

# Westside Subway Extension

## *Draft Environmental Impact Statement/ Environmental Impact Report*

### > Executive Summary September 2010

The U.S. Department of Transportation Federal Transit Administration (FTA) and the Los Angeles County Metropolitan Transportation Authority (Metro) are undertaking the Los Angeles Westside Subway Extension Project (Project) that would extend the Metro Purple Line/Metro Red Line heavy rail subway system from its current western termini at Wilshire/Western Station (Metro Purple Line) and Hollywood/Highland Station (Metro Red Line) to a new western terminus.

### **History and Background of the Westside Subway Extension Project**

Metro's Westside Subway Extension has been an integral element of local, regional, and Federal transportation planning since the early 1980s. Extending westward from the Los Angeles Central Business District (CBD), the Westside Subway Extension has been the subject of in-depth technical studies and extensive community involvement during this period. The transit investment has historically been envisioned to extend toward Beverly Hills, Century City, Westwood (the University of California, Los Angeles (UCLA)), West Los Angeles, and Santa Monica.

### **Suspension of Early Subway Planning**

In the early 1990s, plans were underway to extend the Metro rail subway to the Westside. Construction was underway on the Metro Red Line from Union Station to Wilshire/Western Station and to Hollywood. Environmental clearance and a Full Funding

Grant Agreement (FFGA) were completed to extend the subway from Wilshire/Western to Pico/San Vicente at this time. The subway alignment was to have deviated south of Wilshire Boulevard to avoid a federally prohibited methane gas hazard zone (a zone that was designated in 1985 after naturally occurring methane gas caused a fire in the Fairfax District). The planning for a subway in this corridor was later suspended in 1998 due to a lack of funding, including a ballot initiative that prohibited local funds from being used for subway construction.

### **Resumption of Subway Planning**

In October 2005, at the request of Metro and the Mayor of the City of Los Angeles, the American Public Transportation Association (APTA) conducted a Peer Review to reconsider the feasibility of tunneling along the federally precluded Wilshire Boulevard segment of the Westside Corridor. As a result of this review, which concluded that tunnels could be safely constructed and operated along Wilshire Boulevard due to advances in new tunnel construction methods that were previously unavailable, legislation was enacted in Congress repealing the Federal prohibition on subway funding in December 2007.

### **Alternatives Analysis**

As discussed in Chapter 2 of this Draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR), Alternatives Analysis (AA) Study was initiated in 2007 for all reasonable fixed-guideway alternative alignments and transit technologies,

including heavy rail subway alternatives. The FTA issued an Early Scoping Notice in the *Federal Register* on October 1, 2007, to help define the appropriate range of issues and alternatives to be addressed in the AA Study.

The AA Study evaluated alignment and transit technology alternatives within the Study Area. After the alternatives evaluation in the AA Study, two alternatives were recommended for further consideration in this Draft EIS/EIR. These two alternatives best met the Purpose and Need while having the fewest environmental impacts. The alternatives were: (1) Extend the Metro Purple Line Subway via Wilshire Boulevard to Santa Monica, and (2) Extend the Metro Purple Line Subway via Wilshire Boulevard to Santa Monica plus extend a subway from the Metro Red Line Subway Hollywood/ Highland Station via Santa Monica Boulevard to connect with the Wilshire line.

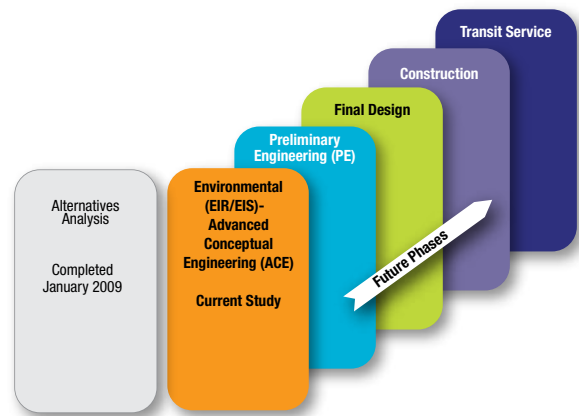
The alternative alignments studied during the AA process were generally located along roadway rights-of-way that could reasonably be used in an at-grade, elevated, or subway configuration. Four technologies were presented and analyzed in the AA Study— heavy rail transit (HRT), light rail transit (LRT), bus rapid transit (BRT), and monorail. The ridership analysis demonstrated a need for a technology that could provide a capacity of more than 700 passengers per train set to accommodate the high-capacity peak-period loading along the Wilshire and Santa Monica alignments. HRT was identified as the preferred technology for further study because it has the capacity to meet the anticipated ridership demand and limit the number of transfers.

In January 2009, the Metro Board approved the Westside Subway Extension Project AA Study and authorized preparation of this Draft EIS/EIR.

Public hearings will be held after the release of the Draft EIS/EIR, and then a Locally Preferred Alterna-

tive (LPA) would be selected and Metro would apply for entry into FTA’s Preliminary Engineering (PE) Phase.

If entry into the FTA PE Phase is granted, the Final EIS/EIR would be prepared at the New Starts PE level of engineering. After completion of the Final EIS/EIR process, a Notice of Determination (NOD) and Record of Decision (ROD) would be issued. If a Build Alternative is identified and selected as the LPA in these decision documents, Metro would then apply for entry into the FTA Final Design phase. At this point in the process, Metro would be able to acquire right-of-way, relocate utilities, prepare final construction plans and specifications (including construction management plans), construction cost estimates, and bid documents. The project financial plan would then be completed—which is required for all projects seeking a FFGA from the FTA. Once Final Design is completed, Metro would begin construction of the project, perform project testing, and then initiate transit service (Figure S-1).



**Figure S-1. Steps in the FTA Project Development Process**

### Draft EIS/EIR Study Process

The FTA and Metro have prepared this Draft EIS/EIR for the Westside Subway Extension in Los Angeles, California. The FTA is the lead agency for the National Environmental Policy Act (NEPA), and

Metro is the lead agency for the California Environmental Quality Act (CEQA).

This Draft EIS/EIR defines the Purpose and Need of the Project and describes and evaluates the alternatives, including a No Build Alternative and a relatively low-cost Transportation System Management (TSM) Alternative. The Draft EIS/EIR documents the evaluation of the potential transportation and environmental impacts and benefits, mitigation measures, operating and maintenance and capital costs, and potential funding sources for the alternatives. It also includes a comparison of alternatives and a discussion of the public and agency outreach. The components of the Project that are evaluated in this Draft EIS/EIR include the following:

- **Westside Subway Extension alternatives**—Five heavy rail subway alternatives are analyzed, representing different project lengths
- **Station location options and alignments**—Consideration whether to include certain stations, the location of alternate station locations where options exist, and comparison of optional routes for connecting station locations
- **Phasing options**—Two minimum operable segments (MOS) with potential interim operation are considered
- **Other project components**—traction powered substations, vent shafts, trackwork options, a rail operations center, and two options for the maintenance yard

### Description of the Westside Subway Extension Study Area

The Study Area for the Project was defined during the AA phase. It is located in western Los Angeles County and encompasses approximately 38 square miles. The Study Area is east/west oriented and includes portions of the Cities of Los Angeles, West Hollywood, Beverly Hills, and Santa Monica, as well as portions of unincorporated Los Angeles County. The Study Area boundaries generally extend north to

the base of the Santa Monica Mountains along Hollywood, Sunset, and San Vicente Boulevards; east to the Metro Rail stations at Hollywood/Highland and Wilshire/Western; south to Pico Boulevard; and west to the Pacific Ocean (Figure S-2).

### Relationship of the Study Area to Metro's Transit System

Since 1990, Metro has constructed a regional fixed-guideway transit system that consists of HRT, LRT, BRT, and commuter rail. This system currently includes more than 76 miles of Metro Rail service (HRT and LRT) and 14 miles of BRT service. These include the Metro Red Line (HRT), Metro Blue Line (LRT), Metro Green Line (LRT), Metro Gold Line (LRT) and Metro Orange Line (BRT). In addition, the Southern California Regional Rail Authority (Metrolink) has opened more than 500 miles of Metrolink commuter rail lines that serve five counties.

The existing fixed-guideway transit service in the region is complemented by the transit corridors currently under study or construction, including: Exposition Light Rail Transit Project Phases 1 and 2; Metro Gold Line Foothill Extension; Metro Regional Connector; Metro Gold Line Eastside Extension Phase 2; Crenshaw/LAX Transit Corridor Project; South Bay Metro Green Line Extension; Metro Orange Line Extension; and Wilshire BRT. The Westside Subway Extension would provide direct connections from the west side of the county to all elements of the existing Metro system. Enhancements are also planned for the Division 20 Maintenance and Storage Facility.

### Purpose and Need for Transit Improvements in the Study Area

The purpose of this Project is to improve transit travel time and provide more reliable transit service to the 286,246 transit riders who travel through the



**Figure S-2. Project Study Area Location and Metro System Connections**

Study Area today. More specifically, the Project’s purpose is to:

- Improve Study Area mobility and travel reliability
- Improve transit services within the Study Area
- Improve access to major activity and employment centers in the Study Area

- Improve opportunities for transit supportive land use policies and conditions
- Improve transportation equity
- Provide a fast, reliable, and environmentally-sound transit alternative
- Meet Regional Transit Objectives through the Southern California Association of Governments’

(SCAG's) Performance Indicators of mobility, accessibility, reliability, and safety

The need for the Project is described in Chapter 1 of this Draft EIS/EIR in the discussions on population and employment growth, the high number of major activity centers, high existing transit usage, and severe traffic congestion. The Study Area currently has, and is projected to have, large population and employment centers scattered throughout 15 existing major activity centers in the corridor. These activity centers are served by extremely congested road networks that will deteriorate further with the projected increase in population of 51,000 (10.1 percent) and the 58,000 additional jobs in the corridor (a 12.1 percent increase) by 2035. This anticipated growth will further affect transit travel speeds and reliability, even with a dedicated lane for express bus service on Wilshire Boulevard. By 2035, buses will travel at speeds ranging from 8 to 11 miles per hour (mph). The Study Area currently has high transit usage—hundreds of thousands of transit riders every day. This high level of transit usage will increase by 29 percent between 2006 and 2035 (from 286,246 to 370,520). The improved capacity that would result from the subway extension is the best solution to improve travel times and reliability and to provide a high-capacity, environmentally-sound transit alternative.

### Study Area Population and Employment

Approximately 5 percent of the Los Angeles County population (504,000) and 10 percent of the jobs (479,000) are concentrated in the Study Area. The Study Area population and employment densities are among the highest in the metropolitan region, averaging approximately 13,100 persons per square mile and 12,500 jobs per square mile.

According to forecasts by SCAG, the designated Metropolitan Planning Organization (MPO), the Study Area's population density will increase to more than

14,400 persons per square mile and approximately 14,000 jobs per square mile by 2035. This represents a 10 percent increase in population density and a 12 percent increase in employment density. In particular, the three largest activity centers are in Beverly Hills (26,000 jobs per square mile), Century City (43,000 jobs per square mile), and Westwood (84,000 jobs per square mile). Approximately 147,000 jobs were located in these three centers in 2006.

The Westwood and Century City business districts each have more jobs than many mid-sized downtowns.

### Major Activity Centers and Destinations

Los Angeles has been characterized as a collection of urban centers. The "Centers Concept" from the 1960s and 1970s identified urban centers of various types throughout the region that represented concentrations of economic activities and higher-density housing. The Centers Concept envisioned that these areas would be interconnected by transit infrastructure. The City of Los Angeles General Plan Framework originally adopted the Centers Concept in 1970, and has subsequently re-adopted the concept in more recent updates of the General Plan.

The concept specifically designated centers in Wilshire Center, Hollywood, Miracle Mile, Sunset Strip, Beverly Hills, Westwood, and Santa Monica. The intent of the plan, which would be met for these centers by this Project, is to link these centers with transit to reduce the reliance on the automobile for access to these higher density areas and to preserve lower densities in existing communities outside designated growth areas.

Major activity centers in the Study Area are shown in Figure S-3, and land uses are shown in Figure S-4. Some of Southern California's most well-known



**Figure S-3. Activity Centers in the Study Area**

entertainment, educational, and cultural activity centers are in the Study Area. Many of these centers are within the densest portions of the Study Area, along the Wilshire and Santa Monica Boulevard corridors. As shown in Figure S-3, major activity centers include Downtown Santa Monica, Westwood Village, UCLA, Century City, Rodeo Drive/Beverly Hills, Beverly Center/Cedars Sinai Hospital, Sunset Strip/West Hollywood, the Grove/Farmer’s Market, Wilshire Miracle Mile, Wilshire Center, and Hollywood.

### **Travel Markets, Transit Usage, Congestion, and Mobility in the Study Area**

Presently, the transportation network consists of a well-defined grid of arterials and freeways generally following an east/west or north/south orientation. These freeways and streets carry some of the highest traffic volumes in California and throughout the country.

#### **Travel Markets**

The primary travel markets in the Study Area are the east/west “within Westside” and the east/west trips

to and from Westside. As shown in Figure S-5, on an average weekday in 2006, about 301,000 home-based work peak trips entered the Study Area from outside origins, while about 123,000 trips left the Study Area for outside destinations. More than twice as many work trips entered the Study Area as left. There were 102,000 daily home-based work peak trips starting and ending within the Study Area, suggesting that approximately one in four Study Area jobs is filled by local (Study Area) residents. The remaining 75 percent of the jobs were filled by individuals living outside the Study Area. Projections suggest that the ratio of home-based work peak trips entering or leaving the Study Area daily will remain about the same through 2035.

### **Transit Usage**

All bus service is currently provided in mixed-flow lanes, which subjects buses to the same high levels of congestion experienced by automobiles. The Wilshire Corridor Route (Line 20/720/920) is the heaviest used bus corridor in Southern California with nearly 60,000 daily boardings, surpassing the ridership of many LRT routes including the Metro Green Line and the Metro Gold Line in Los Angeles.

### **Congestion and Mobility**

Between 2006 and 2035, substantial increases are projected in vehicle miles traveled (VMT) and vehicle hours traveled (VHT). Daily VMT within the Study Area will increase by approximately 26 percent, from 4 million in 2006 to more than 5 million in 2035. During the same period, regional VMT are projected to increase from 304.2 million to 504.7 million, or more than 65.9 percent. VHT in the Study Area are projected to increase from about 165,000 to 247,000, or almost 50 percent. Regional VHT are projected to increase from 9.5 million to 29.2 million, or about 207 percent between 2006 and 2035.

The Study Area contains some of the most congested arterial streets in the County. Key east/west arterials,

such as Wilshire, Santa Monica, Sunset, Hollywood, Olympic, and Pico Boulevards, operate at congested conditions throughout the day. North/south arterials extending westward from Western Avenue include Crenshaw Boulevard, La Brea Avenue, La Cienega Boulevard, Beverly Drive, Westwood Boulevard, Sepulveda Boulevard, Bundy Drive, and Lincoln Boulevard.

Arterials in the Study Area serve employment centers as well as local and regional travel. They are also used as alternatives to the Interstate 10 (I-10) and Interstate 405 (I-405) freeways during heavy congestion, accidents, breakdowns, lane closures, and other random events. As a result, the Study Area's roadway capacity is insufficient to handle the traffic volumes, thus reducing travel time reliability for motorists and transit riders.

The current average speeds of the Metro Rapid buses traveling through the study area range between 10 and 15 mph along Wilshire Boulevard and between 11 and 14 mph along Santa Monica Boulevard. The average speeds of both local buses and the Metro Rapid buses traveling through the Study Area are anticipated to decrease further as traffic congestion increases on roadways, as illustrated in Figure S-6.

The Study Area has substantial traffic congestion, high transit ridership and load factors, and closely spaced bus stops. Combined, these factors result in declining bus operating speeds and reliability,

**Bus speeds are slow and getting slower.**

making transit less competitive with the private automobile. With high passenger loads and congested

roads, desirable headways (frequency of service) are difficult to maintain and result in overcrowded buses. As the road and transit systems become more congested, the Study Area becomes a less desirable

