4.18 Construction Impacts

This section summarizes the potential construction impacts of the proposed alternatives, including the Locally Preferred Alternative (LPA). These impacts are drawn from the construction impact findings of the other environmental sections in Chapter 3, Transportation Impacts and Mitigation, Chapter 4, Environmental Analysis, Consequences, and Mitigation, and the technical appendices. The construction methods that would be employed for each of the alternatives, including the LPA, are described in Chapter 2, Alternatives Considered. Construction methods specific to the LPA are described in Section 4.18.2 below. The information in this section is described in more detail in the Construction Impacts Technical Memorandum, which is incorporated into this Final EIS/EIR as Appendix FF.

This section has been updated since publication of the Draft EIS/EIR to address comments received on the Draft EIS/EIR and the Supplemental Environmental Assessment/Recirculated Sections of the Draft EIR (Supplemental EA/Recirculated Draft EIR Sections), as indicated in the Responses to Comments, Volumes F-2 through F-4, of this Final EIS/EIR, and based on refinements to the LPA. Some revisions to this section were necessary to maintain consistency with revisions made in response to comments on other analysis sections. Minor changes have also been made to this section in order to maintain consistency with other Metro projects. A vertical line in the margin is used to show where revisions have occurred to this section since publication of the Draft EIS/EIR, excluding minor edits for consistency and correction of formatting and minor typographical errors. Since designation of an LPA, mitigation measures have been refined and confirmed for the LPA, which are listed in Section 4.18.4.2 below, based on input received during the Draft EIS/EIR and Supplemental EA/Recirculated Draft EIR Sections public review periods. Environmental consequences associated with construction of the LPA are discussed in Section 4.18.3.4 below and mitigation measures associated with construction are referenced in Section 4.18.4.2.

Refinements made since publication of the Draft EIS/EIR have reduced overall construction impacts by eliminating cut and cover construction on 2nd Street in Little Tokyo, eliminating cut and cover construction in the Financial District on Flower Street between 3rd and 4th Streets, moving tunnel boring machine (TBM) construction staging away from the center of Little Tokyo onto the Mangrove property, and reducing the acquisition of businesses and privately-owned property. The eliminated cut and cover segments would be constructed using TBM excavation.

Refinements to the LPA since publication of the Draft EIS/EIR have reduced the significance of potential construction impacts. Less cut and cover construction and fewer business acquisitions would be needed, and TBM staging would be in a less impactful location on the edge of Little Tokyo. By reducing the need for road and sidewalk closures, property acquisitions, job displacement, and overall neighborhood disruption during construction, the refinements have helped reduce potential construction impacts throughout the project area. The mitigation measures listed for the LPA in this section have been refined and expanded in the Mitigation Monitoring and Reporting Program (MMRP), Chapter 8, of this Final EIS/EIR.

4.18.1 Regulatory Framework

NEPA requires an assessment of construction impacts from proposed projects. The following federal regulations also apply to the evaluation of construction impacts for the Regional Connector Transit Corridor project:

- Federal Clean Air Act (CAA)
- National Ambient Air Quality Standards (NAAQS)
- National Pollutant Discharge Elimination System (NPDES)
- Resource Conservation and Recovery Act of 1976 (RCRA)
- Toxic Substances Control Act of 1976 (TSCA)
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

In addition, the State of California augments the requirements of federal regulations in the areas of air and water quality. This supplements the CAA with the more stringent California CAA. Also, the State's Regional Water Quality Control Board (RWQCB) oversees water quality. CEQA does not provide specific construction thresholds for many of the environmental topics analyzed in this EIS/EIR, so the general thresholds were used to analyze impacts for those topics in this section.

At the local level, construction-related air quality regulation imposed by the South Coast Air Quality Management District (SCAQMD) and construction noise ordinances in the Los Angeles Municipal Code (LAMC) would apply to the Regional Connector project.

More information about NEPA, CEQA, and local guidance for each environmental topic is available in the respective sections of Chapter 3, Chapter 4, and the technical appendices.

4.18.2 Affected Environment

This section describes the affected environment as it relates to construction activities for the LPA. Construction activities for the other build alternatives, and the locations along each proposed alignment where different techniques would be used, are described in Section 2.4 and in Appendix K, Description of Construction, of this Final EIS/EIR.

4.18.2.1 Locally Preferred Alternative Construction Scenario Overview

Typical construction activities for the LPA are described in Chapter 2 of this Final EIS/EIR (Section 2.4). The construction duration for the LPA would be approximately four years. However, construction activities at any one location may be shorter. In the vicinity of cut and cover construction, surface streets would be impacted intermittently over a period of 24 to 48 months. Construction could begin simultaneously at several locations along the selected route to minimize the overall construction times. Facilities requiring the lengthiest construction work,

such as tunnels and underground stations, could potentially be started first so that the entire alignment is completed at approximately the same time.

Construction of the LPA would involve conventional techniques and equipment typically used on similar projects in the Southern California region. Methods would include cut and cover and open cut excavation for certain segments of tunnels, crossovers, portals, stations, and ancillary facilities; and TBM excavation for most of the LPA alignment beneath 2nd Street. The portions of the 2nd/Hope Street station and 1st/Central Avenue station within the street right-of-way would be constructed using the cut and cover method, and off-street portions would be constructed using the open cut method. Part of the 2nd/Hope Street station and the crossover near 2nd/Broadway station may also be constructed using the Sequential Excavation Method (SEM). Also, the proposed portal on 1st Street would be constructed using either the open cut or cut and cover method. More information on these construction methods is provided in Section 2.4 and Appendix K, Description of Construction, of this Final EIS/EIR. Figure 4.18-1 shows the approximate locations where these construction methods would be used.

The equipment that would be used during construction may include rail-mounted vehicles, earth moving vehicles, cranes, concrete mixers, flatbed trucks, sand and gravel delivery trucks, dump trucks, and TBMs. These construction vehicles may temporarily impede traffic mobility in areas of construction and, therefore, traffic detours, designated truck routes, and off-peak hauling schedules could be required during construction. Traffic management and traffic control measures would be coordinated with the City of Los Angeles Department of Transportation (LADOT).

Construction would follow all applicable local, state, and federal laws for building and safety. The Metro Fire Life Safety Committee, composed of members from the City and County of Los Angeles Fire Departments and Metro specialists, would approve all construction methods. Working hours could be varied to meet special circumstances. Standard construction methods and best management practices (BMPs) would be used for traffic, noise, vibration, and dust control, consistent with all applicable laws.

To provide an understanding of the likely steps involved, the anticipated construction activities are described below. This potential construction sequence does not represent the order in which construction activities would be performed. Actual construction would be a complex process with many activities taking place simultaneously. Some of the construction methods and sequences would be left to the discretion of the construction contractor.

4.18.2.2 Utility Relocation and Street Closures

Prior to beginning construction, it would be necessary to relocate, modify, or protect in place all utilities and below-grade structures that would conflict with excavations for street level track work and underground structures (cut and cover sections, tunneling, and station structures). Shallow utilities that would interfere with guideway excavation work, such as maintenance holes or pull boxes, would require relocation. This includes some shallow off-street utilities, such as the underground fuel tank on the proposed 2nd/Broadway station site. These utilities would be modified and moved away from the construction area.

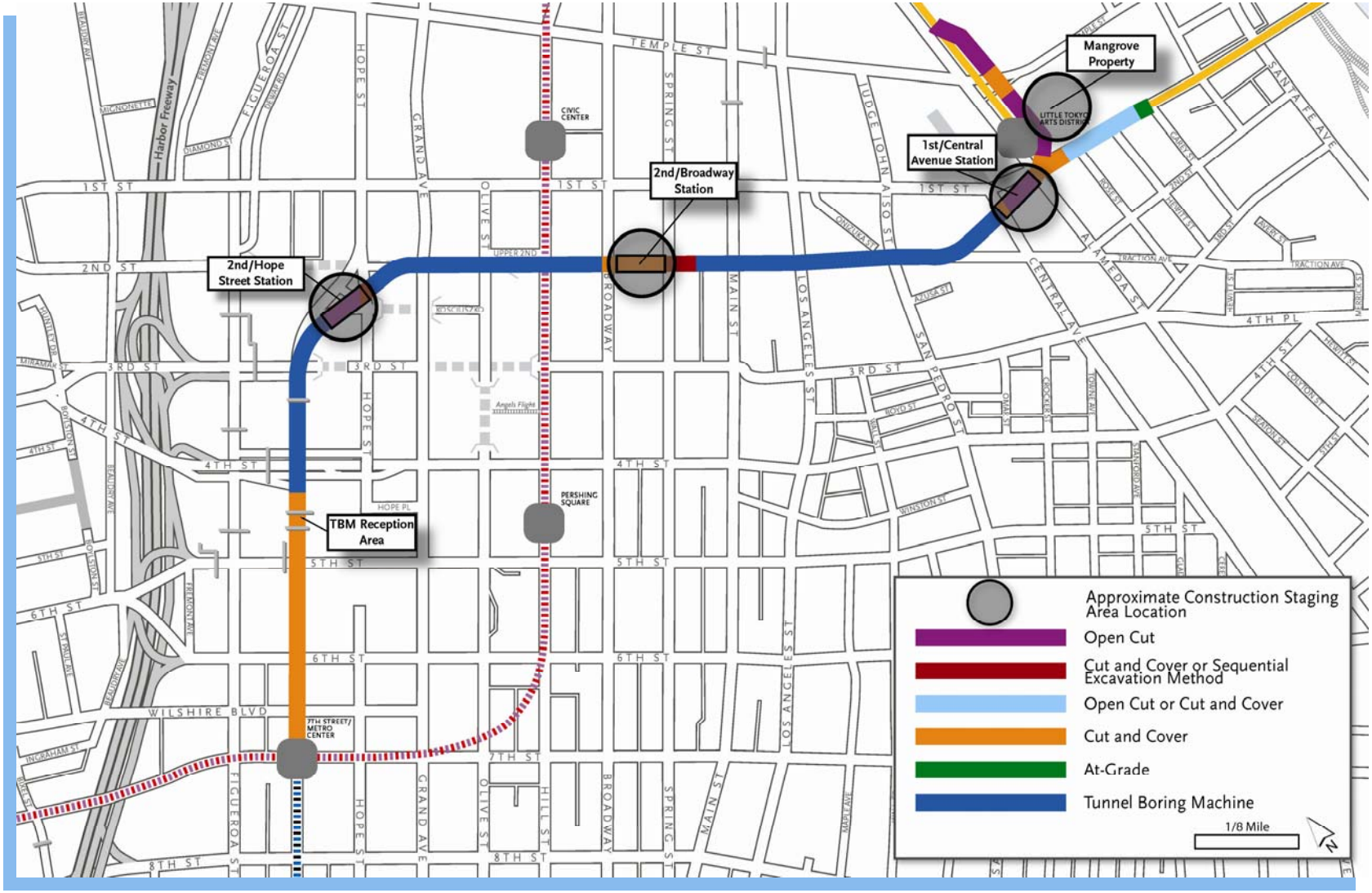


Figure 4.18-1. Locally Preferred Alternative Construction Methods

Travel lanes would need to be temporarily occupied during utility relocation for approximately two to three blocks at a time. Closures could potentially occur in stages and alternate between opposite sides of the street. Depending on the extent of utility relocation work, construction could last up to four months on each two-block segment. Some of the major utilities (greater than 18 to 24 inches in diameter), such as the storm drains on 2nd and Flower Streets, may require more complex construction sequences and schedules for relocations and supports. Other pre-construction activities, such as soldier piling or installation of geotechnical instrumentation, may require temporary partial street closures and the use of drilling equipment and excavators.

4.18.2.3 Staging Areas and Haul Routes

Various locations would be used for construction staging. Typically, a temporary easement would be acquired to reserve portions of the sidewalk and street, and sometimes private property for construction staging. Site clearance and demolition of existing structures at the construction staging areas would be necessary before major construction begins. Construction staging activities are described further in Section 2.4.1 and Appendix K, Description of Construction.

Excavated soils and excess material would be transported off-site to approved disposal sites. To facilitate the removal of excavated materials, haul routes to disposal sites would be pre-determined by agreement with local authorities prior to construction. Testing of materials would be required prior to transportation. Depending on the test results of the soils, disposal options could include the following sites:

California Hazardous (metals) Class I facilities:

- Waste Management Inc., Kettleman City, CA
- Clean Harbors Environmental Services, Buttonwillow, CA
- Veolia Environmental Services, Azusa, CA
- US Ecology Nevada, Inc., Beatty, NV

Non-hazardous, Total Petroleum Hydrocarbon-containing wastes:

- Thermal Processing Systems Treatment, Adelanto, CA

Non-hazardous soil:

- Philadelphia Recycling, Mira Loma, CA
- Municipal landfills
- Other locations identified by the contractor

Routes would follow streets and highways that form the safest, shortest route with the fewest adverse effects on traffic, residences, and businesses. Highways could include Interstate 5 (I-5), State Route 60 (SR 60), US 101, SR 110, I-110, I-10, I-710, and others as appropriate. In addition, the transportation of excavated materials would occur during off-peak hours. The potential staging areas under consideration for the LPA are presented in Chapter 2 and the construction staging drawings in Appendix 1, Locally Preferred Alternative Drawings, of this Final EIS/EIR.

Haul routes would be along major arterial streets. These could include Aliso Street, Temple Street, Commercial Street, 1st Street, 2nd Street, 3rd Street, 4th Street, 5th Street, 6th Street, Wilshire Boulevard, 7th Street, Figueroa Street, Flower Street, Hope Street, Grand Avenue, Olive Street, Hill Street, Broadway, Spring Street, Main Street, Los Angeles Street, San Pedro Street, Central Avenue, and Alameda Street. Due to the large number of industrial and warehouse land uses in the project area, all of these streets currently carry large truck traffic. Precise routes would be confirmed prior to construction.

4.18.2.4 Surface LRT Track Construction Methods

Areas of the LPA where at-grade track work would occur, namely the portal areas near 1st and Alameda Streets and the underground junction, are outlined in Chapter 2. Typical construction activities involved in surface track work are described in Section 2.4.2. Construction would be performed within the roadway median and existing trackway near 1st and Garey Streets, and alongside the roadway, potentially with some temporary staging in the travel lanes. Typical drilling of the shafts for catenary pole and track installation is relatively shallow.

Periodic lane closures, typically on just one side of the work zone, would be required for delivery of materials and other construction activities such as concrete pours.

During construction, cross street and alleyway lanes may be temporarily closed. Depending on allowable working hours, multiple lanes may require closure during excavation, preparation of subgrade, drilling for soldier pile installation, and track foundation placement. Closures would be staggered to facilitate traffic control. Where possible, two-way traffic could potentially be allowed on half of the street.

4.18.2.5 Below Ground LRT Construction Methods

4.18.2.5.1 Cut and Cover Construction

Cut and cover construction would be utilized in various portions of the LPA alignment, as outlined in Chapter 2. These areas include underground cut and cover and trackway construction on Flower Street between Wilshire Boulevard and 4th Street, underground stations, crossovers, portals, and the TBM reception area.

Cut and cover construction is one of various traditional construction methods for underground facilities. Open cut construction method is similar to cut and cover, but does not include temporary decking. Typical activities involved in cut and cover construction are described in Section 2.4.3 and Appendix K, Description of Construction, of this Final EIS/EIR. Cut and cover entails a construction shoring system, excavating down from the ground surface, placing a temporary deck over the excavated area, constructing the underground facilities beneath the

deck, and then backfilling and restoring the surface once the facilities are completed (Figure 4.18-2). Temporary concrete decking can be placed over the cut immediately following the first part of excavation (at about 12 to 15 feet below ground surface) to allow traffic to pass above. The deck may be either flush with the existing street surface, or raised above the street surface with Americans with Disabilities Act (ADA)-compliant ramps to allow continued vehicle and pedestrian access. Once the deck is in place, excavation and internal bracing would continue beneath the deck to the required depth. Once the desired construction is completed inside the excavated area, the deck would be removed, the excavation would be backfilled, and the surface would be restored permanently.

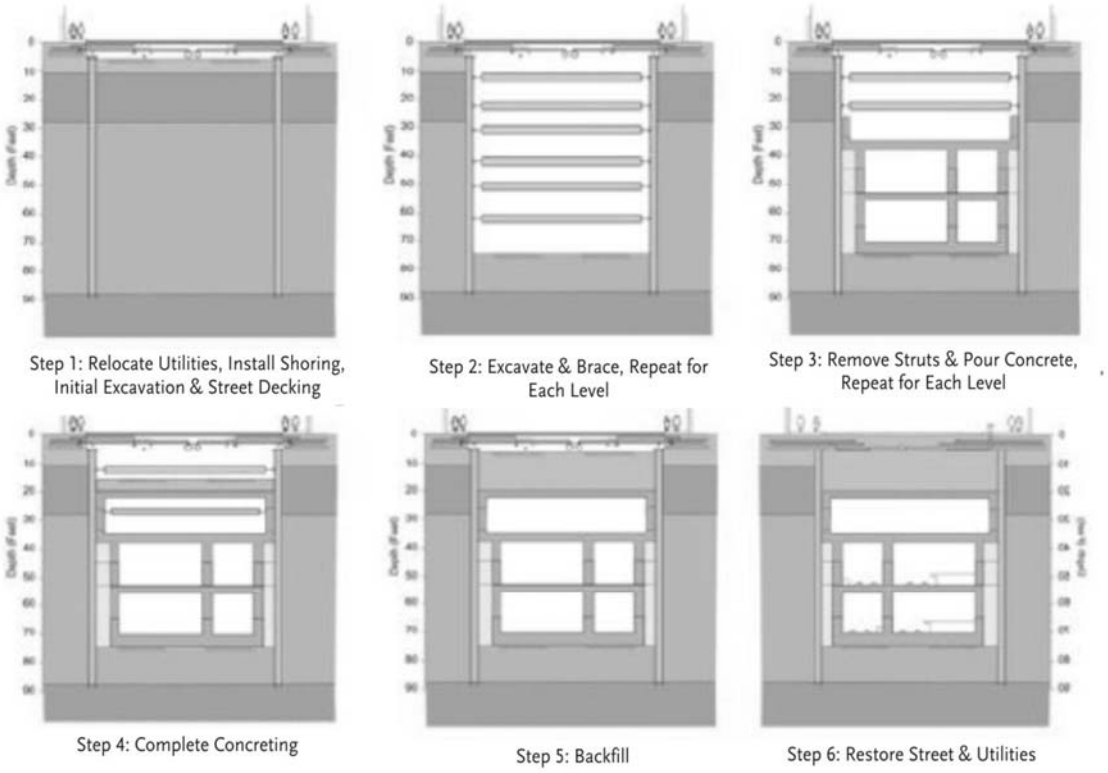


Figure 4.18-2. Cut and Cover Construction Method

Dewatering may be required at underground station locations and tunnel sites to temporarily lower the groundwater level below the excavation depth or to an impermeable layer. Dewatering facilitates installation of shoring systems, improves soil stability, and allows excavation in dry conditions. To dewater an area, groundwater would be pumped from wells installed around the perimeter of the excavation, limiting impacts to surrounding structures, ground, and utilities adjacent to the excavation. Any contaminated groundwater would be properly treated prior to being discharged. Uncontaminated groundwater may be treated and pumped back into the groundwater table, pumped to the sewer or storm drain system, or used on-site for dust control purposes.

Based on experience with the cut and cover construction of the two underground stations on the Metro Gold Line Eastside Extension, after the shoring system was in place, decking installation occurred in only several weekends with non-stop activity from Friday at 5:00 p.m. to Monday morning at 6:00 a.m. with community and local agency approval. Similar progressive staging could be performed for the Regional Connector project, and schedules would be developed in coordination with the affected communities. Portal construction would employ construction methods similar to those used for station excavations and retaining walls, but the portal would remain permanently open and no decking would be required during construction. However, decking may be used during construction of the portal on 1st Street for the LPA.

