

4.15 Construction Impacts and Mitigation

This section provides an overview of the construction methods, the potential construction impacts, and the proposed mitigation measures for the Build Alternatives. Appendix E provides a more detailed description of the construction process.

Pre-construction activities will include: a survey of properties adjacent to tunnels and stations to assess property condition and to produce a photographic record. Construction staging areas will be used during construction for storage of equipment and construction activities. While most construction activity will occur within the public right-of-way, some station entrance points and construction staging areas will be outside the public right-of-way and will require removal of buildings. Construction-related impacts will involve preparation of and demolition on construction staging sites; during construction from activities around station areas, and related to the construction of system components (traction power substations, maintenance and storage facility); and during post-construction from activities related to rehabilitation of the streets. Effects could include dust, noise and traffic disruption, congestion, and diversion, as well as limited or temporarily lost to residences and businesses.



Metro has always been committed to maintaining business and residential access during construction. Construction impacts will be temporary and limited in area as construction proceeds along the length of the Project alignment. Metro will coordinate with affected residents and businesses prior to construction. A detailed survey of community stakeholders and businesses will be conducted. A construction safety campaign will be developed and community response protocols (notification of construction activities, hot lines, etc.) will be produced. A public involvement plan will be developed prior to each construction phase and will be tailored to the construction phase. Metro will maintain the Project website, which will provide information to the public regarding construction phasing. Metro will develop a program tailored for different locations and needs. The program would involve signage and marketing assistance to businesses, identification of parking alternatives, and other measures.

The construction methods will be specified to minimize potential adverse construction effects. Construction would follow all applicable local, State, and Federal laws for building and safety. Standard construction methods would be used for traffic, noise, vibration, and dust control, consistent with all applicable laws. Metro will employ techniques to reduce the impacts during construction. Some of these include: locating soil removal sites near major streets and highways where possible; considering sequencing and timing of all construction steps; locating station excavations off-street where possible; locating staging area adjacent to construction sites where possible; installation of aesthetic treatments (e.g. attractive fencing materials); and implementing dust and noise mitigation measures, described in the following sections.



Metro will maintain an integrated field office with Metro and contractor staff and monitor mitigation measures finalized during Final EIS/EIR. Monitoring efforts will ensure that the environmental commitments in the Final EIS/EIR and the permit conditions are met during the final design and construction of the Project. Metro will employ a dedicated environmental compliance manager to oversee construction contractor compliance with all stormwater Best Management Practices (BMPs), construction noise mitigation measures, utility coordination, business access requirements, and all other mitigation plans prepared for the Project presented below.

4.15.1 Construction Scenarios

This section summarizes the durations of construction activities (time anticipated to construct one of the Build Alternatives), tunnel and station construction including techniques and equipment, staging areas, and other construction elements. In general, conventional construction techniques and equipment would be used, consistent with other similar projects in Southern California. This would include the use of pressurized-face Tunnel Boring Machines (TBMs) to excavate the tunnels.

The major Project elements are tunnels, underground stations, station-related facilities, maintenance and operations yards and buildings, track work, ventilation equipment, and specialty systems such as traction power, communications, signaling equipment, and trains. In addition, the number of workers present at any one time would vary depending on the activities being performed.

For the selected alternative, construction would begin simultaneously at several locations and several station sites along the route, with overlapping construction of the various Project elements. Table 4-49 provides an overview of the general sequence and approximate duration of construction activities. Portions of activities will be conducted at the same time as other activities. For example underground utilities, station excavation and station construction would be concurrent at any individual station location. A construction activity summary for MOS 1 is shown in Table 4-50. Equipment use and estimated truck trips for the other alternatives and MOSs would be similar for stations with and without tunneling activities.

Chapter 4—Environmental Analysis, Consequences, and Mitigation

Table 4-49. Generalized Sequence and Approximate Duration of Construction Activities

Activity ³	Duration ¹	Description	Equipment Required
Survey and Pre-construction	4 to 6 months	Surveys and limited excavation	Largely hand tools and small equipment
Tunnel Construction ²	Approximately 6 to 10 months for a typical one-mile length between stations ²	Excavation and tunnel lining	TBM, potentially slurry pumping and separation equipment, concrete equipment
Underground Utilities	Approximately 8 to 12 months	Locate, move and support utilities	Hand tools and small excavation equipment
Station Excavation	Approximately 1 year	Support of excavation and cut-and-cover excavation	Various excavation equipment and a crane
Station Construction	Approximately 2.5 years	Form and place concrete structure, finish work, architectural and mechanical	Concrete form and placing equipment
Street/Site Restorations	Approximately 4 months	Paving and sidewalks	Paving equipment
Vent Shafts and Emergency Exits	Approximately 12 months	Shafts and cross-passages	Crane and tunnel equipment
Systems Installation and Facilities	Approximately 2.5 years	Installation of trackbed, rails, third rail (traction power); conduits for systems installations; electrical substations; and communications and signaling.	Crane, flatbed trucks, hand tools and small equipment
Systems Testing and Pre-Revenue Operations	5 to 6 months	Testing of power, communications, signaling, and ventilation systems; training of operators and maintenance personnel	Small equipment and rail vehicles

¹Portions of activities will be conducted at the same time as other activities. For example underground utilities, station excavation and station construction would be concurrent at any individual station location.

²Tunnel excavation generally would range from six to ten months for the typical one-mile length between stations, but would vary, depending on the ground conditions encountered, site and work area constraints, length of tunnel, and the number of TBMs used.

³Durations and activities shown are for one location (e.g. one station).

Table 4-50. Construction Activity Summary for MOS 1 Construction

Activity	Construction Equipment							Soil (CY)	Concrete (CY)	Haul Truck Trips per Day	Workers per Day
	Haul Truck	Concrete Truck	Dozer	Excavator	Crane	Drill Rig	Flatbed				
Pre-Construction						X	X	N/A	N/A	5	10-20
Site Preparation	X	X	X	X				1,000	1,000	10-20	20-30
Access Point at Wilshire/Western Station	X	X	X	X	X	X	X	12,000	1,000	20-30	20-30
TBM Tunnel from Wilshire/Western to Wilshire/La Brea	X	X	X	X	X		X	300,000	Precast Segments	40-80	50-80
Wilshire/Crenshaw Station	X	X	X	X	X	X	X	160,000	17,250	25-50	20-30
Wilshire/La Brea Station (Cut and-Cover with crossover)	X	X	X	X	X	X	X	200,000	17,250	25-50	20-30
TBM Tunnel from Wilshire/La Brea to Wilshire/Fairfax	X	X	X	X	X		X	150,000	Precast Segments	40-80	50-80
Wilshire/Fairfax Station (Cut-and-Cover)	X	X	X	X	X	X	X	135,000	20,000	25-50	20-30
Operating Systems Installation	X	-	-	-	X		X	N/A	N/A	2	20-30

Table 4-51 shows the estimated construction durations for the segments in association with the Project alternatives. Construction durations are discussed by segment since portions of activities would occur at the same time as other activities. The Construction schedule for Alternative 1 and 5 to be described below to illustrate the range in construction duration.

Alternative 1 (from Wilshire/Western Station to Westwood/UCLA Station) would be constructed in three segments: Wilshire/Western Station to Wilshire/Fairfax Station; Wilshire/Fairfax to Century City; and Century City to Westwood/UCLA). This assumes implementation of MOS 1 as the first segment. Construction would start at the primary tunnel mining location (possibly at Wilshire/Western or at Wilshire/Fairfax). Construction is expected to take about 6 years for the Wilshire/Western to Wilshire/Fairfax segment. Early, pre-construction activities would focus in the potential paleontological deposit areas at Fairfax and La Brea and include implementation of the mitigation measures CON-69 to CON-73 (see Section 4.15.2) to avoid and minimize impacts to paleontological resources.

Table 4-51. Estimated Construction Duration by Segment and Alternative

Segment	Estimated Construction Duration ¹				
	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Wilshire/Western to Wilshire/Fairfax ²	6 years				
Wilshire/Fairfax to Century City ²	5 years				
Century City to Westwood/UCLA	4 years				
Westwood/UCLA to Westwood/VA Hospital ²	--	4 years ²			
Westwood/VA Hospital Station to Santa Monica	--	--	5.5 years		
West Hollywood Extension	--	--	--	6.5 years	
					10 to 16 years

¹Portions of activities will be conducted at the same time as other activities.

²Portions will be concurrent with Century City to Westwood/UCLA segment.

Construction of Wilshire/Fairfax to Century City segment would be largely dependent on the station and alignment options chosen. However the schedule is anticipated to be approximately a year less than for Wilshire/Western Station to Wilshire/Fairfax Station segment (approximately 5 year construction duration), due to the pre-construction activities connected with the paleontological deposits near Wilshire/Fairfax Station. Lastly, construction of the Century City to Westwood/UCLA segment is expected to take approximately 4 years. By staging the tunnel excavation operation from the Westwood/UCLA Station to excavate east to the Century City Station, this segment of tunnel and station construction would be able to proceed independently of any effect of work timing for the other two segments.

Together the three aforementioned segments constitute Alternative 1, which could be constructed within a time-span of approximately 8 years if all work is concurrently scheduled. If segments are constructed in a series, Alternative 1 construction would take from 10 to 15 years for completion.

Construction between Westwood/UCLA to Westwood/VA Hospital Station is expected to span roughly 4 years. However, part of the construction activity would occur at the same time as the construction between Century City to Westwood/UCLA. Construction of the Westwood/UCLA or Westwood/VA Hospital Station and Wilshire/4th Street Station is expected to take approximately 5.5 years. The tunnel excavation operation will likely use the Westwood/VA Hospital Station to excavate west into Santa Monica. Except for staging two tunnel excavation operations out of this site, this final reach of tunnel and stations will be able to proceed independently of the easterly reaches of the tunnel.

Construction of the West Hollywood Extension is expected to take approximately 6.5 years. This reach includes four new stations (Santa Monica/La Brea, Santa Monica/Fairfax, Santa Monica/San Vicente and Beverly Center Area Stations), parts of which would be constructed concurrently.

Alternative 5 would entail construction of all segments (Wilshire/Western Station to Wilshire/4th Street Station and the West Hollywood Extension). It would be impossible for all of these segments to be advanced concurrently given the scale of construction



activities. The existing roadways and infrastructure would present constraints to implementing the many different construction operations at the same time. In addition, there would be accumulated impacts on the community. One or more of the segments, under Alternative 1, would be expected to be substantially completed before a next reach can begin. In the overall scenarios in which the work is realistically optimized through an aggressive design and construction program, the total construction period could be reduced to approximately 10 to 16 years. If the segments were constructed in a series, the total construction period of Alternative 5 could be extended to as much as 20 years.

Selection of a station option would not generally change the duration of construction for any of the alternatives. Alignment options under Option 4 would have a moderate effect on the construction schedule, depending on the length of the alignment option. Tunnel excavation generally would range from six to ten months for the typical one-mile length between stations, but would vary, depending on the ground conditions encountered, site and work area constraints, length of tunnel, and the number of TBMs used.

Tunnel Construction

Tunnels would be constructed using TBMs, large-diameter horizontal “drills” that continuously excavate circular tunnel sections (Figure 4-76).

The TBM would excavate two parallel tunnels (22 ft. diameter) similar to the twin tunnels excavated for the Metro Eastside Extension (Figure 4-77). An alternative tunnel boring approach using a single, larger diameter tunnel instead of two smaller diameter tunnels is possible. A single large TBM could be used to bore one tunnel big enough to contain both tracks and possibly the station platforms. Further studies are underway to determine if such an approach would be feasible for the Westside Subway Extension.

Both the ground in front of the machine and the horizontal “hole” it creates are continually supported by the TBM face pressure, shield, and pre-cast concrete tunnel liners that are installed as the machine progresses. This method creates a tunnel with little or no disruption at the surface and reduces risk of settlement. The TBM technology allows the tunnel lining to be installed concurrently and without lowering groundwater levels. Excavated



Figure 4-76. Pressurized-Face Tunnel Boring Machine



Figure 4-77. Twin Tunnels on Eastside Extension

materials are removed through the tunnel to the shaft area (station excavation) and brought to the surface for disposal off-site.

Where hazardous hydrocarbons and/or gases are expected to be encountered, it is likely that a specialized slurry-face TBM would be required (Figure 4-78). Slurry-face TBMs

Typical steps for tunneling

- Prepare site and excavate shaft where TBMs are lowered into ground
 - Lower TBMs using cranes
 - Excavate two parallel tunnels (22 ft. diameter)
 - Install pre-cast concrete tunnel lining with gasket seals
 - Install rails, electrical and other systems
 - Boring can proceed on each tunnel simultaneously; machines can excavate about 40 to 50 feet per day
-

use a fully enclosed system to transport excavated soil to the surface. Bentonite slurry is pumped through pipelines to the TBM's pressurized face, and soil cuttings are removed through the return slurry lines. A treatment plant is set up at the surface to separate slurry from soil so that the slurry can be recycled and the soil transported to a disposal site. The American Public Transportation Association Peer Review of tunneling from 2005 concluded that: "It is possible to tunnel and operate a subway along the Wilshire Corridor safely" using these new technologies. Where there is no known hazardous ground conditions, either a slurry-face or earth-pressure balance TBM could be used (refer to section 14.09, Geologic Hazards for additional discussion of gassy ground conditions).

Tunnel excavation generally would range from six to ten months for the typical one-mile length between stations, but would vary, depending on the ground conditions encountered, site and work area constraints, length of tunnel, and the number of TBMs used.

The excavated material (for tunnel and station construction) is brought to the surface, stockpiled, and then hauled away by trucks to designated disposal sites (Figure 4-79).

The routes and times of hauling will be approved by local city departments of transportation beforehand, and the public will be notified through the public involvement plan.

Tunneling in gassy areas

- Pressure face TBMs isolate gas from workers and public
 - Gassy soil and tar separated and treated appropriately
 - Enhanced ventilation system ensures tunnel and station safety
 - Double gaskets for tunnel lining or other methods use as appropriate
-

Station Construction

Cut-and-cover construction is planned at all stations. With the exceptions of Westwood/UCLA and Westwood/VA Stations, station construction would be constructed within the street right-of-way. Some station entrance points and construction staging areas will be outside the street right-of-way and will require removal of buildings. A typical cut-and-cover station excavation and construction sequence is illustrated in Figure 4-80. Underground station construction would take roughly 48 months from start of excavation to backfilling over the station and street restoration.

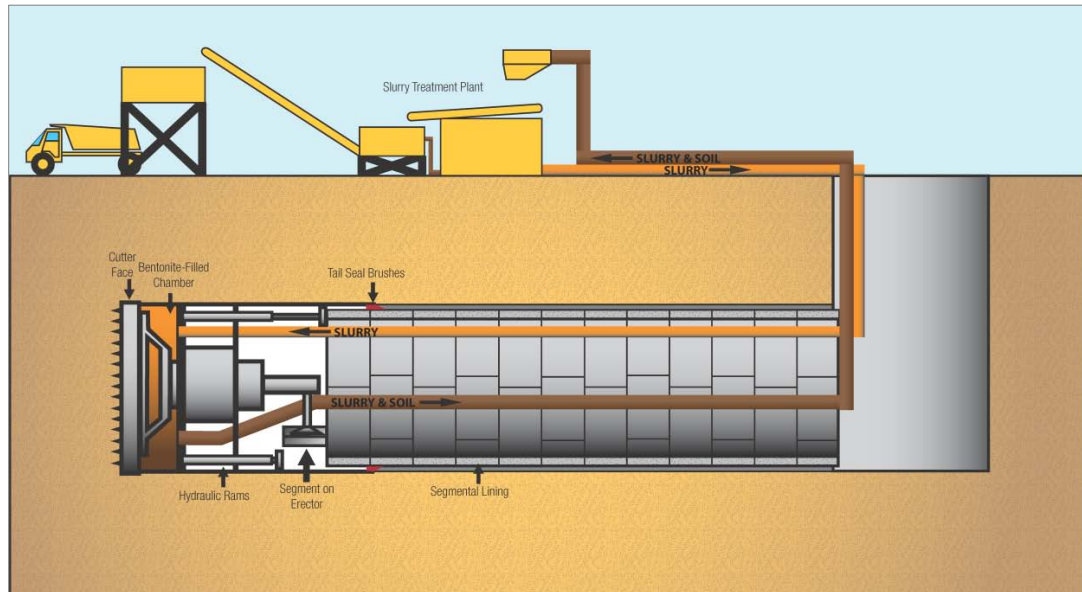


Figure 4-78. Tunneling in Gassy Areas with Pressure Face TBM



Figure 4-79. Haul Truck for Excavated Soil Removal with Cover Mechanism Shown

The typical on-street station construction process involves: 1) relocation of utilities as necessary to maintain service; 2) drilling “soldier piles” on station box perimeter at edge of the roadway; 3) removal of the top six to twelve feet of soil below the existing roadway; 4) installation of a decking across the roadway; 5) installation of shoring and excavation of the area beneath the deck to the depth of the station; 6) construction of the station box in the excavated area; 7) installation of station elements and architectural features; and 8) backfilling over the station box, removal of decking, repaving of streets, and re-opening of streets to traffic. A typical street excavation is shown in Figure 4-81. Figure 4-82 shows the typical concrete decking that would be flush with the existing street level so that traffic can continue to flow. Construction would continue below the decking (Figure 4-83). Typical off-street station construction involves a similar process; however, the decking is not required (Figure 4-84).