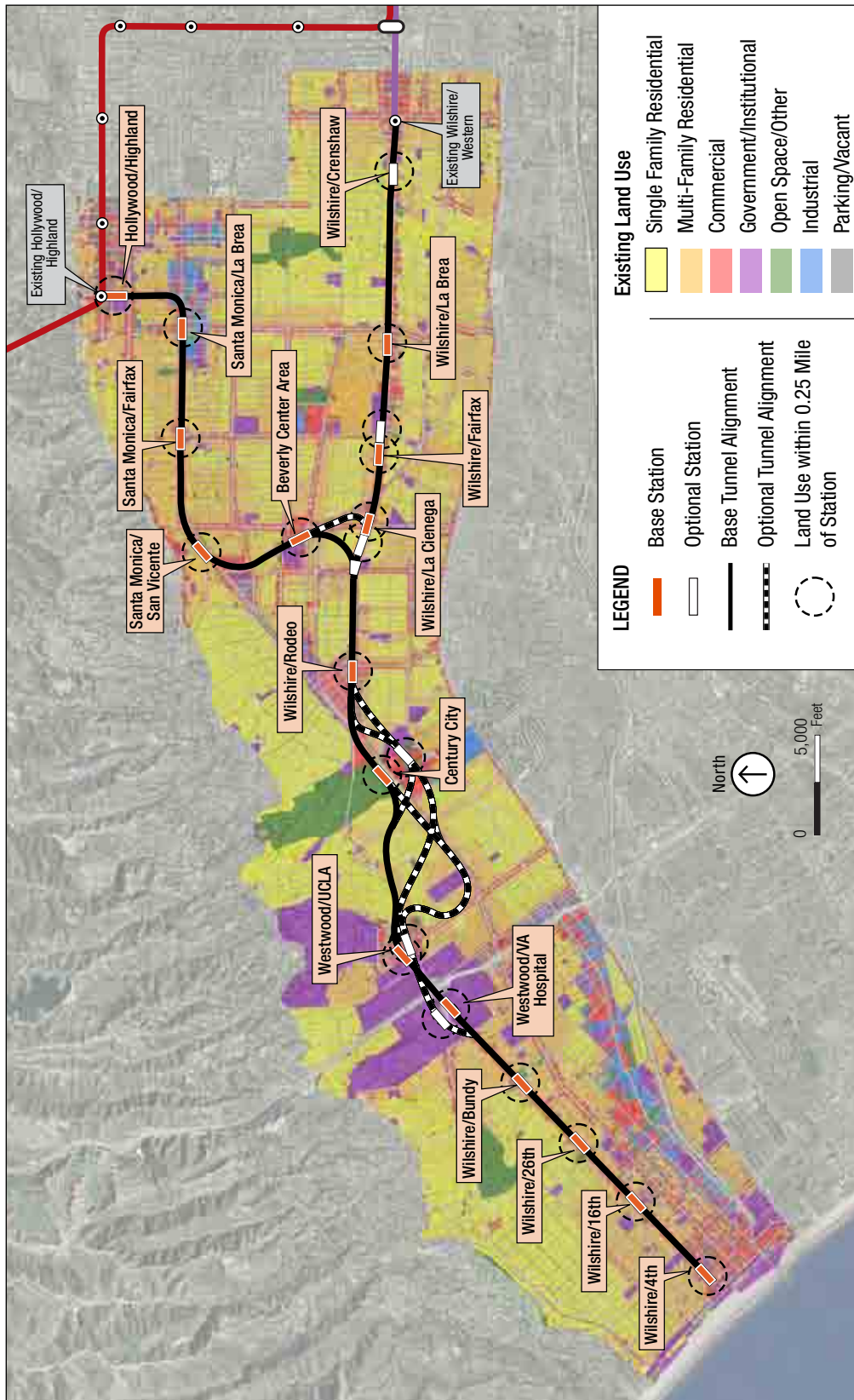


Figure S-4. Land Use



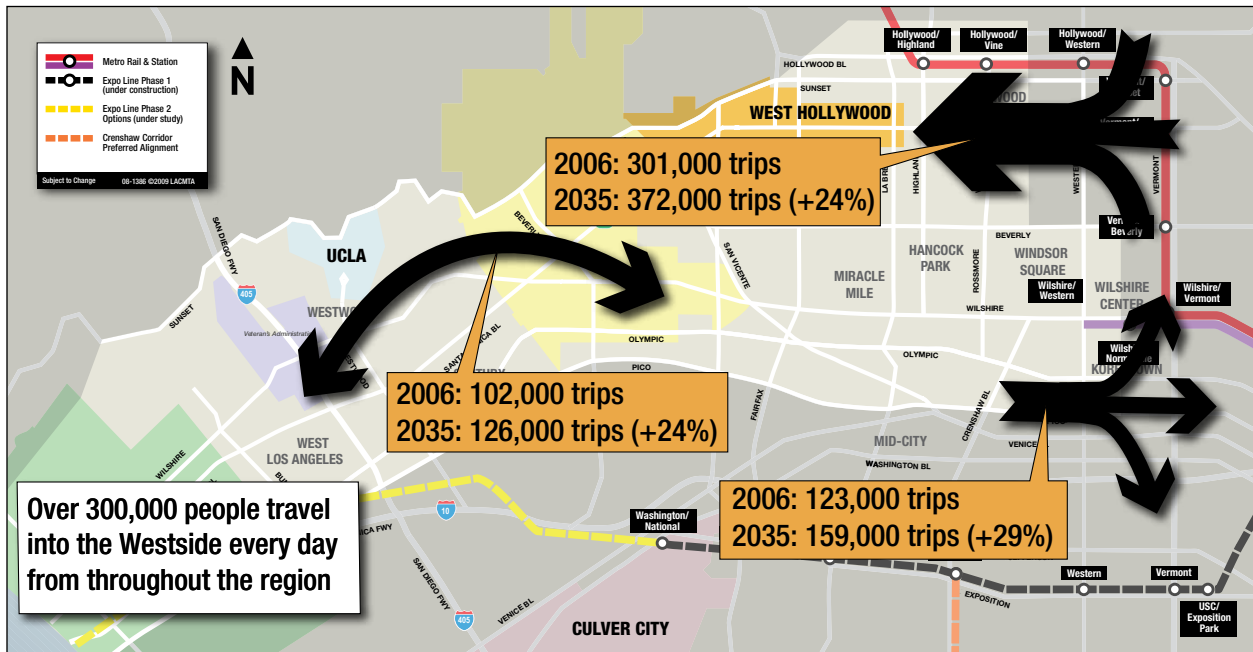


Figure S-5. Home-Based Work Peak Person Trip Comparison: 2006 to 2035

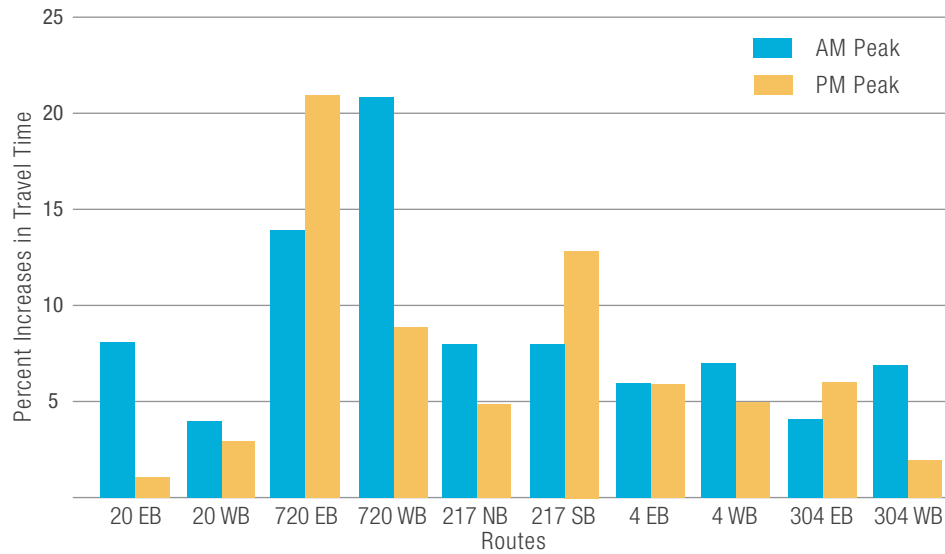


Figure S-6. Percent Increases in Transit Travel Times—Metro Bus Routes in Study Area, 2003 to 2006

place for people to live and work and less attractive for planned growth and development.

### Regional Objectives

In 2008, the SCAG Regional Council adopted the *Regional Transportation Plan (RTP)* (SCAG 2008) to establish the goals, objectives, and policies for the transportation system and to establish an implementation plan for transportation investments. The RTP includes regional performance indicators with objectives against which specific transportation investments can be measured. Four key performance indicators and their 2003 base year results, 2035 baseline projections, and 2035 objectives are shown in Table S-1. The Study Area is designated as one of the most congested areas in the five-county region. Significant improvement in these categories to meet regional objectives for mobility, accessibility, and reliability are needed.

### Measure R

In November 2008, the voters of Los Angeles County approved Measure R, a one-half cent sales tax measure to provide funding for several important new transportation projects in Los Angeles County. A total of \$4.2 billion was identified over a period of 30

years for the Westside Subway Extension, comprised of local sales tax dollars and Federal matching funds.

### Alternatives Before Scoping Period

At the initiation of the Draft EIS/EIR phase, Metro presented the public with the two general alignments for a western extension of the Metro Rail Red Line and Metro Purple Line subway (Alternative 1 in Figure S-7 and Alternative 11 in Figure S-8). A series of NEPA/CEQA scoping meetings were held to solicit public input. In addition to requesting input on the general alignments of Alternatives 1 and 11, Metro sought public comment on the two green-shaded portions in Figure S-7 and Figure S-8 where different alignment and station options were possible in the Beverly Hills to Westwood area and along the West Hollywood Branch alignment. The alternatives and station options discussed in this Draft EIS/EIR include those recommended at the conclusion of the AA phase with alignment and station options. The alignment refinements and options are based on further design and issues identified by the public during scoping.

In October 2009, Metro adopted a *Long Range Transportation Plan (LRTP)*. In response to funding and phasing issues raised by fiscal constraints identified

**Table S-1. Southern California Association of Governments Performance Indicators**

Performance Indicator	Measurement	2003 Base Year	2035 Baseline	2035 Objective
Mobility	Average daily speed	30.5 mph	26.8 mph	29.3 mph
	Average daily delay per capita	20.0 minutes	30.7 minutes	25.8 minutes
Accessibility	Percent of PM work trips within 45 minutes of residence	77% of all auto trips 43% of all transit trips	77% of all auto trips 42% of all transit trips	79% of all auto trips 45% of all transit trips
Reliability	Percent variation in travel time—weekday 5 p.m. to 6 p.m.	28% (2005)	N/A	25%
Safety	Daily accident rate per million persons	28.9 (estimated from graph)	30.2 (estimated from graph)	30.1 (estimated from graph)



during the LRTP process, Metro developed Minimal Operating Segments (MOSSs) to correspond to the timeframe for the availability of Measure R funding. Initial construction segments were identified to Fairfax (2019), Century City (2026) and Westwood (2036).

### **Refinement of the Alignments and Station Locations**

During preparation of this Draft EIS/EIR, the alignment and station locations have been refined to avoid impacts to the natural and built environments where feasible, provide a cost-effective solution to increase east/west mobility in the Study Area, and respond to public and agency input. Chapter 2 of this Draft EIS/EIR and the *Post Scoping Analysis and Refinement of Alternatives* (May 2010) document the evaluation of the alternatives. A summary of the public and agency comments and how the alignments and stations were refined is provided below.

#### ***Wilshire/Crenshaw Station Option (Option 1)***

Scoping comments were divided on this station with some expressing support while others argued that it is not needed. This location is only one-half mile west of the Wilshire/Western Station in a relatively low density area that is not planned to grow in the future. Also Crenshaw Boulevard terminates at Wilshire Boulevard so there are less connectivity opportunities than at other sites. For these reasons, an option has been provided that evaluates operating the project without a station at Wilshire Crenshaw.

#### ***Wilshire/Fairfax Station Option (Option 2)***

During the NEPA/CEQA scoping period, public comments stated that the Wilshire/Fairfax Station should more directly serve the Los Angeles County Museum of Art (LACMA) and the Page Museum/Hancock Park facilities. To address these comments, a second station site closer to the LACMA and park facilities was included in the Draft EIS/EIR for more detailed analysis.

#### ***Wilshire/La Cienega Station Option (Option 3)***

Different station locations were examined to respond to public comment and address potential connections and transfers to a future West Hollywood alignment. There was strong public preference for a station location east of La Cienega Boulevard (which would have no transfer/connection structure between lines). Another station option west of La Cienega Boulevard was developed that would allow for transfers to the West Hollywood Line. Therefore, it was concluded that two station location options should be studied in this Draft EIS/EIR.

#### ***Century City Station and Alignment Options (Option 4)***

##### ***Wilshire/Rodeo Station to Century City Station***

The different Century City Station options necessitated development of different route options between the Wilshire/Rodeo Station and Century City Stations. Alignment options were developed and evaluated in response to scoping comments to consider ways to minimize subsurface easements under residential properties. The analysis concluded that three alignment options—Constellation South, Constellation North, and Santa Monica—should be studied in this Draft EIS/EIR, only one of which would ultimately be selected as part of a Build Alternative.

##### ***Century City to Westwood/UCLA Station***

The AA Study identified multiple sites for subway stations in Century City and Westwood and multiple connecting routes between the different stations. The analysis in this area concluded that two stations (Santa Monica Boulevard at Avenue of the Stars and Constellation Boulevard at Avenue of the Stars) should be evaluated in this Draft EIS/EIR.

Six alignment routes were considered for connecting the Century City and Westwood Stations. By combining station options with route options, a total of 22 route options were considered in this area. Based

on the location of the station options, several route options were eliminated from further consideration. Following the review of scoping comments, more detailed engineering and environmental studies and targeted stakeholder outreach were conducted. The conclusion of these studies resulted in the further consideration of three route alignments: East Route, Central Route, and West Route. The three routes were carried forward for further analysis in the Draft EIS/EIR, only one of which would ultimately be selected as part of a Build Alternative. The East Route provides the shortest, fastest route and the least costly route between Century City and Westwood; it also tunnels under fewer residential properties than the Central Route. The West route passes beneath fewer residential properties but is considerably longer than the Central and East routes.

### **Westwood/VA Hospital Station (Option 6)**

Scoping comments suggested that an additional station should be provided west of the I-405 Freeway because there was too much distance between the Westwood/UCLA and Wilshire/Bundy Stations. Additionally, by extending the Project one station west of the I-405 Freeway, access for residents west of I-405 would be significantly improved, and the Project would still be within Measure R funding. Several sites for stations were considered and evaluated. The analysis in this area concluded that two potential station locations at the Veterans Administration (VA) Hospital—VA Hospital South and VA Hospital North—should be evaluated in this Draft EIS/EIR.

### **West Hollywood Alignments**

During scoping for the Draft EIS/EIR, the public was presented with two possible routes for the West Hollywood alignment for the north/south segment between Santa Monica and Wilshire Boulevards: one followed La Cienega Boulevard and one followed San Vicente Boulevard. The two routes located the stations for the Santa Monica Boulevard/La Cienega Boulevard and Beverly Center areas, which would

result in differences in ridership, impacts, and access to and from destinations, as well as community preference. A screening analysis was performed on the two route options that examined the ability of this alternative to meet the Purpose and Need of the Project, as well as engineering and construction feasibility, urban design considerations, and cost differentials. Based on the analysis, it was concluded that the La Cienega Boulevard alignment would be eliminated from further consideration and the San Vicente Boulevard alignment should be studied further in this Draft EIS/EIR.

### **Alternatives Considered in this Draft EIS/EIR**

Five Build Alternatives, station and alignment options, other components of the Build Alternatives including the maintenance facility, and the phasing of the alternatives (i.e. minimum operable segments or MOSs) are presented in this Draft EIS/EIR. No Build and TSM Alternatives are also under consideration.

#### **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 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. The No Build Alternative is included in this Draft EIS/EIR to provide a comparison of what future conditions would be like if the Project were not built.

#### **Transportation Systems Management (TSM) Alternative**

The TSM Alternative includes more frequent bus service than the No Build Alternative to reduce

delay and enhance mobility. 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.

### Build Alternatives

Metro refined the two AA Study Alternatives and developed alternatives with different lengths to meet the fiscal constraints and funding timelines identified in the LRTP. This Draft EIS/EIR includes five Build Alternatives, station and alignment options, the base stations (i.e., stations without options), other

A base alternative for the Build Alternatives and stations is described in Chapter 2 of this Draft EIS/Draft EIR. Alignment (or segment) and station options to the base alternative alignment and stations are also included. The options are compared against the base alternatives and base stations to determine, among many environmental factors and goals and objectives, which more adequately meet the Project's Purpose and Need.

### Overview of Heavy-Rail Transit (HRT) Technology

The Build Alternatives overlay HRT on the rail and bus networks in the No Build and TSM Alternatives. HRT systems are at the upper end of the urban transit spectrum in terms of speed, capacity, service predictability, and cost. HRT operates in an exclusive grade-separated right-of-way, picking up electrical power from a third rail adjacent to and parallel with

the running rail. For the Build Alternatives, the separated right-of-way is all in a tunnel, with the top of the tunnel being a minimum 30 to 70 feet below the ground. No crossings of the right-of-way are permitted in the same plane with HRT operations.

- Very high passenger-carrying capacity of up to 1,000 passengers per train
- Maximum speed of 70 mph
- Multiple-unit trains with up to six cars per train

HRT is best suited for service in long, high-density, congested corridors to connect the central city with major activity centers and large, dense suburban communities.

### HRT Stations

HRT stations are the gateways to the transit system. HRT stations consist of a station “box,” or area in which the basic components are located (Figure S-9). The station box would 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. Three types of mezzanines are possible: center, single-ended, or double-ended.

The 450-foot platforms would be one level below the mezzanine level and would allow level boarding (the train car floor is at the same level as the platform) for full accessibility. Stations would consist of a center or side platform. Each station would be equipped with



Figure S-9. Existing Metro HRT Train and Station

under-platform exhaust shafts, over-track exhaust shafts, blast relief shafts, and fresh air intakes. Stations and station entrances would comply with the *Americans with Disabilities Act of 1990 (ADA)*.

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

### **Alternative 1—Westwood/UCLA Extension**

This alternative extends HRT, in subway, from the existing Metro Purple Line Wilshire/Western Station to a Westwood/UCLA Station (Figure S-10). The alignment is 8.60 miles long and would operate in each direction at 3.3-minute headways during morning and evening peak periods and at 10-minute headways during midday. Service frequencies on other Metro Rail lines and bus routes in the corridor would be the same as for the No Build Alternative. The estimated one-way running time is 12 minutes 39 seconds from the Wilshire/Western Station.

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, then toward a Westwood/UCLA Station.

### **Alternative 2—Westwood/VA Hospital Extension**

This alternative extends HRT, in subway, from the existing Metro Purple Line Wilshire/Western Station to a Westwood/VA Hospital Station (Figure S-11). This alignment is 8.96 miles long from the Wilshire/Western Station and 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. Service frequencies on other Metro Rail lines and bus routes in the corridor would be the same as for the No Build Alternative. The estimated one-way running time is 13 minutes 53 seconds from the Wilshire/Western Station.

Following the same alignment as Alternative 1 to the 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.

### **Alternative 3—Santa Monica Extension**

This alternative extends from the existing Metro Purple Line Wilshire/Western Station to the Wilshire/4th Street Station in Santa Monica (Figure S-12). The alignment is 12.38 miles long from the Wilshire/Western Station, 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 to Wilshire/4th Street Station in Santa Monica.

Similar to Alternative 1, from the Wilshire/Western Station, Alternative 3 travels westerly beneath Wilshire Boulevard to the Wilshire/Rodeo Station and then southwesterly toward a Century City Station, then toward a Westwood/UCLA Station. Similar to Alternative 2, Alternative 3 continues westerly under the I-405 freeway to a Westwood/VA Hospital Station. Alternative 3 would then continue westerly under Wilshire Boulevard, terminating at the Wilshire/4th Street Station in Santa Monica.

### **Alternative 4—Westwood/VA Hospital Extension plus West Hollywood Extension**

Similar to Alternative 2, this alternative extends HRT, in subway, from the existing Metro Purple Line Wilshire/Western Station to a Westwood/VA Hospital Station but also adds a West Hollywood Extension (Figure S-13). The West Hollywood Extension

