Los Angeles County
Metropolitan Transportation Authority

June 2017

Westside Purple Line Extension

Draft Supplemental Environmental Impact Statement and Section 4(f) Evaluation

Metro

U.S. Department of Transportation
Federal Transit Administration

Administrative Draft
Supplemental Environmental Impact Statement and Section 4(f) Evaluation

for the

Westside Purple Line Extension

prepared by the

U.S. Department of Transportation
Federal Transit Administration

and the

Los Angeles County Metropolitan Transportation Authority

Submitted pursuant to:

The National Environmental Policy Act of 1969, 42 U.S.C. §4321-4370h, 23 CFR 441, 49 U.S.C. §303 and the Final Decision on Motions for Summary Judgment and Ruling in Regard to Remedies of the United States District Court for the Central District of California in Beverly Hills Unified School District v. Federal Transit Administration, et al.**, CV 12-9861-GW(SSx) on August 12, 2016.**

The Federal Transit Administration (FTA) may issue a single Final Supplemental Environmental Impact Statement/Supplemental Record of Decision document pursuant to Public Law 114-94 and 23 U.S.C. 139 (n)(2), unless the FTA determines statutory criteria or practicability considerations preclude issuance of a combined document. In that case, FTA would issue a Final Supplemental Environmental Impact Statement followed by an amendment to the Record of Decision, as needed.

Leslie T. Rogers Region IX Regional Administrator Federal Transit Administration	MAY 26 2017 Date
Phillip A. Washington Chief Executive Officer Los Angeles County Metropolitan Transportation Authority	MAY 26 2017 Date

DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT AND SECTION 4(f) EVALUATION

LEAD AGENCIES—Federal Transit Administration of the U.S. Department of Transportation and Los Angeles County Metropolitan Transportation Authority

TITLE OF PROPOSED ACTION—Westside Purple Line Extension Project

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ABSTRACT—The Federal Transit Administration (FTA) and the Los Angeles County Metropolitan Transportation Authority (Metro) prepared and distributed a Final Environmental Impact Statement/Environmental Impact Report (Final EIS/EIR) for the Westside Subway Extension (now called the Westside Purple Line Extension) Project (the Project) in March 2012. The Project would implement a heavy rail transit subway that would operate as an extension of the Metro Purple Line heavy rail transit subway system from its current western termini at Wilshire/Western Station to a new western terminus near the West Los Angeles Veterans Affairs (VA) Hospital. The extension will be nearly 9 miles and will include a total of seven new stations. The Project is planned to be constructed in three sections with Section 1 currently under construction and anticipated to begin revenue service in October 2024.

The Westside Subway Extension Transit Corridor Study Area is in western Los Angeles County and encompasses approximately 38 square miles. The Study Area is east-west oriented and includes portions of five jurisdictions—the Cities of Los Angeles, West Hollywood, Beverly Hills, and Santa Monica, as well as portions of unincorporated Los Angeles County. The boundaries of the Study Area generally extend north to the base of the Santa Monica Mountains along Hollywood, Sunset, and San Vicente Boulevards, east to the Metro Rail stations at Hollywood/Highland and Wilshire/Western, south to Pico Boulevard, and west to the Pacific Ocean.

This limited scope Draft Supplemental Environmental Impact Statement (Draft SEIS) and Section 4(f) Evaluation was prepared in response to the Final Decision on Motions for Summary Judgment and Ruling in Regards to Remedies (Final Decision) of the United States District Court for the Central District of California in *Beverly Hills Unified School District v. Federal Transit Administration, et al.*, CV 12-9861-GW(SSx) on August 12, 2016, and provides additional detail and analysis of Section 2 of the Project with a particular focus on the Century City Constellation Station and the alignment between the Wilshire/Rodeo and Century City Constellation Station with regard to the following:

- An analysis of the potential public health impacts of nitrogen oxide emissions during construction of Constellation Station and tunneling for Section 2 of the Project and, depending on the results of that analysis, an assessment of the feasibility and efficacy of mitigation measures and alternatives to address such potential impacts

- An analysis of the potential risks of soil gas migration from tunneling or other construction activities related to Section 2 of the Project and, depending on the results of that analysis, the disclosure of any information required by 40 CFR §§ 1502.22, 1502.9, and *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016 (9th Cir. 2006), depending on the results of such analysis and disclosures, an assessment of the feasibility and efficacy of mitigation measures and alternatives to address such potential risks and disclosures
- A discussion of the completeness of the available seismic risk information related to Section 2 of the Project
- A discussion of post-Draft EIS seismic and ridership studies available to the FTA and related to Section 2 of the Project
- Identification of the direct and any constructive "use" of the Beverly Hills High School campus from subway construction and operation on, beneath, or near the campus, and if construction or operation causes a "use," an evaluation of "prudent and feasible alternatives" and "all possible planning" to minimize harm under the Department of Transportation Act § 4(f) Pub. L. No. 89-670, 80 Stat. 931, 933 (Oct. 15, 1966) (codified as amended at 23 United States Code (USC) § 138 and 49 USC § 303) ("Section 4(f)")

In addition to addressing the topics specified in the Court's ruling, this Draft SEIS analyzes the relocation of construction staging activities for the Century City Constellation Station, the removal of the train cross-over at the Wilshire/Rodeo Station, and changes to land uses adjacent to the construction staging areas in Century City.

This Draft SEIS describes the associated transportation and environmental impacts. Areas of impacts include transit; traffic; parking; the bicycle and pedestrian network; geological hazards; and construction impacts. Mitigation measures for the impacts are also identified.

This report also serves as summary documentation of the consultation conducted in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, and the Section 4(f) evaluation prepared pursuant to Section 4(f) of the U.S. Department of Transportation Act of 1966, as amended.

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ACRONYMS AND ABBREVIATIONS

$\mu g/m^3$	micrograms per cubic meter
AA	Alternatives Analysis
AAA	Automobile Club of Southern California
AERMOD	USEPA's Atmospheric Dispersion Model
APE	Area of Potential Effects
ARB	Air Resources Board
BHHS	Beverly Hills High School
BHUSD	Beverly Hills Unified School District
CAA	Clean Air Act
Cal/OSHA	California Occupational Safety and Health Administration
CARB	California Air Resource Board
CCAA	California Clean Air Act
CEQA	California Environmental Quality Act (PRC 21000-21177)
CFR	Code of Federal Regulations
CGS	California Geological Surveys
CMS	changeable message signs
CO	carbon monoxide
CO_{2e}	carbon dioxide equivalent
CPT	cone penetration test
DASH	Downtown Area Shuttle
dB	decibels
dBA	A-weighted decibels
DOGGR	State of California Division of Oil, Gas, and Geothermal Resources
DSOD	State of California Division of Safety of Dams
DTSC	State of California Department of Toxic Substances Control
DWP	City of L.A. Department of Water and Power
EAI	Environmental Audit Inc.
ECI	Earth Consultants International
EIS/EIR	environmental impact statement/environmental impact report
EMFAC	model for on-road vehicle emissions
EPB	earth pressure balance
FHWA	Federal Highway Administration

Final Decision	Final Decision on Motions for Summary Judgment and Ruling in Regards to Remedies (Final Decision) of the United States District Court for the Central District of California in *Beverly Hills Unified School District v. Federal Transit Administration, et al.*, CV 12-9861-GW(SSx)
FTA	Federal Transit Administration
HARP2	Hotspots Analysis and Reporting Program Version 2
ka	thousand years old
KGS	Kenney GeoScience
La	ground-borne noise
LADBS	L.A. Department of Building and Safety
LADOT	Los Angeles Department of Transportation
lbs	pounds
LCI	Leighton Consulting, Inc.
LEL	methane lower explosive limit
Leq	equivalent sound level
Leq(h)	hourly equivalent sound level
LOS	level-of-service
LPA	Locally Preferred Alternative
LRT	Light Rail Transit
LSTM	Line Source Transfer Mobility
Lv	ground-born vibration
MDE	2,450-year return period earthquake
Metro	Los Angeles County Metropolitan Transportation Authority
Metrolink	Southern California Regional Rail Authority
MFR	multi-family residences
mph	miles per hour
MSHA	Mine Safety and Health Administration
Mw	earthquake magnitude
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Protection Act
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
NRHP	National Register of Historic Places
O_3	ozone
ODE	150-year return period earthquake
OFFROAD	model for off-road vehicle and equipment emissions
OSHA PEL	permissible exposure limit

OSL	Optical Stimulated Luminescence
pCi/l	pico Curies per liter of air
PCMS	portable changeable message sign
PFDHA	probabilistic fault displacement hazard analysis
PFRSA	Preliminary Fault Rupture Study Areas
PM	Particulate Matter
PM_{10}	particulate matter smaller than or equal to 10 microns in size
$PM_{2.5}$	particulate matter smaller than or equal to 2.5 microns in size
ppb	parts per billion
ppm	parts per million
PPP	Public Participation Plan
PPV	peak particle velocity
Project	Westside Purple Line Extension
PSHA	probabilistic seismic hazard analyses
RAST	Risk Assessment Standalone Tool
RMS	root mean squared
ROD	Record of Decision
SAAG	Station Area Advisory Group
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
Section 106	National Historic Preservation Act of 1966
Section 4(f)	Parks, Recreation Areas, Wildlife and Waterfowl Refuges, and Historic Sites (23 CFR 774 et seq.)
SEIS	Supplemental Environmental Impact Statement
SFR	single-family residences
SHPO	State Historic Preservation Office/Officer
SO_2	sulfur dioxide
SOP	Standard Operating Procedures
TBM	tunnel boring machine
TDM	transportation demand management
TL	Thermoluminescence
TLV	threshold limit value-time weighted average
TMP	Transportation Management Plan
TOD	transit-oriented development
UCERF	The Uniform California Earthquake Rupture Forecast
UCLA	University of California, Los Angeles

Uniform Relocation Act	Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended
USC	United States Code
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
VA	Veterans Affairs
VdB	vibration decibels
VHT	vehicle hours traveled
VMT	vehicle miles traveled
VOC	volatile organic compounds

GLOSSARY OF TECHNICAL TERMS

Term	Definition
Alluvium	Loose, unconsolidated soil or sediments that are eroded or reshaped by water
Area of Potential Effect (APE)	"…the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking." 36 CFR Part 800.16(d)
At-Grade	Surface level
Capital Costs	Costs incurred on the purchase of land, buildings, construction and equipment to be used in bringing a project to a commercially operable status
Cut and Cover	Construction method that involves "cutting" the area to be excavated and "covering" it to maintain traffic flow while excavation continues below
dBA	A-weighted decibels which account for human perception of sound and unwanted noise
de minimis	The requirements of Section 4(f) would be considered satisfied if it is determined that a transportation project would have only a *de minimis* impact on the Section 4(f) resource. *De minimis* impact is defined in 23 CFR 774.17 as follows: ▪ For parks, recreation areas, and wildlife and waterfowl refuges, a *de minimis* impact is one that would not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f); and ▪ For historic sites, *de minimis* impact means that the FTA has determined, in accordance with 36 CFR Part 800, that no historic property is affected by the project or the project would have "no adverse effect" on the property in question
Dewatering	Removal or draining of groundwater or surface water from a site by pumping or evaporation
Environmental Clearance	The National Environmental Policy Act (NEPA) of 1969 established protocol by which agencies are required to evaluate project impacts on the social and natural environment

Term	Definition
Earth Pressure Balance (EPB)	EPB is a mechanized tunneling method in which the excavated material is used to support the tunnel face while it is being conditioned using foams and other additives to make it more fluid. The spoil is admitted into the tunnel boring machine (TBM) via a screw conveyor. Pressure on the tunnel face is controlled through the speed of the screw conveyor removing material from the pressure chamber and the hydraulic pressure used to push the TBM forward. In this way, the material excavated and removed is "balanced."
Façade	The front of a building; any face of a building given special architectural treatment
Fault	A fracture or zone of fractures along which there has been displacement of the sides relative to one another, parallel to the fracture
Fault Line	A commonly used term that is synonymous with the surface trace of a fault
Fault Rupture	A break in the ground along the fault line during an earthquake
Fault Strand	An individual fault of a set of closely spaced parallel or subparallel faults of a fault system
Footwall	Of the two sides of a non-vertical fault, the side below the fault plane
Geologic Epoch	A timescale based on rock layering
Ground-Borne Noise (GBN)	A low-frequency rumble related to operational vibration
Hanging Wall	Of the two sides of a fault, the side above the fault plane
Lateral Fault	A fault that slips in such a way that the two sides move with a predominantly lateral motion (with respect to each other). The two kinds of lateral slip faults are right-lateral and left-lateral
Laydown Areas	Laydown or staging areas are designated areas where vehicles, supplies, and construction equipment are positioned for access and use to a construction site
Ldn	Average day-night noise level, cumulative 24-hour day-night noise level
Leq	Equivalent, continuous sound level, measure of total noise energy of all sound during a time period
Leq(h)	Hourly equivalent sound level, Leq for a one-hour period
Level of Service (LOS)	A qualitative measure to describe road conditions that reflect the relative ease of traffic flow on a scale of A to F, with free-flow being rated LOS-A and congested conditions as LOS-F
Liquefaction	A process by which loosely packed sandy or silty materials saturated with water are shaken hard enough to lose strength and stiffness
Magnitude	A general term for a measure of the strength or energy of an earthquake as determined from seismographic information

Term	Definition
Maximum Design Earthquake (MDE)	Level of ground shaking hazard that has 4-percent probability of exceedance in 100 years
Methane Gas Risk Zone	An area in the Fairfax District designated as a risk zone in 1985 following a naturally occurring methane gas fire at a Ross "Dress for Less" store. The methane gas fire resulted in an investigation by a special City of Los Angeles Task Force. Conclusions from this investigation led to Congressional prohibition on federal funding for subway construction within this designated Methane Gas Risk Zone Public Law 99-190). Due to advances in new tunnel construction methods, Congress repealed the Federal prohibition on subway funding in December 2007
Mw	Earthquake magnitude measurement used instead of Richter scale
Non-Dispersive Infrared Photometry (NDIR)	A tool used to determine concentration of gas
Operating Design Earthquake (ODEO)	Level of ground shaking hazard that has 50-percent probability of exceedance in 100 years
Peak Ground Acceleration (PGA)	A fraction of the acceleration of gravity used to express ground motion induced by a seismic event
Peak Particle Velocity (PPV)	An expression of ground-borne vibration
Reverse Fault	A fault in which the displacement is predominantly vertical, and the hanging wall is moved upward with respect to the footwall. Some amount of reverse slip is often seen in predominantly lateral faults
Root Mean Squared (RMS)	A formula used to calculate ground-borne vibration from transit vehicles
Scarp	A roughly linear, cliff-like slope or face that breaks the continuity of a surface into distinct levels
Scoping	An early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action
Seismic Moment	A quantity used by earthquake seismologists to measure the size of an earthquake.
Surface Rupture	The breakage of ground along the surface trace of a fault caused by the intersection of the fault surface area ruptured in an earthquake with the Earth's surface
Transit-Oriented Development (TOD)	Compact, medium- to high density mixed-use development within walking distance of transit facilities

Term	Definition
Transverse Ranges	The mountains formed by compression associated with the Big Bend of the San Andreas fault zone —primarily the San Gabriel and San Bernardino Mountains. They are called transverse because they stretch east-west, unlike the north-south-trending Sierra Nevada, the Peninsular Ranges, and the mountains of the Basin and Range Province
Tunnel Boring Machine (TBM)	A machine used to excavate tunnels with the ability to penetrate through a variety of soil and hard rock
Vibration Decibels (VdB)	An expression of ground-borne vibration

S—EXECUTIVE SUMMARY

S.1 Introduction

This Draft Supplemental Environmental Impact Statement (SEIS) and Section 4(f) Evaluation is a limited scope document that was prepared in response to the Final Decision on Motions for Summary Judgment and Ruling in Regards to Remedies (Final Decision) of the United States District Court for the Central District of California in *Beverly Hills Unified School District v. Federal Transit Administration, et al.*, CV 12-9861-GW(SSx) of August 12, 2016. In the Final Decision, the Court remanded the matter back to the Federal Transit Administration (FTA) to prepare an SEIS providing additional detail and analysis of Section 2 of the Project with a particular focus on the completeness of information regarding the decision to locate the planned Century City Station at Constellation Boulevard, and the alignments between the Wilshire/Rodeo and the Century City Constellation Stations with regard to the following:

- An analysis of the potential public health impacts of nitrogen oxides (NOx) and diesel particulate matter emissions during construction of the Century City Constellation Station and tunneling for Section 2 of the Project and, depending on the results of that analysis, an assessment of the feasibility and efficacy of mitigation measures and alternatives to address such potential impacts
- An analysis of the potential risks of soil gas migration from tunneling or other construction activities related to Section 2 of the Project and, depending on the results of that analysis, the disclosure of any information required by 40 Code of Federal Regulations (CFR) §§ 1502.22, 1502.9, and *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016 (9th Cir. 2006), and depending on the results of such analysis and disclosures, an assessment of the feasibility and efficacy of mitigation measures and alternatives to address such potential risks and disclosures
- A discussion of the completeness of the available seismic risk information related to Section 2 of the Project
- A discussion of post-Draft Environmental Impact Statement (Draft EIS) seismic and ridership studies available to the FTA and related to Section 2 of the Project
- Identification of the potential direct and any constructive “use” of the Beverly Hills High School campus from subway construction and operation on, beneath, or near the campus, and if construction or operation causes a “use”, an evaluation of “prudent and feasible alternatives” and “all possible planning” to minimize harm under Department of Transportation Act § 4(f) Pub. L. No. 89-670, 80 Stat. 931, 933 (Oct. 15, 1966) (codified as amended at 23 U.S. Code (USC.) § 138 and 49 USC. § 303) (“Section 4(f)”)

Therefore, this SEIS evaluates the locally preferred alternative (LPA) as it relates to Section 2 of the Project, as described in the Record of Decision. Other alternatives considered under Section 4(f) are discussed in Chapter 5.

In addition to responding to the issues specified in the Court's ruling, this Draft SEIS analyzes the relocation of construction staging areas for the Century City Constellation Station, the removal of the train crossover at the Wilshire/Rodeo Station, and changes to land uses adjacent to the construction staging areas in Century City, as these have changed since the *Westside Subway Extension Final Environmental Impact Statement/Environmental Impact Report* (Final EIS/EIR) (Metro 2012j) was completed.

As directed by the Court ruling, Los Angeles County Metropolitan Transportation Authority (Metro) studies that were completed after the publication of the Draft EIS/EIR are discussed in and appended to this Draft SEIS. In addition to the studies prepared by Metro, geotechnical reports prepared by others have been reviewed and are identified, summarized, and incorporated into this SEIS. Metro reports published prior to March 2012 were included in the Final EIS/EIR.

The publication of this Draft SEIS will be followed by a 45-day review and comment period. The Final SEIS will include and address all comments received during the public review of the Draft SEIS.

The FTA may issue a single Final SEIS/Supplemental Record of Decision (ROD) pursuant to Public Law 114-94 and 23 USC § 139(n)(2) unless the FTA determines that the statutory criteria preclude issuance of a single document. In that case, FTA would issue a Final SEIS followed by a Supplemental ROD, as needed.

S.2 Project Overview

The FTA and Metro prepared and distributed a Final EIS/EIR for the Westside Subway Extension (now called the Westside Purple Line Extension) Project (the Project) in 2012. The Project is an approximately 9-mile heavy rail transit subway that will operate as an extension of the Metro Purple Line from its current western terminus at the Wilshire/Western Station to a new western terminus near the West Los Angeles Veterans Affairs (VA) Hospital (Figure S-1).

The Project was planned to be constructed in three phases:

- Section 1: 3.92-mile section from the existing Wilshire/Western Station to Wilshire/La Cienega with three new stations: Wilshire/La Brea, Wilshire/Fairfax, and Wilshire/La Cienega
- Section 2: 2.59-mile section from Wilshire/La Cienega to Century City with two new stations: Wilshire/Rodeo and Century City Constellation
- Section 3: 2.59-mile section from Century City to Westwood/VA Hospital with two new stations: Westwood/University of California, Los Angeles and Westwood/VA Hospital

The Final EIS/EIR identified environmental impacts and mitigations for the Project, including the use of properties protected under Section 4(f) of the Department of Transportation Act. The Metro Board of Directors approved Section 1 of the Project in April 2012, followed by the approvals of Section 2 and Section 3 in May 2012. A ROD was issued by FTA in August 2012 for all three sections of the Project.

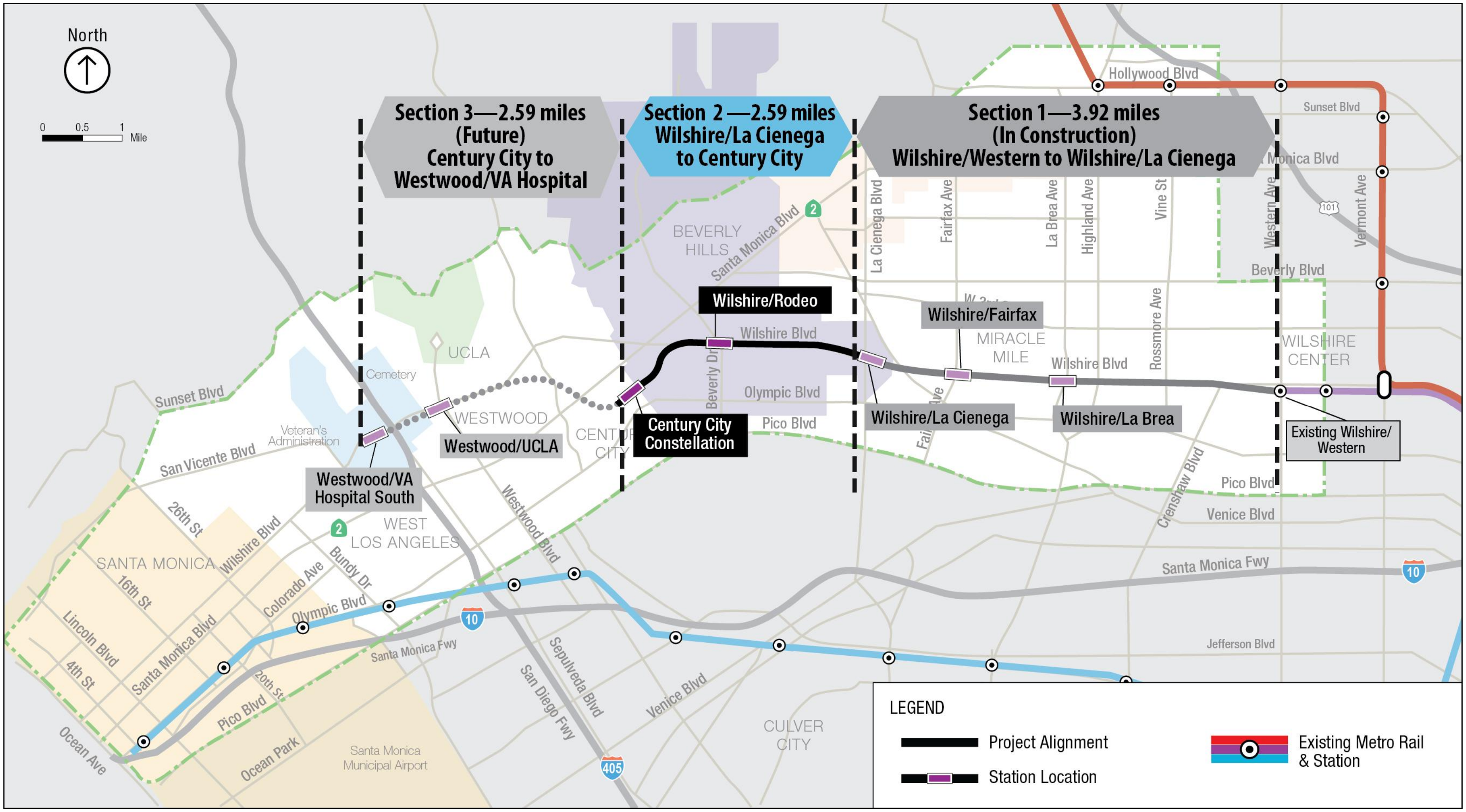


Figure S-1. Westside Purple Line Extension Project

In November 2014, construction began for Section 1 of the Project, which is anticipated to be completed in 2024. Major construction activities for Section 2 of the Project, which is the subject of this limited scope Draft SEIS, could begin as early as January 2018 with expected completion in 2026. Construction for Section 3 is scheduled to begin in 2025 with project completion anticipated in 2035.

On November 8, 2016, Los Angeles County residents voted to approve a half-cent sales tax measure (Measure M—the Los Angeles County Traffic Improvement Plan), which provides funding to expedite construction of Section 3 of the Project.

S.3 Alternative Considered in this SEIS

The alternative considered in this Draft SEIS is the LPA as identified in the ROD. Other alternatives considered under Section 4(f) are discussed in Chapter 5. The subject of this Draft SEIS is Section 2 of the Project, with a focus on the portion from the Wilshire/Rodeo Station to the Century City Station. Specifically, this Draft SEIS focuses on the following Section 2 Project elements:

- The tunnel alignment beneath the Beverly Hills High School (BHHS) campus
- The construction staging sites to support the Century City Constellation Station
- The Century City Station location

The project definition is consistent with that described in the Final EIS/EIR and approved as part of Section 2 by the Metro Board of Directors in May 2012, with the exception of adjustments to the construction staging sites to support the Century City Station and the removal of the double crossover structure and station box shift at the Wilshire/Rodeo Station.

Chapter 2 of this Draft SEIS provides a detailed description of the tunnel alignment and station locations considered in this document, which are consistent with those analyzed in the Final EIS/EIR. As part of the Section 4(f) analysis conducted in response to the Final Ruling, a range of avoidance alternatives and least overall harm alternatives were considered between the Wilshire/Rodeo and Century City Stations as detailed in Chapter 5 of this Draft SEIS. As none of the avoidance alternatives evaluated proved to be feasible and prudent, they are not considered further in this Draft SEIS. Likewise, the least overall harm alternatives were less effective than the Project in meeting the purpose and need, resulted in other adverse impacts, or resulted in a substantial difference in cost and therefore are not considered further in this Draft SEIS.

S.3.1 Century City Construction Staging

The construction staging has changed since the Final EIS/EIR due to a proposed commercial development on the northeast corner of Constellation Boulevard and Avenue of the Stars (Area 1) that would prevent the use of that property for construction staging. Instead, the staging areas identified in the Final EIS/EIR as part of Scenario B are proposed for implementation. Figure S-2 depicts the construction staging locations. The construction staging sites include two locations along Century Park East (Area 2 and 3) that require full acquisition of properties at 1940 Century Park East, 1950 Century Park East, and 2040 Century Park East. Area 2 and Area 3 would be used for the duration of construction - approximately seven years to support tunneling and station construction activities. An access shaft would be located in Area 2, behind the AAA Building (1950 Century Park East), to allow excavated materials to be brought to the surface for disposal. Additional construction staging-related elements include the following:

- **Installation of a Tunnel Access Shaft and Materials Transport Corridor (Area 2 and Area 3):** A temporary access shaft, approximately 80 feet in diameter, would be constructed in Area 2 to provide access to the tunnel for workers and materials and to remove excavated material from the tunnel. Because Areas 2 and 3 are not adjacent, a materials transport corridor would be located along the AT&T property at 2010 Century Park East to move excavated materials and construction equipment between the tunnel access shaft in Area 2 and the staging area in Area 3. The excavated materials would be moved via an enclosed conveyor system located within the materials transport corridor. The materials transport corridor would be in place for five years to support tunnel and cross-passage construction; concrete work within tunnels and cross-passages; and rail welding, track work, and systems installation. The conveyor would operate for approximately three of those five years to move materials excavated from the tunnel and cross-passages.
- **Tunnel Boring Machine (TBM) Launch Box and Station Box Construction:** The TBM launch box and Century City Constellation Station box would be constructed within Constellation Boulevard (Area 4 in Figure S-2). Phased lane closures consisting of sequenced partial and full street closures would be required on Constellation Boulevard for the TBM launch box and station box construction activities. During the installation of soldier piling for the TBM launch box, phased lane closures would occur on Constellation Boulevard over the course of two to four months. The decking of the TBM launch box would require full closure of a 200 foot segment of Constellation Boulevard for a period of approximately six weeks. During excavation of the TBM launch box, Constellation Boulevard will be partially closed for approximately five to six months. Once excavation is completed, an approximate nine month full closure of approximately 200-foot segment of the eastern end of Constellation Boulevard, between Century Park East and the first driveway on the north side of the street, will be required for assembling and launching the TBMs in the launch box. This closure would not block any building or driveway entrances. Phased lane closure would continue on Constellation Boulevard during soldier pile installation for the station box. Following the soldier pile installation, a series of 22 consecutive 56-hour weekend closures would be needed to install decking spanning the full width of Constellation Boulevard along the length of the station box. Once decking is installed, Constellation Boulevard would be closed except for one traffic lane in each direction for approximately four years for station excavation and construction.

- **Use of Existing Bus Layover Area for Construction Material Storage:** A material storage area would be placed at the existing 0.3-acre bus layover site on the southeast corner of Century Park West and Constellation Boulevard (refer to Area 5 in Figure S-2). The site would be used for approximately seven years for trailer offices, storage of construction materials, and parking for construction equipment associated with construction of the station. Following construction of the station, the site would be returned to its current use as a bus layover facility.
- **Temporary Bus Layover on Santa Monica Boulevard:** Due to the use of the existing bus layover site (Area 5) for construction material storage, a new temporary bus layover, approximately 500 feet long and 12 feet wide and providing parking for up to five buses, will be constructed in the median of Santa Monica Boulevard between Avenue of the Stars and Century Park East. This bus layover would be in use for approximately seven years.
- **Ventilation/Exhaust Structures into the Westfield Century City Property:** Temporary and permanent easements into the Westfield Century City mall property (Westfield Mall) would be required to construct and use ventilation ducts servicing the subway.

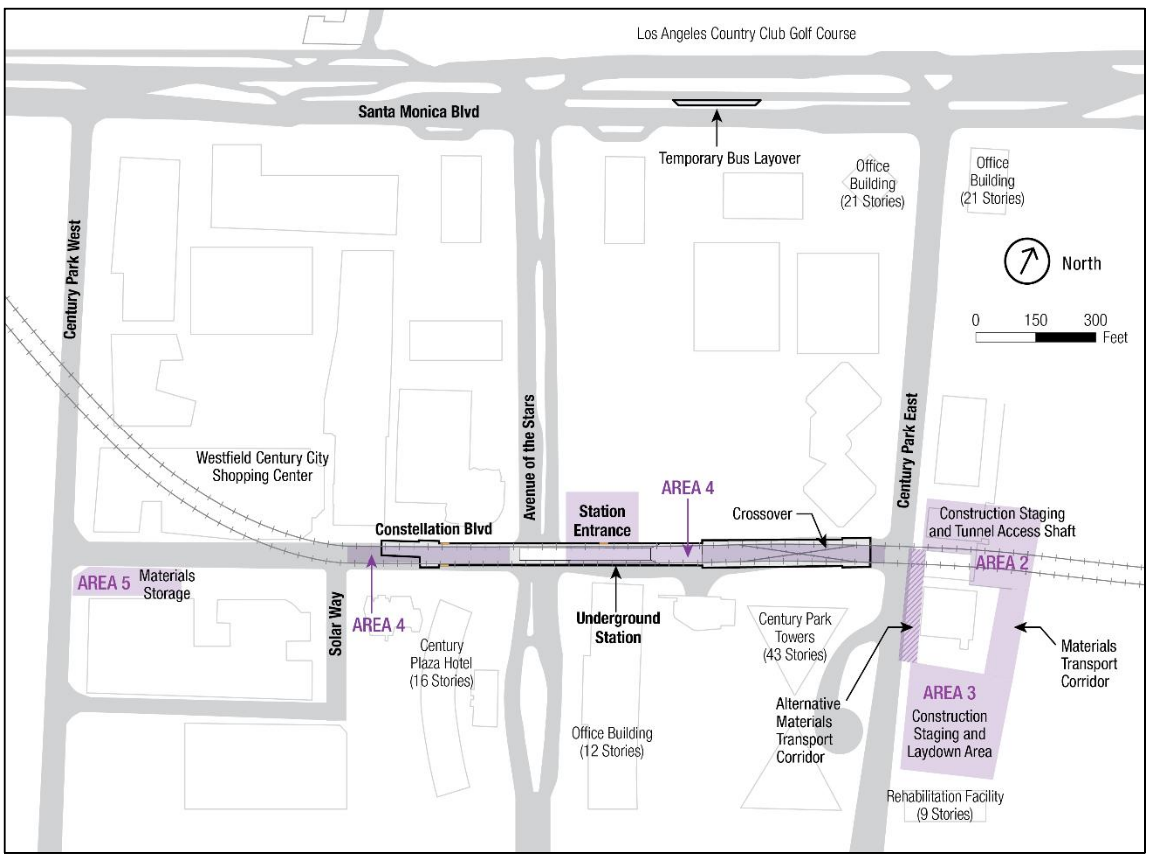


Figure S-2. Century City Construction Staging Sites

In response to concerns expressed by the City of Beverly Hills and the Beverly Hills Unified School District (BHUSD) on potential air quality impacts of the construction staging to BHHS, alternative construction approaches to constructing a tunnel access shaft at 1950 Century Park East were considered. Chapter 2 and Chapter 5 of this Draft SEIS provides further discussion of these alternate tunnel access shaft locations. Locating the tunnel access shaft within Area 2 minimizes impacts to the community (particularly traffic impacts at Constellation Boulevard and Century Park East) and optimizes construction efficiency by locating the tunnel access shaft contiguous to the materials storage and stockpiles in Area 2 and with a connecting corridor to Area 3. The Area 2 location would not require street closures along Constellation Boulevard for tunneling activities after the initial closures for the assembly and launch of the TBMs, reducing disruption to Century City residents and visitors. Therefore, the other alternatives are not considered further in this Draft SEIS.

S.4 Environmental Analysis, Consequences, and Mitigation during Construction and Operation

The environmental analysis in this Draft SEIS focuses on the Final Decision as described in Section S.1 above. In addition, the Draft SEIS provides analysis on the long-term operational and short-term construction environmental impacts related to the following changes on Section 2 of the Project:

- Relocation of the construction staging activities at the Century City Constellation Station as described in Section S.3.1 of the Executive Summary and Chapter 2 of this Draft SEIS
- Changes to land uses adjacent to the construction staging areas in Century City, including the opening of a medical rehabilitation facility along Century Park East and the planned and approved modernization of BHHS, which are described in further detail in Section 4.2 of this Draft SEIS.
- Elimination of the double crossover on the east end of the Wilshire/Rodeo Station and the associated change in the station box, which is planned to extend from Beverly Drive to Canon Drive.

Even though the double crossover was eliminated and the station box was shifted slightly at the Wilshire/Rodeo Station, the long-term operations and construction staging and activities generally remain the same as discussed in the Final EIS/EIR. Therefore, the environmental effects near the Wilshire/Rodeo Station remain the same as in the Final EIS/EIR. The alignment between the Wilshire/Rodeo and Century City Constellation Station has been slightly refined to optimize design. The Final EIS/EIR identified the Perpetual Savings Bank for subsurface easements; however, the refined design at the Wilshire/Rodeo station indicates that the tunnels would not pass below that property and, therefore, subsurface easements for that property would no longer be required. Two additional subsurface easements would be required and are discussed in Chapter 4.

S.4.1 Long-Term Environmental Analysis

This Draft SEIS provides further analysis of long-term operational impacts related to acquisitions and displacements (Section 4.1), noise and vibration (Section 4.2), seismic and subsurface gas hazards (to address the Final Decision) (Section 4.3), and historic resources (Section 4.4). The relocation and refinement of the construction activities do not affect how Section 2 of the Project will operate once the construction is complete because trains will operate in a below-grade tunnel in the same alignment as described in the Final EIS/EIR, except as noted in Chapter 2 in regards to the refinement at Wilshire/Rodeo Station and the alignment between the Wilshire/Rodeo Station and Century City Constellation Station. The long-term environmental impacts, mitigation measures, and impacts remaining after mitigation are presented in Table S-1. The analysis of seismic and subsurface gas risk during operations is detailed in the following section as requested in the Final Decision.

Seismic Risk during Operations

In response to the Final Decision, this Draft SEIS provides a discussion of the completeness of the available seismic risk information and a discussion of the post-Draft EIS seismic studies, including investigations conducted following the publication of the Final EIS/EIR. Based on Metro's review and interpretation of the available data, fault strands associated with the Santa Monica fault zone have been identified at specific locations where those faults cross areas explored as shown in Figure S-3. As illustrated, a number of faults were identified in the vicinity of Santa Monica Boulevard in the Century City-western Beverly Hills area.

The combined data from the investigations performed show that the Santa Monica fault zone widens (from north to south) toward the eastern side of the Century City area into Beverly Hills. The zone, several hundred feet wide, would be subject to both horizontal and vertical shearing along one or more fault strands during large earthquakes. In other words, there is a broad zone along Santa Monica Boulevard, extending both north and south of Santa Monica Boulevard in Century City and Beverly Hills, in which there is a potential for vertical and horizontal ground rupture movement when utilizing the conservative criteria necessary for subway station construction. This zone of faulting is indicated in Figure S-3 by the presence of numerous fault strands encountered in the vicinity of Santa Monica Boulevard at locations explored from Century Park West to Spalding Drive.

Table S-1. Section 2 Long-Term Environmental Impacts, Mitigation Measures, and Impacts Remaining after Mitigation

Description of Identified Impacts	Impacts before Mitigation	Mitigation[1]	Impacts Remaining after Mitigation
Acquisitions and Displacements			
Permanent easement would be needed at 1950 Avenue of the Stars for the station entrance and within the Westfield Mall property located along the north side of Constellation Boulevard. The removal of the double crossover at the Wilshire/Rodeo Station and alignment refinement result in avoiding tunneling beneath the Perpetual Savings Bank Building (9720 Wilshire Boulevard), but do require subsurface easements beneath two properties that were not identified in the Final EIS/EIR: • 216 S Lasky Drive (AIN: 4328-007-016): multi-family residential • 2029 Century Park East (AIN: 4319-016-029): commercial The subsurface easements will not result in displacement or relocation of any structures on the surface of the parcel. Compensation would be provided for all permanent and subsurface easements and no adverse impacts would remain.	No Adverse Impacts	CN-1—Relocation Assistance and Compensation CN-3—Compensation for Easements	No Adverse Impacts
Noise and Vibration Impacts			
Station ventilation systems, which are subject to periodic testing, will adhere to Metro design levels and not exceed FTA Noise Impact Criteria. Noise from rail operations, including the interaction of wheels on tracks, motive power, signaling and warning systems, and the TPSS will occur well below ground. Future traffic increases at the station locations would be minimal and would not add to the existing measured noise levels.	No Adverse Impacts	No mitigation	No Adverse Impacts
If the BHHS Building C subterranean parking structure is constructed as currently proposed, the predicted groundborne noise levels resulting from the operations of Section 2 of the Project at BHHS Building C Gymnasium and PE Office are predicted to exceed FTA Category 3 groundborne noise threshold of 40 dBA for both single-train passby and simultaneous passby of two trains. If the subterranean parking structure is not constructed or if the distance between the top of rail and the Building C foundation with the	Adverse Impacts	VIB-3—Use of Ground-borne Noise Minimization Techniques	No Adverse Impacts

Description of Identified Impacts	Impacts before Mitigation	Mitigation[1]	Impacts Remaining after Mitigation
subterranean parking structure is greater than 40 feet, the predicted train groundborne vibration and the groundborne noise levels for both single-train passby and simultaneous passby of two trains are not predicted to exceed FTA Category 3 threshold of 40 dBA at the BHHS Building C Gymnasium and PE Office. No other vibration-sensitive receivers along Section 2 of the Project are predicted to exceed the FTA groundborne noise criteria.			
The groundborne vibration is not predicted to exceed FTA Category 3 threshold of 75 VdB with or without the subterranean parking structure at BHHS Building C. No other vibration-sensitive receivers along Section 2 of the Project are predicted to exceed the FTA groundborne vibration criteria.	No Adverse Impacts	No mitigation	No Adverse Impacts
Geologic Hazards Impacts—Surface Fault Rupture			
Subway tunnels can be designed to accommodate fault rupture damage without collapse. There may be a need for repairs to the tunnel and potential short-term suspension of train operations, but no permanent adverse impact for tunnels designed to accommodate the movement. The tunnel structure in Section 2 of the Project will cross one or more active fault strands associated with the Santa Monica Fault and therefore may be subject to temporary disruption of service during repairs if the tunnel is damaged due to fault rupture. In contrast, subway stations cannot be designed to accommodate fault rupture without collapse. Therefore, subway stations are designed to be at locations not subject to fault rupture. There was no evidence encountered to indicate the presence of active faulting at the Wilshire/Rodeo Station. There is direct evidence of the absence of faulting at the Century City Constellation Station location, indicating no risk associated with fault rupture at this station location.	No Adverse Impacts	GEO-1—Seismic Shaking GEO-2—Fault Crossing Tunnel, Fault Rupture, Tunnel Crossing GEO-3—Operational Procedures during Earthquake GEO-4— Liquefaction and Seismic Settlement GEO-7—Tunnel Advisory Panel Design Review	No Adverse Impacts

Description of Identified Impacts	Impacts before Mitigation	Mitigation[1]	Impacts Remaining after Mitigation
Geologic Hazards Impacts—Hazardous Subsurface Gas and Oil Fields			
Section 2 of the Project passes through an area characterized by oil and gas fields, thus the possibility of encountering gaseous conditions cannot be completely eliminated. Tunnels and stations will be designed to provide a redundant protection system against gas intrusion hazard and specific requirements will be incorporated into the design and construction. In addition, gas and waterproofing systems will be included in Preliminary and Final Design. Because the operating tunnels and stations will be sealed (barriers preventing communication of gas between interior and exterior of stations and tunnels), their presence will not change the impact of the existing soil gas conditions on nearby buildings. Similarly, the presence of the completed tunnels and stations will not change the impact of existing oil wells on nearby properties except to the extent that any oil wells discovered as part of construction will be properly abandoned and therefore will no longer pose a risk for gas migration through well casing. Therefore, the presence of the constructed tunnel will have no influence on the long-term migration of soil gas to the ground surface or into buildings or increase the risk of explosion.	No Adverse Impacts	GEO-5—Hazardous Subsurface Gas Operations GEO-6—Hazardous Subsurface Gas Structural Design GEO-7—Tunnel Advisory Panel Design Review	No Adverse Impacts
Historic Properties			
Four historic properties in the vicinity of the Century City Constellation Station (the AAA Building, the Century Park Towers, the Century Plaza Hotel, and BHHS) would retain integrity of location, design, materials, workmanship, feeling, and association. Indirect effects will occur, but they will not be adverse. Implementation of Section 2 of the Project would not adversely affect the historic properties' integrity of setting. The proposed project changes result in avoiding tunneling beneath the Perpetual Savings Bank due to the alignment refinement between the Wilshire/Rodeo and Century City Constellation Stations and the Barn due to alignment refinement west of the Century City Constellation Station.	No Adverse Effect	No mitigation	No Adverse Effect

Note: [1] See Chapter 4 and Mitigation Monitoring and Reporting Plan in Appendix A for the full description of all identified mitigation measures.

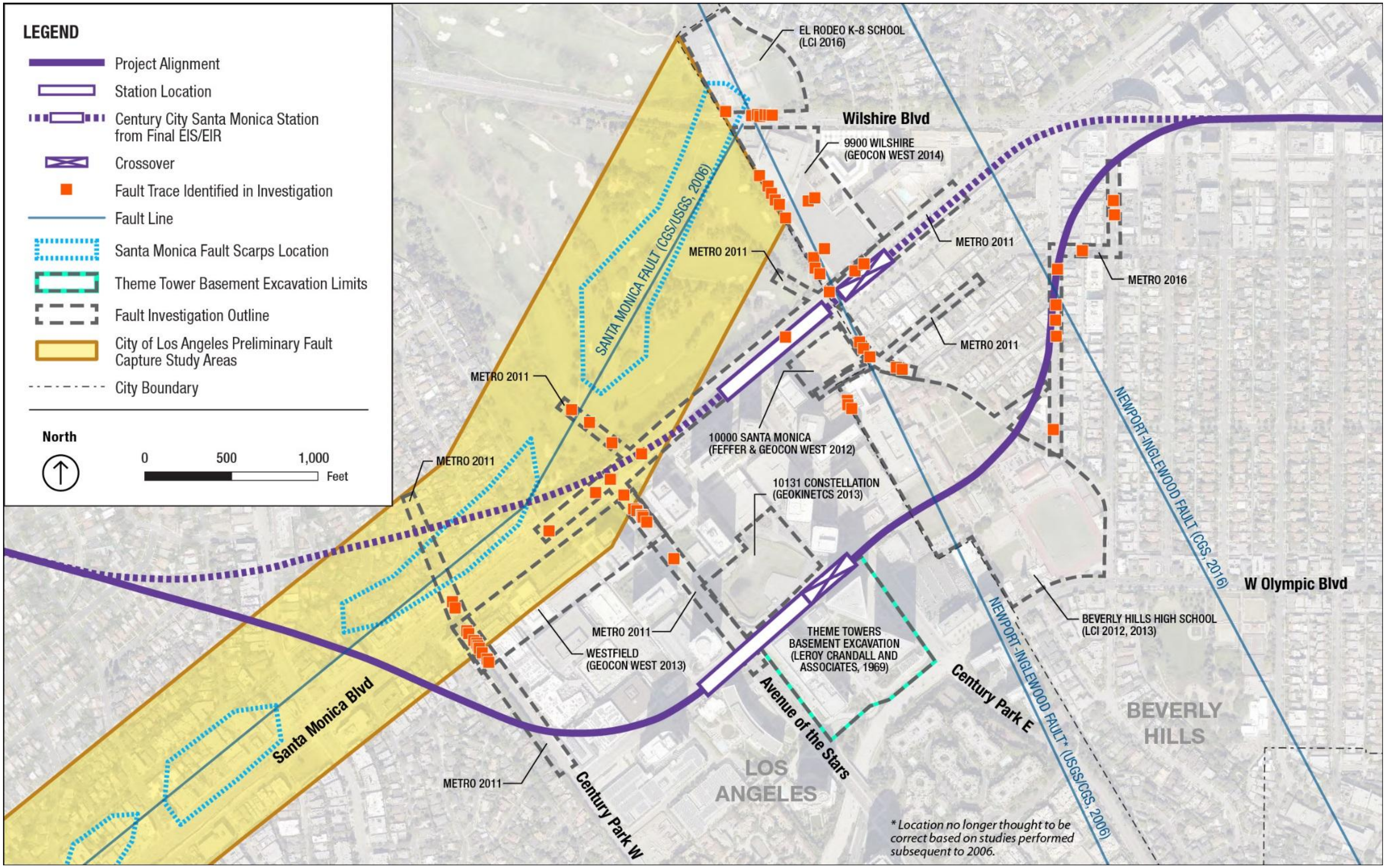


Figure S-3. Faults Encountered in Investigations in the Century City Area

This zone of faulting extends south of Santa Monica Boulevard but does not extend as far south as Constellation Boulevard. The 2011 Metro investigation included two transects that extended from a point north of Santa Monica Boulevard toward the south. The transect along Century Park West extends south to Constellation Boulevard and the transect along Avenue of the Stars extends south of Constellation Boulevard. These are shown in Figure S-3. Based on these transects, which included continuous core borings, Cone Penetration Tests (CPTs) and geophysical seismic reflection surveys, and information from prior geotechnical explorations and the 100-foot-deep basement excavation for the Theme Towers/former ABC Entertainment Center and Shubert Theater complex along the south side of Constellation Boulevard, there is direct evidence that there is no faulting in sediments at the Century City Constellation Station. Those sediments are 600,000 years old along Constellation Boulevard. Therefore, there is not a risk of fault rupture at the location of the Century City Constellation Station.

When a fault strand is identified, there can be uncertainty regarding the state of activity of the specific fault strand, particularly where multiple faults have been identified, such as in the zone of faulting associated with the Santa Monica Fault in the Century City area. In most of the Los Angeles urbanized area, development of buildings, streets, and other infrastructure occurred early, before geologists had an opportunity to explore the land for faults and before the hazard that faults represented was well understood. Because of this development, much of the evidence of past faulting has been obliterated from the ground surface where buildings or other infrastructure have been constructed, requiring more extensive subsurface explorations where those can be performed. It has only been in recent decades that some investigations could be undertaken in urban areas such as this, where known faults occur, to identify the exact location of those faults. This difficulty in exploring much of the urbanized area results in uncertainty in fault locations and the activity of identified fault strands, until the time that detailed and costly fault investigations can be performed. The fault investigations performed by Metro and by others in the vicinity of Section 2 of the Project have utilized portions of the land surface that have not been developed with buildings; nevertheless, the built-over portions of the land surface in the vicinity of the Project have resulted in remaining uncertainty, especially at a Santa Monica Boulevard Station location. In addition, there are differences in opinions by those performing the fault investigations regarding the activity of some of the fault strands found in the vicinity of Santa Monica Boulevard, resulting in additional uncertainty related to which of those fault strands are active. The uncertainties have been eliminated at the Century City Constellation Station due to the ability to obtain direct evidence of no past faulting at that location.

Despite these uncertainties, the review of the recent fault investigations presented in Section 4.3 of this Draft SEIS concludes that there are numerous faults in the vicinity of Santa Monica Boulevard, which could pose a surface fault rupture hazard for a station on Santa Monica Boulevard. A fault rupture event would cause extensive damage to a Santa Monica Boulevard Station because there are no known engineering methods available to construct a subway station that could withstand the rupture without collapse. The subway station is a structure subject to nearly continuous human occupancy, and therefore would represent a high risk to public safety in the event of collapse of the station. For these reasons, locating a station on Santa Monica Boulevard poses a high risk to public safety. In comparison, there is direct evidence of the absence of faulting at the Century City Constellation station location, indicating no risk of damage due to fault rupture at this station location.

Regarding the risk of tunnels to surface fault rupture, the tunnels can be designed to accommodate the anticipated rupture. The approach for design of tunnels traversing active faults is documented in Metro's Seismic Design Criteria and has a well-established precedent. As described in the *Westside Subway Extension Century City Area Tunnel Safety Report* (Metro 2011d), potential tunnel damage is also repairable. A similar approach is adopted for transportation infrastructure in general, including highways, bridges, and pipelines. These structures of necessity have to cross faults, and design approaches minimize damage and allow for repair.

Subsurface Gas Risk during Operations

In response to the Final Decision, Section 4.3 of this Draft SEIS discusses the potential of soil gas migration during operation of Section 2 of the Project.

The detected levels of methane and hydrogen sulfide within Section 2 are not considered "elevated" with the exception of the far eastern and western segments of the alignment (east of Stanley Drive and west of the City of Los Angeles/Beverly Hills boundary). As such, the overall level of risk associated with the potential presence of methane and hydrogen sulfide gas along the Section 2 alignment, including through BHHS, is low.

Metro has specified design and construction measures to address gassy environments during operation of the Project. Tunnels and stations will be designed to provide a redundant protection system against gas intrusion hazard, such as those described in the City of Los Angeles Municipal Code, Chapter IX, Building Regulations, Article 1, Division 71, Methane Seepage Regulations. In compliance with these regulations, specific requirements are determined according to the actual methane levels and pressures detected on a site, and the identified specific requirements will be incorporated into the design and construction. Therefore, the presence of the constructed tunnel will have no influence on the long-term migration of soil gas to the ground surface or into buildings or increase the risk of explosion, resulting in no adverse effect.

S.4.2 Construction Environmental Analysis

With the exception of the changes to the Century City Constellation Station construction staging locations, the construction activities and methods remain largely unchanged from what was described in Appendix E, Construction Methods, of the Final EIS/EIR. Refer to Section 4.5 of this Draft SEIS for an overview of construction activities, including a summary of tunnel and station construction methods.

Construction-related impacts were analyzed for transportation (transit, streets and highways, parking, and pedestrian and bicycle), acquisition and displacement of existing uses, visual quality, air quality, noise and vibration, geological hazards, ecosystems and biological resources, parklands and community services and facilities, and cumulative considerations based on the Final Decision, the changes in construction staging locations at the Century City Constellation Station, and the land use changes adjacent to the Century City Constellation Station construction areas.

Refer to Table S-3 for a summary of environmental impacts anticipated during construction, mitigation measures, and impacts remaining after mitigation. While construction activities at the Century City Constellation Station are scheduled for approximately seven years, many of the potential construction impacts, such as noise and air quality, would be concentrated in the two to three years of station excavation and tunneling activities. For the remainder of the construction duration, it is anticipated that these impacts would be lower as the planned construction activities are less intensive. The analysis of air quality and subsurface gas risk during construction is detailed in the following sections as requested in the Final Decision.

Air Quality Impacts during Construction

In response to the Final Decision, this Draft SEIS includes an analysis to determine whether the construction of the Century City Constellation Station would exceed the South Coast Air Quality Management District's (SCAQMD) Local Significance Thresholds or whether the construction-related emissions of the Century City Constellation Station would cause exceedances of air quality standards or cause any health risk issues at nearby sensitive land uses.

As shown in Table S-2, there are predicted to be no exceedances of the National Ambient Air Quality Standards (NAAQS) or the California Ambient Air Quality Standards (CAAQS) for CO or of the significant change threshold for $PM_{2.5}$. There are also no predicted exceedances of NAAQS for PM_{10}.

Table S-2. Estimated Maximum Localized Pollutant Levels

Pollutant	Averaging Period	Construction of Century City Constellation Station	NAAQS	CAAQS
Nitrogen Dioxide (NO_2) ($\mu g/m^3$)	1-hour	202.3 NAAQS 233.5 CAAQS	188	339
	Annual	28.9	100	57
Carbon Monoxide (CO) (ppm)	1-hour	2.5	35	20
	8-hour	1.5	9	9.0
Particulate Matter (PM_{10}) ($\mu g/m^3$)	24-hour	130.3	150	50
Particulate Matter ($PM_{2.5}$)* ($\mu g/m^3$)	24-hour	N/A	10.4 (incremental)	10.4 (incremental)

Source: *Westside Purple Line Extension Century City Constellation Station Air Quality Technical Memorandum* – Revision 1 (Metro 2017g) (Appendix F)
*Note: since the SCAQMD is nonattainment for PM2.5 and background values already exceed NAAQS, the PM2.5 increment has been compared to the SCAQMD significant change threshold for PM2.5 for construction.
ppm = parts per million; µg/m3 = micrograms per cubic meter; N/A = not applicable; NAAQS = National Ambient Air Quality Standards; CAAQS = California Ambient Air Quality Standards

One exceedance is predicted for nitrogen dioxide (NO_2) 1-hour NAAQS and eight exceedances are predicted for the NO_2 1-hour CAAQS out of the 5,015 receptors modeled over a five-year period. The receptors demonstrating violations of the 1-hour NO_2 standard are located near construction staging Area 2. One of those receptors is located on the BHHS campus at the site of the current temporary classrooms and future half-court soccer field. The violation is anticipated to occur between August and October 2020 when construction activities peak. Based on the BHHS modernization program, the temporary classrooms will no longer be in place at that time and the site will be used as a half-court soccer field.

Violations of the CAAQS for PM_{10} are also predicted but no violations of the NAAQS for PM_{10} are predicted to occur. The violations of the CAAQS for PM_{10} are anticipated at most receptors modeled, including on the BHHS campus, because the background conditions already exceed the CAAQS.

The estimated maximum localized pollutant levels are based on expected production rates and equipment utilization. This information is often limited since it does not take into account the actual equipment on site and construction techniques that the contractor will actually employ. As such, predicted concentrations will be verified once the Contractor provides the final equipment and schedule. As discussed in more detail in the Mitigation Measures section below, based on the results of the verified analysis, the Contractor will be mandated to alter operating procedures/schedule/equipment if a violation of the applicable standards is predicted. The Contractor will be required to keep a log of construction equipment used during construction along with hours of operation of each specific piece of equipment to ensure that construction activities are not in violation of applicable air quality standards

A population-wide health risk assessment was conducted using the Hotspots Analysis and Reporting Program Version 2 (HARP2) Risk Assessment Standalone Tool (RAST) to determine the potential health risks caused by construction of the Century City Constellation Station. HARP2 RAST uses the annual average air concentration of a pollutant, the known cancer inhalation slope factor for the pollutant, and the Office of Environmental Health Hazard Assessment derived intake rate percentile to calculate cancer risk. Cancer risk assessments were conducted for diesel particulate matter, carbon monoxide (CO), and nitrogen dioxide (NO_2). PM_{10} was evaluated separately, and no risk was detected.

To account for sensitive receptors, the most conservative analysis (70 year resident, population-wide) was performed along with a 30 year exposure analysis. The cancer risk value indicates the number of individuals that develop cancer per million individuals as a result of exposure to a pollutant over an assumed lifetime of 70 years. The excess cancer risk did not exceed the SCAQMD excess cancer risk threshold of 10 in a million.

Non-carcinogenic chronic risk assessments were conducted for diesel particulate matter and NO_2. Non-carcinogenic acute risk assessments were conducted for carbon monoxide and NO_2. Each pollutant generated hazard indices which did not exceed the SCAQMD threshold of 1.0.

Noise and Vibration Impacts during Construction

Due to the changes in construction staging at Century City Constellation, the potential for noise and vibration impacts during construction was analyzed for sensitive receptors in the area, including the medical rehabilitation facility and the BHHS campus, at both the existing classroom buildings and the temporary classrooms.

During construction activities, the daytime construction noise level at the temporary BHHS classroom buildings is predicted to exceed the City of Beverly Hills daytime noise limit by 1 dB while the nighttime construction noise limit is predicted to be exceeded by 2 dB. The daytime and nighttime construction noise levels at the BHHS existing classroom locations are not predicted to exceed the City of Beverly Hills.

The City of Los Angeles nighttime noise limit is predicted to be exceeded by 1 dB at the Century Park Towers and by 1 dB at the Annenberg Space for Photography. The predicted construction noise at the patient floors of the medical rehabilitation facility is also predicted to exceed the City of Los Angeles nighttime noise limits on floors three through eight.

The construction noise levels are anticipated to be highest during station excavation and tunneling activities, which are only anticipated to last two to three years of the seven year construction period. The Contractor shall be responsible for providing additional noise control measures and/or limiting the equipment and construction activities to reduce the construction noise at these sites to comply with the noise level limits.

The primary sources of vibration during tunneling are generated by the TBM and the tunnel train used to carry muck, pre-cast concrete tunnel segments, and materials. The high frequency energy of the tunnel trains means effects are more likely to be caused by groundborne noise rather than perceptible vibration. With implementation of mitigation, the perception of the groundborne noise will be minimized in the buildings above the tunnel.

The main source of vibration during tunneling is when the TBM pushes the shield forward against the earth using a hydraulic ram. The vibration levels from TBMs are expected to be below damage risk levels, either for structural damage or minor cosmetic damage such as hairline fractions in plaster or drywall. However, the vibration may be perceptible at the surface, but only four to six times per day over the course of approximately three to four days as the TBM progresses.

Subsurface Gas Migration during Construction

In response to the Final Decision, Section 4.4.5 of this Draft SEIS discusses the potential of soil gas migration from tunneling and any other construction activities related to Section 2 of the Project.

Section 2 of the Project will pass through or near several active or abandoned oil fields and existing oil wells (active and abandoned) that are present within the Study Area. The rocks and soils overlying the oil fields are known to commonly contain naturally occurring methane and/or hydrogen sulfide gases. Methane and hydrogen sulfide are considered hazardous because of their explosive properties. In addition, hydrogen sulfide is highly toxic when inhaled and can be smelled at lower, non-toxic, levels.

The detected levels of methane and hydrogen sulfide within Section 2 are not considered 'elevated' with the exception of the far eastern and western segments of the alignment (east of Stanley Drive and west of the City of Los Angeles/City of Beverly Hills boundary). As such, the overall level of risk associated with the potential presence of methane and hydrogen sulfide gas along the Section 2 alignment, including through BHHS, is low.

The risks presented by tunneling through subsurface gas and near oil wells area evaluated for four categories:

- Risk of gas migration through soil and accumulation at the surface and in buildings
- Risk of an explosion due to the accumulation of gas at the surface and in buildings
- Risk of accumulation of gas in tunnels and risk to construction workers
- Risk of encountering abandoned oil wells

During tunneling construction activities, and assuming gas is present in the ground surrounding the tunnel, there is no plausible mechanism by which the soil pore pressure fluctuations could cause soil gas to migrate the distance to the ground surface or into buildings supported on the ground surface due to pressure face tunnel boring activities, as described in Section 4.5 of this Draft SEIS. Where soil is saturated, by definition there is no gas in voids that can be moved; where soil is not saturated, the pressure influence of the TMBs does not extend to a significant distance because the pressure in gases (that would cause movement) do not change beyond an immediate zone around the TBMs. In addition, the investigations performed found no open fissures/fractures present in the soil that would present a preferential flow path for gases; existing faults and other contacts between dissimilar earth materials have been found to be flush and tight. This is consistent with what would be anticipated for the types of alluvial materials that are present along the Section 2 Project alignment.

Therefore, the *incremental* risk that the proposed tunneling activities could cause subsurface gas to migrate to buildings from the ground surface is *negligible*. This is due to the absence of elevated levels of methane and hydrogen sulfide gas along the majority of the alignment, coupled with the absence of a viable mechanism by which the proposed tunneling activities could cause pressurization and/or migration of subsurface gas the distance to the ground surface. In addition, there are no evident "preferential paths" for migration of gases to the surface in the soils at tunnel depth and above along the alignment. Since the incremental risk of the tunnel construction to cause subsurface gas to migrate to buildings or off-gas from the ground surface is negligible, so too is the incremental risk of an explosion.

Since the western end of Section 2 of the Project (west of the City of Los Angeles/City of Beverly Hills boundary) and the eastern end of Section 2 of the Project (east of Stanley Drive) are located in ground that is known to contain elevated levels of methane and/or hydrogen sulfide, the potentially explosive or otherwise harmful gases could be encountered during the excavation of the tunnels and station boxes. This condition represents a potential exposure risk to workers in the tunnels and stations. During tunnel construction, a combination of monitoring, ventilation, and treatment of gases in the tunnels mitigates the risk of exposure to soil gases for the construction workers. Previous projects in the Methane Risk Zone have been successfully and safely excavated using similar techniques, including projects with deep (of similar depths as anticipated for the Project) basements in highly gassy ground along Wilshire Boulevard and in Century City along Constellation Boulevard. With the implementation of the proposed tunneling techniques, the risk to construction workers is low.

Mapped oil wells (active and abandoned) have been identified through historic photos and agency records. Metro will require additional investigation using magnetic sensing and other techniques to locate unknown wells in the tunnel alignment ahead of construction. If the TBM were to encounter an oil well, the oil well casing could cause damage to the TBM cutting head, resulting in the need for repairs and associated project delays. The TBM cutting head could also damage the well casing(s). However, because of the relatively shallow depth of the tunnel (compared to the depth of the oil wells and the production zone) and the presence of multiple, largely redundant plugs within the well casings, it is highly unlikely that the damage would result in the release of combustible gas from the damaged casing. As presented in the Final EIS/EIR, mitigation measures are proposed to further reduce the risk related to oil wells. The measures taken include a detailed review of State of California's Division of Oil, Gas and Geothermal Resources (DOGGR) records and historical aerial photographs to identify potential oil well locations, adjustment of the tunnel alignment to avoid known oil wells, and geophysical testing to screen for potential oil wells along the proposed alignment.

Fault Rupture and Seismic Ground Shaking during Construction

The construction area would be susceptible to surface fault rupture and seismic ground shaking. The Century City station was located at Constellation Boulevard because it significantly reduces the risk of surface fault rupture compared to locating the Century City station on Santa Monica Boulevard (refer to Section 4.3 of this Draft SEIS). Construction will be performed in accordance with Metro Design Criteria, which includes national standards and codes to protect the workers and work under construction considering seismic conditions. No mitigation measures will reduce the surface fault rupture risk during construction of Section 2 of the Project, but the risk of a fault rupture event impacting the areas under construction during the period of construction is extremely small given the construction duration.

Metro

Table S-3. Section 2 Construction Environmental Impacts, Mitigation Measures, and Impacts Remaining after Mitigation

Description of Identified Impacts	Impacts before Mitigation	Mitigation[1]	Impacts Remaining after Mitigation
Construction-related Transportation Impacts—Public Transit			
Temporary rerouting of bus lines and bus stop locations, resulting in additional transit travel time for bus riders.	Temporary Adverse Impacts	TCON-6—Temporary Bus Stops and Route Diversions	Temporary Adverse Impacts
Construction-related Transportation Impacts—Streets and Highways			
Traffic impacts associated with Section 2 construction include reduced roadway traffic lanes and temporary street closures that could result in traffic disruptions and bottlenecks. Additionally, commercial driveways may be subject to reduced access around construction sites. Construction period traffic impacts are expected to be the highest during the nine-month full closure of the eastern portion of Constellation Boulevard. Emergency vehicle access (e.g., police, fire and rescue, and ambulance) in and around construction work sites may be affected by lane closures or temporary street closures.	Temporary Adverse Impacts	TCON-1—Traffic Control Plans TCON-2—Designated Haul Routes TCON-3—Emergency Vehicle Access TCON-4—Transportation Management Plan	Temporary Adverse Impacts
Construction-related Transportation Impacts—Parking			
During construction, existing loading zones will be temporarily removed where traffic lanes are closed or eliminated temporarily. Parking for the AT&T building may be temporarily displaced during demolition of the garage, if demolition occurs.	Temporary Adverse Impacts	TCON-7—Parking Management TCON-9—Construction Worker Parking	Temporary Adverse Impacts
Construction-related Transportation Impacts—Pedestrian and Bicycle Network			
During construction, pedestrian and bicycle access in and around construction work sites may be impacted as a result of street and sidewalk closures.	Temporary Adverse Impacts	TCON-10—Pedestrian Routes and Access TCON-11—Bicycle Paths and Access	Temporary Adverse Impacts
Acquisition and Displacement of Existing Uses during Construction			
To support construction at Century City Constellation, Metro would acquire 1940, 1950 and 2040 Century Park East. Temporary construction easements would include the Metro bus layover site at the southeast corner of Century Park West and Constellation Boulevard and a portion of the property at 2010 Century Park East (AT&T building).	No Adverse Impacts	CN-1—Relocation Assistance and Compensation CN-3—Compensation for Easements	No Adverse Impacts

Description of Identified Impacts	Impacts before Mitigation	Mitigation[1]	Impacts Remaining after Mitigation
Visual Quality Construction Impacts			
Construction staging areas and related construction activities would create new temporary visual effects. The visibility of construction staging activities, construction lighting sources, and components such as the access shaft and conveyor system would vary from only being visible to those located on upper floors of the surrounding buildings (including the new long-term medical rehabilitation facility at 2080 Century Park East) to also being visible to BHHS. In addition, up to eight trees along Century Park East may be removed.	Temporary Adverse Impacts	CON-2—Timely Removal of Erosion Devices CON-3—Location of Construction Materials CON-4—Construction Lighting CON-5—Screening of Construction Staging Areas VIS-2—Replacement for Tree Removal	No Adverse Impacts
Air Quality Construction Impacts			
There are predicted to be no exceedances of the NAAQS or CAAQS for CO or of the significant change threshold for $PM_{2.5}$. There are also no predicted exceedances of NAAQS for PM_{10}. One exceedance is predicted for nitrogen dioxide (NO_2) 1-hour NAAQS and eight exceedances are predicted for the NO_2 1-hour CAAQS out of the 5,015 receptors modeled over a five-year period. The receptors demonstrating violations of the 1-hour NO_2 standard are located near construction staging Area 2. One of those receptors is located on the BHHS campus at the site of the current temporary classrooms and future half-court soccer field. The violation is anticipated to occur between August and October 2020 when construction activities peak. Based on the BHHS modernization program, the temporary classrooms will no longer be in place at that time and the site will be used as a half-court soccer field. Violations of the CAAQS for PM_{10} are also predicted but no violations of the NAAQS for PM_{10} are predicted to occur. The violations of the CAAQS for PM_{10} are anticipated at most receptors modeled, including on the BHHS campus, because the background conditions already exceed the CAAQS. These exceedances are predicted to occur during tunneling activities, which is the most intensive period of construction, and will only	No Adverse Impacts	CON-6—Meet Mine Safety (MSHA) Standards CON-7—Meet SCAQMD Standards CON-08—Monitoring and Recording of Air Quality at Worksites CON-09—No Idling of Heavy Equipment CON-10-Maintenance of Construction Equipment CON-11-Prohibit Tampering of Equipment CON-12—Use of Best Available Emissions Control Technologies CON-13—Placement of Construction Equipment CON-14—Measures to Reduce the Predicted PM10 Levels CON-15—Reduce Street Debris CON-16—Dust Control During Transport CON-17—Fugitive Dust Control CON-18—Street Watering CON-19—Spillage Prevention for Non-Earthmoving Equipment	No Adverse Impacts

Description of Identified Impacts	Impacts before Mitigation	Mitigation[1]	Impacts Remaining after Mitigation
account for two to three years of the seven year construction period. Based on a population-wide (all age ranges of the population) health risk assessment, no pollutants related to construction of the Century City Constellation Station would result in exceedance of thresholds for excess cancer risk or hazard indices.		CON-20—Spillage Prevention for Earthmoving Equipment CON-21—Additional Controls to Reduce Emissions CON-90 – AERMOD Verification	
Noise and Vibration Construction Impacts			
During construction activities, the daytime construction noise level at the temporary BHHS classroom buildings is predicted to exceed the City of Beverly Hills daytime noise limit by 1 dB while the nighttime construction noise limit is predicted to be exceeded by 2 dB. The daytime and nighttime construction noise levels at the BHHS existing classroom locations are not predicted to exceed the City of Beverly Hills. A difference of 1 dB is not perceptible to the human ear. The City of Los Angeles nighttime noise limit is predicted to be exceeded by 1 dB at the Century Park Towers and by 1 dB at the Annenberg Space for Photography. The predicted construction noise at the patient floors of the medical rehabilitation facility is also predicted to exceed the City of Los Angeles nighttime noise limits on floors three through eight. Construction noise levels are anticipated to be highest during station excavation and tunneling activities, which are only anticipated to last two to three years of the seven year construction period. Groundborne noise may be perceptible due to the tunnel train used to carry muck, pre-cast concrete tunnel segments and materials. Vibration levels from the TBM will be below damage risk levels, but the vibration may be perceptible at the surface occasionally for a few days as the TBM passes.	Temporary Adverse Impacts	CON-22—Hire or Retain the Services of an Acoustical Engineer CON-23—Prepare Noise Control Plan CON-24—Comply with the Provisions of the Nighttime Noise Variance CON-25—Noise Monitoring CON-26—Use of Specific Construction Equipment CON-27—Noise Barrier Walls for Nighttime Construction CON-28—Comply with Local Noise Ordinances CON-29—Signage CON-30—Use of Noise Control Devices CON-31—Use of Fixed Noise-Producing Equipment for Compliance CON-32—Use of Mobile or Fixed Noise-Producing Equipment CON-33—Use of Electrically Powered Equipment CON-34—Use of Temporary Noise Barriers and Sound-Control Curtains CON-35—Distance from Noise-Sensitive Receivers CON-36—Limited Use of Horns, Whistles, Alarms, and Bells	No Adverse Impacts

Description of Identified Impacts	Impacts before Mitigation	Mitigation[1]	Impacts Remaining after Mitigation
		CON-37 Requirements for Project Equipment CON-38—Limited Audibility of Project Related Public Addresses or Music CON-39—Use of Haul Routes with the Least Overall Noise Impact CON-40—Designated Parking Areas for Construction-Related Traffic Con-41—Enclosures for Fixed Equipment CON-91 – Construction Noise Minimization at Medical Rehabilitation Facility CON-92 – Additional Noise Mitigations at Century City Constellation CON-93 – Backup Alarms CON-94 – Haul Truck Noise Emission Limits CON-95 – Vibration Control for Tunnel Train CON-96 – Vibration Monitoring Plan	
Geologic Hazards Construction Impacts Impacts-Hazardous Subsurface Gas and Oil Fields			
Given the ground conditions, existing gas concentrations, and tunneling methods to be used, there is not a plausible mechanism by which the proposed tunneling could cause a substantial amount of gas to migrate to or be released from the ground surface. Although there is an existing risk of methane or hydrogen sulfide gas migrating from the ground to adjacent buildings or being released to the ground surface, the incremental risk of such a release due to tunneling is negligible. However, the presence of methane and hydrogen sulfide gas does pose a potential exposure risk to workers in the tunnels and stations during construction of those structures. The risk of encountering undocumented abandoned oil wells along the alignment exists. If a well casing were damaged by the TBM and that well contained gases under pressure, methane and/or hydrogen sulfide	No Adverse Impacts	The following additional monitoring and mitigation measures are proposed to further evaluate and reduce the existing risk, including on the BHHS campus, due to the presence of oil wells: CON-8—Monitoring and Recording of Air Quality at Worksites CON-51—Techniques to Lower the Risk of Exposure to Hydrogen Sulfide CON 53—Oil Well Locations and Abandonment CON-54—Worker Safety for Gassy Tunnels CON-89—Gas Monitoring—Assessment	No Adverse Impacts

Description of Identified Impacts	Impacts before Mitigation	Mitigation[1]	Impacts Remaining after Mitigation
gas could be released into the tunnel working area as well as to the ground surface through the well casing. Research of oil field maps, historic photos, and geophysical scanning has been performed at potential locations of oil wells, and further evaluation of potential oil well locations is required to be performed at tunnel depth by the construction contractor such that the potential risk of encountering an unknown oil well during tunneling is mitigated.			
Geologic Hazards Construction Impacts Impacts-Fault Rupture and Seismic Ground Shaking			
Construction within the Section 2 Project area will be susceptible to surface fault rupture and seismic ground shaking. However, the risk of a fault rupture event impacting the areas under construction during the period of construction is extremely small given the construction duration.	Temporary Adverse Impacts	No mitigation measures will reduce the surface fault rupture risk during construction of Section 2 of the Project, but the risk is low. Metro Standards for design of temporary shoring systems include earthquake loading to mitigate the risk from seismic ground shaking. Earth pressures for temporary earthquake loads are determined by the geotechnical consultant on a site-specific basis considering the site location and ground conditions. Construction will be performed in accordance with Metro Design Criteria, which includes national standards and codes to protect the workers and work under construction considering seismic conditions.	Temporary Adverse Impacts
Ecosystems and Biological Resources Construction Impacts			
No impacts to sensitive ecological or biological resources are anticipated. However, some tree removal is required and could pose an adverse temporary impact to migratory birds if nests are disturbed in those trees.	Temporary Adverse Impacts	CON-66—Biological Survey CON-67—Compliance with City Regulations CON-69—Avoidance of Migratory Bird Nesting Season VIS-2—Replacement for Tree Removal	No Adverse Impacts

Description of Identified Impacts	Impacts before Mitigation	Mitigation[1]	Impacts Remaining after Mitigation
Parklands and Community Services and Facilities Construction Impacts			
Police and fire emergency response routes to businesses and residences could be disrupted within the vicinity of construction areas. Construction-related activities are predicted to cause noise impacts to BHHS, but those impacts would be mitigated to a less than significant level per regulatory requirements. Lane closures and detours due to construction activities could temporarily affect existing vehicular and pedestrian travel routes to the BHHS.	Temporary Adverse Impacts	CON-82—Communication with Schools CON-83—Work with Transportation, Police, Public Works, and Community Service CON-84—Instructional Rail Safety Programs for Schools CON-85—Information Program to Enhance Safety CON-86—Traffic Control CON-87—Designation of Safe Emergency Vehicle Routes	No Adverse Impacts
Cumulative Construction Impacts			
Section 2 construction overlaps with the BHHS modernization construction schedule and could also potentially overlap with construction of the Century City Center project (1950 Avenue of the Stars). The resulting cumulative transportation, noise and vibration, air quality and community and neighborhood effects would be greater than if each project were constructed at separate times. However, these cumulative effects would extend for a shorter total duration than if the projects were constructed in succession.	Temporary Adverse Impacts	See Transportation, Noise and Vibration, and Air Quality sections for related mitigation measures during construction.	Temporary Adverse Impacts

Note: [1.] See Chapter 3, Chapter 4, and Mitigation Monitoring and Reporting Plan in Appendix A for the full description of all proposed mitigation measures.

S.5 Section 4(f) Analysis

In March 2012, the FTA and Metro issued the Final EIS/EIR, which included, as Chapter 5, the Section 4(f) evaluation for the Project. The FTA issued the ROD on August 9, 2012. At that time, FTA determined that the construction of the tunnels under the school would not result in a use of the Section 4(f) recreational facilities at BHHS, consistent with the guidance included in the 2005 U.S. Department of Transportation (USDOT) Section 4(f) Policy Paper (USDOT 2005), which was updated in 2012. According to the Section 4(f) Policy Paper, in Section 3.3.3.1, tunneling is an option to consider for avoidance of a property. The policy paper states, in Question 28, that Section 4(f) applies to tunneling only if the tunneling:

- Disturbs archaeological sites on or eligible for the National Register of Historic Places (NRHP) which warrant preservation in place;
- Causes disruption which would permanently harm the purposes for which the park, recreation, wildlife, or waterfowl refuge was established; or
- Substantially impairs the historic values of the historic site.

No archaeological sites had been identified at the BHHS campus, and in consultation with the California State Historic Preservation Officer (SHPO) under Section 106 of the National Historic Preservation Act (NRHP) it was determined that the Westside Purple Line Extension Project would not adversely affect the historic qualities of buildings at BHHS that caused it to be on or eligible for the NRHP. The final Section 4(f) evaluation documented that the Westside Purple Line Extension Project would not permanently harm or otherwise substantially impair the recreational activities, features, or attributes that qualify the BHHS property for protection under Section 4(f).

The August 2016 Final Decision on Motions for Summary Judgment and Ruling in Regards to Remedies (Final Decision) of the United States District Court for the Central District of California (District Court) in *Beverly Hills Unified School District v. Federal Transit Administration, et al.*, CV 12-9861-GW (SSx) directed FTA to assess the use of BHHS under Section 4(f) due to the planned tunneling.

Chapter 5 of this Draft SEIS, the Section 4(f) Evaluation, examines the potential use of the BHHS that results from the planned tunneling under the property. This analysis also examines potential use of Section 4(f) resources near the construction staging areas at Century City Constellation Station and the project design refinements for Section 2 of the Project. The alignment and construction staging and activities at Wilshire/Rodeo Station remain the same as described in the Final EIS/EIR relative to Section 4(f) resources; therefore, the effects and the uses under Section 4(f) may be found in the Final EIS/EIR and those areas are not discussed in this analysis.

Table S-4 presents the Section 4(f) resources in the Century City and west Beverly Hills vicinity relative to the Project that were considered in the Section 4(f) Evaluation.

Table S-4. Section 4(f) Resources in the Century City and West Beverly Hills Vicinity Relative to the Project

Property	Section 4(f) Protected Activities, Features, or Attributes	Description of Effect	Preliminary Section 4(f) Finding
Perpetual Savings Bank	Historic property	Transit alignment would not cross property. No incorporation of land. No adverse effect from noise, vibration, or methane gas migration. No adverse effects under Section 106.	No Use
Beverly Hills High School	Historic property	Transit alignment crosses 60 to 70 feet beneath the property in a tunnel. Land would be incorporated below the historic property into a subsurface easement. No physical change at the surface within the boundary of the property would occur. No adverse effect from noise, vibration, or methane gas migration. No adverse effects under Section 106.	*De minimis* impact
AAA Building	Historic property	Transit alignment crosses 70 feet beneath the property in a tunnel. Land would be incorporated for a construction staging area and land under the property into a subsurface easement. Demolition of non-historic parking garage adjacent to building. No adverse effect from noise, vibration, or methane gas migration. No adverse effect under Section 106.	*De minimis* impact
Century Plaza Tower	Historic property	Transit alignment would not cross property. No incorporation of land. No adverse effect from noise, vibration, or methane gas migration. No adverse effects under Section 106.	No Use
Century Plaza Hotel	Historic property	Transit alignment would not cross property. No incorporation of land. No adverse effect from noise, vibration, or methane gas migration. No adverse effects under Section 106.	No Use
Los Angeles Country Club (South Course)	Historic property	Transit alignment would not cross property. No incorporation of land. No adverse effect from noise, vibration, or methane gas migration. No adverse effects under Section 106.	No Use
The Barn	Historic property	Transit alignment would not cross property. No incorporation of land. No adverse effect from noise, vibration, or methane gas migration. No adverse effects under Section 106.	No Use
Beverly Hills High School Recreational Facilities	Publicly owned recreational facilities open to the public	Transit alignment crosses 60 to 70 feet beneath existing and future public sports and recreational uses in a tunnel. Land would be incorporated below the recreational facilities into a subsurface easement. No physical change at the surface within the boundary of the property. No adverse effect from noise, vibration, or methane gas migration.	*De minimis* impact
Roxbury Memorial Park	Publicly owned city park	Transit alignment would not cross property. No incorporation of land. No adverse effect from noise, vibration, or methane gas migration.	No Use

Note: FTA is in consultation with the California SHPO as of the date of issue of this Draft SEIS

All Possible Planning to Minimize Harm

Although a discussion of all possible planning to minimize harm is not required where a *de minimis* impact determination is made per 23 CFR 774.3(b) and 23 CFR 774.17, this analysis acknowledges that the Project is designed to avoid permanent harm to all Section 4(f) properties in the west Beverly Hills and Century City area. To avoid harm to historic resources and recreational facilities, the Project was designed to operate within tunnels, with no project features at the surface within any of the Section 4(f) properties in the west Beverly Hills and Century City area. With the implementation of the avoidance and mitigation measures described in Chapter 4 of this Draft SEIS and as previously discussed in the Final EIS/EIR, the Project would not result in adverse air quality impacts to public recreational-facility users, groundborne noise or vibration levels that exceed the FTA impact criteria, result in significant ground settlement at nor altered methane gas movement below any of the Section 4(f) properties during construction or operation of the project.

The Project would require an approximately 3-acre staging and laydown area to launch the tunneling machines and support the tunneling operations between Century City and the Wilshire/La Cienega Station. Two alternative construction access locations were considered to determine if they would reduce impacts. The alternative approaches are accessing the tunnels from above the station box within Constellation Boulevard or launching the TBM from the Wilshire/La Cienega Station.

The two evaluated alternative construction approaches would have substantial construction-phase impacts on resources not protected by Section 4(f). Compared to the Project, relocation of the access shaft to Constellation Boulevard and Century Park East would require an additional two to three years of complete closure of those roadways. The approach to launch the TBM from the Wilshire/La Cienega Station area would displace nine commercial properties and 10 single-family residences compared to three commercial properties for the Project. The alternative approaches would not minimize harm caused by the Project, as there is no remaining harm after mitigation for the proposed construction staging site at 1950 Century Park East.

Avoidance Alternatives

While the consideration of avoidance alternatives is not required for a project with only *de minimis* impacts (23 CFR 774.3), the Section 4(f) analysis evaluated alternatives that would avoid Section 4(f) properties in west Beverly Hills and Century City to address direction in the Final Decision, to provide the public with information, and to address concerns from the City of Beverly Hills and the BHUSD. Alternatives to the Project that would not use Section 4(f) resources are shown in Figure S-4. Chapter 5 of this Draft SEIS evaluates in detail the feasibility and prudence of each of the identified avoidance alternatives. A comparison of the avoidance alternatives is summarized in Table S-5.

There are no feasible and prudent alternatives that would have no use of Section 4(f) properties in the west Beverly Hills and Century City area.

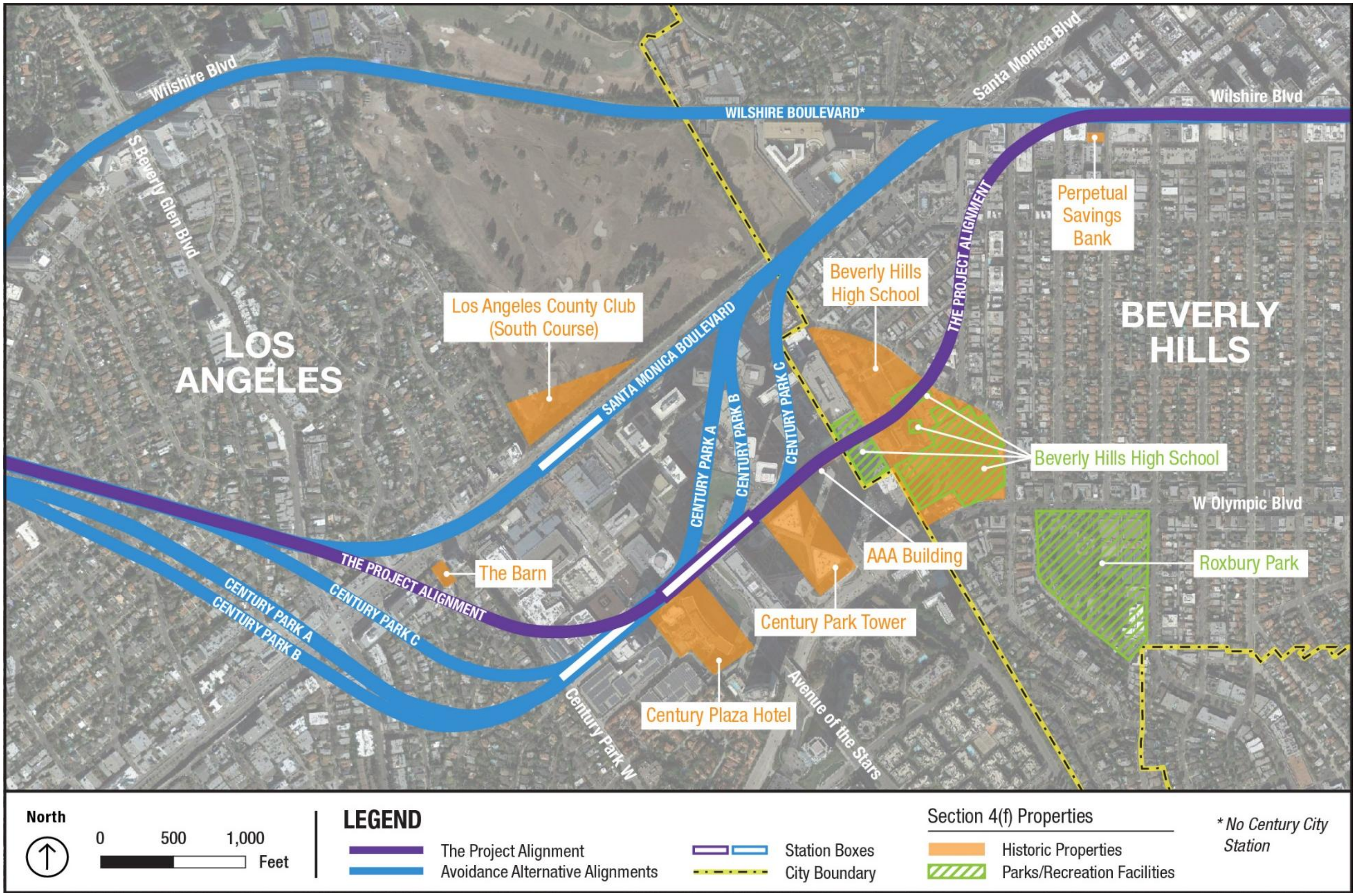


Figure S-4. Avoidance Alternatives

Table S-5. Summary Comparison of Avoidance Alternatives

Alternative	Feasibility	Meets the Purpose and Need	Safety and Operational Considerations	Social, Economic, Environmental, and Community Impacts	Costs of an Extraordinary Magnitude	Unique Problems or Unusual Factors	Cumulative Consideration of Factors
Wilshire Boulevard (No Century City Station)	Feasible	Would not meet purpose and need due to loss of 12% of system boardings and reduced transit access to 49,970 jobs in Century City relative to the Project	None	Acquisition of 16 commercial parcels to complete construction resulting in the loss of approximately 46 jobs; reduction of reliable transit access to jobs for low-income transit users; less substantial air quality and energy improvements relative to the Project	$739 million less than the Project to construct	None	Not prudent because of failure to address purpose and need and social, economic, environmental, and community impacts
Santa Monica Boulevard	Not feasible. High risk of fault rupture would preclude this station being built as a matter of sound engineering judgement	Less effective than Project due to loss of 7% of system boardings relative to the Project	High risk of catastrophic earthquake failure of Century City Santa Monica Station	Acquisition of 16 commercial parcels to complete construction resulting in the loss of approximately 46 jobs	$21 million less than the Project to construct	Risk of catastrophic earthquake failure of Century City Santa Monica Station	Not prudent because of high risk of catastrophic station failure in an earthquake, reduced ridership, and increased number of displacements
Century Park A	Not feasible to construct if development of 1950 Avenue of the Stars precedes Project construction as a matter of sound engineering judgement	Less effective than Project due to 580 person-hours of daily travel time increase relative to the Project	Substantial risks associated with tunneling under existing high-rise buildings; reduced operating speed; increased long-term operational costs relative to the Project	Acquisition of 18 commercial parcels to complete construction resulting in the loss of approximately 46 jobs; additional construction-phase traffic impacts relative to the Project	Greater than $239 million more than the Project to construct	Risk of liability for delay if 1950 Avenue of the Stars is delayed until crossover is constructed.	Not prudent because of project timing, increased travel time, increased building damage risk, increased displacements, delayed schedule, and an extraordinary cost increase
Century Park B	Feasible	Less effective than Project due to 600 person-hours of daily travel time increase relative to the Project	Substantial risks associated with tunneling under existing high-rise buildings; reduced operating speed; increased long-term operational costs relative to the Project	Acquisition of 17 commercial parcels to complete construction resulting in the loss of approximately 46 jobs; additional construction-phase traffic impacts relative to the Project	$119 million more than the Project to construct	Substantial risks associated with the construction of 1950 Avenue of the Stars	Not prudent because of increased travel time, increased building damage risk, increased displacements, increased costs, and delayed schedule

Alternative	Feasibility	Meets the Purpose and Need	Safety and Operational Considerations	Social, Economic, Environmental, and Community Impacts	Costs of an Extraordinary Magnitude	Unique Problems or Unusual Factors	Cumulative Consideration of Factors
Century Park C	Feasible	Less effective than Project due to 680 person-hours of daily travel time increase relative to the Project	Substantial risks associated with tunneling under existing high-rise buildings and the Stone-Hollywood trunk water line; reduced operating speed; increased long-term operational costs relative to the Project	Acquisition of 6 commercial parcels to complete construction resulting in the loss of approximately 15 jobs; increase in construction-phase traffic impacts relative to the Project	$105 million more than the Project to construct	Public and worker safety risk associated with potential rupture or damage to the Stone – Hollywood trunk water line	Not prudent because of increased travel time, increased building damage risk, increased costs, delayed schedule, and increased construction-phase traffic impacts

Figure S-5. Alternatives Considered for Least Overall Harm

Evaluation of Least Overall Harm

Because none of the avoidance alternatives evaluated would be feasible and prudent alternatives to the Project, a range of alternatives that would use land below one or more Section 4(f) properties in the west Beverly Hills and Century City area were then evaluated. Alternatives that had been previously identified to serve Century City, including alternative alignments identified after issue of the ROD, were all considered and evaluated for the evaluation of least overall harm and are shown in Figure S-5.

Least overall harm analysis compares the ability to mitigate adverse impacts, relative severity of the remaining harm, relative significance of each Section 4(f) property, the views of the official(s) with jurisdiction, the degree to which the alternative meets the purpose and need, the magnitude of any other adverse impacts, and substantial differences in costs among the alternatives. A comparison of the alternatives considered for least overall harm is summarized in Table S-6.

The Project would generate the least overall harm considering the degree to which the alternative meets the purpose and need, the magnitude of other adverse impacts, and substantial differences in costs among the alternatives.

Compared to the Project, the Century Park D Alternative would cross below BHHS Building B2, B3, and B4 and have a substantially greater cost. The Constellation Direct Alternative would cross below BHHS Building B2, tunnel under an additional Section 4(f) property (Perpetual Savings Bank) and would have increased travel time, residential subsurface easements, and cost relative to the Project. The Lasky Drive A Alternative would travel under the same existing Section 4(f)-protected features at BHHS as the Project as well as below the planned future swimming pool, would tunnel under an additional Section 4(f) property (Perpetual Savings Bank), and have increased travel time and cost relative to the Project. The Lasky Drive B Alternative would tunnel under the Swim-Gym as well as the future swimming pool and an additional Section 4(f) property (Perpetual Savings Bank) and would have increased travel time, residential subsurface easements, and cost relative to the Project. The Spalding Alternative would tunnel under an additional Section 4(f) property (Perpetual Savings Bank) and would have increased residential subsurface easements and cost relative to the Project. While the Constellation South Alternative would be less costly than the Project, it would require subsurface easements from more residential properties, tunnel under an additional Section 4(f) property (the Barn), and would cross below BHHS Building B2. The Avenue of the Stars Alternative would have substantial construction-phase impacts to Roxbury Memorial Park, a significant recreational resource, that are relatively more severe than the remaining harm of any other alternative to Section 4(f) properties. It would also have increased travel time, travel under Roxbury Memorial Park, require subsurface easements from substantially more residential properties, and have increased cost relative to the Project.

Table S-6. Summary Comparison of Alternatives for Least Overall Harm

Alternative	Subsurface easements below Section 4(f) Historic Properties	Subsurface easements below Section 4(f) Recreational Properties	Construction phase impacts to Section 4(f) Properties	Transit Travel Time Relative to the Project	Subsurface Easements	Capital Cost Relative to the Project (YOE)
The Project (**Least Overall Harm**)	BHHS (Building B1) and AAA Building	BHHS School Recreational Resources (future gymnasium and future half soccer field)	Monitoring instruments at BHHS and construction staging at AAA Building	-	90 residential 30 commercial	-
Century Park D	BHHS (Buildings B2, B3, and B4), and AAA Building	BHHS School Recreational Resources (future half soccer field)	Monitoring instruments at BHHS and construction staging at AAA Building	30 person-hours of daily travel time savings	90 residential 27 commercial	$60M greater
Constellation Direct	Perpetual Savings Bank, BHHS (Building B2), and AAA Building	BHHS Recreational Resources (future half soccer field)	Monitoring instruments at BHHS and construction staging at AAA Building	50 person-hours of daily travel time increase	93 residential 23 commercial	$8M greater
Lasky Drive A	Perpetual Savings Bank, BHHS (Building B1), and AAA Building	BHHS Recreational Resources (future swimming pool, future gymnasium, and future half soccer field)	Monitoring instruments at BHHS and construction staging at AAA Building	240 person-hours of daily travel time increase	88 residential 23 commercial	$6M greater
Lasky Drive B	Perpetual Savings Bank, BHHS (Building B1 and Swim-Gym), and AAA Building	BHHS Recreational Resources (Swim-Gym, future swimming pool, and future half soccer field)	Monitoring instruments at BHHS and construction staging at AAA Building	660 person-hours of daily travel time increase	107 residential 21 commercial	$12M greater
Spalding	Perpetual Savings Bank, BHHS, and AAA Building	BHHS Recreational Resources (future track, future baseball field, and future half soccer field)	Monitoring instruments at BHHS and construction staging at AAA Building	350 person-hours of daily travel time increase	100 residential 19 commercial	$3M greater
Constellation South	BHHS (Buildings B1 and B2), AAA Building, and the Barn	BHHS Recreational Resources (future half soccer field)	Monitoring instruments at BHHS and construction staging at AAA Building	50 person-hours of daily travel time savings	97 residential 20 commercial	$42M less
Avenue of the Stars	Los Angeles Country Club (South Course)	Roxbury Memorial Park	Construction activities would use Roxbury Memorial Park; Park access limited during construction	680 person-hours of daily travel time increase	130 residential 11 commercial	$12M greater

The Project would generate the least overall harm.
Text in black denotes impact similar to the Project. Text in red indicates greater impact or worse performance than the Project. Text in green indicates less impact or better performance than the Project.

Coordination and Consultation

FTA is in consultation with the California SHPO regarding the assessment of effects on historic properties as of the date of issue of this Draft SEIS. The FTA is consulting with the City of Beverly Hills Community Services Department and the BHUSD in regards to public use of the BHHS recreational facilities. Per 23 CFR 774.5(b), the FTA notified the agencies with jurisdiction of its intention to make a *de minimis* impact finding. Public notice and an opportunity to comment on FTA's finding of *de minimis* impact are provided with the public comment period on this Draft SEIS. Following the opportunity for public comment, the FTA will request the concurrence of the City of Beverly Hills Community Services Department and the BHUSD with FTA's finding of *de minimis* impact.

S.6 Public and Agency Outreach

Metro will use a comprehensive set of strategies to actively engage stakeholders similar to what was done for the Final EIS/EIR. Chapter 6 of this Draft SEIS highlights the previous outreach efforts and provides further details on the Public Participation Plan to be implemented as part of this SEIS process. There will be a 45-day public and agency review and comment period of this Draft SEIS prior to the issuance of a Final SEIS. During this period, comments limited to the scope of analysis of this Draft SEIS may be returned to the FTA or Metro. Additionally, the FTA and Metro will hold one public meeting on June 22, 2017 to discuss the contents and findings of this Draft SEIS.

CHAPTER 1—INTRODUCTION

The Federal Transit Administration (FTA) and the Los Angeles County Metropolitan Transportation Authority (Metro) prepared and distributed the *Westside Subway Extension Final Environmental Impact Statement/Environmental Impact Report* (Final EIS/EIR) (Metro 2012j) for the Westside Subway Extension (now called the Westside Purple Line Extension) Project (the Project) in March 2012. The Project was planned to be constructed in three sections (see Section 1.1, Project Overview). The Final EIS/EIR identified environmental impacts and mitigation for the Project, including the use of properties protected under Section 4(f) of the Department of Transportation Act. The Metro Board of Directors approved Section 1 of the Project in April 2012, followed by the approvals of Section 2 and Section 3 in May 2012. A Record of Decision (ROD) was issued by FTA in August 2012 for all three sections of the Project.

This limited scope Draft Supplemental Environmental Impact Statement (Draft SEIS) and Section 4(f) Evaluation was prepared in response to the Final Decision on Motions for Summary Judgment and Ruling in Regards to Remedies (Final Decision) of the United States District Court for the Central District of California in *Beverly Hills Unified School District v. Federal Transit Administration, et al.*, CV 12-9861-GW(SSx) on August 12, 2016. In the Final Decision, the Court remanded the matter back to the FTA to prepare a Draft SEIS and Final SEIS consistent with the Court's findings.

In addition to responding to the Court's ruling, this Draft SEIS analyzes the relocation of construction staging activities for the Century City Constellation Station, the removal of the double crossover at the Wilshire/Rodeo Station, and changes to land uses in the Century City vicinity.

This Draft SEIS supplements the March 2012 Final EIS/EIR, pursuant to FTA National Environmental Policy Act (NEPA) implementing regulations (23 Code of Federal Regulations (CFR) § 771.130), to address the Court's determinations in its ruling, which is discussed in further detail later in this chapter.

This chapter provides information about the Project, including the Project overview, the purpose and scope of this Draft SEIS, and the supplemental environmental review process moving forward.