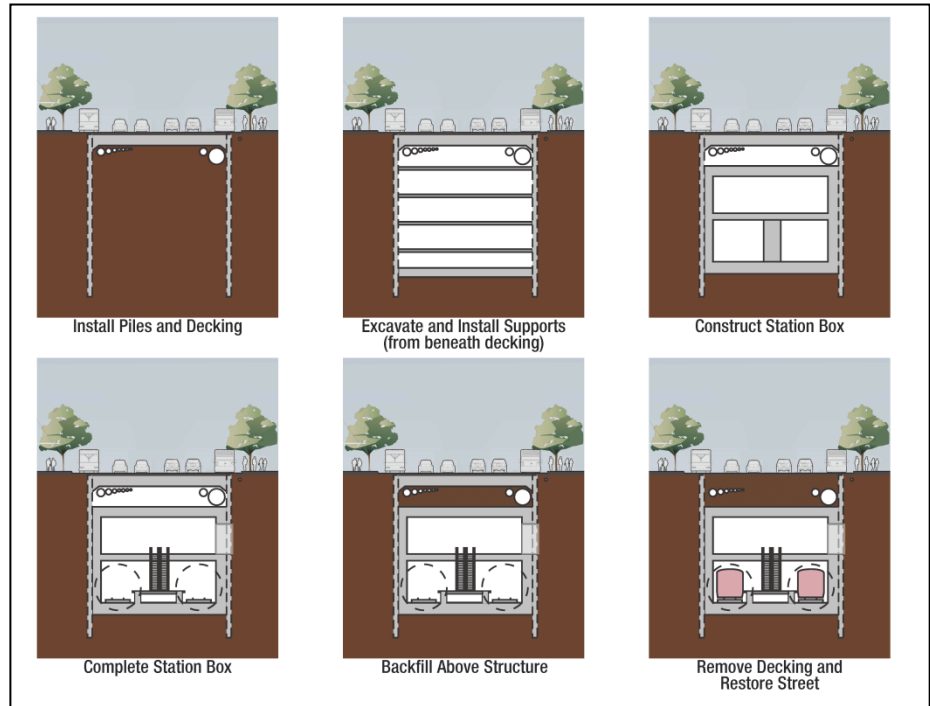


Figure 4-80. Typical Cut-and-Cover Construction Sequence



Figure 4-81. Typical Street Excavation



Figure 4-82. Concrete Decking on Street



Figure 4-83. Construction Activities below Concrete Decking



Figure 4-84. Off-Street Station Box Excavation

In the gassy areas, such as the Wilshire/Fairfax station, initial support for the station walls is expected to be a less permeable wall system such as slurry walls or secant pile walls (Appendix E). Equipment for excavation of slurry walls includes specialized excavation equipment such as hydromills (large trenching machines) or Clamshell-type buckets to remove soil as well as slurry mixing tanks and processing equipment.

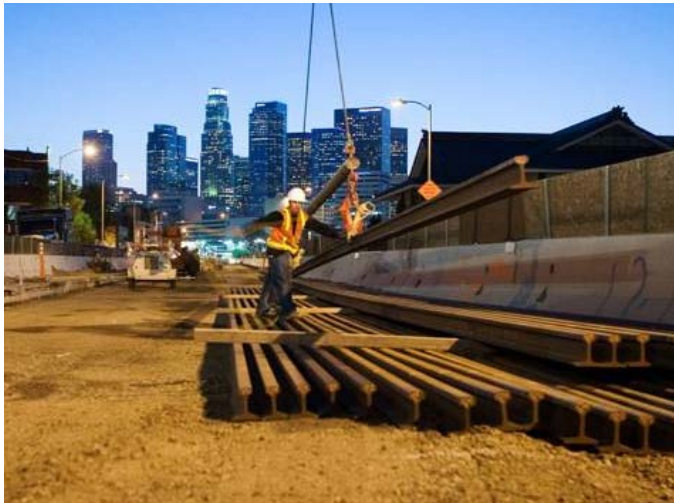


Figure 4-85. Off-Street Construction Area on Metro's Eastside Extension



Figure 4-86. On Street Construction Area Used for 7th/Metro Station

Staging Areas

Contractor staging areas (also referred to as “laydown areas”) would be necessary for tunnel construction, stations, and ancillary facilities. Off-street space would be needed for setup, insertion, operation, and extraction of equipment and materials to the tunnel and station excavations (Figure 4-85).

Construction staging areas are described in in the *Westside Real Estate and Acquisitions Technical Report*. Construction easements are also discussed included in Chapter 2. Appendix C highlights properties that would be acquired (full and partial acquisitions) for the purposes of construction staging. It is important to note that not all of these sites will be selected for implementation. Selection of the construction staging site would consider potential for a station entrance, environmental impacts and cost as well as other factors.

Work areas to support tunnel excavation operations, including processing and removing tunnel spoils, handling precast concrete tunnel-lining segments, and tunnel utilities (such as ventilation, water supply, wastewater removal, and power supply) would be needed. In-street work areas would only be used when no off-street alternative exists (Figure 4-86). Temporary easements, typically a portion of the sidewalk, traffic lanes, and/or

parking areas, may be required at various locations for staging.

Other Construction Elements

In addition to the primary system features of tunnels and stations, there are common elements to the Build Alternatives: building-protection measures, such as underpinning or ground improvement to protect structures; relocation, modification, or protection of utilities; removal or relocation of structures at construction staging sites and station entrances; surface and subsurface drainage systems; traction power substations with

Construction Staging Areas

- Requires up to 2 acres for a typical TBM site, and unless on Metro-owned property, the area is usually leased for time needed.
 - Off-street location immediately adjacent to station box preferred
 - On-street staging possible where sites not available
-

electrical power feeds; track work, ventilation, traction power, communications, and signaling systems for train operations; emergency (backup) power systems; station finishes, including fare vending equipment, elevators, escalators, landscaping, signage, and other necessary amenities; urban design enhancements around station entrances; system integration testing and simulated revenue operation test runs; and final commissioning of the system.

The time necessary for each activity would vary by alternative, depending on the amount of tunneling required and the number of stations. Other factors would include the number and type of utilities requiring relocation, subsurface conditions, and the location and condition of nearby surface and subsurface structures.

4.15.2 Construction Impacts

The No-Build and TSM Alternatives do not have a project construction component and would not result in any construction impacts. This section focuses on the construction impacts of the Build Alternatives.

Section 3.0 Transportation Impacts discusses construction impacts related to traffic, circulation and parking. This section examines construction impacts for resource areas discussed in Chapter 4. Safety and security is discussed separately in Chapter 4. Displacement and relocation of existing uses are discussed in this section as they relate to construction staging.

Traffic, Circulation, and Parking

Refer to Section 3.0 Transportation Impacts for construction impacts related to traffic, circulation and parking.

Land Use and Development

Metro would acquire several parcels during construction of the Project for the storage of equipment and materials and other construction-related activities. The Build Alternatives would result in the acquisition of one single family residence near the Wilshire/Crenshaw Station for construction staging and the location of a potential station entrance. Parcels used for construction staging would be left vacant and would be available for development after construction completion. The vacant parcels present a future opportunity for transit oriented development. The construction also has a beneficial impact of creating construction-related jobs and increasing economic activity for businesses providing goods and services for construction and construction workers (e.g. construction materials, food service, etc.). However, no substantial impact to land use and development are anticipated as a result of construction activity.

Mitigation Measures

The construction of Build Alternatives would not result in adverse effects related to land use, and no mitigation measures are necessary.



Community and Neighborhoods

Construction of the Build Alternatives would result in adverse impacts to communities and neighborhoods. Construction has the potential to affect the community for limited durations due to street and sidewalk closures and traffic detours, especially in areas of station construction. Construction and traffic detours would reduce access to businesses and communities. 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.

As described in the Section 4.2 – Socioeconomic Characteristics of the Westside Draft EIS/EIR, all Build Alternatives would require a number of acquisitions and easements for the purposes of station boxes, station entrances, and construction staging (see Table 4-52).

These acquisitions would result in a number of job losses as described in Section 4.2 – Socioeconomic Characteristics (see Table 4-52). All job losses considered in this analysis were from retail, general stores, restaurants, parking lots and service stations where their removal from their local customer base will likely lead to the disruption and termination of the business. Even though construction period is temporary, these are treated as permanent job losses, lasting through the entire 20-year forecast period. However, businesses in commercial office building were assumed to be able to relocate within the county, a reasonable assumption due to vacancies in the area.

It should be noted that not all of the parcels identified will be acquired. This report identifies all potential acquisitions. There are several possible station entrance locations and construction staging areas identified, but not all will be utilized. The Draft EIS/EIR discloses all possible locations; however, actual property acquisitions will depend on the selection of station entrances and construction sites. All potential acquisitions are detailed in Appendix C – Acquisitions and the *Westside Real Estate and Acquisition Technical Report*.

Table 4-52. Acquisitions & Easements and Job Losses Associated with Each Alternative

Alternative	Affected Parcels						Number of Job Losses
	Full Acquisition	Partial Acquisition	Permanent Easement	Temporary Construction Easement	Permanent Underground Easement	Total	
No Build Alternative	0	0	0	0	0	0	0
TSM Alternative	0	0	0	0	0	0	0
Alternative 1 – Westwood/UCLA Extension	35	5	12	2	217	271	276
Alternative 2 – Westwood/VA Hospital Extension	35	7	12	2	219	275	276
Alternative 3 – Santa Monica Extension	54	7	14	2	219	296	387
Alternative 4 – Wilshire/UCLA Extension plus West Hollywood Extension	59	8	16	3	328	414	337
Alternative 5 – Santa Monica Extension plus West Hollywood Extension	78	8	18	3	328	435	448
MOS 1 – Fairfax Extension	27	1	2	0	0	30	190
MOS 2 – Century City Extension	35	2	11	0	4	52	254

Source: TAHA, 2010

Note: FT=Full Take; PT=Partial Take; PE=Permanent Easement; TCE=Temporary Construction Easement; PUE=Permanent Underground Easement

The Expanded Division 20 maintenance yard site is within the vicinity of loft residences and a school. Trucking routes will be selected carefully and city approval of routes will be required. The Union Pacific Railroad Los Angeles Transportation Center, another potential rail yard site, is isolated from residences and commercial areas, but truck routes will also require approval.

Mitigation Measures

Metro would develop and implement a community outreach plan to notify local communities of construction schedule, road and sidewalk closures, and detours. To mitigate potential construction impacts, the following measures would be implemented:

- **CON-1**—To the maximum extent feasible, develop temporary detours for any road or sidewalk closures during construction to ensure pedestrian detours are accessible to seniors and disabled persons. Post signage (in appropriate language) to alert pedestrians and vehicles of any road or sidewalk closures or detours. 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.
- **CON-2**— Signage to indicate accessibility to businesses would be used in the vicinity of construction activity.
- **CON-3**—Metro would coordinate with local communities during preparation of the traffic management plans to minimize potential construction impacts to community resources and special events. The traffic management plans would include considerations for limiting construction activities during special events.



Environmental Justice

Adverse noise and traffic impacts from demolition, station construction, worker travel, hauling of soils and debris for disposal, deliveries of materials, and other related tasks are anticipated. These impacts would occur throughout the corridor and, but would be expected to occur mostly in and around station areas. Both the Wilshire/Western and Westwood/VA Hospital Stations are areas with environmental justice populations. These impacts would affect all neighborhoods along the alignment and at stations, regardless of demographic or socioeconomic character. No disproportionate adverse impacts are anticipated.

An increase in traffic as a result of construction activities could affect the residential character of some neighborhoods, and street closures are expected to impact mobility and access to the community facilities described previously. As a result, it could be more difficult to access some community resources, such as churches and museums located along Wilshire and Santa Monica Boulevards. In addition, construction activities could also reduce on-street and off-street parking. This could affect the existing businesses as customers may choose to avoid ongoing construction and parking challenges. Pedestrian and vehicle mobility between communities and neighborhoods would be reduced during construction due to road and sidewalk closures and traffic detours. These impacts would be temporary adverse impacts. These impacts would affect all neighborhoods along the alignment and at stations, regardless of demographic or socioeconomic character. No disproportionate adverse impacts are anticipated.

Acquisitions for construction staging and construction easements would occur at all station areas under all Build Alternatives. It is anticipated that several businesses will be displaced throughout the corridor and, some permanent loss of employment would occur. However, the permanent job loss would not be concentrated in one community; rather these losses will occur throughout the proposed alignment and would affect many communities, regardless of demographic or socioeconomic character.

Mitigation Measures

Construction would not result in disproportionate adverse impacts to environmental justice communities. All businesses in construction areas will receive assistance as noted in the economic and fiscal section above. Aside from the mitigation measures identified for the various resource areas, no additional measures are required.

Visual and Aesthetics

Construction impacts common to all Build Alternatives include temporary changes in views of and from the construction area. Construction activities, at station and staging areas and the selected maintenance and operations facility, may introduce considerable heavy equipment such as cranes and associated vehicles, including bulldozers, backhoes, graders, scrapers, and trucks, into the view corridor of public streets, sidewalks, and properties. Viewers in the construction area may experience inconveniences due to the presence of this equipment, as well as stockpiled construction-related materials. Mature vegetation, including trees, would be removed from some areas. Views may be possible from residential land uses on some of the adjacent parcels, either directly through fencing, through entrance gates, or over fencing from second story and higher windows.

If not screened from view, construction staging activities could temporarily affect adjacent viewers. Lighting of the construction staging areas at night could also affect viewers.

The current estimate for the cut-and-cover station construction is 34 to 48 months. The primary visual impact to the local neighborhood would be associated with the time it takes to install piles and decking for the station box support system, visible for a three-to-four-month period. Construction of the station would continue while traffic travels on the decking so visual impacts during this period would be reduced.

The Wilshire/Fairfax Station (either option) and the Wilshire/La Brea Station may require raised decking for station construction to minimize impacts to paleontological resources. The raised decking may temporarily increase the visual impacts to adjacent properties.

Construction activities at the selected maintenance and operations facility site would introduce considerable heavy equipment and associated vehicles, including bulldozers, graders, scrapers, and trucks, into the views to and from the sites. However, due to the limited duration of construction and the low visual quality of the sites, construction impacts are considered less than significant and no mitigation would be required.

Mitigation Measures

To reduce impacts related to construction activities, the following mitigation measures are recommended to be implemented:

- **CON-4**—Visually obtrusive erosion-control devices, such as silt fences, plastic ground cover, and straw bales, should be removed as soon as the area is stabilized.
- **CON-5**—Stockpile areas should be located in less visibly sensitive areas and, whenever possible, not be visible from the road or to residents and businesses. Limits on heights of excavated materials would be developed during design based on the specific area available for storage of material and visual impact.
- **CON-6**—Lighting should be directed 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 would block direct light and views of the construction areas from residences.

Air Quality

The assessment of the air quality construction impacts utilized California Air Resources Board's Urban Emissions Model (URBEMIS), the Road Construction Emissions Model, Version 6.3.2 (RCEM) developed by the Sacramento Metropolitan Air Quality Management District and the South Coast Air Quality Management District's (SCAQMD) OFFROAD 2007 emission factors. As the construction schedule is very preliminary at this time, construction emissions were estimated for each major activity. A summary of air quality impacts from the typical construction activity is shown on Table 4-53.