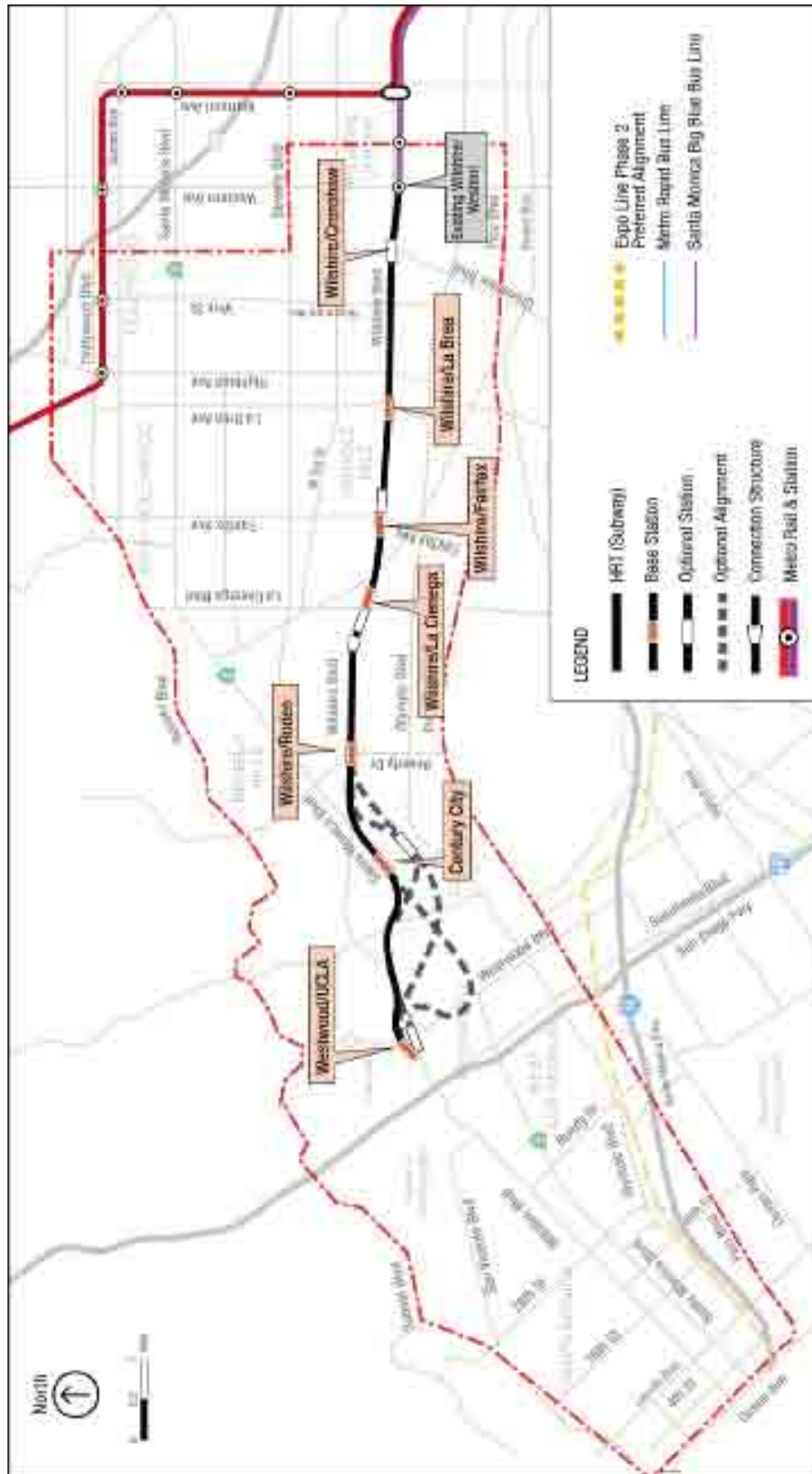


Figure S-10. Alternative 1—Westwood/UCLA Extension



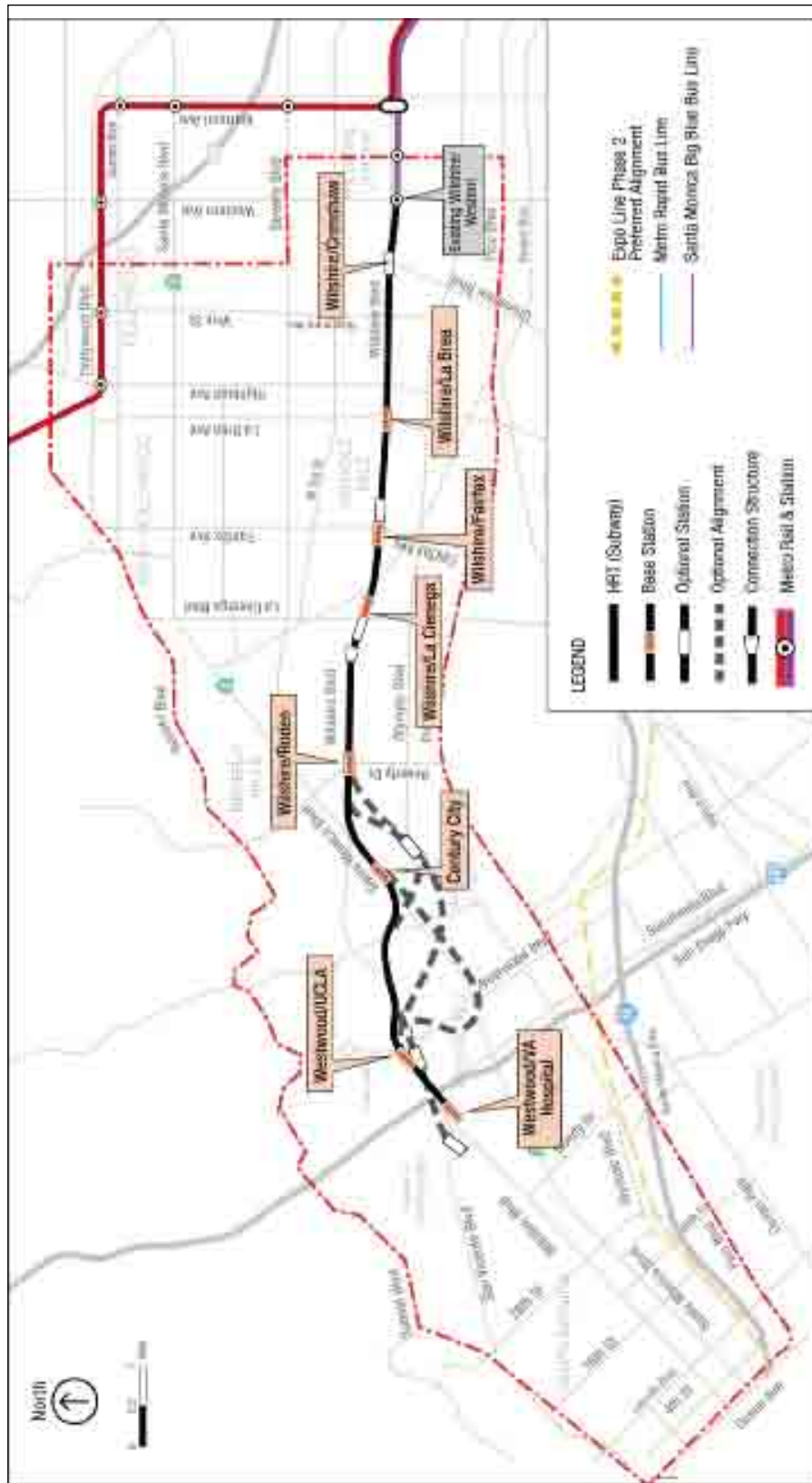


Figure S-11. Alternative 2—Westwood/VA Hospital Extension

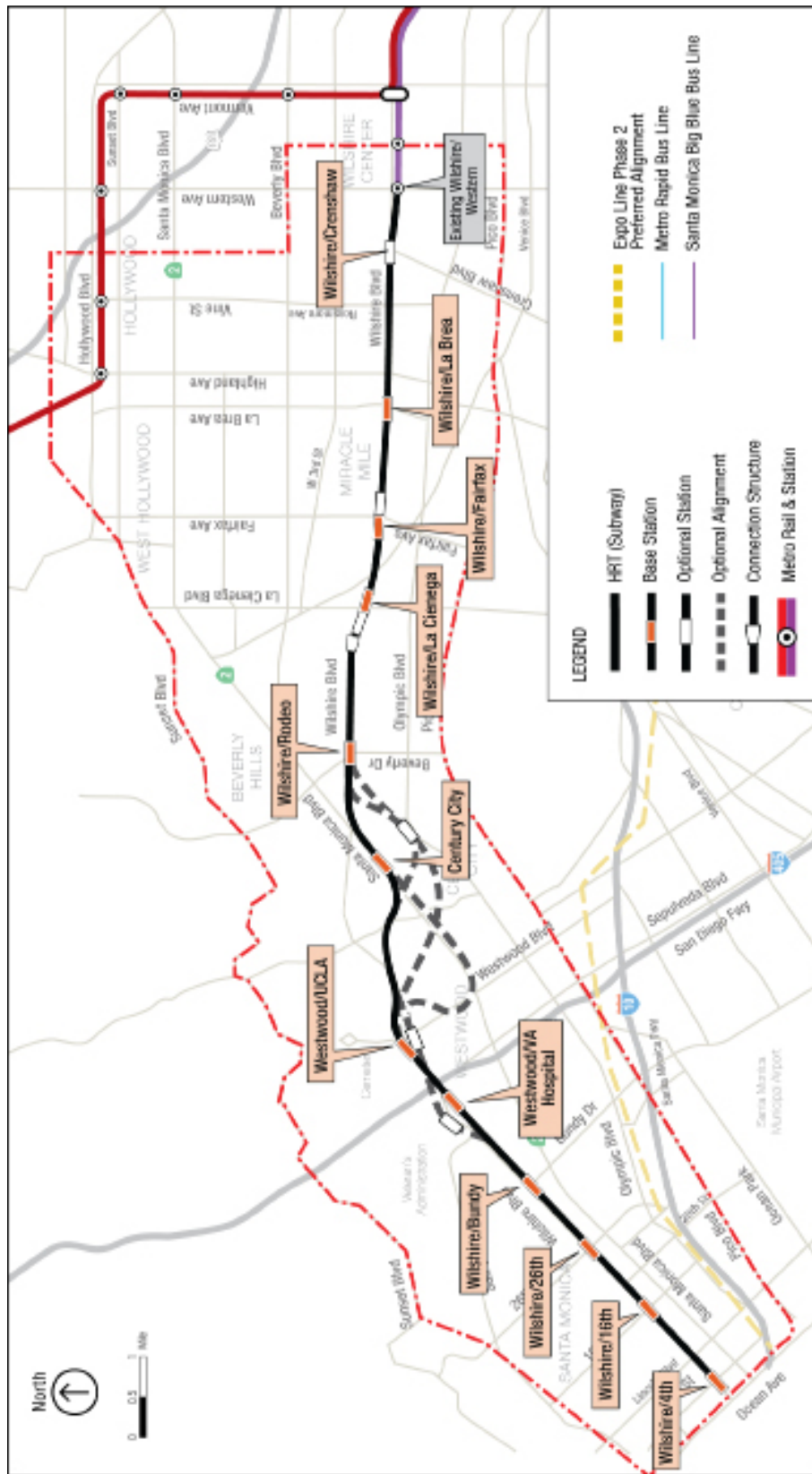


Figure S-12. Alternative 3—Santa Monica Extension

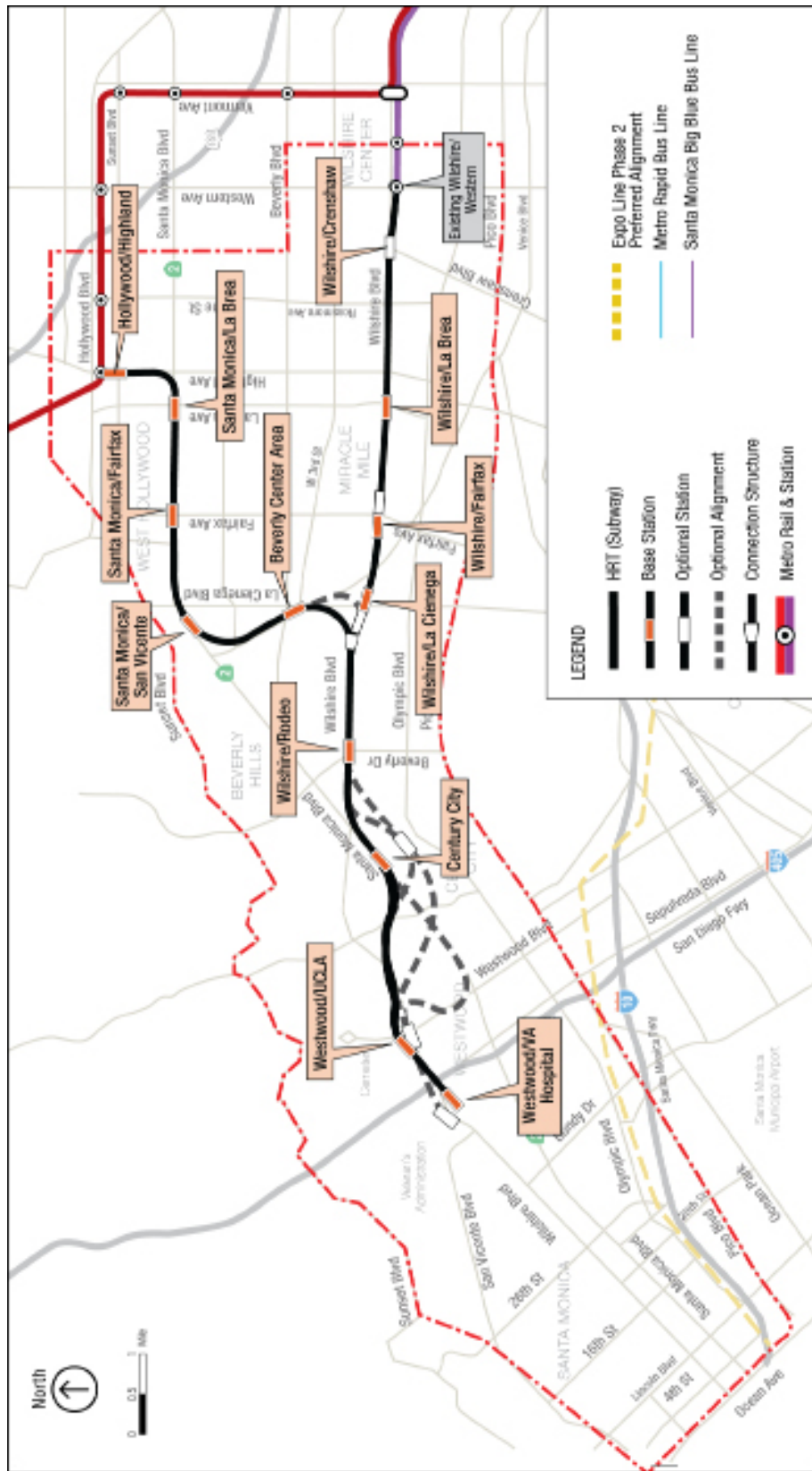


Figure S-13. Alternative 4—Westwood/VA Hospital Extension plus West Hollywood Extension

sion extends from the existing Metro Red Line Hollywood/Highland Station to the west of the Wilshire/La Cienega Station. The alignment is 14.06 miles long from the Wilshire/Western Station to a Westwood/UCLA Station and from Hollywood/Highland Station to Wilshire junction.

Alternative 4 would operate from the Wilshire/Western Station 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 Line of Alternative 4 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 Extension from Hollywood/Highland to Westwood/VA Hospital is 17 minutes 2 seconds.

### ***Alternative 5—Santa Monica Extension plus West Hollywood Extension***

Similar to Alternative 3, this alternative extends HRT, in subway, from the existing Metro Purple Line Wilshire/Western Station to the Wilshire/4th Station and adds a West Hollywood Extension similar to the extension described in Alternative 4 (Figure S-14). The alignment is 17.49 miles long. Alternative 5 is comprised of two elements: a Metro Purple Line extension to Santa Monica and a West Hollywood Line to Santa Monica. The Metro Purple Line extension would operate 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 Line 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 for the West Hollywood Line from

the Hollywood/Highland Station to the Wilshire/4th Station is 22 minutes 36 seconds.

### **Station and Alignment Options**

Figure S-15 shows the proposed station and alignment options. There are six areas where options are proposed: Option 1) No Wilshire/Crenshaw Station; Option 2) Wilshire/ Fairfax East Station; Option 3) Wilshire/La Cienega West Station with Connection Structure; Option 4) Century City Station and Alignment Options; Option 5) Westwood/UCLA On-Street Station Option; and Option 6) Westwood/VA Hospital North Station. These are alternative station location options and are not additional stations. Each of these options is described below and shown in the figures.

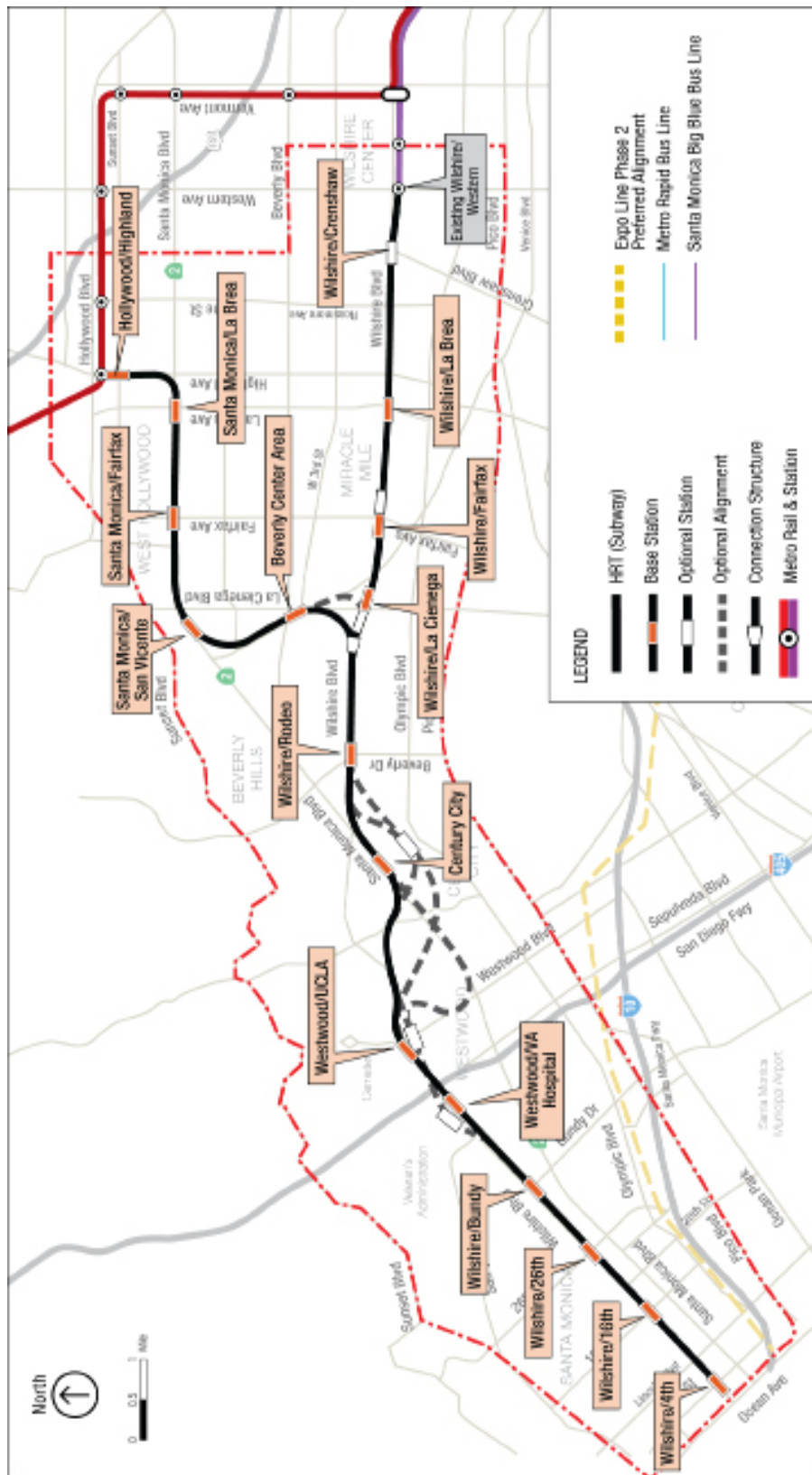


Figure S-14. Alternative 5—Santa Monica Extension plus West Hollywood Extension

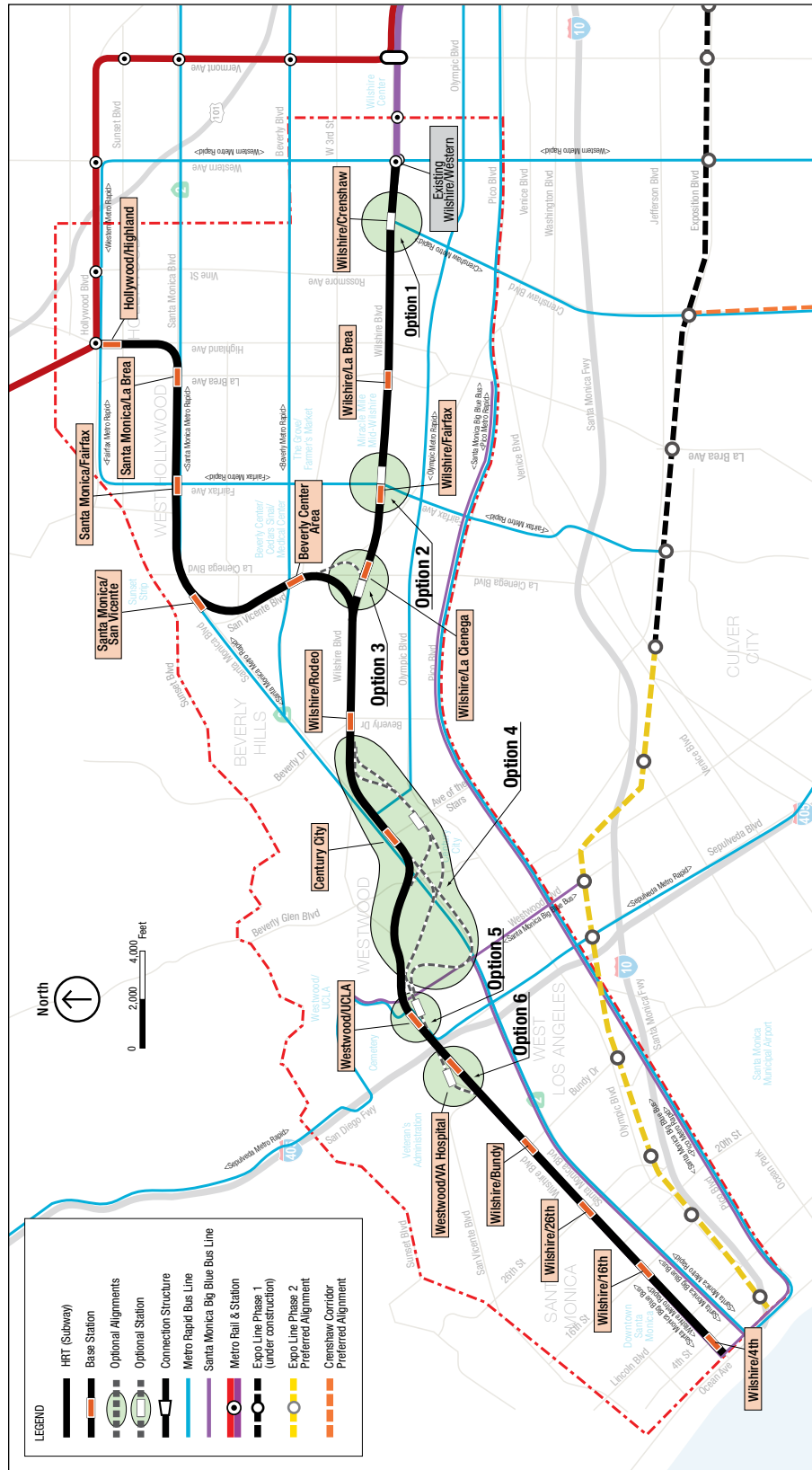


Figure S-15. Station and Alignment Options

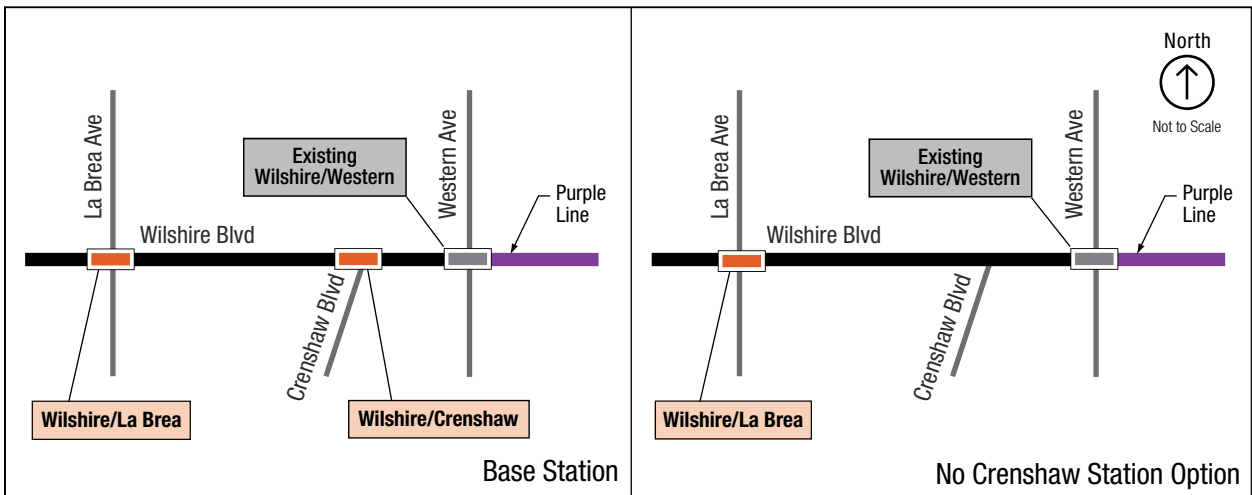
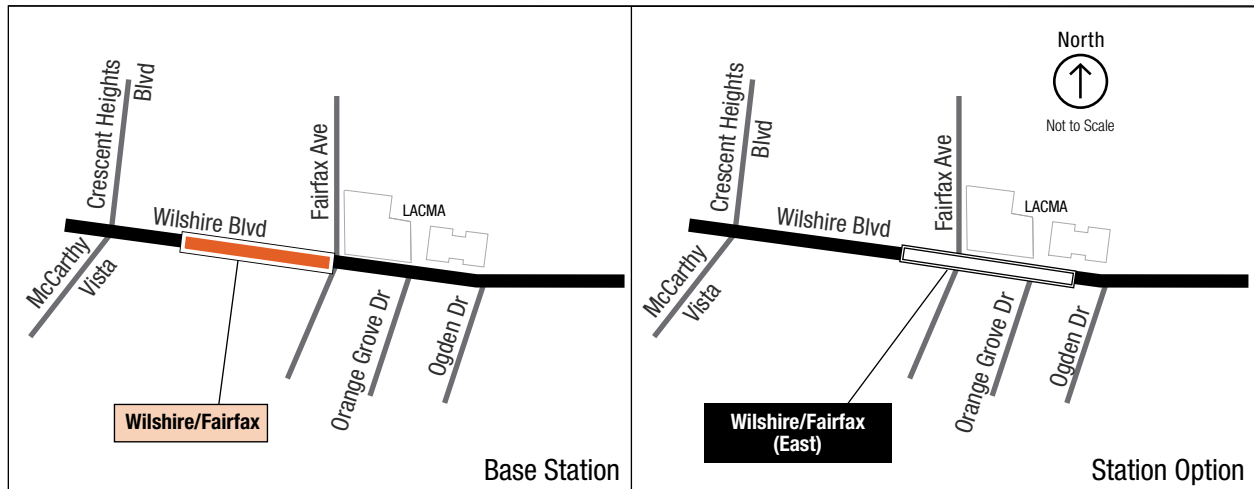


Figure S-16. No Wilshire/Crenshaw Station Option

**Option 1: No Wilshire/Crenshaw Station  
Option (Figure S-16)**

- **Base Station: Wilshire/Crenshaw Station**—The base station straddles Crenshaw Boulevard, between Bronson Avenue and Lorraine Boulevard.
- **Station Option: Remove Wilshire/Crenshaw Station**—This alternate station option would delete the Wilshire/Crenshaw Station. Trains would run from the Wilshire/Western Station to the Wilshire/LaBrea Station without stopping at Crenshaw. If this option is selected, a vent shaft (required for tunnel segments longer than 6,000 feet between stations) would be constructed mid-way between Crenshaw Boulevard and Lorraine Boulevard.