1.1 Project Overview

The Westside Purple Line Extension Project is an approximately 9-mile heavy rail transit subway that will operate as an extension of the Metro Purple Line from its current western terminus at Wilshire/Western Station to a new western terminus near the West Los Angeles Veterans Affairs (VA) Hospital (Figure 1-1). The Project will improve mobility and provide a fast, reliable, high-capacity, and environmentally sound transportation alternative for the Westside of Los Angeles. This improvement in public transit service will significantly increase east–west capacity and improve mobility by reducing transit travel times. On a county-wide level, the Project will strengthen regional access by connecting Metro bus, Metro rail, and Metrolink networks to a high-capacity transit solution serving the Study Area.

The Study Area for the Project is located in western Los Angeles County and encompasses approximately 38 square miles. The Study Area is east/west oriented and includes portions of the Cities of Los Angeles, West Hollywood, Beverly Hills, and Santa Monica, as well as unincorporated areas of Los Angeles County. The Study Area boundaries generally extend north to the base of the Santa Monica Mountains along Hollywood, Sunset, and San Vicente Boulevards; east to the Metro Rail stations at Hollywood/Highland and Wilshire/Western; south to Pico Boulevard; and west to the Pacific Ocean.

The Project was planned to be constructed in three phases:

- Section 1: 3.92-mile section from the existing Wilshire/Western Station to Wilshire/La Cienega with three new stations: Wilshire/La Brea, Wilshire/Fairfax, and Wilshire/La Cienega
- Section 2: 2.59-mile section from Wilshire/La Cienega to Century City with two new stations: Wilshire/Rodeo and Century City Constellation
- Section 3: 2.59-mile section from Century City to Westwood/VA Hospital with two new stations: Westwood/UCLA and Westwood/VA Hospital

In November 2014, construction began for Section 1 of the Project, which is anticipated to be completed in 2024. Major construction activities for Section 2 (Figure 1-1) of the Project, which is the subject of this limited scope Draft SEIS, could begin as early as January 2018 with expected completion in 2026. Construction for Section 3 is scheduled to begin in 2025 with project completion anticipated in 2035.

On November 8, 2016, Los Angeles County residents voted to approve a half-cent sales tax measure (Measure M—the Los Angeles County Traffic Improvement Plan), which provides funding to expedite construction of Section 3 of the Project.

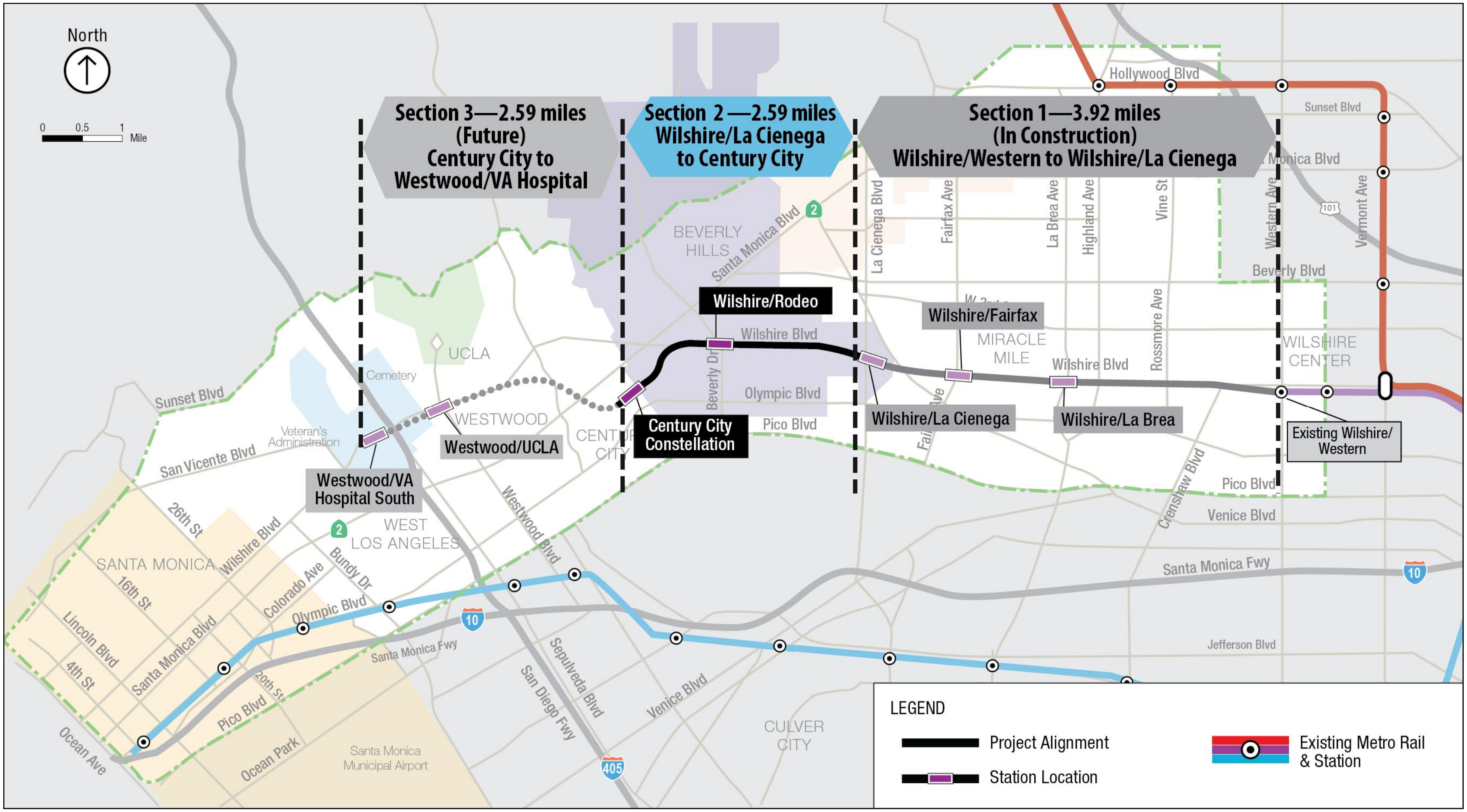


Figure 1-1. Westside Purple Line Extension

1.2 Purpose and Scope of this Draft SEIS

This Draft SEIS and Section 4(f) Evaluation was prepared in response to the Final Decision of the United States District Court for the Central District of California in *Beverly Hills Unified School District v. Federal Transit Administration, et al.*, CV 12-9861-GW(SSx) on August 12, 2016. The preparation of this Draft SEIS is consistent with 23 CFR § 771.130, which states that a Draft SEIS may be required to address issues of limited scope. This Draft SEIS is a limited scope document in response to the Final Decision, providing additional detail and analysis of Section 2 of the Project with a particular focus on the Century City Constellation Station and the tunnel alignment between the Wilshire/Rodeo and Century City Constellation Stations with regard to the following:

- An analysis of the potential public health impacts of nitrogen oxide and diesel particulate matter emissions during construction of Constellation Station and tunneling for Section 2 of the Project and, depending on the results of that analysis, an assessment of the feasibility and efficacy of mitigation measures and alternatives to address such potential impacts
- An analysis of the potential risks of soil gas migration from tunneling or other construction activities related to Section 2 of the Project and, depending on the results of that analysis, the disclosure of any information required by 40 CFR §§ 1502.22, 1502.9, and *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016 (9th Cir. 2006), and depending on the results of such analysis and disclosures, an assessment of the feasibility and efficacy of mitigation measures and alternatives to address such potential risks and disclosures
- A discussion of the completeness of the available seismic risk information related to Section 2 of the Project
- A discussion of post-Draft EIS seismic and ridership studies available to the FTA and related to Section 2 of the Project
- Identification of the potential direct and any constructive "use" of the Beverly Hills High School campus from subway construction and operation on, beneath, or near the campus, and if construction or operation causes a "use," an evaluation of "prudent and feasible alternatives" and "all possible planning" to minimize harm under the Department of Transportation Act § 4(f) Pub. L. No. 89-670, 80 Stat. 931, 933 (Oct. 15, 1966) (codified as amended at 23 United States Code (USC) § 138 and 49 U.S.C. § 303) ("Section 4(f)")

Therefore, this SEIS evaluates the locally preferred alternative as it relates to Section 2 of the Project, as described in the Record of Decision. Other alternatives considered under Section 4(f) are discussed in Chapter 5.

In addition to addressing the topics specified in the Court's ruling, this Draft SEIS analyzes the relocation of construction staging activities for the Century City Constellation Station, the removal of the double crossover at the Wilshire/Rodeo Station, and changes to land uses adjacent to the construction staging areas in Century City.

As directed by the Court ruling, Metro studies that were completed after the publication of the Draft EIS/EIR are discussed in this Draft SEIS. In addition to the studies prepared by Metro, geotechnical reports prepared by others have been reviewed and are identified, summarized, and incorporated into this SEIS in Section 4.3. Metro reports published prior to March 2012 were included in the Final EIS/EIR. The Metro studies that are discussed and appended to this Draft SEIS include the following:

- *Assessment of Tunneling and Station Excavation Risks Associated with Subsurface Gas along Section 2 – Revision 1* (Metro 2017b)
- *Westside Subway Extension Geotechnical and Hazardous Materials Technical Report* (Metro 2010a)
- *Addendum to the Westside Subway Extension Geotechnical and Hazardous Materials Technical Report* (Metro 2011b)
- *Westside Subway Extension Preliminary Geotechnical and Environmental Report* (Metro 2011g)
- *Westside Subway Extension Century City Area Fault Investigation Report* (Metro 2011c)
- *Westside Subway Extension Century City Area Tunneling Safety Report* (Metro 2011d)
- *Geotechnical Design Memorandum – Section 2, Tunnel Reaches 4 and 5* (Metro 2016e)
- *Geotechnical Design Memorandum – Century City Constellation Station* (Metro 2016f)
- *Geotechnical Design Memorandum – Wilshire/Rodeo Station* (Metro 2016g)
- *Geotechnical Data Report – Tunnel Reaches 4 and 5* (Metro 2016h)
- *Geotechnical Data Report – Century City Constellation Station* (Metro 2016i)
- *Environmental Data Report – Century City Constellation Station* (Metro 2015a)
- *Westside Purple Line Extension Section 2 Geotechnical Fault Investigations Summary Memorandum* (Metro 2016a)
- *Transcript: Special Meeting of the MTA Board to Conduct Public Hearing,* May 17, 2012 (Metro 2012a)
- *Reply to Exponent Responses*, dated May 15, 2012 (Metro 2012b)
- *Response to Leighton Consulting Report,* May 14, 2012 (Metro 2012c)
- *Final EIS/EIR Presentation to Metro Committee,* April 18, 2012 (Metro 2012d)
- *Metro Board Report,* April 18, 2012 (Metro 2012e)
- Appendix D to *Metro Board Report* (Metro 2012f)
- *Response to Preliminary Review of Comments of Century City Fault Investigation Report* by Shannon and Wilson, April 17, 2012 (Metro 2012g)
- *Response to Hazard Assessment Study* by Exponent, April 4, 2012 (Metro 2012h)
- *Report of Independent Review Panel,* October 19, 2011 (Metro 2011h)
- *Presentation to Planning & Programming Committee,* October 19, 2011 (Metro 2011i)
- *Tunnel Advisory Panel Final Report,* October 2011 (Metro 2011j)
- *Westside Purple Line Extension Project, Section 2 Addendum to the Final Environmental Impacts Report* (Metro 2015e)
- *Fault Investigation Report Transect 9—Tunnel Reach 5* (Metro 2017c)
- *Probabilistic Fault Displacement Hazard Evaluation* (Metro 2017d)
- *Century City TOD and Walk Access Study* (Metro 2012i)
- *Century City Station Options Updated Jobs and Population Inventory Memorandum* (Metro 2011f)
- *Updated Direct Ridership Forecasting Report* (Metro 2011e)
- *Westside Subway Extension Technical Report Summarizing the Results of the Forecasted Alternatives* (Metro 2012l)

1.3 Environmental Review Process

This Draft SEIS supplements the Final EIS/EIR and is a limited scope document in response to the Final Decision, providing additional detail and analysis of Section 2 of the Project with a particular focus on the Century City Constellation Station and the tunnel alignment between the Wilshire/Rodeo and Century City Constellation Stations. It does not withdraw other previous approvals or decisions made under state and federal regulations or authorities for the Westside Purple Line Extension.

The publication of this Draft SEIS will be followed by a 45-day public review and comment period. The Final SEIS will include and address all of the comments received during the public review of the Draft SEIS.

The FTA may issue a single Final SEIS/Supplemental ROD pursuant to Public Law 114-94 and 23 U.S.C. 139 (n)(2) unless the FTA determines statutory criteria or practicability considerations preclude issuance of the combined document. In that case, FTA would issue a Final SEIS followed by a Supplemental ROD, as needed.

CHAPTER 2—ALTERNATIVE CONSIDERED IN THIS DRAFT SEIS

This chapter provides the Project background, summarizes the history of the development of alternatives, and identifies and describes the Project elements that are the subject of this Draft Supplemental Environmental Impact Statement (Draft SEIS) and Section 4(f) Evaluation. Chapter 2 of the *Westside Subway Extension Final Environmental Impact Statement/Environmental Impact Report* (Final EIS/EIR) (Metro 2012j) provides a detailed description of the entire Project. Unless otherwise noted, the Project elements considered in this Draft SEIS are consistent with the Project identified in Chapter 2 of the Final EIS/EIR and approved by the Metro Board of Directors in April and May 2012. Alternatives to the Project considered under Section 4(f) are identified and described in Chapter 5 of this Draft SEIS.

2.1 Project Background

The Westside Purple Line Extension has been an integral element of local, regional, and federal transportation planning since the early 1980s. Extending westward from the Los Angeles Central Business District, the Westside Purple Line Extension has been the subject of in-depth technical studies and extensive community involvement.

An Alternatives Analysis (AA) Study was initiated in 2007 for all reasonable fixed-guideway alternative alignments and transit technologies. The purpose of the Project, as established in the AA, is to address the mobility needs of residents, workers, and visitors traveling to, from, and within the highly congested Study Area by providing faster and more reliable public transit than existing services, which operate in mixed-flow traffic. The improvement in public transit service will significantly increase east–west capacity and improve mobility by reducing transit travel times. On a county-wide level, the project will strengthen regional access by connecting Metro bus, Metro rail, and Metrolink networks to a high-capacity transit solution serving the Study Area.

The evaluation of alternatives in the AA Study resulted in the identification of heavy rail transit as the preferred technology and the recommendation of two alternative alignments for further consideration in the Draft EIS/EIR. In February 2009, the Metro Board of Directors approved the AA Study and authorized preparation of the Draft EIS/EIR.

FTA and Metro prepared the Draft EIS/EIR for the Westside Purple Line Extension in 2010 with the FTA as the lead agency for the National Environmental Policy Act and Metro as the lead agency for the California Environmental Quality Act. The Draft EIS/EIR defined the Purpose and Need of the Project and described and evaluated the alternatives, including a No Build Alternative, a relatively low-cost Transportation System Management Alternative, and five heavy rail subway alternatives. The Draft EIS/EIR documented the evaluation of the potential transportation and environmental impacts and benefits, mitigation measures, operating and maintenance and capital costs, and potential funding sources for the alternatives. It also included a comparison of alternatives and a discussion of public and agency outreach. The Draft EIS/EIR was published in September 2010.

The Metro Board of Directors reviewed and considered the findings of the Draft EIS/EIR and the public and agency comments on the Draft EIS/EIR received during the official comment period. On October 28, 2010, after deliberation of the benefits and impacts of all the alternatives analyzed and public comments received during the public comment period, the Metro Board of Directors approved the Draft EIS/EIR and identified Alternative 2 (Westwood/Veterans Affairs (VA) Hospital Extension) as the Locally Preferred Alternative (LPA). Alternative 2 was selected as the LPA as it is the alternative that best increases transit ridership and provides benefits at reasonable costs within available financial resources.

The Final EIS/EIR for the LPA was prepared with direction from the Metro Board of Directors to further evaluate station and alignment options and rail support facilities. The Final EIS/EIR evaluation included two station location options for each of the Century City, Westwood/UCLA, and Westwood/VA Hospital Stations, and station entrance options at all seven of the LPA station locations. The Notice of Availability for the Final EIS/EIR was published on March 23, 2012 in the *Federal Register*. The 60-day review period for the Final EIS/EIR concluded on May 22, 2012.

The Metro Board of Directors approved Section 1 of the Project in April 2012 and approved Sections 2 and 3 of the Project in May 2012. FTA issued a Record of Decision (ROD) for the Project in August 2012.

2.2 Purpose and Need of the Project

The purpose of this Project is to improve transit travel time and provide more reliable transit service to the 286,250 transit riders who travel through the highly congested Study Area today, as well as to future riders who will be attracted to the system. More specifically, the Project's purpose is as follows:

- Improve Study Area mobility and travel reliability
- Improve transit services within the Study Area
- Improve access to major activity and employment centers in the Study Area
- Improve opportunities for transit-supportive land use policies and conditions
- Improve transportation equity
- Provide a fast, reliable, and environmentally sound transit alternative
- Meet Regional Transit Objectives through the Southern California Association of Governments' performance indicators of mobility, accessibility, reliability, and safety

The need for the Project, as described in Chapter 1 of the Final EIS/EIR, is based on population and employment growth, the high number of major activity centers served by the Project, high existing transit usage, and severe traffic congestion. The Study Area has 12 large population and employment centers located along the corridor, which are served by extremely congested road networks that will deteriorate further with the projected increase in population and jobs. This anticipated growth will further affect transit travel speeds and reliability, even with a dedicated lane for express bus service on Wilshire Boulevard. The improved capacity that will result from the subway extension is the best solution to improve travel times and reliability and to provide a high-capacity, environmentally sound transit alternative.

2.2.1 Major Activity Centers and Destinations

Los Angeles has been characterized as a collection of urban centers. The City of Los Angeles "Centers Concept" from the 1960s and 1970s identified urban centers of various types throughout the region that represented concentrations of job centers and higher-density housing. Wilshire Center, Hollywood, Miracle Mile, Sunset Strip, Beverly Hills, Westwood, Santa Monica, and others were all designated centers in the plan. The Centers Concept envisioned that these areas would be interconnected by transit infrastructure. The Westside Purple Line Extension will implement a portion of the plan by linking some of these high-density centers via transit to reduce reliance on automobiles.

The Westside Study Area has the second-highest concentration of employment centers and major attractions in the Southern California region after Downtown Los Angeles. The Study Area is widely recognized as one of the preeminent employment generators in California. The three largest activity centers with the highest density levels are Beverly Hills (26,000 jobs per square mile), Century City (43,000 jobs per square mile), and Westwood (42,000 jobs per square mile). Approximately 147,000 jobs were located in these three centers in 2006.

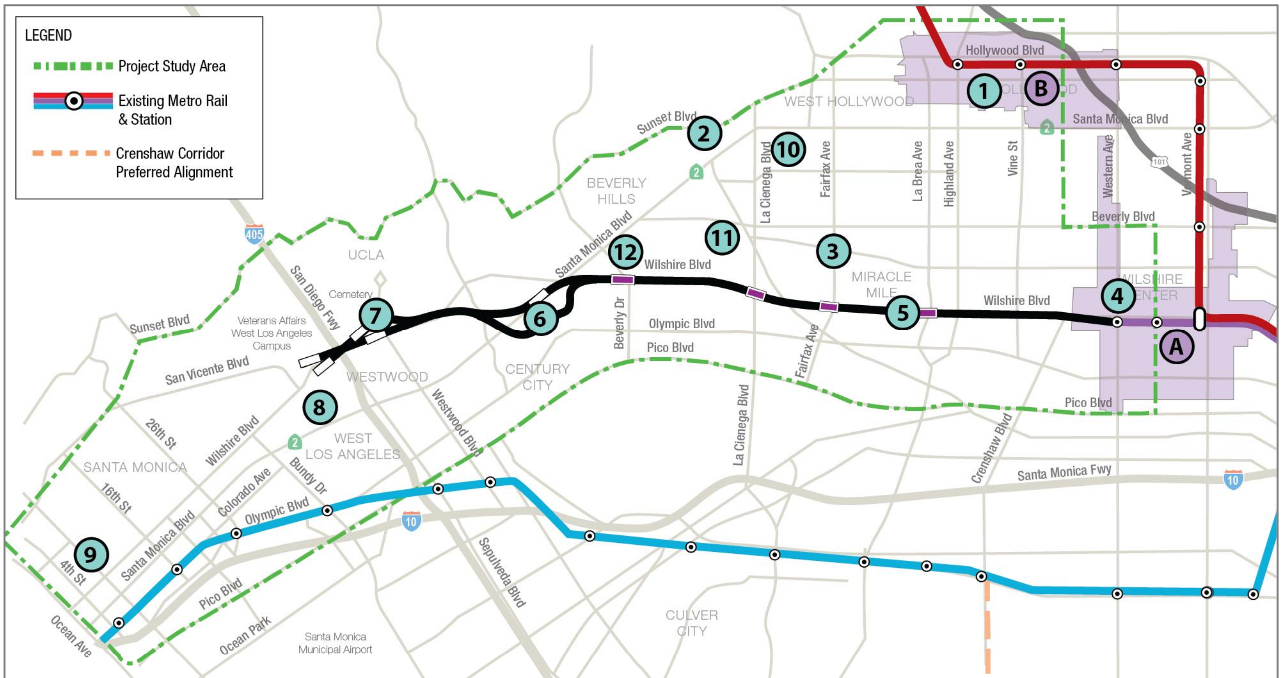
Major activity centers in the Study Area are shown in Figure 2-1. Some of Southern California's most well-known entertainment, educational, and cultural activity centers are located within the Study Area along the high-density Wilshire and Santa Monica Boulevard corridors.

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

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

Travel Markets

The primary travel markets in the Study Area are the east/west trips occurring within or traveling to and from the Westside. As shown in Figure 2-2, on an average weekday, about 301,000 home-based work peak trips enter the Study Area from outside origins, while about 123,000 trips leave the Study Area for outside destinations (i.e., more than twice as many work trips enter the Study Area as leave). There are 102,000 daily home-based work peak trips starting and ending within the Study Area, suggesting that approximately one in four Study Area jobs is filled by a local (Study Area) resident. The remaining 75 percent of the jobs were filled by individuals who live outside the Study Area. Projections suggest that the ratio of home-based work peak trips entering or leaving the Study Area daily will remain about the same through 2035.



Activity Centers

1. Hollywood
2. Sunset Strip
3. The Grove/Farmer's Market
4. Wilshire Center
5. Miracle Mile
6. Century City
7. Westwood/UCLA
8. West Los Angeles
9. Downtown Santa Monica
10. West Hollywood
11. Beverly Center/Cedars Sinai Hospital
12. Beverly Hills/Rodeo Drive

High Opportunity Areas

A. City of Los Angeles Community Redevelopment Agency (CRA) Redevelopment Area in Wilshire Center-Koreatown

B. City of Los Angeles CRA Redevelopment Area in Hollywood

Figure 2-1. Activity Centers in the Study Area

Transit

All bus service in the Study Area is currently provided in mixed-flow lanes, which subjects buses to the same high levels of congestion experienced by automobiles. The Wilshire Corridor (Line 20/720) is the most used bus corridor in Southern California with nearly 60,000 daily boardings, surpassing the ridership of most light rail transit (LRT) routes.

Since 1990, Metro has invested heavily in a regional fixed-guideway transit system that consists of LRT, heavy rail transit, bus rapid transit, and commuter rail. This system currently includes more than 76 miles of Metro Rail service (heavy rail transit and LRT) and 14 miles of bus rapid transit service. In addition, the Southern California Regional Rail Authority (Metrolink) has opened more than 500 miles of Metrolink commuter rail lines that serve five counties. The existing fixed-guideway transit service in the region is complemented by the transit corridors currently under study or construction. The Westside Purple Line Extension will directly connect the west side of the county to all elements of the existing Metro system.

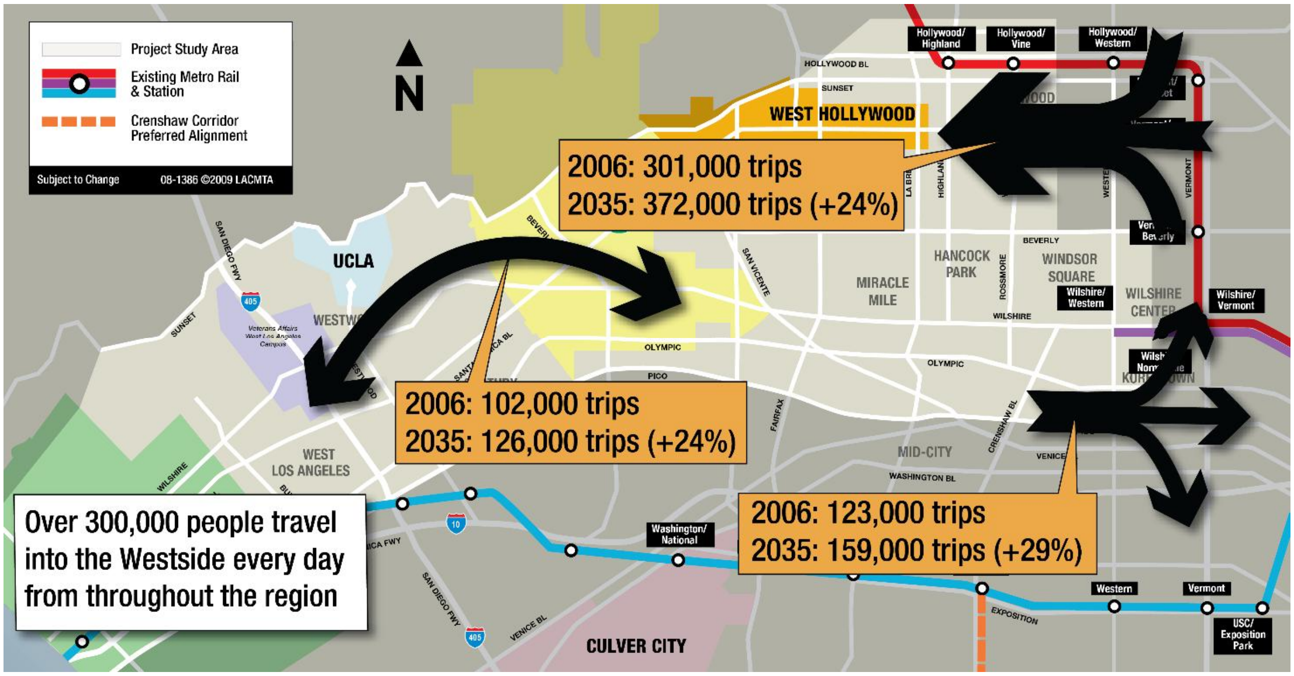


Figure 2-2. Home-Based Work Peak Person Trip Comparison: 2006 to 2035

Congestion and Mobility

Between 2006 and 2035, substantial increases are projected in vehicle miles traveled (VMT) and vehicle hours traveled (VHT). Daily VMT within the Study Area will increase by approximately 26 percent, from 4 million in 2006 to more than 5 million in 2035. During the same period, regional VMT are projected to increase from 304.2 million to 504.7 million, or more than 65 percent. VHT in the Study Area are projected to increase from about 165,000 to 247,000, or almost 50 percent. Regional VHT are projected to increase from 9.5 million to 29.2 million, or about 207 percent between 2006 and 2035.

The Study Area contains some of the most congested arterial streets in the county. Key east/west arterials, such as Wilshire, Santa Monica, Sunset, Hollywood, Olympic, and Pico Boulevards, operate at congested conditions throughout the day. North/south arterials west of Western Avenue include Crenshaw Boulevard, La Brea Avenue, La Cienega Boulevard, Beverly Drive, Westwood Boulevard, Sepulveda Boulevard, Bundy Drive, and Lincoln Boulevard.

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

The current average speeds of the Metro Rapid buses traveling through the Study Area ranges between 10 and 15 miles per hour (mph) along Wilshire Boulevard and between 11 and 14 mph along Santa Monica Boulevard. The average speeds of both local buses and the Metro Rapid buses traveling through the Study Area are expected to decrease further as traffic congestion increases on roadways. As a result, transit travel times will become longer, as illustrated in Figure 2-3.

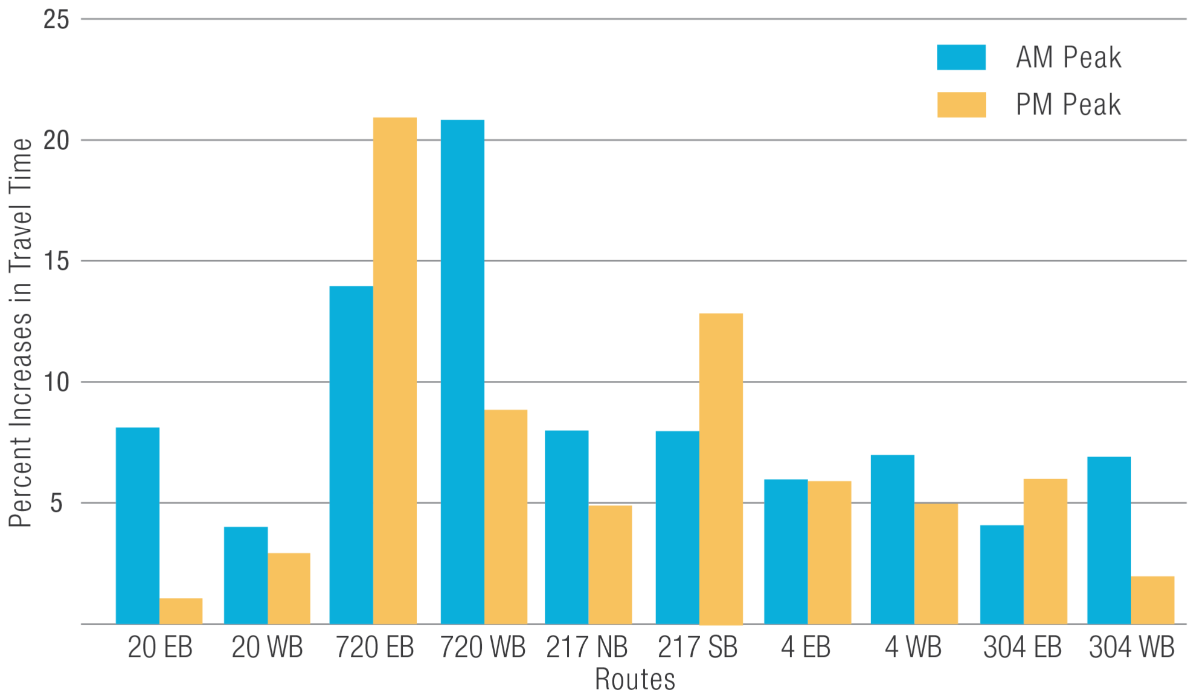


Figure 2-3. Degradation in Transit Travel Times due to Road Congestion – Metro Bus Routes in Study Area, 2003 to 2006

The Study Area has substantial traffic congestion, high transit ridership and load factors, and closely spaced bus stops. Combined, these factors result in declining bus operating speeds and reliability, making transit less competitive with the private automobile. With high passenger loads and congested roads, desirable headways (frequency of service) are difficult to maintain; this results in overcrowded buses. As the road and transit systems become more congested, the Study Area becomes a less desirable place for people to live and work and less attractive for planned growth and development.

2.2.3 Regional Objectives

The Purpose and Need statement in the Final EIS/EIR presented the regional performance indicators for transit projects from the Southern California Association of Governments (SCAG) 2008 *Regional Transportation Plan* (RTP) (SCAG 2008a). In 2016, the SCAG Regional Council adopted the *2016-2040 Regional Transportation Plan/Sustainable Communities Strategies* (RTP/SCS) (SCAG 2016) to establish the goals, objectives, and policies for the transportation system and to establish an implementation plan for transportation investments. The RTP/SCS includes regional performance indicators with objectives against which specific transportation investments can be measured. Three key performance indicators and their 2012 base year results, 2040 baseline projections, and 2040 Plan objectives are shown in Table 2-1. Designated as one of the most congested areas in the five-county region, significant improvement is needed in the Study Area in these categories to meet regional objectives for location efficiency, mobility and accessibility, and safety and health.

Table 2-1. Southern California Association of Governments Performance Indicators

Outcome	Performance Measure	Definition	Category	2012 Baseline	2040 Baseline	2040 Plan
Location Efficiency	Vehicle Miles Traveled (VMT) per capita	Average daily vehicle miles driven per person	Automobiles and light-duty trucks	22.8 miles	22.1 miles	20.5 miles
	Transit mode share	The share of total trips that use transit for work and non-work trips	All trips	2.2%	2.2%	3.1%
			Work trips	4.8%	5.6%	8.2%
Mobility and Accessibility	Person delay per capita	Delay per capita can be used as a supplemental measure to account for population growth impacts on delay	Daily minutes of delay per capita	11.8 mins	15.0 mins	9.2 mins
	Travel time distribution for transit modes	Travel time distribution for transit modes for work and non-work trips	% of PM peak transit trips <45 minutes	N/A	22%	26%
Safety and Health	Collision rates by severity by mode (per 100 million vehicle miles)	Collision rate per 100 million vehicle miles by mode and number of fatalities and serious injuries by mode (all, bicycle/pedestrian)	Serious injuries	4.29	N/A	1.60
			Fatalities	0.83	N/A	0.31

Source: SCAG 2016-2040 Regional Transportation Plan/Sustainable Communities Strategies (RTP/SCS) (SCAG 2016)
Note: 2012 Baseline Conditions were not presented for all metrics.

2.3 Development of the Alternatives for Section 2 of the Project

This Draft SEIS addresses Section 2 of the Project with a focus on the alignment between the Wilshire/Rodeo and Century City Stations, the Century City Station, and the construction activities located in Century City. These project elements underwent a rigorous review process as presented in Chapter 2 of the Final EIS/EIR and are summarized here.

2.3.1 Wilshire/Rodeo to Century City Alignment and Century City Station

The Draft EIS/EIR considered two station options for Century City and three alignment options connecting the Wilshire/Rodeo and Century City Stations. Figure 2-4 depicts the station and alignment locations as they were analyzed in the Draft EIS/EIR.

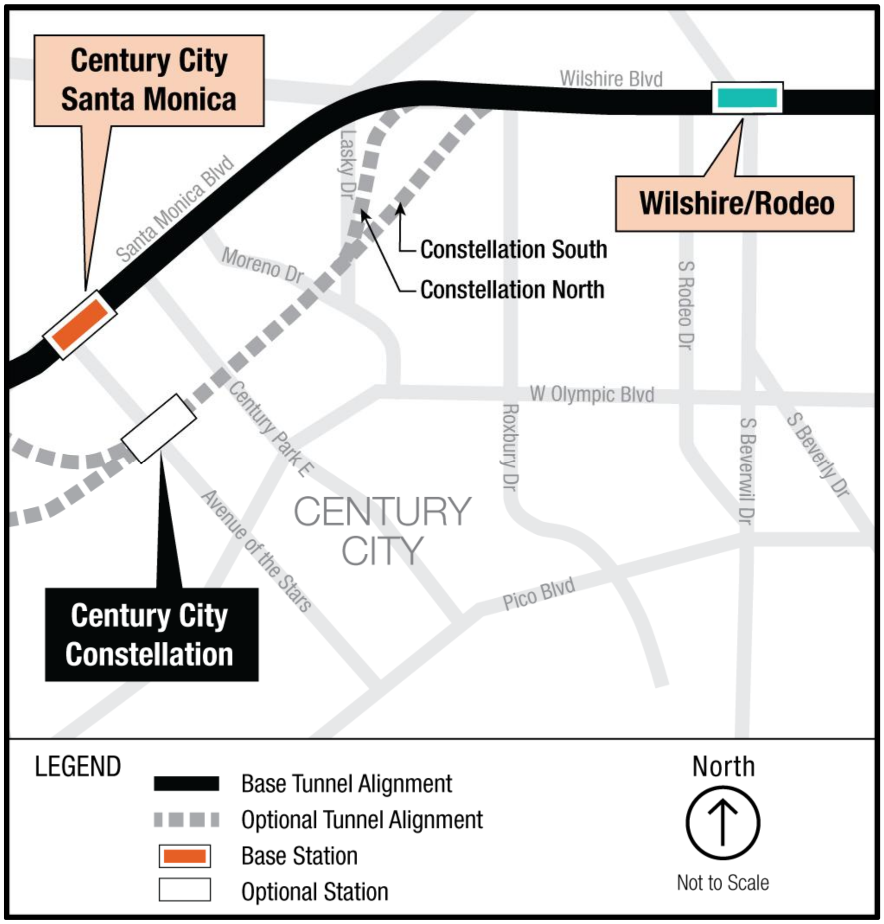


Figure 2-4. Century City Station and Alignment Options in Draft EIS/EIR

The two station locations that were considered in the Century City area are as follows:

- Century City Santa Monica Station—located beneath Santa Monica Boulevard centered on Avenue of the Stars
- Century City Constellation Station—located beneath Constellation Boulevard centered on Avenue of the Stars

During the Draft EIS/EIR, the Santa Monica Station and alignment was termed the "base alignment" because it was the shortest alignment. This label was not intended to suggest a proposed action alternative or Locally pPreferred Alternative.

Three alignments were considered to connect the Wilshire/Rodeo Station in Beverly Hills to one of the two studied Century City Station locations:

- Santa Monica Boulevard—extends west from the Wilshire/Rodeo Station beneath Wilshire Boulevard to Santa Monica Boulevard, where it veers southwest to connect to the Century City Station beneath Santa Monica Boulevard
- Constellation North—extends west from the Wilshire/Rodeo Station on Wilshire Boulevard to Lasky Drive, where it turns southwest to connect to the Century City Station beneath Constellation Boulevard

- Constellation South—extends west from the Wilshire/Rodeo Station on Wilshire Boulevard to Bedford Drive, where it turns southwest to connect to the Century City Station beneath Constellation Boulevard

During the public comment period on the Draft EIS/EIR, a significant volume of comments was received regarding the location of the alignment between the Wilshire/Rodeo and Century City Stations and regarding the Century City Station. Those comments in support of one station location generally expressed strong opposition to the other station location, with those in favor of a station beneath Santa Monica Boulevard opposed to a station beneath Constellation Boulevard, and those in favor of Constellation Boulevard opposed to the Santa Monica Boulevard location. The Santa Monica Boulevard location has been strongly supported by the City of Beverly Hills and the Beverly Hills Unified School District. The Century City Constellation Station was supported by the majority of commenters in meetings held outside Beverly Hills. It was, however, strongly opposed by some in Beverly Hills because the alignments between Beverly Hills and Century City (Constellation North and Constellation South) would need to pass beneath property in Southwest Beverly Hills including Beverly Hills High School. The public comments on the Draft EIS/EIR specifically on the location of the Century City Station focused on three main issues: (1) connectivity to activity centers, (2) the Metro decision-making process on where to locate the Century City Station, and (3) the safety of tunneling underneath Beverly Hills High School.

Many commenters expressed concerns about safety-related issues in regard to tunneling, especially in areas where tunnels would be located beneath homes and schools, such as between the Wilshire/Rodeo and Century City Stations. The issues raised included concerns related to seismic safety (specifically related to the Santa Monica Fault), methane gas, abandoned oil wells, subsidence, and liquefaction. The commenters voiced concern about subsurface hazards during both construction and operation of the subway. Numerous comments focused on the Santa Monica Fault, with some questioning the level of information provided about the Santa Monica Fault and why the available information related to the fault was incomplete at the time of publication of the Draft EIS/EIR. Some also suggested that since the Santa Monica Fault is located in Century City, both Century City Station locations would be affected equally by the fault in the event of an earthquake. The public comments on the Draft EIS/EIR, as well as responses to the comments, were published in the Final EIS/EIR.

To address the concerns raised by the community, the Metro Board of Directors decided to continue to discuss both station locations in Century City (Santa Monica Boulevard and Constellation Boulevard) as part of the LPA analysis in the Final EIS/EIR. Specifically, the Metro Board of Directors directed that further discussion of the Century City Station options be included in the Final EIS/EIR to address the concerns raised by the public, the majority of which related to the safety of tunneling directly on a fault (for the Santa Monica Boulevard Alignment) and the safety of tunneling under homes and schools (for the Constellation North and South Alignments).

Of the two alignments that serve the Constellation Station, the Constellation North Alignment was selected by the Metro Board of Directors for further discussion as part of the LPA. The Constellation North Alignment would pass beneath four residential properties while the Constellation South Alignment would pass beneath 23 residential properties. Both the Constellation North and South Alignments would have similar initial costs. The Santa Monica Boulevard Alignment that follows Wilshire Boulevard and Santa Monica Boulevard was also recommended to be carried forward for further study as part of the LPA so that a route serving the station on Santa Monica Boulevard would also be analyzed. As explained in the Final EIS/EIR, the location of the station on the Santa Monica Boulevard Alignment would present adverse environmental effects and safety issues that cannot be reasonably mitigated because of its location in relation to the Santa Monica Fault.

As directed by the Metro Board, the Final EIS/EIR presented further analysis of the Century City Santa Monica Station and the Century City Constellation Station, as well as the connecting alignments (Figure 2-5). Supplemental geotechnical investigations along Santa Monica Boulevard were conducted as part of the preparation for the Final EIS/EIR to better identify the location of the fault and the safest location for the Century City Station.

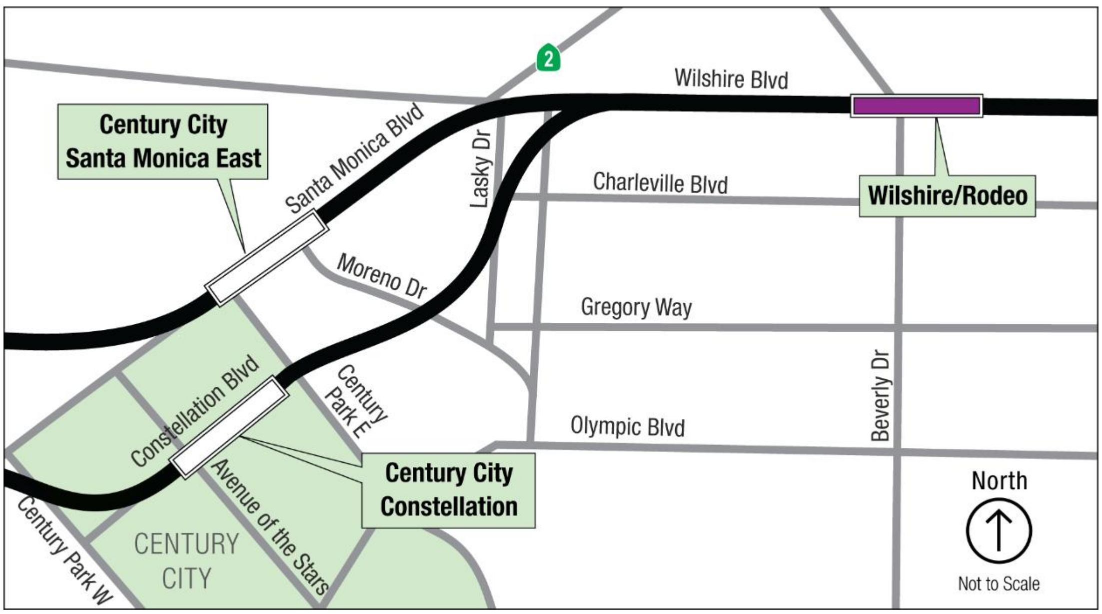


Figure 2-5. Century City Station and Alignment Locations in Final EIS/EIR

During preparation of the Final EIS/EIR, the location for the Century City Santa Monica station box was refined from the Draft EIS/EIR to attempt to avoid locating the station box within the Santa Monica Fault. As a result, in the Final EIS/EIR, the Century City Santa Monica Station was relocated to the east of the location identified in the Draft EIS/EIR. However, this alternative did not avoid the fault completely and therefore did not reduce the fault hazards, as described in Section 4.8 of the Final EIS/EIR and Section 4.3 of this Draft SEIS. In the Final EIS/EIR, the Century City Constellation Station was analyzed in the same location as identified in the Draft EIS/EIR.

In May 2012, the Metro Board of Directors adopted the Project and selected the location of the Century City Constellation Station, incorporating it in the LPA. Its decision considered the analysis of seismic and geotechnical testing and refined seismic analysis conducted in Century City and presented in the Final EIS/EIR. These conclusions were supported by the *Westside Subway Extension Century City Area Fault Investigation Report* (Metro 2011c).

The Final EIS/EIR concluded that the location of the Century City Santa Monica Station at Century Park East was located in the West Beverly Hills Lineament/Newport-Inglewood fault zone at the intersection of Santa Monica Boulevard at about South Moreno Drive. Subway stations, because they are structures for human occupancy, should not be built within active fault/deformation zones due to the regulatory code and the difficulty of designing such structures to withstand the potential ground rupture and associated deformations. Thus, the Century City Santa Monica Station was not considered a viable option for the Century City Station.

The *Westside Subway Extension Century City Area Fault Investigation Report* (Metro 2011c) also concluded that there was no evidence of seismic faulting at the proposed Century City Constellation Station. The Final EIS/EIR concluded that tunnels approaching either Century City station location would necessarily cross the Santa Monica and potentially the Newport-Inglewood Faults. In accordance with the Metro Rail Design Criteria, the tunnels can be designed to accommodate rupture (not collapse) for the fault crossings because of the inherent strength in a circular buried tunnel structure. They will be designed to have the ability to accommodate the design fault rupture with engineering design strategies such as steel liners, multiple liners, oversized tunnels, or other design strategies. The faulting hazards are detailed in Section 4.8 of the Final EIS/EIR and Section 4.3 of this Draft SEIS.

A station on Constellation Boulevard not only would avoid building a station in a fault zone but also would be more centrally located within Century City. Even with a slightly longer alignment and slight increase in travel time when compared to the Century City Santa Monica Station, the Metro Travel Demand Model, which was run during preparation of the Final EIS/EIR, predicted more than 3,000 additional daily boardings at the Century City Constellation Station compared to the Century City Santa Monica Station in the Final EIS/EIR. The results of the Metro Travel Demand Model are documented in the *Westside Subway Extension Technical Report Summarizing the Results of the Forecasted Alternatives* (Metro 2012j), which is appended to this Draft SEIS in Appendix C.

To further assess the ridership projections at Century City, Metro conducted a *Century City TOD and Walk Access Study* (Metro 2012i), which is appended to this Draft SEIS as Appendix C. The report evaluated the relative accessibility of three potential station locations to surrounding commercial and residential development within a ½-mile walking distance and estimated the number of Westside Purple Line Extension riders who would walk to and from the stations. This analysis is a supplement to the Metro travel forecasts that were conducted for the two Century City Station options in the Final EIS/EIR.

A review of the literature on walking to transit was conducted to establish best practice in regard to walking and transit. The review shows that walking rates decline significantly as distance increases from the station. The overall proportion of transit riders walking to transit is greatest within ¼-mile or less of a station, typically declining by 50% between ¼ and ½ -mile, and becoming insignificant beyond ½-mile. Importantly for a major employment center such as Century City, this "distance decay" effect is more pronounced for work trips. The study considered potential pedestrian "walksheds" from the station portals using actual walking distances of 0 to 600 feet, 600 feet to ¼-mile, and ¼-mile to ½-mile.

Table 2-2 summarizes the estimated population and jobs for the walksheds around the Century City Santa Monica East and Century City Constellation stations. Based on existing development, the Constellation Station has approximately twice the number of jobs and residents within the critical 600-foot and ¼-mile walksheds as the Santa Monica Boulevard station location. Within those 600-foot and ¼-mile walksheds, the existing population for the Constellation Station is 20,380 jobs and residents, far larger than the 10,490 for the Santa Monica/Century Park East Station.

Table 2-2. Century City Station Walkshed Population and Jobs

	Century City Santa Monica East		Century City Constellation	
	Population	Total Jobs	Population	Total Jobs
Walkshed Population and Jobs – Existing Development				
0 to 600 feet	0	4,820	0	10,260
600 feet to ¼ mile	180	5,490	210	9,910
¼ to ½ mile	1,720	16,980	1,800	10,870
Total	1,900	27,290	2,010	31,040
Walkshed Population and Jobs – Full Development				
0 to 600 feet	0	8,070	0	13,670
600 feet to ¼ mile	180	5,490	820	23,140
¼ to ½ mile	2,310	32,640	7,190	13,160
Total	2,490	46,200	8,010	49,970
Estimate of Ridership				
Existing Development	5,258		7,606	
Full Development	5,492		8,566	

Source: *Century City TOD and Walk Access Study* (Metro 2012i)

The population and jobs estimates under the full development scenario were developed based on current plans and zoning. It was assumed that full development would be 85 percent of the maximum density allowed, a commercial occupancy rate of 90 percent is representative of normal economic conditions, and the average leasable floor area per employee should be 410 square feet. Based on this build-out scenario, the Constellation Station is also expected to have by far the highest concentration of future jobs and residents within the critical 600-foot and ¼-mile walksheds. Within those 600-foot and ¼-mile walksheds, the future population for the Constellation Station is estimated to be 37,630 jobs and residents, far more than the 13,740 for the Santa Monica/Century Park East Station.

Ridership estimates were calculated based upon the walkshed population estimates and the major findings coming from the literature review. The Century City Station locations performed differently with respect to the number of employees and residents who will walk to and from transit. Applying the ridership rates calibrated by distance provides the most reasonable approximation of how the alternative station locations are likely to perform. Because of distance decay, the proportion of the population likely to use transit declines as distance from the station increases. As shown in Table 2-2, the 14,005 daily riders estimated in the sensitivity analysis for the Constellation Station is approximately 72 percent greater than the 8,145 daily riders estimated at the Santa Monica/Century Park East Station.

The *Century City TOD and Walk Access Study* concluded that the Century City Constellation Station is, and will continue to be, in the most advantageous location for attracting the most riders compared to the station locations along Santa Monica Boulevard. The Constellation Station has the best pedestrian environment, is expected to attract the most transit riders, and is centrally located to help shape the redevelopment of Century City as an important transit-oriented destination.

At the time of the Final EIS/EIR, the cost of the track and station for the Century City Constellation Station was not significantly different from that of the Century City Santa Monica Station. The Century City Santa Monica Station could require more temporary construction easements and right-of-way acquisitions for station construction sites than the Century City Constellation Station depending on the location of construction staging. However, the Century City Santa Monica Station would require fewer subsurface easements than the Century City Constellation Station. In addition, both station options would require temporary roadway lane closures during construction. Currently, Constellation Boulevard carries 20 percent of the traffic volume of Santa Monica Boulevard and operates at a better level-of-service. Therefore, traffic impacts during construction would be less with the Constellation Boulevard Station option.

Considering these factors, in May 2012 the Metro Board of Directors adopted the Century City Constellation Station and associated alignment as part of the LPA definition. Following adoption of the LPA, the tunnel alignment between Wilshire/Rodeo and Century City Constellation has been slightly refined from the Final EIS/EIR to optimize design curves as described in Section 2.4.1 below.

Other Wilshire/Rodeo to Century City Alignment Alternatives Considered

As part of the Section 4(f) analysis conducted in response to the Final Decision, a range of avoidance alternatives and least overall harm alternatives were considered between the Wilshire/Rodeo and Century City Stations as detailed in Chapter 5 of this Draft SEIS. The Project was determined to have the least overall harm compared to other feasible alternatives when considering mitigation of impacts to, relative severity of harm to, relative significance of, and views of officials with jurisdiction over Section 4(f) properties as well as the degree to which each alternative meets purpose and need, magnitude of impacts to resources not protected by Section 4(f), and substantial differences in cost; therefore, they are not considered further in this Draft SEIS. Figure 2-6 shows the location of all of the feasible avoidance and least overall harm alternatives considered. Refer to Chapter 5 of this Draft SEIS for a detailed analysis of these alternatives.

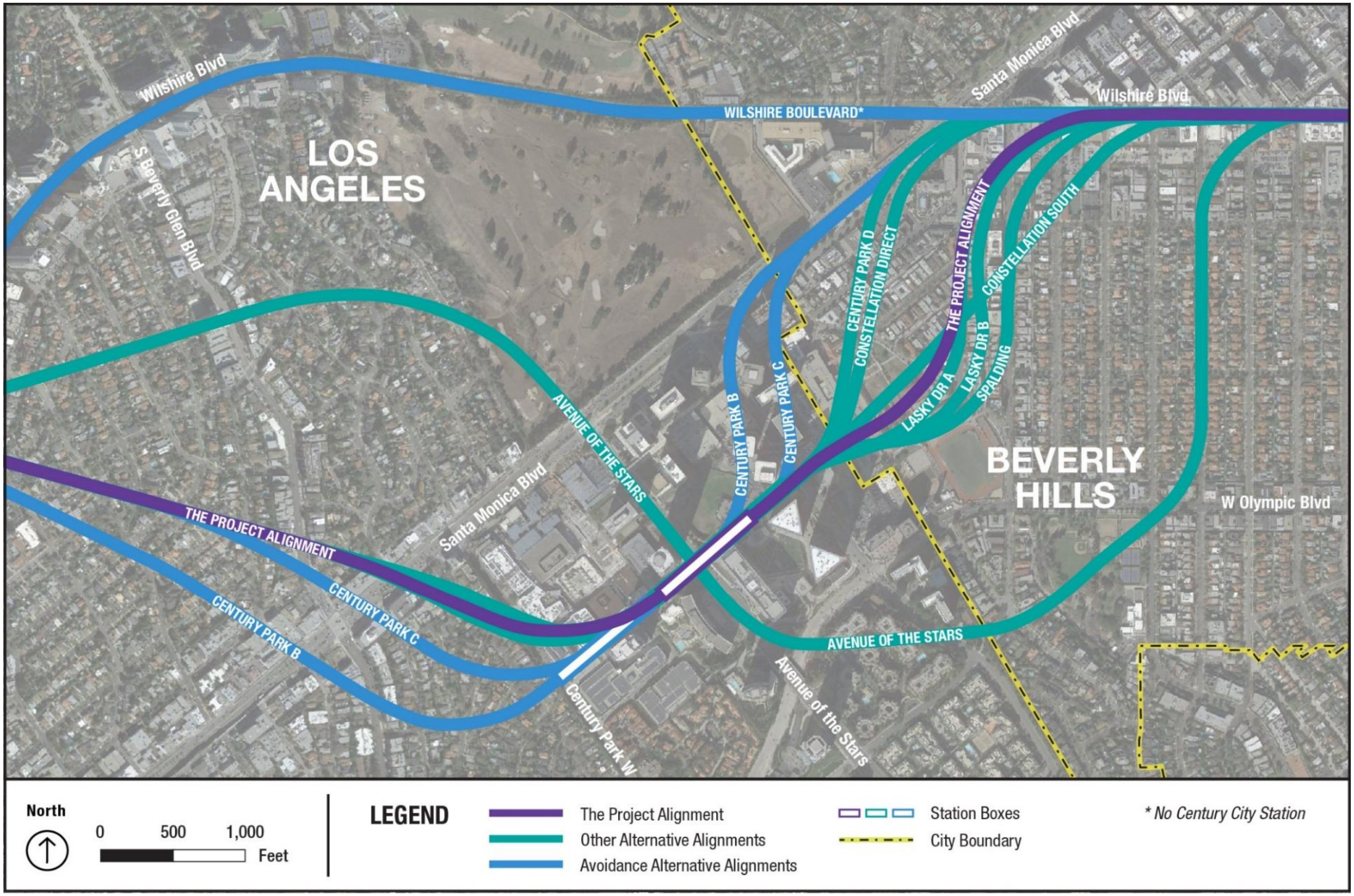


Figure 2-6. Other Feasible Wilshire/Rodeo to Century City Alignment Alternatives Considered

Three feasible avoidance alternatives were identified – Wilshire Boulevard, Century Park B, and Century Park C (Figure 2-6). Wilshire Boulevard was determined to be not prudent because of failure to address purpose and need by not serving Century City and the greater social, economic, environmental community impacts due to the construction staging location along Santa Monica Boulevard. Century Park B and Century Park C were determined to be not prudent because of increase travel time, increased building damage risk, increased displacements, increased cost, and delayed construction schedule. In addition, Century Park C would pose a substantial public and worker safety risk associated with potential rupture or damage to the Stone-Hollywood trunk water line. Therefore, none of the alternatives were determined to be a feasible and prudent alternative that would have no use of Section 4(f) properties in the west Beverly Hills and Century City area and are not considered further in this Draft SEIS.

Because none of the avoidance alternatives evaluated would be feasible and prudent alternatives to the Project, a range of alternatives that would use land below one or more Section 4(f) properties in the west Beverly Hills and Century City area were then evaluated. Feasible least overall harm alternatives were identified, including alternative alignments identified after issue of the ROD – Century Park D, Constellation Direct, Lasky Drive A, Lasky Drive B, Spalding, Constellation South, and Avenue of the Stars (Figure 2-6).

Compared to the Project, the Century Park D Alternative would cross below BHHS Building B2, B3, and B4 and have a substantially greater cost. The Constellation Direct Alternative would cross below BHHS Building B2, tunnel under an additional Section 4(f) property (Perpetual Savings Bank) and would have increased travel time, residential subsurface easements, and cost relative to the Project. The Lasky Drive A Alternative would travel under the same existing Section 4(f)-protected features at BHHS as the Project as well as below the planned future swimming pool, would tunnel under an additional Section 4(f) property (Perpetual Savings Bank), and have increased travel time and cost relative to the Project. The Lasky Drive B Alternative would tunnel under the Swim-Gym as well as the future swimming pool and an additional Section 4(f) property (Perpetual Savings Bank) and would have increased travel time, residential subsurface easements, and cost relative to the Project. The Spalding Alternative would tunnel under an additional Section 4(f) property (Perpetual Savings Bank) and would have increased residential subsurface easements and cost relative to the Project. While the Constellation South Alternative would be less costly than the Project, it would require subsurface easements from more residential properties, tunnel under an additional Section 4(f) property (the Barn), and would cross below BHHS Building B2. The Avenue of the Stars Alternative would have substantial construction-phase impacts to Roxbury Memorial Park, a significant recreational resource, that are relatively more severe than the remaining harm of any other alternative to Section 4(f) properties. It would also have increased travel time, travel under Roxbury Memorial Park, require subsurface easements from substantially more residential properties, and have increased cost relative to the Project.

The Project would generate the least overall harm considering the degree to which the alternative meets the purpose and need, the magnitude of other adverse impacts, and substantial differences in costs among the alternatives as detailed in Chapter 5 of this Draft SEIS. Therefore, none of the least overall harm alternatives are considered further in this Draft SEIS.

2.3.2 Century City Station Construction Staging

As defined in the LPA and adopted by the Metro Board in May 2012, the Century City Constellation Station included the station entrance located at the northeast corner of Constellation Boulevard and Avenue of the Stars with the entrance oriented toward the north. The parcel surrounding the entrance site would have also served as a construction laydown area to support station and tunneling construction activities. Since then, the practical realities have required the consideration of a new laydown design. In particular, a proposed commercial development on the northeast corner of Constellation Boulevard and Avenue of the Stars would prevent the use of that property for construction staging for the Project as originally planned in the Final EIS/EIR. Therefore, the alternate laydown area plan identified in the Final EIS/EIR along with one additional area as described in this section is proposed.

As described in Section 2.6.4 and shown in Figure 2-48, the Final EIS/EIR analyzed two construction staging and laydown areas for the Century City Constellation Station:

- Northeast of Constellation Boulevard and Avenue of the Stars (described here as Scenario A, Figure 2-7)
- Along the east side of Cenutry Park East and within the Constellation Boulevard right-of-way (described here as Scenario B, Figure 2-8)

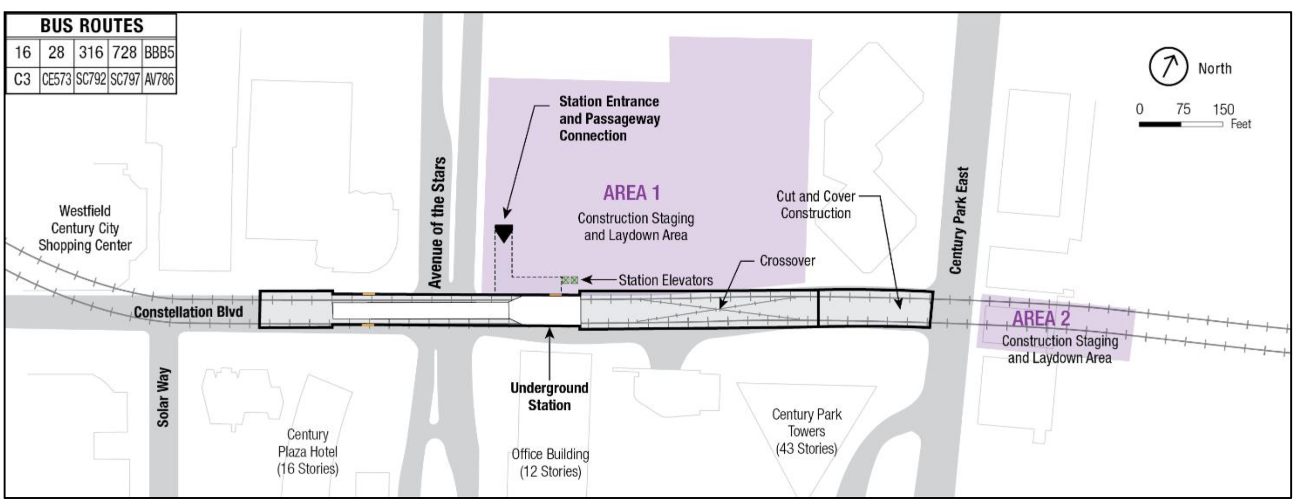


Figure 2-7. Final EIS/EIR Century City Constellation Station Construction Staging Scenario A

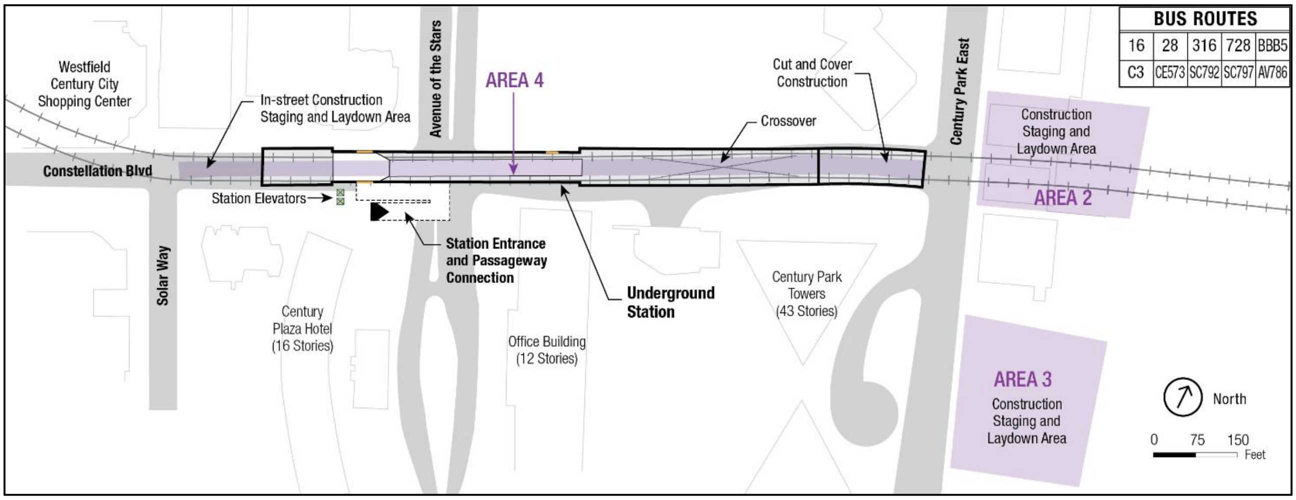


Figure 2-8. Final EIS/EIR Century City Constellation Station Construction Staging Scenario B

Scenario A included an approximately 5.5 acre construction staging area located north of Constellation Boulevard between Avenue of the Stars and Century Park East and another site located on the east side of Century Park East at Constellation Boulevard. These areas are identified as Area 1 and Area 2 in Figure 2-9. Area 1, in addition to being the location of the station entrance, would have served as the launch site for the tunnel boring machine (TBM) and the location for equipment storage needed to support operation of the TBM.

As described in Section 2.6.4 and shown in Figure 2-49 of the Final EIS/EIR, under Scenario B, the station entrance would have been located at the southwest corner of Constellation Boulevard and Avenue of the Stars near the Century Plaza Hotel. Construction staging areas would have been located along the east side of Century Park East at the eastern end of Constellation Boulevard and south of the Constellation Boulevard and Century Park East intersection. These areas are identified in Figure 2-9 as Area 2 and Area 3, respectively. Additionally, construction staging would have occurred in the Constellation Boulevard right-of-way from Century Park East to Solar Way, requiring the closure of the middle lanes of traffic for the duration of construction, leaving one westbound and one eastbound lane open.

Scenario A, as identified in the Final EIS/EIR, with the Century City Constellation Station entrance on the northeast corner and an approximately 5.5-acre construction staging and laydown area at the northeast corner of Constellation Boulevard and Avenue of the Stars (Area 1), was selected as part of the LPA by the Metro Board of Directors in May 2012. Because of a proposed development on the northeast corner of Constellation Boulevard and Avenue of the Stars (Area 1 in Figure 2-9), the construction staging area under Scenario A can no longer be used for the Project. Instead, a modified version of the staging areas identified in the Final EIS/EIR as part of Scenario B would be used, shown as Area 2, Area 3, Area 4, and Area 5 in Figure 2-9 and described in detail in Section 2.4.2 of this Draft SEIS.

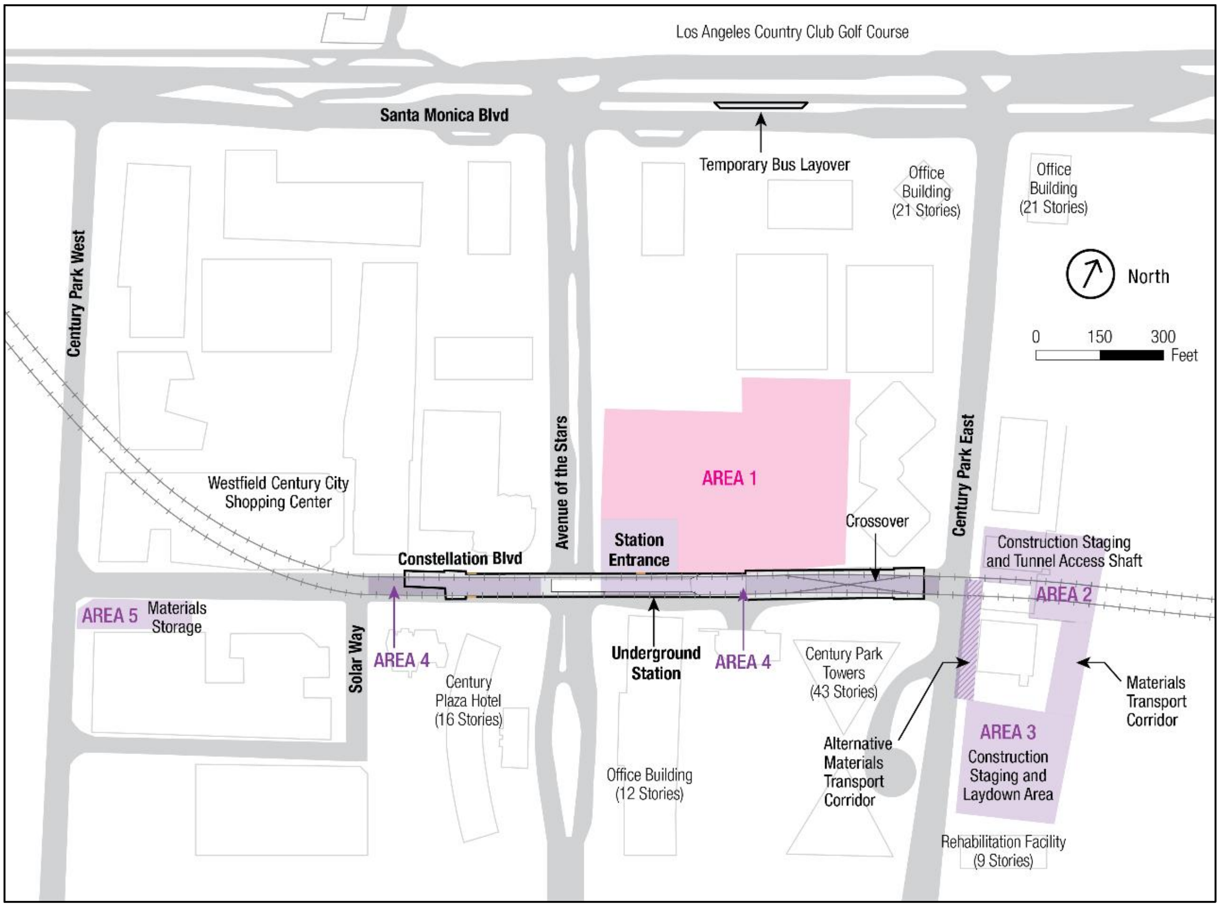


Figure 2-9. Century City Constellation Station Construction Staging Areas

A temporary access shaft, approximately 80 feet in diameter, is needed to provide access to the tunnel for workers and materials and to remove excavated material from the tunnel.

During the initial closures for assembly and launch of the TBMs, the two TBM sub-assemblies would be delivered to the station box excavation on Constellation Boulevard rather than to Area 1 as indicated in the Final EIS/EIR, then lowered into the excavation and assembled, before making the initial drive east to the access shaft. This would require a nine-month full closure of approximately 200 feet of the eastern end of Constellation Boulevard between Century Park East and the first driveway on the north side of the street, which was not included in the Final EIS/EIR.

The station entrance would remain at the northeast corner of Constellation Boulevard and Avenue of the Stars as identified under Scenario A rather than the station entrance location identified as part of Scenario B. The duration of construction (approximately seven years) remains the same as described in the Final EIS/EIR.

Alternative Construction Approaches Considered

In response to concerns expressed by the City of Beverly Hills and the BHUSD on potential air quality impacts of the construction staging to BHHS, alternative construction approaches to constructing a tunnel access shaft at Area 2 (1950 Century Park East) were considered. Chapter 5 of this Draft SEIS provides further discussion of these alternate tunnel access shaft locations. Due to the physical constraints and environmental impacts associated with placing the access shaft at the alternative sites identified, they are not considered further in this Draft SEIS.

The tunnel access shaft was originally planned to be located in Area 1, adjacent to the tunnel, but since this property will be developed prior to construction, the access shaft can no longer be accommodated at Area 1. The tunnel access shaft also cannot be located in other parts of Area 2, in Area 3, or in Area 5 because the tunnel access shaft must be located on or immediately adjacent to the tunnel alignment. Area 5 is also not large enough to support tunneling activities (0.3 acres). Furthermore, Area 5 is isolated from the station box and the rest of the construction staging sites at Area 2 and Area 3, making it difficult to move materials back and forth efficiently. Area 5 is also adjacent to high-rise residential uses, which are too tall to be protected with a sound barrier during construction; therefore, the residences may have adverse noise impacts during construction.

Access Shaft on Constellation/Century Park East

Locating the tunnel access shaft at Area 4 (eastern end of the station box on Constellation Boulevard) would be above the tunnel, but would separate the access shaft in Area 4 from the materials storage and stockpile locations in Area 2 and 3 (Figure 2-10). The eastern end of Constellation Boulevard and a section of Century Park East would be closed to support tunneling activities and to allow for the transport of construction equipment and materials between Area 4 and Areas 2 and 3. This location would require long-term (between three and four years) closure of Constellation Boulevard and Century Park East and delay station completion because the eastern end of the station box would be used to move materials into and out of the tunnels. Pedestrian access would also be disrupted, requiring all pedestrians wishing to use Century Park East to detour around the construction area using Avenue of the Stars. The required roadway closures would be dependent on approvals from the Los Angeles Department of Transportation. Garage access would be maintained to surrounding buildings; however, access to garage entrances on Constellation Boulevard east of Avenue of the Stars would be limited to traffic entering from and exiting to Avenue of the Stars. Century Park East would be closed to through traffic requiring traffic to make U-turns when reaching the construction site closures. An overhead conveyor spanning Century Park East and the driveway entrance to the AT&T building would be required to connect the access shaft with Area 3.

In comparison to Area 4, locating the tunnel access shaft within Area 2 minimizes impacts to the community (particularly traffic impacts at Constellation Boulevard and Century Park East) and optimizes construction efficiency by locating the tunnel access shaft contiguous to the materials storage and stockpiles in Area 2 and with a connecting corridor to Area 3. The Area 2 location would not require street closures along Constellation Boulevard for tunneling activities after the initial closures for the assembly and launch of the TBMs, reducing disruption to Century City residents and visitors.

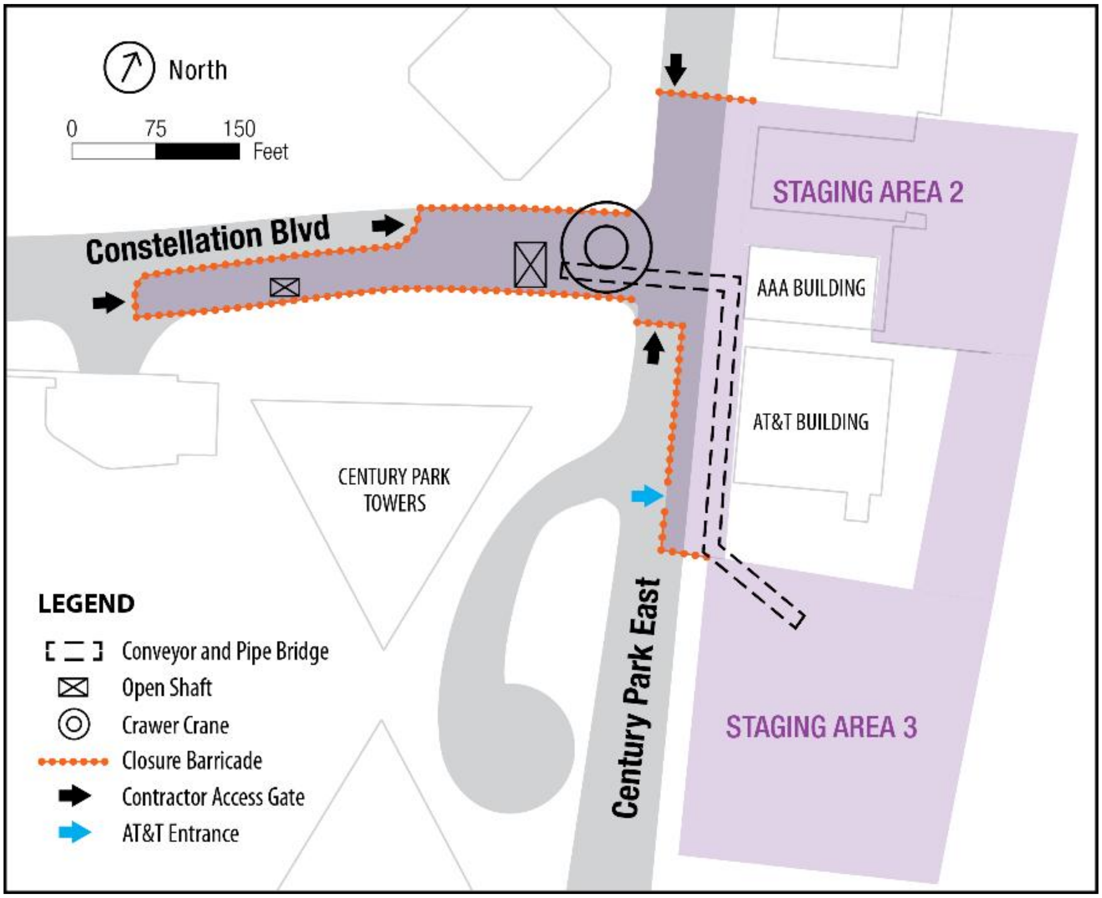


Figure 2-10. Alternative Construction Staging Area for the Project within Constellation Boulevard (Area 4)

Tunnel Boring Machine Launch Site at Wilshire/La Cienega Station

In addition, relocating tunneling activities to the Wilshire/La Cienega Station was considered. However, the Wilshire/La Cienega Station is located on a densely developed corridor surrounded by residential neighborhoods, making it extremely challenging to assemble three acres of land to support tunneling activities.

To tunnel west from the Wilshire/La Cienega Station, a launch site would be needed that can connect directly to the tailtracks that are west of the station box to continue the tunnels west. The launch site must connect directly to the tunnels, either through a side shaft or through a shaft directly above the tunnels. The least-developed option for a staging site that meets the requirements for size and adjacency would be to acquire two blocks on the south side of Wilshire Boulevard between S. Stanley Drive and S. Willaman Drive. This construction approach would require demolition of several buildings, resulting in commercial and residential displacements, to assemble sufficient space for construction staging and tunneling support. The limitations at the Wilshire/La Cienega Station are detailed in Chapter 5 of this Draft SEIS.

2.3.3 Elimination of the Double Crossover at Wilshire/Rodeo Station

The Final EIS/EIR included a double crossover on the east end of the Wilshire/Rodeo Station to allow trains to cross between tunnels, thereby optimizing operations. In September 2014, the Metro Board approved eliminating the double crossover after an operational analysis was performed to verify that operational requirements of the project could be maintained without the double crossover. As a result, the station box shifted east from El Camino Drive to Canon Drive and now extends from Beverly Drive to Canon Drive, reducing the length of the station box and corresponding underground station excavation from approximately 1,150 feet to approximately 950 feet. The shortening of the underground station would result in lower construction costs and slightly reduced impacts to traffic and disruption to the surrounding streets and businesses due to a smaller construction footprint along Wilshire Boulevard, reduced time needed for station excavation, and fewer truck trips needed for hauling excavated material.

2.4 Alternative Considered in this SEIS

The alternative considered in this Draft SEIS is the LPA as identified in the ROD. Other alternatives considered under Section 4(f) are discussed in Chapter 5. The subject of this Draft SEIS is Section 2 of the Project with a focus on the portion extending from the Wilshire/Rodeo Station to the Century City Station. Specifically, this Draft SEIS focuses on the following Section 2 Project elements:

- The tunnel alignment beneath the Beverly Hills High School Campus
- The construction staging sites to support the Century City Constellation Station
- The Century City Station location

The project definition is consistent with that described in the Final EIS/EIR and approved as part of Section 2 by the Metro Board of Directors in May 2012, with the exception of adjustments to the construction staging sites to support the Century City Station.

2.4.1 Tunnel Alignment and Stations

Wilshire/Rodeo Station

The Wilshire/Rodeo Station will serve the Beverly Hills “Golden Triangle,” a local and regional shopping destination and a hub for tourists visiting the famous Rodeo Drive, as well as shops, restaurants, and hotels along Wilshire Boulevard, Beverly Drive, and other streets. All of these activities make this area of Beverly Hills a major employment center.

The Wilshire/Rodeo Station would lie beneath Wilshire Boulevard, extending between Beverly Drive on the west and Canon Drive on the east (Figure 2-11). The station box was shortened to 950 feet as a result of the elimination of the double crossover structure. The station entrance would be located on the southwest corner of Wilshire Boulevard and Reeves Drive at the site of the former Ace Gallery. The site would also be used for construction staging and laydown following demolition of the Ace Gallery building. The entrance would be oriented to the north and would consist of two sets of stairs and escalators. The station elevators would be located to the north of the entrance on the same site. A knockout panel, allowing for the development of a future station entrance on the north side of Wilshire Boulevard, would be located on the north side of the station box.

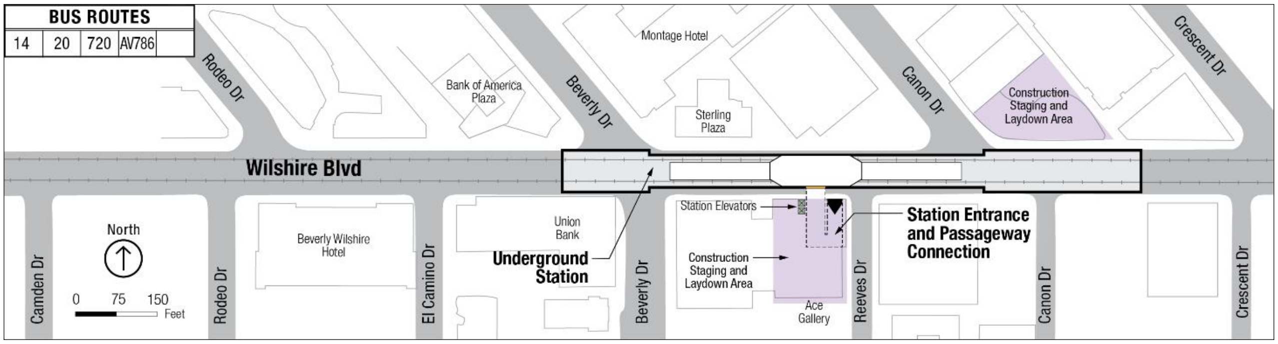


Figure 2-11. Wilshire/Rodeo Station

In addition to the construction activity around the station entrance, approximately 1 acre of construction staging and laydown area would be needed at this site to support construction of the Wilshire/Rodeo Station. This station site would not support tunnel construction activities, such as the TBM launch or tunnel excavation. Construction staging areas would be located at the southwest corner of Wilshire Boulevard and Reeves Drive at the site of the former Ace Gallery and on the northeast corner of Wilshire Boulevard and Canon Drive. All existing structures on the properties identified for construction staging and laydown would be demolished to accommodate construction activities.

Wilshire/Rodeo to Century City Tunnel Alignment

From the Wilshire/Rodeo Station, the alignment would travel westward toward Linden Drive, curve southwesterly at Linden Drive to Lasky Drive, and travel under Lasky Drive to just north of Young Drive where it would then pass beneath private properties and Beverly Hills High School to the east of the proposed station. The alignment would then turn southwesterly under Constellation Boulevard to connect to the Century City Constellation Station between Century Park East and Avenue of the Stars.

The tunnel alignment has been slightly refined from the Final EIS/EIR to optimize design curves. The alignment refinement results in the avoidance of tunneling beneath the Perpetual Savings Bank Building (9720 Wilshire Boulevard), but does require subsurface easements beneath two properties that were not identified in the Final EIS/EIR:

- 216 South Lasky Drive (AIN: 4328-007-016)
- 2029 Century Park East (AIN: 4319-016-029)

From station box to station box, the tunnel would be approximately 1.3 miles long. The tunnels would be approximately 21 feet in diameter bored side-by-side and would be separated by a pillar of ground between them. Subway train tracks would range from approximately 65 to 135 feet below the surface for the stretch between the Wilshire/Rodeo and Century City Stations. While the profile of the alignment also has been refined by a few feet, the depth remains within the range presented and analyzed in the Final EIS/EIR.

Refer to Figure 2-12 for a map of the proposed alignment and the locations of the Wilshire/Rodeo and Century City Constellation Stations. Figure 2-13 shows the depth of the tunnels (to track in feet) between the Wilshire/Rodeo and Century City Constellation Stations. The plan and profile for Section 2 of the Project is provided in Appendix G of this Draft SEIS.

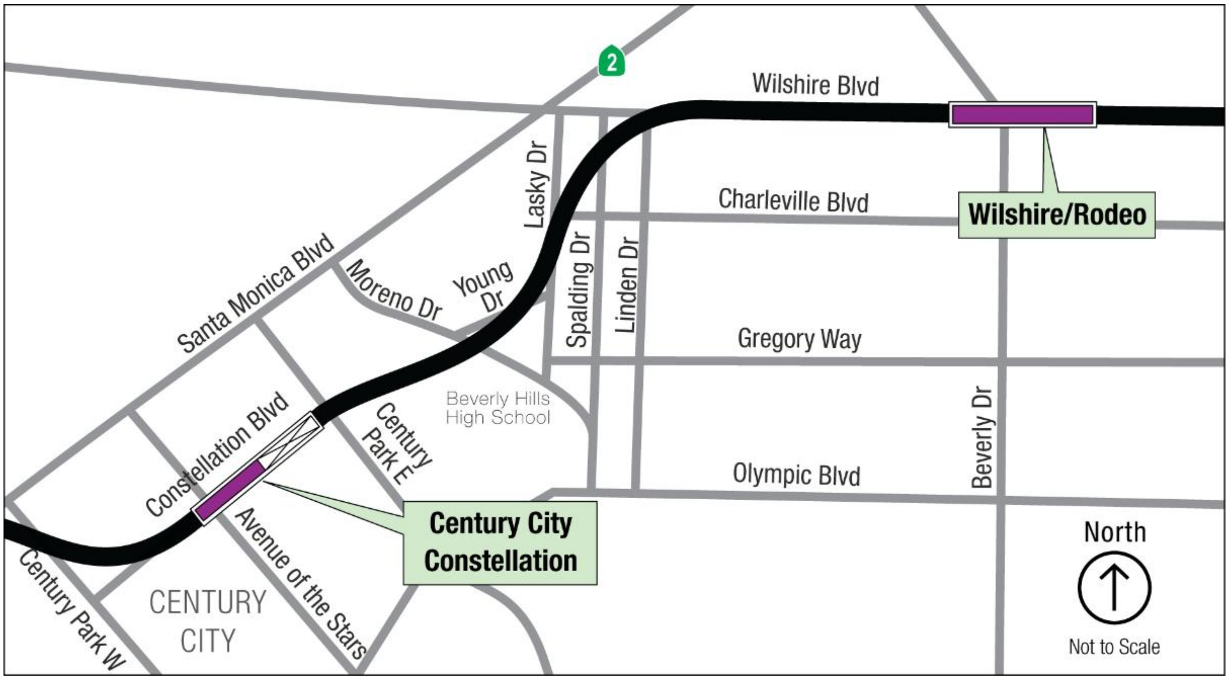


Figure 2-12. Westside Purple Line Extension between Wilshire/Rodeo and Century City Constellation Stations

Figure 2-13. Tunnel Depth to Track between Wilshire/Rodeo and Century City Constellation Stations

Century City Constellation Station

The Century City Constellation Station would serve a high-density commercial, employment, and residential center. As approved by the Metro Board of Directors in May 2012, the Century City Constellation Station would be located underneath Constellation Boulevard from west of Avenue of the Stars to just west of Century Park East. The double crossover tracks would be located to the east of the station box between Avenue of the Stars and Century Park East.

The station entrance would be located on the northeast corner of Constellation Boulevard and Avenue of the Stars. The entrance would consist of two stairways, escalators, and two elevators. Knockout panels, which provide the opportunity to construct additional entrances in the future, would be located near the northwest and southwest corners of Constellation Boulevard and Avenue of the Stars.

The station entrance may be incorporated into future development to be constructed at this location. Metro would coordinate with the property developer regarding the station entrance so as not to preclude a future connection to the development. If development of the site has not yet begun when construction of the Century City Constellation Station begins, the station entrance would be designed as described in the Final EIS/EIR. Further, if the site is not developed at the start of the Century City Constellation Station construction, it is possible that a portion or all (0.25 to 5.5 acres) of Area 1 would be used for construction activities, as identified in the Final EIS/EIR.

2.4.2 Century City Constellation Station Construction Staging

As explained in Section 2.3.2 of this Draft SEIS, modifications have been made to the Century City Constellation Station construction staging areas due to a proposed development. This section provides a detailed description of these modified construction staging and activities planned for the Century City Constellation Station. A more detailed overview of construction activities is provided in Section 4.5 of this Draft SEIS.

In addition to supporting station construction activities, the Century City Constellation Station would serve as a launch site for TBMs and the location for the equipment needed to support tunneling operations. As a result, approximately 3 acres of construction staging and laydown area are needed at this station.

Figure 2-14 depicts the construction staging locations. The construction staging sites include two locations along Century Park East (Area 2 and Area 3) that require full acquisition of 1940 Century Park East, 1950 Century Park East, and 2040 Century Park East. The existing structure at 1940 Century Park East would be demolished to accommodate construction staging activities. The parking structure of 1950 Century Park East would also be demolished and the site would be used as a construction staging area, but the Automobile Club of Southern California (AAA) Building at 1950 Century Park East would remain intact. Area 2 and Area 3 would be used for the duration of construction, which would occur for approximately seven years to support tunneling and station construction activities. An access shaft would be located in Area 2 behind the AAA Building to allow excavated materials to be brought to the surface for disposal.

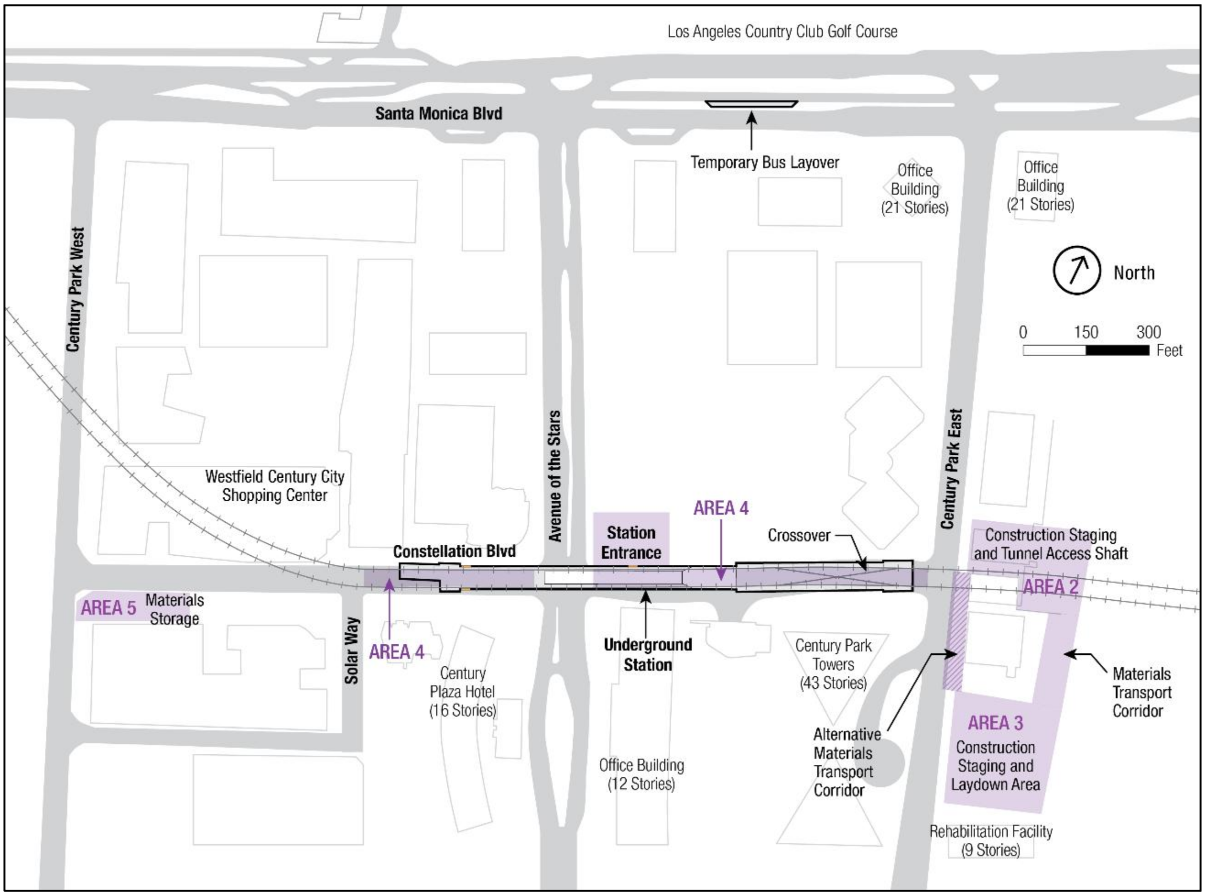


Figure 2-14. Century City Station Construction Staging Sites

Approximately 0.25 acre would be required for construction of the station entrance at the northeast corner of Constellation Boulevard and Avenue of the Stars. Lane closures would occur along Constellation Boulevard (Area 4) to support station box construction and the launch of the TBMs from the station box. A material storage area would be placed at the existing 0.3-acre bus layover site on the southeast corner of Century Park West and Constellation Boulevard (Area 5).

All construction staging areas would be surrounded by a 20-foot noise barrier wall, which would serve the dual purpose of mitigating noise as well as providing a security measure to prevent trespassers from accessing the construction sites. A typical noise barrier wall is shown in Figure 2-15.

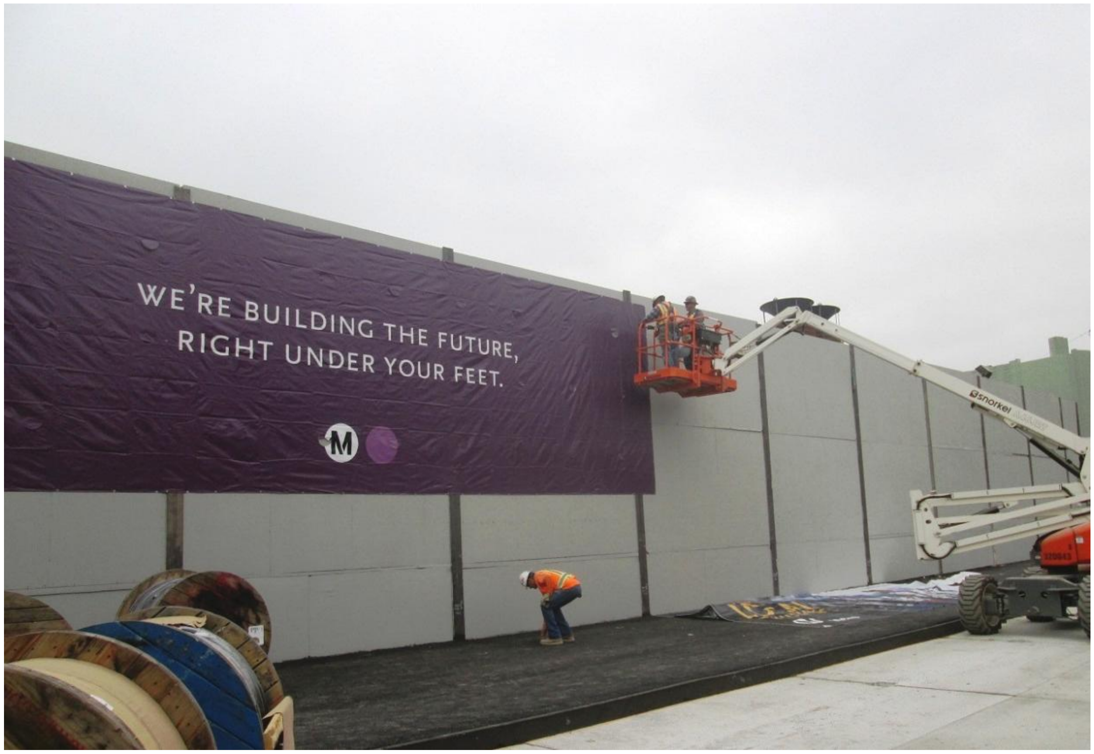


Figure 2-15. Typical 20-foot Noise Barrier at Construction Staging Areas

Installation of Tunnel Access Shaft and Materials Transport Corridor (Area 2 and Area 3)

A temporary access shaft, approximately 80 feet in diameter, would be constructed in Area 2 to provide access to the tunnel for workers and materials and to remove excavated material from the tunnel. The placement of an access shaft in Area 2 was not included as part of the construction staging scenario presented in the Final EIS/EIR. The location of the access shaft is shown in Figure 2-16.

Work at the access shaft would include three phases: (1) construction of the shaft; (2) operations conducted through the shaft, including tunnel and cross-passage construction, concrete work within tunnels and cross-passages, and rail welding, track work, and systems installation; and (3) backfill of the shaft. The operations conducted through the shaft, which support tunneling activities, are anticipated to last between two and three years.

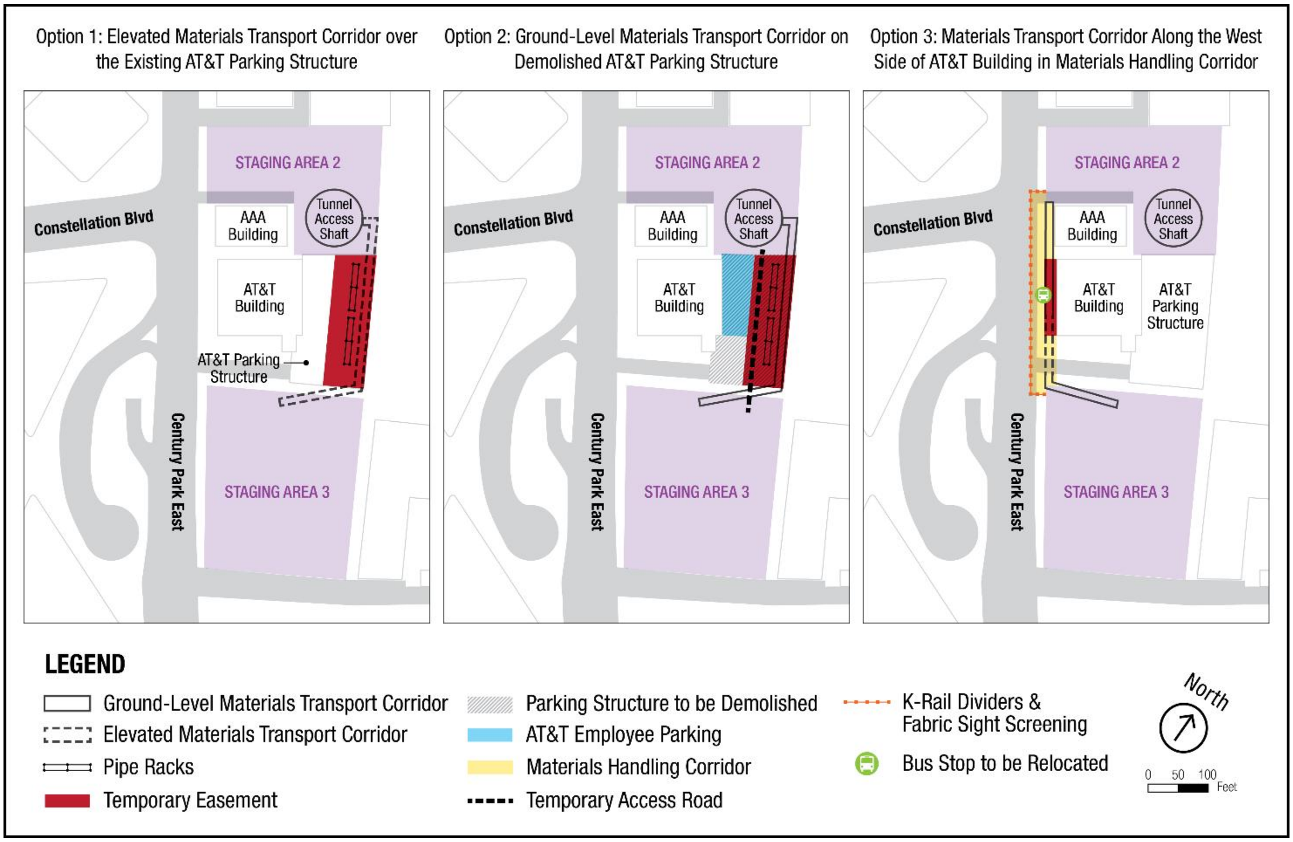


Figure 2-16. Tunnel Access Shaft and Options for Materials Transport Corridor Locations

Because Areas 2 and 3 are not adjacent, a materials transport corridor would be located along the AT&T property at 2010 Century Park East to move excavated materials and construction equipment between the tunnel access shaft in Area 2 and the staging area in Area 3. The excavated materials would be moved via an enclosed conveyor system located within the materials transport corridor (refer to Figure 2-17 for an example of a typical enclosed conveyor system). The materials transport corridor would be in place for five years to support tunnel and cross-passage construction, concrete work within tunnels and cross-passages, and rail welding, track work, and systems installation. The conveyor would operate for approximately three of those five years to move materials excavated from the tunnel and cross-passages. Should a slurry type TBM be used, the conveyance system would carry slurry feed and discharge pipes from the tunnel access shaft to a slurry separation plant in Area 3. There are three proposed location options for the materials transport corridor, with the final location to be determined after negotiations with the property owner and consideration of length and potential impacts. Option 1 and Option 2 provide the most direct connection between Areas 2 and 3 and avoid a lane closure along Century Park East.