Table 4-53. Estimated Construction Impacts for Project Construction Elements (lbs/day)

Activity	VOC	CO	NO _x	PM ₁₀	PM _{2.5}
Typical Station with TBM entry/exit sites					
Construction Equipment	69	300	1053	38	37
Dust Generated from Dirt Handling (Excavation, Backfilling, etc.)				231	
Mobile Sources (Deliveries, worker trips, hauling of material, etc.)	3	24	42	2	2
Total	72	324	1095	272	39
SCAQMD Thresholds	75	550	100	150	55
Typical Station without a TBM entry/exit site					
Construction Equipment	16	64	108	5	5
Dust Generated from Dirt Handling (Excavation, Backfilling, etc.)				120	
Mobile Sources (Deliveries, worker trips, hauling of material, etc.)	3	19	33	1	1
Total	19	83	141	126	6
SCAQMD Thresholds	75	550	100	150	55
Maintenance Facility					
Construction Equipment	27	102	228	8	8
Dust Generated from Dirt Handling (Excavation, Backfilling, etc.)				TBD	
Mobile Sources (Deliveries, worker trips, hauling of material, etc.)	3	19	33	1	1
Total	30	121	261	9+	9
SCAQMD Thresholds	75	550	100	150	55

Emissions

The majority of emissions would occur as a result of removal and transport of soils for disposal from tunneling and excavation activity. The TBMs use electric power, would be connected to the electric grid, and thus would not generate air emissions. Diesel trains (mine trains) would be used in the tunnel to transport workers, pre-cast concrete tunnel liner segments, and other materials to the TBM. The trains also remove spoils if not removed through a slurry transport system. The soil spoils generated by the tunnel would be hauled to a landfill or other disposal area using trucks. Approximately 40 to 80 haul truck trips would be generated to remove the excavated material each day.

The travel emissions from the commute trips of construction workers would be a function of vehicle emission rates and commute distances. The travel emissions would contribute emissions to a lesser extent than the haul trucks.

As shown in Table 4-53, SCAQMD thresholds would be exceeded for nitrous oxides (NO_x) for all construction elements. NO_x levels would be elevated due partially to the proposed use of diesel locomotives to extract soil during the tunnel boring process. Mitigation measures could help to reduce these impacts, but it is unlikely, given the current construction plan, that these levels would be below the SCAQMD threshold.

Particulate matter

The SCAQMD thresholds for PM_{10} would be exceeded if not mitigated for a typical station with TBM entry and exit sites due to some dust. Demolition, grading, stockpiling and hauling soil will contribute to particulate matter emissions. Excavated soil would be separated from the slurry and stockpiled on the surface for up to two to three days. The soil stockpiles would be subject to local wind conditions and would generate dust, if allowed to dry out.

Dust from handling “wet” slurry and spoils generated by the TBM are not expected to become a problem. Dust may be generated by the slurry treatment plant when the bentonite is mixed; however, the treatment plant includes a “bag house” to collect dust during the mixing process. Bag houses typically filter at least 99% of fine particulate matter. As a result, the slurry treatment plant generates minimal dust emissions.

Gas

Methane is a hazard in confined spaces. Methane is a flammable, colorless, odorless gas that is an explosion hazard when mixed with air at concentrations exceeding 5 percent and less than 15 percent. Methane is non-toxic. However, methane can reduce the amount of oxygen in the air necessary to support life.

Since the Wilshire/Fairfax Station options and Wilshire/La Brea Station are located in known ground that contains hydrocarbon deposits, disturbance of the ground will generate varying degrees of toxic or dangerous gases. As such, it is essential that tunnel workers be sufficiently protected, and detection and monitoring equipment would be required.

Once excavation has been completed, though greatly diminished, the potential for developing “pockets” of gas will exist and continual monitoring will still be necessary. Opening new ground for construction of cross-passageways, shafts, and other structure will bring on new, and perhaps, even more concentrated exposure. Fans would dilute methane and hydrogen sulfide concentrations in the tunnel. Monitoring will alert personnel to alter ventilation or perhaps to temporarily evacuate. Gases emanating from the slurry treatment plant, if not properly handled, may also become an issue requiring modification of equipment and or procedure. Once above-ground, methane dissipates rapidly in the atmosphere and would not be a public health hazard.

Previous projects in the Methane Risk Zone have been successfully and safely excavated. Multiple underground parking garages like the Los Angeles County Museum of Art parking facility have been constructed in this area. The Project would apply similar construction measures and there would be no impact.

Odor

The hydrogen sulfide gas in the area occurs in localized zones rather than in a continuous pattern and thus, the concentrations of the gas vary between and in the vicinity of Wilshire/La Brea Station and Wilshire/La Cienega Station options. Hydrogen sulfide odors may also be released from groundwater containing hydrogen sulfide. Thus, aside from odors from vehicle exhaust, the Project may result in odors from hydrogen sulfide. Hydrogen sulfide is a toxic, flammable, and colorless gas that poses an

immediate fire and explosion hazard when mixed with air at concentrations exceeding 4 percent. Hydrogen sulfide has a distinct “rotten-egg” smell. Continuous inhalation of hydrogen sulfide can cause deadening of the sense of smell, dizziness, headache, nausea, and respiratory tract irritation. Additional discussion of hydrogen sulfide properties is provided below under Section 4.8, Geologic Hazards.

Mitigation Measures

To reduce air quality impacts related to construction activities, the following mitigation measures are recommended to be implemented:

- **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. The following types of measures would be specified during construction to reduce emissions:
- **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.
- **CON-7B**—Trucks would be covered to control dust during transport of spoils.
- **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.
- **CON-7D**—Tunnel locomotives (hauling spoils and other equipment to the tunnel heading) would be approved by Metro.
- **CON-7E**—Metro and its contractors would set and maintain work equipment and standards to meet SCAQMD standards including NOx.
- **CON-8**—Continuous monitoring and recording of the air environment would be conducted, particularly in areas of gassy soils. Construction will be altered as required to maintain a safe working atmosphere. The working environment would be kept in compliance with Federal State and Local regulations

Climate Change

Table 4-54 shows the estimated construction emissions for each major construction activity that is common to the Build Alternatives. As the construction schedule is very preliminary at this time, construction emissions were estimated for each major activity.

Table 4-54. Estimated CO₂e Emission Burdens for Construction Activities (Metric Tons/day)

Activity	CO ₂ e
Typical Station with Mining¹	
Construction equipment	35
Mobile sources (deliveries, worker trips, hauling of material, etc.)	5
<i>Total</i>	<i>40</i>
Typical Station with No Mining²	
Construction equipment	8
Mobile sources (deliveries, worker trips, hauling of material, etc.)	4
<i>Total</i>	<i>12</i>
Maintenance Facility	
Construction equipment	17
Mobile sources (deliveries, worker trips, hauling of material, etc.)	1
<i>Total</i>	<i>18</i>

¹ “Mining” includes activities involved with the tunnel boring activities.

² “Stations with No Mining” include the cut-and-cover station construction.

The 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.

Mitigation Measures

Aside from the measures included for air quality, no additional mitigation measures for climate change are proposed.

Noise and Vibration

Noise and vibration impacts from construction will vary greatly depending on location. The construction noise impact is expected to be adverse. The greatest potential for impacts is near stations, tunnel access portals, and construction laydown areas.

Typical construction equipment noise emission levels are shown in Table 4-55. The values shown in Table 4-55 are representative of noise emissions from typical construction equipment and methods from empirical data obtained during similar construction projects. Noise levels from point source stationary noise sources, such as construction equipment decrease at a rate of 6 dB per doubling of distance. A distance of 250 feet from the construction area will be 14 dB less than the values at 50 feet, and noise levels at 500 feet from the source will be 20 dB less than the values at 250 feet.

Table 4-55. Noise Level of Typical Construction Equipment at 50' (dBA Lmax)*

Construction Equipment	Noise Level at 50 Feet
Roller	74
Concrete Vibrator, Pump or Saw	76
Spike Driver	77
Backhoe, Tie Handler	80
Dozer	81
Ballast Equalizer, Compactor, Concrete Pump or Shovel	82
Ballast Tamper, Crane Mobile or Scarifer	83
Tie Cutter	84
Concrete Mixer, Grader, Impact Wrench, Loader, Pneumatic Tool, Tie Inserter or Auger Drill Rig**	85
Crane Derrick, Jack Hammer or Truck	88
Paver or Scraper	89
Rail Saw	90
Pile Driver (Sonic)	96
Rock Drill	98
Pile Driver*** (Impact)	101

Sources:

**FTA Manual, Table 12-1, 2006.*

*** FHWA RCNM*

**** note pile drivers not used,*

Shown for perspective. Piles will be drilled.

The types and levels of noise and vibration associated with tunneling and construction activities in the known gassy or potentially gassy areas would be generally the same as those associated with tunneling in the non-gas zones. In both zones, construction activities that generate noise include demolition, station construction, worker travel, hauling of soils and debris for disposal, deliveries of materials, and other related tasks.

For tunneling in the known gassy or potentially gassy areas, a slurry plant would be an additional component of the construction activities and associated noise. Noise from the treatment plant may be minimized by enclosing the plant behind soundwalls or within a building. Thus, noise associated with this single component would not result in higher noise levels as compared to the overall construction activities.

Common vibration producing equipment used during demolition and station construction activities include jackhammers, pavement breakers, hoe rams, auger drills, bulldozers,



cranes and backhoes. Soldier piles, if used, are to be drilled; a method which does not result in noticeable vibration.

Equipment used for underground construction, such as the TBM and mine trains, could generate vibration levels that could result in audible ground-borne noise levels in buildings at the surface, depending on the depth of the tunnel and soil conditions. The operation of the mine trains could contribute to underground construction vibration since it will operate continuously during the excavation, mining, and finishing of the tunnel. Since underground construction is expected to occur continuously over a 24-hour day, there is the potential for these operations, particularly the mine trains, to be audible during the nighttime sleep hours when background noise levels inside the residential buildings are very low.

The Metro Red Line construction used a tunneling shield, as opposed to a boring machine with a cutting wheel for the tunneling work. A ground vibration study of the mining operations was conducted to estimate construction vibration both from actual excavation of the tunnel and from the trains used to haul mine spoils out of the tunnel. The study indicated that vibration from the tunnel excavation and mine trains was rarely a significant problem in adjacent areas, although the vibration can be sufficient to cause several hours of intrusive low level ground-borne vibration at areas above the tunnel when the mining is at that location. A tunnel boring machine was also used for the Metro Gold Line Eastside Extension. No noise complaints associated with the TBM or the mine trains used for the Gold Line were received.

To reduce the potential for noise and vibration impacts associated with project construction, Metro's plans, specifications, and estimates ("bid") documents will include measures to:

- **CON-9**—The Project will comply with the City of Los Angeles, City of Beverly Hills, City of Santa Monica, City of West Hollywood, and County of Los Angeles noise ordinance during construction hours. Comply with City of Los Angeles, City of Beverly Hills, City of Santa Monica, City of West Hollywood, and County of Los Angeles standards for short-term operation of mobile equipment and long-term construction operations of stationary equipment, including noise levels and hours of operation.

Hours of construction activity would be varied to meet special circumstances and restrictions. Municipal and building codes of each city in the Study Area include restrictions on construction hours. The Cities of Los Angeles and Santa Monica limit construction activity to 8 a.m. to 6 p.m. on Monday through Friday and 9 a.m. to 5 p.m. on Saturdays, with no construction on Sundays and federal holidays. The City of Beverly Hills identifies general construction hours of 8:00 a.m. to 6:00 p.m. from Monday through Saturday. The City of West Hollywood restricts construction activity to 8:00 a.m. to 7:00 p.m. for Monday through Friday. On Saturday, only interior work in West Hollywood may be conducted from 8:00 a.m. to 7:00 p.m. For all the cities in the Study Area, construction is prohibited on Sundays and city holidays. Construction outside of these working periods would require a permit from the applicable city.

- **CON-10**—Readily visible signs indicating “Noise Control Zone” will be prepared.
- **CON-11**—Noise-control devices that meet original specifications and performance will be used.
- **CON-12**—Fixed noise-producing equipment will be used to comply with regulations in the course of project activity.
- **CON-13**—Mobile or fixed noise-producing equipment that are equipped to mitigate noise to the extent practical will be used.
- **CON-14**—Electrically-powered equipment will be used to the extent practical.
- **CON-15**—Temporary noise barriers and sound-control curtains will be erected where project activity is unavoidably close to noise-sensitive receptors.
- **CON-16**—Designated haul routes will be used based on the least overall noise impact Route heavily-loaded trucks away from residential streets, if possible. Identification of haul routes will consider streets with the fewest noise sensitive receptors if no alternatives are available.
- **CON-17**—Non-noise sensitive, designated parking areas for project-related vehicles will be used.
- **CON-18**—Earth-moving equipment, fixed noise-generating equipment, stockpiles, staging areas, and other noise-producing operations will be located as far as practicable from noise-sensitive receptors.
- **CON-19**—Use of horns, whistles, alarms, and bells will be limited.
- **CON-20**—All noise-producing project equipment and vehicles will 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) will be equipped with shrouds and noise control features that are readily available for that type of equipment.
- **CON-21**—Any project-related public address or music system will not be audible at any adjacent receptor.
- **CON-22**—Demolition, earth moving, and ground impacting operations will be phased so as not to occur in the same time period.
- **CON-23**—Impact pile driving will be avoided. Drill piles or sonic or vibratory pile drivers will be used where the geological conditions permit their use.
- **CON-24**—Demolition methods will be selected to minimize noise and vibration impact where possible.
- **CON-25**—Use of vibratory rollers and packers will be avoided near vibration sensitive areas.
- **CON-26**—Temporary tracks for mine trains will be in good condition. In sensitive areas, require further measures to reduce noise such as rail isolation materials.
- **CON-27**—Enclosures for fixed equipment such as TBM slurry processing plants will be required in order to reduce noise.

Energy

Energy consumption during construction for the Build Alternatives would be: 2.0 trillion BTUs (Alternative 1); 2.3 trillion BTUs (Alternative 2); 3.4 trillion BTUs (Alternative 3); 3.7 trillion BTUs (Alternative 4); 4.9 trillion BTUs (Alternative 5); 866 billion BTUs

(MOS 1); 1.7 trillion BTUs (MOS 2); and 5.1 billion BTUs for the maintenance facility (Table 4-56). Option A (Remove Crenshaw Station) would reduce the energy consumption for the alternatives by 2.4 billion BTUs; none of the other options would change the energy consumption. These BTUs represent between 0.01 and 0.06 percent of the total energy consumed per year in the State of California.

Table 4-56. Estimated Construction Energy Consumption

Alternative	Energy Consumption (Billion BTUs)
1	2,020
2	2,309
3	3,463
4	3,752
5	4,906
MOS 1	866
MOS 2	1,732
Maintenance Facility	5

Source: Terry A. Hayes Associates LLC, 2010

Metro would require the construction contractor to implement energy conserving Best Management Practices (BMPs) in accordance with Metro’s Energy and Sustainability Policy. BMPs include, but are not limited to, implementing a construction energy conservation plan, using energy-efficient equipment, consolidating material delivery to ensure efficient vehicle utilization, 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. With implementation of these measures, the Build Alternatives would not lead to a wasteful, inefficient, or unnecessary usage of fuel

or energy, and therefore would not result in an adverse energy impact.

Mitigation Measures

Mitigation measures are not required.

Geologic Hazards

Tunneling, foundation excavation, and other related construction activities may encounter geological hazards and subsurface hazardous substances.

Seismic and Liquefaction

Construction of the project area is susceptible to surface fault rupture and seismic ground shaking. Metro Standards for design of shoring systems include earthquake loading. Earth pressures for earthquake loads are determined by the geotechnical consultant on a site-specific basis considering the site location and ground conditions. 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. Designs to minimize risk of liquefaction include increasing the depth of soldier piles to reach non-liquefiable zones, or ground improvement to densify the soil may be provided prior to the installation of the excavation support system.

Subsidence

No current significant subsidence problems related to petroleum or groundwater extraction have been identified in the vicinity of the project alignment. Therefore, the subsidence related to extraction of petroleum and groundwater is not considered a significant hazard to the project. There is however the potential for ground subsidence

related to construction activities such as tunneling and dewatering at station areas along the full lengths of all the proposed alignment alternatives. Therefore, tunneling and construction dewatering induced subsidence poses a potentially significant impact.

