profile elevations, the Fernando Formation may be encountered in a limited reach along Alternatives 1 through 3 and MOS 1 and 2 between South Rimpau Boulevard and South McCadden Place in the Hancock Park area (Plate 1.4). Elsewhere, the upper contact of the Fernando Formation appears to be at depths below the tunnel elevations.

Puente Formation (regional geologic map symbol: Tpn1; geologic profile symbol: Tp)

Sedimentary bedrock units of the Miocene-age Puente Formation unconformably underlie the San Pedro Formation along Alternatives 1 through 3 and MOS 1 and 2 from the Western Avenue Station west to about South Windsor Boulevard (Plates 1.1 and 1.2). Prior borings (CWDD/ESA/GRC, 1981) drilled to depths of about 210-feet below ground surface (bgs) reportedly did not encounter the Puente Formation west of Crenshaw Boulevard. However, based on oil well data and geologic contact relationships in surface exposures in the eastern portion of the Elysian Hills, the Puente Formation is inferred to underlie the Fernando Formation at greater depths west of Crenshaw Boulevard. Where encountered in these borings the Puente Formation was comprised of massive siltstone and intervals of claystone that are interbedded with thin sandstone and siltstone laminae (CWDD/ESA/GRC, 1981). Based on preliminary profile elevations, the top of the Puente Formation appears to lie beneath the tunnel excavation invert elevations.

3.2.3 Groundwater Conditions

Hydrogeologic Basins in Project Study Area

The study area traverses three of the four main hydrogeologic basins of the coastal plain of Los Angeles County. From east to west these are the Hollywood, Central and Santa Monica Basins.

Groundwater in the Hollywood Basin occurs within the sands and gravels of several aquifers of the Pleistocene age Lakewood and San Pedro Formations. Confined groundwater occurs in the deeper aquifers of these formations while shallow, unconfined groundwater may be present where the Lakewood and San Pedro aquifers are exposed at or near the surface in the northerly and easterly portion of the basin. Semi-perched groundwater may exist in the Holocene alluvium that forms a thin blanket over about half of the Hollywood Basin (California Department of Water Resources, 1961). The deeper aquifers of Central Basin are also the sands and gravels of the Lakewood and San Pedro Formations. Relatively shallow, semi-perched groundwater may also be present in the overlying recent and older alluvium (California Department of Water Resources, 1961). The Santa Monica Basin is separated from the Hollywood and Central Basins to the east by the Newport-Inglewood fault zone. The Newport-Inglewood acts as a barrier to groundwater flow at depth between the Santa Monica Basin and the Central Basin to the west. The Santa Monica Basin is subdivided into five subbasins by the Charnock, Overland and Santa Monica faults which also act as groundwater barriers. Groundwater is generally confined with some local areas that have unconfined or perched water.

Depth to historic high (shallow) groundwater for the project area has been mapped by the California Geological Survey (CDMG, 1997, 1998) as shown on Figure 3-2, Historic High



Groundwater Contours. These contour maps are based on water well logs dating back as far as the early 1900s. Although they typically depict shallower groundwater than existing conditions, they do provide some general indication of the groundwater levels that can be anticipated in the study area. As shown on Figure 3-2, shallow groundwater (generally less than 40 feet bgs) can be expected along most of the alternative alignments except perhaps in the Santa Monica area, near the western end of the study area. Figure 3-2 also shows that in the Hollywood and West Hollywood areas of the study area the depth to groundwater contours depict a very steep groundwater gradient that typically shows deep groundwater at its northern end, becoming progressively shallow towards the south.

Local Groundwater Conditions

The following discussion of groundwater conditions along the alternative alignments based on groundwater elevation data from Mactec's (2010) geotechnical borings drilled and monitoring wells installed in 2009 (Task 10.02) and previous borings and monitoring wells from other consultants as shown on Mactec's geologic profiles (Plates 1.1 to 1.36), which are included as Appendix A to this report.

Most of the West Hollywood portion of Alternatives 4 and 5 are located in an area of West Hollywood that historically has been an area of high groundwater, with substantial marshland and artesian wells. Groundwater data shown by Mendenhall (1905) indicate that artesian groundwater conditions existed in 1905 along Santa Monica Boulevard from near La Cienega east to about Doheny on the west and extending south of Wilshire Blvd. Following cessation of groundwater pumping for urban use in the West Hollywood area in the late 1970s, groundwater levels have generally risen in the West Hollywood area. A groundwater contour map prepared for the city's Draft General Plan/Final EIR (West Hollywood Draft General Plan/Final EIR (1988) indicated that in the 1980s groundwater depths were as shallow as 0 to 10 feet bgs in portions of the city. As shown on Figure 3-2, the California Geological Survey mapped historic high groundwater depths along the West Hollywood portion of Alternatives 4 and 5 as ranging from approximately 10 to 110 feet bgs.

Groundwater data obtained from Mactec's borings drilled and wells installed in 2009 were used in their analysis of recent groundwater conditions in the West Hollywood portion of Alternatives 4 and 5 (Task 10.02). Groundwater data obtained from previous borings, existing reports and well records and from previous construction observation records were also utilized. A brief summary of their findings and conclusions is presented in the following paragraph.

Along the alignment from Hollywood/Highland to the intersection with Fairfax Avenue and Santa Monica Boulevard, groundwater levels ranged from 20 to 87 feet bgs (Plates 1.26 to 1.29). From Fairfax/Santa Monica to Wilshire Boulevard, groundwater elevations ranged from 1.3 to 20.3 feet bgs (Plates 1.29 to 1.36). Mactec (2010) stated that data from three of the wells from Fairfax to La Cienega (Plates 1.29 to 1.31, wells G-34, G-36, and G-37) suggest a southerly hydraulic gradient in this area and they attribute some of the widely varying groundwater levels between relatively closely spaced monitoring wells to be due to perched water conditions (wells G-39 and G-40 on Plate 1.34). Artesian conditions were encountered during construction of well G-39 (Plate 1.34) near the intersection of La Cienega and Beverly Boulevards which is located within the artesian groundwater zone delineated by Mendenhall (1905).



The following is a discussion of recent groundwater conditions based on Mactec's analysis (2010) along the portions of Alternatives 1 through 5 and MOS 1 and 2 that extend westerly from the Wilshire/Western Station and as far as the Wilshire/4th Street Station in Santa Monica.

In the segment along Wilshire Boulevard between Western and Fairfax Avenues, exploratory borings drilled by Woodward-Clyde Consultants (WCC, 1977) and Converse Ward Davis Dixon/Earth Science Associates/Geo-Resource Consultants (CWDD/ESA/GSC, 1981) encountered shallow groundwater (probably perched) between approximately 10 to 35 feet below the ground surface (bgs) (Plates 1.1 to 1.7). As shown on Plates 1.2 to 1.6, groundwater levels measured in monitoring wells along Wilshire between Crenshaw and Burnside Avenues in September 2007 by TRC ranged between 12 to 40 feet bgs (TRC, 2007). Differing water levels for each of the shallow and deep screened intervals suggests either perched or possibly semi-confined groundwater. Groundwater as shallow as 5 to 10 feet bgs was reported (LeRoy Crandall and Associates, 1983) in borings drilled along Wilshire Boulevard between Curson and Orange Grove Avenues, just east of Fairfax (Plates 1.5 and 1.6). Groundwater elevation data from Mactec's (Task 10.022010) borings drilled and monitoring wells installed in 2009 indicate that depth to groundwater along Wilshire Boulevard between Crenshaw Boulevard and Fairfax Avenue ranges from approximately 16 to 44 feet bgs (Plates 1.2 to 1.7).

Along Wilshire Boulevard between Fairfax Avenue and Santa Monica Boulevard, groundwater elevation data from Mactec's (2010) borings drilled and monitoring wells installed in 2009 indicate that depth to groundwater generally ranges from 21 to 59 feet bgs (Plates 1.7 to 1.12).

In the alignment segment from the intersection of Wilshire and Santa Monica Boulevards westward through Westwood and Century City to the intersection of Wilshire and the 405 Freeway, Mactec's (2010) borings and wells drilled in 2009 indicate groundwater elevations ranging from approximately 16 to 69 feet bgs (Plates 1.12 to 1.18).

Borings drilled by Woodward-Clyde Consultants just south of Wilshire at Westwood Boulevard (WCC, 1970) encountered water at depths of 65 and 70 feet bgs.

Caltrans drilled four borings in the immediate vicinity of the intersection of Wilshire Boulevard and the 405 Freeway in 2007 and encountered groundwater at depths ranging from 63 to 73 feet bgs (Caltrans, 2007). One of Mactec's groundwater monitoring wells (G-24) installed in 2009 in the same area indicated depth to groundwater of 69 feet bgs (Plate 1.18).

Based on their interpretation of data from current monitoring wells and prior borings Mactec (2010) suggested that groundwater is likely perched within different zones and depths along the portion of the Westside Subway Extension from its easterly terminus to approximately the 405 Freeway. The stratigraphic layers encountered along the alignment appear to be laterally discontinuous within the older alluvium. The fine grained units within the older and possibly younger alluvium (in paleo-drainages) may act as aquitards at variable depths along the Santa Monica Extension alignment. This



appears to be reflected in the variable ground water levels measures in the current monitoring wells and the prior borings.

For the portion of the alignment west of the 405 Freeway to its westerly terminus at Wilshire Boulevard and Ocean Avenue in Santa Monica, groundwater level data is sparse. A well located near the intersection of Wilshire Boulevard and Bundy Drive in the Sawtelle area of Los Angeles had water levels recorded for the years 2005 thru 2008 that ranged from about 25 to 31 feet bgs (Los Angeles County Department of Public Works, 2008). Mactec installed a monitoring well (G-26) in June 2009 on Wilshire Boulevard about 200 feet east of Bundy drive and recorded the depth to groundwater as 21.6 bgs in August 2009 (Plate 1.20). Mactec noted that groundwater depths are at least 20 feet shallower than prior groundwater level measurements taken in wells from this vicinity in the 1970s and attributed this change to a decrease in groundwater pumping in the vicinity. Mactec (2010) suggests that groundwater levels along Wilshire Boulevard in the city of Santa Monica are generally deeper than 50 feet bgs. The California Division of Mines and Geology (1998a) interpreted the highest historical groundwater level to range from approximately 10 to 40 feet bgs for the area of the alignment west of the 405 Freeway (Figure 3-2).

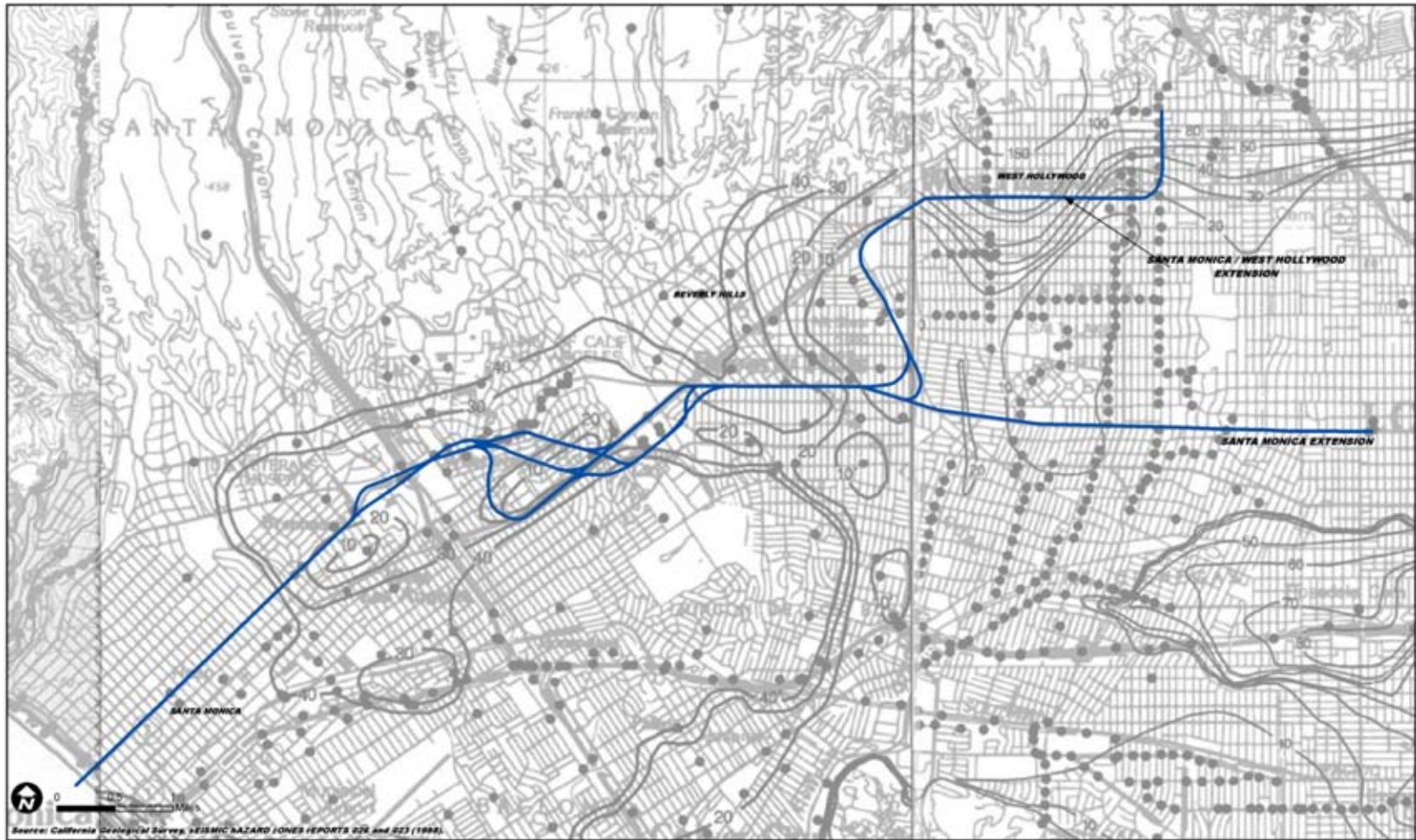


Figure 3-2: Historic High Groundwater Contours



3.2.4 Faulting and Seismicity

The project site is located within a seismically active region that is well known for its many active faults and historic seismicity as shown on Figure 3-3, Fault and Epicenter Map. Because the site is in a seismically active region, it follows that it will be subjected to future seismic shaking that will occur along local or more distant regional faults.

The geoseismic characteristics of some of the faults considered by the CGS (2003) and the USGS (2002) as potential seismic sources within the project area are listed in Table 3-2, including an estimate of the maximum earthquake that could be generated by each fault.

Significant historic earthquakes that have occurred near the study area include:

- The 1812 Wrightwood earthquake (M7.3) on the San Andreas fault,
- The 1933 Long Beach earthquake (Magnitude [M] 6.4) on the Newport-Inglewood fault south of Huntington Beach,
- The 1971 San Fernando earthquake (M6.6) on the San Fernando fault,
- The 1987 Whittier earthquake (M6.0) on the Puente Hills thrust fault, and
- The 1994 Northridge earthquake (M6.7) on the Northridge fault.

The closest seismic source faults to the project area are the Santa Monica fault, the Hollywood fault, the Newport-Inglewood fault, the Upper Elysian Park fault and the Puente Hills fault. These and other nearby faults are briefly summarized in the following paragraphs. The fault locations are shown on Figure 3-1.



Table 3-2: Summary of Potential Seismic Sources

Fault or Fault Segment	Fault Type⁽¹⁾	Dip (deg.)⁽²⁾	Dip Direction	Depth to Top of Rupture Plane (km)⁽³⁾	Approx. Closest Distance to Site (km)	Approx. Maximum Magnitude, Mw⁽⁴⁾
Santa Monica	O/LL, R	75	N	0	0 ⁽⁶⁾	6.6
Hollywood	O/LL, R	70	N	0	0.3 ⁽⁶⁾	6.4
Newport-Inglewood	RL	90	--	0	2.9 ⁽⁶⁾	7.1
Malibu Coast	O/LL, R	75	N	0	3.2 ⁽⁷⁾	6.7
Upper Elysian Park	R	50	NE	3 ⁽⁵⁾	3.3 ⁽⁸⁾	6.4
Puente Hills	R	27	N	2.1 ⁽⁵⁾	3.8 ⁽⁸⁾	6.6 (single segment rupture) 7.1 (multi-segment rupture)
Raymond	O/LL, R	75	N	0	7.4 ⁽⁶⁾	6.5
Palos Verdes	RL	90	--	0	9 ⁽⁶⁾	7.3
Compton	R	20	NE	3 ⁽⁵⁾	9.4 ⁽⁹⁾	6.8
Verdugo-Eagle Rock	R	45	NE	0	15.8 ⁽⁷⁾	6.9
Sierra Madre	R	45	N	0	17.8 ⁽⁶⁾	7.2
Anacapa-Dume	O/LL, R	45	N	0	18.8 ⁽⁷⁾	7.5
Northridge	R	42	S	7.4 ⁽⁵⁾	21.9 ⁽⁷⁾	7.0
San Fernando	R	45	N	0	23 ⁽⁷⁾	6.7
Whittier	O/RL, R	75	NE	0	23.7 ⁽⁶⁾	6.8
Santa Susana	R	55	N	0	27.5 ⁽⁶⁾	6.7
San Andreas (Mojave)	RL	90	--	0	53 ⁽⁶⁾	7.4

- Notes:**
- (1) RL = Right Lateral Strike-Slip Fault; LL = Left Lateral Strike-Slip Fault; O/LL = Oblique Left-Lateral Fault; R = Reverse Fault.
 - (2) Unless noted otherwise, fault dip angle is from California Geological Survey (2003b).
 - (3) Unless noted otherwise, depth to top of rupture plane is from California Geological Survey (2003b).
 - (4) Unless noted otherwise, maximum credible earthquake values reported as maximum moment magnitude by the California Geological Survey (2003b).
 - (5) This fault is a blind thrust fault (fault does not rupture the ground surface). The depth noted is to the upper limit of the rupture plane in the subsurface from Wills et al. (2008).
 - (6) Distance noted is the closest distance to the surface trace of the fault as measured from United States Geological Survey (2006).
 - (7) Distance noted is the closest distance to the surface trace of the fault as measured from California Geological Survey (2003).
 - (8) This fault is a blind thrust fault (fault does not rupture the ground surface). The distance noted is the closest distance to the rupture plane in the subsurface calculated using fault location from Shaw et al. (2002) and depth to upper limit of rupture plane and fault dip angle from Wills et al. (2008).
 - (9) This fault is a blind thrust fault that does not rupture the ground surface. The distance noted is the closest distance to the rupture plane in the subsurface calculated using fault location from Community Fault Model for Southern California (2007) and depth to upper limit of rupture plane and fault dip angle from Wills et al. (2008).



Santa Monica Fault

The Santa Monica fault is part of the Transverse Ranges Southern Boundary fault system, a west-trending system of reverse, oblique-slip, and strike slip faults that extends for more than 124 miles (200 kilometers) along the southern edge of the Transverse Ranges. Dolan et al. (2000) suggest that the Santa Monica fault zone consists of a combination of high-angle, near-surface strike-slip faults, deeper reverse faults and low-angle, near-surface thrust faults.

The Santa Monica fault has not produced any moderate or large earthquakes in the historic record. However, Dolan et al. (2000) suggested that the Santa Monica fault has had at least six surface rupture events in the past 50,000 years with the most recent surface rupture probably occurring between 1,000 and 3,000 years ago.

Dolan et al. (2000) identified the surface expression of the active strands of the west segment of the Santa Monica fault as three distinct, left-stepping, east-trending, en echelon topographic scarps west of the 405 Freeway and a fourth topographic scarp east of the 405 and less than 50 feet north of the westbound side of Santa Monica Boulevard. This fourth scarp changes to a more northerly strike direction east of Beverly Glen Boulevard and appears to cross Wilshire Blvd. near the western city limit of Beverly Hills and terminates at the north-northwest-trending West Beverly Hills lineament.

Based on the geomorphic evidence noted by Dolan et al. (2000), it appears that active strands of the Santa Monica fault cross some of the alignment alternatives at several locations. In Santa Monica, strands cross Alternatives 3, 4 and 5 between about 21st and Chelsea Streets and also between Stanford and Harvard Streets. The third strand west of the 405 Freeway crosses these alternatives near Bundy Drive in the Sawtelle District of Los Angeles. Based on the present project plans, the area around Wilshire Boulevard and Bundy Drive may be located on this fault strand.

Based on preliminary findings from an ongoing geophysical study by the project study team, the fourth fault strand of the Santa Monica fault appears to run subparallel to Santa Monica Boulevard from about Avenue of the Stars to Westwood Boulevard and would cross all of the alignment alternatives and options in this vicinity, with the exception of MOS 1. Mactec will present the results of their fault study in a forthcoming addendum report.

West Beverly Hills Lineament

The West Beverly Hills Lineament (WBHL) is a northwest trending geomorphic lineament that crosses the Westside Subway Extension alignment in the vicinity of the intersection of Moreno Drive and Santa Monica Boulevard. It is delineated by discontinuous east-facing scarps that mark the boundary between two distinct geomorphic provinces. Older, uplifted alluvium and marine terraces occur to the west of the lineament, whereas the area to the east of the lineaments is characterized by gently sloping younger alluvium. The lineament is oriented northwest, parallel to the Newport-Inglewood fault, but is located several hundred feet west of its expected position if it were a northern extension of the fault (Dolan and Sieh, 1992). It coincides with an approximately 1 mile (1½ kilometer) left step between the Santa Monica fault and the



Hollywood fault. Various tectonic interpretations have been proposed for the WBHL. For example Dolan et al (1997) speculated that it may represent an east-dipping normal fault associated with extension along the left step between the Hollywood and Santa Monica faults. Others have speculated that that the WBHL may be the northernmost of a series of en echelon, left-stepping, right-lateral strike-slip faults of the Newport Inglewood fault (Wright 1991, Dolan and Sieh, 1992, Hummon et al. 1994, Tsutsumi et al. 2001), or a fold scarp along the northern extension of the back limb of the gently east-dipping Compton blind thrust fault (Dolan et al. 1997). However Lang (1994) reported that subsurface mapping within the Cheviot Hills and Beverly Hills oil fields, constrained by dense subsurface control, precludes the existence of the WBHL. Thus the prospect that the WBHL is the surface manifestation of an active fault has not been confirmed. Further evaluation of the WBHL and its significance to the project will be performed during forthcoming design level investigations for the project.

Hollywood Fault

The Hollywood fault trends westerly along the base of the Santa Monica Mountains from the West Hollywood-Beverly Hills area east to the Los Feliz area of Los Angeles. At the closest point, this fault is located about 0.2 miles (0.3 kilometers) north of the north termini of Alternatives 4 and 5 in Hollywood. Recent studies by several investigators (Dolan et. al., 1997 & 2000a) have suggested that the fault is active based on geomorphic evidence, stratigraphic correlation between exploratory borings, and fault trenching studies. Based on these studies, the age of the most recent Hollywood fault earthquake probably occurred between 4,000 and 20,000 years ago.

Newport Inglewood Fault

The Newport-Inglewood fault zone, located about 1.8 miles (2.9 kilometers) to the south of the study area, is an active right lateral wrench fault system that extends southwest from Beverly Hills to offshore of Newport Beach for a total length of about 41 miles (66 kilometers). The Newport-Inglewood fault zone is considered to connect with features south of Newport Beach (the Offshore Zone of Deformation, and the Rose Canyon fault) to form a major active zone of deformation that extends from Baja California to the southern front of the Santa Monica Mountains. The magnitude M6.4 Long Beach earthquake occurred on March 10, 1933 on a segment of the fault south of Huntington Beach.

Overland Avenue Fault

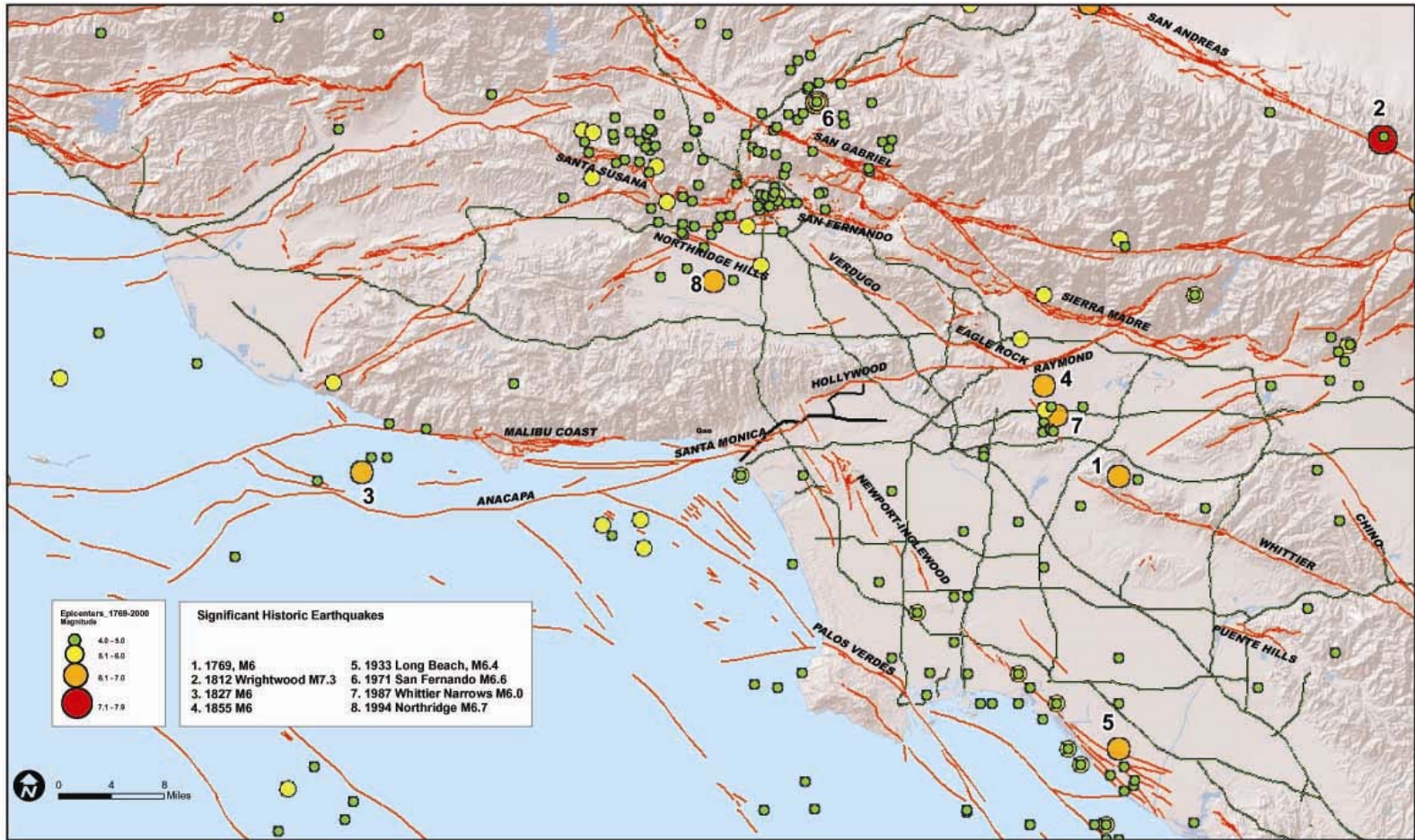
The northwest trending Overland Avenue fault is located within approximately 2 miles (3.2 kilometers) to the south of the Santa Monica Extension. This fault has been located by well log and water level data and has no surface expression (Poland et al., 1959). The California Geological Survey (2003) does not consider the Overland Avenue fault as a potential seismic source. However, Jennings (1994) and Ziony and Jones (1989) indicate that it is a late Quaternary fault.

**Puente Hills Thrust**

The Puente Hills thrust is an approximately 26 mile (42 kilometer) long, northwest trending, northeast dipping blind thrust that is located between about downtown Los Angeles and the Coyote Hills in northern Orange County (Shaw and Shearer, 1999). The Puente Hill thrust is considered to be the source of the 1987 M_w 6.0 Whittier Narrows earthquake. It consists of three segments that are overlain by anticlinal folds that are expressed at the surface by the Montebello Hills, the Santa Fe Springs Anticline, and the Coyote Hills. The closest segment of the Puente Hills thrust is the Los Angeles Segment. The rupture top of this segment is located approximately 3 miles (5 kilometers) beneath the ground surface (Cao et al., 2003) and 2 ½ miles (4 kilometers) south of the study area.

Upper Elysian Park Thrust

The Elysian Park thrust is an approximately 21 mile (34 kilometer) long, northwest trending blind thrust that is located beneath the Los Angeles metropolitan area from the Puente and Coyote Hills on the southwest to near the Raymond and Hollywood faults on the northwest. The Elysian park thrust had been interpreted to be the source of the 1987 M_w 6.0 Whittier Narrows earthquake (Haukson and Jones, 1987, Davis et al., 1989). However an alternative hypothesis by Shaw and Shearer (1999) suggests that the Whittier Narrows earthquake occurred along the Puente Hills thrust. Regardless of its relationship with the Whittier Narrows earthquake, clear evidence of Quaternary deformation associated with the Elysian Park thrust (Bullard and Lettis, 1993, Shaw and Suppe 1996) indicates that it may be the source of future moderate magnitude



Source: EHP Earthquake Fault Epicenters IMS; California Department of Conservation CGS 2000; Quaternary Faults USGS Interactive Maps 1993

Figure 3-3: Fault and Epicenter Map



3.2.5 Gassy Ground Conditions

Methane gas is a naturally occurring gas associated with the decomposition of organic materials. Methane gas is common in oil and gas fields and often occurs with hydrogen sulfide gas (H_2S). H_2S is produced by the anaerobic decomposition of any type of organic or inorganic matter that contains sulfur. Methane and H_2S can also occur in a dissolved state in groundwater. Methane and H_2S are considered hazardous gases due to their explosive properties. H_2S is also highly toxic. These gases can seep into tunnels and other excavations through soil and also through discontinuities (fractures, faults, etc.) in bedrock.

The study alternative alignments pass through or near several active or abandoned oil fields in west Los Angeles, Beverly Hills, and West Hollywood areas. These include the active Salt Lake, South Salt Lake, Cheviot Hills, Sawtelle and the Beverly Hills oil fields and the inactive Sherman oil field. The rocks and soils overlying these oil fields are known to commonly contain methane and/or H_2S gases. The active oil fields in the vicinity of the study area are shown on Figure 3-4, Oil Field and Oil Wells Map.