**Figure S-17. Wilshire/Fairfax Station East Station Option**

**Option 2: Wilshire/Fairfax Station East Station Option (Figure S-17)**

- **Base Station: Wilshire/Fairfax Station**—Scoping alternatives showed a single station at Wilshire/Fairfax, west of Fairfax Avenue. This location was selected to move the station as far as possible from the gassy ground at the La Brea Tar Pits. Therefore, the base station is under the center of Wilshire Boulevard, immediately west of Fairfax Avenue.
- **Station Option: Wilshire/Fairfax Station East Station Option**—This alternate station option would locate the Wilshire/Fairfax Station farther east, with the station underneath the Wilshire/Fairfax intersection.



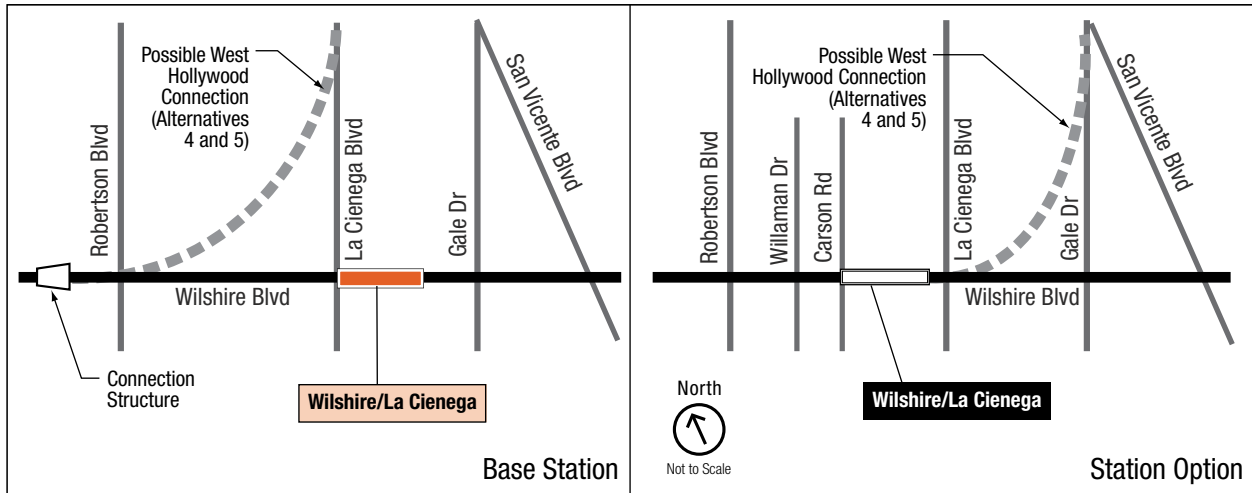
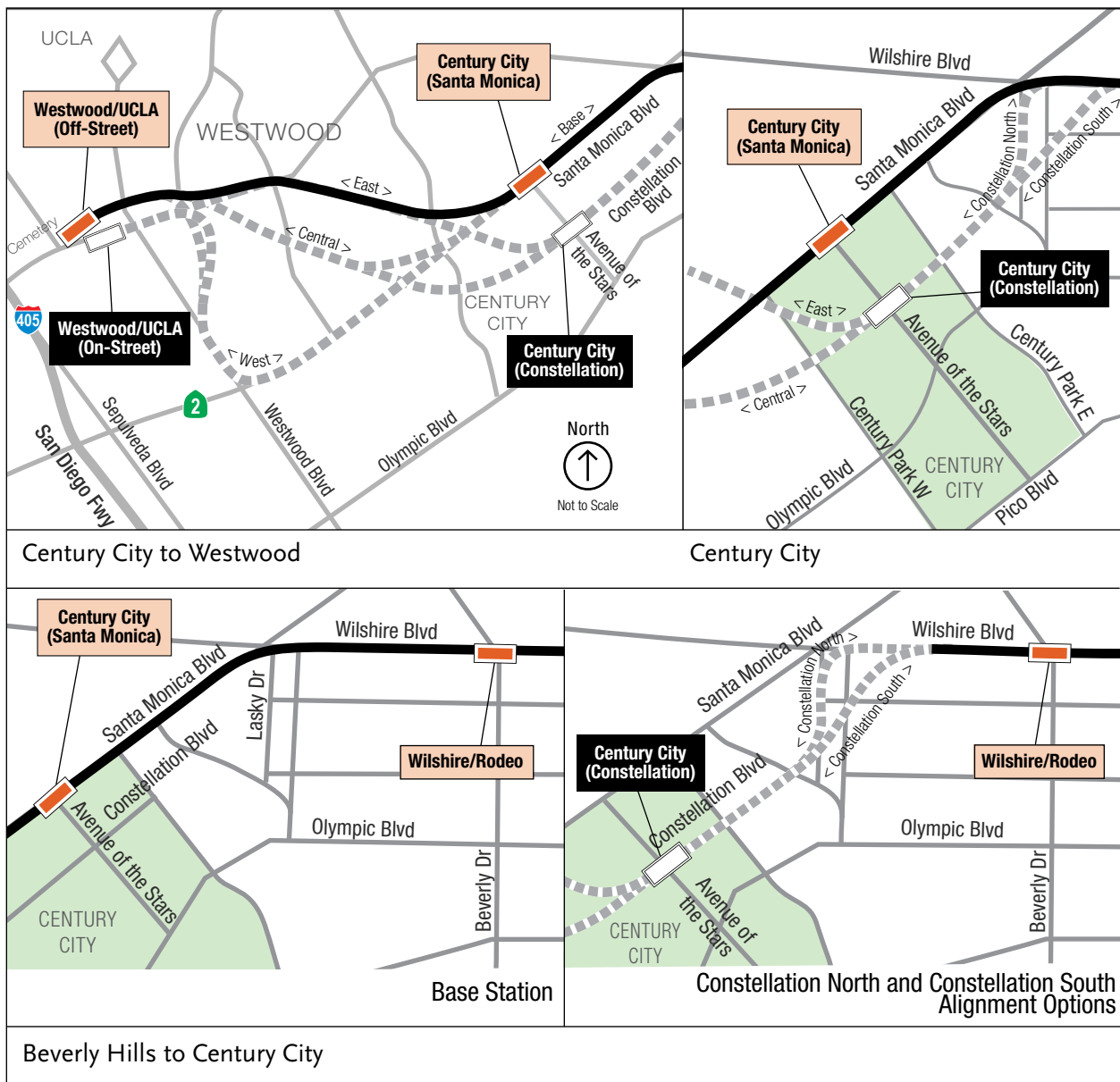


Figure S-18. Wilshire/La Cienega Station West with Connection Structure

**Option 3: Wilshire/La Cienega Station West with Connection Structure (Figure S-18)**

- **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 to the west near 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 alternate 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. This station would be a multi-level below-grade station. It also contains an align-

ment 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 S-19. Century City Station**

**Option 4: Century City Station (Figure S-19)**

The AA Study identified multiple sites for subway stations between Beverly Hills to Westwood Stations that include a station in Century City and Westwood and multiple connecting routes between the different stations. As a result of screening based on public comment, further conceptual design review, and screening against the goals to address the Purpose and Need, the options were reduced to the following:

- Century City Station Options (two station options)

- Wilshire/Rodeo Station to Century City Station Segment Options (three segment options)
- Century City Station to Westwood/UCLA Segment Options (three segment options)
- Westwood/UCLA Station Options (two station options)(Option 5)

Only one station site in Century City and in Westwood/UCLA will be selected for implementation. Similarly, one segment option between Beverly Hills/

Century City and between Century City/Westwood will be constructed.

Table S-2 shows how each segment option connects to the Century City and Westwood/UCLA Stations. The general segment descriptions are provided below. Detailed engineering plans of each option can be found in the *Final Plan & Profile & Typical Section Drawings (Appendix A and B)*.

**Century City Station Options**  
**Century City (Santa Monica Boulevard)**  
**Station Option**

This station would be centered under Santa Monica Boulevard, with the station box centered on Avenue of the Stars. The western end would extend to Club View Drive. There are two potential station entrances: on the southeast corner of Santa Monica Boulevard and Avenue of the Stars and on the southwest corner of Santa Monica Boulevard and Avenue of the Stars. It would also be possible to develop a secondary entrance in association with the Westfield Century City Shopping Center on the south side of Santa Monica Boulevard, mid-block between Avenue of the Stars and Century Park West.

**Century City (Constellation Boulevard)**  
**Station**

With this alternate station option, the Century City Station on Santa Monica Boulevard would be replaced with a station on Constellation Boulevard. This station is under the center of Constellation Boulevard, straddling Avenue of the Stars and extending westward to east of MGM Drive. There are three

potential primary station entrances: on the north-east, southeast, and southwest corners of Constellation Boulevard and Avenue of the Stars. A possible secondary entrance would be possible in association with the Westfield Century City Shopping Center on the north side of Constellation Boulevard, mid-block between Avenue of the Stars and Century Park West. It is anticipated that only one station entrance would initially be constructed as a part of the Project, but additional entrances would be possible in association with private development.

**Wilshire/Rodeo Station to Century City**  
**Station Segment Options**

Three alternate segment options are proposed to connect the Wilshire/Rodeo Station to Century City: via Santa Monica Boulevard, via Constellation North, and via Constellation South. All three extend from the Wilshire/Rodeo Station to a Century City Station, either on Santa Monica Boulevard or Constellation Boulevard. Only one of these segments will be selected.

**Santa Monica Boulevard**

This alignment is considered the base segment. From the Wilshire/Rodeo Station, the Santa Monica Boulevard segment travels westerly, beneath Wilshire Boulevard, to the Wilshire Boulevard/Santa Monica Boulevard intersection, then curves southwesterly to Santa Monica Boulevard, and to the Century City Station on Santa Monica Boulevard.

**Table S-2. Century City Station to Westwood/UCLA Station Segments - Option 4**

Century City Station	Westwood/UCLA Station—Off Street			Westwood/UCLA Station—On Street		
Santa Monica	Via East Segment	Via Central Segment	Via West Segment	Via East Segment	Via Central Segment	Via West Segment
Constellation Boulevard	Via East Segment	Via Central Segment	Via West Segment	Via East Segment	Via Central Segment	Via West Segment

### **Constellation North**

The Constellation North alternate segment option begins at the Wilshire/Rodeo Station and travels west to near Linden Drive. At this juncture, this segment curves southwesterly at Linden Drive to Lasky Drive, and under Lasky Drive to just north of Young Drive. The segment option then turns southwesterly to under Constellation Boulevard and to the station on Constellation Boulevard at Avenue of the Stars.

### **Constellation South**

The Constellation South segment option begins at the Wilshire/Rodeo Station and travels west to Bedford Drive. At this juncture, this segment curves to the southwest and travels directly southwest to Constellation Boulevard and into the optional station on Constellation Boulevard at Avenue of the Stars.

### **Century City Station to Westwood/UCLA Station Options**

There are three general segments: East, Central, and West. 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. Only one of these segments will be chosen.

#### **East Segment**

This is the base segment when combined with the Century City Station (Santa Monica Boulevard) and the Westwood/UCLA Station (Off Street). From the Century City Station (Santa Monica Boulevard), this segment is accessed by traveling west on Santa Monica Boulevard. The segment turns at Century Park West and continues northwesterly until Wilshire Boulevard, where it turns and connects into the Westwood/UCLA Station (Off Street) via Lindbrook Drive. The connection into the Westwood/UCLA Station (On Street) from either Century City Station is made by continuing westerly on Wilshire Boulevard to Westwood Boulevard.

From the Century City Station (Constellation Boulevard), the East Segment is accessed by turning northwesterly under the Westfield Mall and continuing northerly to connect into the segment as described above.

#### **Central Segment**

From the Century City Station (Santa Monica Boulevard), this alternate segment is accessed by continuing farther west past the East Segment, turning northwesterly near Beverly Glen Boulevard, crossing Wilshire Boulevard and turning westerly at Lindbrook Drive to enter into the Westwood/UCLA Station (Off Street).

From the Century City Station (Constellation Boulevard), this segment is accessed by continuing farther west past the East Segment, turning northwesterly, crossing Santa Monica Boulevard, and connecting with the Central Segment described above to enter into the Westwood/UCLA Station (Off Street).

To enter into the Westwood/UCLA Station (On Street) from either Century City Station, the Central Segment as described above for each Century City Station is followed to Wilshire Boulevard. At Wilshire Boulevard, the Westwood/UCLA Station (On Street) is accessed by continuing west on Wilshire Boulevard to Westwood Boulevard.

#### **West Segment**

From the Century City Station (Santa Monica Boulevard), this alternate segment is accessed by traveling farther west past both the East and Central Segments along Santa Monica Boulevard to Westwood Boulevard. At Westwood Boulevard, the segment travels north, curves slightly to the east mid-way between Westwood and Wilshire Boulevards to be able to curve westerly into either Westwood/UCLA Station. To access the Westwood/UCLA Station (Off Street) this segment crosses Wilshire Boulevard and

connects into the other two segments near Lindbrook Drive and entering this station.

From the Century City Station (Constellation Boulevard), this segment travels along the same route as the Central Segment until just south of Santa Monica Boulevard, where it turns westerly under Santa Monica Boulevard and connects into the West Segment described above. The connection into either Westwood/UCLA Station is the same as described above.

**Option 5: Westwood/UCLA On-Street Station Option (Figure S-20)**

Several station locations were considered in Westwood. As a result of screening based on public comment, further conceptual design review, and screening against the goals to address the Purpose

and Need, two station options were developed and included in this Draft EIS/EIR.

- **Base Station: Westwood/UCLA Station Off-Street Station Option**—The base station is the Westwood/UCLA Station located under the UCLA lot on the north side of Wilshire Boulevard between Gayley and Veteran.
- **Station Option: Westwood/UCLA On-Street Station Option**—This alternate station option would be located under the center of Wilshire Boulevard, immediately west of Westwood Boulevard.

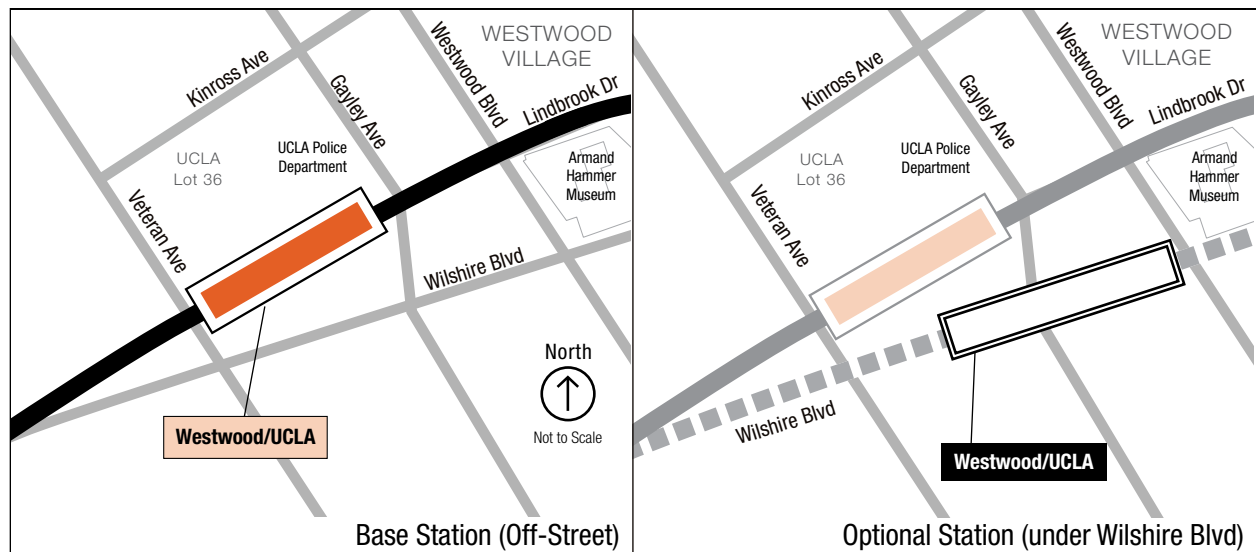


Figure S-20. Westwood/UCLA On-Street Station Option

### Option 6: Westwood/VA Hospital North Station (Figure S-21)

- **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 alternate station option would locate the Westwood/VA Hospital Station on the north side of Wilshire Boulevard between Bonsall Avenue and Wadsworth Theater.

#### Base Stations

The following stations did not have optional sites and are, therefore, presented here as the base stations. In most stations, it is anticipated that only one station entrance or portal would be constructed as part of the Project, but additional portals could be developed as a part of station area development (by others).

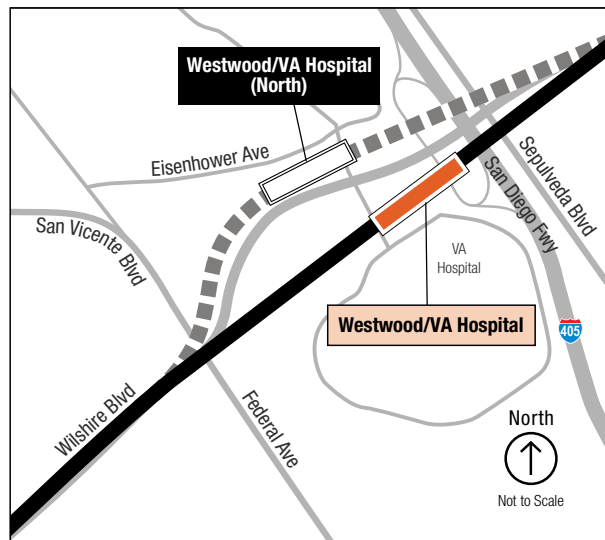


Figure S-21. Westwood/VA Hospital North Station

#### ***Wilshire/La Brea Station***

This station is 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.

#### ***Hollywood/Highland Station***

This station is located under Highland Avenue and provides 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 intersection.

### **Santa Monica/Fairfax Station**

This station is under Santa Monica Boulevard and extends from just east of Fairfax Avenue on the west to just east of Ogden Drive on the east.

### **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.

## **Other Components of the Build Alternatives**

Other components of the Build Alternatives that are included in the analysis of project costs and impacts are described below.