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

Hazardous Subsurface Gas

Methane and hydrogen sulfide are present in concentrations higher than those encountered in Metro's Red Line Construction, along about a 1.1 mile stretch along Wilshire Boulevard from about South Burnside Avenue on the east to about South La Jolla Avenue on the west. The entire alignment passes through an area characterized by oil and gas fields and thus the possibility of encountering gaseous conditions cannot be completely discounted for any portion of the alignment. Therefore, hazardous subsurface gasses pose a significant hazard for construction of the Build Alternatives.

A fully enclosed tunnel mining system, such as a slurry-face TBM (a type of pressurized-face TBM) is expected to be used for tunneling in known gassy or potentially gassy areas. This technology is considered a considerable improvement over the methods used during construction of Metro's initial Red Line operating segments, and some of this technology was used successfully on Metro's Gold Line Eastside Extension. Slurry-face TBMs minimize exposure of workers to elevated gas concentrations underground, since the excavated soil is removed in a fully enclosed slurry pipeline to an above-ground, enclosed treatment plant. Another type of pressurized-face TBM is the earth pressure balance (EPB) TBM. If the EPB TBM can operate similarly to a slurry-face TBM—with an enclosed spoil transport system, it would afford similar benefits and potentially be acceptable for use. New technologies developed over the course of the design phases will be also be considered. Appendix E presents additional information on tunneling technology.

The Expanded Division 20 maintenance yard is located adjacent to the Union Station oil field. As such, there is some potential that methane and hydrogen sulfide are present in this area. However, it is not anticipated that the maintenance yards will require construction of any subterranean structures. Therefore, hazardous subsurface gasses are not considered to pose a significant hazard to construction of the maintenance yards.

For underground construction classified "Gassy" by Cal/OSHA, specific requirements will include compliance with the Tunnel Safety Orders that include:

- All equipment used in the tunnel must be approved. For example, internal combustion engines and other equipment such as lighting must meet approval standards of the US Mine Safety and Health Administration (MSHA). These approvals require verification that equipment is safe with respect to not producing sparks or emitting gas into the tunnel.
- Smoking is not allowed in the tunnel, nor is standard welding, cutting, or other spark-producing operations. Special permits and additional air monitoring are required if welding or cutting operations are essential for the work. In addition,



welding will only be allowed in stable atmospheres containing less than 10% of the lower explosive limit and under the direct supervision of qualified personnel.

- A fixed system of continuous automatic monitoring equipment will be provided for the heading (working area of the tunnel), spoils handling transfer points and return air sources. The monitors will be equipped with sensors so situated to detect any anticipated gas to be encountered. Monitors will automatically signal the heading, give visual and audible warning and shut down electric power in the tunnel—except for acceptable ventilation, lighting, and pumping equipment necessary to evacuate personnel, when 20% or more of lower explosive limit is encountered. In addition, a manual shut down control is to be provided near the heading.
- Tests for flammable and hazardous gas, and petroleum vapors are conducted in the return air and measured a short distance from the working surfaces.
- Whenever gas levels in excess of 10% of the lower explosive limit are encountered, Cal/OSHA is to be notified immediately. After the approval to proceed by Cal/OSHA, any work is then conducted with extra care and steps will be taken to increase ventilation.
- The main ventilation systems must exhaust flammable gas or vapors from the tunnel, be provided with explosion relief mechanisms, and be constructed of fire-resistant materials. This exhaust requirement means that only ridged fan lines (as opposed to flexible), and two-way fan systems that operate in both directions by blowing exhaust out from the tunnel and blowing air in to the tunnel, can be used in gassy tunnels.
- A refuge chamber or alternate escape route must be maintained within 5,000 feet of the face of a tunnel classified as gassy or extra-hazardous. Workers must be provided with emergency rescue equipment and trained in its use. Refuge chambers are to be equipped with a compressed air supply, a telephone, and means of isolating the chamber from the tunnel atmosphere. The emergency equipment, air supply, and rescue chamber installation will be acceptable to Cal/OSHA.
- Special health and safety training and procedures will be implemented due to the health and safety issues associated with tunneling through a zone known to have elevated methane, hydrogen sulfide, and oil seeps. These procedures may require basic Hazardous Waste and Emergency Response training (29 CFR 1926 Subpart M), as well as training for excavations in a hazardous atmosphere (29 CFR 1926 Subpart P).
- The tunnel must have adequate ventilation to dilute gasses to safe levels.

Mitigation Measures

The following measures would be implemented to reduce impacts related to geological hazards:

- **CON-28**—As added protection to detect potential tunneling-induced subsidence and subsidence induced by other excavation activities, pre-construction surveys would be performed to document the existing conditions of buildings along the alignment before the tunneling begin, and instrumentation would be installed to monitor structures. To optimize control of the ground overlying and surrounding the tunnels and limit ground subsidence to acceptable levels, pressurized-face TBMs would be used for tunnel construction, and would allow the tunnel lining to be installed and

grout to be injected into the annulus between the lining and the ground immediately behind the TBM concurrently and without having to lower groundwater levels by dewatering.

- **CON-29**—Dewatering is usually not necessary when tunneling with pressure-face TBMs. However, station construction would require excavations that would encounter the groundwater table and/or perched groundwater, dewatering may be required to complete the construction in some areas. Dewatering of the excavations made during construction could result in potentially damaging subsidence adjacent to the construction area. However, experience in much of the corridor is that the soils have previously undergone numerous cycles of ground-water fluctuation, and have therefore previously experienced the settlements associated with lowering of the ground water, and would not be expected to have significant additional settlement. During the design phases, additional geotechnical exploration and analysis would be undertaken to assess areas where dewatering would cause significant additional settlement. If these conditions are found in some areas, methods to prevent lowering of the ground water outside of the excavation would be employed, such as using slurry walls, secant pile walls, or other methods for the construction of the station walls to reduce the settlement impacts due to groundwater lowering.
- **CON-30**—During construction, instrumentation (e.g., ground surface and building monitoring programs) would be in place to measure movements and provide information to the resident engineer and contractor on tunneling performance as well as to document that the settlement specifications are met. If measurements indicate settlement limits could be exceeded, the contractor would be required to change or add methods and/or procedures to comply with those limits. Construction work would be reassessed if settlements exceed action (warning) levels.
- **CON-31**—Where conditions warrant (for example, willow tunnels directly below sensitive structures or utilities), additional methods to reduce settlement would be specified. Such methods could include:
 - ▶ permeation grouting to improve the ground prior to tunneling,
 - ▶ compaction grouting to consolidate the ground above the tunnel,
 - ▶ compensation grouting as the tunnel is excavated, and
 - ▶ underpinning the structure’s foundation.
- **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 is unlikely to be necessary where a slurry-face TBM is used, but 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.



- **CON 33**—In addition to pre-treatment of the ground/water prior to mining, 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.
- **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. The slurry wall provides a thick (typically 3 to 4 feet) concrete barrier against water and gas intrusion, and significantly reduces 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. Slurry walls present a challenge in accommodating existing utilities, and typically more utility relocation is required for slurry wall systems. 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.
- **CON-35**—Prior to construction, more detailed research on oil well locations will be conducted. Where the tunnel alignment cannot be adjusted to avoid well casings, The California Department of Conservation (Department of Oil, Gas and Geothermal Resources) would be contacted to determine the appropriate method to re-abandon the well. Similarly, during construction if an unknown well is encountered, the contractor will notify Metro, Cal/OSHA, and the Gas and Geothermal Resources for well abandonment procedures.
- **CON-36**—Although not specifically required for gassy tunnels, oxygen-supply-type self-rescuers (required for evacuation during fires) would be used, as necessary.

Hazardous Waste and Materials

As discussed in Section 4.9, a number of gas stations, dry cleaners and other hazardous waste generators are located in the vicinity of the Project. Underground storage tanks, volatile organic compounds and oil exploration sites also occur in the Project area. The tunnel is expected to be under the lowest point of contaminated soils, there would be no or low potential impact. In areas of station excavation, there is a higher potential to encounter contaminated soils. During construction, the Project has a high likelihood of encountering groundwater, which may contain contamination. Based on current and former use, petroleum hydrocarbons, metals, herbicides, and polynuclear aromatic hydrocarbons are likely to present in the soils within the maintenance yards. Areas with unidentified soil and/or groundwater impacts may be present in the Project area.

Construction activity would involve routine transport, use, or disposal of hazardous materials, namely contaminated soils and groundwater; however, these materials are not expected to be acutely hazardous. Construction activities are unlikely to create accident conditions involving the release of hazardous materials or waste. All hazardous materials, soils, drums, trash, and debris will be removed and disposed of in accordance with State and Federal regulatory guidelines.

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.

Mitigation Measures

The following measures would be implemented to avoid or minimize impact as required by applicable regulations:

- Treatment and handling of groundwater during excavation and/or tunneling would be conducted in accordance with applicable regulations.
- All hazardous materials, drums, trash, and debris would be removed and disposed of in accordance with regulatory guidelines.
- In locations where buildings may be demolished or modified, asbestos and/or lead may be present and would be handled by licensed contractors in accordance with applicable regulations.
- Emergency response or contingency plan 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 construction.

In addition, the following mitigation measures are included in regards to hazardous materials:

- **CON-37**—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.
- **CON-38**—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.
- **CON-39**—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.
- **CON-40**— 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.

- **CON-41**— 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.
- **CON-42**—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.
- **CON-43**- Hazardous materials would be properly stored to prevent contact with precipitation and runoff.
- **CON-44**—An effective monitoring and cleanup program would be developed and implemented for spills and leaks of hazardous materials
- **CON-45**—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
- **CON 46**- Any significant chemical residue on the project sites would be removed through appropriate methods.

Other measures related to water quality are discussed in the Water Resources Section.

Ecosystems/Biological Resources

Construction of all proposed stations is assumed to employ a cut-and-cover method, whereby all surface conditions within the footprint of the station would be completely disturbed (i.e., all structures, concrete and other surfaces would be demolished and all trees and vegetation removed). Similarly, construction at Division 20 Maintenance Facility or the Union Pacific Railroad Los Angeles Transportation Center Rail Yard could require the removal or disturbance (including trimming) of mature trees located at the site. Tree removal would require compliance with all applicable tree local tree protection codes, including the City of Los Angeles’s Native Tree Protection Ordinance, to ensure impacts would be reduced. Following construction of each underground station, surface conditions would be restored as much as possible.

An adverse impact could occur if an active migratory bird nest located in any of these trees is disturbed during construction. Trees within 100 feet of the construction footprint would not be directly impacted through removal or pruning, but there could still be disturbance of nesting birds due to increased noise and vibration during construction activities. Because the majority of the project area provides only low quality habitat for migratory birds, indirect impacts are not expected to be substantial, as only a small number of migratory birds would be displaced, if any.

Mitigation Measures

Mitigation measures would be required for compliance with the Migratory Bird Treaty Act and State migratory bird protection and to avoid and minimize impacts to bird species that may utilize trees that could be removed or disturbed during construction of the Build Alternatives. Construction activities that involve tree removal or trimming would be timed to occur outside the migratory bird nesting season, which occurs

generally from March 1st through August 31st and as early as February 1st for raptors. The following mitigation measure would be implemented:

- **CON-47**—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.
- **CON-48**—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.
- **CON-49**—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.

Water Resources

Water Supply

During construction, field offices, the TBM and associated cooling towers would require water use. Water is also required to mix concrete and other construction materials, for dust control, for personnel use, etc., but this would not adversely affect the water supply. The slurry used in the TBM would be water and bentonite, and the discharged water would be recycled for preparing additional slurry. The water used by cooling towers near the tunnel access shafts would be recycled and used again. With the use of the recycled water, the TBM and related equipment would not affect the municipal water supply, even accounting for evaporation. It is anticipated that construction water use would be approved during project design and that Los Angeles Department of Water and Power has the capacity to supply the water. Therefore, the Build Alternatives construction would not adversely affect the municipal water supply.

Also, dewatering during tunnel excavation has the potential to overdraw groundwater resources. However, potable groundwater underlying the proposed alignment alternatives is from the San Pedro Formation aquifers, which are deeper than the proposed tunnels. Therefore, potential dewatering would not affect water supply.



Surface and Groundwater

The proposed alignments do not cross any surface water and are not near surface water. Construction would be conducted in accordance with applicable regulatory requirements and permits. No adverse effects to surface water hydrology are anticipated.

Constructing the build alternatives, alignment options, and stations will involve tunneling which would likely occur at or below groundwater levels. Since dewatering is anticipated, a Los Angeles Regional Water Quality Control Board (LARWQCB) dewatering permit would be required. Uncontaminated groundwater collected during dewatering could be treated and pumped back into groundwater basins, pumped to the sewer or storm drain system, or used for dust control.

Because the study area is within an urban area, the likelihood of encountering contaminated groundwater is high. Contaminated groundwater cannot be discharged to the storm drain system. If contaminated groundwater is encountered, it would be managed in compliance with applicable permits and regulations. The LARWQCB would have to grant permission to pump groundwater back into the groundwater basins or discharge it into the storm drain system.

Drainage

Although tunnel construction would occur from between 40 and 80 feet below the ground surface, which is deep enough to avoid impacts to existing drainage structures, constructing eight stations would affect existing drainage structures. At these stations, the affected drainage structures would be resized or relocated to maintain drainage requirements and prevent flooding or ponding.

Water Quality

Surface construction, such as grading and excavation, has the potential to result in water quality impacts from increases in erosion and sedimentation. The construction over the Los Angeles River to access the maintenance yard at Union Pacific rail yard would result in similar temporary impacts to water quality. Subsurface tunnel construction creates the potential for excavated materials to come into contact with stormwater or to be discharged to stormwater drainage. Runoff during construction would be routed to existing storm drain systems and/or lined channels, thereby avoiding offsite erosion. Best Management Practices (BMPs) in the Storm Water Pollution Prevention Plan (SWPPP) would also minimize construction impacts to water quality.

The water used in the tunneling slurry and for cooling also is a potential source of pollutants. While much of the cooling water would be recycled and reused, the cooling process would create wastewater that would be contained onsite and disposed of at a permitted facility. Disposal would be in compliance with applicable municipal National Pollution Discharge Elimination System permits and waste discharge requirements. As a result, the handling and disposal of wastewater would not result in adverse impacts to water quality.

Trenching and tunneling could expose contaminated groundwater and potentially create preferential pathways for the underground spread of contaminated groundwater. Using impermeable material for underground structures will reduce contaminant migration.

Mitigation Measures

In addition to the measures identified for geologic hazards and hazardous wastes and materials, the following measures are recommended to avoid and minimize impacts to water resources and water quality:

- **CON-50**—An erosion and sediment control plan would be established prior construction. The plan would include the following Best Management Practices as appropriate:
 - ▶ Use of natural drainage, detention ponds, sediment ponds, or infiltration pits to allow runoff to collect and to reduce or prevent erosion
 - ▶ Use of barriers to direct and slow the rate of runoff and to filter out large-sized sediments
 - ▶ Use of downdrains or chutes to carry runoff from the top of a slope to the bottom;
 - ▶ Control of the use of water for irrigation so as to avoid off-site runoff
- **CON-51**—Biological oil and grease removal systems would be used in new storm drain systems to treat water before it leaves project sites
- **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 will have BMPs to divert potential storm water runoff from entering the construction area. Containment around the site would 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 would 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.

Specific construction stormwater management controls would be implemented in order to comply with the project Storm Water Pollution Prevention Plan. These controls would function to minimize the contact of construction materials, equipment, and maintenance supplies (e.g., fuels, lubricants, solvents) with storm water. Site supervisors would conduct regular meetings to discuss pollution prevention.

Parks and Community Facilities

Community facilities (e.g. libraries, churches, social services, cemeteries) and parklands immediately adjacent to stations (such as Carthay Circle Park, Hancock Park, Plummer Park and the Los Angeles Country Club) would experience disruptions as a result of noise and/or emissions during construction. Station Options A through E would not result in impacts to community facilities or parklands. Option 2, the Wilshire/Fairfax East Station would be located directly under Los Angeles County Museum of Art West near Hancock Park, which could limit or reduce access to this park. The potential construction related impacts to the Los Angeles Country Club could be lessened if, under Option 4, the Constellation Station were selected and the Constellation North or Constellation South routes were used to access the Constellation Station. .

Although there are no police or fire stations located near the station portals, emergency response times may be affected during construction due to temporary street closures necessary for station excavation and construction. In addition, response times could also be affected by increased congestion along haul routes utilized by heavy truck traffic. Based on input received from police officials, construction of the project alternatives would not increase response times or reduce ability of police departments to meet their service objectives. Project construction would comply with local emergency response plans for all alternatives. A construction mitigation plan, which includes coordination with emergency services, will be implemented to avoid impacts to emergency response.