Hazardous gas monitoring performed as part of studies for various proposed and completed tunneling projects in the Los Angeles area has been occurring for many years. As part of this study, Metro installed permanent gas monitoring wells at 25 locations along the proposed alternative alignments to further evaluate the presence of hazardous gases and their possible impact upon construction of the proposed subway extension. The well locations were typically chosen in areas within known methane areas as defined by Los Angeles City, Department of Public Works, Bureau of Engineering (Figure 3-5, Methane Zones Map) or within or near active or abandoned oil fields in Beverly Hills and West Hollywood.

Based on the gas readings in the monitoring wells, the approximately 1.1 mile long portion of Wilshire Boulevard between South Burnside Avenue and South La Jolla Avenue displayed high levels of gas pressure, methane, and H_2S . This portion of Wilshire near the La Brea Tar Pits is also characterized by having extensive tar sands.

In other areas of the study alignments, gas concentrations range from non-detectable to very low. Methane and H_2S concentrations determined from the recent and past gas monitoring are shown on the Plans and Profiles, Plates 1.1 through 1.36 and are discussed in more detail in following sections.

Summary of Los Angeles Tunneling Project Efforts in Gassy Ground Areas

The presence of naturally occurring, hazardous subsurface gases (methane and hydrogen sulfide) has presented major challenges to tunnel projects in the Los Angeles region. These challenges require additional provisions for design, construction, and operations. The presence of methane and hydrogen sulfide and their impacts on tunneling have been studied extensively by Metro in planning and design phases. These studies have been carried over time to the present since the exploration for the Metro Rail Project took place in the 1980s. In addition, Metro has data from actual conditions found during construction of the existing Metro Red Line, and from the Gold Line Eastside Extension tunnels and station construction. This section provides review of Metro tunnel construction experience and studies performed for the Mid-City Extension and Red Line



Eastside Extension (both suspended), which were conducted in the early to mid 1990s. Other Los Angeles tunnel projects are also reviewed in this section for lessons learned and applicable technology.

Metro Red Line

Even prior to the creation of the methane potential-risk zones by the city of Los Angeles in 1985 (prompted by the methane-gas explosion at the Ross Dress-for-Less store in the Wilshire-Fairfax District earlier that year), Metro engineers prepared the “Alerting Report on Tunneling Liners” in 1984. This report presented anticipated tunnel construction methods, recommended lining methods, and ventilation requirements for each tunnel reach between stations along the proposed 1983 alignment of the Metro Red Line (extending west along Wilshire Boulevard and north on Fairfax Avenue).

Following the creation of the methane “potential-risk zone” and “high potential-risk zone” in 1985, Metro commissioned the Congressionally Ordered Reengineering Study (CORE) to evaluate alternative alignments for the Metro Red Line with respect to gas conditions. Ultimately, the present Red Line alignment from the Wilshire/Vermont Station to Hollywood Boulevard and North Hollywood, as well as the Purple Line to Wilshire/Western were selected.

The final conclusions of the CORE study were that no part of the study area (the area bounded on the north and south by Sunset and Pico Boulevards and on the east and west by Vermont and Fairfax Avenues) could be considered to be free of gas. The highest concentrations of gas were measured in the southern area (along Wilshire between La Brea and Fairfax Avenues) and gas is more likely to be found over or near old oil fields. It was also concluded that since no part of the study area can be considered free of gas, subsurface facilities should be constructed using standard precautions and gas mitigation measures to ensure the safety of the system. Thus, to minimize gas (and water) inflow, all Metro Red Line segments were designed with a “two-pass” tunnel lining system that included a high-density polyethylene (HDPE) water and gas barrier.

In 1986, the U.S. Congress enacted legislation (HR3244) which funded Los Angeles County Metropolitan Transportation Authority (LACMTA) initial Red Line segment, but prohibited use of federal funds for subway construction in Los Angeles’ methane high potential-risk zone due to safety concerns, thereby effectively halting subway construction in the methane zone. In 2007, Congress repealed the 1986 legislation by enacting HR 238 given subsequent advances in technology and demonstrated successes in underground construction projects, including those in Los Angeles. Key in the repeal of this legislation were conclusions by a panel of experts assembled by the American Public Transportation Association (APTA). The panel reviewed new data and prepared the November 2006 Peer Review Panel Report on tunneling safely along Wilshire Boulevard (APTA, 2005). H_2S very often occurs in the same areas as methane. The APTA panel concluded that H_2S is probably a greater safety risk than methane since the industry has less experience with it and because it causes problems at much lower concentration levels. The panel therefore recommended that decisions regarding most gassy ground tunneling issues primarily consider H_2S . Considering this, the following discussions are more focused on H_2S .



Mid-City Subway Alignment Studies

During the Mid-City Subway Alignment planning studies in the mid-1990s, H₂S concentrations were discovered in some areas that were much greater than preliminary tests had identified. This discovery prompted the Mid-City Extension Reassessment Study in 1994. As part of this study, soil-gas monitoring and testing programs were undertaken to locate the gas-bearing formations, determine the extent of the gas reservoir, examine methods of treatment - both pre-tunneling and during tunneling, and recommend tunnel and station configurations to avoid the gassiest ground. Conclusions pointed to safe tunneling if slurry-face tunnel boring machines (TBMs) were used in conjunction with soil-gas extraction and control methods to reduce worker exposure to H₂S. Slurry-face TBMs are a type of pressure-face TBM that allows for a positive pressure to be applied to the tunnel face. Maintaining a positive pressure at the tunnel face decreases the potential for ground loss and soil instability (sloughing or caving), as well as preventing infiltration of groundwater. This type of TBM also confines gases within the slurry system. Metro evaluated several feasible alternative alignments including one that included an aerial station. However, the Mid-City alignment studies were ultimately suspended due to financial issues.

Red Line Eastside Extension

In the same time frame as Mid-City was being studied, design began for the Metro Red Line Segment 3 Heavy Rail Transit (HRT) Eastside Extension. While development of the Red Line Eastside Extension HRT was suspended, the Eastside Extension was ultimately designed and constructed as Light Rail Transit (LRT) with 1.8 miles of tunneling. The previous design of the Eastside suspended project as a heavy rail system is reviewed for background on the development of the design and tunneling specifications for tunneling in the Eastside's gassy ground. Technology developed for the Eastside suspended project, and later tested through construction of the Gold Line Eastside Extension, is directly applicable to that which may be recommended for the proposed Westside Subway Extension in the Methane Risk Zone.

During final design of the suspended project, very high levels of H₂S (up to 21,000 ppm) were measured in head space of groundwater monitoring wells. The highly contaminated conditions occurred in the tunnel reach south of Union Station between the 101 Freeway and the proposed Little Tokyo Station. Methane levels were also high, over the lower explosive limit of 5 percent. In this reach the water table was mostly above the proposed tunnel crown, conditions similar to those in the Westside Subway Extension's gassy areas.

As with the Mid-City Alignment, slurry-face TBMs were to be specified for the tunnel segment in H₂S-bearing ground. H₂S control method specifications were developed by Metro based on a number of environmental studies which included supplemental gas investigations and small scale "bench testing" to develop in-situ and other methods for reducing risks of tunneling in H₂S-bearing ground.

Given the risks of H₂S and methane leakage in to the tunnel, designers (and Metro's Tunnel Review Panel (TAP) recommended use of a double-gasketed tunnel liner ("one-pass" system) for use with the slurry-face TBMs. Seismic conditions led to design of



flexible tunnel liner joints so that the tunnel would remain sealed from gas during and following earthquakes. This sealing system was believed to be the first of its kind, and thus Metro undertook a six-month, nearly full scale, laboratory testing program which was conducted at the University of Illinois.

Although testing provided a high level of confidence in the one-pass system using double gaskets, additional redundancy was designed for the tunnel section in contaminated reaches of the tunnel. This called for design of an oversized tunnel such that a second lining could be added in the event of leakage. This case was thought to be most likely after a significant earthquake. As required for all Metro subways, the design also called for continuous gas detection in the operating tunnels and emergency ventilation.

The project was suspended due to lack of funding in 1997 and a similar design was not field tested until construction of the Metro Gold Line Eastside Light Rail Extension (described in the next section).

Metro Gold Line Eastside Extension (MGLEE)

The Metro Gold Line Eastside Extension project tunnels were not constructed in the highly contaminated area west of the Los Angeles River. That portion of the alignment is now at-grade. However, the tunnels do pass through the abandoned Boyle Heights oil field, and methane and H₂S were anticipated. No H₂S gas was measured in soil borings, but H₂S odor was reported on boring logs. Methane was measured with a maximum reading of 1,700 ppm and Cal/OSHA ultimately issued a “Gassy” tunneling classification. As with the suspended project, Metro specified pressure-face TBMs and a pre-cast concrete, bolted, gasketed lining for the MGLEE. This would provide additional safety with respect to gassy conditions.

Similar to the suspended Red Line Eastside project, Metro specifications required pressure-face TBMs, either the slurry-face TBM or the earth pressure balance (EPB) TBM. The contractor elected to use the EPB TBM and the tunneling was successfully completed in December 2006. The MGLEE project has proven that the tunneling specifications for that project were appropriate for the ground conditions and the construction was successful.

North East Interceptor Sewer Tunnels

Another Los Angeles tunneling project reviewed for issues related to tunneling feasibility was the North East Interceptor Sewer (NEIS) constructed for the City of Los Angeles between 2003 and 2005. High levels of H₂S and methane were encountered and Cal/OSHA classified the tunnel as “Gassy.” Despite being documented by Cal/OSHA to be the single most dangerous tunnel project constructed in the Los Angeles area since the Sylmar tunnel constructed in the 1970s, the project was ultimately successful by strictly adhering California’s Tunnel Safety Orders, additional ventilation and careful crew training (Zernich, et. al., 2005).

Conclusions

The Metro Red Line tunnels were successfully built using open face tunneling machines in Los Angeles geology including ground with methane and H₂S present. More advanced



TBMs and tunneling practices have been developed since that time and have demonstrated even better success in the gassy ground of the Boyle Heights area of Los Angeles during construction of the MGLLE. Studies conducted for the suspended Mid-City Extension and Red Line Eastside Extension projects also concluded that those tunnels could have been constructed and operated with success. Much of this experience can be applied to the evaluation of tunnel feasibility for the Westside Subway Extension study area. Given the advancements in tunneling technology and experience gained during recent successful tunnel construction projects, tunnel construction in the gassy ground of the Westside Extension study area appears feasible.

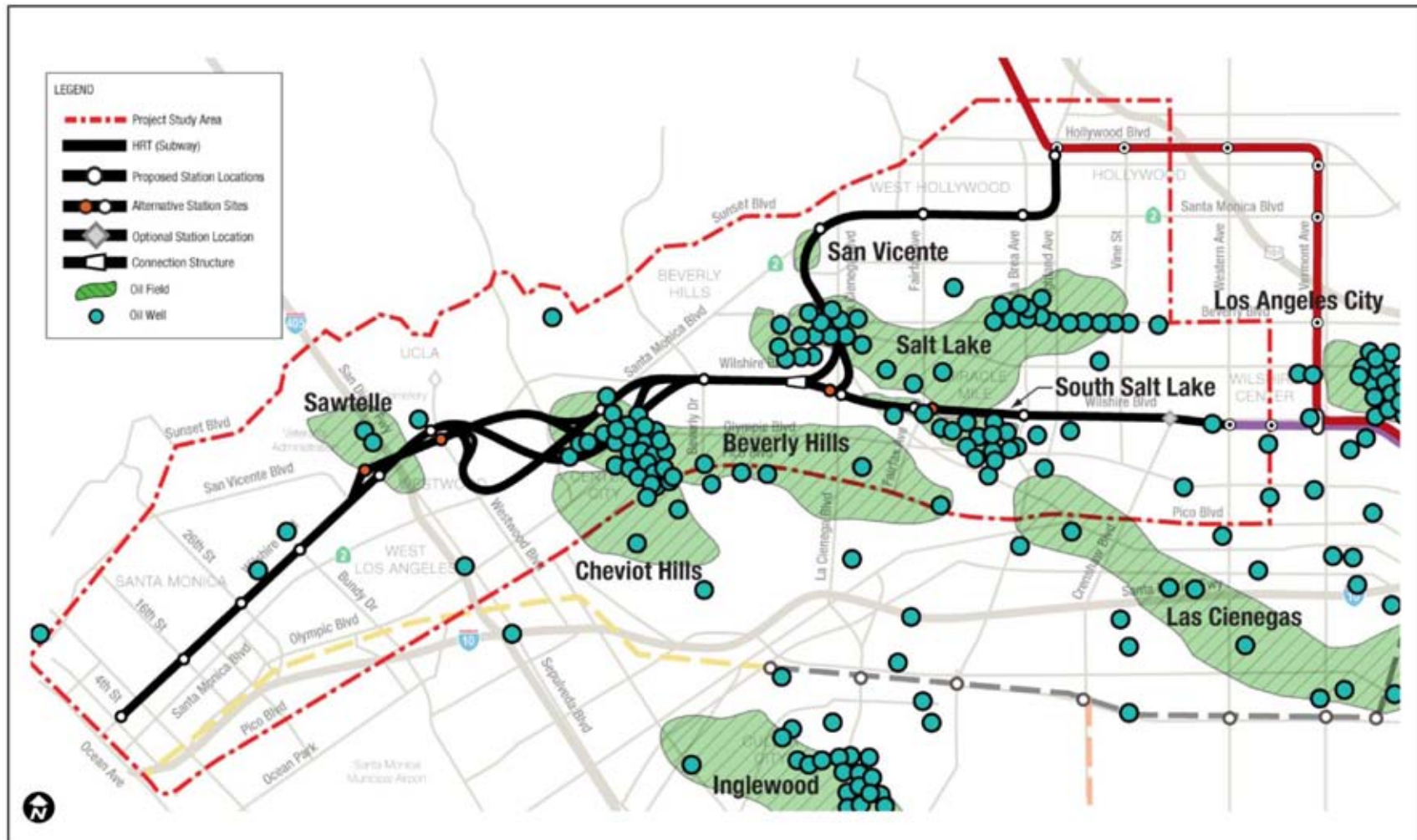


Figure 3-4: Oil Field and Oil Wells Map

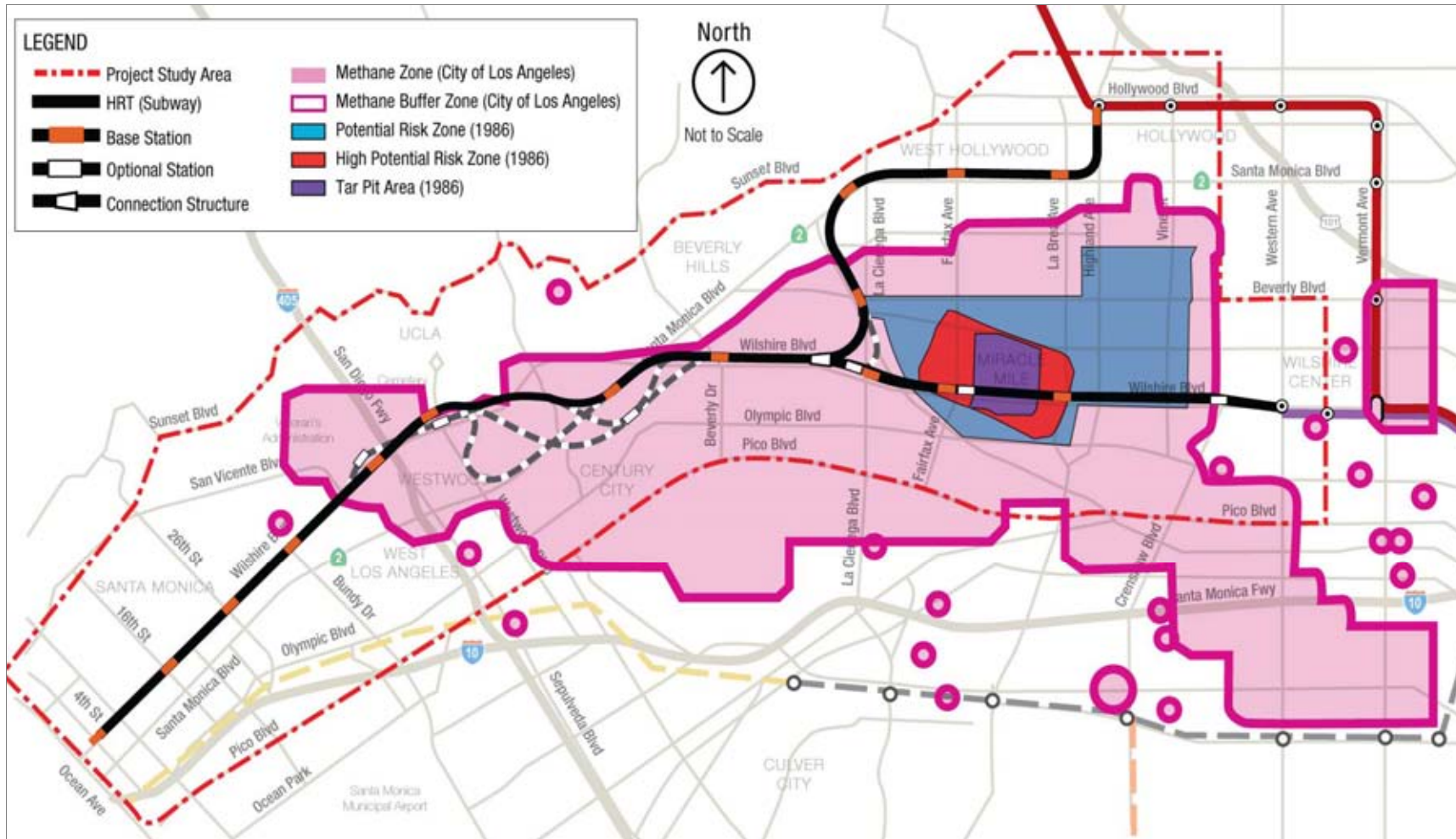


Figure 3-5: Methane Zones Map

**3.2.6 Geologic and Seismic Hazards****Surface Fault Rupture**

Surface fault rupture is ground deformation that occurs along the surface trace of the causative fault during an earthquake. In most cases it is impractical from an economic and engineering perspective to design a structure to withstand serious damage under the stress of surface fault rupture. However, because surface faulting is generally confined to a relative narrow zone a few feet to a few tens of feet wide, avoidance is often a practical means of mitigating surface fault rupture hazards for most facilities. To help identify and reduce the hazard of surface fault rupture, the “Alquist-Priolo Earthquake Fault Zoning Act” (A-P Act) is a state law that regulates certain development projects near active faults. The purpose of the act is to prohibit the location of most structures intended for human occupancy across the trace of an active fault. The act requires that development permits for projects within an “Earthquake Fault Zones” be withheld until geologic investigations demonstrate that the sites are not threatened by surface displacement from future fault rupture. To be zoned under the Alquist-Priolo Fault Zoning Act, a fault must be considered active or both sufficiently active and well-defined¹ (Hart and Bryant, 1997). The CGS defines an active fault as one that has had surface displacement within Holocene time (about the last 11,000 years), and a sufficiently active fault as one that has evidence of Holocene surface displacement along one or more of its segments or branches (Hart and Bryant, 1997). The CGS considers a fault to be well defined if its trace is clearly detectable as a physical feature at or just below the ground surface.

For linear engineering works and facilities, such as the Westside Subway Extension, an avoidance mitigation strategy such as employed by the A-P Act, is not a practical solution other than for location of stations and other project facilities intended for human occupancy. Mitigation to address fault rupture hazards for linear facilities typically involve measures taken to ease repairs after the rupture event, as discussed further in Section 5.0.

Multiple strands of the Santa Monica fault cross the study alignment alternatives at several locations. The Santa Monica fault has not been zoned under the A-P Act because of the absence of well-defined fault traces. However, based on geomorphic interpretations and paleoseismologic investigations by Dolan et al., (2000), the Santa Monica fault is believed to be a Holocene active fault. Therefore, the Santa Monica fault represents a ground rupture hazards at the locations where the strands cross the study alignment alternatives.

The West Beverly Hills Lineament might also be the surface manifestation of an active fault that crosses the study alignment alternatives. As such, it could also represent a

¹ The A-P Act originally required the State Geologist to establish earthquake fault zones for all active (had surface displacement within last 11,000 years) and potentially active (had surface displacement within last 1.6 million years) faults. However the State Geologist recognized that there are so many potentially active faults in the state that it would be meaningless to zone them all. Therefore a policy decision was made to zone only those potentially active faults that are considered sufficiently active and well defined.



ground rupture hazard to the project. Further evaluation of the WBHL and its significance to the project will be performed during forthcoming design level investigations for the project.

Seismic Ground Shaking

The project site, like most sites in southern California, is susceptible to strong ground shaking generated during earthquakes on any of several nearby faults. Strong seismic shaking can cause severe damage to vulnerable manmade structures and engineered foundations that are not adequately designed to withstand strong ground motions.

Strong ground motion occurs as energy is released during an earthquake. The intensity of ground motion is dependent upon the distance to the fault rupture, the earthquake magnitude, and the geologic conditions underlying and surrounding the site. Ground motions induced by a seismic event are typically characterized by a value of horizontal peak ground acceleration (PGA) which is expressed as a fraction (or multiple) of the acceleration of gravity (g). Either deterministic or probabilistic methods are typically used to estimate the level of shaking that can be expected at a project site. The CGS in cooperation with the USGS has developed a probabilistic seismic hazard model for California (CGS, 2003) and probabilistic ground motion corresponding to a 10% probability of exceedance in 50 years can be obtained from a CGS web site (http://www.consrv.ca.gov/cgs/rghm/psha/fault_parameters/pdf/2002_CA_Hazard_Maps.pdf) by inputting the latitude and longitude of the project site. Based on this probabilistic hazard model the ground accelerations for the project area are anticipated to range from approximately 0.4g to approximately 0.6g along the alignment alternatives. Note that these ground accelerations are calculated for 'firm rock' sites. However, much of the alignment areas are soil sites which may amplify or de-amplify these values. Site specific ground motion to be used for design will be developed during design phases using data from the subsurface exploration programs.

Differential Seismic Settlement

Differential seismic settlement occurs when seismic shaking causes one type of soil or rock to settle more than another type. It may also occur within a soil deposit with relatively homogeneous properties if the seismic shaking is uneven, which could occur due to variable geometry, for example, and variable depth of the soil deposit. Differential seismic settlement is most likely to occur in areas that transition between rock formations and lower density, more recently deposited alluvial soils or artificially placed fill.

Liquefaction and Lateral Spreading

Liquefaction is a phenomenon that causes water-saturated, cohesionless granular materials to change into a fluid-like state when subjected to powerful shaking associated with strong earthquakes. Liquefaction causes soils to lose their strength and their ability to support a load, and therefore liquefaction related ground failures are a significant seismic hazard. Liquefaction induced lateral spreading involves the movement of soil blocks on gentling sloping ground over shallow liquefied soil deposits.



The susceptibility of a site to undergo liquefaction is a function of the type of sedimentary deposit, the density of cohesionless sediment, and the depth to groundwater. Saturated, cohesionless granular sediment situated at depths less than 30 feet are generally regarded as the most susceptible to liquefaction (Tinsley and others, 1985). Liquefaction is generally considered possible when the depth to groundwater is less than about 50 feet below the ground surface.

The CGS has designated certain areas within California as liquefaction hazard zones. The areas within these zones have had historic occurrences of liquefaction or include geological and groundwater conditions that are conducive to ground displacement to such a point that mitigation would be required to make the areas suitable for structural development. Based on the CGS seismic hazard mapping, portions of the alternative alignments are located within liquefaction hazard zones (CDMG, 1997, 1999). As shown on Figure 3-6, Liquefaction Hazard Zones, the alignment alternatives cross liquefaction hazard zones in the vicinity of San Vicente Boulevard and in the vicinity of Interstate 405. However, based on the relatively thin cover of Holocene sediments in these areas, it appears that at tunnel excavation elevations, the tunnels will be driven below the potentially liquefiable Holocene section and into the underlying older Pleistocene alluvium and Pleistocene Lakewood and San Pedro Formation sediments as well sedimentary bedrock of the Pliocene-age bedrock of the Fernando Formation and Miocene-age Puente Formation (Task 10.02). Therefore, liquefaction is not considered a potential seismic hazard to the tunnel components of the project. However, based on their review of recent and past geotechnical subsurface data, CGS maps and reports, Mactec (2010) concluded that due to the presence of shallow groundwater and young alluvial deposits there may be potential for liquefaction in soils adjacent to the upper portions of some station walls. However, settlement beneath these stations due to liquefaction is considered remote due to the dense character of the older alluvium at preliminary station depths. Since the terrain in the study area is generally flat-lying, lateral spreading of liquefiable soils is not considered a significant hazard to the project.



Figure 3-6: Liquefaction Hazard Zones

Subsidence

PETROLEUM AND GROUNDWATER EXTRACTION-RELATED SUBSIDENCE- The extraction of petroleum or groundwater from sedimentary source rocks or soils can cause the permanent collapse of the pore space previously occupied by the removed fluid. The compaction of subsurface sediment caused by fluid withdrawal can cause subsidence of the ground surface overlying a pumped reservoir. If the volume of water or petroleum removed is sufficiently great, the amount of resulting subsidence may be sufficient to damage nearby engineered structures.

The proposed project alignments traverse or are in close proximity to several oil fields where oil extraction is currently under way (California Division of Oil, Gas and Geothermal Resources, 2001, 2003, 2006 & 2009). These oil fields include the Salt Lake, South Salt Lake, San Vicente, Cheviot Hills, Sawtelle and the Beverly Hills. The California Division of Oil, Gas and Geothermal Resources (DOGGR) oversees monitoring of ground subsidence in oil fields. Since oil production in the Beverly Hills Oil Field began in 1966, some subsidence has been measured that cannot be attributed to regional tectonic downwarping and has been attributed to oil extraction. This subsidence was measured in a few hundredths of an inch per year for the period from 1967 to 1969, which was the peak period of oil production (Erickson and Spaulding, 1975). However, subsidence is closely monitored and subsurface water injection methods have been employed which have successfully arrested the minor amounts of subsidence which may be attributable to oil extraction activities (Erickson and Spaulding, 1975). Since the continued water pumping program has been successful, it doesn't appear that oil extraction-related ground subsidence will present a significant geologic hazard to the project as long as the program continues. No current significant subsidence problems have been identified for the other oil fields in the vicinity of the project alignments.

As discussed previously, the proposed alignments traverse three of the four main hydrogeologic basins of the coastal plain of Los Angeles County, the Hollywood, Central and Santa Monica basins. Groundwater pumping occurs in all three of these basins for both domestic and irrigation purposes as well as for groundwater contamination mitigation in some areas (California Department of Water Resources, 2004a, 2004b & 2008). However, no current significant subsidence problems related to groundwater pumping have been identified in the vicinity of the study alternative alignments. Considering the above discussion, hazard from subsidence related to extraction of petroleum and groundwater is considered not significant to the project.

CONSTRUCTION DEWATERING-INDUCED SUBSIDENCE- Since construction of some proposed facilities (primarily stations) will require excavations that will encounter the groundwater table and/or perched groundwater, dewatering may be required to complete the construction in some areas. Dewatering of the excavations made during construction could result in potentially damaging subsidence adjacent to the construction area. Because of the potential for subsidence to occur during construction, dewatering-related subsidence is considered a potential geologic hazard to the project.

Gassy Ground Conditions

As discussed previously in Section 3.2.5 and based on early results of Mactec's (2010) hazardous gas monitoring study, hazardous subsurface gases including methane and hydrogen sulfide (H₂S) are present in especially high concentrations along an approximately 1.1 mile portion of Wilshire Boulevard from about South Burnside Avenue on the east to about South La Jolla Avenue on the west (along a portion of all the alignment alternatives, including MOS 1 and 2). Methane levels ranged up to 100 percent within this area with H₂S levels ranging up to 1,000 ppm. To put these gas levels in perspective, methane is combustible when mixed with air in the range of between 5 percent and 15 percent by volume. The five percent methane volume is called the Lower Explosive Limit (LEL). A tunnel excavation is classified as "Gassy" if methane concentrations exceed 5 percent of the LEL. The worker safety exposure limit level for H₂S is given by OSHA as 10 ppm.

Elsewhere within the areas of the study alternative alignments, no sample point contained greater than 1.25% methane (25% of the lower explosive limit) or indicated greater than 5 ppm of H₂S. Gas concentrations are very low to non-detectable along the portions of the alignment alternatives located west of the San Vicente Boulevard/ Wilshire Boulevard intersection. Concentrations are also very low to non-detectable in the areas of West Hollywood, Hollywood and the Beverly Center along the West Hollywood portion of Alternatives 4 and 5, between the Hollywood /Highland Station and the San Vicente Boulevard/ Wilshire Boulevard intersection.

These recently measured gas level concentrations, along with data from previous gas monitoring in the study area plus the fact that the entire project alignment passes through an area characterized by oil and gas fields and/or is underlain by sedimentary rock, indicates that the possibility of encountering gassy conditions cannot be completely discounted for any portion of the alignment. Therefore, hazardous subsurface gases pose a significant geologic hazard for all of the project alignment alternatives and this hazard will require mitigation.

Other Geologic and Seismic Hazards

POOR SOILS CONDITIONS- Poor soil conditions can potentially represent a hazard where site soils are expansive, collapsible or have corrosive properties.

Expansive soils are fine-grained soils (clay) that can undergo a significant increase in volume with an increase in water content, and a significant decrease in volume with a decrease in water content. Changes in the water content of an expansive soil can result in severe distress to structures constructed upon the soil. Although the majority of the soils within the areas of the alignments are granular and not susceptible to expansion, significant deposits of clayey soils are known to exist. The impacts of expansive soils are routinely mitigated using standard geotechnical design practices such as removal and replacement with engineered fill and obtaining foundation support below the zone of seasonal moisture variation. Therefore, expansive soils are not considered a significant hazard for the project.

Collapsible soils are those that undergo settlement upon wetting, even without the application of additional load. The process of collapse with the addition of water is known as hydrocompaction. Hydrocompaction occurs when water weakens or destroys the bonds between soil particles and severely reduces the bearing capacity of the soil. Typical collapsible soils are low in plasticity, have relatively low densities and may exhibit visible porosity. Collapsible soils are typically associated with alluvial fans, windblown materials, or colluvium. Some of these soils may have a potential for hydrocollapse where they exist above groundwater and could present a geologic hazard to some proposed ground-level or near ground-level project improvements with shallow foundations. The impacts of collapsible soils can be mitigated through standard geotechnical design practices such as removal and replacement of the collapsible soils with engineered fill and obtaining foundation support below the collapsible zone.