### **Traction Power Substations and Emergency**

Traction power substations (TPSS) are required to provide traction power for the HRT system. Substations would be located in the station box or in the crossover box and are generally in an underground room that measures about 50 feet by 100 feet.

### **Mid-Tunnel Vent Shaft**

Each alternative would require ventilation shafts. The vent shafts are emergency ventilation shafts with dampers, fans, and sound attenuators generally placed at both ends of a station box for exhausting smoke. The vent shafts are also required in tunnel segments with more than 6,000 feet between stations to meet fire/life safety requirements. At the surface, Metro generally incorporates ventilation openings in the sidewalk grates or incorporated into buildings.

### **Trackwork Options**

Each Build Alternative would require components of special trackwork that provides for operational efficiency and safety. These components include the following:

- Tail tracks—a track, or tracks, that extends beyond the end of a terminal station (the last station on a line)
- Pocket tracks—an additional track 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 the other track

### **Rail Operations Center**

An important aspect of implementing the Project is Metro's expansion program of the existing Rail Operations Center (ROC) that is located in Los Angeles near the intersection of Imperial Highway and the Metro Blue Line. The current ROC configuration has evolved over the years as new rail lines have been added and expanded; it 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.

### **Maintenance Yards**

Metro currently has a fleet size of 104 Heavy Rail Vehicles (HRVs) to operate the existing Metro Red/Metro Purple Lines. Increased service for the No Build Alternative would require an additional 42 HRVs, for a total fleet of 146 vehicles. HRVs required for the Build Alternatives range from 196 (MOS 1) to 336 (Alternative 5). The number of additional vehicles over the No Build Alternative range from 50 HRVs (MOS 1) to 190 HRVs (Alternative 5).

Currently, Metro stores and maintains its Red Line/ Purple Line vehicle fleet at the existing Division 20 Maintenance and Storage Facility in Downtown Los Angeles at the site bounded by 1st Street on the north, the Los Angeles River on the east, 4th Street on the south, and Santa Fe Avenue on the west. With a capacity to accommodate up to 200 HRVs, the yard currently has sufficient capacity to store 96 additional HRVs. Several enhancements to the facility are planned and assumed in the No Build Alternative.

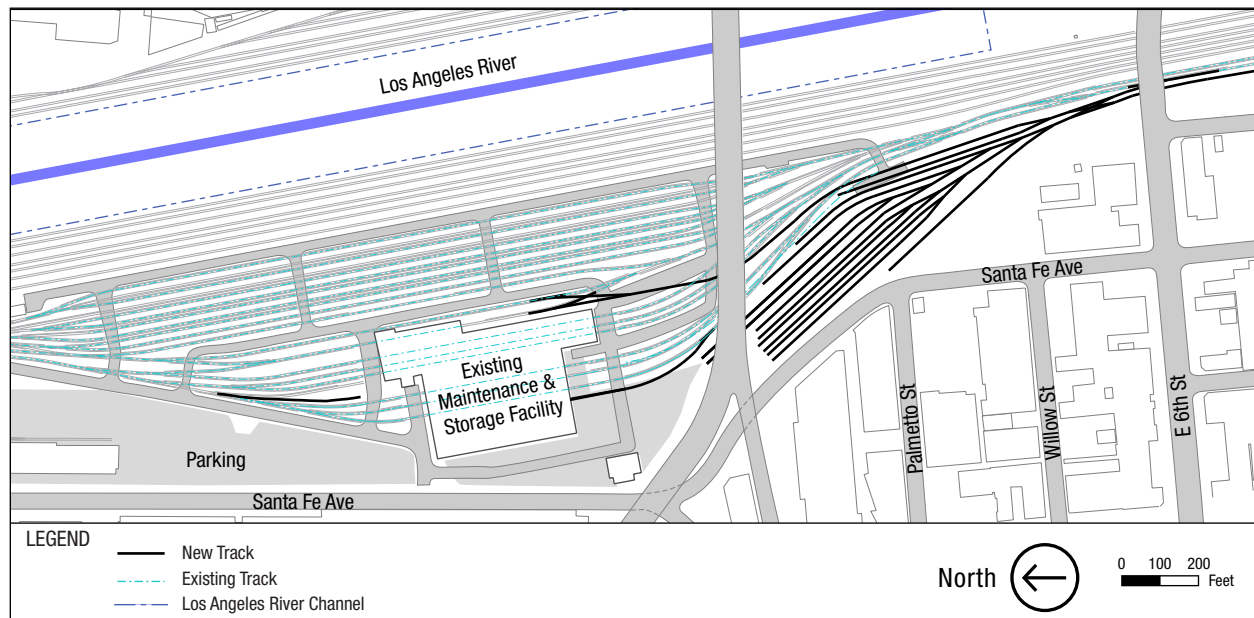
If any of the Build Alternatives are selected, additional storage capacity would be needed. Two options for providing this expanded capacity are as follows:

- Additional storage immediately south of the Division 20 Maintenance and Storage Facility between the 4th and 6th Street Bridges. This option would require purchasing 3.9 acres of predominantly vacant private property abutting the southern boundary of the existing facility, and the construction of additional maintenance and storage tracks. This would accommodate up to 102 vehicles, sufficient added capacity for Alternatives 1 and 2 (Figure S-22).

- In the event that the existing Metro Red Line Rail Storage and Maintenance Yards could not be expanded to accommodate the Project, an alternate satellite facility could be built at the Union Pacific (UP) Los Angeles Transportation Center Rail Yard, connected by yard lead tracks to the Division 20 Maintenance and Storage Facility. This site is currently used as a truck/rail transfer facility, and a portion of these facilities would need to be relocated if this alternative were to be used. This site has more than 123 acres, of which approximately 53 acres would be needed for the facility sufficient to accommodate the vehicle fleet for all five HRT alternatives. An additional 1.3 miles of track and a new bridge over the Los Angeles River would be constructed for vehicles to reach this yard (Figure S-23).

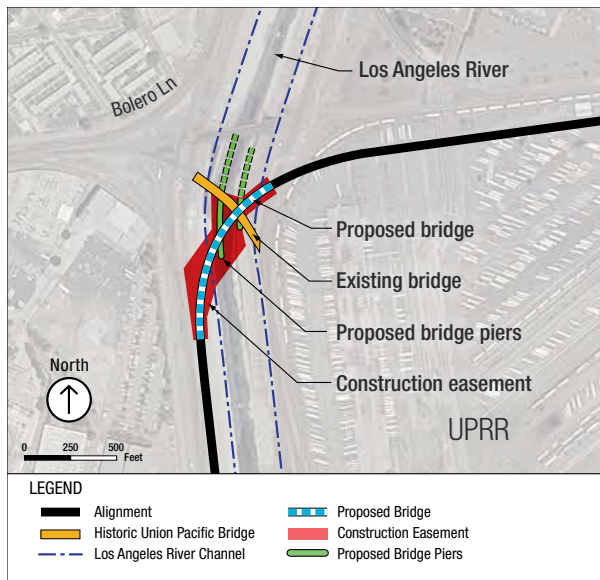
## Project Phasing

The final decision to be made in selecting a Locally Preferred Alternative is the best terminus for an initial phase of implementation, in the event that the Project must be built in phases over time. Two MOS options are evaluated in this Draft EIS/EIR and are



**Figure S-22. Expanded Division 20 Yard**





**Figure S-23. Union Pacific Railroad Rail Bridge and Extension of Tracks to Reach UP Yard**

compared with the five Build Alternatives and the No Build and TSM Alternatives:

- MOS 1—Interim terminus at Fairfax
- MOS 2—Interim terminus at Century City

## Evaluation of the Alternatives

An evaluation of the alternatives based on the ability of each alternative to meet the Project’s objectives and the Purpose and Need is included in Chapter 7 of this Draft EIS/EIR. Table S-3 summarizes this evaluation.

## Mobility Improvements

### Transit Travel Time

The Build Alternatives, operating in an exclusive guideway that is fully separated from roadway traffic, would achieve much higher speeds than would be possible with buses, even with the priority treatments assumed in the No Build and TSM Alternatives. Thus, all five of the Build Alternatives would have faster travel times than the No Build and TSM Alternatives. The longer Build Alternatives—Alternatives 3 and 5 in particular—provide faster travel to and from Santa Monica. For trips to and from the

San Fernando Valley, Alternatives 4 and 5 would be 7 to 10 minutes faster than Alternatives 1, 2, and 3, reflecting the additional link to the Metro Red Line in West Hollywood. New links between the Build Alternatives and other transit lines would improve transit travel time for residents throughout the County.

Because of its higher operating speeds, the Build Alternatives offer a travel mode that is more competitive with the automobile. During peak periods, rail operating speeds are faster than speeds for a comparable auto trip. Competitiveness is greatest for the alternatives with the greatest mileage of rail, as the difference in speed becomes more apparent to potential riders for trips covering longer distances and reaching the more densely developed parts of the Study Area.

### Reliability, Comfort, and Convenience

The alternatives can be compared in terms of the percentage of transit passenger miles that would occur on an exclusive fixed guideway facility. The percentage grows significantly with all of the Build Alternatives and exceeds 50 percent with Alternatives 3 and 5. The remaining transit passenger miles would be in buses operating in mixed traffic or bus lanes subject to various traffic delays. Under the Build Alternatives, subway service would provide frequent and reliable service no matter the traffic conditions on Study Area streets and highways.

Another measure of transit travel time and convenience to passengers is the number of transfers travelers must make to get from their origin to their destination. Riders generally consider out-of-vehicle travel time—i.e., the time spent waiting for a bus or train to arrive—as being more onerous than time spent moving in a vehicle. All of the rail alternatives would lead to a significant reduction in the number of transfers. Among the Build Alternatives, Alternatives 3 and 5 (which would extend rail to Santa

**Table S-3. Evaluation Results for TSM and Build Alternatives**

Relevant Goals, Objectives, Criteria	No Build	TSM	Wilshire HRT			Combined HRT (Wilshire Plus West Hollywood)	
			Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
<b>Mobility Improvement</b>							
Average peak period travel time between select origin-destination pairs and rating	70.0 Low	69.6 Low	49.6 Medium	49.6 Medium	46.6 Medium-High	44.7 Medium-High	41.6 High
Average end-to-end transit operating speeds and rating	13.5 Low	13.5 Low	31.1 High	30.8 High	31.8 High	32.0 High	33.0 High
Competitiveness with auto speed	Low	Low	Low-Medium	Medium	Medium-High	High	High
Percentage of transit passenger miles on fixed guideway	4.7% Low	4.6% Low	39.2% Medium-High	42.0% Medium-High	51.6% High	44.0% Medium-High	53.0% High
Number of transfers between select origin-destination pairs	Low	Low	Medium-High	Medium-High	High	Medium-High	High
New transit trips (per day in 2035)	Base	2,115	24,142 Medium	27,615 Medium	35,235 Medium-High	31,224 Medium-High	40,123 High
<b>Transit Supportive Land Use Policies and Conditions</b>							
High-density mixed use activity centers within 1/2 mile of alignment	NA	NA	6	7	8	10	12
High-opportunity areas for redevelopment within 1/2 mile of alignment	NA	NA	1	1	1	2	2
<b>Cost Effectiveness</b>							
Capital cost in million 2009 dollars	Base	\$42	\$4,036	\$4,358	\$6,116	\$6,985	\$8,747
Year 2035 O&M cost in million 2009 dollars	\$1,742	\$1,746	\$1,778	\$1,782	\$1,804	\$1,831	\$1,861
Cost per hour of user benefit compared with TSM Alternative (FTA Cost Effectiveness Index, or CEI)	NA	Base	\$35.98	\$33.58	\$36.31	\$49.50	\$47.55
<b>Project Feasibility</b>							
Affordability within limits of Metro's Long-Range Transportation Plan	Yes	Yes	Yes	Yes	No	No	No
<b>Equity</b>							
Low income residents within 1/2 mile of guideway alignment	NA	NA	25,707	27,180	32,114	38,799	43,733
% of residents who are low income	NA	NA	17.3%	17.1%	15.6%	16.4%	15.4%
Minority residents within 1/2 mile of guideway alignment	NA	NA	71,939	74,236	83,491	93,688	102,943
% of residents who are minority	NA	NA	47.0%	45.5%	39.5%	38.9%	35.6%
<b>Environmental Considerations</b>							
Number of single-family residences displaced	0	0	1	1	1	1	1
Number of multi-family residences displaced	0	0	1 (32 units)	1 (32 units)	1 (32 units)	1 (32 units)	1 (32 units)
Number of jobs potentially displaced	0	0	302	302	413	363	474
Daily reduction in vehicle miles traveled compared to No Build Alternative	Base	0	28,982	31,899	37,768	34,786	41,643

Source: Westside Subway Extension Comparative Benefits and Costs Analysis Technical Report (Metro 2010w)

Monica) tend to require the fewest transfers, and are rated high in Table S-3. The alternatives terminating at Westwood are rated medium-high, because those transit riders traveling between Santa Monica and places east of Westwood would need to transfer between rail and bus. The No Build and TSM alternatives would lead to substantially more transfers.

Alternative 5 provides the largest number of direct connections to other rail lines and to north-south bus routes, followed by Alternatives 3 and 4. Under each of the alternatives, riders from the Study Area can access Metrolink and Amtrak with just one transfer at Union Station.

### **Capacity and Expandability**

Alternatives that attract the highest ridership are those that offer the best service to the greatest number of people. Projected increases in transit ridership also indicate the extent to which an alternative can be expected to reduce vehicle miles of travel and congestion on the highway system, reduce air pollutant emissions, and reduce the use of gasoline.

As shown in Table S-3, Alternative 5 would lead to the largest increase in transit ridership, as measured by new transit trips. By covering the largest service area, as well as making connections in West Hollywood between the Metro Red and Purple Lines, Alternative 5 offers the greatest improvement in transit service. Alternative 3 has the second highest increase in transit ridership. Several findings are of particular note:

- A comparison between Alternatives 5 and 3 and between Alternatives 4 and 2 shows the benefits of the West Hollywood connection. The connection would result in about 3,600 to 4,900 new daily transit trips per day, an increase of about 13 percent.
- The one-station extension from Westwood/UCLA (Alternative 1) to the Westwood/VA Hos-

pital (Alternative 2) results in 3,500 new transit trips, an increase of close to 15 percent.

- The benefits of extending the line from Westwood to Santa Monica are shown by comparing Alternatives 3 and 2 and Alternatives 5 and 4. The Santa Monica extension would increase the number of new daily transit trips by 7,500 to 8,900, or about 28 percent.
- The TSM Alternative is least effective, attracting no more than 5 to 10 percent of the new riders attracted by the rail alternatives.

### **Transit-supportive Land Use Policies and Conditions**

The extent to which each of the Build Alternatives meet land use goals can be measured by the number of high-density, mixed-use activity centers within one-half mile of the alignment and by the number of high opportunity areas for redevelopment within one-half mile of the alignment. Twelve activity centers—defined as locations with major commercial activity and mixed uses—and two high opportunity areas are identified for this comparison.

All of the Build Alternatives were developed to serve these activity centers and high opportunity areas. The extent to which they are served is a function of each alternative's length and number of stations. Alternatives 4 and 5, thus serve more activity centers and high opportunity areas than the other alternatives.

Transit-supportive land use is also a critical aspect of the FTA's rating of projects that are seeking discretionary New Starts funds. Forty percent of the project justification rating is a function of transit-oriented land use.

### **Cost-effectiveness**

The Build Alternatives are significantly more expensive than the No Build and TSM Alternatives.

In 2009 dollars, the rail alternatives range in cost from \$4.0 to \$8.7 billion. The rail alternatives are also more costly to operate and maintain.

With faster speeds, the Build Alternatives would save transit riders between 31,000 and 52,000 hours of equivalent travel time (transit system user benefits) on an average weekday in 2035. This analysis further reveals the following:

- Alternatives 1, 2, and 3 are substantially more cost-effective than Alternatives 4 and 5. In other words, while Alternatives 4 and 5 tend to have more benefits than Alternatives 1, 2, and 3, they achieve these additional benefits at a high incremental cost.
- The cost-effectiveness indices (CEI) for Alternatives 1, 2, and 3 are similar. The added investment of extending the line to Santa Monica has roughly the same rate of return as a shorter extension to Westwood/UCLA.
- Alternative 2 is the most cost effective.

### Cost-Effectiveness Index

The cost-effectiveness measure used in this evaluation is derived by annualizing each alternative's capital cost, adding the annual operating and maintenance costs, and dividing the sum by the alternative's annual transit system user benefits. User benefits refer primarily to travel-time savings.

This measure, referred to as the "cost effectiveness index," is used by FTA in its rating of projects seeking New Starts funds.

## Project Feasibility

Comparing the capital funding requirements of each alternative with the \$2.7 billion set aside for the Westside Subway Extension in the LRTP, and assum-

ing that the project is competitive for New Starts funds, shows the following:

- The TSM Alternative and Alternatives 1 and 2 are financially feasible.
- Alternatives 3, 4, and 5 are not currently financially feasible. Implementation of Alternative 1 or Alternative 2 would not preclude a future extension to Santa Monica or a future subway connection to West Hollywood. However, additional local funding would need to be identified.

## Equity

The number of low-income and minority residents living in close proximity to the Project increases with the project scope and number of stations. However, the percentage of residents within one-half mile who are low income or minority varies little across the alternatives.

Those alternatives with the larger number of stations will provide better mobility to a larger number of low-income and minority people. Similarly, alternatives with a larger scope and number of stations will expose more low-income and minority residents to short-term construction impacts.

## Environmental Considerations

Each of the five Build Alternatives would displace one or more properties in order to construct station portals and provide for construction staging. Some business displacement would occur. The total number of jobs displaced would depend on which portal location is selected at each station. Several alternative entrance locations have been identified at each station; however, only one or two would be selected for implementation. Several hundred jobs have been identified for potential displacement, but only a small percentage would actually be displaced.

All of the five Build Alternatives would reduce VMT on the highway system, with attendant reductions in

congestion, pollutant emissions, and gasoline consumption. The decrease is small in relation to total VMT in the Study Area.

Each of the alternatives would also cause impacts during construction. As discussed in Chapter 4, construction impacts would include traffic and access disruptions near station sites, construction noise and emissions (nitrogen oxide (NOx) and particulate matter less than 10 micrometers in size (PM10)), temporary removal of parking, visual effects, and haul trucks removing material excavated from the tunnel and station boxes. The amount of impact would generally be a function of the length of the subway and the number of stations. The Draft EIS/EIR identifies mitigation measures for these impacts.

### Summary of Impacts and Benefits

Considering the TSM and Build Alternatives in terms of the project goals:

- All Build Alternatives are more effective than the TSM Alternative in enhancing mobility, serving development opportunities, and addressing other aspects of the Purpose and Need. Alternatives 3, 4, and 5 are more effective than Alternatives 1 and 2.
- While offering few mobility benefits, the TSM Alternative is the most cost-effective because of its low cost.
- Alternatives 1, 2, and 3 have similar cost-effectiveness indices and are more cost-effective than Alternatives 4 and 5.
- Alternatives 1 and 2 are expected to be most competitive for New Starts funds and can be built with available Measure R and other identified funds. Alternatives 3, 4, and 5 are not financially feasible without a new source of revenues.
- Alternative 2, which extends the subway beyond Westwood/UCLA to the VA Hospital, adds riders and benefits at a reasonable cost and is financially feasible.

- All of the alternatives would reduce VMT, pollutant emissions, and energy consumption. The longer Build Alternatives have the greatest environmental benefit.
- All of the alternatives would displace jobs and have construction impacts, with the longer alternatives having the largest impacts.

Detailed information on transportation impacts and mitigation are presented in Chapter 3 and environmental impacts are presented in Chapter 4 of this document. There are some differences in transportation impacts between the alternatives, including:

- Transit Travel Time—Higher operating speeds of service on a dedicated guideway are expected to reduce travel time. Service on an exclusive guideway would increase reliability compared to No Build and TSM Alternatives.
- Traffic—Alternatives 3 and 5 would result in the most reduction of Study Area Vehicle Miles Traveled (VMT). For these alternatives the intersection of Wilshire Boulevard/16<sup>th</sup> Street would be adversely affected during the hour hours. A signal is proposed at this intersection to mitigate impacts.

There would be temporary off-street parking loss at Westwood/UCLA and Westwood/VA Hospital Stations. The rest of the transportation related construction impacts are similar for all alternatives. There will be temporary traffic impacts, on-street parking loss, and delays for bus transfer and pedestrian and bicyclists.

For many of the environmental resources, there are no or very little differences in impacts among the Build Alternatives. In most instances the primary reason for differences in impacts is due to the length of the alignment rather than severity of the impact.