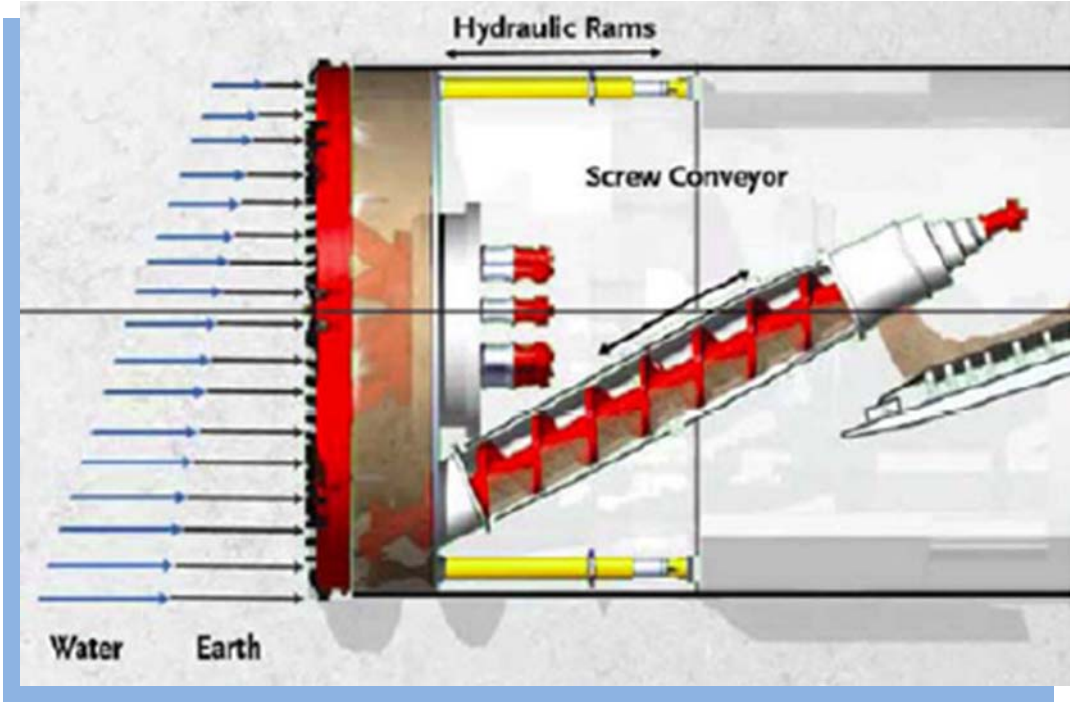
For the LPA, the trackway planned under Flower Street between Wilshire Boulevard and 4th Street, and all underground stations and crossovers would be built with the cut and cover technique. A potential exception is the 2nd/Hope Street station and the crossover near the 2nd/Broadway station, where open cut and SEM construction methods are being considered. Open cut construction would also be used for portions of the 1st/Central Avenue station for the LPA. Underground station construction could last up to 48 months at each underground station location.

Based on the anticipated volume of excavation for the cut and cover tunnel and stations, it is estimated that an average of 20 to 30 dump truck trips per day would be required to haul and dispose of the excavated soils.

4.18.2.5.2 Tunnel Construction and Tunnel Boring Machine (TBM)

Portions of the LPA along 2nd and Flower Streets are anticipated to be bored using a pressurized face TBM(s), as indicated in Chapter 2. Typical activities involved in cut and cover construction are described in Section 2.4.3 and Appendix K, Description of Construction, of this Final EIS/EIR. TBMs are large-diameter horizontal drills that continuously excavate circular tunnel sections. Compared to the cut and cover method, tunnel boring is far less disruptive to surface traffic and adjacent land uses. The excavated materials would be removed through the tunnel using hopper type rail cars or a conveyor system. As the TBM advances, it would support both the ground in front of it and the hole it creates using a shield and pre-cast concrete tunnel liners (Figure 4.18-3). This method creates a tunnel with little disruption at the surface, and is especially suitable for creating a circular opening at depths that would not be practical for cut and cover construction. Concrete tunnel liner segments would have rubber gaskets between them where necessary to prevent water from entering the tunnel, allowing excavation to proceed below the groundwater level.

TBMs require an insertion shaft to start the tunneling operation. For the LPA, the TBM would be inserted into the ground on the Mangrove property on the northeast corner of 1st and Alameda Streets and into Central Avenue through the 1st/Central Avenue station box. The TBM would then excavate toward the 4th and Flower Streets reception area. The TBM would then be dismantled and retrieved through a vertical shaft at the reception area. It would then be transported back to the insertion shaft, and reassembled to repeat its journey for the second twin tunnel. Inserting two TBMs simultaneously, therefore eliminating the need to dismantle and transport a TBM back to the Mangrove property, is an option as well.



Source: CDM, 2009

Figure 4.18-3. Tunnel Boring Machine (TBM) Method

Based on comments received on the Draft EIS/EIR and input received from community meetings held during preparation of this Final EIS/EIR, the TBM insertion site options at 2nd Street and Central Avenue and at 2nd/Hope Street station are no longer being considered for the LPA. Instead, the property at the northeast corner of 1st and Alameda Streets, known as the Mangrove property, would be the insertion site for construction of the LPA. This site is bounded by the Metro Gold Line to the west, Temple Street to the north, 1st street to the south, and Hewitt Street to the east. The property to be used for staging is currently used as an undeveloped surface parking lot with one storage building on-site and is owned by the City of Los Angeles. The TBM would be inserted into the ground on the Mangrove property instead of at the originally proposed 2nd/Central Avenue insertion area, which would reduce the intensity of construction on the block bounded by 1st Street, Central Avenue, 2nd Street, and Alameda Street and result in fewer acquisitions. Spoils (excavated soil) would be removed within the Mangrove property, and trucks would be routed to the east and/or north to reach the freeway, and would not pass through Little Tokyo. Tunnel boring activities from this site would proceed farther down Flower Street to 4th Street, instead of ending at the proposed 2nd/Hope Street station. No cut and cover on 2nd Street in Little Tokyo would be required with use of this TBM insertion site, which would result in less cut and cover overall during construction.

The pre-cast concrete liners would be fabricated off-site and delivered by truck. Segment delivery would require six to ten truck trips per day for the duration of tunneling, assuming an average excavation rate of 35 feet per day for a single tunnel. Should simultaneous tunneling occur, 12 to 20 truck trips would be required for segment delivery. Table 4.18-1 shows the number of truck trips that would be needed to support TBM activities for the LPA. All delivery and hauling would

be performed from Temple Street, Hewitt Street, Vignes Street, and Santa Fe Avenue. Tunneling operation would typically be continuous, occurring seven days a week, 20 hours per day.

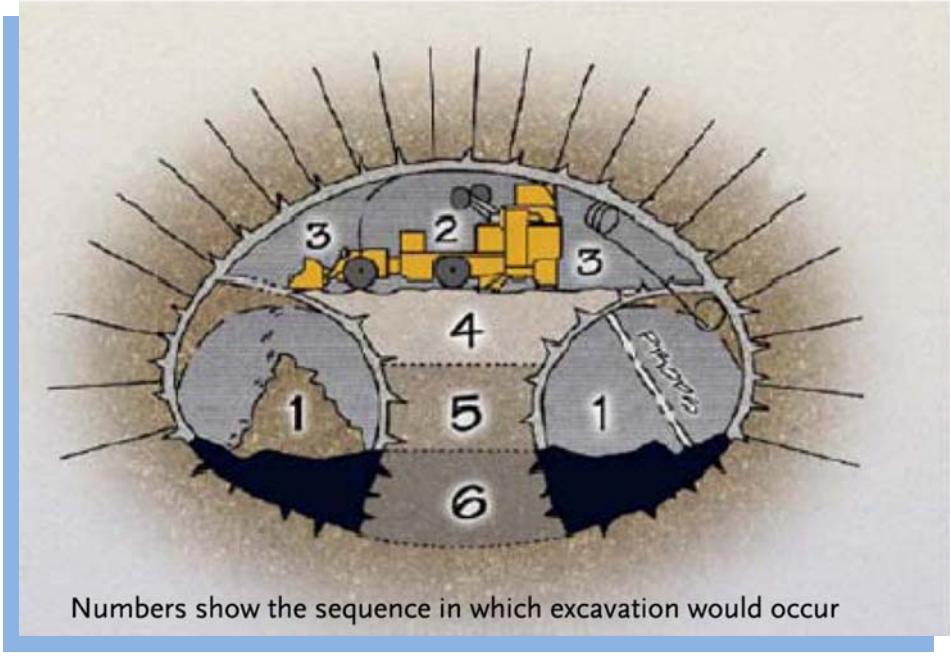
Table 4.18-1. Tunneling Activity Truck Trips for the Locally Preferred Alternative

Activity	Duration (months)	Truck Trips per Day
Pre-Construction	4-6	5
Site Preparation	12-18	10-20
Flower Street Cut and Cover Tunnel	24-48	20-30
2nd/Hope Street Station (SEM)	24-48	10-15
2nd/Hope Street Station (Open Cut)	24-48	20-30
2nd Street TBM Tunnel	24-48	35-70
2nd/Broadway Cut and Cover Station	24-48	15-20
TBM Insertion Site (Mangrove Property)	2-4	5-10
Cut and Cover Tunnel near 1st/Central Avenue Station	12-24	15-20
1st/Central Avenue Open Cut Station	18-36	20-30
Open Cut/Cut and Cover from 1st/Central Avenue to East Portal	12-24	15-20
Open Cut/Cut and Cover from 1st/Central Avenue to North Portal	12-24	15-20
Improvements near 1st and Alameda Streets	12-24	15-20

4.18.2.5.3 Sequential Excavation Method (SEM)

SEM construction involves excavating incrementally in small areas and supporting with steel supports beyond the opening and sprayed concrete as shown in Figure 4.18-4 and described in Section 2.4.4 and Appendix K, Description of Construction, of this Final EIS/EIR. While TBMs can only excavate a fixed circular shape, SEM can be used to construct a tunnel with a horseshoe or sub-rounded shape. This construction technique would be considered in special instances where the planned depth, shape, or length of the tunnel may render it not cost-effective using other methods.

Due to the depth of the 2nd/Hope Street station for the LPA, SEM construction is being considered as an alternative to the open cut and cut and cover methods. Application of SEM would have less surface disruption than these methods since the excavation would be performed mostly underground and accessed via a vertical shaft. SEM can be substituted for cut and cover construction without causing additional impacts.



Source: CDM, 2009

Figure 4.18-4. Sequential Excavation Method (SEM)

4.18.2.6 Additional Construction Activities

4.18.2.6.1 Construction of Underground Station and Portal Structures

Underground stations would be constructed in the following steps: excavation of the station box, followed by the pouring of the foundation base slab, followed by the installation of exterior walls and any interior column elements. Portal structures would use similar construction methods involving placement of concrete inverts, walls, and walkways. Some temporary lane closures would be needed. Station entrance locations would likely be used as access points to underground stations during the construction process. Exterior entrances would be constructed after the station structure has been completed.

Connecting the Regional Connector to the existing Metro Gold Line would require temporary and intermittent interruption of rail service for critical construction activities. There would be two primary closures of the tracks between the intersection of Alameda and Temple Streets, and the intersection of 1st and Vignes Streets, lasting up to six weeks.

In order to maintain rail service to the Eastside Gold Line during construction, Metro would construct a temporary bypass rail connection around the 1st and Alameda Streets intersection.

Approximately one year after start of the construction contract, Metro Gold Line service would be temporarily halted for a period of approximately two to four weeks in order to connect the temporary bypass with existing track immediately south of the existing Little Tokyo/Arts District Station to existing track on 1st Street at Garey Street. During this period, rail service would continue to be provided to the existing Little Tokyo/Arts District Station from Union Station and Pasadena. However, a bus bridge would be needed from Little Tokyo/Arts District Station to all stations further east in the direction of Atlantic Station. Metro would evaluate the possibility of running train service from Atlantic Station to Pico/Aliso Station during this period. Once the temporary bypass is completed and tested, rail service would resume along the entire Metro Gold Line.

Following approximately three to four years of construction, another service interruption of approximately four to six weeks in duration would be required to construct the final section of tracks along 1st Street between Vignes and Hewitt Streets, and to connect the new rail line to the existing Metro Gold Line. During the service interruption, rail service could be maintained from Union Station to the existing Little Tokyo/Arts District Station. Again, a bus bridge would service stations along the Metro Gold Line east of Little Tokyo/Arts District Station.

A likely subsequent scenario would be completion and testing of the Regional Connector, then beginning service along the proposed East-West Line, allowing the new 1st/Central Avenue station to have regional rail service from the Eastside through the Regional Connector to 7th Street/Metro Center Station, continuing on to Santa Monica via the Metro Expo Line.

Once the new East-West Line service is operating, the bus bridge would be shortened to run only between the new 1st/Central Avenue station and Union Station for a period of approximately one year. During this time, construction and testing of the segment of the Regional Connector from the new 1st and Alameda junction to the existing embankment north of Temple Street, would be completed.

As with any existing operating lines, maintenance of tracks and overhead power lines may result in incidental service interruptions along the temporary bypass or the Metro Gold Line during construction. Metro will attempt to minimize closures and shorten the overall project construction schedule in order to reduce customer inconvenience.

4.18.2.6.2 Operating Systems Installation

Operating systems for the LPA would include traction power, an overhead catenary system (OCS), a communications system, and a signal system. An at-grade OCS consists of poles connected to drilled shaft foundations with overhead wires to supply power to the trains. Within the tunnel segments, the OCS would be connected to the top of the tunnels. The system would include Traction Power Substations (TPSS) to provide direct power to the trains. TPSS equipment would need to be installed within station boxes along underground segments of the alignment. Signaling and communications systems would be installed inside the stations and tunnels, and equipment would be housed in ancillary rooms. Communications antennas would be installed on poles or incorporated into existing or planned structures, as described in Section 2.3.3.7.

4.18.2.6.3 Ventilation Shafts and Emergency Exits

The underground segments would include a number of ventilation and emergency exit areas in the vicinity of the underground stations. The stations would house emergency ventilation fan shafts, as well as separate emergency exit shafts at both ends of the stations. Ventilation fans would be installed to extract smoke from tunnels and stairs for evacuation in the event of an emergency, such as a fire in the underground areas. The exact location of these facilities would be determined during the final design. These shafts would be built as extensions of the station excavations using cut and cover construction methods. In some cases, ventilation shafts can extend above ground level, but this is anticipated only at the LPA's 1st/Central Avenue station.

4.18.2.7 Protection of Existing Structures

The alignment of the Regional Connector project and stations have been planned to minimize construction near or beneath the existing structures. However, there are areas where this cannot be avoided. Existing structures along both sides of the LPA alignment on Flower and 2nd Streets would be close to the excavation sites or the tunnel alignment. Building assessments would be necessary as part of the pre-construction evaluation of existing structures along the alignment. During preliminary and final design of the project, subsurface (geotechnical) investigations would be undertaken to evaluate soil, groundwater, and environmental conditions along the alignment. The geologic conditions will influence design and construction methods specified for stations and tunnels and protection of existing facilities and foundations.

Before any construction, a survey of structures within the anticipated zone of construction influence would be conducted in order to establish baseline conditions. A geotechnical instrumentation and settlement monitoring plan and mitigation measures would be developed and adhered to during construction to ensure appropriate measures are taken to address any construction-induced movement.

If assessments indicate the necessity to proactively protect nearby structures, additional support for the structures by underpinning or other ground improvement techniques would be required prior to the underground construction.

For buildings adjacent to cut and cover construction, it is anticipated that the shoring system in conjunction with internal bracing could provide a temporary support for the proposed excavation that would result in deformation generally within the tolerable limits of the structures. Evaluations during future phases of design would help confirm the appropriate levels of monitoring, protection, and mitigation measures required during construction.

To reduce surface settlement and the potential for ground loss and soil instability (sloughing, caving) at the tunnel face due to tunneling, closed pressure-face TBMs and pre-cast, bolted and gasketed segmental lining systems would be employed. In combination with the face pressure, grout would be injected immediately behind the TBM, in the annular space between the installed precast concrete liners (tunnel rings) and the excavated ground. The closed pressure-face TBM can tunnel below the groundwater table without requiring dewatering or lowering of the groundwater table.

Where conditions warrant, for example shallow tunnels directly below sensitive structures or utilities, additional methods to reduce settlement would be specified. The following is a brief summary of the various types of protective methods that could be employed along the alignment.

4.18.2.7.1 Permeation and/or Jet Grouting to Improve the Ground Prior to Tunneling

Chemical (sodium silicate) or cement-based grouts are injected into the ground to fill voids between soil particles and provide greater strength and stand-up time for the soil. This grout can be placed through pipes from the surface before the tunnel reaches the grouted area or from pits or shafts adjacent to the grouted area. The permeation methods have been used successfully for the Metro Red Line in instances where the tunnel passed under potentially sensitive or important structures such as the US 101 Freeway (downtown, Hollywood and at Universal City).

4.18.2.7.2 Compaction Grouting as the Tunnel is Excavated

This method involves injection of a stiff "grout," typically sand with small amounts of cement, above the tunnel crown as the tunnel advances. The grout increases soil density above the tunnel crown and replaces some of the lost ground, thereby preventing settlement from propagating to the surface. This method was used in several instances for the Metro Red Line project in the downtown Los Angeles area and along portions of Hollywood Boulevard.

4.18.2.7.3 Compensation Grouting

Compensation grouting involves carefully controlled injection of grout between underground excavations and structures requiring protection from settlement. For tunnel applications, the pipes for grouting are installed above the intended tunnel position, in advance of tunneling. A major key component in controlling compensation grouting is careful monitoring of both structure and ground movements to allow the timing and quantities of grout injected to be optimized. Grout injection can take place before, during, and after tunneling activity with grout pipes that are designed for multiple grout injections.

For grouting methods, surface preparation would likely be required (removal of landscaping etc.) to allow space for drilling equipment, installation of grout pipes, and injection of grout. In cases where large structures are directly over the tunnel, access into the building or basements, where basements exist, could be required for grouting operations, and use of the building could be limited during the grouting operations. After grouting is completed, the area would be restored to its existing condition.

4.18.2.7.4 Underpinning

Underpinning involves providing a direct support of the foundations of an existing building by carrying its load bearing element to deeper levels than its previous configuration. This method of protection provides positive protection of the building from settlement that may be caused by tunneling operations or open cut station excavations below the bottom of adjacent foundations. It permanently extends the foundations of a structure to an appropriate level beyond the range of influence of the construction activity. This can be accomplished by providing deeper piles

adjacent to or directly under the existing foundation and transferring the building foundation loads onto the new system.

4.18.3 Environmental Impacts/Environmental Consequences

Potential construction impacts would be temporary, short-term effects during construction. Long-term operational impacts are discussed in their respective environmental topic sections in Chapters 3 and 4 and the EIS/EIR technical appendices.

The following sections summarize the evaluation of potential construction impacts for each alternative, including the LPA. Table 4.18-2 summarizes the results of the analysis. Impact conclusions for all of the alternatives are based on the thresholds referenced above in Section 4.18.1.

Table 4.18-2. Summary of Potential Construction Impacts

Alternative	Potential Effects/ Impacts Before Mitigation	Unavoidable Impacts Remaining After Mitigation (NEPA and CEQA)
No Build	None	None
TSM	None	None
At-Grade Emphasis LRT	Adverse effects/ significant impacts	Transportation (traffic circulation, transit, pedestrian, bicycle), air quality
Underground Emphasis LRT	Adverse effects/ significant impacts	Transportation (traffic circulation, transit, pedestrian, bicycle), air quality, paleontological resources
Locally Preferred Alternative	Adverse effects/ significant impacts	Transportation (traffic circulation, transit, pedestrian, bicycle), air quality, paleontological resources

4.18.3.1 No Build and TSM Alternatives

The No Build Alternative would not involve any new construction as part of the Regional Connector project. The TSM alternative would involve installation of new bus shelters and associated safety features to accommodate two new shuttle bus routes between 7th Street/Metro Center Station and Union Station. This construction would be very short-term (days) and would not result in any adverse impacts.

4.18.3.1.1 NEPA Finding

Neither the No Build Alternative nor the TSM Alternative would result in any adverse construction-related effects. Therefore, no mitigation measures would be required.

4.18.3.1.2 CEQA Determination

Neither the No Build Alternative nor the TSM Alternative would result in any significant construction-related impacts. Therefore, no mitigation measures would be required.

4.18.3.2 At-Grade Emphasis LRT Alternative

The potentially significant adverse construction impacts for the At-Grade Emphasis LRT Alternative are described in this section. Other environmental topics and less than significant potential impacts are further discussed in Appendix FF, Construction Impacts Technical Memorandum.

4.18.3.2.1 Traffic, Circulation, and Parking

Construction of the At-Grade Emphasis LRT Alternative would require the loss of on-street parking and reduction in travel lanes in certain locations. In most instances, these would be temporary conditions during the construction phase.

In areas designated for cut and cover construction, the top two to three feet of the roadway would be removed and decking would be installed over a series of long weekends (or other suitable times during the week) spanning an approximate three- to four-month period. Construction of the stations would continue underground while traffic operates normally on the decking. This procedure would require temporary off-peak, nighttime or weekend street closures to install the decking. The closure schedules would be coordinated to minimize impacts to residences, businesses, special events, and traffic flow. During these times, traffic would be re-routed to adjacent streets via clearly marked detours.

Utility relocations, construction of the trackway, stations, and the proposed Alameda Street underpass at Temple Street would require the temporary closure of lanes on Flower Street, Hope Street in the vicinity of General Thaddeus Kosciuszko Way, Main Street, Los Angeles Street, Temple Street, 2nd Street, and Alameda Street. The track construction and permanent street configuration along 2nd Street would result in the elimination of eastbound vehicular travel on the segment of roadway between Hill and Main Streets as well as the permanent closure of one eastbound travel lane between Main and Los Angeles Streets. For the westbound direction of 2nd Street, a one lane permanent closure has been identified between Hill and Los Angeles Streets. Travel times for vehicles traveling along the westbound direction of 2nd Street are expected to increase and eastbound vehicular through traffic would likely shift to 4th and 1st Streets. This shift would result in increased delays at several intersections between Hill Street and Los Angeles Street. Vehicular travel times and intersection operations along these roadways would potentially be impacted.