Figure 2-17. Typical Enclosed Conveyor

Materials Transport Corridor Option 1

The first option aligns the conveyor system from the access shaft in Area 2 and travels approximately 400 feet along the east side of the AT&T property at 2010 Century Park East to Area 3 (Option 1 in Figure 2-16). The conveyor would span the top of the existing parking structure located on the east side of the building. In addition to the conveyor, temporary pipe racks carrying utility lines, water, grout, foam, compressed air, etc. would be installed over the top of the parking structure. This option would require Metro to obtain a temporary easement for approximately five years along the eastern portion of the AT&T property.

Materials Transport Corridor Option 2

The second option is also located along the east side of the AT&T building at 2010 Century Park East (Option 2 in Figure 2-16). With this option, the parking structure located at the AT&T property would be demolished. The parking structure is structurally unsound and only partially used. Due to structural safety issues, only a dozen spaces on the ground floor of the garage are currently used. Should AT&T agree to remove the parking structure, the enclosed conveyor system would be placed at ground level between Areas 2 and 3. Removal of the parking structure would also allow for additional area behind the AT&T building to be used for construction staging and laydown activities and for movement of materials and equipment on a temporary access road between Areas 2 and 3. In addition, the area immediately adjacent to the east side of the building would be available for use as parking for employees of the AT&T facility. Similar to the first option, this option would require Metro to obtain a temporary easement along the eastern portion of the AT&T property for approximately five years.

Materials Transport Corridor Option 3

The third option would place the conveyor system along the west side of the AT&T building in a materials handling corridor (Option 3 in Figure 2-16). This option would require Metro to obtain a temporary easement along the narrow western edge of the AT&T property for approximately five years and would only be used if an easement along the east side of the AT&T building is not feasible. The corridor would extend from staging Area 2 to Area 3, a distance of approximately 400 feet, with a width encompassing one northbound traffic lane and sidewalk in the public right-of-way along the eastern side of Century Park East, and the space between the AT&T building and the eastern edge of the sidewalk. The corridor would be separated from traffic on Century Park East by K-Rail dividers and fencing with fabric sight screening. Materials handling equipment would travel on the closed street lane. The enclosed conveyor would be elevated such that traffic entering the AT&T facility could pass beneath the conveyor structure. Access to the AT&T building and its facilities would be maintained through the period of use, which is approximately five years. The materials handling corridor along Century Park East would require the temporary relocation of one bus stop serving the Metro 28 line and Los Angeles Department of Transportation Commuter Express line 534.

TBM Launch Box and Station Box Construction

The TBM launch box and the Century City Constellation Station box would be constructed within Constellation Boulevard (Area 4 in Figure 2-14). In the Final EIS/EIR, the TBMs would have been launched from the site on the northeast corner of Constellation Boulevard and Avenue of the Stars. However, since that site is no longer available, the TBMs would be launched from a TBM launch box located on the eastern end of the Century City Constellation Station box.

Phased lane closures consisting of sequenced partial and full street closures would be required on Constellation Boulevard to support the TBM launch box and station box construction activities. Constellation Boulevard is a minor four-lane east/west collector street traversing approximately 0.4 mile between Century Park West and Century Park East. It is classified as an Avenue II in the *City of Los Angeles Mobility Plan 2035* (LA 2016). Constellation Boulevard has two travel lanes in each direction with painted two-way left-turn lanes, primarily providing a means of access to the properties along its length.

During the installation of soldier piling for the TBM launch box, phased lane closures would occur on Constellation Boulevard over the course of two to four months. The decking of the TBM launch box would require full closure of a 200 foot segment of Constellation Boulevard for a period of approximately six weeks. During excavation of the TBM launch box, Constellation Boulevard will be partially closed for approximately five to six months.

Once excavated, TBMs and support equipment would be delivered and lowered into the TBM launch box, which will be located on the eastern end of the station box excavation on Constellation Boulevard. Cranes on Constellation Boulevard would also be used to assemble and launch the TBMs in the launch box excavation beneath the street. This would require a full closure of approximately 200 feet of the eastern end of Constellation

Boulevard between Century Park East and the first driveway on the north side of the street. The full closure of this short section of the noncontiguous Constellation Boulevard would be in place for approximately nine months but would not block any building or driveway entrances.

The excavation of the station box is consistent with the timeline presented in the Final EIS/EIR. During solider pile installation for the station box, phased lane closures would take place on Constellation Boulevard. Following the soldier piling installation, a series of 22 consecutive 56-hour weekend closures would be needed to install decking spanning the full width of Constellation Boulevard. Once decking is installed, Constellation Boulevard would be closed except for one traffic lane in each direction for approximately four years for station excavation and construction. The street closures are detailed in Section 3.2 of this Draft SEIS.

Use of Existing Bus Layover Area for Construction Material Storage

In addition to the Century Park East sites identified in the Final EIS/EIR, a material storage area would be placed at the existing 0.3-acre bus layover site on the southeast corner of Century Park West and Constellation Boulevard (refer to Area 5 in Figure 2-9). The bus layover was built by the property owner as a requirement of the *City of Los Angeles Century City North Specific Plan* (LA 1981). The layover area was dedicated by the Owner to the City of Los Angeles for use by municipal bus operators, including Metro. Metro has been operating out of the layover area since 2005. The property owner also uses the site for a fuel cell installation to generate electricity for the office tower at 10250 Constellation Boulevard. The fuel cell installation is located on the northwest corner of the property. Access to the fuel cell installation would be maintained during the entire time the site is used by Metro for construction-related purposes. There would be no ground-disturbing activity at the site other than for installation and removal of sound walls, and for removal and restoration of curbs and landscaping. Following construction of the station, the site would be returned to its current use as a layover facility for Metro buses. The site would be used for approximately seven years for trailer offices, storage of construction materials, and parking of construction equipment associated with station construction.

Temporary Bus Layover on Santa Monica Boulevard

As a result of the use of the existing bus layover site (Area 5) for construction material storage, a new temporary bus layover would be constructed in the median of Santa Monica Boulevard between Avenue of the Stars and Century Park East (Figure 2-18). The layover would be approximately 500 feet long and 12 feet wide and provide parking for up to five buses. Restroom facilities for Metro bus operators also would be included. The layover zone would be located in the landscaped median between the eastbound lanes of Santa Monica Boulevard and a dedicated bus lane, and would be in use for approximately seven years. Following completion of the Century City Constellation Station, the area would be restored to its existing condition.

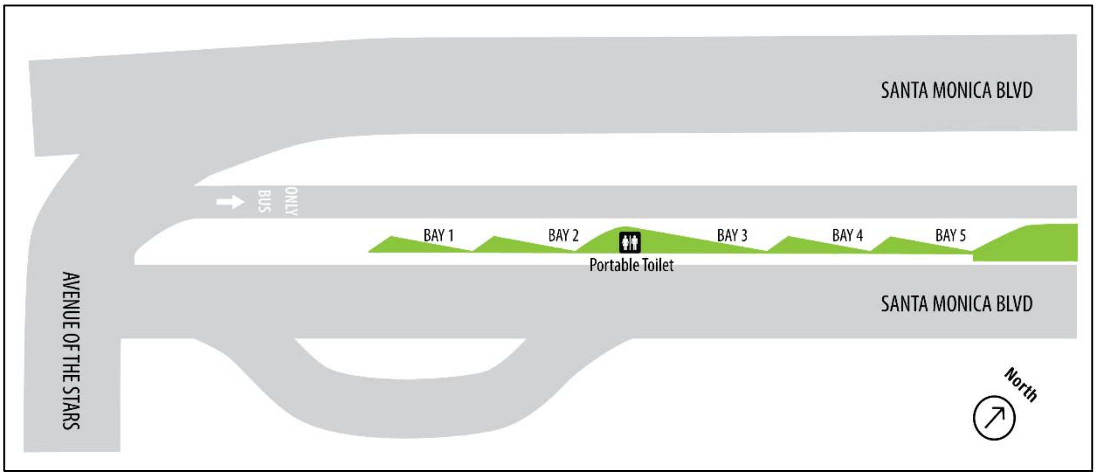


Figure 2-18. Temporary Santa Monica Boulevard Bus Layover Design

Ventilation/Exhaust Structures into the Westfield Century City Property

Metro would require temporary and permanent easements into the Westfield Century City mall property (Westfield Mall) for the purpose of constructing ventilation ducts to service the subway. Metro is currently in discussions with the property owners regarding the placement of the station appendages (exhaust and vent shafts) within the Westfield Mall property.

2.5 Section 2 Construction Schedule

Figure 2-19 summarizes the construction schedule for Section 2 of the Project, which is consistent with the construction timeline presented in the Final EIS/EIR. Section 4.5 of this Draft SEIS provides a more detailed discussion of the construction methods.

Section 2 early construction activities began in late 2016 and are expected to last through 2019. These early construction activities include survey work, utility relocation, and preparation of staging areas, which includes real estate acquisition and demolition, fencing and securing the staging areas, and leveling and graveling the staging areas to control dust and water runoff.

Major construction activities could begin as early as January 2018 with piling for the station box. Work at the Wilshire/Rodeo and Century City Constellation Stations, from the commencement of temporary station shoring and street decking to the removal of street decking and street reinstatement, would take approximately seven years to complete.

Construction of the Century City Constellation Station would begin with the piling and excavation of the TBM launch box, which would be located within the eastern end of the station box. The piling and decking of the TBM launch box will take approximately three to five months, with excavation of the TBM launch box taking another five to six months. Once the TBM launch box is excavated, it would take approximately nine months to assemble and launch the TBM within Constellation Boulevard.

Figure 2-19. Construction Schedule for Section 2

In total, the station box piling and decking of the Wilshire/Rodeo and Century City Constellation Stations would last approximately 12 to 15 months and would consist of the installation of excavation support, installation of dewatering and instrumentation wells, removal of street pavement and subgrade, and installation of deck beams and precast concrete deck panels. Following the piling and decking, the station box excavation would extend for another year.

Once the TBMs are launched from the station box within Constellation Boulevard, they would tunnel eastward toward the Wilshire/La Cienega Station, which will be completed as part of Section 1. Tunneling of Section 2 is anticipated to extend from late 2019 through the end of 2020. Starting in mid-2020, excavation work would begin on cross-passages, tunnel inverts, and walkways, which would extend into 2022. This three-year period of tunneling and excavation activities would be the most intense construction period with excavated materials removed through the access shaft in Area 2, conveyed to Area 3, and removed via haul trucks. Other activities to support tunneling would include slurry pumping and delivery of segments and tunnel supplies via the access shaft in Area 2.

The station construction activities would last four to five years and would include forming and placing concrete station structures and installing architectural and mechanical elements. The system installation and facilities would begin in 2022 and last approximately two years and would consist of installation of the trackbed, rail, and third rail (traction power); conduits for systems installations; electrical substations; and communications and signaling. The station backfill and street restoration would begin in 2023 and would take approximately a year to complete.

Once construction activities are complete, system testing and pre-revenue operations would begin in late 2024 and last through early 2026. Section 2 revenue operations are anticipated to commence in 2026.

CHAPTER 3—TRANSPORTATION

This chapter presents information on transportation impacts of Section 2 of the Project that have changed from those identified in the published *Westside Subway Extension Final Environmental Impact Statement/Environmental Impact Report* (Final EIS/EIR) (Metro 2012j).

3.1 Introduction

This chapter addresses impacts related to changes in the transportation conditions along Section 2 of the Project that have occurred since the certification of the Final EIS/EIR for the Westside Purple Line Extension. This chapter incorporates detail on construction-related traffic impacts at the Century City Constellation Station based on the revised construction staging scenario. Further Level-of-Service (LOS) traffic operation analysis was conducted specifically for the closure of approximately 200 feet of Constellation Boulevard between the entrance of the parking garage at 10100 Constellation Boulevard and Century Park East. This analysis was conducted to reflect traffic volumes in 2016 based on land use changes since the certification of the Final EIS/EIR. The detailed analysis is documented in the *Westside Purple Line Extension Century City Station Updated Traffic Analysis Technical Memorandum* (Metro 2017a) (Appendix G) and summarized in this chapter. The changes analyzed in this chapter consist of the following:

- Relocation of construction staging activities at the Century City Constellation Station as described in Chapter 2 of this Supplemental EIS (SEIS)
- Review of changes to land uses adjacent to the construction staging areas in Century City, including the opening of a rehabilitation facility along Century Park East and the planned and approved modernization of Beverly Hills High School (BHHS), which are described in further detail in Section 3.2.1

The relocation of construction staging activities for the Century City Constellation Station described in Chapter 2 and the proposed land use changes adjacent to the site would not change the long-term operational transportation impacts discussed and identified in the Final EIS/EIR. Relocation of the construction staging activities at the Century City Constellation Station would only affect transportation operations within the immediate vicinity of the Century City Constellation Station during the construction period, which would end with the Section 2 opening in 2026. Following the Section 2 opening, the construction staging activities would no longer affect traffic demand or alter traffic patterns. As a result, the long-term transportation impacts remain unchanged from those described in the Final EIS/EIR and operational impacts related to transportation are not discussed in this Draft SEIS.

Similarly, the proposed BHHS campus improvements do not include campus expansion or an increase in student enrollment, faculty, or staff. Accordingly, travel demand and traffic patterns are not anticipated to change in the long term. Because the traffic operational parameters do not change from those identified in the Final EIS/EIR, the long-term operational transportation impacts remain unchanged from those described in the Final EIS/EIR.

The changes in construction staging locations and the BHHS modernization do warrant further analysis to identify potential transportation impacts during construction that may have changed since the Final EIS/EIR was published. The construction impacts on the following transportation areas are considered in this Draft SEIS:

- Public Transit
- Streets and Highways
- Parking
- Bicycle and Pedestrian Network

Cumulative transportation impacts are considered in Section 4.6 of this Draft SEIS.

3.2 Construction-related Transportation Impacts

3.2.1 Construction Approach

The construction activities associated with the Century City Constellation Station and tunneling of Section 2 will require a series of street closures for the Tunnel Boring Machine (TBM) launch box and the Century City Constellation Station box. The activities and street closures associated with the construction stages of each of these elements are detailed in this section. General traffic control activities that apply to all stages of the construction include:

- Elimination of parking on both sides of Constellation Boulevard within the work area limits
- Relocation of bus stops within work areas
- Maintenance of local access to businesses at all times

The construction approach described in this chapter is conceptual and will be finalized in Traffic Management Plans, which are subject to the approval of the City of Los Angeles. The Traffic Management Plans will also need to be coordinated with other construction projects that could be underway concurrently with elements of Section 2 construction. The final approved Traffic Management Plans may change to reflect City requirements and coordination needs with other projects.

TBM Launch Box Construction

As part of the change in construction staging areas, the TBM would be launched from the station excavation along Constellation Boulevard rather than from the site on the northeast corner of Constellation Boulevard and Avenue of the Stars. This would require the full closure of approximately 200 feet of Constellation Boulevard between Century Park East and the alley west of Century Park East on the north side of the street for approximately nine months for assembly and launch of the TBMs. Table 3-1 describes the construction activities, and Figure 3-1 shows the construction areas during each stage of the TBM Launch Box construction. The details of each construction stage are described below.

Table 3-1. TBM Launch Box Construction Activities

Stage	Traffic Control Activities	Duration
1. TBM Launch Box Piling – North Side	• Reconfiguration of travel lanes to one lane each direction along the east end of Constellation Blvd., with a left-turn pocket to northbound Century Park East. This will occur during weekdays. • Weekend closures of Constellation Blvd. entrance to the Watt Plaza alley from Friday 9:00 p.m. to Monday 6:00 a.m. • Maintenance of pedestrian access on north and south sides of the street at all times.	1 to 2 months
2. TBM Launch Box Piling – South Side	• Reconfiguration of travel lanes to one lane each direction along Constellation Blvd. between Avenue of the Stars and Century Park East. • Relocation of valet parking for Craft Restaurant at 10100 Constellation Blvd. to Avenue of the Stars. • Maintenance of pedestrian access on north side of street at all times.	1 to 2 months
3. TBM Launch Box Decking	• Full closure of Constellation Blvd. between Century Park East and Watt Plaza Alley for a period of approximately six weeks. During weekdays, access to Watt Plaza Alley and to the underground parking garage at 10100 Constellation Blvd. will be maintained • Full weekend closures of Constellation Blvd. between Avenue of the Stars and Century Park East from Friday 9:00 p.m. to Monday 6:00 a.m. This requires the closure of the Constellation Boulevard entrances to the Watt Plaza alley and the underground parking garage at 10100 Constellation Blvd. • Prohibition of turns onto Constellation Blvd. from Century Park East. • Maintenance of pedestrian access on the north side of Constellation Blvd. at all times.	4 to 6 weekends
4. TBM Launch Box Excavation	• Closure of the south side of Constellation Blvd between Century Park East and the entrance to the underground parking garage at 10100 Constellation Blvd. for the duration of this stage. • Reconfiguration of travel lanes to one lane each direction along the north side of Constellation Blvd. between Avenue of the Stars and Century Park East. • Relocation of valet parking for Craft Restaurant at 10100 Constellation Blvd. to Avenue of the Stars. • Maintenance of pedestrian access on north and south sides of the street at all times, except for the south sidewalk on Constellation Blvd. between 10100 Constellation Blvd. and Century Park East, which will be closed during this stage.	5 to 6 months

Stage	Traffic Control Activities	Duration
5. TBM Assembly and Launch	• Full closure of Constellation Blvd. east of the alley adjacent to Watt Plaza. • Reconfiguration of travel lanes to one lane each direction along Constellation Blvd. between Avenue of the Stars and the alley west of Century Park East and adjacent to Watt Plaza. • Prohibition of turns onto Constellation Blvd. from Century Park East. • Relocation of valet parking for Craft Restaurant at 10100 Constellation Blvd. to Avenue of the Stars. • Maintenance of pedestrian access on both sides of the street at all times except for the south sidewalk on Constellation Blvd. between 10100 Constellation Blvd. and Century Park East, which will be closed. • Full nighttime closures of Constellation Blvd. between Avenue of the Stars and Century Park East for the delivery of oversize loads.	9 months
6. TBM Support	• Reconfiguration of travel lanes to one lane each direction along Constellation Blvd. between Avenue of the Stars and Century Park East. • Relocation of valet parking for Craft Restaurant at 10100 Constellation Blvd. to Avenue of the Stars. • Maintenance of pedestrian access on the north side of Constellation Blvd. at all times. • TBM support work performed during this stage will be 24 hours per day, seven days per week. Metro will request a nighttime noise variance for work beyond regular work hours.	5 months

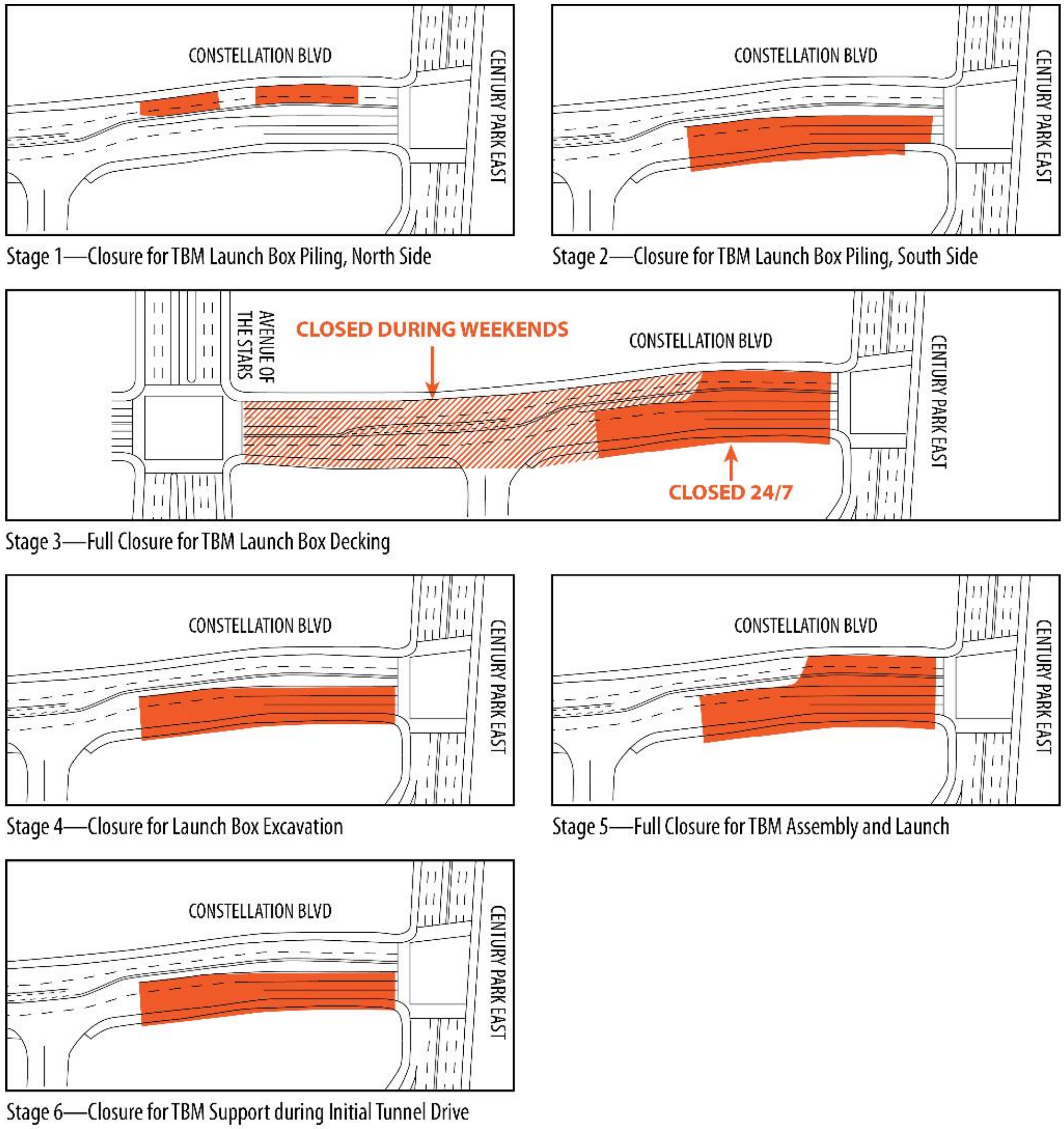


Figure 3-1. Construction Area (TBM Launch Box Construction)

Station Box Construction

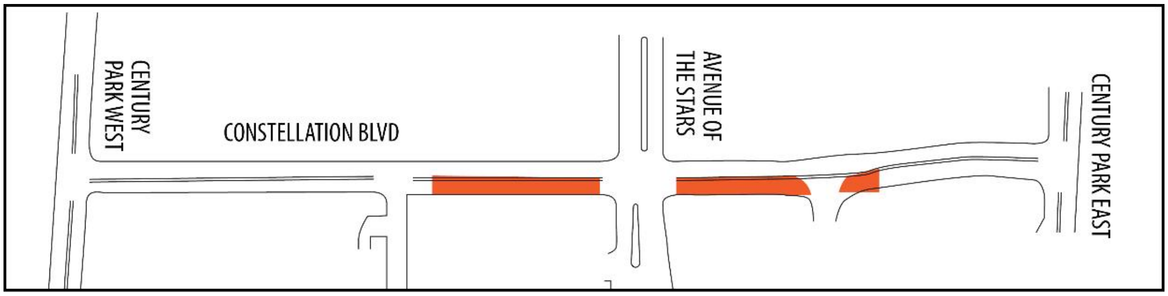
For the remainder of station construction, temporary lane closures on the north and south sides of Constellation Boulevard would be required for the installation of soldier piles. Then a series of consecutive, 56-hour weekend full street closures (22 are estimated to be required) would be needed to install decking spanning the full width of Constellation Boulevard along the length of the station box, which is consistent with the assumptions in the Final EIS/EIR and with construction plans for other stations along the Project. Once decking is installed, Constellation Boulevard would be closed except for one traffic lane in each direction, ensuring access to all driveways along that stretch of Constellation Boulevard, for approximately four years for station excavation and construction. Table 3-2 summarizes and Figure 3-2 shows the construction areas during each stage of the station box construction. The four remaining stages for station construction after the TBM Launch stage are as follows:

- Station Box Piling – South Side
- Station Box Piling – North Side
- Station Box Decking
- Station Box Excavation and Construction

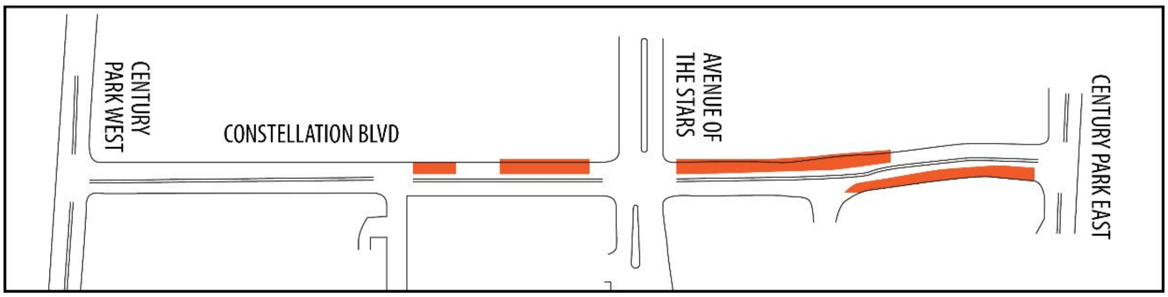
Table 3-2. Century City Constellation Station Box Excavation Activities

Stage	Traffic Control Activities	Duration
1. Station Box Piling – South Side	• Reconfiguration of travel lanes to one lane each direction along Constellation Blvd. between Century Park West and Century Park East. • Relocation of valet parking for Craft Restaurant at 10100 Constellation Blvd. to Avenue of the Stars. • Staged closure of the Constellation Blvd. vehicle entrance to the Century Plaza Hotel. • Staged closures of the garage entrance for the new Century Plaza Towers development. • Maintenance of pedestrian access on north side of the street at all times. • Pedestrian access on the south sidewalk of Constellation Blvd. between Solar Way and Avenue of the Stars will be closed. • Weekend closures within the intersection of Avenue of the Stars and Constellation Blvd.	4 to 5 months

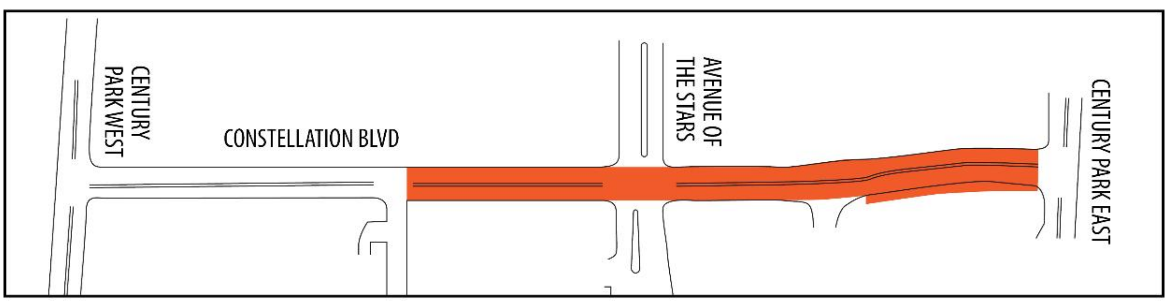
Stage	Traffic Control Activities	Duration
2. Station Box Piling – North Side	• Reconfiguration of travel lanes to one lane each direction along Constellation Blvd. between Century Park East and Solar Way. • Relocation of valet parking for Craft Restaurant at 10100 Constellation Blvd. to Avenue of the Stars. • Maintenance of pedestrian access on south side of the street at all times. • With the exception of the sidewalk section between Avenue of the Stars and the alley west of Century Park East and adjacent to Watt Plaza and the sidewalk between Solar Way and Avenue of the Stars, maintain pedestrian access on north side of the street at all times. Pedestrian access to the affected sections of sidewalk will be restored upon completion of pile construction work. • Weekend closures within the intersection of Avenue of the Stars and Constellation Blvd. • Staged construction across driveways to parking garages.	3 to 4 months
3. Station Box Decking	• Full weekend closures of Constellation Blvd. between Solar Way and Century Park East. • Prohibition of turns onto Constellation Blvd. from Century Park East, Avenue of the Stars, and Solar Way for the duration of the full closure. • Maintenance of local access to businesses at all times, except those in the full street closure zone. • Maintenance of pedestrian access on both sides of the street at all times except near the work area.	5 to 6 months
4. Station Box Excavation and Construction	• Reconfiguration of travel lanes to one lane each direction along Constellation Blvd. between Century Park East and Solar Way. • Left turns from westbound Constellation Blvd. onto southbound Avenue of the Stars will be restricted. • Relocation of valet parking for Craft Restaurant at 10100 Constellation Blvd. to Avenue of the Stars. • Pedestrian access will be maintained along the north and south sides of Constellation Blvd. at all times, except for that section of the south sidewalk east of the parking garage entrance to 10100 Constellation Blvd. to Century Park East.	4 years



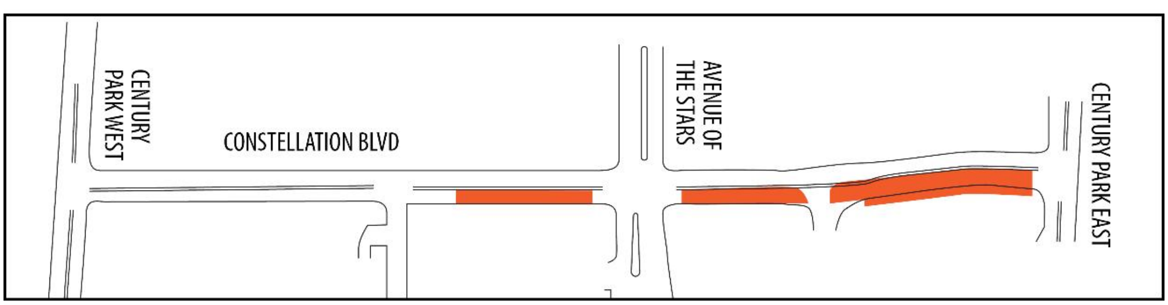
Stage 1—Closure for Station Box Piling, South Side



Stage 2—Closure for Station Box Piling, North Side



Stage 3—Closure for Station Box Decking



Stage 4—Closure for Station Box Excavation & Construction

Figure 3-2. Construction Area (Station Box Construction)

3.2.2 Public Transit

Affected Environment/Existing Conditions

The affected environment/existing conditions for the public transit system along Section 2 of the Project has not changed from what was described in Section 3.4.1 of the Final EIS/EIR. Metro is the principal public transit provider in Section 2, which is also served by Santa Monica's Big Blue Bus, Los Angeles Department of Transportation (LADOT) Downtown Area Shuttle (DASH), LADOT Commuter Express, Santa Clarita Transit Commuter Express Service, Culver CityBus, and Antelope Valley Transit Authority Commuter Services.

The following bus routes currently serve the Wilshire/Rodeo area:

- Metro 14/37
- Metro 20
- Metro 720
- Antelope Valley 786

The following bus routes currently serve the Century City area:

- Metro 4
- Metro 16
- Metro 17
- Metro 28
- Metro 316
- Metro 704
- Metro 728
- Big Blue Bus 5
- Culver CityBus 3
- Commuter Express 534
- Commuter Express 573
- Santa Clarita 792/797
- Antelope Valley 786

Construction-related Environmental Impacts/Environmental Consequences

In general, the transit operation impacts associated with the temporary construction activities of the Century City Constellation Station and related tunneling activities would be the same as those identified in the Final EIS/EIR, as described below.

Temporary street closures would require temporary rerouting of bus lines and bus stop locations, which would add transit travel time for bus riders. Transit providers would be contacted at least 100 days in advance of changes that would affect bus operations and/or stop locations. In addition, the materials handling corridor along a portion of the northbound side of Century Park East would require temporary relocation of a bus stop serving Metro line 28 and City of Los Angeles Department of Transportation Commuter Express line 534.

The use of the existing bus layover site at Century Park West/Constellation Boulevard would require Metro bus lines 16, 316, and 728/28 to use the temporary bus layover that would be constructed in the median of Santa Monica Boulevard and would not affect existing traffic lanes. The change in bus layover location would require minor rerouting of each of the affected bus lines. Since the proposed terminal would be located near the existing layover location, the impact on existing bus operations would be minimal and patrons would still be able to use a number of existing bus stops in the area.

Mitigation Measures

Section 3.8.3 of the Final EIS/EIR states that construction period public transit impacts would remain as temporary adverse impacts even with the implementation of mitigation. With the changes to the Century City Constellation Station construction areas, the level of impacts to public transit during construction would be similar to those impacts identified in Section 3.8.3 of the Final EIS/EIR even with the implementation of the mitigation measure. The proposed mitigation measure would allow transit services to continue to serve the transit users near the Century City Constellation Station construction areas. However, the relocation of the bus stops might require additional walk time for the transit users, and the temporary route diversions might increase overall transit travel time for the affected transit services.

- **TCON-6—Temporary Bus Stops and Route Diversions**: Construction impacts to local and regional transit operations (e.g., Metro Bus, Santa Monica Big Blue Bus, Culver CityBus, LAX Flyaway, DASH, and UCLA Campus Shuttle) will be mitigated to minimize impacts to the degree possible at each station construction location. Impacts to local and regional transit will be mitigated through, but not be limited to, the use of temporary relocated bus stops and temporary route diversions. Impacts to local and regional transit operations will be coordinated with each transit agency and/or provider. In addition, the Final Design-level mitigation proposals will be approved by the transit agency and/or provider and the local jurisdictions and incorporated into the TMP.

3.2.3 Streets and Highways

Affected Environment/Existing Conditions

Section 2 of the Project is generally served by a mature roadway network of arterial streets and freeways, which provide options for north/south and east/west travel. Key arterials along Section 2 include:

- **Wilshire Boulevard** – Wilshire Boulevard is a major east/west arterial that is classified as a Major Class II Highway. It extends from Ocean Avenue in Santa Monica on the west to Grand Avenue in Downtown Los Angeles on the east. In the Study Area, it generally has two full-time travel lanes in each direction, with the parking lane used as a travel lane during peak periods in many locations. Dedicated left-turn lanes are provided at most major intersections.
- **Santa Monica Boulevard** – Santa Monic Boulevard is a major east/west arterial that is classified as a Major Class II Highway. It extends from Ocean Avenue in Santa Monica on the west to Sunset Boulevard in the Silver Lake neighborhood on the east.

In the Study Area, it generally has two travel lanes in each direction. Dedicated left-turn lanes are provided at most major intersections.

- **Olympic Boulevard** – Olympic Boulevard is a major east/west arterial that is classified as a Major Class II Highway. It extends from 5th Street in Santa Monica on the west to Downtown Los Angeles and farther on the east. In the Study Area, it generally has two to three full-time travel lanes in each direction, with the parking lane used as a travel lane during peak periods in some locations. Dedicated left-turn lanes are provided at most major intersections.

The affected environment/existing conditions for the roadway system and traffic conditions in the Study Area remain unchanged from those described in Section 3.5.1 of the Final EIS/EIR, with the exception of the opening of the medical rehabilitation facility on Century Park East and the approved BHHS modernization program, described below and shown in Figure 3-3.

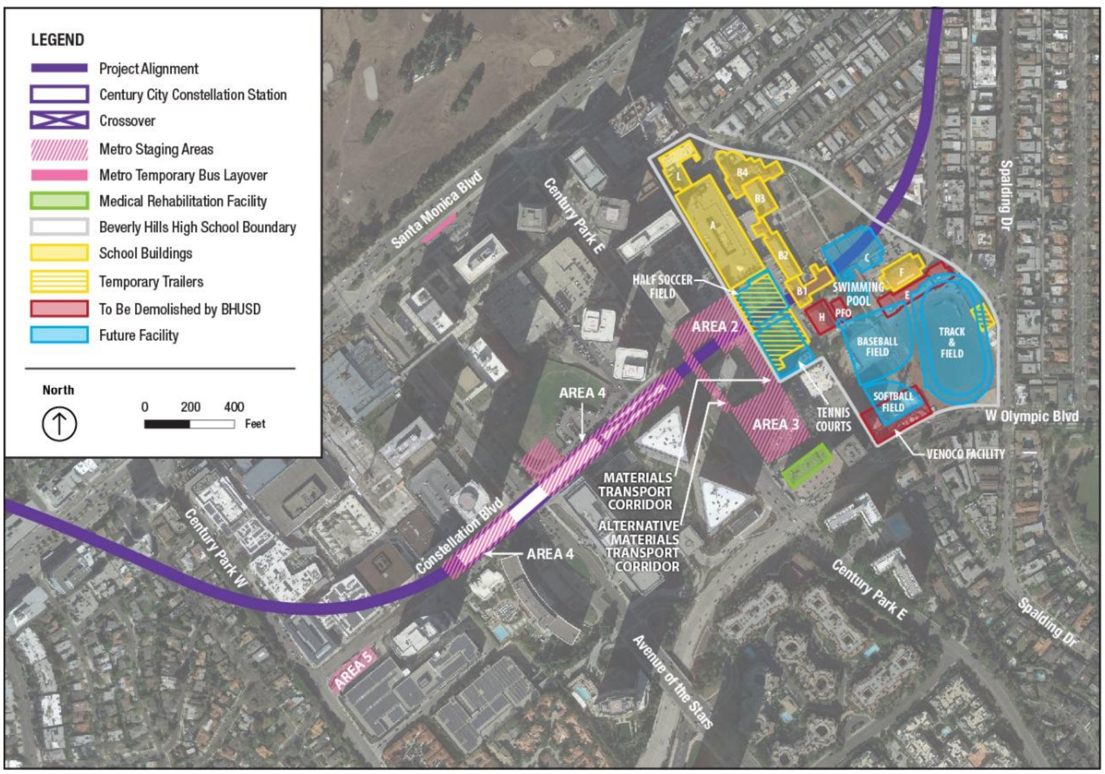


Figure 3-3. Century City Station Construction Staging, Beverly Hills High School Modernization Program and the Medical Rehabilitation Facility

A former physician-run hospital at 2080 Century Park East that was closed in 2008 was remodeled to become a new 138-bed medical rehabilitation facility. This facility is adjacent to and immediately south of the Century City Constellation construction staging site on Century Park East. The nine-story rehabilitation facility was not in operation at the time of the Final EIS/EIR studies; therefore, the analysis of the adjacent construction staging area did not assess potential impacts to the facility. This rehabilitation facility opened for business in June 2016.

The BHHS campus, which is immediately east of the Century City Constellation construction staging area, will be undergoing a modernization, and some BHHS construction activities are scheduled to coincide with construction activities for Section 2. In 2008, the Beverly Hills Unified School District (BHUSD) issued the Draft Master Plan that was accepted by the California Board of Education in 2010. The *Beverly Hills High School, Hawthorne K-8 School, and El Rodeo K-8 School Improvement Project Final EIR* (BHUSD 2015) was completed in 2015. Construction within the campus began in 2016 and is expected to be completed by 2020, with the peak construction period occurring between February 2016 and April 2016. Based on this schedule, the peak construction period for the BHHS campus improvements would not coincide with major construction activities for Section 2 of the Project, which would begin in January 2018. However, some construction activities for the BHHS improvements were already underway when the traffic counts were conducted, and therefore, the construction traffic related to the BHHS campus improvements was considered and analyzed as part of the background baseline traffic under existing 2016 traffic conditions. Between January 2018 and 2020, the construction activities from the Project and BHHS campus improvements would overlap, and therefore, the cumulative impacts of both activities were also considered and discussed in further details in Section 4.6 of this Draft SEIS.

An intersection LOS analysis was conducted based on existing 2016 traffic conditions, taking into account the rehabilitation facility being operational, and the ongoing construction activities for the BHHS campus modernization. LOS is a qualitative measure used to describe the condition of traffic flow, ranging from LOS A (free flow conditions) to LOS F (congested conditions), with LOS E representing the theoretical maximum capacity of a link or intersection before gridlock occurs. Generally, the minimum acceptable LOS for any intersection in an urbanized area is LOS D. The existing LOS at key intersections around Century City is provided below in Table 3-3. As shown, many intersections already operate at deficient LOS during peak hours. All three intersections along Santa Monica Boulevard are currently operating at LOS F during both the AM and PM peak hours. The intersection of Century Park West and Olympic Boulevard is operating at LOS F in the AM peak and LOS E in the PM peak hour. The intersection of Century Park East and Olympic Boulevard is operating at LOS E in the AM and PM peak hours. The intersection of Century Park West and Constellation Boulevard is operating at LOS E in the PM peak hour. The remaining four study intersections are operating at LOS D or better during both the peak hours.

Table 3-3. Existing Intersection LOS in Century City

Intersection	Existing Conditions (2016)			
	AM Peak Hour		PM Peak Hour	
	LOS	Delay (sec)	LOS	Delay (sec)
Century Park East/ Santa Monica Blvd	F	125.6	F	130.0
Century Park East/ Constellation Blvd	C	30.6	D	40.0
Century Park East/ Olympic Blvd	E	59.3	E	55.0
Avenue of the Stars/ Santa Monica Blvd	F	129.6	F	114.9
Avenue of the Stars/ Constellation Blvd	C	30.5	C	29.2
Avenue of the Stars/ WB Olympic Blvd	B	16.1	A	9.1
Avenue of the Stars/ EB Olympic Blvd	C	29.8	D	36.3
Century Park West/ Santa Monica Blvd	F	151.8	F	152.7
Century Park West/ Constellation Blvd	A	7.7	E	55.8
Century Park West/ Olympic Blvd	F	89.0	E	77.9

Source: *Westside Purple Line Extension Century City Station Updated Traffic Analysis Technical Memorandum* (Metro 2017a) (Appendix G)

Construction-related Environmental Impacts/Environmental Consequences

The traffic analysis presented in Chapter 3 of the Final EIS/EIR concluded that traffic impacts associated with the Section 2 Project construction include reduced roadway traffic lanes and temporary street closures, which could result in traffic disruptions and bottlenecks. During construction, full street closures would generally be limited to nighttime and weekends. Partial street closure will remain in place during the entire construction period during station piling, excavation, construction, and tunneling.

As described in the Final EIS/EIR, under 2035 project conditions, 24 of the 83 analyzed intersections (29 percent) in Section 2 would operate at an acceptable LOS D or better in the AM peak hour. The remaining 59 intersections (71 percent) would operate at LOS E or F (deficient LOS) during the AM peak hour. Twenty-four of the 83 Section 2 analyzed intersections (29 percent) would operate at an acceptable LOS D or better in the PM peak hour. The remaining 59 intersections (71 percent) would operate at LOS E or F (deficient LOS) during the PM peak hour. By 2035, the majority of the study intersections would operate under congested conditions (LOS F) during peak hours, both with and without Section 2 of the Project.

In general, the traffic-related impacts associated with construction of the Century City Constellation Station and related tunneling activities would be the same as those identified in the Final EIS/EIR, with the exceptions as indicated below.

During construction, driveway entrances and exits will be maintained during regular business hours. When construction activity affects existing business driveways, maintenance of traffic plans will be prepared by the construction contractor showing how vehicular access will be maintained to businesses. If acceptable, alternative access points approved by LADOT and/or City of Los Angeles Department of Public Works, Bureau of Engineering (BOE) will be provided. The construction activity must be coordinated with each affected property representative and the plans approved by the agency having jurisdiction. The local agency may restrict the left-turn and/or right-turn vehicular movements entering and/or exiting driveways during construction.

The following section provides an LOS analysis for the construction elements requiring street closures for the construction of the TBM launch box, specifically the nine-month period that the eastern portion of Constellation Boulevard would be fully closed to all through traffic. Construction period traffic impacts within the Study Area are expected to be the highest during the nine-month full closure as all east/west through traffic at the eastern portion of Constellation Boulevard would have to be rerouted around the closure. Traffic analysis conducted for this phase of the construction represents the "worst-case" scenario through the construction period.

TBM Launch Box Construction LOS Analysis

This section analyzes the potential traffic impacts resulting from the nine-month full closure along the eastern portion of Constellation Boulevard during the assembly and launch of the TBMs, as described in Section 3.2.1. During this phase of the construction, northbound and southbound traffic turning westbound onto Constellation Boulevard from Century Park East would be diverted around the construction area and use Avenue of the Stars to get to their destination. Similarly, eastbound traffic on Constellation Boulevard would be detoured before crossing Avenue of the Stars, with the exception of local access traffic destined for the buildings along the full closure segment. Using existing 2016 traffic volumes as the baseline, traffic diversions for the construction were applied and intersection LOS analysis was conducted at the study intersections. Table 3-4 summarizes the expected changes from the existing 2016 LOS at key intersections around the Century City Constellation Station during the nine-month period that the eastern portion of Constellation Boulevard would be closed to traffic. The key intersections analyzed around the Century City Constellation Station are shown in Figure 3-4.

Table 3-4. LOS Changes at Key Intersections during TBM Launch Box Full Closure (200 Feet Full Closure)

Intersection	Existing Conditions (2016)				200 Feet Full Closure of Constellation Boulevard			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
Century Park East/ Santa Monica Blvd	F	125.6	F	130.0	E	79.9	F	201.0
Century Park East/ Constellation Blvd	C	30.6	D	40.0	A	8.3	A	7.3
Century Park East/ Olympic Blvd	E	59.3	E	55.0	D	49.1	D	46.6
Avenue of the Stars/ Santa Monica Blvd	F	129.6	F	114.9	F	144.6	F	100.6
Avenue of the Stars/ Constellation Blvd	C	30.5	C	29.2	E	56.6	D	44.5
Avenue of the Stars/ WB Olympic Blvd	B	16.1	A	9.1	C	28.6	A	9.2
Avenue of the Stars/ EB Olympic Blvd	C	29.8	D	36.3	C	28.1	D	41.4
Century Park West/ Santa Monica Blvd	F	151.8	F	152.7	F	135.0	F	155.9
Century Park West/ Constellation Blvd	A	7.7	E	55.8	A	7.8	D	49.7
Century Park West/ Olympic Blvd	F	89.0	E	77.9	E	79.9	E	78.7

Source: *Westside Purple Line Extension Century City Station Updated Traffic Analysis Technical Memorandum* (Metro 2017a) (Appendix G)
Note: Green denotes LOS improvement, and orange denotes LOS deterioration

The temporary closure and diversion of traffic from the eastern end of Constellation Boulevard would result in two intersections along Santa Monica Boulevard (at Avenue of the Stars, and Century Park West) continuing to operate at LOS F during both the AM and PM peak hours. Intersection LOS would worsen at two of the intersections, with two intersections (Avenue of the Stars/Constellation Boulevard and Avenue of the Stars/westbound Olympic Boulevard) worsening in the AM peak hour and one intersection (Avenue of the Stars/Constellation Boulevard) worsening in the PM peak hour. Intersection LOS would improve at five of the intersections. Two intersections (Century Park East/Santa Monica Boulevard and Century Park West/Olympic Boulevard) would improve during the AM peak hour, and one intersection (Century Park West/Constellation Boulevard) would improve during the PM peak hour. The LOS at Century Park East/Olympic Boulevard would improve in both the AM and PM peak hours. The LOS at Century Park East/Constellation Boulevard would improve in both the AM and PM peak hours with turn restrictions from Century Park East to Constellation Boulevard, and from Constellation Boulevard to Century Park East.

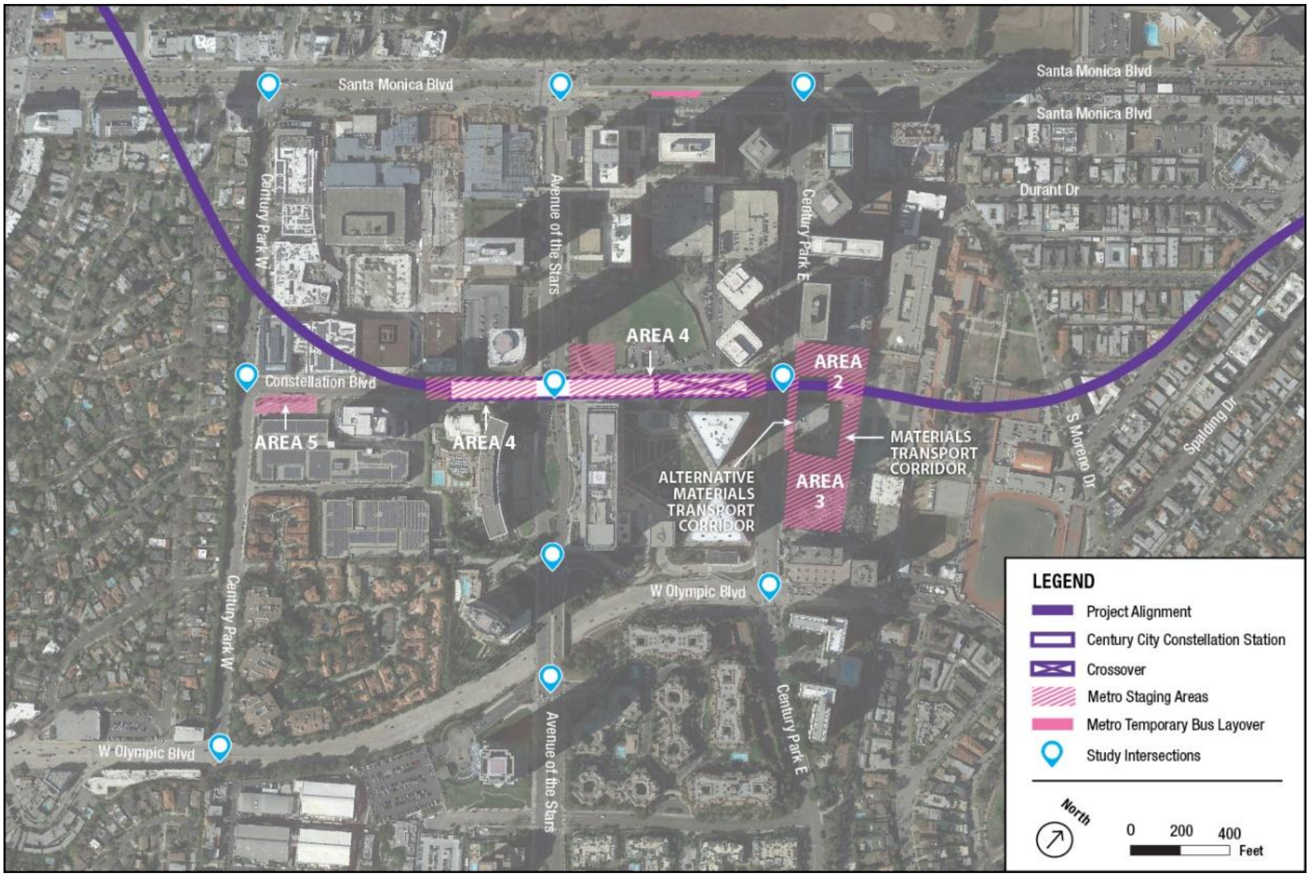


Figure 3-4. Key Intersections around Century City Constellation Station

Haul Routes

As described in Section 3.8.2 of the Final EIS/EIR, anticipated truck haul routes related to the construction of Section 2 would include arterial and local streets within City of Los Angeles and Beverly Hills. The haul routes identified for the construction of the Wilshire/Rodeo have not changed from what was described in Section 3.8.2 of the Final EIS/EIR. The haul routes identified for construction of the Century City Constellation Station and the Section 2 tunnel would be located to the west of the BHHS campus and would not overlap with construction activities for the BHHS construction activities. The construction haul truck routes for the Century City Constellation Station and the Section 2 tunnel include Santa Monica Boulevard, Constellation Boulevard, Century Park East, Century Park West, and Avenue of the Stars. The haul trucks would use these routes to transport spoils, muck, material, and equipment between construction laydown site locations, station entrance locations, and the off-site disposal location using the nearest freeway interchange. To minimize peak period traffic disruptions, haul truck activity is anticipated to take place during off-peak and nighttime periods. Land use along the haul routes is mainly commercial, with the exception of residential areas to the west side of Century Park West. The estimated daily haul truck trips differ depending on the type of construction activity. Table 3-5 summarizes the daily haul truck trips generated for the construction of the Century City Constellation station and Section 2 tunneling activities.

Table 3-5. Estimated Daily Haul Truck Trips

Location	Station Box Construction	Tunnel Boring Machine Activity	Station and Other Related Construction
Constellation Station and TMB launch location	80-120	90-130	80-120

Source: *Westside Purple Line Extension Century City Constellation Station Air Quality Technical Memorandum—Revision 1* (Metro 2017g) (Appendix F)

Even with the relocation of construction staging activities for the Century City Constellation Station as described in Chapter 2, haul truck routes to support construction staging would be along street segments that were identified in Section 3.8.2 of the Final EIS/EIR. However, the haul truck routes immediate to the construction site are modified based on the relocation of the construction staging activities.

The haul routes along Santa Monica Boulevard between I-405 and Century Park West identified in Section 3.8.2 of the Final EIS/EIR are not expected to change based on the relocation of the construction staging and laydown areas described in Chapter 2 of this SEIS.

Figure 3-5 illustrates the proposed new haul routes. For the proposed new haul routes, inbound trips would split to three different routes from Santa Monica Boulevard. The first route would turn right at Century Park West and left at Constellation Boulevard to access Area 5 before exiting via Avenue of the Stars and Santa Monica Boulevard. This route would be adjacent to residential areas west of Century Park West between Santa Monica Boulevard and Constellation Boulevard. As noted, the haul trucks would operate during off-peak hours, and therefore would not increase traffic impact at this segment.

The second route would turn right at Avenue of the Stars and left on Constellation Boulevard to access Area 4 before exiting via Century Park East and Santa Monica Boulevard. The third route would turn right at Century Park East to access Area 2 and Area 3 before exiting via Century Park East in reverse direction.

The proposed new haul truck routes would not affect additional roadway segments other than those identified in Chapter 3 of the Final EIS/EIR, and transportation-related impacts associated with the proposed new haul truck routes would be the same as those identified in Section 3.8.2 of the Final EIS/EIR.

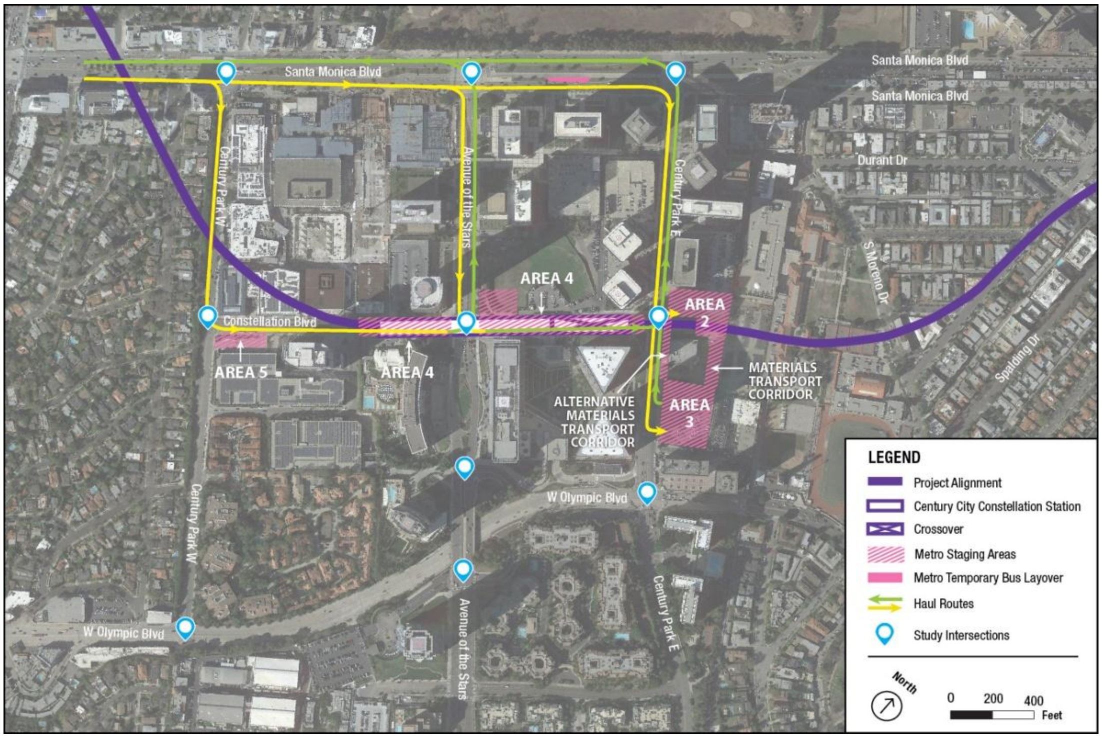


Figure 3-5. Proposed Construction Truck Haul Routes

Mitigation Measures

With the changes to the Century City Constellation Station construction areas, the construction period traffic impacts would remain as a temporary adverse impact even with the implementation of the mitigation measures as specified in Section 3.8.6 of the Final EIS/EIR. The level of construction period traffic impacts with the implementation of the mitigation measure would be similar to the impacts identified in the Final EIS/EIR, but over a longer duration due to the required full closure of approximately 200 feet of Constellation Boulevard for approximately nine months for assembly and launch of the TBMs.

- **TCON-1—Traffic Control Plans**: Site-specific traffic control plans will be developed to minimize construction impacts for each work zone location. These locations will include, but not be limited to, utility relocations, stations, crossovers, laydown areas, TBM launch and removal locations, emergency exit shafts, station entrances, drop pipes, and grout injection. Traffic control plans will follow state and local jurisdiction guidelines and standards. Traffic control plans will be developed for Wilshire, Santa Monica, and Constellation Boulevards and north–south streets including, but not limited to, La Brea Avenue, Fairfax Avenue, La Cienega Boulevard, Rodeo Drive, Beverly Drive, Canon Drive, Century Park East, Avenue of the Stars, Westwood Boulevard, Veteran Avenue, Sepulveda Boulevard, I-405 ramps to/from eastbound Wilshire Boulevard, and Bonsall Avenue. Traffic control plans will encompass the following:
  - Minimum lane widths
  - Number of available travel lanes (two lanes minimum in each direction during peak periods)

- Number, length, and location of temporary right- and left-turn lanes
- Temporary street closures and detour routes
- Traffic-control devices (signing and striping)
- Temporary traffic signals and street lighting
- Temporary pedestrian access and routes
- Temporary bicycle routes
- Temporary driveway access
- Temporary business access
- Construction site phasing

To facilitate traffic flow and mitigate major disruption and bottlenecks due to construction, advanced traffic control will extend beyond one arterial street on each side of each station construction location. This will help disperse peak-hour traffic flows onto the adjacent arterial street network. Business owners will be interviewed to identify the type of business, delivery and shipping schedules, and critical days/ times of years for the business. Traffic-control plans will incorporate this information. Specific street closures will be developed in close coordination with the local jurisdictions during the Final Design phase.

- **TCON-2—Designated Haul Routes:** Designated truck haul routes using arterial streets are intended to minimize noise, vibration, and other possible impacts to adjacent businesses, schools, major commercial developments, and residential neighborhoods. Metro will incorporate the following objectives into its truck haul route plans:
  - Establish nighttime truck haul operations times/days for each route. Truck haul operations will not be allowed during AM and PM peak hours, in residential neighborhoods (where feasible), during noise restriction hours and special events, during holiday season restrictions, and as restricted by State and local jurisdictional mandates.
  - Establish truck haul headways to avoid platoons of trucks on local arterial streets and freeways. Establish a vehicle dispatching system at construction laydown areas and off-site locations to monitor and address truck headway issues as they arise.
  - Develop truck haul routes for each site in coordination with and approved by State and local jurisdictions.
  - Incorporate comments and issues from State and local jurisdictions into the final approved truck haul routes and truck haul operation schedules.

- **TCON-3—Emergency Vehicle Access**: Emergency vehicle access will be maintained at all times to the construction work site, adjacent businesses, and residential neighborhoods. In addition, emergency vehicle access will be maintained at all times to and from fire stations, hospitals, and medical facilities near the construction sites and along the haul routes. LPA construction activities and haul route operations will be coordinated with local law enforcement representatives and fire department officials during the Final Design phase.

- **TCON-4—Transportation Management Plan**: Once subway construction sequencing/phasing and the truck haul routes have been concurred upon by Metro and reviewed by local jurisdictions and the California Department of Transportation, a Transportation Management Plan (TMP) will be developed and approved by Metro and other appropriate agencies. The TMP will include the following:
  - Public information (e.g., media alerts, website)
  - Traveler information (e.g., traffic advisory radio, changeable message signs [CMS])
  - Incident management (e.g., TMP coordination, tow truck services)
  - Construction (e.g., detour routes, haul routes, mitigation, construction times)
  - Demand management (e.g., carpooling, express bus service, variable work hours, parking management)
  - Coordination with concurrent Locally Preferred Alternatives

3.2.4 Parking

Affected Environment/Existing Conditions

Existing parking in the Century City vicinity has not changed from what was identified in Section 3.6.1 of the Final EIS/EIR.

No unrestricted parking is located within one-half mile of the Wilshire/Rodeo and Century City Constellation Stations. Unrestricted on-street parking spaces are those that are not metered nor have restrictions on use by time of day or day of week.

Several off-street parking facilities are within one-half mile of primary station entrances, as shown in Table 3-6.

Table 3-6. Station Area Off-street Parking Supply within One-half Mile of Primary Station Entrance

Station	Retail (spaces)	Office (spaces)	Hotel (spaces)	Food Services (spaces)	Publicly Accessible Parking Facilities (spaces)	Total (spaces)
Wilshire/Rodeo	4,420	10,410	1,320	30	6,770	22,950
Century City Constellation	2,600	23,710	250	260	0	26,820

Construction-related Environmental Impacts/Environmental Consequences

Impacts to parking during construction of the Century City Constellation Station would remain the same as those identified in Section 3.8.4 of the Final EIS/EIR because the changes in construction staging at the Century City Constellation Station do not include areas with on-street parking.

As stated in the Final EIS/EIR, during construction, existing taxi zones will be temporarily removed for the duration of specific construction stages in accordance with approved traffic control plans. In addition, contractors will be required to have all employees park off-street at Metro-approved locations.

Additional parking impacts associated with the temporary construction activities of the Century City Constellation Station and related tunneling activities include an approximately 11,000-square-foot temporary construction easement that may be used along the eastern portion of the property at 2010 Century Park East (AT&T building) for placement of the conveyor system between staging Areas 2 and 3, which would result in a loss of parking. Due to structural safety issues, only a dozen spaces on the ground floor of the garage are currently used. If the conveyor belt is located on the top floor of the garage, no parking will be displaced. If AT&T should agree to remove the parking structure, the parking will be temporarily displaced during demolition of the structure, but ground level parking will be available during the remainder of construction.

When construction activity affects the curb-side passenger loading or commercial loading zones, loading zone circulation plans will be prepared by the construction contractor in association with Metro and approved by the local agency having jurisdiction. The loading zone plan must be coordinated with each affected property representative.

Mitigation Measures

The changes to the Century City Constellation Station construction areas would not cause additional parking impact compared to those identified in the Final EIS/EIR. With the changes to the Century City Constellation Station construction areas, the construction period parking impacts would remain as a temporary adverse impact even with the implementation of the mitigation measures as specified in the Final EIS/EIR. The level of construction period parking impacts with the implementation of the mitigation measure would be similar to the impacts identified in the Final EIS/EIR.

- **TCON-7—Parking Management:** A parking management program will be developed to minimize impacts due to temporary removal of on- and off-street parking within the construction work area(?). The program will incorporate appropriate parking-control measures; replacement parking within a reasonable distance from the affected parking locations, if available; or other transportation demand management (TDM) strategies. Development of the parking management program will be coordinated with the appropriate local jurisdictions and affected communities or property owners and be incorporated into the TMP.
- **TCON-9—Construction Worker Parking:** Metro will require that all construction contractors identify adequate off-street parking for construction workers at Metro-approved locations. This will occur for each construction site to minimize additional loss of parking. Metro will work with construction contractors on implementation of adequate off-street parking for construction workers.

3.2.5 Pedestrian and Bicycle Network

Affected Environment/Existing Conditions

The affected environment and existing conditions for pedestrian facilities and bicycle networks have not changed from what was described in Section 3.7.1 of the Final EIS/EIR.

There are high levels of pedestrian accessibility within the Study Area. A continuous network of facilities connects every neighborhood and destination within the Cities of Los Angeles and Beverly Hills. Pedestrian network variations, such as sidewalk widths, landscaping, and sidewalk amenities vary by location, depending on the density and mix of land uses within the built environment and the circulation patterns of the vehicular transportation system. High volumes of existing pedestrian activity (established as 500 or more pedestrians crossing at a study intersection during a peak hour) occur at the Wilshire/Rodeo and Century City Constellation Station locations.

There are few existing bicycle facilities within the City of Los Angeles and the City of Beverly Hills. There is currently a Class II bicycle lane along Santa Monica Boulevard, west of Avenue of the Stars. The City of Los Angeles *Mobility Plan 2035* (LADOT 2016) proposes Tier I protected bicycle lanes along Santa Monica Boulevard in Century City as well as bicycle lanes along Avenue of the Stars. No bicycle lanes exist along Wilshire Boulevard in the City of Beverly Hills.

Construction-related Environmental Impacts/Environmental Consequences

As indicated in the Final EIS/EIR, in general, sidewalk access will be maintained on both sides of the street at Metro construction sites throughout the construction period with temporary sidewalk closures during specific construction staging activities. Pedestrian access to all business will be maintained during essential business operating hours without any requirements for businesses to make such a request. Under certain circumstances, sidewalks will be closed following approval by the LADOT and/or City of Los Angeles Department of Public Works, BOE.

The closest bicycle facility includes a Class II Bike Lane along Santa Monica Boulevard, which is part of the proposed construction haul truck routes. During construction, this segment along Santa Monica Boulevard would not be affected by street closures. Hence this bike lane would not be subject to closure or re-routing. There is no other designated bike route/lane within the vicinity of the construction areas.

In general, the pedestrian and bicycle impacts associated with the temporary construction activities of the Century City Constellation Station and related tunneling activities would be the same as those identified in the Final EIS/EIR, with the exceptions indicated below.

To accommodate one of the materials handling corridor options between construction areas, one northbound lane on Century Park East may be closed for five years. During this time, pedestrian traffic will be detoured around the closed portion.

The proposed street closures for the temporary construction activities of the Century City Constellation Station and related tunneling activities would affect bicycle access on regular arterials.

The construction activities proposed for the BHHS campus modernization project would not impact the existing pedestrian and bicycle facilities because the construction activity is contained within the BHHS campus.

Mitigation Measures

With the changes to the Century City Constellation Station construction areas, the construction period pedestrian and bicycle access impacts would remain as a temporary adverse impact even with the implementation of the mitigation measures as specified in Section 3.8.6 of the Final EIS/EIR. The level of construction period pedestrian and bicycle access impacts with the implementation of the mitigation measures would be similar to the impacts identified in the Final EIS/EIR.

- **TCON-10—Pedestrian Routes and Access:** Safe pedestrian routes and access will be provided through and/or adjacent to construction work areas. Pedestrian routes and access, including temporary pedestrian facilities, will comply with the requirements of the ADA and must be properly signed and lighted. Special facilities, such as handrails, fences, and walkways, will be provided for pedestrian safety. Temporary pedestrian routes and access concerns will be addressed with, but not limited to, local residents, the VA Hospital, schools, and businesses and approved by the local jurisdiction. Pedestrian routes and access will be monitored and maintained throughout construction.

- **TCON-11—Bicycle Paths and Access:** Bicycle traffic (e.g., paths, lanes, and routes) will be maintained safely through and adjacent to construction work areas. If bicycle traffic cannot be maintained, then alternative temporary bicycle routes will be identified, signed, and lighted. These alternative routes should be on adjacent streets that can safely accommodate bicycle traffic. Development of these routes will be coordinated with bicycle groups and local jurisdictions. Temporary routes will require approval by the local jurisdiction. Bicycle access will be monitored and maintained throughout construction.

CHAPTER 4—ENVIRONMENTAL ANALYSIS, CONSEQUENCES, AND MITIGATION

This chapter presents additional information about the environmental impacts of Section 2 of the Project in response to the Final Decision on Motions for Summary Judgment and Ruling in Regards to Remedies (Final Decision) of the United States District Court for the Central District of California in *Beverly Hills Unified School District v. Federal Transit Administration, et al.*, CV 12-9861-GW(SSx) on August 12, 2016. This chapter also assesses any changes to environmental impacts that would result from the changed location of construction staging activities at the Century City Constellation Station, changes to surrounding land uses near the Century City Constellation Station, and design refinements at the Wilshire/Rodeo Station.

4.1 Introduction

In response to the Final Decision, this chapter focuses on the following:

- An analysis of the potential public health impacts of nitrogen oxides (NOx) emissions during construction of the Century City Constellation Station and tunneling for Section 2 of the Project
- An analysis of the potential risks of soil gas migration from tunneling or other construction activities related to Section 2 of the Project
- A discussion of the completeness of the available seismic risk information related to Section 2 of the Project
- A discussion of post-Draft Environmental Impact Statement/Environmental Impact Report (Draft EIS/EIR) seismic and ridership studies available to the Federal Transit Administration (FTA) and related to Section 2 of the Project

In addition, this chapter provides analysis of the long-term operational and short-term construction environmental impacts related to the following changes in Section 2 of the Project:

- Relocation of the construction staging activities at the Century City Constellation Station as described in Chapter 2 of this Draft Supplemental Environmental Impact Statement and Section 4(f) Evaluation (Draft SEIS)
- Changes in land uses adjacent to the construction staging areas in Century City, including the opening of a medical rehabilitation facility along Century Park East and the planned and approved modernization of Beverly Hills High School (BHHS), which are described in further detail in Section 4.2 of this Draft SEIS
- Elimination of the double crossover on the east end of the Wilshire/Rodeo Station and the associated change in the station box, which is planned to extend from Beverly Drive to Canon Drive.

At the Wilshire/Rodeo Station, even though the double crossover was eliminated and the station box has slightly shifted, the long-term operations and construction staging and activities generally remain the same as discussed in the Final EIS/EIR. Therefore, the environmental effects near the Wilshire/Rodeo Station remain the same as in the Final EIS/EIR. However, the alignment in the vicinity of the Perpetual Savings Bank was refined. The Final EIS/EIR also identified the Perpetual Savings Bank for subsurface easements; however, the refined design at the Wilshire/Rodeo station indicates that the tunnels would not pass below that property and, therefore, easements from that properties would not be required. Two additional subsurface easements would be required and are discussed in Chapter 4.

This chapter provides analysis of long-term operational impacts related to noise and vibration (Section 4.2), seismic and subsurface gas hazards (to address the Final Decision) (Section 4.3), and historic resources (Section 4.4).

The relocation and refinement of the construction activities do not affect how Section 2 of the Project will operate once the construction is complete because trains will operate in a below-grade tunnel in the same alignment as described in the Final EIS/EIR, except as noted in Chapter 2 in regards to the refinement at Wilshire/Rodeo Station and west of the Century City Station.

As described in Chapter 2 of this Draft SEIS, the tunnel alignment was refined slightly since to Final EIS/EIR to accommodate the removal of the double crossover at the Wilshire/Rodeo Station and to optimize the radii of the curves. The alignment refinement results in avoiding tunneling beneath the Perpetual Savings Bank Building (9720 Wilshire Boulevard), but does require subsurface easements beneath two properties that were not identified in the Final EIS/EIR:

- 216 S Lasky Drive (AIN: 4328-007-016): multi-family residential
- 2029 Century Park East (AIN: 4319-016-029): commercial

The subsurface easements will not result in displacement or relocation of any structures on the surface of the parcel. Therefore, no adverse impacts related to subsurface easements are anticipated. In addition, a permanent easement would be required at 1950 Avenue of the Stars to support the station entrance and an approximately 3,000 square feet of permanent easements would be needed for ventilation and exhaust shafts within the Westfield Mall property located along the north side of Constellation Boulevard. As required by both the Uniform Relocation Assistance and Real Property Acquisition Policies Act and the California Relocation Assistance Act, Metro would fairly compensate property owners for all permanent and subsurface property easements. The acquisition and displacement impacts would not be considered an adverse impact with the implementation of the measures specified in Section 4.2 of the Final EIS/EIR.

Based on these considerations, the following resource areas are not discussed further in this Draft SEIS with respect to long-term operation of Section 2 of the Project, and the long-term operational impacts and mitigations measures relating to these areas remain unchanged from the Final EIS/EIR:

- **Land Use, Socioeconomic Characteristics, Environmental Justice, Visual Quality, and Parklands and Community:** The surrounding land use types, socioeconomic conditions, and visual character remain the same as those analyzed in the Final EIS/EIR. Although the BHHS campus is undergoing a modernization program, the use of the BHHS property remains as a public school. Likewise, while the physician-run hospital is being converted into a medical rehabilitation facility, it is continuing its use as a medical facility. Furthermore, neither of these facilities is immediately adjacent to the station area. No new parklands or community facilities have been developed around the station areas since publication of the Final EIS/EIR. The operations of Section 2 of the Project, which remain the same as those analyzed in the Final EIS/EIR, will not conflict with existing land uses, land use plans, or land use policies or result in a disproportionately high and adverse impact to minorities and low-income communities.

- **Air Quality, Climate Change, and Energy:** As stated in the Final EIS/EIR, operation of Section 2 of the Project is expected to decrease regional vehicle miles traveled, which will reduce energy consumption and lower emissions of some air pollutants, resulting in beneficial air quality and climate change effects. Since the refinements analyzed in this Draft SEIS do not affect operations, these energy, air quality, and climate change beneficial effects remain.
- **Hazardous Waste and Materials, Ecosystems/Biological Resources, Water Resources, and Archaeological and Paleontological Resources:** The changes at the BHHS campus and the conversion of the physician-run hospital into a medical rehabilitation facility do not introduce new hazardous waste or materials or archaeological or paleontological resources. These land use changes also do not affect the surrounding ecosystems/biological resources or water resources. Because the operations of Section 2 of the Project remain unchanged from those analyzed in the Final EIS/EIR, the assessment of these resource areas also remains unchanged. No significant impacts are anticipated related to hazardous materials or waste or water resources. The removal of trees during construction is addressed in Section 4.5.6 of this Draft SEIS. The Area of Potential Effects (APE) for the tunnel and stations remains unchanged from that analyzed in the Final EIS/EIR. The potential to encounter previously unknown archaeological or paleontological resources during construction is discussed below.
- **Safety and Security:** Since Section 2 of the Project will operate as identified in the Final EIS/EIR, Section 2 of the Project will not have a significant effect on safety and security with the incorporation of the measures described in the Final EIS/EIR. Safety related to subsurface gas risk as it relates to the BHHS campus is described in Section 4.3 of this Draft SEIS.
- **Growth-Inducing Impacts, Relationship between Short-term and Long-term Productivity, and Irreversible and Irretrievable Commitments of Resources:** Section 2 of the Project is located within a densely developed urban area, which remains a densely developed urban area with the surrounding land use changes, and will not extend into undeveloped areas that may induce changes. As identified in the Final EIS/EIR, potential indirect growth-inducing effects may result from opportunities Section 2 of the Project provides for micro-scale growth, including economic growth. Even with the refinements to the construction staging areas, the local short-term impacts and use of resources are consistent with the maintenance and enhancement of long-term productivity for the local area and region. The consumption of irreversible and irretrievable resources during construction and operation will not result in the unnecessary, inefficient, or wasteful use of such resources.

The Final Decision, the changes in construction staging activities at the Century City Constellation Station, the proposed modernization of the BHHS campus, and the conversion of the physician-run hospital into a medical rehabilitation facility were examined to identify potential impacts during construction. The proposed construction staging areas in this Draft SEIS are a refinement to Scenario B, which was analyzed in the Final EIS/EIR. The resource areas and the construction impact determinations and mitigation measures that are unchanged from the Final EIS/EIR are:

- **Land Use, Socioeconomics, Economic and Fiscal, and Environmental Justice Construction Impacts**: The surrounding land uses types and socioeconomic conditions remain the same as those analyzed in the Final EIS/EIR. Although the BHHS campus is undergoing a modernization program, the use of the property remains a public school. Likewise, while the physician-run hospital is being converted into a medical rehabilitation facility, its use as a medical facility remains. The construction of Section 2 of the Project will not directly conflict with the identified land use plans, policies, and regulations. The use of the proposed properties for construction activities will not substantially alter land uses in the station area vicinity. Construction impacts will affect neighborhoods surrounding construction staging areas, regardless of demographic or socioeconomic character. Construction activities may temporarily impact businesses, particularly those adjacent to construction sites, but at a minimum one access point to those businesses will be maintained at all times.
- **Climate Change and Energy Construction Impacts:** With the refinements to the location of the construction staging areas, the construction methods and approach continue to remain consistent with the construction methods analyzed in the Final EIS/EIR. Construction of Section 2 of the Project will not significantly increase daily carbon dioxide equivalent (CO_{2e}) emissions and will not lead to a wasteful, inefficient, or unnecessary use of energy.
- **Hazardous Waste and Materials and Water Resources Construction Impacts:** Although the staging area locations were refined slightly, the areas of excavation and construction approach remain consistent with those identified in the Final EIS/EIR. The tunnel is anticipated to be below the lowest point of contaminated soils. As contaminated groundwater may be encountered during construction, it will be treated in accordance with applicable permits' requirements prior to discharge or disposal. Preparation of construction staging areas will require the demolition of structures. If asbestos and/or lead is identified in these structures, the materials will be handled by licensed contractors in accordance with applicable regulations. The construction of Section 2 of the Project will not adversely affect the municipal water supply. Anticipated dewatering activities will require a permit from the Los Angeles Regional Water Quality Control Board, and if contaminated groundwater is encountered it will be managed in compliance with applicable permits and regulations. The drainage structures affected by construction will be resized or relocated to maintain drainage functions and prevent flooding or ponding. Construction and wastewater disposal will be conducted in accordance with applicable regulatory water quality requirements and permits.

- **Safety and Security Construction Impacts:** The construction approach and methods are consistent with those identified in the Final EIS/EIR, although the construction locations have been refined. As explained in Chapter 2 of this Draft SEIS, a 20-foot noise barrier will surround all construction staging areas, which provides site security. The safety of construction workers and the general public remains a key element of construction activities, which will be conducted in accordance with the U.S. Occupational Safety and Health Administration, the California Occupational Safety and Health Administration, the California Public Utilities Commission, and Metro policies and practices.
- **Archaeological and Paleontological Resources Construction Impacts**: With the exception of Area 5, all of the construction activities are within the area of potential effects established for Section 2 of the Project in the Final EIS/EIR. Area 5 is proposed to be used for materials storage at the surface with no excavation proposed at this location. Therefore, construction activities will not disturb archaeological or paleontological resources at Area 5. The Final EIS/EIR identified the potential for construction activities to encounter subsurface prehistoric and/or historic archaeological deposits, as well as fossils from non-asphaltic deposits, and mitigations in case such resources are encountered.

Section 4.5 of this Draft SEIS includes an analysis of the construction-related impacts to the following resource areas:

- Acquisition and Displacement of Existing Uses (Section 4.5.1)
- Visual Quality (Section 4.5.2)
- Air Quality (Section 4.5.3)
- Noise and Vibration (Section 4.5.4)
- Geological Hazards (subsurface gas) (Section 4.5.5)
- Ecosystems and Biological Resources (Section 4.5.6)
- Parklands and Community Services and Facilities (Section 4.5.7)
- Historic Resources Construction Impacts (Section 4.4)

Finally, this chapter includes an analysis of the cumulative operational and construction impacts that could result from construction and operation of Section 2 of the Project.

4.2 Noise and Vibration

This section provides analysis of long-term operational impacts related to noise and vibration for Section 2 of the Westside Purple Line Extension Project.

4.2.1 Affected Environment/Existing Conditions

Noise-sensitive land uses, such as residencies, parks, schools, hospitals, places of worship, and theater, were identified in the immediate vicinity of each station location and near any proposed project at-grade facilities, such as emergency generators in Section 4.6.2 of the *Westside Subway Extension Final Environmental Impact Statement/Environmental Impact Report* (Final EIS/EIR) (Metro 2012j). These locations were considered because of the potential for different sources of operations noise at street level near the stations. Land uses along the Project directly above the subway tunnel and between stations would not be affected by noise. Groundborne noise and vibration effects from train operations through the subway tunnels are analyzed at these locations above the tunnel alignment. The land uses surrounding the Century City Constellation Station are shown in Figure 4-1.

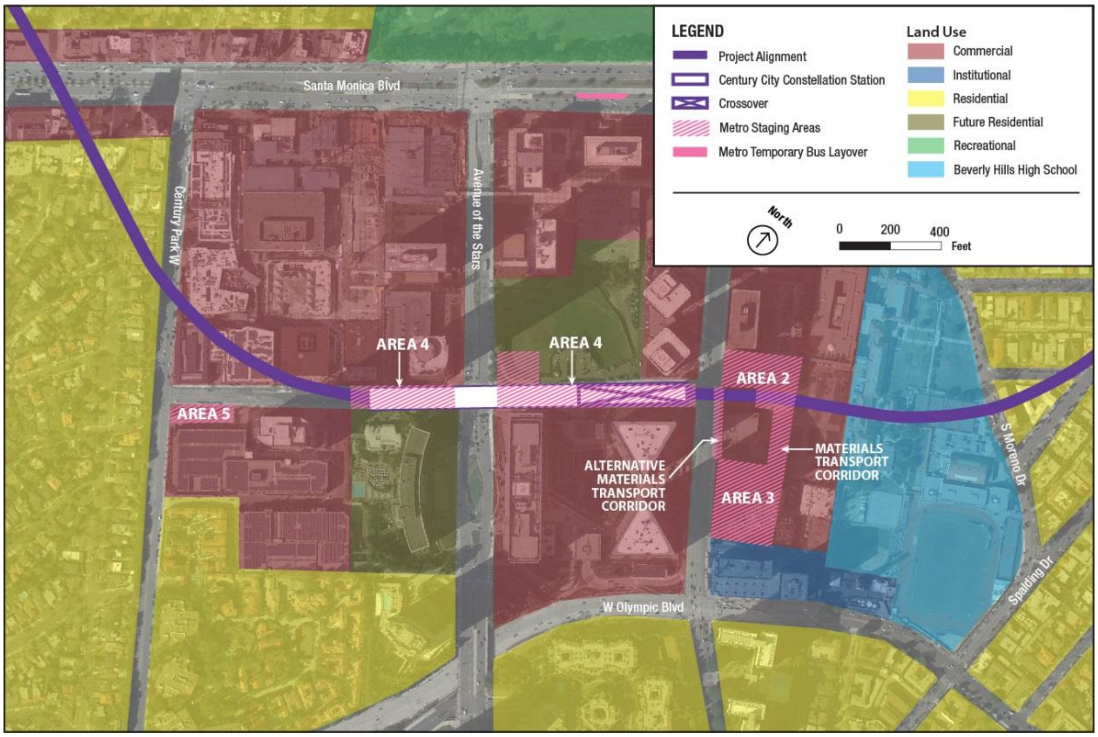


Figure 4-1. Land Uses Surrounding the Century City Constellation Station

The existing noise and vibration environment have not changed from what was described in the Final EIS/EIR. Since the publication of the Final EIS/EIR, a medical rehabilitation facility on Century Park East has opened and the BHHS campus is undergoing its approved modernization program (Figure 4-2). However, as described below, both of these uses are typical urban facilities. During the preparation of the Final EIS/EIR, noise levels were measured for 24 hours at the Wilshire/Rodeo and Century City Stations.

At the Wilshire/Rodeo Station, noise levels were measured at 120 Canon Drive south of Wilshire Boulevard (near the Wilshire/Rodeo Station). This property is located behind the retail and office buildings that front the proposed station site. The first-row land uses along the proposed station location are retail and office buildings. Multi-family residential land uses are located behind the first-row land uses to the south of Wilshire Boulevard; one hotel and an apartment building are located north of Wilshire Boulevard behind the retail and office land uses. An Ldn of 64 dBA and a peak noise hour of Leq(h) of 66 dBA were measured at this location.

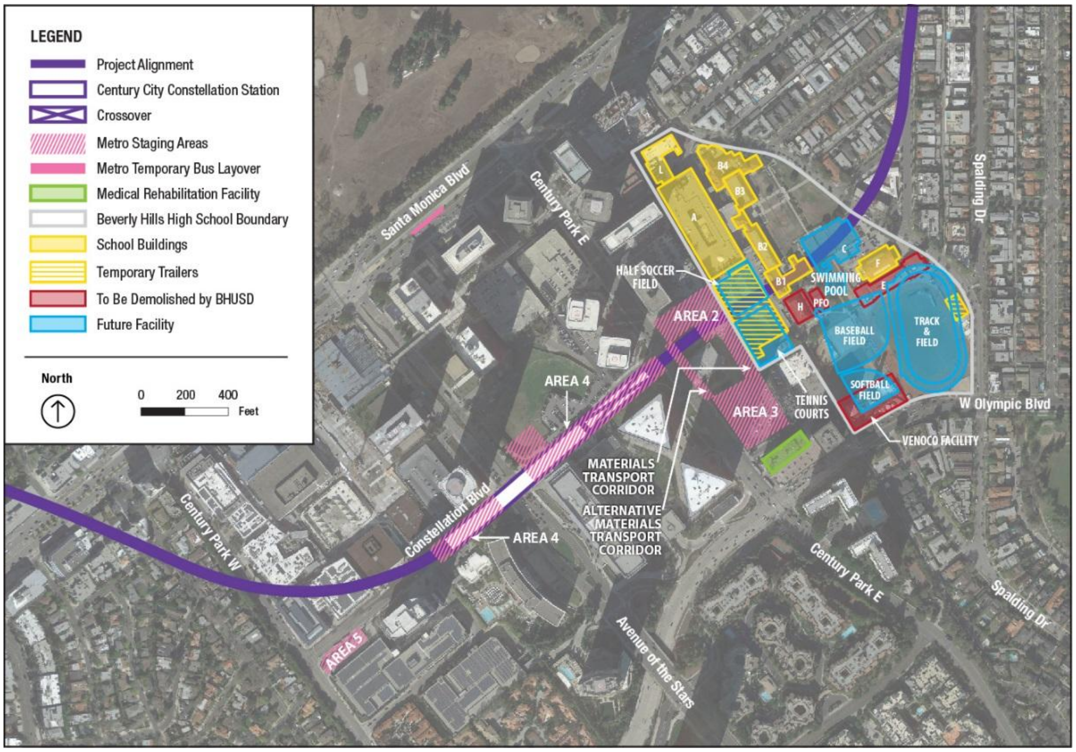


Figure 4-2. Beverly Hills High School Modernization Program

At the Century City Station, noise levels were measured at the northeast corner of Avenue of the Stars and Constellation Boulevard. A future condominium and offices are proposed on this corner and the Century Plaza Hotel is located on the southwest corner, which is also planned to be converted into a hotel and residential use. All other land uses in the immediate area are office buildings or shopping centers. An Ldn of 74 dBA and a peak noise hour Leq(h) of 78 dBA were measured at this location.

The existing ground vibration levels are typical of an urban environment, with the background VdB levels expected to range from 50 to 65 according to FTA's guidance manual *Transit Noise and Vibration Impact Assessment* (FTA 2006). As the area is typical of an urban environment, ambient vibration levels were not measured but vibration propagation tests were conducted to project the rate at which vibration attenuates. The results of this study for the BHHS are presented as part of the analysis in Section 4.2.2.

On the northeast corner of Century Park East and Olympic Boulevard is a former physician-run hospital at 2080 Century Park East. This facility was closed in 2008 due to funding issues and recently reopened under new ownership as a remodeled 9-story, 138-bed medical rehabilitation facility with inpatient services. The facility was not in operation at the time of the Final EIS/EIR studies but is a typical urban facility which is not a generator or substantial traffic or noise. The medical rehabilitation facility is located more than 1,000 feet away from the station entrance and is not above the tunnel alignment and therefore is not considered a sensitive receptor during operations or subject to noise or vibration impacts during operations.

Located immediately east of the Century City Constellation construction staging area is BHHS, which is undergoing a modernization of the campus. In 2008, the Beverly Hills Unified School District (BHUSD) issued its Draft Master Plan that was accepted by the California Board of Education and became final in 2010. The *Beverly Hills High School, Hawthorne K-8 School, and El Rodeo K-8 School Improvement Project Final EIR* (BHUSD 2015) was completed in 2015. Construction activities for the campus began in 2015 and are scheduled to continue through 2020; therefore, some BHHS construction activities will be concurrent with construction activities for Section 2 of the Project. As shown in Figure 4-2, the BHHS modernization program includes the following:

- Improvements/modifications to Buildings A (Main Class Rooms), B1 (Domestic Science), B2 (Old Class Rooms), B3 (Peters Auditorium), B4 (Salter Wing), F (Swim Gym), and L (Science Laboratories)
- Construction of a new athletics building (Building C) with underground parking
- Construction of an aquatics center
- Demolition of Buildings E (Gymnasium) and H (Maintenance & Operations; Moreno High School)
- Reconfiguration of athletic fields
- Construction of a new pedestrian plaza, enhancements to "graduation lawn," and conversion of Heath Avenue into a pedestrian walk
- Elimination of circulation on Heath Avenue, but the existing parking garage in Building A used by students and staff will remain

In total, the modernization will increase BHHS campus parking from 544 spaces to 712 spaces. During construction, portable classrooms will temporarily be located on the current lacrosse fields, which are immediately to the east of and adjacent to the Century City Constellation Station construction staging areas.

Due to its location immediately above the tunnel alignment, groundborne noise and vibration analysis was conducted for the BHHS modernization program. The BHHS campus is not in the immediate vicinity of the station box and therefore would not be subject to surface level noise during operations. Potential for noise impacts during construction is considered in Section 4.5.4 of this Draft SEIS.

4.2.2 Environmental Impacts/Environmental Consequences

Noise

The noise and vibration impacts of the Project are consistent with those analyzed in Section 4.6.3 of the Final EIS/EIR. The removal of the double crossover structure at the Wilshire/Rodeo Station and subsequent shortening of station box does not affect the noise producing activities at the station during operations because the train and station operations would remain the same as described in the Final EIS/EIR. The design of the Century City Constellation Station is consistent with how it was presented in the Final EIS/EIR.

At both the Wilshire/Rodeo and Century City Constellation Stations, components of the Project with the potential to generate noise that will be audible at the surface are the station ventilation systems, which are subject to periodic testing, and will adhere to

Metro design levels and not exceed FTA Noise Impact Criteria. At both the Wilshire/Rodeo and Century City Constellation Stations, the station ventilation fan noise would be designed so as not to exceed a maximum noise level of 45 dBA at a distance of 50 feet from the ventilation shaft outlet at the sidewalk grating or at the setback line of the nearest building, whichever is closest. The estimate fan noise levels over a 24-hour period (Ldn) and one-hour period (Leq) are presented in Table 4-1 along with the measured existing noise levels and the FTA noise impact criteria. Emergency ventilation fans would be periodically tested during the afternoon when the existing ambient traffic noise levels are at their highest.

Table 4-1. Predicted Station Ventilation Fan Noise

	Measured Existing Noise Level (dBA)	Estimated Maximum Fan Noise (dBA)	FTA Noise Impact Criteria (dBA)
Wilshire/Rodeo	Ldn = 64	Ldn = 61	Ldn = 61
Century City Constellation	Ldn = 74	Ldn = 61	Ldn = 66

Noise from rail operations, including the interaction of wheels on tracks, motive power, signaling and warning systems, and the TPSS will occur well below ground. Future traffic increases at the station locations would be minimal and would not add to the existing measured noise levels. Therefore, no adverse effects related to noise are anticipated during operations of Section 2 of the Project.

Groundborne Noise and Vibration

To accommodate the shorter Wilshire/Rodeo station box and optimize operations, the alignment was adjusted slightly between the Wilshire/Rodeo and Century City Stations as described in Chapter 2 of this Draft SEIS. This revised alignment requires subsurface easements beneath two properties that were not identified in the Final EIS/EIR: 216 Lasky Drive (multi-family residential) and 2029 Century Park East (commercial). To account for the alignment adjustment, groundborne vibration and noise predictions were prepared at these two properties.

Section 2 of the Project would pass 55 to 80 feet beneath the BHHS campus (to the tops of the tunnels), including existing Building B1 and the proposed Building C, a new athletic facility with proposed underground parking. The operational noise and vibration impacts to Building B1 were considered in the Final EIS/EIR, but the operational noise and vibration impacts to Building C were not. With the proposed subterranean parking structure, the top of tunnels would pass between approximately 8.5 and 18 feet beneath the foundation of Building C (24.5 to 34 feet to top of rails) with the shallowest point on the western end of the parking structure. The Gymnasium and the PE offices are located within Building C. The *Westside Purple Line Extension Beverly Hills High School Master Plan Groundborne Vibration Assessment – Revision 1* (Metro 2017f) (Appendix E) considers the potential for groundborne noise and vibration impacts to BHHS Building C and presents groundborne vibration and noise predictions, which are summarized in this section.

Groundborne noise is considered for the potential to create an annoyance as well as the potential to damage buildings:

- **Human Annoyance from Vibration:** Potential human annoyance from vibration is assessed using root mean squared (RMS) vibration velocity. As described in Section 4.6.3 of the Final EIS/EIR, groundborne vibration from transit vehicles is characterized using RMS vibration velocity amplitude expressed as VdB. The vibration perception threshold for most humans is around an RMS vibration level of 65 to 70 VdB. Levels from 70 to 75 VdB are typically noticeable but acceptable to most persons. Levels higher than 80 VdB are often considered unacceptable.
- **Building Damage from Vibration:** Vibration, as it is related to risk of building damage, is generally assessed in terms of peak particle velocity (PPV) in units of inches per second (in/sec). The damage risk threshold from construction vibration ranges from 0.12 in/sec for historic buildings and cultural resources to 0.5 in/sec and for architectural damage to 2.0 in/sec for structural damage.

Following FTA guidance established in the *Transit Noise and Vibration Impact Assessment* (FTA 2006), the significance of vibration impacts is based on the vibration level, the type of land use, and whether the vibration events occur frequently, occasionally, or infrequently. Frequent events are more than 70 vibration events of the same source per day. Most transit subway projects, including this one, fall into that category.

Excessive ground vibration from transit subway operations can sometimes result in a low-pitched rumbling sound occurring within a nearby building during the train pass-by called groundborne noise. The FTA groundborne vibration and groundborne noise impact criteria are shown in Table 4-2.

The groundborne noise and vibration analysis in the Final EIS/EIR uses vibration impact thresholds defined by the FTA in the *Transit Noise and Vibration Impact Assessment* (FTA 2006). Schools are considered FTA Category 3 receivers in this FTA guidance. The thresholds for Category 3 receivers are 75 VdB for groundborne vibration and 40 A-weighted decibels (dBA) for groundborne noise.

An important factor in projecting levels of groundborne vibration is the rate at which the vibration dissipates as it travels away from the source where it is generated. The relationship between a vibration source and the resulting vibration of the ground is known as the transfer mobility. The transfer mobility was determined by conducting vibration measurements in which the vibration pulses from a dropped weight were measured at various distances from the source. A load cell (force transducer) is used to measure the force input to the ground from the dropped weight, and calibrated vibration transducers are used to measure the vibration pulses at various distances from the source, as shown in Figure 4-3. The frequency-dependent propagation characteristics are derived from the transfer function relationships of the ground surface vibration and the force. The tests were conducted by dropping the weight down a borehole to the depth of the top of rail, which is the location of the vibration source that results from the train running along the rail.

Table 4-2. FTA Groundborne Vibration and Groundborne Noise Impact Criteria for General Assessment

Land Use Category	Groundborne Vibration Levels (VdB re 1 micro-inch/second)			Groundborne Noise Impact Levels (dB re 20 micro Pascals)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where vibration would interfere with interior operations	65 VdB[4]	65 VdB[4]	65 VdB[4]	N/A[5]	N/A[5]	N/A[5]
Category 2: Residences and buildings where people normally sleep	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Source: *Transit Noise and Vibration Impact Assessment* (FTA 2006)

[1]Frequent Events are defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.

[2]Occasional Events are defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.

[3]Infrequent Events are defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.

[4]This criterion limit is based on levels that are acceptable for most moderately sensitive equipment, such as optical microscopes. Vibration-sensitive manufacturer or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.

[5]Vibration-sensitive equipment is generally not sensitive to groundborne noise.

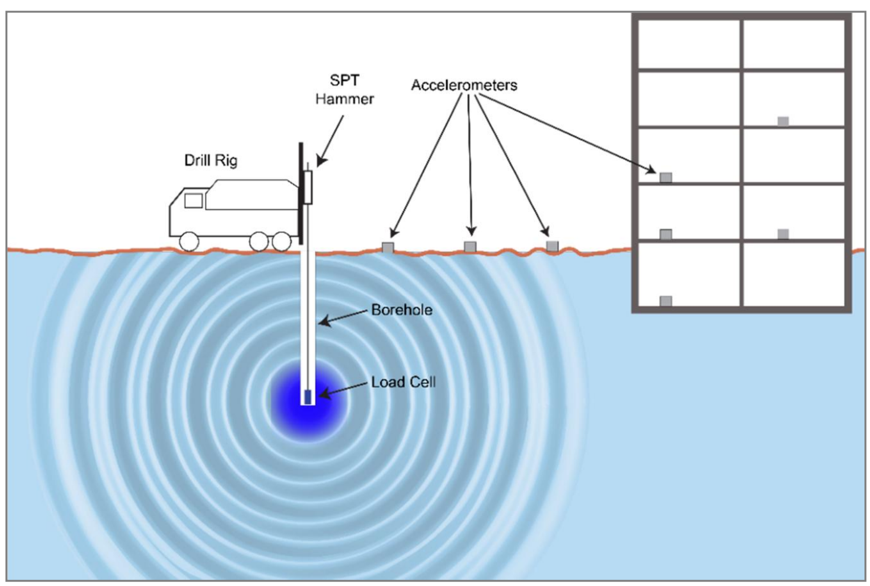


Figure 4-3. Borehole Test Configuration

Downhole vibration propagation measurements were made at several places on or near the BHHS campus in 2011 in support of the Final EIS/EIR. Borehole site G-165 was located on Heath Avenue, directly west of Building B1 (Figure 4-4). Vibration testing was conducted at three depths of 55 feet, 65 feet, and 75 feet. Several receiver positions were measured at the surface, including three measurements made inside the classrooms. The results of this testing are included in the *Westside Subway Extension Noise and Vibration Study* (Metro 2011a).