There are some distinctions, though in most cases they are slight variations, including:

- Displacements – are the lowest for Alternative 1 (277) and highest for Alternative 5 (437), primarily attributable to the length of the alternative
- Economic and Fiscal – operations and maintenance expenditures from direct and indirect employment vary slightly among alternatives, with lower number of Person Years (PY) for Alternatives 1 and 2 and higher numbers for Alternatives 3, 4, and 5
- Air Quality – slight differences in the quantity of emissions burdens expected to be reduced by the alternatives, with the greatest reductions with Alternatives 4 and 5
- Energy – varies with alternative, with mobile source energy consumption decreases much lower for Alternative 5 (10,000 additional rail miles over Alternative 4 results in more energy use and less energy savings), and energy consumption for stations nearly double for Alternative 5 than Alternative 1
- Geologic Hazards – some variations because of additional station locations for Alternative 3 that are in more susceptible areas
- Liquefaction – some variations due to the fact that alternatives have different station locations
- Water Resources – some variation because a portion of Alternatives 3 and 5 are in coastal zone and would require Coastal Development Permit
- Safety and Security – Alternatives 2 – 5 would require risk assessment because they pass by federal facilities, including the VA Medical Center and California Army National Guard

Construction impacts are similar for all alternatives, with differences occurring for some resource categories (primarily energy consumption and parklands and community services and facilities) due to differences in alternative length.

Table S-4 provides an overview of the more detailed transportation impact discussion found in Chapter 3 while Table S-5 presents a summary of environmental impacts and mitigation measures for subway operations discussed in Chapter 4. Table S-6 provides highlights of construction impacts.

Table S-4. Summary of Transportation Impacts and Mitigation

▶ Transit Travel Time		
Transit Travel Time	No Build Alternative	Travel speeds are expected to decline due to increased strain on existing roads, resulting in more traffic congestion and longer travel times.
	TSM Alternative	TSM would marginally improve travel times over No Build.
	Alternative 1	Higher operating speeds of service on a dedicated guideway are expected to reduce travel time. Service on an exclusive guideway would increase reliability compared to No Build and TSM.
	Alternative 2	Similar to Alternative 1.
	Alternative 3	Similar to Alternative 1.
	Alternative 4	Similar to Alternative 1.
	Alternative 5	Similar to Alternative 1.
<b>Mitigation</b> No adverse effects. No mitigation required.		
▶ Traffic (Construction and Operation)		
Traffic (Construction and Operation)	No Build Alternative	Major intersections along Wilshire and Santa Monica Boulevards will operate at poor LOS, resulting in significant delays in the east-west direction.
	TSM Alternative	TSM reduces AM and PM peak vehicle trips by less than 0.10% compared to No Build. TSM reduces vehicle miles travelled (VMT) 0.1% over No Build. TSM is considered to be similar to No Build.
	Alternative 1	Station construction would require some temporary lane closures, resulting in reduced roadway capacity. Rerouting of trips that bypass congested areas would result in new traffic patterns. Vehicular travel times and intersection operations along these roadways would be affected during construction period. During operation, Study Area VMT would be reduced by 0.57% compared to No Build.
	Alternative 2	Construction impacts similar to Alternative 1. During operation, Study Area traffic would be reduced by 0.63% VMT compared to No Build.
	Alternative 3	Construction impacts similar to Alternative 1. However, construction would affect a larger area because the alignment is longer. The intersection of Wilshire Boulevard/16th Street would be adversely affected during the peak hours. During operation, Study Area VMT would be reduced by 0.75% compared to No Build.
	Alternative 4	Construction impacts similar to Alternative 1. However, the construction would affect a larger area because the alignment is longer. During operation, Study Area VMT would be reduced by 0.69% compared to No Build.
	Alternative 5	Construction impacts are similar to Alternatives 3 and 4. The intersection of Wilshire Boulevard/16th Street would be adversely affected during the peak hours. During operation, Study Area VMT would be reduced by 0.82% compared to No Build.
<b>Mitigation</b> <i>Streets and Highways Mitigation Measure 2</i> <ul style="list-style-type: none"> <li>Alternatives 3 and 5—signalization of the Wilshire Boulevard/16th Street intersection is proposed to mitigate the traffic impact.</li> </ul> <i>Construction Impacts on Transportation Measure TCON 1</i> <ul style="list-style-type: none"> <li>Traffic Control Plans—develop a traffic control plan to mitigate construction-related traffic impacts. Plan would include considerations to preserve business access during construction.</li> </ul>		

**Table S-4. Summary of Transportation Impacts and Mitigation (continued)**

► Parking (Construction and Operation)		
Parking (Construction and Operation)	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	Temporary loss of off-street parking at Westwood/UCLA and Westwood/VA Hospital stations during construction. On-street parking may be temporarily unavailable near stations during construction. No permanent parking loss. Neighborhood spillover parking impacts may occur at station locations.
	Alternative 2	Similar to Alternative 1.
	Alternative 3	Similar to Alternative 1.
	Alternative 4	Similar to Alternative 1.
	Alternative 5	Similar to Alternative 1.
	<b>Mitigation</b>	
<p><i>Streets and Highways Mitigation Measure 1 and Parking Mitigation Measures 1 and 2</i></p> <ul style="list-style-type: none"> <li>• Find parking accommodations for temporary parking impacts during construction.</li> <li>• Monitor neighborhood parking.</li> <li>• Work with local jurisdictions and affected communities to assess the need for a residential permit parking program for affected neighborhoods. Consider developing a shared parking program with operators of off-street parking facilities to accommodate parking demand.</li> </ul> <p><i>Construction Impacts on Transportation Measure TCON-2</i></p> <ul style="list-style-type: none"> <li>• When construction activity impacts existing on-street parking spaces, Parking Circulation Plans would be prepared</li> </ul>		
► Bicycle and Pedestrians (Construction and Operation)		
Bicycle and Pedestrians (Construction and Operation)	No Build Alternative	No adverse effect.
	TSM Alternative	No adverse effect.
	Alternative 1	Temporary sidewalk and bicycle lane closures or detours will be required during station construction. Delays may occur for bus transfers temporarily during construction. During construction, bicyclists transferring between rail and bus may have to cross more than one road or block. During construction, pedestrians and bicyclists may be required to cross roadways of more than two lanes at unsignalized locations or at locations where marked crosswalks are not installed. Once in operation, access to transit for pedestrians and bicyclists is expected to improve.
	Alternative 2	Similar to Alternative 1.
	Alternative 3	Similar to Alternative 1.
	Alternative 4	Similar to Alternative 1.
	Alternative 5	Similar to Alternative 1.
	<b>Mitigation</b>	
<p><i>Bicycle and Pedestrian Mitigation Measure 1</i></p> <ul style="list-style-type: none"> <li>• Bus Transfer Delays: When construction activity encroaches into a sidewalk, walkway, or crosswalk, measures would be considered for pedestrian safety in a temporary traffic control zone. For excessive bus transfer delays, potential mitigation measures include:</li> <li>• Install marked crosswalks.</li> <li>• As feasible, relocate/consolidate bus stops to ensure transfers between bus transit and the subway do not require crossing more than one roadway.</li> <li>• Relocate station entrances or bus stops or install signals to ensure that transfers between buses and the subway do not require crossing more than one roadway.</li> </ul>		



Table S-4. Summary of Transportation Impacts and Mitigation (continued)

Bicycle and Pedestrians (Construction and Operation)	<ul style="list-style-type: none"> <li>• Construct a second station entrance or include a bus turnaround at the station where feasible.</li> </ul> <p><i>Bicycle and Pedestrian Mitigation Measure 2</i></p> <ul style="list-style-type: none"> <li>• Pedestrian Safety: Pedestrian safety measures include:</li> <li>• Relocate bus stops.</li> <li>• Construct a second station entrance or bus turnarounds.</li> <li>• Shift station entrances (or provide added marked crosswalks or signals depending on location).</li> </ul> <p><i>Construction Impacts on Transportation Measure 3</i></p> <ul style="list-style-type: none"> <li>• Pedestrian Access: Access to sidewalks would be maintained on both sides of the street at all Metro construction sites at all times, including access to all businesses.</li> </ul> <p><i>Construction Impacts on Transportation Measure 4</i></p> <ul style="list-style-type: none"> <li>• Bicycle Access: Preliminary bike lane design analysis is being prepared for the Project, and this information would be used during the stage construction and traffic handling phase of the Project. During construction, Metro-approved bike routes would be maintained past all construction sites.</li> </ul>
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Table S-5. Summary of Environmental Impacts and Mitigation

► Land Use, Community and Neighborhoods, and Environmental Justice		
Regional Land Use	No Build Alternative	No adverse effects. Consistent with SCAG regional policies.
	TSM Alternative	No adverse effects. Consistent with SCAG regional policies.
	Alternative 1	No adverse effects. Consistent with SCAG regional policies. Growth forecasted in study area may provide opportunities for transit-oriented development (TOD) around stations. The highest growth for all alternatives is projected to occur near the Wilshire/Fairfax Wilshire/Rodeo, and Westwood/UCLA stations. In addition, for Alternative 3 and 5, high growth is projected to occur near the Wilshire/Bundy Station.
	Alternative 2	
	Alternative 3	
	Alternative 4	
	Alternative 5	
<b>Mitigation</b>		No adverse effects. Therefore, no mitigation is required.
Land Use Plans	No Build Alternative	Local land use policies and goals that promote transit supportive land uses and promote mass transit would not be met.
	TSM Alternative	Local land use policies and goals would not be met
	Alternative 1	Consistent with applicable land use plans.
	Alternative 2	
	Alternative 3	
	Alternative 4	
	Alternative 5	
<b>Mitigation</b>		No adverse effects. Therefore, no mitigation is required.

**Table S-5. Summary of Environmental Impacts and Mitigation (continued)**

Division of Established Community	No Build Alternative	No adverse effect.
	TSM Alternative	No adverse effect.
	Alternative 1	Build Alternatives would not result in adverse effects related to land use. Alternatives 2-5 connect Westwood and West Los Angeles by providing fixed guideway connection across I-405.
	Alternative 2	
	Alternative 3	
	Alternative 4	
	Alternative 5	
<b>Mitigation</b>		No adverse effects. Therefore, no mitigation is required.
Displacements	No Build Alternative	None
	TSM Alternative	None
	Alternative 1	Total: 277 40 Full acquisitions (F), 5 Partial acquisitions(P), 12 Permanent easements (PE), 2 Temporary construction easements(TCE), 218 Permanent underground easements (PUE)
	Alternative 2	Total: 278 40 F, 5 P, 12 PE, 2 TCE, 219 PUE,
	Alternative 3	Total: 298 59 F, 5 P, 13 PE., 2 TCE, 219 PUE,
	Alternative 4	Total: 417 64 F, 6 P, 16 PE, 3 TCE, 3 28 PUE,
	Alternative 5	Total: 437 83 F, 6 P, 17 PE, 3 TCE , 328 PUE
<b>Mitigation</b>		<ul style="list-style-type: none"> <li>• CN-1 — Provide relocation assistance and compensation for all displaced businesses and residences, as required by both the Uniform Act and the California Act. All real property acquired by Metro would be appraised to determine its fair market value. Just compensation, which would not be less than the approved appraisal, would be made to each property owner. Each business or residence displaced would be given advance written notice and would be informed of their eligibility for relocation assistance and payments under the Uniform Relocation Act. There would be businesses that relocate and, as such, most jobs would be relocated and would not be permanently displaced. However, there are permanent job losses anticipated. Metro would coordinate with the appropriate jurisdictions regarding business relocations.</li> <li>• CN-2 — Consider joint-use agreements for the land it would take for station entrances and construction staging to induce job creation in areas where permanent job loss is anticipated.</li> <li>• CN-3 — For easements, appraise each property to determine the fair market value of the portion that would be used either temporarily during construction or permanently above and below ground. Just compensation, which would not be less than the approved appraisal, would be made to each property owner.</li> </ul>
Environmental Justice	No Build Alternative	No disproportionate adverse impacts.
	TSM Alternative	No disproportionate adverse impacts.
	Alternative 1	No disproportionate adverse impacts. All Build Alternative are expected to result in beneficial effects for minority and low income communities (visual enhancement, improved accessibility, and improved mobility) with benefits distributed over a larger area in proportion to the length of the corridor.
	Alternative 2	
	Alternative 3	
	Alternative 4	
Alternative 5		
<b>Mitigation</b>		No disproportionate adverse impacts. Therefore, no mitigation is required.

Table S-5. Summary of Environmental Impacts and Mitigation (continued)

Economic and Fiscal	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	Operations and maintenance expenditures will result in both direct employment (5,775 Person Years [PY] ) and indirect employment (9,965 PY).
	Alternative 2	Operations and maintenance expenditures will direct employment (5,789 PY) and indirect employment (9,989 PY).
	Alternative 3	Operations and maintenance expenditures will direct employment (5,861 PY) and indirect employment (10,112 PY).
	Alternative 4	Operations and maintenance expenditures will direct employment (5,944 PY) and indirect employment (10,257 PY).
	Alternative 5	Operations and maintenance expenditures will direct employment (6,042 PY) and indirect employment (10,425 PY).
<p><b>Mitigation</b> No adverse effects. Therefore, no mitigation is required.</p>		
<p>► Visual Quality</p>		
Visual Quality	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	Visible changes would include new station entrances and some station components. The Project would be consistent with Metro Design Criteria. Design of station entrances would to complement the cultural, historic, geographic, and aesthetic character of the surrounding areas. Where practicable, entrances would be integrated into existing buildings or could be integrated into future development.
	Alternative 2	
	Alternative 3	
	Alternative 4	
	Alternative 5	
<p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• In addition to the Metro Urban Design Criteria, design guidelines to avoid and minimize impacts include but are not limited to 1) preserve and enhance the unique cultural identity of each station area and its surrounding community by implementing art and landscaping; and 2) promote a sense of place, safety, and walkability by providing street trees, walkways or sidewalks, lighting, awnings, public art, and/or street furniture.</li> <li>• VQ-1 — To minimize visual clutter, integrate system components reduce the potential for conflicts between the transit system and adjacent communities; design of the system stations and components should follow the recommendations and guidance developed in the urban design analysis conducted for the Project.</li> <li>• VQ-2 — Where mature trees are removed, replacement with landscape amenities of equal value should be considered to enhance visual integrity of the station area.</li> <li>• VQ-3 — Source shielding in exterior lighting at stations and maintenance facilities should be used to limit spillover light and glare.</li> <li>• VQ-4 — Station designs should be integrated with area redevelopment plans.</li> </ul>		

**Table S-5. Summary of Environmental Impacts and Mitigation (continued)**

▶ Energy		
Energy	No Build Alternative	No adverse effects.
	TSM Alternative	Mobile source energy consumption would decrease by 36.7 billion BTU per year. Net energy consumption would be less than No Build.
	Alternative 1	Mobile source energy consumption would decrease by 500 billion BTU per year. Energy consumption for stations = 1.2 billion BTUs per year. Net energy consumption would be less than No Build.
	Alternative 2	Mobile source energy consumption would decrease by 485 billion BTU per year. Energy consumption for stations = 1.4 billion BTUs per year. Net energy consumption would be less than No Build.
	Alternative 3	Mobile source energy consumption would decrease by 374 billion BTU per year. Energy consumption for stations = 2.1 billion BTUs per year. Net energy consumption would be less than No Build.
	Alternative 4	Mobile source energy consumption would decrease by 222 billion BTU per year. Energy consumption for stations = 2.3 billion BTUs per year. Net energy consumption would be less than No Build.
	Alternative 5	Mobile source energy consumption would decrease by nearly 15 billion BTU per year. Energy consumption for station = 3 billion BTUs per year. Net energy consumption would be less than No Build.
	<b>Mitigation</b>	

Table S-5. Summary of Environmental Impacts and Mitigation (continued)

▶ Geologic Hazards		
	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	Multiple segments of the Build Alternatives traverse the Santa Monica Fault. The West Beverly Hills Lineament crosses the Study Area in the vicinity of the intersection of Moreno Drive and Santa Monica Boulevard in Century City. Alternatives are susceptible to possible surface fault rupture and strong ground shaking generated by nearby faults. In addition, Alternative 3 is subject to surface fault rupture hazards at three (3) additional locations: 1) Wilshire Boulevard and Bundy Drive, 2) Wilshire Boulevard between Stanford and Harvard Streets, and 3) Wilshire Boulevard between Chelsea and 21st Streets.
	Alternative 2	
	Alternative 3	
	Alternative 4	
	Alternative 5	
Seismic	<b>Mitigation</b>	
	<ul style="list-style-type: none"> <li>• GEO-1—To minimize impacts related to repair of damage from surface fault rupture, the strategy used for the Red Line North Hollywood Extension would be applied. During design, geotechnical investigations would be undertaken to study the fault characteristics (location, width of zone, expected offset, etc). Where sections cross a fault, a “Seismic Section” would be defined. At these Seismic Sections, alternatives for design would be dependent on the fault properties. Design alternatives could include oversized tunnel for a distance of longer than the fault zone so as to facilitate an expedient repair of the tunnel, realignment of the tracks, and reinstatement of train operations in the event of damage from ground rupture. Another possible alternative to tunneling through a fault crossing—where the tunnel is relatively shallow—is to construct widened cut-and-cover box structures at those locations and incorporate a resilient and easily repaired support system for the trackwork as discussed above. If offset occurs over a longer distance a more flexible liner—such as steel segments—may be designed accommodate strain.</li> <li>• GEO-2—Potential operational impact from fault rupture (i.e. derailment) to the safety of subway riders cannot be entirely mitigated. 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. Metro would implement measures to provide uninterruptible fire, power, lighting and ventilation systems to increase safety.</li> <li>• GEO -4—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 Metro Design Standards for the operating design earthquake and maximum design earthquake.</li> </ul>	

**Table S-5. Summary of Environmental Impacts and Mitigation (continued)**

Liquefaction	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	Tunnels will be below potentially liquefiable soils. There may be potential adverse effects from liquefaction adjacent to the upper portions of some station walls at the Wilshire/La Cienega and Westwood/UCLA Stations.
	Alternative 2	In addition to the impacts of Alternative 1, there may be potential adverse effects from liquefaction adjacent to the upper portions of some walls at Westwood/VA Hospital Station.
	Alternative 3	In addition to the impacts of Alternative 2, there may be potential adverse effects from liquefaction adjacent to the upper portions of some station walls at the Wilshire/Bundy Station and Wilshire/4th Street Station.
	Alternative 4	In addition to the impacts of Alternative 1, there may be potential adverse effects from liquefaction adjacent to the upper portions of some station walls at the Santa Monica/San Vicente and Beverly Center Stations.
	Alternative 5	Same as Alternative 3 and 4
<p><b>Mitigation</b>            GEO-3—The only subway structures that are likely to be affected by liquefaction of the surrounding soils are the upper portions of some station walls. This potential impact can be mitigated by designing the upper portions of the station walls to resist greater lateral earth pressures. If soils are found to be liquefiable at the LATC yard, several measures could be considered to mitigate liquefaction. For example, foundations for structures could require ground improvement prior to construction or pile design to reach non-liquefiable zones.</p>		
Subsidence	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	No adverse effects. Subsidence is not considered an impact during operations.
	Alternative 2	
	Alternative 3	
	Alternative 4	
	Alternative 5	
<p><b>Mitigation</b>            No adverse effect; therefore, no mitigation measures are required.</p>		

Table S-5. Summary of Environmental Impacts and Mitigation (continued)

Subsurface Gases	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	Hazardous subsurface gasses (methane and hydrogen sulfide) pose a hazard during construction and operation.
	Alternative 2	
	Alternative 3	
	Alternative 4	
	Alternative 5	
<b>Mitigation</b>		
<ul style="list-style-type: none"> <li>• GEO-5—The City of Los Angeles Municipal Code, Chapter IX, Building Regulations, Article 1, Division 71, Methane Seepage Regulations, requires construction projects located within the Methane Zone or Methane Buffer Zone to comply with the City’s Methane Mitigation Standards to control methane intrusion emanating from geologic formations. Mitigations required are determined according to the actual methane levels and pressures detected on a site.</li> <li>• GEO-6—Tunnels and stations would include gas monitoring and detection systems with alarms, as well as special ventilation equipment to dissipate gas.</li> <li>• GEO-7—Implement measures from Metro’s special studies for analysis and testing during design phases.</li> </ul>		
<b>► Hazardous Wastes and Materials</b>		
Hazardous Wastes and Materials	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	No adverse effects. Subway tunnel is expected to be under the lowest point of contaminated soils; low or negligible potential impact expected. Any contaminated groundwater would be treated in accordance with applicable permits prior to discharge or disposal.
	Alternative 2	
	Alternative 3	
	Alternative 4	
	Alternative 5	
<b>Mitigation</b>		
<p>HAZ-1—Continued treatment of groundwater from underground structures, if necessary</p> <p>HAZ-2—Emergency response would 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, particularly the maintenance facilities.</p>		
<b>► Ecosystems/Biological Resources</b>		
Ecosystems/Biological Resources	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	No adverse effects.
	Alternative 2	
	Alternative 3	
	Alternative 4	
	Alternative 5	
<b>Mitigation</b>		
No adverse effect; therefore, no mitigation measures are required.		