Construction of the proposed Alameda Street underpass at Temple Street would also result in the temporary reduction of roadway capacity for extended periods of time. In order to maintain two through travel lanes in each direction during construction activities, the two-way left turn median in the mid-block area and the exclusive right and left turn lanes at the intersection approaches would be temporarily eliminated over the two to three year period estimated to construct the underpass. The north and south intersection lane configurations would consist of a shared through and right turn lane and a shared through and left turn lane for the segment of Alameda Street between Aliso and 1st Streets.

The existing signal phasing may be changed to split phasing in order to minimize conflicts between left turns and opposing through movements. This would minimize the formation of queues that could result from a vehicle waiting for a gap in the opposing traffic to complete a left turn movement. Consequently, travel times along this segment of Alameda Street are expected to increase due to the potential for additional traffic congestion. Also, operating conditions for the Alameda Street intersections between Aliso and 1st Streets are expected to experience increased delays.

Construction of the At-Grade Emphasis LRT Alternative would require use of heavy-duty trucks to transport equipment and excavated soil. The addition of these truck trips to the existing street network has the potential to adversely affect traffic and parking. Haul and delivery truck routes would affect residents and commuters along the alignment. Soil hauling, rail and catenary deliveries, and general construction traffic would impact traffic flow patterns as well. Roadway surface restoration may be needed in areas that experience frequent project-related truck trips. These would be temporary conditions during the construction phase.

Existing on-street parking spaces and loading stalls would be temporarily removed during construction. This would potentially impact parking space and loading areas on the east and west sides of Flower Street, the loading areas on the east side of Main and Los Angeles Streets, and the parking spaces on the south side of Temple Street. In addition, the realigned intersection of Hope Street in the vicinity of General Thaddeus Kosciuszko Way may temporarily remove several parking spaces along both the east and west sides of the roadway segment. The track construction and permanent street configuration along 2nd Street would result in the temporary removal of several parking and loading stalls. Adjacent to the Alameda Street underpass, the Japanese American National Museum (JANM) tour bus loading zone on the west side of the street would be temporarily relocated for the duration of the construction period.

As noted earlier, the construction along 2nd Street would shift some of the through traffic movements on to 1st Street, which is designated as a Class III bicycle route. Consequently, the flow of bicycle traffic could be hampered due to increased auto traffic volumes on 1st Street. The additional automobile traffic would result in increased turning movements, potentially reducing bicycle operating speeds or resulting in a greater risk of bicycle-automobile conflict, since Class III routes do not have bicycle-designated lanes.

The construction of the underpass on Alameda Street may result in localized shifts in traffic to adjacent streets such as Central Avenue, which is also designated as a Class III bicycle route. Similarly, the increase in traffic volumes could potentially impact the flow of bicycle traffic.

Track construction, permanent street configuration changes along 2nd Street, and the construction of an underpass on Alameda Street may also require temporary sidewalk detours. Temporary sidewalk detours during the construction of this alternative would impact pedestrian flow.

Restoration of these parking, pedestrian and bicycle circulation, and travel lanes to their permanent configurations would occur prior to operations. Although short-term, potentially adverse impacts are anticipated during construction of this alternative. Potentially adverse

impacts due to the rerouting of transit service could also occur during construction. Combined with the effects of other projects in the downtown area, potential cumulative adverse impacts could occur.

4.18.3.2.2 Displacements and Relocation

During construction of the At-Grade Emphasis LRT Alternative, staging of construction equipment and materials would require temporary construction easements that would impact six parcels. The portions of these parcels that would be utilized would be plazas and open areas. Access to businesses and buildings would be maintained. Some sidewalk detours would be necessary. Mitigation would minimize the adverse impacts associated with this type of displacement during construction. Specific measures are identified in Section 4.2. In addition, once construction is completed, the sites would be restored to their permanent conditions.

4.18.3.2.3 Community and Neighborhood Impacts

Mobility would be reduced in the Civic Center, Historic Core, and Little Tokyo areas due to street closures associated with construction activities including track work, cut and cover excavation, and structural support work. Disruption of traffic patterns would require detours for persons accessing nearby residences and businesses. In Little Tokyo, disruption to traffic along Alameda and Temple Streets would directly affect cultural institutions such as JANM, the Go For Broke Monument, and the Museum of Contemporary Art (MOCA) and other businesses during the excavation and construction of the Alameda Street underpass and the potential pedestrian bridge. This could impact the economic vitality of some businesses, particularly in Little Tokyo, where the community has expressed concern about construction activities. Prolonged disruption to businesses could affect community cohesion. Without mitigation, potential adverse construction impacts associated with community and neighborhoods are anticipated under the At-Grade Emphasis LRT Alternative.

4.18.3.2.4 Visual and Aesthetic Resources

During construction of the At-Grade Emphasis LRT Alternative, several construction staging areas would be utilized. Construction areas would be protected by barriers. The placement of concrete barriers and fencing would be visible from multi-family residences and other sensitive uses adjacent to the alignment, particularly the Bunker Hill Towers, the Higgins Building, Hikari, and Savoy. Viewers would see construction equipment, construction-related activities, and stockpiles of dirt and debris, and the urban streetscape would be temporarily altered. Screening of construction staging areas would minimize aesthetic impacts at street level. The project would be constructed in a heavily urbanized environment where construction activities are not uncommon, and the construction of the project would not noticeably reduce visual quality or alter viewing context. In Little Tokyo, large construction equipment would be required for the excavation and construction of the Alameda Street underpass and of the potential pedestrian bridge. This impact would be temporary and would be considered less than significant. Overall, less than significant impacts associated with views and visual character are anticipated due to construction activities.

Temporary lighting may be necessary for nighttime construction, which minimizes disruption to daytime traffic and business activities and at night for security of staging sites. However, nighttime construction activities would be limited to non-residential areas and nighttime illumination of staging areas would be directed towards the site and away from sensitive uses. Therefore, less than significant impacts are anticipated.

4.18.3.2.5 Air Quality

An analysis of construction-related emissions was completed in accordance with SCAQMD requirements. The estimate included emissions from off-road construction equipment, fugitive dust, construction worker commuting, and haul truck emissions. Daily regional construction emissions are anticipated to exceed SCAQMD regional significance thresholds for VOC, NO_X, CO, PM_{10} and $PM_{2.5}$ and would result in a potential adverse effect without mitigation. Daily regional emissions of VOC, NO_X, and CO would remain significant after mitigation.

In addition to evaluating emissions on a regional level, construction emissions were also compared to SCAQMD's localized significance thresholds. The methodology includes using look-up tables for NO_X, CO, PM_{10}, and $PM_{2.5}$. The tables show the maximum allowable emission levels given the project location, acreage, and distance to the nearest receptor. It was assumed that most project construction sites would be approximately one acre in size and located within 25 meters of a receptor. Cut and cover construction along Flower Street would generate the maximum localized construction emissions. Daily construction emissions are anticipated to exceed SCAQMD localized significance thresholds for NO_X, PM_{10}, and $PM_{2.5}$, and would result in a potentially adverse localized air quality effect, which could be mitigated below the level of significance.

Daily regional and localized construction emissions are anticipated to exceed SCAQMD regional significance thresholds and would result in a potentially adverse cumulative effect without mitigation.

4.18.3.2.6 Noise and Vibration

Construction of the At-Grade Emphasis LRT Alternative would potentially generate noise and vibration from excavators, bulldozers, trenchers, drill rigs, cranes, and heavy-duty trucks used to transport construction equipment. The construction activities and locations with the greatest potential for noise impacts are: the Flower Street cut and cover tunnel, Flower/6th/5th Street station cut and cover construction, 2nd/Hope Street station open cut construction, and construction of the junction and underpass at Temple and Alameda Streets. These four activities have the greatest potential for noise impacts due to the extended duration of work and proximity to noise-sensitive land uses. Potential adverse effects from construction noise are anticipated if mitigation measures are not implemented.

Vibration from large bulldozers and drill rigs could exceed the FTA annoyance criteria for sensitive land uses identified in the Noise and Vibration Technical Memorandum (Appendix S). However, perceptible vibration from construction equipment would be short-term and intermittent. Therefore, perceptible vibration from the construction equipment is considered an "infrequent event," less than 30 events a day as defined by FTA. Occupants would not be subject to vibration levels above the FTA annoyance criteria. It should be noted that large

bulldozers and drill rigs would operate intermittently and would not be used during every day of construction. Without the implementation of mitigation measures, potentially adverse effects from vibration could occur.

4.18.3.2.7 Geotechnical/Subsurface/Seismic/Hazardous Materials

The At-Grade Emphasis LRT Alternative proposed alignment does not cross any known faults. However, portions of the proposed alignment occur in areas mapped with the potential for liquefaction based on soil stability. Areas susceptible to liquefaction are located along Flower Street between Wilshire Boulevard and 2nd Street, and along 2nd Street between Hill and San Pedro Streets. The eastern edge of the alignment near the intersection of 1st and Temple Streets is within the mapped Inundation Hazard Area. In addition, the proposed 2nd/Hope Street station is within the Hillside Ordinance area (Bunker Hill).

During construction of underground stations, portal structures, and the Alameda Street underpass, there is the potential for adverse impacts related to ground settlement and differential settlement on adjacent structures including historical buildings. Further evaluation and survey would be performed during final design to confirm building types and existing conditions, and to develop criteria to limit potential movement to acceptable threshold values. Protection of buildings could involve design of adequately rigid excavation support systems, underpinnings, and ground improvements to minimize settlement to tolerable limits. A pre-construction survey of the adjacent structures and all historical buildings in the vicinity would be conducted to establish a baseline for measuring potential construction-induced damage. Construction monitoring would be required to ensure that ground movement does not exceed threshold values. With mitigation, less than significant impacts would be anticipated.

Construction of surface track work, stations, and portals would likely require removal of protective vegetation or pavement that would increase the potential for soil erosion. With mitigation, potential adverse construction impacts associated with subsurface soils would be less than significant.

4.18.3.2.8 Water Quality

There is known and suspected soil and groundwater contamination along the proposed At-Grade Emphasis LRT Alternative alignment. Construction activities have the potential to increase erosion and sedimentation around proposed construction and staging areas. Grading activities associated with construction could potentially result in a temporary increase in the amount of suspended solids running off construction sites. In a storm event, construction site runoff could result in sheet erosion of exposed soil. Groundwater may be encountered during trenching or tunneling, and would require dewatering. Dewatering activity would result in the potential release of contaminated water due to the presence of relatively shallow groundwater (located at depths ranging from 14 to 36 feet) that is contaminated with pollutants common to urban development. All dewatering activity would occur with a NDPES permit. Testing would occur prior to construction and on-site treatment and discharge in accordance with applicable standards or transport to a treatment or disposal facility would be required. Without mitigation, potential adverse construction impacts associated with water quality would be anticipated under the At-Grade Emphasis LRT Alternative.

4.18.3.2.9 Historic Built Environment Resources

An adverse effect would occur to the 2nd Street Tunnel according to the criteria for adverse effect to a historic property (36 CFR 800.5(a)(1)) due to the demolition of a portion of the National Register of Historic Places (NRHP)-eligible 2nd Street Tunnel and the subsequent change in use. The changes would directly alter a characteristic of the historic property in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.

Seven other NRHP- and/or California Register of Historical Resources (CRHR)-eligible properties could be potentially affected by differential settlement due to cut and cover construction, differential settlement, and construction noise and vibration associated with construction of the At-Grade Emphasis LRT Alternative. The implementation of design measures would protect and stabilize the ground near historic properties as noted in Section 4.12.1.4 of the Draft EIS/EIR. These measures would avoid adverse effects to all of these properties. If properly implemented, short-term construction activities would not directly alter a characteristic of the historic property in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.

4.18.3.2.10 Archaeological Resources

The At-Grade Emphasis LRT Alternative has the potential to alter, remove, or destroy archaeological resources within the area of potential effect (APE). A historic brick alignment may be affected during ground disturbance from construction of a proposed pedestrian bridge at the intersection of Temple and Alameda Streets. The site appears to be not eligible for NRHP or CRHR listing. However, previously unrecorded parts of the site that retain substantial integrity may be present. This alternative also has the potential to affect previously unrecorded archaeological resources during ground disturbance from constructing new underground tunnel segments on Flower Street, new stations, and an automobile underpass and pedestrian overpass on Alameda Street at Temple Street. Such damage to archaeological resources would represent a significant effect that could be mitigated. Implementing mitigation measures described in Section 4.12.2.4 of the Draft EIS/EIR would reduce this effect to a less than significant level.

4.18.3.2.11 Paleontological Resources

The At-Grade Emphasis LRT Alternative would have the potential to adversely impact paleontological resources at the surface and at depth within the project area as a result of ground disturbance related to construction of new underground tunnel segments and at new proposed stations. Any ground disturbances in areas of high sensitivity (see Section 4.12.3) would have the potential to impact paleontological resources at the surface and at depth. Ground disturbance in areas of sensitivity ranging from low to high have the potential to impact paleontological resources at a depth of five feet or greater below the ground surface. In areas where proper mitigation measures in Section 4.12.3.4 of the Draft EIS/EIR can be implemented, potential impacts can be reduced to a less than significant level.

4.18.3.2.12 Ecosystems and Biological Resources

During construction of the At-Grade Emphasis LRT Alternative, some mature trees located along the proposed alignment could be removed. As these mature trees may provide potential nesting and roosting habitat for bird species, including raptors, removal or disturbance of this vegetation during the nesting season could directly impact this habitat and any bird species that are present. There are currently approximately 250 mature trees in the area that could potentially be affected by construction, and some of these trees could be removed or disturbed. Approximately 60 of the trees are native California sycamore trees, a protected species. Potential mitigation measures are described in Section 4.8.4 of the Draft EIS/EIR and include a removal permit from the Los Angeles Board of Public Works, if construction of the project requires removal of any of the native trees, in accordance with the City of Los Angeles Native Tree Protection Ordinance. The tree removal permit may require replanting of native trees within the project area or at another location within the City of Los Angeles to mitigate for the removal of these trees. Implementation of mitigation identified in Section 4.8.4 of the Draft EIS/EIR would reduce this potential impact to a less than significant level.

4.18.3.2.13 Parklands and Other Community Facilities

During construction of the At-Grade Emphasis LRT Alternative, access to the parking structure beneath Maguire Gardens and pedestrian access to the gardens and the City Hall Park could potentially be reduced, but not eliminated, due to street closures and construction activities. Discrete locations along the alignment that could experience modified pedestrian and vehicle access during construction and operation include the new Los Angeles Police Department (LAPD) headquarters, the State of California Department of Transportation (Caltrans) building, City Hall, City Hall East, the U.S. Federal Government Building (Roybal Center), the Los Angeles Ambulatory Care Center, the fire station on Temple Street, and the Little Tokyo Branch Public Library. Disruption of traffic patterns would temporarily impede access to certain community resources such as the MOCA, the Geffen Contemporary at MOCA, City Hall South Lawn Park, Walt Disney Concert Hall, JANM, and the Go For Broke Monument. However, access to the facilities would be maintained throughout construction, though detours or alternate access routes may be needed. Although construction impacts are direct by nature, the construction of the At-Grade Emphasis LRT Alternative alignment could potentially discourage patrons of community facilities and parks to visit them due to impeded access and temporary parking restrictions. This would have the potential to affect annual festivals and events held in the downtown area during the construction period. Response times for emergency services could also be impacted due to street closures and detours, but this would be avoided through mitigation. As such, no adverse construction impacts associated with parklands and other community facilities are anticipated under the At-Grade Emphasis LRT Alternative.

4.18.3.2.14 Economic and Fiscal Impacts

Construction of the At-Grade Emphasis LRT Alternative would directly impact several businesses located along the alignment due to lane closures, sidewalk detours and restricted street parking during track installation and cut and cover activities. These businesses primarily rely on vehicular and pedestrian traffic for revenue generation. Appendix BB, Economic and Fiscal Impacts Technical Memorandum, lists businesses along the proposed alignment that would likely be affected by the track installation and street closures during construction. In addition,

temporary closures or impeded access to Alameda Street during construction of the underpass and potential pedestrian bridge would impact a heavily utilized truck route and impede freeway access to Little Tokyo. Cultural institutions, such as MOCA and JANM, could potentially be impacted directly, and other businesses could be impacted indirectly.

Investment in transportation, including direct investment in the form of capital construction and operation costs, provides economic benefits in several basic ways: the creation of direct and indirect jobs, and spending by suppliers whose goods and services are used in the project. These benefits are discussed in Section 4.14 and Appendix BB, Economic and Fiscal Impacts Technical Memorandum. Overall, the short-term impacts and long-term benefits of the project would result in a net benefit.

4.18.3.2.15 Safety and Security

The contractor would have a safety plan and be responsible for construction site security consistent with local regulations and standards. Construction activities are not anticipated to affect security in the project area. Typically construction areas are fenced off with restricted access and are well lit. Direct adverse impacts are not anticipated with regards to safety or security.

4.18.3.2.16 NEPA Finding

The At-Grade Emphasis LRT Alternative would have adverse construction effects related to the environmental topics shown in Table 4.18-3. Most of these potential effects could be reduced to a not substantially adverse level by the mitigation measures proposed in resource-specific sections in Chapters 3 and 4. However, there would still be unavoidable adverse effects with respect to transportation (traffic circulation, transit, pedestrian, and bicycle) and air quality.

Table 4.18-3 also indicates which of these potential effects would remain adverse after implementation of the mitigation measures referenced in Section 4.18.4 of the Draft EIS/EIR.

4.18.3.2.17 CEQA Determination

The At-Grade Emphasis LRT Alternative would have significant construction impacts related to the environmental topics shown in Table 4.18-3. Most of these potential impacts could be reduced to a less than significant level by the mitigation measures proposed in resource-specific sections in Chapters 3 and 4. However, there would still be unavoidable significant impacts with respect to transportation (traffic circulation, transit, pedestrian, and bicycle) and air quality.

Table 4.18-3 also indicates which of these potential impacts would remain significant after implementation of the mitigation measures referenced in Section 4.18.4 of the Draft EIS/EIR.

Table 4.18-3. NEPA Findings and CEQA Determinations for Potential Construction Impacts of the At-Grade Emphasis LRT Alternative

Topic	Potentially Adverse Effect or Significant Impact Before Mitigation?		Potentially Adverse Effect or Significant Impact After Mitigation?	
	NEPA	CEQA	NEPA	CEQA
Transportation (Traffic Circulation, Transit, Pedestrian, and Bicycle)	Yes	Yes	Yes	Yes
Displacements and Relocation	Yes	Yes	No	No
Air Quality	Yes	Yes	Yes	Yes
Noise and Vibration	Yes	Yes	No	No
Community and Neighborhood Impacts	Yes	No	No	No
Visual and Aesthetic Resources	No	No	No	No
Geotechnical/Subsurface/Seismic/ Hazardous Materials	Yes	Yes	No	No
Historic Built Environment/ Archaeological Impacts	Yes	Yes	No	No
Paleontology	Yes	Yes	No	No
Water Resources	Yes	Yes	No	No
Economic and Fiscal Impacts	Yes	Yes	No	No
Ecosystems and Biological Resources	Yes	Yes	No	No
Parklands and Other Community Facilities	No	No	No	No
Safety and Security	No	No	No	No

4.18.3.3 Underground Emphasis LRT Alternative

The potential adverse construction impacts of the Underground Emphasis LRT Alternative would be similar to those of the At-Grade Emphasis LRT Alternative. Only the differences in impacts between the two alternatives are noted in this section.

4.18.3.3.1 Traffic, Circulation, and Parking

The Alameda Street underpass would be located at Alameda and 1st Streets under the Underground Emphasis LRT Alternative. Other than the difference in location, the construction activities would be the same as described in Section 4.18.3.2.1. Travel times along this segment of Alameda Street are expected to increase due to the potential for increased traffic congestion. Also, operating conditions for the Alameda Street intersections between Aliso and 1st Streets are expected to deteriorate.

Construction of the Underground Emphasis LRT Alternative would require the use of heavy-duty trucks to transport equipment and excavated soil. The additional excavated soil necessary to construct the underground segment along 2nd Street would require more haul trucks than the At-Grade Emphasis LRT Alternative. Haul and delivery truck routes would affect residents and commuters along the proposed alignment. Tunnel spoil hauling, rail and catenary deliveries, and general construction traffic would impact traffic flow as well. Roadway surface restoration may be needed in areas that experience frequent project-related truck trips. These would be temporary conditions during the construction phase.