Highly corrosive soils can cause destruction to steel and concrete that comes in contact with the soil. Soil corrosivity is a measure of the severity of corrosion to steel and concrete. Hydrogen sulfide in soils is corrosive to metals. The response of steel and concrete to soil corrosion depends primarily on the nature of the soil and certain other environmental factors, such as the availability to moisture and oxygen. For design and corrosion risk assessment purposes, it is desirable to estimate the corrosivity of soils. Appropriate laboratory testing during field investigation phase of the project will be required to identify the corrosion potential of site soils. Based on the laboratory results, appropriate construction materials and other corrosion protection measures are then recommended to mitigate the effects of corrosive soils. Selection of appropriate construction materials and other corrosion protection measures based on laboratory results is normal and routine for construction projects. The project would include careful selection and application of the appropriate construction materials and corrosion protection measures; because of this, the effects of hydrogen sulfide affected soils or other corrosive soils are not considered to represent a significant hazard to the project.

LANDSLIDES- Landsliding can occur when the stability of slopes underlain by soil or bedrock is decreased during periods of prolonged rainfall or by other factors including seismic activity. The terrain within the study area is relatively flat-lying where landslides would not be expected to occur. Review of available geological maps (Yerkes and Graham, 1997a & 1997b, Dibblee, 1991 & 1991b) do not indicate the presence of any known landslides within the study area nor does the CGS Seismic Hazard Maps for the study area (California Division of Mines and Geology, 1999a & 1999b) indicate any nearby areas prone to seismically induced landsliding. Therefore, landsliding is not considered a significant geologic hazard for the project.

3.3 Hazardous Materials

3.3.1 History of Past Uses

This section provides information regarding past uses of the study area alignments (specifically Alternatives 3 and 5 since both incorporate the other alignments, MOS 1 and MOS 2, and the maintenance yards), based upon a review of historical documents. Readily available historical data pertaining to the areas surrounding the alignments was obtained from the State of California Division of Oil, Gas and Geothermal Resources (DOGGR) Online Mapping System (DOMS 2010) and from Environmental Data Resources, Inc. (EDR). The available historical data from EDR included historical aerial photographs, topographic maps, and Sanborn® fire insurance maps (Sanborn® maps). These references were reviewed for evidence of activities that would suggest the potential presence of hazardous substances in those areas and to evaluate the potential for the proposed alignments and maintenance yards to be impacted by onsite and/or offsite sources of contamination. The review of past uses focuses on those historic uses that have a potential to environmentally impact the proposed alignments and maintenance yards.

Alternative locations tabulated below are based on the Advanced Conceptual Engineering Drawings (Draft December 30, 2009) and the Union Pacific Los Angeles Transportation Center Rail Yard location is on the Advanced Conceptual Engineering Drawings (Draft January 2010). These types of drawings were not available for the proposed expansion to the Division 20 Maintenance and Storage Facility or the proposed Turnback Facility.

3.3.2 Oil Wells

A review of the State of California Division of Oil, Gas, and Geothermal Resources (DOGGR) Online Mapping System (DOMS 2010) identified oil wells listed in Table 3-3. For each alternative, the table shows oil wells within 100 feet of the outer edge of the proposed tunnel or station alignments and those that may be located within the tunnel area. The locations noted in the tables are approximate, since the DOMS maps are representational and are intended for general public use.

Table 3-3: Identified Oil Wells

Well Name/API No.	Location	Plan Sheet (Appendix A of DEIS)	Approximate Station	Well Status
Alternatives 1, 2, and 3				
Wilton Corehole API 03706346	100 feet north of Wilshire and 50 feet west of Bronson	C-102	24+00-25+00	uncompleted and abandoned
Highland Corehole 1 and 2 API 03701151 API 03720045	100 feet south of Wilshire and 100 feet east of orange	C-105	94+00-96+00	uncompleted and abandoned
Chevron USA 10 API 0314970	50 feet north of Wilshire and 100 feet west of Fairfax	C107	157+00-159+00	idle
Chevron USA 49 API 03715144	50 feet north of Wilshire at McCarthy	C107	168+00-169+00	abandoned
Kansas Crude Co 1 API 03700991	10 feet north of North Santa Monica Blvd at Ensley	C114	346+00-348+00	abandoned
Kansas Crude Co 3 API 03700993	50 feet west of Warnall 200 feet north of North Santa Monica Blvd	C114	35+00-353+00	idle
Alternatives 4 and 5				
Chevron Laurel Corehole 2 API 03706325	100 feet south of Santa Monica Blvd, west of Flores St	C205	13+00-135+00	abandoned
Chevron USA Arden PE 4 API: 03721199 Arden PE 1 API: 03716759 Arden Corehole 8 API: 03721237	South of Santa Monica Blvd curve to San Vicente	C207	176+00-183+00	abandoned
Beverly Oil Co. 9 API: 03714611	Within alignment	C208	206+00-209+00	abandoned
McDor Oil Co. 3 API: 03725120	20 feet east Sherbourne and south of Bonner	C208	206+00-20+009	abandoned
McDor Oil Co. 1 API: 03726465	50 feet east of Sherbourne and 50 feet north of Beverly Drive	C208	207+00-210+00	idle
Chevron USA Beverly 11 API: 03714613 Pico 3 API: 03714545	Within alignment	C208	21+00-215+00	abandoned
Plains Exploration and Oil Co S-93 API: 03714616 Beverly A1 API: 03722000	10 to 20 feet east of alignment. Plains also has other multiple active and idle oil wells within 100 to 500 feet to the east of the alignment	C209	217+00-223+00	idle active
Chevron USA Picot 2 API: 03714544	Within alignment 100 feet north of 3rd	C209	220+00-222+00	abandoned
Chevron USA Picot 1 API: 03714543	Within 10 feet west of alignment and 20 feet north of 3rd	C209	222+00-223+00	abandoned
Chevron USA Beverly 2 API: 03714604	Within 20 feet east of alignment and 30 feet north of 3rd	C209	222+00-223+00	abandoned
Chevron USA 139	Within 20 feet east of alignment and 50 feet south of 3rd	C209	225+00-227+00	abandoned

Well Name/API No.	Location	Plan Sheet (Appendix A of DEIS)	Approximate Station	Well Status
Option 3 – Wilshire La Cienega – West with Transfer Station				
Chevron USA Rodeo 1 API: 03714549	20 feet east of San Vicente and 200 feet south of Maryland	C701 C	247+00-249+00	idle
Option 4 – Constellation Station				
Chevron USA Rodeo 107 API: 03701069	Beverly Hills High School, 100 feet south of alignment at Constellation and 200 feet east of Century Park East	C-702 G	247+00-249+00	abandoned
Chevron USA Wolfskill 23 API: 03701104	On alignment 100 feet east of Century Park East	C-702 G	324+00-325+00	abandoned
Chevron USA Aladdin wells API: 03716545 Wolfskill wells API: 03701105 20 th Century Fox Wells API: 03700985 Community Wells API: 03717552	On alignment and 50 feet north at NE corner of Constellation and Avenue of the Stars	C703G	335+00-336+00	abandoned
Option 4 – Century City Santa Monica to UCLA East Route				
Kansas Crude Co 1 API 03700991	10 feet north of North Santa Monica Blvd at Ensley	C701 K	345+00-347+00	abandoned
Kansas Crude Co 3 API 03700993	50 feet west of Warnall 200 feet north of North Santa Monica Blvd	C701 K	350+00-352+00	buried idle
Option 4 – Santa Monica to UCLA Middle and West Routes				
Union Oil Co. Gabel 2 API: 03701113	On north side of Santa Monica Blvd 300 feet east of Beverly Glen, within 30 feet of alignment	C701 L C701 M C701 N C701 O	356+00-358+00	abandoned
Option 4 – Century City/ Constellation to UCLA, East route				
Chevron USA Wolfskill 23 API: 03701104	On alignment 100 feet east of Century Park East	C701 P C701Q	340+00-342+00	abandoned
Chevron USA Aladdin wells API: 03716545 Wolfskill wells API: 03701105 20 th Century Fox Wells API: 03700985 Community Wells API: 03717552	On alignment and 50 feet north at NE corner of Constellation and Avenue of the Stars	C701P C701Q	340+00-342+00	abandoned
Union Oil Co. Gabel 2 API: 03701113	On Santa Monica Blvd 300 feet east of Beverly Glen Approximately 5- feet south of alignment	C701 P C701Q	358+00-360+00	abandoned
Option 4 – Century City/ Constellation to UCLA, Middle and West Routes				
Chevron USA Wolfskill 23 API: 03701104	On alignment 100 feet east of Century Park East	C-701 R C-701 S C-701 T	340+00-342+00	abandoned

Well Name/API No.	Location	Plan Sheet (Appendix A of DEIS)	Approximate Station	Well Status
Chevron USA Aladdin wells API: 03716545 Wolfskill wells API: 03701105 20 th Century Fox Wells API: 03700985 Community Wells API: 03717552	On alignment and 50 feet north at NE corner of Constellation and Avenue of the Stars	C-701 R C-701 S C-701 T C-701 U	340+00-342+00	abandoned

Alternative 1 – Station No. 0+00 to 454+00 – Drawings C-101 through C-117

- **Aerial Photographs** (dated 1928, 1938, 1947, 1956, 1965, 1976, 1989, 1994, and 2002). The aerial photographs reviewed indicate that the alignment is within a developed urban area.
- **Topographic Maps** (dated 1900, 1901, 1902, 1903, 1910, 1926, 1928, 1934, 1947, 1952, 1966, 1967, 1972, 1981, 1991, 1994, and 1995). The topographic maps reviewed indicate that the alignment falls within an urban area.
- **Sanborn® Maps** (dated 1905-1950). All of the Sanborn® maps reviewed appear to be developed with residential and commercial structures. Historical gas stations locations depicted on the Sanborn® maps are summarized in Table 3-4 below.

Table 3-4: Historic Gas Station Locations (Alternative 1)

Sheet number	Location
C-101-Wilshire/Western	Northeast corner of Wilshire Boulevard and S. Western Avenue; Northeast corner of Wilshire Boulevard and S. Oxford Avenue.
C-102-Wilshire/Crenshaw	Southeast corner of Wilshire Boulevard and Crenshaw Boulevard.
C-105-Wilshire/La Brea	Northeast corner of Wilshire Boulevard and S. La Brea Avenue; Northeast corner of Wilshire Boulevard and Cloverdale Avenue; Northeast corner of Wilshire boulevard and S. Detroit Street.
C-107- Wilshire/Fairfax	Southwest corner of Wilshire boulevard and Orange Grove Avenue.
C-108-Wilshire/La Cienega	Southeast corner of Wilshire Boulevard and S. Le Doux Road; Northwest corner of Wilshire Boulevard and N. La Cienega Boulevard; Southwest corner of Wilshire Boulevard and Stanley Drive.

Alternative 2 – Station No. 0+00 to 473 +26.326 – Drawings C2-118 through C2-119

- **Aerial Photographs** (dated 1928, 1938, 1947, 1956, 1965, 1976, 1989, 1994, and 2002).

The aerial photographs reviewed indicate that the alignment is within a developed urban

- **Topographic Maps** (dated 1900, 1901, 1902, 1903, 1910, 1926, 1928, 1934, 1947, 1952, 1966, 1967, 1972. 1981, 1991, 1994, and 1995).

The topographic maps reviewed indicate that the alignment falls within an urban area.

- **Sanborn® Maps** (dated 1905-1950).

All of the Sanborn® maps reviewed appear to be developed with residential and commercial structures. Historical gas station locations depicted on the Sanborn® maps are summarized in Table 3-5 below.

Table 3-5: Historic Gas Station Locations (Alternative 2)

Sheet number	Location
C2-118-Westwood/VA Hospital	Southwest corner of Wilshire Boulevard and S. Barry Avenue; Southwest corner of Wilshire Boulevard and Federal Avenue.

Alternative 3 – Station No. 0+00 to 653+83.97 – Drawings C3-119 through C3-125

- **Aerial Photographs** (dated 1928, 1938, 1947, 1956, 1965, 1976, 1989, 1994, and 2002).

The aerial photographs reviewed indicate that the alignment is within a developed urban area.

- **Topographic Maps** (dated 1900, 1901, 1902, 1903, 1910, 1926, 1928, 1934, 1947, 1952, 1966, 1967, 1972. 1981, 1991, 1994, and 1995).

The topographic maps reviewed indicate that the alignment falls within an urban area.

- **Sanborn® Maps** (dated 1905-1950).

All of the Sanborn® maps reviewed appear to be developed with residential and commercial structures. Historical gas station locations depicted on the Sanborn® maps are summarized in Table 3-6 below.

Table 3-6: Historic Gas Station Locations (Alternative 3)

Sheet number	Location
C3-122	Southwest corner of Wilshire Boulevard and 25 th Street; Northwest corner of Wilshire Boulevard and 26 th Street; Northeast corner of Wilshire Boulevard and 26 th Street; Southeast corner of Wilshire Boulevard and .Berkeley; Southwest corner of Wilshire Boulevard and Franklin.
C3-123	Northwest corner of Wilshire Boulevard and 16 th Street; Northwest corner of Wilshire Boulevard and 17 th Street; Northwest corner of Wilshire Boulevard and 19 th Street; Southwest corner of Wilshire Boulevard and 19 th Street.
C3-125	Northwest corner of Wilshire Boulevard and Ocean Avenue; Southwest corner of Wilshire Boulevard and 2 nd Street; Northwest corner of Wilshire Boulevard and 6 th Street; Southwest corner of Wilshire Boulevard and 7 th Street.

Alternatives 4 and 5 – Station No. 0+00 to 269+38.66 & 0+00 to 454+00 – Drawings C-201 through C-211

- **Aerial Photographs** (dated 1928, 1938, 1947, 1956, 1965, 1976, 1989, 1994, and 2002).

The aerial photographs reviewed indicate that the alignment is within a developed urban area.

- **Topographic Maps** (dated 1900, 1901, 1902, 1903, 1910, 1926, 1928, 1934, 1947, 1952, 1966, 1967, 1972, 1981, 1991, 1994, and 1995).

The topographic maps reviewed indicate that the alignment falls within an urban area.

- **Sanborn® Maps** (dated 1905-1950).

All of the Sanborn® maps reviewed appear to be developed with residential and commercial structures. Historical gas station locations depicted on the Sanborn® maps and not already discussed in the above alternatives are summarized in Table 3-7 below.

Table 3-7: Historic Gas Station Locations (Alternatives 4 and 5)

Sheet number	Location
C-201	Southeast corner of N. Highland Avenue and Selma Avenue; Northeast corner of N. Highland Avenue and Hawthorne Avenue.
C-203	Northwest corner of Santa Monica Boulevard and La Brea Avenue; Southeast corner of Santa Monica Boulevard and N. Formosa Avenue; Southeast corner of Santa Monica Boulevard and N. La Brea Avenue.
C-204	Southeast corner of Santa Monica Boulevard and N. society Avenue; Northeast corner of Santa Monica Boulevard and N. Orange Grove Boulevard; Southeast corner of Santa Monica Boulevard and N. Edinburgh Avenue; Southeast corner of Santa Monica Boulevard and N. Ogden Avenue; Northeast corner of Santa Monica Boulevard and N. Hayworth Avenue.
C-206	Northwest corner of Beverly Boulevard and N. La Cienega Boulevard; Northwest corner of S. La Cienega Boulevard and S. San Vicente Boulevard.

Union Pacific Los Angeles Transportation Center Rail Yard – Station No. 0+00 through 65+00 – Drawings Y-101 through Y-103

- **Aerial Photographs** (dated 1928, 1938, 1947, 1956, 1965, 1976, 1989, 1994, 2002, and 2005).

The aerial photographs reviewed indicate that the proposed maintenance yard is located within the northern portion of an existing rail yard (Union Pacific Los Angeles Transportation Center Rail Yard) developed in an urban area since at least 1928.

- **Topographic Maps** (dated 1900, 1901, 1913, 1928, 1953, 1966, 1972, 1981, 1991, and 1994).

The topographic maps reviewed indicate that the proposed maintenance yard falls within the northern portion of an existing rail yard (Union Pacific Los Angeles Transportation Center Rail Yard) located in an urban area since at least 1928.

- **Sanborn® Maps** (dated 1894-1970).

All of the Sanborn® maps reviewed appear to be developed with residential, commercial, and industrial structures. Rail yard maintenance facilities depicted on the Sanborn® maps are summarized in Table 3-8 below.

Table 3-8: Railyard Maintenance Facilities (Union Pacific Los Angeles Transportation Center Rail Yard)

Year	Description
1894	The area to the west of Los Angeles River is developed with “AT&SF RR” tracks. The maintenance yard area to the south of Alhambra Avenue, east of the Los Angeles River, and west of Interstate 5, is unmapped.
1906	The area adjacent to the west of Los Angeles River is developed with “AT&SF RR” tracks. The maintenance yard area to the south of Alhambra Avenue, east of the Los Angeles River, and west of Interstate 5, is unmapped.
1950, 1953, 1954, and 1957	The area adjacent to the west of the Los Angeles River continues to be developed with “AT & SF RR” tracks, followed by industrial development as “Mfg Dutch Cleanser” facility with an associated machine shop and battery case storage facility. By 1957, an additional structure (“Grocery Warehouse”) is depicted west of Los Angeles River. The maintenance yard area to the south of Alhambra Avenue, east of the Los Angeles River, and west of Interstate 5, is unmapped.
1960, 1964, 1965, 1967, and 1970	The area adjacent to the west of the Los Angeles River continues to be developed with “AT & SF RR” tracks, followed by two large industrial facilities identified as “Laundry & Textile Chemical Manufacturing” and “Ceramic Warehouse.” The previously discussed cleanser manufacturer facility appears to be converted to a “Scrap Metal Storage Yard” with associated structures including paper towel warehouse and a scrap metal warehouse. The maintenance yard area to the south of Alhambra Avenue, east of the Los Angeles River, and west of Interstate 5, is unmapped.

Although not specifically shown on historic maps, the Aliso Street Manufactured Gas Plant was located west of the Los Angeles River.

Expanded Division 20 Yard

- **Aerial Photographs** (dated 1928, 1938, 1947, 1956, 1965, 1976, 1989, 1994, 2002, and 2005).

The aerial photographs reviewed indicate that the proposed maintenance yard expansion is located within an existing rail yard (Division 20 Maintenance and Storage Facility) developed in an urban area since at least 1928.

- **Topographic Maps** (dated 1900, 1901, 1913, 1928, 1953, 1966, 1972, 1981, and 1994).

The topographic maps reviewed indicate that the maintenance yard falls within an existing rail yard located in an urban area since at least 1928.

- **Sanborn® Maps** (dated 1894-1970).

All of the Sanborn® maps reviewed appear to be developed with residential and commercial structures. Rail yard maintenance facilities depicted on the Sanborn® maps are summarized in Table 3-9 below.

Table 3-9: Railyard Maintenance Facilities (Expanded Division 20 Yard)

Year	Description
1894	The storage yard area is developed as “Southern California R.R.” Railroad tracks are depicted trending north south in the central portion of the property. Round House and associated maintenance shop are located along the western property boundary. Several other small structures are located along the southern property boundary, including two general storage facilities, R.R. oil house, and an oil storage structure. Los Angeles River is located adjacent to the east, Santa Fe Avenue to the west, and Short Street to the south.
1906	The storage yard area is developed as the “Atchison Topeka & Santa Fe R.R. Yard.” Railroad tracks are depicted trending north south in the central portion of the property. A freight house, freight shed, and freight platform line the eastern portion of the property. Round House and associated maintenance shop are located in the southwest portion of the property. Several other small structures are located along the southern property boundary (north of the E. 4 th Street viaduct), including a storage room and office, oil house, sand house, yard office, a water tank, and fire pump. Los Angeles River is located adjacent to the east, E. 4 th Street is located to the south, and Santa Fe Avenue is located to the west.
1950,1953, 1954, 1959, &1960	The storage yard area continues to be developed as the “Atchison Topeka & Santa Fe R.R. Yard” with railroad tracks trending north/south in the central portion of the property. The freight warehouse, freight house, and car loading shed are located along the western property boundary. Additionally, a pump house and tool house are located in the southeastern portion of the property. Los Angeles River is located adjacent to the east, E. 4 th Street is located to the south, and Santa Fe Avenue is located to the west.
1967 & 1970	The storage yard area continues to be developed as the “Atchison Topeka & Santa Fe R.R. Yard” with railroad tracks trending north/south in the central portion of the property. The freight warehouse and car loading shed are

Year	Description
	repair facility and a gas and oil storage are located in the southwest corner of the property. Los Angeles River is located adjacent to the east, E. 4 th Street is located to the south, and Santa Fe Avenue is located to the west.

Turnback Facility

- **Aerial Photographs** (dated 1928, 1938, 1947, 1956, 1965, 1976, 1989, 1994, 2002, and 2005).

The aerial photographs reviewed indicate that the proposed maintenance yard is located within an existing rail yard developed in an urban area since at least 1928.

- **Topographic Maps** (dated 1900, 1901, 1913, 1928, 1953, 1966, 1972, 1981, and 1994).

The topographic maps reviewed indicate that the proposed maintenance yard falls within an existing rail yard located in an urban area since at least 1928.

- **Sanborn® Maps** (dated 1894-1970).

All of the Sanborn® maps reviewed appear to be developed with residential and commercial structures. Rail yard maintenance facilities depicted on the Sanborn® maps are summarized in Table 3-10 below.

Table 3-10: Railyard Maintenance Facilities (Turnback Facility)

Year	Description
1894	The proposed maintenance yard area north of First Street is developed as "Crescent Coal Co. Wood & Coal Yard," followed by "Southern California R.R." tracks, depicted trending north south in the central portion of the property. In addition, several structures including a wood shed, coal shed, corral, and night watchmen station are located on the property. South of First Street, the proposed maintenance yard is developed as "Azusa Ice & Cold Storage Company," followed by "Smith Paving company Yard & Works," beyond is "Cerillo's Coal company Yard." The Los Angeles River is located adjacent to the east, Santa Fe Avenue to the west, 4 th Street to the south, and Commercial Street to the distant north.
1906	The proposed maintenance yard area north of First Street is developed as "Lee Chamberlain & Co." followed by "AT & SF R.R." tracks depicted trending north south in the central portion of the property. In addition, several structures including a grinding room, coal shed, office, and scales are located on the property. The area south of First Street is developed as "California Ornamental Brick Co." followed by "AT & SF R.R." tracks depicted trending north south in the central portion of the property. In addition, several structures including a fruit warehouse,

Year	Description
	located on the property. The Los Angeles River is located adjacent to the east, Santa Fe Avenue to the west, 4 th Street to the south, and Commercial Street to the distant north.
1950	The proposed maintenance yard area north and south of First Street is developed with "AT & SF R.R." tracks depicted trending north south in the central portion of the property. The Los Angeles River is located adjacent to the east, Santa Fe Avenue to the west, 4 th Street to the south, and Turner Street to the north.
1953, 1954, 1957, 1959, 1960, 1965, 1967, 1968, & 1970	The proposed maintenance yard area north of First Street is vacant with the exception of a railroad spur located in the southwest portion of the property. The area south of First Street is developed with "AT & SF R.R." tracks depicted trending north south in the central portion of the property. The Los Angeles River is located adjacent to the east, Santa Fe Avenue to the west, 4 th Street to the south, and Turner Street to the north.

3.4 Government Agency Database List Search

This section summarizes a search for facilities listed by regulatory agencies as potentially having environmental concerns. The search covers an area within a maximum 500-foot radius of the alignments, to assess whether activities on or near the alignments have the potential to create recognized environmental conditions (RECs). For the maintenance yards, the search was limited to an approximately 200-foot radius from the rail yard boundary because the yards are more likely to be impacted by RECs at the surface than those that are below ground since no tunneling is proposed at the maintenance yards. A complete list of databases reviewed is provided in the EDR Reports (Appendix B) and is summarized in the following subsections in a table format.

EDR's Orphan Summary was reviewed to evaluate if any of these properties appear to be located within the designated radii of the subject property. No unmapped sites were identified with the potential to impact the proposed alignment.

Listings along each alignment alternative were reviewed for agency database listings that have a low to high potential for hazardous materials impacts to the project area. Agency listings directly over a proposed alignment, within 100 to 200 feet on either side, or groundwater cases within 500 feet are included in this review.

The facilities that are considered potentially to pose the greatest concern are those with soil and/or groundwater contamination within or adjacent to a proposed alignment or maintenance yards, and those with groundwater contamination near proposed alignments. These facilities were chosen by the criteria listed below:

- Based on the findings of the environmental agency database search obtained from EDR, all open leaking underground storage tank (LUST) cases and/or site investigation cases within the study area (i.e., parcels directly affected by the

boundaries of and within 200-feet of a maintenance yard) are considered to have a high potential for hazardous materials impacts to the proposed alignment. For those sites with a documented release either within or adjacent to the study area, an additional search for information was conducted through a review of readily accessible on-line databases including the DTSC's ENVIROSTOR web site (ENVIROSTOR), the SWRCB's GeoTracker web site (GeoTracker), and the California SWIS web site (SWIS) as appropriate. The ENVIROSTOR, GeoTracker, and SWIS databases are referenced in instances only where further information beyond what was reported by EDR was available. Those sites where additional information was needed because limited data was available in readily accessible environmental agency databases are considered to have a high potential for hazardous materials impacts to the study area.

- A number of sites identified within the alignment as “closed” or “no further action” cases are usually considered to have a low potential to impact the proposed alignment based on the closed or no further action status. However, based on a review of environmental agency databases, some of these sites appear to have residual contamination remaining post closure and therefore, these sites are considered to have a high potential to impact the proposed alignment.
- Due to the ability of contamination to migrate offsite, sites listed within 200 feet on either side of the centerline of the proposed alignments or from the boundary of the railroad yards, but not directly impacted by the alignment or yard footprint, that have contamination migration potential (i.e. groundwater impacts) are considered adjacent.
- In addition, sites with open groundwater cases and/or existing groundwater release/remediation activities were further evaluated at a distance up to 500 feet on either side of the centerline of the proposed alignments and from the boundary of the railroad yards.
- Dry-cleaning facilities that were not listed as open cases were considered to have a low potential for impact and, although identified, were not discussed in detail.
- Closed soil only LUST cases were considered to have no impact and were not further discussed if the location was over a portion of the tunnel where depth to the top of the tunnel is 30 feet or greater.
- Facilities that handle, store, and/or generate hazardous materials/wastes that do not have a reported release to soil and/or groundwater are unlikely to affect the alignments or maintenance yards and therefore are not discussed further.

The following sections includes Tables 3-11 through 3-16, which provide a summary of the EDR listings identified with potential impacts for each alternative and the maintenance yards.

3.4.1 Alternative 1

The following table provides a summary of the EDR listings identified with potential impacts to Alternative 1.

Table 3-11: EDR Listings with Potential Impacts to Alternative 1

Drawing No. ²	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map no.	EDR ID No.	Address	EDR Listings
C-102	26	Wilshire/Crenshaw	16	117	626 S. Bronson Ave. Los Angeles, CA 90005	This address was identified as Dakota Investment Company in the UST database. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, this listing is not expected to impact the proposed alignment.
C-101	26	Wilshire/Western	16	151	3855 Wilshire Blvd. Los Angeles, CA 90010	This address was identified as George Adamian/Texaco Station (Former) in the SWEEPS UST, CA FID UST, HIST CORTESE, and LUST databases. According to the LUST database, in 1987, a gasoline release affected groundwater at this site. The status of the LUST case is listed as “completed -case closed” as of August 20, 1998. Based on the closed case status and the time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.
C-101	26	Wilshire/Western	16	150	3875 Wilshire Blvd. Los Angeles, CA 90010	This address was identified as Jamison 3875 Wilshire, LLC/Wilshire Professional Building in the EMI and LUST databases. According to the LUST database, in 1987, a gasoline release affected this site. The media affected was not reported in the EDR Report. The status of the LUST case is listed as “completed-case closed” as of August 8, 2007. According to the GeoTracker database ³ , a gasoline release was reported in 2005 and the media affected is “under investigation”. The GeoTracker database further reports that remediation began in 2005 and is listed as “excavate and dispose” indicating that soil was affected. Closure was granted by the RWQCB in 2007. Based on this information, there is a low potential for this property to impact the proposed alignment.
C-101	26	Wilshire/Western	16	149	3810 Wilshire Blvd. Los Angeles, CA 90010	This address was identified as Equitec Financial Group Inc. in the SWEEPS UST, HAZNET, and CA FID UST databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-101	26	Wilshire/Western	16	149	3731 Wilshire Blvd. Los Angeles, CA 90010	This address was identified as State Street Bank & Trust/Orange Grove in the SWEEPS UST, HAZNET, RCRA-LQG, and CA FID UST databases. No tank specifics are reported. Based on the lack of violations and/or listing in other databases indicating a release, these listings are not expected to impact the proposed alignment.

² Los Angeles County MTA, Westside Subway Extension, Advanced Conceptual Engineering Drawings, Draft December 30, 2009.