Hospitals and medical care facilities located near construction sites that may be impacted due to emissions, noise and vibration, and potential access constraints during construction include: Century City Hospital, Cedars-Sinai Medical Center, Bel Air Medical Center, Santa Monica UCLA Medical Center and Orthopedic Hospital, and St. John's Hospital Health Center. Access to regional healthcare and medical institutions as well as small clinics and private healthcare offices which are located throughout the study area may also be affected by temporary street closures for station construction and traffic congestion along haul routes.

Schools in close proximity to construction areas include but are not limited to Horace Mann Elementary, UCLA, Cathedral Chapel School, and Beverly Hills High School. Construction related impacts to schools include safety of students walking past construction sites and air and noise and vibration effects on schools close to

construction sites and/or haul routes. Pedestrian detours would be implemented during construction to ensure safety.

Mitigation Measures

In addition to the measures for communities and neighborhoods, the following measures would avoid and minimize impacts to parks and community facilities:

- **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, Volume IX;
- **CON-63**—Metro would provide at no charge to school districts an instructional rail safety program with materials to all affected elementary and middle schools;
- **CON-64**—Metro would provide an on-going informational program to nearby medical facilities, senior centers, and parks if requested by these facilities, to enhance safety. The program would be similar to that described for the schools except the information and materials provided would be geared toward senior citizens.
- **CON-65**—Safe emergency vehicle routes would be designated around construction sites. The identification of the routes will be coordinated with other agencies.

Archaeological, Historic and Paleontological Resources

Archeological Resources

All of the Build Alternatives, including construction of the maintenance facility, have the potential to adversely affect cultural resources pertaining to intact archaeological deposits. Given the historic period nature of the built environment, which often did not disturb more than a few feet of topsoil, there is a potential for construction to encounter subsurface prehistoric and/or historic archaeological deposits. A higher potential for the presence of buried historic period deposits is likely around proposed Wilshire/4th Street Station in Alternatives 3 and 5. For Alternatives 4 and 5, a higher potential for the presence of buried historic period deposits is likely around Highland Avenue and Hollywood Boulevard.

Historic Resources

All of the Build Alternatives could result in an adverse effect on two historic properties at the Wilshire/Rodeo Station (Union Bank at 9460 Wilshire Boulevard and Ace Galley at 9430 Wilshire Boulevard) depending on which station portal location and construction lay down area is selected. Furthermore, Alternatives 3 and 5 would result in an adverse effect to an additional historic property, the Cheyenne Building (412 Wilshire Boulevard, Santa Monica) at the Wilshire/4th Street Station. At the stations, the identified historic sites are options for potential station entrances and may not be affected if a different



station entrance is selected as part of the locally preferred alternative. At the Wilshire/Rodeo Station, only one of the two historic buildings may be removed for the potential station entrance and construction staging. The Cheyenne may or may not be selected station entrance is selected as part of the locally preferred alternative.

Subsurface easements are anticipated under seven historical properties. Ground-borne noise and vibration from construction activity are not expected to adversely affect historic resources.

Paleontological Resources

All of the Build Alternatives are expected to encounter the paleontological resources, including in and around Hancock Park (Rancho La Brea Tar Pits), from the existing Wilshire/Western Station to the Wilshire/Fairfax Station (either option). The Build Alternatives and the alignment options also cross areas of known paleontological resources along La Cienega Boulevard, along Wilshire Boulevard near Beverly Drive, near Century City, and at Wilshire and Thayer. Alternative 3 and Alternative 5 include one locality in Santa Monica between Olympic and the Interstate 10 Freeway at Cloverfield, which has produced a fossil of an American lion. Furthermore, Alternative 4 and Alternative 5 may also encounter the Older Alluvium from Wilshire to the Hollywood/Highland Station. Excavations up to 40 feet in these areas would have an adverse effect on paleontological resources, unless mitigation measures are employed.

The areas surrounding the Wilshire/Fairfax (either option) and Wilshire/La Brea Stations are known to have tar deposits and or tar sands with potential paleontological features that may have to be removed under special conditions. Preliminary preparation and excavation is likely to take place early on in order to orderly and carefully remove the resources (i.e., fossils, artifacts, etc.) and prepare the ground for the coming excavations.

In specific cases where paleontological or other significant cultural resources are found, it may be possible to alter the cut-and-cover construction methods to allow for sufficient time to evaluate and recover the resources while not requiring the complete suspension of construction activities. One such method could be to employ raised decking, which would allow for traffic to be restored as originally planned without disturbing the encountered resources. The decking system would be elevated above the existing street level, which would also require ramps for traffic to transition on-to and off-of the decking. Although raised decking may temporarily increase the visual impacts to adjacent properties, as well as present some access restrictions, this method would significantly reduce traffic impacts during any period of cultural resource investigation and/or recovery.

Mitigation Measures

Implementation of the following measures would reduce potential impacts to archeological, historic and paleontological resources:

- **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 would 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.

- **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 shall 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 would 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.
- **CON-68**—Metro would seek early approval to begin fossil recovery in advance of construction.
- **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.
- **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.
- **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.
- **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.



- **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.

Economic and Fiscal

Construction of the Build Alternatives would result in both economic/fiscal impacts and benefits.

Construction-Related Economic Losses

Construction would have temporary impacts on commercial and industrial businesses, particularly those near or adjacent to construction sites. Potential impacts include: traffic disruption; increased noise, vibration and dust; modified vehicular and pedestrian traffic patterns; and utility disruptions. Sidewalk space may be obstructed temporarily for station and alignment construction, thereby reducing business access but additional access will be maintained to businesses and residences at all times. Business impacts could also include reduced visibility of commercial signs and business locations. These construction impacts could in turn produce economic impacts to commercial establishments.

Construction-Related Employment

The Project would result in a beneficial direct and indirect employment impacts. Table 4-57 shows the new direct jobs (jobs and services purchased to build the Project) and indirect employment (secondary demand for goods and services) for each Build Alternative. Construction related employment is directly proportional to the magnitude of capital expenditures, with higher cost construction alternatives generating more construction-related employment.

Table 4-57. Estimated Full Time Employment Generated by Construction Spending (in Person Years or Full-time Employment for One Person for One Year)

Alternative	Direct Employment (Person Years)	Indirect/Induced Employment (Person Years)	Total Employment (Person Years)
1	33,930	26,177	60,108
2	36,218	27,933	64,151
3	51,182	39,328	90,509
4	60,002	46,193	106,195
5	75,579	58,116	133,695
MOS 1	15,409	11,934	27,343
MOS 2	28,623	21,912	50,535

Figure 4-87 provides a breakdown of jobs created by industry for the seven alternatives studied. As expected, construction, professional services, and manufacturing are three of

the top four industries impacted by the construction spending. Other industries that will see significant job impacts from the project include retail trade, health care, food services, administration and waste management, and real estate.

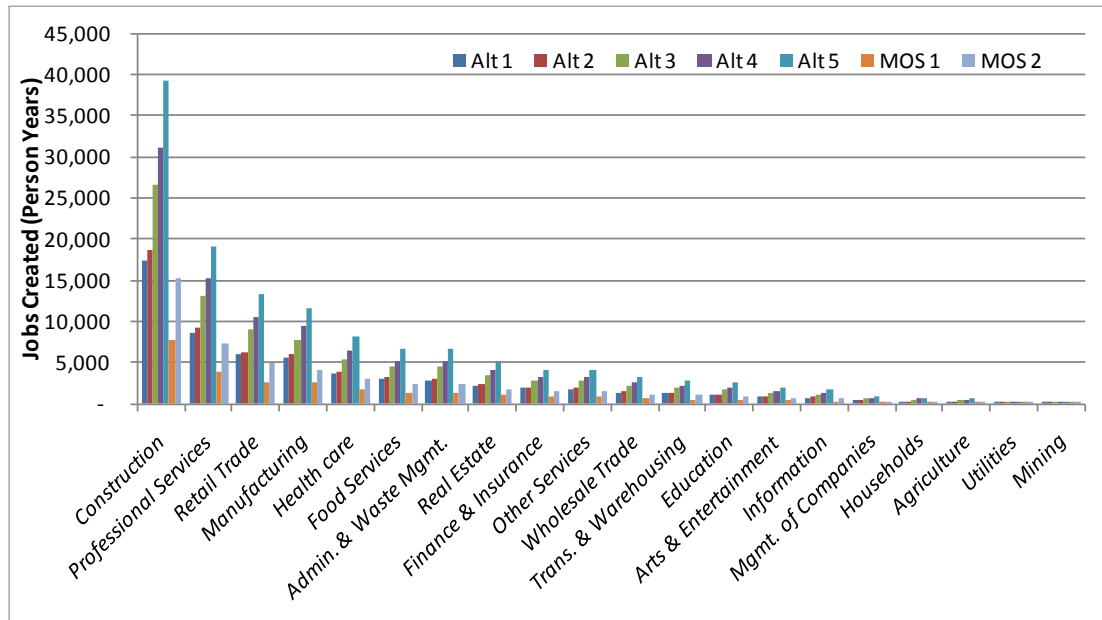


Figure 4-87. Breakdown of Construction Related Job Creation by Industry

It is also important to consider the quality of the jobs that would be created by the project, which can be most easily measured by the number of jobs created at various levels of compensation. Figure 4-88 shows that the majority of jobs generated by the project would receive compensation above \$40,000 per year for all seven alternatives. This indicates that the project construction will help to stimulate the local economy.

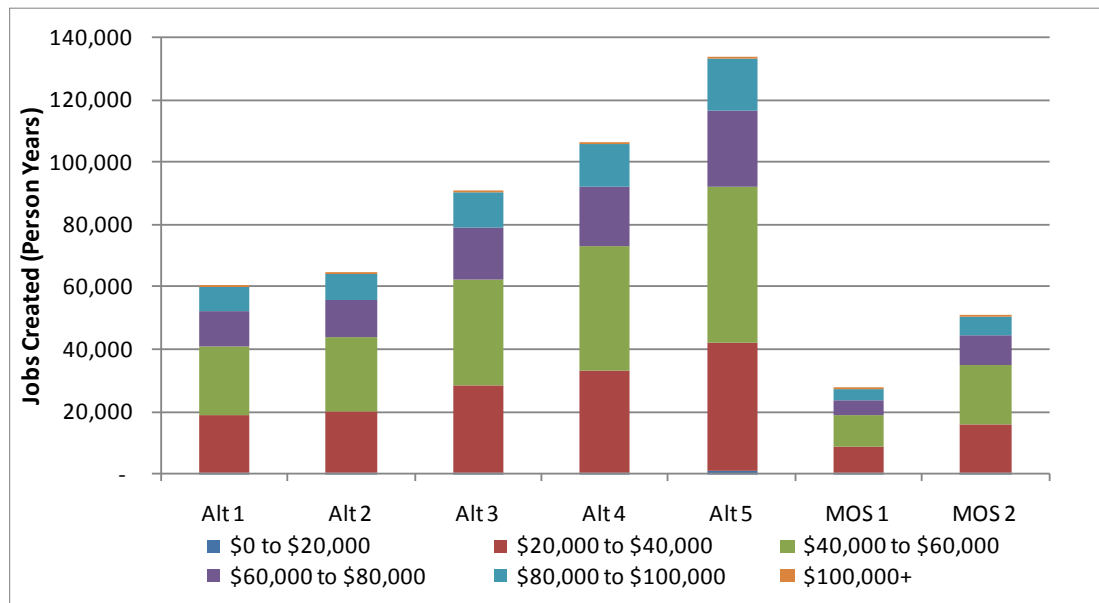


Figure 4-88. Breakdown of Construction Related Job Creation by Earnings Range

Construction Spending on the Regional Economy

The jobs created as a result of construction spending on the project will result in both direct and indirect economic impacts on the Los Angeles region. This can be quantified as the overall output for the Los Angeles region. Output can be defined as the total value of sales made for all intermediate and final purchases within a region resulting from increased demand for an industry's goods or services. It should not be confused with Gross Regional Product (similar to Gross Domestic Product), which is the sum of value added for all industries; value added is an economic concept which nets out the cost of intermediate purchases for materials and labor. The overall output generated for each alternative as a result of construction spending for the project is provided in Table 4-58.

Table 4-58. Estimated Construction Related Economic Output by Alternative (2009 dollars, billions)

Alternative	Direct Output	Indirect/Induced Output	Total Output
1	\$4,410	\$5,037	\$9,447
2	\$4,700	\$5,375	\$10,075
3	\$6,616	\$7,561	\$14,176
4	\$7,780	\$8,884	\$16,664
5	\$9,798	\$11,173	\$20,971
MOS 1	\$2,037	\$2,295	\$4,332
MOS 2	\$3,647	\$4,213	\$7,861

As is shown in Table 4-58, projected economic output can range from \$4.3 billion for MOS 1 to \$21 billion for Alternative 5. Approximately 47% of the projected output is directly related to the construction of the project, while the remaining is expected to result from indirect and induced spending.

Mitigation Measures

Measures to minimize temporary business disruption include:

- **CON-74**—Both standard and site-specific mitigation measures would be developed to minimize disruption of pedestrian access to business and disruption of general vehicular traffic flow or access to specific businesses.



4.16 Growth Inducing Impacts

This section addresses the potential to directly or indirectly induce population, housing, and/or employment growth within the Study Area and the region. It summarizes the *Westside Subway Extension Growth-Inducing Impacts Technical Report*.

4.16.1 Regulatory Setting

Guidance for analyzing potential growth-inducing impacts has been established by Federal and State regulations.

National Environmental Policy Act Guidance

The Council on Environmental Quality established guidelines for implementing the National Environmental Policy Act (NEPA). These guidelines require the evaluation of potential consequences of all proposed Federal actions. Any proposed Federal activity or program must examine not only direct consequences, but also indirect, or secondary impacts that may occur in areas beyond the immediate influence of a proposed action and at some time in the future (40 CFR 1508.8). Secondary impacts may include changes in land use which include housing and economic vitality (including employment and population density); and all components of growth. The NEPA guidelines require an evaluation of reasonably anticipated growth in relation to growth projections that a federally-designated metropolitan planning organization develops.

California Environmental Quality Act Guidance

The California Environmental Quality Act (CEQA) requires consideration and discussion of the Project's potential to induce growth. Section 15126.2(d) requires discussing "the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment." Growth-inducing impacts also include the removal of obstacles to population growth and/or encouraging and facilitating other activities that could significantly affect the environment, either individually or cumulatively.

According to CEQA guidelines, a project would result in a significant impact if it would induce substantial population growth in an area, either directly (for example, by proposing new homes or a business) or indirectly (for example, through extending roads or other infrastructure).

Regional Growth Management Plans

The Southern California Association of Governments (SCAG) is the federally designated metropolitan planning organization for the counties of Los Angeles, Orange, Riverside, San Bernardino, Ventura, and Imperial. SCAG develops regional growth management plans to provide efficient movement of people, goods, and information; enhance economic growth and international trade; and improve the Southern California regional quality of life.

The 2008 SCAG Regional Comprehensive Plan and Guide (RCPG) describes the plan for implementing short-term strategies and long-term initiatives and guiding principles for a sustainable and livable region. The RCPG focuses on specific planning and resource management areas, including land use and housing, open space and habitat, water,

energy, air quality, solid waste, transportation, security and emergency preparedness, and the economy. The RCPG’s Growth Management chapter addresses issues related to SCAG’s regional growth and land use and enumerates guiding principles for development that supports the RCPG goals.

SCAG completed a comprehensive growth visioning process described in their 2004 Southern California Compass Growth Vision Report. The objective of the visioning process was to further develop ways to accommodate growth while maintaining mobility, prosperity, and sustainability goals. This resulted in a regional vision known as the Compass Blueprint Growth Vision.

4.16.2 Existing Conditions/Affected Environment

Study Area

The Study Area traverses two of the 14 subregions comprising the SCAG region: the City of Los Angeles and the Westside Cities Council of Governments subregion, where the Cities of Beverly Hills, West Hollywood, and Santa Monica are located.

Population and Housing Growth

The 2009 SCAG regional population was roughly 18.7 million. Between 2000 and 2009, Los Angeles County had the largest population growth (from 9.5 million to 10.4 million) or 40 percent, with an additional 873,855 residents. However, Los Angeles County was the slowest growing SCAG county with a 1 percent annual average population growth rate.