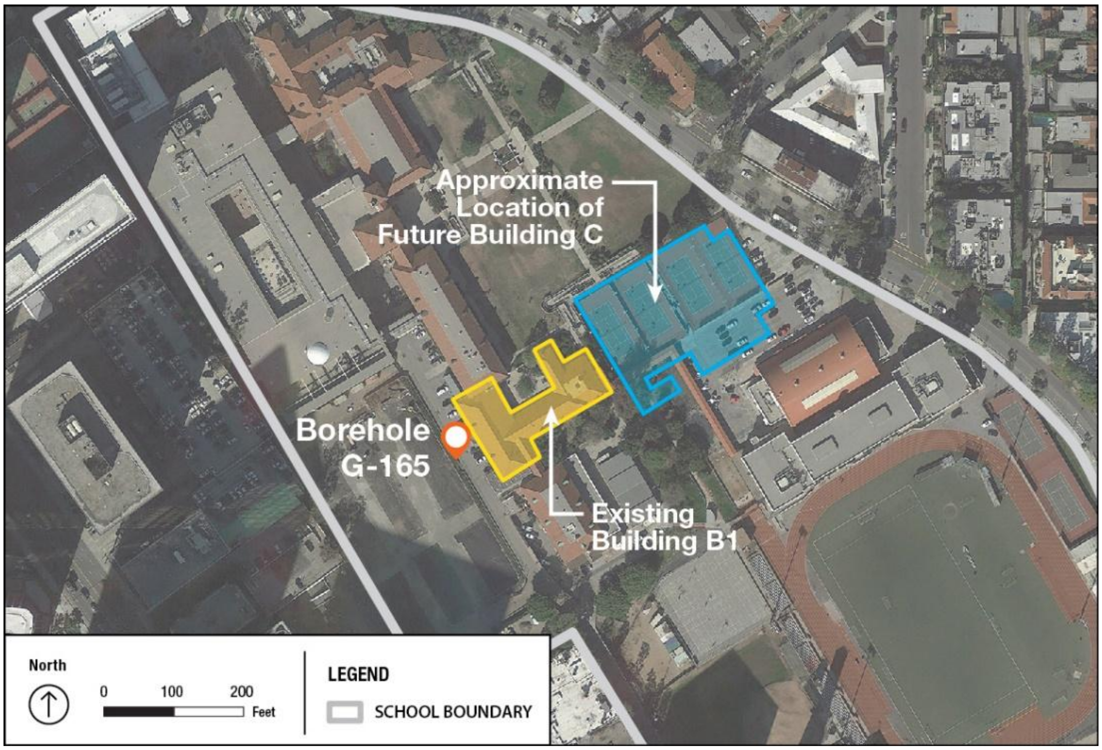


Figure 4-4. Location of Borehole Site G-165

The vibration propagation measurements were used to define the Line Source Transfer Mobility (LSTM) as a function of the diagonal distance from the top of rail. The LSTM is combined with the Force Density Level of a Metro Red Line Breda Vehicle, which is the predicted vibration excitation caused by the transit rail vehicle wheels as they travel along the tracks, to make groundborne vibration and groundborne noise predictions. Because a subterranean parking garage is proposed beneath Building C, the analysis assumed the recommended FTA coupling loss to building foundation for a large masonry building on spread footings.

Table 4-3 and Table 4-4 shows the FTA thresholds and the predicted groundborne vibration and noise levels for a single train passby and simultaneous passby of two trains, respectively, for the Gymnasium and PE office in Building C, the planned future facility on the BHHS campus that would be located directly over the Section 2 tunnel, based on the vibration propagation measurements.

Table 4-3. Predicted Groundborne Vibration and Noise Levels at BHHS Building C – Single Train Passby

	FTA Category 3 Thresholds	Building C Gymnasium (1st Floor) Predicted Levels	Building C PE Office (2nd Floor) Predicted Levels
With Building C Subterranean Parking Structure			
Groundborne Vibration (Lv)	75 VdB	72 VdB	70 VdB
Groundborne Noise (La)	40 dBA	53 dBA	51 dBA
Without Building C Subterranean Parking Structure			
Groundborne Vibration (Lv)	75 VdB	65 VdB	63 VdB
Groundborne Noise (La)	40 dBA	32 dBA	30 dBA

Source: *Transit Noise and Vibration Impact Assessment* (FTA 2006) and *Beverly Hills High School Master Plan Groundborne Vibration Assessment –Revision 1* (Metro 2017f) (Appendix E)

Table 4-4. Predicted Groundborne Vibration and Noise Levels at BHHS Building C – Two Train Passby

	FTA Category 3 Thresholds[1]	Building C Gymnasium (1st Floor) Predicted Levels	Building C PE Office (2nd Floor) Predicted Levels
With Building C Subterranean Parking Structure			
Groundborne Vibration (Lv)	83 VdB	75 VdB	73 VdB
Groundborne Noise (La)	48 dBA	56 dBA	54 dBA
Without Building C Subterranean Parking Structure			
Groundborne Vibration (Lv)	83 VdB	68 VdB	66 VdB
Groundborne Noise (La)	48 dBA	35 dBA	33 dBA

Source: *Transit Noise and Vibration Impact Assessment* (FTA 2006) and Beverly *Hills High School Master Plan Groundborne Vibration Assessment –Revision 1* (Metro 2017f) (Appendix E)
Notes: 1. FTA Category 3 thresholds for infrequent events of fewer than 30 per day.

As shown in Table 4-3, the predicted maximum level groundborne vibration and groundborne noise for a single train passby at the Building C Gymnasium and PE Office would exceed the FTA Category 3 groundborne noise threshold of 40 dBA if the BHHS subterranean parking structure is constructed as currently proposed. It is predicted not to exceed the groundborne vibration threshold of 75 VdB. If the subterranean parking structure is not constructed, the predicted train groundborne vibration and the groundborne noise levels are not predicted to exceed FTA Category 3 thresholds at the Building C Gymnasium and PE Office.

The predicted groundborne vibration and groundborne noise, presented in Table 4-4, is a maximum level for simultaneous passby of two trains. It is not expected that two trains will simultaneously pass under Building C for more than 21 times per day. The FTA threshold for infrequent events of fewer than 30 per day is used to assess the potential effect of this occurrence. If the subterranean parking structure is constructed as currently proposed, the two train predicted groundborne noise at the Building C Gymnasium and PE Office would exceed the FTA Category 3 groundborne noise threshold of 48 dBA. It is predicted not to exceed the groundborne vibration threshold of 83 VdB. If the subterranean parking structure is not constructed, the predicted train groundborne vibration and the groundborne noise levels are not predicted to exceed FTA Category 3 thresholds at the Building C Gymnasium and PE Office.

The predicted groundborne vibration and noise levels presented in Table 4-3 and Table 4-4 account for the proposed location of the Building C subterranean parking structure, which extends the building foundation to within approximately 8.5 feet of top of tunnel (24.5 feet from the top of rail) at the shallowest point. Any changes to the proposed building location and/or building design would affect the groundborne vibration and groundborne noise levels. If the distance between the top of rail and the building foundation increases, the predicted groundborne vibration and noise levels would be lower.

At 40 feet or more between top of rail and building foundation, the predicted groundborne noise levels would not exceed the FTA threshold of 40 dBA at the Gymnasium or PE Office for a single train passby or 48 dBA for a two train passby. However, constructing the tunnel at that depth would increase costs and result in less efficient train operations. The gradient of the tunnels east of Constellation Station is already approaching the maximum of 4 percent permitted by Metro criteria. Therefore, lowering the tunnels below BHHS buildings would require a corresponding increase in the depth of the Century City Constellation Station. Increasing the depth of the Century City Constellation Station is not technically prudent as all the additional depth would be below the water table, meaning increased dewatering and hence settlement due to dewatering impacting buildings adjacent to the station. The increased depth of the station would also result in increased loads on shoring from building foundations now within the zone of influence of the deeper station or foundation loads now further above the bottom of excavation. In addition to not being technically prudent, the deeper excavation will result in higher volumes of excavation, a longer construction timeline and street closures, and subsequently higher construction costs. Furthermore, placing the station at that depth would create an inconvenience for passengers by increasing the amount of time required to access and egress the station.

Table 4-5 shows the FTA thresholds and the predicted groundborne vibration and noise levels at 216 Lasky Drive and 2029 Century Park East. As shown, the groundborne vibration and groundborne noise is predicted not to exceed FTA thresholds at these locations for their respective land uses. As stated in the Final EIS/EIR, the groundborne vibration and groundborne noise is predicted not to exceed FTA thresholds at any other vibration sensitive land uses along Section 2 of the Project.

Table 4-5. Predicted Groundborne Vibration and Noise Levels at 216 Lasky Drive and 2029 Century Park East

	FTA Groundborne Vibration Thresholds	Groundborne Vibration (Lv)	FTA Groundborne Noise Thresholds	Groundborne Noise (La)
216 Lasky Drive (Multi-family Residential)	72 VdB	60 VdB	35 dBA	26 dBA
2029 Century Park East (Commercial)	75 VdB	71 VdB	40 dBA	38 dBA

4.2.3 Mitigation Measures

The predicted groundborne vibration resulting from operation of Section 2 of the Project would not exceed FTA Category 3 thresholds for Gymnasium and PE office at BHHS's Building C if the BHHS subterranean parking structure is not built. If the distance between the top of rail and the Building C foundation with the subterranean parking structure is less than 40 feet, the predicted groundborne noise levels resulting from operation of Section 2 of the Project would exceed FTA Category 3 thresholds for the Gymnasium and PE office at BHHS's Building C. With the implementation of the following mitigation, the groundborne noise level is predicted not to exceed the FTA Category 3 thresholds and no groundborne noise impacts would remain.

- VIB-3—Use of Groundborne Noise Minimization Techniques: If the distance between the top of rail and the BHHS Building C foundation is less than 40 feet, resilient rail fasteners, floating slab track or other similar technology will be incorporated into the project design to reduce groundborne noise to levels that do not exceed FTA Category 3 groundborne noise threshold at BHHS Building C.

4.3 Geologic Hazards

The Final Decision identified the following three issues related to geologic hazards to be addressed in this SEIS:

- An analysis of the potential risks of soil gas migration from tunneling or other construction activities related to Section 2 of the Project to nearby structures and, depending on the results of that analysis, additional disclosures and/or assessments
- A discussion of the completeness of the available seismic risk information related to Section 2 of the Project
- A discussion of the post-Draft EIS seismic studies available to the FTA and related to Section 2 of the Project

The geologic hazards analysis of the Project in the *Westside Subway Extension Final Environmental Impact Statement/Environmental Impact Report* (Final EIS/EIR) (Metro 2012j) is incorporated into this SEIS by reference. This section provides updated information to Section 4.8 of the Final EIS/EIR to address the Final Decision and incorporates the results of all available geotechnical investigations, including investigations carried out after the Draft EIS/EIR publication, as they relate to the following:

- Surface fault rupture
- Subsurface gas and oil fields

The findings of the geotechnical investigations carried out after the Draft EIS/EIR publication are consistent with the information provided in the Final EIS/EIR for the following areas of geologic hazards, which, as directed by the Final Decision, are not the subject of this SEIS:

- Seismic ground shaking
- Liquefaction and seismic settlement

As part of the Final Decision, the SEIS should provide the public with an opportunity to comment on the post-Draft EIS/EIR additional seismic studies. To do so, the Project is presented in this section as it was analyzed in the Final EIS/EIR, with both the Century City Constellation Station and the Century City Santa Monica Station locations. The Century City Constellation Station and alignment is described in Chapter 2 of this SEIS.

The Century City Santa Monica Station and alignment location analyzed in the additional studies is consistent with the description in Chapter 2 of the Final EIS/EIR as follows: the Century City Santa Monica Station would be located underneath Santa Monica Boulevard from just west of Century Park East to Moreno Drive. A separate crossover box would be located east of Moreno Drive. The entrance would be located on the southwest corner of Santa Monica Boulevard and Century Park East.

Following the publication of the Draft EIS/EIR, investigations were carried out in the Century City area to address the Metro Board of Directors' motion to study tunneling safety in the Board-approved Locally Preferred Alternative (LPA) tunnel alignment between Beverly Hills and Westwood. Two reports, the *Westside Subway Extension Century City Area Tunneling Safety Report* (Metro 2011d) and the *Westside Subway Extension Century City Area Fault Investigation Report* (Metro 2011c) were prepared to present the results of these studies in detail. The soil boring logs, gas monitoring well diagrams, and detailed geologic profiles from these studies along the LPA were presented in the *Westside Subway Extension Preliminary Geotechnical and Environmental Report* (Metro 2011g) and in the *Westside Subway Extension Century City Area Fault Investigation Report* (Metro 2011c). The findings of the reports were reviewed by Metro's Tunnel Advisory Panel and an Independent Review Panel (refer to the *Tunnel Advisory Panel Final Report* [Metro 2011j] and *Report of Independent Review Panel* [Metro 2011ao]).

The reports' findings were presented to the Metro Board of Directors and released to the general public on October 19, 2011. The presentation made to the Metro Board of Directors is appended to this SEIS (*Presentation to Planning & Programming Committee* [Metro 2011i]) and the video is available on the Metro project website at www.Metro.net/purplelineext.

The results of these investigations were incorporated into the Final EIS/EIR. All of the geotechnical reports prepared for the Final EIS/EIR are also appended to this SEIS.

Following completion of the Final EIS/EIR, the City of Beverly Hills and the Beverly Hills Unified School District (BHUSD) submitted a series of letters (described further below) to Metro regarding Metro's interpretation of the geotechnical data in the Final EIS/EIR. Metro reviewed all of the letters and prepared responses, both written and oral, in May 2012 when Section 2 of the Project was approved. The following documentation relates to the Board approval of the Final EIS/EIR and selection of the Century City Constellation Station, and is appended to this SEIS:

- *Transcript: Special Meeting of the MTA Board to Conduct Public Hearing* (Metro 2012a)
- *Final EIS/EIR Presentation to Metro Committee* (Metro 2012d)
- *Metro Board Report* (Metro 2012e)
- *Appendix D to Metro Board Report* (Metro 2012f)

Since the Final EIS/EIR was certified in 2012, additional geotechnical investigations have been performed by Metro during Advanced Preliminary Engineering. In addition to the reports listed above, the following reports have been prepared by Metro since 2012 and are appended to this SEIS:

- *Geotechnical Design Memorandum – Section 2, Tunnel Reaches 4 and 5* (Metro 2016e)
- *Geotechnical Design Memorandum – Century City Constellation Station* (Metro 2016f)
- *Geotechnical Design Memorandum – Wilshire/Rodeo Station* (Metro 2016g)
- *Geotechnical Data Report–Tunnel Reaches 4 and 5* (Metro 2016h)
- *Geotechnical Data Report – Century City Constellation Station* (Metro 2016i)
- *Environmental Data Report – Century City Constellation Station* (Metro 2015a)
- *Westside Purple Line Extension Section 2 Geotechnical Fault Investigations Summary Memorandum (*Metro 2016a*)*
- *Westside Purple Line Extension Project, Section 2 Addendum to the Final Environmental Impacts Report* (Metro 2015e)
- *Fault Investigation Report Transect 9—Tunnel Reach 5* (Metro 2017c)
- *Probabilistic Fault Displacement Hazard Evaluation* (Metro 2017d)
- *Assessment of Tunneling and Station Excavation Risks Associated with Subsurface Gas along Section 2 – Revision 1* (2017b)

In addition to reports prepared by Metro, other property owners in the Project's vicinity prepared a number of independent geotechnical fault investigation reports, which have been reviewed by Metro and used by Metro in further analysis of geologic conditions in the vicinity, as described herein. Those reports as listed below, are incorporated into this SEIS by reference and are summarized in Appendix B:

- *Fault Hazard Assessment of the West Beverly Hills Lineament, Beverly Hills High School* (Leighton Consulting, Inc. [LCI] 2012a)
- *Initial Response to California Geological Survey Review Comments, Fault Rupture Hazard Review, Beverly Hills High School* (LCI 2012b)
- *Second Response to California Geological Survey Review Comments, Fault Rupture Hazard Review, Beverly Hills High School (*LCI 2012c)
- *Addendum to Second Response to California Geological Survey Review Comments, Fault Rupture Hazard Review, Beverly Hills High School* (LCI 2013)
- *Fault Rupture Hazard Investigation, 1802 Avenue of the Stars, 10250 Santa Monica Boulevard, 1930 Century Park West* (Geocon West 2013)

- *Report of Phase II Site-Specific Fault Rupture Investigation* (Geocon West 2014)
- *Report of Fault Rupture Hazard Investigation* (Feffer Geological Consulting [FGC] and Geocon West 2012)
- *Summary of Fault Trench Study at 10131 Constellation Boulevard - Century City* (GeoKinetics Geotechnical & Environmental Engineers [GeoKinetics] 2013)
- *Geohazard Report, El Rodeo K-8 School* (LCI 2015);
- *Updated Fault Hazard Assessment and Response to CGS Review Letter, El Rodeo K8 School* (LCI 2016)

Based on the data in the above-listed geotechnical fault investigation reports, a number of opinion reports were prepared by various parties either criticizing the Metro investigations or attempting to present different interpretations as to the meaning of the reported data and the geoseismic conditions of the area. The following such reports, along with Metro responses, incorporated herein by reference, have been prepared since the publication of the Draft EIS/EIR and were considered by Metro and FTA in preparing this Draft SEIS:

- *Preliminary Literature and Geomorphic Evaluation of the Eastern Santa Monica Fault Zone, and Potential Impacts Associated with Fault Surface Rupture Relative to Proposed LA Metro Stations in Century City (*Kenney GeoScience [KGS] 2011)
- *Geomorphic, Structural and Stratigraphic Evaluation of the Eastern Santa Monica Fault Zone, and West Beverly Hills Lineament* (KGS 2012)
- *Hazard Assessment Study* (Exponent 2012a)
  - *Response to Hazard Assessment Study by Exponent* (Metro 2012h)
  - *Response to Metro Comments* (Exponent 2012b)
  - *Reply to Exponent Responses* (Metro 2012b)
- *Preliminary Review Comments of Century City Area Fault Investigation Report, Westside Subway Extension Project Century City and Beverly Hills Area* (Shannon & Wilson 2012)
  - *Response to Preliminary Review Comments of Century City Area Fault Investigation Report by Shannon and Wilson* (Metro 2012g)
- *Response to Leighton Consulting Report [Fault Hazard Assessment of the West Beverly Hills Lineament, Beverly Hills High School]* (Metro 2012c)
- *Preliminary Revised Fault Map Based on Geomorphic, Structural and Stratigraphic Evaluation in the Century City/Cheviot Hills Area (*KGS 2013)
- *Structural and Stratigraphic Evaluation of the Century City-Cheviot Hills Area* (KGS 2014)
- *Evaluation of Regional and Local Seismic Issues within the Beverly Hills Unified School District and their Public and Scientific Issues* (KGS and PrimeSource Project Management LLC [PSPM] 2016)

In addition, the California Geological Survey (CGS) has issued a revised geologic map of the Los Angeles Basin that includes the Century City area, which is discussed in Section 4.3.1. This map, although not produced for use in surface fault rupture hazard evaluation or seismic shaking hazard evaluation, illustrates the Newport-Inglewood and Santa Monica Faults.

Furthermore, the City of Los Angeles established the Preliminary Fault Rupture Study Areas (PFRSA) in 2015, where fault investigations are required by the City of Los Angeles Department of Building and Safety in areas under that agency's jurisdiction. The PFRSA in the Century City area includes the Santa Monica Fault as shown in CGS, 2014, generally along Santa Monica Boulevard between the Cities of Santa Monica and Beverly Hills (LA 2015).

Information in this section has been developed based on a review of the data and opinions presented in all of the above-listed geotechnical documents. This Draft SEIS provides the public the opportunity to comment on the geotechnical work and Metro's geoseismic studies completed to date.

4.3.1 Existing Conditions/Affected Environment

The existing conditions and affected environment related to geologic hazards for Section 2 of the Project are presented in the following sections. Where appropriate, the geologic conditions are described for the entire Study Area with a focus on Section 2 of the Project. The changes to the land uses at a medical rehabilitation facility on Century Park East and to BHHS are described in Section 4.2.1 of this Draft SEIS. Unless otherwise noted, the existing conditions remain the same as they were identified in Section 4.8 of the Final EIS/EIR.

The fundamental geology of the Study Area has not changed since the publication of the Final EIS/EIR. However, extensive additional studies were conducted after the Final EIS/EIR.

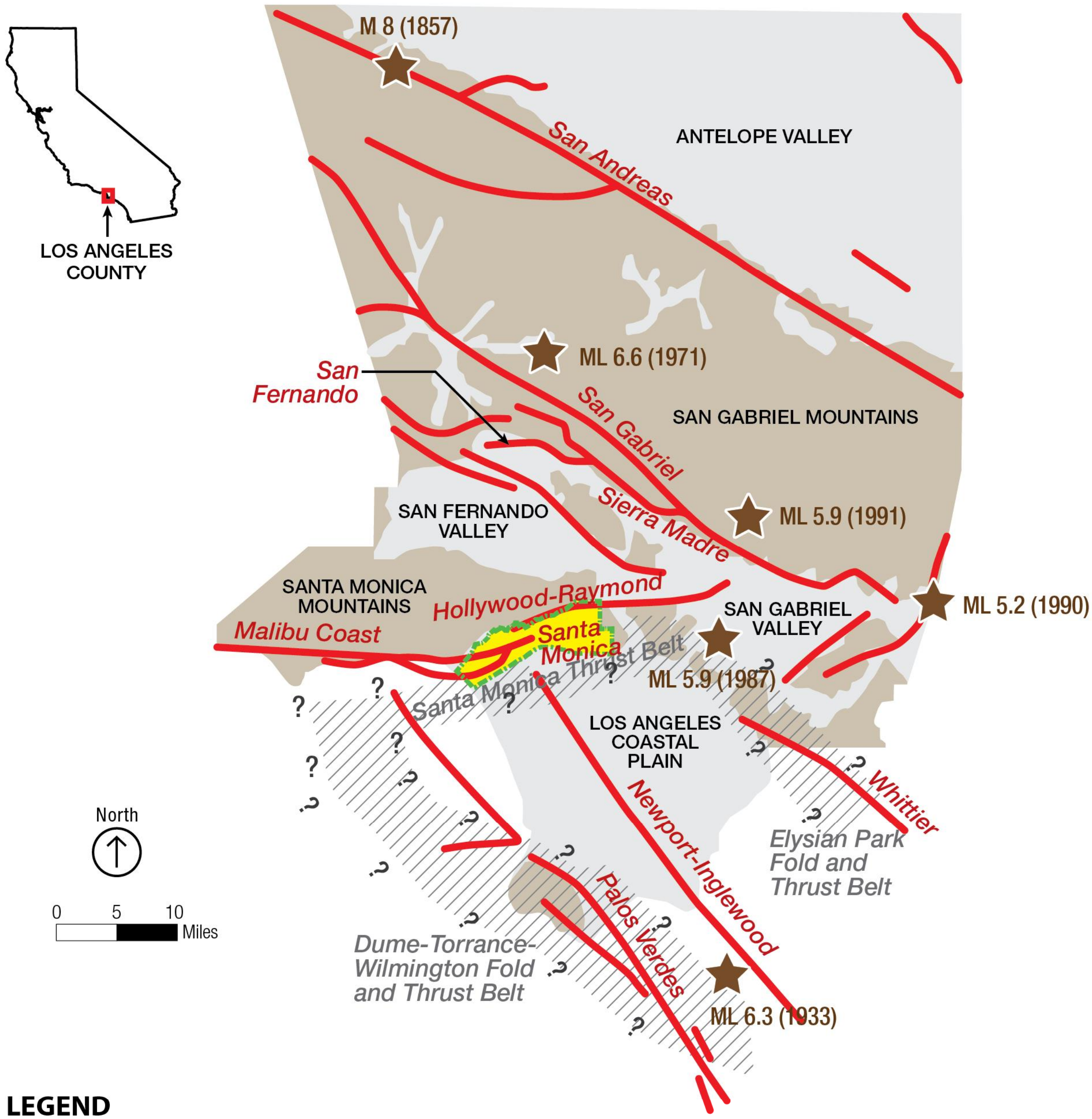
The additional studies provided more data on faulting in the vicinity of the Century City Station options (Metro 2011c). In addition, fault studies were performed on several properties along and adjacent to the Project alignment by the property owners (see References), as well as along the alignment by Metro (2016). These studies provided additional scientific/technical analysis regarding the Santa Monica Fault zone that confirmed, and in some cases supplemented, the existing geotechnical and geological information in the environmental review record (refer to Section 4.8 of the Final EIS/EIR).

Study Area Geology

Geological Setting

The Project lies at the intersection of the northern end of the northwest-trending Peninsular Ranges physiographic province with the southern portion of the east-west-trending Transverse Ranges physiographic province (Figure 4-5). The Peninsular Ranges physiographic province includes the nearby San Jacinto and Santa Ana Mountains. The Transverse Ranges physiographic province includes the Santa Monica Mountains.

The Los Angeles Basin, which lies at the northwest end of the Peninsular Ranges physiographic province, is an elongated northwest-trending, sediment-filled trough that is up to 6 miles deep. At its surface, the Los Angeles Basin is an alluvial coastal plain composed mainly of stream- and alluvial fan-deposited sediments originating from nearby mountains. In the Project area, the sediments originated primarily from the south flank of the Santa Monica Mountains.



LEGEND

- Study Area
- Mountains
- Blind Thrust Belts from Hauksson (1990)
- ? Estimated, but unknown, limits of the blind thrust belts by Hauksson (1990)
- Epicenters of Selected Earthquakes
- ML Local Magnitude Earthquake
- M Magnitude Earthquake
- Fault Lines

Figure 4-5. Physiographic Provinces and Identified Earthquake Faults in Los Angeles County, from Metro Supplemental Seismic Design Criteria, 2015

Geology

A geological unit (or "Formation") is a grouping of rock or soil of an identifiable origin and age that is defined by its distinctive and dominant features. There are four geologic units within the tunnel and station depth horizon of Section 2 of the Project, as shown in Table 4-6, with the youngest units being present at the shallowest depths and older units being below the younger units. Geology in Section 2 of the Project is shown in Figure 4-6 as it is currently understood based on published studies. Geology in relation to Section 2 of the Project tunnel is shown in Figure 4-7.

Table 4-6. Geologic Units within Depth Range of Tunnel and Station

Age	Geologic Formation (age)	Age (Thousands of years)	Symbol	Composition	Location in Study Area
Youngest	Younger Alluvium (Holocene)	Recent to 11	Qal	Poorly consolidated, interlayered silts, clays, and silty sands with some sand layers and gravel	Beverly Hills east of the vicinity of Moreno Drive
	Older Alluvium/ Alluvial Fan (Late Pleistocene)	11-500	Qalo	Non-marine sediments	All areas
	Lakewood (Pleistocene)	350-500	Qlw	Sands, silty sands with some clayey sand layers	Century City and Beverly Hills west of Lasky Drive
Oldest	San Pedro (Pleistocene)	500+	Qsp	Fine-grained sand and silty sand with few interbeds of medium- to course-grained sand and some local silt layers. Some asphaltic sand	Century City and Beverly Hills west of Lasky Drive and east of vicinity of Roxbury Drive

Sources: *Westside Subway Extension Geotechnical and Hazardous Materials Technical Report* (Metro 2015i), Section 3.2.2, modified 2016

Note: Geologic Units = units appearing at any depths ranging from the ground surface to bottom of the tunnel

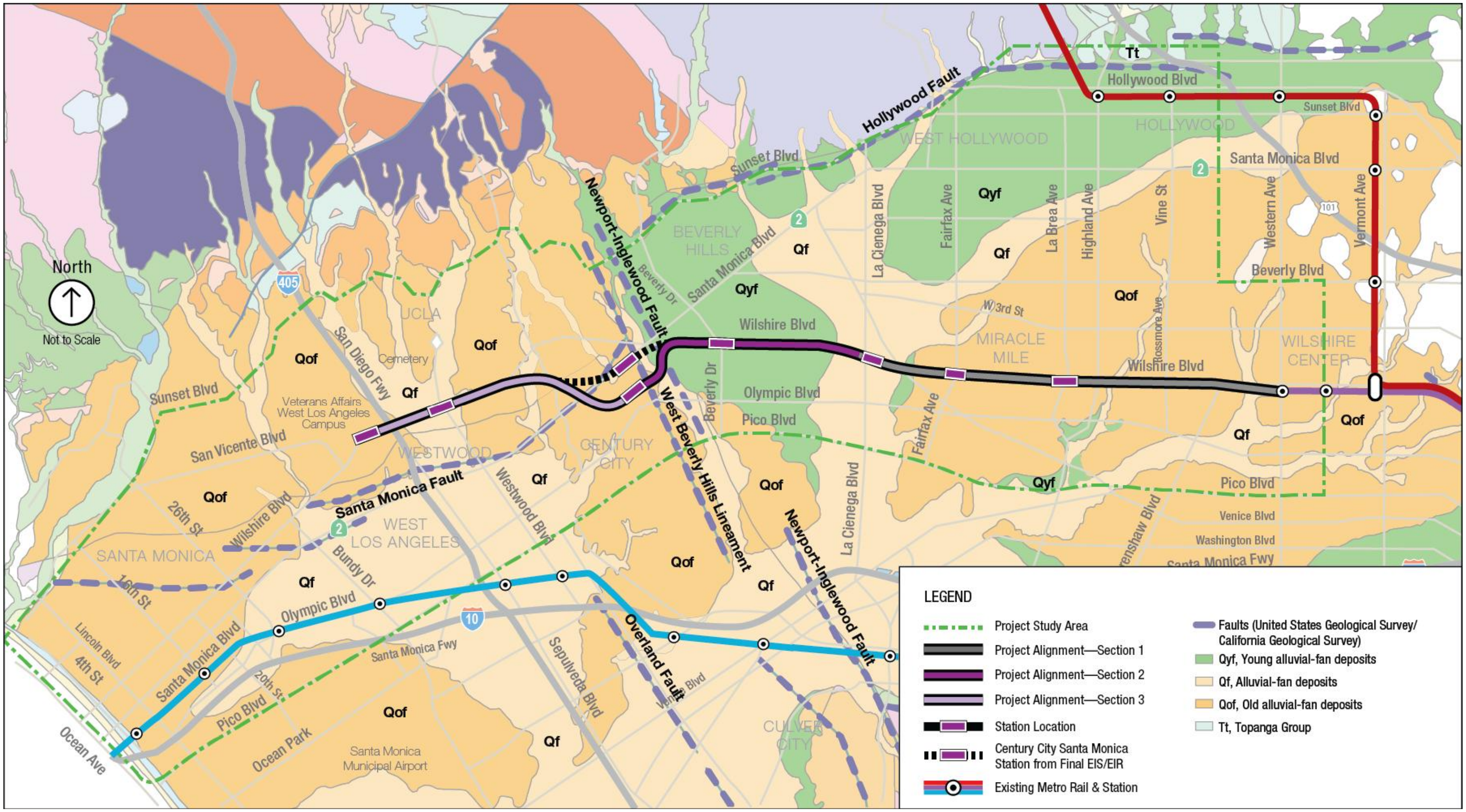
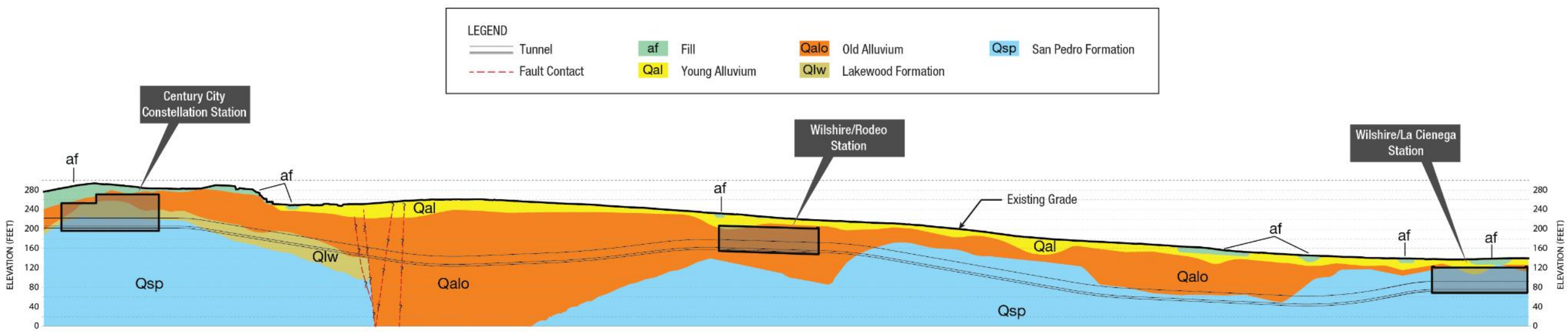


Figure 4-6. Surface Geology and Identified Earthquake Faults



Sources: *Westside Purple Line Extension Section 2 Fault Investigation Report* (Metro 2016a) and *Westside Purple Line Extension Geotechnical Data Report–Tunnel Reaches 4 and 5* (Metro 2015d)

Figure 4-7. Geologic Cross-Section for Section 2 of the Project

Seismic Hazards

The following section describes faulting in the Study Area, seismicity, and seismically induced hazards.

Fault Characterization

Numerous faults are present in the Los Angeles area, with many of these faults occurring near the edges (or "margins") of the Los Angeles Basin. This fact is not disputed, nor is the fact that many of the faults constitute hazards for the built environment. As stated in the Metro Supplemental Seismic Design Criteria: "except for the Newport-Inglewood Structural Zone, most surface geological faults such as the Santa Monica, Hollywood, and Whittier faults occur along the Basin margins."

The hazards presented by faults can be classified as primary, secondary, and tertiary: the primary hazard is ground surface rupture, which can cause fault displacement of the ground surface where the fault reaches up to the ground surface; the secondary hazard is shaking caused by the earthquake rupture. The hazard of surface-rupture displacement is confined to a narrow zone along the fault, whereas the shaking hazard can be present at large distances from a fault, depending on the magnitude of the earthquake. In addition, the shaking hazard itself can result in tertiary effects such as damage to structures, liquefaction of the ground, and instability of slopes within the zone of significant seismic shaking from the earthquake.

In order to evaluate the risk of the primary, secondary, and tertiary effects of earthquakes, the locations of faults must first be evaluated and then a determination is made whether those faults present a hazard for the particular project. Often the terms "active" and "inactive" are applied to help represent the risk of a particular fault having future earthquakes that would affect a project; in those terms, an active fault would represent a fault presenting an increased potential hazard for a project, whereas an inactive fault would represent a fault presenting a lower potential hazard for a project.

Characterization of faults includes a determination of a fault's location and activity. The following sections define the process for characterizing faults.

How are faults explored?

Faults are explored by conducting subsurface investigations. A fault is located by identifying geologic materials broken by a plane that is vertical or inclined. The fault often causes the same geologic material on each side of the fault to be "offset" by some distance due to movement on the fault, either horizontally or vertically, or some combination of the two. Therefore, if the explorations show a horizontal geologic layer that is identified at different depths within a short horizontal distance, that offset can sometimes be attributed to fault activity. The explorations consist of borings, cone penetration tests (CPTs), trenches, or geophysical scanning methods. A transect refers to a series of borings, CPTs, or geophysical explorations that extend in a line when shown on a map. The purpose of arranging the explorations as a "transect" is to allow for a geologic cross-section to be drawn based on the data obtained from the explorations.

How is an active fault defined?

The standard of practice for evaluation of a fault is to first establish whether a fault is active or inactive, based primarily on the timing of the last rupture event. The definition of "active" is not straight-forward and agency standards vary nationwide. The CGS defines an "active" fault as having ruptured in the last 11,700 years before present. However, the use of a single date as definite evaluation of the potential for future rupture is both arbitrary and overly simplistic, as stated by the CGS:

> *The evaluation of a given site with regard to the potential hazard of surface fault rupture is based extensively on the concepts of recency and recurrence of faulting along existing faults. In a general way, the more recent the faulting the greater the probability for future faulting (Allen, 1975). Stated another way, faults of known historic activity during the last 200 years, as a class, have a greater probability for future activity than faults classified as Holocene age (last 11,000 years), and a much greater probability of future activity than faults classified as Quaternary age (last 1.6 million years). However, it should be kept in mind that certain faults have recurrent activity measured in tens or hundreds of years whereas other faults may be inactive for thousands of years before being reactivated. (CGS Note 49, Guidelines for Evaluating the Hazard of Surface Fault Rupture, 2002)*

Other standards for defining a fault as "active" are used by other agencies, such as those used for dams and nuclear power plants. As described by the State of California Division of Safety of Dams (DSOD) publication regarding active faults, "numerous definitions for active faulting have been proposed, but no one definition has been universally accepted…." (DSOD 2001). The DSOD defines an "active" seismic source as a fault that has ruptured within the last 35,000 years. As stated by the DSOD:

> *The 35,000-year value was selected based on the belief that Holocene activity (the last 10,000 years) is not a sufficiently conservative criterion for elimination of a fault when estimating ground motion for dam design….This or any fault activity criterion is somewhat arbitrary by its very nature. There is no physical reason why a fault that has not moved during the last 35,000 years cannot move again. This point is illustrated by the October 16, 1999 Magnitude 7.1 Hector Mine Earthquake. Much of the fault zone that produced this earthquake had not ruptured previously during the Holocene, clearly illustrating the need to design dams for a criterion more conservative than Holocene activity. The 35,000-year criterion was selected because it provides this conservatism, while retaining the practicality of having several age-dating techniques available to investigating geologists.*

Similarly, the U.S. Nuclear Regulatory Commission provides guidelines for evaluation of faults; rather than using the term "active," the Commission uses the term "capable," which is defined as a fault that "has exhibited one or more of the following characteristics: (1) Movement at or near the ground surface at least once within the past 35,000 years or movement of a recurring nature within the past 500,000 years…." (USNRC 2015).

Because a subway is a critical facility, it is prudent to consider some faults as active even if the age of the most recent rupture on those faults is more than 11,700 years before the present. Recent significant earthquakes in Southern California demonstrate this:

- June 28, 1992: Magnitude 7.3 Landers Earthquake centered in the Mojave Desert, which ruptured the Johnson Valley, Kickapoo (also known as Landers), Homestead Valley, Homestead/Emerson, Emerson Valley, and Camp Rock Faults, several sections of which had pre-Landers ruptures older than would have been caused for those faults to be considered active according to the classification using Holocene activity 11,700 years before the present.
- October 16, 1999: Magnitude 7.1 Hector Mine Earthquake also centered in the Mojave Desert, which ruptured the Lavic Lake Fault and the Bullion Fault, portions of which would not have been considered Holocene-active based on their prior activity (see additional commentary on this earthquake in the DSOD quotation above).

How is the age of geologic features determined?

Various methods are used to estimate the dates of geologic materials. For example, the City of Los Angeles identifies three methods that may be used for determining the age of geologic units to assess the age of fault activity (LA 2015):

- Radiocarbon dating
- Thermoluminescence (TL) and Optical Stimulated Luminescence (OSL) dating
- Soil-Profile Development

Reliability of Geologic Dating

Highest Reliability	Radiocarbon TL / OSL
Lowest Reliability	Soil-Profile Development

Radiocarbon dating measures the radioactive decay of carbon-14. The radiocarbon dating method produces a numerical age up to approximately 50,000 years and has optimal resolution in the age range of interest for evaluating active faulting. The reliability of radiocarbon dating is considered to be relatively high compared to other dating methods.

TL and OSL dating techniques evaluate the last exposure of quartz and feldspar minerals to sunlight prior to burial and measure the age of sediments (soils) in the range of 10 to 500,000 years. TS and OSL dating are methods of dating late Quaternary sediments older than radiocarbon limits of about 50,000 years.

Soil-Profile Development compares soils developed within a similar climate, parent material, organisms, topography, and time. The Soil-Profile Development method requires a geologist to be familiar with Quaternary climatic cycles to which dating of geologic layers is commonly correlated.

There are uncertainties associated with dating using any of these methods and, therefore, dating of multiple samples and by multiple methods is prudent as a means to reduce the uncertainty associated with dating soil deposits.

How are shaking hazard and rupture hazard determined?

If a fault is considered to be active, then the possible risk of future earthquakes on that fault is evaluated. In order to evaluate the risk due to future earthquakes on a particular fault, first the potential magnitudes of future events on that fault are estimated. The magnitude is a quantification of the energy released by an earthquake, which can be obtained from past earthquakes based on measurements of the maximum motion recorded by seismographs, which record the trembling of the ground. Basically, the magnitude scale is exponential, where each whole magnitude number is 32 times the strength of the previous whole magnitude number below it (for example, a magnitude 6 earthquake is 32 times stronger than a magnitude 5 earthquake).

The shaking hazard from an earthquake on the fault is computed using numerical quantities to describe the earthquake activity on a fault, including the "slip rate" (typically given in units of millimeters/year) which indicates on average how much potential earthquake energy is stored up in the fault per year. The greater the slip rate, the greater the likelihood of earthquakes on the fault.

The risk of rupture hazard on the fault is evaluated based on the largest future earthquake magnitude estimated for the fault, as well as the slip rate. The fault is categorized with regard to rupture hazard based on these two values.

Uncertainty in Fault Location Investigations

Evaluation of fault locations and orientations ("strike") requires evidence of offset (or breaking) of sediment layers deposited at the location of the fault prior to the last large earthquake on that fault. In fault investigations that use a line of borings, an offset is inferred by the observation of a particular sediment layer being present at a lower depth in one boring as compared to the same sediment layer in the next boring in the line. This inference of offset has uncertainty because there are other reasons that sediment layers can be at varying elevations in adjacent borings, such as tilting of deposits over a broad area or landslide activity, as examples. In addition, once an offset has been observed and characterized as representing a fault, the evaluation of the potential of that fault to rupture in the future requires a means to date the deposits that have been offset at the location of the fault. This process of fault evaluation can result in uncertainty regarding the state of activity of a specific fault strand, particularly where multiple faults have been identified, such as in the zone of active faulting associated with the Santa Monica Fault.

In most of the Los Angeles urbanized area, development of buildings, streets, and other infrastructure occurred early before geologists had an opportunity to explore the land for faults and before the hazard that faults represented was well understood. Because of this development, much of the ground surface evidence of past faulting has been obliterated, requiring more extensive subsurface explorations where those can be performed. The obliteration of faulting evidence includes removal of the upper younger earth material as prior projects excavated sites for basements or installed subterranean features such as large utilities. It has only been in recent decades that some investigations could be undertaken in the heavily urbanized areas where known faults occur to better identify the exact location of those faults. This results in uncertainty in fault locations.

Fault investigations have been performed by Metro and by others in the vicinity of Section 2 of the Project, and these studies have utilized portions of the land surface that have not been developed; nevertheless, the built-over portions of the land surface in the vicinity of the Project have resulted in remaining uncertainty, especially at the Century City Santa Monica Station location and at the crossings of the tunnels by faults. The uncertainties have been eliminated at the Century City Constellation Station due to the ability to obtain direct evidence of no past faulting at that location.

Faults Crossing the Section 2 Study Area

The Section 2 Study Area lies within a seismically active region. The most significant seismic sources related to the Project are listed in Table 4-7. Known significant fault traces are delineated by the U.S. Geological Survey (USGS) and the CGS. These faults, as they are currently understood based on published studies, are listed in Table 4-7, and those in the Study Area are shown in Figure 4-6.

Two faults that have been identified as being potentially capable of generating surface rupture are located within the Section 2 Study Area and both are in close proximity to Section 2 of the Project: the Santa Monica Fault and the Newport-Inglewood Fault, which are both described in the following sections.

Santa Monica Fault

The State of California identifies the Santa Monica fault zone as an active fault along its entire length within the most recent geologic epoch (the Holocene, which extends from about 11,700 years before the present). The State bases this conclusion on the most thorough scientific research published to date on the fault zone (Dolan, et al. 2000a and Dolan, et al. 2000b). This information, along with recent fault investigations performed by Metro as part of the Project as well as fault investigations performed by owners of properties in the vicinity of Section 2 of the Project, are used as the primary sources for scientific information about the Santa Monica fault zone. This section describes the current understanding of the fault locations and characteristics. The fault's relationship to Section 2 of the Project is described in Section 4.3.2.

Table 4-7. Selected Major Faults and Fault Segments in Study Area

Fault or Fault Segment	Approximate Distance to Study Area (in miles)[1]	Approximate Maximum Credible Earthquake Magnitude (Mw)[2, 3]
Santa Monica	0	6.6
Newport-Inglewood	0[4]	7.1
Hollywood	0.25	6.4
Malibu Coast	2	6.7
Upper Elysian Park	2	6.4
Puente Hills	2.5	6.6—single segment rupture 7.1—multi-segment rupture
Raymond	4.5	6.5
Palos Verdes	5.5	7.3
Verdugo-Eagle Rock	10	6.9
Sierra Madre	11	7.2
Anacapa-Dume	11.75	7.5
Northridge	13.75	7.0
San Fernando	14.25	6.7
Whittier	14.75	6.8
Santa Susana	17	6.7
San Andreas (Mojave)	33	7.4

Source: *Geotechnical Data Report – Century City Constellation Station* (Metro 2015e) Table 5-2, Summary of Potential Seismic Sources. Distances shown originally in kilometers were converted to miles and approximated.

Notes:
[1] Distances represent the distance from the closest trace of the fault to the closest portion of the Project.
[2] The moment magnitude scale (denoted as Mw) is now used by seismologists rather than the former Richter scale. Magnitude is based on the moment of the earthquake, which is equal to the rigidity of the Earth multiplied by the average amount of slip on the fault and the size of the area that slipped. The scale retains the familiar numerical magnitude units defined by Richter.
[3] Magnitude from CGS 2003, 2013.
[4] The Newport-Inglewood fault zone is referenced in recent literature as crossing the tunnel alignment between the Wilshire/Rodeo and Century City Constellation Stations as discussed in the *Century City Area Fault Investigation Report* (Metro 2011c), USGS/CGS 2006, and CGS 2014/2016. However, based on recent investigations as described in the text, it is possible that the Newport-Inglewood Fault might not cross the tunnel alignment.

The geologic literature that existed prior to the Final EIS/EIR supported a model wherein the Santa Monica fault zone was defined as a left lateral reverse fault, active at the Veterans Affairs West Los Angeles Medical Center area (investigated in the area north of Ohio Avenue, west of Sawtelle Boulevard, and south of Dowlen Drive), and extending east to Century City. In the Century City area, the fault "stepped" toward the north to the Hollywood Fault, also an active left lateral reverse fault (CGS, 2006). The Santa Monica fault zone is defined as an oblique-left-lateral reverse fault that would displace in an east-west and vertical direction. The concept of displacement during an earthquake is shown in Figure 4-8. The Santa Monica fault zone is comprised of several faults, individually referred to as fault traces or fault strands. As described below, in the eastern portion of Century City, the Santa Monica fault zone splays toward the northeast into a northern fault zone north of Santa Monica Boulevard (the Santa Monica North Fault). In Century City, the Santa Monica fault zone also splays into a southern zone south of Santa Monica Boulevard (the Santa Monica South Fault). As shown in Table 4-7, the Santa Monica fault zone could have a maximum credible earthquake magnitude (Mw) of 6.6 based on estimates from the State of California (CGS 2003). The area along Santa Monica Boulevard, particularly between Spalding Drive/Wilshire Boulevard in Beverly Hills and Century Park West and continuing to the west, is geologically complex due to this faulting.

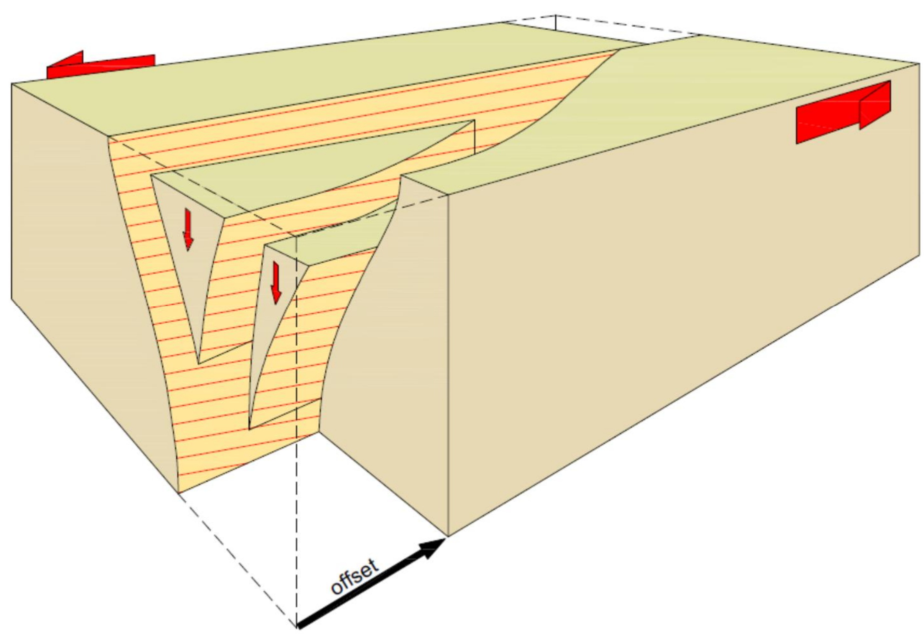


Figure 4-8. Santa Monica Fault Zone Schematic

Since publication of the Draft EIS/EIR in 2010, numerous geotechnical investigations have been conducted by both Metro and local property owners in the Century City vicinity, providing additional data to strengthen the understanding of the Santa Monica Fault. That being said, a full understanding may not be realized due to physical limitations to subsurface investigations as described in Uncertainty in Fault Location Investigations section on page 4-27 of this Draft SEIS. Those limitations include the fact that the majority of the land in the area is developed with structures, under which it is very difficult to excavate fault investigation trenches or borings. In addition, much of the remaining undeveloped land consists of streets with numerous utilities whose presence limits the availability and ability for explorations or obscure geologic evidence of faulting. Since 2011, the fault investigation reports identified in Section 4.3 and summarized in Appendix B have been performed. In addition, many other investigations have been performed for various purposes in Century City. The locations of the subsurface explorations are shown in Figure 4-9. The 2011 Metro investigation was the first investigation specifically performed to evaluate the Santa Monica Fault and Newport-Inglewood Fault models, prevailing at that time, for the Century City area.

Subsequent fault investigations to evaluate specific properties have also been conducted in the Century City vicinity. Investigative methods included trenching, continuous core borings, CPTs, and geophysical seismic reflection surveys. Trenching, which is the most reliable form of fault investigation, was frequently limited or not pursued due to the presence of existing structures, including underground utilities. Locations of explorations were generally targeted to a specific location of a previously interpreted fault. In those subsequent fault investigations, dating methods rarely included radiocarbon dating testing or other numerical dating methods (although such dating would have reduced the uncertainty in conclusions obtained), and where performed were not always considered credible by the authors of the reports presenting those dating results. For example, the dating was not considered credible by the authors of the report because of the methodology used to collect the sample and the potential for contamination of the sample by soils from other locations in the boring. The qualitative dating method of soil development profiling was performed for most of these investigations; this method is subjective and has high uncertainty because of the need to correlate soils in the study area with other soils elsewhere that have been dated, rather than the use of direct dating techniques that provide greater certainty.

Table 4-8 briefly summarizes the studies performed and some of the major conclusions reached. A more detailed summary of the various studies is presented in the *Westside Purple Line Extension Section 2 Geotechnical Fault Investigations Summary Memorandum* (Metro 2016c) included in Appendix B of this Draft SEIS.

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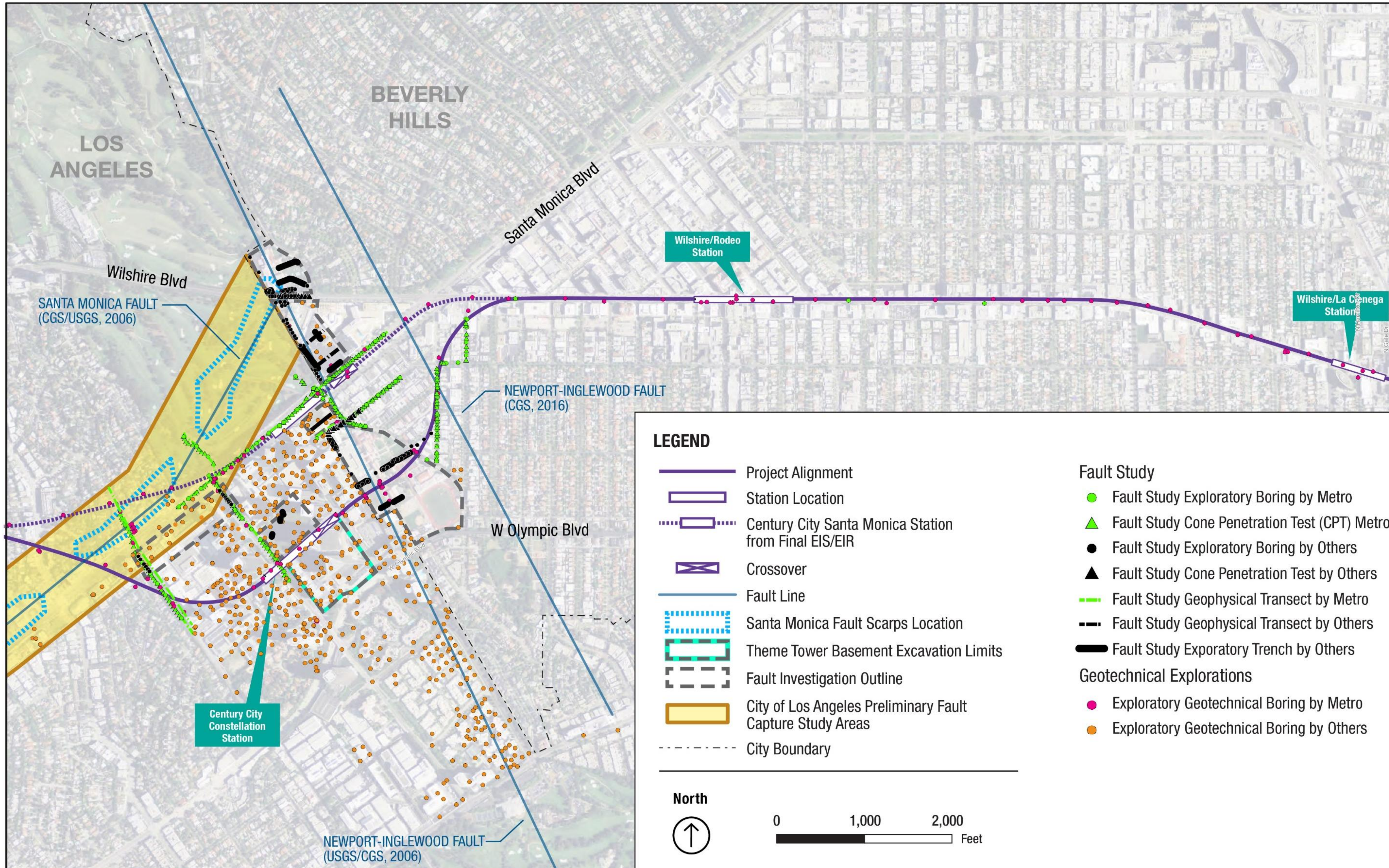


Figure 4-9. Geotechnical and Fault Investigations along Section 2 of the Project

Table 4-8. Summary of Century City Area Fault Investigation Studies

Study Name	Agency / Consulting Firm	Date	Location	Type of Investigation	Study Summary
Century City Area Fault Investigation, Westside Subway Extension	Metro/Parsons Brinckerhoff	2011	Century City Area	Borings, CPTs, Geophysical Profiling	• System of faults associated with both Santa Monica Fault and Newport-Inglewood Fault were interpreted. • Secondary fault strands and zones of distributed near-surface deformation are likely to occur in association with Santa Monica and Newport-Inglewood Faults. • Direct evidence demonstrates that there is no faulting at Century City Constellation Station. • Evidence of complex faulting and potential multiple strands of active faults at station locations along Santa Monica Boulevard, with associated uncertainty in locations of all potential fault strands.
Fault Rupture Hazard Review	BHUSD/Leighton Consulting, Inc. (LCI) and Earth Consultants International (ECI)	2012a, 2012b, 2012c, and 2013	Beverly Hills High School	Trenching, Borings, CPTs	• Major east-west trending fault observed in a trench in the northern portion of BHHS campus; fault appears to be associated with Santa Monica Fault and presence of fault at this location indicates that the overall Santa Monica Fault zone is wider than previously evaluated. The major fault strand was interpreted as not extending to the top of Pleistocene sediments and was therefore not considered Holocene-active for the purpose of school facility development. • Numerous fractures were observed in other trenches at the site; the additional fractures were considered to be due to slope creep, tilting due to seismic ground shaking, and expansion-contraction of expansive soils rather than due to faulting. • Additional fractures were encountered in some trenches, including some with small apparent vertical offsets, but were interpreted as not representing Holocene-active faulting because they were not observed to extend to the top of Pleistocene sediments. • Concluded that north-south trending faults previously interpreted by Metro based on offsets of soil layers were due to tilting of the beds and not faulting.

Study Name	Agency / Consulting Firm	Date	Location	Type of Investigation	Study Summary
Report of Fault Rupture Hazard Investigation	Crescent Heights/Geocon West Inc. and Feffer Geological Consulting	2012	10000 Santa Monica Boulevard	Trenching	• Trench excavated in southwest-northeast direction only in order to evaluate the potential for northwest-southeast-trending Newport-Inglewood fault at the site. • No trenching performed in an orientation to evaluate potential for northeast-southwest-trending Santa Monica fault strands. • No northwest-southeast oriented faults were observed within the trench. • Steeply dipping fractures, vertically and laterally discontinuous, were observed, interpreted as being due to ground shaking rather than faulting.
Fault Rupture Hazard Investigation	Westfield/Geocon West Inc.	2013	1801 Avenue of the Stars, 10250 Santa Monica Boulevard, 1930 Century Park West	Borings	• Performed to evaluate northwest-southeast trending faults south of Santa Monica Boulevard. • Five significant faults, identified as Faults A, B, C, D, and E, were interpreted as being in close proximity to Santa Monica Boulevard in the investigation. These faults appear to be associated with the Santa Monica fault zone. • Based on correlation of interpreted primary stratigraphy and buried soils, soil-stratigraphic age estimates, and geomorphic analysis (rather than other numerical dating methods such as radiocarbon dating) concluded that the faults investigated are not Holocene-active.
Fault Trench Study	JMB/GeoKinetics	2013	10131 Constellation Boulevard	Trenching	• Did not observe "deformation, shearing, vertical offsets, horizontal offsets, or other indications of fault activity" in three trenches excavated and concluded that there was no evidence for faulting.

Study Name	Agency / Consulting Firm	Date	Location	Type of Investigation	Study Summary
Phase II Site-Specific Fault Rupture Hazard Investigation	Allen Matkfins Leck Gamble Malory & Natsis LLP/Geocon West Inc.	2014	9900 Wilshire Boulevard	Borings, CPTs, Trenching	• Numerous faults were interpreted along investigation Transects A and B (northwest-southeast trenching and east-west trenching, respectively): faults were identified with names Fault A through Fault J. • Fault activity based on interpreted primary stratigraphy, buried soil stratigraphic age estimates (rather than numerical laboratory age dating such as radiocarbon). • Faults A through E and J were interpreted as not being Holocene-active. • Faults G, H, and I were interpreted as being Holocene-active. • Fault F was not able to be identified as Holocene-active or not being Holocene-active due to lack of specific boring data on west side of fault.
Fault Hazard Assessment	BHUSD/Leighton Consulting, Inc.	2014 and 2016	El Rodeo K8 School	Trenching, Borings, CPTs, Well Monitoring	• Interpreted that three of the east-west-trending faults at El Rodeo campus were not Holocene-active and that no Holocene-active faults are present on El Rodeo K8 School campus or its associated buildings. • Fault activity based on interpreted primary stratigraphy, buried soil stratigraphic age estimates (rather than numerical laboratory age dating such as radiocarbon). Other geologic features previously identified by Geocon West as faults were re-interpreted as a result of erosional channeling or tilted sediments.
Evaluation of Regional and Local Seismic Issues within the BHUSD	BHUSD/KGS and PrimeSource Project Management LLC	2011, 2012, 2013, 2014, and 2016	Beverly Hills Unified School District and broader Century City/Hollywood Area	Reviewed prior investigations and reinterpreted regional framework and activity	• Hypothesis made that Santa Monica Boulevard Fault and western Hollywood Basin cross faults became inactive approximately 200,000 years ago; therefore, Santa Monica Fault North, Santa Monica Fault South, and eastern San Vicente Fault should be considered Holocene-inactive. • Hypothesis made that the western Hollywood fault zone may be inactive. • Cross Fault No. 1 in western Hollywood Basin is inactive. • Rancho Fault and western San Vicente Fault may be active. • Studies do not indicate that there is faulting activity at Century City Constellation Station area.

Study Name	Agency / Consulting Firm	Date	Location	Type of Investigation	Study Summary
Hazard Assessment Study	City of Beverly Hills/Exponent/Metro response	2012	Century City Area	Review of Metro 2011 investigation and evaluation	• Opined that Constellation Boulevard station alternative had less risk exposure to faulting hazards than Santa Monica Boulevard Station alternative. • Suggested additional trenching investigations at Santa Monica Boulevard and adjacent properties. • Metro responded and developed alignment at Century City Constellation Station where there are no faults and where gassy ground risk can be mitigated.
Preliminary Review Comments of Century City Area Fault Investigation Report	City of Beverly Hills/Shannon and Wilson	2012	Century City and Beverly Hills Area	Review of Metro 2011 investigation and evaluation	• Opined that additional exploration should be conducted at Constellation Station location. • Determined that Santa Monica Station or a location to the east had seismic activity risks due to high probability of ground deformation resulting from earthquakes. • Suggested station location along Santa Monica Boulevard toward the west side of Century City if no active faults were present.
Fault Investigation for Section 2 of Project	Metro/Parsons Brinckerhoff	2016	North along Lasky Drive, east along Charleville Boulevard, then north along Spalding Drive in Beverly Hills, between Moreno Drive on the south and Wilshire Boulevard on the north	Borings, CPTs	• Faults identified along central to northern portion of transect and far southern portion. • Faults at central to northern portion of transect identified as Holocene-active faults. • Not able to determine current state of activity of fault at southern portion. • Faults at central to northern portion of transect: strike (orientation) of faults could not be definitively determined, but considered to likely represent strands of the Santa Monica South Fault Zone.

Study Name	Agency / Consulting Firm	Date	Location	Type of Investigation	Study Summary
Probabilistic Fault Displacement Hazard Evaluation	Metro/Parsons Brinckerhoff	2017	Santa Monica Fault Crossings of Section 2 in Beverly Hills	No additional explorations for this evaluation	• In order to assess the potential impact of fault rupture to the tunnel, the probabilistic fault displacement hazard analysis (PFDHA) was performed in accordance with the Metro Supplemental Seismic Design Criteria. • The locations and extent of faults in the PFDHA model were The Uniform California Earthquake Rupture Forecast (UCERF) 3 (Field et al., 2013). • The potential fault crossings of the South Trace of the Santa Monica Fault as defined in UCERF3 are located along Tunnel Reach 5; a mapped eastern extension of the South Trace passes across the subway tunnel alignment at Lasky Drive and at Wilshire Boulevard (Field et al., 2013; Metro 2017). • An inferred northern extension of the Newport-Inglewood fault also may cross the subway tunnel alignment at Lasky Drive (California Geological Survey 2017) and was considered in the PFDHA model. • The displacement hazard for the Santa Monica fault was evaluated from a series of 18 scenario ruptures that include multi-fault ruptures on the adjacent Anacapa Dume, Malibu Coast, Hollywood, and Raymond faults, and on two traces of the Santa Monica fault in the Beverly Hills area: the North Trace and the South Trace. • The PFDHA model assumed that displacement during ruptures along the Santa Monica fault is distributed along both the Santa Monica North and South Traces, with 75 percent of the displacement in each postulated rupture scenario occurring on the South Trace and 25 percent occurring on either the North Trace or in the area between the two traces of the Santa Monica faults. • The results of the evaluation for the Santa Monica South Trace (at Lasky Drive and also at Wilshire Boulevard) provided an expected displacement of <1 cm in the event of the 150-year return period earthquake (ODE) and 13.0 cm in the event of the 2,450-year return period earthquake (MDE). • The results of the evaluation for the Newport-Inglewood North Extension at Lasky Drive provided an expected displacement of <1 cm in the event of both the ODE and MDE events.

Based on Metro's review and interpretation of the available data, an improved knowledge of the numerous fault strands associated with the Santa Monica fault zone has been developed. This includes a number of faults in the vicinity of Santa Monica and Wilshire Boulevards in the Century City to western Beverly Hills area, as shown in Figure 4-10. Some of these faults are interpreted to extend upward close to the existing ground surface. The orientations of these faults (e.g., north-south, east-west, or other orientations) are not well established by the data obtained to date. The type of faulting associated with the Santa Monica and Newport-Inglewood Faults, which have strike slip faulting where the two sides of the fault slide past each other horizontally, can result in little to no apparent vertical offset of soils, which makes it difficult to observe the effects of the faulting in past earthquakes. There is evidence for large amounts of strike slip faulting on the Santa Monica south fault zone (the portion of the fault zone south of Santa Monica Boulevard).

As along most major fault systems, additional secondary fault strands and zones of possible distributed near-surface deformation are also likely to occur in association with these faults. The methods of investigation used in the fault investigation study may not detect such smaller features. Thus, a buffer zone extending approximately 100 feet beyond the detected main traces of the faults was established to include areas that may be subject to ground rupture, folding, secondary faulting, and off-fault distributed deformation expected during an earthquake. Such features are likely to be found within the structurally complex zone of the widening of the Santa Monica fault zone going from west to east.

The investigations indicate that the Santa Monica fault zone increases in width (from north to south) toward the eastern side of the Century City area into Beverly Hills. The zone, several hundred feet wide, would be subject to both vertical distortion and shearing horizontally along one or more strands of the fault during large earthquakes. In other words, there is a broad zone along Santa Monica Boulevard, extending both north and south of Santa Monica Boulevard in Century City and western Beverly Hills, in which there is a potential for vertical and horizontal ground rupture movement when utilizing the conservative criteria necessary for subway station construction. This zone of faulting is indicated by the presence of numerous faults encountered in the vicinity of Santa Monica Boulevard from Century Park West to Century Park East, as shown in Figure 4-10. It should be noted that this zone of faulting extends south to approximately half-way between Santa Monica Boulevard and Constellation Boulevard, but does not extend as far south as Constellation Boulevard. A similar zone of faulting was shown by CGS, as indicated in Figure 4-10 as a yellow zone, which does not extend as far south as the site-specific studies described above have indicated.

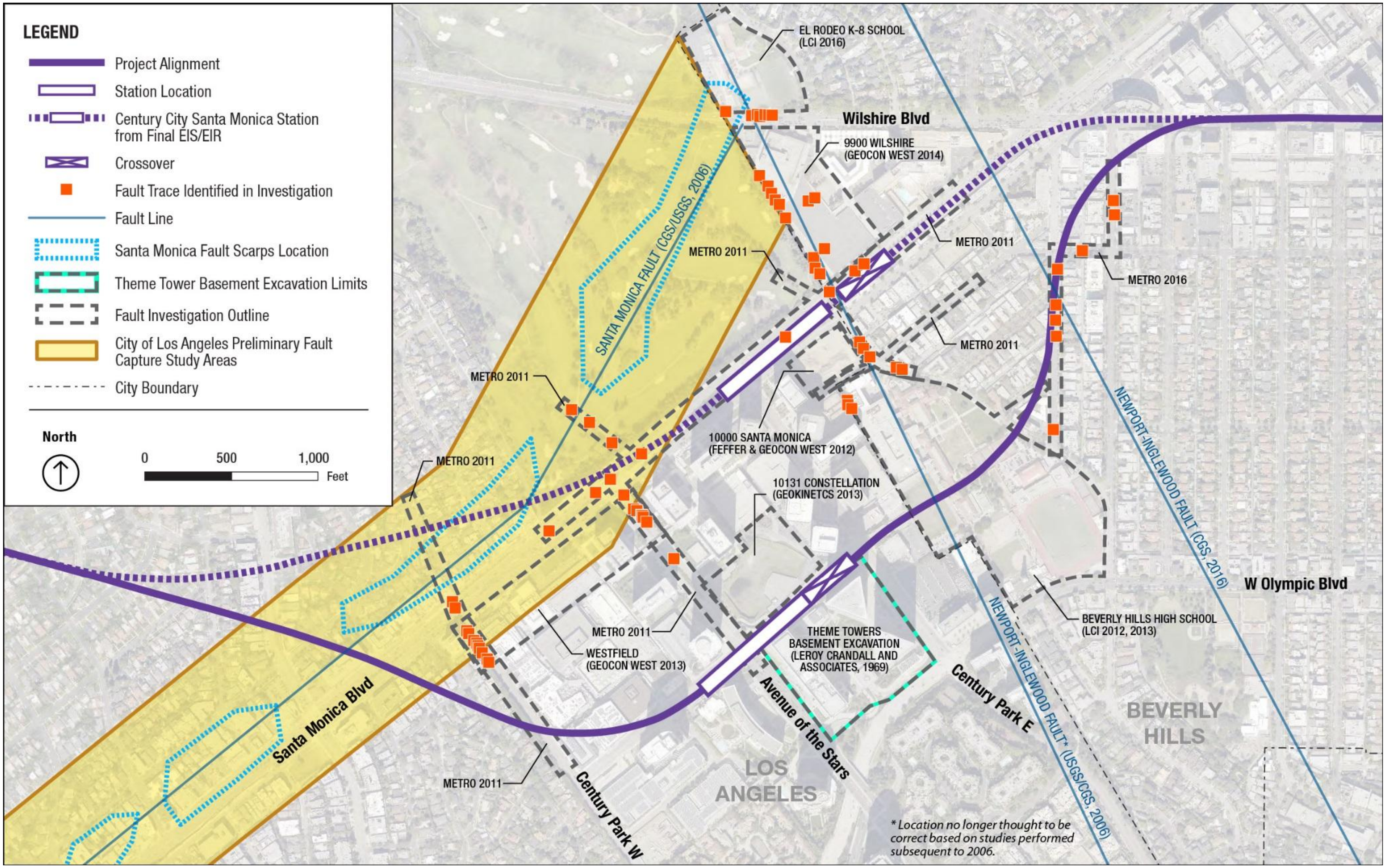


Figure 4-10. Faults Encountered in Investigations in the Century City Area

The 2011 Metro investigation included two transects that extended from north of Santa Monica Boulevard. The transect along Century Park West extends south to Constellation Boulevard, and the transect along Avenue of the Stars extends south of Constellation Boulevard. Based on these transects, which included continuous core borings, CPTs, and geophysical seismic reflection surveys, as well as information from prior geotechnical explorations and the 100-foot-deep basement excavation for the Theme Towers/former ABC Entertainment Center and Shubert Theater complex along the south side of Constellation Boulevard, there is evidence that there is no faulting in sediments interpreted to be at least 600,000 years old along Constellation Boulevard. This is illustrated in a photograph taken of the excavation for the Century City Theme Towers during construction (Figure 4-11). Unlike most deep excavations, the Century City Theme Tower excavation initially included the excavation using a slope for the full depth of the deep basement. As a by-product of the excavation technique, a geologic profile could be seen from Avenue of the Stars to Century Park East along the south side of Constellation Boulevard. The continuous and horizontal layering of the exposed side of the excavation provided direct evidence that no faulting was present along the north side of the excavation.

What are "Transects"?

A transect refers to a series of borings, CPTs, or geophysical explorations that extend in a line when shown on a map. The purpose of arranging the explorations as a "transect" is to allow for a geologic cross-section to be drawn based on the data obtained from the explorations.

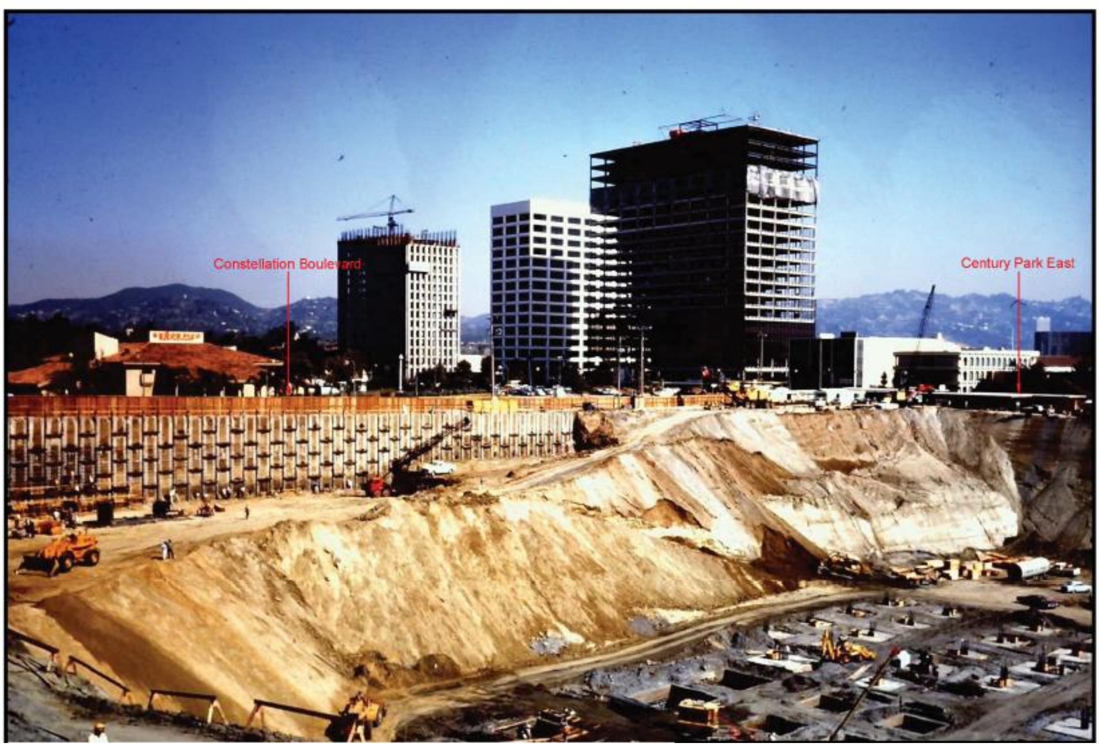
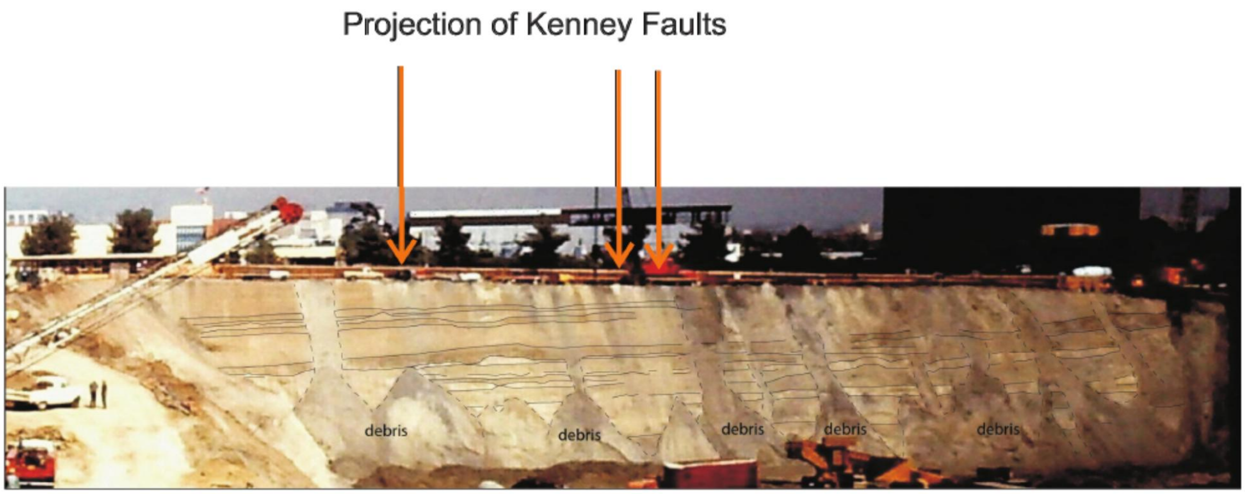


Figure 4-11. Century City Theme Towers during Construction circa 1972 – North Side of Excavation Illustrating Lack of Faulting in Soil Layers

In addition, the exposed eastern side of the Century City Theme Towers excavation showed direct evidence of no faulting, including at three locations that were hypothetically considered to possibly have faulting per Kenney Geoscience (KGS 2012), as shown in Figure 4-12.



Photograph of East Wall of 1970's Basement Excavation Along Century Park East

Depth is Approximately 100 Feet

Note that the faults postulated by Kenney project through exceptionally well-exposed, unfaulted stratigraphy that is at least 600,000 years old. These observations preclude the possibility of late Quaternary faulting through the site.

Figure 4-12. Projection of Kenney Hypothetical Faults at Century City Theme Towers

Finally, locations that were hypothetically considered to possibly have faulting just north of Constellation Boulevard per Kenney Geoscience (KGS 2012), were investigated by fault trenches as part of geotechnical explorations for a potential development at the northeast corner of Constellation Boulevard and Avenue of the Stars, and were found to have no faulting (GeoKinetics 2013).

Additional photographs and description of the excavation can be seen in the *Response to Preliminary Review Comments of Century City Area Fault Investigation Report by Shannon and Wilson* (Metro 2012g).

Although some of the Santa Monica fault strands are not interpreted to be Holocene-active according to some of the studies (Geocon West 2013 and LCI 2012a, 2012b, 2012c, and 2013), a potential for fault rupture along these strands cannot be discounted for a critical facility such as a subway station, as described in the section above regarding definition of fault activity.

Although the activity of some of the strands of the Santa Monica Fault are disputed by various parties as described above, there is a common understanding that fault traces exist along Santa Monica Boulevard. Based on the entirety of geologic information available to date in the Century City/West Beverly Hills Area, as described above, there is direct evidence that there is no faulting along Constellation Boulevard, while there is direct evidence of faulting immediately in the vicinity of Santa Monica Boulevard. Some of the faulting in the vicinity of Santa Monica Boulevard has evidence of Holocene activity, which would indicate that strands of the Santa Monica Fault are active in the vicinity of Santa Monica Boulevard. Where the evidence of faulting in near-surface soils has been destroyed by prior construction activities, there will always be a degree of uncertainty regarding the exact locations of fault strands and the activity of those strands.

Beverly Hills Lineament/Newport-Inglewood Fault

The geomorphic feature called the West Beverly Hills Lineament is a feature previously considered to possibly be a northwest-southeast trending fault acting as a tear fault connecting the Santa Monica and Hollywood Faults, and a northerly extension of the Newport-Inglewood Fault. Metro performed investigative work in the vicinity of BHHS, and considered north-south trending apparent offsets of soil layers as potentially an expression of the Newport-Inglewood Fault. This feature was further investigated at BHHS by Leighton Consultants, Inc. (LCI 2012a, 2012b, 2012c, and 2013), which found that the apparent offsets were due to tilting of the beds and not faulting. Based on these additional explorations, it was concluded that the previously identified north-south offsets are not faults within the main BHHS campus.

Subsequent to these investigations, the CGS in 2014 and 2016 produced maps indicating the Newport-Inglewood Fault extending northward into Beverly Hills, east of the BHHS campus. No additional subsurface investigations were conducted by CGS as part of the development of these maps; the maps were developed by review of Lidar maps and interpretation of publications, including some or all of the publications listed within this section.

Later, Metro performed additional fault explorations along Lasky Drive, Charleville Boulevard, and Spalding Drive in Beverly Hills (Metro 2016a). The explorations encountered several offsets that are considered to be due to faulting and that approximately align with the mapped location of the Newport-Inglewood Fault (CGS 2014, 2016). However, the faults observed at that location are likely associated with the east-west-trending Santa Monica Fault rather than the Newport-Inglewood Fault based on the alignment of the offsets.

There is currently no direct evidence of faulting associated with the Newport-Inglewood Fault crossing the Project, even though the Newport-Inglewood Fault is being shown by CGS 2014/2016 as crossing the Project. The West Beverly Hills Lineament crosses the Project, however based on the studies conducted to date, the lineament is currently not thought to be a fault or reflect the location of the Newport-Inglewood Fault. This location is different from those provided in the Final EIS/EIR because additional studies as described above were performed in the area; some faults previously thought to be associated with the Newport-Inglewood Fault are now concluded to represent strands associated with the Santa Monica South Fault, and some offsets previously identified as faults are now concluded to represent a gradually sloping surface of soil layers. Some of the faults previously identified as crossing the Project as being the Newport-Inglewood

Fault are now thought to be associated with the Santa Monica Fault Zone; however, whether those faults are associated with the Newport-Inglewood Fault or the Santa Monica Fault zone, they represent a fault rupture hazard for the tunnel, which is consistent with the conclusions presented in the Final EIS/EIR.

Surface Fault Rupture

During moderate-to-large earthquakes, fault slip usually creates breaks (or ruptures) of the ground surface. If the rupture extends to the surface, there is visible movement on a fault (surface rupture) that produces a scarp or step at the surface if there is vertical movement. As described above, the Santa Monica fault zone crosses the Project and represents a potential surface fault rupture hazard to the Project if it crosses the Project directly. Based on an analysis performed by Dolan et al. (Dolan 2000a), the Santa Monica fault zone is capable of generating earthquakes in the magnitude range M6.9 to M7.2, with average surface displacements of approximately 3 to 6 feet. The magnitude range is higher than the CGS (2003) estimate as it assumes a potentially longer rupture length.

Study Area Subsurface Gas Conditions and Oil Wells

Section 2 of the Project will pass through or near several active or abandoned oil fields and existing oil wells (active and abandoned) that are present within the Study Area. Some areas of rock and soil overlying the oil fields are known to contain naturally occurring methane and/or hydrogen sulfide gases; in other areas the soil and rock have been found to have no or low levels of methane and hydrogen sulfide. At locations with existing or former oil wells, methane or hydrogen sulfide levels are sometimes elevated. For example, the BHHS campus has oil production in the extreme southern area of campus, and there have been measured high levels of methane and/or hydrogen sulfide in that area, whereas other areas, away from the oil production area, have had consistently low levels of methane and hydrogen sulfide in the soil.

Methane and hydrogen sulfide are considered hazardous because of their explosive properties. Also, hydrogen sulfide is highly toxic when inhaled, and can be smelled at lower, non-toxic, levels. These gases can seep into existing buildings and into open excavations, such as tunnels, from the surrounding soil and through open fractures or faults in deep bedrock.
Figure 4-13 and Figure 4-14 show the oil fields in and around the Project Study Area and the portion of Section 2 of the Project in the Century City area, respectively.

What is “ppm”?

“ppm” is a measure of the concentration of a gas or liquid in the overall gas or liquid. For instance, the concentration of methane in air can be expressed as “x” ppm where “x” represents the parts of methane per million parts of air. 1,000 ppm methane would represent that there are 1,000 parts methane per 1,000,000 parts air, corresponding to 0.1%

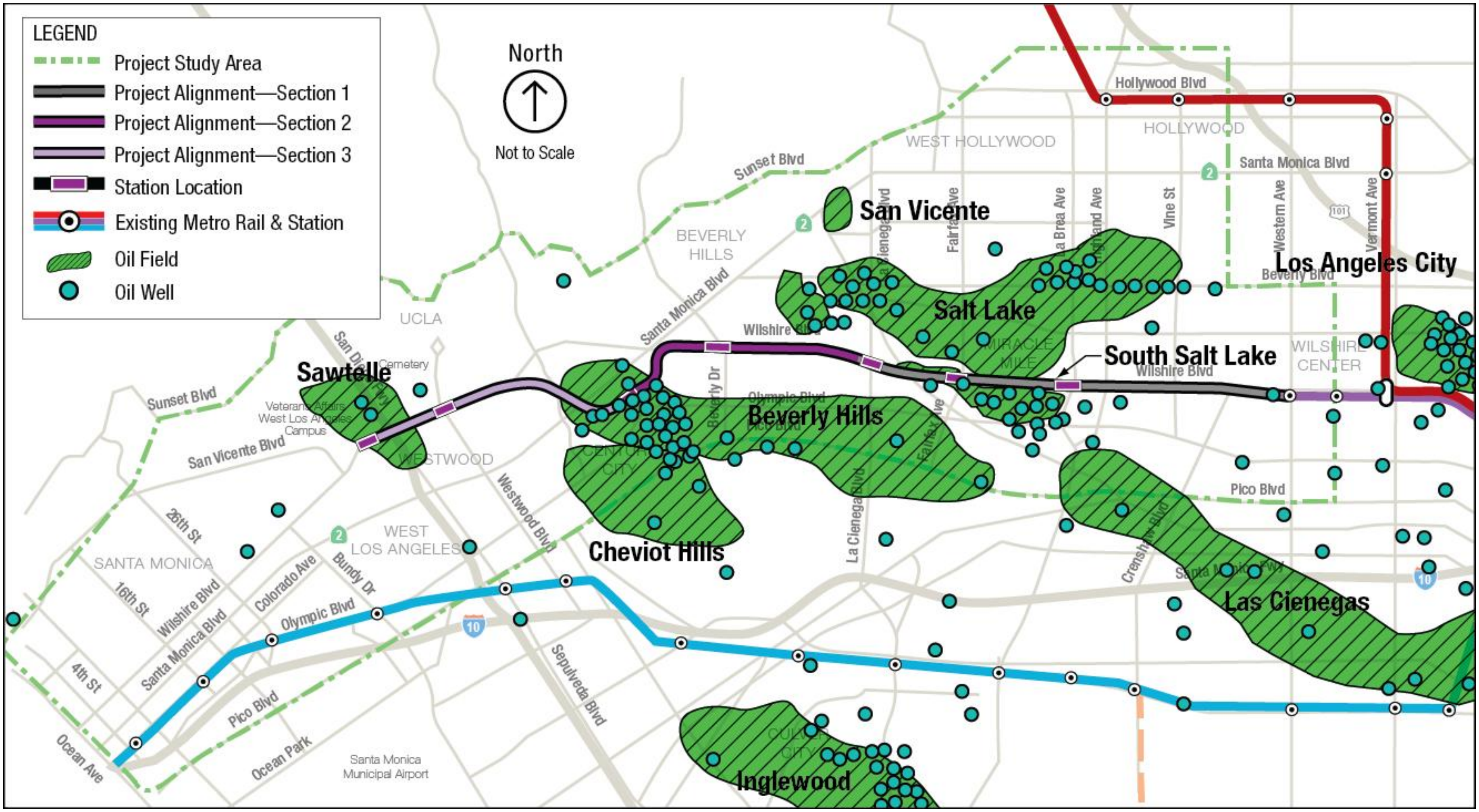


Figure 4-13. Oil Fields/Wells in Project Study Area

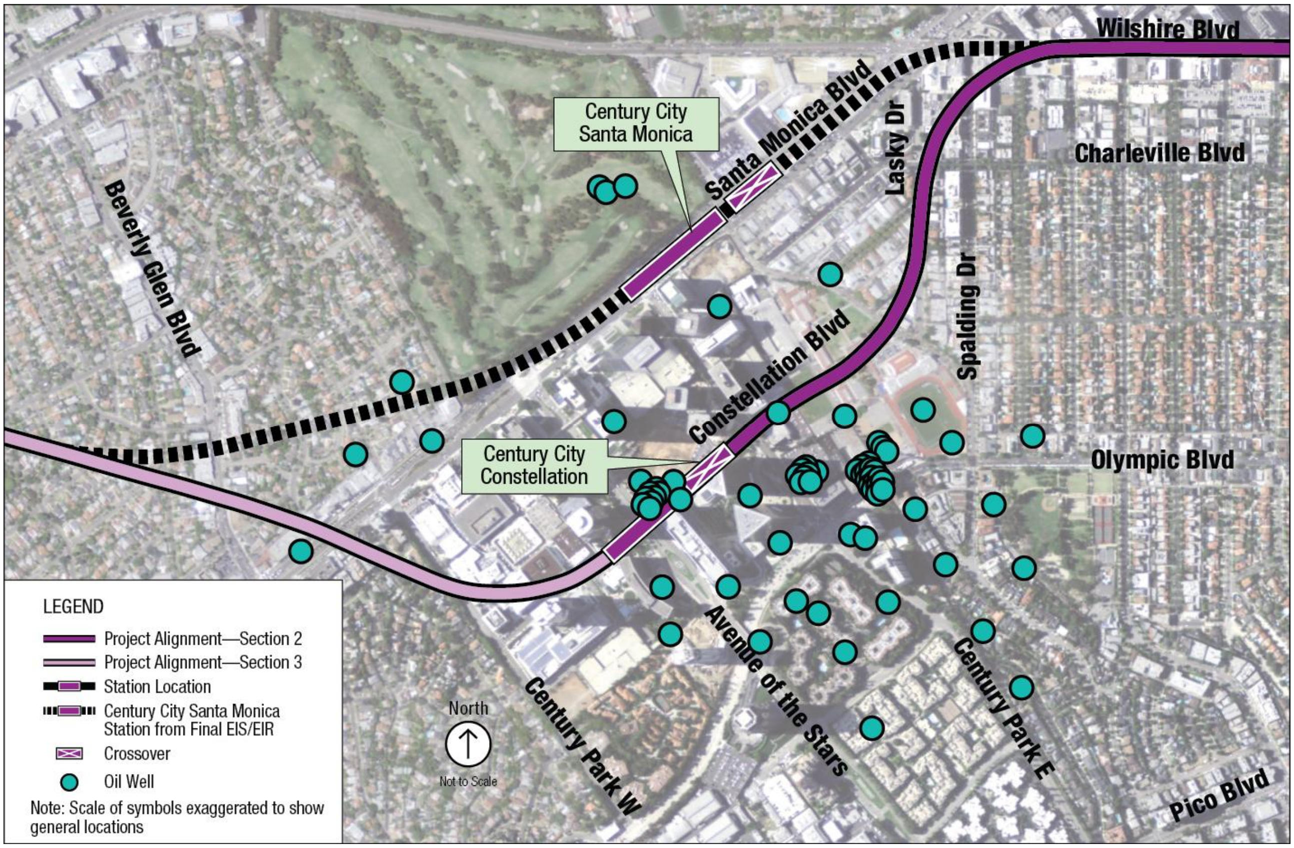


Figure 4-14. Mapped Oil Wells in Century City Area

Hydrogen Sulfide Gas Characteristics

Hydrogen sulfide is produced by the anaerobic decomposition of organic and inorganic matter that contains sulfur. As stated above, it is highly toxic, in certain concentrations, when inhaled. It is potentially explosive at concentrations between 4 and 46 percent and it is highly corrosive. Hydrogen sulfide (density ~1.54 g/l at atmospheric pressure) is heavier than air and, at high concentrations within the ground tends to accumulate just above the groundwater table and within depressions. It is highly soluble in water. According to the American Conference of Governmental Industrial Hygienists (ACGIH 2001), hydrogen sulfide gas has an exposure limit or threshold limit value-time weighted average (TLV) of 10 ppm for continuous exposure and 15 ppm for Threshold Limit Value—Short Term Exposure Limit. This threshold limit value is the concentration to which it is believed that workers can be exposed continuously for a short period of time without suffering from irritation, chronic or irreversible tissue damage, or narcosis of sufficient degree to increase the likelihood of accidental injury, impair self-rescue ability, or materially reduce work efficiency, and provided that the daily exposure limit is not exceeded. A Short Term Exposure Limit is defined as a 15-minute total weighted average exposure that should not be exceeded at any time during a workday. The California Occupational Safety and Health Administration (Cal/OSHA) also sets these as the exposure limits. Hydrogen sulfide gas has a characteristic "rotten-egg" type odor that is perceptible to most people at concentrations at, or below, approximately 1 ppm.

Radon is a gas that can cause lung cancer and other health problems. Los Angeles is located in an area with a general indoor radon potential of between 2.0 and 4.0 pico Curies per liter of air (pCi/l). The USEPA action level for radon is above 4.0 pCi/l; hence, radon is not a large concern for the Study Area.

What is "pico Curies per liter of air"?

"pico Curies" is a measure of the radioactivity of a substance, in this case radon gas. A curie represents the radioactivity of one gram of radium. Radium decays at a rate of about 2.2 trillion disintegrations (2.2×10^{12}) per minute. A picocurie is one trillionth of a curie. Thus, a picocurie (abbreviated as pCi) represents 2.2 disintegrations per minute. One pico Curie per liter of air represents the radioactivity equivalent to one trillionth of a gram of radium that is present in one liter of air.

Methane Gas Characteristics

Methane is common in oil and gas fields and is often found with hydrogen sulfide gas. Methane gas is explosive when its concentration is between 5 and 15 percent at atmospheric oxygen levels, but is not toxic. Five and 15 percent are known as the lower and upper explosive limits, respectively. At higher percentages in air, it can be an asphyxiant as it displaces oxygen. Under normal atmospheric conditions, the oxygen content in air is approximately 21 percent by volume; if the oxygen content is reduced below 19.5 percent by volume by the displacement of others gases, the air is considered to be oxygen-deficient, in accordance with Occupational Safety and Health Administration (OSHA) guidelines. Methane (density ~0.72 g/l at atmospheric pressure) is lighter than air and it tends to rise through the ground and dissipate. Methane is moderately soluble in water. A total weighted average exposure of 1,000 parts per million (ppm) (0.1 percent) has recently been added to the American Conference of Governmental Industrial Hygienists' recommended practices; peak values are allowed to be higher than 1,000 ppm, but an weighted average exposure of 1,000 ppm is used in order to prevent adverse health hazards for prolonged exposure.

Methane Risk Zones

After a methane explosion due to gas accumulation under a store in the Third Street and Ogden Avenue area in 1985, the City of Los Angeles created a task force to provide recommendations for construction in areas where subsurface methane gas could be a hazard. Following the recommendations of the task force, the City of Los Angeles Department of Public Works Bureau of Engineering has mapped potential Methane Zones and Methane Buffer Zones, and most recently updated its map in 2004, as shown with respect to the Study Area in Figure 4-15 (as modified to interpolate boundaries of the zones into the City of West Hollywood, City of Beverly Hills, and Veteran's Affairs properties). The City of Los Angeles Municipal Code, Chapter IX, Building Regulations, Article 1, Division 71, Methane Seepage Regulations, requires construction projects located within a Methane Zone or Methane Buffer Zone to comply with the City's Methane Mitigation Standards to control methane intrusion emanating from geologic formations. Mitigation requirements are determined according to the actual methane levels and pressures detected in the subsurface at a site. Mitigation measures can include both active and passive ventilation systems to ensure exchange of air, gas barriers (membranes around basements and foundations), and sensors in interior spaces to monitor the presence of gas and its pressure.

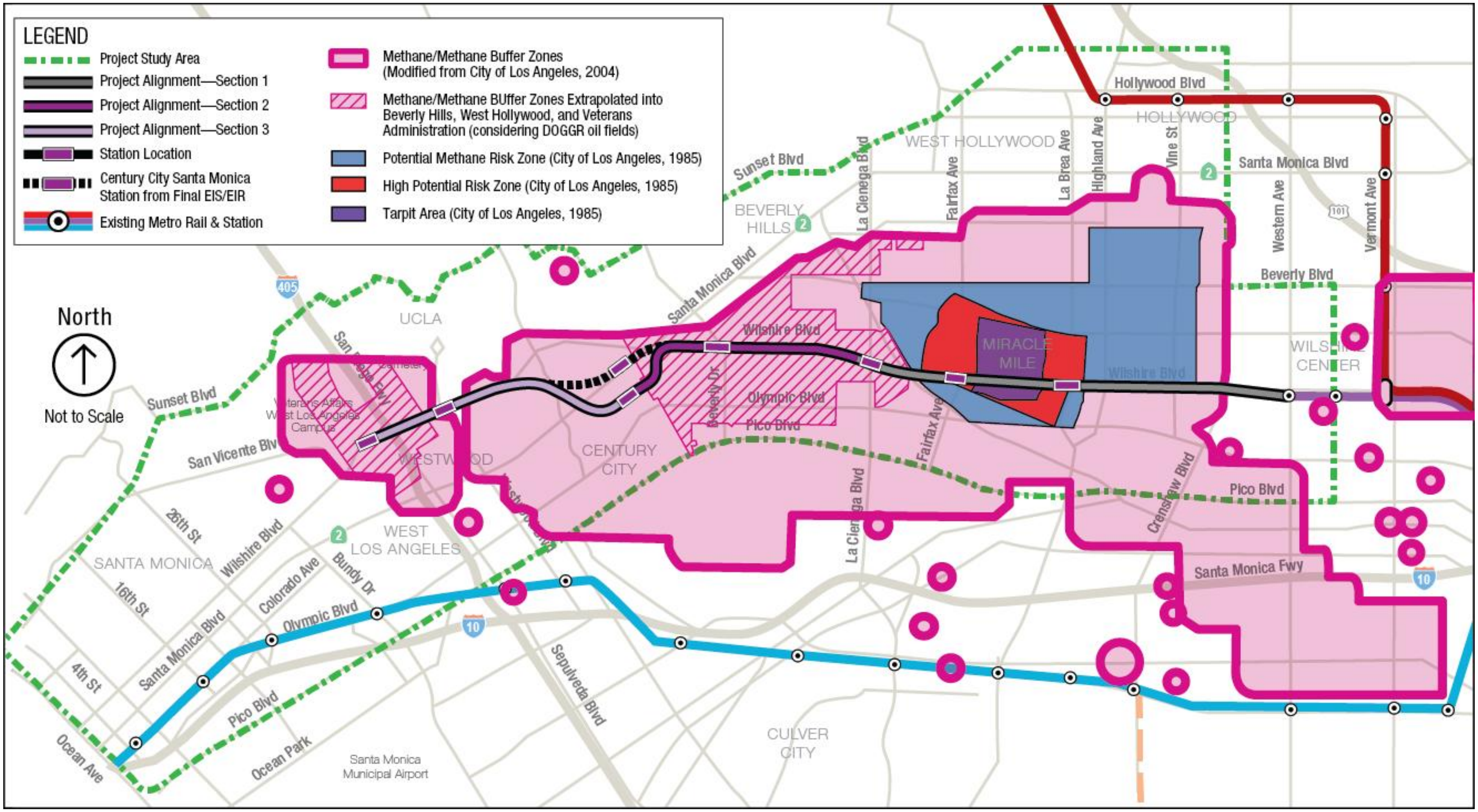


Figure 4-15. Methane Risk Zone

Methane and Hydrogen Sulfide Threshold Levels

Various agencies/organizations including the Environmental Protection Agency, City of Los Angeles, American Society for Testing and Materials, State of California Department of Toxic Substances Control have published guidelines or requirements for evaluation of Methane and Hydrogen Sulfide in the ground. Metro 2017b provides more details on the guidelines of these agencies/organizations in evaluation of methane and hydrogen sulfide.

Metro's approach for the Project to evaluate methane and hydrogen sulfide in the ground incorporates consideration of the guidelines of all of the agencies described above. As an example, the State of California Department of Toxic Substances Control guideline for school facilities indicates field investigations of soil gas should be performed where methane concentrations are anticipated to be greater than 5,000 ppm in the ground. As a result, Metro has performed gas investigations and mitigation with regard to soil gas along the WPLE alignment. Metro has defined "elevated" gas conditions as areas where gas monitoring readings have shown methane levels greater than 5 percent (corresponding to the LEL), or hydrogen sulfide levels above 5 ppm (corresponding to the OSHA PEL) (Metro 2017b). Section 4.5.5 of this Draft SEIS further describes monitoring of the working environment for elevated gas conditions during tunneling.