³ California State Water Resources Control Board’s GeoTracker Database <http://www.geotracker.swrcb.ca.gov/>

Drawing No. ²	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map no.	EDR ID No.	Address	EDR Listings
C-101	26	Wilshire/Western	16	149	3765 Wilshire Blvd. Los Angeles, CA 90010	This address was identified as ARCO AM/PM 5355 in the SWEEPS UST database. Three USTs were reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-101	26	Wilshire/Western	16	149	3807 Wilshire Blvd. Los Angeles, CA 90010	This address was identified as Korean Drycleaners & Laundry/Wil-West Inc. in the WIP, SLIC, and HAZNET databases. According to the SLIC database, groundwater was affected by volatile organic compounds (VOCs) at this site. The status of the SLIC case is listed as “open-site assessment” as of October 1, 1999. No additional information was available on the GeoTracker database. Based on the open case status and lack of information available, there is a high potential for this property to impact the proposed alignment.
C-101	26	Wilshire/Western	16	146	3675 Wilshire Blvd. Los Angeles, CA 90010	This address was identified as ARCO #5355 in the HAZNET, LUST, and HIST CORTESE databases. According to the LUST database, in 1987, a gasoline release affected groundwater at this site and remedial action began in 2004. The status of the LUST case is listed as “completed-case closed” as of September 24, 2008. Based on the closed case status and remedial action completed, there is a low potential for this property to impact the proposed alignment.
C-101	26	Wilshire/Western	16	146	3700 Wilshire Blvd. Los Angeles, CA 90010	This address was identified as Bechtel Investments/Wilshire Park Place LLC/Pacific Parking Corporation/The Car Concierge/Benequity Properties in the UST, HIST UST, SWEEPS UST, FINDS, RCRA-NonGen, and CA FID UST databases. Two former USTs were reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-101	25	NA	16	141	3959 Wilshire Blvd. Los Angeles, CA 90010	This address was identified as Concord Cleaners/Seoul Cleaners in the HAZNET and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-102	25	NA	16	148	4001-D Wilshire Blvd. Los Angeles, CA 90010	This address was identified as Campu Cleaners in the DRYCLEANERS list. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-102	25	NA	16	148	4006 Wilshire Blvd. Los Angeles, CA 90010	This address was identified as Unocal Service Station #0932/ O's Union Station 1715/Union Oil Service Station #932/Unocal #0932 in the HIST CORTESE, HIST UST, HAZNET, LUST, CA FID UST, and SWEEPS UST databases. According to the LUST database, in 1988, a gasoline release affected groundwater at this site. The

Drawing No. ²	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map no.	EDR ID No.	Address	EDR Listings
						status of the LUST case is listed as “completed -case closed” as of December 28, 1994. Based on the closed case status and the time elapsed since the case was closed, there is a low potential for this property to impact the proposed alignment.
C-102	25	NA	16	148	4029 Wilshire Blvd. Los Angeles, CA 90010	This address was identified as City of Los Angeles General Services/Los Angeles Fire Station #29 in the HAZNET and UST databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-102	25	NA	16	148	4033 Wilshire Blvd. Los Angeles, CA 90010	This address was identified as City of Los Angeles Fire Station #29 in the CA FID UST and SWEEPS UST databases. Two USTs were reportedly located at the site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-102	25	Wilshire/Crenshaw	16	141/143	4180 Wilshire Blvd. Los Angeles, CA 90010	This address was identified as Alright Parking Lot in the HIST CORTESE, HAZNET, and LUST databases. According to the LUST database, in 1982, a gasoline release affected groundwater at this site. The status of the LUST case is listed as “open-remediation” as of June 8, 2008. According to the GeoTracker database, free product is present in groundwater at this site, which is currently undergoing remedial action. Based on the open case status and ongoing remedial action, there is a high potential for this property to impact the proposed alignment.
C-102	25	Wilshire/Crenshaw	15/16	143	4201 Wilshire Blvd. Los Angeles, CA 90010	This address was identified as Harbor Associates Building/Jamison Properties Inc./Pacific Bell in the CA FID UST, SWEEPS UST, HAZNET, EMI, RCRA-LQG, and FINDS databases. Five USTs were reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-103	22	NA	15	134	4680 Wilshire Blvd. Los Angeles, CA 90010	This address was identified as Farmers Insurance in the HAZNET, CA FID UST, and EMI databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-104	22	NA	15	133	4750 Wilshire Blvd. Los Angeles, CA 90010	This address was identified as Farmers Insurance in the UST, SWEEPS UST, HAZNET, CA FID UST, and EMI databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-104	23	NA	15	129	5034 Wilshire Blvd. Los Angeles, CA 90036	This address was identified as Highland Express Cleaners in the HAZNET, DRYCLEANERS, SLIC, and EMI databases. According to the SLIC database, a release of tetrachloroethylene (PCE) affected groundwater at this site. The status of the SLIC case is listed as “open-site assessment” as of April 16, 2001 in the EDR

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Drawing No. ²	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map no.	EDR ID No.	Address	EDR Listings
						Report. The GeoTracker database lists the cleanup status as “open-assessment & interim remedial action” as of June 18, 2009. Based on the open case status and ongoing remedial action, there is a high potential for this property to impact the proposed alignment.
C-104	23	NA	15	129	5020 Wilshire Blvd. Los Angeles, CA 90036	This address was identified as Tidewater Service Station (Former) in the SLIC database. According to the SLIC database, a release of “other solvent or non-petroleum product” affected groundwater at this site. The status of the SLIC case is listed as “open-site assessment” as of October 18, 2000. The GeoTracker database lists the cleanup status as “open-site assessment” as of July 7, 2009 and assessment work is still being performed at this site. Based on the open case status and ongoing assessment, there is a high potential for this property to impact the proposed alignment.
C-104	23	NA	15	129	5050-5070 Wilshire Blvd. Los Angeles, CA 90036	This address was identified as Lou Ehlers Cadillac (Former) in the LUST database. According to the LUST database, a release of “waste oil/motor/hydraulic/lubricating” affected soil at this site. The status of the LUST case is listed as “open-referred” as of December 10, 2008. The GeoTracker database lists the cleanup status as “completed-case closed” as of December 21, 2009. Based on the closed case status and impacts to soil only, this listing is not expected to impact the proposed alignment.
C-104	23	NA	15	128, 129	5001 Wilshire Blvd., Suite 108 Los Angeles, CA 90036	This address was identified as TLC Cleaners/ M Nemanpour DBA/Ted & Hedy Orden in the DRYCLEANERS, EMI, HIST UST, FINDS, and RCRA-SQG databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-105	22	NA	15	127	5115 Wilshire Blvd. Los Angeles, CA 90016	This address was identified as Carnation Office (Former)/Avalon Wilshire in the HAZNET, SWEEPS UST, RCRA-LQG, FINDS, CA FID UST, CA WDS, HIST CORTESE, and LUST databases. According to the LUST database, in 1992, a gasoline release affected groundwater at this site. The status of the LUST case is listed as “completed -case closed” as of July 31, 1996. Based on the closed case status and the time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.
C-105	22	NA	15	126	5151 Wilshire Blvd. Los Angeles, CA 90036	This address was identified as Lou Ehlers Cadillac in the HAZNET, LA County HMS, SWEEPS UST, AST, EMI, RCRA-SQG, FINDS, CA FID UST, HIST UST, and LUST databases. Two LUST cases are identified for this site. The first LUST case reports that in 1988, a gasoline release affected groundwater at this site. The status of this LUST case is listed as “completed -case closed” as of August 22, 1996.

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Drawing No. ²	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map no.	EDR ID No.	Address	EDR Listings
						The status of the second LUST case is listed as “open-assessment & interim remedial action” as of January 13, 2009. The date of the release, material released, and media affected were not reported. The lead agency for this case is the City of Los Angeles and therefore, additional information was not available on the GeoTracker database. Based on the open case status and lack of information available, there is a high potential for this property to impact the proposed alignment.
C-105	22	NA	15	126	5170 Wilshire Blvd. Los Angeles, CA 90036	This address was identified as Budget Cleaners in the HAZNET, DRYCLEANERS, RCRA-SQG, FINDS, and EMI databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-105	22	Wilshire/Fairfax	14	115	682 Cloverdale Ave. Los Angeles, CA 90036	This address was identified as Cloverdale Cleaners in the HAZNET and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-105	22	Wilshire/Fairfax	14	124	5220 Wilshire Blvd. Los Angeles, CA 90036	This address was identified as BRE 5220 Wilshire in the SLIC database. The status of the SLIC case is listed as “open-site assessment” as of November 17, 2008. The potential media affected and potential contaminants of concern are not reported. The lead agency for this case is the City of Los Angeles and therefore, additional information was not available on the GeoTracker database. Based on the open case status and lack of information available, there is a high potential for this property to impact the proposed alignment.
C-105	22	Wilshire/La Brea	14	124	5225 Wilshire Blvd. Los Angeles, CA 90036	This address was identified as 5225 Wilshire Associates, CA/Environmental Salvage Ltd. in the HAZNET, FINDS, RCRA-NonGen, and SWEEPS UST databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-106	21	NA	14	121	5750 Wilshire Blvd. Los Angeles, CA 90036	This address was identified as Wilshire Courtyard/La Salle Partners Asset Management/JH Snyder Co. and California Fed Sav in the HAZNET, EMI, UST, CA FID UST, and SWEEPS UST databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-106	21	NA	14	118	5670 Wilshire Blvd. Los Angeles, CA 90036	This address was identified as J H Snyder Co. III, L.P./Pacific Parking Corporation/Arden Realty Inc./Service Station 7152/California Federal Plaza/Cal Fed Savings & Loan in the HIST UST, HAZNET, SWEEPS UST, FINDS, CA FID UST, and EMI databases. A gasoline station appears to have operated onsite. Five

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Drawing No. ²	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map no.	EDR ID No.	Address	EDR Listings
						USTs were reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-106	21	NA	14	118	5700 Wilshire Blvd. Los Angeles, CA 90036	This address was identified as Wilshire Courtyard LLC/J H Snyder Co & California Federal Savings/La Salle Partners Assets Mgmt. in the HAZNET, UST, SWEEPS UST, FINDS, RCRA-SQG, CA FID UST, and EMI databases. One UST was reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-106	21	NA	14	116	5757 Wilshire Blvd. Los Angeles, CA 90036	This address was identified as Museum Square/5757 Wilshire LLC in the HAZNET, CA FID UST, HIST CORTESE, LUST, and EMI databases. According to the LUST database, in 1995, a diesel release affected groundwater at this site. The status of the LUST case is listed as “completed-case closed” as of May 21, 1996. Based on the closed case status and time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.
C-106	21	NA	14	116	5779 W. Wilshire Blvd. Los Angeles, CA 90036	This address was listed in the CHMIRS database, which indicates that a release of methane gas was reported at this location on August 11, 1992. According to the EDR Report, this was a natural occurrence and other occurrences had been reported in the past. The Fire Department was called to analyze the amount of gas. It was reported that methane gas appeared to be flowing at a rate of approximately 4 liters per minute and had reportedly been doing so for years. Natural occurrence of methane gas is discussed further in Sections 3.2.5 and 4.4.6.
C-106	20	NA	14	113	5900 Wilshire Blvd. Los Angeles, CA 90036	This address was identified as 5990 Wilshire Blvd. Building/Mutual Benefit Financial Co./Milton Meyer & Co. in the RCRA-LQG, EMI, HIST UST, HAZNET, SWEEPS UST, ERNS, FINDS, and RCRA-SQG databases. The site is listed as a former gasoline station. Two USTs were reportedly located at this site. The ERNS database reports that during renovations at this site in 2000 asbestos was released into the air. Based on the lack of listing in other databases indicating violations and/or impacts to soil or groundwater, these listings are not expected to impact the proposed alignment.
C-106	20	Wilshire/La Brea	14	113	5905 Wilshire Blvd. Los Angeles, CA 90036	This address was identified as Los Angeles County/Museum of Arts in the LA County HMS, HAZNET, NPDES, EMI, SWEEPS UST, and CA FID UST databases. Two USTs were reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.

Drawing No. ²	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map no.	EDR ID No.	Address	EDR Listings
C-107	20	Wilshire/Fairfax	14	105	6100 Wilshire Blvd. Los Angeles, CA 90048	This address was identified as New Wilshire Building/6100 Holdings Partners/JP Mahoney & Co. in the SWEEPS UST, UST, CA FID UST, EMI, CA WDS, and NPDES databases. One UST was reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-107	20	Wilshire/Fairfax	14	101	6250 Wilshire Blvd. Los Angeles, CA 90047	This address was identified as Ogdens Cleaners/Raydan Enter in the RCRA-SQG, FINDS, HAZNET, DRYCLEANERS, and EMI databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, it is URS' opinion that there is a low potential for this property to impact the proposed alignment.
C-108	19	NA	13	87	6500 Wilshire Blvd. Beverly Hills, CA 90210	This address was identified as 6500 Wilshire Blvd./Cadillac Fairview/California Inc./Office Building, LA/Prentis Properties in the RCRA-SQG, FINDS, HAZNET, SWEEPS UST, CA FID UST, CA WDS, and NPDES databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-108	19	NA	13	82	8302 Wilshire Blvd. Beverly Hills, CA 90211	This address was identified as Beverly Wilshire Cleaners in the RCRA-SQG, FINDS, HAZNET, DRYCLEANERS, and EMI databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-108	19	NA	13	79	8383 Wilshire Blvd. Beverly Hills, CA 90211	This address was identified as Arden Realty Inc./Wilshire-San Vicente, JMB PR/Wilshire San Vicente Plaza in the HAZNET, SWEEPS UST, HIST CORTESE, LUST, LA County HMS, EMI, and NPDES databases. According to the LUST database, in 1990, a gasoline release affected groundwater at this site. The status of the LUST case is listed as "completed-case closed" as of March 27, 1997. Based on the closed case status and time elapsed since the closure was granted, there is a low potential for this property to impact the proposed alignment.
C-108	18	NA	13	73	8484 Wilshire Blvd. Beverly Hills, CA 90211	This address was identified as Great Western Savings in the SWEEPS UST, EMI, HIST UST, LA County HMS, CA WDS, and NPDES databases. Two USTs were reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-109	18	Wilshire/La Cienega	13	68	8536 Wilshire Blvd. Beverly Hills, CA 90211	This address was identified as Unocal #3664/Unocal Corporation Service Station #3664 in the LA County HMS, SWEEPS UST, CA FID UST, HIST UST, and LUST databases. According to the LUST database, in 1989, a gasoline release affected

Drawing No. ²	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map no.	EDR ID No.	Address	EDR Listings
						groundwater at this site. The status of the LUST case is listed as “completed-case closed” as of July 17, 1996. Based on the closed case status and time elapsed since the closure was granted, there is a low potential for this property to impact the proposed alignment.
C-109	18	Wilshire/La Cienega	13	68	8567 Wilshire Blvd. Beverly Hills, CA 90211	This address was identified as Stanley Oil/Cherko Automotive/Mobil Oil Corporation Service Station/Milton R. Torin/Mobil #18-GWX (Former #11)/AGT Auto in the LA County HMS, HAZNET, SWEEPS UST, CA FID UST, HIST UST, HIST CORTESE, LUST, FINDS, UST, and RCRA-SQG databases. According to the LUST database, in 1990, a gasoline release affected groundwater at this site. The status of the LUST case is listed as “open-site assessment” as of January 15, 2008. The GeoTracker database lists the cleanup status as “completed-case closed” as of January 9, 2010; however, it appears that residual contamination (benzene) remains in groundwater. Therefore, there is a high potential for this property to impact the proposed alignment.
C-109	18	Wilshire/La Cienega	13	60	8621 Wilshire Blvd. Beverly Hills, CA 90211	This address was identified as Wilshire Cleaners in the RCRA-SQG, FINDS, HAZNET, and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-109	18	Wilshire/La Cienega	13	60	8624 Wilshire Blvd. Beverly Hills, CA 90211	This address was identified as Non Pariel Cleaners in the HAZNET and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-109	18	Wilshire/La Cienega	13	58	8692 Wilshire Blvd. Beverly Hills, CA 90211	This address was identified as WKH Corporation/ William Weinberg in the LA County HMS and HIST UST databases. One diesel UST was reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-109	18	NA	13	57	8767 Wilshire Blvd. Beverly Hills, CA 90211	This address was identified as 8767 Wilshire Blvd. LP/Wilshire Robertson Office Building in the LA County HMS, LUST, and NPDES databases. According to the LUST database, in 2005, a gasoline and diesel release affected groundwater at this site. The status of the LUST case is listed as “completed-case closed” as of August 14, 2007. Based on the closed case status, there is a low potential for this property to impact the proposed alignment.
C-111	17	NA	13	54	8833 Wilshire Blvd. Beverly Hills, CA 90211	This address was identified as Beverly Hills Ltd./Beverly Hills BMW in the RCRA-SQG, FINDS, HAZNET, HIST CORTESE, HIST UST, LA County HMS, SWEEPS UST, CA FID UST, and LUST databases. According to the LUST database, in 1995,

Drawing No. ²	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map no.	EDR ID No.	Address	EDR Listings
						a gasoline release affected groundwater at this site. The status of the LUST case is listed as "completed-case closed" as of October 30, 1998. Based on the closed case status and time elapsed since the release, there is a low potential for this property to impact the proposed alignment.
C-111	17	NA	13	54	9022 Wilshire Blvd. Beverly Hills, CA 90212	This address was identified as Zipper- BMW of Beverly Hills/Beverly Hills Cadillac in the HIST UST, RCRA-SQG, and FINDS databases. One former waste oil UST was reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-111	17	NA	13	53	8930 Wilshire Blvd. Beverly Hills, CA 90210	This address was identified as Hillcrest Motors Company in the SWEEPS UST and LA County HMS databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-111	17	NA	13	45	9100 Wilshire Blvd. Beverly Hills, CA 90210	This address was identified as Service Station 2574, Alterna Incorporated/Unocal Service Station #2574/Matterhorn USA Inc./Douglas Emmett 2008, LLC/Wilshire Doheny Plaza in the HIST UST, FINDS, HAZNET, LA County HMS, and SWEEPS UST databases. Two USTs were reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-111	17	NA	13	45	9090 Wilshire Blvd. Beverly Hills, CA 90210	This address was identified as Casden Company/Wilshire Doheny Building in the NPDES, SWEEPS UST, and LA County HMS databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-111	17	NA	13	45	9045 Wilshire Blvd. Beverly Hills, CA 90210	This address was identified as Savon #9767/Albertsons Inc./Heritage Cleaners in the HAZNET, DRYCLEANERS, LA County HMS, FINDS, and RCRA-SQG databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-111	17	NA	13	45	9055 Wilshire Blvd. Beverly Hills, CA 90210	This address was identified as Unocal Corporation Service Station 1782/Unocal #1782 in the HIST CORTESE, HIST UST, LA County HMS, SWEEPS UST, CA FID UST, and LUST databases. According to the LUST database, in 1989, a solvent release affected groundwater at this site. The status of the LUST case is listed as "completed-case closed" as of August 23, 1994. Based on the closed case status and time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.

Drawing No. ²	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map no.	EDR ID No.	Address	EDR Listings
C-110	16	NA	12	51	9222 Wilshire Blvd. Los Angeles, CA 90212	This address was identified as Hillcrest Motor Company in the SWEEPS UST and LA County HMS databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-111	16	Wilshire/Rodeo	12	44	9331 Wilshire Blvd. Los Angeles, CA 90212	This address was identified as MGM/UA Communications in the SWEEPS UST and LA County HMS databases. One UST was reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-111	16	Wilshire/Rodeo	12	44	9378 Wilshire Blvd. Los Angeles, CA 90212	This address was identified as Chevron 93532/Harold W. Butler Chevron 93532 in the RCRA-SQG, FINDS, HIST CORTESE, UST, HIST UST, LA County HMS, HAZNET, LUST, and SWEEPS UST databases. Two LUST cases are identified for this site. The first LUST case reports that in 1994 a gasoline release affected soil at this site. The status of this LUST case is listed as "completed -case closed" as of January 22, 1991. The second LUST case reports that in 1999, a solvent release affected groundwater at this site. The status of the second LUST case is listed as "completed -case closed" as of September 8, 2004. Based on the closed case status, there is a low potential for this property to impact the proposed alignment.
C-111	16	Wilshire/Rodeo	12	69	165 S. Beverly Dr. Beverly Hills, CA 90210	This address was identified as Service Station 7218 in the HIST UST databases. Four USTs were reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-111	16	Wilshire/Rodeo	12	64	151 S. El Camino Dr. Beverly Hills, CA 90212	This address was identified as William Morris Agency Inc. in the UST, Los Angeles Co. HMS, SWEEPS UST, CA FID UST, HAZNET, LUST, and HIST UST databases. According to the LUST database, a release of gasoline affected this site. The potential media affected is reported as "under investigation". The status of the LUST case is listed as "completed -case closed" as of April 5, 2007. Based on the closed case status, there is a low potential for this property to impact the proposed alignment.
C-111	16	Wilshire/Rodeo	12	34	225 N. Canon Dr. Beverly Hills, CA 90210	This address was identified as Beverly Hills Luxury Hotel LLC in the DRYCLEANERS database. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-111	16	Wilshire/Rodeo	12	40	9420 Wilshire Blvd. Los Angeles, CA 90211	This address was identified as Cannon@Wilshire Realty LP in the HAZNET and DRYCLEANERS database. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low

Drawing No. ²	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map no.	EDR ID No.	Address	EDR Listings
						potential for this property to impact the proposed alignment.
C-112	16	Wilshire/Rodeo	12	40	9500 Wilshire Blvd. Los Angeles, CA 90212	This address was identified as Regent Beverly Wilshire Hotel in the RCRA-SQG, FINDS, HAZNET, LA County HMS, EMI, UST, and SWEEPS UST databases. One UST was reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-112	15	NA	12	38	9777 Wilshire Blvd. Los Angeles, CA 90210	This address was identified as Wilshire Triangle Center in the HIST CORTESE, HIST UST, LUST, CA FID UST, and SWEEPS UST databases. According to the LUST database, in 1988, a gasoline release affected groundwater at this site. The status of the LUST case is listed as “completed-case closed” as of July 6, 1998. Based on the closed case status, there is a low potential for this property to impact the proposed alignment.
C-112	15	NA	12	38, 41	9988 Wilshire Blvd. Los Angeles, CA 90210	This address was identified as Union Oil Service Station 0703/Conoco Phillips #250703/Avis Unocal Service Station/Unocal Corporation 0703/Tosco- 76 Station #0703 in the HIST CORTESE, HIST UST, LA County HMS, HAZNET, LUST, CA FID UST, and SWEEPS UST databases. According to the LUST database, in 1998, a gasoline release affected groundwater at this site. The status of the LUST case is listed as “open-site assessment” as of August 8, 2007. The GeoTracker database reports that elevated levels of tertiary butyl alcohol (TBA) are present in groundwater. Groundwater monitoring and site assessment activities are ongoing at this site. Therefore, there is a high potential for this property to impact the proposed alignment.
C-112	15	NA	12	38	9876 Wilshire Blvd. Los Angeles, CA 90210	This address was identified as Beverly Hilton Joint Venture/Beverly Hilton Hotel in the SWEEPS UST, HAZNET, EMI, and LA County HMS databases. One UST was reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-112	15	NA	12	38	9815 Wilshire Blvd. Los Angeles, CA 90210	This address was identified as Budget Rent-A-Car in the SLIC, UST, HIST UST, LA County HMS, and HAZNET databases. According to the SLIC database, a release of “gasoline, waste oil/motor oil/hydraulic/lubricating” affected this site. The potential media affected is listed as “under investigation”. The status of the SLIC case is listed as “open-site assessment” as of February 26, 2001. The GeoTracker database reports that the “extent of contamination has not been determined” and lists the cleanup status as “open-site assessment” as of June 12, 2009. Therefore, there is a high potential for this property to impact the proposed alignment.

Drawing No. ²	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map no.	EDR ID No.	Address	EDR Listings
C-111	15	NA	12	42	9560 Wilshire Blvd. Los Angeles, CA 90212	This address was identified as Drexel Burnham & Lambert in the HAZNET and SWEEPS UST databases. One UST was reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-112	15	NA	12	43	9560 Wilshire Blvd. Los Angeles, CA 90212	This address was identified as Wilshire Rodeo Plaza/Nike in the HAZNET and UST databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-112	15	NA	12	48	9601 Wilshire Blvd. Los Angeles, CA 90212	This address was identified as First Interstate Bank Building in the SWEEPS UST and CA WDS databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-113	14	NA	12	59	9860 Santa Monica Blvd. Beverly Hills, CA 90212	This address was identified as Hertz Corporation in the SWEEPS UST, CA FID UST, HIST UST and LA County HMS databases. Four USTs were reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-113	14	NA	12	59	9925 Santa Monica Blvd. Beverly Hills, CA 90212	This address was identified as Non Pariel Cleaners in the HAZNET, DRYCLEANERS, RCRA-SQG, and FINDS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-113	14	NA	12	83	9975 Santa Monica Blvd. Beverly Hills, CA 90210	This address was identified as Chevron/Abandoned Gasoline Station/Webbs Chevron in the HIST CORTESE, HIST UST, LUST, SWEEPS UST, and CA FID UST databases. According to the LUST database, in 1989, a gasoline released affected soil at this site. The status of the LUST case is listed as “completed-case closed” as of December 22, 1992. Based on the closed case status and time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.
C-113	13A/14	Century City (Santa Monica Blvd./Little Santa Monica Blvd.)	11/12	111	10100 Santa Monica Blvd. Los Angeles CA 90067	This address was identified as JMB Corporation/Century City North Office Building in the SWEEPS UST, CA FID UST, RCRA-SQG, and FINDS databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-113	13A	Century City (Santa	11	156	1800 Ave. of the Stars	This address was identified as Gateway East Office Building/Century City Car

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Drawing No. ²	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map no.	EDR ID No.	Address	EDR Listings
		Monica Blvd./Little Santa Monica Blvd.)			Los Angeles, CA 90067	Care/Topa Management in the FINDS, RCRA-SQG, HAZNET, CA FID UST, SWEEPS UST, CA WDS, and NPDES databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-113	13A	Century City (Santa Monica Blvd./Little Santa Monica Blvd.)	11	156	1801 Ave. of the Stars Los Angeles, CA 90067	This address was identified as Gateway Landowners, Gateway West Building in the UST, HAZNET, CA FID UST, SWEEPS UST, CA WDS, FINDS, NPDES, and EMI databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-114	13A	NA	11	177	10301 Santa Monica Blvd. Los Angeles, CA 90025	This address was identified as Beverly Crest Cleaners in the RCRA-SQG, FINDS, HAZNET, EMI, SLIC, and DRYCLEANERS lists. The status of the SLIC case is listed as "open-site assessment" as of July 18, 2002. The potential media affected and potential contaminants of concern are not reported in the EDR Report. The GeoTracker database reports that site assessment activities and groundwater monitoring are ongoing at this site. Therefore, there is a high potential for this property to impact the proposed alignment.
C-114	13A	NA	11	179	10250 Santa Monica Blvd. Los Angeles, CA 90067	This address was identified as Pangborn Plumbing Co./AMC Century Theater in the HAZNET, CA FID UST, EMI, UST, and SWEEPS UST databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-114	12	NA	11	196, 198	10389 Santa Monica Blvd. Los Angeles, CA 90025	This address was identified as Unocal Service Station #1715/Tosco- 76 Station #1715/Conoco Phillips #251715/Kelvin Stewart in the HIST CORTESE, UST, HIST UST, CA WDS, ERNS, HAZNET, LUST, CA FID UST, SWEEPS UST, and NPDES databases. According to the LUST database, in 1987, a diesel release affected groundwater at this site. The status of the LUST case is listed as "open-site assessment" as of May 4, 2006. The GeoTracker database reports that groundwater remediation is ongoing at this site to remove elevated levels of total petroleum hydrocarbons as gasoline (TPHg), benzene, methyl tertiary-butyl ether (MTBE), and TBA and free product is present in groundwater. Furthermore, that the groundwater contamination has extended off-site to the south and southeast. Therefore, there is a high potential for this property to impact the proposed alignment.
C-114	12	NA	11	198	10400 Santa Monica Blvd. Los Angeles, CA 90025	This address was identified as Weiss Development in the LUST database. According to the LUST database, in 1997, a gasoline release affected soil at this site. The status of the LUST case is listed as "completed-case closed" as of February 1, 2002. Based on the closed case status, there is a low potential for this property to impact the

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Drawing No. ²	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map no.	EDR ID No.	Address	EDR Listings
						proposed alignment.
C-114	12	NA	11	206	10425 Santa Monica Blvd. Los Angeles, CA 90025	This address was identified as Browns Cleaners Inc. in the RCRA-SQG, FINDS, HAZNET, EMI, and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C1-117	9	NA	10	169	1155 Glendon Ave. Los Angeles, CA 90024	This address was identified as Westwood Tune-up in the HIST UST, CA FID UST, and SWEEPS UST databases. Two USTs were reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C1-117	9	Westwood/UCLA (Wilshire Blvd.)	10	180	10866 Wilshire Blvd. Los Angeles, CA 90024	This address was identified as Westwood Place in the CA FID UST, EMI, SWEEPS UST, and UST databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C1-117	9	Westwood/UCLA (Wilshire Blvd.)	10	180	10877 Wilshire Blvd. Los Angeles, CA 90024	This address was identified as Center West/Wilshire Glendon Associates LTD in the HIST CORTESE, HAZNET, LUST, CA FID UST, and SWEEPS UST databases. According to the LUST database, in 1981, a gasoline release affected groundwater at this site. The status of the LUST case is listed as "completed-case closed" as of February 9, 1998. Based on the closed case status and time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.
C1-117	9	Westwood/UCLA (Wilshire Blvd.)	10	180	10880 Wilshire Blvd. Los Angeles, CA 90024	This address was identified as Tishman West Management Corporation in the CA FID UST, HAZNET, and SWEEPS UST databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C1-117	9	Westwood/UCLA (Wilshire Blvd.)	10	181	1157 W. Gayley Ave. Los Angeles, CA 90024	This address was identified as Tosco Corporation, Station #30377/Service Station #1065/Union Oil Service Station in the HIST UST, UST, HAZNET, CA FID UST, SWEEPS UST, LUST, CHMIRS, and HIST CORTESE databases. According to the LUST database, in 1991, a gasoline release affected groundwater at this site and remedial action began in 2002. Groundwater is present at approximately 40 feet bgs. The status of the LUST case is listed as "completed-case closed" as of August 12, 2008. Based on the closed case status and remedial action completed, there is a low potential for this property to impact the proposed alignment.
C1-117	9	Westwood/UCLA (Wilshire Blvd.)	10	184	10889 Wilshire Blvd. Los Angeles, CA 90024	This address was identified as Westwood Tune-Up in the HIST UST, CA FID UST, and SWEEPS UST databases. Three USTs were reportedly located at this site.