Lane closures during construction on Flower Street, Hope Street in the vicinity of General Thaddeus Kosciuszko Way, Main Street, 2nd Street, 1st Street, and Alameda Street would result in the temporary removal of existing on-street parking spaces and loading stalls. This would impact parking spaces and loading areas on both sides of Flower Street, on 2nd Street between Spring and Alameda Streets, on Central Avenue and Alameda Street between 1st and 2nd Streets, and on 1st Street between San Pedro and Hewitt Streets. In addition, the realigned intersection of Hope Street in the vicinity of General Thaddeus Kosciuszko Way may temporarily remove several parking spaces along both the east and west sides of the roadway segment. In the vicinity of the Alameda Street underpass, the JANM tour bus loading zone on the west side of the street would be temporarily removed and relocated for the duration of the construction period. Overall, parking impacts during construction would not be considered adverse.

Cut and cover station construction along segments of Flower Street and construction of the underpass on Alameda Street may require temporary sidewalk detours, which could potentially impede pedestrian flow. However, pedestrian flow on 2nd Street would be better under this alternative than the At-Grade Emphasis LRT Alternative.

In addition, the construction of the underpass on Alameda Street may result in localized shifts in traffic to adjacent streets such as Central Avenue, which is designated as a Class III bicycle route. The flow of bicycle traffic could potentially be impacted due to increased traffic volumes on Central Avenue. The additional automobile traffic would result in increased turning movements, potentially reducing bicycle operating speeds or resulting in a greater risk of bicycle-automobile conflict, since Class III routes do not have bicycle-designated lanes.

Impacts to transportation (traffic circulation, transit, pedestrian, and bicycle) during construction would be short-term. However, they would contribute to a potential cumulative adverse effect when combined with other projects in the downtown area. Therefore, potential cumulative adverse transportation impacts are anticipated under the Underground Emphasis LRT Alternative.

4.18.3.3.2 Community and Neighborhood Impacts

Mobility would be reduced in the Financial District, Bunker Hill, Civic Center, Historic Core, and Little Tokyo areas due to street closures associated with construction activities including track installation at 1st and Alameda Streets, cut and cover excavation, and structural support work. Disruption of traffic patterns would impede, but not eliminate, access to residences and businesses.

In Little Tokyo, disruption to traffic along Alameda and 1st Streets would directly affect cultural institutions such as JANM, the Go For Broke Monument, MOCA, the Geffen Contemporary at MOCA, and other businesses during the excavation and construction of the Alameda Street underpass and the potential pedestrian bridge. Disruption would also temporarily impede access to community resources such as City Hall South Lawn Park and Walt Disney Concert Hall. In addition, the installation of TBMs either in the Little Tokyo or Bunker Hill areas would temporarily disrupt communities, businesses, and residents. Buildings likely to experience disruption include Savoy and Honda Plaza in Little Tokyo, and the Bunker Hill Towers. However, access to facilities would be maintained throughout construction, though detours or alternate access routes may be needed, as noted in the transportation mitigation measures in Section 3.4 of the Draft EIS/EIR. Although construction impacts are direct by nature, the construction of the Underground Emphasis LRT Alternative alignment could potentially discourage patrons of community facilities and parks from visiting them due to impeded access and temporary parking restrictions. Without mitigation, potential adverse construction impacts associated with community and neighborhoods would be anticipated under the Underground Emphasis LRT Alternative.

During utility relocation, mobility would be temporarily reduced in the Financial District, Bunker Hill, Civic Center, Historic Core, and Little Tokyo areas. Disruption of traffic patterns would temporarily impede access to residences and businesses. This could impact the economic vitality of some businesses, particularly in Little Tokyo, where the community has expressed concern about construction activities. Prolonged disruption to businesses could affect community cohesion. Without mitigation, potential adverse indirect construction impacts associated with communities and neighborhoods would be anticipated under the Underground Emphasis LRT Alternative.

4.18.3.3.3 Visual and Aesthetic Resources

Visual character impacts would be limited to construction staging areas and would occur to a lesser extent than under the At-Grade Emphasis LRT Alternative, since portions of the Underground Emphasis LRT Alternative alignment would be constructed using TBMs.

4.18.3.3.4 Air Quality

The maximum localized construction emissions would occur during cut and cover construction of the tunnel on Flower Street, the Flower/5th/4th Street station, and the 2nd Street station (either option). The additional soil removal necessary for the underground segment along 2nd Street would also intensify the localized emissions compared to the At-Grade Emphasis LRT Alternative. Daily localized construction emissions are anticipated to exceed SCAQMD significance thresholds for NO_x, PM_{10}, and $PM_{2.5}$ and would result in a potential adverse localized

air quality construction effect. Daily regional construction emissions are anticipated to exceed SCAQMD regional significance thresholds for VOC, NO_x, CO, and $PM_{2.5}$ and would result in a potential adverse effect without mitigation. Daily regional emissions of VOC, NO_x, and CO would remain significant after mitigation. Daily regional and localized construction emissions would also result in a potential adverse cumulative effect without mitigation.

4.18.3.3.5 Noise and Vibration

The Underground Emphasis LRT Alternative would require the same construction equipment as the At-Grade Emphasis LRT Alternative, with the addition of TBMs. TBMs, large bulldozers, and drill rigs would be the main construction vibration sources that could potentially exceed the FTA annoyance criteria for sensitive land uses (Appendix S, Noise and Vibration Technical Memorandum).

Perceptible vibration from construction equipment would be short-term and intermittent, and considered an "infrequent event," (less than 30 events per day) as defined by FTA. Short-term vibration levels during construction could exceed the FTA annoyance criteria. Building occupants would not be subject to vibration levels above the FTA annoyance criteria. It should be noted that large bulldozers and drill rigs would operate intermittently and would not be used during every day of construction. As such, associated noise and vibration impacts would be less than significant.

TBM operation occurs underground and produces little to no noise at the surface. The activity at the potential installation and recovery sites account for most of the noise associated with TBM use. These would be the potential locations where excavated material would be treated and removed. Other construction noise along the TBM segment would be produced by haul trucks and equipment needed to perform utility relocations. Noise from these sources would generate a maximum of 90 dBA at 50 feet and would occur less frequently and for a shorter duration than construction of the At-Grade Emphasis LRT Alternative along 2nd Street.

Using the minimum safe distance, the potential worst-case vibration category, vibration from construction equipment during utility relocation lane closures would result in a potential adverse effect if it occurred less than 21 feet from buildings. A pre-construction survey of structures within 21 feet of the anticipated zone of construction would be conducted to assess the potential for ground-borne vibration (GBV) to cause damage, and to establish baseline pre-construction conditions. Without the implementation of mitigation measures, vibration impacts would be potentially significant.

4.18.3.3.6 Geotechnical/Subsurface/Seismic/Hazardous Materials

Geotechnical, subsurface, seismic, and hazardous materials impacts for the Underground Emphasis LRT Alternative would be similar to those of the At-Grade Emphasis LRT Alternative. In addition to those impacts previously discussed, a limited portion of the alignment near 1st and Alameda Streets would be within the mapped Inundation Hazard Area.

4.18.3.3.7 Historic Built Environment Resources

The Underground Emphasis LRT Alternative's effects on the built environment would be roughly similar to those of the At-Grade Emphasis LRT Alternative, except near the 1st and Alameda

underpass. The proposed train portal at the intersection of Alameda and 1st Streets would be within the viewshed of two historic properties: the Little Tokyo National Historic Landmark District and the NRHP-eligible John A. Roebling Sons Co. Building. However, the portal area is not encompassed within the boundary of a historic property, historical resource, or a contributing element to the significance of either property. An asphalt paved parking lot currently occupies the majority of the parcel. No adverse effect would occur to the Little Tokyo National Historic Landmark District or the John A. Roebling Sons Co. Building from the construction of the portal.

4.18.3.3.8 Archaeological Resources

The Underground Emphasis LRT Alternative would involve substantial ground disturbance, and therefore would have the potential to alter, remove, or destroy archaeological resources within the APE. It has the potential to affect archaeological resources during ground disturbance from constructing a new underground tunnel along its entire route, underground stations, an automobile underpass on Alameda Street between 2nd and Temple Streets, and a potential pedestrian bridge at the intersection of Alameda and 1st Streets.

Potentially affected resources include portions of the Los Angeles Zanja System. Although the precise location and local integrity of the zanjas have not been established, the alternative's 2nd Street alignment would likely cross the system multiple times.

Archaeological sites may extend into the project area and be subject to direct alteration. This would result in a significant effect that could be mitigated. Construction of new stations would almost certainly affect any extant archaeological resources within their footprints. Construction of new tunnel segments through deep tunneling, as opposed to cut and cover techniques, could avoid effects to shallow archaeological resources, although the maximum depth of these resources and minimum depth of construction would both need to be established. Implementing the mitigation measures in Section 4.12.2.4 of the Draft EIS/EIR would reduce this effect to a less than significant level.

4.18.3.3.9 Paleontological Resources

The Underground Emphasis LRT Alternative would involve ground disturbance and therefore has the potential to adversely impact paleontological resources within the project area. This disturbance would result from excavations related to construction of a new tunnel, stations, the Alameda Street underpass and potential pedestrian bridges. Any ground disturbances in areas of high sensitivity would have the potential to impact paleontological resources at the surface and at depth. Ground disturbance in areas of sensitivity ranging from low to high have the potential to impact paleontological resources at a depth of five feet or more below the ground surface. In areas where proper mitigation measures could implemented (see Section 4.12.3.4 of the Draft EIS/EIR), potential impacts can be reduced to a less than significant level. In areas where new underground TBM segments would be constructed, mitigation for paleontological resources would not be feasible and are thus unavoidable (see Section 4.12.3.4 of the Draft EIS/EIR).

4.18.3.3.10 Ecosystems and Biological Resources

The Underground Emphasis LRT Alternative's impacts to ecosystems and biological resources are similar to those of the At-Grade Emphasis LRT Alternative. However, there are currently 170 mature trees in the area that could potentially be affected by construction of the Underground Emphasis LRT Alternative, and some could be removed or disturbed. It is unknown at this time exactly how many trees could be affected. An estimated 40 native California sycamore trees are located in the potential area of impact and could be affected by this alternative.

4.18.3.3.11 NEPA Finding

The Underground Emphasis LRT Alternative would have adverse construction effects related to the environmental topics shown in Table 4.18-4. Most of these potential effects could be reduced to a not substantially adverse level by the mitigation measures proposed in resource-specific sections in Chapters 3 and 4. However, there would still be unavoidable adverse effects with respect to transportation (traffic circulation, transit, pedestrian, and bicycle), air quality, and paleontological resources.

Table 4.18-4 also indicates which of these potential effects would remain adverse after implementation of the mitigation measures referenced in Section 4.18.4 of the Draft EIS/EIR.

4.18.3.3.12 CEQA Determination

The Underground Emphasis LRT Alternative would have significant construction impacts related to the environmental topics shown in Table 4.18-4. Most of these potential impacts could be reduced to a less than significant level by the mitigation measures proposed in resource-specific sections in Chapters 3 and 4. However, there would still be unavoidable significant impacts with respect to transportation (traffic circulation, transit, pedestrian, and bicycle), air quality, and paleontological resources.

Table 4.18-4 also indicates which of these potential impacts would remain significant after implementation of the mitigation measures referenced in Section 4.18.4 of the Draft EIS/EIR.

4.18.3.4 Locally Preferred Alternative

The potentially significant adverse construction impacts for the LPA are described in this section. Operational impacts and less than significant construction impacts are discussed in the topic-specific sections of Chapters 3 and 4.

Table 4.18-4. NEPA Findings and CEQA Determinations for Potential Construction Impacts of the Underground Emphasis LRT Alternative

Topic	Potentially Adverse Effect or Significant Impact Before Mitigation?		Potentially Adverse Effect or Significant Impact After Mitigation?	
	NEPA	CEQA	NEPA	CEQA
Transportation (Traffic Circulation, Transit, Pedestrian, and Bicycle)	Yes	Yes	Yes	Yes
Displacements and Relocation	Yes	Yes	No	No
Air Quality	Yes	Yes	Yes	Yes
Noise and Vibration	Yes	Yes	No	No
Community and Neighborhood Impacts	Yes	No	No	No
Visual and Aesthetic Resources	No	No	No	No
Geotechnical/Subsurface/Seismic/ Hazardous Materials	Yes	Yes	No	No
Historic Built Environment/ Archaeological Impacts	Yes	Yes	No	No
Paleontology	Yes	Yes	Yes	Yes
Water Resources	Yes	Yes	No	No
Economic and Fiscal Impacts	Yes	Yes	No	No
Ecosystems and Biological Resources	Yes	Yes	No	No
Parklands and Other Community Facilities	No	No	No	No
Safety and Security	No	No	No	No

4.18.3.4.1 Traffic, Circulation, and Parking

In areas designated for cut and cover construction, the top 12 to 15 feet of the roadway would be removed and decking would be installed intermittently over a series of weekends (or other suitable times) spanning an approximate three- to four-month period. Construction of the stations would continue underground while traffic operates normally on the decking. This procedure would require temporary off-peak street closures to install the decking, such as weekends or other suitable times. The closure schedules would be coordinated to minimize

impacts to residences, businesses, and traffic flow. During these times, traffic would be re-routed to adjacent streets via clearly marked detours. Temporary sidewalk detours in the cut and cover areas could potentially impede pedestrian flow, but access would be maintained throughout the construction period.

In addition, the construction of the underground junction on Alameda Street and cut and cover activity on Central Avenue may result in localized shifts in traffic to adjacent streets. The flow of bicycle traffic on some streets could potentially be impacted due to increased traffic volumes. The additional automobile traffic would result in increased turning movements, potentially reducing bicycle speeds or resulting in a greater risk of bicycle-automobile conflict, since all bicycle routes in the downtown area are Class III routes, which do not have bicycle-designated lanes.

Lane closures during construction on Flower Street, Hope Street in the vicinity of General Thaddeus Kosciuszko Way, 2nd Street, Central Avenue, 1st Street, and Alameda Street would result in the temporary removal of existing on-street parking spaces and loading stalls. This would impact parking spaces and loading areas on both sides of Flower Street, on 2nd Street at the 2nd/Broadway station site, on Central Avenue and Alameda Street between 1st and 2nd Streets, and on 1st Street between Central Avenue and Vignes Street. In addition, the realigned intersection of Hope Street in the vicinity of General Thaddeus Kosciuszko Way may temporarily remove several parking spaces along both the east and west sides of the roadway segment. In the vicinity of the Alameda Street underpass, the JANM tour bus loading zone on the west side of the street would be temporarily removed and relocated for the duration of the construction period. Off-street parking needs would be monitored and addressed as described in the Environmental Justice section of the MMRP. Overall, street parking impacts during construction would not be considered adverse.

Construction of the proposed Alameda Street portal north of Temple Street would result in the reduction of roadway capacity for extended time periods during construction. Two through travel lanes would be maintained in each direction along Alameda Street from Temple Street northwards, tapering back to three through lanes in each direction near Aliso Street. As a result of this configuration, the two-way left turn median in the mid-block area and the exclusive right and left turn lanes at the southbound intersection approach at Temple Street would be temporarily eliminated during the period needed to construct the portal. The southbound intersection lane configuration at Temple Street would consist of a shared through and right turn lane and a shared through and left turn lane.

The existing signal phasing may be changed to split phasing to minimize conflicts between southbound left turns and the opposing northbound through movements. This would help prevent the formation of queues behind vehicles waiting for a gap in opposing traffic to complete left turn movements. Consequently, travel times for vehicles along this segment of Alameda Street would be expected to increase due to the potential for additional congestion and changed operating conditions at the intersection of Temple and Alameda Streets.

On 1st Street between Alameda and Vignes Streets, one through travel lane in each direction would need to be removed temporarily during construction. This could cause additional

congestion. However, the 1st Street bridge is currently operating one-way eastbound with only two lanes, and lengthy delays do not frequently occur.

The conclusion of the construction phase would include restoration of the travel lanes and parking, pedestrian, and bicycle facilities to their permanent configurations. Potential short-term, adverse impacts are anticipated during construction of this alternative. Potentially adverse impacts due to the rerouting of transit service could also occur during construction. Impacts to transportation (traffic circulation, transit, pedestrian, and bicycle) during construction would be short-term, but they would result in a considerable contribution to a potential cumulative adverse effect when added to other projects in the downtown area. Therefore, potential cumulative adverse transportation impacts are anticipated under the LPA, and these impacts may remain significant after mitigation.

4.18.3.4.2 Displacements and Relocation

During construction of the LPA, staging of construction equipment and materials would require 12 temporary construction easements. The portions of these parcels that would be utilized would be plazas and open areas, and no buildings would be removed on these construction easement parcels. Access to businesses and existing buildings would be maintained. Sidewalks and detour routes would also be reconfigured as needed. Mitigation would minimize the potential adverse impacts associated with this type of displacement during construction. The LPA would not result in a considerable contribution to a cumulative impact. Specific measures are provided in Section 4.2.4.2 and the MMRP for the LPA (Chapter 8) of this Final EIS/EIR. In addition, once construction is completed, the sites would be restored to their permanent configurations.

4.18.3.4.3 Community and Neighborhood Impacts

Disruption of traffic patterns would impede, but not eliminate, access to residences and businesses, though to a lesser extent than the other build alternatives. In Little Tokyo, there would be less disruption to traffic along Alameda and 1st Streets than with the Underground Emphasis LRT Alternative because this alternative does not include the excavation and construction of the Alameda Street underpass or construction of the potential pedestrian bridge across Alameda Street. However, the cut and cover construction of the rail junction beneath the intersection of 1st and Alameda Streets would still cause disruption. Since preparation of the Draft EIS/EIR, the proposed TBM insertion area has been moved from 2nd Street to the Mangrove property (northeast of 1st and Alameda Streets), thereby eliminating the need for cut and cover construction on 2nd Street in Little Tokyo, removing some construction truck trips from the community, and reducing potential business impacts. Cut and cover impacts would also be reduced in the Financial District, because proposed TBM operation would extend to 4th Street, thus eliminating cut and cover activities on Flower Street between 3rd and 4th Streets. This constitutes an overall reduction in community and neighborhood impacts during construction.

Compared to the Underground Emphasis LRT Alternative, the LPA would have a larger construction area because two portals would need to be built east of Alameda Street. The impacts of these two portals would be less than those of the single portal proposed as part of the Underground Emphasis LRT Alternative because they would be located further from most

Little Tokyo businesses and community resources. As noted in Chapter 3, no additional traffic impacts would occur, and community disruption during construction would be reduced.

During utility relocation and rail construction, mobility would be reduced in the Financial District, Bunker Hill, Civic Center, Historic Core, and Little Tokyo areas. Disruption of traffic patterns would affect access for residents and businesses, though to a lesser extent than the other two build alternatives. This could impact the economic vitality of some businesses, particularly in Little Tokyo, where the community has expressed concern about construction activities. Access to cultural institutions such as JANM, the Go For Broke Monument, and MOCA would also be affected, though access routes would be maintained at all times. Prolonged disruption to businesses and cultural institutions could affect the cohesion of some communities, including Little Tokyo. Potential adverse indirect construction impacts associated with community and neighborhoods would be anticipated under the LPA, but can be mitigated through measures in Section 4.18.4.2.3 below and the MMRP for the LPA (Chapter 8). This adverse impact would not result in a considerable contribution to a cumulative impact. Construction activities would introduce construction employees into the area temporarily, who could become new customers of neighborhood restaurant and retail establishments.

4.18.3.4.4 Visual and Aesthetic Resources

During construction of the LPA, several construction staging areas would be utilized. Construction areas would be protected by barriers. The placement of concrete barriers and fencing would be visible from multi-family residences and other sensitive uses adjacent to the alignment, particularly the Bunker Hill Towers, the Higgins Building, Hikari, and Savoy. Viewers would see construction equipment, construction-related activities, and stockpiles of dirt and debris, and the urban streetscape would be temporarily altered. Screening of construction staging areas with art-enhanced construction walls and fencing would minimize aesthetic impacts at street level. In some locations where the proposed construction staging areas are currently occupied by empty lots or surface parking, the art-enhanced construction barriers may constitute a visual improvement at street level. The project would be constructed in a heavily urbanized environment consisting of high- and mid-rise buildings, where construction activities are not uncommon, and the construction of the project would not noticeably reduce visual quality or alter viewing context. In Little Tokyo, large construction equipment would be required for the excavation and construction of the Alameda Street underground junction and for construction of the 1st/Central Avenue station. Large equipment would also be needed on the Mangrove property to support TBM operations. This impact would be temporary and would be considered less than significant. Overall, less than significant impacts associated with views and visual character are anticipated due to construction activities.

Temporary lighting may be necessary for nighttime construction, which minimizes disruption to daytime traffic and business activities, and at night for security of staging sites. However, nighttime construction activities would be limited to non-residential areas to the extent practicable, and nighttime illumination of staging areas would be directed towards the site and away from sensitive uses. Therefore, less than significant impacts are anticipated.