Gas Condition Investigations along Section 2

Metro examined existing data along the Study Area and installed new soil borings and gas monitoring wells along the Section 2 alignment to evaluate soil, groundwater conditions, and the presence of hazardous gases and their potential to affect construction and design of the Project (Metro 2011g). Gas monitoring wells were installed in locations known as being within methane areas. The locations of wells along Section 2 are shown on Figures 4-12 through 4-15.

In addition, soil gas investigations were performed at the BHHS site in 2003 by Camp Dresser & McKee, in 2004 by Ultra Systems, in 2012 by Environmental Audit Inc. (EAI), in 2015 by EAI (Refs. 25 and 26), and in 2016 by EAI, and as shown in the *Metro Geotechnical Data Report and Environmental Data Report Section 2* (Metro 2015e and 2015g).

Existing Levels of Methane and Hydrogen Sulfide along Section 2

At least 194 soil gas samples have been collected at various locations along Section 2 of the Project, of which 111 detected methane and 21 detected hydrogen sulfide. The Metro soil gas samples were obtained at depths similar to the planned tunnel depths. Some of the samples obtained by others were at depths shallower than the planned tunnel, but were also considered as an indicator of general soil gas conditions. Figure 4-16 and Figure 4-17 show maximum reported methane levels on the BHHS campus/Century City area and area of BHHS, respectively. Figure 4-18 and Figure 4-19 show maximum reported hydrogen sulfide levels on the BHHS campus/Century City area and area of BHHS, respectively. A summary of the methane and hydrogen sulfide readings along Section 2 of the Project is provided in *Assessment of Tunneling and Station Excavation Risks Associated with Subsurface Gas along Section 2–Revision 1* (Metro 2017b).

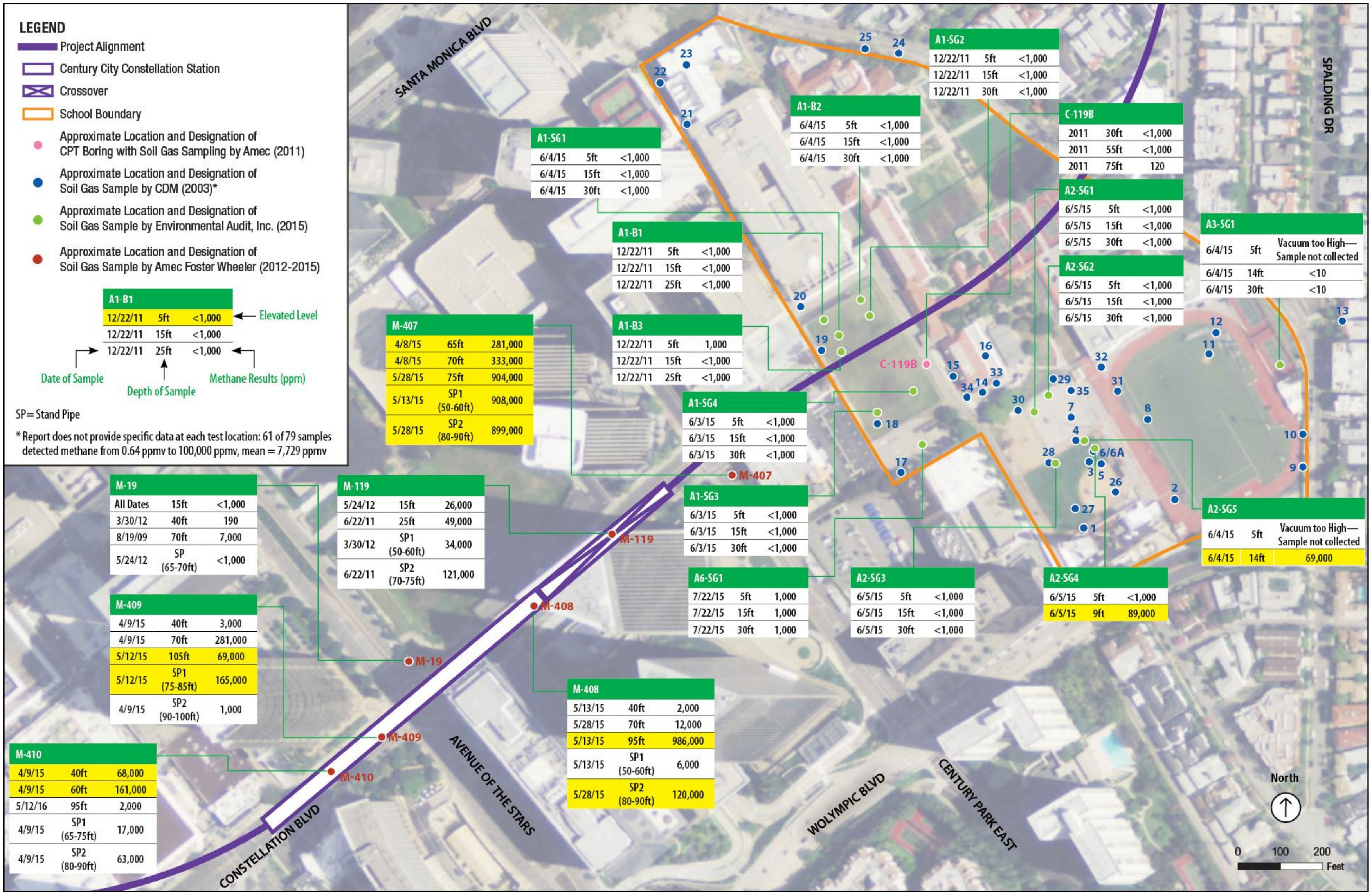


Figure 4-16. Methane Readings in Century City and on Beverly Hills High School Campus

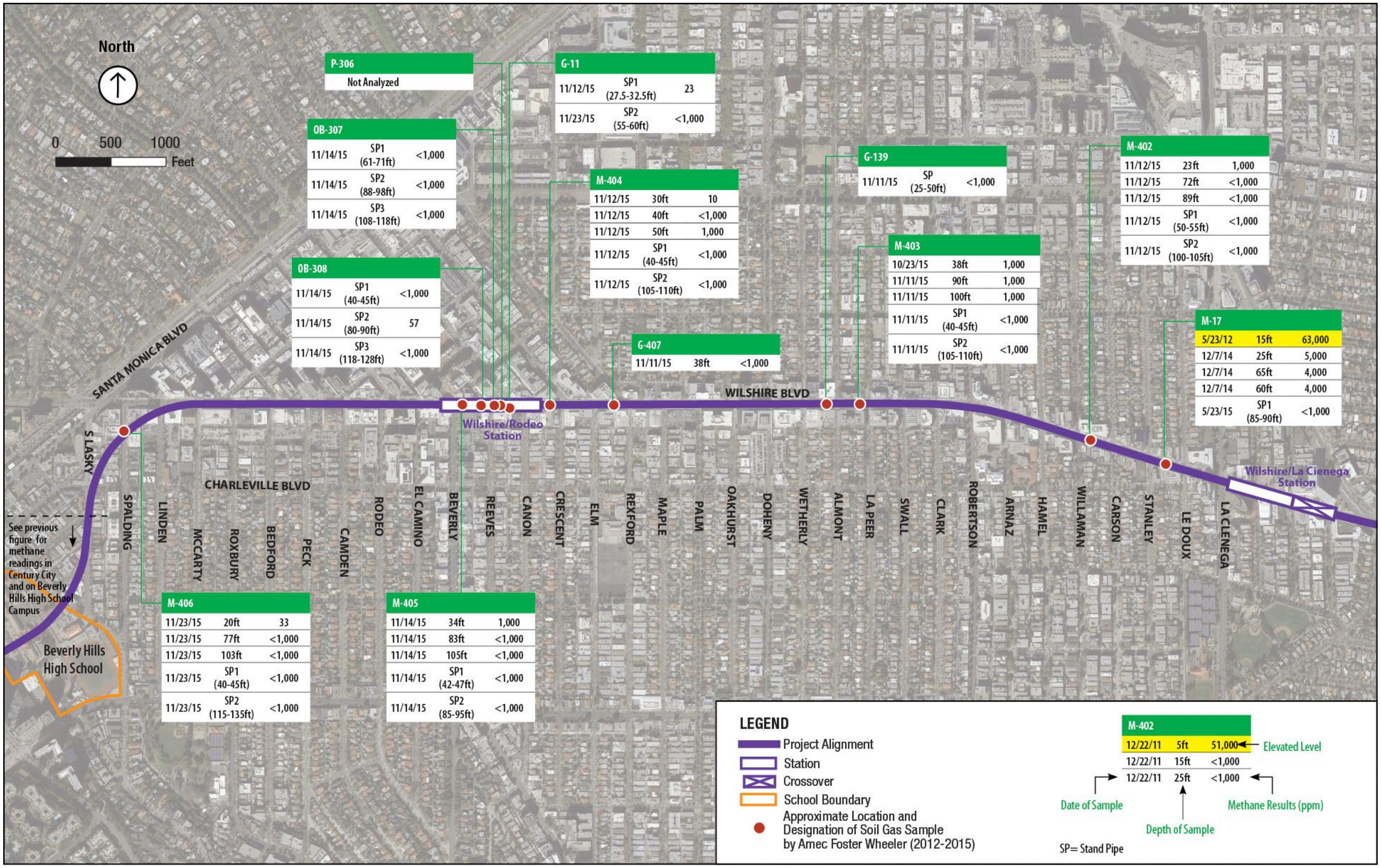


Figure 4-17. Methane Readings along Section 2 of the Project, East of Lasky Drive

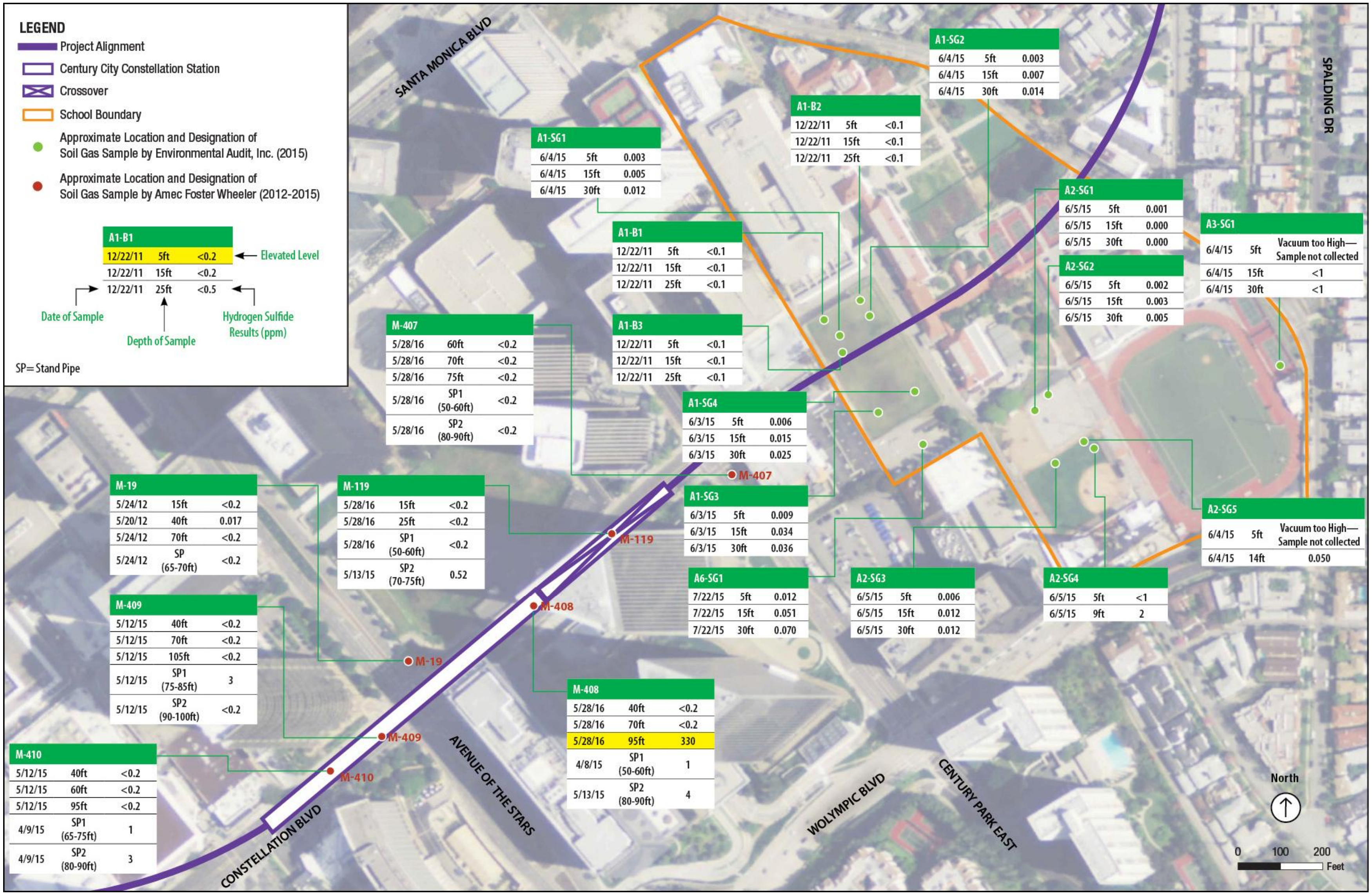


Figure 4-18. Hydrogen Sulfide Readings in Century City and on Beverly Hills High School Campus

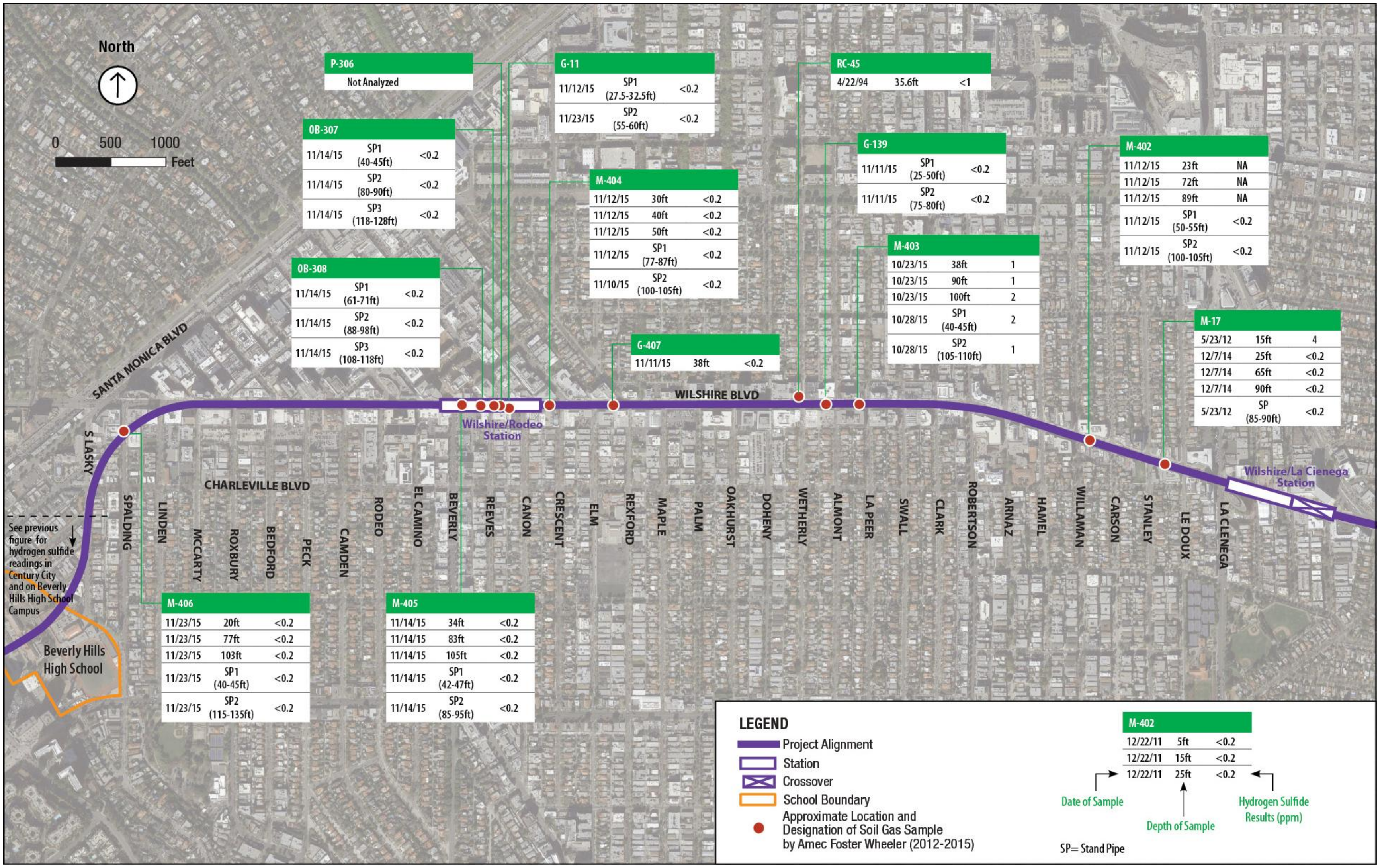


Figure 4-19. Hydrogen Sulfide Readings along Section 2 of the Project, East of Lasky Drive

The methane readings along Section 2 of the Project are as follows from east to west:

- The highest concentration of methane measured in the ground east of Stanley Drive is 6.3 percent (63,000 ppm).
- The highest concentration of methane between Stanley Drive (two blocks west of La Cienega Boulevard) and the City of Los Angeles/Beverly Hills boundary was 0.1 percent (1,000 ppm).
- At BHHS, elevated levels of methane gas (above explosive limits) have not been identified at any locations outside of the upper field basketball court area (over 400 feet south of the tunnel alignment) and the southeast corner of the northern parking lot (Figure 4-16).
- The highest concentration of methane measured in the ground west of the City of Los Angeles/Beverly Hills boundary was 98.6 percent (986,000 ppm). This reading is representative of the higher soil gas conditions measured at the Century City Constellation Station, and based on measurements taken east of the City of Los Angeles/Beverly Hills boundary (both at shallow depths and tunnel depth), elevated methane readings do not occur east of the boundary.

Concentrations of hydrogen sulfide gas above the National Institute for Occupational Safety and Health Recommended Exposure Limit of 10 ppm have not been identified at any location along the Section 2 tunnel alignment east of the City of Los Angeles/Beverly Hills Beverly, including on the BHHS property. One reading of hydrogen sulfide was elevated, with a reading of 330 ppm, in M-408, between Century Park East and Avenue of the Stars.

As described above, a considerable amount of subsurface data is available for the Section 2 alignment, including the portion that extends across the BHHS property. That data indicates elevated levels of combustible gas are present along portions of the alignment. Elevated levels of methane gas have been identified along portions of tunnel reaches 4 and 5 (the far eastern end of tunnel reach 4 at well M-17, and the far western end of tunnel reach 5), and around the Century City Constellation Station. At BHHS, elevated levels of methane gas have not been identified at any locations outside of the upper field basketball court area and the southeast corner of the northern parking lot. Elevated concentrations of hydrogen sulfide have not been identified at any location along the alignment at the BHHS property, but do appear at the Century City Constellation Station. The gas readings along the Section 2 alignment were performed in a phased manner to provide greater number of measurements in areas considered or previously measured to potentially have elevated levels of methane or hydrogen sulfide. Both horizontal and vertical variability were considered in the evaluations, based on readings performed and based on the layering and permeability of the earth materials. Refer to the *Assessment of Tunneling and Station Excavation Risks Associated with Subsurface Gas along Section 2–Revision 1* (Metro 2017b) for a more detailed description of the existing subsurface gas conditions along Section 2 of the Project.

4.3.2 Environmental Impacts/Environmental Consequences

Surface Fault Rupture

As described above in Section 4.3.1, the Santa Monica fault zone, as it is currently understood, extends along and parallel to Santa Monica Boulevard in West Los Angeles. Traces of the fault zone have been encountered by numerous investigations, as shown in Figure 4-10. Based on Metro's current interpretation of the fault data, with the Century City Station located on Constellation Boulevard, the tunnel alignment would cross the Santa Monica Fault at a high angle northwest of Century City between the Century City Constellation Station and the Westwood/UCLA Station for Section 3. If the Century City Station were to be located on Santa Monica Boulevard, the fault traces would run parallel to the tunnel alignment and cross the station box itself. This section provides a discussion of hazards posed by the fault in relation to each of the Century City Station locations.

Subway stations, because they are habitable structures for human occupancy, may not be built in active fault zones per regulatory codes, including the Alquist-Priolo Act, and because of the practical difficulty of designing a safe and repairable structure as required by Metro's Design Criteria. For Maximum Design Earthquake events in the Santa Monica Fault zones, fault displacements could be on the order of approximately 3 to 6 feet. Metro's underground stations are complex two-story structures up to 1,000 feet long and include systems and ventilation equipment. As stated in the *Preliminary Review Comments of Century City Area Fault Investigation Report, Westside Subway Extension Project Century City and Beverly Hills Area* (Shannon & Wilson 2012), "we did not find references to stations knowingly placed across an active fault trace." As an example, for the Metro Crenshaw/LAX Line light rail project currently under construction, the La Brea Station was moved in order to not be constructed over the active Newport-Inglewood Fault.

An area susceptible to surface fault rupture can range from tens to several hundred feet wide, depending on the fault characteristics. Avoidance is the recommended means of mitigating surface fault rupture hazards for facilities such as passenger stations. Based on Metro's geologic studies and other studies for adjacent properties, the Century City Santa Monica Station option would be located within the broad zone of the Santa Monica Fault, with multiple faults (some identified as Holocene-active, and some on which most-recent rupture has not been definitively identified) potentially passing through station locations along Santa Monica Boulevard. As stated in the *Preliminary Review Comments of Century City Area Fault Investigation Report, Westside Subway Extension Project Century City and Beverly Hills Area* (Shannon & Wilson 2012), "relocating the station further south or east along Santa Monica Boulevard…has risks similar to the current proposed Santa Monica Station owing to high probability of ground deformation stemming from earthquakes originating from the SMFZ [Santa Monica Fault Zone] or by previously unmapped fault splays." Thus, surface fault rupture poses a risk of, and uncertainty related to, this station location that cannot be mitigated with available techniques and measures. In comparison, the location of the Century City Constellation Station has direct evidence of no faulting at or in the immediate vicinity of the station. The Century City Constellation Station is not located in a fault zone or a fault buffer zone, and thus fault rupture is not a hazard for this station location.

For linear facilities such as tunnels, avoidance of faults may not be possible. Thus, the preferred designs for tunnels are to cross the faults as nearly perpendicular as possible to the faults to limit the area of potential damage due to fault ruptures. Depending on the predicted fault off-set and area over which the movement is distributed, some distortion can be accommodated by the tunnel structure.

The approach for design of tunnels traversing active faults is documented in Metro's Seismic Design Criteria and has a well-established precedent. As described in the *Westside Subway Extension Century City Area Tunnel Safety Report* (Metro 2011d), potential tunnel damage is also repairable. A similar approach is adopted for transportation infrastructure in general, including highways, bridges, and pipelines. These structures of necessity have to cross faults, and these established design approaches minimize damage and allow for repair.

In some cases, such as in the Metro Red Line tunnel crossing the Hollywood fault zone, the tunnels are built larger through a fault zone to accommodate potential future fault displacement. This is not always practical, particularly when tunnel boring machines with segmental linings are used. For potentially large anticipated tunnel deformations in fault zones, articulated joint designs have been developed as a means to satisfactorily and efficiently mitigate the seismic risk, providing that sufficient elasticity can be provided in the tunnel lining at the fault (Russo 2002). Other solutions include placing a stiff but crushable material behind the tunnel lining to allow movement. These types of solutions were used for other tunnels in Los Angeles that cross the Newport-Inglewood fault zone, such as the North Outfall Replacement Sewer, and the North Outfall Sewer – East Central Interceptor Sewer, two large-diameter tunnel projects that were both over-bored with compressible material placed between the over-bored tunnel and the final tunnel lining. Where fault rupture displacement may be distributed over a longer distance, more flexible tunnel lining, such as steel tunnel lining segments that can accommodate some strain, can be considered.

In the design for the Century City tunnels, the specific Maximum Design Earthquake and Operating Design Earthquake fault displacements will be used, together with further exploration to refine the fault zone locations specific to the selected tunnel alignment. With this design, hazard from surface fault rupture will be minimized.

In conclusion, based on all of the recent fault investigations presented in Section 4.3.1, there are numerous faults in the vicinity of Santa Monica Boulevard, which could pose a hazard for a *station* on Santa Monica Boulevard, as well as a greater length of hazard along the subway tunnel that would serve a Santa Monica Boulevard station. A fault rupture event would cause extensive damage to both a Santa Monica Boulevard station and the adjacent tunnel because there are no known engineering methods available to construct a subterranean subway station that could withstand the rupture without collapse. For these reasons, locating a *station* on Santa Monica Boulevard poses a high risk to public safety.

In comparison, there is direct evidence of the absence of faulting at the Century City Constellation station location, indicating no risk of damage due to fault rupture at this station location. With elimination of the double crossover at the Wilshire/Rodeo Station and slight shifting of the station box there was no evidence encountered to indicate the presence of active faulting at the Wilshire/Rodeo Station. Therefore, there is minimal risk of the Section 2 stations being subject to damage due to fault rupture, resulting in no adverse effect.

The tunnels connecting the Century City Constellation Station to the Wilshire/Rodeo Station to the east and the Westwood/UCLA Station to the west will be able to be designed to accommodate potential fault rupture in accordance with Metro Design Criteria and practice of other agencies in California for constructing tunnels at fault crossings (a design accommodation that is not possible for design of a station located on an active fault). Therefore, there is no adverse effect for the tunnel crossing.

Hazardous Subsurface Gas and Oil Fields

Metro has extensively studied the characteristics of methane and hydrogen sulfide with respect to their effects on the construction and operation of its facilities, as methane and hydrogen sulfide are present in the ground surrounding the existing Metro Red and Purple Lines and the underground portion of the Metro Gold Line Eastside Extension. Since 1984, Metro has been developing documentation and methods for reducing or eliminating hazardous conditions in its facilities under construction and in operation, some of which are as follows:

- In 1984, Metro developed the Alerting Report on Tunneling Liners, which included tunnel construction methods, lining methods, and ventilation requirements for the then proposed 1983 alignment of the Red Line tunnels (along Wilshire Boulevard and Fairfax Avenue).
- In 1985, Metro commissioned the development of the Congressionally Ordered Reengineering Study that established methane conditions along alternative alignments and led to the re-alignment of the then- proposed Metro Red Line into its current alignment.
- Metro designed a “two-pass” tunnel lining system (i.e., two tunnel linings that were constructed in sequence, with the second lining being constructed within the first lining) for the Metro Red Line that included a high-density polyethylene water and gas barrier in tunnel construction.
- Metro undertook a study for the Mid-City area to locate and monitor gas-bearing geologic formations to determine the extent of the gas reservoirs, examine methods of treatment for pre-tunneling and tunneling timeframes, and recommend tunnel and station configurations to avoid the most gaseous areas.
- Metro implemented a double-gasketed tunnel liner that can flex enough to protect the tunnel from gas intrusion before, during, and after an earthquake.

Metro continuously monitors for gaseous environments in its tunnels, and has emergency ventilation in all its tunnel facilities in addition to the standard ventilation provided in the tunnels.

Section 2 of the Project passes through an area characterized by oil fields; thus the possibility of encountering gaseous conditions cannot be completely eliminated. A discussion of the risks of tunneling through areas of methane and/or hydrogen sulfide gases along Section 2 of the Project is provided in Section 4.5.5 of this Draft SEIS and *Assessment of Tunneling and Station Excavation Risks Associated with Subsurface Gas along Section 2–Revision 1*(Metro 2017b). Therefore, Metro has specified design and construction measures to address gassy environments. Furthermore, the elevated soil gas concentrations and pressures present in some areas along Section 2 of the Project are not higher than those encountered previously during design and construction of underground stations and tunnels for the Metro Red Line.

Experience has been gained from the construction of existing buildings, with up to five levels of underground parking, in the Wilshire/Fairfax and adjacent area (most notably the existing Citi National Bank mid-rise building at 6100 Wilshire Boulevard at the southwest corner of Wilshire Boulevard and Fairfax Avenue, which has five basement levels). In more recently constructed buildings, construction of the subterranean walls has included water and gas-proof membranes in order to fulfill requirements of the City of Los Angeles methane regulations, as enforced by the Los Angeles Department of Building and Safety. Existing buildings in Century City along Constellation Boulevard have also been constructed in the gassy ground conditions, with up to five levels of underground parking for the Century City Theme Towers complex (up to 100 foot depth, similar to the basement excavation shown in Figure 4-12). Additional buildings have recently been completed or are currently being designed in Century City with provisions for the anticipated methane conditions in the area, as required by the Los Angeles Department of Building and Safety, such as the recently completed “The Century” high-rise tower at 1 West Century Drive and the “New Century” high-rise tower complex at 2025 Avenue of the Stars, planned to start construction in 2017.

Tunnels and stations for the Project will be designed to provide a redundant protection system against gas intrusion hazard, such as those described in the City of Los Angeles Municipal Code, Chapter IX, Building Regulations, Article 1, Division 71, Methane Seepage Regulations. In compliance with these regulations, specific requirements are determined according to the actual methane levels and pressures detected on a site, and the identified specific requirements will be incorporated into the design and construction. Therefore, the risk posed by hazardous subsurface gas to the operations of Section 2 of the Project will be minimized. Further methods to reduce the risk of gas exposure and intrusion into the Metro structures are described below.

Most gases, if present, are purged from the tunnels simply by the air movement caused by the action of trains running through the tunnels. Nevertheless, during non-revenue operations, air velocity must be maintained at a minimum of 100 feet per minute, per Metro’s Design Criteria. This air velocity is the minimum that the ventilation system must achieve to direct gases toward the nearest point of extraction and prevent hazardous gases from accumulating during the hours when the trains are not operating. Additional ventilation is also employed during revenue operations. In addition, gas and waterproofing systems considered in preliminary and Final Design include the following:

- Specially designed precast concrete liners used for the primary tunnel lining for ground support and water/gas barrier are designed with the possibility of adding a secondary liner as needed if leakage occurs at some future time. This approach is being used on Section 1 of the Project.
- At some locations, the lining may include thicker segments than what was provided to date to protect against corrosion and so that wider gaskets could be used to increase the performance of the gasket seals.
- Reduced permeability tunnel segment concrete—the segments may include steel fibers or other types of fiber reinforcement for denser concrete as well as coatings.
- Double-gasket design to provide a second seal for a more redundant system. This also facilitates post-installation repair of leaks (if needed) by grouting the areas between the gaskets.
- Segment Insert Materials—use of non-corrosive plastics, for example plastic dowels, at segment circumferential joints.
- Rapid repair methods such as pre-installed grout tubes within water-proofing systems.
- In station structures, water/gas proofing membranes are to be "compartmentalized" so that leakage, if it occurs, can be isolated and readily repaired using pre-installed grout tubes.
- Other methods for gas and waterproofing will be added for evaluation as they are identified.

As shown in Figure 4-13 and Figure 4-14, abandoned oil wells have been identified near or within the Section 2 Project alignment. Based on the existing information, design of Section 2 of the Project has avoided oil wells where their locations have been identified. During Final Design, additional studies and testing will be performed to further ensure that all oil wells are identified and re-abandoned or removed according to approved California State Department of Oil, Gas, and Geothermal Resources procedures prior to tunneling or station excavation. Testing will include magnetic scanning to locate metallic well casings within the immediate area of the tunnel alignment and station limits. With these safeguards, the presence of existing oil wells is not considered a hazard for operation of Section 2 of the Project. Refer to Section 4.5.5 of this Draft SEIS for additional information on the risks of constructing tunnels in areas with oil wells.

Furthermore, the tunnel is a ventilated space with barriers preventing communication of gases between the interior and exterior of the tunnel as described above. The presence of the tunnel will not influence the soil gas already within the ground, in particular because there are no "open" preferential pathways (such as open fractures) for gas within the ground (refer to Section 4.5.5). The tunnel does not provide new pathways for gas transmission, as the tunneling methodology utilizes grout along its length such that the space around the tunnel is sealed by the grout. Therefore, the presence of the constructed tunnel will have no influence on the long-term migration of soil gas to the ground surface or into buildings or increase the risk of explosion, resulting in no adverse effect.

4.3.3 Completeness of Information

In response to the Final Decision's requirement for a more thorough discussion of the completeness of the seismic risk information, this section has been prepared in compliance with 40 CFR § 1502.22(b), which states:

> *(b) If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement: (1) A statement that such information is incomplete or unavailable; (2) a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment; (3) a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment, 4) the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.*

As discussed in Section 4.3.1, the seismic risk analysis was prepared in compliance with 40 CFR § 1502.22(b) as follows. The completeness of information related to subsurface gas is presented in Section 4.5.5 of this Draft SEIS.

(1) A statement that such information is incomplete or unavailable

The information relevant to reasonably foreseeable significant adverse impacts is considered complete to the degree necessary for the purposes of the planning and preliminary design of Section 2 of the Project; however, as described in the Uncertainty in Fault Location Investigations section on page 4-27 of this Draft SEIS, there is uncertainty inherent to the fault location investigation process, including those uncertainties due to the physical constraints of investigation in the densely developed urban portion of Los Angeles in the vicinity of Section 2 of the Project.

Geotechnical investigations are designed to provide an understanding of the subsurface/geologic conditions at a site based on geologic maps, site reconnaissance, existing data, and an exploration program, usually including a reasonable number of borings drilled to the depths of interest. The completeness of the investigation is assessed by standards of practice; guidelines, including federal, state, local, and industry; and the judgment of Licensed Geologists and/or Engineers practicing Geology and Geotechnical Engineering.

A comprehensive record of the subsurface conditions is not possible to assemble based on a finite number of geotechnical explorations because of the intrinsic variability within earth materials; therefore, a full dataset of the subsurface conditions cannot be ascertained until excavation for the project (foundation, station structure, etc.) is complete, and even then, only to the depth and lateral limits of excavation. The Uncertainty in Fault Location Investigations section on page 4-27 of this Draft SEIS further explains the challenges of investigating the geologic conditions in dense, urbanized areas and the resulting uncertainty in fault locations. In addition, there are differing scientific opinions regarding the activity of some of the fault strands identified in the studies in the vicinity of Section 2 of the Project, which in itself presents uncertainty.

Keeping these limitations in mind, Section 4.3.1 and Section 4.3.2 of this Draft SEIS include the following:

- Documentation that demonstrates no risk from surface fault rupture hazard for the Wilshire/Rodeo Station and the alignment east of that station.
- Documentation that demonstrates evidence of faulting and therefore risk associated with surface fault rupture hazard if a station was located along Santa Monica Boulevard.
- Documentation that demonstrates no risk from surface fault rupture hazard for the Century City Constellation Station, including direct scientific evidence of no faulting along the station.
- Documentation that demonstrates there is a potential risk from surface fault rupture along the tunnel alignment between the Wilshire/Rodeo Station and the Century City Constellation Station. The information regarding the risk at this particular location is partially complete at this time because faults have been found to cross the alignment in the vicinity of Lasky Drive, Charleville Boulevard, and Spalding Drive; further investigations have been required to be performed by the design-builder to better evaluate/constrain the location and width of fault zones in order that the tunnel is designed to accommodate displacement in the event of an earthquake on the faults.

(2) A statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment

As described above, although there remain uncertainties regarding the fault investigation, the evaluations performed demonstrate directly that there is no risk from faulting at the Century City Constellation Station, such that the station can be safely designed at this location, but the tunnel zone between those two stations has evidence of fault crossing (fault zone) with associated fault rupture hazard. The fault rupture displacement hazard can be accommodated in design of a tunnel, as described in Section 4.3.2. The tunnel will be designed such that collapse of the tunnel does not occur due to fault rupture displacement, and the tunnel and tracks can be repaired after such an event. With the additional information required to be obtained by the design-builder prior to approval of design, including additional geotechnical explorations to evaluate the length of the zone of faulting across the tunnel, the currently incomplete information along the portion of the alignment between the intersection of Lasky Drive and Moreno Drive and the Wilshire/Rodeo Station will be made complete with respect to tunnel design to accommodate fault displacement.

Although incomplete, the data available regarding faulting along Santa Monica Boulevard is sufficient to conclude that constructing the proposed Century City Santa Monica Boulevard Station would pose a risk to human life, creating a significant adverse impact. The data is also sufficient to demonstrate that the risk of surface fault rupture along Santa Monica Boulevard is greater than the risk at the Century City Constellation Station because there is evidence of faulting along Santa Monica Boulevard and evidence of no faulting at the Century City Constellation Station. This conclusion is reached despite the uncertainties described above due to the sufficiency of the available data.

(3) A summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment
The conclusions provided in Section 4.3.1 of this Draft SEIS were made utilizing the review of published references, and all existing studies conducted by either Metro or private property owners. Table 4-8 provides a summary of existing studies of the Santa Monica Fault that were reviewed in the preparation of this Draft SEIS. These studies are described in further detail in Appendix B.

(4) The agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community.
Section 4.3.1 of this Draft SEIS concludes that the stations along Section 2 will not be impacted by fault rupture since there is direct evidence of no faulting at the Wilshire/Rodeo and Century City Constellation Stations. However, the Century City Santa Monica Station would be located along numerous faults, which could pose a hazard. A fault rupture event would cause extensive damage to a station on Santa Monica Boulevard because there are no known engineering methods available to construct a subterranean subway station that could withstand the rupture without collapse.

Similarly, there is evidence that there is no faulting along the alignment of the tunnel at or east of the Wilshire/Rodeo Station. However, because of potential for faulting in a portion of the tunnel between the Wilshire/Rodeo Station and the Century City Constellation Station, that portion of the tunnel will be designed to accommodate potential fault rupture displacement using methods similar to those previously employed in California (refer to Power 1998 for methods used in design) Examples include the design of the following subway tunnel projects:

- Metro Red Line through the Hollywood Fault in Hollywood (northwest of the Hollywood/Highland Station)
- BART tunnels through fault zones in the San Francisco Bay Area (see Power 1998)

The Metro Design Criteria describes design of tunnels in the zone of fault crossing (Metro 2015k).

4.3.4 Mitigation Measures

Construction and design will be performed in accordance with Metro's Design Criteria, the most current Federal and State seismic and environmental requirements, and State and local building codes. By compliance with these requirements, potential impacts from geologic hazards will be minimized along Section 2 of the Project with the Century City Constellation Station. The mitigation measures identified in the Final EIS/EIR and listed below are also included to further avoid and minimize impacts. With compliance with existing requirements and implementation of these identified mitigation measures, no additional mitigation is necessary for long-term geologic hazards and there is no adverse effect.

With gas and waterproofing systems considered in preliminary and Final Design of Section 2 of the Project and incorporation of these mitigation measures, the hazards associated with hazardous subsurface gasses during operation of Section 2 of the Project will be minimized and there is no adverse effect.

- **GEO-1—Seismic Shaking:** Metro design criteria require probabilistic seismic hazard analyses (PSHA) to estimate earthquake loads on structures. These analyses take into account the combined effects of all nearby faults to estimate ground shaking. During Final Design, site-specific PSHAs will be used as the basis for evaluating the ground motion levels along the Project. The structural elements of the Project will be designed and constructed to resist or accommodate appropriate site-specific estimates of ground loads and distortions imposed by the design earthquakes and conform to Metro's Design Standards for the Operating and Maximum Design Earthquakes. The concrete structures are designed according to the Building Code Requirements for Structural Concrete (ACI 318) by the American Concrete Institute.
- **GEO-2—Fault Crossing Tunnel, Fault Rupture, Tunnel Crossing:** Design will allow for the tunnels to cross the faults nearly perpendicular to limit the area of potential damage and will use Metro's two-level approach to assess fault offset and the associated structural design required to accommodate the offset. During Final Design, fault crossings will be designed for the ground conditions at the crossing location and incorporate the methods used to excavate and support the tunnel. Metro Design Criteria require use of a probabilistic approach to determine the Maximum Design Earthquake and Operating Design Earthquake. Design must include the following:
  - Prevent collapse of the tunnel to ensure tunnel safety
  - Maintain structural continuity of tunnel ring
  - Prevent flow of water and soil
  - Establish the tunnel size to maintain tunnel clearances and provide a guideway for derailed trains to decelerate without impact
  - Several preliminary design approaches or combinations have been considered and will be further developed in Final Design:
    - Steel tunnel rings with compressible material between the ring and soil to accommodate movement of the fault
    - Flexible steel linings
    - Articulated joints between tunnel segments for added flexibility

- Oversized tunnel to allow additional movement and, to some extent, more rapid repair after a seismic event. This could also be accomplished using cut and cover methods.

- **GEO 3—Operational Procedures during Earthquake**: In addition to design measures implemented on the existing Red line, Metro will implement Standard Operating Procedures in seismic areas to detect earthquakes and will provide back-up power, lighting, and ventilation systems to increase safety during tunnel or station evacuations in the event of loss of power due to an earthquake. For example, seismographs are located in 11 of the existing Metro Red/Purple Line stations to detect ground motions and trigger Standard Operating Procedures (SOP #8 – Earthquake) by the train operators and controllers. Operating procedures are dependent on the level of earthquake and include stopping or holding trains, gas monitoring, informing passengers, communications with Metro's Central Control, and inspecting for damage.
- **GEO 4—Liquefaction and Seismic Settlement:** At liquefaction or seismic settlement prone areas, evaluations by geotechnical engineers will be performed to provide estimates of the magnitude of the anticipated liquefaction or settlement. Based on the magnitude of evaluated liquefaction, a suitable mitigation will be selected, either structural design, or ground improvement (such as deep soil mixing) or deep foundations to non-liquefiable soil (such as drilled piles). Site specific design will be selected based upon the State of California Guidelines design criteria set forth in the *Metro Seismic Design Criteria*.
- **GEO 5—Hazardous Subsurface Gas Operations:** As with the existing Red and Purple Lines and the Metro Gold Line Eastside Extension, Metro will install gas monitoring and detection systems with alarms, as well as ventilation equipment to dissipate gas to safe levels according to Metro's current design criteria and Cal/OSHA standards for a safe work environment. Measures will include, but are not limited to, the following for both tunnel and station operation:
  - High volume ventilation systems with back-up power sources
  - Gas detection systems with alarms
  - Emergency ventilation triggered by the gas detection systems
  - Automatic equipment shut-off
  - Maintenance and operations personnel training
  - Gas detection instrumentation is set to send alarms to activate ventilation systems and evacuate the structures as follows: methane gas—minor alarm at 10 percent of the lower explosive limit (activate ventilation) and major alarms at 20 percent of the lower explosive limit (evacuation of area)
  - Hydrogen sulfide—Minor alarm at 8 ppm and major alarm at 10 ppm
- **GEO 6—Hazardous Subsurface Gas Structural Design:** Tunnels and stations will be designed to provide a redundant protection system against gas intrusion hazard. The primary protection from hazardous gases during operations is provided by the physical barriers (tunnel and station liner membranes) that keep gas out of tunnels and stations. As with the existing Metro Red and Purple Lines and the Metro Gold Line Eastside Extension, tunnels and stations will be designed to exclude gas to

below alarm levels (GEO-5) and include gas monitoring and detection systems with alarms, as well as ventilation equipment to dissipate gas.

At stations in elevated gassy ground (e.g., Wilshire/Fairfax), construction will be accomplished using slurry walls—or similar methods such as continuous drilled piles—to provide a reduction of gas inflow both during and after construction than would occur with conventional soldier piles and lagging.

Other station design concepts to reduce gas and water leakage are the use of additional barriers; compartmentalized barriers to facilitate leak sealing; and flexible sealants, such as poly-rubber gels, along with high-density polyethylene-type materials used on Metro's underground stations.

Consideration of secondary station walls to provide additional barriers or an active system (low or high pressure barrier) will also be studied further to determine if they will be incorporated into the Project.

The evaluations for station and tunnel construction materials will include laboratory testing programs such as those conducted for the Metro Gold Line Eastside Extension during development of the double gasket system and material testing for long-term exposure to the ground conditions for materials such as rubber gaskets used for tunnel segment linings. Testing programs will examine:

- Segment leakage—gasket seal under pressure before, during, and after seismic movements. This will include various gasket materials and profiles (height and width).
- Gasket material properties—effective life and resistance to deterioration when subjected to man-made and natural contaminants, including methane, asphaltic materials, and hydrogen sulfide.
- Alternative products to high-density polyethylene products such as poly-rubber gels, now in use in ground containing methane in other cities could be considered. Alternative methods for field testing of high-density polyethylene joints will be examined to provide additional quality control during installation. These are now being used for landfill liners and water tunnels under internal water pressure.

- **GEO 7—Tunnel Advisory Panel Design Review:** The Metro Tunnel Advisory Panel will review designs with respect to geologic hazards in areas of identified higher risk. These include the Century City area (seismic risk) and the Fairfax area (gassy ground risk). The panel will be supplemented, as necessary, by qualified experts in seismic design, gas intrusion, and ground contaminant effects on underground structures.

4.4 Historic Properties

4.4.1 Affected Environment/Existing Conditions

The description of Historic Properties located in Section 2 of the Project Study Area has not changed from what was provided in Section 4.14 of the Final EIS/EIR. However, changes and refinements to the Project require a slight expansion of the Area of Potential Effects (APE) to accommodate a materials storage area in the block bounded of Solar Way, Constellation Boulevard and Century Park West. This area, as well as the area between the Wilshire/Rodeo and Century City Constellation Stations, which is under consideration as part of this Draft SEIS, includes four historic properties: the Century Plaza Hotel, the AAA Building, the Century Park Towers, and BHHS (Figure 4-20). These properties were within the Project's previously established APE and are listed in or were determined eligible for listing in the National Register of Historic Places (NRHP). Because of proposed changes to the construction staging area and the materials storage area in their vicinity, effects to these historic properties are being reassessed.

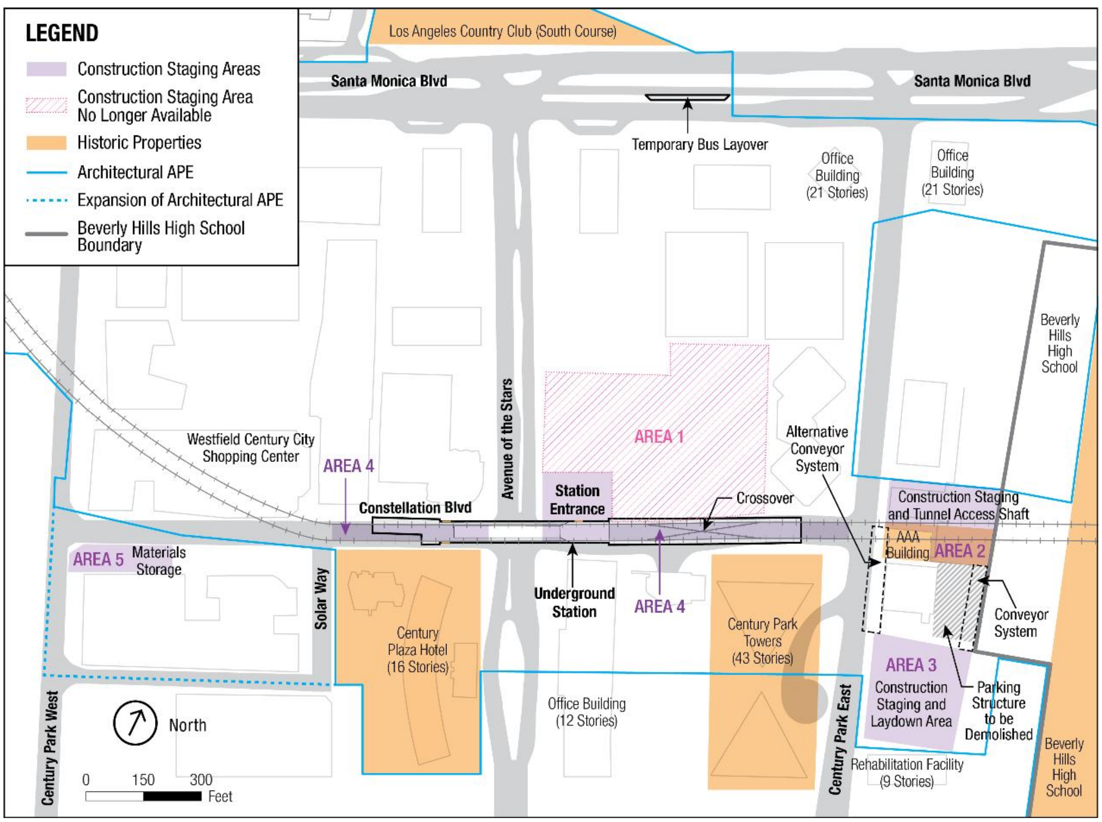


Figure 4-20. Historic Properties in the Vicinity of the Century City Constellation Station

In addition to the changes in the construction staging areas at the Century City Constellation Station, the double crossover at the Wilshire/Rodeo Station was eliminated. As a result, the station box shifted east from El Camino Drive to Canon Drive and now extends from Beverly Drive to Canon Drive, reducing the length of the station box and corresponding underground station excavation from approximately 1,150 feet to approximately 950 feet. The shortening of the underground station would result in lower construction costs and slightly reduced impacts to traffic and disruption to the surrounding streets and businesses due to a smaller construction footprint along Wilshire Boulevard, reduced time needed for station excavation and fewer truck trips needed for hauling excavated material. Because the station footprint and construction effects are being minimized, there are no new adverse effects in the vicinity of the Wilshire/Rodeo Station. Due to the refinement of the alignment in the Century City area, the tunnels no longer require subsurface easements beneath the Perpetual Savings Bank or the Barn, reducing the number of historic properties the tunnel passes beneath.

No additional historic properties, including archeological sites or built historic properties, are present in the area that is part of the expanded APE. Furthermore, no additional historic properties are present in any area that is subject to re-evaluation as part of Project changes or refinements.

4.4.2 Environmental Impacts/Environmental Consequences

As part of Section 106 studies completed for the Final EIS/EIR, forty-one historic properties were identified within the APE. As part of the assessment of effects, FTA determined that the proposed Project would have no adverse effect to forty properties. One property, the Ace Gallery, would be adversely affected by the Project because of proposed demolition. For information on these properties, please refer to Section 4.14.5 of the Final EIS/EIR.

Since publication of the Final EIS/EIR, a proposed development on the northeast corner of Constellation Boulevard and Avenue of the Stars has resulted in changes to the Century City Constellation Station construction staging sites as described in Section 2.3.2 of this SEIS. The construction staging sites include two locations along Century Park East and require the full acquisition of 1940 Century Park East, 1950 Century Park East, and 2040 Century Park East properties. This change also requires installation of a tunnel access shaft and a materials transport corridor, including a conveyor belt, to connect staging sites on 1950 Century Park East with the staging site at 2040 Century Park East, the use of an existing bus layover area for storage, temporary bus layover on Santa Monica Boulevard, and placement of ventilation/exhaust structures on the Westfield Century City property (Figure 4-20).

The proposed construction activities for the Century City Constellation Station and tunneling of Section 2 are located in the vicinity of four historic properties as defined by Section 106: the AAA Building, the Century Park Towers, the Century Plaza Hotel, and BHHS. Figure 4-20 depicts the location of each historic property in relation to the construction staging areas, the tunnel, and the Century City Constellation Station. Construction staging areas would be located north, east and west (in the public right-of-way) of the AAA Building, north and east of Century Park Towers, north and west of the Century Plaza Hotel, and west of BHHS. As part of this reassessment it is important to note that the proposed project changes result in avoiding tunneling beneath the Perpetual Savings Bank due to the alignment refinement between the Wilshire/Rodeo and Century City Constellation Stations. Consultation with the SHPO regarding the reassessment of effects is ongoing at the date of issue of this Draft SEIS.

As previously assessed in the Final EIS/EIR, Section 2 Project activities in the vicinity of the AAA Building would include construction of a bored heavy rail tunnel and the Century City Constellation Station, which, when complete, would be located outside the boundary of the historic properties. The Section 2 tunnels would be constructed approximately 60 feet beneath the AAA Building (to top of tunnel) on an east-west axis beneath Constellation Boulevard and BHHS. The tunnel underground features would not be visible at the surface on the AAA Building property and would be outside of the historic property boundary of the AAA Building, which only extends to the building foundation. The AAA Building has also been identified as a site that may be used as a potential project office during construction. This potential use would not result in any changes to the exterior and any potential interior alterations would be temporary or reversible.

Section 2 of the Project would also include construction of the proposed Century City Constellation Station below ground at the intersection of Constellation Boulevard and Avenue of the Stars. The Century City Constellation Station would consist of an underground station box with a central platform area. The station box would be built using cut-and-cover construction, connecting with bored sections of the tunnels for its underground alignment. Underground station construction would occur outside of the historic properties' boundaries, within the street footprint of Constellation Boulevard.

The station entrance would be located in the northeast quadrant of Constellation Boulevard and Avenue of the Stars outside the historic properties' boundaries. The proposed station entrance would span approximately one-third of the block and be approximately .25 acre and will be incorporated into the surrounding built environment. The station design will incorporate site design to integrate it into its surroundings. The aboveground features would also include stairs, escalators, and elevators; ancillary ventilation shafts would be located at the Westfield Century City Shopping Center, which is not a historic property.

A construction staging area will be located adjacent to the historic property boundary of the AAA Building; across Century Park East approximately 150 feet from Century Park Towers; and immediately adjacent to the BHHS property boundary, but 150 feet from the BHHS historic property boundary. These changes to the Project will not adversely affect BHHS. Section 2 of the Project would travel in a tunnel under the BHHS campus. The top of the tunnels would be between 60 and 70 feet below the ground surface as it crosses under the campus. There would be no changes to surface features on the high school campus, nor would the Project elements be visible from the school campus. Construction vibration levels would be less than the levels that could potentially structurally damage fragile buildings and would not substantially diminish the utility of the historic buildings. With mitigation, operational groundborne noise and vibration levels would be less than the FTA noise impact criteria for institutional use and would not affect the ability to continue classroom activities at the high school. Tunneling with a pressurized-face tunnel boring machine would not cause significant ground settlement that would result in structural damage to the historic building. The BHHS integrity of location, design, setting, materials, workmanship, feeling, and association will not be minimized as a result of the proposed Project. Therefore, the Project will continue to have no adverse effect on BHHS, consistent with previous effects assessments.

To accommodate construction staging activities at this site, demolition of the garage on the AAA Building's parcel will occur. While the garage is within the boundary of the historic property, it does not contribute to the eligibility of the property for the NRHP and has been considered as a distinct entity from the AAA Building. In correspondence dated December 8, 2011, the California SHPO concurred that the AAA Building only was determined eligible for listing in the NRHP. The previously completed *Westside Subway Extension Project: Historic Properties Supplemental Survey Technical Report* (Metro 2012) contains an updated State of California Building, Structure, and Object Record form (updated November 2011). The report stated that the garage was distinct from the historic Brutalist AAA Building and was not intended to be a contributing element to the historic property from the original architect's design perspective.

Project-related activities that will occur within the construction staging area include vehicle parking; an equipment and supply storage within a laydown area; a tunnel access shaft; and a conveyor system that will be either ground-level or elevated on the eastern side of the parcel or elevated on the western side of the parcel to transport excavated soils and other ancillary construction activities supporting the staging area.

Construction activities are anticipated to continue for approximately seven years. Tunneling activities, which would result in the most noticeable construction activities at the tunnel shaft adjacent to the AAA Building, would last for approximately two of those seven years. Therefore, minimization measures to control the effects of construction are planned. These measures would include noise and dust minimization efforts and best practices; with respect to working hours only; and use of equipment such as a hospital-grade muffler and using low-noise emission construction equipment to minimize construction effects. A comprehensive list of general noise control measures can be found in the report entitled *Westside Purple Line Extension AAA Building Construction Noise and Vibration Assessment* (Metro 2016d).

Current studies indicate that dust and vibration levels will remain within acceptable levels and would not cause adverse indirect effects *(Westside Purple Line Extension AAA Building Construction Noise and Vibration Assessment*, (Metro 2016d)). Contractors will monitor construction to ensure that dust and vibration do not exceed the acceptable levels. Most of the equipment can be operated without risk of damage at distances of seven feet or greater from the AAA Building with the exception of a vibratory roller and large bulldozer which would be operated no closer than 35 to 40 feet. In addition to implementing recommendations based on the contents of *Westside Purple Line Extension AAA Building Construction Noise and Vibration Assessment* (Metro 2016d), the contractor is required to submit a Vibration Monitoring Plan. Vibration monitoring shall be performed at the AAA Building closest to the locations where equipment and/or construction activities generate a substantial amount of ground-borne vibration. Vibration monitoring at the AAA Building shall consist of continuous measurements of vibration at the closest building façade to the construction activities. All vibration monitors used should be equipped with an “alarm” feature to provide notification that the 0.2 PPV vibration damage risk threshold has been approached or exceeded.

Construction effects will be temporary and will not substantially alter the historic setting of the areas around the historic properties, which have already been altered by modern high-rise buildings. Construction activities will not materially alter in an adverse manner the physical characteristics that convey the historic significance of the AAA Building. The use of the building as a potential project office will have no adverse effect on the historic character-defining features of the building. The exterior will not be affected and effects to the interior will be temporary and reversible. The use of the building as a project office is consistent with its historic use as an office building. Indirect effects such as dust and vibration will not affect character-defining features of the historic properties and will be temporary.

After construction is completed, only the Century City Constellation Station elements, which were previously determined to have no adverse effect, will remain. The construction staging area will be restored and improved with appropriate landscaping and hardscape finishes, although the non-historic garage adjacent to the AAA Building will no longer be present. The removal of the garage will result in a change in the setting in the vicinity of the AAA Building, but there are no significant historic views to or from the AAA Building and the garage was not a contributing element to the historic property or a significant architectural feature on its own. Therefore, the removal of the garage will not alter character-defining historic features of the area.

The materials storage area is located to the west of the Century Plaza Hotel, across Solar Way. The site is currently a 0.3-acre Metro bus layover location. The site would be used for approximately seven years for trailer offices, construction materials storage, and parking of construction equipment associated with station construction. There would be no ground-disturbing activity at the site other than for installation and removal of sound walls, and for removal and restoration of curbs and landscaping. After station construction is complete, the site would be returned to its current use as a layover facility for Metro buses. The four historic properties retain integrity of location, design, materials, workmanship, feeling, or association. No direct physical effects would occur to contributing elements or character-defining features within the historic properties’ boundaries. Although the proposed Century City Constellation Station’s above-ground station entrance and escalators would be visible from portions of the historic properties, these Project features, when completed, represent a minor alteration to the area’s visual setting and do not impact character-defining features of the setting. Similarly, the materials storage area, which will be temporary, will be across the street but visible from the Century Plaza Hotel; however, this area is currently used as a bus layover facility. No historic viewsheds or historic setting will be affected by the change from a bus layover facility to a materials storage area. After construction is complete, the area will return to use as a bus layover facility.

Atmospheric changes, such as noise and dust, and visual changes, which are potential indirect effects that could affect integrity of setting, are expected for the duration of station construction, which can be expected to last seven years. However, minimization measures and best practices will reduce construction effects, and these effects will be temporary in nature. Additionally, integrity of setting is low or not retained at all in this vicinity due to modern construction and an absence of character-defining historic viewsheds that contribute to the significance of historic properties (refer to Figure 4-21). After Section 2 of the Project is built, the areas directly around the construction staging area and the materials storage area will be returned to their prior condition and only the station itself, which was previously determined to have no adverse effect, will remain.

Source: Google Earth, 2017

Figure 4-21. AAA Building Setting

Permanent Project effects, which include those that are the result of Project operations, will be minimal. With mitigation, no noise or vibration effects are anticipated as a result of Project operation. Because the Project will be underground in the vicinity of the four historic properties, no visual effects are anticipated. The station entrance will not be visible from BHHS and the AAA Building. The station entrance is located across Avenue of the Stars from the Century Plaza Hotel, approximately 300 feet away, and the entrance is more than 500 feet from the Century Park Towers. The permanent presence of the station entrance will not affect any character-defining historic features or historic viewsheds or settings of the nearby historic properties. Most notably, the scale of the adjacent properties are much larger than the station entrance, which will be comparatively small.

As described above, the removal of the garage adjacent to the AAA Building will result in a change in the setting in the vicinity of the AAA Building, but there are no significant historic views to or from the AAA Building and the garage was not a contributing element to the historic property or a significant architectural feature on its own. Therefore, the permanent effect from its removal is not an adverse effect according to Section 106 regulations.

Based on the assessment of temporary construction-related and permanent project effects, Section 2 of the Project will have no adverse effect to the AAA Building, Century Park Towers, BHHS, and the Century Plaza Hotel. No additional adverse effects will result from Section 2 of the Project. All prior effects assessments for the other thirty-eight historic properties remain valid, including a Determination of Adverse Effect for the Ace Gallery located in Section 2. Therefore, the overall project finding remains unchanged.

Consultation with the SHPO on the proposed project refinements and the reassessment of effects is pending. Beverly Hills Unified School District and the City of Beverly Hills have requested to be Section 106 consulting parties. FTA has granted this request and both groups will be included in forthcoming Section 106 consultation, affording them the opportunity to comment on historic preservation-related aspects of the Project.

4.4.3 Mitigation Measures

Because the project work described above will result in no adverse effect to historic properties, no additional mitigation will be required. The prior adverse effect finding of effect resulting from the proposed removal of the Ace Gallery remains in place. However, no additional adverse effects are anticipated as a result of the proposed project refinements. As described above, the proposed project work will not adversely affect character-defining features or integrity. Consultation with the SHPO on the proposed project refinements and the reassessment of effects is pending.

While no other Section 106 mitigation is required because there are no additional adverse effects, the measures and best practices described in Section 4.4.2 that will avoid or minimize construction effects will be implemented. These measures will avoid or minimize indirect effects such as noise, vibration, or atmospheric effects and are important considerations in avoiding unanticipated adverse effects.

The mitigation contained in "Memorandum of Agreement between the Federal Transit Administration and the California State Historic Preservation Officer Regarding the Los Angeles Westside Subway Extension Project, Los Angeles County, California" remains valid and in place. However, the minimization measures described in detail in Section 4.4.2 include noise, vibration, and dust minimization efforts and best practices. Contractors will monitor construction to ensure that dust and vibration do not exceed the acceptable levels. These minimization practices are being implemented in order to maintain the reassessment finding of no adverse effect for the four historic properties that are proximate to the proposed staging areas.

4.5 Construction Impacts and Mitigation

The following construction impacts analysis focuses on changes to Section 2 of the Project, including the relocation of construction staging activities at the Century City Constellation Station described in Chapter 2 and the proposed land use changes adjacent to the construction sites at Century City Constellation Station. This section will also analyze those issues identified in the Final Decision. The Transportation Construction Impacts analysis is presented in Chapter 3, along with a more detailed discussion of the construction approach.

Section 4.5 summarizes Section 2 construction activities and methods and is followed by a description of construction impacts by resource area. With the exception of the changes to the construction staging locations at the Century City Constellation Station, the construction activities and methods remain largely unchanged from what was described in Appendix E, Construction Methods, of the *Westside Subway Extension Final Environmental Impact Statement/Environmental Impact Report* (Final EIS/EIR) (Metro 2012j). This information is summarized here for reference.

Overview of Construction Activities

Construction activities for Section 2 of the Project have not changed from what was described in Section 4.15.1 of the Final EIS/EIR with the exception of the relocation of construction staging activities for the Century City Constellation Station. Table 4-9 provides an overview of the general sequence and approximate duration of construction activities, and Table 4-10 provides a summary of construction activities, including types of construction equipment to be used, volumes of soil and concrete, haul truck trips per day, and approximate range of workers required per day. Major construction activities for Section 2 of the Project could begin as early as January 2018 with expected completion in 2026.

Tunnel Construction

Tunnels would be constructed using tunnel boring machines (TBMs)—large-diameter horizontal “drills” that continuously excavate circular tunnel sections (Figure 4-22). The TBM would excavate two parallel tunnels (21 feet in diameter) similar to the twin tunnels excavated for the Metro Gold Line Eastside Extension subway (Figure 4-23).

Both the ground in front of the machine and the horizontal “hole” it creates are continuously supported by the TBM pressurized face, shield, and pre-cast concrete tunnel liners that are installed as the machine progresses. This method creates a tunnel with little or no disruption at the surface and reduces risk of settlement. The TBM technology allows the tunnel lining to be installed concurrently with the excavation and without lowering groundwater levels. Excavated materials are removed through the tunnel to the shaft area and brought to the surface for disposal off-site, typically in a landfill or re-used for fill material.

Table 4-9. Generalized Sequence and Approximate Duration of Construction Activities

Activity[1]	Duration[2]	Description	Equipment Required
Survey and pre-construction	4 to 6 months	Surveys and limited excavation	Largely hand tools and small equipment
Underground utilities	Approximately 18 to 24 months	Locate, move, and support utilities	Hand tools and small excavation equipment
Tunnel construction[3]	Approximately 8 to 12 months for a typical 1-mile length between stations [3]	Excavation and tunnel lining	TBM, slurry pumping and separation equipment, concrete equipment. Hauling equipment to remove spoil and bring in segments and tunnel supplies. Instrumentation and monitoring equipment
Station box piling and decking	Approximately 12 to 15 months	Installation of excavation support, installation of dewatering and instrumentation wells, removal of street pavement and subgrade, installation of deck beams and precast concrete deck panels	Pile drilling equipment, well drilling equipment for instrumentation and dewatering wells, cranes, excavators, potholing equipment, hauling equipment to remove spoil and bring in piles, beams, deck panels, concrete trucks, tanks and mixing equipment for drilling fluids, cutting and welding equipment
Station excavation	Approximately 1 year	Support of excavation and cut-and-cover excavation	Various excavation equipment, drilling equipment, slurry wall equipment, and cranes, loaders, and trucks Instrumentation and monitoring equipment
Station construction	Approximately 2.5 years	Form and place concrete structure, finish work, architectural and mechanical	Hauling equipment to bring in ready mix concrete and building materials. Concrete form and placing equipment, cranes, trucks, soil compaction equipment, trucks, and cranes
Street/site restorations	Approximately 4 months	Paving and sidewalks	Paving equipment
Vent shafts and emergency exits	Approximately 12 months	Shafts and cross-passages	Crane and tunnel equipment
Systems installation and facilities	Approximately 2.5 years	Installation of trackbed, rails, third rail (traction power); conduits for systems installations; electrical substations; and communications and signaling	Crane, flatbed trucks, hand tools and small equipment, and rail welding equipment

Activity[1]	Duration[2]	Description	Equipment Required
Systems testing and pre-revenue operations	5 to 6 months	Testing of power, communications, signaling, and ventilation systems; training of operators and maintenance personnel	Small equipment and rail vehicles

Notes:
[1]Durations and activities shown are for one location (e.g., one station).
[2]Portions of activities would be conducted at the same time as other activities. For example underground utilities, station excavation, and station construction would be concurrent at any individual station location.
[3]Tunnel excavation generally would range from 8 to 12 months for the typical 1-mile length between stations, but would vary depending on the ground conditions encountered, site and work area constraints, length of tunnel, and the number of TBMs used.

Table 4-10. Construction Activity Summary

Activity	Construction Equipment							Soil (Cubic Yards)	Concrete (Cubic Yards)	Haul Truck Trips per Day	Workers per Day
	Haul Truck	Concrete Truck	Dozer	Excavator	Crane	Drill Rig	Flatbed				
Pre-construction						✓	✓	N/A	N/A	5	10-20
Site preparation	✓	✓	✓	✓	✓		✓	1,000	1,000	10-20	20-30
Operating systems installation	✓				✓		✓	N/A	N/A	2	20-30
TBM tunnel from Wilshire/ La Cienega to Century City	✓	✓	✓	✓	✓		✓	330,000	Precast Segments	90-130	50-80
Wilshire/Rodeo Station (cut-and-cover without double ")	✓	✓	✓	✓	✓	✓	✓	192,000	53,000	60-100	70-150
Century City Station (cut-and-cover with double crossover)	✓	✓	✓	✓	✓	✓	✓	256,000	70,000	80-120	50-225

Figure 4-22. Pressurized-Face Tunnel Boring Machine

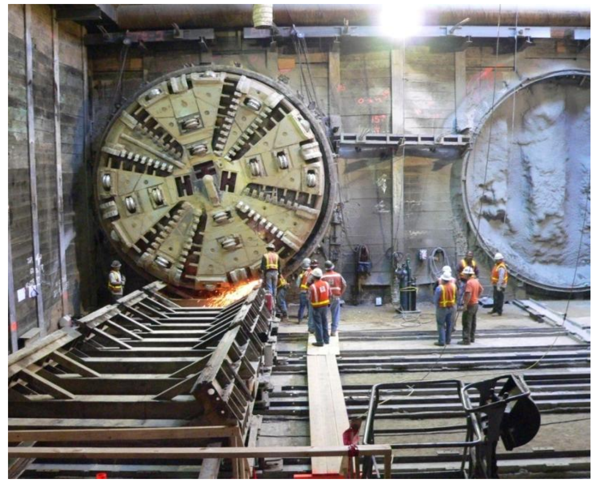


Figure 4-23. Twin Tunnels on Eastside Extension

As described in Section 4.3, Section 2 of the project is located in the City of Los Angeles' methane buffer zone. This would require use of pressure face TBMs to provide control of the ground as well as exposure of workers to gassy ground. The design-build contractor would select the specific type of TBM, either a slurry-face TBM (Figure 4-24) or an earth pressure balanced (EPB) TBM.

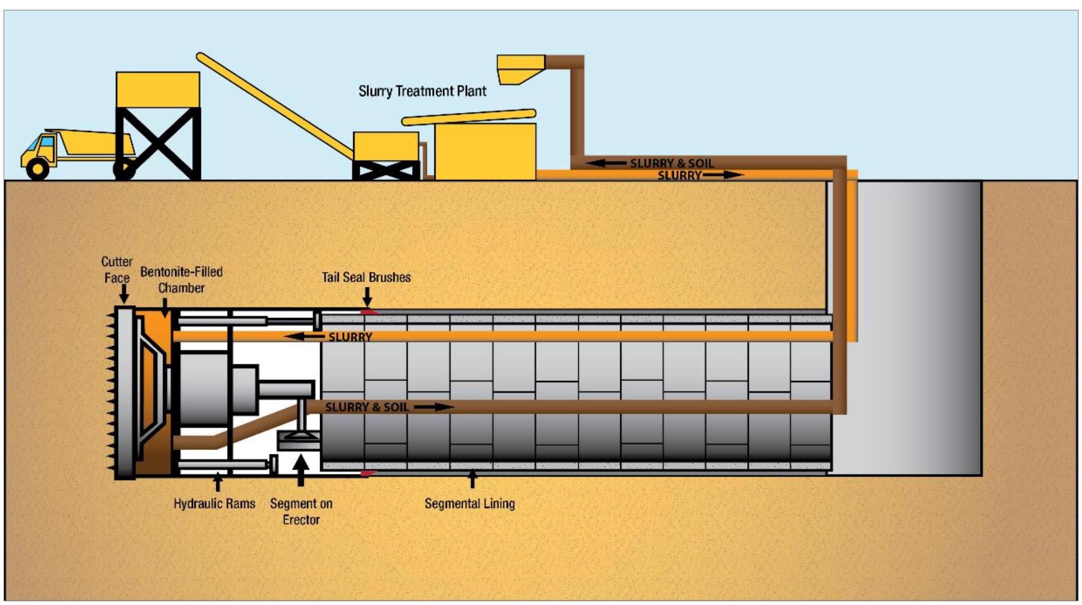


Figure 4-24. Tunneling in Gassy Areas with Pressure Face TBM

In North America, EPB TBMs are the most common and have been used successfully in Los Angeles. These TBMs rely on balancing the thrust pressure of the machine against the soil and water pressures from the ground being excavated. The EPB TBMs are generally well suited for boring in soft ground, the type of soil expected in the project area. An EPB TBM will be used for Section 1 of the project.

Slurry-face TBMs use a fully enclosed system to transport excavated soil to the surface. Bentonite (a clay mineral) slurry is pumped through pipelines to the TBM's pressurized face, and soil cuttings are suspended in the slurry and removed through the return slurry lines. A treatment plant is set up at the surface to separate slurry from soil cuttings so that the slurry can be recycled and the soil cuttings transported to a disposal site. The American Public Transportation Association Peer Review of tunneling from 2005 concluded: "It is possible to tunnel and operate a subway along the Wilshire Corridor safely" using these new technologies. In all cases, contractors will monitor the surface and subsurface environment for compliance with the California Division of Occupational Safety and Health (Cal/OSHA) standards for worker safety and Air Quality Management District standards (refer to Section 4.3 for additional discussion of gassy ground conditions). Additional information on construction methods is provided in Appendix E of the Final EIS/EIR.

Tunnel excavation generally would range from 8 to 12 months for the typical 1-mile length between stations, but would vary, depending on the ground conditions encountered, site and work area constraints, length of tunnel, and the number of TBMs used.

The excavated material (for tunnel and station construction) is brought to the surface, stockpiled, and then hauled away by trucks to suitable disposal sites. The routes and times of hauling would be approved by local jurisdictions beforehand, and the public would be notified as part of the public involvement plan.

Cross-passages between adjacent tunnels would be constructed to connect tunnels at intervals of about every 800 feet. These openings would be excavated using small excavating equipment, such as backhoes, and subsequently concreted. Before exposing the ground, particularly where water or gas would be encountered, a tight seal of improved soils (using grout freezing or other soil improvements) would typically be installed around the area to be excavated.

Specific ground conditions would dictate the method and detail of preparing the cross-passage sites for excavation. Ground treatment for cross passages often includes drilling and grouting from above the tunnels at the street surface. Although surface drilling is often more disruptive to surface activities, it may provide for greater control of ground treatment application.

Station Construction

Station construction methods have not changed from those detailed in Section 4.15.2 of the Final EIS/EIR; however, in areas where gas is present, Cal/OSHA requires additional measures for equipment safety and monitoring the environment.

Since certification of the Final EIS/EIR, the double crossover structure at the Wilshire/Rodeo Station has been eliminated from the Section 2 Project design (refer to Section 2.3.3). As a result, the Wilshire/Rodeo station box beneath Wilshire Boulevard has been shortened to 950 feet. The shortening of the underground station would result in lower construction costs and slightly reduced impacts to traffic and disruption to the surrounding streets and businesses due to a smaller construction footprint along Wilshire Boulevard, reduced time needed for station excavation, and fewer truck trips needed for hauling excavated material.

Staging Areas

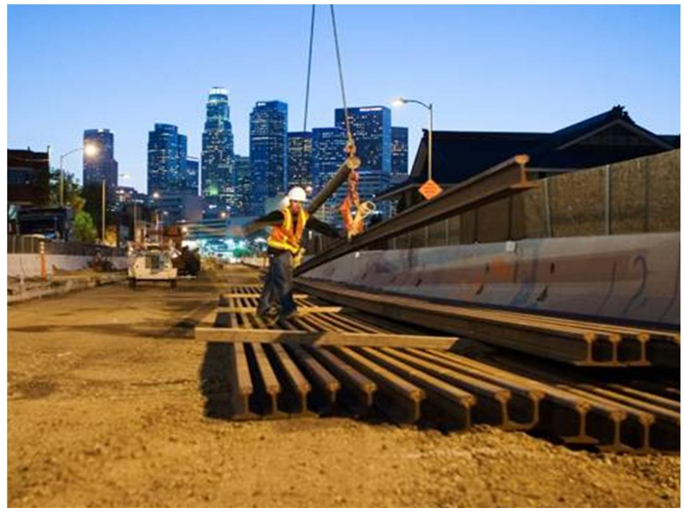


Figure 4-25. Off-Street Construction Area on Metro's Gold Line Eastside Extension

Construction staging areas (also referred to as "laydown areas") would be necessary for tunnel construction, stations, and ancillary facilities. Off-street space would be needed for setup, insertion, operation, and extraction of equipment and materials to the tunnel and station excavations. Figure 4-25 shows an example of an off-street construction area for the Metro Gold Line Eastside Extension. The construction staging site for the Wilshire/Rodeo Station has not changed from that described in the Final EIS/EIR. As described in detail in Section 2.3.2 of this Draft SEIS, the construction staging areas for the Century City Constellation Station have changed from what was analyzed in the Final EIS/EIR.

Because of a proposed commercial development at the northeast corner of Constellation Boulevard and Avenue of the Stars, the construction staging area under Scenario A can no longer be used for Section 2 of the Project. Instead, the staging areas identified in the Final EIS/EIR as part of Scenario B would be used. The Scenario B construction staging sites (Area 2 and Area 3 in Figure 4-26) include two staging locations along Century Park East and require full acquisition of 1940 Century Park East, 1950 Century Park East, and 2040 Century Park East. An area approximately 0.25-acre in size would be required for construction of the station entrance at the northeast corner of Constellation Boulevard and Avenue of the Stars. The station entrance would be incorporated into future development to be constructed at this location.

In response to concerns expressed by the City of Beverly Hills and the BHUSD on potential air quality impacts of the construction staging to BHHS, alternative construction approaches to constructing a tunnel access shaft at 1950 Century Park East were considered. Chapter 2 and Chapter 5 of this Draft SEIS provides further discussion of these alternate tunnel access shaft locations. Due to the physical constraints and environmental impacts associated with placing the access shaft either within Constellation Boulevard or at the Wilshire/La Cienega Station, they are not considered further in this Draft SEIS. Locating the tunnel access shaft within Area 2 minimizes impacts to the community (particularly traffic impacts at Constellation Boulevard and Century Park East) and optimizes construction efficiency by locating the tunnel access shaft contiguous to the materials storage and stockpiles in Area 2 and with a connecting corridor to Area 3. The Area 2 location would not require street closures along Constellation Boulevard for tunneling activities after the initial closures for the assembly and launch of the TBMs, reducing disruption to Century City residents and visitors.

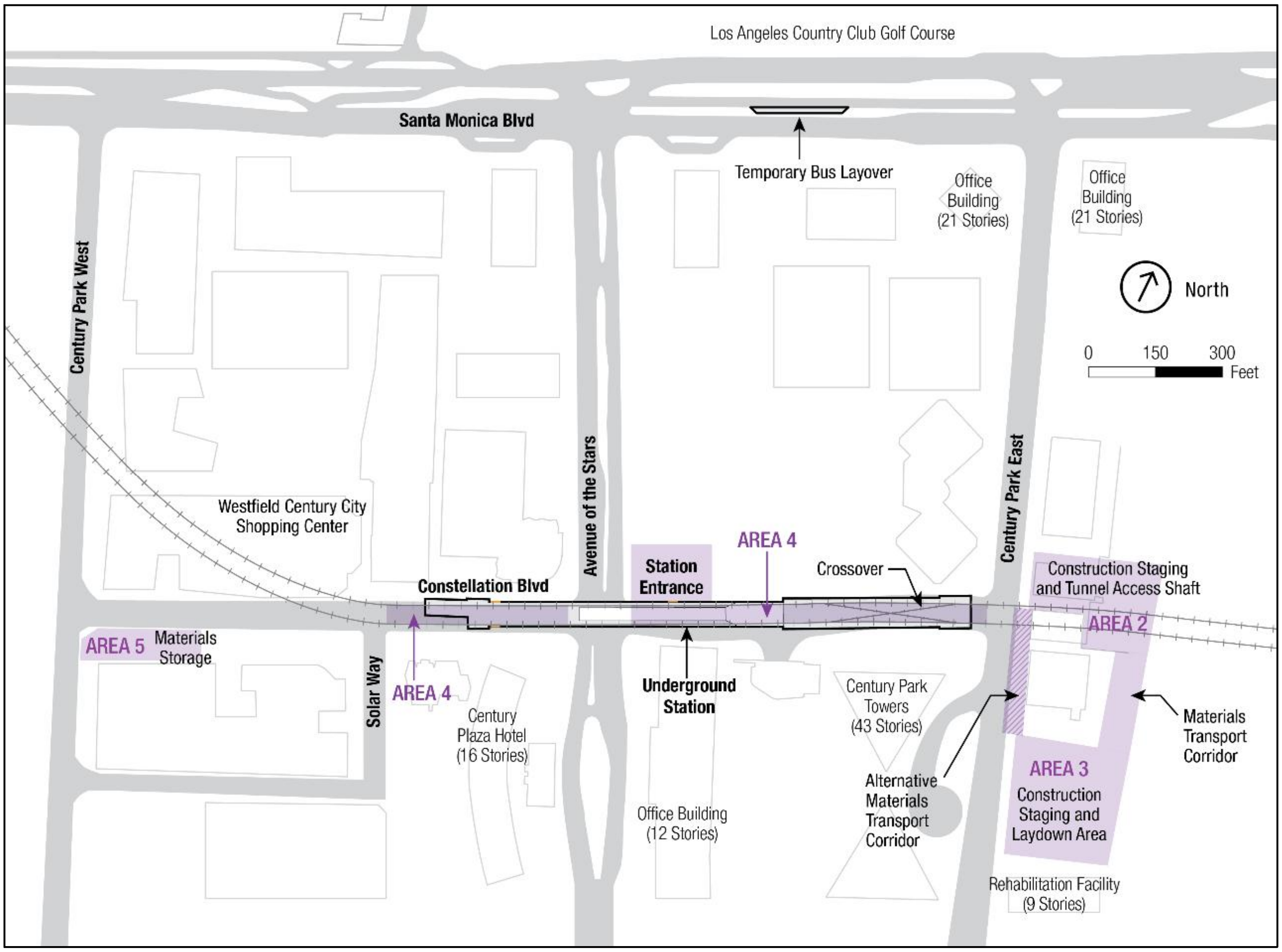


Figure 4-26. Century City Constellation Construction Staging Areas

4.5.1 Acquisition and Displacement of Existing Uses

Section 4.2.2 of the Final EIS/EIR describes the land ownership and leasing/easement agreements that would change as a result of the Project. As identified in the Final EIS/EIR, 1940, 1950 and 2040 Century Park East would be acquired by Metro. A permanent easement would be required at 1950 Avenue of the Stars to support the station entrance. In addition to the full acquisitions, partial acquisitions, permanent easements, and temporary construction easements identified in the Final EIS/EIR, the change in construction staging areas for the Century City Constellation Station would require additional temporary and permanent easements as indicated below.

The change in construction staging areas for the Century City Constellation Station would require a new temporary construction easement for materials storage and construction offices at the 0.3-acre bus layover site located at the southeast corner of Century Park West and Constellation Boulevard, owned by JMB Realty Corporation. To offset the loss of the five bus layover spaces, a new temporary bus layover area would be created in the median of Santa Monica Boulevard. Following construction of the Century City Constellation Station, the bus layover site used for construction material storage would return to use as a bus layover site and the temporary layover site would be removed and the median of Santa Monica Boulevard would be returned to its previous condition. In addition, access to the fuel cell installation located on the northwest corner of the site would be maintained during the entire seven years the site is used by Metro for construction-related purposes. The fuel cell installation is in a partially enclosed area approximately 15 feet by 60 feet that is accessible from within the bus layover site. The fuel cells provide power to the Constellation Place office building at 10250 Constellation Boulevard.

An approximate 11,000-square-foot temporary construction easement may be used along the eastern portion of the property at 2010 Century Park East (AT&T building) for placement of the conveyor system and for a temporary access road between Staging Areas 2 and 3. The conveyor system would either run across the top of the existing parking structure on the east side of the AT&T building or, should agreement be reached with the property owners for removal of the parking structure, the conveyor would connect the shaft in Area 2 to Area 3 at ground level. The 11,000-square-foot temporary construction easement also includes space to support general construction staging activities for the duration of Section 2 of the Project.

If use of the eastern portion of the AT&T property is not feasible, the conveyor system would be placed in a temporary construction easement along the west side of the AT&T building, in a materials handling corridor along an approximately 400-foot-long section of Century Park East. The corridor would have a width encompassing one northbound traffic lane and sidewalk in the public right-of-way along the eastern side of Century Park East and an approximate 1,900-square-foot temporary construction easement between the AT&T building and the eastern edge of the sidewalk.

In addition to the temporary easements described above, approximately 3,000 square feet of permanent easements would be needed for ventilation and exhaust shafts within the Westfield Mall property located along the north side of Constellation Boulevard (Figure 4-27).

As described in Chapter 2 of this Draft SEIS, the tunnel alignment was refined slightly since to Final EIS/EIR to accommodate the removal of the double crossover at the Wilshire/Rodeo Station and to optimize the radii of the curves. The alignment refinement results in avoiding tunneling beneath the Perpetual Savings Bank Building (9720 Wilshire Boulevard), but does require subsurface easements beneath two properties that were not identified in the Final EIS/EIR:

- 216 S Lasky Drive (AIN: 4328-007-016): multi-family residential
- 2029 Century Park East (AIN: 4319-016-029): commercial

The subsurface easements will not result in displacement or relocation of any structures on the surface of the parcel. Therefore, no adverse impacts related to subsurface easements are anticipated.

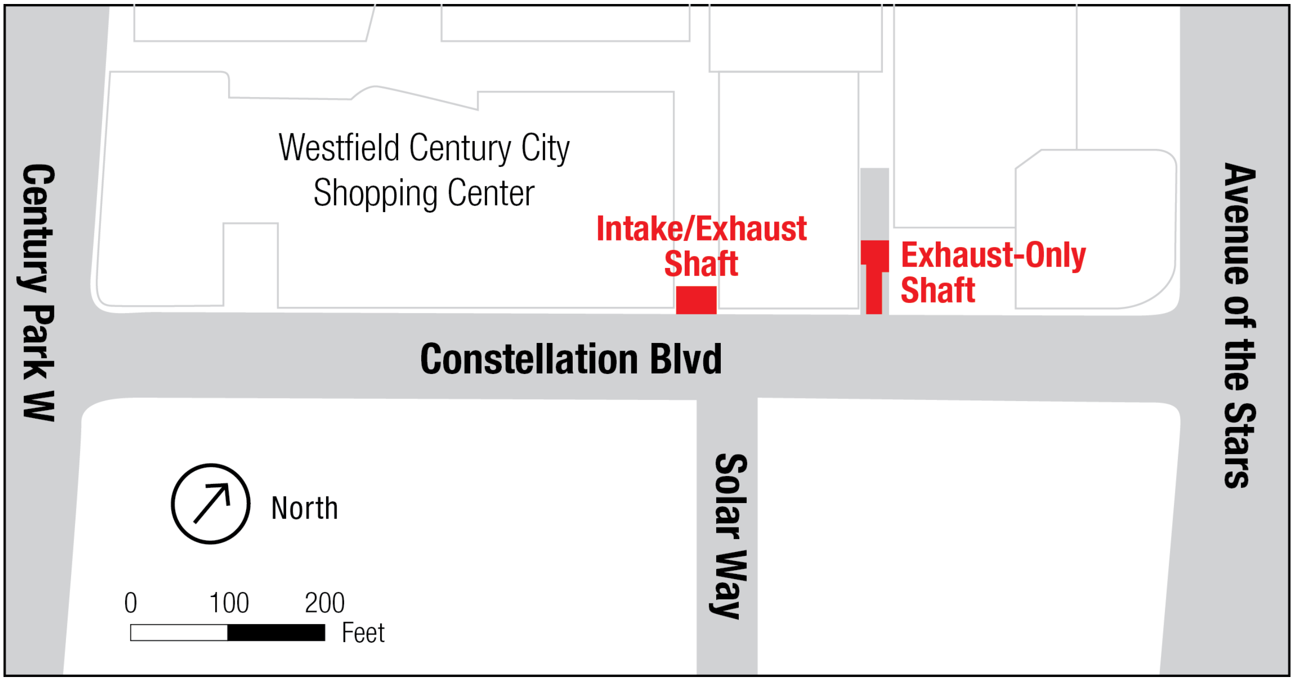


Figure 4-27. Westfield Mall Easements

Construction-related Environmental Impacts/Environmental Consequences

There would be no additional construction-related impacts to communities and neighborhoods beyond those described in Section 4.15.3 of the Final EIS/EIR.

Metro would compensate property owners for the full acquisitions and permanent and temporary property easements as well as the removal of the parking structure. The structure at 1940 Century Park East would be demolished, which would be permanent. If agreed upon with the property owners, the demolition of the AT&T parking structure would be permanent. Currently, only a section of the ground floor of the AT&T parking structure is used to support their operations. If the parking structure is demolished, the construction laydown area would occupy half the footprint of the AT&T parking structure with the remainder available to AT&T for parking or other uses throughout construction.

The permanent easements needed for the station appendages in the Westfield Mall property would not affect the function or operation of the mall, and the appendages would be incorporated into the on-going renovation efforts at the site.

Mitigation Measures

As described in mitigation measure CN-3 below, compensation will be provided to AT&T for the temporary property easements on their property and for the removal of the parking structure if removal of the parking structure is agreed upon. In addition, compensation will be negotiated with the Westfield Mall and other property owners for permanent property easements required for the ventilation and exhaust shafts. With the changes to the Century City Constellation Station construction areas, the acquisition and displacement impacts would not be considered an adverse impact with the implementation of the following mitigation measures specified in Section 4.2 of the Final EIS/EIR:

- **CN-1 Relocation Assistance and Compensation:** Metro will provide relocation assistance and compensation for all displaced businesses and residences, as required by both the Uniform Relocation Assistance and Real Property Acquisition Act and the California Relocation Assistance Act. All real property acquired by Metro will be appraised to determine its fair market value. Just compensation, which will not be less than the approved appraisal, will be made to each displaced property owner. Each business and residence displaced as a result of the LPA will be given advance written notice and will be informed of their eligibility for relocation assistance and payments under the Uniform Relocation Assistance and Property Acquisition Act. It is anticipated that most businesses will relocate and, as such, most jobs will be relocated and will not be permanently displaced. However, there are permanent job losses anticipated. Metro shall coordinate with the appropriate jurisdictions regarding business relocations.
- **CN-3 Compensation for Easements:** For easements, Metro will appraise each property to determine the fair market value of the portion that will be used for an easement either temporarily during construction or permanently above and below ground. As required by both the Uniform Relocation Assistance and Real Property Acquisition Policies Act and the California Relocation Assistance Act, just compensation, which will not be less than the approved appraisal, will be made to each property owner.

4.5.2 Visual Quality

Affected Environment/Existing Conditions

There is no change to the Study Area's existing visual environment, its general character, key features, and overall visual quality from what was described in Section 4.3 of the Final EIS/EIR, with the exception of the new medical rehabilitation facility and BHHS modernization, which are described in the affected environment/existing conditions in Section 4.2.

As described in Section 4.3 of the Final EIS/EIR, the general visual character of the Century City area consists of a dense auto-oriented urban center with tall buildings and wide boulevards and multi-level plazas with pedestrian overpasses. The Century City high-rise buildings are a visual landmark, and prominent buildings contribute to the area's visual character. Views are limited, but include distant mountains and the Hollywood sign. Mature trees, corporate plazas, and banners are prominent visual elements. The area has a generally pleasant appearance but lacks strong consistent architectural style and urban design features, and does not include sensitive visual resources.

Construction-related Environmental Impacts/Environmental Consequences

The visual effects associated with the construction staging changes at the Century City Constellation Station are similar to the effect identified in Section 4.15.3 of the Final EIS/EIR. As identified in the Final EIS/EIR, the construction activities include the use of heavy construction equipment, stockpiled construction-related materials, erosion devices, excavated materials, new lighting sources, fences, noise barriers, and temporary removal of trees, which would conflict with the existing visual character and would result in a change in visual quality for the areas adjacent the construction sites. The Final EIS/EIR indicates that during the construction period, these visual elements would temporarily degrade the physical character of the station and staging areas, resulting in adverse effects without mitigation. Implementation of the mitigation measures identified would reduce the anticipated visual impacts.

Several changes associated with construction staging at the Century City Constellation Station would result in visual changes to the area that were not discussed in the Final EIS/EIR. These visual changes are described below. The removal of the double crossover at the Wilshire/Rodeo Station would not alter the visual effects of construction at this station as the proposed construction activities and locations would be consistent with those identified in Section 4.15.3 of the Final EIS/EIR. Due to the elimination of the double crossover, the duration of construction activities may be shortened slightly, reducing the duration of visual effects at this station.

The demolition of the existing parking structure and construction of an approximate 80-foot-diameter shaft to access the tunnel and installation of a materials transport corridor to move material out of the tunnel were not included in the Final EIS/EIR as part of the activities in construction Area 2. Construction of the access shaft is a new temporary condition and is adjacent to the AAA Building. With Area 2 surrounded by 20-foot-high temporary barriers (see Figure 4-28), the shaft opening would likely be visible from only the upper floors of the office building immediately north of Area 2 (1888 Century Park East) and the AAA Building. The shaft opening would not be visible to pedestrians or motorists on Century Park East or to students, faculty, and staff at BHHS. During the potential overlap between the BHHS campus modernization and Section 2 construction activities, the shaft opening would not be visible to students, faculty, and staff located temporarily in portable classrooms on the current BHHS lacrosse fields. A crane at the shaft would extend beyond the 20-foot high temporary barrier. The crane would be in the vicinity of the AAA Building and visible to BHHS and the public on Century Park East (see Figure 4-29), but would be located in a dense commercial urban visual environment surrounded by high rise structures, would not block scenic viewsheds or vistas and therefore, would not result in a substantial change to visual quality.

If the AT&T building parking structure were removed, a materials transport corridor, consisting of a conveyor system, temporary access road, and temporary pipe racks carrying utility lines, water, grout, foam, compressed air, etc. between Areas 2 and 3, would be placed at ground level. Under this scenario, the conveyor system would not be visible to the surrounding properties except for the upper floors of the office building immediately north of Area 2 (1888 Century Park East), the AAA Building, and the medical rehabilitation facility south of Area 3 (2080 Century Park East). Removal of the parking structure would not substantially alter the visual character of the surrounding area as construction activities and demolition of structures are already planned to occur in the immediate vicinity of the AT&T building, including the demolition of 1940 Century Park East and the parking garage of the AAA Building (1950 Century Park East) immediately north of the AT&T parking structure.

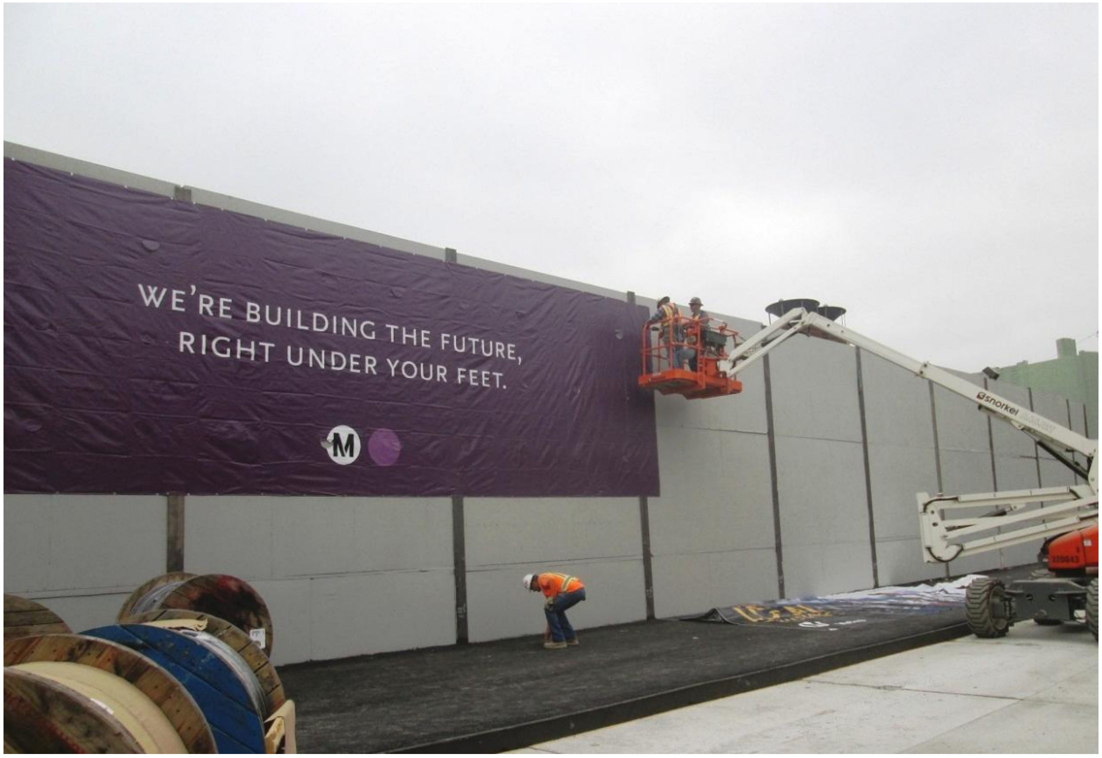


Figure 4-28. Typical 20-foot Noise Barrier at Construction Staging Areas

Figure 4-29. Crane at the Wilshire/La Brea Muck Shaft

If the parking structure were not demolished and the conveyor system and temporary pipe racks must span the top level of the three-story parking structure, a taller vertical conveyor from the shaft would be required in order to span the parking structure. Since the shaft conveyor system would be higher than the standard 20-foot barrier surrounding the site, it would be visible to both the upper floors of the office building immediately north of Area 2, the AAA Building, and could be visible to BHHS located immediately east of the staging areas and the conveyor system (see Figure 4-30).

Figure 4-30. Typical Enclosed Conveyor

If it is not feasible to install a materials transport corridor on the east side of the AT&T building, the conveyor system would be elevated approximately 15 feet high across the west side of the AT&T building and the AAA Building as part of a materials handling corridor. Access to the AT&T building and the AAA Building would be maintained beneath the conveyor. As the installation of the elevated conveyor and use of an approximate 400-foot portion of Century Park East for movement of materials and equipment would be located in a dense commercial urban visual environment surrounded by high rise structures, it would not block scenic viewsheds or vistas and therefore, would not result in a substantial change to visual quality. Up to eight trees along Century Park East may be removed to accommodate the conveyor system and materials handling corridor creating an additional visual effect along this portion of Century Park East. Following construction, the conveyor belt would be removed and the area would be restored with replacement trees per mitigation measure VIS-2 and the sidewalk and traffic lane would return to use.

During construction, the access shaft conveyor would be screened and the horizontal conveyor system between Areas 2 and 3 would be enclosed to minimize its visual effect regardless of which option for its placement is used.

Construction staging activities in Area 3 would be visible to the new long-term rehabilitation facility at 2080 Century Park East. The nine-story structure is located immediately south of Area 3, and views from the north side of the building would be affected by construction staging activities in Area 3, including hauling operations to remove excavated material and storage of equipment and materials. In addition, construction-related lighting sources would be introduced in Area 3, which could affect the north side of the rehabilitation facility. Several large trees along the northern edge of the rehabilitation facility property would provide some screening of Area 3.

During potential concurrent construction of the BHHS campus modernization and Section 2 of the Project, the 20-foot-high barrier surrounding Area 3 would shield construction staging activities from students, faculty, and staff in temporary portable classrooms on the current BHHS lacrosse fields.

The use of the bus layover at the corner of Century Park West and Constellation Boulevard (Area 5) would create a new temporary visual change for the office building (10250 Constellation Boulevard) located east of the site, primarily the offices facing west. With the bus layover site surrounded by a 20-foot-high barrier, only the upper floors of the office building, which would overlook the materials and equipment storage in Area 5, would be affected.