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Drawing No. ²	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map no.	EDR ID No.	Address	EDR Listings
						Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C1-117	9	Westwood/UCLA (Wilshire Blvd.)	10	187	10900 Wilshire Blvd. Los Angeles, CA 90024	This address was identified as Frederick W Field/Murdock Plaza in the CA FID UST, EMI, SWEEPS UST, UST, HIST CORTESE, and HAZNET databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C1-117	9	Westwood/UCLA (Wilshire Blvd.)	10	190	10920 Wilshire Blvd. Los Angeles, CA 90024	This address was identified as Tishman Midvale/Regents UCLA in the UST, CA FID UST, and SWEEPS UST databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C1-117	9	Westwood/UCLA (Wilshire Blvd.)	10	192	10936 Wilshire Blvd. Los Angeles, CA 90024	This address was identified as C L Peck/Wilshire Westwood Associates in the HIST Cal-Sites, RESPONSE, ENVIROSTOR, CA FID UST, and SWEEPS UST databases. The EDR Report indicated that during construction of an office building at this site contaminated soil was encountered, which was subsequently excavated and disposed offsite. The ENVIROSTOR, HIST Cal-Sites, and RESPONSE databases indicate that this site was “certified” as having been remediated satisfactorily under DTSC oversight as of 1986. Based on the “certified” status and time elapsed since this status was achieved, there is a low potential for this property to impact the proposed alignment.
C1-117	9	Westwood/UCLA (Wilshire Blvd.)	10	192	10951 Wilshire Blvd. Los Angeles, CA 90024	This address was identified as Hertz Corporation/Hertz-West LA in the HIST UST, CA FID UST, SWEEPS UST, LUST, and HIST CORTESE databases. According to the LUST database, in 1988, a gasoline release affected soil at this site. The status of the LUST case is listed as “completed-case closed” as of October 5, 1989. Based on the closed case status and time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.
C1-117	9	Westwood/UCLA (Wilshire Blvd.)	10	192	10960 Wilshire Blvd. Los Angeles, CA 90024	This address was identified as Swiss Bank Corp./Hines Interests in the UST, CA FID UST, and SWEEPS UST databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C1-117	9	Westwood/UCLA (Wilshire Blvd.)	10	197	10990 Wilshire Blvd. Los Angeles, CA 90024	This address was identified as One Westwood Office Building in the CA FID UST and SWEEPS UST databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.



3.4.2 Alternative 2

Alternative Alignment 2 includes Alternative 1. Because of this, the citations above for Alternative 1 cover sites that would be along Alternative 2. Alternative 2 also includes a small segment from the proposed Westwood/UCLA station to the Westwood/VA Hospital station. No additional properties were identified in the environmental regulatory database searches that indicate potential for hazardous material related concern to the project.

3.4.3 Alternative 3

The following table provides a summary of the EDR listings identified with potential impacts to Alternative 3.

Table 3-12: EDR Listings with Potential Impacts to Alternative 3

Drawing No. ⁴	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map No.	EDR ID No.	Address	EDR Listings
C3-119	7	NA	20	236	11601 Wilshire Blvd. Los Angeles, CA 90024	This address was identified as World Savings Center in the SWEEPS UST, UST, and NPDES databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C3-119	7	NA	20	240	11666 Wilshire Blvd. Los Angeles, CA 90025	This address was identified as Exxon Oil Corporation 11472/John Bastardo SMI in the HIST UST, UST, HAZNET, FINDS, RCRA-SQG, HAZNET, LUST, CA FID UST, CHMIRS, and SWEEPS UST databases. According to the LUST database, in 2000, a gasoline release affected groundwater at this site. The status of the LUST case is listed as "open-remediation" as of November 8, 2007. According to the GeoTracker database ⁵ , groundwater monitoring is being performed at this site. Based on the open case status and ongoing monitoring, there is a high potential for this property to impact the proposed alignment.
C3-119	7	NA	20	240	11701 Wilshire Blvd. Los Angeles, CA 90026	This address was identified as Beverly Hills Cleaners/V Messersmith in the HAZNET, RCRA-SQG, DRYCLEANERS, FINDS, and EMI databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C3-119	7	NA	20	240	11704 Wilshire Blvd. Los Angeles, CA 90025	This address was identified as Barrington Plaza Ltd./Douglas Emmett Realty Advisors Fund in the HAZNET, EMI, and UST databases. One former waste oil UST was reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C3-119	6	NA	20	244	11755 Wilshire Blvd. Los Angeles, CA 90025	This address was identified as Wilshire Landmark 1/Landmark 1 CORP in the CA FID UST, SWEEPS UST, EMI, HAZNET, HIST UST, and UST databases. One UST was reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C3-119	6	NA	20	244	11760 Wilshire Blvd. Los Angeles, CA 90025	This address was identified as Singer Company Cleaners in the RCRA-SQG, DRYCLEANERS, and FINDS databases. No violations are reported. Based on the lack of listing in other databases indicating a

⁴ Los Angeles County MTA, Westside Subway Extension, Advanced Conceptual Engineering Drawings, Draft December 30, 2009.

⁵ California State Water Resources Control Board's GeoTracker Database <http://www.geotracker.swrcb.ca.gov/>

Drawing No. ⁴	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map No.	EDR ID No.	Address	EDR Listings
						release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C3-119	6	NA	20	244	11766 Wilshire Blvd. Los Angeles, CA 90025	This address was identified as Wilshire Landmark II Building/HD Delaware Prop in the NPDES, UST, CA FID UST, SWEEPS UST, EMI, and HAZNET databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C3-119	6	NA	20	244	11803 Wilshire Blvd. Los Angeles, CA 90025	This address was identified as Carriage Trade C/S/Carriage Trade Cleaners & Laundry in the HAZNET, DRYCLEANERS, EMI, RCRA-SQG, and FINDS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C3-119	6	NA	20	244	11800 Wilshire Blvd. Los Angeles, CA 90025	This address was identified as Chevron #9-7748 (Former)/97748/Chevron USA in the HIST CORTESE, HIST UST, HAZNET, FINDS, RCRA-LQG, LUST, CA FID UST, and SWEEPS UST databases. According to the LUST database, in 1987, a gasoline release affected groundwater at this site. The status of the LUST case is listed as "completed -case closed" as of July 9, 2001. Based on the closed case status and the time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.
C3-120	6	NA	20	247	11859 Wilshire Blvd. Los Angeles, CA 90025	This address was identified as Gordon L Pattison DDS/Union Oil Co. in the HIST CORTESE, HAZNET, CA FID UST, and SWEEPS UST databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C3-120	6	NA	20	247	11905 Wilshire Blvd. Los Angeles, CA 90049	This address was identified as Norge Village Cleaners and Laundry in the HAZNET, LA Co. Site Mitigation, DRYCLEANERS, and EMI databases. According to the LA Co. Site Mitigation database, the facility is listed as abated as of January 7, 2004. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C3-120	6	NA	20	247	11919 Wilshire Blvd. Los Angeles, CA 90025	This address was identified as Cleaner by Nature in the HAZNET and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.

Drawing No. ⁴	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map No.	EDR ID No.	Address	EDR Listings
C3-120	6	Na	19	254	12054 Wilshire Blvd. Los Angeles, CA 90025	This address was identified as Mobil Oil Corporation 18-LDM/Osko Karaghossian/Mobil #18-LDM (Former)/Zoheir A. Maarouf/Exxon Mobil Oil Corporation in the HIST UST, HIST CORTESE, FINDS, RCRA-SQG, HAZNET, LUST, CA FID UST, SWEEPS UST, CA WDS, and NPDES databases. According to the LUST database, in 1987, a gasoline release affected groundwater at this site. The status of this LUST case is listed as “open-remediation” as of October 16, 2007 in the EDR Report. However, the GeoTracker database lists the cleanup status as “completed-case closed” as of October 27, 2009. A review of quarterly monitoring reports available on the GeoTracker database indicates that residual contamination (benzene) remains in groundwater. Therefore, there is a high potential for this property to impact the proposed alignment.
C3-120	6	NA	19	254	12100 Wilshire Blvd. Los Angeles, CA 90025	This address was identified as W/B LTD c/o CB Commercial, W/B LTD c/o Coldwell Banker/Argus Publishers Corp. in the HAZNET, CA FID UST, SWEEPS UST, and EMI databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C3-120	6	NA	19	254	12121 Wilshire Blvd. Los Angeles, CA 90025	This address was identified as Wilshire Bundy Plaza/Men at Work/Carlyle Real Estate Ltd. Partnership in the HIST UST, HAZNET, CA FID UST, SWEEPS UST, and EMI databases. One waste UST was reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C3-120	6	NA	19	254	Corner of Wilshire & Bundy Los Angeles, CA 90403	This address was identified as Santa Monica MTBE in the CERCLIS and FINDS databases. According to the CERCLIS database, this site is not a Federal facility or on the NPL list. The Non-NPL status is listed as “removal site only (no site assessment work needed)”. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C3-120	6	NA	19	258	12200 Wilshire Blvd. Los Angeles, CA 90025	This address was identified as Texaco/Image Cleaners in the HIST UST, FINDS, RCRA-SQG, HAZNET, DRYCLEANERS, LA Co. Site Mitigation, CA FID UST, and SWEEPS UST databases. Five USTs were reportedly located at this site. According to the LA Co. Site Mitigation database, the facility is listed as abated as of March 31, 2004. No violations are reported. Based on the lack of listing in other databases indicating a

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Drawing No. ⁴	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map No.	EDR ID No.	Address	EDR Listings
						release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C3-120	5	NA	19	263	12400 Wilshire Blvd. Los Angeles, CA 90025	This address was identified as Equidon Investment/Wilshire Brentwood Plaza in the HAZNET, CA FID UST, SWEEPS UST, and EMI databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C3-121	5	NA	19	265	12424 Wilshire Blvd. Los Angeles, CA 90025	This address was identified as Douglas Emmett Joint Venture/Centinela Ltd. in the UST, CA FID UST, SWEEPS UST, and EMI databases. One UST was reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C3-121	5	NA	19	267	3019 Wilshire Blvd. Santa Monica, CA 90403	This address was identified as ECO Cleaners in the HAZNET and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C3-121	5	NA	19	272	2800 Wilshire Blvd. Santa Monica, CA 90403	This address was identified as Kramer Motors, Inc. (Mazda) in the CA FID UST, SWEEPS UST, and HAZNET databases. ne waste oil UST was reportedly located at this site. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C3-121	4	Wilshire/26th	19	273	2730 Wilshire Blvd. Santa Monica, CA 90403	This address was identified as Kennedy-Wilson International/ BH Car Wax/Cordary Plaza/Roger L. Lent DDS/AIMCO/Samual DDS/Edward C. Dorr DDS/American Bioscience/Manhattan Controls in the HIST CORTESE, HAZNET, LUST, CA FID UST, and SWEEPS UST databases. According to the LUST database, in 1995, a release of aviation fuel affected soil only at this site. The status of the LUST case is listed as "completed-case closed" as of July 24, 1996. Based on this information, there is a low potential for this property to impact the proposed alignment.
C3-122	4	Wilshire/26th	19	275	2601 Wilshire Blvd. Santa Monica, CA 90403	This address was identified as 93650/Conoco Phillips #257347/Tosco Service Station #7347/Wilshire Unocal/Unocal Service Station #7347 in the HIST UST, UST, HAZNET, FINDS, RCRA-SQG, LUST, HIST CORTESE, CA FID UST, CHMIRS, and SWEEPS UST databases. Two LUST cases are identified for this site. The first LUST case reports that in 1997, a benzene release affected soil only at this site. The status of this LUST case is listed as "completed -case closed" as of October 25,

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Drawing No. ⁴	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map No.	EDR ID No.	Address	EDR Listings
						2007. The second LUST listing reports that soil at this site was affected with gasoline and benzene. The status of the second LUST case is also listed as “completed -case closed” as of October 25, 2007. Based on the closed case status and media affected (soil only), there is a low potential for this property to impact the proposed alignment.
C3-122	4	Wilshire/26th	19	277	2420 Wilshire Blvd. Santa Monica, CA 90403	This address was identified as Wilshire One Hour Cleaners in the HAZNET and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C3-122	4	NA	19	279	2320 Wilshire Blvd. Santa Monica, CA 90403	This address was identified as Wilshire West Car Wash in the HIST UST and HAZNET databases. Three USTs were reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C3-122	4	NA	19	281	2037 Wilshire Blvd. Santa Monica, CA 90403	This address was identified as Rene French Cleaners in the HAZNET, DRYCLEANERS, and EMI databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C3-123	3	NA	30	283	1907 Wilshire Blvd. Santa Monica, CA 90403	This address was identified as Hallmark Cleaners in the RCRA-SQG, FINDS, EMI, HAZNET, and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C3-123	3	Wilshire/16th	30	290	1731 Wilshire Blvd. Santa Monica, CA 90403	This address was identified as Prestige Cleaners in the HAZNET and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C3-123	3	Wilshire/16th	30	293	1626 Wilshire Blvd. Santa Monica, CA 90403	This address was identified as W.I. Simonson Inc. Pre-owned in the HIST UST, FINDS, RCRA-SQG, HAZNET, LUST, CA FID UST, and SWEEPS UST databases. According to the LUST database, in 1998, a hydrocarbons release affected soil only at this site. The status of the LUST case is listed as “completed-case closed” as of May 12, 2000. Based on the closed case status and the time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.

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Drawing No. ⁴	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map No.	EDR ID No.	Address	EDR Listings
C3-123	3	Wilshire/16th	30	293	1601 Wilshire Blvd. Santa Monica, CA 90403	This address was identified as C.H. Hornburg Jr. Imported Motors/Hornburg Jaguar, Inc. in the HIST UST, FINDS, RCRA-NonGen, and HAZNET database. Two waste oil USTs were reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C3-123	3	Wilshire/16th	30	301	1250 16 th St. Santa Monica, CA 90404	This address was identified as Santa Monica-UCLA Medical Center in the UST, EMI, NPDES, CA FID UST, and SWEEPS UST databases. One former diesel UST was reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C3-123	3	Wilshire/16th	30	306	1421 Wilshire Blvd. Santa Monica, CA 90403	This address was identified as Lotto Cleaners/Jae Joo Kang D in the FINDS, RCRA-SQG, HAZNET, DRYCLEANERS, and EMI databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C3-123	3	Wilshire/16th	30	306	1225 15 th St. Santa Monica, CA 90404	This address was identified as S.M. Hospital Medical in the HIST UST, EMI, CA FID UST, and SWEEPS UST databases. One former diesel UST was reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C3-124	2	NA	29	311	1300 Wilshire Blvd. Santa Monica, CA 90401	This address was identified as Whilco Cleaners/Tommy's #4 Cleaners/Lucky Dry Cleaners in the RCRA-SQG, FINDS, EMI, HAZNET, and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C3-124	2	NA	29	311	1221 Wilshire Blvd. Santa Monica, CA 90403	This address was identified as Lucky Dry Cleaners/S.M. Lucky Dry Cleaners and Laundry in the RCRA-SQG, FINDS, HAZNET, and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C3-124	2	NA	29	315	1200 Wilshire Blvd. Santa Monica, CA 90403	This address was identified as Goodyear Auto Service #9274 in the HIST UST and HAZNET databases. One former waste oil UST was reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, this listing is not expected to impact the proposed alignment.

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Drawing No. ⁴	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map No.	EDR ID No.	Address	EDR Listings
C3-124	2	NA	29	316	1122 Wilshire Blvd. Santa Monica, CA 90401	This address was identified as One Hour Martinizing in the EMI, HAZNET, and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C3-124	2	NA	29	318	1011 Wilshire Blvd. Santa Monica, CA 90401	This address was identified as Plaza Cleaners/Regal Cleaners in the EMI, HAZNET, DRYCLEANERS, RCRA-SQG, and WIP databases. No violations are reported. The DRYCLEANERS database reports that this facility is "inactive" as of June 30, 1997. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C3-124	2	NA	29	323	804 Wilshire Blvd. Santa Monica, CA 90401	This address was identified as Fujita Corporation/Sam's Union/Arco Products Company in the HIST CORTESE, SWEEPS UST, CA FID UST, HIST UST, HAZNET, and LUST databases. Five USTs were reportedly located at this site. According to the LUST database, in 1991, a gasoline release affected soil only at this site. The status of the LUST case is listed as "completed -case closed" as of June 27, 1992. Based on the closed case status and the time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.
C3-125	1	Wilshire/4th	29	329	510 Wilshire Blvd. Santa Monica, CA 90401	This address was identified as Beach Cleaners/Oceanside Dry Cleaners in the EMI, HAZNET, FINDS, DRYCLEANERS, and RCRA-SQG databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C3-125	1	Wilshire/4th	29	329	534 Wilshire Blvd. Santa Monica, CA 90401	This address was identified as Plaza Cleaners in the EMI, HAZNET, FINDS, DRYCLEANERS, and RCRA-SQG databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C3-125	1	Wilshire/4th	29	329	567 Wilshire Blvd. Santa Monica, CA 90401	This address was identified as Cherko Auto in the HIST UST database. The facility is listed as a gasoline station. Three gasoline USTs and one waste oil UST were reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, this listing is not expected to impact the proposed alignment.
C3-125	1	Wilshire/4th	29	334	432 Wilshire Blvd. Santa Monica, CA 90401	This address was identified as 90716/Holmes Chevron Food Mart/Chevron Station 90716 in the HIST UST, FINDS, RCRA-SQG, HAZNET, LUST, CA FID UST, and SWEEPS UST databases. According to the LUST database, a gasoline release affected soil only at this site.

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Drawing No. ⁴	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Focus Map No.	EDR ID No.	Address	EDR Listings
						The status of the LUST case is listed as “open-site assessment” as of January 13, 2009. No additional information was available on the GeoTracker database. Based on the open case status and lack of information available, there is a high potential for this property to impact the proposed alignment.
C3-125	1	Wilshire/4th	29	334	410 Wilshire Blvd. Santa Monica, CA 90401	This address was identified as Plaza Cleaners/Hilda Borekcia in the EMI database. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C3-125	1	Wilshire/4th	29	334	419 Wilshire Blvd. Santa Monica, CA 90401	This address was identified as Santa Monica Cleaners/\$1 Dollar Cleaners Co. in the FINDS and RCRA-SQG databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.

3.4.4 Alternative 4

The following table provides a summary of the EDR listings identified with potential impacts to Alternative 4.

Table 3-13: EDR Listings with Potential Impacts to Alternative 4

Drawing No.	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Report	EDR ID No.	Address	EDR Listings
C-201	36	Hollywood/Highland	ALT A	2	6800 Hollywood Blvd. Hollywood, CA 90028	This address was identified as Trizec Hahn Hollywood LLC/Souvenirs of Hollywood in the SLIC and HAZNET databases. The SLIC case status is listed as “no further action required.” The GeoTracker database lists the cleanup status as “completed-case closed” as of April 6, 2001. Based on the closed case status and time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.
C-201	36	NA	ALT A	7	1410 N. Highland Ave. Hollywood, CA 90028	This address was identified as Firestone Tire/Rubber Co. in the FINDS, HAZNET, and SWEEPS UST databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-201	36	NA	ALT A	7	1411 N. Highland Ave. Hollywood, CA 90028	This address was identified as Cinema City Car Wash, Inc. in the HIST UST, HAZNET, CA FID UST, and SWEEPS UST databases. Five USTs were reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-201	36	NA	ALT A	7	1459 N. Highland Ave/6804 W Sunset. Hollywood, CA 90028	This address was identified as Chevron #9-9377/Chevron USA in the RCRA-SQG, FINDS, HIST UST, LUST, SWEEPS UST, CA FID UST, and HIST CORTESE databases. According to the LUST database, in 1988, a release of gasoline affected groundwater at this site. The status of the LUST case is listed as “completed -case closed” as of December 30, 1994. Based on the closed case status and the time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.
C-201	36	NA	ALT 11A	7	6693 W. Sunset Blvd. Hollywood, CA 90028	This address was identified as Studio Cleaners & Tailors in the HAZNET and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-201	36	NA	ALT A	7	6760 W. Sunset Blvd. Hollywood, CA 90012	This address was identified as Sunset Union Service/Union Oil #6760 in the HIST UST, CA FID UST, and SWEEPS UST, databases. Three USTs were reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are

Drawing No.	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Report	EDR ID No.	Address	EDR Listings
						not expected to impact the proposed alignment.
C-202	34	Santa Monica/ La Brea	ALT A	18	8569 W. Sunset Blvd. Hollywood, CA 90028	This address was identified as Unocal #4284 in the LUST and HIST CORTESE databases. According to the LUST database, in 1994, a gasoline release affected groundwater at this site. The status of the LUST case is listed as "completed -case closed" as of February 3, 1997. Based on the closed case status and the time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.
C-205	32	NA	ALT 11A	22	8042 Santa Monica Blvd. Hollywood, CA 90028	This address was identified as Four Seasons Cleaners in the HAZNET, FINDS, RCRA-SQG, and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-203	34	NA	ALT 11A	22	7116 Santa Monica Blvd. Los Angeles, CA 90046	This address was identified as Econo Lube N' Tube/Hollywood Warner Studio in the LA Co. HMS, HIST UST, FINDS, RCRA-SQG, and SWEEPS UST databases. One UST was reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-203	34	NA	ALT 11A	22	7116 Santa Monica Blvd. Los Angeles, CA 90046	This address was identified as SL West Hollywood LLC in the LA Co. HMS and LUST databases. According to the LUST database, a release affected this site. The potential media affected and potential contaminants of concern are not listed. The status of the LUST case is listed as "open-site assessment" as of April 17, 2008. The lead agency for this case is reported as Los Angeles County and therefore additional information was not available on the GeoTracker database. Based on the open case status and lack of information available, there is a high potential for this property to impact the proposed alignment.
C-203	34	NA	ALT 11A	22	7141 Santa Monica Blvd. Los Angeles, CA 90048	This address was identified as Faith Plating in the HIST UST, FINDS, RCRA-SQG, FINDS, EMI, SWEEPS UST, HIST CORTESE, LA Co. HMS, and LUST databases. According to the LUST database, in 1990, a gasoline release affected groundwater at this site. The status of the LUST case is listed as "completed-case closed" as of December 31, 1996. Based on the closed case status and the time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.
C-203	34	NA	ALT 11A	22	7144 Santa Monica Blvd. Los Angeles, CA 90038	This address was identified as Unocal (Former)/City of West Hollywood-BA Studios/Union Oil/West Hollywood Gateway in the HIST CORTESE, SLIC, LA Co. HMS, and LUST databases. The SLIC database lists the

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Drawing No.	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Report	EDR ID No.	Address	EDR Listings
						cleanup status as “open-site assessment” as of May 25, 2001. According to the LUST database, in 1991, a gasoline release affected soil at this site. The status of the LUST case is listed as “open-site assessment” as of December 23, 1991. No additional information was available on the GeoTracker database. Based on the open case status and lack of information available, there is a high potential for this property to impact the proposed alignment.
C-204	32	NA	ALT 11A	22	7308 Santa Monica Blvd. Hollywood, CA 90046	This address was identified as Movie Town Cleaners in the FINDS, RCRA-SQG, and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-205	32	NA	ALT 11A	22	8020 Santa Monica Blvd. Los Angeles, CA 90046	This address was identified as World Oil Co. #5 in the UST, RCRA-SQG, FINDS, HAZNET, HIST UST, HIST CORTESE, CA WDS, LUST, and LA Co. HMS databases. According to the LUST database, in 1986, a gasoline release affected groundwater at this site. The status of the LUST case is listed as “completed-case closed” as of December 28, 2005. Based on the closed case status, there is a low potential for this property to impact the proposed alignment.
C-205	32	NA	ALT 11A	22	8122 Santa Monica Blvd. Los Angeles, CA 90046	This address was identified as Top Hat Cleaners in the DRYCLEANERS, RCRA-SQG, FINDS, HAZNET, and EMI databases. No violations are reported. Top Hat Cleaners is located in the Crescent Shopping Center, which was identified at 8100-8136 Santa Monica Blvd. in the SLIC database. According to the SLIC database, a release of VOCs affected groundwater at this site. The status of the SLIC case is listed as “open-site assessment” as of November 16, 1999. The GeoTracker database lists the potential contaminants of concern as “fuel oxygenates, gasoline, other chlorinated hydrocarbons, other petroleum, PCE, TCE, waste oil/motor/hydraulic/lubricating” that affected indoor air, soil vapor, and groundwater”. In November 2009, the RWQCB issued a notice of violation for failure to submit technical reports. No technical reports were found on the GeoTracker database. Based on the lack of information available, the open case, the notice of violation, and proximity to the alignment, there is a high potential for this property to impact the proposed alignment.

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Drawing No.	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Report	EDR ID No.	Address	EDR Listings
C-205	32	NA	ALT 11A	22	8205 Santa Monica Blvd. Hollywood, CA 90046	This address was identified as City Express Cleaners in the FINDS, RCRA-SQG, HAZNET, EMI, and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-205	32	NA	ALT 11A	22	8210 Santa Monica Blvd. Hollywood, CA 90046	This address was identified as Joy Cleaners in the EMI and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-205	32	NA	ALT 11A	22	8122 Santa Monica Blvd. Hollywood, CA 90046	This address was identified as Top-Hat Cleaners in the FINDS, RCRA-SQG, HAZNET, EMI, and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-204	34	NA	ALT 11A	22	7564 Santa Monica Blvd. Los Angeles, CA 90046	This address was identified as Thrifty Oil Company/ARCO #9639/Thrifty Service Station #244/Chevron #9-1099 in the LUST, SWRCY, SWEEPS UST, LA Co. HMS, and HIST CORTESE databases. Two LUST cases are identified for this site. The first LUST case reports that in 2001, a gasoline and diesel release affected this site. The potential media affected is listed as “under investigation”. The status of this LUST case is listed as “open-site assessment” as of September 5, 2001. The GeoTracker database reports that no groundwater data is available related to this case and that groundwater monitoring wells are required. Additional information was not available on the GeoTracker database. The second LUST case reports that in 1992, a hydrocarbons release affected soil only at this site. The status of the second LUST case is listed as “completed-case closed” as of July 17, 1996. Based on the open case status and lack of information available, there is a high potential for this property to impact the proposed alignment.
C-204	34	NA	ALT 11A	22	7643 Santa Monica Blvd. Los Angeles, CA 90046	This address was identified as LA CO Fire Station #8 in the HIST UST, LUST, UST, SWEEPS UST, LUST, and LA Co. HMS databases. According to the LUST database, in 1994, a gasoline release affected this site. The potential media affected is not reported. The status of the LUST case is listed as “leak being confirmed” in the EDR Report. The GeoTracker database reports the cleanup status as “open-site assessment” as of May 24, 2001. It appears that soil sampling was performed at this site in 2003, but since the lead agency is listed as Los Angeles County, additional information was available on the GeoTracker

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Drawing No.	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Report	EDR ID No.	Address	EDR Listings
						database. Based on the open case status and lack of information available, there is a high potential for this property to impact the proposed alignment.
C-204	32	NA	ALT 11A	22	7611 Santa Monica Blvd. Hollywood, CA 90046	This address was identified as Top-Hat Cleaners in the FINDS, RCRA-SQG, HAZNET, and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-204	34	NA	ALT 11A	22	7960 Santa Monica Blvd. Los Angeles, CA 90046	This address was identified as 76 Products Station #7261 in the ERNS, HAZNET, CHMIRS, and LUST databases. According to the LUST database, in 1996, a gasoline release affected soil at this site. The status of the LUST case is listed as "completed-case closed" as of April 21, 1997. Based on the closed case status and the time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.
C-204	32	NA	ALT 11A	22	7755 Santa Monica Blvd. Hollywood, CA 90046	This address was identified as Mini Clean Drycleaners in the FINDS, RCRA-SQG, and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-204	32	NA	ALT 11A	22	7755 Santa Monica Blvd. Hollywood, CA 90046	This address was identified as San Fair Cleaners in the FINDS, EMI, HAZNET, RCRA-SQG, and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-203	32	NA	ALT 11A	22	1110 N. La Brea Ave. Hollywood, CA 90038	This address was identified as Otto's Drycleaners/Quality Cleaners in the RCRA-SQG, FINDS, HAZNET, EMI, and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-203	34	NA	ALT 11A	22	1154 N. La Brea Ave. Hollywood, CA 90038	This address was identified as Gerster/Rolph Brake & Wheel in the UST and LUST databases. According to the LUST database, a gasoline release affected this site. The potential media affected is not reported. The status of the LUST case is listed as "open-site assessment" as of April 25, 2008. According to the GeoTracker database, the extent of groundwater contamination has not been determined and elevated levels of TPHg and benzene are present in groundwater. Four groundwater monitoring wells are located on this site. Based on the open case status and additional assessment work needed, there is a high potential for this

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Drawing No.	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Report	EDR ID No.	Address	EDR Listings
						property to impact the proposed alignment.
C-204	32	NA	ALT 11B	5	8032 Santa Monica Blvd. West Hollywood, CA 90069	This address was identified as Four Seasons Dry Cleaners & Laundry in the SLIC database. According to the SLIC database, a release of tetrachloroethylene (PCE) affected groundwater at this site. The status of the SLIC case is listed as "open-site assessment" as of June 12, 2006. No additional information was available on the GeoTracker database. Based on the open case status and lack of information available, there is a high potential for this property to impact the proposed alignment.
C-204	32	NA	ALT 11B	5	8100 Santa Monica Blvd. West Hollywood, CA 90069	This address was identified as Crescent Shopping Center in the SLIC database. According to the SLIC database, a release of volatile organic compounds (VOCs) affected this site. The status of the SLIC case is listed as "open-site assessment" as of November 16, 1999. No additional information was available on the GeoTracker database. Based on the open case status and lack of information available, there is a high potential for this property to impact the proposed alignment.
C-204	31	NA	ALT 11B	7	8203 Santa Monica Blvd. West Hollywood, CA 90069	This address was identified as the City Express Cleaners in the DRYCLEANERS and HAZNET databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-204	31	NA	ALT 11B	7	8278 Santa Monica Blvd. West Hollywood, CA 90069	This address was identified as the Studio 4 Cleaners in the DRYCLEANERS, HAZNET, RCRA-SQG, and FINDS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-204	31	NA	ALT 11B	7	8265 Santa Monica Blvd. West Hollywood, CA 90069	This address was identified as the Village Cleaners LLC/Alpha Cleaners in the DRYCLEANERS, HAZNET, RCRA-SQG, and FINDS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-204	31	NA	ALT 11B	7	8280 Santa Monica Blvd. West Hollywood, CA 90069	This address was identified as the Hanger Cleaners in the DRYCLEANERS, HAZNET, RCRA-SQG, and FINDS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-204	31	NA	ALT 11B	7	8291 Santa Monica Blvd. West Hollywood, CA	This address was identified as N/A in the LUST databases. According to the LUST database, in 2002, a gasoline release affected soil at this site. The status of the LUST case is listed as "completed-case closed" as of