During the same period, Los Angeles County increased households by 869,358, from 9.3 million to 10.2 million. While these households comprised about 40 percent of the SCAG total housing growth, the 1.2 percent average annual growth rate was the lowest of the six SCAG counties.

Table 4-59 shows that between 2000 and 2009, the Cities of Los Angeles and Santa Monica had a 1.1 percent annual average population growth rate. The Cities of Beverly Hills and West Hollywood had less than 1 percent annual average population growth rates.

Table 4-59. Population Growth in Cities within the Study Area, 2000-2009

City	Year 2000	Year 2009	2000-2009 Change	Annual Average % Change
Los Angeles	3,694,742	4,065,585	370,843	1.1
West Hollywood	35,794	37,580	1,786	0.6
Beverly Hills	33,784	36,090	2,306	0.8
Santa Monica	84,084	92,494	8,410	1.1

Source: State of California, Department of Finance, E-4 Population Estimates for Cities, Counties and the State, 2001-2009, with 2000 Benchmark.

As shown in Table 4-60, by 2009, the City of Los Angeles had the largest number of households at 1,407,967. The Cities of Los Angeles and Santa Monica households both grew at about 0.5 percent annually compared to the 0.17 and 0.16 percent for the Cities of West Hollywood and Beverly Hills.

Table 4-60. Households in Cities within the Study Area, 2000-2009

City	Year 2000	Year 2009	2000-2009 Change	Annual Average % Change
Los Angeles	1,340,036	1,407,967	67,931	0.50
West Hollywood	24,142	24,560	418	0.17
Beverly Hills	15,946	16,206	260	0.16
Santa Monica	48,133	50,371	2,238	0.47

Source: State of California, Department of Finance, E-5 Population Estimates for Cities, Counties and the State, 2001-2009, with 2000 Benchmark.

Employment Growth

SCAG regional employment, including self-employment, decreased by 73,200 jobs between 2000 and 2009. Los Angeles County lost about 228,000 jobs, a 5.2 percent decrease between 2000 and 2009. The current Los Angeles County unemployment rate was estimated at 12.3 percent, just slightly below the 12.5 percent statewide unemployment rate (as of February 2010).

Employment in all four cities in the Study Area decreased between 5 and 5.2 percent between 2000 and 2009. The City of Los Angeles lost 88,100 jobs and has a 13.6 percent unemployment rate. The City of West Hollywood has an estimated 10.4 percent unemployment rate; the City of Santa Monica is 10.2 percent; and the City of Beverly Hills has an 8.6 percent unemployment rate, the lowest among the four cities as of February 2010¹.

Generally, growth-inducing projects are located in isolated, undeveloped, or under-developed areas, necessitating major infrastructure being extended (e.g., sewer and water facilities, roadways, etc.) or are those that could encourage “premature” or unplanned growth (i.e., “leap-frog” development). Growth-inducing impacts would be considered significant if the Project has the potential to induce substantial area population growth, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extending roads or other infrastructure).

Future Growth Projections

According to SCAG’s projections, the region is expected to steadily grow to about 24 million residents and 10.3 million jobs by 2035. The region is expected to have 7.7 million households. The Los Angeles County population and employment are projected to increase by nearly 2 million people and 490,000 jobs between 2010 and 2035. This represents an estimated average annual increase of nearly 800,000 persons (less than 0.7 percent average annual population growth) and 19,600 jobs (less than 0.5 percent average annual employment growth).

The SCAG’s 2008 RTP projections shows the population growth in all the Study Area cities is projected to be relatively low during the 2010- 2035 period, reflecting their built-out character. The City of Los Angeles population is projected to grow 0.35 percent per year,

¹ California Department of Finance, March 2010.

while the City of Santa Monica population growth is projected at 0.04 percent per year, or the lowest rate among the cities. The household growth closely corresponds to the projected population growth, with the City of Los Angeles adding households at a 0.73 percent annual growth rate and the City of Santa Monica at 0.06 percent per year over the next 25 years. Similarly, employment growth is projected to be the highest at an average of 0.38 percent per year for the City of Los Angeles, and the lowest at 0.28 percent per year for the Cities of Santa Monica and Beverly Hills (Table 4-61).

Table 4-61. Population, Households, and Employment Growth in Cities within the Study Area, 2010-2035

City	2010 Population	2035 Population	2010 Households	2035 Households	2010 Employment	2035 Employment
Los Angeles	4,057,484	4,415,772	1,366,985	1,616,578	1,820,092	1,994,134
West Hollywood	38,223	39,821	23,718	24,940	32,185	34,719
Beverly Hills	36,433	38,508	15,289	16,094	58,068	62,104
Santa Monica	91,335	92,314	46,088	46,764	101,871	109,118

Source: SCAG, 2010-2035 RTP Adopted Growth Forecast, 2008.

4.16.3 Environmental Impact/Environmental Consequences

To evaluate potential growth-inducing impacts, the 2008 SCAG RCPG, 2008 RTP, and the *2004 Compass Blueprint Growth Vision Report* were used. SCAG also states that the Program Environmental Impact Report (PEIR) prepared for the 2008 RTP can be used as the basis of regional impact analyses for their individual projects. In particular, this environmental analysis uses the RTP population, housing, and employment projections with relevant PEIR information to address the magnitude of a project’s potential impacts related to regional growth.

No Build Alternative

The No Build Alternative includes all existing highway and transit services and facilities, and the committed highway and transit projects in the *2009 Metro Long Range Transportation Plan* and the *2008 Southern California Association of Governments’ Regional Transportation Plan*². Under the No Build Alternative, no new infrastructure would be built within the study area, aside from projects currently under construction or projects funded for construction, environmentally cleared, planned to be in operation by 2035, and identified in the Long Range Transportation Plan.

All these transportation improvement projects are located within a densely developed urban region, including the greater Los Angeles area. They will not extend into previously undeveloped areas that could induce growth in such areas or remove a barrier to growth.

These projects are intended to help accommodate the existing and future transportation needs of the area’s population—which is projected to grow steadily into the future—by providing new public transit options that would help increase subregional and local mobility for current and future residents. At the same time, while accommodating the

² Metro is working with SCAG to update the RTP, which would add the projects identified in Metro’s LRTP into the RTP. It is anticipated that the update will be completed in summer 2010.

existing and future needs and transportation demand, these projects would indirectly provide local development and growth opportunities including opportunities for transit-oriented development around new stations.

By enhancing mobility, particularly for transit-dependent populations, the No Build Alternative could create opportunities for more intensive and focused urban growth near new transit stations and corridors, as well as for continuing growth in areas made accessible by these new transit services. With these opportunities, future growth and development in certain areas may occur sooner, rather than later, as a result of the No Build Alternative. However, such future development would be consistent with land use and community plans and subject to all applicable regulations of each local jurisdiction, and no growth beyond that already anticipated in local or regional plans would occur.

The No Build Alternative would also generate new employment, directly and indirectly. Employment is directly proportional to the magnitude of capital expenditure associated with each project. When combined, these projects would generate significant direct and indirect long-term operation-related employment within the SCAG region, including the City of Los Angeles and the Westside Cities Council of Governments subregions.

Overall, the No Build Alternative would significantly contribute to general economic growth, including employment growth, within their corridors, their regions' cities and counties, and within the entire SCAG region. This is considered a significant beneficial effect since this new employment is anticipated to help alleviate the effects of lost jobs resulting from the current recession, help alleviate current unemployment, and help generate future employment that has been projected for the region and the study area. The No Build Alternative would not result in adverse growth-inducing effects.

TSM Alternative

The TSM Alternative enhances the No Build Alternative by expanding bus services operating in the Westside Transit Corridor. The TSM Alternative would not remove a barrier to growth or otherwise induce growth directly or indirectly. Therefore, no adverse impacts are anticipated related to growth inducement.

Build Alternatives

As with the No Build and TSM Alternatives, the Build Alternatives would be located within a densely developed urban area and would not extend into previously undeveloped areas.

Potential indirect growth inducing effects may result from opportunities the Build Alternatives provide for micro-scale growth or development near stations. Such growth may occur from implementation of local and state land use policies or local planning objectives, which may encourage transit-oriented development, station area planning, or housing density bonuses adjacent to transit corridors at (see Section 4.1, Land Use and Development). With opportunities for such development, future growth in these station areas may occur sooner rather than later. All such future development (including mixed-use, residential, and commercial) within the City of Los Angeles, Westside Cities Council of Governments subregions, and the entire SCAG region would be consistent with applicable land use and community plans and subject to all applicable requirements and regulations of local jurisdictions where the stations would be located. The Build

Alternatives would not induce growth beyond that already anticipated in the regional plans and projections for the SCAG region, or in local land and community plans. They would also significantly contribute to general economic growth, including employment growth within the Study Area and SCAG region. They would generate between 15,000 and 16,500 long-term jobs during operation (including between 5,600 and 6,000 direct and more than 9,500 to 10,500 indirect jobs)³. This is considered a significant beneficial effect since this new employment is anticipated to help alleviate effects of more than a quarter-million (228,000) jobs lost within Los Angeles County during the current recession. This new employment would help alleviate current unemployment and help generate future employment. This is considered a significant beneficial effect; no adverse impacts are anticipated related to growth inducement.

4.16.4 Mitigation Measures

None are required.

4.16.5 California Environmental Quality Act Determination

According to CEQA, growth inducing impact is considered to be significant if the proposed project has the potential to induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure).

The No Build and TSM Alternatives would result in a beneficial effect and would not induce growth either directly or indirectly beyond that already anticipated by regional and local land use and community plans, and regional projections for the City of Los Angeles, the Westside Cities Council of Governments subregions, and the entire SCAG region. No significant impacts are anticipated pursuant to CEQA.

The Build Alternatives, including stations and alignment options, would not induce growth, either directly or indirectly, beyond that already anticipated in the regional plans and projections for the SCAG region, or in local land and community plans of the City of Los Angeles or Westside Cities Council of Governments subregions. The project alternatives would result in beneficial effects; no significant adverse impacts are anticipated pursuant to CEQA or related to growth inducement; no mitigation measures are required.

³ Number of jobs is in person years, which is equivalent to the full-time employment of one person for one year.

4.17 Cumulative Impacts

4.17.1 Introduction

This section examines the potential cumulative impacts that could result from implementing the Project when considered in combination with the identified past, present and foreseeable future projects.

4.17.2 Regulatory Setting

Guidance for analyzing potential cumulative impacts has been established by both Federal and State regulations, as described below.

National Environmental Policy Act Guidance

The Council on Environmental Quality regulations regarding implementation of the National Environmental Policy Act (NEPA) defines cumulative effects as those effects that result from incremental impacts of a proposed action when added to past, present, and reasonably foreseeable future actions, regardless of which agency (Federal or nonfederal) or person undertakes such actions.

Cumulative effects can result from individually minor, but collectively significant, actions that occur over time (40 CFR 1508.7).

California Environmental Quality Act Guidance

Section 15355 of the California Environmental Quality Act (CEQA) guidelines defines cumulative impacts as two or more individual effects that, when considered together, are considerable and may compound or increase other environmental impacts.

Cumulative impacts can result from individually minor, but collectively significant, projects occurring over a period of time (Section 15355(b)).

Regional Growth Management Plans

The Southern California Association of Governments (SCAG) is the federally designated metropolitan planning organization for a six-county Southern California region (the counties of Los Angeles, Orange, Riverside, San Bernardino, Ventura, and Imperial). SCAG develops regional growth management plans with the goals to provide for efficient movement of people, goods, and information; enhance economic growth and international trade; and improve the quality of life for the Southern California region.

The 2008 SCAG Regional Comprehensive Plan and Guide (RCPG) describes the action plan for implementing short-term-strategies and long-term initiatives and the guiding principles for a sustainable and livable region. The RCPG focuses on specific planning and resource management areas, including land use and housing, open space and habitat, water, energy, air quality, solid waste, transportation, security and emergency preparedness, and economy. The RCPG's Growth Management chapter addresses issues related to growth and land use, and enumerates guiding principles for development that support the overall RCPG goals.

The 2008 SCAG Regional Transportation Plan (RTP) is a regional planning document that establishes the goals, objectives, and policies for the region's transportation system

and establishes an implementation plan for transportation investments through the year 2035. The RTP contains regional population, housing, and employment growth projections through the year 2035. These projections are used as growth guidelines in each jurisdiction within the SCAG region.

SCAG is also conducting a comprehensive growth visioning process, the Southern California Compass Blueprint. The objective of the Compass Blueprint process is to further develop ways through transportation and land-use planning to accommodate growth region-wide while maintaining mobility, prosperity, and sustainability goals for the region's residents.

4.17.3 Analysis Methodology

The cumulative impact analysis follows the guidelines provided in “Considering Cumulative Effects under the National Environmental Policy Act” (Council on Environmental Quality, January 1997). The analysis is also consistent with CEQA guidelines, Section 15130(b)(1), which direct cumulative impact analyses to include “a summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document which has been adopted or certified, which described or evaluated regional or area-wide conditions contributing to the cumulative impact.”

This cumulative impact analysis incorporates the regional projections from the 2008 RTP. The SCAG region's budget for the next 30 years totals an estimated \$568.9 billion. The RTP recommends “closing critical gaps in the transit system to improve service and extending routes to serve a greater number of passengers,” and has identified \$163.7 billion (approximately 29 percent of the budget) for proposed, committed, and programmed transit projects.

The region-wide impact analysis conducted in the 2008 RTP Program Environmental Impact Report (EIR) (SCH No. 2007061126, May 2008) serves as the basis for this cumulative impacts analysis, pursuant to Section 15130(b)(1) of the CEQA guidelines.

In addition to long-term cumulative effects, cumulative effects associated with short-term (temporary) construction effects of the Project when combined with potential construction effects of other transportation and transit projects are also addressed.

4.17.4 Existing Conditions/Affected Environment

Study Area

The Study Area for this cumulative impacts analysis generally encompasses the SCAG region, including the areas traversed by the Project (i.e., the two SCAG subregions comprised of the City of Los Angeles and the Westside Cities Council of Governments subregions where the Cities of Beverly Hills, West Hollywood, and Santa Monica are located).

4.17.5 Environmental Impact/Environmental Consequences

No Build Alternative

The No Build Alternative includes all existing highway and transit services and facilities, and the committed highway and transit projects in the *2009 Metro Long Range*

Transportation Plan (LRTP) and the 2008 SCAG RTP¹. Under the No Build Alternative, no new infrastructure would be built within the Study Area, except for projects currently under construction or projects funded for construction, environmentally cleared, planned to be operating by 2035, and identified in the Metro LRTP. These projects and their anticipated completion dates are as follows:

- Exposition Boulevard Light Rail Phase 1 (Expo 1), summer 2011
- Exposition Boulevard Light Rail Phase 2 (Expo 2), 2015
- Gold Line Foothill Extension, 2017
- Eastside Phase 2, 2035
- Crenshaw Transit Corridor Project, 2018
- Green Line Extension to Los Angeles Airport (LAX), 2035
- South Bay Green Line Extension to Torrance Transit Center, 2035
- LAX Automated People Mover (APM), 2028, depending on availability of funding

These projects are anticipated to be completed and operational within the same planning horizon as the Project. Of these projects, the Expo 1 and 2 and the Crenshaw Transit Corridor Projects are closest to the Project.

In addition, the No Build Alternative includes the proposed LAX Automated People Mover, which is part of the LAX Master Plan. The No Build Alternative also includes all the existing bus service provided by Metro and other transit agencies and incorporates the following three planned projects: 1) the Metro Orange Line Extension, in service by summer 2012; 2) the Wilshire Bus Rapid Transit Project with construction expected to begin in late 2010; and 3) the Line 910 El Monte Station–Artesia Transit Center via Downtown that started in December 2009. The nearly complete Metro Rapid Bus Program is also included.

The region-wide impact analysis conducted in the 2008 RTP Program EIR identified considerable cumulative effects associated with the 2008 RTP, which is included in the No Build Alternative. These effects are a result of substantially increased urbanization within the SCAG region by 2035. The provision of new and enhanced transportation projects and improvements under the No Build Alternative would increase mobility and provide opportunities for local land use development, including transit-oriented development within the region, and thus, would influence urbanization growth.