Installation of the temporary bus layover site in the Santa Monica Boulevard median could require removal of up to four small trees and landscaping within the median. Removal of trees and vegetation and construction of a bus layover area would result in a visual change for motorists traveling east on Santa Monica Boulevard. Once the temporary layover site is no longer needed, the median would be restored.

Mitigation Measures

With the change of construction staging activities and introduction of several new visual elements during the construction of Section 2 of the Project, including the access shaft and conveyor system, to the Century City Constellation Station area, the construction period visual impacts would be minimized with the implementation of the following mitigation measures identified in Section 4.15 of the Final EIS/EIR. With implementation of mitigation, the Project would not result in additional adverse temporary visual-related impacts beyond those discussed in the Final EIS/EIR.

- **CON-2 Timely Removal of Erosion Devices:** Visually obtrusive erosion-control devices, such as silt fences, plastic ground cover, and straw bales, will be removed as soon as the area is stabilized.
- **CON-3 Location of Construction Materials:** Stockpile areas will be located in less visibly sensitive areas and, whenever possible, not be visible from the road or to residents and businesses. Limits on heights of excavated materials will be developed during design based on the specific area available for storage of material and visual impact.

- **CON-4 Construction Lighting:** Lighting will be directed toward the interior of the construction staging area and be shielded so that it will not spill over into adjacent residential areas or outdoor areas that are used at night such as cafes, plazas, and other gathering areas where users may stay for an extended period of time and is integral to the enjoyment of the land use. In addition, temporary sound walls of Metro approved design will be installed at station and work areas. These will block direct light and views of the construction areas from residences
- **CON-5 Screening of Construction Staging Areas:** Construction staging areas will be screened to reduce visual effects on adjacent viewers.
- **VIS-2 Replacement for Tree Removal:** Where mature trees are removed, replacement with landscape amenities of equal value will be incorporated into final designs, where feasible, to enhance visual integrity of the station area.

4.5.3 Air Quality

This air quality analysis focuses on the construction phase impacts of the Century City Constellation Station in Section 2 of the Project. The removal of the double crossover at the Wilshire/Rodeo Station would not substantially alter the construction approach at this station and if anything would result in reduced emissions and reduced impacts to air quality due to smaller station footprint, decreased construction activities, and decreased excavation volumes. Therefore, it is not discussed further in this section.

As documented in the *Westside Purple Line Extension Century City Constellation Station Air Quality Technical Memorandum - Revision 1* (Metro 2017g) (Appendix F), analyses have been conducted to determine the following:

- Whether construction-related emissions would exceed the South Coast Air Quality Management District's (SCAQMD) Local Significance Thresholds
- Whether construction-related emissions would cause exceedances of air quality standards or cause any health risk issues at nearby sensitive land uses

The analysis is summarized in the sections below.

Affected Environment/Existing Conditions

"Air pollution" is a general term that refers to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants degrade the atmosphere by reducing visibility; they are also responsible for damaging property, reducing the productivity or vigor of crops or natural vegetation, and/or reducing human or animal health. Air quality is a term used to describe the amount of air pollution the public is exposed to.

Pollutants that degrade air quality in the United States are governed by the Federal Clean Air Act (CAA); the CAA is administered by the U.S. Environmental Protection Agency (USEPA). In addition to being subject to the requirements of the CAA, pollutants that degrade air quality in California are also governed under the California Clean Air Act (CCAA). The CCAA, as amended in 1992, requires all air quality management districts in the State to endeavor to achieve and maintain State Ambient Air Quality Standards. The California Air Resources Board (CARB) administers the CCAA statewide.

State and National Ambient Air Quality Standards

As required by the Clean Air Act, National Ambient Air Quality Standards (NAAQS) have been established for six major air pollutants. These pollutants are: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide, and lead. The State of California has also established ambient air quality standards, known as the California Ambient Air Quality Standards (CAAQS). These standards are generally more stringent than the corresponding federal standards and incorporate additional standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles.

Both State and Federal standards are summarized in Table 4-11. The "primary" standards have been established to protect the public health. The "secondary" standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the general welfare.

Table 4-11. State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]		Federal Standards[2]		
		Concentration[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]
Ozone (O_3)[8]	1 Hour	0.09 ppm (180 $\mu g/m^3$)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 $\mu g/m^3$)		0.070 ppm (137 $\mu g/m^3$)		
Respirable Particulate Matter (PM_{10})[9]	24 Hour	50 $\mu g/m^3$	Gravimetric or Beta Attenuation	150 $\mu g/m^3$	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 $\mu g/m^3$		—		
Fine Particulate Matter ($PM_{2.5}$)[9]	24 Hour	—		35 $\mu g/m^3$	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 $\mu g/m^3$	Gravimetric or Beta Attenuation	12.0 $\mu g/m^3$	15 $\mu g/m^3$	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—		
Nitrogen Dioxide (NO_2)[10]	1 Hour	0.18 ppm (339 $\mu g/m^3$)	Gas Phase Chemiluminescence	100 ppb (188 $\mu g/m^3$)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 $\mu g/m^3$)		53 ppb (100 $\mu g/m^3$)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1 Hour	0.25 ppm (655 $\mu g/m^3$)	Ultraviolet Fluorescence	75 ppb (196 $\mu g/m^3$)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 $\mu g/m^3$)	
	24 Hour	0.04 ppm (105 $\mu g/m^3$)		0.14 ppm (for certain areas)[11]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[11]	—	
Lead[12,13]	30 Day Average	1.5 $\mu g/m^3$	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 $\mu g/m^3$	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 $\mu g/m^3$		
Visibility Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No Federal Standards		
Sulfates	24 Hour	25 $\mu g/m^3$	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 $\mu g/m^3$)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 $\mu g/m^3$)	Gas Chromatography			

Source: *Ambient Air Quality Standards* (CARB 2016a)
See next page for footnotes.

Table 4-11 (continued)

Footnotes

[1] California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[2] National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 μg/m3 is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.

[3] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[4] Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

[5] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

[6] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[7] Reference method as described by the USEPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the U.S. EPA.

[8] On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

[9] On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 μg/m3 to 12.0 μg/m3. The existing national 24- hour PM2.5 standards (primary and secondary) were retained at 35 μg/m3, as was the annual secondary standard of 15 μg/m3. The existing 24-hour PM10 standards (primary and secondary) of 150 μg/m3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

[10] To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

[11] On June 2, 2010, a new 1-hour SO2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved. Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

[12] The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[13] The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 μg/m3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

[14] In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

Local Monitored Air Quality

Air quality data is measured at monitoring stations throughout the state by monitors that CARB/SCAQMD generally maintains. The monitoring stations nearest the Project Study Area are located at the Veterans Affairs Hospital in West Los Angeles and 1630 North Main Street in downtown Los Angeles. The last three years of available monitored data for these locations are summarized in Table 4-12 to illustrate the Study Area's general air quality trends.

Table 4-12. Air Quality Summary for Project Study Area Monitoring Stations (2013-2015)

Air Pollutant	Standard/Exceedance**	Veterans Hospital West Los Angeles			North Main Street Los Angeles		
		2013	2014	2015	2013	2014	2015
Carbon Monoxide (CO)	Year Coverage*	N/A	N/A	N/A	N/A	N/A	N/A
	Max. 1-hour Concentration (ppm)	1.9	22	1.6	2.5	2.5	3.2
	Max. 8-hour Concentration (ppm)	1.3	1.3	1.4	2.0	2.0	1.8
	# Days>Federal 1-hour Std. of >35 ppm	0	0	0	0	0	0
	# Days>Federal 8-hour Std. of >9 ppm	0	0	0	0	0	0
	# Days>California 8-hour Std. of >9.0 ppm	N/A	N/A	N/A	N/A	N/A	N/A
Ozone (O_3)	Year Coverage*	88%	95%	98%	82%	94%	98%
	Max. 1-hour Concentration (ppm)	0.088	0.116	0.102	0.081	0.113	0.104
	Max. 8-hour Concentration (ppm)	0.075	0.094	0.072	0.069	0.094	0.074
	# Days>Federal 8-hour Std. of >0.070 ppm	0	5	2	0	6	6
	# Days>California 1-hour Std. of >0.09 ppm	0	1	2	0	3	2
	# Days>California 8-hour Std. of >0.070 ppm	1	6	3	0	7	6
Nitrogen Dioxide (NO_2)	Year Coverage*	72%	93%	93%	75%	95%	98%
	Max. 1-hour Concentration (ppm)	0.051	0.064	0.068	0.090	0.082	0.079
	Annual Average (ppm)	N/A	0.013	0.011	N/A	0.022	0.022
	# Days>California 1-hour Std. of >0.18 ppm	0	0	0	0	0	0
Sulfur Dioxide (SO_2)	Year Coverage*	N/M	N/M	N/M	N/M	N/M	N/M
	Max. 24-hour Concentration (ppm)	N/M	N/M	N/M	N/M	N/M	N/M
	Annual Average (ppm)	N/M	N/M	N/M	N/M	N/M	N/M
	# Days> Federal 1-hour Std. of >0.075 ppm	N/M	N/M	N/M	N/M	N/M	N/M
Suspended Particulates (PM_{10})	Year Coverage*	N/M	N/M	N/M	97%	92%	97%
	Max. 24-hour Concentration ($\mu g/m^3$)	N/M	N/M	N/M	57.0	66.0	73.0
	#Days>Fed. 24-hour Std. of>150 $\mu g/m^3$	N/M	N/M	N/M	0	0	0
	#Days>California 24-hour Std. of>50 $\mu g/m^3$	N/M	N/M	N/M	20	38	30
	National Annual Average ($\mu g/m^3$)	N/M	N/M	N/M	29.5	30.6	27.1
Suspended Particulates ($PM_{2.5}$)	Year Coverage*	N/M	N/M	N/M	95%	83%	94%
	Max. 24-hour Concentration ($\mu g/m^3$)	N/M	N/M	N/M	43.1	59.9	56.4
	State Annual Average ($\mu g/m^3$)	N/M	N/M	N/M	18.9	NA	12.5
	#Days>Fed. 24-hour Std. of>35 $\mu g/m^3$	N/M	N/M	N/M	1	6	7
	National Annual Average ($\mu g/m^3$)	N/M	N/M	N/M	12.0	N/A	12.3

Sources: South Coast Air Quality Management District, 2017: http://www.aqmd.gov/home/library/air-quality-data-studies/historical-data-by-year
EPA AirData, 2017 (for CO only): https://www.epa.gov/outdoor-air-quality-data/monitor-values-report
NM = not measured; NA = not applicable
*Year Coverage indicates how extensive monitoring was during the time of year when high pollutant concentrations were expected.
***The number of days above the standard is not necessarily the number of violations of the standard for the year.*

Attainment Status

Section 107 of the 1977 Clean Air Act Amendment requires that the United States Environmental Protection Agency (USEPA) publish a list of all geographic areas in compliance with the NAAQS, as well as those not attaining the NAAQS. Areas not in NAAQS compliance are deemed non-attainment areas. Areas that have insufficient data to make a determination are deemed unclassified and are treated as being attainment areas until proven otherwise. An area's designation is based on the data collected by the state monitoring network on a pollutant-by-pollutant basis.

The Project Study Area is located in Los Angeles County. As shown Table 4-13, the USEPA has classified Los Angeles County as a nonattainment area for O_3, $PM_{2.5}$, and lead. Los Angeles County is listed as a maintenance area for CO and PM_{10}, as it was previously a nonattainment area for these pollutants.

Table 4-13. Study Area Attainment Status

Criteria Pollutant	Federal Attainment Status
Ozone (O_3)	Nonattainment
Nitrogen Dioxide (NO_2)	Attainment
Carbon Monoxide (CO)	Attainment/Maintenance
Particulate Matter (PM_{10})	Maintenance
Particulate Matter ($PM_{2.5}$)	Nonattainment
Lead	Nonattainment
All others	Attainment/Unclassified

Source: USEPA 2016

Sensitive Receptors

Air-quality-sensitive land uses, such as residences, parks, schools, day care centers, hospitals, or parks and playgrounds, have not changed from what was described in Section 4.4.2 of the Final EIS/EIR, with the exception of the opening of the rehabilitation facility on Century Park East and the approved BHHS modernization program, as described in Section 4.2 of this Draft SEIS. The land uses immediately surrounding the Century City Constellation Station are primarily commercial with high-rise residential planned for the northeast and southwest corners of Constellation Boulevard and Avenue of the Stars. A hotel currently occupies the southwest corner of this intersection and residential uses are planned for the future. Adjacent to the proposed construction staging Century Park East are the BHHS campus and the medical rehabilitation facility. Residential land uses also border Century Park West. The receptor locations analyzed in this study are shown in Figure 4-31.

Construction-related Environmental Impacts/Environmental Consequences

Emission Burden Analysis

An assessment of the air quality construction impacts of the Century City Constellation Station, using the staging information and schedule described in Section 4.5, was conducted. This assessment used emission factors from the Air Resources Board (ARB) model for off-road vehicle and equipment emissions (OFFROAD), as well as the ARB model for on-road vehicle emissions (EMission FACtor program, or EMFAC). For the off-road vehicles and equipment, SCAQMD-specific OFFROAD 2011 emission factors, along with project-specific information on pieces of equipment for each construction phase, were used. For each piece of equipment, the ARB equipment type, number of pieces of equipment, horsepower, and utilization were provided by project engineers. Worker and delivery trip emissions factors were estimated using the EMFAC2014

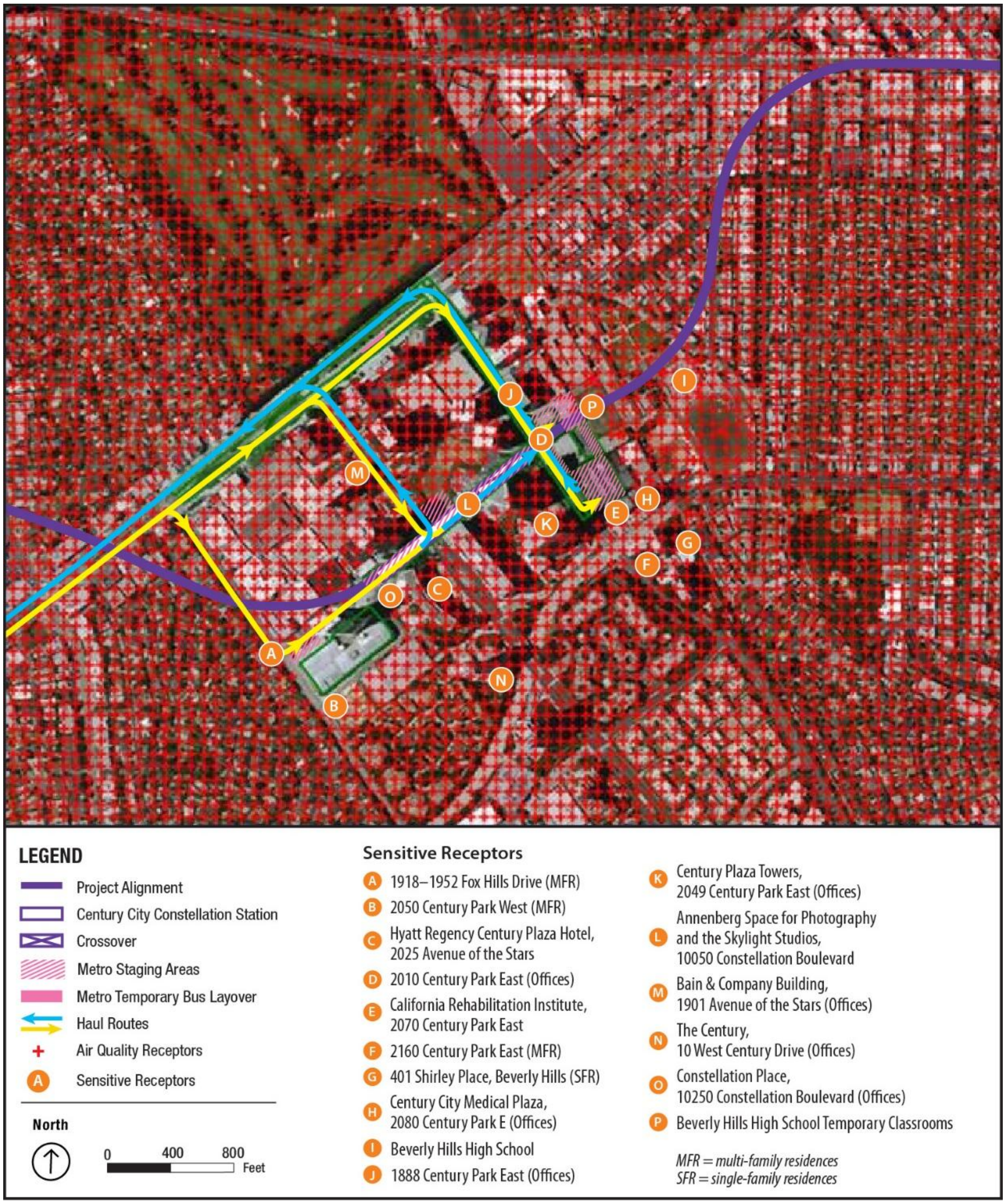


Figure 4-31. AERMOD Layout with Grid and Sensitive Receptors

emission factor model. In addition, as listed in the *Air Quality Technical Memorandum – Revision 1* (Metro 2017g), specific pieces of equipment, are required to meet Tier 4 final emission standards. EPA adopted multiple tiers of emissions standards for offroad equipment ranging from Tier 1 to Tier 4, with Tier 4 being the most stringent.

Using these various data sources, daily construction emission levels were developed. These values were all shown to be below the air quality construction significance thresholds shown in Table 4-14.

Table 4-14. Estimated Maximum Daily Construction Emissions for Century City Constellation Station (lbs/day)

Activity	VOC	CO	NOx	PM_{10}	$PM_{2.5}$
Construction Equipment and Dirt Moving	1	37	16	9	2
Mobile Sources (deliveries, worker trips, hauling of material, etc.)	3	39	38	4	2
Highest Daily Total	4	76	54	13	4
SCAQMD Thresholds	75	550	100	150	55

Source: *Westside Purple Line Extension Century City Constellation Station Air Quality Technical Memorandum – Revision 1* (Metro 2017g) (Appendix F)
Notes: Total construction emissions may not occur during the same peak period as each emission source; therefore, the total construction emissions shown may not add up to the sum of the elements presented in this table. Peak construction emissions for all pollutants are predicted in the year 2020.

The regional emissions presented in Table 4-14 are those associated with construction of the Century City Constellation Station. These emission estimates are based upon updated models and information since issuance of the Final EIS/EIR and subsequent air quality analyses in 2012 and 2015. These updates include refinement of the construction emissions model, reflecting project specific equipment, including electrification of specific pieces of equipment, Tier 4 final emission standard requirements for specific pieces of equipment, and detailed equipment placement and usage. Due to these changes, the emissions presented in this report are significantly lower than those presented in the Final EIS/EIR and the *Westside Subway Extension Project Air Quality Memorandum* (Metro 2011m) for a typical station with a TBM entry/exit site.

Emissions of VOC, NOx and $PM_{2.5}$ presented in this report are also lower than those presented in the *Westside Subway Extension Project Air Quality Construction Impacts Memorandum* (Metro 2012k) for a typical station with a TBM entry/exit site under the Phased Construction Scenario after Mitigation (Table 3-5 in the *Westside Subway Extension Project Air Quality Construction Impacts Memorandum*), while emissions of CO and PM_{10} presented in this report are slightly higher (by 5 pounds per day) than those presented in the *Westside Subway Extension Project Air Quality Construction Impacts Memorandum*.

Estimated emissions of VOC, NOx, PM_{10}, and $PM_{2.5}$ are also lower than those presented in the *Addendum to the Final Environmental Report* (Metro 2015j) for the Century City Constellation Station (Table 3 on the *Addendum to the Final Environmental Report*), while emissions of CO are slightly higher (by 9 pounds per day) in this report.

As such, emissions associated with larger portions of the project (i.e. Section 2) would be significantly lower than those presented in the Final EIR/EIS and, with the exception of CO and PM_{10}, lower than those presented in the *Westside Subway Extension Project Air Quality Construction Impacts Memorandum* and the *Addendum to the Final Environmental Report*.

Microscale Analysis

A microscale (localized) air quality analysis was conducted to assess the potential impacts of construction activities. This analysis, which follows guidelines in SCAQMD's 2008 Final Localized Significance Threshold Methodology (SCAQMD 2008), shows the project's local impacts on the criteria pollutants of $PM_{2.5}$, PM_{10}, NO_2, and CO. For this analysis, refined modeling was conducted using USEPA's Atmospheric Dispersion Model (AERMOD), along with the emissions burdens estimated from the above construction emission burden analysis. The analysis followed SCAQMD's Modeling Guidance for AERMOD along with EPA's Guideline on Air Quality Models, updated on January 17, 2017. This guidance details modeling requirements including the requirement to model with and without terrain, and the application of a receptor grid in order to identify the maximum predicted concentrations.

Dispersion models use mathematical formulations to characterize the atmospheric processes that disperse pollutants emitted by emission sources, which in this case are the emissions generated by the construction equipment and vehicles operating within the project area. As directed by the guidance, the **A**merican Meteorological Society/ **E**nvironmental Protection Agency **R**egulatory **Mod**el (AERMOD) Version 16216r was used to determine microscale pollutant concentrations. AERMOD is a steady-state plume model. AERMOD incorporates current concepts about flow and dispersion in complex terrain. AERMOD is currently USEPA's state-of-the-art model for predicting pollution concentrations from emission sources. Based on estimated emission rates and meteorological inputs, AERMOD was used to predict pollutant concentrations at the selected receptor locations. Five years of meteorological data (2008 to 2012) from SCAQMD's West LA meteorological station were input into the AERMOD program.

Figure 4-31 presents the AERMOD model layout. The construction activities are shown in as the Metro staging areas. There are currently 13 areas where construction activity/hauling of material is planned to occur. The red crosses represent receptor locations where pollutant concentrations from construction activities are estimated. A total of 5,015 receptors were analyzed. In addition to the receptor grid laid over the study area, receptors were placed at sensitive land uses, including residences, schools, hotels, and medical facilities, adjacent to construction staging areas or haul routes.

AERMOD microscale modeling is used to predict concentrations resulting from emissions from construction equipment and vehicles operating within the project area. A background level must be added to this value to account for pollution entering the area from other sources. The background level is the component of the total concentration not accounted for through the microscale modeling analysis. Unique background levels, based on the specific details of the applicable standards and as recommended by USEPA and SCAQMD, have been added to modeled results. The resulting pollutant concentrations (modeled result + background) were then compared to the applicable NAAQS. This methodology is further detailed in the *Air Quality Technical Memorandum – Revision 1* (Metro, 2017g).

Table 4-15 presents the maximum levels modeled in the microscale analysis. As shown, there are predicted to be no exceedances of the NAAQS or CAAQS for CO or of the significant change threshold for $PM_{2.5}$. There are also no predicted exceedances of NAAQS for PM_{10}.

Table 4-15. Estimated Maximum Localized Pollutant Levels

Pollutant	Averaging Period	Background	On-Site Increment (Modeled Result)	Proposed Action (Modeled Result + Background) **	NAAQS	CAAQS
Nitrogen Dioxide (NO_2) (µg/m^3)	1-hour	95.9 NAAQS 127.1 CAAQS	106.4	202.3 NAAQS 233.5 CAAQS	188	339
	Annual	22.6	6.4	28.9	100	57
Carbon Monoxide (CO) (ppm)	1-hour	2.2	0.3	2.5	35	20
	8-hour	1.4	0.1	1.5	9	9.0
Particulate Matter (PM_{10}) (µg/m^3)	24-hour	65	65.6	130.3	150	50
Particulate Matter ($PM_{2.5}$)* (µg/m^3)	24-hour	N/A	7.8	N/A	10.4 (incremental)	10.4 (incremental)

Source: *Westside Purple Line Extension Century City Constellation Station Air Quality Technical Memorandum – Revision 1* (Metro 2017g) (Appendix F)
*Note: As per SCAQMD email on October 10, 2016, since the SCAQMD is nonattainment for $PM_{2.5}$ and background values already exceed NAAQS, the $PM_{2.5}$ increment should be compared to the SCAQMD significant change threshold for $PM_{2.5}$ for construction.
**Numbers may not add up exactly due to rounding.
ppm = parts per million; µg/m^3 = micrograms per cubic meter; N/A = not applicable; NAAQS = National Ambient Air Quality Standards

One exceedance is predicted for nitrogen dioxide (NO_2) 1-hour NAAQS and eight exceedances are predicted for the NO_2 1-hour CAAQS out of the 5,015 receptors modeled over a five-year period. The receptors demonstrating violations of the 1-hour NO_2 standard are located near construction staging Area 2 as shown in Figure 4-32 . One of those receptors is located on the BHHS campus at the site of the current temporary classrooms and future half-court soccer field. The violation is anticipated to occur between August and October 2020 when construction activities peak. Based on the BHHS modernization program, the temporary classrooms will no longer be in place at that time and the site will be used as a half-court soccer field.

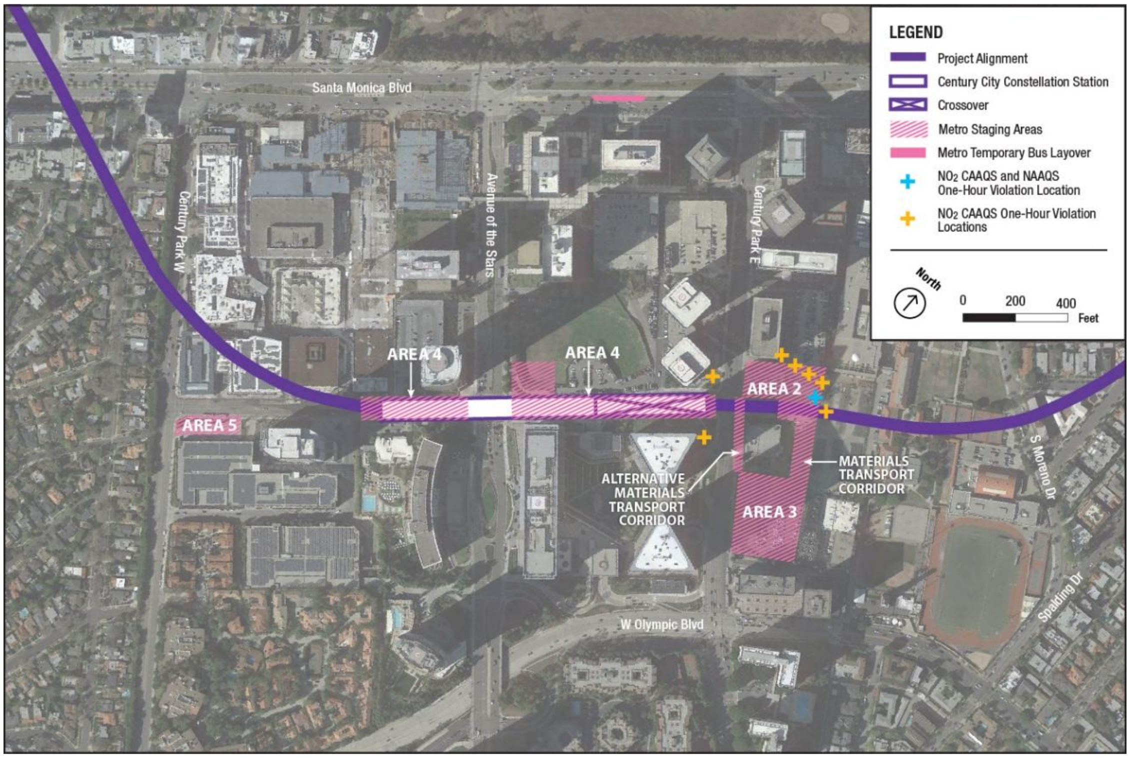


Figure 4-32. Receptor Locations Predicted to Exceed NO_2 CAAQS and NAAQS

Violations of the CAAQS for PM_{10} are also predicted but no violations of the NAAQS for PM_{10} are predicted to occur. The violations of the CAAQS for PM_{10} are anticipated at most receptors modeled, including on the BHHS campus, because the background conditions already exceed the CAAQS.

The estimated maximum localized pollutant levels are based on expected production rates and equipment utilization. This information is often limited since it does not take into account the actual equipment on site and construction techniques that the contractor will actually employ. As such, predicted concentrations will be verified once the Contractor provides the final equipment and schedule. As discussed in more detail in the Mitigation Measures section below, based on the results of the verified analysis, the Contractor will be mandated to alter operating procedures/schedule/equipment if a violation of the applicable standards is predicted. The Contractor will be required to keep a log of construction equipment used during construction along with hours of operation of each specific piece of equipment to ensure that construction activities are not in violation of applicable air quality standards.

Health Risk Assessment

A population-wide health risk assessment was conducted to determine the potential health risks caused by construction of the Century City Constellation Station. The Hotspots Analysis and Reporting Program Version 2 (HARP2) Risk Assessment Standalone Tool (RAST) was used to analyze cancer, chronic, 8-hour chronic, and acute health risks associated with inhalation of pollutants of concern. Other exposure pathways were not evaluated, as this analysis only considers air pollutants. The pollutants of concern analyzed in this health risk assessment were: diesel particulate matter, carbon monoxide, and nitrogen dioxide (NO_2). Each pollutant generated a risk value. PM_{10} was evaluated separately, and no risk was detected.

To account for sensitive receptors, the most conservative analysis (70 year resident, population-wide) was performed along with a 30 year exposure analysis. The cancer risk value indicates the number of individuals that develop cancer per million individuals as a result of exposure to a pollutant over an assumed lifetime of 70 years. HARP2 RAST uses the annual average air concentration of a pollutant, the known cancer inhalation slope factor for the pollutant, and the Office of Environmental Health Hazard Assessment derived intake rate percentile (resident) to calculate cancer risk. A ratio was applied to the cancer risk probability to account for project duration.

Non-carcinogenic chronic risk is determined by calculating hazard quotients and indices. A hazard quotient is calculated for each organ system affected by inhalation of a pollutant. A hazard index is the sum of each hazard quotient for a pollutant. HARP2 RAST contains a database with information on which pollutant affects which organ system(s). Using the average annual air concentration of a pollutant and the known non-carcinogenic chronic inhalation reference exposure level for the pollutant, HARP2 RAST calculates hazard quotients according to each affected organ system for a certain pollutant.

Similarly, non-carcinogenic acute risk is calculated by HARP2 RAST using the maximum hourly concentration of a pollutant, affected organ systems, and the known non-carcinogenic acute inhalation reference exposure level for the pollutant.

Cancer risk assessments were conducted for diesel particulate matter and NO_2. Results from the AERMOD modeling for sensitive receptors as detailed above were used in the HARP2 analysis. Using these parameters with a 3-year conservative exposure of 12 hours per day, 225 school days a year, and a constant maximum exposure level, the excess cancer risk did not exceed the SCAQMD excess cancer risk threshold of 10 in a million. The results of this analysis are summarized in Table 4-16. These results do not take into account the expected use of best available control technologies (BACT) on equipment that is required to be Tier 2 due to its subsurface use. As discussed previously, the construction parameters will be verified and the applicable BACT for each piece of equipment that can be safely installed, as per Mitigation Measure, CON-12, will be utilized.

Table 4-16. Excess Cancer Risk Assessment

Pollutant	Excess Cancer Risk 70 year/30 year (in a million)	Excess Cancer Risk Threshold (in a million)
Diesel Particulate Matter	7 / 6	10

Source: *Westside Purple Line Extension Century City Constellation Station Air Quality Technical Memorandum* (Metro 2016e) (Appendix F)

Non-carcinogenic chronic risk assessments were conducted for diesel particulate matter and NO_2. Non-carcinogenic acute risk assessments were conducted for CO and NO_2. Each pollutant generated hazard indices. The hazard indices did not exceed the SCAQMD threshold of 1.0. These results are summarized in Table 4-17.

Table 4-17. Acute and Chronic Non-Carcinogenic Risk Assessment

Pollutant	Risk Assessment Type	Hazard Index	Hazard Index Threshold
Diesel Particulate Matter	Chronic (non-carcinogenic)	.04	1.0
Nitrogen Dioxide (NO_2)	Acute (non-carcinogenic)	.05	1.0
Carbon Monoxide	Acute (Non-carcinogenic)	.02	1.0

Source: *Westside Purple Line Extension Century City Constellation Station Air Quality Technical Memorandum* (Metro 2016e) (Appendix F)

Given that the construction of Section 2 of the Project did not result in an exceedance of the SCAQMD excess cancer risk threshold or the non-carcinogenic chronic risk hazard indices, the construction of Section 2 of the Project would not result in an adverse impact to human health.

Mitigation Measures

The analysis of the construction of the Century City Constellation Station found estimated exceedances of $N0_2$ localized pollutant levels only during tunneling activities with the active use of the TBMs, which will last two to three years. As such, an additional mitigation measure is proposed to verify emissions once the equipment and schedule are verified to avoid adverse effects. With the implementation of mitigation, the construction of Section 2 of the Project would not result in additional adverse air quality impacts beyond those discussed in the Final EIS/EIR:

- **CON-6—Meet Mine Safety (MSHA) Standards:** Tunnel locomotives (hauling spoils and other equipment to the tunnel heading) will be approved by Metro to meet MSHA standards.
- **CON-7—Meet SCAQMD Standards:** Metro and its contractors will set and maintain work equipment and standards to meet SCAQMD standards, including NOx.
- **CON-8—Monitoring and Recording of Air Quality at Worksites:** Monitoring and recording of air quality at the worksites will be conducted. In areas of gassy soil conditions (Wilshire/La Brea and Wilshire/Fairfax work sites), air quality will be continuously monitored and recorded. Construction will be altered as required to maintain a safe working atmosphere. The working environment will be kept in compliance with federal, state, and local regulations, including SCAQMD and Cal/OSHA standards.
- **CON-9—No Idling of Heavy Equipment:** Metro specifications will require that contractors not unnecessarily idle heavy equipment.

- **CON-10—Maintenance of Construction Equipment:** Metro will require its contractors to maintain and tune engines per manufacturer's specifications to perform at EPA certification levels, where applicable, and to perform at verified standards applicable to retrofit technologies. Metro will also require periodic, unscheduled inspections to limit unnecessary idling and to ensure that construction equipment is properly maintained, tuned, and modified consistent with established specifications.
- **CON-11—Prohibit Tampering of Equipment:** Metro will prohibit its contractors from tampering with engines and require continuing adherence to manufacturer's recommendations.
- **CON-12—Use of Best Available Emissions Control Technologies:** Metro will encourage its contractors to lease new, clean equipment meeting the most stringent of applicable federal or state standards (e.g., Tier 3 or greater engine standards) or best available emissions control technologies on all equipment.
- **CON-13—Placement of Construction Equipment:** Construction equipment and staging zones will be located away from sensitive receptors and fresh air intakes to buildings and air conditioners.
- **CON-14—Measures to Reduce the Predicted PM10 Levels:** Mitigation measures such as watering, the use of soil stabilizers, etc. will be applied to reduce the predicted PM_{10} levels to below the SCAQMD daily construction threshold levels. A watering schedule will be established to prevent soil stockpiles from drying out.
- **CON-15—Reduce Street Debris:** At truck exit areas, wheel washing equipment will be installed to prevent soil from being tracked onto city streets, and followed by street sweeping as required to clean streets.
- **CON-16—Dust Control during Transport:** Trucks will be covered to control dust during transport of spoils.
- **CON-17—Fugitive Dust Control:** To control fugitive dust, wind fencing and phase grading operations, where appropriate, will be implemented along with the use of water trucks for stabilization of surfaces under windy conditions.
- **CON-18—Street Watering:** Surrounding streets at construction sites will be watered by trucks as needed to eliminate air-borne dust. In keeping with Metro's prior policy on the Eastside Gold Line, the contractor will water streets in the station area impacted by dust not less than once a day and more often if needed.
- **CON-19—Spillage Prevention for Non-Earthmoving Equipment:** Provisions will be made to prevent spillage when hauling materials and operating non-earthmoving equipment. Additionally, speed will be limited to 15 mph for these activities at construction sites.
- **CON-20—Spillage Prevention for Earthmoving Equipment:** Provisions will be made to prevent spillage when hauling materials and operating earth-moving equipment. Additionally, speed will be limited to 10 mph for these activities at construction sites.
- **CON-21—Additional Controls to Reduce Emissions:** EPA-registered particulate traps and other appropriate controls will be used where suitable to reduce emissions of particulate matter and other pollutants at the construction site.

- **CON-92 –AERMOD Verification:** The estimated maximum localized pollutant levels are based on a series of assumptions made about Contractor's equipment and schedule. These levels will be verified using the actual equipment and schedule proposed by the contractor. Based on the results of the verification, the contractor will be mandated to alter operating procedures/schedule/equipment if a violation of the applicable standards is predicted. Contractor will be required to keep a log of construction equipment used during construction along with hours of operation of each specific piece of equipment to ensure that construction activities are not in violation of applicable air quality standards.

4.5.4 Noise and Vibration

Affected Environment/Existing Conditions

The existing noise and vibration environment of Century City Station area and the identified noise-sensitive land uses, such as residences, parks, schools, hospitals, places of worship, and theaters, have not changed from that described in Section 4.6.2 of the Final EIS/EIR, with the exception of the new medical rehabilitation facility and BHHS modernization, which is described in the affected environment/existing conditions in Section 4.2 of this Draft SEIS. The Wilshire/Rodeo Station area was not considered in this analysis as the construction methods and locations are the same as those considered in the Final EIS/EIR. Therefore, there was no change to the impacts that were discussed in the Final EIS/EIR.

To further assess the construction noise impacts associated with changes in the Century City Constellation Station staging areas, a construction noise impact assessment was performed and documented in the *Westside Purple Line Extension Project, Section 2 Construction Noise and Vibration Assessment* (Metro 2017e) (Appendix E). As part of the detailed assessment, noise measurements were recorded at various receivers adjacent to construction areas in the City of Los Angeles and City of Beverly Hills to identify the preconstruction noise environment. Table 4-18 lists the results of those measurements, and Figure 4-33 shows the pre-construction noise measurement locations. The daytime construction noise limits in the City of Los Angeles Municipal Code (LAMC) are not dependent on the existing ambient levels, which is why they are not included in Table 4-18. Prior to construction, Metro shall review and update the noise sensitive locations listed in Table 4-18 and Figure 4-33, adding and deleting locations to reflect any changes.

Table 4-18. Pre-Construction Noise Measurement Results in the Century City Constellation Station Area

Receiver No.	Measurement Location	Nighttime[b] Leq
A	1918-1952 Fox Hills Drive (MFR)	58 dBA
B	2050 Century Park West (MFR)	59 dBA
C	Hyatt Regency Century Plaza Hotel, 2025 Avenue of the Stars	56 dBA
D	2010 Century Park East (Offices)	63 dBA
E	Century City Rehabilitation Facility & Medical Center, 2080 Century Park East	63 dBA
F	2160 Century Park East (MFR)	65 dBA
6	1888 Century Park East (Offices)[a]	63 dBA
7	Century Park Towers, 2049 Century Park East (Offices)[a]	59 dBA
8	Annenberg Space for Photography and the Skylight Studios, 10050 Constellation Boulevard[a]	56 dBA
9	Bain & Company Building, 1901 Avenue of the Stars[a]	61 dBA
10	The Century, 10 West Century Drive (Offices)[a]	57 dBA
11	Constellation Place, 10250 Constellation Boulevard (Offices)[a]	64 dBA

Receiver No.	Measurement Location	Daytime[c]	Evening[c]	Nighttime Leq[c]
Sites G, 5, N, and O are in the City of Beverly Hills and subject to the Beverly Hills' Noise Code				
G	401 Shirley Place, Beverly Hills (SFR)	68 dBA	68 dBA	63 dBA
5	Beverly Hills High School Lacrosse Field (a,d)	56 dBA	53 dBA	51 dBA
N	Beverly Hills High School Façade(e)	53 dBA	50 dBA	48 dBA
O	Beverly Hills High School Temporary Classroom Buildings Closest to the 1940 CPE Construction Site(f)	59 dBA	56 dBA	54 dBA

Source: *Westside Purple Line Extension Project, Section 2 Construction Noise and Vibration Assessment* (Metro 2017e) (Appendix E)

Notes:

(a) 1-hour measurements were taken at Receivers 5 through 11. At these locations, the daytime Leq, evening Leq, and nighttime Leq were estimated by comparing the 1-hour measurement to the same hour of the nearest 24-hour measurement location.

(b) Nighttime is from 9:00 p.m. to 7:00 a.m. as defined by the City of Los Angles Municipal Code.

(c) Daytime is from 8:00 A.M. to 6:00 P.M., evening is from 6:00 P.M. to 9:00 P.M. and nighttime is from 9:00 P.M. to 8:00 A.M as defined by the City of Beverly Hills.

(d) The measurements at Receiver 5 were taken before the temporary classrooms were located in the Lacrosse Field

(e) A distance adjustment was made between Receiver 5 and the closest building façade at Beverly Hills High School.

(f) A distance adjustment was made between Receiver O and Receiver 5.

MFR = multi-family residences; SFR = single-family residences

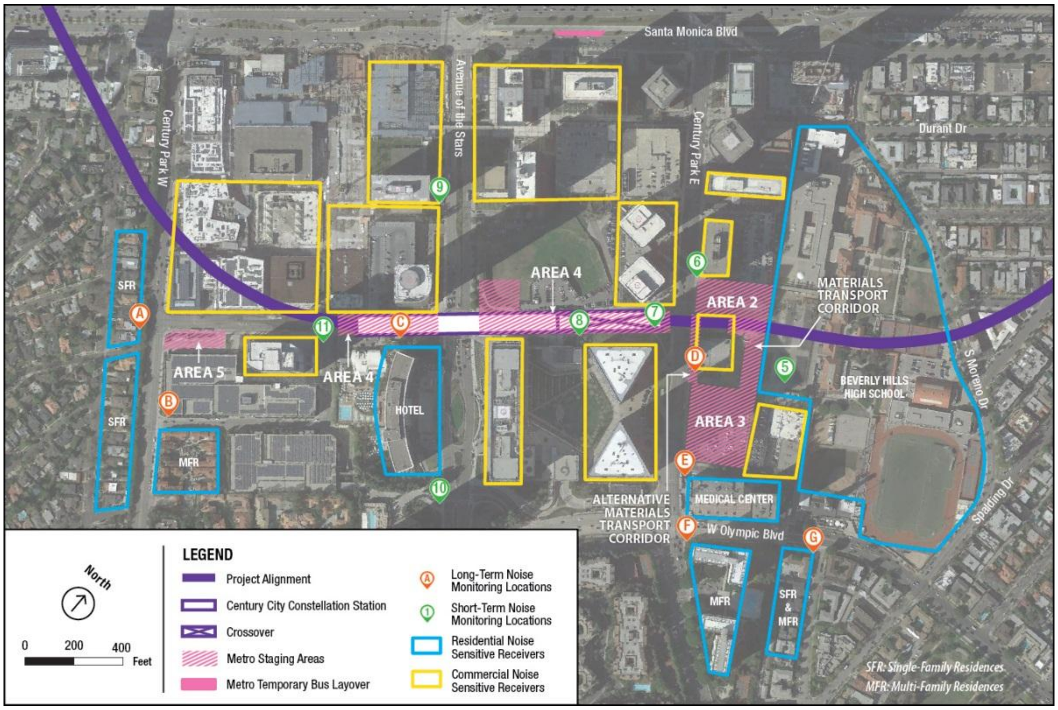


Figure 4-33. Pre-Construction Noise Measurement Locations in the Century City Constellation Station Area

Construction-related Environmental Impacts/Environmental Consequences

Construction Noise

Section 4.15.3 of the Final EIS/EIR presents the project construction-related noise and vibration impacts. Noise from at-grade construction of the stations would be generated by heavy equipment such as bulldozers, backhoes, hauling trucks, scrapers, loaders, cranes, and paving machines. Table 4-19 sets forth the noise emission levels for typical construction equipment. Noise levels from point source stationary noise sources, such as construction equipment, decrease at a rate of 6 decibels (dB) per doubling of distance. For example, at a distance of 250 feet from a construction area, noise would be 14 dB lower than at a distance of 50 feet.

Based on the typical noise levels presented in Table 4-19 and as identified in the Final EIS/EIR, all of the construction equipment would exceed the existing presumed nighttime ambient noise levels at the receivers in the City of Los Angeles and would introduce new sources of noise to the immediate vicinity of the construction sites. As stated in the Final EIS/EIR, noise impacts would be reduced through implementation of the identified mitigation measures, but adverse construction noise impacts could remain after mitigation in areas of concentrated construction activity, including near stations, tunnel access portals, and construction laydown areas.

Table 4-19. Noise Level of Typical Construction Equipment at 50 Feet (dBA Lmax)

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

Source: *Transit Noise and Vibration Impacts Assessment,* Table 12-1 (FTA 2006)

The following construction activities at site Areas 2 and 3 have the potential to generate noise impacts:

- Area 2 (1940 and 1950 Century Park East) would be primarily used to support tunneling operations, receive materials, support the mining of cross-passages, and concreting. Area 2 would also be used for the temporary electrical substation providing power to TBMs, tunnel lighting, ventilation, and for fume ventilation exhaust scrubbers. An access shaft would be located in Area 2 to support tunneling operations for day and night shifts during tunneling. The access shaft facilitates removal of tunnel muck, as well as for deliveries of precast segments to rail-mounted cars below, which would be taken to the TBM's rear trailing gear for installation as the tunnel liner. Other miscellaneous materials would also be delivered in this manner. This site also supports concreting of tunnels (invert and walkway) and cross-passages and installation of mechanical electrical equipment in tunnels and cross-passage. During construction of the access shaft, the site would be used by excavating and hoisting equipment required for shaft construction. At the completion of tunnel construction, the shaft would be used to support rail welding. Stock rail would be delivered to the site by trucks. The rail would be lowered down to track level through the shaft and placed in stockpiles. A portable rail welding plant would be set up at the bottom of the shaft to weld stock rail into continuous welded rail strings approximately 500-feet long. These rail strings would also be stockpiled within the tunnels.

- Area 3 (2040 Century Park East) would be primarily used for day and night stockpiling and off-hauling of tunnel muck for approximately two to three years during tunneling activities. The site would also be used during the duration of construction for equipment operation, material storage, and contractor offices. Equipment that may be in operation on site includes a compressor plant, ventilation plant, grout plant, foam plant, conveyor system, mobile cranes, and front end loader. The site would also include a machine shop and electrical shop. Upon completion of the tunneling operations, the site would be used to support concreting of tunnels, rail installation, and mechanical and electrical finishing.

The analysis assumed that the following equipment would be used on-site at each of the staging areas during nighttime hours[1]:

- Area 2: Tower crane, boom crane, pile rig drill, front end loader, Bob Cat, drilling polymer plant, concrete pumps, generator, ready mix trucks, pick-up trucks, haul trucks, ventilations fans, street sweepers, telehandler, water treatment plant, conveyor system, segment carrier, and roller compactor.
- Area 3: Front end loader, boom crane, haul trucks, excavator, concrete pumps, shotcrete machine, lift hoist, water treatment plant, ventilation plant, compressor plant, foam plant, grout plant, conveyor system, mechanical shop, and electrical shop.
- TBM Launch Site: Boom crane, rough terrain crane, pile drill rig, front end loader, Bob Cat, drilling polymer plant, concrete pumps, generator, ready mix trucks, pick-up trucks, street sweeper, light plants, welding plants, fork lifts, excavator, haul trucks, dozer, ventilation fans, and telehandler.
- Century City Constellation Station Box: Boom crane, rough terrain crane, pile drill rig, front end loader, Bob Cat, drilling polymer plant, concrete pumps, generator, ready mix trucks, pick-up trucks, street sweeper, light plants, welding plants, fork lifts, excavator, haul trucks, dozer, ventilation fans, and telehandler.
- Area 5: Telehandler, hydraulic crane, and pick-up truck.

The predicted construction noise levels and noise limits for the various receivers adjacent to the construction areas are presented in Table 4-20. This information shows the predicted construction noise during the daytime, evening, and nighttime hours for Receivers G, 5, N, and O in the City of Beverly Hills, compared to the Beverly Hills Municipal Code noise limit (i.e., existing daytime, evening, and nighttime ambient noise plus 5 dB). The remaining receiver sites are within the City of Los Angeles and are presented showing the predicted daytime construction noise compared to the LAMC noise limit of 75 A-weighted decibels (dBA), and the nighttime construction noise to the existing ambient noise plus 5 dB City of Los Angeles noise limit.

[1] Nighttime hours are 9:00 p.m. to 7:00 a.m. for the City of Los Angeles and 9:00 p.m. to 8:00 a.m. for the City of Beverly Hills.

Table 4-20. Century City Constellation Station Construction Noise - Leq (dBA)

Receiver[1]	Location	Daytime Construction Noise	Daytime Noise Limit[2]	Evening Construction Noise	Evening Noise Limit[3]	Nighttime Construction Noise	Nighttime Noise Limit[4]
The following receivers are within the jurisdiction of the City of Beverly Hills							
G	401 Shirley Place (SFR)	48	73	42	73	42	68
5	Beverly Hills High School	58	61	54	58	54	56
N	Beverly Hills High School Facade	56	58	50	55	50	53
O	Beverly Hills High School Temporary Classroom Buildings Closest to the 1940 CPE Construction Site	65	64	61	61	61	59
The following receivers are within the jurisdiction of the City of Los Angles							
A	1918-1952 Fox Hills Drive (MFR)	56	75	N/A	N/A	47	63
B	2050 Century Park West (MFR)	44	75	N/A	N/A	31	64
C	Hyatt Regency Century Plaza Hotel, 2025 Avenue of the Stars	68	75	N/A	N/A	59	61
D	2010 Century Park East (Offices)	67	75	N/A	N/A	61	68
E[5]	Century City Rehabilitation Facility & Medical Center, 2080 Century Park East	57	75	N/A	N/A	51	61
F	2160 Century Park East (MFR)	55	75	N/A	N/A	48	70
6	1888 Century Park East (Offices)	67	75	N/A	N/A	61	68
7	Century Park Towers, 2049 Century Park East (Offices)	71	75	N/A	N/A	65	64
8	Annenberg Space for Photography and the Skylight Studios, 10050 Constellation Boulevard	68	75	N/A	N/A	62	61
9	Bain & Company Building, 1901 Avenue of the Stars	61	75	N/A	N/A	55	66
10	The Century, 10 West Century Drive (Offices)	55	75	N/A	N/A	51	62
11	Constellation Place, 10250 Constellation Boulevard (Offices)	60	75	N/A	N/A	53	69

Source: *Westside Purple Line Extension Section 2 Construction Noise and Vibration Assessment* (Metro 2017e) (Appendix E)
Notes:
[1] The locations of the modeled receivers are shown on Figure 2-4 of the *Section 2 Construction Noise and Vibration Assessment* (Metro 2017e) (Appendix E).
[2] Daytime is defined as 8:00 a.m. to 6:00 p.m. by the City of Beverly Hills and 7:00 a.m. to 9:00 p.m. by the City of Los Angeles.
[3] Evening is defined as 6:00 p.m. to 9:00 p.m. by the City of Beverly Hills. The LAMC does not include evening hours.
[4] Nighttime is defined as 9:00 p.m. to 8:00 a.m. by the City of Beverly Hills and 9:00 p.m. to 7:00 a.m. by the City of Los Angeles.
[5] Construction noise at Site E was modeled at street level. The analysis of the upper floor construction noise is presented in Table 4-21.
Noise levels in red indicate an exceedance of the noise level limits.

The analysis assumed a 20-foot-high noise barrier around all sites, except for the Constellation Boulevard station box and TBM launch site areas, where a moveable noise barrier with an approximate height of 14 feet would be used to shield the construction activities. The equipment used during nighttime hours will comply with the low noise equipment emissions limits specified in Metro's Specification Section 01 56 19, Construction Noise and Vibration Control.

As shown in Table 4-20, the construction noise level at Site O, BHHS temporary classroom buildings closest to the Area 2 construction site, is predicted to exceed the noise limit by 1 dB for daytime and 2 dB for nighttime hours. The daytime, evening, and nighttime noise limits are not predicted to be exceeded at all the other sites within Beverly Hills analyzed. At Site 7, Century Park Towers, the nighttime noise limit is predicted to be exceeded by 1 dB. At Site 8, Annenberg Space for Photography and Skylight Studios, the nighttime noise limit is predicted to be exceeded by 1 dB, a different that is not perceptible to the human ear. The nighttime noise limits is not predicted to be exceeded at all the other sites analyzed within Los Angeles. The Contractor will be responsible for providing additional noise control measures and/or limiting the equipment and construction activities to be used at the LAMC nighttime noise limit and BHMC daytime and nighttime noise limits. Therefore, there would be no adverse effect at these sites.

The medical rehabilitation facility located immediately south of Area 3 is a new sensitive receptor that was not analyzed as part of the Final EIS/EIR. The 20-foot-high noise barrier wall at the perimeter of Area 3 and the 16-foot high noise barrier around the mucking operations would shield the construction noise activities at the street level of the building resulting in an average nighttime noise level of 51 dBA, which is 10 dB below the noise limit of 61 dBA (Table 4-20). Since the patient rooms of the rehabilitation facility overlooking the construction site are on the upper floors of the building, a more detailed noise assessment was prepared for this receiver and is presented in the *Westside Purple Line Extension, Section 2 Construction Noise and Vibration Assessment* (Metro 2017e) (Appendix E).

As a "worst-case scenario," the ambient noise of Leq = 56 dBA measured from 3 a.m. and 4 a.m. at Receiver E was used to determine the noise control measures for nighttime construction activities affecting the medical rehabilitation facility building. The ambient noise level was measured at ground level and adjusted for additional height of the third through the eighth patient floors. The adjusted ambient noise level and the nighttime noise impact threshold are presented in Table 4-21, along with the predicted noise levels from nighttime construction activities. The predicted nighttime construction noise level accounts for a 20-foot noise barrier wall around the perimeter of the site and the 16-foot high noise barrier around the mucking operations and the use of low noise emission equipment.

As presented in Table 4-21, the predicted construction noise at the patient floors exceeds the nighttime noise limits of existing ambient plus 5 dB, which is considered an adverse effect. Measures to minimize the nighttime construction noise are identified in the "Mitigation Measures" section below.

Table 4-21. Nighttime (3:00 A.M to 4:00 A.M) Construction Noise Impact Thresholds at the Medical Rehabilitation Facility

Medical Rehabilitation Facility Building Floor	Ambient Noise Level, Leq (dBA)	Los Angeles Nighttime Construction Noise Limit, Leq (dBA)	Nighttime Construction Noise, Leq (dBA)	Exceeds the Nighttime Noise Limits (Y/N)
Ground Level	56	61	51	N
Patient Floor 3	52	57	65	Y
Patient Floor 4	51	56	66	Y
Patient Floor 5	51	56	66	Y
Patient Floor 6	51	56	66	Y
Patient Floor 7	51	56	66	Y
Patient Floor 8	51	56	66	Y

Source: *Westside Purple Line Extension Section 2 Construction Noise and Vibration Assessment* (Metro 2017e) (Appendix E)
Note: Ambient noise levels were measured from 3:00 A.M. to 4:00 A.M.

The construction noise levels were also predicted at the facades of the AAA Building (1950 Century Park East), which is a historic property as defined by Section 106. Table 4-22 presents the predicted construction noise levels for the tunneling construction during the daytime hours of 7:00 a.m. to 6:00 p.m. for the AAA Building. As shown in Table 4-22, the daytime construction noise levels at the AAA Building would not exceed the 75 dBA LAMC noise limit and therefore there is no adverse effect at the AAA Building during construction.

Table 4-22. Predicted Daytime Construction Noise at AAA Building

Location at AAA Building Facade	Noise Level, Leq(h) (dBA)
A	70
B	70
C	69
D	67

Source: *Westside Purple Line Extension AAA Building Construction Noise and Vibration Assessment–Revision 1* (Metro 2017h) (Appendix E)

As described in Chapter 3 of this Draft SEIS, the proposed haul route along Century Park West would run adjacent to a residential neighborhood. As a result, traffic noise at the residential areas to the west side of Century Park West would increase during nighttime operations of the haul trucks. Haul trucks operating between the hours of 12:00 midnight and 5:00 AM must have lower emission limits (80 dBA at 50 feet) than normally required by the California Vehicle Code. All trucks used for these nighttime hours must be certified in accordance with these specifications. Necessary steps shall be taken by the Contractor to comply with this limit, which may include fitting the equipment with high grade engine exhaust silencers and engine casing sound insulation.

Construction Vibration

The primary concern regarding construction vibration relates to risk of damage, which is of particular importance when considering a historic property. Vibration is generally assessed in terms of peak particle velocity (PPV) for risk of building damage. PPV is the appropriate metric for evaluating the potential of building damage and is often used when monitoring blasting and construction vibration because it relates to the stresses that are experienced by the buildings.

Vibration damage risk thresholds from the Final EIS/EIR are presented in Table 4-23. The table presents PPV thresholds for different building categories. The 'Structural Building Damage' category is the level above which there is a risk that structural damage may occur. The 'Architectural Building Damage' category is the level above which there is a risk that superficial building damage, such as small cracks, may occur. The third category, 'Damage Risk to Historic Buildings and Cultural Resource Structures' is meant to apply to historic buildings that are particularly susceptible to damage. The upper range of the threshold for historic buildings of 0.2 PPV is used to assess damage risk to the AAA Building. The lower range of the threshold of 0.12 PPV would be used for fragile historic buildings and fragile cultural resources. Where the PPV is expected to exceed 0.2, monitoring is required. When the construction vibration exceeds 0.2 PPV mitigation measures such as using alternative construction approaches, are considered.

Table 4-23. Construction Vibration Damage Risk Thresholds

Building Category	Peak Particle Velocity (in/sec)
Structural Building Damage	2.0
Architectural Building Damage	0.5
Damage Risk to Historic Buildings and Cultural Resource Structures	0.12 to 0.2

Source: *Westside Subway Extension Final EIS/EIR* (Metro 2012j)

Table 4-24 presents the distance beyond which the damage risk criteria of 0.20 in/sec would not be exceeded for the major vibration-generating pieces of equipment likely to be used for the Project. Most of the equipment can be operated without risk of damage at distances of eight feet or greater from the AAA Building except for a vibratory roller and large dozer, which should be operated no closer than 25 to 40 feet.

The closest building of the Century Plaza Hotel to the Century City Station box construction is more than 40 feet from the edge of the construction. BHHS is over 200 feet from Area 2 and Area 3. At these distances, it is not expected that the equipment assumed to be used for construction will exceed the damage risk criteria of 0.20 inches/second for these structures.

Table 4-24. Distance to Construction Vibration Impact Thresholds

Equipment	PPV Ref Level at 100 ft (in/sec)[a]	Distance to Impact Threshold of 0.2 in/sec PPV
Cranes	0.001	3 ft
Dozer	0.04 to 0.07	25 to 40 ft
Front End Loader	0.011	8 ft
Vibratory Roller	0.059	35 ft
Excavator	0.011	8 ft
Auger Drill Rig	0.011	8 ft

Source: *Westside Purple Line Extension AAA Building Construction Noise and Vibration Assessment–Revision 1* (Metro 2017h) (Appendix E)

At the Wilshire/Rodeo Station, the Sterling Plaza/Bank of California building and Union Bank Building are within 25 feet of the Wilshire/Rodeo Station box construction area. At this distance, there is the potential risk of exceeding the damage risk criteria of 0.20 inches/second during jackhammering, compacting, and operation of a dozer.

Groundborne Noise and Vibration During Tunneling

The primary sources of vibration during tunneling are generated by the TBM and the tunnel train used to carry muck, pre-cast concrete tunnel segments, and materials. Previous measurements conducted of tunnel trains operating during the construction of the Metro Red Line Segment 2 tunnel shows a predominance of high frequency energy, up to 125 Hz. This contrasts with the groundborne vibration from rail trains in subways where vibration levels usually peak below 60 Hz. The high frequency energy of the tunnel trains means effects are more likely to be caused by groundborne noise rather than perceptible vibration.

Tunnel trains are expected to operate for the duration of the tunnel construction, typically 24 to 36 months until the final trackwork is installed. The vibration from the tunnel train operations is transmitted directly into the tunnel invert through the rails. Providing a resilient support under the track in the form of rubber rail pad will reduce the high frequency vibration and in most cases either eliminate or minimize the perception of the groundborne noise in the buildings above the tunnel.

The main source of vibration during tunneling is when the TBM pushes the shield forward against the earth using a hydraulic ram. The vibration generated by this action would be perceptible above the tunnel at distances of 100 feet from the tunnel centerline and would approach human annoyance levels at closer distances. Most of the energy from the TBM operation is at low frequencies (30 Hz and lower). This would mean that if the TBM vibration is perceived in buildings above the tunnel, it will be perceived as feelable vibration rather than groundborne noise.

Based on previous measurements conducted of the Metro Red Line Section 2 construction in 1993 made near the Wilshire/Western Station, the vibration levels from TBMs were below damage risk levels, either for structural damage or minor cosmetic damage such as hairline fractions in plaster or drywall.

The advance rate of the TBM is expected to be approximately 40 feet per day. The presence of the TBM beneath any one residential structure where it would be perceptible as either feelable vibration or groundborne noise would be approximately three to four days. The vibration would not be continuous but would occur only at times when the shield is pushed against the earth using the hydraulic ram, approximately four to six times a day. Measures can be used to keep residents informed when the tunneling will occur in their area and that some vibration may be perceptible, but not damage buildings.

Mitigation Measures

During tunneling activities, which is expected to last two to three years, the construction of Section 2 of the Project is predicted to exceed City of Beverly Hills noise limits at the temporary BHHS classroom building, and to exceed the City of Los Angeles noise limits the Century Park Towers, the Annenberg Space for Photography, and the medical rehabilitation facility. Mitigation measures CON-91 through CON-96 are new mitigations designed to minimize the construction noise and vibration impacts at the Wilshire/Rodeo and Century City Constellation Stations in addition to mitigation measures CON-22 through CON-41 that were already identified in Section 4.15 of the Final EIS/EIR. The Contractor shall be responsible for providing additional noise control measures and/or limiting the equipment and construction activities to reduce the construction noise at these sites to comply with the noise level limits. With the implementation of the following mitigation measures, the construction of Section 2 of the Project would not result in additional adverse noise or vibration impacts beyond those discussed in the Final EIS/EIR.

- **CON-22 Hire or Retain the Services of an Acoustical Engineer:** Hire or retain the services of an acoustical engineer to be responsible for preparing and overseeing the implementation of the Noise Control and Monitoring Plans. The Noise Control and Monitoring Plan will ensure that noise levels are at or below criteria levels in Metro Baseline Specifications Section 01565, Construction Noise and Vibration Control.
- **CON-23 Prepare Noise Control Plan:** Prepare a Noise Control Plan that includes an inventory of construction equipment used during daytime and nighttime hours, an estimate of projected construction noise levels, and locations and types of noise abatement measures that may be required to meet the noise limits specified in the Noise Control and Monitoring Plan.
- **CON-24 Comply with the Provisions of the Nighttime Noise Variance:** In the case of nighttime construction, the contractor will comply with the provisions of nighttime noise variances issued by local jurisdictions. The variance processes for the Cities of Los Angeles and Beverly Hills require the applicant to provide a noise mitigation plan and to hold additional public meetings before granting the variance to allow work that would be performed outside the permitted working hours.
- **CON-25 Noise Monitoring:** Conduct periodic noise measurements in accordance with an approved Noise Monitoring Plan, specifying monitoring locations, equipment, procedures, and schedule of measurements and reporting methods to be used.

- **CON-26 Use of Specific Construction Equipment:** At night, use only construction equipment operating at the surface of the construction site under full load, are certified to meet specified lower noise level limits set in the Noise Control Plan, and specified in the noise variance application.
- **CON-27 Noise Barrier Walls for Nighttime Construction:** Where nighttime construction activities are expected to occur, erect Metro designed noise barrier walls at each construction site prior to the start of construction activities. Barriers should be designed to reduce construction site noise levels by at least 5 dBA.
- **CON-28 Comply with Local Noise Ordinances:** Construction will comply as applicable with the City of Los Angeles, City of Beverly Hills, and County of Los Angeles noise ordinances during construction hours. Compliance with City of Los Angeles, City of Beverly Hills, and County of Los Angeles standards for short-term operation of mobile equipment and long-term construction operations of stationary equipment, including noise levels and hours of operation, also will occur. Hours of construction activity will be varied to meet special circumstances and restrictions. Municipal and building codes of each city in the Study Area include restrictions on construction hours. The City of Los Angeles limits construction activity to 8 a.m. to 6 p.m. on Monday through Friday and 9 a.m. to 5 p.m. on Saturdays, with no construction on Sundays and Federal holidays. The City of Beverly Hills identifies general construction hours of 8:00 a.m. to 6:00 p.m. from Monday through Saturday. For all the cities in the Study Area, construction is prohibited on Sundays and city holidays. Construction outside of these working periods will require a variance from the applicable city. The variance processes for the Cities of Los Angeles and Beverly Hills and the County of Los Angeles require the applicant to provide a noise mitigation plan and hold additional public meetings.
- **CON-29 Signage:** Readily visible signs indicating "Noise Control Zone" will be prepared and posted on or near construction equipment operating close to sensitive noise sites.
- **CON-30 Use of Noise Control Devices:** Noise control devices that meet original specifications and performance will be used.
- **CON-31 Use of Fixed Noise-Producing Equipment for Compliance:** Fixed noise-producing equipment will be used to comply with regulations in the course of Project-related construction activity.
- **CON-32 Use of Mobile or Fixed Noise-Producing Equipment:** Mobile or fixed noise producing construction equipment that are equipped to operate within noise levels will be used to the extent practical.
- **CON-33 Use of Electrically Powered Equipment:** Electrically powered equipment will be used to the extent practical.
- **CON-34 Use of Temporary Noise Barriers and Sound-Control Curtains:** Temporary moveable noise barriers and sound-control curtains will be erected where construction activity is predicted to exceed the noise limits and is unavoidably close to noise-sensitive receivers.
- **CON-35 Distance from Noise-Sensitive Receivers:** Within each construction area, earth-moving equipment, fixed noise generating equipment, stockpiles, staging areas, and other noise producing operations will be located as far as practicable from noise-sensitive receivers.

- **CON-36 Limited Use of Horns, Whistles, Alarms, and Bells:** Use of horns, whistles, alarms, and bells will be limited for use as warning devices, as required for safety.
- **CON-37 Requirements for Project Equipment:** All noise-producing project equipment, including vehicles that use internal combustion engines, will be required to be equipped with mufflers and air-inlet silencers, where appropriate, and kept in good operating condition that meets or exceeds original factory specifications. Mobile or fixed "package" equipment will be equipped with shrouds and noise-control features that are readily available for that type of equipment.
- **CON-38 Limited Audibility of Project Related Public Addresses or Music:** Any Project-related public address or music system will not be audible at any sensitive receiver.
- **CON-39 Use of Haul Routes with the Least Overall Noise Impact:** To the extent practical, based on traffic flow, designated haul routes for construction-related traffic will be used based on the least overall noise impact. For example, heavily loaded trucks will be routed away from residential streets if possible. Where no alternatives are available, haul routes will take into consideration streets with the fewest noise-sensitive receivers.
- **CON-40 Designated Parking Areas for Construction-Related Traffic:** Non-noise sensitive designated parking areas for Project-related traffic will be used.
- **CON-41 Enclosures for Fixed Equipment:** Enclosures for fixed equipment, such as TBM slurry processing plants, will be required to reduce noise.
- **CON-91 – Construction Noise Minimization at Medical Rehabilitation Facility:** If needed to comply with City of Los Angeles noise ordinances nighttime noise limits at the medical rehabilitation facility, the following noise-control measures or similar approaches will be used in Area 3:
    - Fully enclose the compressor plant, ventilation plant, grout plant, foam plant, machine shop, and electrical shop. Enclose the conveyor system.
    - All equipment used from 9 p.m. to 7 a.m. Monday through Friday, 6 p.m. to 8 a.m. Saturdays, and anytime on Sunday including boom crane and front-end loader shall be low emission equipment as required by Metro Specification Section 01 56 19, Construction Noise and Vibration Control, Parts 3.01 and 3.04, and Table 4.
    - Retrofit the boom crane and front end loader to be used during nighttime (9 p.m. to 7 a.m. Monday through Friday, 6 p.m. to 8 a.m. Saturdays, and anytime on Sunday) operations with a hospital-grade muffler and additional damping and insulation added to the engine compartments.
    - Install an additional 16-foot noise barrier wall within the interior of Area 3 to further shield noise from the front-end loader and crane operations.
- **CON 92 Additional Noise Mitigations at Century City Constellation:** If needed to comply with City of Los Angeles of City of Beverly Hills noise ordinances at the Century City Constellation Station construction sites, the Contractor shall be responsible for providing additional noise control measures and/or limiting the equipment and construction activities to reduce the construction noise at these sites to comply with the noise level limits by implementing the following or similar measures:

- Moveable noise barriers that can be located within the construction site in close proximity to the equipment and activities that are exceeded the impact thresholds. The moveable noise barriers shall be constructed in accordance with Metro's Specification Section 01 56 19, Construction Noise and Vibration Control, Article 2.03, Moveable Noise Barriers. The height of the moveable noise barrier shall be a minimum of 14 feet.
- Noise control curtains that can be tented over the area where the noisy equipment is operating. The noise curtain shall be constructed in accordance with Metro's Specification Section 01 56 19, Construction Noise and Vibration Control, Article 2.04, Noise Control Curtains
- §Replacing the standard engine exhaust muffler with a hospital grade engine silencer for stationary cranes, front end loaders, dozers, and any other diesel powered equipment operating during nighttime hours.

- **CON-93 – Backup Alarms:** All equipment operating during nighttime hours at all construction sites shall use low impact backup alarms. The low impact back-up alarms shall comply with CCR Title 8, Section 1592, Warning Methods. For equipment that must comply with CCR Title 8, Section 1592(a), equip these vehicles with compliant white sound, broadband and multi-frequency type back-up alarm devices. For equipment subject to the requirements of CCR Title 8, Section 1592(b) the Contractor may choose to equip with automatic back-up audible alarms. Such alarms shall only be of a compliant white sound, broadband or multi-frequency back-up alarm type device.

  The compliant white sound, broadband and multi-frequency type back-up alarm device shall be a self-adjusting, "smart" reversing, alarm that continually adjusts to 5 dB above ambient. Acceptable manufacturers are Brigade, ECCO or approved equal. The compliant white sound, broadband and multi-frequency type back-up alarm device shall be rated as medium duty or heavy duty, as the field conditions and/or usage would dictate.

- **CON-94 – Haul Truck Noise Emission Limits:** Limit trucks operating off-site between the hours of 12:00 midnight and 5:00 AM to the extent feasible. Trucks that must operate during these hours should be fitted with equipment such as high grade engine exhaust silences and engine casing sound insulation or other equivalent devices.
- **CON-95 – Vibration Control for Tunnel Train:** If ground-borne noise limits or ground-borne vibration limits are exceeded, the contractor will be required to take action to reduce noise and/or vibrations to acceptable levels. Such action could include: 1. A durable resilient system to support the tunnel train tracks. Such as system would include: a. Resilient mat under the tracks b. A resilient grommet or bushing under the heads of any track fasteners. 2. The hardness of the resilient mat should be in the 40 to 50 durometer range and be about 1 to 2" thick, depending on how heavily loaded the cars would be. 3. The Contractor shall select the mat thickness so that the rail doesn't bottom out during a train pass by. 4. Reduce the speed of the tunnel trains. 5. Maintain the tunnel train track and train wheels in good order to reduce potential vibration impacts, including keeping gaps between track sections to a minimum and frequent maintenance to avoid wheel flats.

- **CON-96 – Vibration Monitoring Plan:** The Contractor is required to submit a Vibration Monitoring Plan prepared, stamped, and administered by the Contractor's Acoustical Engineer. As part of the implementation of this plan, vibration monitoring will be performed at the historic Sterling Plaza/Bank of California, Union Bank Building, and AAA Building closest to the locations where equipment and/or construction activities generate a substantial amount of ground-borne vibration. Vibration monitoring will consist of continuous measurements at the building façade closest to the construction activities. All vibration monitors used will be equipped with an "alarm" feature to provide notification if the 0.2 PPV vibration damage risk threshold has been approached or exceeded.

4.5.5 Geological Hazards

Affected Environment/Existing Conditions

Section 4.3 provides a detailed description of the affected environment/existing conditions related to geologic hazards. As the discussion in this section focuses mainly on subsurface gas, the subsurface gas existing conditions are summarized here for reference. Refer to Section 4.3 and the *Assessment of Tunneling and Station Excavation Risks Associated with Subsurface Gas along Section 2–Revision 1* (Metro 2017b) in Appendix B of this Draft SEIS for additional information on methane and hydrogen sulfide gases.

Methane and hydrogen sulfide are the primary gases of concern that could be encountered during the tunneling activities for Section 2 of the Project. The general characteristics of both of these gases are summarized in Section 4.3 of this Draft SEIS.

Portions of Section 2 of the Project will involve tunneling through ground that contains elevated concentrations of methane and hydrogen sulfide gas. For the Project, Metro defines elevated concentrations of gases as encountered in the ground as:

- Methane greater than 5 percent (50,000 ppm), corresponding to the lower explosive limit
- Hydrogen sulfide greater than 0.0005 percent (5 ppm), corresponding to OSHA PEL

The areas with most widespread elevated concentrations of methane and hydrogen sulfide gas are along Section 1 of the Project. Oil-bearing deposits essentially extend up to the ground surface along Wilshire Boulevard in the area of the La Brea Tar Pits, which is part of Section 1. The tunnel in the La Brea Tar Pits area will be excavated through ground containing close to 100 percent (1,000,000 ppm) methane gas and up to approximately 0.65 percent (6,500 ppm) hydrogen sulfide gas.

In contrast to Section 1, the oil-bearing deposits in Section 2 of the Project, including the area of the BHHS campus, are located 2,000 feet or more below the ground surface, much deeper than the planned tunnels and station. Based on the soil boring data collected for Section 2 of the Project by Metro and others (see Section 4.3 and Appendix B of this Draft SEIS for more details regarding the subsurface gas investigations performed), elevated concentrations and volumes of methane or hydrogen sulfide gas are not present along Section 2 of the Project between Stanley Drive (west of the Wilshire/La Cienega Station) and the City of Los Angeles/City of Beverly Hills boundary (east of the Century City Constellation Station), which is the majority of the Section 2 alignment. The highest concentration of methane measured along this stretch of Section 2 was 0.1 percent (1,000 ppm). The highest concentration of hydrogen sulfide measured in the ground along this stretch of Section 2 was 0.0002 percent (2 ppm). At BHHS, elevated levels of methane gas (above explosive limits) have not been identified at any locations outside of the upper field basketball court area and the southeast corner of the northern parking lot.

On the far eastern end of the Section 2 alignment (east of Stanley Drive), the highest concentration of methane measured in the ground is 6.3 percent (63,000 ppm), which is considered slightly elevated, and the highest concentration of hydrogen sulfide was 0.0004 percent (4 ppm), which is not considered elevated.

On the far western end of the Section 2 alignment (west of the City of Los Angeles/City of Beverly Hills boundary), the highest concentration of methane measured in the ground was 98.6 percent (986,000 ppm) and the highest concentration of hydrogen sulfide measured in the ground west of the City of Los Angeles/City of Beverly Hills boundary was 0.0330 percent (330 ppm), both considered elevated.

Refer to Figure 4-16 through Figure 4-19 in Section 4.3 of this Draft SEIS for maps showing the measured methane and hydrogen sulfide levels at points along the Section 2 alignment.

Subsurface Gas and Oil Wells

Construction-related Environmental Impacts/Environmental Consequences

The risks associated with the operation of Section 2 of the Project are evaluated in Section 4.3 of this Draft SEIS. The risks presented by tunneling through subsurface gas and near oil wells are evaluated for four categories:

- Risk of gas migration through soil and accumulation at the surface and in buildings
- Risk of an explosion due to the accumulation of gas at the surface and in buildings
- Risk of accumulation of gas in tunnels and risk to construction workers
- Risk of encountering abandoned oil wells

The removal of the double crossover at the Wilshire/Rodeo Station would not substantially alter the construction approach at this station or the risk related subsurface gas; therefore, it is not discussed specifically in this section.

Risk of Gas Migration through Soil and Accumulation at the Surface and in Buildings

The potential for subsurface gases to migrate is related to the pressure and concentration of those gases (documented under existing conditions) as well as to the soil and groundwater conditions. Along Section 2, tunneling will take place through either saturated or unsaturated soils (above and below the groundwater level). The risks of gas migration associated with each of these soil types is described in the following paragraphs. Refer to the Overview of Construction Activities provided in Section 4.4 of this Draft SEIS for a description of tunneling methods.

In saturated soils (below the groundwater table), the pores between soil grains are filled with groundwater (Figure 4-34). When a TBM cutting head moves through a soil, the groundwater pressures in saturated soils can temporarily increase in the vicinity of the TBM. This increase in pressure is controlled and limited through operation and continuous monitoring of the TBM. The increase is greatest at the location of the TBM cutting head and dissipates rapidly as the distance from the TBM increases. The TBM operation is designed to balance the existing soil and groundwater pressure so that it does not add or remove soil or groundwater outside of the machine as part of tunneling. Monitoring of the pressure within the TBM cutting head chamber and pressures above and around the shield provides confirmation that the balanced condition is maintained. After the TBM has passed, the pressures in the ground return to pre-tunneling levels.

Soil is a three-phase material, composed of:

» Solids
» Liquid
» Gas

When there is no gas component, the soil is known as "saturated." Note, however, that the liquid phase can contain dissolved gas.

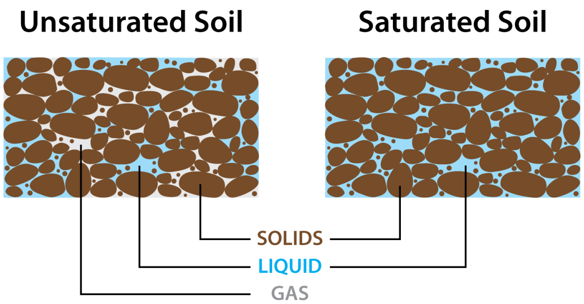


Figure 4-34. Saturated and Unsaturated Soils

The temporary pressure increase that occurs in saturated soils (when tunneling through saturated soils) will not affect soil gas below the groundwater table since soil gas is not present because the soils are saturated with water. A rise in the surface of the groundwater table above the TBM could provide a potential for pressurization or displacement of soil gas above the groundwater table to exist. However, the proposed tunneling procedures, by design, will not alter the level of the groundwater table. It should also be noted that fluctuations in groundwater levels and related movement of soil gases above the groundwater table occur naturally due to seasonal or cyclical rises and drops in groundwater. As with the pressures around the TBM, instrumentation will be installed to monitor groundwater pressures prior to, and during, tunneling operations. Therefore, the act of tunneling will not have an impact on the groundwater table and resulting potential changes in gas pressures/concentrations above the groundwater table.

Unsaturated soils have a combination of water and gas in the pores (Figure 4-34). The gases in the pores contain constituents found in the air, and in some cases, could also include methane and/or hydrogen sulfide as discussed above. The gas contained within the pore space of unsaturated soils is compressible. As a result, for unsaturated soils through which some of the tunneling will occur, the incremental pressure produced by the TBM will not propagate outward in the same way it can with saturated soils.

A simple analogy involves the propagation of a wave. A wave can be created by a disturbance or pressure pulse in a body of water. Because of the incompressibility of water, the wave can propagate outward radially a significant distance from the point where it was created. The same mechanism does not occur with compressible fluids such as soil gases. The compressibility of gas limits its outward propagation.

The "fluid" that is maintained at the TBM cutting head would have to flow into and through the soil pore space in order to displace and potentially pressurize any soil gas that is present. That fluid consists of the soil that is excavated from the tunnel bore and mixed with additives (surfactants) to make it less abrasive and a more uniform consistency. Due to the nature and consistency of that fluid, it will not flow through the types of soil deposits that are present along the alignment (silty sand, silts, and clays). As such, there is not a mechanism by which measurable displacement of soil gases could occur away from the TBM with the proposed tunneling method.

During excavation of the tunnel, water and gas are prevented from traveling along the sides of the tunnel by pressure grouting around the tunnel. Grout is pressure injected around the tunnel through the tail of the tunneling shield as it advances. This is done not only to minimize surface settlement but also to provide continuous support of the segmental tunnel lining and to reduce the flow of water and gas along the contact between the tunnel and the ground. Grout pressures and the volumes injected are monitored during each advance of the tunnel shield, and a continuous digital record is obtained for immediate viewing by the contractor's engineers and operators and for review and evaluation. In addition, if necessary, a program of check grouting is carried out to test for grout placement around the lining after the grout is in place.

Questions have been raised about the potential movement of gases through "preferential pathways" such as faults or fissures in the ground. The geologic materials above the planned depth of excavation along Section 2 of the Project have been evaluated through investigations utilizing trenches, borings, and geophysical testing procedures. There are two types of ground in a general sense: rock or soil. Faults/fractures in rock can provide a preferential pathway for fluids (liquids or gases) to flow through the rock, because those faults/fractures can be "open" to some extent. In soils, faults do not generally represent an "open" preferential pathway for fluid flow because most fractures in soil in a relatively stable earth environment, such as along Section 2 of the Project, are flush or have been infilled with soil eroding from above (instability resulting in open fractures in soil could be present in locations with landsliding, which is not present along Section 2 of the Project). Indeed, the investigations performed in the vicinity of the tunnel found some faults within soils, but no open fissures/fractures were present in the soil that would present a preferential flow path for gases; all existing faults and other contacts between dissimilar earth materials have been found to be flush and tight or filled with soil rather than open. For example, in fault trench FT-2 by Leighton Consulting, Inc. (LCI, 2012a), "Several clay filled fractures or cracks were documented..." Similarly, in fault trench FT-3, two zones of minor faulting were encountered, but the faults and fractures were found to be infilled with soil (and not open) (LCI, 2012a). Also, in fault trench FT-4, "several clay filled fractures were observed" rather than being open fractures. This is consistent with what would be anticipated for the types of alluvial materials that are present along the Section 2 Project alignment. An example of a fault encountered in a trench excavation at BHHS is shown below in Figure 4-35(a), and a photograph of the Newport-Inglewood Fault encountered at Los Angeles Southwest College is shown in Figure 4-35(b). These are examples of the closed, tight nature of faults encountered in similar geologic materials as to those along the entire Project Alignment at tunnel depths. In conclusion, these closed faults do not provide a preferential path for movement of soil gases in the subsurface because these closed faults do not represent an open vertical path along which gases could preferentially move.

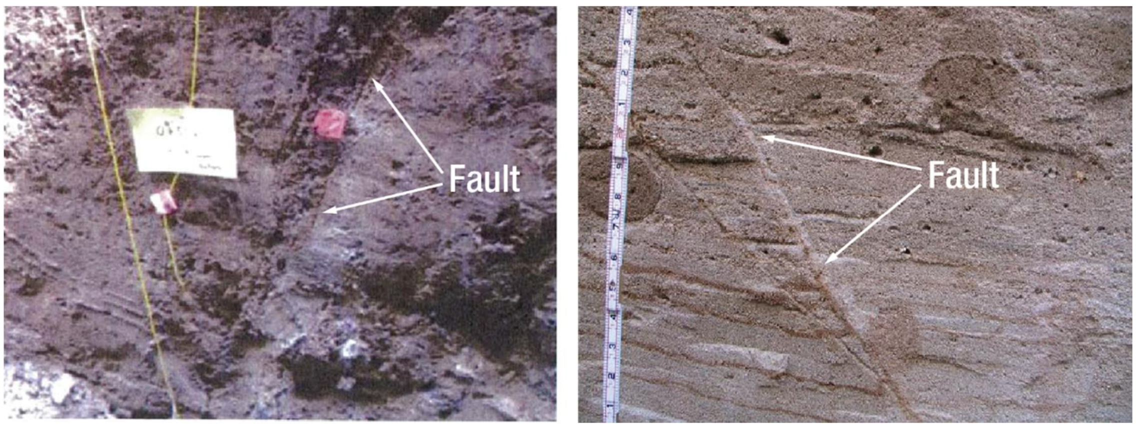


Figure 4-35. Photographs of faults encountered in trench explorations (a) at BHHS (LCI, 2012a), and (b) Newport-Inglewood Fault at Los Angeles Southwest College (Mactec, 2007)

In addition, the stratigraphy along the BHHS campus consists of horizontal layers of fine-grained (such as clay) alluvial deposits and layers of coarse-grained (such as sand) alluvial deposits, as shown in Figure 4-36 The layers of fine-grained material prevent rapid movement of gases vertically through the ground. Therefore, with the tunneling methods, proposed, no additional vertical pathways of gas travel are introduced.

Considering all of the above, even with no nearby tunneling activities, when sufficient concentrations of gases are present in the subsurface, the potential exists for those gases to accumulate at the surface and below, and possibly enter, buildings. The risk increases if the gas pressures are higher than atmospheric pressure.

Testing has been done to document the concentrations and pressures of subsurface gas along the Section 2 alignment. The data is presented in the *Geotechnical Baseline Report (*Metro 2015d) the *Section 2 Addendum to the Final Environmental Report* (Metro 2015e), and the *Geotechnical Data Report - Tunnel Reaches 4 and 5* (Metro 2016h). As summarized in the existing conditions above, the data indicates that elevated concentrations and volumes of methane and hydrogen sulfide gas are not present along Section 2 of the Project between Stanley Drive (west of the Wilshire/La Cienega Station) and the City of Los Angeles/City of Beverly Hills boundary (east of the Century City Constellation Station). Elevated levels of methane gas are present at the far eastern portion of the Section 2 alignment (east of Stanley Drive) and elevated levels of methane and hydrogen sulfide gas are present within the immediate area of the Century City Constellation Station (west of the City of Los Angeles/City of Beverly Hills boundary).

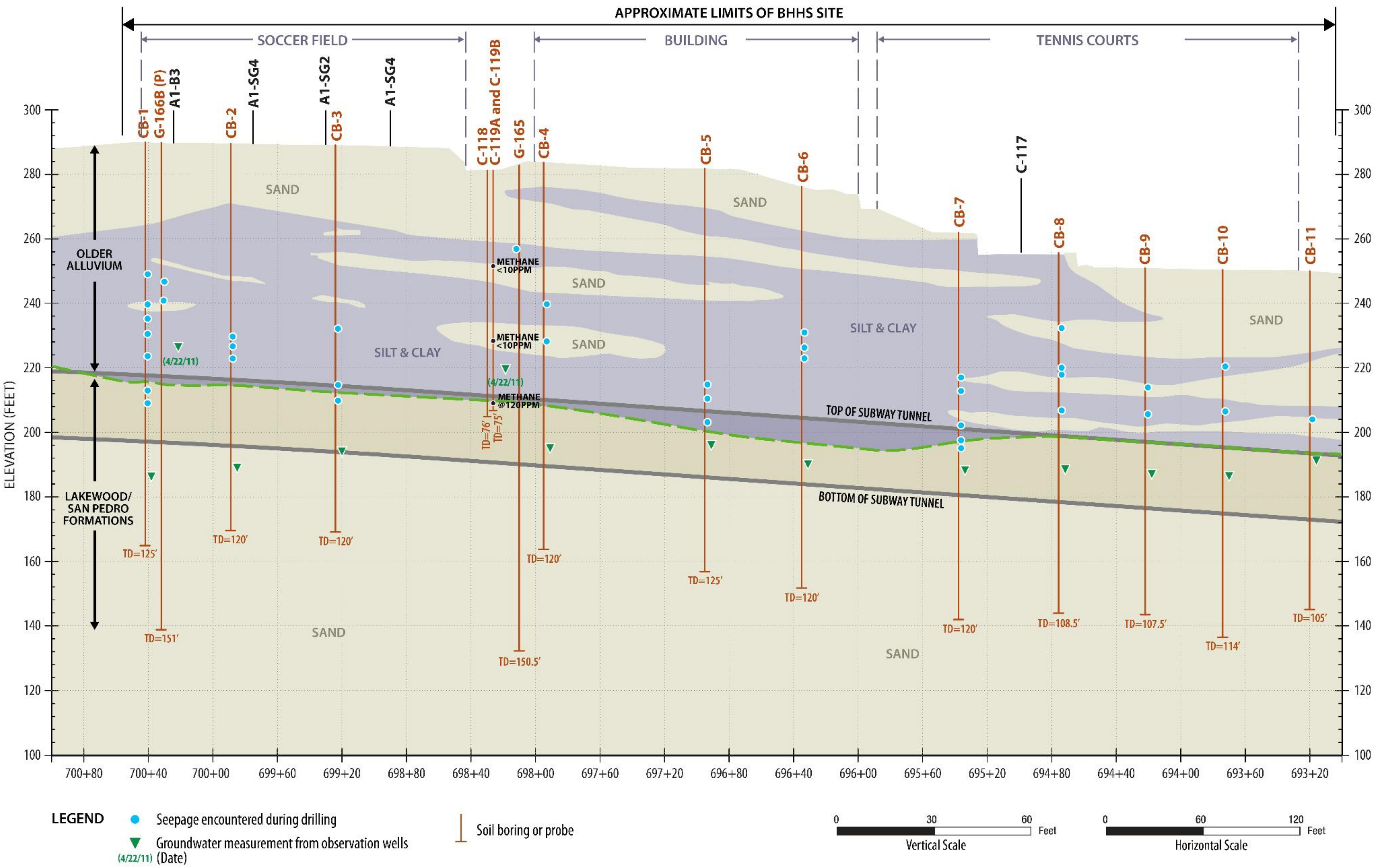


Figure 4-36. Stratigraphic Cross Section along Proposed Tunnel Alignment beneath BHHS and Vicinity

Given the non-elevated subsurface gas concentrations and pressures along most of the Section 2 alignment, the current level risk for additional subsurface gases to migrate to buildings or to emit from the ground surface is low along most of the Section 2 alignment. Gas that enters the atmosphere dilutes rapidly. There is a higher risk of gas migrating to buildings or off-gassing (emitting) from the ground surface west of the City of Los Angeles/City of Beverly Hill boundary or east of Stanley Drive.

However, the *incremental* risk that the proposed tunneling activities could cause subsurface gas to migrate to buildings, or to off-gas from the ground surface, is negligible. This is due to the absence of elevated levels of methane and hydrogen sulfide gas along the majority of the alignment (measured both at tunnel depth and in shallower materials), coupled with the absence of a viable mechanism by which the proposed tunneling activities could cause pressurization and/or migration of subsurface gas the distance to the ground surface. In addition, there are no evident "preferential paths" for migration of gases to the surface in the soils at tunnel depth and above along the alignment. Because of the absence of a viable mechanism for tunneling activities to cause migration of subsurface gas to the surface, and because of the lack of preferential vertical paths of gas to the ground surface, even in areas with elevated soil gas levels at depth, the incremental risk of increased gases at the surface due to tunneling activities is negligible. Since the incremental risk is negligible, there is no adverse effect related to migration of subsurface gas during tunneling activities.

Risk of Explosion due to Accumulation of Gas at the Surface and in Buildings

The risk of gas accumulation in and below structures exists in all areas of the Los Angeles basin where gas occurs in the ground. Where gas accumulates at a concentration above the lower explosive limit, there is a risk of explosion in confined spaces (not in soil), if sufficient oxygen is present and if there is a source of ignition. Although the existing risk of an explosion due to build-up of methane and hydrogen sulfide gas along most of the Section 2 alignment is low, the result of such an explosion, if it were to occur, would be severe. Since the incremental risk of the tunnel construction to cause subsurface gas to migrate to buildings or off-gas from the ground surface is negligible, so too is the incremental risk of an explosion. Since the incremental risk of an explosion is negligible, there is no adverse effect related to explosion risk during tunneling activities.

Since this pre-existing risk to buildings is present in areas of the Los Angeles basin where methane levels are elevated, the City of Los Angeles has acknowledged the risk by implementing measures for permitting of design and construction of structures in City of Los Angeles Methane Zone or Methane Buffer Zones, and Metro has implemented measures during design, construction, and operation of their facilities throughout Los Angeles County where existing subsurface gases are encountered. Similarly, the City of Beverly Hills has implemented the provisions of the California Building Code (as part of the Beverly Hills Building Code) that require the geotechnical report for a project "specify whether methane exists on site" and includes "results of the testing procedure and the proposed mitigation measures."

Gas wells were installed along the alignment during the geotechnical investigations. Additional multi-stage (varying depths) soil gas wells (or probes) will be installed along the alignment in areas where elevated gas has been detected. The probes will be monitored for methane, hydrogen sulfide, oxygen, and carbon dioxide before, during, and after tunneling. In addition, in areas where elevated gas levels have been detected and in the vicinity of known oil wells, ambient air monitoring will be performed at the ground surface to screen for indications of soil gas emissions. This may be done daily during the tunneling operation and less frequently before and after tunneling.

If gas probes or ambient air monitoring indicate significant deviations from the pre-construction levels, combustible gas monitoring will be conducted in the interior of the closest building(s). In the highly unlikely event that elevated gas levels are found—and persist—the affected building(s) will be ventilated to reduce the gas levels.

Risk of Accumulation of Gas in Tunnels and Risk to Construction Workers

Since the western end of Section 2 of the Project (west of the City of Los Angeles/City of Beverly Hills boundary) and the eastern end of Section 2 of the Project (east of Stanley Drive) are located in ground that is known to contain elevated methane and/or hydrogen sulfide, the potentially explosive or otherwise harmful gases could be encountered during the excavation of the tunnels and station boxes. This condition represents a potential exposure risk to workers in the tunnels and stations.

The combination of the proposed tunneling method, the proposed monitoring and ventilation, and the treatment of gases in the tunnel and station excavation, reduces the risk of exposure of workers to soil gases. These procedures are described below:

- **Tunneling Equipment and Protocol:** A pressure face tunnel mining system will be used, as described in Section 4.4 of this Draft SEIS. This technology is a considerable improvement over the methods used during construction of Metro's initial Red Line operating segments, and was used successfully for the Metro Gold Line Eastside Extension Project. It is currently being used for the Metro Crenshaw/LAX Line and the Metro Regional Connector Line tunnels, both under construction. New technologies developed over the course of the design phases also will be considered. Appendix E of the Final EIS/EIR presents additional information on tunneling technology, and the *Westside Subway Extension Century City Area Tunneling Safety Report* (Metro 2011d) contains additional information on tunneling in gassy conditions and areas with suspected oil well casings.
- **Detection and monitoring:** Detection and monitoring equipment will be required to warn of the presence of methane and/or hydrogen sulfide in the excavations. Once excavation has been completed, Metro will continue to monitor for gases within the completed tunnel and stations. Exposing new ground for construction of cross-passageways, shafts, and other structures could also expose workers to potentially hazardous gases, and monitoring will continue as these other types of structures are excavated. Monitoring will alert personnel working in the tunnel and station excavations to enhance ventilation, don personal protective equipment, suspend excavation activities, and if warranted, temporarily evacuate the excavation.

- **Ventilation:** Fans will provide air movement to dilute methane and hydrogen sulfide concentrations in the tunnels and stations. Toxic gases such as hydrogen sulfide emanating from a slurry treatment plant (if used), will be captured and treated (absorbed and/or neutralized). Once above ground, methane rises and dissipates rapidly in the atmosphere and will not be a public health hazard.
- **Treatment of Exhaust Air:** Air scrubbers will be specified to treat hydrogen sulfide to meet Air Quality Management District standards before release from the tunnel/station ventilation system.

Furthermore, for underground construction classified as “Gassy” by the State of California Division of Occupational Safety and Health (Cal/OSHA) (California Code of Regulations, Title 8, Tunnel Safety Orders), specific requirements will include compliance with the following Tunnel Safety Orders:

- All equipment used in the tunnel must be approved. For example, internal combustion engines and other equipment such as lighting must meet approval standards of the U.S. Mine Safety and Health Administration. These approvals require verification that equipment is safe with respect to not producing sparks or emitting gas into the tunnel.
- Smoking will not be allowed in the tunnel, nor is standard welding, cutting, or other spark-producing operations, in accordance with Cal/OSHA requirements. Special permits and additional air monitoring will be required if welding or cutting operations are essential for the work. In addition, welding will only be allowed in stable atmospheres containing less than 10 percent of the lower explosive limit and under the direct supervision of qualified personnel.
- A fixed system of continuous automatic monitoring equipment will be provided for the heading (working area of the tunnel), spoils handling transfer points, and return air sources. The monitors will be equipped with sensors situated so as to detect any anticipated gas to be encountered. Monitors will automatically signal the heading, give visual and audible warnings, and shut down electric power in the tunnel—except for acceptable ventilation, lighting, and pumping equipment necessary to evacuate personnel, when 20 percent or more of the lower explosive limit is encountered. In addition, a manual shut down control will be provided near the heading.
- Tests for flammable and hazardous gas and petroleum vapors will be conducted in the return air and measured a short distance from the working surfaces.
- Whenever gas levels in excess of 10 percent of the lower explosive limit are encountered, Cal/OSHA will be notified immediately. After the approval to proceed by Cal/OSHA, any work will then be conducted with required precautionary measures such as increased ventilation.
- The main ventilation systems must exhaust flammable gas or vapors from the tunnel, will be provided with explosion-relief mechanisms, and will be constructed of fire-resistant materials. This exhaust requirement means that only rigid fan lines (as opposed to flexible) and two-way fan systems that operate in both directions by blowing exhaust out from the tunnel and blowing air in to the tunnel could be used

in gassy tunnels. The tunnel (and stations) must have adequate ventilation to dilute gases to safe levels.

- A refuge chamber or alternate escape route must be maintained within 5,000 feet of the face of a tunnel classified as gassy or extra-hazardous. Workers must be provided with emergency rescue equipment and trained in its use. Refuge chambers (typically pre-fabricated) will be equipped with a compressed air supply, a telephone, and means of isolating the chamber from the tunnel atmosphere. The emergency equipment, air supply, and rescue chamber installation will be acceptable to Cal/OSHA.

Special health and safety training and procedures will be implemented due to the health and safety issues associated with tunneling through a zone known to have elevated methane, hydrogen sulfide, and oil seeps. These procedures may require basic Hazardous Waste and Emergency Response training (29 CFR 1926 Subpart M), as well as training for excavations in a hazardous atmosphere (29 CFR 1926 Subpart P).

Previous projects in the Methane Risk Zone, for example, Metro's Red Line tunnels, have been successfully and safely excavated using procedures similar to those proposed for the Project alignment.

Multiple underground parking garages, such as the Century City Theme Towers parking facility adjacent to the Century City Constellation Station, the Century Plaza Hotel parking basement, and the Westfield Shopping Center basement, have been constructed in the vicinity of Section 2 of the Project alignment.

Numerous basements and underground parking structures have also been constructed along Wilshire Boulevard in areas with elevated subsurface gas levels without incident. Most of those underground structures were constructed before 1986 with no mitigation measures specific to methane, or have basic measures consisting of ventilation. In contract, the Project will have extensive gas barriers and gas monitoring and ventilation measures. Some of the buildings along Wilshire Boulevard adjacent to the Project alignment, such as buildings at the Los Angeles County Museum of Art, are in close proximity to the La Brea Tar Pits.