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Drawing No.	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Report	EDR ID No.	Address	EDR Listings
					90046	April 28, 2003. Based on the closed case status and media affected (soil), there is a low potential for this property to impact the proposed alignment.
C-204	31	NA	ALT 11B	7	8305 Santa Monica Blvd. West Hollywood, CA 90069	This address was identified as The Peter's-Magnolia Cleaners/Peters Cleaners in the DRYCLEANERS, HAZNET, RCRA-SQG, and FINDS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-205	31	NA	ALT 11B	8	8359 Santa Monica Blvd. West Hollywood, CA 90069	This address was identified as Hollyway Cleaners in the DRYCLEANERS, HAZNET, EMI, RCRA-SQG, and FINDS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-205	31	Santa Monica/ La Cienega	ALT 11B	8	8380 Santa Monica Blvd. West Hollywood, CA 90069	This address was identified as Allan Wutkee Service Center/West Hollywood Service Center/A&A Tire & Service Center in the HAZNET, FINDS, CA FID UST, LA Co. HMS, LUST, HIST UST, HIST CORTESE, and SWEEPS UST databases. Six USTs were reportedly located at this site. According to the LUST database, a gasoline release affected groundwater at this site. The status of the LUST case is listed as "open-remediation" as of February 5, 2004. The GeoTracker database reports that groundwater is impacted with elevated levels of MTBE and remediation is ongoing. Based on the open case status and ongoing remediation, there is a high potential for this property to impact the proposed alignment.
C-205	31	NA	ALT 11B	8	8364 Santa Monica Blvd. West Hollywood, CA 90069	This address was identified as Care Cleaners & Laundry in the DRYCLEANERS, HAZNET, LA Co. HMS, EMI, RCRA-SQG, and FINDS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-205	31	NA	ALT 11B	8	8383 Santa Monica Blvd. West Hollywood, CA 90069	This address was identified as Thrifty Oil Co./Chevron #9-0769T (Former)/Service Station in the HAZNET, LUST, HIST UST, HIST CORTESE, CA FID UST, and SWEEPS UST databases. Four USTs were reportedly located at this site. According to the LUST database, in 1985, a gasoline release affected groundwater at this site. The status of the LUST case is listed as "completed-case closed" as of June 14, 1999. Based on the closed case status and the time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.
C-206	31	NA	ALT 11B	11	8505 Santa Monica	This address was identified as Canyon Cleaners in the DRYCLEANERS,

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Drawing No.	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Report	EDR ID No.	Address	EDR Listings
					Blvd. West Hollywood, CA 90069	HAZNET, and EMI databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-206	30	Santa Monica/ La Cienega	ALT 11B	14	958 Hancock Ave. Los Angeles, CA 90069	This address was identified as Fire Station #7 in the LUST, HIST UST, and HIST CORTESE databases. According to the LUST database, in 1985, a gasoline release affected groundwater at this site. The status of the LUST case is listed as "completed-case closed" as of September 13, 1996. Based on the closed case status and the time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.
C-206	30	Santa Monica/ La Cienega	ALT 11B	13	8725 Santa Monica Blvd. West Hollywood, CA 90069	This address was identified as Former Canyon Cleaners/Elliott Enterprises in the RCRA-SQG, SLIC, HAZNET, and FINDS databases. According to the SLIC database, a release of VOCs affected this site. The status of the SLIC case is listed as "open -remediation" as of June 30, 2002. According to the GeoTracker database, this site received closure for soil remediation in 2003, but groundwater remains impacted with PCE. The cleanup status of the site is "open -remediation" as of March 30, 2009 on the GeoTracker database. Based on the open case status and impacted to groundwater, there is a high potential for this property to impact the proposed alignment.
C-206	30	Santa Monica/ La Cienega	ALT 11B	13	8741 Santa Monica Blvd. Los Angeles, CA 90212	This address was identified as Westside Story in the SWEEPS UST database. Two USTs were reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, this listing is not expected to impact the proposed alignment.
C-206	30	Santa Monica/ La Cienega	ALT 11B	13	8759 Santa Monica Blvd. West Hollywood, CA 90069	This address was identified as Pacific Bell in the HAZNET, LUST, RCRA-LQG, HIST UST, NPDES, HIST CORTESE, and SWEEPS UST databases. According to the LUST database, in 1985, a gasoline release affected soil at this site. The status of the LUST case is listed as "completed-case closed" as of December 12, 1995. Based on the closed case status and the time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.
C-207	30	Santa Monica/ La Cienega	ALT 11B	17	8787 Santa Monica Blvd. West Hollywood, CA 90069	This address was identified as Santa Palm Car Wash in the LUST, HAZNET, HIST CORTESE, LA Co. HMS, SWEEPS UST, ENVIROSTOR, HIST UST, CA BOND EXP. Plan, UST, and NPDES and databases. The ENVIROSTOR database reports that the case was referred to the RWQCB in 1986. According to the LUST database, in 1985, a gasoline release affected groundwater at this site. The status of the LUST case is listed as "completed-case closed" as of March 26, 1997.

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Drawing No.	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Report	EDR ID No.	Address	EDR Listings
						Based on the closed case status and the time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.
C-207	30	Santa Monica/ La Cienega	ALT 11B	17	8800 Santa Monica Blvd. Los Angeles, CA 90069	This address was identified as Division 7-West Hollywood/Southern CA RTD/LACMTA/Metro Division 7/SO CAL Rapid Transit District in the HIST UST, EMI, LUST, CHMIRS, HIST CORTESE, CA WDS, HAZNET, UST, LA Co. HMS, NPDES, and SWEEPS UST databases. According to the LUST database, in 1985, a diesel release affected groundwater at this site. The status of the LUST case is listed as "open-site assessment" as of October 19, 2004. The GeoTracker database reports that groundwater is impacted with free product, which is being removed. Based on the open case status and impacts to groundwater, there is a high potential for this property to impact the proposed alignment.
C-207	30	Santa Monica/ La Cienega	ALT 11B	17	804 Hilldale Ave. West Hollywood, CA 90069	This address was identified as Marklee Cleaners in the FINDS, HAZNET, DRYCLEANERS, and RCRA-SQG databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-207	29	NA	ALT 11B	19	720 N. San Vicente West Hollywood, CA 90069	This address was identified as Los Angeles Sheriff's Stations West Hollywood/Johnson Controls in the HAZNET, LUST, UST, HIST UST, LA Co. HMS, HIST CORTESE, CA FID UST, and SWEEPS UST databases. According to the LUST database, in 1985, a gasoline release affected groundwater at this site. The status of the LUST case is listed as "completed-case closed" as of December 4, 1996. Based on the closed case status and the time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.
C-207	29	NA	ALT 11B	25	8494 Melrose Ave. West Hollywood, CA 90048	This address was identified as Center for Early Education in the LUST database. According to the LUST database, in 1996, a gasoline release affected groundwater at this site. The status of the LUST case is listed as "completed-case closed" as of August 20, 2004. Based on the closed case status, there is a low potential for this property to impact the proposed alignment.
C-208	28	NA	ALT 11B	37	8700 Beverly Blvd. Los Angeles, CA 90048	This address was identified as Cedars Sinai Medical Center in the HIST UST, HAZNET, CA FID UST, UST, NPDES, SWEEPS UST, RCRA-LQG, FINDS, and CA WDS databases. Eleven USTs were reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, this listing is not expected to impact the proposed alignment.

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Drawing No.	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Report	EDR ID No.	Address	EDR Listings
C-208	28	NA	ALT 11B	37	310 N. San Vicente Los Angeles, CA 90048	This address was identified as 310 Surgical Center in the UST database. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, this listing is not expected to impact the proposed alignment.
C-208	28	NA	ALT 11B	37	8555 Beverly Blvd. Los Angeles, CA 90048	This address was identified as Hotel Du Boid Rouge in the SWEEPS UST, EMI, and CA FID UST databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-208	28	NA	ALT 11B	37	NW Corner -8655 Beverly Blvd. West Hollywood, CA	This location was identified as San Vicente & Beverly in the WMUDS/SWAT and SWF/LF databases. This location is identified as a closed solid waste disposal site. The date of closure is not reported. The California Solid Waste Information System (SWIS) database ⁶ reports that this former disposal site is inspected annually by the County of Los Angeles and the last inspection was performed on November 13, 2007. No violations or areas of concern were reported at that time. The exact location of this former solid waste disposal site cannot be determined based on the information available. Therefore, there is a high potential for this property to impact the proposed alignment.
C-209	28	Beverly Center Area	ALT 11B	44	100 S. La Cienega Blvd. Los Angeles, CA 90048	This address was identified as 100 Fifty-Five Cal Corporation Construction Site in the LUST and HIST CORTESE databases. According to the LUST database, in 1987, a heating oil/fuel oil release affected groundwater at this site. The status of the LUST case is listed as "completed-case closed" as of July 25, 1996. Based on the closed case status and the time elapsed since closure was granted, there is a low potential for this property to impact the proposed alignment.
C-209	28	Beverly Center Area	ALT 11B	45	220 San Vicente Blvd. Los Angeles, CA 90048	This address was identified as Chevron U.S.A. Inc., Production in the EMI database. Based on the lack of listing in other databases indicating violations and/or a release, this listing is not expected to impact the proposed alignment.
C-209	28	Beverly Center Area	ALT 11B	46	118 Sherbourne Dr. Los Angeles, CA 90048	This address was identified as Cedar Sinai Medical Center in the LUST database. According to the LUST database, in 2002, a release of "waste oil/motor/hydraulic/lubricating" affected groundwater at this site. The

⁶ California Department of Resources Recycling and Recovery (CalRecycle), Solid Waste Information System (SWIS) database, <http://www.calrecycle.ca.gov/SWFacilities/Directory/>

Drawing No.	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Report	EDR ID No.	Address	EDR Listings
						status of the LUST case is listed as “completed-case closed” as of September 28, 2005. Based on the closed case status, there is a low potential for this property to impact the proposed alignment.
C-209	28	NA	ALT 11B	47	8631 W. 3 rd St. Los Angeles, CA 90048	This address was identified as Cedars Sinai Medical Towers/Wright Carlyle in the SWEEPS UST and CA FID UST databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-209	27	Beverly Center Area	ALT 11B	49	8550 W. 3 rd St., Suite 100 Los Angeles, CA 90048	This address was identified as Merry Go Round Cleaners/George Franscell in the RCRA-SQG, SLIC, HAZNET, EMI, FINDS, and DRYCLEANERS databases. According to the SLIC database, a release of VOCs affected groundwater and soil vapor at this site. According to the GeoTracker database, the cleanup status is listed as “open-remediation” as of January 20, 2009. Groundwater is impacted with PCE, TCE, and VOCs and groundwater monitoring and remediation is ongoing at this site. Based on the open case status and impacts to groundwater, there is a high potential for this property to impact the proposed alignment.
C-209	27	Beverly Center Area	ALT 11B	50	8474 W. 3 rd St., Suite 100 Los Angeles, CA 90048	This address was identified as La Mirage Cleaners in the HAZNET, RCRA-SQG, FINDS, EMI, and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-209	27	Beverly Center Area	ALT 11B	50	300 S. La Cienega Blvd. Los Angeles, CA 90048	This address was identified as Marc A Fogel/Bug City/Studio Express in the HAZNET, LUST, CA FID UST, and SWEEPS UST databases. According to the LUST database, in 1999, a gasoline release affected groundwater at this site. The status of the LUST case is listed as “open-remediation” as of June 9, 2008. According to the GeoTracker database, groundwater is impacted with elevated levels of TPHg, benzene, MTBE, and TBA and remedial action (cleanup) is underway. Based on the open case status and impacts to groundwater, there is a high potential for this property to impact the proposed alignment.
C-209	27	Beverly Center Area	ALT 11B	54	430 S. San Vicente Blvd. Los Angeles, CA 90048	This address was identified as Best Quality Cleaners in the HAZNET and DRYCLEANERS databases. No violations are reported. Based on the lack of listing in other databases indicating a release to soil and/or groundwater, there is a low potential for this property to impact the proposed alignment.
C-209	27	NA	ALT 11B	56	435 S. La Cienega Blvd. Los Angeles, CA	This address was identified as La Cienega Realty Association in the SWEEPS UST and CA FID UST databases. No tank specifics are reported. Based on the lack of listing in other databases indicating

Drawing No.	URS Map Sheet (1 to 39)	Nearby Proposed Station Location	EDR Report	EDR ID No.	Address	EDR Listings
					90048	violations and/or a release, these listings are not expected to impact the proposed alignment.
C-209	27	NA	ALT 11B	56	477 S. La Cienega Blvd. Los Angeles, CA 90048	This address was identified as Hotel Nikko at Beverly Hills in the UST, HAZNET, FINDS, RCRA-SQG, and SWEEPS UST databases. One UST was reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.
C-209	27	NA	ALT 11B	59	444 S. San Vicente Blvd. Los Angeles, CA 90048	This address was identified as Cedars Sinai Medical Center/Tower Magnetic Imaging Inc. in the UST, HAZNET, CA FID UST, SWEEPS UST, and EMI databases. One UST was reportedly located at this site. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed alignment.



3.4.5 Alternative 5

Alternative 5 includes Alternatives 1, 2, 3, and 4 and therefore this information can be found in the previous sections.

3.4.6 MOS 1

EDR listings with the potential to impact MOS 1 are included in the discussion for Alternative 1.

3.4.7 MOS 2

EDR listings with the potential to impact MOS 2 are included in the discussion for Alternative 1.

3.4.8 Union Pacific Los Angeles Transportation Center Rail Yard

The following table provides a summary of the EDR listings identified with potential impacts to the Union Pacific Los Angeles Transportation Center Rail Yard.

Table 3-14: EDR Listings with Potential Impacts to the Union Pacific Los Angeles Transportation Center Rail Yard

Drawing No. ⁷	URS Map Sheet (1 to 39)	EDR ID No.	Address	EDR Listings
Y-102	38	A1, A2	750 Lamar St. Los Angeles, CA 90031	This address was identified as Parsec and LA Transportation Center in the RCRA SQG, FINDS, HAZNET, NPDES, and SWEEPS UST databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed maintenance yard.
Y-102	38	D8, D9	1430 Bolero Ln. Los Angeles, CA 90012	This address was identified as BNSF Mission Tower Site in the SLIC database. According to the SLIC database, a release of total petroleum hydrocarbons, VOCs, and metals including arsenic and chromium affected this site. The potential media affected is not specified. The GeoTracker database reports the cleanup status as “open-site assessment” as of June 13, 2000. No additional information was available on the GeoTracker database. Based on the open case status, the type of contaminants, and the likelihood that this release is related to the railroad line where it crosses the Los Angeles River into train yard, this listing has high potential to impact the proposed maintenance yard.
Y-103	38	B6, B7	730 Lamar St. Los Angeles, CA 90031	This address was identified as Rail Services Inc. in the HIST UST, SWEEPS UST, and CA FID UST databases. A motor vehicle diesel UST was reportedly located at this site.

⁷ Los Angeles County MTA, Westside Subway Extension, Advanced Conceptual Engineering Drawings, Draft January 2010.

Drawing No. ⁷	URS Map Sheet (1 to 39)	EDR ID No.	Address	EDR Listings
				Based on the lack of listing in other databases including the GeoTracker database indicating violations and/or a release, these listings are not expected to impact the proposed maintenance yard.
Y-101 and Y-102	38	G20, G21, G22, G23, G25, G26, G27, G28, G30	490, 496, 498 Bauchet St. Los Angeles, CA 90013	This address was identified as County of Los Angeles/Bauchet Street/Van der Horst Corp of America/United States EPA in the HIST UST, ENVIROSTOR, SLIC, CERCLIS, RCRA-SQG, RCRA-LQG, Liens 2, and FINDS databases. Based on the information reviewed, the entire area was historically the location of a manufactured gas plant. The 498 Bauchet property is currently a closed SLIC case. The 496 Bauchet property was investigated by US EPA and given a no further action determination with regard to Superfund listing. The location at 490 Bauchet Street is identified as So Cal Gas Company Sector E of the Aliso Street Manufactured gas plant site. The manufactured gas plant extended from the Bauchet Street location south to Temple Street adjacent to the west of the railroad line. Soils were reportedly impacted by petroleum hydrocarbons, VOCs, metals including arsenic and lead, and polynuclear aromatic hydrocarbons (PAHs). Remediation was achieved through excavation and the sites closed to risk based cleanup levels. Based on the case status of restricted closure to risk based clean up levels, impacted soil, location either adjacent to or within the maintenance yard, there is a high potential for this property to impact the proposed maintenance yard.
Y-101	38 and 39		Keller Yard south of Caesar Chavez Los Angeles, CA	This location is listed in ENVIROSTOR database as a part of the former Aliso Street manufactured gas plant. Soils were impacted by petroleum hydrocarbons, VOCs, metals including arsenic and lead, and PAHs. Based on information provided in the ENVIROSTOR database, the case remains open and a removal action has not yet been completed. Based on the open case status, impacts to soil, location either adjacent to or within the maintenance yard, there is a high potential for this property to impact the proposed maintenance yard.

3.4.9 Expanded Division 20 Yard

The following table provides a summary of the EDR listings identified with potential impacts to the Expanded Division 20 Yard.

Table 3-15: EDR Listings with Potential Impacts to the Expanded Division 20 Yard

URS Map Sheet (1 to 39)	EDR ID No.	Address	EDR Listings
39	A1, A2	585 S. Santa Fe Ave. Los Angeles, CA 90013	This address was identified as Charles G. Spilo in the CA FID, SWEEPS UST, and HIST UST databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed maintenance yard.
39	3	1479 E. 6th St. Los Angeles, CA 90013	This address was identified as Inmont Corporation in the CA FID UST and SWEEPS UST databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed maintenance yard.
39	A4, A5	1451 East 6 th St. Los Angeles, CA 90013	This address was identified as LA Street Maintenance Storage Yard/6 th Street Cleaning Yard in the RCRA SQG, HAZNET, and FINDS databases. According to the GeoTracker database, soil only was affected at this site and the case was closed in January 2001. Based on the closed case status and impacts to soil only, there is a low potential for this property to impact the proposed maintenance yard.
39	A7, A8, A9, A10, A11, A12, A13	590 S. Santa Fe Ave. Los Angeles, CA 90013	This address was identified as BASF Corp./Inmont Corporation/New Line Cinema/Sun Chemical Corporation/Butterfield in the HIST UST, HIST Cal-Sites, ENVIROSTOR, SLIC, LUST, RCRA Non-Gen, HIST CORTESE, and FINDS databases. The location was used historically for the manufacture of paints and inks using solvents. Numerous USTs were operated onsite. Soil and groundwater was affected by solvents and the potential contaminants of concern include benzene, ethylbenzene, dichloroethane, dichloroethene, and other chemicals. According to the ENVIROSTOR database, this location is an active Voluntary Cleanup site. The database does not indicate whether remedial action has yet occurred. Based on the active case status, impacts to soil, location either adjacent to or within the maintenance yard, there is a high potential for this property to impact the proposed maintenance yard.
39	B22	320 S Santa Fe Ave. Los Angeles 90013	This address is identified as So Cal Rapid Transit District in the NPDES, SWEEPS UST, and HAZNET databases. Four USTs were reportedly located at this site. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed maintenance yard.

3.4.10 Turnback Facility

The following table provides a summary of the EDR listings identified with potential impacts to the Turnback Facility.

Table 3-16: EDR Listings with Potential Impacts to Turnback Facility

URS Map Sheet (1 to 39)	EDR ID No.	Address	EDR Listings
39	1	814 East Temple St. Los Angeles, CA 90012	This address was identified as Poppy Poultry in the CA FID UST and SWEEPS UST databases. No tank specifics are reported. Based on the lack of listing in other databases indicating violations and/or a release, these listings are not expected to impact the proposed maintenance yard.
39	A2, A3, A4, A5, A6	410 Center St. Los Angeles, CA 90012	This address was identified as Manley Oil/Greenwald Company in the HIST UST, VCP, RCRA-SQG, and ENVIROSTOR databases. According to the LUST database, Manley Oil operated a crude oil bulk plant with two 10,000-gallon tanks. No additional information was provided. Under Greenwald, the listing indicates voluntary cleanup under DTSC oversight and prior use as a machine shop/manufactured gas plant. Soils listed as impacted by butadiene, lead, metals, PAHs, and VOCs. In 2006 a removal action completion report was submitted to DTSC. The ENVIROSTOR database indicates that a deed restriction was recorded in December 2007 and site use is restricted to industrial use. Based on the case closed status, there is a low potential for this property to impact the proposed maintenance yard.
39	A7, A8, A9	501 Center St Los Angeles, CA 90012	This address was identified as TOSCO/UNOCAL in the SLIC, EMI, CA FID UST, SWEEPS UST, and HIST UST databases. According to the SLIC and GeoTracker databases, this location was operated as an oil distribution facility and has been an open investigation since 1997. Based on the location of over 200-feet to the west of the maintenance yard, there is a low potential for this property to impact the proposed maintenance yard.



3.5 Project Reconnaissance

This section documents the findings of the project's geologic and hazardous substances reconnaissance.

3.5.1 Geologic Reconnaissance

Following review of pertinent geologic maps and reports for the area of the study alternative alignments, a geologic site reconnaissance was performed along the entire lengths of the proposed alignments by a California Certified Engineering Geologist on July 6, 8 and 13, 2009. The reconnaissance was performed both on foot and by automobile. The purpose of this reconnaissance was to visually observe any exposed geologic materials and geomorphic features that may indicate previously unknown adverse conditions. Open excavations related to building construction along the alignments were observed (when and if any observation was possible) from accessible public areas outside the sites.

The entire West Hollywood portion of Alternatives 4 and 5 was toured on foot on July 8, 2009. Most of this alignment area is covered by the pavement of Highland Avenue and Santa Monica and San Vicente Boulevards. The ground surface of the areas adjacent to both sides of those streets is almost entirely covered by buildings, parking lot pavement, driveways, sidewalks and other walkways. With the exception of a block-long, graded vacant lot on the east side of Highland Avenue between Leland Way and De Longpre Avenue in Hollywood and a few landscaped areas such as West Hollywood Park at the intersection of Santa Monica and San Vicente Boulevards, the ground surface is almost completely obscured by buildings, pavement and other improvements. Several buildings were under construction along the alignment, but no open basement excavations were present. The terrain is flat and since grading has taken place in all areas, any significant geomorphic features that may have once existed have been altered or covered and were not observable. No unusual or adverse geologic conditions were observed along the alignment.

The portions of Alternatives 1 through 5 and MOS 1 and 2 that originate at the Wilshire/Western Station and extend as far as the Wilshire/4th Station in Santa Monica was toured on foot and by automobile on July 6 and 13, 2009. The entire alignment area was observed with the exception of the area in Westwood where several alignment alternatives are still being considered, some of which traverse cross country beneath residential neighborhoods, and the VA Hospital grounds in the Westwood/Sawtelle area. The reconnaissance was limited to Wilshire Boulevard in these areas.

Most of the alignment is covered by the pavement of Wilshire and Santa Monica Boulevards. The ground surface of the areas adjacent to both sides of those streets is almost entirely covered by buildings, parking lot pavement, driveways, sidewalks and other walkways. The few areas not covered by these types of improvements where the ground surface could be observed include a few vacant lots, a few basement excavations where building construction was taking place, landscaped areas including the grounds of the Los Angeles Country Club (very restricted visibility from the streets) and the Los Angeles Mormon Temple and the landscaped strip between Santa Monica Boulevard and Little Santa Monica Boulevard. The ground surface of all these areas had been



significantly altered by grading. No unusual or adverse geologic conditions were observed. The majority of the area along and adjacent to the alignment alternative is flat, occupied by buildings structures and since grading has taken place in all areas, any significant geomorphic features that may have once existed have been altered or covered and were not observable.

Stations

Approximately 23 stations are proposed along the study alignment alternatives. Some alternate station locations are being considered. The proposed stations are located directly along the alignments. As with the alignments themselves, due to extensive grading and construction, any significant geomorphic features that may have once existed have been altered or covered and were not observable. Additionally, no unusual or adverse geologic conditions were observed along the alignment.

Maintenance Yards

Proposed maintenance yards for the project, including the Division 20 Maintenance Yard, the Union Pacific Los Angeles Transportation Center Rail Yard, and the Turnback Facility, were not field reconnoitered due to access limitations. These yards are located within existing rail yards adjacent to the Los Angeles River. Review of aerial photographs and regional geologic maps (Dibblee, 1989) reveals that the maintenance yards are underlain by Holocene age alluvium. Review of the seismic hazard map of the area (California Division of Mines and Geology, 1999c) reveals that the Union Pacific Los Angeles Transportation Center Rail Yard is located in a liquefaction hazard zone, but the Turnback Facility and the Division 20 Maintenance Yard are not. Historic high groundwater is estimated to be at around 20-feet bgs at the Union Pacific Los Angeles Transportation Center Rail Yard and about 40 to 120 feet bgs at the Turnback Facility and the Division 20 Maintenance Yard (California Division of Mines and Geology, 1998c). No earthquake faults are known to cross any of the yards. However they are all located within a seismically active region and therefore will be subjected to future seismic shaking that will occur along local or more distant regional faults. The Union Station Oil Field is located immediately west of the Turnback Facility and the Division 20 Maintenance Yard.

3.6 Hazardous Substances Reconnaissance

This section describes the hazardous substances reconnaissance conducted to note the use or storage of hazardous or industrial chemicals or petroleum products. Access limitations allowed only for a visual observation from either the front or back of a business from public right-of-ways or other publically accessible areas along the alignments. A site reconnaissance of the proposed maintenance yard facilities was not performed due to access limitations and observations were made from public right-of-ways. These facilities are located within existing large rail yard properties. Due to access limitations, interviews with property personnel were not performed.

Based solely on the site reconnaissance observations and locations with respect to the observed land uses, some of the businesses/facilities would be considered as recognized



environmental conditions (RECs) with respect to the proposed alignment and maintenance yards (specifically, facilities where the facility is listed as a leaking underground storage tank [LUST] site or under investigation by either DTSC or the RWQCB within a 200-foot radius of the alignment and maintenance yards or underground storage tanks [USTs] were operated within the alignment). The alignments are located within an urban area characterized by paved streets, commercial office buildings, retail businesses, medical office buildings, museum property, federal property, and residential homes and apartments. The maintenance yards are also located within an urban area characterized by industrial uses including parking lots, commercial buildings, existing railroad yards or railroad right-of-way. Obvious evidence of surficial spills or leaks migrating from these properties onto the alignment was not noted. However, access onto the adjacent/surrounding properties was not available during the area reconnaissance and observations were made from public right-of-ways or other publically accessible areas.

Alternative locations tabulated below are based on the Advanced Conceptual Engineering Drawings (Draft December 30, 2009) and the Union Pacific Los Angeles Transportation Center Rail Yard location is on the Advanced Conceptual Engineering Drawings (Draft January 2010). These types of drawings were not available for the proposed expansion to the Division 20 Maintenance and Storage Facility or the proposed Turnback Facility. The reconnaissance description is organized such that as each alternative is described, only the sections of that alternative that have not already been described are added. Thus, there is no repetition within this report. MOS 1 and MOS 2 are included within Alternative 1.

**3.6.1 Alternative 1
(Station No. 0+00 to 441+00 - Drawings C-101 through C-117)**

This section describes the hazardous substances reconnaissance conducted to note the use or storage of hazardous or industrial chemicals or petroleum products along Alternative 1.

Table 3-17: Hazardous Substances Reconnaissance Findings for Alternative 1

USTs/ASTs	Ten historic gas station locations were identified in Table 3-2 based on a review of Sanborn® maps. A total of 73 UST sites were identified in Table 3-9, EDR Listings with Potential Impacts to Alternative 1.
Drycleaners	A total of 17 dry-cleaning facilities were identified in Table 3-9.
PCBs	Utility-owned transformers located under streets and on poles. No evidence of leaks or spills observed.
Waste Disposal	Dumpsters and/or trash receptacles observed at all businesses and homes.
Wetlands	None observed
Drums/Chemical Containers	None observed in accessible areas
Dumping	No dumping observed.
Pits, Ponds, Septic, Sumps	None observed in accessible areas.
Pesticide Use	None observed.
Staining	Observed staining considered to be de minimis.



Stressed Vegetation	None observed.
Unusual Odors	None noticed.
Wells, monitoring, oil and gas	Las Cienegas Oil Field Salt Lake Oil Field San Vicente Oil Field Beverly Hills Oil Field – West Area Sawtelle Oil Field
Environmentally Sensitive sites	None observed.
Asbestos	Not likely in soil. Possible in buildings older than 1982.
Lead based paint	Not likely in soil. Possible in buildings older than 1978.
Radon	US EPA survey indicated radon zone level for Los Angeles County, California is 2. Zone 2 areas are predicted to have an indoor radon screening potential between 2.0 and 4.0 pico Curies per liter (pCi/l) of air. US EPA action level for radon is 4.0 pCi/l.
Other Man made concerns	None observed.

**3.6.2 Alternative 2
(Station No. 441+00 to 467+00 – Drawing C2-118)**

This section describes the hazardous substances reconnaissance conducted to note the use or storage of hazardous or industrial chemicals or petroleum products along the segment of Alternative 2 from Westwood/UCLA to Westwood/VA Hospital. Land use includes offices, federally owned land, the 405 Freeway (Caltrans property), and the VA Hospital grounds.

Table 3-18: Hazardous Substances Reconnaissance Findings for Alternative 2

USTs/ASTs	None observed or identified. No UST sites were identified in the EDR Report for this segment of Alternative 2.
Drycleaners	None observed or identified. No dry-cleaning facilities were identified in the EDR Report for this segment of Alternative 2.
PCBs	Utility-owned transformers located under streets and on poles. No evidence of leaks or spills observed.
Waste Disposal	Dumpsters and/or trash receptacles observed at all businesses
Wetlands	None observed.
Drums/Chemical Containers	None observed.
Dumping	None observed.
Pits, Ponds, Septic, Sumps	None observed.
Pesticide Use	None observed.
Staining	Observed staining considered to be de minimis.
Stressed Vegetation	None observed.
Unusual Odors	None noted.
Wells, monitoring, oil and gas	Sawtelle Oil Field
Environmentally Sensitive sites	None observed.



Asbestos	Not likely in soil. Possible in buildings older than 1982.
Lead based paint	Not likely in soil. Possible in buildings older than 1978.
Radon	US EPA survey indicated radon zone level for Los Angeles County, California is 2. Zone 2 areas are predicted to have an indoor radon screening potential between 2.0 and 4.0 pico Curies per liter (pCi/l) of air. US EPA action level for radon is 4.0 pCi/l.
Other Man made concerns	None observed.