**Table S-5. Summary of Environmental Impacts and Mitigation (continued)**

▶ Safety and Security		
Safety and Security	No Build Alternative	No adverse effects. Safety would remain at current levels or follow current trends.
	TSM Alternative	No adverse effects. Metro bus operators will perform under similar conditions as No Build and in accordance with Metro’s established safety program. Safety would remain at current levels or follow current trends.
	Alternative 1	<p>No adverse effects. Construction effects will be temporary and localized primarily in station and staging areas.</p> <p>Project elements/activities have a potential risk of fire and related hazards. With Metro safety programs in place, no adverse affects to employee safety during operations are anticipated. Metro is committed to following risk assessment processes performed by federal agencies of their sites and potential risk security countermeasures recommended by a federal agency to reduce risk at their site. Sites include: Los Angeles General Services Administration Building.</p> <p>A significant impact to law enforcement agencies located along the alignment would occur from a potential terrorist threat targeting the increase in pedestrian circulation and critical infrastructures at or near at-grade station portals and sub grade station platforms.</p> <p>For Alternatives 2 – 5, additional federal facilities, which risk assessment will be required include the VA Medical Center and California Army National Guard.</p>
	Alternative 2	
	Alternative 3	
	Alternative 4	
	Alternative 5	
<b>Mitigation</b>		
<ul style="list-style-type: none"> <li>• SS-1—Implementation of public safety awareness and employee training program.</li> <li>• SS-2—Development and implementation of project-specific safety certification plan.</li> <li>• SS-5 to 7—Design in accordance with Metro Fire/Life safety criteria, Metro ventilation criteria, California Building Code, and other applicable Federal, State, and local rules and regulations.</li> <li>• SS-8—Implementation of public safety awareness, employee training program, and system design features.</li> <li>• SS-9—Implementation of security features, including lighting, communication devices (e.g., passenger telephones), closed circuit television, signs and other design features, and law enforcement officers to reduce criminal activities. In addition, expand the Rail Operations Center to provide an integrated control facility that would allow monitoring of an expanded rail network.</li> <li>• SS-10—Implementation of security features, including: security education and employee training specific to terrorism awareness, lighting, communication devices (e.g., passenger telephones), closed circuit television, signs and other design features to reduce terrorism activities.</li> <li>• SS-11—Development and implementation of a comprehensive emergency preparedness plan, employee and emergency responders training, and system design features.</li> </ul>		
▶ Parklands and Community Services and Facilities		
Parklands and Community Services and Facilities	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	Access to over 14 community facilities and services within ¼ mile of stations would be improved. There would be some improvement in traffic flow, which could improve travel times for emergency responses.
	Alternative 2	In addition to those facilities in Alternative 1, this alternative also improves accessibility to the West Los Angeles Healthcare Center (VA Hospital).
	Alternative 3	In addition to those facilities in Alternative 1, this alternative improves accessibility to ten (10) additional community facilities and services within ¼ mile of the stations
	Alternative 4	In addition to those facilities in Alternative 1, this alternative also improves accessibility to eight community facilities and services within ¼ mile of the stations.
	Alternative 5	Similar to Alternatives 3 and 4.
<b>Mitigation</b>		
Project operations would not result in adverse impacts to parks and community facilities. No mitigation is required.		



Table S-5. Summary of Environmental Impacts and Mitigation (continued)

▶ Historic, Archeological, and Paleontological Resources		
Historic, Archeological, and Paleontological Resources	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	Project could result in an adverse effect on historic properties at the Wilshire/Rodeo Station. Although there are two (2) historic sites at Wilshire/Rodeo, only one site may be selected as a station entrance and would be adversely affected. Alternative 3 could also result in an adverse effect on the Cheyenne Building at the Wilshire/4th Street Station, depending on the station entrance selected. Alternative 3 could impact to archaeological resources due to potential resources near proposed Wilshire/4th Street. Alternative 4 could also impact to archaeological resources due to potential resources near Highland Avenue and Hollywood Boulevard.
	Alternative 2	
	Alternative 3	
	Alternative 4	
	Alternative 5	
<b>Mitigation</b>		
<ul style="list-style-type: none"> <li>• HR-1—To the extent possible, each phase of the Project would be designed in adherence to Secretary of the Interior’s Standards for the Rehabilitation of Historic Properties (United States Department of the Interior, National Park Service 1997). Designs would ensure the preservation of the character defining features of the built environment properties, and would avoid damaging or destroying materials, features, or finishes that are important to the property, while also considering economic and technical feasibility.</li> <li>• HR-2—In the event that activities associated with the Project cannot be implemented in a manner which meets adherence to Secretary of the Interior’s Standards for the Rehabilitation of Historic Properties, FTA, with the assistance of Metro, would prepare appropriate records and documentation, pursuant to Section 110(b) of the National Historic Preservation Act for properties which would be adversely affected.</li> <li>• HR-3—In connection with HABS/HAER documentation, Metro would develop a public website concerning the history of adversely affected properties.</li> <li>• PA-1—Metro would coordinate with the Page Museum of La Brea Discoveries and the Natural History Museum of Los Angeles County concerning any maintenance activities that might impact paleontological resources.</li> <li>• PA-2— Station excavation design at or near potential fossil deposits (Wilshire/Fairfax and Wilshire/La Brea Stations) will be designed to facilitate fossil recovery.</li> </ul>		
▶ Growth-inducing		
Growth-inducing	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	No adverse effects.
	Alternative 2	
	Alternative 3	
	Alternative 4	
	Alternative 5	
▶ Cumulative		
Cumulative Impacts	No Build Alternative	No contribution to cumulative impacts.
	TSM Alternative	No contribution to cumulative impacts.
	Alternative 1	If the Project occurs at the same time as other projects in a particular community, cumulative effects associated with noise and vibration, street closures and traffic, parking, aesthetics, access to businesses, parks and public facilities, and other construction-related effects would be significant during construction.
	Alternative 2	
	Alternative 3	
	Alternative 4	
Alternative 5		

**Table S-6. Summary of Environmental Impacts and Mitigation—Construction**

► Land Use, Community and Neighborhoods, and Environmental Justice		
Division of Established Community	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	Adverse effects for limited durations due to street and sidewalk closures and traffic detours, especially in areas of station construction. Noise and emissions from the haul trucks and construction equipment could disrupt community activities. Local neighborhoods, community facilities and businesses may be inconvenienced temporarily because of traffic delays, noise, air quality, temporary removal of parking, and visual effects.
	Alternative 2	
	Alternative 3	
	Alternative 4	
	Alternative 5	
<b>Mitigation</b>		
<ul style="list-style-type: none"> <li>• CON-1—To the maximum extent feasible, develop temporary detours for any road or sidewalk closures during construction. Post signage (in appropriate language) to alert pedestrians and vehicles of any road or sidewalk closures or detours. Ensure pedestrian detours are accessible to seniors and disabled persons. Sidewalks, Americans with Disabilities Act (ADA) accessible, would be required on both sides of the street during construction. However, subject to Metro approval, sidewalks may be closed for short durations.</li> <li>• CON-2—Develop a community outreach plan to notify local communities of construction schedule, road and sidewalk closures, and detours. Coordinate with local communities during preparation of the traffic management plans to minimize potential construction impacts to community resources and special events. Consider limiting construction activities during special events.</li> <li>• CON-3—Develop construction mitigation plans with community input to directly address community concerns.</li> </ul>		
Economic and Fiscal	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	Business impacts include some reduced access to businesses, decreased visibility of commercial signs; economic impacts to commercial establishments during construction. Construction would result in both direct employment (33,930 person years [PY]) and indirect employment (26,177 PY).
	Alternative 2	
	Alternative 3	
	Alternative 4	
	Alternative 5	
<b>Mitigation</b>		
CON-79 — Develop both standard and site-specific mitigation measures to minimize disruption of pedestrian access to business and disruption of general vehicular traffic flow or access to specific businesses.		

Table S-6. Summary of Environmental Impacts and Mitigation—Construction (continued)

▶ Visual Quality		
Visual Quality	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	Construction would result in temporary changes in views of and from the construction area. Lighting of staging areas at night could also affect views.
	Alternative 2	
	Alternative 3	
	Alternative 4	
Alternative 5		
	<b>Mitigation</b>	<ul style="list-style-type: none"> <li>• CON-4 — Remove visually obtrusive erosion-control devices, such as silt fences, plastic ground cover, and straw bales, as soon as the area is stabilized.</li> <li>• CON-5 — Located stockpile areas in less visibly sensitive areas and, whenever possible, not be visible from the road or to residents and businesses. Develop limits on heights of excavated materials during design based on the specific area available for storage of material and visual impact.</li> <li>• CON-6 — Direct lighting toward the interior of the construction staging area and be shielded so that it would not spill over into adjacent residential areas. In addition, sound walls of Metro approved design would be installed at station and work areas. These will block direct light and views of the construction areas from residences.</li> </ul>
▶ Air Quality		
Air Quality	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	SCAQMD thresholds would be exceeded for nitrous oxides (NOx) and particulate matter (PM10) for construction activities. During construction, methane in the soil may be encountered and hydrogen sulfide odors may also be released from groundwater containing hydrogen sulfide. Once in operation, all regional pollutant burden levels are expected to decrease.
	Alternative 2	Similar to Alternative 1.
	Alternative 3	
	Alternative 4	
Alternative 5		
	<b>Mitigation</b>	<ul style="list-style-type: none"> <li>• CON-7—Mitigation measures such as watering, the use of soil stabilizers, etc. would be applied to reduce the predicted PM10 levels to below the SCAQMD daily construction threshold levels.</li> <li>• CON-7A—At truck exit areas, wheel washing equipment would be installed to prevent soil from being tracked onto city streets, and followed by street sweeping as required to clean streets.</li> <li>• CON-7B—Trucks would be covered to control dust during transport of spoils.</li> <li>• CON-7C—Spoil removal trucks would operate at a Metro approved emission level, including standards adopted by the Port of Long Beach’s Clean Trucks Program, and all.</li> <li>• CON-7D—Tunnel locomotives (hauling spoils and other equipment to the tunnel heading) would be approved by Metro.</li> <li>• CON-7E—Metro and its contractors would set and maintain work equipment and standards to meet SCAQMD standards including NOx.</li> <li>• CON-8—Continuous monitoring and recording of the air environment would be conducted, particularly in areas of gassy soils. Construction would be altered as required to maintain a safe working atmosphere. The working environment would be kept in compliance with Federal State and Local regulations</li> </ul>

**Table S-6. Summary of Environmental Impacts and Mitigation—Construction (continued)**

► Climate Change		
Climate Change	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	Construction emissions may result in a short-term impact for greenhouse gases; however, these emissions are limited to the duration of construction and are not expected to result in a substantial long-term impact.
	Alternative 2	
	Alternative 3	
	Alternative 4	
Alternative 5		
<b>Mitigation</b>		No adverse effects; therefore, no mitigation measures are required.
► Noise and Vibration		
Noise and Vibration	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	Noise impacts relating to construction are expected to be adverse. The largest potential impacts are located near stations, tunnel access portals, and construction laydown areas.
	Alternative 2	
	Alternative 3	
	Alternative 4	
Alternative 5		
<b>Mitigation</b>		<ul style="list-style-type: none"> <li>• CON-9—The Project would comply with the local noise ordinance during construction hours and local standards for short-term operation of mobile equipment and long-term construction operations of stationary equipment, including noise levels and hours of operation.</li> <li>• CON-10—Readily visible signs indicating “Noise Control Zone” would be prepared.</li> <li>• CON-11—Noise-control devices that meet original specifications and performance would be used.</li> <li>• CON-12—Fixed noise-producing equipment would be used to comply with regulations in the course of project activity.</li> <li>• CON-13—Mobile or fixed noise-producing equipment that are equipped to mitigate noise to the extent practical would be used.</li> <li>• CON-14—Electrically-powered equipment would be used to the extent practical</li> <li>• CON-15—Temporary noise barriers and sound-control curtains would be erected where project activity is unavoidably close to noise-sensitive receptors.</li> <li>• CON-16—Designated haul routes would be used based on the least overall noise impact Route heavily-loaded trucks away from residential streets, if possible. Identification of haul routes would consider streets with the fewest noise sensitive receptors if no alternatives are available.</li> <li>• CON-17—Non-noise sensitive, designated parking areas for project-related vehicles would be used.</li> <li>• CON-18—Earth-moving equipment, fixed noise-generating equipment, stockpiles, staging areas, and other noise-producing operations would be located as far as practicable from noise-sensitive receptors.</li> <li>• CON-19—Use of horns, whistles, alarms, and bells would be limited.</li> </ul>

**Table S-6. Summary of Environmental Impacts and Mitigation—Construction**

Noise and Vibration	<ul style="list-style-type: none"> <li>• CON-20—All noise-producing project equipment and vehicles would be required to use internal combustion engines equipped with mufflers and air-inlet silencers, where appropriate, and kept in good operating condition that meet or exceed original factory specifications. Mobile or fixed “package” equipment (e.g., arc-welders, air compressors) would be equipped with shrouds and noise control features that are readily available for that type of equipment.</li> <li>• CON-21—Any project-related public address or music system would not be audible at any adjacent receptor.</li> <li>• CON-22—Demolition, earth moving, and ground impacting operations would be phased so as not to occur in the same time period.</li> <li>• CON-23—Impact pile driving would be avoided. Drill piles or sonic or vibratory pile drivers would be used where the geological conditions permit their use.</li> <li>• CON-24—Demolition methods would be selected to minimize noise and vibration impact where possible.</li> <li>• CON-25—Use of vibratory rollers and packers would be avoided near vibration sensitive areas.</li> <li>• CON-26—Temporary tracks for mine trains would be in good condition. In sensitive areas, require further measures to reduce noise such as rail isolation materials.</li> <li>• CON-27—Enclosures for fixed equipment such as TBM slurry processing plants would be required in order to reduce noise.</li> </ul>															
	<b>▶ Energy</b>															
	Energy	<table border="1"> <tr> <td>No Build Alternative</td> <td>No adverse effects.</td> </tr> <tr> <td>TSM Alternative</td> <td>No adverse effects.</td> </tr> <tr> <td>Alternative 1</td> <td>Energy consumption during construction would be 2.0 trillion BTUs</td> </tr> <tr> <td>Alternative 2</td> <td>Energy consumption during construction would be 2.3 trillion BTUs.</td> </tr> <tr> <td>Alternative 3</td> <td>Energy consumption during construction would be 3.4 trillion BTUs.</td> </tr> <tr> <td>Alternative 4</td> <td>Energy consumption during construction would be 3.7 trillion BTUs</td> </tr> <tr> <td>Alternative 5</td> <td>Energy consumption during construction would be 4.9 trillion BTUs.</td> </tr> </table>	No Build Alternative	No adverse effects.	TSM Alternative	No adverse effects.	Alternative 1	Energy consumption during construction would be 2.0 trillion BTUs	Alternative 2	Energy consumption during construction would be 2.3 trillion BTUs.	Alternative 3	Energy consumption during construction would be 3.4 trillion BTUs.	Alternative 4	Energy consumption during construction would be 3.7 trillion BTUs	Alternative 5	Energy consumption during construction would be 4.9 trillion BTUs.
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Alternative 5	Energy consumption during construction would be 4.9 trillion BTUs.															
<p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• No adverse effects; therefore, no mitigation measures are required.</li> <li>• Metro would require the construction contractor to implement energy conserving Best Management Practices in accordance with Metro’s Energy and Sustainability Policy. Best Management Practices would include, but would not be limited to, implementing a construction energy conservation plan, using energy-efficient equipment, consolidating material delivery to ensure efficient vehicle use, scheduling delivery of materials during non-rush hours to maximize vehicle fuel efficiency, encouraging construction workers to carpool, and maintaining equipment and machinery in good working condition.</li> </ul>																
<b>▶ Geologic Hazards</b>																
Seismic and Liquefaction	<table border="1"> <tr> <td>No Build Alternative</td> <td>No adverse effects.</td> </tr> <tr> <td>TSM Alternative</td> <td>No adverse effects.</td> </tr> <tr> <td>Alternative 1</td> <td rowspan="5">Alternative traverses the Santa Monica Fault and West Beverly Hills Lineament. Construction and operation are susceptible to possible seismic liquefaction, surface fault rupture and strong ground shaking generated by nearby faults.</td> </tr> <tr> <td>Alternative 2</td> </tr> <tr> <td>Alternative 3</td> </tr> <tr> <td>Alternative 4</td> </tr> <tr> <td>Alternative 5</td> </tr> </table>	No Build Alternative	No adverse effects.	TSM Alternative	No adverse effects.	Alternative 1	Alternative traverses the Santa Monica Fault and West Beverly Hills Lineament. Construction and operation are susceptible to possible seismic liquefaction, surface fault rupture and strong ground shaking generated by nearby faults.	Alternative 2	Alternative 3	Alternative 4	Alternative 5					
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	Alternative 2															
	Alternative 3															
	Alternative 4															
Alternative 5																
<p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• No mitigation is required.</li> <li>• Construction would be performed in accordance with Metro criteria and the latest federal and state seismic and environmental requirements as well as state and local building codes to protect the workers and work under construction under construction considering seismic conditions.</li> </ul>																

**Table S-6. Summary of Environmental Impacts and Mitigation—Construction Noise and Vibration (continued)**

	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	Hazardous subsurface gasses (methane and hydrogen sulfide) pose a hazard during construction and operation.
	Alternative 2	
	Alternative 3	
	Alternative 4	
	Alternative 5	
Subsurface Gases	<b>Mitigation</b>	
	<ul style="list-style-type: none"> <li>• CON 32—In areas of potential hydrogen sulfide exposure, there are several techniques that can be used to lower the risk of exposure. Areas that have been determined to be at risk of elevated hydrogen sulfide levels can be treated by displacing and oxidation of the hydrogen sulfide by injecting water possibly containing dilute hydrogen peroxide into the ground and groundwater in advance of the tunnel excavation. This “in-situ oxidation” method reduces hydrogen sulfide levels even before the ground is excavated. This pre-treatment method may be implemented 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 excavations.</li> <li>• CON 33—Additives can be mixed with the bentonite (clay) slurry during the mining and/or prior to discharge into the slurry separation plant. For example, zinc oxide can be added to the slurry as a “scavenger” to precipitate dissolved hydrogen sulfide when slurry hydrogen sulfide levels get too high.</li> <li>• CON 34—For the stations, the use of relatively impermeable diaphragm or slurry walls or equivalent would be implemented to reduce of gas inflows both during and after construction to provide a barrier against water and gas intrusion and reduce the need for dewatering the station during construction. Grout tubes can be pre-placed within slurry wall panels to be used in the event leakage occurs. Additional ventilation, continuous monitoring, and worker training for exposure to hazardous gases would also be required during construction. In extreme cases, some work may require use of personal protective equipment, such as fitted breathing apparatus.</li> <li>• CON-35—If abandoned wells are found to be located within the alignment, the California Department of Conservation (Department of Oil, Gas and Geothermal Resources) would be contacted to determine the appropriate method to abandon the well. Similarly, during construction if an unknown well is encountered, the contractor would notify Metro, Cal/OSHA, and the Gas and Geothermal Resources for well abandonment procedures.</li> <li>• CON-37—Although not specifically required for gassy tunnels, oxygen supply-type self-rescuers (required for evacuation during fires) would be used, as necessary.</li> </ul>	

Table S-6. Summary of Environmental Impacts and Mitigation—Construction (continued)