In addition, in 2013-2014, Metro constructed a 75-foot-deep exploratory shaft in an area where high concentrations of subsurface gas were present, to evaluate construction procedures and potential rates of gas emission from the excavation. This exploratory shaft was advanced through tar-saturated gassy ground in the Wilshire/Fairfax area. The test excavation and the ongoing work along Section 1 of the Project have confirmed the suitability of the excavation, monitoring, and mitigation measures that were proposed for the Project in the Final EIS/EIR.

A number of other tunnels have been safely constructed in the Los Angeles Basin as described in the *Century City Area Tunneling Safety Report* (Metro 2011d). With implementation of similar monitoring, ventilation, and treatment construction measures along Section 2 of the Project as are currently being used in Section 1 of the Project (including the Wilshire/Fairfax Station) (discussed under mitigation), the impact on worker safety will be mitigated.

With the implementation of the proposed tunneling techniques, the risk to construction workers is low and presents no adverse effect.

Risks of Encountering Abandoned Oil Wells

The locations of abandoned oil wells, including the six identified abandoned oil wells on the BHHS property, have been evaluated based upon State Department of Oil, Gas and Geothermal Resources (DOGGR) records, historic aerial photographs Figure 4-37, and geophysical (magnetometer) surveys to identify more precisely the location of metal casings. Based upon this information, the closest known abandoned oil well at the BHHS site is believed to be approximately 35 feet from the proposed alignment. In addition, an abandoned well may be located near the tunnel alignment near Century Park East. Finally, several former wells have been identified near the Century City Constellation Station. Apart from these wells, the likelihood of encountering a well along Section 2 is low. Nevertheless, as described below, additional precautionary measures are proposed to screen for wells along the alignment before and during the proposed tunneling activities.

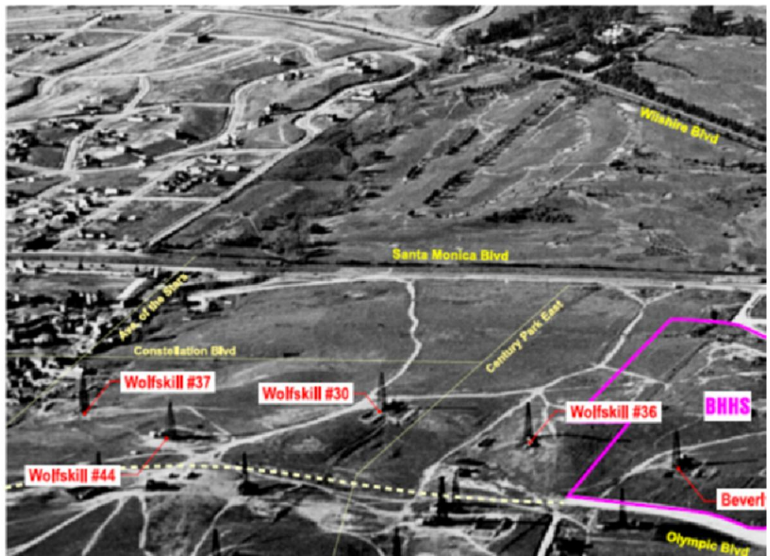


Figure 4-37. Historic Photo of Oil Wells in Century City Area

Such measures include performing a supplemental geophysical survey along the proposed tunnel alignment prior to construction in the areas of known oil production and mapped wells. This survey will incorporate ground-penetrating radar and/or electromagnetic testing procedures to screen for oil wells and other subsurface improvements along the tunnel. If any anomalies are detected, shallow excavations will be made to expose and observe such anomalies. Other planned techniques include horizontal directional drilling with magnetometers used to detect metal casings. Procedures for handling abandoned oil wells are further described below and in the *Century City Area Tunneling Safety Report* (Metro 2011d).

Questions have been asked about the potential for vibration due to the TBM to cause damage to existing oil wells. The peak acceleration estimated to be experienced in the ground at a distance of 25 feet from the tunnel during tunneling operations is 0.015g (where 1g is the acceleration due to gravity, equal to 32.2 feet per second squared). For comparison, the recorded peak ground acceleration (PGA) from the California Strong

Motion Instrumentation Program (CSMIP) at the Century City North (CCN) station during the 1994 Northridge Earthquake was 0.26g. This was the closest ground recording to Beverly Hills High School from the Northridge Earthquake. Acceleration of 0.26g due to the earthquake is more than an order of magnitude (over a factor of 10) greater than anticipated ground shaking due to tunneling. Therefore, the tunneling vibration does not present additional risk of damage to existing oil wells. Never-the-less, monitoring will be conducted during tunnel operations to identify changes in gas levels.

Procedures for Handling Abandoned Oil Wells

Oil wells typically have a larger diameter steel "surface" casing that extends from just below the ground surface to a depth of 100 feet or more, with one or more smaller-diameter steel casings located inside that surface casing. When the wells are abandoned, DOGGR requires that the casings be filled with a series of cement plugs along their lengths. The upper cement plug that is provided at the ground surface must be at least 25 feet in length but typically extends to depths of 100 to 200 feet. If the TBM were to encounter an oil well at the proposed tunnel depths, it would likely do so within the surface casing interval. The steel casings and associated cement plugs could damage the TBM cutting head, resulting in the need for repairs and associated project delays. The cutting head could also significantly damage the well casing(s). However, because of the depth of the tunnel (on the order of tens of feet) would be relatively shallow compared to the depth of the wells and the production zone (on the order of thousands of feet), the presence of multiple largely redundant plugs within the well casings, and the depth of soil cover over the top of the tunnels (on the order of tens of feet), it is highly unlikely the damage would result in the release of combustible gas from the damaged casing reaching the surface. This is because the path of least resistance for gas under pressure would be for the gas to enter the TBM chamber rather than move through the tens of feet of soil cover. If gas enters the TBM pressure chamber and mucking system, it would be detected by the existing TBM instrumentation. If sufficient quantity were detected, tunneling operations would cease so that gas entering the tunnel could be controlled.

If an abandoned well is found and access to the top of the well is available at the ground surface, then the well can be re-abandoned after removing the portion of steel casing at the tunnel depth. The work to remove the casings and re-abandonment would be performed by specialty contractors from the surface via a borehole or small-diameter shaft drilled down to below the invert of the proposed tunnel. The re-abandonment of abandoned oil wells in tunnels is described in the *Century City Area Tunneling Safety Report* (Metro 2011d).

If an abandoned well is found that would obstruct tunnel excavation and access to the top of the well is not available at the ground surface (i.e., the well is located under a structure), several options exist. Depending on the well's location with respect to the tunnel, it first would be determined whether it is possible to adjust the tunnel alignment to avoid the abandoned well. This is feasible if the well is very near the side of the tunnel. Second, it would have to be determined if altering the alignment is feasible with respect to constructability issues and operation of the system. If this is not possible, then the steel casings would have to be removed.

To remove steel casings at depth without access from the surface, access would be required from underground at tunnel depth. Options for such access include from within the tunnel that encountered the abandoned well or from the parallel tunnel. The procedures for removal of the steel casings and abandonment of the well at depth are detailed in the *Century City Area Tunneling Safety Report* (Metro 2011b). Access procedures are described below:

- **Access from within the tunnel that is in the way of the casing:** To remove the casing from within the tunnel being excavated, access would be required in front of the TBM's face or cutterhead. Depending on ground and groundwater conditions, ground treatment, such as grouting, would be required in the area around the well to provide safe, stable ground conditions in front of the TBM free of excessive groundwater. The ground treatment could be performed from within the TBM, such that surface access is not required, or in some cases using angled grout holes from the surface to reach the area to be stabilized with grout. Metro specifications for TBMs require that grouting of the ground can be done from the TBM.
- **Access from the parallel TBM:** To access the casing from the other tunnel drive, an adit (small tunnel) could be mined from the parallel tunnel to the location of the abandoned oil well before the tunnel that would encounter the oil well was driven. The construction of the adit would be similar to that of the construction of a standard cross passage between tunnels and would likely be constructed using the Sequential Excavation Methods with ground treatment performed from within the excavation to control ground and groundwater. Depending on ground conditions (i.e., sufficient ground water), ground freezing methods also could be considered to stabilize the ground.

Although a release of combustible gas through this mechanism is unlikely, it is possible. If a casing were damaged by the TBM and that well contained gas under pressure, some amount of methane and/or hydrogen sulfide gas could be released into the tunnel working area as well as to the ground surface through the well casing as stated above. The risk of such an event occurring is low and therefore no adverse effect.

As presented in the Final EIS/EIR, mitigation measures are proposed to further reduce the risk. The measures taken include a detailed review of DOGGR records and historical aerial photographs to identify potential oil well locations, geophysical testing to screen for potential oil wells along the proposed alignment.

40 CFR Analysis

In response to the Final Decision's requirement for a more thorough discussion of the completeness of the evaluation of subsurface gas risk during tunneling, this section has been prepared in compliance with 40 CFR § 1502.22(b), which states:

> *(b) If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement: (1) A statement that such information is incomplete or unavailable; (2) a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;*

(3) a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment, 4) the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.

Based on the evaluation described in Section 4.5.5, this analysis was prepared in reference 40 CFR § 1502.22(b) as follows:

(1) A statement that such information is incomplete or unavailable:
The available data is considered to be sufficient to both characterize and mitigate risks associated with the proposed tunneling construction. Investigations of soil gas conditions are designed to provide an understanding of the likelihood for encountering methane and hydrogen sulfide during construction of the Project, and are based on:

- Geologic and regulatory maps regarding soil gas.
- Existing data related to conditions that are commonly associated with the presence of methane and hydrogen sulfide, such as oil production, naturally occurring near-surface petroleum, and landfills or other organic matter.
- An exploration program in areas thought to potentially include methane that usually include a reasonable number of borings drilled to the depths of interest, with both in-situ testing (testing within the ground as opposed to testing on a sample removed from the ground) of methane/hydrogen sulfide and installation of monitoring wells for sampling of gas and continued observation of soil gas over time. The completeness of the investigation is assessed by standard of practice, guidelines that include the exploration techniques specified by City of Los Angeles' methane evaluation requirements, and the professional judgment of Licensed Geologists and/or Engineers practicing Geotechnical Engineering.

A complete knowledge of the existing subsurface gas conditions is not possible to assess based on a finite number of explorations because of the intrinsic variability of soil gas within earth materials. Nevertheless, if explorations in an area show similar soil gas measurements, then the likelihood of anomalously high soil gas between explorations is related to the distance between explorations and the understanding of the subsurface conditions that could produce methane/hydrogen sulfide in that area. Extensive exploration and testing has been performed along the proposed tunnel alignment such that the subsurface conditions have been characterized sufficiently to identify and mitigate potential hazards. This data includes at least 82 exploratory borings along with 18 soil gas and/or groundwater monitoring wells (in addition to many other wells performed on the BHHS campus by others) and thousands of soil gas measurements over a multi-year period. The subsurface data that has been compiled along the Section 2 alignment is presented in Section 4.3 of this Draft SEIS.

Regarding the potential presence of oil wells along the tunnel alignment, it is not possible to completely eliminate the potential for the presence of an existing oil well. However, extensive research into oil well records and historical documentation and photography has been performed, geophysical testing has been performed near each suspected oil well location (including consideration of uncertainty in the mapped locations, which could be as much as 200 feet off of the actual locations), and additional testing of the subsurface at tunnel depth has been required to be performed by the construction contractor. Evidence for the existence of unknown oil wells directly along the tunnel alignment has not been uncovered. See section entitled "Risk of Encountering Abandoned Oil Wells" on page 4-125 for a further description of the evaluations performed along the alignment. Therefore, the combined research and testing performed to date and required to be performed is sufficient to identify and characterize the risk of encountering existing abandoned oil wells.

(2) **A statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment:**
As described above, although it is not possible to obtain complete knowledge of the existing subsurface gas conditions, the available data is believed to be sufficient to both characterize and mitigate risks associated with the proposed tunneling construction. Nevertheless, the relevance of further explorations would be to provide further information about variation in soil gas in the ground. As a precautionary measure, additional data will be collected, and mitigation measures will be undertaken, as set forth in this document.

(3) **A summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment:**
The existing credible scientific evidence includes the extensive subsurface stratgraphic, soil gas, groundwater, and a geophysical data that has been compiled for the Section 2 alignment along with the DOGGR and historic aerial photographic records pertaining to oil well locations. These data are summarized in Section 4.3.1 of this Draft SEIS and are based, in part, on subsurface gas investigations performed by Metro for Section 2 of the Project and by subsurface gas investigations performed by others on the BHHS campus. Refer to Section 4.3.1, including Figure 4-18, for a summary of soil gas readings obtained in the western portion of Section 2 of the Project.

(4) **The agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community:**
Analysis of the available data indicates the risk for tunneling construction to cause explosive or toxic gases to enter buildings or to be emitted from the ground surface is low – except for a scenario where an unknown and improperly abandoned oil well is encountered during tunneling. This scenario is considered to be highly unlikely based on the data evaluated to date. A further discussion is provided in the

Assessment of Tunneling and Station Excavation Risks Associated with Subsurface Gas along Section 2–Revision 1 (Metro, 2017b).

Mitigation Measures

Existing soil gas conditions in Section 2 of the Project (with the exception of west of the City of Los Angeles/City of Beverly Hills boundary and east of Stanley Drive) are not considered “elevated,” and therefore the risk of encountering methane or hydrogen sulfide associated with the proposed Section 2 tunneling is low and there is no adverse effect related to tunneling activities. In the areas with existing elevated levels of methane and/or hydrogen sulfide, there is negligible incremental risk for migration of these gases to the ground surface or into buildings due to tunneling activities. Nevertheless, monitoring and mitigation measures were proposed in the Final EIS/EIR to further evaluate and reduce the risk of methane or hydrogen sulfide entering buildings and the risk due to the presence of unknown oil wells.

Based on the further analysis on the risk associated with the potential presence of subsurface gas during tunneling presented in this Draft SEIS, the construction period subsurface gas impacts would remain no adverse effect with implementation of the following mitigation measures, as specified in Section 4.15 of the Final EIS/EIR. CON-8, CON-51, and CON-54 will mitigate risk to workers in the tunnel, and CON-53 will mitigate risk to both structures at the surface and workers in the tunnel.

- **CON-8—Monitoring and Recording of Air Quality at Worksites:** Monitoring and recording of air quality at the worksites will be conducted. In areas of gassy soil conditions (Wilshire/La Brea and Wilshire/Fairfax work sites), air quality will be continuously monitored and recorded. Construction will be altered as required to maintain a safe working atmosphere. The working environment will be kept in compliance with Federal, State, and local regulations, including SCAQMD and Cal/OSHA standards.
- **CON 51—Techniques to Lower the Risk of Exposure to Hydrogen Sulfide:** The primary method for reducing exposure to subsurface gases is dilution through the ventilation system. In areas where hydrogen sulfide is encountered, several additional techniques could be used to lower the risk of exposure. The primary measures to prevent exposure to hydrogen sulfide gas are separation of materials from the tunnel environment through use of enclosed tunneling systems such as pressurized-face TBMs and increased ventilation capacity to dilute gases to safe levels as defined by Cal/OSHA. Secondary measures could include pre-treatment of groundwater containing hydrogen sulfide by displacing and oxidation of the hydrogen sulfide by injecting water (possibly containing dilute hydrogen peroxide) into the ground and groundwater in advance of the tunnel excavation. This “in-situ oxidation” method reduces hydrogen sulfide levels even before the ground is excavated. This pre-treatment method is unlikely to be necessary where a slurry-face TBM is used, but may be implemented at tunnel-to-station connections or at cross-passage excavation areas and where open excavation and limited dewatering may be conducted, such as for emergency exit shafts and low-point sump excavations.

When needed to reduce hydrogen sulfide to safe levels for slurry treatment; additives could be mixed with the bentonite (clay) slurry during the tunneling and/or prior to discharge into the slurry separation plant. For example, zinc oxide could be added to the slurry as a "scavenger" to precipitate dissolved hydrogen sulfide when slurry hydrogen sulfide levels get too high. Gas levels will be maintained in accordance with Cal/OSHA requirements for a safe working environment.

- **CON-53—Oil Well Locations and Abandonment:** Pre-construction geophysical surveys will be conducted to detect oil wells should unknown wells be present along the tunnel alignment. Detection of oil wells will include use of magnetic devices to sense oil well casings within the tunnel alignment. It is anticipated that the geophysical survey will be performed along the proposed tunnel alignment prior to construction in the areas of known oil production and mapped wells. This survey will incorporate techniques such as ground-penetrating radar and electromagnetic testing procedures to screen for oil well casings and other subsurface obstructions along the tunnel. These methods could be initiated from the ground surface, in horizontal holes drilled using horizontal directional drilling techniques, or a combination of methods. Shallow excavations may be made to expose and observe anomalies that are detected.

  Where the tunnel alignment cannot be adjusted to avoid well casings, the California Department of Conservation (Department of Oil, Gas and Geothermal Resources) will be contacted to determine the appropriate method to re-abandon the well. Oil well abandonment must proceed in accordance with California Laws for Conservation of Petroleum and Gas (1997), Division 3. Oil and gas, Chapter 1. Oil and Gas Conservation, Article 4, Sections 3228, 3229, 3230, and 3232. The requirements include written notification to DOGGR, protection of adjacent property, and before commencing any work to abandon any well, obtaining approval by the DOGGR. Abandonment work, including sealing off oil/gas bearing units, pressure grouting, etc., must be performed by a state-licensed contractor under the regulatory oversight and approval of DOGGR. Similarly, during construction if an unknown well is encountered, the contractor will notify Metro, Cal/OSHA, and Oil, Gas and Geothermal Resources for well abandonment, and proceed in accordance with state requirements.

- **CON-54—Worker Safety for Gassy Tunnels:** Although not specifically required for gassy tunnels, workers will be supplied with oxygen-supply-type self-rescuers (a breathing apparatus required for safety during evacuation of fires).
- **CON-89 – Gas Monitoring – Assessment:** Gas wells were installed along the alignment during the preliminary geotechnical investigations. Additional multi-stage (varying depths) soil gas wells (or probes) will be installed along the alignment in areas where elevated gas has been detected. The probes will be monitored for methane, hydrogen sulfide, oxygen, and carbon dioxide before, during, and after tunneling. Ambient air monitoring will also be performed at the ground surface to screen for indications of soil gas emissions. While elevated gas levels have not been detected at Beverly Hills High School, monitoring will be conducted in response to

concerns from the school district. Monitoring will be conducted daily during the tunneling operation beneath Beverly Hills High School and less frequently before and after tunneling. Any instance where methane is detected at or above a concentration of 5,500 ppm (10 percent LEL) or hydrogen sulfide is detected at or above a concentration of 20 ppm (OSHA PEL) in a soil probe (5 feet below the ground surface) will be investigated. Where these levels are exceeded, combustible gas monitoring will be performed in the interior of the closest building. In the unlikely event that elevated gas levels are found—and persist—the affected building(s) will be ventilated to reduce the gas levels.

Fault Rupture and Seismic Ground Shaking

Construction-related Environmental Impacts/Environmental Consequences

Construction within Section 2 of the Project will be susceptible to surface fault rupture and seismic ground shaking. The Century City station was located at Constellation Boulevard because it significantly reduces the risk of surface fault rupture compared to locating the Century City station on Santa Monica Boulevard (refer to Section 4.3 of this Draft SEIS).

Metro standards for design of temporary shoring systems include earthquake loading. Earth pressures for temporary earthquake loads are determined by the geotechnical consultant on a site-specific basis considering the site location and ground conditions, and typically assuming the probability of exceedance of the design loading is less than 10% in the typical 5 year duration wherein the temporary shoring is utilized for support of excavation. Construction will be performed in accordance with Metro Design Criteria that includes national standards and codes to protect the workers and work under construction considering seismic conditions.

Mitigation Measures

As stated in Section 4.15 of the Final EIS/EIR, no mitigation measures will further reduce the risk of fault rupture and seismic ground shaking during construction. Even with compliance with Metro Design Criteria, the risk during construction will remain low, resulting in no adverse effect.

4.5.6 Ecosystems and Biological Resources

Affected Environment/Existing Conditions

The ecosystems/biological resources in the Study Area have not changed from those identified in Section 4.10 of the Final EIS/EIR. The Section 2 of the Project construction area lies within a densely developed and urbanized area with limited ecosystems/biological resources. Land cover in this area is predominantly urban development with irrigated and maintained landscaping and some mature trees. Some migratory bird species may use these trees during migration. Native trees, including southern coast live oak riparian forest, California walnut woodland, and southern sycamore alder riparian and walnut forest, have the potential to occur in the area. No sensitive vegetation communities were previously observed.

Construction-related Environmental Impacts/Environmental Consequences

As described in the Final EIS/EIR, Section 2 of the Project is located in a densely developed urban land area, including the Century City Constellation Station area. No impacts to sensitive ecological or biological resources are anticipated. However, the changes in the construction staging would require additional tree removal beyond that identified in the Final EIS/EIR. The removal of the double crossover structure at the Wilshire/Rodeo Station and subsequent shortening of the station box would not result in the removal of any additional trees that were not already identified in the Final EIS/EIR. Construction of a new temporary Metro bus layover site in the median of Santa Monica Boulevard would require the removal of up to four small trees. In addition, if placement of the materials transport corridor on the east side of the AT&T building at 2010 Century Park East is not feasible, the materials transport corridor would be located along the west side of the building, which would require the removal of up to eight trees along Century Park East. An adverse impact could occur if an active migratory bird nest were disturbed in any of these trees. To offset the removal of mature trees, replacement trees would be provided.

Mitigation Measures

Changes in the construction staging at the Century City Constellation Station would require additional tree removal beyond that identified in the Final EIS/EIR and could result in an adverse impact if an active migratory bird nest were disturbed in any of these trees. Mitigation measures will be implemented to meet the requirements for compliance with the Migratory Bird Treaty Act and state migratory bird protection. With the implementation of mitigation, the construction period biological impacts of Section 2 of the Project would not result in additional adverse impacts beyond those discussed in the Final EIS/EIR:

- **CON-66 Biological Survey:** Two biological surveys will be conducted, one 15 days prior and a second 72 hours prior to construction that will remove or disturb suitable nesting habitat. The surveys will be performed by a biologist with experience conducting breeding bird surveys. The biologist will prepare survey reports documenting the presence or absence of any protected native bird in the habitat to be removed and any other such habitat within 300 feet of the construction work area (within 500 feet for raptors). If a protected native bird is found, surveys will be continued in order to locate any nests. If an active nest is located, construction within 300 feet of the nest (500 feet for raptor nests) will be postponed until the nest is vacated and juveniles have fledged and when there is no evidence of a second attempt at nesting.
- **CON-69 Avoidance of Migratory Bird Nesting Season**: Construction activities that involve removal or trimming will be timed to occur outside the migratory bird nesting season, which occurs generally from March 1 through August 31 and as early as February 1 for raptors.
- **CON-67 Compliance with City Regulations:** If construction or operation of the Project requires removal or pruning of a protected tree, a removal permit will be required in accordance with applicable municipal codes and ordinances of the city in which the affected tree is located. Within the City of Los Angeles, compliance with

the Native Tree Protection Ordinance will require a tree removal permit from the Los Angeles Board of Public Works. Similarly, within the City of Beverly Hills, applicable tree protection requirements, such as tree removal permits, will be followed. Tree removal permits may require replanting of protected trees within the Study Area or at another location to mitigate for the removal of these trees

- **VIS-2 Replacement for Tree Removal:** Where mature trees are removed, replacement with landscape amenities of equal value will be incorporated into final designs, where feasible, to enhance the visual integrity of station areas.

4.5.7 Parklands and Community Services and Facilities

Affected Environment/Existing Conditions

The description of parklands and community services and facilities located in Section 2 of the Project Study Area has not changed from what was provided in Section 4.13 of the Final EIS/EIR, with the exception of a new medical rehabilitation facility and improvements to the BHHS campus described in Section 4.2 of this Draft SEIS.

Three parks, recreation centers, and/or museum facilities are located within one-quarter mile of the Century City Constellation Station area:

- Beverly Hills Garden Park (Santa Monica Boulevard, Beverly Hills)
- Los Angles Country Club (10101 Wilshire Boulevard, Los Angeles)
- Beverly Hills High School (241 Moreno Drive, Beverly Hills)

One police station and one fire station would serve the Century City Constellation Station area:

- Los Angeles Police Department West Los Angeles Community Police Station (1663 Butler Avenue, Los Angeles)
- Los Angeles Fire Department Fire Station 92 (10556 Pico Boulevard, Los Angeles)

Three public schools are located within one-quarter mile of the Century City Constellation Station area:

- El Rodeo School (605 N. Whittier Drive, Beverly Hills)
- Beverly Hills Adult School (255 S. Lasky Drive, Beverly Hills)
- Beverly Hills High School (241 Moreno Drive, Beverly Hills)

The California Rehabilitation Institute (2080 Century Park East, Los Angeles) is the only medical facility located within one-quarter mile of the Century City Constellation Station area.

Construction-related Environmental Impacts/Environmental Consequences

Access to police and fire stations would not be affected by the changes to the construction staging areas in Century City because no stations are adjacent to where these sites and related construction activities would occur. However, police and fire emergency response routes to businesses and residences could be disrupted within the vicinity of construction areas. To minimize potential disruptions, the Los Angeles County Sheriff's Department, the Beverly Hills Police/Fire Departments, and the Los Angeles Police/Fire Departments would be informed of all lane closures and detours prior to construction so that emergency routes can be adjusted accordingly. Access to necessary collector streets, local streets, and alleys would be maintained to ensure emergency routes are accessible.

Hospitals and medical care facilities near the construction sites that could be affected by emissions and/or noise and vibration include the new medical rehabilitation facility located at 2080 Century Park East. Refer to Section 4.5.3, Construction Air Quality, and Section 4.5.4, Construction Noise and Vibration, regarding temporary construction-related impacts and their associated mitigation measures. Access to the medical rehabilitation facility would be maintained during lane closures and detours associated with construction and cut-and-cover activities.

Of the parks, recreational centers, and schools located within one-quarter mile of the Century City Constellation Station area, the Beverly Hills Garden Park, the Los Angeles Country Club, El Rodeo School, and Beverly Hills Adult school would not be affected by the changes to the construction staging areas in Century City because they are not located adjacent to where these sites and related construction activities would occur. Construction activities would occur at staging Areas 2 and 3 adjacent to BHHS, which is considered both a school and a recreational facility. The City of Beverly Hills Community Services Department uses the high school fields for registered participation of youth and adult soccer, tennis, and football. The high school gymnasiums, Swim-Gym, and wrestling room are also used for city programs. The high school track is open for weekend recreational use, and the sports fields are open for other group use by permit. As described in Section 4.5.4, Construction Noise and Vibration, construction-related activities could result in noise impacts to BHHS, especially during tunneling activities, when Section 2 Project construction would overlap with the BHHS modernization and students and faculty are located temporarily in portable classrooms on the current BHHS lacrosse fields. The construction of Section 2 of the Project is predicted to exceed City of Beverly Hills noise limits at the temporary BHHS classroom buildings. With the implementation of mitigation measures, the construction of Section 2 of the Project would not result in additional adverse noise or vibration impacts to BHHS beyond those discussed in the Final EIS/EIR. .

Lane closures and detours due to construction activities could temporarily affect existing vehicular and pedestrian travel routes to BHHS. The BHUSD would be informed of changes to Metro bus routes, street closures, and pedestrian crossings prior to construction. Metro would ensure safety by developing and implementing measures that safeguard safety of pedestrians near schools.

Impacts to parklands and community services and facilities are not anticipated to result from the removal of the double crossover structure at the Wilshire/Rodeo Station and subsequent shortening of the station box beyond those identified in this section and consistent with the Final EIS/EIR. This would instead result in lower construction costs and slightly reduced impacts to traffic and disruption to the surrounding streets and businesses due to a smaller construction footprint along Wilshire Boulevard, reduced time needed for station excavation, and fewer truck trips needed for hauling excavated material.

Mitigation Measures

The changes to the Century City Constellation Station construction areas could result in construction period impacts to parklands and community services and facilities such as the new medical rehabilitation facility and BHHS. With the implementation of mitigation, the construction of Section 2 of the Project would not result in additional adverse impacts beyond those discussed in the Final EIS/EIR:

- **CON-82 Communication with Schools:** School districts and private school institutions along the alignment will be informed of changes to Metro bus routes, school bus routes, and pedestrian crossings prior to construction.
- **CON-83 Work with Transportation, Police, Public Works, and Community Service Departments:** Metro will work with transportation, police, public works, and community services departments of jurisdictions along the alignment to implement mutually agreed upon measures, such as posting of clearly marked signs, pavement markings, lighting as well as implementing safety instructional programs, to enhance the safety of pedestrians, particularly in the vicinity of schools and access routes to hospitals. The measures will be developed to conform to Metro Rail Transit Design Criteria and Standards, Fire/Life Safety Criteria, Volume IX.
- **CON-84 Instructional Rail Safety Programs for Schools:** Metro will provide at no charge to school districts an instructional rail safety program with materials to all affected elementary middle and high schools.
- **CON-85 Informational Program to Enhance Safety:** Metro will provide an on-going informational program to nearby medical facilities, senior centers, and parks if requested by these facilities, to enhance safety. The program will be similar to that described for the schools except the information and materials provided will be geared toward senior citizens.
- **CON-86 Traffic Control:** Contractors will be required to control traffic during construction by following the City of Los Angeles Work Area Traffic Control Manual; City of Los Angeles Bureau of Engineering Standard Plan S-610-12 (Notice to Contractors-Comprehensive); and the Bureau of Engineering Standard Specifications for Public Works Construction. Comparable standards will be enforced for work conducted in the other jurisdictions along the alignment.
- **CON-87 Designation of Safe Emergency Vehicle Routes:** Safe emergency vehicle routes will be designated around construction sites. The identification of the routes will be coordinated with other agencies.

4.6 Cumulative Impacts

This section examines the cumulative impacts that could result from implementation of Section 2 of the Project when considered in combination with identified past, present, and foreseeable future projects, including those that have changed since the certification of the Final EIS/EIR.

4.6.1 Methodology

The cumulative impacts analysis in this Draft SEIS utilizes the same methodology as the Final EIS/EIR, which followed the guidelines provided in "Considering Cumulative Effects under the National Environmental Policy Act" (Council on Environmental Quality, January 1997). In addition to long-term cumulative effects, cumulative effects associated short-term construction effects of the Project, when combined with construction effects of other projects, are addressed for the resource areas analyzed in this Draft SEIS.

4.6.2 Affected Environment/Existing Conditions

The Study Area for this cumulative impacts analysis has not changed from what was presented in Section 4.17.3 of the Final EIS/EIR. The analysis of cumulative impacts in this Draft SEIS is focused on the Century City Constellation Station area in Section 2 of the Project since the elimination of the train crossover at the Wilshire/Rodeo Station would slightly reduce construction impacts because of the reduced construction footprint and would not cause cumulative impact that is different from that considered in the Final EIS/EIR.

The analysis examined changed conditions in Section 2 of the Project. These changed conditions involve updated information about the past, present, and reasonably foreseeable future actions in the Century City area. While no new transportation projects are anticipated in the Century City area beyond those described in the Final EIS/EIR, several new public and commercial development projects are planned or are under construction. These projects are described in Table 4-25 and their locations are shown in Figure 4-38. In addition to the projects listed, the former physician-run hospital at 2080 Century Park East recently reopened as a remodeled 9-story, 138-bed medical rehabilitation facility with inpatient services. The medical rehabilitation facility is located more than 1,000 feet away from the Century City Constellation Station entrance and is a typical urban facility, which is not a generator or substantial traffic or noise. Since construction of the facility is complete, it was not analyzed in the cumulative construction analysis.

Table 4-25. Past, Present, and Reasonably Foreseeable Future Actions in the Century City Area

ID #	Project Title	Project Description	Status
1	Beverly Hills High School Modernization Project	As described in the Affected Environment/Existing Conditions of Section 4.2, the Beverly Hills High School campus has begun modernization of the school's campus.	Construction activities began in 2015 and are scheduled through 2020.
2	10000 Santa Monica Boulevard Project	Development of a 40-story residential project with 283 units. The project also includes 75,000 square feet of indoor and outdoor recreation/site amenities for project residents.	Substantially complete, building has opened.
3	Remodeling of the Westfield Century City Mall Property	An $800-million upgrade and expansion of the mall to provide upgraded facilities and new retail and hospitality services.	Currently under construction with expected completion date of spring 2017.
4	Century City Center - 1950 Avenue of the Stars	The property is fully entitled to build two 47-story residential towers and an additional 12-story residential building with a combined total of 483 residential units. The project also includes approximately 1.7 acres of open park space and 1,208 below ground parking spaces. Alternatively, the property is also entitled for one 37-story 700,000-square-foot office building, 25,830 square feet of low-rise one- and two-story office space, an approximately 1,300-square-foot Mobility Hub, a Transit Plaza, approximately 4,120 square feet of ancillary retail, and a partially subterranean parking structure with 1,579 stalls.	A Notice of Determination for project revisions was submitted in February 2015. Residential entitlements extend through September 2018, and office entitlements extend through 2021; if exercised, construction would be expected to follow and extend for one to two years.
5	Century Plaza Hotel Development Project - 2025 Avenue of the Stars	Project to restore the existing hotel and construct two 46-story buildings containing a mix of residential, restaurant, retail, and hotel uses behind the hotel. The project also includes a 2-acre publicly accessible garden/plaza with ground-level retail and restaurant uses.	Preliminary construction is underway with an expected completion date of early 2018.

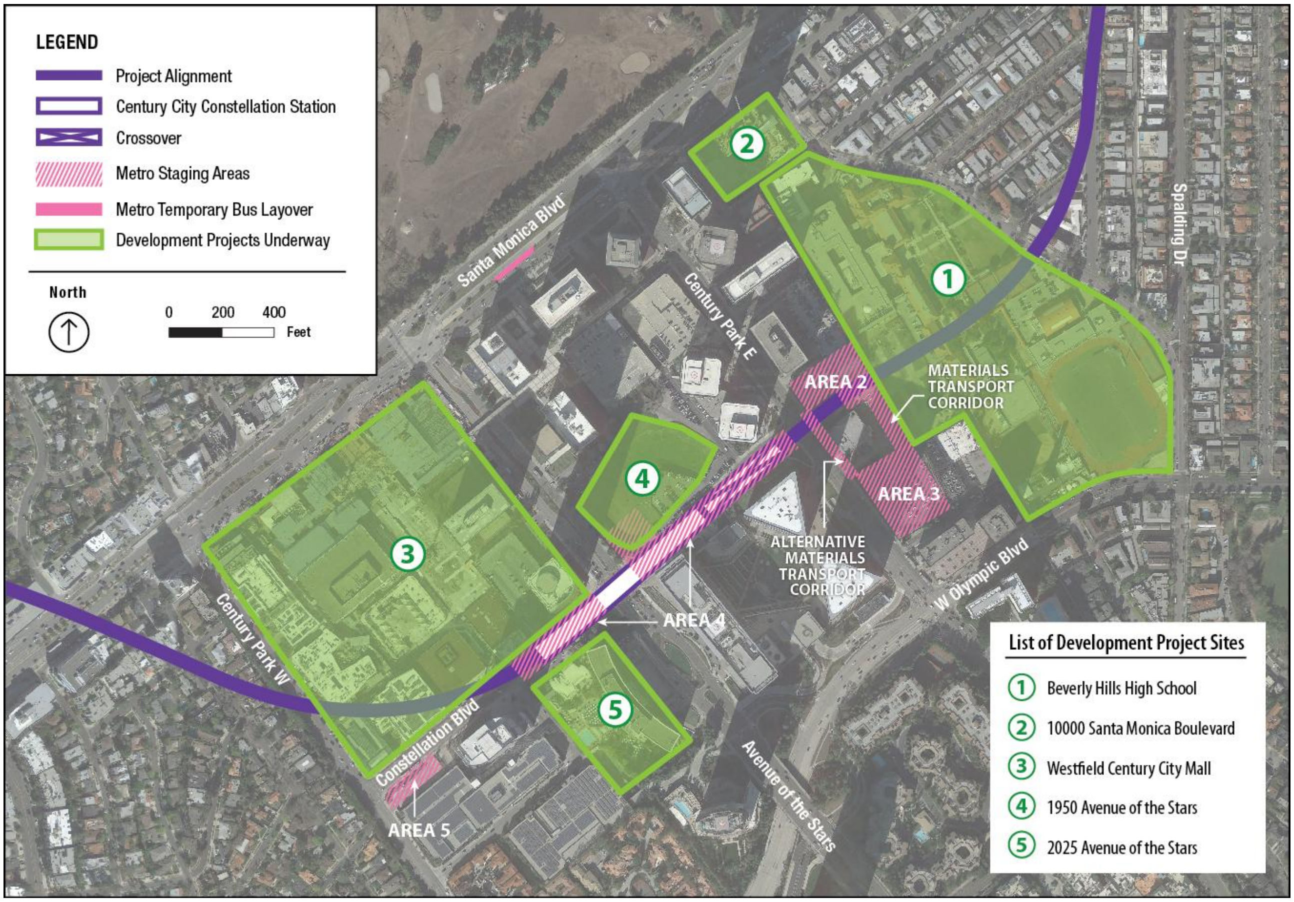


Figure 4-38. Location of Cumulative Projects

4.6.3 Environmental Impacts/Environmental Consequences

This cumulative impacts discussion assesses the overall cumulative effects of Section 2 of the Project that have changed since certification of the Final EIS/EIR. The following analysis examines the cumulative operational impacts and then the cumulative construction impacts.

Cumulative Long-term Impacts

Additional detailed information about individual public and commercial development projects available since the approval of the Final EIS/EIR is provided in Section 4.5.2; however, as the Final EIS/EIR considered development in the Study Area consistent with the 2009 Metro Long Range Transportation Plan and the 2008 Southern California Association of Government's (SCAG) Regional Transportation Plan, these projects fall within the framework of what was considered and analyzed for long-term cumulative operational impacts in the Final EIS/EIR. The long-term impacts of the Project have not changed from those discussed in the Final EIS/EIR and the following topic areas all have no adverse impact during operations of the Project with implementation of mitigation. Therefore, the cumulative impacts for noise and vibration, land use and development, community and neighborhoods, parklands and other community facilities, visual effects, archeological resources, paleontological resources, energy, water quality, geologic hazards, and hazardous materials would be the same as discussed in the Final EIS/EIR and the Project would continue to have effects that are less than cumulatively considerable. With regards to cultural and historic resources, the long-term impacts of the changes to the construction staging areas at Century City Constellation were assessed in Section 4.4 of this Draft SEIS and concluded that the construction and operation of the Project would result in no adverse effect to the cultural and historic resources near the Century City Constellation Station. Therefore, the cumulative effect of the Project to cultural and historic resources would not be cumulatively considerable.

Furthermore, the Project would provide additional transit service options to the Century City Station area, reducing, the traffic and parking demand in Century City area. Similarly, the Project would result in long term benefits to air quality and greenhouse gas emissions. Therefore, the Project will not result in additional or greater contribution to long-term cumulative impacts on transit, traffic, parking, air quality and greenhouse gas emissions other than those discussed in the Final EIS/EIR.

Cumulative Short-term Impacts

The cumulative short-term impacts analysis considers the potential impact of overlapping construction schedules of several projects in close proximity to the Project. Impacts are described as temporary since the duration of the impacts would be limited to the duration of construction. While the Century Plaza Hotel development project is scheduled to open in early 2018, the majority of its construction is expected to be completed prior to the start of Century City Constellation Station major construction activities, which would begin in January 2018 (refer to Section 2.5 of this Draft SEIS) and would not likely contribute to cumulative construction impacts. Of the projects identified in Table 4-25, the Beverly Hills High School (BHHS) modernization has a construction schedule that overlaps with Section 2 Project construction; however, the peak construction period for BHHS was estimated to occur in the spring of 2016 and would end before construction activities for Section 2 of the Project would begin. While the construction schedule of the Century City Center project is currently unknown and the Subsequent EIR identified expected completion of construction to be in 2015 (LSA 2013), as discussed in Section 2.3.2 of this Draft SEIS, development of the Century City Center project within the same timeframe as Section 2 of the Project would preclude the use of that property for the construction staging site for the Century City Constellation Station, resulting in the need for an alternative staging area. The overlapping construction of the Project, the BHHS modernization, and the construction of Century City Center could result in temporary cumulative impacts in the vicinity of the Century City Constellation Station area associated with street closures and traffic, air quality, noise and vibration, geologic hazards, access to businesses and public facilities, hazardous materials, water quality, aesthetics, and biological resources. Cumulative impacts of construction for each of these resource areas are discussed in the sections below.

Transportation

As discussed in Chapter 3 of this Draft SEIS, construction of Section 2 of the Project, including stations, alignment, and station entrances, will result in the temporary disruption and rerouting of traffic, including buses, which will contribute to the cumulative increase in congestion within the Section 2 Study Area.

The construction period for the BHHS campus improvements was scheduled between late 2015 and mid-2020, with the peak construction period scheduled between February 2016 and April 2016 (BHUSD 2015). As of the issue date of this Draft SEIS, the campus improvement project was underway and ongoing. Based on this schedule, the peak construction period for the BHHS campus improvements would not coincide with major construction activities for Section 2 of the Project, which would begin in January 2018, but between January 2018 and mid-2020, construction activities from Section 2 of the Project and less intensive construction activities at BHHS will overlap. The increase in construction traffic from both projects will result in incremental construction traffic impacts within the Study Area. Even though construction traffic from worker trips and haul trucks will occur during the off-peak hours for both projects to minimize traffic disruptions, the additional trips would increase overall traffic within the Section 2 Study Area. As a result, the Project will contribute incrementally to the cumulative traffic impact during construction.

If construction of the Century City Center were to move forward while Section 2 Project construction was ongoing, the cumulative construction impacts on traffic circulation, parking, transit, and other modes (pedestrian and bicycles) as a result of construction access, delivery of materials, and lane closures and detours would be expected to increase. If each project were constructed at separate times, then those impacts would not be additive. Compared to the construction of projects at separate times, the concurrent construction would have a higher intensity of impact for a shorter duration.

The contribution of the Project to cumulative temporary impact on the transportation system would be reduced with the implementation of traffic control plans (TCON-1), designated haul routes (TCON-2), and a transportation management plan (TCON-4) that also consider the timing of other development in Century City to coordinate closures and truck routing.

However, even with implementation of these measures, cumulative construction period impacts on public transit, traffic, parking, and pedestrian and bicycle access, while reduced, would remain as temporary adverse impacts.

Air Quality

There is a potential for cumulative construction impacts if peak construction activities and emissions from the Century City Constellation Station, the BHHS modernization, and the Century City Center development occur during the same time period, where the combined effect could have the potential to exceed South Coast Air Quality Management District (SCAQMD) thresholds. Table 4-26, Table 4-27, and Table 4-28 present the maximum daily construction emissions burdens for the Project, the BHHS modernization, and the Century City Center development as compared to SCAQMD daily thresholds. As shown, individually there are no projected exceedances of the SCAQMD thresholds by any of these projects. Peak daily air quality emissions for the Century City Center were anticipated to exceed the SCAQMD thresholds for volatile organic compounds (VOC) and nitrogen oxide (NOx) without mitigation; however, the mitigated peak daily levels would be below the thresholds (Table 4-28).

Table 4-26. Estimated Maximum Daily Construction Emissions for Century City Constellation Station (lbs/day)

Activity	VOC	CO	NOx	PM_{10}	$PM_{2.5}$
Highest Daily Total	4	76	54	13	4
SCAQMD Thresholds	**75**	**550**	**100**	**150**	**55**

Source: *Westside Purple Line Extension Century City Constellation Station Air Quality Technical–Revision 1* (Metro 2017g)

Table 4-27. Beverly Hills Unified School District Peak Combined Construction Emissions (lbs/day)

Activity	VOC	CO	NOx	PM_{10}	$PM_{2.5}$
Highest Daily Total	59.7	148.8	207.8	33.1	21.5
SCAQMD Thresholds	**75**	**550**	**100**	**150**	**55**

Source: *Beverly Hills High School, Hawthorne K-8 School, and El Rodeo K-8 School Improvement Project Final Environmental Impact Report* (BHUSD 2015)
Note: Peak CO, NOx, $PM_{10,}$ and $PM_{2.5}$ predicted to occur during Month 11. Peak emissions for VOC predicted to occur in Month 49.

Table 4-28. Century City Center Mitigated Peak Combined Construction Emissions (lbs/day)

Activity	VOC	CO	NOx	PM_{10}	$PM_{2.5}$
Highest Daily Total	54.0	123.9	53.4	12.1	2.2
SCAQMD Thresholds	**75**	**550**	**100**	**150**	**55**

Source: *Century City Center Draft Subsequent EIR*, Table 4.4.AI (LSA 2013)

As shown in Table 4-27, peak BHHS construction emissions for the majority of pollutants (carbon monoxide, NOx, Particulate Matter (PM) PM_{10} and $PM_{2.5}$) are predicted to occur in Month 11 (roughly late 2016), except for VOCs, which are predicted to peak in Month 49 (roughly early 2020). Given this schedule, it is more likely that peak BHHS construction emissions for VOCs could overlap with peak emissions from

Century City Constellation Station construction, which would be underway in 2020. If peak BHHS VOC emissions (59.7 lbs/day) are added to peak Century City Constellation Station VOC emissions (4 lbs/day), the total (63.7 lbs/day) emissions would still be below the SCAQMD threshold.

However, if the Century City Center project proceeds forward, the combined emissions of overlapping peak construction periods of the three projects have the potential to exceed SCAQMD thresholds, resulting in a temporary adverse cumulative impact. However, given the current project timelines for all three projects, this peak construction overlap may not occur since the schedule and activities associated with construction of the Century City Center are currently unknown, while the Subsequent EIR identified expected completion of construction to be in 2015 (LSA 2013).

Noise and Vibration

Construction noise and vibration impacts are generally site-specific and localized to the vicinity of each related project. Construction activities for the Project will comply with local noise ordinances, including the City of Los Angeles Noise Ordinance, the City of Beverly Hills Noise Ordinance, and the County of Los Angeles Noise Ordinance, as well as the Metro Baseline Specifications Section 01565, Construction Noise and Vibration Control.

However, given the close proximity of Section 2 construction staging areas at Century City, the BHHS modernization program construction activities, and the potential Century City Center development, concurrent construction activities could have a cumulative noise impact on sensitive noise receivers in the area such as the BHHS, Century City Rehabilitation Facility & Medical Center, Hyatt Regency Century Plaza Hotel, office, multi-family and single-family residences (See Table 4-18 in Section 4.5.4 of this SEIS for a full list). With implementation of mitigation measures specified in the Final EIS/EIR and/or additional practices identified in Section 4.5.4 of this Draft SEIS, the Project contribution to the cumulative noise impact would be minimized.

Geologic Hazards

Excavation and construction of the Century City Center project and BHHS modernization could encounter subsurface gasses during construction that is unrelated to construction of the Project. As discussed in Section 4.5.5 of this Draft SEIS, the incremental risk that the Project's tunneling activities could cause subsurface gas to migrate is negligible; therefore, tunneling activities would not affect gas levels encountered by any of the other projects in the vicinity and would not increase risk. With the mitigation measures identified in Section 4.5.5, the Project would not contribute to a cumulative increase in risk from subsurface gas.

Likewise, the Century City Center project and BHHS modernization could be subject to fault rupture, seismic ground shaking, liquefaction, subsidence and settlement that is unrelated to construction of the Project. The risk of a fault rupture event impacting the any of the areas under construction during the period of construction is extremely small given the construction durations. During construction of Section 2 of the Project, designs to minimize risk of liquefaction-related damage include increasing the depth of soldier piles to reach non-liquefiable zones or ground improvement to densify the soil prior to installation of the excavation support system and therefore liquefaction does not result in an adverse effect during construction. Soils in the construction area have previously experienced settlement associated with lowering of groundwater and as a result soil are not expected to have significant additional settlement. As the construction of the Project would not increase likelihood of damage associated with fault rupture, seismic ground shaking, liquefaction, subsidence and settlement, it would not contribute to a cumulative increase in risk.

Community and Neighborhood Effects

Construction of Section 2 of the Project will be disruptive to communities and neighborhoods in the immediate vicinity of construction activities. Construction of Section 2 of the Project will overlap with the construction of the BHHS modernization program from 2018 through 2020 and with the Century City Center development construction for one to two years once that project breaks ground. During these periods, the cumulative effects associated with noise and vibration, street closures and traffic, parking, aesthetics, access to businesses, parks and public facilities, and other construction-related effects during construction would be greater than if each project were constructed at separate times. The Project's contribution to community and neighborhood effects is cumulatively considerable in regards to street closures and access to business, parks and public facilities. However, these temporary adverse cumulative impacts would extend for a shorter total duration than if each project was constructed in succession.

Hazardous Materials

As described in Section 4.17.3 of the Final EIS/EIR, excavating and transporting soils affected by hazardous materials (spoils) for disposal will occur as part of Section 2 construction activities. Spoils will be disposed of off-site at licensed disposal facilities. Most of the projects identified in Table 4-25 are for commercial (office, hotel, retail) and high-density residential uses, including the Century City Center project, which are not large generators of hazardous materials. The BHHS campus, however, has environmental conditions that are expected to require remediation activities resulting in disposal of hazardous materials, including for soils that will be removed for construction of the underground parking structure on campus.

With 21 hazardous materials treatment storage and disposal facilities within the SCAG region, it is anticipated that there will be sufficient disposal capacity to accommodate contaminated materials disposal from construction of Section 2 of the Project and the other identified projects; however, as identified in the Final EIS/EIR, the transporting of hazardous materials for disposal from the Project and all other regional projects would be cumulatively considerable.

Water Quality

As described in Section 4.17.3 of the Final EIS/EIR, to protect water quality in the area, construction the Section 2 of the Project will proceed in strict compliance with all existing regulations and requirements. This includes meeting the Clean Water Act's National Pollutant Discharge Elimination System (NPDES) permit requirements, incorporating Best Management Practices (BMPs,) and implementing a Standard Urban Stormwater Management Plan. Construction of Section 2 will not result in a conversion of pervious surfaces to impervious surfaces or in a substantial altercation of the existing amount or pattern of runoff. Therefore, no substantial increases in erosion, siltation, flooding, or exceedance of the stormwater drainage system's capacity will occur. All other projects under construction in the Century City area will also comply with all existing regulations and requirements and will not result in the conversion of pervious surfaces to impervious surfaces as this is a heavily developed urban area. Therefore, construction of the Project would not be cumulatively considerable.

Visual Effects

As identified in the Final EIS/EIR, temporary impacts during construction of Section 2 of the Project, including increased dust, stockpiling of construction-related materials, the presence of heavy equipment (e.g., cooling towers for the tunnel boring machines, cranes, bulldozers, graders, scrapers, and trucks), temporary barriers, and enclosures, will result in a localized temporary adverse impact. However, with the implementation of the mitigation measures specified in Section 4.15 of the Final EIS/EIR, the Project would minimize its contribution to cumulative visual effects within Century City.

Ecosystems and Biological Resources

As described in the Final EIS/EIR, the Section 2 Study Area is a densely developed urban area with limited biological resources. As identified in Section 4.5.6 of the Draft SEIS, construction of Section 2 would result in the removal of some street trees. However, implementation of identified mitigation measures will reduce this impact so no adverse impacts remain. Since Section 2 of the Project and all other projects under construction in the Century City area are within a densely built-out urban environment, they will not affect undisturbed natural areas. Therefore, the potential of the construction of the Project to contribute to significant cumulative effects on biological resources is not considerable.

CHAPTER 5—SECTION 4(f) EVALUATION

In March 2012, the Federal Transit Administration (FTA) and the Los Angeles County Metropolitan Transportation Authority (Metro) issued the *Westside Subway Extension Final Environmental Impact Statement/Environmental Impact Report* (Final EIS/EIR) (Metro 2012j), which included, as Chapter 5, the Section 4(f) evaluation for the project (now referred to as the Westside Purple Line Extension). The FTA issued the Record of Decision (ROD) on August 9, 2012. At that time, FTA determined that the construction of the tunnels under the school would not result in a use of the Section 4(f) recreational facilities at Beverly Hills High School (BHHS), consistent with the guidance included in the 2005 U.S. Department of Transportation (USDOT) Section 4(f) Policy Paper (USDOT 2005), which was updated in 2012. According to the Section 4(f) Policy Paper, in Section 3.3.3.1, tunneling is an option to consider for avoidance of a property. The policy paper states, in Question 28, that Section 4(f) applies to tunneling only if the tunneling:

- Disturbs archaeological sites on or eligible for the National Register of Historic Places (NRHP) which warrant preservation in place;
- Causes disruption which would permanently harm the purposes for which the park, recreation, wildlife, or waterfowl refuge was established; or
- Substantially impairs the historic values of the historic site.

No archaeological sites had been identified at the BHHS campus, and in consultation with the California State Historic Preservation Officer (SHPO) under Section 106 of the National Historic Preservation Act, it was determined that the Westside Purple Line Extension Project would not adversely affect the historic qualities of buildings at BHHS that caused it to be on or eligible for the NRHP. The final Section 4(f) evaluation documented that the Westside Purple Line Extension Project would not permanently harm or otherwise substantially impair the recreational activities, features, or attributes that qualify the BHHS property for protection under Section 4(f).

The August 2016 Final Decision on Motions for Summary Judgment and Ruling in Regards to Remedies (Final Decision) of the United States District Court for the Central District of California (District Court) in *Beverly Hills Unified School District v. Federal Transit Administration, et al.*, CV 12-9861-GW (SSx) directed FTA to assess the use of BHHS under Section 4(f) due to the planned tunneling. Therefore, this Section 4(f) evaluation examines the potential use of the BHHS that results from the planned tunneling under the property. This analysis also examines potential use of Section 4(f) resources near the construction staging areas at Century City Constellation Station and the project design refinements for Section 2 of the Westside Purple Line Extension Project. The alignment and construction staging locations and activities at Wilshire/Rodeo Station remain the same as described in the Final EIS/EIR relative to Section 4(f) resources; therefore, the effects and the uses under Section 4(f) may be found in the Final EIS/EIR and those areas are not discussed in this analysis.

5.1 Section 4(f) Regulatory Framework

Section 4(f) of the Department of Transportation Act of 1966 (49 United States Code (USC) 303), in pertinent paragraphs, provides the following:

> (c) Approval of programs and projects. Subject to subsection (d), the Secretary may approve a transportation program or project (other than any project for a

park road or parkway under Section 204 of title 23) requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, area, refuge, or site) only if:

(1) there is no prudent and feasible alternative to using that land; and

(2) the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use.

FTA has developed and promulgated joint regulations with the Federal Highway Administration (FHWA) implementing and interpreting Section 4(f) (23 Code of Federal Regulations (CFR) 774). In addition to the Section 4(f) regulations, FTA has adopted FHWA's Section 4(f) Policy Paper (USDOT 2012) to guide Section 4(f) analyses. The analysis in this Draft Supplemental Environmental Impact Statement (Draft SEIS) and Section 4(f) Evaluation has been conducted in accordance with 23 CFR 774, the Section 4(f) Policy Paper, and direction from the District Court to consider the subsurface easement required for the tunnels under BHHS as a permanent incorporation of land.

5.1.1 Types of Properties Protected by Section 4(f)

The Section 4(f) regulations (23 CFR 774.17) state that a Section 4(f) property means publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance, or land of a historic site of national, state, or local significance.

The regulations further clarify that consideration under Section 4(f) is not required when the official(s) with jurisdiction over a park, recreation area, or wildlife and waterfowl refuge determine that the property, considered in its entirety, is not significant. In the absence of such a determination, the Section 4(f) property will be presumed to be significant. For historic sites, the Section 4(f) requirements apply only to historic sites listed in or eligible for the NRHP unless the Administration determines that the application of Section 4(f) is otherwise appropriate. Section 4(f) applies to all archeological sites listed in or eligible for inclusion on the NRHP, including those discovered during construction, except as set forth in 23 CFR 774.13(b).

5.1.2 Section 4(f) Use

The Section 4(f) regulations (23 CFR 774.17) indicate that, with certain identified exceptions, a "use" of Section 4(f) property occurs:

1) When land is permanently incorporated into a transportation facility;
2) When there is a temporary occupancy of land that is adverse in terms of the statute's preservation purpose as determined by the criteria in Section 774.13(d); or
3) When there is a constructive use of a Section 4(f) property as determined by the criteria in Section 774.15.

Permanent Incorporation

Land is considered permanently incorporated into a transportation project when it has been purchased as right-of-way or sufficient property interests have otherwise been acquired for the purpose of project implementation. For example, a subsurface easement required for the purpose of project construction or that grants a future right of access onto a Section 4(f) property, such as for the purpose of routine maintenance by the transportation agency, would be considered a permanent incorporation of land into a transportation facility.

Temporary Occupancy

Examples of temporary occupancy of Section 4(f) land include right-of-entry, project construction, a temporary easement, or other short- term arrangement involving a Section 4(f) property. A temporary occupancy will not constitute a Section 4(f) use when all of the conditions listed in 23 CFR 774.13(d) are satisfied:

1) Duration must be temporary (i.e., less than the time needed for construction of the project), and there should be no change in ownership of the land;
2) Scope of the work must be minor (i.e., both the nature and the magnitude of the changes to the Section 4(f) property are minimal);
3) There are no anticipated permanent adverse physical impacts, nor will there be interference with the protected activities, features, or attributes of the property, on either a temporary or permanent basis;
4) The land being used must be fully restored (i.e., the property must be returned to a condition which is at least as good as that which existed prior to the project); and
5) There must be documented agreement of the official(s) with jurisdiction over the Section 4(f) resource regarding the above conditions.

In situations where the above criteria cannot be met, the temporary occupancy will be a use of Section 4(f) property and the appropriate Section 4(f) analysis, coordination, and documentation will be required (refer to 23 CFR 774.13(d)). In those cases where a temporary occupancy constitutes a use of Section 4(f) property and the *de minimis* impact criteria are also met, a *de minimis* impact finding may be made. *De minimis* impact findings should not be made for temporary occupancy that does not constitute a use of Section 4(f) property.

Constructive Use

A constructive use occurs when the transportation project does not incorporate land from a Section 4(f) property, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired. Substantial impairment occurs only when the protected activities, features, or attributes of the property are substantially diminished [23 CFR 774.15(a)].

The FTA has determined that a constructive use occurs when (23 CFR 774.15(e)):

- The projected noise level increase attributable to the project substantially interferes with the use and enjoyment of a noise-sensitive facility of a property protected by Section 4(f), such as:
  - Hearing the performances at an outdoor amphitheater
  - Sleeping in the sleeping area of a campground
  - Enjoyment of a historic site where a quiet setting is a generally recognized feature or attribute of the site's significance
  - Enjoyment of an urban park where serenity and quiet are significant attributes
  - Viewing wildlife in an area of a wildlife and waterfowl refuge intended for such viewing
- The proximity of the proposed project substantially impairs esthetic features or attributes of a property protected by Section 4(f), where such features or attributes are considered important contributing elements to the value of the property. Examples of substantial impairment to visual or esthetic qualities would be the location of a proposed transportation facility in such proximity that it obstructs or eliminates the primary views of an architecturally significant historic building, or substantially detracts from the setting of a Section 4(f) property which derives its value in substantial part due to its setting;
- The project results in a restriction of access which substantially diminishes the utility of a significant publicly owned park, recreation area, or a historic site;
- The vibration impact from construction or operation of the project substantially impairs the use of a Section 4(f) property; or
- The ecological intrusion of the project substantially diminishes the value of wildlife habitat in a wildlife and waterfowl refuge adjacent to the project.

The FTA has determined that a constructive use does not occur when (23 CFR 774.15(f)):

- Compliance with the requirements of 36 CFR 800.5 for proximity impacts of the proposed action, on a site listed on or eligible for the National Register, results in an agreement of "no historic properties affected" or "no adverse effect";
- The impact of projected traffic noise levels of the proposed highway project on a noise-sensitive activity do not exceed the FHWA noise abatement criteria as contained in Table 1 in part 23 CFR 772, or the projected operational noise levels of the proposed transit project do not exceed the noise impact criteria for a Section 4(f) activity in the FTA guidelines for transit noise and vibration impact assessment;
- The projected noise levels exceed the relevant threshold in paragraph (f)(2) of [23 CFR 774.15] because of high existing noise, but the increase in the projected noise levels if the proposed project is constructed, when compared with the projected noise levels if the project is not built, is barely perceptible (3 dBA [A-weighted decibels] or less);
- There are proximity impacts to a Section 4(f) property, but a governmental agency's right-of-way acquisition or adoption of project location, or the Administration's approval of a final environmental document, established the location for the proposed transportation project before the designation, establishment, or change in the significance of the property. However, if it is reasonably foreseeable that a

property would qualify as eligible for the National Register prior to the start of construction, then the property should be treated as a historic site for the purposes of this section; or

- Overall (combined) proximity impacts caused by a proposed project do not substantially impair the activities, features, or attributes that qualify a property for protection under Section 4(f);
- Proximity impacts will be mitigated to a condition equivalent to, or better than, that which would occur if the project were not built, as determined after consultation with the official(s) with jurisdiction;
- Change in accessibility will not substantially diminish the utilization of the Section 4(f) property; or
- Vibration levels from project construction activities are mitigated, through advance planning and monitoring of the activities, to levels that do not cause a substantial impairment of protected activities, features, or attributes of the Section 4(f) property.

The Section 4(f) Policy Paper (USDOT 2012) provides additional guidance about constructive use. As defined in regulation, constructive use occurs when the proximity impacts of a project on an adjacent or nearby Section 4(f) property, after incorporation of mitigation, are so severe that the activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired. Substantial impairment occurs when the protected activities, features, or attributes of the Section 4(f) property are substantially diminished. As a general matter, this means that the value of the resource, in terms of its Section 4(f) purpose and significance, will be meaningfully reduced or lost. The degree of impact and impairment must be determined in consultation with the officials with jurisdiction in accordance with 23 CFR 774.15(d)(3). In those situations where a potential constructive use can be reduced below a substantial impairment by the inclusion of mitigation measures, there will be no constructive use and Section 4(f) will not apply. If there is no substantial impairment, notwithstanding an adverse effect determination (under Section 106), there is no constructive use and Section 4(f) does not apply. The District Court has upheld that constructive use does not apply to temporary impacts that would not have a lasting effect beyond the period of construction.

De Minimis Impact

An impact to a Section 4(f) property may be determined to be *de minimis* if the transportation use of the Section 4(f) property, including incorporation of any measure(s) to minimize harm (such as any avoidance, minimization, mitigation, or enhancement measures), does not adversely affect the activities, features, or attributes that qualify the resource for protection under Section 4(f). For historic sites, *de minimis* impact means that the Administration has determined, in accordance with 36 CFR part 800, that no historic property is affected by the project or that the project will have "no adverse effect" on the historic property in question. For parks, recreation areas, and wildlife and waterfowl refuges, a *de minimis* impact is one that will not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f).

5.1.3 Prudent and Feasible Avoidance Alternatives

If a project would use a Section 4(f) resource and the use is not *de minimis*, that project can only be approved by determining that (1) there is no prudent and feasible avoidance alternative, and (2) the project includes all possible planning to minimize harm resulting from the use (23 CFR 774.3). A *de minimis* impact is one that, after taking into account any measures to minimize harm (such as avoidance, minimization, mitigation, or enhancement measures), results in either (23 CFR 774.17):

- A Section 106 finding of no adverse effect on a historic property or no historic properties affected; or
- A determination that the project would not adversely affect the activities, features, or attributes qualifying a park, recreation area, or refuge for protection under Section 4(f).

When the use is not *de minimis*, the first step in meeting the requirements for approval is to develop and consider avoidance alternatives.

An avoidance alternative is one that completely avoids the use of Section 4(f) resources. Per the Section 4(f) Policy Paper (USDOT 2012), "[A] project alternative that avoids one Section 4(f) property by using another Section 4(f) property is not an avoidance alternative." An avoidance alternative must first be evaluated to determine whether it is prudent and feasible. FTA Section 4(f) regulations list a series of factors to consider in determining whether an alternative is prudent and feasible. A feasible and prudent avoidance alternative is defined in 23 CFR 774.17 as:

1) A feasible and prudent avoidance alternative avoids using Section 4(f) property and does not cause other severe problems of a magnitude that substantially outweighs the importance of protecting the Section 4(f) property. In assessing the importance of protecting the Section 4(f) property, it is appropriate to consider the relative value of the resource to the preservation purpose of the statute.
2) An alternative is not feasible if it cannot be built as a matter of sound engineering judgment.
3) An alternative is not prudent if:
    a) It compromises the project to a degree that it is unreasonable to proceed with the project in light of its stated purpose and need;
    b) It results in unacceptable safety or operational problems;
    c) After reasonable mitigation, it still causes:
        1. Severe social, economic, or environmental impacts;
        2. Severe disruption to established communities;
        3. Severe disproportionate impacts to minority or low income populations; or
        4. Severe impacts to environmental resources protected under other Federal statutes;
    d) It results in additional construction, maintenance, or operational costs of an extraordinary magnitude;
    e) It causes other unique problems or unusual factors; or

  f) It involves multiple factors in paragraphs (3)(i) through (3)(v) of this definition, that while individually minor, cumulatively cause unique problems or impacts of extraordinary magnitude.

5.1.4 All Possible Planning to Minimize Harm

All possible planning, defined in 23 CFR 774.17, means that all reasonable measures identified in the Section 4(f) evaluation to minimize harm or mitigate for adverse impacts and effects must be included in the project. All possible planning to minimize harm does not require analysis of feasible and prudent avoidance alternatives, since such analysis already occurred in the context of searching for feasible and prudent alternatives that avoid Section 4(f) properties altogether.

Minimization of harm may entail both alternative design modifications that reduce the amount of Section 4(f) property used and mitigation measures that compensate for residual impacts. Minimization and mitigation measures should be determined through consultation with the official with jurisdiction.

Mitigation measures involving public parks, recreation areas, or wildlife or waterfowl refuges may involve a replacement of land and/or facilities of comparable value and function or monetary compensation to enhance the remaining land.

Mitigation of historic sites usually consists of those measures necessary to preserve the historic integrity of the site and agreed to in accordance with 36 CFR 800 by FTA, the California SHPO, and other consulting parties. In any case, the cost of mitigation should be a reasonable public expenditure in light of the severity of the impact on the Section 4(f) property in accordance with 23 CFR 771.105(d).

5.1.5 Least Overall Harm

If there is no feasible and prudent Section 4(f) avoidance alternative, FTA may approve only the alternative that causes the least overall harm as defined in 23 CFR 774.3(c)(1) as the alternative that:

1) Causes the least overall harm in light of the statute's preservation purpose. The least overall harm is determined by balancing the following factors:
    a) The ability to mitigate adverse impacts to each Section 4(f) property (including any measures that result in benefits to the property);
    b) The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection;
    c) The relative significance of each Section 4(f) property;
    d) The views of the official(s) with jurisdiction over each Section 4(f) property;
    e) The degree to which each alternative meets the purpose and need for the project;
    f) After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f); and
    g) Substantial differences in costs among the alternatives.
2) The alternative selected must include all possible planning, as defined in 23 CFR 774.17, to minimize harm to Section 4(f) property.

A least overall harm analysis balances these factors to eliminate the alternative(s) that, on balance, present the greatest harm in light of the Section 4(f) statute's preservationist perspective. Many of the factors included in the least overall harm standard duplicate the factors in the prudence test.

For more information about Section 4(f) requirements, refer to the FHWA and FTA Section 4(f) regulations in 23 CFR 774 and the FHWA Section 4(f) Policy Paper (USDOT 2012).

5.2 Description of Section 4(f) Resources

Table 5-1 and Figure 5-1 show and summarize Section 4(f) resources within Century City and west Beverly Hills that are near Section 2 of the Project and that could be affected by either Section 2 of the Project or alternatives to the Project that are considered to avoid or reduce harm to Section 4(f) properties. These resources include both historic properties and publicly-owned parkland and recreational facilities that are open to the public. The bike lane on Santa Monica Boulevard is a transportation facility and not a Section 4(f)-protected resource. The remainder of this section describes the Section 4(f) resources.

Table 5-1. Section 4(f) Resources in the Century City and West Beverly Hills Vicinity

Resource	Section 4(f)-protected activities, features, or attributes
Perpetual Savings Bank	Historic property
Beverly Hills High School	Historic property
AAA Building	Historic property
Century Plaza Tower	Historic property
Century Plaza Hotel	Historic property
Los Angeles Country Club (South Course)	Historic property
The Barn	Historic property
Beverly Hills High School Recreational Facilities	Publicly owned recreational facilities open to the public
Roxbury Memorial Park	Publicly owned city park

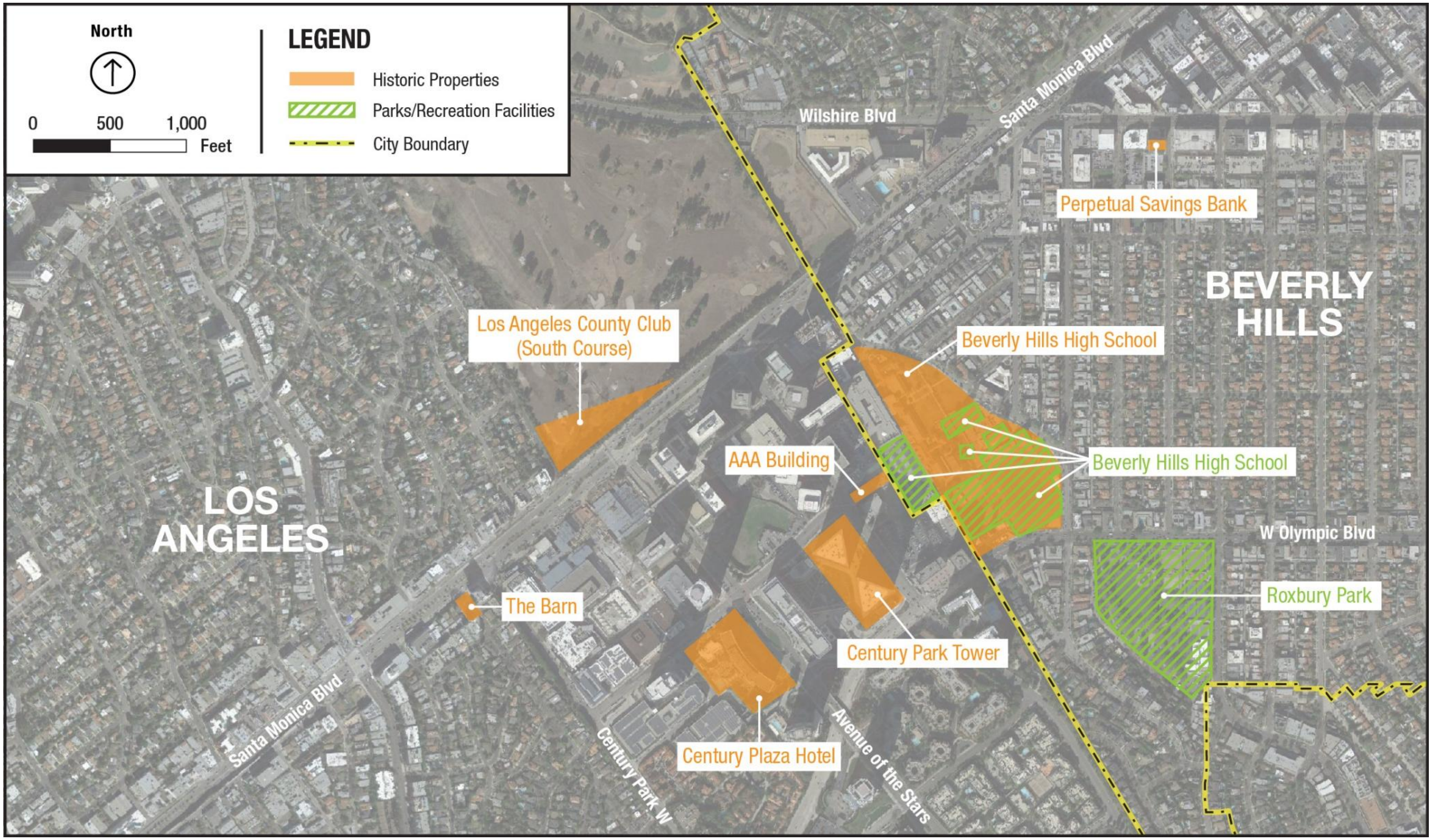


Figure 5-1. Section 4(f) Resources in the Century City and West Beverly Hills Vicinity

5.2.1 Perpetual Savings Bank Historic Property

The Perpetual Savings Bank and Plaza is located at 9720 Wilshire Boulevard and currently operates as the Pacific Mercantile Bank (Figure 5-2).

Figure 5-2. Perpetual Savings Bank Building

Description of Property

The Perpetual Savings Plaza is located at 9720 Wilshire Boulevard in a densely developed urban setting. It is a New Formalism-style commercial building. It is set back approximately 30 feet from Wilshire Boulevard, occupying the rear half of the lot. The building is nine stories with a rectangular plan. The building features a flat roof with a parapet and glass curtain walls of fixed metal-framed sashes enframed in a concrete grille of flaring arches (14 arched bays on each floor of primary north façade). The primary façade is symmetrical with the main entrance centered on the first floor. The building appears to be unaltered and in excellent condition. The parking garage to the south and the round fountain to the north of the building demonstrate the same architectural style and may be related features.

Activities, Features, and Attributes Eligible for Protection under Section 4(f)

The Perpetual Savings Bank Building is eligible for listing in the NRHP under Criterion C as a building that significantly embodies the distinctive characteristics of the New Formalism architectural style. The FTA notified the California SHPO of its determination of eligibility on September 16, 2011, and the California SHPO concurred with the determination on December 8, 2011. The New Formalism style, popular from 1960 to the present, is characterized by strict symmetry; flat projecting rooflines; suggestion of classical columns (piers) and entablatures; smooth wall surfaces, often elegantly sheathed in stone; high-quality materials; delicacy of all details with no heavy, monumental qualities; grilles of polished metal, concrete, and stone; and formal landscaping including pools, fountains, and frequent use of integrated sculpture. The property retains its integrity of location, design, setting, materials, workmanship, and feeling.

5.2.2 Beverly Hills High School (BHHS) Historic Property

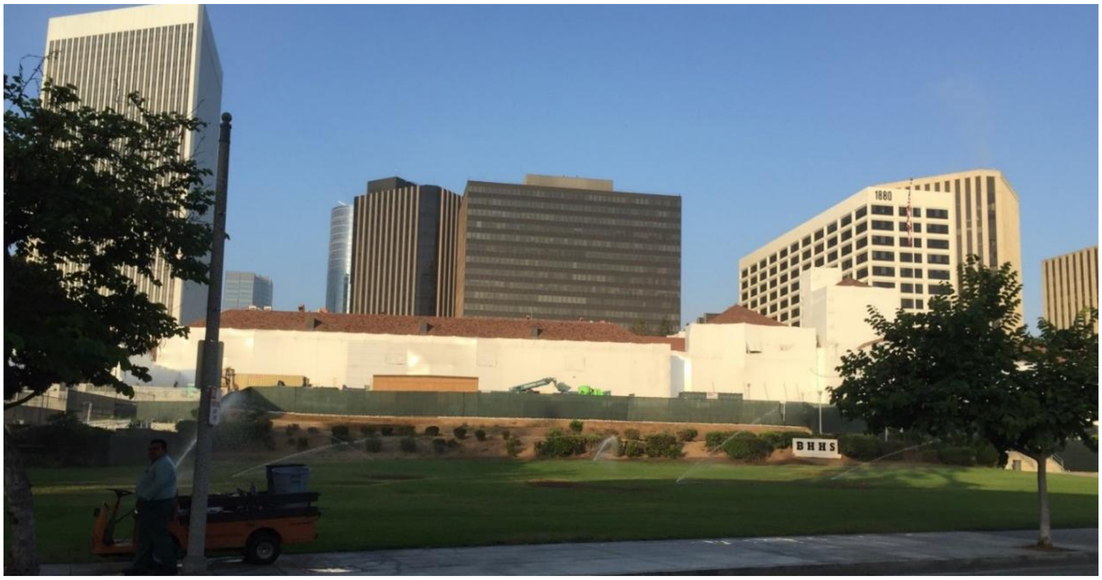
BHHS is located at 241 Moreno Drive and is eligible for listing in the NRHP under Criterion C for its architectural significance (Figure 5-3 and Figure 5-4).

Description of Property

BHHS (APN 4319001900) is located in an urban residential setting. The FTA notified the California SHPO of its determination of eligibility on September 16, 2011, and the California SHPO concurred with the determination on December 8, 2011. BHHS is eligible for listing in the NRHP under Criterion C for its architectural significance (Figure 5-3 and Figure 5-4). The historic property boundary documented in the eligibility determination includes all parts of the campus east of Heath Avenue; therefore, Section 4(f) is applicable to the portion of the BHHS campus east of Heath Avenue as a historic property (Figure 5-5).

The school is a French Eclectic-style collection of educational buildings. The complex occupies the east side of the parcel (east of Health Avenue) and has an east-facing orientation. It is two stories with a roughly U-shaped plan that encompasses a large central lawn. Access to the property is from Moreno Drive by way of a flight of steps featuring metal crossed and circular patterned railings. The buildings, which include the original 1927 school and later architecturally compatible additions, feature moderately pitched, hipped roofs covered with composite shingles, and dormer vents. The window bays are regularly arranged and filled with metal- frame sash windows. The walls are clad in stucco and brick with quoins. The primary façade is asymmetrical with multiple entries framed by cast-concrete surrounds with segmental pediments. A square tower with a round clock and finial is centrally located on the façade. On the south side of the parcel is a cylindrical-roofed swimming pool known as the Swim-Gym. The projecting end areas of the pool building have rounded corners, horizontal bands, glass-block windows, and coping above the windows. The buildings retain a high level of integrity and are in excellent condition. There are new classrooms and a science center outside of the boundary of the historic property to the west of Health Avenue, a private street that divides the parcel and is the western boundary of the historic property (FTA 2011).

Figure 5-3. Section 4(f) Properties Associated with BHHS



BHHS, under renovation August 2016

Figure 5-4. Beverly Hills High School

Figure 5-5. Current Features of BHHS

The buildings were constructed in 1927 by the Los Angeles High School District. In 1936-1937, the main school building underwent earthquake renovation due to the 1933 Long Beach earthquake. The Swim-Gym was built in 1939-1940. Major additions (including the north wing to the main building, a five-story building with classrooms, and a two-level parking garage) were constructed in 1967-1970 and were designed by Rowland H. Crawford. In 2005-2007, the Science and Technology Center designed by LPA was added (Metro 2011n).

The historic property boundary, defined as the parcel containing the buildings associated with BHHS, was evaluated for NRHP eligibility as a single historic property in 2010. This approach was taken because of the shared ownership, collective educational uses, and physical proximity of the buildings on the property. The parcel contains a 1927 academic school building (with a late 1960s addition) and a 1939-1940 Swim-Gym recreational building. An additional classroom building (Building A) and parking garage built from 1967-1970 and a science and technology center constructed between 2005 and 2007 are located on a separate parcel to the west across Heath Avenue and are not eligible for the NRHP. They are not built in the same period of historic significance and do not contribute to the NRHP eligibility of the BHHS campus. The 1927 academic building and the Swim-Gym were determined to be eligible for the NRHP under Criterion C and were collectively designated as BHHS. These buildings are distinct, with differing styles that convey the two eras in which they were built. Each would be individually eligible for the NRHP under Criterion C. However, together they are both historic elements of the BHHS. Because of their physical proximity and historic association with BHHS, they were designated as a single, unified historic property. The overall campus-like setting of the high school is a character-defining feature of the BHHS historic property.

Activities, Features, and Attributes Eligible for Protection under Section 4(f)

BHHS (APN 4319001900) is eligible for listing in the NRHP under Criterion C for the main school building's architectural significance as a building that embodies the distinctive characteristics of the French Eclectic and Streamline Moderne architectural styles. French Eclectic, popular between 1915 and 1945, is characterized by tall, steeply pitched hipped roofs, eaves commonly flared upward at the roof-wall junction; brick, stone, or stucco wall cladding; and sometimes decorative half-timbering. Streamline Moderne, popular from 1920 to the commencement of World War II, is characterized by stucco box massing, often with rounded corners and even, rounded parapets; emphasis is on the horizontal through the use of banded surfaces and windows; curved projecting wings; glass brick; round windows (ship portholes); steel (ship) railing; and brightly colored vitrelight. The Swim-Gym is a good example of the work of Stiles O. Clements, a master architect. Buildings B, E, F, and H (Figure 5-5) are contributing resources to the historic property (Beverly Hills Unified School District (BHUSD) 2015).

BHUSD Strategic and Long Range Facilities Master Plan

BHUSD completed a *Facilities Master Plan* (BHUSD 2010) and a *Strategic and Long Range Facilities Master Plan* (BHUSD 2012) that identified several changes to the BHHS campus (Figure 5-6). Proposed architectural changes include demolition of the existing Building H, demolition of the existing Building E, and construction of a new Athletics Building C with four floors of subsurface parking at the location of the existing tennis courts (BHUSD 2014b). The plans also include substantial internal changes and modernization of other buildings on campus. The seismic evaluation completed of Building B (Domestic Science) indicates that after modification and seismic upgrade it will be used for a combination of classroom and administrative offices (BHUSD 2014a). Temporary classrooms (Figure 5-7) have been installed south of Building A (Figure 5-5) to replace instruction space during modernization activities, which are scheduled to end the first quarter of 2020. These temporary classrooms are proposed to eventually be replaced with new tennis courts and a half-field soccer field (BHUSD 2016). These changes were planned and are being undertaken by BHHS and are not related to the Westside Purple Line Extension. This analysis assumes that while the changes to the BHHS campus being undertaken by the BHUSD would remove two buildings that the BHUSD identified as historic (Buildings E and H), they would not change the historic integrity of the remaining historic buildings (Buildings B and F). Based on the campus modernization schedule, Buildings E and H are expected to be removed by 2020. Therefore, this Section 4(f) analysis considers the remaining historic buildings (Buildings B and F) as Section 4(f) properties, but does not consider Buildings E and H, which are being removed by BHUSD.

5.2.3 AAA Building Historic Property

The AAA Building is a Modern-era articulated concrete structure located at 1950 Century Park East (Figure 5-8).

Description of Property

The AAA Building is a rectangular-massed, Modern-era articulated concrete structure enclosing a three-story glass-walled inner structure. The building's office space is located within the glass-walled inner structure that is free from supporting framing members because the exterior concrete frame supports the building structure. The narrow ends of the main block provide the main entrance on the west elevation and the tangentially attached parking garage on the east elevation. The concrete frame walls on the north and south elevations have arched openings that admit ample light into the interior space, and the ends of the arched frames appear to be supporting the long horizontal concrete beams on each level of the front (west) façade. The front entrance is located in a three-story glass wall recessed behind an opening between the rough-surfaced, solid concrete end walls of the front elevation. The building does not appear to have been altered and is in excellent condition.

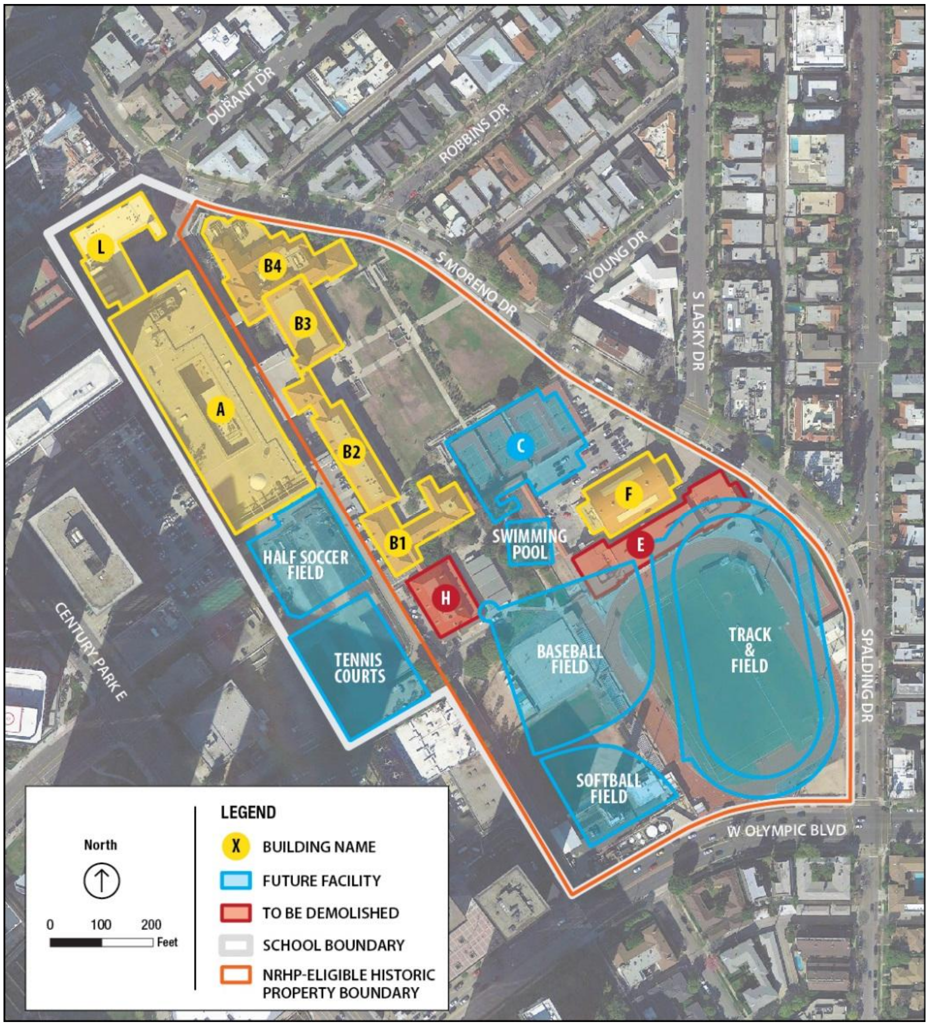


Figure 5-6. Proposed Changes to BHHS included in Master Plan

BHHS, temporary clasrooms photographed May 2016

Figure 5-7. Temporary Classrooms at BHHS

Figure 5-8. AAA Building

Activities, Features, and Attributes Eligible for Protection under Section 4(f)

The AAA Building was constructed with an articulated concrete frame designed by Welton Becket and Associates for the Century City District Office of the Automobile Club of Southern California. The building was constructed in 1963 using pre-stressed concrete construction. In 1965, it was designated one of the ten most outstanding examples of pre-cast construction in the United States. The concrete frame is not delicate or artistically turned, giving it a Brutalist appearance.

Welton Becket, as part of his company Welton Becket and Associates, was one of—if not the most—influential architects of commercial architecture in Southern California from his arrival in Los Angeles in 1929. Becket's works include the Capital Records Building, the Dorothy Chandler Music Pavilion, and the Cinerama Dome. The AAA Building is a modest commercial building that was constructed on commission from the Automobile Club of Southern California and is situated on the edge of the towering articulated steel and glass curtain-walled buildings of Century City. The AAA Building was constructed with the exterior concrete frame carrying the structural load so that the inner glass-walled space is nearly free of support members in the open space. Trees were planted along the length of the building, allowing a view of openness and nature from the interior office space. It is currently occupied by the Meridian Sports Club.

The AAA Building was determined eligible for listing in the NRHP under Criterion C as a building that embodies the distinctive characteristics of a Modern-era Brutalist style building. The FTA notified the California SHPO of its determination of eligibility on September 16, 2011, and the California SHPO concurred with the determination on December 8, 2011.

5.2.4 Century Plaza Tower Historic Property

Century Plaza Tower (Figure 5-9) is located at 2029 Century Park East in the Century Park Commercial development.

Figure 5-9. Century Plaza Tower

Description of Property

Century Plaza Tower is in the Century Park Commercial development, within a heavily developed urban commercial setting. A twin building (2049 Century Park East), which is outside the project's area of potential effect, mirrors this building to the immediate south. The building is a Modern-era style commercial skyscraper that occupies the center of the lot. It is 44 stories, including the ground-floor pedestal, with a triangular plan. The building features a flat roof, 23 vertical bays on each side that are filled with aluminum frame, fixed-pane window sashes, and concrete and steel cladding. The façades are symmetrical with a front entrance on Century Park East The entries are slightly recessed and filled with metal frame glass pane doors. The original lobby, which was open, was enclosed in mullion-free glass at some point. The building appears otherwise unaltered and is in excellent condition.

Activities, Features, and Attributes Eligible for Protection under Section 4(f)

The Century Plaza Tower (at 2029 Century Park East) is eligible for listing in the NRHP under Criterion C as a building that significantly embodies the distinctive characteristics of Modern-era architectural style and as the work of master architect Minoru Yamasaki. Tower entrances and lobbies were renovated in 2008 (Century Park 2016). The FTA notified the California SHPO of its determination of eligibility on September 16, 2011, and the California SHPO concurred with the determination on December 8, 2011. The building was constructed from 1973 to 1975 and is less than 50 years old; however, it has been determined to meet Criterion Consideration G for exceptional importance.

5.2.5 Century Plaza Hotel Historic Property

The Century Plaza Hotel (Figure 5-10) is located at 2025 Avenue of the Stars.

Figure 5-10. Century Plaza Hotel

Description of Property

The Century Plaza Hotel is located in a heavily developed urban commercial setting. It is a Modern-era style hotel with the front elevation facing northeast. It is 20 stories with a curved rectangular massing. The building features a flat, overhanging roof ornamented by an aluminum panel entablature with an abstracted egg-and-dart design. The longitudinal sides consist of a rhythmic series of bays of recessed concrete hotel room balconies with metal railings that are separated by vertical concrete privacy walls. The floors of the balconies are rectangular with concave corners and the rooms have sliding glass doors and fixed metal window sashes. The ends of the building have three bays. The middle bays feature balconies and the side bays are covered in aluminum panels. The southwest elevation features two towers evenly spaced in the center and clad with rectangular aluminum panels. Both protrude from the roof. The northern tower is flush with the wall surface, while the rectangular tower on the south protrudes about five panels from the wall surface. The primary façade (northeast elevation facing Avenue of the Stars) is symmetrical with a central, four-story glazed, multi-bay entrance under a non-historic age canopy and through non-historic age doors. A pool and gymnasium (probably non-original or heavily remodeled original garden structure) are at the rear of the property (southwest and west of building). In front (northeast) of the building is a plaza with pedestrian access to the plaza fountain on Avenue of the Stars. The building appears to be minimally altered and is in good condition.

Activities, Features, and Attributes Eligible for Protection under Section 4(f)

The Century Plaza Hotel is eligible for listing in the NRHP under Criterion C as a building that significantly embodies the distinctive characteristics of the Modern-era of architecture and as the work of master architect Minoru Yamasaki. The FTA notified the California SHPO of its determination of eligibility on September 16, 2011, and the California SHPO concurred with the determination on December 8, 2011. It is the only Modern-era hotel building in Century City and one of the few Yamasaki designs in the Los Angeles area. The building was constructed in 1965-1966 and was less than 50 years old when evaluated; however, it was determined to meet Criterion Consideration G for exceptional importance.

The hotel closed in March 2016 for a major renovation. It is planned to be reopened as a luxury hotel in 2018 (Westside Today 2016).

5.2.6 Los Angeles Country Club (South Course) Historic Property

The Los Angeles Country Club (LACC) is a private, members-only golf club located at 10101 (Figure 5-11).

Figure 5-11. Los Angeles Country Club

Description of Property

The LACC was established in 1897. LACC constructed its current buildings and the North and South Golf Courses at its present location in 1911. The North and South Golf Courses were designed by the golf course designers George C. Thomas (1873-1932) and William P. Bell (1886-1953). Historic aerial photographs dating to 1950 and information from the LACC confirm that the landscape of the southwest area of the South Course has been relatively unchanged for 100 years. The layout of the tees, fairways, bunkers, sand traps, landscape, foliage, and greens is the same as designed by Thomas and Bell in 1911.

Activities, Features, and Attributes Eligible for Protection under Section 4(f)

The LACC is not publicly owned nor is it open to the general public; therefore, the property does not qualify as a Section 4(f) recreational resource. The southwest area of the Los Angeles County Club South Course is eligible for listing in the NRHP under Criterion C. This portion of the property is considered a Section 4(f) historic resource.

The North and South Golf Courses at LACC were designed by the famous golf course landscapers George C. Thomas and William P. Bell in 1911, based upon information provided by Russ Myers, Director of Golf Courses and Grounds at LACC. Thomas is renowned among golf enthusiasts for being a bold golf course design strategist, creating holes with beauty and originality. In the early 1900s, golf courses had to be constructed by hand, so the natural contour of the landscape where the course was to be sited had to be incorporated into the design. Thomas also designed the golf course at the Bel Air Country Club (Los Angeles), Riviera Country Club (Los Angeles), and Ojai Valley Inn (Ventura County). The brilliance of Thomas's and Bell's work is evident in the fact that many of their course designs are still in use 100 years after their construction.

The southwest area of the Los Angeles County Club South Course is eligible for listing in the NRHP under Criterion C as a historic landscape by master designers that significantly embodies the distinctive characteristics of a professionally designed golf course (landscape) over 50 years old. The FTA notified the California SHPO of its determination of eligibility on September 16, 2011, and the California SHPO concurred with the determination on December 8, 2011.

The Los Angeles Country Club is beginning a restoration of the South Course that will implement course design elements that were planned in the 1920s (LA Times 2015). These changes are not related to the Westside Purple Line Extension and are not expected to change the eligibility of the property.

5.2.7 The Barn Historic Property

The Barn is located at 10300 Santa Monica Boulevard and is currently used as a private residence (Figure 5-12).

Figure 5-12. The Barn

Description of Property

The Barn is located in a heavily developed urban residential setting. The commercial and residential building resembles a New England barn. It occupies the majority of the parcel and has main elevations facing Fox Hills Drive and Santa Monica Boulevard. It is two stories with an L-shaped plan. The building features a moderately pitched, cross-gable, asphalt-shingle roof with a small eave overhang and exposed rafters. The roof has non-historic skylights and roof vents. In general, the window bays are regularly arranged and filled with grille-covered window sashes on the ground story; wood frame, three-over-two double-hung window sashes on the second floor; and metal frame, square window sashes on the north elevation's gable. The building is clad in wood clapboard siding with end boards. The primary façade is symmetrical with entry from Fox Hills Drive. The entrance contains non-historic plywood panels attached to the sides of a large, deeply recessed square entry and a small flight of tiled steps. A second entry from Santa Monica Boulevard is a recessed entrance with end boards and a casement style, multi-light window sash. Above the second entry is a large dormer with a square, multi-light window sash. The remaining ground floor doors have been filled with plywood panels. The building appears to be minimally altered and is in excellent condition.

Activities, Features, and Attributes Eligible for Protection under Section 4(f)

The Barn is eligible for listing in the NRHP under Criterion B, Consideration G of the NRHP, as a building that is associated with the lives of persons significant in our past. The FTA notified the California SHPO of its determination of eligibility on September 16, 2011, and the California SHPO concurred with the determination on December 8, 2011. The building is associated with the later career of architect Archibald Quincy Jones, who is important to the history of modern architecture in Southern California. Jones bought the property in 1965, and it was his residence and studio from 1965 until his death in 1979, during the historically significant part of his career that focused on large institutional projects. Jones is also well known for his modern tract housing for Joseph Eichler in the Bay Area and other residential work. During the time Jones lived and worked at this property, he completed several important projects, including buildings at the University of California's Irvine, Riverside, Los Angeles, and San Diego campuses and at the University of Southern California (LA Conservancy).

5.2.8 Beverly Hills High School Recreational Facilities

Recreational facilities at BHHS are used by the public during periods when they are not in use for school purposes (Figure 5-5). The public use of school recreational and other facilities occurs under a joint powers agreement between the City of Beverly Hills and BHUSD that was first executed in 1978. Only the recreational facilities open to the public are protected as a recreational resource under Section 4(f).

Description of Resource

The southern portion of the BHHS campus includes both existing (Figure 5-5) and planned (Figure 5-6) recreational facilities with public use. Under the current joint powers agreement between the City of Beverly Hills and BHUSD, dated January 10, 2012, supplemented February 19, 2013, and extended on June 21, 2016 until June 30, 2017, the City of Beverly Hills Community Services Department uses the high school fields for registered participation of youth and adult soccer, tennis, and youth football. The high school gymnasiums, Swim-Gym, and wrestling room are also used for city programs. The high school track is also open for weekend recreational use, and the sports fields are open for other group use by permit (BH 2011). Until 2016, there was a combination soccer and lacrosse field south of Building A. In spring of 2016, this field was converted to use as temporary classrooms and is not currently in recreational use.

Activities, Features, and Attributes Eligible for Protection under Section 4(f)

Under 23 CFR 774.11(d), where Federal lands or other public land holdings are administered under statutes permitting management for multiple uses, and, in fact, are managed for multiple uses, Section 4(f) applies only to those portions of such lands that function for, or are designated in the plans of the administering agency as being for, significant park, recreation, or wildlife and waterfowl refuge purposes. The Section 4(f) Policy Paper (USDOT 2012) provides guidance on when Section 4(f) applies to public school recreational facilities. The guidance defines the term "playground" to refer to the area of the school property developed and/or used for public park or recreational purposes, such as baseball diamonds, soccer fields, tennis courts, track and field facilities, and other features, such as jungle gyms or swing sets. This can also include open space or practice fields if those areas serve a park or recreation function. The guidance states, in part, that when a public school playground is open to the public and serves either organized or substantial walk-on recreational purposes that are determined to be significant, it will be subject to the requirements of Section 4(f). The guidance explains that Section 4(f) would apply if the public recreation area permits visitation of the general public at any time during the normal operating hours. Section 4(f) would not apply when visitation is permitted to a select group only and not to the entire public.

The guidance clarifies cases where a school board may have authorized another public agency (e.g., the city park and recreation department) to control the facilities after school hours. In such cases, the public agency with authority to control the playground would be considered an official with jurisdiction with regard to any after-hours use of the playground. Section 4(f) would apply to the playground areas only and not the entire campus unless the school and campus are also significant historic properties. The historic property associated with BHHS was described separately above, addressing this element of the guidance.

The City of Beverly Hills Community Services Department and BHUSD are the agencies with jurisdiction over the public recreational activities and areas of the BHHS campus. The joint powers agreement between the City and the BHUSD makes available the outdoor athletic fields and play yards, including the BHHS sport fields and tennis courts, for use by the community and for registered participants of youth and adult soccer, tennis, and youth football programs. The track is open for weekend recreational use, and the sports fields are open for other group use by permit. The City and BHUSD had previously commented that these facilities are considered significant local recreational resources. Therefore, they are being considered as Section 4(f) recreational resources.

Public access to the high school gymnasiums, Swim-Gym, and wrestling room facilities is limited to those who apply for a permit through the BHUSD under Civic Center Rentals or those who register in the programs offered through the City of Beverly Hills Community Services Department. The visitation and use of these facilities are not for walk-on recreational purposes and are limited to select groups only and are not open to the entire public. Nonetheless, because of the prior comments from the officials with jurisdiction, these facilities are considered Section 4(f) recreational resources for the purposes of analysis in this SEIS.