**3.6.3 Alternative 3
(Station No. 467+00 to 632+00 – Drawings C3-119 through C3-125)**

This section describes the hazardous substances reconnaissance conducted to note the use or storage of hazardous or industrial chemicals or petroleum products along the segment of Alternative 3 from the Westwood/VA Hospital Station to the Wilshire/4th Street Station in the city of Santa Monica.

Table 3-19: Hazardous Substances Reconnaissance Findings for Alternative 3

USTs/ASTs	Twelve historic gas station locations were identified in Table 3-4 based on a review of Sanborn® maps. A total of 26 UST sites were identified in Table 3-10, EDR Listings with Potential Impacts to Alternative 3.
Drycleaners	A total of 19 dry-cleaning facilities were identified in Table 3-10.
PCBs	Utility-owned transformers located under streets and on poles. No evidence of leaks or spills observed.
Waste Disposal	Dumpsters and/or trash receptacles present at all businesses and homes.
Wetlands	None observed.
Drums/Chemical Containers	None observed in accessible areas.
Dumping	No dumping observed.
Pits, Ponds, Septic, Sumps	None observed in accessible areas.
Pesticide Use	None observed.
Staining	Observed staining considered to be de minimis.
Stressed Vegetation	None observed.
Unusual Odors	None noted.
Wells, monitoring, oil and gas	No oil fields or oil wells within 850 feet.
Environmentally Sensitive sites	None observed.
Asbestos	Not likely in soil. Possible in buildings older than 1982.
Lead based paint	Not likely in soil. Possible in buildings older than 1978.
Radon	US EPA survey indicated radon zone level for Los Angeles County, California is 2. Zone 2 areas are predicted to have an indoor radon screening potential between 2.0 and 4.0 pico Curies per liter (pCi/l) of air. The US EPA action level for radon is 4.0 pCi/l.
Other Man made concerns	None observed.



**3.6.4 Alternatives 4 and 5
(Station No. 0+00 to 270+00 – Drawings C-20I through C-21I)**

This section describes the hazardous substances reconnaissance conducted to note the use or storage of hazardous or industrial chemicals or petroleum products along the segment of Alternatives 4 and 5 from the Hollywood/Highland Station to the Connection Structure.

Table 3-20: Hazardous Substances Reconnaissance Findings for Alternatives 4 and 5

USTs/ASTs	Twelve historic gas station locations were identified in Table 3-5 based on a review of Sanborn® maps. A total of 35 UST sites were identified in Table 3-11, EDR Listings with Potential Impacts to Alternative 4.
Drycleaners	A total of 25 dry-cleaning facilities were identified in Table 3-11.
PCBs	Utility-owned transformers located under streets and on poles. No evidence of leaks or spills observed.
Waste Disposal	Dumpsters and/or trash receptacles observed at all businesses and homes.
Wetlands	None observed.
Drums/Chemical Containers	None observed in accessible areas.
Dumping	No dumping observed.
Pits, Ponds, Septic, Sumps	None observed in accessible areas.
Pesticide Use	None observed.
Staining	Observed staining considered to be de minimis.
Stressed Vegetation	None observed.
Unusual Odors	None noted.
Wells, monitoring, oil and gas	Within Sherman and Salt Lake Oil Fields Beverly Center locations have oil wells within 40 feet.
Environmentally Sensitive sites	None observed.
Asbestos	Not likely in soil. Possible in buildings older than 1982.
Lead based paint	Not likely in soil. Possible in buildings older than 1978.
Radon	US EPA survey indicated radon zone level for Los Angeles County, California is 2. Zone 2 areas are predicted to have an indoor radon screening potential between 2.0 and 4.0 pico Curies per liter (pCi/l) of air. US EPA action level for radon is 4.0 pCi/l.
Other Man made concerns	None observed.

3.6.5 Subway Station Locations

A summary of the 23 proposed and alternate station locations is included in the Draft Site Assessment Study Report (127A) dated December 10, 2009 (Task 10.03.02) prepared by Mactec.



3.6.6 Expanded Division 20 Yard and Turnback Facility

This section describes the hazardous substances reconnaissance conducted to note the use or storage of hazardous or industrial chemicals or petroleum products for the Expanded Division 20 Yard and the Turnback Facility. Additional storage and maintenance capacity is proposed to be developed as an expansion of the existing Division 20 Maintenance and Storage Facility, as shown on Figure 2-49 of the Metro Westside Extension Draft EIS/EIR Project Description (Task 14.2), which is known as the Expanded Division 20 Yard. The proposed Turnback Facility, which allows trains to turn from one direction to another direction more efficiently, is proposed to be developed as part of the No Build Alternative, and is located within the Division 20 Maintenance and Storage Facility. Access onto the Division 20 Maintenance and Storage Facility was not provided and therefore, observations were made from public right-of-ways and a review of available on-line maps and photographs.

Table 3-21: Hazardous Substances Reconnaissance Findings for Expanded Division 20 Yard and Turnback Facility

USTs/ASTs	No USTs identified onsite. ASTs observed on west side of yard at Banning and Center Streets.
Drycleaners	None identified.
PCBs	Public utilities provided to existing rail yards.
Waste Disposal	Unknown.
Wetlands	None observed. The adjacent Los Angeles River is a concrete-lined channel.
Drums/Chemical Containers	None observed.
Dumping	No dumping observed.
Pits, Ponds, Septic, Sumps	None observed.
Pesticide Use	None observed. Based on URS' experience, herbicides containing arsenic and oil were typically used along railroad lines.
Staining	None observed.
Stressed Vegetation	None observed. No vegetation observed.
Unusual Odors	None noted.
Wells, monitoring, oil and gas	None observed.
Environmentally Sensitive sites	None observed.
Asbestos	Not likely in soil. Possible in buildings older than 1982.
Lead based paint	Not likely in soil. Possible in buildings older than 1978.
Radon	US EPA survey indicated radon zone level for Los Angeles County, California is 2. Zone 2 areas are predicted to have an indoor radon screening potential between 2.0 and 4.0 pico Curies per liter (pCi/l) of air. US EPA action level for radon is 4.0 pCi/l.
Other Man made concerns	None observed. Based on URS' experience, lead, arsenic and petroleum hydrocarbons are typically found in surface soils at railroad yards.



**3.6.7 Union Pacific Los Angeles Transportation Center Rail Yard
(Station No. 0+00 through 65+00 - Drawings Y-101 through Y-103)**

This section describes the hazardous substances reconnaissance conducted to note the use or storage of hazardous or industrial chemicals or petroleum products for the Union Pacific Los Angeles Transportation Center Rail Yard. An alternative site is proposed for increased storage and maintenance capacity at the Union Pacific Los Angeles Transportation Center Rail Yard, as shown on Figure 2-13, which depicts the location of this yard relative to the existing Division 20 Maintenance and Storage Facility, summarized above in Section 3.6.6. Access onto the Union Pacific Los Angeles Transportation Center Rail Yard was not provided and therefore, observations were made from public right-of-ways and a review of available on-line maps and photographs.

Table 3-22: Hazardous Substances Reconnaissance Findings for Union Pacific Los Angeles Transportation Center Rail Yard

USTs/ASTs	No USTs identified onsite. ASTs observed south of the railroad line adjacent to east side of Lamar Street.
Drycleaners	None identified.
PCBs	Public utilities provided to existing rail yards.
Waste Disposal	Unknown.
Wetlands	None observed. The adjacent Los Angeles River is a concrete-lined channel.
Drums/Chemical Containers	None observed.
Dumping	No dumping observed.
Pits, Ponds, Septic, Sumps	None observed.
Pesticide Use	None observed. Based on URS' experience, herbicides containing arsenic and oil were typically used along railroad lines.
Staining	None observed.
Stressed Vegetation	None observed. No vegetation observed.
Unusual Odors	None noted.
Wells, monitoring, oil and gas	None observed.
Environmentally Sensitive sites	None observed.
Asbestos	Not likely in soil. Possible in buildings older than 1982.
Lead based paint	Not likely in soil. Possible in buildings older than 1978.
Radon	US EPA survey indicated radon zone level for Los Angeles County, California is 2. Zone 2 areas are predicted to have an indoor radon screening potential between 2.0 and 4.0 pico Curies per liter (pCi/l) of air. US EPA action level for radon is 4.0 pCi/l.
Other Man made concerns	None observed. Based on URS' experience, lead, arsenic and petroleum hydrocarbons are typically found in surface soils at railroad yards.



4.0 ENVIRONMENTAL IMPACTS/ENVIRONMENTAL CONSEQUENCES

This section provides a location-specific assessment of the geologic and seismic hazard impact potential for the project alignments, as well as impact from hazardous materials. The severity of each of the identified hazards previously discussed in Section 3.0 is evaluated relative to stationing (where appropriate) along the alternative alignments. The principal findings of this evaluation are discussed in the following paragraphs. The findings are summarized in Table 4-1 at the end of this section.

4.1 Methodology

4.1.1 Impact Evaluation Methodology

The following impacts on the project alternatives were evaluated based on California Environmental Quality Act (CEQA) criteria. The project impacts are classified as no impact, less than significant or potentially significant.

4.2 No Build Alternative

The No Build Alternative includes all existing highway and transit services and facilities, and the committed highway and transit projects in the 2009 Metro Long Range Transportation Plan (LRTP) and the 2008 Southern California Association of Governments (SCAG) Regional Transportation Plan. Under the No Build Alternative, no new infrastructure would be built within the study area, aside from projects currently under construction or projects funded for construction, environmentally cleared, planned to be in operation by 2035, and identified in the Metro LRTP (Metro, 2010).

Projects in the No Build Alternative may be subject to the identified hazards previously discussed in Section 3.0. However, it is assumed that all construction would be performed in accordance with the latest federal and state seismic and environmental requirements as well as state and local building codes. By compliance with these standards, potential impacts from these hazards would be less than significant.

4.3 Transportation System Management (TSM) Alternative

The Transportation System Management (TSM) Alternative enhances the No Build Alternative by expanding the Metro Rapid bus services operating in the Westside Transit Corridor. This alternative emphasizes more frequent service to reduce delay and enhance mobility. A number of local bus routes will see frequency enhancements over the No Build Alternative (Metro, 2010).

Projects associated with the TSM Alternative may be subject to the identified hazards previously discussed in Section 3.0. However, it is assumed that all construction would be performed in accordance with the latest federal and state seismic and environmental requirements as well as state and local building codes. By compliance with these standards, potential impacts from these hazards would be less than significant.



4.4 Alternative 1

This section provides a site specific assessment of the potential for and the severity of each of the identified hazards previously discussed in Section 3.0 relative to Alternative 1.

4.4.1 Surface Fault Rupture

As discussed in Section 3.2.4, the Santa Monica fault is believed to be active and potentially capable of surface fault rupture. Based on geomorphic evidence and preliminary findings from an ongoing geophysical study by the project study team, the Santa Monica fault is believed to cross the study alignment alternatives at four principal locations; therefore, surface fault rupture poses a potentially significant impact to the alignment at those locations.

The Santa Monica fault appears to run subparallel to Santa Monica Boulevard approximately between Avenue of the Stars and Westwood Boulevard (Station No. 338+00 to 356+00, Plates 1.13 and 1.14, and Figure 3-1) and would cross Alternative 1 at one or more locations in this vicinity depending on selection of the final alignment.

As discussed in Section 3.2.4, the West Beverly Hills Lineament (WBHL) might also be an active fault and potentially capable of surface fault rupture, therefore potentially posing a significant hazard to Alternative 1. The WBHL crosses Alternative 1 in the vicinity of Century Park East and South Moreno at approximately Sta. No. 325+00 (Plate 1.13 and Figure 3-1). There are different interpretations regarding the significance and potential activity of the WBHL. Further evaluation of the WBHL and its significance to the project will be performed during forthcoming design level investigations for the project.

4.4.2 Seismic Ground Shaking

The Alternative 1 alignment, like most sites in southern California, is susceptible to strong ground shaking generated during earthquakes on nearby faults. Based on probabilistic estimates of ground motion corresponding to a 10% probability of exceedance in 50 years as obtained from the CGS web site (CGS, 2003), peak ground acceleration along the alignment is estimated to range from approximately 0.4g to 0.6g. Therefore, hazard from seismic ground shaking poses a potentially significant impact to all of the project alignment alternatives.

4.4.3 Differential Seismic Settlement

As discussed in Section 3.2.6, differential seismic settlement is most likely to occur in areas that transition between rock formations and lower density, more recently deposited alluvial soils or artificially placed fill. Since the project tunnel reaches are located at depth and below the recently deposited alluvium or artificial fill, they will not be subjected to differential seismic settlement. Likewise, in light of the fact that the stations will all be subterranean, hazard from differential seismic settlement is not considered to be a significant impact for any of the alignment alternatives.

**4.4.4 Liquefaction**

As discussed in Section 3.2.6, since the tunnels will be driven below potentially liquefiable surficial Holocene soils, liquefaction is not considered a potential seismic hazard to the tunnel components of the project. However, due to the presence of shallow groundwater and young surficial alluvial deposits there may be potential for liquefaction adjacent to the upper portions of some station walls. This condition could potentially occur at the Wilshire/La Cienega and Westwood/UCLA stations along the Alternative 1 alignment; therefore, hazard from liquefaction at these station sites potentially poses a significant impact.

4.4.5 Subsidence

As discussed in Section 3.2.6, no current significant subsidence problems related to petroleum or groundwater extraction have been identified in the vicinity of the project alignment. Therefore, the subsidence related to extraction of petroleum and groundwater is not considered a significant hazard to the project. There is however the potential for ground subsidence related to construction activities such as tunneling, dewatering, etc. along the full lengths of all the proposed alignment alternatives. Therefore, hazard from tunneling and construction dewatering induced subsidence poses a potentially significant impact for Alternative 1.

4.4.6 Hazardous Subsurface Gases

As discussed in Section 3.2.5 “Oil and Gas Conditions” and based on early results of Mactec’s (2010) hazardous gas monitoring study, the hazardous subsurface gases methane and hydrogen sulfide (H₂S) are present in high concentrations along about a 1.1 mile portion of Alternative 1. This area stretches along Wilshire Boulevard from about South Burnside Avenue on the east to about South La Jolla Avenue on the west (Plates 1.6 through 1.8, Station No. 119+00 to 177+00). Furthermore the entire alignment passes through an area characterized by oil and gas fields and sedimentary rock, thus the possibility of encountering gassy conditions cannot be completely discounted for any portion of the alignment. Therefore, hazardous subsurface gasses pose a significant hazard for all of Alternative 1.

4.4.7 Hazardous Materials

As outlined in Sections 3.3, 3.4, and 3.6, there are numerous historical gas stations and dry-cleaner facilities with the potential to cause significant impact to Alternative 1. These facilities are all listed as either being currently open LUST cases with local regulatory agencies, are closed LUST cases, are facilities with potential to impact based on the type of use, such as a drycleaner, or were identified as being a historic business such as a gas station. In this evaluation, not all closed LUST cases were identified with potential significant impact to the alignment. If the top of the tunnel was delineated in maps as being below first encountered groundwater, and a LUST case was soil only, then it was determined that based on depth to the top of the tunnel, that the potential for impact from contaminated soil could be classified as no impact. Likewise, if a case involved contaminated groundwater, then the potential for impact was determined to be potentially significant because the tunnel alignment would have a high likelihood of encountering groundwater. Dry-cleaning facilities identified in the EDR Report and on



the GeoTracker database as being under investigation are considered to have potentially significant impacts. Other drycleaners as well as gas stations, just by being in operation are considered to have less than significant impact.

The following locations represent areas where the potential of significant impact related to hazardous materials is high due to LUSTs, VOCs, or oil exploration along Alternative 1.

- 3807 Wilshire Blvd., Los Angeles (Drawing C-101) – intersection of Wilshire Blvd. and Western Ave., dry-cleaning facility with open SLIC case.
- 4180 Wilshire Blvd., Los Angeles (Drawing C-102) – intersection of Wilshire Blvd. and Crenshaw Blvd., open LUST case with groundwater remediation.
- 5034 Wilshire Blvd., Los Angeles (Drawing C-104) – intersection of Wilshire Blvd. and Citrus Ave, dry-cleaning facility with open SLIC case
- 5020 Wilshire Blvd., Los Angeles (Drawing C-104) – intersection of the Wilshire and Citrus Ave., former gas station, open SLIC case with ongoing assessment.
- 5151 Wilshire Blvd., Los Angeles (Drawing C-105) – intersection of Wilshire Blvd. and La Brea Ave., car dealership, open LUST case.
- 5220 Wilshire Blvd., Los Angeles (Drawing C-105) – intersection of Wilshire Blvd. and La Brea Ave., open SLIC case.
- 5779 Wilshire Blvd., Los Angeles (Drawing C-106) – intersection of Wilshire Blvd. and Curson Ave., naturally occurring methane gas
- Along Wilshire Blvd. between La Brea Ave. and La Cienega Blvd., oil exploration and natural oil seeps (Drawings C-105 through C-108)
- 8567 Wilshire Blvd., Beverly Hills (Drawings C-108/C-109) – intersection of Wilshire Blvd. and Stanley Dr., closed LUST with residual contamination remaining in groundwater
- 9815 Wilshire Blvd., Beverly Hills (Drawing C-112) – intersection of Wilshire Blvd. and Santa Monica Blvd., open SLIC case
- 9988 Wilshire Blvd., Beverly Hills (Drawings C-112/C-113) – gas station, open LUST case, groundwater monitoring and site assessment ongoing
- 10301 Santa Monica Blvd., Los Angeles (Drawing C-114) – intersection of Santa Monica Blvd. and Warnall Ave., dry-cleaning facility, open SLIC case, groundwater monitoring and site assessment ongoing
- 10389 Santa Monica Blvd. (Drawing C-114) – intersection of Santa Monica Blvd. and Beverly Glen Blvd, gas station, open LUST case, groundwater remediation
- Within Century City locations, oil exploration, Drawings C-113 and C-114



4.5 Alternative 2

This section provides a site specific assessment of the potential for and the severity of each of the identified hazards previously discussed in Section 3.0 relative to Alternative 2.

4.5.1 Surface Fault Rupture

Alternative 2 includes Alternative 1 and the potential impact from surface fault rupture hazard is the same for both alternatives. Refer to the surface fault rupture discussion in Section 4.4.1.

4.5.2 Seismic Ground Shaking

As discussed in Section 4.4.2, hazard from seismic ground shaking poses a potentially significant impact to all of the project alignment alternatives.

4.5.3 Differential Seismic Settlement

As discussed in Section 4.4.3, hazard from differential seismic settlement is not considered to be a significant impact for any of the alignment alternatives.

4.5.4 Liquefaction

As discussed in Section 3.2.6, since the tunnels will be driven below potentially liquefiable surficial Holocene soils, liquefaction is not considered a potential seismic hazard to the tunnel components of the project. However, due to the presence of shallow groundwater and young surficial alluvial deposits there may be potential for liquefaction adjacent to the upper portions of the station walls for the Wilshire/La Cienega, Westwood/UCLA and Wilshire/VA Hospital stations. Therefore, hazard from liquefaction at these station sites poses a potentially significant impact.

4.5.5 Subsidence

As discussed in Section 3.2.6, no current significant subsidence problems related to petroleum or groundwater pumping has been identified in the vicinity of any of the project alignment alternatives. Therefore, the subsidence related to extraction of petroleum and groundwater is not considered a significant hazard to the project. There is however the potential for ground subsidence related to construction activities such as tunneling, dewatering, etc. along the full lengths of all the proposed alignment alternatives. Therefore, hazard from tunneling and construction dewatering induced subsidence poses a potentially significant impact for Alternative 2.

4.5.6 Hazardous Subsurface Gases

Alternative 2 includes Alternative 1 and the subsurface gas hazards are the same for both alternatives. Refer to the hazardous subsurface gas discussion in Section 4.4.6. Hazardous subsurface gases pose a significant hazard for Alternative 2.

4.5.7 Hazardous Materials

Alternative 2 includes Alternative 1 as well as a small segment from the proposed Westwood/UCLA station to the Westwood/VA Hospital station. The hazardous materials



discussion for Alternative 1 can be found in Section 4.4.7. Hazardous materials pose a significant hazard for Alternative 2.

As outlined in Sections 3.3, 3.4, and 3.6, there are two historical gas stations with the potential to impact Alternative 2 along Wilshire Boulevard. However, these historical gas stations were not identified in the EDR Report in environmental regulatory databases indicating a release. Therefore, there is a low potential for hazardous materials from these historical gas stations to impact Alternative 2.

4.6 Alternative 3

This section provides a site specific assessment of the potential for and the severity of each of the identified hazards previously discussed in Section 3.0 relative to Alternative 3.

4.6.1 Surface Fault Rupture

Alternative 3 includes Alternatives 1 and 2 and is therefore subject to impact from fault rupture hazard at the same location as discussed in Section 4.4.1. Alternative 3 is also subject to impact from surface fault rupture hazard at three additional locations as listed below:

- The vicinity of Bundy Drive (Station No. 508+00 to Station Number 516+00, Plate 1.20, and Figure 3-1).
- Between Stanford and Harvard Streets (Station No. 538+00 to 547+00, Plate 1.21, and Figure 3-1).
- Between Chelsea and 21st Streets (Station No. 561+00 to 575+00, Plate 1.22 and Figure 3-1).

At the same location as Alternatives 1 and 2 and as discussed in Section 4.4.1, the West Beverly Hills Lineament crosses Alternative 3 and therefore potentially poses a significant hazard to Alternative 3. Further evaluation of the WBHL and its significance to the project will be performed during forthcoming design level investigations.

4.6.2 Seismic Ground Shaking

As discussed in Section 4.4.2, hazard from seismic ground shaking poses a potentially significant impact to all of the project alignment alternatives.

4.6.3 Differential Seismic Settlement

As discussed in Section 3.2.6, hazard from differential seismic settlement is not considered a significant hazard for any of the project alignment alternatives.

4.6.4 Liquefaction

As discussed in Section 3.2.6, the tunnel elements of all of the project alignment alternatives are not subject to impact from liquefaction hazard. However, due to the presence of shallow groundwater and young surficial alluvial deposits there may be potential for liquefaction adjacent to the upper portions of some station walls.

**4.6.5 Subsidence**

As discussed in Section 3.2.6, no current significant subsidence problems related to petroleum or groundwater pumping has been identified in the vicinity of any of the project alignment alternatives. Therefore, the subsidence related to extraction of petroleum and groundwater is not considered a significant hazard to the project. There is however the potential for ground subsidence related to construction activities such as tunneling, dewatering, etc. along the full lengths of all the proposed alignment alternatives. Therefore, hazard from tunneling and construction dewatering induced subsidence poses a potentially significant impact for Alternative 3.

4.6.6 Hazardous Subsurface Gases

The subsurface gas hazards for Alternative 3 are the same as for Alternatives 1 and 2. Refer to the hazardous subsurface gas discussion in Section 4.4.6. Hazardous subsurface gases pose a significant hazard for Alternative 3.

4.6.7 Hazardous Materials

As outlined in Sections 3.3, 3.4, and 3.6, there are numerous gas stations and several drycleaners with the potential to cause significant impact to Alternative 3. These facilities are all listed as either being currently open LUST cases with local regulatory agencies, are closed LUST cases, are facilities with potential to impact based on the type of use, such as a drycleaner, or were identified as being a historic business such as a gas station. In this evaluation, not all closed LUST cases were identified with potential significant impact to the alignment. If the top of the tunnel was delineated in maps as being below first encountered groundwater, and a LUST case was soil only, then it was determined that based on depth to the top of the tunnel, that the potential for impact from contaminated soil could be classified as no impact. Likewise, if a case involved contaminated groundwater, then the potential for impact was determined to be potentially significant because the tunnel alignment would have a high likelihood of encountering groundwater. Dry-cleaning facilities identified in the EDR Report and on the GeoTracker database as being under investigation are considered to have potentially significant impacts. Other drycleaners as well as gas stations, just by being in operation are considered to have less than significant impact.

The following locations represent areas where the potential of significant impact related to hazardous materials is high due to LUSTs, VOCs, or oil exploration along Alternative 3.

- 11666 Wilshire Blvd., Los Angeles (Drawing C3-119) – intersection of Wilshire Blvd. and Barrington Ave., open LUST case with groundwater remediation and monitoring.
- 12054 Wilshire Blvd., Los Angeles (Drawing C3-120) – intersection of Wilshire Blvd. and Bundy Dr., closed LUST case with residual contamination in groundwater.
- 432 Wilshire Blvd., Santa Monica (Drawing C3-125) – intersection of Wilshire Blvd. and 5th St., open LUST case.



4.7 Alternative 4

This section provides a site specific assessment of the potential for and the severity of each of the identified hazards previously discussed in Section 3.0 relative to Alternative 4.

4.7.1 Surface Fault Rupture

Alternative 4 includes Alternatives 1 and 2 and is therefore subject to impact from fault rupture hazard at the same location as discussed in Section 4.4.1. At the same location as Alternatives 1 and 2 and as discussed in Section 4.4.1, the West Beverly Hills Lineament crosses Alternative 4 and therefore potentially poses a significant surface fault rupture hazard to Alternative 4. Further evaluation of the WBHL and its significance to the project will be performed during forthcoming design level investigations for the project.

4.7.2 Seismic Ground Shaking

As discussed in Section 4.4.2, hazard from seismic ground shaking poses a potentially significant impact to all of the project alignment alternatives.

4.7.3 Differential Seismic Settlement

As discussed in Section 3.2.6, hazard from differential seismic settlement is not considered a significant hazard for any of the project alignment alternatives.

4.7.4 Liquefaction

As discussed in Section 3.2.6, the tunnel elements of all of the project alignment alternatives are not subject to impact from liquefaction hazard. However, due to the presence of shallow groundwater and young surficial alluvial deposits there may be potential for liquefaction adjacent to the upper portions of some station walls. In addition to the stations mentioned earlier along Alternatives 1 and 2, the upper station walls of the Santa Monica/San Vicente and Beverly Center stations are subject to a potentially significant impact from liquefaction hazard.

4.7.5 Subsidence

As discussed in Section 3.2.6, no current significant subsidence problems related to petroleum or groundwater pumping have been identified in the vicinity of any of the project alignment alternatives. Therefore, the subsidence related to extraction of petroleum and groundwater is not considered a significant hazard to the project. There is however the potential for ground subsidence related to construction activities such as tunneling, dewatering, etc. along the full lengths of all the proposed alignment alternatives. Therefore, hazard from tunneling and construction dewatering induced subsidence poses a potentially significant impact for Alternative 4.

4.7.6 Hazardous Subsurface Gases

The subsurface gas hazards for Alternative 4 are the same as for Alternatives 1 and 2. Refer to the hazardous subsurface gas discussion in Section 4.4.6. Hazardous subsurface gases pose a significant hazard for Alternative 4.

**4.7.7 Hazardous Materials**

As outlined in Sections 3.3, 3.4, and 3.6, there are numerous gas stations and several drycleaners with the potential to cause significant impact to Alternative 4. These facilities are all listed as either being currently open LUST cases with local regulatory agencies, are closed LUST cases, are facilities with potential to impact based on the type of use, such as a drycleaner, or were identified as being a historic business such as a gas station. In this evaluation, not all closed LUST cases were identified with potential significant impact to the alignment. If the top of the tunnel was delineated in maps as being below first encountered groundwater, and a LUST case was soil only, then it was determined that based on depth to the top of the tunnel, that the potential for impact from contaminated soil could be classified as no impact. Likewise, if a case involved contaminated groundwater, then the potential for impact was determined to be potentially significant because the tunnel alignment would have a high likelihood of encountering groundwater. Dry-cleaning facilities identified in the EDR Report and on the GeoTracker database as being under investigation are considered to have potentially significant impacts. Other drycleaners as well as gas stations, just by being in operation are considered to have less than significant impact.

The following locations represent areas where the potential of significant impact related to hazardous materials is high due to LUSTs, VOCs, or oil exploration along Alternative 4.

- 7116 Santa Monica Blvd., Los Angeles (Drawing C-203) – intersection of Santa Monica Blvd and La Brea Ave., open LUST case.
- 7144 Santa Monica Blvd., Los Angeles (Drawing C-203) – intersection of Santa Monica Blvd and Detroit St., open SLIC/LUST case.
- 8100-8136 Santa Monica Blvd., Los Angeles (Drawing C-204) – intersection of Santa Monica Blvd. and Crescent Heights Blvd., open SLIC case.
- 7564 Santa Monica Blvd., Los Angeles (Drawing C-204) – intersection of Santa Monica Blvd. and Curson Ave., open LUST case.
- 7643 Santa Monica Blvd., Los Angeles (Drawing C-204) – intersection of Santa Monica Blvd. and Spauling Ave., open LUST case.
- 1154 N. La Brea Ave., Hollywood (Drawing C-203) – intersection of N. La Brea Ave and Lexington Ave., open LUST case.
- 8032 Santa Monica Blvd., West Hollywood (Drawing C-204) – intersection of Santa Monica Blvd. and Crescent Heights Blvd., open SLIC case.
- 8380 Santa Monica Blvd., West Hollywood (Drawing C-205) – intersection of Santa Monica Blvd. and Orlando Ave., open LUST case.
- 8725 Santa Monica Blvd., West Hollywood (Drawing C-206) – intersection of Santa Monica Blvd. and Westbourne Dr., open SLIC case with groundwater remediation.
- 8800 Santa Monica Blvd., Los Angeles (Drawing C-207) – intersection of Santa Monica Blvd. and San Vicente Blvd., open LUST case.



- 8655 Beverly Blvd., West Hollywood (Drawing C208) – NW corner of intersection of Beverly Blvd. and San Vicente Blvd., former solid waste disposal site.
- 8550 W. 3rd St., Los Angeles (Drawing C-209) – intersection of W. 3rd St. and Holt Ave., open SLIC case with groundwater monitoring and remediation.
- 300 S. La Cienega Blvd., Los Angeles (Drawing C-209) – intersection of La Cienega Blvd. and 3rd St., open LUST case with groundwater remediation.
- Beverly Center locations, oil exploration, Drawings C-208 and C-209

4.8 Alternative 5

This section provides a site specific assessment of the potential for and the severity of each of the identified hazards previously discussed in Section 3.0 relative to Alternative 5.