During construction, nighttime lighting would predominantly consist of security lighting, and light would be directed on-site. As such, nighttime lighting impacts would not be adverse or

significant during construction. Shade and shadow impacts associated with construction-related facilities and equipment located aboveground would be minimal compared to those currently created by the high- and mid-rise buildings along the alignment's corridors. Therefore, no shade or shadow impacts would result. Construction of the LPA would not result in significant impacts to scenic resources. Therefore, construction of this alternative would not result in a considerable contribution to a cumulative scenic resource impact.

4.18.3.4.5 Air Quality

An analysis of construction-related emissions was completed in accordance with SCAQMD requirements using the methodology presented in Section 4.5.1.2. The estimate included emissions from off-road construction equipment, fugitive dust, construction worker commuting, and haul truck emissions. Daily regional construction emissions are anticipated to exceed SCAQMD regional significance thresholds for VOC, NO_X, CO, and $PM_{2.5}$ and would result in a potential adverse effect without mitigation. Daily regional emissions of VOC, NO_X, and CO would remain significant after mitigation.

The maximum localized construction emissions would occur during cut and cover construction of the tunnel along Flower Street and cut and cover construction of the 2nd Street/Broadway station. Daily localized construction emissions are anticipated to exceed SCAQMD significance thresholds for NO_X, PM_{10}, and $PM_{2.5}$ and would result in a potential adverse localized air quality construction effect.

The LPA would have greater construction emissions than the other build alternatives because of the additional excavation needed for the underground station at 1st Street and Central Avenue as well as the underground junction beneath Alameda and 1st Streets. Additional truck trips to dispose of excavated material would also be needed. This would result in an increase in NO_X and diesel particulate matter emissions.

Daily regional and localized construction emissions would result in a considerable contribution to a cumulative effect without mitigation. Regional construction emissions would remain cumulatively significant after mitigation.

4.18.3.4.6 Noise and Vibration

For the LPA, the following construction activities would have the most potential for construction-related noise and vibration impacts: cut and cover construction of a tunnel at Flower Street; cut and cover construction of the approach to the proposed 2nd/Hope Street station and cut and cover or SEM construction of the station itself; construction of the proposed 2nd Street/Broadway station; construction of the proposed 1st/Central Avenue station; and TBM tunneling beneath 2nd Street and the insertion site northeast of the 1st and Alameda Streets intersection. These seven activities have the most potential for noise and vibration impacts due to their duration and their proximity to noise sensitive land uses.

Estimated construction noise levels (as indicated in Table 4.7-15) would not exceed FTA construction noise criteria identified in Section 4.7.3 above, and impacts would be less than significant. Consistency with the goals of applicable local ordinances and implementation of BMPs, listed in Section 4.7, would ensure that noise associated with construction of the LPA

would not result in a significant adverse impact to sensitive land uses as classified by the FTA (e.g., residences, hospitals, and hotels are Category 2 land uses). Mitigation has also been incorporated to ensure that the FTA construction noise criteria is not exceeded.

The FTA provides short-term GBV and ground-borne noise (GBN) impact criteria for project operations, which may also be used to assess human annoyance caused by vibration from construction activities. These criteria, identified in Section 4.7.1, were used for evaluating the LPA's potential GBV and GBN impacts during construction. Large bulldozers and drill rigs, the main at-grade sources of construction vibration, could exceed levels specified in FTA annoyance criteria for sensitive land uses. Taking into account a 10 dBA reduction in vibration for coupling to building foundation loss (Table 10-1, FTA 2006), occupants would not be subjected to vibration annoyance impacts. It should be noted that large bulldozers and drill rigs would operate intermittently and would not be used every day of construction. In addition, construction of the alignment would not dwell in one location for the entire duration of construction. Therefore, vibration impacts (including GBN) associated with large bulldozers and drill rigs would be less than significant.

Additional noise and vibration studies (contained in Appendix 2, Updated Locally Preferred Alternative Noise and Vibration Analysis, of this Final EIS/EIR) were performed for refinements to the alignment associated with the LPA. Due to refinements to the LPA, the TBM and delivery trains used in the tunnel during construction could exceed levels specified in FTA annoyance criteria (See Tables 4.7-2 and 4.7-3) for the following sensitive land uses: the Walt Disney Concert Hall; office uses in the JVP; the Hikari Lofts; and the Nakamura Tetsujiro Building. During construction, GBV and GBN generated by the TBM would result in significant and adverse impacts to the Japanese Village Plaza (JVP); the Hikari Lofts, and the Nakamura Tetsujiro Building. The TBM and Delivery trains would result in a significant GBN noise impact to the Walt Disney Concert Hall, and the Broad Art Foundation Museum, which is currently under construction. With implementation of mitigation measures identified in Section 4.18.4.2.6, GBV and GBN impacts would be reduced to less than significant.

As a school, the Colburn School is properly considered as a Category 3 land use in Section 4.7, which determined that no significant impacts would occur to the school during construction. However, at the request of the Colburn School, additional noise analysis was undertaken, treating the school as a Category 1 land use. If the Colburn School were a Category 1 land use, a potentially significant GBN impact could occur at the Colburn School due to operation of the TBM and delivery trains during construction. Thus, in an abundance of caution, the mitigation identified for the Walt Disney Concert Hall in Section 4.18.4.2.6 below has been modified to ensure that GBN generated by the TBM and delivery trains would not impact the sensitive activity occurring at the Colburn School.

For the LPA, the at-grade junction and underpass on Alameda Street proposed for the other build alternatives would not be constructed. This would remove a construction noise source in the Little Tokyo community that would last for a two to three year period under the At-Grade and Underground Emphasis LRT Alternatives. However, noise would still be generated by construction of the underground rail junction beneath 1st and Alameda Streets and the new portals on 1st Street and near Temple and Alameda Streets. Consistency with the goals of

applicable local ordinances and implementation of BMPs, listed in Section 4.7, would ensure that noise associated with construction of the LPA would not result in a significant adverse impact.

FTA guidelines, identified in Section 4.7.1.1, address the potential for construction-activity-induced vibration to damage buildings. With regard to the physical structure of the building, sensitive buildings (Category I, II, III, IV buildings as defined in Table 4.7-4), or historic buildings in the vicinity of construction may be susceptible to vibration damage. Large bulldozers and drill rigs would be the main source of construction vibration that could have the potential to cause vibration damage. Using the minimum safe distance, the potential worst-case vibration category, sensitive buildings (Category I, II, III, IV buildings as defined in Table 4.7-4) or historic buildings within 21 feet of construction may be susceptible to vibration damage and impacts could be significant. As part of mitigation for the LPA, a pre-construction survey of all structures within 21 feet of the anticipated vibration-producing construction activity would be conducted to confirm the building category, structural condition, and to provide a baseline for monitoring of GBV and the potential for GBV to cause damage. Potentially adverse effects from vibration could occur, but could be mitigated below the level of significance. With implementation of mitigation measures identified in Section 4.18.4.2.6 below, construction of the LPA would not result in a considerable contribution to potentially significant cumulative noise or vibration impacts.

4.18.3.4.7 Geotechnical/Subsurface/Seismic/Hazardous Materials

The proposed LPA alignment does not cross any known faults. However, portions of the proposed alignment occur in areas mapped with the potential for liquefaction based on soil stability. Areas susceptible to liquefaction are located along Flower Street between Wilshire Boulevard and 2nd Street, and along 2nd Street between Hill and San Pedro Streets. The eastern edge of the alignment along 1st Street is within the mapped Inundation Hazard Area. In addition, the proposed 2nd/Hope Street station is within the Hillside Ordinance area (Bunker Hill).

During construction of underground stations, portal structures, and the underground rail junction at 1st and Alameda Streets, there would be potential for adverse impacts related to ground settlement and differential settlement on adjacent structures including historical buildings. Further evaluation and survey would be performed during final design to confirm building types and existing conditions, and to develop criteria to limit potential movement to acceptable threshold values. Protection of buildings could involve design of adequately rigid excavation support systems, underpinnings, and ground improvements to minimize settlement to tolerable limits. A pre-construction survey of the adjacent structures and all historical buildings in the vicinity would be conducted to establish a baseline for measuring potential construction-induced damage. Construction monitoring would be required to ensure that ground movement does not exceed threshold values. With mitigation, less than significant impacts would be anticipated.

Construction of surface track work, underground stations, and portals would likely require removal of protective vegetation or pavement that would increase the potential for soil erosion. With mitigation, potential adverse construction impacts associated with subsurface soils would

be less than significant. Implementation of mitigation measures identified in Section 4.18.4.2.7, along with compliance with applicable hazardous waste laws and regulations, would ensure the LPA would not result in a considerable contribution to cumulative impacts.

4.18.3.4.8 Water Quality

There is known and suspected soil and groundwater contamination along the proposed LPA alignment. Construction activities have the potential to increase erosion and sedimentation around proposed construction and staging areas. Grading activities associated with construction could potentially result in a temporary increase in the amount of suspended solids running off construction sites. In a storm event, construction site runoff could result in sheet erosion of exposed soil. Groundwater may be encountered during trenching or tunneling, and would require dewatering. Dewatering activity would result in the potential release of contaminated water due to the presence of relatively shallow groundwater (located at depths ranging from 14 to 36 feet) that is contaminated with pollutants common to urban development. All dewatering activity would occur with a NDPES permit. Testing would occur prior to construction and on-site treatment and discharge in accordance with applicable standards or transport to a treatment or disposal facility would be required. Potential adverse construction impacts associated with water quality would be anticipated, but could be mitigated below the level of significance. Overall, construction and operation of the LPA would not result in a considerable contribution to significant cumulative water quality, hydrology, and/or drainage impacts.

4.18.3.4.9 Historic Built Environment Resources

Differential settlement during construction would potentially affect eight historic resources in the project area, but these effects could be mitigated below the level of significance by mitigation measures listed in Section 4.18.4.2.9. These include implementation of design measures that would protect and stabilize the ground near historic properties. Mitigation measures would also avoid short-term construction effects that could directly alter a characteristic of historic properties in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.

The use of large bulldozers and drill rigs may cause construction-related GBV to 12 historic properties. Potential impacts to these properties could also be mitigated using measures listed in Section 4.18.4.2.9, including the same ground stabilization techniques used to address differential settlement.

TBM construction activities have the potential to introduce GBN that would cause a moderate impact under FTA's noise guidance at the Walt Disney Concert Hall. This effect has the potential to alter the building's use and diminish its historical integrity if not mitigated. This impact can be mitigated to reduce the noise impact below significance so that the concert hall and recording facility use would not be adversely affected. The effect would not be adverse in nature, if mitigation measures described in Sections 4.18.4.2.9 are implemented.

The proposed portal within 1st Street between Alameda and Garey Streets would be within the viewshed of two historic properties: the Little Tokyo National Historic Landmark District and the NRHP-eligible John A. Roebling Sons Co. Building. However, the portal is not encompassed

within the boundary of a historic property, historical resource, or a contributing element to the significance of either property. Potential effects would not alter the setting of historic properties in a manner that would diminish the integrity of the historic district.

Implementation of mitigation measures identified in Section 4.18.4.2.9 would ensure the LPA would not result in a considerable contribution to cumulative impacts.

4.18.3.4.10 Archaeological Resources

Construction of the LPA has the potential to directly affect archaeological resources within the APE, including previously unidentified archaeological resources, the Los Angeles Zanja System, and three other known archaeological sites. Although the precise location and local integrity of the zanjas have not been established, the project's 2nd Street alignment likely crosses the system multiple times.

As with the Underground Emphasis LRT Alternative, archaeological features associated with these sites may extend into the project area and be subject to direct alteration. This would result in a significant effect. Construction of new tunnel segments through deep tunneling, as opposed to cut and cover techniques, could avoid effects to shallow archaeological resources, although the maximum depth of these resources and minimum depth of construction would both need to be established to ascertain actual effects. Implementation of mitigation measures described in Section 4.18.4.2.10 would reduce potential direct impacts to identified and previously unidentified archaeological resources to a less than significant level.

The LPA would not result in a considerable contribution to a cumulative impact on unidentified archaeological resources. Potential destruction of portions of the Los Angeles Zanja System could result in a considerable contribution to a cumulative impact to this resource. Implementation of the mitigation measures described in Section 4.18.4.2.10 would reduce both direct and cumulative impacts to known archaeological resources, including the Zanja System, to a less than significant level.

4.18.3.4.11 Paleontological Resources

The LPA would involve ground disturbance associated with excavations to construct three new stations and an entirely underground tunnel located from the 7th Street/Metro Center Station to the east and north of the intersection of 1st and Alameda Streets. Any ground disturbances in areas of high sensitivity would have the potential to impact paleontological resources at the surface and at depth; areas of ground disturbance in areas of sensitivity ranging from low to high have the potential to impact paleontological resources at a depth of five feet or more below the ground surface. In areas where mitigation measures can be implemented, potential impacts could be reduced to a less than significant level. In areas where new underground TBM segments would be constructed, mitigation for paleontological resources would not be feasible resulting in significant and unavoidable impacts.

4.18.3.4.12 Ecosystems and Biological Resources

During construction of the LPA, some mature trees located along the proposed alignment could be removed. As these mature trees may provide potential nesting and roosting habitat for bird species, including raptors, removal or disturbance of this vegetation during the nesting season

could directly impact this habitat and any bird species that are present. There are currently approximately 87 mature trees in the area that could potentially be affected by construction, and some of these trees could be removed or disturbed. Approximately 25 of the trees are native California sycamore trees, a protected species. These tree counts were performed for the four-station Fully Underground LRT Alternative from the Draft EIS/EIR. It is unknown at this time exactly how many trees could be affected by the three-station LPA, but the number would be less than or equal to the four-station Fully Underground LRT Alternative. Cumulative impacts would be less than significant with respect to biological resources. The LPA would not result in a considerable contribution to a cumulative impact.

Potential mitigation measures are described in Section 4.18.4.2.12 and include a removal permit from the Los Angeles Board of Public Works, if construction of the project requires removal of any of the native trees, in accordance with the City of Los Angeles Native Tree Protection Ordinance. The tree removal permit may require replanting of native trees within the project area or at another location within the City of Los Angeles to mitigate for the removal of these trees. Implementation of mitigation identified in Section 4.18.4.2.12 would reduce this potential impact to a less than significant level.

4.18.3.4.13 Parklands and Other Community Facilities

Some parklands and recreational resources near the proposed LPA alignment would be affected by temporary loss of street parking and impairment of pedestrian and vehicle access during construction. Pedestrian and vehicle access (including parking) could be affected at the Geffen Contemporary at MOCA, JANM, the future Broad Art Foundation Museum (currently under construction), and Walt Disney Concert Hall temporarily during construction. However, access to the facilities would be maintained throughout construction, though detours or alternate access routes may be needed, as noted in the final mitigation measures for the LPA in Section 4.18.4.2.13 and the MMRP for the LPA (Chapter 8). Impacts would be temporary and would not significantly affect the amenities or access to facilities. These impacts would not result in a considerable contribution to a cumulative impact. Community resources in Little Tokyo would experience fewer impacts associated with impaired access compared to the other build alternatives because the LPA would not include surface track work, an underpass, or a pedestrian bridge at the intersection of Alameda and 1st Streets. Instead, an underground junction would be built at this location using the cut and cover method, along with portals near Temple and Alameda Streets and on 1st Street east of Alameda Street.

Effects on emergency vehicle response times are not anticipated, and the LPA would not affect adopted emergency response or emergency evacuation plans or expose people or structures to a significant risk of loss, injury, or death. The LPA may also make parklands and community facilities adjacent to the alignment more accessible, which would be a beneficial impact. No significant adverse construction impacts associated with parklands and community facilities are anticipated.

4.18.3.4.14 Economic and Fiscal Impacts

Construction of the LPA would directly impact several businesses located along the alignment due to lane closures, sidewalk detours and restricted on- and off-street parking. These businesses primarily rely on vehicular and pedestrian traffic for revenue generation. Appendix

BB, Economic and Fiscal Impacts Technical Memorandum, and Section 4.14, Economic and Fiscal Impacts, discuss businesses along the proposed alignment that would likely be affected by the track installation and street closures during construction. In addition, temporary closures or restricted access to Alameda Street during construction of the underground rail junction and adjacent portals would impact a heavily utilized truck route and impede freeway access to Little Tokyo. Overall, this disruption would be lesser in magnitude than construction of the proposed underpasses and pedestrian bridges for the other build alternatives. Cultural institutions, such as the Geffen Contemporary at MOCA and JANM, could potentially be impacted directly, and other businesses could be impacted indirectly. Related projects could be under construction during the same time as the proposed alternative and could result in a considerable contribution to cumulative economic or fiscal construction impacts. With implementation of mitigation, construction of the LPA would not result in a considerable contribution to cumulative economic or fiscal construction impacts.

Investment in transportation, including direct investment in the form of capital construction and operation costs, provides economic benefits in several basic ways: the creation of direct and indirect jobs, and spending by suppliers whose goods and services are used in the project. These benefits are discussed in Section 4.14 and Appendix BB, Economic and Fiscal Impacts Technical Memorandum. Overall, the short-term impacts and long-term benefits of the project would result in a net benefit.

4.18.3.4.15 Safety and Security

The contractor would have a safety plan and be responsible for construction site security consistent with local regulations and standards. Construction activities are not anticipated to affect security in the project area. Typically construction areas are fenced off with restricted access and are well lit. Direct adverse impacts are not anticipated with regards to safety or security. From a cumulative perspective, potential impacts associated with the LPA would be mitigated to a less than significant level and the LPA would not result in a considerable contribution to cumulative effects on the safety and security environment in the project area during construction.

4.18.3.4.16 NEPA Finding

The LPA would have adverse construction effects related to the environmental topics shown in Table 4.18-5. Most of these potential effects will be reduced to a not substantially adverse level by the mitigation measures under resource-specific sections in Section 4.18.4.2. However, there will still be unavoidable adverse effects with respect to transportation (traffic circulation, transit, pedestrian, and bicycle), air quality, and paleontological resources.

Table 4.18-5 also indicates which of these potential effects will remain adverse after implementation of the mitigation measures discussed in Section 4.18.4.2.

4.18.3.4.17 CEQA Determination

The LPA would have significant construction impacts related to the environmental topics shown in Table 4.18-5. Most of these potential impacts could be reduced to a less than significant level by the mitigation measures under resource-specific sections in Section 4.18.4.2. However, there

would still be unavoidable significant impacts with respect to transportation (traffic circulation, transit, pedestrian, and bicycle), air quality, and paleontological resources.

Table 4.18-5 also indicates which of these potential impacts would remain significant after implementation of the mitigation measures discussed in Section 4.18.4.2.

Table 4.18-5. NEPA Findings and CEQA Determinations for Potential Construction Impacts of the Locally Preferred Alternative

Topic	Potentially Adverse Effect or Significant Impact Before Mitigation?		Potentially Adverse Effect or Significant Impact After Mitigation?	
	NEPA	CEQA	NEPA	CEQA
Transportation (Traffic Circulation, Transit, Pedestrian, and Bicycle)	Yes	Yes	Yes	Yes
Displacements and Relocation	Yes	Yes	No	No
Air Quality	Yes	Yes	Yes	Yes
Noise and Vibration	Yes	Yes	No	No
Community and Neighborhood Impacts	Yes	No	No	No
Visual and Aesthetic Resources	No	No	No	No
Geotechnical/Subsurface/Seismic/ Hazardous Materials	Yes	Yes	No	No
Historic Built Environment/ Archaeological Impacts	Yes	Yes	No	No
Paleontology	Yes	Yes	Yes	Yes
Water Resources	Yes	Yes	No	No
Economic and Fiscal Impacts	Yes	Yes	No	No
Ecosystems and Biological Resources	Yes	Yes	No	No
Parklands and Other Community Facilities	No	No	No	No
Safety and Security	No	No	No	No

4.18.4 Mitigation Measures

4.18.4.1 Updates to the Candidate Mitigation Measures from the Draft EIS/EIR

The Draft EIS/EIR included candidate mitigation measures for review and comment by the public, agencies, and other stakeholders. Since publication of the Draft EIS/EIR, Metro has adjusted and added specificity to the candidate mitigation measures for construction impacts presented in the Draft EIS/EIR. The final LPA mitigation measures, shown in Section 4.18.4.2 below, are included in the MMRP for the LPA, Chapter 8, of this Final EIS/EIR, and supersede candidate mitigation measures identified in the Draft EIS/EIR. Updates to the mitigation measures made since publication of the Draft EIS/EIR include:

- Transportation, Circulation, and Parking
  - Addition of consultation with the City of Los Angeles Transportation Construction Traffic Management Committee (TCTMC) regarding haul routes.
  - Addition of provision for shuttle bus drop-off areas at City National Plaza during construction.
- Displacements and Relocation
  - Addition of coordination with LADOT to open city parking lots in the evenings for short-term parking during construction and to reduce the impacts of government vehicles parking on 2nd Street.
- Community and Neighborhood Impacts
  - Addition of a 24-hour live hotline for community concerns regarding construction, as well as a project office within the Little Tokyo community, in order to maintain day-to-day contact with the community during construction.
  - Addition of the Regional Connector Community Leadership Council (RCCLC) to provide input into the construction mitigation and outreach plans.
  - Addition of measures to mitigate possible temporary intermittent utility disruption, including field verification of underground utility line locations, coordination with utility providers, protective construction measures, and immediate technician response in the event of unplanned outages.
- Visual Resources and Aesthetics
  - Revisions based on comments on the Draft EIS/EIR.
  - Mitigation measures to further reduce less than significant impacts associated with construction of the LPA.