The 2008 RTP Program EIR also identified associated cumulatively considerable effects on the following resources: traffic; air quality (short-term and long-term effects associated with criteria air pollutant emissions and greenhouse gas emissions from construction and operation activities); visual character; biological resources; cultural resources; energy consumption; geotechnical hazards; hazardous materials transport to areas outside the SCAG region; land use; noise (as a result of expanded or new transportation facilities and increased use of existing transit facilities); open space; some public services and utilities; fire hazard; water quality and flooding; and existing water supplies and infrastructure.

¹ Metro is working with SCAG to update the RTP, which would add the projects identified in Metro's LRTP into the RTP. It is anticipated that the update will be completed in Summer 2010.

TSM Alternative

The TSM Alternative enhances the No Build Alternative by expanding the bus services operating in the Study Area. This alternative emphasizes more frequent service to reduce delay and enhance mobility. The enhanced bus services would not result in a substantial permanent change to the physical environment of the Study Area or the region. However, with the additional bus service, this alternative would contribute to the No Build Alternative’s cumulatively considerable effects associated with an increase in regional traffic and in air pollutant emissions, even though Metro operates natural gas-powered “clean air” bus system which is one of the lowest emissions-generating systems in the nation. The TSM Alternative’s contribution to the cumulative impact would therefore be relatively limited.

Build Alternatives

In the discussion of potential impacts, the Build Alternatives are addressed as a group, not individually because potential impacts would be the same or similar for each of the Build Alternatives. It is important to note that while potential impacts would be generally similar, they would increase as the length of the proposed alignment increases. Table 4-62 briefly describes the Build Alternatives and their alignment lengths.

Table 4-62. Westside Subway Extension Project Alternatives

Number	Description	Length (miles)
1	Westside/UCLA Extension	8.60
2	Westwood/VA Hospital Extension	8.96
3	Santa Monica Extension	12.38
4	Westwood/VA Hospital Extension Plus West Hollywood Extension	14.06
5	Santa Monica Extension Plus West Hollywood Extension	17.49
MOS 1	Fairfax Extension	3.10
MOS 2	Century City Extension	6.61

MOS = minimum operable segment

Generally, the alternatives follow the Westside/UCLA Extension alignment but extend incrementally farther until the subway reaches Santa Monica. This cumulative impacts discussion assesses the overall cumulative effects of the Build Alternatives, which includes a maintenance facility and expansion of the Rail Operations Center. If there are substantial impact differences among the alternatives, those differences are noted in the discussion. Though both MOS 1 and MOS 2 represent shorter segments of Alternative 1, cumulative effects associated with these segments are similar to cumulative effects associated with Alternative 1.

The following analysis examines cumulative impacts associated with operations, followed by cumulative impacts involved with construction activity.

Cumulative Impacts for Operations

Transit

The Build Alternatives would provide significant additional fixed- guideway transit capacity under a congested corridor; thus, the incremental effect of the Build Alternatives on the transit network would be beneficial. Even allowing time spent for accessing subway service (including vertical movement to platforms) under the Build Alternatives, they would result in substantial increases in transit speeds and reduced travel times versus the No Build and TSM Alternatives. When combined with other



planned transit projects and improvements pursuant to the 2008 RTP, the Build Alternative's beneficial cumulative effect would accrue to the entire SCAG region and, in particular, to the Los Angeles County subregion.

Traffic

Project would result in one significant adverse traffic impact at one intersection (Wilshire Boulevard and 16th Street in Santa Monica) under Alternatives 3 and 5. However, this impact would be minimized with the implementation of the mitigation measure to signalize the intersection. In general, the Build Alternatives are projected to result in fewer vehicle trips and vehicle miles traveled (VMT) as compared to the 2035 No Build Alternative ; thus, the incremental effect of all Build Alternatives on the combined traffic impacts at the analyzed study intersections would not be cumulatively considerable. Therefore, the Build Alternatives would not contribute to the projected 2035 cumulative traffic increase.

Parking

The Build Alternatives are expected to result in significant on-street parking impacts due to residential neighborhood spillover. The projected increase in population within a one-quarter mile walking distance of potential station locations would also increase parking demand. Therefore, the Build Alternatives' parking impact would be cumulatively considerable when considered together with the increased parking demand that could result from a higher population density in station areas of the Project, as well as stations of other transit projects and improvements. The mitigation recommendations contained in the *Parking Policy Plan* for the Build Alternatives or similar measures developed for each individual future transit project were developed to help reduce the magnitude of this impact. Nonetheless, even with such a reduction, the cumulative impact would remain significant as a result of the projected regional and localized population growth and density, and the associated higher parking demand.

The Build Alternatives could result in the loss of private, off-street, and non- required parking at two station locations, Westwood/UCLA Off-Street and Westwood/Veterans Affairs (VA) Hospital either the base station of Option 6. UCLA and the Department of Veterans Affairs, respectively, own these locations and are working with Metro on station development. The parking analysis indicates, that this impact would not be significant since the parking at the Westwood/VA Hospital Station location would be replaced and it is anticipated that other parking facilities owned or planned by UCLA would be able to absorb any displaced demand. The parking demand itself could be reduced by the provision of the proposed subway transportation option.

In addition, the Build Alternatives could result in the loss of private off-street parking due to the station entrances. Station entrances, including the corridor to connect the station entrance from the platform to the street-level, may impact underground parking facilities at the Beverly Center, Century City, Westwood/UCLA and Westwood VA Hospital Stations. This impact would depend on the station entrance selected. At many of these locations, the underground parking exceeds the levels required by local parking ratios. Metro would replace any impacted parking, as appropriate. Therefore, the

Project's contribution to the potential cumulative impact associated with loss of off-street parking would be limited.

Air Quality

The Build Alternatives are expected to reduce regional VMT and regional air pollutant emissions burden levels, and thus would not contribute to cumulative air quality impacts. The Project is included in the Draft Amendment #08-34 to the 2008 Regional Transportation Improvement Plan (RTIP) as Project ID #UT101, #1TR1002 and #1TR1003 (refer to page 5 of Draft Amendment). The Project is also included in Metro's 2009 LRTP under Candidates for Private Sector Financial Participation—Transit Projects (refer to Figure K on page 25). The RTIP includes a transportation conformity determination for the entire region, as it accounts for future emissions from all mobile sources and ensures that attainment will not be delayed by future projects.

Climate Change

The Project was analyzed using traffic projections that consider the foreseeable future. Although a greenhouse gas conformity analysis was not done at this time, the Project is included in the Draft Amendment #08-34 to the 2008 RTIP as Project ID #UT101, #1TR1002 and #1TR1003 (refer to page 5 of Draft Amendment). The Project is also included in Metro's 2009 LRTP under Candidates for Private Sector Financial Participation—Transit Projects (refer to Figure K on page 25). As such, the Project is part of a program that accounts for future criteria pollutant emissions from all mobile sources and ensures that attainment will not be delayed by future projects.

Furthermore, when considering the combined effect of reduced roadway VMT and increased power usage for the rail system, most of the Build Alternatives show no measurable change in greenhouse gas emissions, while Alternative 4 shows an overall decrease in greenhouse gas emissions. Accordingly, the Build Alternatives are not expected to have a cumulative impact on greenhouse gas emissions.

Noise and Vibration

Noise impacts to the environment from introducing transit system noise generally result from operations of at grade and elevated transit systems. The Build Alternatives would operate heavy rail trains up to 70 feet below the ground surface. Noise from subway rail transit operations, including the interaction of wheels on track, motive power, signaling, and warning systems would be well below ground, and airborne noise from these components would not be audible at ground level and above. Thus, the Build Alternatives would not contribute to a cumulative airborne noise impact from these components.

The Build Alternatives would use the existing road and sidewalk network for passenger access to underground stations. While noise could be generated in the above-ground portion of stations from pedestrians, bicyclists, and passenger drop off activities, these activities are not significant noise generators. Any such noise would be brief and minimal, and would not result in long-term noise impacts. Each operational component would be typical of all stations and communities and would not result in direct or indirect impacts, or contribute to cumulative operational noise impacts.



The vibration analysis indicated that no adverse impacts associated with subway operation are anticipated. All alternatives will be designed and built in compliance with FTA noise and vibration standards to eliminate noise and vibration impact. Any groundborne noise or vibration impacts would be minimized to levels that comply with Federal noise and vibration impact criteria. Operational noise and vibration emissions from the TSM and all build alternatives of this Project would occur only at very specific locations (e.g., TPSSs, emergency electrical power generators, subway tunnel vent discharge/emergency egress locations) and do not result in area-wide impacts. Therefore, the Build Alternatives would not contribute to cumulative operational vibration impacts.

Land Use and Development

The Build Alternatives would provide opportunities for implementing local and state land use policies or local planning objectives, which may encourage transit-oriented development, including station area planning and/or housing density bonuses adjacent to transit corridors and stations. All such future development (including mixed-use, residential, and commercial) within the County and City of Los Angeles, Westside Cities Council of Governments subregions, and the entire SCAG region would be consistent with applicable land use and community plans and subject to all applicable requirements and regulations of local jurisdictions where the stations would be located. Therefore, the Build Alternatives are not anticipated to indirectly facilitate development either inconsistent with applicable local land use and community plans or beyond that already anticipated in the regional plans and SCAG regional projections. Nonetheless, when combined with other transportation projects and improvements pursuant to the 2008 RTP that would provide similar development opportunities around the station areas, the indirect cumulative effect of such future development would be part of the cumulatively considerable regional impact to land use and would change land use intensity and patterns in some areas. The change associated with the Project would be to facilitate and encourage more compact and pedestrian-oriented growth and discourage urban sprawl.

Community and Neighborhood Impacts

The Build Alternatives would travel through or near numerous neighborhoods and local jurisdictions, and would not introduce any new barriers that could divide the community. Metro would acquire several parcels during construction for the storage of equipment and materials and other construction-related activities. The Build Alternatives would result in the acquisition of one single family residence near the Wilshire/Crenshaw Station for construction staging and the location of a potential station entrance. Parcels used for construction staging would be left vacant and would be available for development after construction completion. The vacant parcels may present a future opportunity for transit-oriented development.

The Build Alternatives, together with other future transit and transportation improvements projects, would provide opportunities for future stations and station area development in those neighborhoods and communities. This development is anticipated to enhance circulation and connectivity within the greater region, which in turn may help enhance the character and cohesion of these communities and neighborhoods. In

addition, the new and expanded transit services would provide enhanced access directly to those neighborhoods, and by upgrading service throughout the day, they would improve access to and support of employment opportunities and job retention, as well as the use of community, institutional, education, and recreational facilities in those areas. No adverse cumulative impact is anticipated.

Parklands and Other Community Facilities

The Build Alternatives would not reduce the number of existing parkland or require full acquisition of community facilities in the Study Area, and thus, would not directly contribute to the potential cumulative impact.

Indirectly, the Build Alternatives would provide opportunities for transit-oriented development around station areas, which includes a residential use component. Residential uses may increase demand for local parks and other community facilities, and potentially influence a demand for additional recreational and other facilities. When combined with similar opportunities provided by other transit and transportation improvement projects pursuant to the 2008 RTP, the potential indirect impact would be cumulatively considerable.

Visual Effects

The visual effects analysis indicates that the Build Alternatives would not directly result in adverse impacts on scenic highways and vistas, visual character, or light and glare; therefore, the Build Alternatives would not contribute to such direct cumulative effects. Indirectly, the Build Alternatives would provide opportunities for development around station areas that may result in a more densely developed urban environment. When combined with similar development opportunities provided by other transit and transportation improvements projects pursuant to the 2008 RTP, the potential indirect contribution to impacts on the overall visual character of the existing landscape setting would be cumulatively considerable.

Cultural and Historic Resources

All Build Alternatives, except for MOS 1, may require removing up to two historic buildings depending on the station entrance selected at the Wilshire/Rodeo Station. Alternatives 3 and 5 could require removing an additional historic building depending on the station entrance selected. Removal of all these historic resources, should the station portal location require their takings, is considered an adverse effect. When combined with potential effects of other transit and transportation improvement projects pursuant to the 2008 RTP on historic resources, this impact would be cumulatively considerable. MOS 1 does not extend to Wilshire/Rodeo and would not adversely affect historic resources.

Archaeological Resources

The Build Alternatives could affect previously undisturbed and some known archaeological sites and/or resources. Therefore, when combined with potential effects of other transit and transportation improvement projects pursuant to the 2008 RTP on archeological resources, this impact would be cumulatively considerable.



Paleontological Resources

All Build Alternatives involve tunneling in soils in the general area of the La Brea Tar Pits which has yielded the heaviest concentration of known fossil deposits and has provided the most prolific record of Late Pleistocene vertebrate animal life discovered anywhere in the world. Best known paleontological and curation practices will be followed. Recovered fossils will be donated to a public museum like the George C. Page Museum at the La Brea Tar Pits. Overall, with an increased likelihood of encountering scientifically significant paleontological resources in these soils, it is likely that the Build Alternatives would encounter previously unknown fossils as well. Preliminary preparation and excavation would then be conducted early on in order to methodically and carefully remove the resources and prepare the ground for the coming excavations. However, other paleontological resources may still be encountered during tunneling. Therefore, this is considered a potential direct impact on paleontological resources and a cumulatively considerable impact when combined with potential effects of excavation activities associated with other transit and transportation improvements projects pursuant to the 2008 RTP.

Energy

The Build Alternatives would use energy during operations. However, the Build Alternatives are expected to reduce automobile passenger-miles of travel and associated fossil-fuel-based energy consumption. Reducing automobile travel also reduces vehicle congestion, which reduces energy consumption associated with vehicle idling and vehicle travel at slower speeds. The Project is expected to remove passenger cars from the regional roadway network, easing the increase in regional vehicle miles traveled by 340 to 380 thousand miles and reducing mobile source energy consumption up to nearly 535 billion BTUs compared to the No Build Alternative.

All of the alternatives would decrease regional energy consumption resulting in a beneficial energy impact. The energy consumption associated with these alternatives is not considered a cumulatively considerable impact when combined with energy use associated with other transit and transportation projects pursuant to the 2008 RTP.

Water Quality

The Build Alternatives would not result in either an increase in impervious surfaces, siltation, or changes in the existing amount or runoff patterns within the watershed. With full compliance with existing regulations, including developing and implementing site-specific Standard Urban Storm Water Mitigation Plans that would contain design features and appropriate Best Management Practices (BMP) to reduce post-construction pollutants in stormwater discharges, as well as implementation of identified mitigation measures, the Build Alternatives would not result in significant water quality impacts, and their contribution to the cumulative effect on water quality within the region would be minimal.

Geologic Hazards

As with any transportation and other development projects within the seismically active Southern California region, the Build Alternatives are subject to hazard from fault rupture. The active Santa Monica Fault crosses the Project corridor in at least four

places. While the impact from fault rupture hazard would be reduced through implementation of specialized construction techniques, it cannot be completely eliminated. Therefore, the Build Alternatives would contribute to the significant regional cumulative effect associated with geologic hazards. The potential impacts from seismic ground shaking, hazardous gases, liquefaction, expansive soils, subsidence, and collapse would not be significant with implementation of the identified mitigation measures. The overall contribution of the Build Alternatives to the significant cumulative regional geotechnical effects associated with implementation of the 2008 RTP transportation projects and improvements would be limited.

Hazardous Materials

Several facilities included on hazardous materials site lists were identified along the Build Alternatives' alignments and the two proposed maintenance yards.

Implementation of the identified mitigation measures, such as evaluating whether soils and/or groundwater would require sampling to develop a soil management/groundwater management or contingency plan and implementation of this plan as needed, would reduce this impact to a less than significant level.

Operations and maintenance will require routine transport, use, or disposal of hazardous materials. These materials would typically include fuel, oil, solvents, cleansers and other materials, which are not considered acutely hazardous. Operation of the Build Alternatives is not anticipated to result in exposure to acutely hazardous materials. The Project operations would not substantially contribute to cumulative impacts regarding hazardous materials.

Cumulative Impacts for Construction

The construction impacts assessment indicates that the Build Alternatives would result in the following cumulative impacts.

Traffic

Constructing the Build Alternatives would result in the temporary disruption and rerouting of traffic, including buses, which would contribute to the cumulative increases in congestion within the Study Area. Therefore, this cumulative impact would be significant, particularly along Wilshire Boulevard, from Western Avenue (currently a Metro Purple Line terminus) to near Westwood Boulevard and on Santa Monica Boulevard at station locations. In addition to being one of the Study Area's major travel corridors, Wilshire Boulevard is a major transit link that includes Metro Rapid Bus service and a future dedicated bus lane.