4.8.1 Surface Fault Rupture

Alternative 5 includes Alternatives 1 through 4 and is therefore subject to impact from fault rupture hazard at the same locations as discussed in Section 4.6.1. Also as discussed in Section 4.6.1, the West Beverly Hills Lineament crosses Alternative 5 and therefore potentially poses a significant surface fault rupture hazard to Alternative 5. Further evaluation of the WBHL and its significance to the project will be performed during forthcoming design level investigations for the project.

4.8.2 Seismic Ground Shaking

As discussed in Section 4.4.2, hazard from seismic ground shaking poses a potentially significant impact to all of the project alignment alternatives.

4.8.3 Differential Seismic Settlement

As discussed in Section 3.2.6, hazard from differential seismic settlement is not considered a significant hazard for any of the project alignment alternatives.

4.8.4 Liquefaction

As discussed in Section 3.2.6, the tunnel elements of all of the project alignment alternatives are not subject to impact from liquefaction hazard. However, due to the presence of shallow groundwater and young surficial alluvial deposits there may be potential for liquefaction adjacent to the upper portions of some station walls. The upper station walls of the stations mentioned previously along Alternatives 1 through 4 are subject to a potentially significant impact from liquefaction hazard.

4.8.5 Subsidence

As discussed in Section 3.2.6, no current significant subsidence problems related to petroleum or groundwater pumping have been identified in the vicinity of any of the project alignment alternatives. Therefore, the subsidence related to extraction of petroleum and groundwater is not considered a significant hazard to the project. There is however the potential for ground subsidence related to construction activities such as tunneling, dewatering, etc. along the full lengths of all the proposed alignment



alternatives. Therefore, hazard from tunneling and construction dewatering induced subsidence poses a potentially significant impact for Alternative 5.

4.8.6 Hazardous Subsurface Gases

The subsurface gas conditions for Alternative 5 are the same as for Alternatives 1 through 4. Hazardous subsurface gases pose a significant hazard for Alternative 5.

4.8.7 Hazardous Materials

Alternative 5 includes Alternatives 1, 2, 3, and 4 and therefore this information can be found in the previous hazardous materials sections. Refer to the hazardous materials discussion in Sections 4.4.7, 4.5.7, 4.6.7 and 4.7.7. Hazardous materials pose a significant hazard for Alternative 5.

4.9 MOS 1

This section provides a site specific assessment of the potential for and the severity of each of the identified hazards previously discussed in Section 3.0 relative to MOS 1.

4.9.1 Surface Fault Rupture

No faults capable of surface fault rupture are known to cross MOS 1; therefore hazard from fault surface rupture is less than significant.

4.9.2 Seismic Ground Shaking

The MOS 1 alignment, like most sites in southern California, is susceptible to strong ground shaking generated during earthquakes on nearby faults. Based on probabilistic estimates of ground motion corresponding to a 10% probability of exceedance in 50 years as obtained from the CGS web site (CGS, 2003), peak ground acceleration along the alignment is estimated to range from approximately 0.4g to 0.6g. Therefore, hazard from seismic ground shaking poses a potentially significant impact to the entire MOS 1 alignment.

4.9.3 Differential Seismic Settlement

As discussed in Section 3.2.6, differential seismic settlement is most likely to occur in areas that transition between rock formations and lower density, more recently deposited alluvial soils or artificially placed fill. Since the project tunnel reaches are located at depth and below the recently deposited alluvium or artificial fill, they will not be subjected to differential seismic settlement. Likewise, in light of the fact that the stations will all be subterranean, differential seismic settlement is not considered to be a significant hazard. Hazard from differential seismic settlement is not considered a significant hazard for the project.

4.9.4 Liquefaction

As discussed in Section 3.2.6, the tunnel elements of all of the project alignment alternatives are not subject to impact from liquefaction hazard. However, due to the presence of shallow groundwater and young surficial alluvial deposits there may be potential for liquefaction adjacent to the upper portions of some station walls. However,



there are no stations along MOS 1 that are subject to hazard from liquefaction. Therefore, liquefaction is not considered a significant hazard for MOS 1.

4.9.5 Subsidence

As discussed in Section 3.2.6, no current significant subsidence problems related to petroleum or groundwater pumping have been identified in the vicinity of any of the project alignment alternatives. Therefore, the subsidence related to extraction of petroleum and groundwater is not considered a significant hazard to the project. There is however the potential for ground subsidence related to construction activities such as tunneling, dewatering, etc. along the full lengths of all the proposed alignment alternatives. Therefore, hazard from tunneling and construction dewatering induced subsidence poses a potentially significant impact for MOS 1.

4.9.6 Hazardous Subsurface Gases

The subsurface gas hazards for MOS 1 are the same as for Alternative 1 (refer to discussion in Section 4.4.6). Hazardous subsurface gases pose a significant hazard for MOS 1.

4.9.7 Hazardous Materials

Hazardous materials for MOS 1 are the same as for Alternative 1. Refer to the hazardous materials discussion in Section 4.4.7. Hazardous materials pose a significant hazard for MOS 1.

4.10 MOS 2

This section provides a site specific assessment of the potential for and the severity of each of the identified hazards previously discussed in Section 3.0 relative to MOS 2.

4.10.1 Surface Fault Rupture

MOS 2 is subject to impact from fault rupture hazard at the same location as for Alternative 1 (refer to discussion in Section 4.4.1). Also as discussed in Section 4.4.1, the West Beverly Hills Lineament crosses MOS 2 and therefore potentially poses a significant surface fault rupture hazard to MOS 2. Further evaluation of the WBHL and its significance to the project will be performed during forthcoming design level investigations for the project.

4.10.2 Seismic Ground Shaking

As discussed in Section 4.4.2, hazard from seismic ground shaking poses a potentially significant impact to all of the project alignment alternatives.

4.10.3 Differential Seismic Settlement

As discussed in Section 3.2.6, hazard from differential seismic settlement is not considered a significant hazard for any of the project alignment alternatives.

**4.10.4 Liquefaction**

As discussed in Section 3.2.6, since the tunnels will be driven below potentially liquefiable surficial Holocene soils, liquefaction is not considered a potential seismic hazard to the tunnel components of the project. However, due to the presence of shallow groundwater and young surficial alluvial deposits there may be potential for liquefaction adjacent to the upper portions of some station walls. This condition could potentially occur at the Wilshire/La Cienega Station along MOS 2.

4.10.5 Subsidence

As discussed in Section 3.2.6, no current significant subsidence problems related to petroleum or groundwater pumping have been identified in the vicinity of any of the project alignment alternatives. Therefore, the subsidence related to extraction of petroleum and groundwater is not considered a significant hazard to the project. There is however the potential for ground subsidence related to construction activities such as tunneling, dewatering, etc. along the full lengths of all the proposed alignment alternatives. Therefore, hazard from tunneling and construction dewatering induced subsidence poses a potentially significant impact for MOS 2.

4.10.6 Hazardous Subsurface Gases

The subsurface gas hazards for MOS 2 are the same as for Alternative 1 (refer to discussion in Section 4.4.6). Hazardous subsurface gases pose a significant hazard for MOS 2.

4.10.7 Hazardous Materials

Hazardous materials for MOS 2 are the same as for Alternative 1. Refer to the hazardous materials discussion in Sections 4.4.7. Hazardous materials pose a significant hazard for MOS 2.

4.11 Maintenance Yards

This section provides a site specific assessment of the potential for and the severity of each of the identified hazards previously discussed in Section 3.0 relative to the proposed maintenance yards.

4.11.1 Surface Fault Rupture

None of the maintenance yards are within an Alquist-Priolo earthquake fault zone and there are no known faults that cross the yards. Therefore, surface fault rupture does not pose a significant hazard to the maintenance yards.

4.11.2 Seismic Ground Shaking

The maintenance yards, like most sites in southern California, are susceptible to strong ground shaking generated during earthquakes on nearby faults. Based on probabilistic estimates of ground motion corresponding to a 10% probability of exceedance in 50 years as obtained from the CGS web site (CGS, 2003), peak ground acceleration at the yards is estimated to be approximately 0.5g. Therefore, hazard from seismic ground shaking poses a potentially significant impact to the maintenance yards.

**4.11.3 Differential Seismic Settlement**

As discussed in Section 3.2.6, differential seismic settlement is most likely to occur in areas that transition between rock formations and lower density, more recently deposited alluvial soils or artificially placed fill. Since the maintenance yards are all located on alluvium, they will not likely be subjected to differential seismic settlement. Hazard from differential seismic settlement is not considered a significant hazard for the project.

4.11.4 Liquefaction

As discussed in Section 3.5.5, the Union Pacific Los Angeles Transportation Center Rail Yard is located on potentially liquefiable soils. Therefore, hazard from liquefaction potentially poses a potentially significant impact to this yard. Liquefaction is not considered a significant hazard at the Turnback Facility and the Division 20 Maintenance Yard.

4.11.5 Subsidence

No current significant subsidence problems related to oil or groundwater pumping have been identified in the vicinity of the maintenance yards. Therefore, the subsidence related to extraction of petroleum and groundwater is not considered a significant hazard to any of the yards.

4.11.6 Hazardous Subsurface Gases

As discussed in Section 5.5.5, the Turnback Facility and the Division 20 Maintenance Yard are located adjacent to the Union Station Oil field. As such, there is some potential that hazardous subsurface gases methane and hydrogen sulfide (H₂S) are present in this area. However, it is not anticipated that the maintenance yards will require construction of any subterranean structures. Therefore, hazardous subsurface gasses are not considered to pose a significant hazard to the maintenance yards.

4.11.7 Hazardous Materials

Based on current and former use, soils within the maintenance yards are expected to be impacted by petroleum hydrocarbons, metals, herbicides, and polynuclear aromatic hydrocarbons. Off-site facilities with high potential to impact the maintenance yards include:

- 1430 Bolero St., open SLIC case, hydrocarbon and metal impacted soils.
- 490 Bauchet St. locations associated with former manufactured gas plant. Although a closed case, soils remain impacted. The entire rail line from approximately the 101 Freeway to the eastward bend over the Los Angeles River is expected to be impacted.
- Keller Yard, south of Cesar Chavez, open DTSC investigation, soil impacted by manufactured gas plant.
- 590 S. Santa Fe Ave., open DTSC investigation, soil impacted by solvents.
- 320 S. Santa Fe Ave., USTs operated onsite within proposed maintenance yard and may require removal.



Features included in the maintenance yard sites will require storing hazardous materials/waste on-site and consist of a storage yard for the heavy rail transit vehicles, a maintenance area, a car wash building, and other support for the yard and shop. Operations and maintenance will require routine transport, use, or disposal of hazardous materials. These materials would typically include fuel, oil, solvents, cleansers and other materials.



4.12 Summary

The potential environmental impacts identified for the project area as summarized in this section are presented in Table 4-1.

Table 4-1: Summary of Environmental Impacts

Alternatives	Surface Fault Rupture	Seismic Ground Shaking	Differential Seismic Settlement	Liquefaction	Subsidence	Hazardous Subsurface Gases	Hazardous Materials
Alternative 1	Potential Impact	Potential Impact	No impact	Potential Impact	Potential Impact	Potential Impact	Potential Impact
Alternative 2	Potential Impact	Potential Impact	No impact	Potential Impact	Potential Impact	Potential Impact	Potential Impact
Alternative 3	Potential Impact	Potential Impact	No impact	Potential Impact	Potential Impact	Potential Impact	Potential Impact
Alternative 4	Potential Impact	Potential Impact	No impact	Potential Impact	Potential Impact	Potential Impact	Potential Impact
Alternative 5	Potential Impact	Potential Impact	No impact	Potential Impact	Potential Impact	Potential Impact	Potential Impact
MOS 1	No impact	Potential Impact	No impact	No impact	No impact	Potential Impact	Potential Impact
MOS 2	Potential Impact	Potential Impact	No impact	Potential Impact	Potential Impact	Potential Impact	Potential Impact
Maintenance Yards	No impact	Potential Impact	No impact	No impact	No impact	No impact	Potential Impact



5.0 MITIGATION MEASURES

This section provides a discussion of possible mitigation measures that could be employed to reduce the various hazards identified in Section 4.0. This discussion includes identifying locations where these mitigation measures might be employed.

5.1 Alternatives 1 through 5 and MOS Alternatives

This section provides a discussion of possible mitigation measures that could be employed to eliminate or reduce the identified hazards for these alignment alternatives.

5.1.1 Mitigation for Operational Impacts

Surface Fault Rupture

As discussed previously, strands of the active Santa Monica fault will cross Alternatives 1 through 5 and MOS 2. Because surface faulting is generally confined to a relatively narrow zone, avoidance is often a practical means of mitigating surface fault rupture hazards for facilities such as stations. However, for linear facilities such as the tunnels, avoidance may not be possible. Design should allow for the tunnels to cross the faults as perpendicular to the fault line as possible so as to limit the area of potential damage.

For the mitigation of some operational impacts related to repair of damage from surface fault rupture, one mitigation strategy is the one used for the Red Line North Hollywood Extension. The section of the North Hollywood Extension that crossed the active Hollywood fault was constructed as what was called the “Special Seismic Section.” Where the tunnels crossed the fault, they were excavated oversize for a distance of 300 feet so as to facilitate an expedient realignment of the tracks and reinstatement of train operations in the event of damage from ground rupture (Lehnen and Valencia, 2001). The tracks were supported by concrete block ties encased in elastomeric boots which were cast into a 2,500 psi concrete invert slab. This provided resilient support to the tracks. The low-strength concrete allows for ease of removal of the block ties and expedient realignment of the track. Another possible alternative to tunneling through a fault crossing is to construct widened cut-and-cover box structures at those locations and incorporate the resilient and easily repaired support system for the trackwork as discussed above. Where fault rupture displacement may be distributed over a longer distance, more flexible tunnel lining such as steel segments may be considered.

Implementation of the above mitigation measures would allow easier and more expedient repair of the tunnels and tracks following damage from fault rupture. However, potential operational impact from fault rupture (i.e. derailment) to the safety of subway riders cannot be entirely mitigated. Some increase in safety would be gained by installing linear monitoring systems along the tunnels within the zone of potential rupture to provide early warning triggered by strong ground motions and allow temporary control of subway traffic to reduce derailment risks. Measures to provide uninterrupted fire, power, lighting, and ventilation systems will be provided to increase safety.



Seismic Ground Shaking

To mitigate potential impact from seismic ground shaking, the structural elements of the alignment alternatives would be designed and constructed to resist or accommodate appropriate site-specific ground motions and conform to MTA Design Criteria as well as all applicable federal, state and local building codes. As mentioned previously, Metro is currently developing ground motion response spectra suitable for design of the project facilities.

Differential Seismic Settlement

Hazard from differential seismic settlement is not considered a significant operational impact.

Liquefaction

As discussed previously, the only subway structures that are likely to be potentially affected by liquefaction of the surrounding soils are the upper portions of some station walls. This potential impact would be mitigated by designing the upper portions of the station walls to resist greater lateral earth pressures.

Subsidence

Hazard from ground subsidence is not considered a significant operational impact.

Hazardous Subsurface Gases

To mitigate the hazard of subsurface gases during operation, the tunnels and stations would be designed to provide a redundant protection system against gas intrusion hazard. The primary protection from hazardous gases during operations is provided by the physical barriers (tunnel liner membranes) which keep gas out of tunnels and stations. Additional mitigation measures include the following for both tunnel and station operation:

- High volume ventilation systems with backup power sources
- Gas detection systems with alarms
- Emergency ventilation triggered by the gas detection systems
- Automatic equipment shut-off
- Additional personnel training

Several other concepts have been reviewed for use in the Elevated Gas Zone. For example, a specially designed precast concrete liner could be used for initial support and possibly with the addition of a secondary liner as needed if leakage occurs at some future time. Segment design could include thicker segments than what has been provided to date, so that wider gaskets can be used, to increase the performance of the gaskets. The segments may include steel fibers or other types of fiber reinforcement for stronger and denser concrete, with consequent additional reduction in permeability. Another concept includes a double gasket design such as that used on the MGLEE. The double gasket



system provides a second seal for a more redundant system. This also facilitates post-installation repair of leaks (if needed) by grouting the areas between the gaskets to provide additional sealing.

At the stations in gassy ground, it is anticipated that construction would be accomplished using slurry walls - or similar methods - to provide a more positive reduction of gas inflows both during and after construction than would be possible with conventional soldier piles and lagging. The slurry wall provides a thick (typically 3 to 4 feet) concrete barrier against water and gas intrusion, and eliminates the need for dewatering the station during construction. Grout tubes can be placed within slurry wall panels to be used in the event leakage occurs. This recommendation is made with full cognizance that slurry walls present a challenge in accommodating existing utilities.

Other station design concepts to reduce leakage include additional barriers made of flexible sealants, such as poly-rubber gels, along with the HDPE used today on Metro underground stations. Consideration of secondary station walls to provide an active system (low pressure barrier) has been recommended for further study. A summary of gas and waterproofing structural elements to be considered in preliminary and final design follows. Other methods for gas and waterproofing would be added for study as they are identified.

- Segment leakage testing – gasket seal under pressure before, during, and after seismic movements. This would include various gasket materials and profiles (height and width)
- Gasket material –effective life span and resistance to deterioration when subjected to man-made and natural contaminants, including methane, asphaltic materials and H₂S.
- Concrete permeability – new (dense) concrete mixes and including
- Steel fiber reinforcing - before and after seismic movements.
- Synthetic fiber reinforcing
- Special concrete mixes and additional thickness considered for tunnel segments and station walls,
- Segment coatings
- Cross passage seal details (construction and operations)
- Segment Insert Materials - use of non-corrosive plastics - e.g., dowels at segment circumferential joints
- Rapid repair methods – example pre-installed grout tubes within gasketed areas,
- Materials testing of HDPE, and alternative products such as poly-rubber gels, now in use in ground containing methane in other cities.
- Additional barrier design - multiple (double thickness of HDPE) such that leak zones can be isolated and injected with sealants for rapid repair. (Similar systems are now used for tunnels under high hydrostatic water pressures)



- Ground modification methods – ground treatment to reduce/neutralize, extraction or venting to remove, grouting to capture contaminants such as man-made contaminants, natural contaminants, methane, H₂S, and the like.
- Additional investigation of existing Metro Eastside tunnel for performance
- Review of sealing methods used by other industries
- Reviews by Tunnel Advisory Panel and other experts such as APTA panel convened in 2005.
- Scrubbers at slurry plant and other plant controls
- Tar separation and disposal

Hazardous Materials

Mitigation of the hazardous materials that potentially impact the tunnels will require the following:

- File reviews associated with facilities identified to potentially have a significant impact to evaluate whether soils and/or groundwater would require sampling in order to develop a project specific soil management/groundwater management or contingency plan in accordance with applicable regulations.
- Removal and offsite disposal of impacted soils based on appropriate criteria and regulations.
- Reuse of soils as defined in a project specific soil management plan and in accordance with USEPA Region 9 Regional Screening Levels (RSLs).
- Treatment and handling of groundwater during excavation and/or tunneling activities in accordance with applicable regulations.
- In locations where buildings may be demolished or modified for the staging and station access sites, asbestos and/or lead may be encountered and will be handled by licensed contractors in accordance with applicable regulations.
- Emergency response will be developed in conformance with federal, state and local regulations in the unlikely event of a major hazardous materials release close to or within the vicinity of the proposed project.

Mitigation of the hazardous materials that potentially impact the maintenance yards will require the following:

- File reviews associated with facilities identified to potentially have a significant impact to evaluate whether soils would require sampling in order to develop a project specific soil management plan in accordance with applicable regulations.
- Removal and offsite disposal of impacted soils based on appropriate criteria and regulations.
- Reuse of soils as defined in a project specific soil management plan and in accordance with USEPA Region 9 Regional Screening Levels (RSLs).



- In locations where buildings may be demolished or modified for the staging and station access sites, asbestos and/or lead may be encountered and will be handled by licensed contractors in accordance with applicable regulations.
- Emergency response will be developed in conformance with federal, state and local regulations in the unlikely event of a major hazardous materials release close to or within the vicinity of the proposed project.
- There is the potential for hazardous materials/waste spills to occur; however, it is assumed that the storage and disposal of hazardous materials/waste will be conducted in accordance with all Federal and State regulatory requirements that are intended to prevent or manage hazards and that if a spill does occur, it will be remediated accordingly.

5.1.2 Mitigation for Construction Impacts

Mitigation measures are listed below where appropriate to mitigate impacts of project construction due to surface fault rupture, seismic ground shaking, differential seismic settlement, liquefaction, subsidence, hazardous subsurface gases, and hazardous materials.

Surface Fault Rupture

Considering the infrequency of surface fault rupture occurring on the faults that cross the project alignment and the relatively short construction time for the project, the probability of surface fault rupture occurring during construction is considered extremely remote. Therefore, surface fault rupture is not considered a significant construction hazard that would require mitigation.

Seismic Ground Shaking

To mitigate potential impact from seismic ground shaking, the structural elements of the alternative alignments would be designed and constructed to resist or accommodate appropriate site-specific ground motions and conform to MTA Design Criteria as well as all applicable federal, state and local building codes. As mentioned previously, Metro is currently developing ground motion response spectra suitable for design of the project facilities.

Differential Seismic Settlement

Hazard from differential seismic settlement is not considered a significant construction impact.

Liquefaction

As discussed previously, the only subway structures that are likely to be potentially affected by liquefaction of the surrounding soils are the upper portions of some station walls. However, considering the infrequency of earthquakes of magnitudes great enough to cause liquefaction and the relatively short construction time for the project, the probability of liquefaction occurring during construction is considered extremely remote.



Therefore, liquefaction is not considered a significant construction hazard that would require mitigation.

Subsidence

To optimize control of the ground overlying and surrounding the tunnels and limit ground subsidence to acceptable levels, pressurized-face Tunnel Boring Machines (TBMs) will be used for tunnel construction. These TBMs also allow the tunnel lining to be installed and grout to be injected into the annulus between the lining and the tunnel wall immediately behind the TBM concurrently and without having to lower groundwater levels by dewatering.

As added protection against potential tunneling-induced subsidence and subsidence induced by other excavation activities, pre-construction surveys would be performed to document the existing conditions of buildings along the alignment before the tunneling begins. During construction, instrumentation, e.g., ground surface and building monitoring programs, would be in place to measure movements and provide information to the contractor on tunneling performance as well as to document that the settlement specifications are met. If measurements indicate settlement limits will be exceeded, the contractor will be required to change or add methods and/or procedures to comply with those limits. Construction work would be reassessed when settlements exceed action (warning) levels. Contractors will be required to modify construction methods if settlements exceed specified maximum levels.

Where conditions warrant, for example, shallow tunnels directly below sensitive structures or utilities, additional methods to reduce settlement would be specified. Such methods could include permeation grouting to improve the ground prior to tunneling, compaction grouting as the tunnel is excavated, compensation grouting involving the carefully controlled injection of grout between underground excavations and structures requiring protection from settlement, or underpinning the structure's foundation.

Dewatering is usually not necessary when tunneling with pressure-face TBMs. However, station construction will require excavations that will encounter the groundwater table and/or perched groundwater, dewatering may be required to complete the construction in some areas. Dewatering of the excavations made during construction could result in potentially damaging subsidence adjacent to the construction area. However, dewatering in sensitive areas would be avoided by utilizing slurry walls or secant pile walls in the construction of the station walls.

Hazardous Subsurface Gases

A fully enclosed tunnel mining system, such as a slurry-face TBM (a type of pressurized-face TBM) is expected to be used for tunneling in known gassy or potentially gassy areas. This technology is considered a considerable improvement over the methods used during construction of Metro's initial operating segments. Slurry-face TBMs minimize exposure of workers to elevated gas concentrations underground, since the excavated soil is removed in a fully enclosed slurry pipeline to an above-ground, enclosed treatment plant. Another type of pressurized-face TBM is the earth pressure balance (EPB) TBM. If the



EPB TBM can be converted to operate similar to a slurry-face TBM with a closed spoil transport system, it would afford similar benefits and would likely be acceptable for use.

In areas of potential H₂S exposure, there are several techniques that can be used to lower the risk of H₂S exposure. Areas that have been determined to be at risk of elevated H₂S levels can be treated by displacing and oxidation of the H₂S by injecting large quantities of H₂S -free water containing dilute hydrogen peroxide into the ground and groundwater in advance of the tunnel excavation (Jacobs et al., 1999). This “in-situ oxidation” method reduces H₂S levels even before the ground is excavated. This pre-treatment method is unlikely to be necessary where a slurry-face TBM is used, but may be implemented in at tunnel-to-station connections or at cross-passage excavation areas and where open excavation and limited dewatering may be conducted such as emergency exit shafts and low-point sump shafts.

In addition to pre-treatment of the ground/water prior to mining, additives can be injected into the bentonite slurry during the mining and/or prior to discharge into the slurry separation plant. The use of sodium hydroxide as an additive to maintain the pH of the slurry at 10 or 11 has been found to be effective in suppressing H₂S “off-gassing” from the slurry (Jacobs, et al., 1999). However, because of health and safety issues associated with use of sodium hydroxide, Cal/OSHA has previously indicated that they would not support such an application in a tunnel environment. In the slurry treatment plant located above ground, which can be more tightly controlled and monitored, sodium hydroxide dosing may be possible.

A more promising technique is the addition of zinc oxide to the slurry, a method commonly used in oil-field operations. The zinc oxide precipitates out dissolved sulfides to similarly reduce the potential for H₂S release or exposure. The slurry pipelines can be equipped with H₂S sensors that can automatically start zinc oxide dosing when certain levels are reached. However, if zinc dosages are significant enough, the post-treatment solids could be considered contaminated, which could require disposal at special facilities.

All of these treatments can neutralize the presence of hydrogen sulfide gas, thus improving the safety of workers involved in the slurry and separation plant systems. Such treatments have the additional benefit of reducing the corrosive effects of H₂S when it is dissolved in the slurry or groundwater.

The use of relatively impermeable diaphragm or slurry walls may be required to reduce gas inflow in other excavations, such as for stations, in gassy areas. Additional ventilation, monitoring, and worker training for exposure to hazardous gases will also be required during construction. In extreme cases, some work may require additional worker training and use of personal protective equipment (PPE), such as fitted breathing apparatus, that may include supplied air.

The final structure may include additional sealing from gas intrusion, such as with special gas-resistant membranes and/or joint sealants, which will increase resistance to leakage and be “self-healing” against small movements. Stations should also include gas



monitoring and detection systems with alarms, as well as special ventilation equipment to dissipate gas.

All of these issues will be further investigated during the Preliminary Engineering and Final Design as described above.

Hazardous Materials

Mitigation of the hazardous materials that potentially impact the tunnels and maintenance yards will require the following:

- File reviews associated with facilities identified to potentially have a significant impact to evaluate whether soils and/or groundwater would require sampling in order to develop a project specific soil management/groundwater management or contingency plan in accordance with applicable regulations.
- Removal and offsite disposal of impacted soils based on appropriate criteria and regulations.
- Reuse of soils as defined in a project specific soil management plan and in accordance with USEPA Region 9 Regional Screening Levels (RSLs).
- Treatment and handling of groundwater during excavation and/or tunneling activities in accordance with applicable regulations.
- In locations where buildings may be demolished or modified for the staging and station access sites, asbestos and/or lead may be encountered and will be handled by licensed contractors in accordance with applicable regulations.
- Emergency response will be developed in conformance with federal, state and local regulations in the unlikely event of a major hazardous materials release close to or within the vicinity of the proposed project.
- Due to the potential that abandoned oil wells may be encountered within the proposed alternative alignments, the tunnel should be aligned to avoid these wells or the wells properly reabandoned prior to tunneling.

5.2 CEQA Determination

5.2.1 Geotechnical

Categories of potential geotechnical impacts are set forth by the California Environmental Quality Act (CEQA), the California Public Resources Code, and State CEQA Guidelines. For the purposes of this analysis, an impact was considered to be significant and to require mitigation if it would result in any of the following:

- Expose people or structures to adverse effects, including the risk of loss, injury or death involving rupture of known earthquake faults, strong seismic ground shaking, landslides, liquefaction, or expansive soils.



- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse.
- Result in substantial soil erosion or the loss of topsoil.
- Have soils incapable of adequately supporting the use of septic tanks.

Due to the relatively flat terrain of the project area, impacts from landsliding and lateral spreading are not considered significant impacts and do not require mitigation.

Since the majority of the project elements consist of underground structures and the areas around the tops of the stations are or will be paved, soil erosion or the loss of topsoil are not considered significant impacts and do not require mitigation.

Since the project is not expected to utilize septic tanks, soil conditions relative to septic tank use are not considered a significant impact and do not require mitigation.

Impacts from seismic ground shaking, liquefaction, expansive soils, subsidence or collapse are not expected to be significant following mitigation.

As discussed previously, the active Santa Monica fault crosses the Santa Monica Extension alignment in at least four places. While the impact from fault rupture hazard can be reduced through the implementation of specialized construction techniques, the hazard cannot be eliminated. Therefore, impact from fault rupture hazard would remain significant following mitigation.

5.2.2 Hazardous Materials

Categories of potential hazardous material impacts are set forth by the California Environmental Quality Act (CEQA), the California Public Resources Code, and State CEQA Guidelines. For the purposes of this analysis, an impact was considered to be significant and to require mitigation if it would result in any of the following:

- Creates a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.
- Creates a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.
- Is located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment.

Impacts from hazardous materials are not expected to be significant following mitigation.

Soils impacted by hazardous materials may be excavated and transported on public roads and highways that could cause exposure to potentially harmful substances. Mitigation would be required to remove a spill if an accident occurred



During construction, contaminated groundwater may be encountered that would be disposed to waterways. Mitigation would be required that includes potential treatment and permits.

Several facilities included on lists of hazardous materials sites were identified with the potential to create significant hazard in the form of contaminated soil. Mitigation potentially consisting of removal and or soil management would be required during tunneling, excavation, and for worker health and safety.

Without mitigation, such impacts would be significant.

5.3 Impacts Remaining After Mitigation

5.3.1 Geotechnical

Potential impacts from seismic ground shaking, hazardous gases, liquefaction, expansive soils, subsidence and collapse would not be significant following mitigation.

Some level of fault rupture hazard would likely exist following mitigation. However, this hazard is typically considered to pose an acceptable level of risk. That is, the level of injury and material/property loss that could potentially occur from fault rupture is considered to be tolerable by the community.

5.3.2 Hazardous Materials

Potential impacts associated with hazardous materials associated with facilities along the alignment and maintenance yards would be less than significant after mitigations are complete.



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