- Air Quality
  - Projects are required to follow the SCAQMD Rule 403 and all of the Best Available Control Measures described in the rule. Nonetheless, several Rule 403 standards applicable to this project have been included as mitigation measures.
  - The addition of the California Vehicle Code for haul trucks.
  - The addition of California Air Resources Board (CARB) requirements.
  - The addition of EPA emission standards.
- Noise and Vibration
  - The addition of mitigation during construction and operation of the LPA to reduce GBN levels that could occur at the Colburn School and the Broad Art Foundation Museum, currently under construction.
- Geotechnical/Subsurface/Seismic/Hazardous Materials
  - Additional detail provided for mitigation measures that assess the potential for hazardous materials and hazardous building materials to be encountered during construction.
- Water Resources
  - No substantial new mitigation measures have been added.
- Historic Built Environment
  - Addition of protection for facades of historic buildings adjacent to construction areas.
  - Addition of mitigation measures to offset potential GBN impacts at the Walt Disney Concert Hall.
- Archaeological Resources
  - No substantial new mitigation measures have been added.
- Paleontological Resources
  - No substantial new mitigation measures have been added.
- Ecosystems and Biological Resources
  - No substantial new mitigation measures have been added.

- Parklands and Other Community Facilities
  - Addition of temporary roadway restriping during construction and provision of advance lane closure and relocation notices.
  - Addition of temporary removal of street parking during construction to maximize vehicular capacity.
- Economic and Fiscal
  - Additional detail provided to mitigation measures which involve measures to assist businesses affected by construction, such as develop a parking mitigation program and a Construction Mitigation Program.
- Safety and Security
  - No substantial new mitigation measures have been added.

4.18.4.2 Final Mitigation Measures for the Locally Preferred Alternative

Mitigation measures listed for the LPA in this section have been carried forward and included in the MMRP for the LPA, Chapter 8, of this Final EIS/EIR. They are the final committed mitigation measures for the LPA. MMRP index numbers are shown in parenthesis after each mitigation measure.

4.18.4.2.1 Transportation, Circulation, and Parking

To mitigate the transportation disruption that would occur during construction:

- Prior to the initiation of localized construction activities, a traffic management and construction mitigation plan shall be devised. The closure schedules in the construction traffic plan shall be coordinated to minimize impacts to residences, businesses, special events, and traffic flow. During these times, traffic shall be re-routed to adjacent streets via clearly marked detours. The traffic management and construction mitigation plan shall identify, for instance, proposed closure schedules and detour routes; construction traffic routes, including haul truck route, and hours so as to avoid peak hours where feasible. It shall also account for the provisions below. Traffic flow shall be maintained, particularly during peak hours, to the degree feasible. Access to adjacent businesses shall be maintained via existing or temporary driveways at all times during business hours, and residences at all times. Metro shall provide signage to indicate new ways to access businesses and community facilities affected by construction. Metro shall post advance notice signs prior to construction in areas where business access could be affected. Metro shall also notify LADOT in advance of street closures, detours, or temporary lane reductions. Metro shall also inform advisory committees of known road closures during regularly scheduled meetings. (TR-1)
- Accessible detours shall be provided whenever possible. Detours shall be compliant with the ADA. Signage shall be provided in those languages most commonly spoken in the

immediate community. Signs shall mark detours in accordance with the Manual on Uniform Traffic Control Devices, and other applicable local and state requirements. Detours shall be designed to minimize cut-through traffic in adjacent residential areas. (CN-1)

- Traffic management and construction mitigation plans shall be developed in coordination with the community to minimize disruption and limit construction activities during special events. Worksite Traffic Control Plans shall be developed in conjunction with LADOT and surrounding communities to minimize impacts to traffic, businesses, residents, and other stakeholders. Crossing guards and other temporary traffic controls shall be provided in the vicinity of construction sites, haul routes, and other relevant sites as proposed in California DOT Traffic Manual, Section 10-07.3, Warrants for Adult Crossing Guards, and as appropriate to maintain traffic flow during construction. (CN-3)

- A 24-hour live hotline for community concerns regarding construction shall be provided, as well as a project office within the Little Tokyo community. Residents and businesses shall also be provided with comment/complaint forms during construction. A construction office shall also be placed within the community to provide in-person assistance and services. Metro shall negotiate with the JANM to locate the office within the museum's historic building on 1st Street. The hotline and office shall enable Metro to maintain day-to-day contact with the community during construction and provide community members with all project details that may be relevant to the public. (CN-4)

- A community outreach plan shall be developed and implemented to notify local communities and the general public of construction schedules and road and sidewalk detours. Metro shall coordinate with local communities during preparation of the traffic management plans to minimize potential construction impacts to community resources and special events. Construction activities shall be coordinated with special events. (CN-5)

To mitigate the effects of construction haul routes along project area streets:

- Haul routes for trucks shall be confirmed during the final design phase of the project. The routes shall be located to minimize noise, vibration, and other possible impacts to adjacent businesses and neighborhoods. Truck trips shall be primarily scheduled at times when they would be least disruptive to the community. Lighted or reflective signage shall direct truck drivers to the haul routes. If physical damage to the haul route roads occurs due to project-related traffic, the roads shall be restored to their pre-construction condition as quickly as is practicable. Haul routes shall be discussed with and approved by the City of Los Angeles through the TCTMC. (TR-2)

To mitigate the effects of street parking needing to be temporarily removed during construction:

- To avoid impacts to neighborhood parking supplies, Metro shall require the contractor to designate areas for construction/contractor employee parking and shall not allow employees to park in other lots or unauthorized areas. Metro shall identify and implement measures to reduce the need for parking by construction workers, including carpool incentives, transit passes, or designated on-site or off-site parking. Metro shall direct construction workers not to park on the street. (TR-3)

- Metro shall work with the City to develop a parking mitigation program to mitigate the loss of public parking spaces during construction. This would include, but is not limited to, restriping the existing street to allow for diagonal parking, reducing the number of restricted parking areas, phasing construction activities in a way that minimizes parking disruption, and increasing the time limits for on-street parking. Restriping would occur on portions of Temple Street, Alameda Street, 1st Street, 2nd Street, Central Avenue, San Pedro Street, Judge John Aiso Street, 3rd Street, and Traction Avenue. Such parking mitigation shall be implemented on a temporary, tiered basis pending findings of the annual parking analysis described in EJ-11 in the MMRP for the LPA, Chapter 8, of this Final EIS/EIR. (DR-4)

- Metro shall not hinder access to other public parking lots during construction. (DR-5)

To mitigate the effects of rerouting pedestrian and bicycle traffic during construction:

- Safe pedestrian detours with handrails, fences, k-rail, canopies, and walkways shall be provided as needed. When a crosswalk is closed due to construction activities, pedestrians shall be directed to nearby alternate crosswalks. Access shall be ADA accessible at all times per existing Metro policy. (TR-4)

- Bicyclists shall be encouraged through signage to ride carefully in streets near construction activities, ride carefully on sidewalks (as City of Los Angeles municipal code permits), or choose nearby alternate routes around construction sites. Detours shall be provided as needed. Metro shall provide signage showing the alternate bicycle routes. Pedestrian and bicycle circulation, and travel lanes temporarily impacted during construction shall be restored to their permanent configurations at the conclusion of the construction period and prior to operations. (TR-5)

To mitigate the effects on shuttle bus drop-off areas for City National Plaza during construction:

- Metro shall ensure that shuttle bus drop-off areas at City National Plaza are provided throughout construction. (TR-9)

To mitigate the restriction of access to some bus stops in the project area during construction:

- Metro shall maintain access to bus stops and provide adequate signage to guide bus users to accessible stops. Metro shall minimize temporary closures or relocations of bus stops and layover zones. Metro shall provide notices of closures and relocations on its website, smart phone apps, and other modes typically used to communicate service announcements. When closures of other bus operators' stops are needed, Metro shall work closely with the affected operators to provide notices. (TR-12)

To mitigate the effects of temporarily relocating some bus stops in the project area during construction due to street closures and detours around construction areas:

- As needed, Metro shall temporarily relocate bus stops to nearby alternative locations based on the re-routing of bus service, and provide adequate signage and notices at strategic locations indicating the relocated bus stops. Metro shall provide notices of relocations on its website, smart phone apps, and other modes typically used to communicate service announcements. Metro shall coordinate with municipal transit providers to temporarily relocate non-Metro bus stops. When bus re-routing is necessary, buses shall be re-routed to adjacent streets in a manner that minimizes inconvenience to bus passengers and to affected neighborhoods. (TR-13)

4.18.4.2.2 Displacements and Relocation

Due to the partial taking of parking and primary access to the Central Plant (APN 5151-014-032, Parcel 3 in Figures 4.2-1 and 4.2-2, and Parcel 4 in Figure 4.2-5; 703 W. 3rd Street):

- Metro shall provide replacement parking elsewhere on the parcel or on a nearby parcel during construction.(DR-1)

- Metro shall maintain access to the Central Plant at all times during construction. (DR-2)

Since some privately-owned parcels needed for construction staging currently contain buildings, but would be owned by Metro and may be vacant after construction:

- Upon completion of construction, property needed for construction but not required to maintain the physical infrastructure or necessary for access shall be included in the Metro Joint Development Program for possible development. Any development shall be environmentally and separately cleared from this project and shall undergo its own community input process. Until a development is approved, the remaining underutilized property may be used for public parking spaces or at the very least shall be graded and fenced to a higher standard that reflects the community's identity and character more than typical gravel and chain link. Per Metro's Joint Development Policy, the community shall be included in the development process. (DR-3)

To offset the public parking spaces that would be lost in Little Tokyo during construction:

- Metro shall work with the City to develop a parking mitigation program to mitigate the loss of public parking spaces during construction. This would include, but is not limited to, restriping the existing street to allow for diagonal parking, reducing the number of restricted parking areas, phasing construction activities in a way that minimizes parking disruption, and increasing the time limits for on-street parking. Restriping would occur on portions of Temple Street, Alameda Street, 1st Street, 2nd Street, Central Avenue, San Pedro Street, Judge John Aiso Street, 3rd Street, and Traction Avenue. Such parking mitigation shall be implemented on a temporary, tiered basis pending findings of the annual parking analysis described in mitigation measureEJ-11 in the MMRP for the LPA, Chapter 8, of this Final EIS/EIR. (DR-4)

- Metro shall not hinder access to other public parking lots during construction. (DR-5)

- Prior to construction, Metro shall conduct an annual parking needs assessment in Little Tokyo. Metro shall provide replacement parking for spaces lost as a result of the project as described in EJ-3 and to respond to the needs identified in the parking needs assessment. Metro shall work with Little Tokyo and surrounding communities to educate visitors and residents where parking is available during construction. Metro shall monitor parking, and the parking analysis shall be conducted on an annual basis throughout the duration of construction. This effort shall include new signage and other way finding features as appropriate. (EJ-11)

- Any unmet demand for parking spaces eliminated in Little Tokyo during construction shall be temporarily replaced within one block of the land uses that rely on those spaces, or through a combination of: (EJ-2)

  - Metro shall work with the City of Los Angeles to develop a parking mitigation program, as described above in mitigation measure DR-4.

  - Metro shall provide two acres of land on the Mangrove property (northeast of 1st and Alameda Streets) for the purposes of providing alternative parking services during construction, which could include satellite parking served by shuttle buses, valet parking from vehicle pick-up/drop-off in the central business areas of Little Tokyo, and standard self-parking. The number of spaces provided would range from 200 standard spaces to approximately 300 spaces when supplemental parking services are operating. Any parking services shall be operated by a licensed/bonded parking company and shall be selected through a competitive request for proposal (RFP) process. Cost to park shall be comparable with current cost to park. This shall offset the temporary loss of parking available to patrons of Little Tokyo businesses, and other visitors, during construction. (EJ-3)

  - Metro shall provide notices of traffic control plans and parking relocations on its website, smart phone apps, and other modes typically used to communicate service announcements. (EJ-4)

- Metro shall support efforts to curb non-legitimate use of disabled parking spaces. (EJ-5)
- Metro shall work with the LADOT, owners of private parking lots, and businesses to develop an advanced parking reservation system at cooperative and suitable locations during construction. (EJ-6)
- Metro shall work with LADOT to open city parking lots for short-term use on evenings and weekends during construction in the vicinity of Little Tokyo.(EJ-7)
- Metro shall work with the City of Los Angeles to reduce impacts of government vehicles parking on 2nd Street during construction, such as identification of alternate parking areas. (EJ-8)
- Metro shall work with the City of Los Angeles and the Little Tokyo Business Improvement District to facilitate creation of financial incentives such as parking validation programs to prioritize parking for Little Tokyo customers, residents, and businesses during construction. (EJ-9)
- Metro shall develop measures to assist business owners significantly impacted by construction. These shall include temporary parking, marketing programs, and other measures developed jointly between Metro and affected businesses. (EF-1)

In order to offset the potential for reduction of access to the Little Tokyo Library and other community destinations due to construction:

- Metro shall maintain access to the Little Tokyo Library and other community facilities at all times during construction. (DR-6)
- Metro shall develop a Construction Mitigation Program that includes protocol for community notification of construction activities, including traffic control measures, schedule of activities, and duration of operations, with written communications to the community translated into appropriate languages. (DR-7)

To offset the impacts of necessary displacement and relocation of businesses:

- Metro shall provide relocation assistance and compensation as required by the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. (DR-8)

Due to the permanent acquisition of a portion of the Los Angeles Department of Water and Power (LADWP) site on APNs 5173-007-901 and 5173-006-900 for right-of-way:

- Metro shall consult LADWP during the design phase to accommodate its operational needs during construction and operation of the project. (DR-9)

4.18.4.2.3 Community and Neighborhood Impacts

To mitigate the temporary disruption of traffic patterns and access to residences and businesses during construction, which could affect the economic vitality of some businesses:

- Accessible detours shall be provided whenever possible. Detours shall be compliant with the ADA. Signage shall be provided in those languages most commonly spoken in the immediate community. Signs shall mark detours in accordance with the Manual on Uniform Traffic Control Devices, and other applicable local and state requirements. Detours shall be designed to minimize cut-through traffic in adjacent residential areas. (CN-1)

- Early notification of traffic disruption shall be given to emergency service providers. Work plans and traffic control measures shall be coordinated with emergency responders to prevent impacts to emergency response times. (CN-2)

- Traffic management and construction mitigation plans shall be developed in coordination with the community to minimize disruption and limit construction activities during special events. Worksite Traffic Control Plans shall be developed in conjunction with LADOT and surrounding communities to minimize impacts to traffic, businesses, residents, and other stakeholders. Crossing guards and other temporary traffic controls shall be provided in the vicinity of construction sites, haul routes, and other relevant sites as proposed in California DOT Traffic Manual, Section 10-07.3, Warrants for Adult Crossing Guards, and as appropriate to maintain traffic flow during construction. (CN-3)

- A 24-hour live hotline for community concerns regarding construction shall be provided, as well as a project office within the Little Tokyo community. Residents and businesses shall also be provided with comment/complaint forms during construction. A construction office shall also be placed within the community to provide in-person assistance and services. Metro shall negotiate with the JANM to locate the office within the museum's historic building on 1st Street. The hotline and office shall enable Metro to maintain day-to-day contact with the community during construction and provide community members with all project details that may be relevant to the public. (CN-4)

- A community outreach plan shall be developed and implemented to notify local communities and the general public of construction schedules and road and sidewalk detours. Metro shall coordinate with local communities during preparation of the traffic management plans to minimize potential construction impacts to community resources and special events. Construction activities shall be coordinated with special events. (CN-5)

- Metro shall develop a construction mitigation plan with community input to directly address specific construction impacts in the project area. Metro shall establish and receive input from the RCCLC in developing the construction mitigation plan. The RCCLC shall consist of representatives from all parts of the alignment area. Metro shall work with the RCCLC in developing the outreach plan. (CN-6)

- Metro shall work with the City to develop a parking mitigation program to mitigate the loss of public parking spaces during construction. This would include, but is not limited to, restriping the existing street to allow for diagonal parking, reducing the number of restricted parking areas, phasing construction activities in a way that minimizes parking disruption, and increasing the time limits for on-street parking. Restriping would occur on portions of Temple Street, Alameda Street, 1st Street, 2nd Street, Central Avenue, San Pedro Street, Judge John Aiso Street, 3rd Street, and Traction Avenue. Such parking mitigation shall be implemented on a temporary, tiered basis pending findings of the annual parking analysis described in EJ-11 in the MMRP for the LPA, Chapter 8, of this Final EIS/EIR. (DR-4)

- Metro shall not hinder access to other public parking lots during construction. (DR-5)

To mitigate the negative impact construction sites could have on the community if left unsecured:

- Barriers shall be erected and security personnel provided during construction to minimize trespassing and vandalism. Barriers shall be enhanced with culturally-relevant artwork, attractive design features, and advertisements for parking locations and businesses. Signage shall also identify that businesses are open during construction. Community input shall be sought in determining artwork and design features. (CN-7)

To mitigate the temporary intermittent utility disruption that could occur as part of construction:

- Metro shall field verify (by potholing or other methods) the exact locations and depths of underground utilities and conduct condition checks prior to utility relocation. (CN-10)

- Metro shall coordinate closely with utility providers to develop a service plan as needed to address planned and unplanned utility service interruptions. Should an unplanned outage occur as a result of construction activities, Metro shall contact the appropriate utility provider immediately to restore service. Metro shall also maintain access to utilities for providers' technicians. Metro shall provide protective measures such as pipe and conduit support systems, vibration and settlement monitoring, trench sheeting, and shoring during construction to avoid potential damage to utilities. (CN-11)

4.18.4.2.4 Visual Resources and Aesthetics

While no significant impacts to the Historic Core, Civic Center, or Little Tokyo communities would result from construction of the LPA, the following mitigation measures will further reduce less than significant impacts.

- Metro shall shield temporary lighting during construction to reduce spillover lighting. (VA-3)

- Metro shall locate stockpile areas (storage areas for construction equipment, supplies, and excavated soil) primarily in less visually sensitive locations, where they are not visible from the road or to businesses or residents. (VA-4)

- Temporary construction sheds and barricades shall be located so as to avoid obscuring significant views of historic properties. (VA-5)

4.18.4.2.5 Air Quality

- Contractors shall be required to adhere to SCAQMD standards for off-road engine emissions (refer to Section 4.5.1.1). Examples of how the contractors could ensure adherence include retrofitting off-road engines with add-on control devices such as catalytic oxidizers and diesel particulate filters where feasible. (AQ-1)

- Metro shall require contractors to use equipment that meets up-to-date specifications (equivalent to models manufactured from 2013 to 2017) for pollutant emissions during project construction. (AQ-2)

- Contractors shall be required to adhere to SCAQMD standards for dust emissions such as SCAQMD Rule 403. Examples of how the contractors could ensure adherence include applying water or a stabilizing agent to exposed surfaces in sufficient quantity to prevent generation of dust plumes. (AQ-3)

- Dirt from construction equipment shall not extend 25 feet or more from an active operation, and shall be removed at the conclusion of each workday (refer to Section 4.5.3.3). Street sweeping services shall be coordinated with construction activity to minimize impacts to surrounding businesses and residences. (AQ-4)

- Contractors shall be required to utilize at least one of the measures set forth in the SCAQMD Rule 403 Section (d)(5) to remove bulk material from tires and vehicle undercarriages before vehicles exit the project site. (AQ-5)

- All haul trucks hauling soil, sand, and other loose materials shall maintain at least six inches of freeboard (not filling trucks all the way to the top) in accordance with California Vehicle Code 23114. (AQ-6)

- All haul trucks hauling soil, sand, and other loose materials shall be covered (e.g., with tarps or other enclosures that would reduce dust emissions) (refer to Section 4.5.1.1). (AQ-7)

- Traffic speeds on unpaved roads shall be limited to 15 MPH. (AQ-8)

When wind gusts exceed 25 MPH, Metro shall require the contractor to implement the following provisions, consistent with the requirements of SACQMD Rule 403, as they apply to each of the construction activities identified below: (AQ-9)

- Earth-moving activities:

  - (1A) Cease all active operations; or

  - (2A) Apply water to soil not more than 15 minutes prior to moving such soil.