Parking

The Study Area is densely developed and built out with limited opportunities for off-street parking. Station construction under an active thoroughfare necessitates that the station be "decked" over with a supporting steel structure and deck panels. Since the deck structure cannot be used for public parking, there would be a loss of parking spaces. In general, public parking would spill over onto nearby side streets on a first-come basis. This spillover would be further aggravated by the parking of commuting vehicles for construction personnel. To the extent possible within this densely developed



urban area that has very little available space to use for temporary parking, a separate parking area for construction personnel would be designated nearby the work site, if needed. A separate additional area for the public to park may also be provided if there is additional space available for such temporary parking. Nonetheless, when combined with similar parking effects associated with other transit and transportation projects pursuant to the 2008 RTP, the public parking loss during construction would be a significant cumulative impact.

Pedestrian and Bicycle Circulation

High levels of transit boarding activities occur along the affected portions of Wilshire Boulevard, including areas for the proposed stations such as Wilshire/Fairfax, Century City, and Westwood/UCLA. High levels of pedestrian and bicycle circulation occur in the study area, such as Westwood Village and along Santa Monica Boulevard and Sunset Strip. In Westwood, affected transit operations include buses operated by Metro, Santa Monica Transit Big Blue Bus, Culver City Bus, and the UCLA Campus Shuttle. Pedestrian and bicycle movements could be affected at bus stops, street crossings, and along portions of streets affected by construction. Pedestrian and bicycle access in construction areas could also be affected. This includes street crossings, movements along sidewalks/bike lanes, access to local businesses, and access/waiting involving existing bus zones, which require temporary pedestrian diversions. The Build Alternatives would be a component of regional disruptions associated with construction of the 2008 RTP transportation projects and improvements on pedestrian and bicycle circulation. With numerous transit and other transportation projects planned for construction within the same planning horizon as the Project, construction overlap among those projects is highly likely. Metro aims to maintain Americans with Disabilities Act (ADA) compatible sidewalks throughout construction such that pedestrian and bicycle movement are maintained and only short durations where a sidewalk may be closed for construction purposes may be necessary. When combined, the cumulative effect would be considerable in some areas.

Air Quality

Constructing the Build alternatives, including stations, support facilities, subway tunnels and infrastructure, would result in emissions from construction equipment and dust from excavations. Except for nitrous oxides (NO_x), construction emissions of criteria pollutants would be below SCAQMD thresholds. The Build Alternatives would contribute to a cumulative effect of NO_x emissions during construction. Although with the implementation of mitigation measures emissions of PM₁₀ and PM_{2.5} for the Build Alternatives would be below SCAQMD thresholds, the Study Area is in a nonattainment area for these pollutants. The Build Alternatives would contribute to cumulative effects in regards to PM₁₀ and PM_{2.5}. When combined with construction-related emissions generated by other transit and transportation projects, the cumulative air quality impact for NO_x and particulate matter would be significant, but temporary and limited to the duration of construction.

Noise and Vibration

Construction noise and vibration impacts include noise and vibration associated with construction activities and equipment, rerouting traffic, employee vehicle trips, and truck traffic along haul routes. When combined with potential concurrent construction of other projects, the cumulative impact would be significant, although intermittent at various locations.

Community and Neighborhood Effects

Construction of the Build Alternatives would be disruptive to communities and neighborhoods in the immediate vicinity of the Project. However, construction could be phased and perhaps not all of the project communities would experience construction effects at the same time. Nonetheless, 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.

Geologic Hazards

The Build Alternatives are likely to encounter methane gas during construction. Previous projects in the Methane Risk Zone have been successfully and safely excavated. Multiple underground parking garages, like the Los Angeles County Museum of Art parking facility, have been constructed in this area. The Project would apply similar construction measures and there would be no impact on public health and safety. Therefore, the Project would not result in cumulative impacts.

Hazardous Materials

Construction of the Build Alternatives would involve excavating and transporting soils affected by hazardous materials (spoils) for disposal. While contaminated groundwater may be encountered during tunneling and other excavations, groundwater treatment during excavation and/or tunneling activities would ensure that no contaminated water enters the waterways.

Spoils would be disposed of off-site at licensed disposal facilities. However, because all tunneling would be performed with pressure-face tunnel boring machines, spoils would undergo partial treatment (drying of spoils; or de-sanding and other processing of slurry spoils) on-site before being loaded on trucks for off-site disposal. After treatment, those spoils would be disposed of at appropriate licensed facilities. Since there is only a limited number of disposal facilities within the SCAG region, when combined with disposal associated with the construction of other transit and transportation projects pursuant to 2008 RTP, the cumulative effect of transporting hazardous materials outside the SCAG region would be significant.

Water Quality

Constructing the Build Alternatives would proceed in strict compliance with existing regulations and requirements, including National Pollution Discharge Elimination System permit requirements, incorporating BMPs, and implementing a Standard Urban Stormwater Management Plan. Construction would not result in a conversion of



pervious land to impervious land or in a substantial alteration of the existing amount or pattern of runoff. As such, no substantial increases in erosion, siltation, flooding, or exceedance of the stormwater drainage system's capacity would occur. As a result, no significant impact to water quality is anticipated and the Project's contribution to cumulative impacts on water quality from construction would be limited.

Visual Effects

Temporary impacts during construction, including increased dust, stockpiling of construction-related materials, the presence of heavy equipment (e.g., cooling towers for the tunnel boring machines, cranes, bulldozers, graders, scrapers, and trucks), temporary barriers, and enclosures would result in an adverse and locally significant impact on the visual environment. With similar effects associated with construction of other transit and transportation projects pursuant to the 2008 RTP, the combined impact would be significant, though dispersed throughout the area and region.

Biological Resources

The Study Area is a densely developed urban area with limited biological resources. However, construction within such an area could result in the removal of locally protected trees, and tree removal permits would be required to replace or otherwise mitigate the loss of these resources. In addition, the existing urban landscape may provide nesting habitat for migratory birds at some locations. If so, construction may disturb nesting habitat during the migratory birds' breeding season at those locations. In such instances mitigation would be implemented to reduce the impacts on migratory birds, as required under the Migratory Bird Treaty Act. Implementation of these measures would reduce such potential impacts to a less than significant level. Since the Build Alternatives would be contained within a densely built-out urban environment and not affect undisturbed natural areas, the potential to contribute to significant cumulative effects on biological resources—including wetlands, sensitive habitats, and wildlife movement corridors—is limited.

4.18 Relationship between Short-term Uses of the Environment and Long-term Productivity

Pursuant to NEPA and CEQA, significant irreversible environmental changes are described as uses of non-renewable resources during the initial and continued phases of a project that may be irreversible (losses that cannot be recovered or reversed) if removal of the resources occurs, or the loss of future options and the resource cannot be recovered or reused. Primary impacts and secondary impacts, such as dedication of right-of-way to transportation uses, typically commit future generations to similar uses. In addition, irreversible damage can result from environmental accidents associated with a project (CEQA Guidelines 15126(e)).

The Project is included in the Metro LRTP and the SCAG RTP, which consider the need for present and future transportation requirements within the context of present and future land use development in the Southern California region. The local short-term impacts and use of resources by the proposed action are consistent with the maintenance and enhancement of long-term productivity for the local area and region.

The No Build Alternative does not entail construction beyond the projects that are currently under construction and planned. It would not result in short-term or long-term losses or gains. It would not resolve worsening congestion on local streets and highways. As a result, the No Build Alternative would not enhance the Study Area or regional long-term productivity.

The TSM Alternative does not entail major construction, but may include rehabilitating bus stops, maintenance, etc., and would not result in short-term losses or gains associated with construction. By enhancing bus services, the TSM Alternative would offer long-term gains associated with reducing congestion on local streets and highways; however, traffic congestion in the Study Area and along Wilshire Boulevard would continue to be a problem for many communities within the Westside corridor. The TSM Alternative would result in increased jobs and revenue through expanded transit services. It would enhance the local and regional long-term productivity.

For the Build Alternatives, short-term losses would include economic losses experienced by business relocations and construction impacts, such as noise, visual quality, and motorized and non-motorized traffic delays or detours. There would also be a short-term loss of plant resources from removing any street trees or landscaping. This would be considered a short-term loss, since Metro would comply with local tree ordinances and replace trees, as necessary. Short-term benefits would include increased jobs and revenue generated during construction.

Long-term losses associated with the Build Alternatives would include construction materials and energy. Construction activities may result in the loss of paleontological and archaeological site values. The demolition, in whole or part, of three historical properties is also a long-term loss.

Long-term gains include transit network improvement, increased regional and local activity centers access, reduced local street and highway congestion, and increased jobs and revenue through expanded transit services. Equally important, the Build Alternatives



would locate transit alignments and stations in areas with existing land uses conducive to transit use or in areas that have the greatest potential to develop transit-supportive land uses. Sites used for construction staging would be available for development after construction completion, and these vacant parcels would present a future opportunity for TOD. Therefore, the Build Alternatives would enhance the local and regional long-term productivity.

4.19 Irreversible and Irretrievable Commitments of Resources

CEQA Section 15126.2(c) requires a discussion of any significant irreversible environmental changes that would be caused by a proposed project should it be implemented. Generally, a project would result in significant irreversible environmental changes if any of the following would occur:

- The project would involve a large commitment of nonrenewable resources
- The proposed consumption of resources is not justified (e.g., the project involves wasteful energy use)
- The primary and secondary impacts would generally commit future generations to similar uses
- The project involves uses in which irreversible damage could result from any potential environmental accidents associated with the project

Under the No Build Alternative, no new infrastructure would be built within the Study Area, aside from projects currently under construction or projects funded for construction, environmentally cleared, planned to be in operation by 2035, as identified in the Metro LRTP. The No Build Alternative provides the baseline conditions for comparing impacts from all the alternatives.

The TSM Alternative does not have a construction component and would not have an irreversible and irretrievable commitment of nonrenewable resources associated with construction. Operating enhanced bus services under the TSM Alternative would rely upon the use of nonrenewable resources or a commitment of physical resources, such as metal, to the expanded bus fleet. Operation of the TSM Alternative would increase energy consumption due to the maintenance and operations of the expanded bus fleet. The use of fossil fuel would be necessary to provide electricity and fuel for buses, worker vehicles, and maintenance operations.

Construction of the Build Alternatives would entail the one-time irreversible and irretrievable commitment of nonrenewable resources, such as energy (fossil fuels used for construction equipment) and construction materials (such as lumber, sand, gravel, metals, and water). Additionally, labor and natural resources are used to produce construction materials. These materials are generally not retrievable. However, they are not in short supply and their use would not have an adverse effect upon continued availability of these resources. Any construction would also require a substantial one-time expenditure of both local and Federal funds, which are not retrievable.

Land used to construct the proposed facilities is considered an irreversible commitment during the period the land is used. After construction is completed, land used for construction staging would be available for other uses. The heavy rail train system is

primarily underground. The Project would commit land at stations and the maintenance facility to transit use. Station portals, maintenance facilities, and aboveground elements would be located on sites with existing commercial, retail, and industrial uses and would not require a substantial land commitment. This commitment of long-term land resources is consistent with the policies of the County of Los Angeles and the Cities of Los Angeles, Hollywood, West Hollywood, and Santa Monica to promote transit-oriented uses.

The consumption of nonrenewable resources related to the Build Alternatives includes water, petroleum products, and electricity. Tunneling activities would require water for slurry for the tunnel boring machine and in-water cooling towers. While much of this water can be recycled and reused, these processes would also create wastewater that would require disposal. In addition, fossil fuels would be used for transporting workers and materials during construction, and electricity and fuel would be used for trains, stations, and worker vehicles for maintenance and operation during the life of the Project. The consumption amount and rate of these resources would not result in significant environmental impacts or the unnecessary, inefficient, or wasteful use of such resources because they would increase transit use (which increases energy efficiency) and decrease automobile dependence (which uses fossil fuels).

Benefits from the Westside Subway Extension would include improved mobility, transit accessibility, and energy and time savings. The resources commitment and consumption for the Build Alternatives are considered appropriate because regional and local area residents and visitors would benefit from improved transit services, which, in turn, would result in an overall decrease in the irreversible and irretrievable commitment of nonrenewable resources. For example, transportation sources account for over 40 percent of the energy consumed in California. The Project is expected to remove passenger cars from the regional roadway network, easing the increase in VMT and the usage of fossil fuels. The Build Alternatives would reduce regional VMT by 340 to 380 thousand miles and reduce mobile source energy consumption up to nearly 535 billion BTUs. Therefore, the Project can substantially decrease the irreversible and irretrievable commitment of resources.

The Project consists of a heavy rail transit system that would include transit stations, a maintenance facility, and a rail operations center. These components of the Project would primarily use household-type cleaning materials, such as detergents and cleansers. Oil, solvents, and other materials would be used for train maintenance in relatively small volumes and are not considered acutely hazardous materials according to the National Institute of Health. There is the potential for hazardous materials/waste spills to occur; however, the storage and disposal of hazardous materials/waste will be conducted in accordance with all Federal and State requirements in order to prevent or manage hazards. In the unlikely event that a spill does occur, remediation would be conducted accordingly. Therefore, there would be minimal risk of irreversible damage caused by an environmental accident associated with hazardous or acutely hazardous materials.



4.20 Anticipated Permits and Approvals

No permits or approvals are required for the No Build and TSM Alternatives.

The Build Alternatives require compliance with the State General Permit for Storm Water Discharges Associated with Construction Activity (Order No. 99-08-DQW), Construction General Permit (Order No. 2009-0009-DWQ), and Industrial General Permit (Order No. 97-03-DWQ). In addition, tunneling would likely occur at or below groundwater levels, and dewatering is anticipated. An LARWQCB dewatering permit would be required. Waste discharges must comply with LARWQCB Municipal NPDES Permit (LARWQCB Order No. R4-2008-0032) and waste discharge requirements (WDR) (Order No. 93-010 and Order No. 91-93). Approvals for discharges into drainage and sewer systems would be required under Municipal Separate Storm Sewer System (MS4) Permits (Order No. 01-182, NPDES No. CAS004001) from the County of Los Angeles; the Cities of Hollywood, West Hollywood, Los Angeles, Beverly Hills, and Santa Monica; the County Sanitation District; and the Los Angeles County Flood Control District.

Grading and construction permits and compliance with tree protection ordinances would be required by the Cities of Hollywood, West Hollywood, Los Angeles, and Santa Monica. Demolition permits would also be required by these cities for the removal of buildings at construction staging and station areas. Coordination and approvals from the communications and utility purveyors (including, but not limited to, Southern California Edison, Southern California Gas Company, AT&T, Verizon, MWD, LADWP) would be needed for temporary or permanent utilities relocation or service interruption.

All of the Build Alternatives, except MOS 1 and MOS 2, would require coordination with UCLA for constructing the Westwood/UCLA (Off-Street) Station or Option 5, Westwood/UCLA On-Street Station, and the General Services Administration for constructing the alignment and special track work near its facilities east of Interstate 405 (I-405). Alternatives 2, 3, 4, and 5 would also require VA approvals for constructing the station and tracks at the Westwood/VA Hospital (South) Station or Option 6, Westwood/VA Hospital North Station.

For Alternatives 2, 3, 4, and 5, the alignments cross under the I-405 freeway. This would require a California Department of Transportation (Caltrans) encroachment permit and easement. Caltrans coordination and building permits from the County of Los Angeles are also required for expanding the ROC.

For Alternatives 3 and 5, the Wilshire/4th Street Station is located within the coastal zone. Station construction would require a Coastal Development Permit from the California Coastal Commission.

Should the Union Pacific Railroad Los Angeles Transportation Center Rail Yard site be selected as the Project's maintenance facility, a new bridge over the Los Angeles River would be required to access the rail yard. In addition to the permits and approvals above, the following would be required:

- Clean Water Act Section 401 Water Quality Certification (Los Angeles Regional Water Quality Control Board)

Chapter 4—Environmental Analysis, Consequences, and Mitigation

- Clean Water Act Section 404 Permit for filling or dredging waters of the United States (USACE)
- Section 14 of the Rivers and Harbors Act (33 USC 408), also known as Section 408 approval, for alteration of bulkhead, jetty, dike, levee, wharf, pier, or other work built by the United States (USACE)
- Streambed Alteration Agreement (California Department of Fish and Game)
- Approval for right-of-way acquisition (Union Pacific Railroad)