▶ Hazardous Waste and Materials	
No Build Alternative	No adverse effects.
TSM Alternative	No adverse effects.
Alternative 1	Alignment is close to areas where underground storage tanks, volatile organic compounds and oil exploration sites occur. Subway tunnel is expected to be under the lowest point of contaminated soils; low or negligible potential impact expected. Contaminated groundwater may be encountered during construction and operation. Any contaminated groundwater would be treated in accordance with applicable permits prior to discharge or disposal. Preparation of construction staging areas will require demolition of structures. In locations where buildings may be demolished or modified, asbestos and/or lead may be present and will be handled by licensed contractors in accordance with applicable regulations. No adverse effect.
Alternative 2	
Alternative 3	
Alternative 4	
Alternative 5	
Hazardous Waste and Materials	<b>Mitigation</b>
	<ul style="list-style-type: none"> <li>• CON-38—An Environmental Site Assessment would be conducted prior to construction in areas of impacted soil. A base line soil sampling protocol would be established with special attention to those areas of potential environmental concern. The soil would be assessed for constituents likely to be present in the subsurface including, but not limited to, total petroleum hydrocarbons, volatile and semi-volatile organic compounds, polychlorinated biphenyls, polynuclear aromatic hydrocarbons, pesticides, lead arsenates, and Title 22 metals. The depth of the sampling would be based on the depth of grading or type of construction activities. In addition, in areas where groundwater would be encountered, samples would also be analyzed for suspected contaminants prior to dewatering to ensure that National Pollutant Discharge Elimination System discharge requirements are satisfied.</li> <li>• CON-39—A soil mitigation plan would be prepared showing the extent of soil excavation during construction. The soil mitigation plan would establish soil reuse criteria, a sampling plan for stockpiled materials, and the disposition of materials that do not satisfy the reuse criteria. It would specify guidelines for imported materials. The plan would include provisions for soil screening for contamination during grading or excavation activities.</li> <li>• CON-40—Soil samples that are suspected of contamination would be analyzed for suspected chemicals by a California certified laboratory. If contaminated soil is found, it would be removed, transported to an approved disposal location and remediated or disposed according to State and federal laws. Soils would be used on-site as appropriate.</li> <li>• CON-41— If unanticipated contaminated groundwater is encountered during construction, the contractor would stop work in the vicinity, cordon off the area, and contact Metro and the appropriate hazardous waste coordinator and maintenance hazardous spill coordinator at Metro and immediately notify the Certified Unified Program Agencies (City of Los Angeles Fire Department, County of Los Angeles Fire Department, and LARWQCB) responsible for hazardous materials and wastes.</li> <li>• CON-42— In coordination with the LARWQCB, an investigation and remediation plan would be developed in order to protect public health and the environment. Any hazardous or toxic materials would be disposed according to local, state, and federal regulations.</li> <li>• CON-43—A health and safety plan would be developed for persons with potential exposure to the constituents of concern identified in the limited Phase II Environmental Site Assessment.</li> <li>• CON-44- Hazardous materials would be properly stored to prevent contact with precipitation and runoff.</li> <li>• CON-45—An effective monitoring and cleanup program would be developed and implemented for spills and leaks of hazardous materials</li> <li>• CON-46—Equipment to be repaired or maintained would be placed in covered areas on a pad of absorbent material to contain leaks, spills, or small discharges</li> <li>• CON 47- Any significant chemical residue on the project sites would be removed through appropriate methods .</li> </ul>

**Table S-6. Summary of Environmental Impacts and Mitigation—Construction (continued)**

► Ecosystems/Biological Resources		
Ecosystems/Biological Resources	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	Construction may require the removal or disturbance (including trimming) of mature trees located at the construction sites. An adverse effect could occur if an active migratory bird nest located in any of these trees is disturbed during construction.
	Alternative 2	
	Alternative 3	
	Alternative 4	
	Alternative 5	
<b>Mitigation</b>		
<ul style="list-style-type: none"> <li>• CON-48—Two biological surveys would be conducted, one 15 days prior and a second 72 hours prior to construction that would remove or disturb suitable nesting habitat. The surveys would be performed by a biologist with experience conducting breeding bird surveys. The biologist would prepare survey reports documenting the presence or absence of any protected native bird in the habitat to be removed and any other such habitat within 300 feet of the construction work area (within 500 feet for raptors). If a protected native bird is found, surveys would be continued in order to locate any nests. If an active nest is located, construction within 300 feet of the nest (500 feet for raptor nests) would be postponed until the nest is vacated and juveniles have fledged and when there is no evidence of a second attempt at nesting.</li> <li>• CON-49—If construction or operation of the Project requires removal or pruning of a protected tree, a removal permit would be required in accordance with applicable municipal codes and ordinances of the city in which the affected tree is located. Within the City of Los Angeles, compliance with the Native Tree Protection Ordinance would require a tree removal permit from the Los Angeles Board of Public Works. Similarly, within the cities of West Hollywood, Beverly Hills, and Santa Monica applicable tree protection requirements, such as tree removal permits, would be followed. Tree removal permits may require replanting of protected trees within the project area or at another location to mitigate for the removal of these trees.</li> <li>• CON-50—If construction or operation would entail pruning of any protected tree, the pruning would be performed in a manner that does not cause permanent damage or adversely affect the health of the trees.</li> </ul>		
► Water Resources		
Water Resources	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	No adverse effects. Groundwater is encountered at varying depths throughout the Study Area and dewatering during construction and operation may be required. For Alternatives 3 and 5 a portion of the alignment is in the coastal zone and would require a Coastal Development Permit.
	Alternative 2	
	Alternative 3	
	Alternative 4	
Alternative 5		



**Table S-6. Summary of Environmental Impacts and Mitigation—Construction** (continued)

**Mitigation**

- CON-51—An erosion and sediment control plan would be established prior construction.
- CON-52—Landscape and construction debris would be periodically and consistently removed.
- CON-53—Non-toxic alternatives would be employed for any necessary applications of herbicides or fertilizers;
- CON-54—Temporary detention basins would be installed to remove suspended solids by settlement.
- CON-55—Water quality of runoff would be periodically monitored before discharge from the site and into the storm drainage system.

As required under the National Pollution Discharge Elimination System permit, an Urban Stormwater Mitigation Plan and appropriate drainage plan would be implemented to control pollutants to the maximum extent practicable. The drainage control plan would be developed to properly convey drainage from the project area and avoid ponding on adjacent properties. Best Management Practices for tunnel construction activities include but not limited to the following measures as appropriate:

- CON-56—Construction sites would have BMPs to divert potential storm water runoff from entering the construction area. Containment around the site will include use of temporary measures such as fiber rolls to surround the construction areas to prevent any potential spills of slurry discharge or spoils recovered during the separation process. Downstream drainage inlets will also be temporarily covered to prevent potential discharge from entering the storm drain system.
- CON-57—Construction entrances/exits would be properly set up so as to reduce or eliminate the tracking of sediment and debris offsite. Appropriate measures would include measures such as grading to prevent runoff from leaving the site, and establishing “rumble racks” or wheel water points at the exit to remove sediment from construction vehicles.
- CON-58—Onsite rinsing or cleaning of any equipment would be performed in contained areas and rinse water collected for appropriate disposal.
- CON-59—A tank would be required on work sites to collect the water for periodic offsite disposal. Since the slurry production is a closed loop system in which the water separated from the discharge slurry is continually recycled, minimal and infrequent water discharges are anticipated. These discharges can be accommodated in a tank onsite to collect the water and dispose of periodically.
- CON-60—Soil and other building materials (e.g., gravel) stored onsite must be contained and covered to prevent contact with storm water and potential offsite discharge .

**► Safety and Security**

No Build Alternative	No adverse effects. Safety would remain at current levels or follow current trends.
TSM Alternative	No adverse effects. Metro bus operators will perform under similar conditions as No Build and in accordance with Metro’s established safety program. Safety would remain at current levels or follow current trends.
Alternative 1	No adverse effects. Construction effects will be temporary and localized primarily in station and staging areas. Construction equipment and haul trucks would create potential safety hazards for pedestrians, bicyclists and motorists. Safety impacts related to the number and proximity of vehicles and people adjacent to the construction facilities. Construction workers working at the various surface construction locations, and underground in tunnel bores, also subject to safety risk. Adverse effect would be temporary. During construction, subsurface gases (methane and hydrogen sulfide gas) could be encountered in tunneling and excavation staging areas.
Alternative 2	
Alternative 3	
Alternative 4	
Alternative 5	

**Mitigation**

- SS-3—Implement safety rules, procedures, and policies to protect workers and work sites during construction.
- SS-4—Provide warning and/or notification signs, detours, and barriers.

**Table S-6. Summary of Environmental Impacts and Mitigation—Construction** (continued)

▶ Parklands and Community Services and Facilities	
No Build Alternative	No adverse effects.
TSM Alternative	No adverse effects.
Alternative 1	Community facilities and services and parklands immediately adjacent to stations would experience disruptions as a result of noise and/or emissions during construction. Construction related impacts to schools include safety of students walking past construction sites and air and noise/vibration effects on schools close to construction sites and/or haul routes.
Alternative 2	Same as Alternative 1; however, the construction would affect a larger area because the alignment is longer.
Alternative 3	Same as Alternative 1; however, the construction would affect a larger area because the alignment is longer.
Alternative 4	Same as Alternative 1; however, the construction would affect a larger area because the alignment is longer.
Alternative 5	Same as Alternative 3 and 4.

**Mitigation**

- CON-61—School districts and private school institutions along the alignment would be informed of changes to Metro bus routes, school bus routes, and pedestrian crossings prior to construction.
- CON-62—Metro would work with transportation, police, public works, and community services departments of jurisdictions along the alignment to implement mutually agreed upon measures, such as posting of clearly marked signs, pavement markings, lighting as well as implementing safety instructional programs, to enhance the safety of pedestrians, particularly in the vicinity of schools and access routes to hospitals.
- The measures would be developed to conform to Metro Rail Transit Design Criteria and Standards, Fire/Life Safety Criteria.
- CON-63—Metro would provide an instructional rail safety program with materials to all affected elementary and middle schools.
- CON-64—Metro would provide an informational program to nearby medical facilities, senior centers, and parks if requested by these facilities, to enhance safety.
- CON-65—Safe emergency vehicle routes will be designated around construction sites and would be coordinated with other agencies.

Table S-6. Summary of Environmental Impacts and Mitigation—Construction

► Historic, Archeological, and Paleontological Resources		
Historic, Archeological, and Paleontological Resources	No Build Alternative	No adverse effects.
	TSM Alternative	No adverse effects.
	Alternative 1	Construction may encounter subsurface paleontological, prehistoric and/or historic archaeological deposits. Excavation may result in adverse effects. Project could result in an adverse effect on historic properties at the Wilshire/Rodeo Station. Although there are two (2) historic sites at Wilshire/Rodeo, only one site may be selected as a station entrance and would be adversely affected. Alternative 3 could also result in an adverse effect on the Cheyenne Building at the Wilshire/4th Street Station, depending on the station entrance selected. Alternative 3 could also impact to archaeological resources due to potential resources near proposed Wilshire/4th Street Station. Alternative 4 could also impact to archaeological resources due to potential resources near Highland Avenue and Hollywood Boulevard.
	Alternative 2	
	Alternative 3	
	Alternative 4	
Alternative 5		
<p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• CON-66—Metro would implement a mitigation monitoring program and would retain a qualified archaeologist to monitor all ground disturbing activities where sub-surface soils would be exposed and examination of these deposits are feasible. The areas to be examined would be determined based on project plans and in consultation with construction staff and the qualified archaeologist during pre-construction meetings and as needed throughout the construction process. If subsurface resources are identified by the monitor during construction, all construction activities in the area of identified archaeological resources would be temporarily halted so that the archaeologist may quickly document and remove any resources (as may be necessary). All resources shall be documented on California Department of Parks and Recreation (DPR) 523 Series Forms. At the completion of archaeological monitoring for the project, an archaeological resources monitoring report would be prepared and submitted, along with any DPR forms, to the South Central Coastal Information Center to document the results of the monitoring activities and summarize the results of subsurface resources encountered, if any.</li> <li>• CON-67—Metro would ensure that impacts to cultural resources related to the unanticipated discovery of human remains are reduced to less than significant by ensuring that, in the event that human remains are encountered, construction in the area of the find would cease, and the remains would remain in-situ pending definition of an appropriate plan to adequately address the resources. The Los Angeles County Coroner would be contacted to determine the origin of the remains. In the event the remains are Native American in origin, the NAHC shall be contacted to determine necessary procedures for protection and preservation of the remains, including reburial, as provided in the State of California Environmental Quality Act (CEQA) Guidelines, Section 15064.5(e), “CEQA and Archaeological Resources,” CEQA Technical Advisory Series.</li> <li>• CON-68—Metro would seek early approval to begin fossil recovery in advance of construction.</li> <li>• CON-69—Metro would retain the services of a qualified paleontologist to oversee execution of mitigation measures. The areas to be examined would be determined based on project plans and in consultation with construction staff and the qualified paleontologist during pre-construction meetings and as needed throughout the construction process. At the completion of paleontological monitoring for the project, a paleontological resources monitoring report would be prepared and submitted to the Page Museum of La Brea Discoveries and the Natural History Museum of Los Angeles County to document the results of the monitoring activities and summarize the results of any paleontological resources encountered.</li> <li>• CON-70—Metro would develop a Paleontological Resources Monitoring and Mitigation Plan (PRMMP) acceptable to the collections manager of the Vertebrate Paleontology Section of the Natural History Museum of Los Angeles County and the collection manager of the Page Museum of La Brea Discoveries. Metro would implement the PRMMP during construction.</li> </ul>		

**Table S-6. Summary of Environmental Impacts and Mitigation—Construction (continued)**

Historic, Archeological, and Paleontological Resources	<ul style="list-style-type: none"> <li>• CON-71—For any La Brea deposits encountered near the Hancock Park area, all fossils detected during excavation of the asphalt masses would be prepared and conserved, the remaining matrix degreased, and the resultant concentrate inspected for vertebrate, invertebrate, and plant fossils by a qualified paleontologist.</li> <li>• CON-72—Metro would prepare a report detailing the paleontological resources recovered, their significance, and arrangements made for their curation at the conclusion of the monitoring effort.</li> <li>• CON-73—Metro would provide the resources necessary to curate the identified and prepared fossils in a manner that meets the standards published by the Society of Vertebrate Paleontology and the Paleontological Resources Preservation Act. Those fossils collected near the Page Museum of La Brea Discoveries would be curated at this institution. All other fossils would be curated at the Natural History Museum of Los Angeles County.</li> </ul>	
	<b>► Cumulative Impacts</b>	
	No Build Alternative	No contribution to cumulative impacts
	TSM Alternative	No contribution to cumulative impacts
Cumulative Impacts	Alternative 1	The Build Alternatives when combined with other projects that could occur at the same time would result in cumulative construction impacts for localized air quality, and localized visual quality. If the Project occurs at the same time as other projects in a particular community, cumulative effects associated with noise and vibration, street closures and traffic, parking, aesthetics, access to businesses, parks and public facilities, and other construction-related effects would be significant to communities and neighborhoods during construction.
	Alternative 2	
	Alternative 3	
	Alternative 4	
	Alternative 5	

## Summary Evaluation of Station and Alignment Options

In general, the Project would improve VMT within the Study Area. The station options would not cause a negative impact on traffic. The one exception is the intersection of Wilshire Boulevard and 16th Street in Santa Monica under Alternatives 3 and 5. Near the stations, parking impacts and consequences include potential loss of on- and off-street capacity to accommodate construction of rail stations. Spillover parking potential may impact neighborhoods, as riders may drive to stations to access the subway.

At all of the stations there is the potential to temporarily impact local bus stops, bicyclists, and pedestrians during construction. The operation plan for any of the Build Alternatives would accommodate transit and non-motorized facilities into the station design. Stations and adjacent station area development is anticipated to enhance pedestrian circulation patterns and connectivity to maximize ridership.

The station options would not physically divide an established community, would be consistent with applicable local and regional adopted plans and policies, and would be compatible with surrounding land uses. These stations would not significantly impact land use.

All station options would result in some full acquisitions, partial acquisitions, permanent easements, and temporary construction easements surrounding station locations for the purposes of station boxes, station entrances, and construction staging.

Design of station entrances is expected to complement the cultural, historic, geographic, and aesthetic character of the surrounding areas. Where practicable, entrances would be integrated into existing buildings or could be integrated into future development.

There would be no adverse effect from noise and vibration at the stations. Multiple segments of the Santa Monica Fault cross sections of the Study Area and some of the stations are in designated liquefaction hazard zones. However, no adverse effects are anticipated. This fault has not produced any moderate or large earthquakes in the historic record; however, it has been suggested that the fault has had at least six rupture events in the last 50,000 years, with the most recent being between 1,000 and 3,000 years ago.

The potential exists to encounter subsurface gases and hazardous materials near some of the stations. While there is a potential impact, these materials will be managed in accordance with regulatory requirements.

A few historic sites are located near some of the station options; however, there would be no adverse effects to these historic sites.

The stations would be located within a densely developed urban area and would not extend into undeveloped areas that may induce changes in such areas. Potential indirect growth-inducing effects may result from opportunities the Build Alternatives provide for micro-scale growth, including economic growth.

Cumulative effects would be the same for all the Build Alternatives. The incremental effect of the station options would be beneficial overall, although parking loss during construction would be a significant cumulative impact.

### **Option 1: No Wilshire/Crenshaw Station Option**

Removal of this station would reduce transit access for those residents and jobs within one-half mile of the proposed Crenshaw Station. The area around this station; however, has relatively low density and is not planned for growth in the future. The Wilshire/Western Station is more than one-half mile away, a significant distance to walk. Residents of the station area and workers with jobs in the station area would be dependent on the bus system for the “last mile” to their homes and jobs. As a result of the slower speeds on buses and the possible need for an additional transfer, they would be less likely to use transit. Deleting this station would also respond to community concerns about development pressures that could change the character of this residential area. Also, the costs to construct this station would only provide modest ridership and travel time benefits that would not be sufficient to improve the cost-effectiveness of the overall project.

### **Option 2: Wilshire/Fairfax Station East Station Option**

Either of the two Fairfax Station options offers a station portal serving the Los Angeles County Museum of Art. The west option (Base) provides access to the LACMA and Hancock Park. However, the east option provides more direct access but it has a somewhat greater potential to encounter paleontological remains and gassy soils and may cause more traffic impacts during construction. Both locations have similar costs.

### **Option 3: Wilshire/La Cienega Station West with Connection Structure**

The west station option creates the opportunity for direct transfers between the Wilshire and the West Hollywood line in Alternatives 4 and 5. With the east station, transfers would be possible at the Wilshire/Rodeo Station but would require out-of-direction travel and added travel time. The east station site offers better access to higher density residences and businesses east of La Cienega.

### **Option 4: Century City Station**

For the Century City Station, the feasibility of the Santa Monica Boulevard (Base) site assumed in the Base Alignment for the five Build Alternatives is compromised by its close proximity to the Santa Monica Fault which runs directly beneath Santa Monica Boulevard in this area. The optional Constellation site is farther from the fault and would have a lower seismic risk. The Constellation site is also more centrally located within Century City, enhancing walk access for many passengers boarding and alighting at Century City.

Relocating the station from Santa Monica Boulevard to Constellation would save \$4.1 million in station costs. Because it increases the alignment length, a station at Constellation would increase the overall capital cost by \$60.4 million.

If the Century City Station is located at Constellation, there are two alignment options for connecting to the Wilshire/Rodeo Station, the Constellation north option and the Constellation south option. If the Century City station is located on Santa Monica Boulevard, the alignment between Century City and Wilshire/Rodeo would follow Santa Monica Boulevard. Neither the alignment options nor the station location options would have a significant impact on transit travel time between Century City and the Wilshire/Rodeo Station.

There are 3 alignment options to connect a Century City Station to a Westwood/UCLA Station: East (Base), Central and West alignments. At Westwood/UCLA there are two possible station sites: on and off-street.

The South Alignment is longer than the other two and would increase travel time between Century City and Westwood by more than two minutes. This, in turn, would lead to somewhat lower ridership and user benefits, and to fewer air quality and energy conservation benefits. The South Alignment would also increase capital costs by more than \$140 million compared with the Base Alignment and increase operating and maintenance costs. Those alignment options with higher costs will also have higher CEIs and would be less competitive for FTA New Starts funds.

Noise and vibration are key environmental concerns for alignment options between the Wilshire/Rodeo Station in Beverly Hills and Westwood. Residents worry that subway trains could cause vibrations that would be felt in properties above the tunnel. The West Alignment option would require fewer subsurface easements and cross under fewer residential units. The analysis has shown, however, that vibration impacts for subway tunnels are generally below the threshold of human perception.

### **Option 5: Westwood/UCLA On-Street Station Option**

The on-street option under Wilshire Boulevard increases capital costs by \$10.1 million and would disrupt roadway traffic during the construction period due to the need for lane closures during certain periods of the construction process. The off-street site would reduce traffic and construction impacts by relocating the primary construction site off street. The off-street site would temporarily displace existing surface parking during the construction period.

### **Option 6: Westwood/VA Hospital North Station**

The south station site (Base) is less than 300 feet from the hospital, while the north option is more than 1,000 feet away on the other side of Wilshire Boulevard. Thus, the south option offers much better access to the VA Hospital for employees, patients, and visitors.

Moving the station to the north side of Wilshire Boulevard would increase project cost by \$92.6 million but would avoid construction impacts near the VA Hospital. However, a station on the north side would have greater potential to adversely affect cultural resources such as the Wadsworth Theater and the Chapel.

### **Project Phasing**

MOS 1—Interim terminus at Fairfax, and MOS 2—Interim terminus at Century City are compared with the five Build Alternatives, as well as the No Build and TSM Alternatives, in Section 7.1 of this Draft EIS/EIR. Two goals are considered to be most relevant to a decision on phasing—cost-effectiveness and equity. Station-area impacts at the interim termini (Fairfax for MOS-1 and Century City for MOS-2) would not differ significantly from the impacts noted previously.

The MOSs are less cost-effective than the five Build Alternatives. However, MOS 1 serves a part of the Study Area that has a larger percentage of residents who are low income or minority. Two goals are considered to be most relevant to a decision on phasing—cost-effectiveness and equity. Station area impacts at the interim termini (Fairfax for MOS 1 and Century City for MOS 2) would not differ significantly from the impacts for other stations.