- Disturbed surface areas:
  - (OB) On the last day of active operations prior to a weekend or holiday: apply water with a mixture of chemical stabilizer diluted with not less than 1/20 of the concentration required to maintain a stabilized surface for a period of six months; or
  - (1B) Apply chemical stabilizers prior to wind event; or
  - (2B) Apply water to all unstabilized disturbed areas three times per day. If there is evidence of wind driven fugitive dust, watering frequency is increased to a minimum of four times per day; or
  - (3B) Establish a vegetative ground cover within 21 days after active operations have ceased. Ground cover must be sufficient density to expose less than 30 percent of unstabilized ground within 90 days of planting, and at all times thereafter; or
  - (4B) Utilize any combination of control actions (1B), (2B) and (3B) such that, in total, these actions apply to all disturbed surface areas.
- Unpaved roads:
  - (1C) Apply chemical stabilizers prior to wind event; or
  - (2C) Apply water twice per hour during active operation; or
  - (3C) Stop all vehicular traffic.
- Open storage piles:
  - (1D) Apply water twice per hour; or
  - (2D) Install temporary coverings.
- Paved road track-out:
  - (1E) Cover all haul vehicles; or
  - (2E) Comply with vehicle freeboard requirements of Section 23114 of the California Vehicle Code for both public and private roads.
- All categories:
  - (1F) Any other control measures approved by the Executive Officer and the United States Environmental Protection Agency as equivalent to the methods specified may be used.
- Heavy equipment operations shall be suspended during second stage smog alerts as issued by the SCAQMD. (AQ-10)

- On-site stockpiles of debris, dirt, or rusty materials shall be covered or watered at least two times per day. (AQ-11)
- Contractors shall utilize electricity supplied by LADWP rather than temporary diesel or gasoline generators, as feasible. (AQ-12)
- Heavy-duty trucks shall be prohibited from idling in excess of five minutes, both on- and off-site. Metro shall employ CARB anti-idling requirements during construction, which would reduce emissions generated from construction vehicles. Metro shall require the contractor to regularly perform unscheduled inspections of construction equipment and activities to ensure minimization of associated air quality impacts. (AQ-13)
- Construction worker parking shall be configured to minimize traffic interference. This measure would minimize vehicle idling time, which would reduce emissions generated from construction vehicles. (AQ-14)
- Construction activity that affects traffic flow on the arterial system, including the transportation of excavated materials, shall be primarily limited to off-peak hours. This measure would minimize vehicle idling time, which would reduce emissions generated from construction vehicles. (AQ-15)
- Metro shall require ongoing maintenance and adherence to manufacturer's specifications for all construction equipment engines and vehicles. (AQ-16)
- Dedicated turn lanes for the movement of trucks and equipment to and from construction sites shall be provided where appropriate. This measure would minimize vehicle idling time, which would reduce emissions generated from construction vehicles. (AQ-17)
- Metro shall require on-site construction equipment to meet EPA Tier 2 or higher emission standards according to the January 1, 2012 to December 31, 2014 and post-January 15, 2015 criteria. (AQ-18)
- Metro shall maintain and clean all trucks and construction equipment. (AQ-19)
- Metro shall use low-sulfur fuel where possible. (AQ-20)
- The project and stations shall be designed and constructed in a manner consistent with Metro's sustainability policies (such as Metro's Energy and Sustainability Policy). (AQ-21)
- Detour routes shall be designed to ensure that traffic does not idle for extended periods of time, thus reducing the potential for localized exceedence of federal CO/CO_2 standards. (AQ-22)

4.18.4.2.6 Noise and Vibration

During the construction phase of the LPA, sensitive or historic buildings within 21 feet of construction may be susceptible to vibration damage. The following mitigation measures shall be implemented:

- A survey of historic properties and/or historical resources within 21 feet of vibration producing construction activity shall be conducted to confirm the building category, and to provide a baseline for monitoring of GBV and the potential for GBV to cause damage. The survey shall also be used to establish baseline, pre-construction conditions for historic properties and historical resources. During preliminary engineering and final design of the project, additional subsurface (geotechnical) investigations shall be undertaken to further evaluate soil, groundwater, seismic, and environmental conditions along the alignment. The analysis shall assist in the selection and development of appropriate support mechanisms for cut and cover construction areas and any SEM (mining) construction areas, in accordance with industry standards and the Building Code. The subsurface investigation shall also identify areas that could experience differential settlement as a result of using a TBM in close proximity to historic properties and/or historical resources. An architectural historian or historical architect who meets the Secretary of Interior's Professional Qualification Standards shall provide input and review of design contract documents prior to implementation of the mitigation measures. (CR/B-2)

- The mitigation measure above shall also apply to sensitive, non-historic structures (Category I, II, III, IV buildings as defined in Table 4.7-4) located within 21 feet of vibration producing construction activity. However, design contract documents shall not require input or review by an architectural historian or historical architect under this mitigation measure. (NV-1)

- A vibration monitoring plan shall be developed during Final Design to ensure appropriate measures are taken to avoid any damage to sensitive buildings (Category I, II, III, IV buildings as defined by FTA in Table 4.7-4)or historic buildings due to construction-induced vibration. This shall include pre-construction surveys of all buildings within 21 feet of vibration producing construction activity to confirm the building category (Category I, II, III, IV buildings as defined in Table 4.7-4), structural condition of the building, and to provide a baseline for monitoring of GBV and measuring the potential for GBV to cause damage where needed. Any damage caused by Metro's construction activities shall be repaired. (NV-2)

The following mitigation measures will further reduce annoyance to sensitive land uses caused by GBV. All or a combination of the following measures will be used to mitigate adverse noise and vibration impacts:

- Distances greater than those provided in EIS/EIR Table 4.7-5 shall be maintained near vibration-sensitive locations to avoid potential construction-related vibration impacts. (NV-3)

- Less vibration-intensive construction equipment or techniques shall be used near vibration-sensitive locations. (NV-4)

- Heavily laden vehicles shall be routed away from vibration-sensitive locations. (NV-5)
- Earthmoving equipment shall be operated as far as possible from vibration-sensitive locations. (NV-6)
- Construction activities that produce vibration, such as demolition, excavation, earthmoving, and ground impacting shall be sequenced so that the vibration sources do not operate simultaneously. (NV-7)
- Nighttime construction activities that produce noticeable vibration shall be avoided near vibration-sensitive locations. (NV-8)
- Devices with the least impact shall be used to accomplish necessary tasks. (NV-9)
- Non-impact demolition and construction methods, such as saw or torch cutting and removal for off-site demolition, chemical splitting, and hydraulic jack splitting, shall be used instead of high impact methods near vibration-sensitive locations. (NV-10)
- Building protection measures such as underpinning, soil grouting, or other forms of ground improvement shall be used where needed to prevent deterioration of building condition due to construction. (NV-11)
- Pavement breakers, vibratory rollers, and packers shall operate as far as possible from vibration-sensitive locations. (NV-12)

If a noise complaint is filed during project construction, noise monitoring shall be conducted in the vicinity of the area in question. If monitored noise levels exceed FTA construction noise criteria, the contractor shall use all or a combination of the following measures to reduce construction noise levels below FTA construction noise criteria: (NV-13)

- Temporary noise barriers around the construction sites and localized barriers around specific items of equipment or smaller areas shall be provided as needed. (NV-14)
- Alternative back-up alarms/warning procedures shall be used where feasible as needed. (NV-15)
- Higher performance mufflers shall be used on equipment used during nighttime hours near sensitive land uses as needed near sensitive land uses. (NV-16)
- Portable noise sheds for smaller, noisy equipment, such as air compressors, dewatering pumps, and generators shall be provided as needed. (NV-17)

In addition to the construction mitigation measures listed above, the following mitigation measures will also reduce the potential annoyance to the Walt Disney Concert Hall, the Colburn School, and the Broad Art Foundation Museum, which is currently under construction, caused by GBN associated with construction of the LPA. The following measures shall be used to

mitigate adverse GBN impacts, and with respect to the Colburn School, are adopted in an abundance of caution:

- Construction of the LPA, in the vicinity of the Walt Disney Concert Hall, shall be done in accordance with the Memorandum of Agreement (MOA) between FTA and the State Historic Preservation Officer (SHPO), which includes stipulations that outline the specific requirements for consultation and decision-making between the lead federal agency and consulting parties, specify the level of Historic American Building Survey/Historic American Engineering Record (HABS/HAER) recordation, and outline specific requirements for pre- and post-construction surveys, geotechnical investigations, building protection measures, and TBM specifications(for the Walt Disney Concert Hall only). (NV-18)

Tunnel Boring Machine

- Maintenance and Operation: The construction contractor shall minimize vibration from jacking or pressing operations (if applicable, the action could be smoothed out to avoid a sharp push), and maintain machinery in good working order. (NV-19)

- Coordination and Notification: There would be times when the Main Auditorium of the Walt Disney Concert Hall is vacant or not used for a noise-sensitive activity, thereby eliminating any noise impact from TBM. Similarly, there would be times at the Los Angeles Philharmonic Association (LAPA) Conference Room (and offices) of the Walt Disney Concert Hall and at the recording/performance halls of the Colburn School when activities are not particularly noise-sensitive. Metro shall coordinate closely with the Walt Disney Concert Hall, the Colburn School, and the Broad Art Foundation Museum, which is currently under construction, to ensure that the noise-generating parts of TBM operations shall be conducted to avoid noise-sensitive periods. (NV-20)

Delivery Train

- Speed: Delivery train speed shall be limited to 5 MPH in the vicinity of the Walt Disney Concert Hall, the Colburn School, and the Broad Art Foundation Museum, currently under construction, which would reduce the GBN to the lower range, or 5 dBA from the maximum range. (NV-21)

- Resilient Mat: A resilient system to support and fasten the delivery train tracks shall be used during construction, which would reduce GBN levels by at least 4 dBA. (NV-22)

    - Such as system shall include a) resilient mat under the tracks and b) a resilient grommet or bushing under the heads of any track fasteners (assuming some kind of anchor or bolt system). The hardness of the resilient mat shall be in the 40 to 50 durometer range, and be about one to two inches thick, depending on how heavily loaded the cars would be. The contractor shall select the mat thickness so that the rail does not bottom out during a car pass-by.

- Conveyor: The delivery train shall be replaced with a conveyor system to transport materials in the tunnel if GBN exceeds the FTA annoyance criteria at the Walt Disney Concert Hall, the Colburn School, or the Broad Art Foundation Museum, which is currently under construction. (NV-23)

- Coordination and Notification: There would be times when the Main Auditorium and Choral Hall of the Walt Disney Concert Hall, and the recording/performance halls of the Colburn School are vacant or not used for noise-sensitive activities, thereby eliminating any noise impact from the delivery train. Metro shall coordinate closely with the Walt Disney Concert Hall, the Colburn School, and the Broad Art Foundation Museum, which is currently under construction, to ensure that the delivery train pass-bys would be conducted to avoid noise-sensitive periods. (NV-24)

In addition to the general construction mitigation measures listed above, the following mitigation measures will also reduce the potential annoyance to the Hikari Lofts, office uses in the JVP, and the Nakamura Tetsujiro Building caused by GBV and/or GBN associated with construction of the LPA. The following measures shall be used to mitigate adverse GBV and GBN impacts:

- Metro shall provide advance notice and coordinate with the affected property owners regarding schedules for tunneling and other activities prior to the commencement of those activities. (NV-25)

- Metro shall provide advanced notification and coordination by doing the following. (NV-26)

  - Metro shall establish a Construction Community Relation Program to inform and coordinate construction activities including notification to all occupants at the Hikari Lofts, the interior designer office at the JVP, and the Nakamura Tetsujiro Building about the schedule of tunneling activities at least one month prior to the start of the activities.

  - Metro shall monitor GBN and GBV levels in the in the building adjacent to TBM activity during its operation in that area.

  - During the few days the TBM will be operating in this area, should GBN or GBV measurements exceed FTA annoyance criteria for short-term impacts during construction, Metro shall offer to temporarily relocate affected residents.

4.18.4.2.7 Geotechnical/Subsurface/Seismic/Hazardous Materials

- Before any construction, a survey of structures within the anticipated zone of construction influence shall be conducted in order to establish baseline conditions. A geotechnical instrumentation and settlement monitoring plan and mitigation measures shall be developed and adhered to during construction to ensure appropriate measures are taken to address any construction-induced movement. If assessments indicate the necessity to proactively protect nearby structures, additional support for the structures by underpinning or other ground improvement techniques shall be required prior to the underground construction. Metro shall require the construction contractor to limit movement to less than

acceptable threshold values for vertical, horizontal, and angular deformation as a performance standard. These acceptable threshold values shall be established such that the risk of damage to buildings and utilities will be negligible to very slight. For buildings, these threshold values will be based on the relationship of building damage to angular distortion and horizontal strain consistent with Boscardin and Cording (1989) and qualitative factors including but not limited to the type of structure and its existing condition. For utility mains, these threshold values shall be those established by the utility owners. Additional data and survey information shall be gathered during final design for each building and utility main to enable assessment of the tolerance of potentially affected structures and utilities. Additional engineering and design level geotechnical studies shall be performed to define the nature of the soils and to refine the means of achieving each performance specification. (GT-1)

- Ground improvement such as grouting or other methods shall be required to fill voids where appropriate and offset potential settlement when excess material has been removed during excavation. The criteria for implementing grouting or ground improvement measures shall be based on the analysis described in the above mitigation measure. (GT-2)

- The tunnel alignment shall be grouted in advance to provide adequate soil support and minimize settlement as geotechnical conditions require. (GT-3)

- Settlement along the project alignment shall be monitored using a series of measuring devices above the route of the alignment. Leveling surveys shall be conducted prior to tunneling to monitor for possible ground movements. (GT-4)

- Tunnel construction monitoring requirements shall be described and defined in design contract documents. Additional geotechnical provisions shall be included to the extent feasible, including use of an Earth Pressure Balance or Slurry Tunnel Boring Machine for tunnel construction to minimize ground loss. During tunnel construction, the soils encountered shall be monitored relative to anticipated soil conditions as described in a Geotechnical Baseline Report. (GT-5)

- A survey of historic properties and/or historical resources within 21 feet of vibration producing construction activity shall be conducted to confirm the building category, and to provide a baseline for monitoring of GBV and the potential for GBV to cause damage. The survey shall also be used to establish baseline, pre-construction conditions for historic properties and historical resources. During preliminary engineering and final design of the project, additional subsurface (geotechnical) investigations shall be undertaken to further evaluate soil, groundwater, seismic, and environmental conditions along the alignment. The analysis shall assist in the selection and development of appropriate support mechanisms for cut and cover construction areas and any SEM (mining) construction areas, in accordance with industry standards and the Building Code. The subsurface investigation shall also identify areas that could experience differential settlement as a result of using a TBM in close proximity to historic properties and/or historical resources. An architectural historian or historical architect who meets the Secretary of Interior's Professional Qualification Standards shall provide input and review of design contract documents prior to implementation of the mitigation measures. (CR/B-2)

- A Contaminated Soil/Groundwater Management Plan shall be implemented during construction to establish procedures to follow if contamination is encountered in order to minimize associated risks. The plan shall be prepared during the Final Design phase of the project, and the construction contractor shall be held to the level of performance specified in the plan. The plan shall include procedures for the implementation of the following mitigation measures. (GT-6)
  - Appropriate regulatory agencies shall be contacted if contaminated soil or groundwater is encountered. (GT-7)
  - Sampling and analysis of soil and/or groundwater known or suspected to be impacted by hazardous materials shall be conducted. (GT-8)
  - Procedures for the legal and proper handling, storage, treatment, transport, and disposal of contaminated soil and/or groundwater shall be delineated and conducted in consultation with regulatory agencies and in accordance with established statutory and regulatory requirements (refer to Section 4.9.1). (GT-9)
  - Dust control measures such as soil wetting, wind screens, etc. shall be implemented for contaminated soil. (GT-10)
  - Groundwater collection, treatment, and discharge shall be performed according to applicable standards and procedures (refer to Section 4.10.1). (GT-11)
- Worker Health and Safety Plan shall be implemented prior to the start of construction activities. All workers shall be required to review the plan, receive training if necessary, and sign the plan prior to starting work. The plan shall identify properties of concern, the nature and extent of contaminants that could be encountered during excavation activities, appropriate health and environmental protection procedures and equipment, emergency response procedures including the most direct route to a hospital, contact information for the Site Safety Officer. (GT-12)
- Impermeable grout and other appropriate measures shall be used where necessary to fill gaps between the tunnels and the surrounding earth to address the potential for creation of a preferential pathway and resulting spread of existing contaminated groundwater. (GT-13)
- Testing for subsurface gases shall be conducted along all portions of the underground alignment. (GT-14)
- Construction of the project shall be consistent with the City of Los Angeles Methane Mitigation Standards, established in accordance with City of Los Angeles Ordinance No. 175790 and No. 180619, which provide detailed installation procedures, design parameters, and test protocols for the methane gas mitigation system as well as methods to control methane intrusion emanating from geologic formations. (GT-15)

- Specialized excavation methods shall be implemented to protect workers and the public from exposure to toxic gases and prevent explosions. For instance, pressurized closed-face TBMs and other equipment outfitted with ventilation systems would be used, as needed, to excavate the tunnels associated with the LPA, including Slurry Face Machines (SFMs) and Earth Pressure Balance Machines (EPBMs). During tunneling, the volume of gas (or water containing dissolved gas) released from the soil is confined to the excavated material chamber of the TBM because of the closed-face and gas-tight lining that is installed immediately behind the TBM. The project shall also comply with the City's Methane Mitigation Standards, which include provisions to protect workers and the public. (GT-16)

- Prior to building demolition, surveys of asbestos containing materials and lead-based paint shall be conducted. If necessary, destructive sampling shall be used. All asbestos containing materials and lead-based paint shall be removed or otherwise abated prior to demolition in accordance with all applicable laws and regulations. (GT-17)

- The construction contractor shall be required to implement BMPs for handling hazardous materials in compliance with existing regulations. These shall include requirements for proper use, storage, and disposal of chemical products and hazardous materials used in construction; spill control and countermeasures, including employee spill prevention/response training; vehicle fueling procedures to avoid overtopping construction equipment fuel tanks; procedures for routine maintenance of construction equipment, including the proper containment and removal of grease and oils; procedures for the proper disposal of discarded containers of fuels and other chemicals. (GT-18)

- Metro shall develop and implement an Environmental Site Assessment program in accordance with appropriate laws and regulations (refer to Section 4.9.1) to assess the potential for hazardous materials that may be encountered during construction. (GT-20)

- Metro shall develop and implement plans for pre-demolition and demolition abatement of hazardous building materials (i.e., asbestos, lead-based paint, PCB-light ballasts) in accordance with appropriate laws and regulations such as the Toxic Substances Control Act (refer to Section 4.9.1). (GT-21)

4.18.4.2.8 Water Resources

An erosion control plan shall be prepared prior to construction and shall specify procedures for implementing the following mitigation measures:

- Natural drainage, detention ponds, sediment ponds, or infiltration pits shall be used to allow runoff to collect and reduce or prevent erosion. (WR-2)

- Barriers shall be used to direct and slow the rate of runoff and to filter out large-sized sediments. (WR-3)

- Down-drains or chutes shall be used to carry runoff from the top of a slope to the bottom. (WR-4)

- Use of water for irrigation and dust control shall be controlled so as to avoid off-site runoff. (WR-5)

Potentially significant impacts to water quality stemming from both construction and operation of the LPA will be mitigated with the following measures as appropriate:

- Project design shall include properly designed and maintained biological oil and grease removal systems in new storm drain systems to treat water before it leaves project sites. (WR-6)

- Hazardous materials shall be stored properly to prevent contact with precipitation and runoff. (WR-7)

- An effective monitoring and cleanup program for spills and leaks of hazardous materials shall be developed and maintained. (WR-8)

- Equipment to be repaired or maintained shall be placed in covered areas on a pad of absorbent material to contain leaks, spills, or small discharges. (WR-9)

- Periodic and consistent removal of landscape and construction debris shall be performed. (WR-10)

- Any significant chemical residue on the project sites shall be removed through appropriate methods. (WR-11)

- Non-toxic alternatives for any necessary applications of herbicides or fertilizers shall be used. (WR-12)

- Detention basins shall be installed to remove suspended solids by settlement. (WR-13)

- Water quality or runoff shall be periodically monitored before discharge from project sites and into the storm drainage system. (WR-14)

4.18.4.2.9 Historic Built Environment

To offset construction-related direct and indirect adverse impacts, the following mitigation measures shall be applied as indicated in 4.12.1.3.5:

- Documentation of historic properties and historical resources adversely affected by the project shall consist of the development of individual HABS/HAER submissions. The appropriate level of recordation shall be established in consultation with the California SHPO and formalized as a part of a MOA as described in Section 4.12.1.4.5 of the Draft EIS/EIR and included in Appendix 3 of this Final EIS/EIR. The HABS/HAER documents shall be offered to the Library of Congress and the documents shall be prepared so that the original archival-quality documentation would be suitable for inclusion in the Library of

Congress if the National Park Service accepts these materials. Archival copies of the documentation shall also be offered for donation to local repositories, including the Los Angeles Central Library and the Los Angeles Conservancy. (CR/B-1)

- A survey of historic properties and/or historical resources within 21 feet of vibration producing construction activity shall be conducted to confirm the building category, and to provide a baseline for monitoring of GBV and the potential for GBV to cause damage. The survey shall also be used to establish baseline, pre-construction conditions for historic properties and historical resources. During preliminary engineering and final design of the project, additional subsurface (geotechnical) investigations shall be undertaken to further evaluate soil, groundwater, seismic, and environmental conditions along the alignment. The analysis shall assist in the selection and development of appropriate support mechanisms for cut and cover construction areas and any SEM (mining) construction areas, in accordance with industry standards and the Building Code. The subsurface investigation shall also identify areas that could experience differential settlement as a result of using a TBM in close proximity to historic properties and/or historical resources. An architectural historian or historical architect who meets the Secretary of Interior's Professional Qualification Standards shall provide input and review of design contract documents prior to implementation of the mitigation measures. (CR/B-2)

- The historic property and historical resource protection measures as well as the geotechnical and vibration monitoring program shall be reviewed by an architectural historian or historical architect who meets the Secretary of Interior's Professional Qualification Standards to ensure that the measures would adequately protect the properties/resources. A post-construction survey shall also be undertaken to ensure that adverse effects or significant impacts have not occurred to historic properties or historical resources. (CR/B-3)

- For those historic properties and historical resources where adverse impacts are anticipated, a MOA has been developed to resolve those adverse effects consistent with 36 CFR 800. This agreement, developed by FTA and Metro in consultation with the California SHPO and other consulting parties shall resolve and/or avoid, minimize, or mitigate potential effects to historic properties and/or historical resources. The agreement includes stipulations that outline the specific requirements for consultation and decision-making between the lead federal agency and consulting parties, specify the level of HABS/HAER recordation, and outline specific requirements for pre- and post-construction surveys, geotechnical investigations, building protection measures, and TBM specifications. See Appendix 3 (Memorandum of Agreement) of this Final EIS/EIR for specific requirements. (CR/B-4)

- The S. Kamada Restaurant, Atomic Café, Señor Fish, and Coast Imports building (to be removed) shall be offered for a period of one year following certification of the Final EIS/EIR for the price of $1 to any party willing to move it off of the 1st/Central Avenue station site at their own expense. Should no parties come forward, Metro shall incorporate materials from the building into the project facilities. Metro shall explore keeping portions of the building intact for use in the 1st/Central Avenue station. Metro shall also offer to provide an exhibit

commemorating the building at the JANM, the 1st/Central Avenue station site, or other suitable location. An individual HABS/HAER submission shall be developed. (CR/B-5)

- Facades of historic buildings adjacent to the construction areas shall be protected from accumulation of excessive dirt or shall be cleaned in an appropriate manner periodically while construction activities are occurring nearby. (CR/B-6)

In order to mitigate potential ground movement associated with cut and cover construction and potential ground loss due to tunneling that could affect historic resources:

- Before any construction, a survey of structures within the anticipated zone of construction influence shall be conducted in order to establish baseline conditions. A geotechnical instrumentation and settlement monitoring plan and mitigation measures shall be developed and adhered to during construction to ensure appropriate measures are taken to address any construction-induced movement. If assessments indicate the necessity to proactively protect nearby structures, additional support for the structures by underpinning or other ground improvement techniques shall be required prior to the underground construction. Metro shall require the construction contractor to limit movement to less than acceptable threshold values for vertical, horizontal, and angular deformation as a performance standard. These acceptable threshold values shall be established such that the risk of damage to buildings and utilities will be negligible to very slight. For buildings, these threshold values will be based on the relationship of building damage to angular distortion and horizontal strain consistent with Boscardin and Cording (1989) and qualitative factors including but not limited to the type of structure and its existing condition. For utility mains, these threshold values shall be those established by the utility owners. Additional data and survey information shall be gathered during final design for each building and utility main to enable assessment of the tolerance of potentially affected structures and utilities. Additional engineering and design level geotechnical studies shall be performed to define the nature of the soils and to refine the means of achieving each performance specification. (GT-1)

- Ground improvement such as grouting or other methods shall be required to fill voids where appropriate and offset potential settlement when excess material has been removed during excavation. The criteria for implementing grouting or ground improvement measures shall be based on the analysis described in the preceding mitigation measure. (GT-2)

- The tunnel alignment shall be grouted in advance to provide adequate soil support and minimize settlement as geotechnical conditions require. (GT-3)

- Settlement along the project alignment shall be monitored using a series of measuring devices above the route of the alignment. Leveling surveys shall be conducted prior to tunneling to monitor for possible ground movements. (GT-4)

- Tunnel construction monitoring requirements shall be described and defined in design contract documents. Additional geotechnical provisions shall be included to the extent feasible, including use of an Earth Pressure Balance or Slurry Tunnel Boring Machine for tunnel construction to minimize ground loss. During tunnel construction, the soils

encountered shall be monitored relative to anticipated soil conditions as described in a Geotechnical Baseline Report. (GT-5)

To offset the potentially significant GBN impacts that could occur during construction at Walt Disney Concert Hall:

- Construction of the LPA, in the vicinity of the Walt Disney Concert Hall, shall be done in accordance with the MOA between FTA and the SHPO, which includes stipulations that outline the specific requirements for consultation and decision-making between the lead federal agency and consulting parties, specify the level of HABS/HAER recordation, and outline specific requirements for pre- and post-construction surveys, geotechnical investigations, building protection measures, and TBM specifications (for the Walt Disney Concert Hall only). (NV-18)

Tunnel Boring Machine

- Maintenance and Operation: The construction contractor shall minimize vibration from jacking or pressing operations (if applicable, the action could be smoothed out to avoid a sharp push), and maintain machinery in good working order. (NV-19)

- Coordination and Notification: There would be times when the Main Auditorium of the Walt Disney Concert Hall is vacant or not used for a noise-sensitive activity, thereby eliminating any noise impact from TBM(s). Similarly, there would be times at the LAPA Conference Room (and offices) of the Walt Disney Concert Hall and the recording/performance halls of the Colburn School when activities are not particularly noise-sensitive. Metro shall coordinate closely with the Walt Disney Concert Hall, the Colburn School, and the Broad Art Foundation Museum, which is currently under construction, to ensure that the noise-generating parts of TBM operations shall be conducted to avoid noise-sensitive periods. (NV-20)

Delivery Train

- Speed: Delivery train speed shall be limited to 5 MPH in the vicinity of the Walt Disney Concert Hall, the Colburn School, and the Broad Art Foundation Museum, currently under construction, which would reduce the GBN to the lower range, or 5 dBA from the maximum range. (NV-21)

- Resilient Mat: A resilient system to support and fasten the delivery train tracks shall be used during construction, which would reduce GBN levels by at least 4 dBA.

  - Such as system shall include a) resilient mat under the tracks and b) a resilient grommet or bushing under the heads of any track fasteners (assuming some kind of anchor or bolt system). The hardness of the resilient mat shall be in the 40 to 50 durometer range, and be about one to two inches thick, depending on how heavily loaded the cars would be. The contractor shall select the mat thickness so that the rail doesn't bottom out during a car pass-by. (NV-22)

- Conveyor: The delivery train shall be replaced with a conveyor system to transport materials in the tunnel if GBN exceeds the FTA annoyance criteria at the Walt Disney Concert Hall, the Colburn School, or the Broad Art Foundation Museum, which is currently under construction. (NV-23)

- Coordination and Notification: There would be times when the Main Auditorium and Choral Hall of the Walt Disney Concert Hall, and the recording/performance halls of the Colburn School are vacant or not used for noise-sensitive activities, thereby eliminating any noise impact from the delivery train. Metro shall coordinate closely with the Walt Disney Concert Hall, the Colburn School, and the Broad Art Foundation Museum, which is currently under construction, to ensure that the delivery train pass-bys would be conducted to avoid noise-sensitive periods. (NV-24)

4.18.4.2.10 Archaeological Resources

To offset the impacts of unknown archaeological impacts potentially being disturbed during construction:

- Construction personnel shall be trained on proper procedures by a qualified lead archaeologist. (CR/A-1)

- An archaeological monitor shall be present during ground-disturbing activities. The archaeological monitor shall have authority to halt operations to examine potential resources and recover artifacts using professional archaeological methods. (CR/A-2)

- A Native American cultural resources consultant from the Gabrielino/Tongva San Gabriel Band of Mission Indians and/or the Tongva Ancestral Territorial Tribal Nation shall be contacted to monitor ground-disturbing work if Native American cultural resources are discovered. (CR/A-3)

- Work shall stop if human remains are found, and the Los Angeles County Coroner shall be notified immediately. If the remains are determined to be prehistoric, the Coroner shall notify the Native American Heritage Commission, which will arrange for a most likely descendent to inspect the site within 48 hours and issue recommendations for scientific removal and nondestructive analysis. (CR/A-4)

- If no cultural resources are discovered during construction monitoring, the archaeological monitor shall submit a brief letter to that effect. If previously unidentified cultural resources are discovered in the course of construction monitoring, a report shall be prepared following Archeological Resource Management Report (OHP 1990) guidelines that documents field and analysis results and interprets the data within an appropriate research context. (CR/A-5)

To offset impacts caused by disturbance of the Los Angeles Zanja System (CA-LAN-887H and other unnumbered zanjas), and sites CA-LAN-3588, P-19-003338, and P-19-003339, which could occur during construction:

- A proactive identification and documentation program that would facilitate preservation or mitigation in a cost-effective manner shall be undertaken. This shall include using documentary research to identify, as accurately as possible, the precise alignments of the zanjas within the APE. Where these alignments are expected to be affected by the proposed project, particularly where cut and cover or other near-surface construction techniques are planned in the vicinity of mapped zanja segments, full-time archaeological monitoring shall be instituted to ensure documentation consistent with Section 4.12.2.4.2 of the Draft EIS/EIR. (CR/A-6)

4.18.4.2.11 Paleontological Resources

To offset the impacts of previously undiscovered paleontological resources potentially being disturbed during construction:

- A qualified paleontologist shall prepare a Paleontological Monitoring and Mitigation Plan for the proposed project and supervise monitoring of construction excavations within sensitive geologic sediments. The monitor shall have authority to temporarily divert grading away from exposed fossils to professionally and efficiently recover the fossil specimens and collect associated data. (CR/P-1)

- All project-related ground disturbances that could potentially affect the Puente Formation, Fernando Formation, and Quaternary older alluvium and terrace deposits would be monitored by a qualified paleontological monitor on a full-time basis (where feasible) because these geologic sediments are determined to have a high paleontological sensitivity. Very shallow surficial excavations (less than five feet) within Quaternary younger alluvium would be monitored on a part-time basis to ensure that underlying sensitive units are not adversely affected. Construction monitoring during any tunneling activity is not warranted as any potential fossil specimens present within sensitive geologic units would be crushed and destroyed by the nature of tunneling methodology. (CR/P-2)

- At each fossil locality, field data forms shall be used to record pertinent geologic data, stratigraphic sections shall be measured, and appropriate sediment samples shall be collected and submitted for analysis. (CR/P-3)

- Due to the likelihood of the presence of microfossils, matrix samples shall be collected and tested within the Puente Formation and Fernando Formation. Testing for microfossils shall consist of screen-washing samples (approximately 30 pounds) to determine if significant fossils are present. Productive tests shall result in screen-washing of additional bulk matrix up to a maximum of 2,000 pounds per locality to ensure recovery of a scientifically significant sample. (CR/P-4)

- Recovered fossils shall be prepared to the point of curation, identified by qualified experts listed in a database to facilitate analysis, and reposited in a designated paleontological curation facility such as the Natural History Museum of Los Angeles County. (CR-P/5)

- The paleontologist shall prepare a final monitoring and mitigation report to be filed, at a minimum, with Metro and the identified repository. (CR/P-6)

4.18.4.2.12 Ecosystems and Biological Resources

In order to reduce the number of trees potentially removed or disturbed during construction of the LPA, the following mitigation measures shall be implemented:

- The construction contractor shall minimize disturbance to trees through avoidance or fencing. (EB-1)
- If disturbance is unavoidable, the construction contractor shall trim individual trees instead of removing them completely where feasible to reduce the scale of disturbance. (EB-2)
- The construction contractor shall replant or replace disturbed or removed trees as soon as practicable. (EB-3)
- The construction contractor shall schedule necessary tree removal and trimming activities that would affect bird nesting outside of the bird breeding season, which can extend from February 1 to August 31. (EB-4)

If it is not feasible to avoid tree removal and trimming related to construction during the breeding bird season from February 1 to August 31, breeding bird surveys shall be conducted as recommended by the California Department of Fish and Game.

- A qualified biologist shall conduct two biological surveys, one 15 days prior and a second 72 hours prior to construction activities that would remove or disturb suitable nesting habitat. The biologist shall prepare survey reports documenting the presence or absence of active nests of any protected native bird (as identified in the Migratory Bird Treaty Act) in the habitat to be removed and any other such habitat within 300 feet of the construction work area (within 500 feet for raptors). (EB-5)
- If an active native bird species nest is located, construction within 300 feet of the nest (500 feet for raptor nests) shall be postponed or modified in consultation with the qualified biologist until the nest is vacated, juveniles have fledged, and there is no evidence of a second attempt at nesting. (EB-6)

A tree survey shall be conducted by a qualified arborist to identify native trees that could be affected by project construction. If construction of the project requires removal of any of the native trees located along the proposed alignment and stations for the LPA, the following mitigation measure shall be applied:

- A removal permit shall be obtained from the Los Angeles Board of Public Works in accordance with the City of Los Angeles Native Tree Protection Ordinance. Tree replacement shall comply with the ordinance and the terms of the removal permit. If construction would require pruning of any protected native tree, the pruning shall be performed in a manner that does not cause permanent damage or adversely affect the health of the trees. (EB-7)

- New trees planted at station locations shall be regularly monitored by Metro to ensure healthy growth and development. Metro shall replace trees as close as possible to original locations. (EJ-30)

4.18.4.2.13 Parklands and Other Community Facilities

To mitigate the temporary restriction of access to public services that could occur during construction activities:

- Where feasible, temporary restriping of the roadway to maximize the vehicular capacity at locations affected by construction closures shall be performed. Metro shall provide notices of closures and relocations on its website, smart phone apps, and other modes typically used to communicate service announcements. (PC-1)

- Where feasible and necessary, temporary removal of on-street parking to maximize the vehicular capacity at locations affected by construction closures shall be performed. Where temporarily eliminated, parking spaces will be restored to their prior striped or signed condition at the conclusion of the construction period. (PC-2)

- Construction activity that affects traffic flow on the arterial system, including the transportation of excavated materials, shall be primarily limited to off-peak hours. This measure would minimize vehicle idling time, which would reduce emissions generated from construction vehicles. (AQ-15)

- Accessible detours shall be provided whenever possible. Detours shall be compliant with the ADA. Signage shall be provided in those languages most commonly spoken in the immediate community. Signs shall mark detours in accordance with the Manual on Uniform Traffic Control Devices, and other applicable local and state requirements. Detours shall be designed to minimize cut-through traffic in adjacent residential areas. (CN-1)

- Traffic management and construction mitigation plans shall be developed in coordination with the community to minimize disruption and limit construction activities during special events. Worksite Traffic Control Plans shall be developed in conjunction with LADOT and surrounding communities to minimize impacts to traffic, businesses, residents, and other stakeholders. Crossing guards and other temporary traffic controls shall be provided in the vicinity of construction sites, haul routes, and other relevant sites as proposed in California DOT Traffic Manual, Section 10-07.3, Warrants for Adult Crossing Guards, and as appropriate to maintain traffic flow during construction. (CN-3)

- A community outreach plan shall be developed and implemented to notify local communities and the general public of construction schedules and road and sidewalk detours. Metro shall coordinate with local communities during preparation of the traffic management plans to minimize potential construction impacts to community resources and special events. Construction activities shall be coordinated with special events. (CN-5)

- Metro shall develop a construction mitigation plan with community input to directly address specific construction impacts in the project area. Metro shall establish and receive input from the RCCLC in developing the construction mitigation plan. The RCCLC shall consist of representatives from all parts of the alignment area. Metro shall work with the RCCLC in developing the outreach plan. (CN-6)

- Safe pedestrian detours with handrails, fences, k-rail, canopies, and walkways shall be provided as needed. When a crosswalk is closed due to construction activities, pedestrians shall be directed to nearby alternate crosswalks. Access shall be ADA accessible at all times per existing Metro policy. (TR-4)

- Bicyclists shall be encouraged through signage to ride carefully in streets near construction activities, ride carefully on sidewalks (as City of Los Angeles municipal code permits), or choose nearby alternate routes around construction sites. Detours shall be provided as needed. Metro shall provide signage showing the alternate bicycle routes. Pedestrian and bicycle circulation, and travel lanes temporarily impacted during construction shall be restored to their permanent configurations at the conclusion of the construction period and prior to operations. (TR-5)

- Metro shall maintain access to the Little Tokyo Library and other community facilities at all times during construction. (DR-6)

- The temporary displacement of three bus loading spaces on Alameda Street for the JANM shall be replaced nearby for the duration of construction activities. Metro shall work with JANM to confirm locations of temporary loading spaces. (EJ-1)

4.18.4.2.14 Economic and Fiscal

- Metro shall develop measures to assist business owners significantly impacted by construction. These shall include temporary parking, marketing programs, and other measures developed jointly between Metro and affected businesses. (EF-1)

- Metro shall work with the City to develop a parking mitigation program to mitigate the loss of public parking spaces during construction. This would include, but is not limited to, restriping the existing street to allow for diagonal parking, reducing the number of restricted parking areas, phasing construction activities in a way that minimizes parking disruption, and increasing the time limits for on-street parking. Restriping would occur on portions of Temple Street, Alameda Street, 1st Street, 2nd Street, Central Avenue, San Pedro Street, Judge John Aiso Street, 3rd Street, and Traction Avenue. Such parking mitigation shall be implemented on a temporary, tiered basis pending findings of the annual parking analysis described in EJ-11 in the MMRP for the LPA, Chapter 8, of this Final EIS/EIR. (DR-4)

- Metro shall not hinder access to other public parking lots during construction. (DR-5)
- Metro shall maintain access to the Little Tokyo Library and other community facilities at all times during construction. (DR-6)
- Metro shall develop a Construction Mitigation Program that includes protocol for community notification of construction activities, including traffic control measures, schedule of activities, and duration of operations, with written communications to the community translated into appropriate languages. (DR-7)
- Metro shall provide relocation assistance and compensation as required by the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. (DR-8)

4.18.4.2.15 Safety and Security

- Accessible detours shall be provided whenever possible. Detours shall be compliant with the ADA. Signage shall be provided in those languages most commonly spoken in the immediate community. Signs shall mark detours in accordance with the Manual on Uniform Traffic Control Devices, and other applicable local and state requirements. Detours shall be designed to minimize cut-through traffic in adjacent residential areas. (CN-1)
- Early notification of traffic disruption shall be given to emergency service providers. Work plans and traffic control measures shall be coordinated with emergency responders to prevent impacts to emergency response times. (CN-2)
- Traffic management and construction mitigation plans shall be developed in coordination with the community to minimize disruption and limit construction activities during special events. Worksite Traffic Control Plans shall be developed in conjunction with LADOT and surrounding communities to minimize impacts to traffic, businesses, residents, and other stakeholders. Crossing guards and other temporary traffic controls shall be provided in the vicinity of construction sites, haul routes, and other relevant sites as proposed in California DOT Traffic Manual, Section 10-07.3, Warrants for Adult Crossing Guards, and as appropriate to maintain traffic flow during construction. (CN-3)
- Metro shall protect public use of work areas involving sidewalks, entrances to buildings, lobbies, corridors, aisles, stairways, and vehicular roadways with appropriate guardrails, barricades, temporary fences, overhead protection, temporary partitions, shields, and adequate visibility. Metro shall keep sidewalks, entrances to buildings, lobbies, corridors, aisles, doors, or exits that remain in use by the public clear of obstructions. Metro shall post appropriate warnings, signs, and instructional safety signs. These requirements shall be included in the construction specifications. (SS-15)

- Safe pedestrian detours with handrails, fences, k-rail, canopies, and walkways shall be provided as needed. When a crosswalk is closed due to construction activities, pedestrians shall be directed to nearby alternate crosswalks. Access shall be ADA accessible at all times per existing Metro policy. (TR-4)

- Metro shall develop a Construction Mitigation Program that includes protocol for community notification of construction activities, including traffic control measures, schedule of activities, and duration of operations, with written communications to the community translated into appropriate languages. (DR-7)