BHUSD Strategic and Long Range Facilities Master Plan BHUSD completed a *Strategic and Long Range Facilities Master Plan* (BHUSD 2012) that identified several changes to the BHHS campus (Figure 5-6). The changes to the campus will remove sports fields and courts that are currently used by the public for recreation. In spring 2016, the soccer and lacrosse practice field south of Building A was converted into temporary classrooms (Figure 5-5). The existing tennis courts located along South Moreno Drive north of the Swim-Gym will be removed and replaced by Building C, shown in Figure 5-6. The Master Plan shows the replacement of the tennis courts and creation of a half-field soccer field in the area of the former lacrosse practice field south of Building A. A new gymnasium building is planned at the location of the existing tennis courts, north of the Swim-Gym (BHUSD 2016). The existing track and football field will be reconstructed to the east of its current location, with new baseball and softball fields taking up a portion of the current location. Based on the schedule for campus modernization, the half-field soccer field would be constructed above the tunnels at some point during the Westside Purple Line Extension Project construction. The BHHS campus improvements are scheduled to continue construction through 2020 (BHUSD 2016).

Section 4(f) would apply to the recreational facilities that are open for public use. Based on the timing of campus modernization, none of the existing sports facilities located above the tunnel alignment would be in service at the time of project construction. Sports fields south of the tunnel alignment would continue to be available for public use during project construction. It is assumed that the future facilities would be operated under similar provisions as the BHHS existing facilities currently operating under the joint-powers agreement; therefore, the analysis considers the future half-field soccer field, future tennis courts, and future gymnasium building as Section 4(f) recreational resources for the purposes of the analysis (Figure 5-6).

According to the Section 4(f) Policy Paper and consistent with 23 CFR 774.11(d), for properties managed for multiple uses, Section 4(f) applies to only those portions of such lands which function for, or are designated in the plans as being for, significant park and recreation. In this case, the playgrounds (the area of the school property developed and/or used for public park or recreation purposes such as baseball diamonds, soccer fields, tennis courts, track and field facilities, and other features such as jungle gyms or swing sets) are considered recreational resources under Section 4(f). Future development rights, including the development of subsurface parking for a property with multiple uses, are not a Section 4(f)-protected feature (USDOT 2012); however, the current tunnel design would allow for construction of up to four floors of underground parking on a mat foundation with approximately 10 feet of clearance to the top of the tunnels. Future plans for parking would not be protected under Section 4(f) because the primary purpose of future parking improvements is to provide parking for BHHS staff and students and is not dedicated for recreational use. Section 4(f) would apply to the recreational areas only and not the entire campus, except for the areas that are also significant historic sites.

5.2.9 Roxbury Memorial Park

Roxbury Memorial Park is a city park located on the south side of West Olympic Boulevard between South Spalding Drive and Roxbury Drive (Figure 5-13 and Figure 5-14).

Figure 5-13. Roxbury Memorial Park

Figure 5-14. View of Roxbury Memorial Park

Description of Property

Roxbury Memorial Park is an approximately 11-acre city park that provides for recreational activities, including picnicking, a playground, lawn bowling, croquet, basketball, sand volleyball, tennis, baseball, and soccer (BH 2007). The park is open daily from 6 a.m. to 10 p.m. The park also includes a recently constructed community center. A year-round preschool operates out of the Roxbury Clubhouse, located on the east side of the park.

Activities, Features, and Attributes Eligible for Protection under Section 4(f)

The *Park Master Plan-La Cienega Park and Roxbury Park* was adopted in 2007 and included the community center that was constructed in 2014, as well as other changes to the park's configuration and amenities. The primary purpose of Roxbury Memorial Park is as a public park that provides a significant recreational resource in Beverly Hills. As such, the park is protected in its entirety under Section 4(f).

5.3 Evaluation of Use of Section 4(f) Resources

The Project (Figure 5-15) would travel in a tunnel in the vicinity of west Beverly Hills and Century City, approximately 60 to 70 feet beneath two historic properties: BHHS and the AAA Building. BHHS also includes publicly owned lands that are open to the public at certain times for recreational use (Table 5-2). The other Section 4(f) resources discussed in Section 5.2 are not affected by the Project. The Project would not pass beneath these resources and would not affect them at the surface.

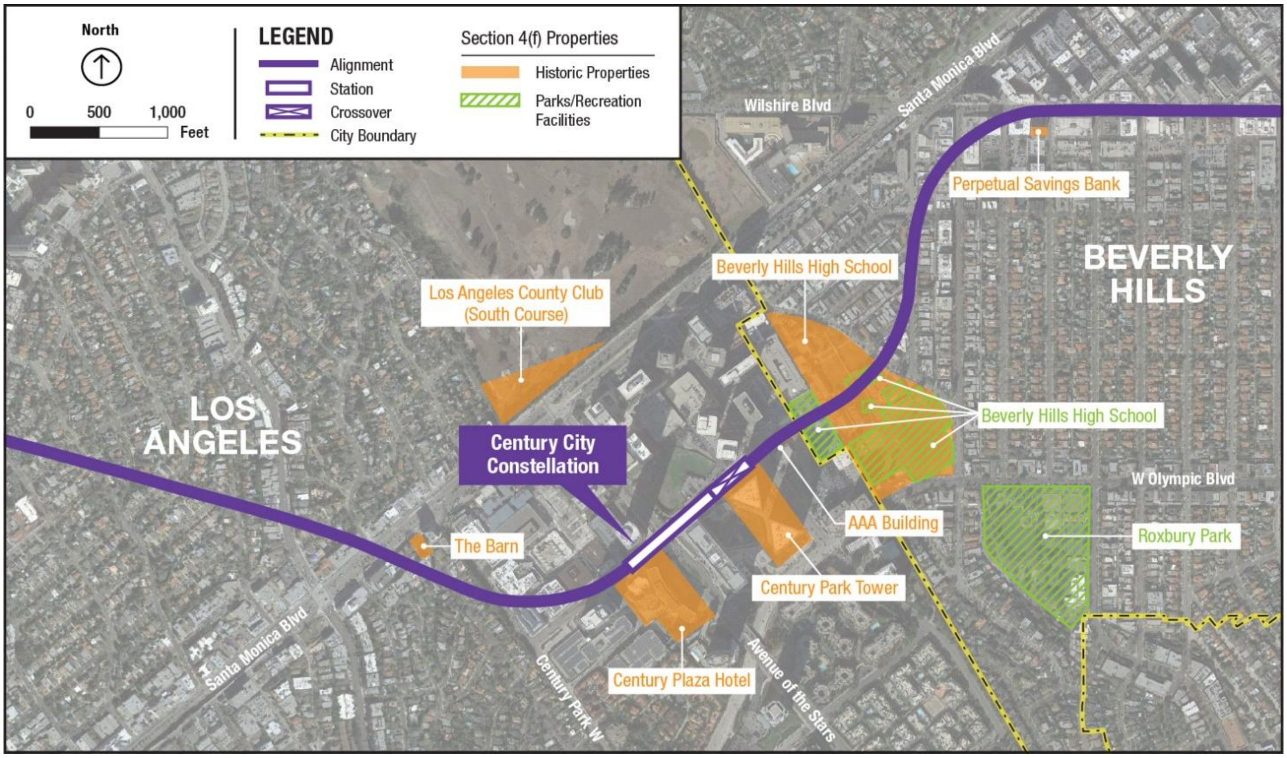


Figure 5-15. Project Features Relative to Section 4(f) Properties

The Final EIS/EIR Section 4(f) analysis also identified the Perpetual Savings Bank and the Barn for subsurface easements; however, easements from those properties would not be required. In the vicinity of the Perpetual Savings Bank, the alignment was shifted slightly to improve curve geometry. Refined analysis of the final design indicates that the tunnels would not pass near but not below the Barn property. There would be no impairment of the activities, features, or attributes that qualify those resources for protection under Section 4(f) and no temporary occupancies of those properties. Therefore, there would be no Section 4(f) use or constructive use.

At the Wilshire/Rodeo Station, the crossover was eliminated and the station box has shifted; however, construction staging and activities generally remain the same as discussed in the Final EIS/EIR. Therefore, the effects and uses under Section 4(f) in those areas remain the same as in the Final EIS/EIR.

Table 5-2. Section 4(f) Resources in the Century City and West Beverly Hills Vicinity Relative to the Project

Property	Section 4(f) Protected Activities, Features, or Attributes	Description of Effect	Preliminary Section 4(f) Finding
Perpetual Savings Bank	Historic property	Transit alignment would not cross property. No incorporation of land. No adverse effect from noise, vibration, or methane gas migration. No adverse effects under Section 106.	No Use
Beverly Hills High School	Historic property	Transit alignment crosses 60 to 70 feet beneath the property in a tunnel. Land would be incorporated below the historic property into a subsurface easement. No physical change at the surface within the boundary of the property would occur. No adverse effect from noise, vibration, or methane gas migration. No adverse effects under Section 106.	*De minimis* impact
AAA Building	Historic property	Transit alignment crosses 70 feet beneath the property in a tunnel. Land would be incorporated for a construction staging area and land under the property into a subsurface easement. Demolition of non-historic parking garage adjacent to building. No adverse effect from noise, vibration, or methane gas migration. No adverse effect under Section 106.	*De minimis* impact
Century Plaza Tower	Historic property	Transit alignment would not cross property. No incorporation of land. No adverse effect from noise, vibration, or methane gas migration. No adverse effects under Section 106.	No Use
Century Plaza Hotel	Historic property	Transit alignment would not cross property. No incorporation of land. No adverse effect from noise, vibration, or methane gas migration. No adverse effects under Section 106.	No Use
Los Angeles Country Club (South Course)	Historic property	Transit alignment would not cross property. No incorporation of land. No adverse effect from noise, vibration, or methane gas migration. No adverse effects under Section 106.	No Use

Property	Section 4(f) Protected Activities, Features, or Attributes	Description of Effect	Preliminary Section 4(f) Finding
The Barn	Historic property	Transit alignment would not cross property. No incorporation of land. No adverse effect from noise, vibration, or methane gas migration. No adverse effects under Section 106.	No Use
Beverly Hills High School Recreational Facilities	Publicly owned recreational facilities open to the public	Transit alignment crosses 60 to 70 feet beneath existing and future public sports and recreational uses in a tunnel. Land would be incorporated below the recreational facilities into a subsurface easement. No physical change at the surface within the boundary of the property. No adverse effect from noise, vibration, or methane gas migration.	*De minimis* impact
Roxbury Memorial Park	Publicly owned city park	Transit alignment would not cross property. No incorporation of land. No adverse effect from noise, vibration, or methane gas migration.	No Use

Note: FTA is in consultation with the California SHPO as of the date of issue of this Draft SEIS

5.3.1 Beverly Hills High School Historic Property

Direct Use

Section 2 of the Project would travel in a tunnel under the BHHS campus (Figure 5-16). The top of the tunnels would be between 60 and 70 feet below the ground surface as it crosses under the campus. There would be no changes to surface features on the high school campus, nor would the project elements be visible from the school campus. The subsurface easement required for the tunnels under BHHS is considered a permanent incorporation of land, and the FTA has preliminarily determined that the project would have a *de minimis* impact under Section 4(f).

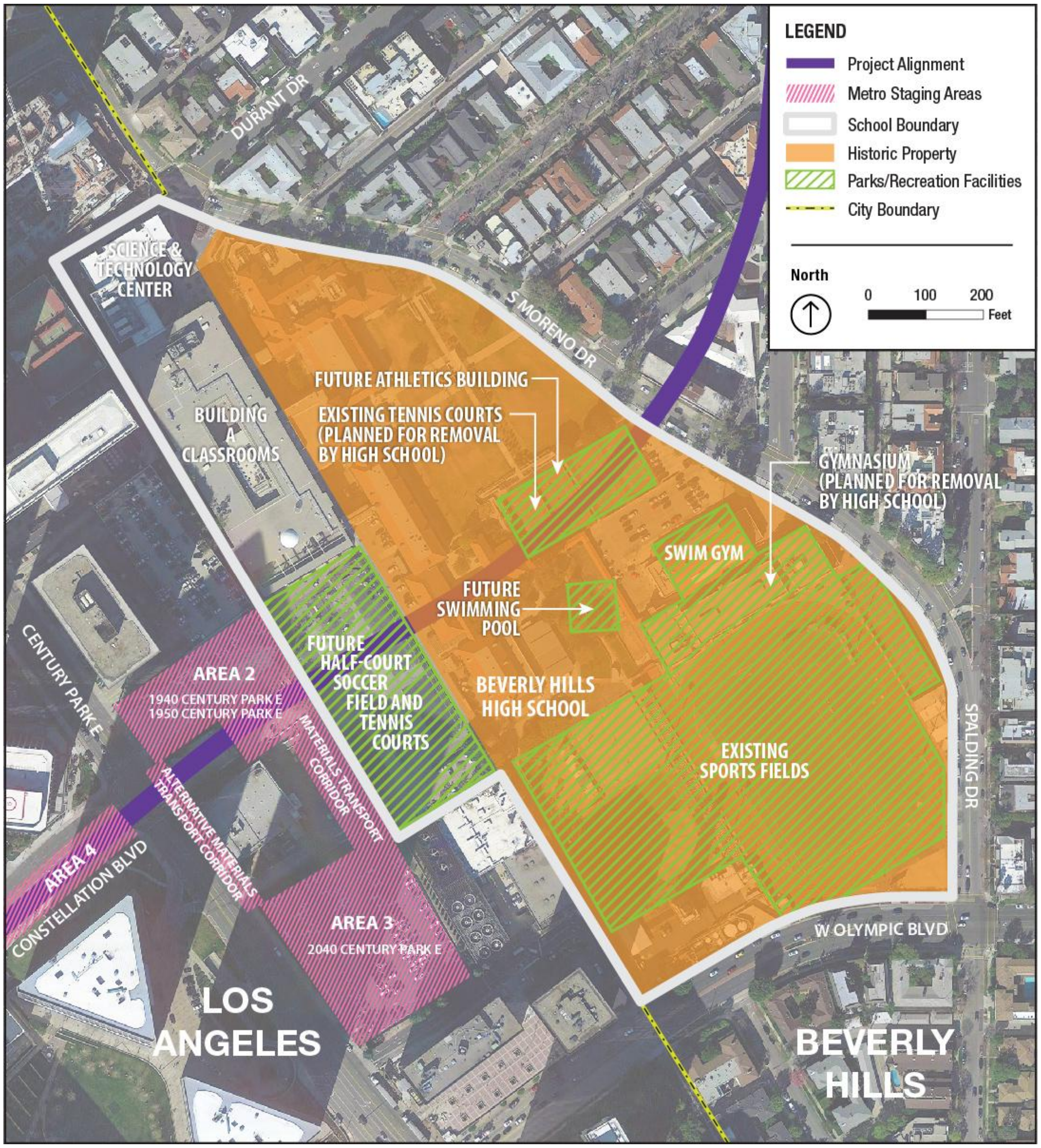


Figure 5-16. Project Features Relative to BHHS

As documented in Section 4.15.3 of the Final EIS/EIR (Metro 2012j), construction vibration levels would be less than the levels that could potentially structurally damage fragile structures and would not substantially diminish the utility of the historic buildings (Figure 5-5). Operational ground-borne noise and vibration levels would be less than the FTA noise impact criteria for institutional use and would not affect the ability to continue classroom activities at the high school. At a depth of approximately 70 feet below ground when passing under Building B1, tunneling with a pressurized-face tunnel boring machine would not cause significant ground settlement that would result in structural damage to the historic building, as discussed in Sections 4.15.3 and 8.8.4 of the Final EIS/EIR (Metro 2012j). The expanded analysis of subsurface conditions (refer to Section 4.3 and Section 4.5.5 of this Draft SEIS) indicates that tunneling activities would not increase the risk presented by subsurface gas on the BHHS historic property and the risk of an explosion remains low during both construction and operation of Section 2 of the Project.

Section 4.4 of this Draft SEIS and Section 4.14 of the Final EIS/EIR (Metro 2012j) document that the Project will result in no adverse effect to the historic property. In 2011, the FTA determined that the Westside Purple Line Extension would have no adverse effect under Section 106 on BHHS. In a letter dated December 8, 2011, the California SHPO concurred with the FTA's determination of eligibility and finding of effect for the Project, including no adverse effect to BHHS. There would be no change to the Project's finding of effect under Section 106. Based on this information, the FTA has made a preliminary determination per 23 CFR Section 774.3(b) that the use of the property, in the form of the subsurface easement under the BHHS campus, would have a *de minimis* impact on this Section 4(f) resource when considered as a historic property. FTA is in consultation with the California SHPO regarding this assessment.

Temporary Occupancy

Prior to and during construction, there would be survey and monitoring activities, including surface, ground, and building movement detection and gas monitoring instruments to monitor construction activities; ground improvement (grout injection); geophysical investigations to locate abandoned oil wells; and soil borings that would temporarily occupy portions of the BHHS campus, including historic buildings. The scope of the work is minor and the activities would be temporary, would not change ownership of the land, would have no permanent physical effects, and would not interfere with the use of the facilities. In addition, any alteration to the facilities would be non-destructive and would be fully restored. Metro will coordinate all campus access for investigations and monitoring with BHUSD. Refer to Sections 4.3 and 4.5.5 of this Draft SEIS for a detailed description of the planned investigations and monitoring.

The temporary occupancy of the BHHS campus would meet all of the conditions in 23 CFR Section 774.13(d) and would be so minimal as to not constitute a use within the meaning of Section 4(f).

Constructive Use

A constructive use occurs when the transportation project does not incorporate land from a Section 4(f) property, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired (23 CFR 774.15(a)). The Westside Purple Line Extension includes construction of a tunnel in a subsurface easement under BHHS, which, by the definition used in this analysis, would incorporate land from the Section 4(f) property, which is a permanent use. Therefore, since there would be a direct use, by definition, the Westside Purple Line Extension would not have a constructive use of the BHHS property. The proximity effects related to construction and operation of the tunnels beneath the school are included in the Section 4(f) evaluation above as it relates to the direct use of Section 4(f) resources at BHHS.

Even so, this analysis considers potential proximity effects from the construction staging site on Century Park East (Figure 5-16).

Activities occurring on the construction staging site would not substantially impair the historic features and attributes that qualify the property for protection under Section 4(f). A quiet setting is a not generally recognized feature or attribute of the BHHS site's historic significance. The site's historic significance is drawn from the architecture of the buildings. The Swim-Gym and Buildings B, E, F, and H are contributing resources to the historic property. As detailed in Chapter 4 of this Draft SEIS, with mitigation, the activities at the construction staging sites would not generate air pollution, noise, or vibration at the BHHS historic property that would adversely affect the character-defining features of the property within the context of Section 106 (Figure 5-15). As documented in Section 4.15.3 of the Final EIS/EIR (Metro 2012j) and expanded on in Sections 4.2 and 4.5.4 of this Draft SEIS, the vibration impact from construction or operation of the project would not physically damage the historic buildings. Therefore, the project would not substantially impair the Section 4(f) property or substantially diminish the utility of the buildings. Consistent with 23 CFR 774.15(f)(8), vibration levels from project construction activities are mitigated, through advance planning and monitoring of the activities, to levels that do not cause a substantial impairment of protected activities, features, or attributes of the Section 4(f) property. The Final EIS/EIR identified mitigation measures CON-42 through CON-46 to address potential vibration during construction. The surveys and installation of monitoring equipment are discussed above in the Temporary Occupancy section. Access to the BHHS campus would be maintained during construction and operation of the project.

The proximity of the proposed project would not substantially impair aesthetic features or attributes of a property protected by Section 4(f), where such features or attributes are considered important contributing elements to the historic value of the property. The construction staging site is located on commercial property and parking lots and would be separated from the school by a 20-foot high sound barrier. The nearest boundary of the construction staging site to a building (Building B) which contributes to the historic value of the BHHS historic property would be approximately 230 feet (refer to Section 2.3.2 of this Draft SEIS). The location of a proposed transportation facility (the tunnel and station) and construction staging areas would not obstruct or eliminate the primary views of an architecturally significant historical building or substantially detract from the setting of a Section 4(f) property. There is no direct view from the construction staging site or the Century City Constellation station of the historic buildings on the campus. There are intervening buildings, including the temporary classrooms and Buildings A and L of BHHS, between construction staging and the Century City Constellation Station and the historic buildings on the campus. The primary views of the architecturally significant buildings, particularly the Swim Gym and Buildings E and F, would be from Olympic Boulevard to the south and Spalding Drive to the east. Building H and Building E are proposed for demolition by the BHUSD as part of their Facilities Master Plan. Therefore, the construction staging area and the project would not affect the views or adversely affect the setting of the campus. Accordingly, the project would not result in a constructive use of the BHHS as a historic resource.

5.3.2 AAA Building Historic Property

Direct Use

The Project would travel in a tunnel constructed in a subsurface easement under the AAA Building. The top of the tunnels would be approximately 70 feet below the ground surface as it crosses under the building (Figure 5-17). The project would acquire and incorporate land from the AAA Building property for a construction staging area (Figure 2-12). The acquisition would allow Metro to ensure the protection and preservation of the AAA Building. During construction, Metro may use a portion of the building's interior space for a project office, which would not require modifications to the building. The building would be preserved and, once construction is complete, the AAA Building would be made available for other uses. No project features would remain at the surface within the AAA Building property.

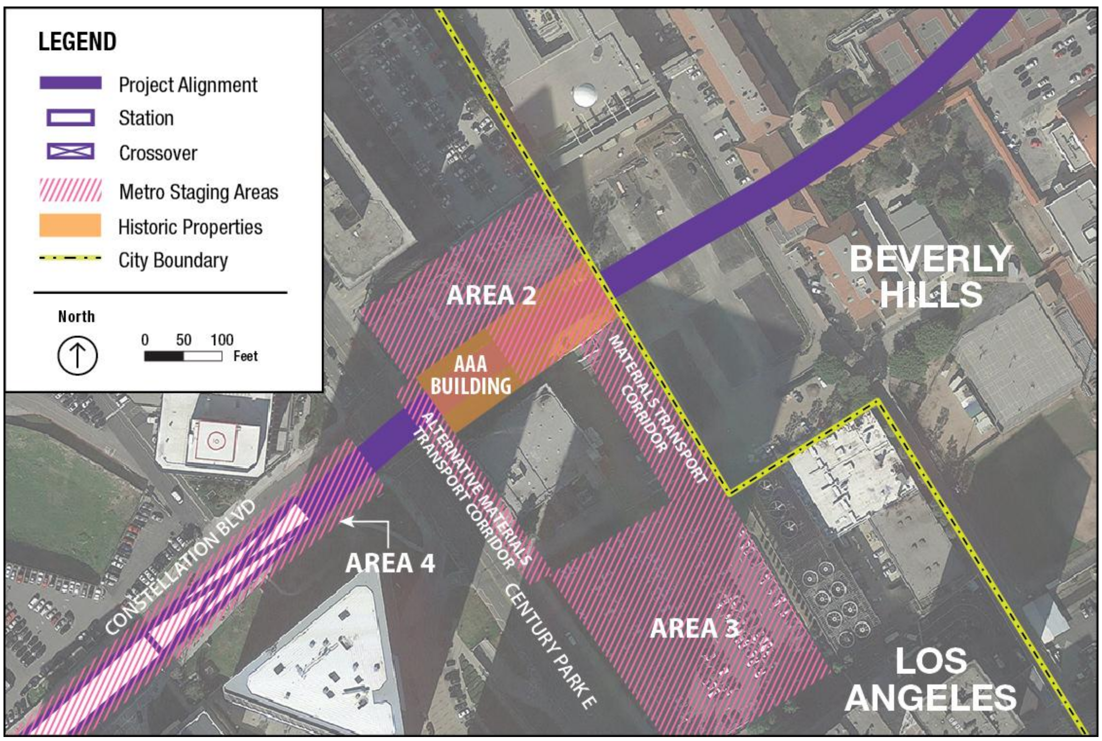


Figure 5-17. Project Features and Construction Staging Areas relative to the AAA Building

As documented in Sections 4.15.3 and 4.6.3 of the Final EIS/EIR (Metro 2012j), construction and operational vibration levels would be less than the levels that could potentially structurally damage fragile structures. As documented in Sections 4.3 and 4.5.5 of this Draft SEIS, with mitigation, the construction and operation of Section 2 of the Project would not increase explosion risk related to methane gas at the AAA Building and the risk of such an explosion would remain low. The Project would not affect the activities, features, or attributes of the building that qualify it for protection under Section 4(f).

In 2011, the FTA determined that the Locally Preferred Alternative would have no adverse effect under Section 106 on the AAA Building. In a letter dated December 8, 2011, the California SHPO concurred with the FTA's determination of eligibility and finding of effect for the project, including no adverse effect to the AAA Building.

The Project would use a portion of the property on which the AAA Building is located as a construction staging site, as described in Section 2.3.2 of this Draft SEIS. The level of detail about construction staging has increased since the Final EIS/EIR (Metro 2012j); therefore, FTA has reassessed project effects related to construction staging as described in Section 2.4.2 of this Draft SEIS. As detailed in Appendix K to the Final EIS/EIR (Metro 2012j), the parking garage, which is located to the east of the AAA Building and does not contribute to the eligibility of the property for the NRHP, would be demolished.

The FTA evaluated the project changes and determined that there would be no change to the Project finding of effect and again consulted with the California SHPO on the determination. FTA is in consultation with the California SHPO regarding this assessment. FTA has made a preliminary determination per 23 CFR Section 774.3(b) that the Project would have a *de minimis* impact on the AAA Building.

Temporary Occupancy

Because Metro is acquiring the AAA Building there would be no temporary occupancy.

Constructive Use

A constructive use occurs when the transportation project does not incorporate land from a Section 4(f) property, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired (23 CFR 774.15(a)). The Westside Purple Line Extension would incorporate land from the AAA Building property during construction. Therefore, by definition, the Westside Purple Line Extension cannot have a constructive use of the AAA Building. The temporary effects associated with construction, including impacts associated with the construction staging area on the AAA Building parcel (Figure 5-17), are included in the Section 4(f) evaluation above as it relates to the direct use of the AAA Building property.

5.3.3 Beverly Hills High School Recreational Facilities

Direct Use

This analysis considers the potential effects of construction and operation of the Westside Purple Line Extension on the future half-court soccer field and gymnasium building. The Project would include a tunnel under the BHHS campus (Figure 5-15). The tunnels would cross between 60 and 70 feet below existing tennis courts that are available for use by the public on some days. As described in Section 5.2.8, the tennis courts are being removed during a campus modernization project and will no longer be available to the public at the time of project construction. A new gymnasium building will be constructed in the location of the tennis courts. At the completion of the modernization project, a new half-field soccer field would be constructed above the subsurface easement in the area currently used for temporary classrooms (Figure 5-6). Replacement tennis courts would be constructed south of the tunnels.

The Project would not incorporate land located below the replacement tennis courts. The subsurface easement required for the tunnels under the future half-court soccer field and gymnasium building is considered a permanent incorporation of land.

Project construction for the Westside Purple Line Extension in the vicinity of BHHS is scheduled to begin in 2018 (refer to Section 2.5 of this Draft SEIS); at that time, no high school recreational facilities that are available to the public would exist above the tunnel construction. Based on the schedule for campus modernization, the half-court soccer field and new gymnasium building at BHHS would be constructed above the tunnels at some point during the Westside Purple Line Extension project construction (BHUSD 2014b). The Project would not impair the ability of BHUSD to develop any of their planned recreational facilities.

There would be no changes to the sports and recreational features, nor would the project elements be visible from sports fields since the project consists of tunnels located 60 to 70 feet below those facilities. The maximum operational ground-borne noise level was predicted at 33 dBA, and the maximum operational vibration level was predicted at 64 vibration decibels (VdB) for any location on the BHHS campus, which would be less than the FTA impact criteria for institutional land uses of 40 dBA and 75 VdB at the future half-court soccer field (Table 4-34 of the Final EIS/EIR [Metro 2012j]). Section 4.2 of this Draft SEIS provides analysis to confirm that with mitigation ground-borne noise and vibration levels inside the future gymnasium also would be below the criteria. Noise and vibration levels in the future parking garage are not a Section 4(f) consideration.

As detailed in Sections 4.3 and 4.5.5 of this Draft SEIS, construction and operation of the project would not alter methane gas movement within the ground and would not create new preferential pathways for gas within the ground below the recreational facilities. With mitigation identified in this Draft SEIS, there would not be an increase in methane exposure or explosion risk to users of BHHS recreational facilities as a result of the Westside Purple Line Extension.

The Project would not affect public access to or recreational use of the future BHHS sports and recreational facilities, which is the activity, feature, or attribute that qualifies the facilities for protection under Section 4(f) as a publicly owned recreational resource.

Based on this information, the FTA has made a preliminary determination per 23 CFR Section 774.3(b) that the use of the property, in the form of the subsurface easement under the BHHS campus, would have a *de minimis* impact on the Section 4(f)-protected public recreational use of the BHHS sports and recreational facilities.

Temporary Occupancy

No temporary occupancy of recreational facilities, including survey and monitoring activities, would occur when the facilities are open to the public. Project construction would not alter access by the public to any of the BHHS recreational facilities.

Constructive Use

A constructive use occurs when the transportation project does not incorporate land from a Section 4(f) property, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired [23 CFR 774.15(a)]. The Westside Purple Line Extension would construct a tunnel under BHHS, which, by the definition used in this analysis, would incorporate land from the Section 4(f) property. Therefore, since there would be a direct use by definition, the Westside Purple Line Extension would not have a constructive use of the BHHS recreational facilities. The proximity effects related to construction and operation of the tunnels beneath the school are included in the Section 4(f) evaluation above as it relates to the direct use of BHHS recreational facilities.

Even so, this analysis considers potential proximity effects from the construction staging site on Century Park East (Figure 5-16). The nearest boundary of the construction staging site would be approximately 250 feet from the nearest existing recreational facility on the BHHS campus. Temporary classroom buildings are located adjacent to the construction staging site on the former lacrosse practice fields. Based on the construction schedule for campus modernization, the temporary classroom buildings are anticipated to be needed until 2020. Afterwards, a half-court soccer field will be installed. When the half-court soccer field opens, it will be adjacent to the northern construction staging site on Century Park East. As detailed in Sections 2.4 and 2.5 of this Draft SEIS, activity at the construction staging sites would be greatest during the first three years of construction (2018 through 2020), while tunnel construction is occurring. Because tunnel construction activity would generally occur 24-hours a day for six days per week, with hauling of materials occurring during non-peak traffic periods, this analysis considers non-school time periods when the BHHS recreational facilities would be in use by the public.

As discussed in Section 4.5.3 of this Draft SEIS, mitigation would be incorporated to ensure that construction-phase air pollutant concentrations would be less than both the National Ambient Air Quality Standards and California Ambient Air Quality Standards for construction-related pollutants at all BHHS recreational facilities at times when they would be open to the public. As discussed in Section 4.5.4 of this Draft SEIS, mitigation measures would be incorporated so that construction-phase noise levels would not exceed City of Beverly Hills construction noise level limits and the noise level increase would not interfere with the public use and enjoyment of the recreational facilities.

The proximity of the proposed project would not substantially impair aesthetic features or attributes of a property protected by Section 4(f), where such features or attributes are considered important contributing elements to the value of the property. The construction staging site is located on commercial property and parking lots and would be separated from the school by a 20 foot high sound barrier. Construction activities would be visually shielded from public recreational activities at BHHS.

Activities occurring on the construction staging site would not restrict public access to or recreational use of existing or future BHHS sports and recreational facilities.

As documented in Section 4.5.4 of this Draft SEIS, vibration peak particle velocity would be less than 0.07 inch/second at a distance of 100 feet from anticipated construction equipment, while the nearest public recreational use would be approximately 250 feet from the staging site. The vibration impact from construction of the project would not substantially impair a Section 4(f) property, because the projected vibration levels are low and would not be perceptible. Access to the BHHS campus would be maintained during construction and operation of the project.

The activities at the construction staging sites, after mitigation, would not have a significant adverse effect on air quality, noise, aesthetics, access, or vibration at the BHHS existing or future recreational facilities to the extent that they would substantially interfere with the public recreational use of the facilities (Figure 5-16).

5.3.4 All Possible Planning to Minimize Harm

Although a discussion of all possible planning to minimize harm is not required where a *de minimis* impact determination is made per 23 CFR 774.3(b) and 23 CFR 774.17, this analysis acknowledges that the Project is designed to avoid permanent harm to all Section 4(f) properties in the west Beverly Hills and Century City area. The consideration and implementation of avoidance or mitigation measures reflect all possible planning to minimize harm to Section 4(f) properties. Additional information about the planning and alternative consideration process is included in Section 2.3 of the Final EIS/EIR (Metro 2012j) and Section 2.3 of this Draft SEIS.

To avoid harm to historic resources and recreational facilities, the Project was designed to operate within tunnels, with no project features at the surface within any of the Section 4(f) properties in the west Beverly Hills and Century City area. Between 2007 and 2009, Metro conducted an Alternatives Analysis Study that evaluated multiple modes, both above and below ground, to serve the corridor. At-grade and elevated alignments would have greater adverse effects on properties crossed than a tunnel alignment. With the implementation of the avoidance and mitigation measures described in Chapter 4 of this Draft SEIS and as previously discussed in the Final EIS/EIR, the Project would not result in adverse air quality impacts to public recreational-facility users, ground-borne noise or vibration levels that exceed the FTA impact criteria, nor result in significant ground settlement at any of the Section 4(f) properties during construction or operation of the project. Construction and operation of the Project would not alter methane gas movement below the Section 4(f) properties and would not pose risks to human health or property.

Vibration monitoring would be conducted on historic properties during construction to ensure that damage criteria are not exceeded. As discussed in Section 4.4 of this Draft SEIS, the project includes measures to reduce construction effects to the AAA Building to less than adverse effect. The project includes a 20-foot sound barrier around the construction staging site on Century Park East to minimize noise and visual effects during construction. The barrier would also prevent BHHS students and other individuals from entering the active construction site. Material delivery hours would be scheduled to minimize congestion to surrounding roadways. Metro will require construction equipment to meet stringent emission standards through contract requirements to reduce air pollutant concentrations near the construction staging sites.

To minimize the duration of construction activities, the tunneling equipment is generally operated 24-hours a day for six days per week. Tunnel spoils would be constantly transported by conveyor to Staging Area 3 at 2040 Century Park East (Figure 2-10). As described in the

Final EIS/EIR in Mitigation Measure TCON-2, haul trucks would use designated routes that minimize noise, vibration, and other possible impacts to adjacent businesses, schools, major commercial developments, and residential neighborhoods. Hauling would not be allowed during peak traffic hours and special events, and hauling would be dispatched in a manner to avoid platooning. Because tunnel spoils would accumulate constantly, truck hauling would occur daily.

As described in Section 2.4.2 of this Draft SEIS, the Project would require an approximately 3-acre staging and laydown area to launch the tunneling machines and support the tunneling operations near the Century City Constellation Station.

Both BHUSD and the City of Beverly Hills have expressed concerns with the proximity of the tunnel access shaft to recreational uses on the BHHS campus; therefore, alternative construction approaches that would relocate the tunnel construction access location were considered to determine if they would reduce impacts of the Project. Staging areas 3 and 5 are located too far from the tunnel alignment to be used for access shafts (Figure 2- 8). Staging area 5 also is too small to support an access shaft and is adjacent to high-rise residential uses, which are too tall to be protected with a 20-foot sound barrier. Constructing an access shaft from above the station box within Constellation Boulevard or launching the tunnel boring machine from the Wilshire/La Cienega Station would be alternative construction approaches and are evaluated below.

Access Shaft on Constellation/Century Park East

Access to the tunnels and construction of the Project could be supported from above the station box within Constellation Boulevard (Figure 5-18). This location would require long-term (between 2.5 and 3.5 years) closure of Constellation Boulevard and Century Park East and would delay station completion because the eastern end of the station box would be used to move materials into and out of the tunnels. Pedestrian access also would be disrupted, requiring all pedestrians wishing to use Century Park East to detour around the construction area using Avenue of the Stars. The required roadway closures would be dependent on approvals from the Los Angeles Department of Transportation. Garage access would be maintained to surrounding buildings; however, access to garage entrances on Constellation Boulevard east of Avenue of the Stars would be limited to traffic entering from and exiting to Avenue of the Stars. Century Park East would be closed to through traffic requiring traffic to make U turns when reaching the construction site closures. An overhead conveyor spanning Century Park East and the driveway entrance to the AT&T building would be required to connect the access shaft with Staging Area 3.

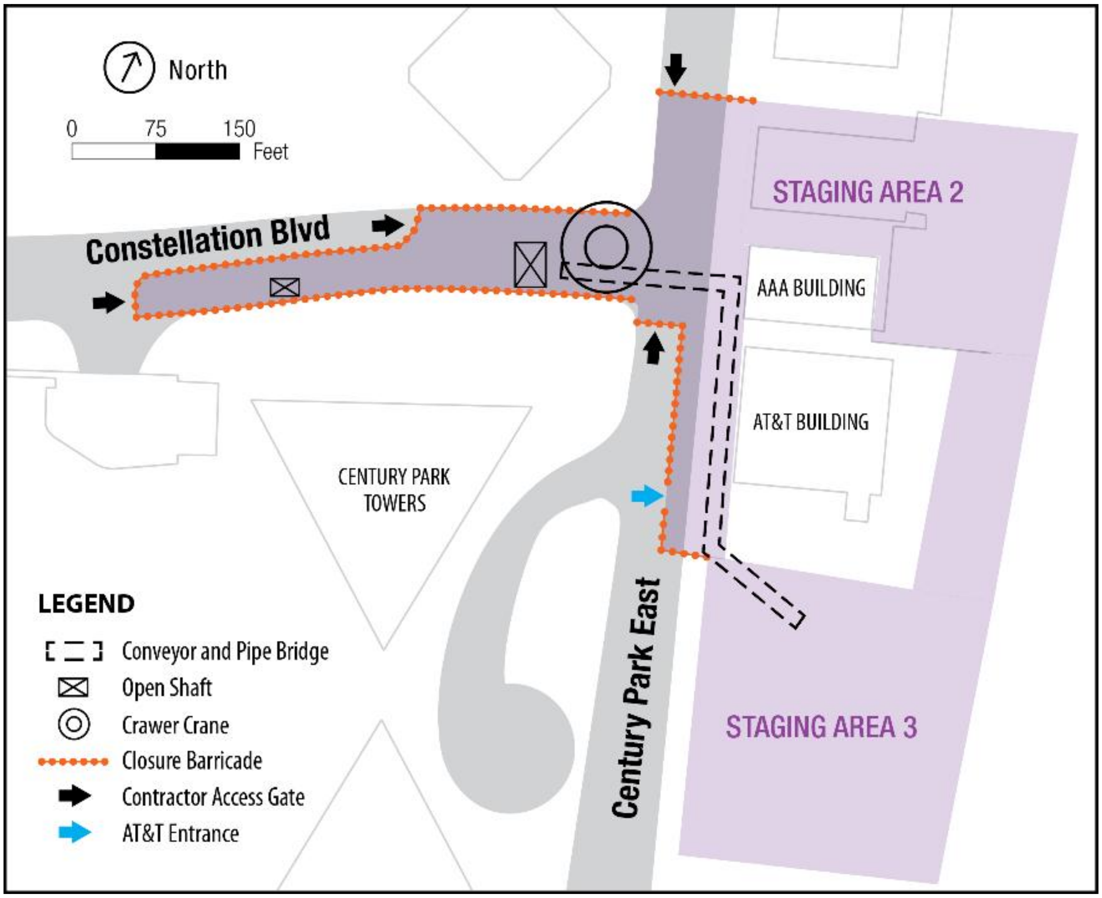


Figure 5-18. Alternative Construction Staging Area for the Project within Constellation Boulevard

Relocating the access shaft would require closure of Constellation Boulevard and Century Park East to traffic and pedestrians for between 2.5 and 3.5 years compared to an approximately 9-month closure of only Constellation Boulevard for the Project (Table 5-3). During the period of roadway closures, traffic using Constellation Boulevard and Century Park East would be detoured to other local streets, increasing roadway and intersection congestion. In addition, local building access would be maintained but re-rerouted to open streets, resulting in longer travel distances for residential and business access and further increasing traffic volume of the streets and intersections that remain open. This option would decrease construction costs relative to the Project (Table 5-4).

Table 5-3. Comparison of Construction Approach Effects

Alternative	Traffic Closures	Pedestrian Access	Displacements
The Project	Partial closures of Constellation Boulevard for utility relocations and for installing soldier piles; approximately 9-month full closure of Constellation Boulevard for tunneling machine launch and installing and removing street decking	Temporary short-term sidewalk closures with detour to the other side of the street	3 commercial properties: 1940 Century Park East, 1950 Century Park East, and 2040 Century Park East
Access Shaft on Constellation/ Century Park East	Partial closures of Constellation Boulevard for utility relocations and for installing soldier piles; approximately 40-month full closure of Constellation Boulevard for tunneling machine launch, support of tunneling, and installing and removing street decking; approximately 30 month closure of Century Park East for support of tunneling	Approximately 30 month closure of all pedestrian access along Century Park East	3 commercial properties: 1940 Century Park East, 1950 Century Park East, and 2040 Century Park East
TBM Launch Site at La Cienega	Partial closures of Wilshire Boulevard for utility relocations and for installing soldier piles; weekend full closures of Wilshire Boulevard installation and removal of street decking	Temporary short-term sidewalk closures with detour to the other side of the street	Acquisition and displacement of 9 commercial properties, 10 single-family residences, and a recently constructed multifamily residential property

Table 5-4. Comparison of Costs

Alternative	Capital Cost[1]	Difference from the Project
The Project	$2,411	N/A
Access Shaft on Constellation/Century Park East	$2,387	-$23 (-1%)
TBM Launch Site at La Cienega	$2,564	$153 (6.3%)

[1]Values are in millions (year of expenditure dollars)

Tunnel Boring Machine Launch Site at Wilshire/La Cienega

As described in Section 2.4.2 of this Draft SEIS, the Project would launch the tunneling machines and support the tunneling operations from the construction staging and laydown areas identified in Century City and would tunnel toward the Wilshire/La Cienega Station. An alternative construction approach would be to tunnel from the Wilshire/La Cienega Station to the west.

Tunneling west from the Wilshire/La Cienega Station was not considered in the Final EIS/EIR because sufficient available land is not available in the vicinity of the station to support the tunneling operation. Approximately 3 acres is required to support tunneling operations. To tunnel west from the Wilshire/La Cienega Station, a launch site would be needed that can connect directly to the tailtracks that are west of the station box to continue the tunnels. The launch site must connect directly to the tunnels, either through a side shaft or through a shaft directly above the tunnels. The least-developed option for a staging site that meets the requirements for size and adjacency would be to acquire two blocks on the south side of Wilshire Boulevard between S. Stanley Drive and S. Willaman Drive (Figure 5-19). This construction approach would require demolition of several buildings, resulting in commercial and residential displacements, to assemble sufficient space for construction staging and tunneling support.

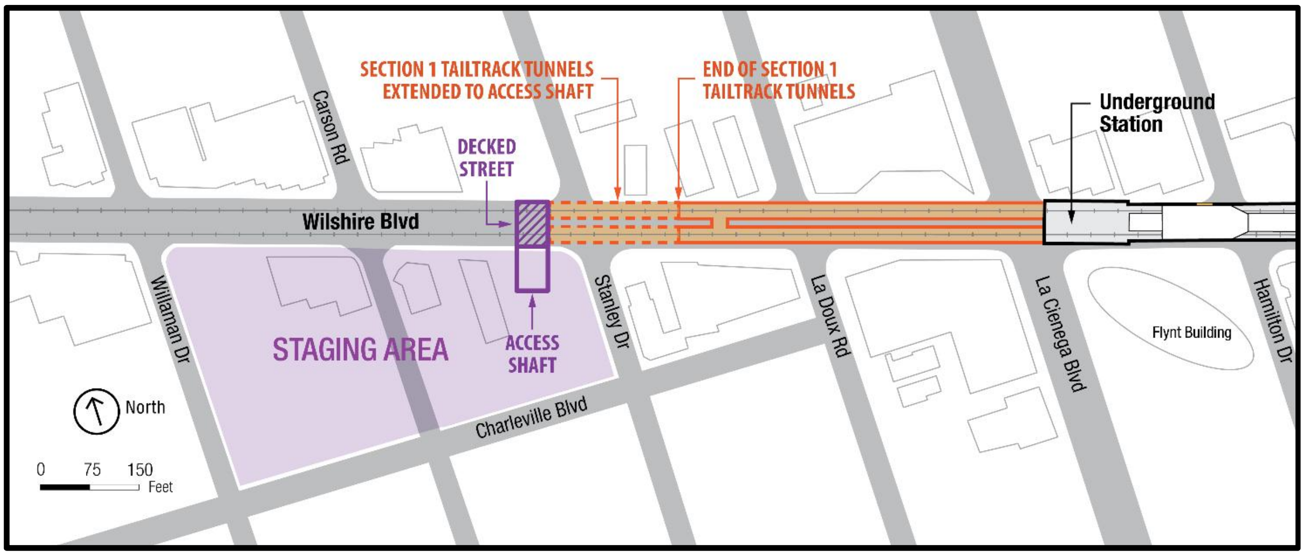


Figure 5-19. Construction Staging Area Required to Launch the Tunnel Boring Machine from Wilshire/La Cienega

Tunneling to the west from the Wilshire/La Cienega Station would require approximately 3 acres for staging adjacent to the launch and access site. The necessary staging area could be provided in the two blocks on the south side of Wilshire Boulevard between S. Stanley Drive and S. Willaman Drive (Figure 5-19). This area is currently a mixture of low-rise commercial and residential uses. The acquisition would displace 9 office and retail properties and 10 single-family residences (Table 5-3). Additionally, a multifamily residential development has been recently completed at the corner of Wilshire Boulevard and S. Stanley Drive. This option would substantially increase construction costs relative to the Project (Table 5-4).

Summary of Construction Approach Analysis

The two alternative construction approaches would have substantial construction-phase impacts on resources not protected by Section 4(f). Compared to the Project, relocation of the access shaft to Constellation Boulevard and Century Park East would require an additional two to three years of complete closure of those roadways. The approach to launch the TBM from the Wilshire/La Cienega Station area would displace 9 commercial properties and 10 single-family residences compared to 3 commercial properties for the Project. The alternative approaches would not minimize harm caused by the Project, as there is no remaining harm after mitigation for the proposed construction staging site at 1950 Century Park East.

5.4 Avoidance Alternatives

A feasible and prudent avoidance alternative is defined in 23 CFR 774 as an alternative that avoids using Section 4(f) property and does not cause other severe problems of a magnitude that substantially outweighs the importance of protecting Section 4(f) properties (refer to Section 5.1.2 of this Draft SEIS/4(f)).

While the consideration of avoidance alternatives is not required for a project with *de minimis* impacts (23 CFR 774.3), this Section 4(f) analysis evaluates alternatives that would avoid Section 4(f) properties in west Beverly Hills and Century City (Figure 5-20) to address direction in the Final Decision, to provide the public with information, and to address concerns from the City of Beverly Hills and the BHUSD.

This section evaluates the feasibility and prudence of the identified avoidance alternatives (Table 5-5). This Section 4(f) evaluation considers a representative range of alternatives that encompasses the alternatives that have been previously identified to serve Century City, including alternative alignments identified after issuance of the ROD, that could reduce adverse effects in west Beverly Hills and Century City. Between 2007 and 2009, Metro conducted an Alternatives Analysis Study that evaluated multiple modes, both above and below ground, to serve the corridor. At-grade and elevated alignments would have greater adverse effects on properties crossed than a tunnel alignment and would not provide an avoidance alternative to tunneling under Section 4(f) properties.

The evaluation of feasibility and prudence is applicable when considering a Section 4(f) avoidance alternative. An alternative is not feasible if it cannot be built as a matter of sound engineering judgment. An alternative is not prudent if:

- It compromises the project to a degree that it is unreasonable to proceed with the project in light of its stated purpose and need;
- It results in unacceptable safety or operational problems;

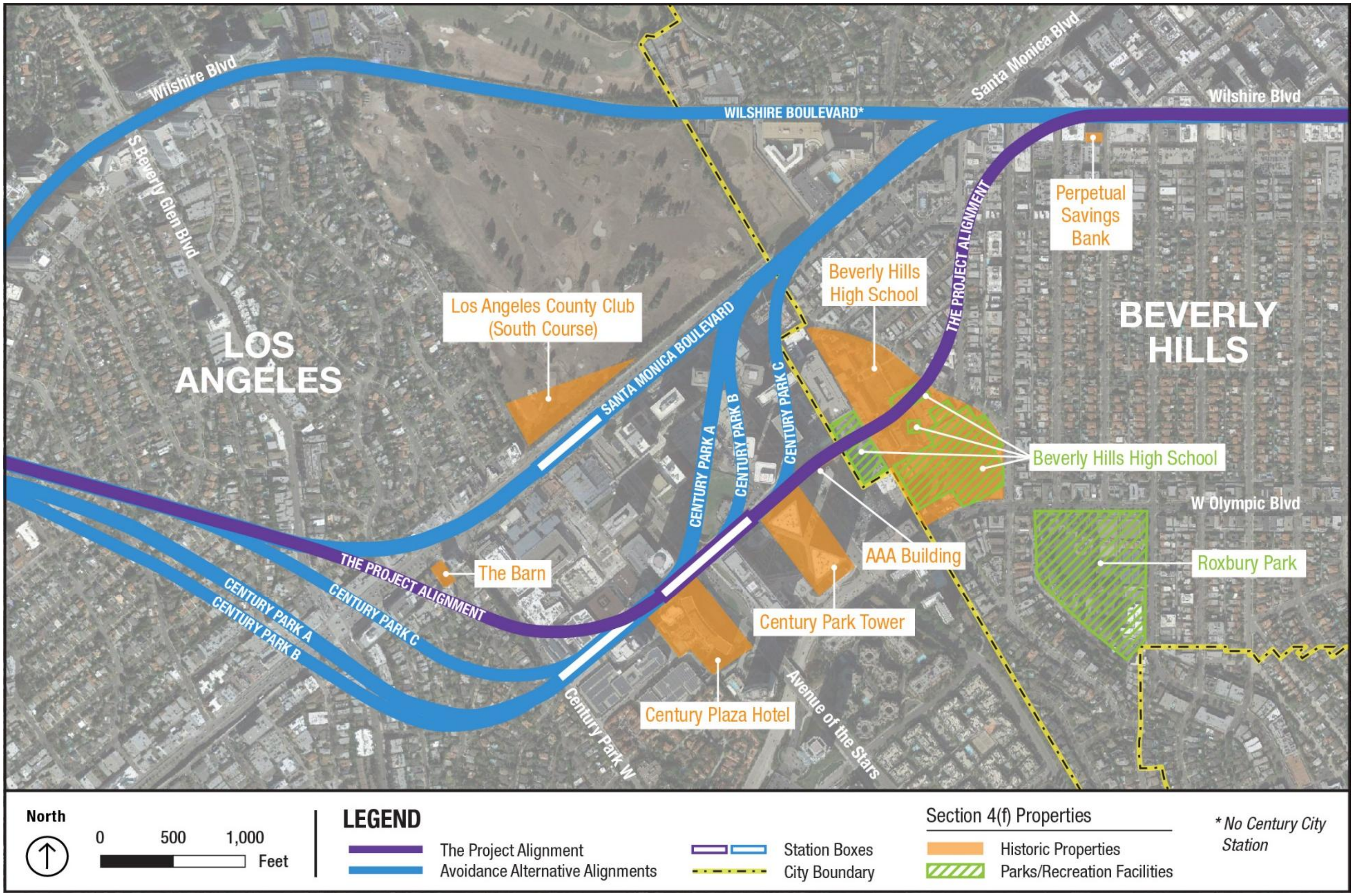


Figure 5-20. Avoidance Alternatives

Table 5-5. Summary Comparison of Avoidance Alternatives

Alternative	Feasibility	Meets the Purpose and Need	Safety and Operational Considerations	Social, Economic, Environmental, and Community Impacts	Costs of an Extraordinary Magnitude	Unique Problems or Unusual Factors	Cumulative Consideration of Factors
Wilshire Boulevard (No Century City Station)	Feasible	Would not meet purpose and need due to loss of 12% of system boardings and reduced transit access to 49,970 jobs in Century City relative to the Project	None	Acquisition of 16 commercial parcels to complete construction resulting in the loss of approximately 46 jobs; reduction of reliable transit access to jobs for low-income transit users; less substantial air quality and energy improvements relative to the Project	$739 million less than the Project to construct	None	Not prudent because of failure to address purpose and need and social, economic, environmental, and community impacts
Santa Monica Boulevard	Not feasible. High risk of fault rupture would preclude this station being built as a matter of sound engineering judgement	Less effective than Project due to loss of 7% of system boardings relative to the Project	High risk of catastrophic earthquake failure of Century City Santa Monica Station	Acquisition of 16 commercial parcels to complete construction resulting in the loss of approximately 46 jobs	$21 million less than the Project to construct	Risk of catastrophic earthquake failure of Century City Santa Monica Station	Not prudent because of high risk of catastrophic station failure in an earthquake, reduced ridership, and increased number of displacements
Century Park A	Not feasible to construct if development of 1950 Avenue of the Stars precedes Project construction as a matter of sound engineering judgement	Less effective than Project due to 580 person-hours of daily travel time increase relative to the Project	Substantial risks associated with tunneling under existing high-rise buildings; reduced operating speed; increased long-term operational costs relative to the Project	Acquisition of 18 commercial parcels to complete construction resulting in the loss of approximately 46 jobs; additional construction-phase traffic impacts relative to the Project	Greater than $239 million more than the Project to construct	Risk of liability for delay if 1950 Avenue of the Stars is delayed until crossover is constructed.	Not prudent because of project timing, increased travel time, increased building damage risk, increased displacements, delayed schedule, and an extraordinary cost increase

Alternative	Feasibility	Meets the Purpose and Need	Safety and Operational Considerations	Social, Economic, Environmental, and Community Impacts	Costs of an Extraordinary Magnitude	Unique Problems or Unusual Factors	Cumulative Consideration of Factors
Century Park B	Feasible	Less effective than Project due to 600 person-hours of daily travel time increase relative to the Project	Substantial risks associated with tunneling under existing high-rise buildings; reduced operating speed; increased long-term operational costs relative to the Project	Acquisition of 17 commercial parcels to complete construction resulting in the loss of approximately 46 jobs; additional construction-phase traffic impacts relative to the Project	$119 million more than the Project to construct	Substantial risks associated with the construction of 1950 Avenue of the Stars	Not prudent because of increased travel time, increased building damage risk, increased displacements, increased costs, and delayed schedule
Century Park C	Feasible	Less effective than Project due to 680 person-hours of daily travel time increase relative to the Project	Substantial risks associated with tunneling under existing high-rise buildings and the Stone-Hollywood trunk water line; reduced operating speed; increased long-term operational costs relative to the Project	Acquisition of 6 commercial parcels to complete construction resulting in the loss of approximately 15 jobs; increase in construction-phase traffic impacts relative to the Project	$105 million more than the Project to construct	Public and worker safety risk associated with potential rupture or damage to the Stone – Hollywood trunk water line	Not prudent because of increased travel time, increased building damage risk, increased costs, delayed schedule, and increased construction-phase traffic impacts

- After reasonable mitigation, it still causes:
  - Severe social, economic, or environmental impacts;
  - Severe disruption to established communities;
  - Severe disproportionate impacts to minority or low-income populations; or
  - Severe impacts to environmental resources protected under other Federal statutes;
- It results in additional construction, maintenance, or operational costs of an extraordinary magnitude;
- It causes other unique problems or unusual factors; or
- It involves multiple factors in [the list above], that while individually minor, cumulatively cause unique problems or impacts of extraordinary magnitude.

The first test for prudence is whether an alternative would compromise the project to a degree that it is unreasonable to proceed with the project in light of its stated purpose and need. The project's purpose is as follows (refer to Section 2.2 of this Draft SEIS):

- Improve Study Area mobility and travel reliability
- Improve transit services within the Study Area
- Improve access to major activity and employment centers in the Study Area
- Improve opportunities for transit-supporting land use policies and conditions
- Improve transportation equity
- Provide a fast, reliable, and environmentally sound transit alternative
- Meet Regional Transit Objectives through the Southern California Association of Governments' performance indicators of mobility, accessibility, reliability, and safety.

This section considers tunnel alternatives that would not use land from any Section 4(f) resources, and Section 5.5 evaluates a range of tunnel alternatives that would use land from one or more Section 4(f) properties to consider which of those alternatives would cause the least overall harm. For all of the alternatives considered in either Section 5.4 or Section 5.5, no project features would be at the surface within the boundaries of any Section 4(f) property.

5.4.1 Wilshire Boulevard (No Century City Station)

Description of Alternative

Eliminating the station in Century City would allow for a more direct path between the Wilshire/Rodeo and Westwood/UCLA Stations. The most direct alignment would be to follow Wilshire Boulevard (Figure 5-21). Because of the over 2-mile length of the tunnels between the Wilshire/Rodeo and Westwood/UCLA Stations, a ventilation shaft would be required for this alternative and would be provided in the vicinity of the Wilshire Boulevard and Santa Monica Boulevard intersection.

Figure 5-21. Wilshire Boulevard Alternative (No Century City Station)

As described in Section 2.4.2 of this Draft SEIS, a construction staging site of approximately 3 acres is required to launch the tunnel boring machine to the east, support tunnel boring, and receive the tunnel boring machine approaching from the west. The construction staging area must be along the alignment so that it can connect directly to the tunnels under construction. The only identified location between the Wilshire/Rodeo and Westwood/UCLA Stations that is accessible to the tunnel alignment and would provide the needed space is the developed area between North Santa Monica Boulevard and South Santa Monica Boulevard south and west of Wilshire Boulevard, extending to South Moreno Drive (Figure 5-22).

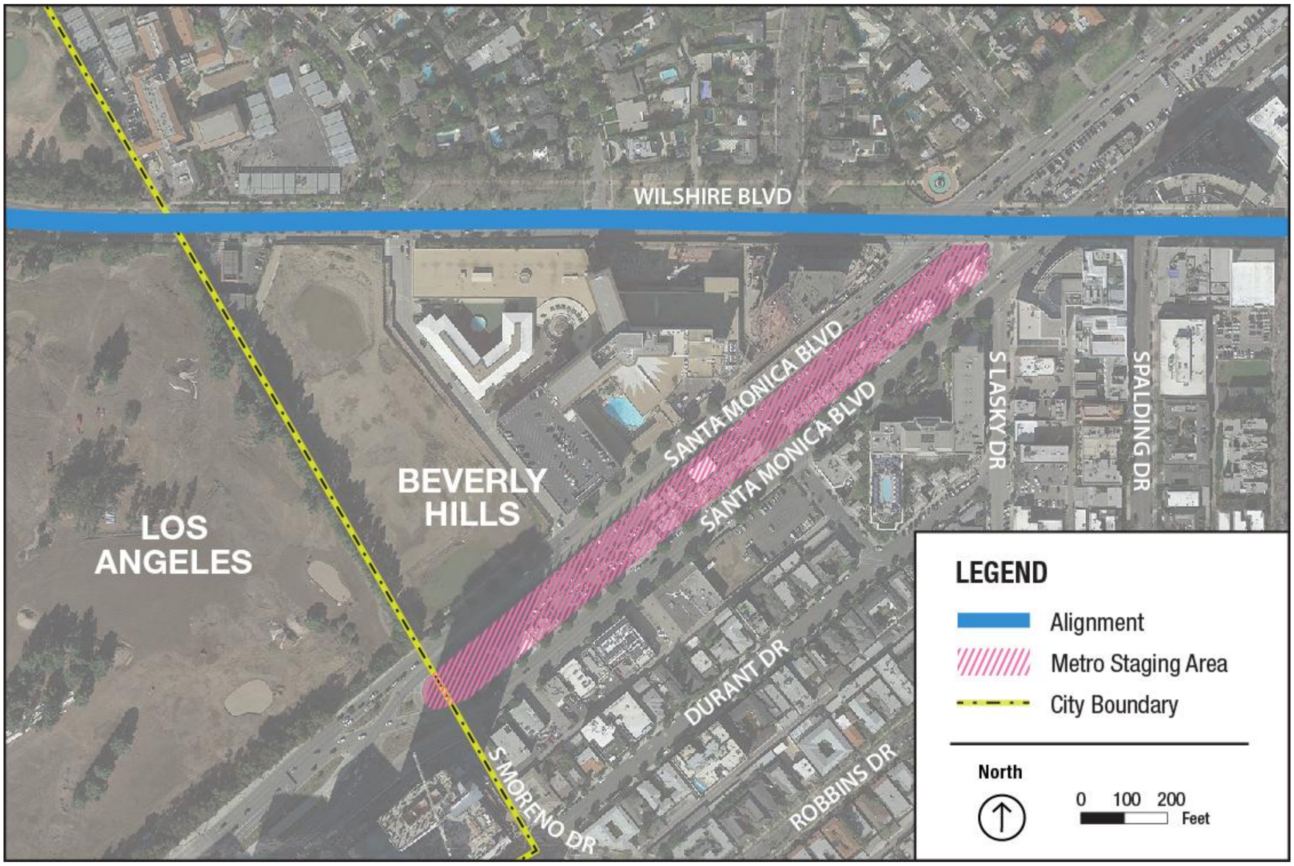


Figure 5-22. Construction Staging Areas Required for Wilshire Boulevard Alternative (No Century City Station)

Evaluation of Feasibility

An alternative is not feasible if it cannot be built as a matter of sound engineering judgment. The Wilshire Boulevard Alternative would be feasible to construct.

Evaluation of Prudence

Effectiveness at Meeting Purpose and Need

Century City is a designated urban center in the Los Angeles General Plan. Currently, there are 31,040 jobs and 2,010 residents located within one-half mile of the Century City Constellation Station location, which is projected to grow to 49,970 jobs and 8,010 residents over the planning horizon (Table 2-1). This is the highest concentration of jobs at any station for the Project. Serving Century City is a key element in meeting the Project's purpose to improve access to major activity and employment centers in the Study Area. Under the Project, the Century City Constellation Station would serve 8,566 (17 percent) of the projected 49,340 daily boardings for the completed Project (Table 5-6). This is the second-highest station volume of any station for the Project (Table 3-5 of the Final EIS/EIR [Metro 2012j]).

Table 5-6. Comparison of Operating Factors

Alternative	Century City Constellation Daily Station Boardings	Daily System Boardings for the Westside Purple Line	Distance between Wilshire/Rodeo and Westwood/UCLA Stations	Average Operating Speed between Wilshire/Rodeo and Westwood/UCLA Stations	Travel Time between Wilshire/Rodeo and Westwood/UCLA Stations (min:sec)
The Project	8,566	49,340	16,390 feet	43 mph	5:14
Wilshire Boulevard (No Century City Station)	0	43,390	14,622 feet	43 mph	3:54
Santa Monica Boulevard	5,492	45,989	15,570 feet	45 mph	4:56
Century Park A	8,394	48,650	17,160 feet	40 mph	5:51
Century Park B	8,394	48,650	17,320 feet	40 mph	5:52
Century Park C	8,390	48,630	17,120 feet	39 mph	5:57

Under the Wilshire Boulevard Alternative, through trips between the Wilshire/Rodeo and Westwood/UCLA Stations would be shorter and have a faster travel time by roughly one minute and fifteen seconds. However, there would be a loss of trips to and from the Century City Constellation Station and reduced connectivity to major activity and employment centers. Travel forecasting results indicate that by eliminating the Century City Constellation Station, the daily boardings for the completed Project would decrease by 5,850 (12 percent) to 43,490 daily boardings. Eliminating the Century City Constellation Station would be detrimental to meeting the elements of the Project's purpose to improve mobility, connectivity and access to major activity and employment centers, and transit services within the Study Area.

As shown in Table 4-5 of the Final EIS/EIR (Metro 2012j), 15 percent of the population lives below the poverty level in Los Angeles County. While the Century City Constellation Station area does not have a high concentration of low-income or minority populations in residence, the makeup of workers who use transit to get to their jobs in Century City is very different. According to a forecasting analysis for FTA New Starts reporting, 37 percent of trips from home to work that alight at the Century City Constellation Station would be taken by low-income riders (Metro 2016j). Eliminating the Century City Constellation Station would affect low-income transit users and reduce their ability to access jobs and would be contrary to the Project's purpose to improve transportation equity.

In eliminating the Century City Constellation Station, the Wilshire Boulevard Alternative would fail to meet key elements of its purpose and need. Because the Wilshire Boulevard Alternative would fail to meet purpose and need, it would not be a prudent alternative to the Project.

Safety and Operational Considerations

The Wilshire Boulevard Alternative would not have substantial safety and operational concerns.

Social, Economic, Environmental, and Community Impacts

Because the Wilshire Boulevard Alternative would operate in a tunnel, it would not physically divide the community, affect community character or cohesion, or require displacements of residential or commercial property along the Wilshire Boulevard Alignment. Elimination of the Century City Station would not offer the benefits on regional air quality and energy consumption relative to the Project because it has less connectivity to major employment and activity centers, which would result in lower ridership and less incentive for the travelling public to shift from automobile trips to transit. It would also have a social, economic, and community effect of eliminating reliable transportation to jobs. As described above, low-income riders, who account for 37 percent of trips from home to work that are forecast to alight at the Century City Station, would lose reliable transit service between home and work. Low-income and minority workers would not benefit from the improved transit service and connections that are offered by the Project.

The construction-phase impacts of the alternatives also would differ substantially. The only identified location adjacent to the tunnel alignment that would provide the needed space to support tunnel boring is the developed area between North Santa Monica Boulevard and South Santa Monica Boulevard south and west of Wilshire Boulevard extending to South Moreno Drive. This area currently contains a series of low-rise commercial buildings and parking lots that includes 16 developed commercial properties (Figure 5-22). An access shaft over the tunnel alignment would be constructed on Wilshire Boulevard, connecting to the construction staging area. The tunnel boring machine would excavate east from this location. The shaft would also serve as a receiving shaft for the Section 3 tunnel boring machines connecting from the west. The construction staging would substantially increase the number of business displacements in Century City and west Beverly Hills relative to the Project and jobs would be lost for businesses that cannot relocate within the area (Table 5-7). Specific property details are provided in Appendix C of the Final EIS/EIR under the Century City Santa Monica Station Scenario "A" (Metro 2012j).

Table 5-7. West Beverly Hills and Century City Acquisitions to Support Construction

Alternative	Property Acquisitions	Displacements
The Project	6 parcels	2 public parking lots and 6 individual businesses, and a loss of approximately 15 jobs
Wilshire Boulevard (No Century City Station)	16 parcels	5 vacant or surface parking, 2 multi-tenant office buildings, 32 individual businesses, and a loss of loss of approximately 46 jobs
Santa Monica Boulevard	16 parcels	5 vacant or surface parking, 2 multi-tenant office buildings, 32 individual businesses, and a loss of approximately 46 jobs
Century Park A	18 parcels	7 vacant or surface parking, 2 multi-tenant office buildings, 32 individual businesses, and a loss of approximately 46 jobs
Century Park B	17 parcels	6 vacant or surface parking, 2 multi-tenant office buildings, 32 individual businesses, and a loss of approximately 46 jobs
Century Park C	6 parcels	2 public parking lots and 6 individual businesses, and a loss of approximately 15 jobs

Costs of an Extraordinary Magnitude

Due to the elimination of a station, the Wilshire Boulevard Alternative would have lower capital cost than the Project (Table 5-8). However, this cost estimate includes capital costs only and does not include increased indirect costs resulting from procurement delay, schedule delays, contractor fees, or escalation and increased finance charges.

Table 5-8. Comparison of Capital Costs of Avoidance Alternatives

Alternative	Capital Cost[1]	Difference from the Project[1]
Section 2 of the Project	$2,411	N/A
Wilshire Boulevard (No Century City Station)	$1,671	-$739 (-31%)
Santa Monica Boulevard	$2,390	-$21 (-1%)
Century Park A	$2,650	$239 (10%)
Century Park B	$2,530	$119 (5%)
Century Park C	$2,516	$105 (4%)

[1]Values are in millions (year of expenditure dollars)

Unique Problems or Unusual Factors

The Wilshire Boulevard Alternative would not have unique problems or factors that would make it not prudent.

Cumulative Consideration of Factors

The Wilshire Boulevard Alternative fails to meet key elements of the Project's purpose and need. It would have less benefit in regards to improving regional air quality and reducing energy consumption, as well as fewer social, economic, and community benefits of connectivity to jobs for low-income populations. The cumulative consideration of these factors would make the Wilshire Boulevard Alternative not prudent. Since the alternative is not prudent, it was not carried forward for further consideration.

5.4.2 Santa Monica Boulevard

Description of Alternative

The Draft EIS/EIR considered a tunnel under Santa Monica Boulevard through west Beverly Hills and Century City with a station in Century City under Santa Monica Boulevard where it crosses Avenue of the Stars (Figure 5-23). The alternative was described in Section 2.4 of the Draft EIS/EIR (Metro 2010c).

As identified in Section 2.6.4 of the Final EIS/EIR (Metro 2012j), the developed area between North Santa Monica Boulevard and South Santa Monica Boulevard south and west of Wilshire Boulevard, extending to South Moreno Drive would be required for construction staging (Figure 5-24).

Figure 5-23. Santa Monica Boulevard Alternative

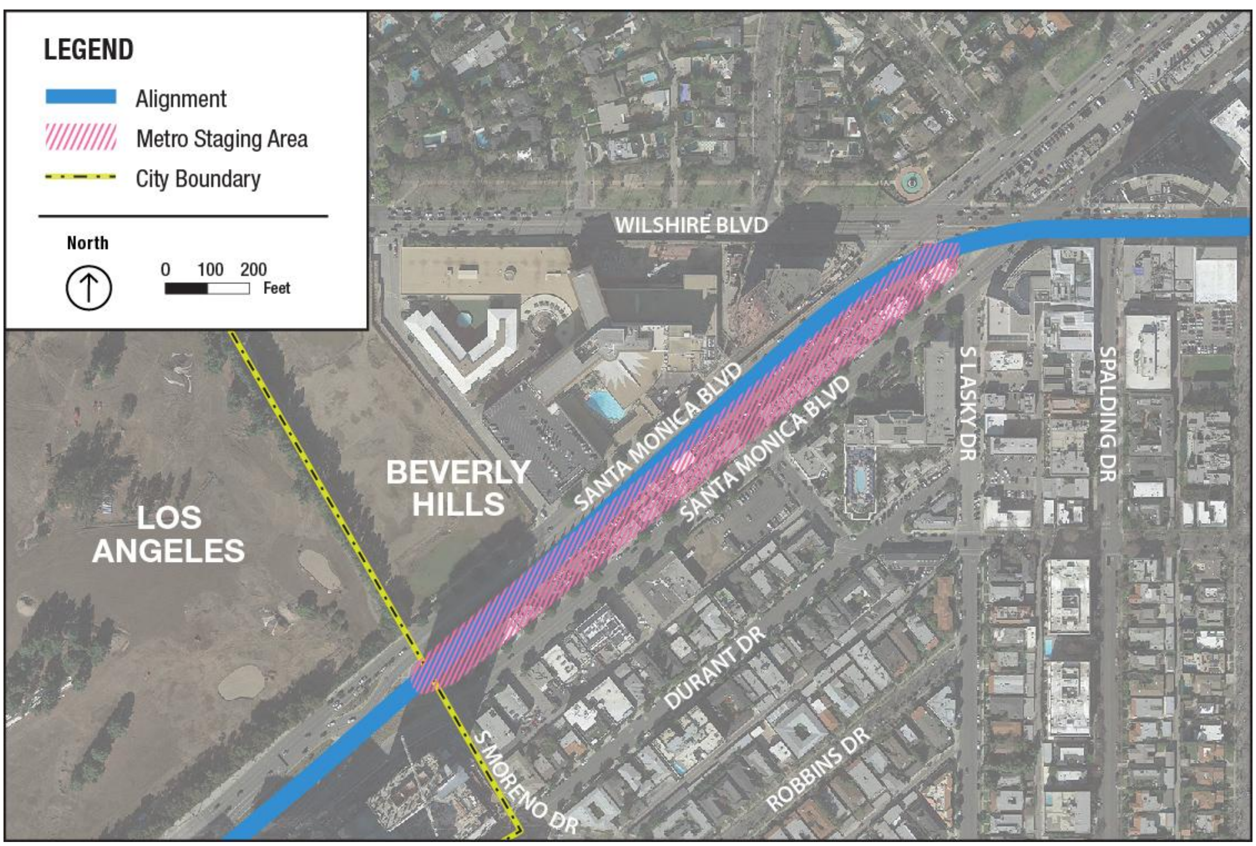


Figure 5-24. Construction Staging Areas Required for Santa Monica Boulevard Alternative

Evaluation of Feasibility

An alternative is not feasible if it cannot be built as a matter of sound engineering judgment. As described in both the Draft and Final EIS/EIR and detailed further in Section 4.3 of this Draft SEIS, the Santa Monica fault zone is characterized by numerous fault strands in the vicinity of Santa Monica Boulevard, which could pose a surface fault rupture hazard for a station on Santa Monica Boulevard. A fault rupture would cause extensive damage to both the Santa Monica Boulevard Station because there are no known engineering methods available to construct a subway station that could withstand the rupture without collapse. The subway station is a structure subject to nearly continuous human occupancy and therefore would represent a high risk to public safety in the event of collapse of the station. The tunnels can be designed to accommodate the fault rupture without collapse and potential damage is repairable. No feasible mitigation has been identified for the substantial risk of fault rupture at the Century City Santa Monica Station. Sound engineering judgment precludes construction of the station at this location.

Evaluation of Prudence

Effectiveness at Meeting Purpose and Need

One element of the Project's purpose and need is to improve access to major activity and employment centers in the Study Area. The location of the Century City Santa Monica Station would increase walk distance for most users relative to the Project. As a result of the increased walk distance from the station on Santa Monica Boulevard to the center of employment in Century City and total travel time (including both in-vehicle and station access time) for users, the daily station boardings would decrease by 36 percent from 8,566 with the Project to 5,492 with the Santa Monica Boulevard Alternative. Total daily system boardings on the Westside Purple Line Extension would decrease by 3,351 (7 percent) (Table 3-5 in the Final EIS/EIR). While the Santa Monica Boulevard Alternative would be less effective at meeting purpose and need, it would not compromise the Project to such a degree that it would be unreasonable to proceed.

Safety and Operational Considerations

As described in Section 4.3 of this Draft SEIS, the Santa Monica fault zone in the vicinity of Santa Monica Boulevard pose a hazard for a station and subway tunnels in that location. A fault rupture would extensively damage both the Santa Monica Boulevard Station and the tunnels. The tunnels can be designed to accommodate the fault rupture without collapse and are repairable, but stations cannot be designed to accommodate fault rupture without collapse. Because a subway station is a structure subject to nearly continuous human occupancy, and locating a station at Santa Monica Boulevard presents a high risk to public safety in the event of the collapse of the station. No feasible mitigation has been identified for the substantial risk of fault rupture at the Century City Santa Monica Station. The risk of catastrophic failure of the Century City Santa Monica Station would make the Santa Monica Boulevard Alternative not prudent.

Social, Economic, Environmental, and Community Impacts

Because the Santa Monica Boulevard Alternative would operate in tunnels and would therefore avoid surface impacts, as would the Project, the long-term social, economic, environmental, and community impacts would be similar between the alternatives. The increased walk distance to the core of Century City would reduce the number of transit users and result in lost time and productivity, as was discussed related to the effectiveness at meeting purpose and need.

The alternatives also would differ substantially in construction-phase impacts. The construction staging area for the Santa Monica Boulevard Alternative to support tunnel boring is the developed area between North Santa Monica Boulevard and South Santa Monica Boulevard south and west of Wilshire Boulevard extending to South Moreno Drive. This area currently contains a series of low-rise commercial buildings and parking lots (Figure 5-22). The construction staging would substantially increase the number of business displacements in Century City and west Beverly Hills and jobs would be lost for businesses that cannot relocate within the area (Table 5-7). Specific property details are provided in Appendix C of the Final EIS/EIR under the Century City Santa Monica Station Scenario “A” (Metro 2012j).

Costs of an Extraordinary Magnitude

The Santa Monica Boulevard Station would cost approximately $21 million year of expenditure (YOE) dollars less than the Project to construct (Table 5-8).

Unique Problems or Unusual Factors

As identified in Section 4.8 of the Final EIS/EIR (Metro 2012j) and supplemented in Section 4.3 of this Draft SEIS, the safety risks associated with placing an underground station on an active fault are unique to the Santa Monica Boulevard Alternative. No feasible mitigation has been identified for the high risk of fault rupture at the Century City Santa Monica Station.

Cumulative Consideration of Factors

The Santa Monica Boulevard Alternative, when compared to the Project, would increase walk distance for most users of the Century City Santa Monica Station resulting in a 36 percent decrease in boardings at that station and would introduce high risk of catastrophic failure of the Century City Santa Monica Station as a result of fault rupture during an earthquake. The cumulative consideration of these factors would make the Santa Monica Boulevard Alternative not prudent. Since the alternative is not feasible or prudent, it was not carried forward for further consideration.

5.4.3 Century Park A

Description of Alternative

After completion of the Final EIS/EIR, Metro identified several variations on the alignment through Century City. The alignment and station alternatives were presented to the Metro Board of Directors on May 24, 2012, in comparison to the Locally Preferred Alternative identified in the Final EIS/EIR and ROD. The Century Park A Alternative (Figure 5-25) is one of the alternatives identified in the presentation. The Century Park A Alternative would travel below and between the foundations of several high-rise buildings in Century City, including the 38-story Sun America Building, the 24-story 1801 Century Park East, and the 15-story 1800 Century Park East. These buildings have up to five basement levels of parking below ground level.

Figure 5-25. Century Park A Alternative

This alignment requires the crossover structure to be located on the property at 1950 Avenue of the Stars and would require constructing the crossover structure deep enough to accommodate future underground parking at this location. 1950 Avenue of the Stars has been permitted for development of two 47-story towers and one 12-story building or alternatively for a 37-story building and additional low-rise retail space (Century City Center). Anticipating four levels of underground parking and a mat foundation, the station at Constellation and tunnels would have to be lowered by 37 feet compared to the design for the Project to provide the necessary clearance at 1950 Avenue of the Stars. The separate crossover requires an additional tunnel ventilation zone between the Century City Constellation and Wilshire/Rodeo stations with ventilation equipment and a way to include exhaust and intake air ducts either beneath the parking garage and connecting to the surface or incorporated directly into the future development. The presence of the crossover structure beneath a future high-rise development would require the building developer to design the building foundation to span the crossover structure or to accommodate changes in the engineering properties of the subgrade due to the presence of the crossover structure just beneath the building foundations.

The station would be located at the west end of Constellation Boulevard, which would shift the alignment for the Section 3 tunnels to the west and increase the number of residential properties from which subsurface easements would be required. Moving the station to the west also would affect the proposed station entrance at the northeast corner of Avenue of the Stars and Constellation Boulevard, which is near the center of activity in Century City. Maintaining the station entrance at this location would require an extended corridor beneath Constellation Boulevard to connect the entrance to the station concourse. Alternatively, the station entrance could be moved farther west to the existing bus layover facility at the southeast corner of the intersection of Constellation Boulevard and Century Park West, which would increase walk distances for most station users.

The tunnel alignment for Century Park A would not be accessible from the construction staging sites that are proposed for the Project and located between 1940 and 2040 Century Park East; therefore, an alternative site would be required to launch the tunnel boring machine and support tunnel boring. Similar to the Santa Monica Boulevard Alternative, the developed area between North Santa Monica Boulevard and South Santa Monica Boulevard south and west of Wilshire Boulevard extending to South Moreno Drive would be required for construction staging (Figure 5-26).

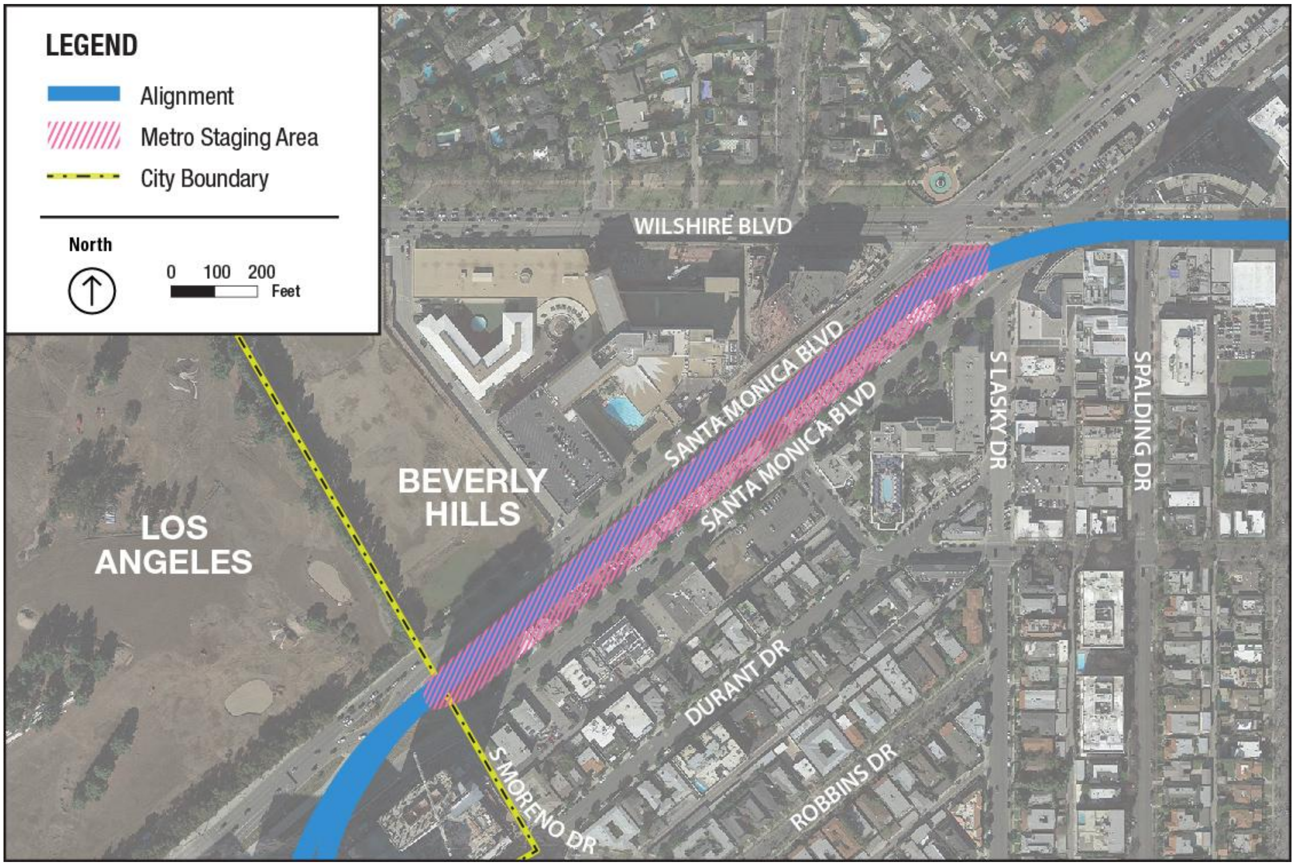


Figure 5-26. Construction Staging Areas Required for Century Park A and Century Park B Alternatives

Evaluation of Feasibility

The Century Park A Alternative would travel below and between the foundations of several high-rise buildings in Century City. This would create construction challenges and reduce operational efficiency, which are factors in considering the prudence of the alternative.

The track crossover would be located below 1950 Avenue of the Stars. As described in Section 4.5 of this Draft SEIS, the existing entitlements on that site allow for development of a high-rise building within the same timeframe as the completion of Section 2 of the Project. The developer of 1950 Avenue of the Stars has recently indicated that construction will begin before the scheduled construction of the Century City Station.

The crossover would be constructed in an excavated structure, which could not be constructed after completion of a high-rise building on the site. To construct the crossover and tunnels after 1950 Avenue of the Stars finished, Metro would have to construct not only tunnels under a building but a large crossover cavern. The issues with tunneling under high-rise buildings is described in the evaluation of prudence of the alternative because there is substantial safety risk associated with tunneling under high-rise buildings. Construction of a cavern large enough for a crossover under an existing building would also require halting the developer to redesign the building foundations to span over the cavern. The same costs for redesign and delay of 1950 Avenue of the Stars would apply, and in addition a foundation to span the cavern would be substantially more expensive. The safety risk to workers also increases with this scenario: whereas with a tunnel workers are protected by the tunnel shield, in this case, the cavern would require workers to excavate and support the soil without a shield and under heavily loaded foundations. Because of safety risk to workers and structural risk to the high-rise building above, this option could not be built as a matter of sound engineering judgment. Should the high-rise construction precede construction of the crossover, the track crossover could not be constructed and the Century Park A Alternative would not be feasible. Delaying construction of 1950 Avenue of the Stars until after completion of the crossover structure is considered for prudence in the following sub-section.

Evaluation of Prudence

Effectiveness at Meeting Purpose and Need

Elements of the Project's purpose and need are to improve transit services within the Study Area and provide a fast, reliable, and environmentally sound transit alternative, the Century Park A Alternative would have a greater length and lower average operating speed, which would increase travel time between both the Wilshire/Rodeo and Westwood/UCLA stations and Century City relative to the Project (Table 5-6). The 56,680 passengers that board and alight daily at Century City and stations farther west would experience a collective 580 hours of travel time increase daily compared to the Project. Shifting the station west also would increase walk distance from the station to the center of employment in Century City. While it would be less effective at meeting purpose and need, it would not compromise the project to a degree that it would be unreasonable to proceed.

Safety and Operational Considerations

Due to the longer alignment and the separation between the station and cross-over, the Century Park A Alternative would result in less efficient operations than the Project. Separating the crossover structure from the station creates operational problems as trains entering and leaving the station have to maintain crossover speed for the distance between station and crossover, resulting in an increase in travel time between the Century City Constellation and Wilshire/Rodeo stations. It would add more than half a minute to each transit trip traveling on the Project. The separate crossover would also add an additional ventilation zone to the tunnel reach between Wilshire /Rodeo and Century City Constellation Stations. The additional fans and power requirements would increase operating and maintenance costs. The increased operating time, along with longer alignment (approximately a 5 percent increase in the track distance between the Wilshire/Rodeo and Westwood/UCLA stations) and the additional ventilation zone would increase operation and maintenance requirements for the Century Park A Alternative relative to the Project. The increased operating time, if served with the same vehicle fleet, would decrease the schedule recovery time at the end of each trip, thereby increasing the occurrences of cascading schedule delays. One additional train could be added to the vehicle fleet to mitigate potential schedule delays; however, that would further increase project capital and operating costs relative to what is included in this analysis.

In addition to operational concerns, substantial structural safety risks are associated with tunneling under high-rise buildings. The response of existing structures to tunneling-induced ground movement depends on the structure type (geometry and structural system) and condition, in addition to other factors such as ground type and distance of the structure above the top of tunnels. Low-rise buildings generally have simple structural systems where any deformation caused by tunneling can be readily assessed and repaired if needed.

Modern mid-rise and high-rise buildings are built with seismic lateral systems that can be difficult to assess because of the way differential settlements affect the bracing. In Los Angeles, most existing buildings will have already experienced seismic events that may have produced deformations in the building structure. The structural systems of buildings are generally not visible for inspection or survey, so it is generally not possible to perform field measurements to determine a building's current geometry compared to its design and determine the safe limit for further stress or displacement. A further complication in assessing current conditions is that as-built drawings of buildings, with actual measurements of the structural frame at the time of construction, are rarely available.

The ability to assess current structural conditions of high-rise buildings is limited; therefore, it is not possible to determine what effect potential ground disturbance from tunneling under a building would have on its condition. Structural damage could require repair or replacement of major structural elements within the building, or in the extreme case of cumulative damage beyond safety limits, demolition of the building.

The Century Park A Alternative would be designed with a minimum clearance distance of 15 feet below existing structures to the top of the tunnels because the alignment is constrained by station depth, vertical curve, and grade limits. To maintain this minimum clearance beneath the foundations of the high-rise buildings and the underground levels of parking, the Century City Station would be approximately 37 feet deeper than required for the Project.

The Century Park A Alternative would be operationally less efficient than the Project and has additional tunneling risks related to safely tunneling under high-rise structures. The safety risks of tunneling under high-rise buildings would make it imprudent to proceed with the alternative.

Social, Economic, Environmental, and Community Impacts

Because the Century Park A Alternative would operate in tunnels and therefore would avoid surface impacts and would serve the same areas as the Project, the long-term social, economic, environmental, and community impacts would be similar between the alternatives. The increased transit travel time for the Century Park A Alternative would result in lost time and productivity for transit users.

The alternatives, however, would differ substantially in construction-phase impacts. The tunnel alignment for Century Park A would not be accessible from the construction staging sites that are proposed for the Project that are located between 1940 and 2040 Century Park East; therefore, an alternative site would be required to launch the tunnel boring machines and support tunnel boring. Approximately 3 acres are required to support tunneling operations, which is more than the available undeveloped or lightly-developed land at the Wilshire/Rodeo Station or the proposed Century City Station location under this alternative. The location above the tunnel alignment with the least development that would provide the needed space is the area between North Santa Monica Boulevard and South Santa Monica Boulevard south and west of Wilshire Boulevard extending to South Moreno Drive. This area currently contains a series of low-rise commercial buildings and parking lots (Figure 5-26). Because the site is in the center of the reach between stations, the tunnel boring machines would have to be launched first in one direction, then brought back to the launch site and sent in the other direction. This would add several months to the construction period and associated disturbance. The construction staging would substantially increase the number of business displacements in Century City and west Beverly Hills.

In addition, the Century City Station would be approximately 37 feet deeper and shifted to the west compared to the Project, which would increase the disruption during construction. Construction would be nearer residential properties west of Century Park West. Construction would require decking and excavation in front of the entrance to Westfield Mall. It would also require long-term lane closures above the station footprint to provide a staging area for station construction (Table 5-9).

The lengthened construction schedule, combined with the likely multiple-year delay that would result from the need to perform structural assessments on existing high-rise buildings and negotiate subsurface easements with the building owners, would affect the community by delaying realization of the benefits of the Westside Purple Line Extension by approximately two to four years. The two-to-four-year delay related to property acquisition in Section 2 would prevent operation of Section 3 until Section 2 is complete, resulting in an approximately 18-month to three-year delay to Section 3.

Costs of an Extraordinary Magnitude

The costs for the Century Park A Alternative relative to the Project would increase because of the longer alignment, deeper station, schedule delay, depth of the crossover, increased construction duration, and the requirements for alternative tunnel boring machine launch and construction staging areas (Table 5-8). As depth increases, the cost and complexity of excavating from the surface for station and crossover structures increases substantially. An increase in construction costs of $239 million year of expenditure (YOE) dollars, which is approximately 10 percent of the cost of Section 2 of the Project, would be an increase of extraordinary magnitude and make the Century Park A Alternative not prudent. This cost estimate does not include Metro liability for costs and damages related to delay of 1950 Avenue of the Stars as discussed below.

Table 5-9. Construction Traffic Closure Requirements

Alternative	Century Park East	Constellation Boulevard	Century Park West	Avenue of the Stars	Property Access Closures
The Project	Partial closures for utility relocations and for a material transport corridor between 2040 Century Park East and 1940 Century Park East	Partial closures for utility relocations. Partial closures for soldier piles. Partial closures for station excavation and construction. Full weekend closures for installing and removing street decking. Full closure for the assembly and launch TBMs (9 months)	No closures required	Partial closures for utility relocations. Partial closures for soldier piles. Partial closures for the installation and removal of street decking. Partial closures for construction of station entrance and appendages.	Full and partial closures will impact entrances to: • Customer parking and loading dock at Westfield Mall • Entrance to parking at Sun America • Entrance to future loading dock at 1950 Avenue of the Stars • Watt Plaza Alley and parking structure • Entrance to 10100 Constellation Boulevard parking • Entrance to Century Plaza Hotel parking • Entrance to future parking for New Century Plaza • Entrance to Solar Way • Entrance to AT&T facility at 2010 Century Park East
Wilshire Boulevard (No Century City Station)	No closures required	No closures required	No closures required	No closures required	No closures required
Santa Monica Boulevard	No closures required	No closures required	No closures required	No closures required	No closures required
Century Park A	No closures required	Partial closures for utility relocations. Partial closures for soldier piles. Partial closures for station excavation and construction. Full weekend closures for installing and removing street decking. (Note that tunnel activity is based at Santa Monica Blvd.)	Partial closures for utility relocations. Partial closures for ground improvement (grouting). Partial closures for soldier piles. Partial closures for the installation and removal of street decking.	Partial closures for utility relocations. Partial closures for ground improvement (grouting). Partial closures for appendage construction	Full and partial closures will impact entrances to: • Customer parking and loading dock at Westfield Mall • Entrance to parking at Sun America • Entrance to Century Plaza Hotel parking • Entrance to future parking for New Century Plaza • Entrance to Solar way

Alternative	Century Park East	Constellation Boulevard	Century Park West	Avenue of the Stars	Property Access Closures
Century Park B	No closures required	Partial closures for utility relocations. Partial closures for soldier piles. Partial closures for station excavation and construction. Full weekend closures for installing and removing street decking. (Note that tunnel activity is based at Santa Monica Blvd.)	Partial closures for utility relocations. Partial closures for soldier piles. Partial closures for the installation and removal of street decking.	Partial closures for utility relocations. Partial closures for ground improvement (grouting). Partial closures for appendage construction	Full and partial closures will impact entrances to: • Customer parking and loading dock at Westfield Mall • Entrance to parking at Sun America • Entrance to Century Plaza Hotel parking • Entrance to future parking for New Century Plaza • Entrance to Solar way
Century Park C	Partial closures for utility relocations and for a material transport corridor between 2040 Century Park East and 1940 Century Park East. Full closure for tunneling and cross passage construction (27 months)	Partial closures for utility relocations. Partial closures for soldier piles. Partial closures for station excavation and construction. Full weekend closures for installing and removing street decking. Full closure for tunneling and cross passage construction (27 months)	No closures required	Partial closures for utility relocations. Partial closures for soldier piles. Partial closures for the installation and removal of street decking. Partial closures for construction of station entrance and appendages.	Full and partial closures will impact entrances to: • Customer parking and loading dock at Westfield Mall • Entrance to parking at Sun America • Entrance to future loading dock at 1950 Avenue of the Stars • Entrance to 10100 Constellation Blvd parking • Entrance to Century Plaza Hotel parking • Entrance to future parking for New Century Plaza • Entrance to Solar Way

Unique Problems or Unusual Factors

The schedule for development of 1950 Avenue of the Stars would impact the way the crossover beneath the development could be constructed. As discussed under the safety and operational considerations above, the crossover and tunnels would have to be built in advance of the development. In this way, the construction can be managed from the surface using conventional construction methods and the crossover can be designed to carry the future building loads and the building design can in turn can reflect the presence of the tunnels and crossover. Delays associated with redesign and contracting of the Westside Purple Line Extension to adopt the Century Park A Alternative would increase the amount of time by which planned development of 1950 Avenue of the Stars would precede crossover construction and, therefore, would increase to delay cost liability to Metro if development of 1950 Avenue of the Stars is delayed until after completion of the crossover structure.

If construction of Section 2 of the Project does proceed before development of 1950 Avenue of the Stars, the top of the structure to hold the crossover tracks would be 15 feet below the bottom of the new building foundations (approximately 60 feet below street level) and require structural strength sufficient to construct the entitled high-rise property above the structure. The design of the high-rise foundations would need to be carefully coordinated with the tunnels and crossover to avoid conflicts with foundation elements of the building, which is adjacent to the Century City Station and above the crossover structure. This would result in delays and redesign for the property's developer and require a delay of building construction until after completion of the crossover structure.

The developer is currently proceeding with design and permitting; therefore, this scenario would require Metro to stop the developer from moving forward with the current design and schedule to work around the crossover and tunnel. Metro would have to accept the cost of delays and redesign and in the worst case the cost of the developer abandoning the project if the delays would mean the developer misses the current market cycle. These costs are substantial and have not been included in the current cost estimate. This is feasible but not prudent due to the cost of delays to the developer, which would be a liability for Metro.

Cumulative Consideration of Factors

The Century Park A Alternative, when compared to the Project, would operate less efficiently by increasing travel time for patrons and operation and maintenance requirements for the system, would have increased construction-phase risks and impacts, would delay the benefits of the project by between two and four years, and would include a significant risk that the crossover structure could not be constructed. The station entrance would be less central to the intersection of Constellation Boulevard and Avenue of the Stars, making it less convenient for Metro riders. Furthermore, the construction cost would be higher by an extraordinary magnitude compared to the Project. The cumulative consideration of these factors would make the Century Park A Alternative not prudent. Since the alternative is not prudent, it was not carried forward for further consideration.

5.4.4 Century Park B

Description of Alternative

The Century Park B Alternative (Figure 5-27) is another alternative identified in the May 24, 2012 presentation to the Metro Board of Directors. The Century Park B Alternative would travel below and between the foundations of several high-rise buildings in Century City, including the 40-story 10000 Santa Monica Boulevard, the 24-story 1875 Century Park East, and the 15-story 1800 Century Park East. These buildings have up to three basement levels of parking below ground level.

Figure 5-27. Century Park B Alternative

As with the Century Park A Alternative, the tunnel alignment would cross the property at 1950 Avenue of the Stars and the tunnel profile would have to be lowered to accommodate future development, which is anticipated to be high-rise buildings above four levels of underground parking and a mat foundation. The station at Constellation Boulevard and the tunnels would have to be lowered by 12 feet compared to the design for the Project to provide the necessary clearance at 1950 Avenue of the Stars.

The station would be located at the west end of Constellation Boulevard, which would shift the alignment for the Section 3 tunnels to the west and increase the number of residential properties from which subsurface easements would be required. Moving the station to the west also would affect the proposed station entrance at the northeast corner of Avenue of the Stars and Constellation Boulevard, which is near the center of activity in Century City. Maintaining the station entrance at this location would require an extended corridor beneath Constellation Boulevard to connect the entrance to the station concourse. Alternatively, the station entrance could be moved farther west to the existing bus layover facility at the southeast corner of the intersection of Constellation Boulevard and Century Park West, which would increase the walk distance for most station users.

As with the Century Park A Alternative, the Century Park B Alternative would require a site to launch the tunnel boring machines and support tunnel boring. The developed area between North Santa Monica Boulevard and South Santa Monica Boulevard south and west of Wilshire Boulevard extending to South Moreno Drive would be required for construction staging (Figure 5-26).

Evaluation of Feasibility

The Century Park B Alternative, as with the Century Park A Alternative, would travel below and between the foundations of several high-rise buildings in Century City. This would create construction challenges and reduce operational efficiency, which are factors in considering the prudence of the alternative, but the challenges would not make the alternative infeasible. There are substantial risks associated with tunneling under high-rise buildings as described for Century Park A.

Evaluation of Prudence

Effectiveness at Meeting Purpose and Need

Elements of the Project's purpose to improve transit services within the Study Area and provide a fast, reliable, and environmentally sound transit alternative, the Century Park B Alternative would have a greater length and lower average operating speed, which would increase travel time between both the Wilshire/Rodeo and Westwood/UCLA stations and Century City relative to the Project (Table 5-6). The 56,680 passengers that board and alight daily at Century City and stations farther west would experience a collective 600 hours of travel time increase daily compared to the Project. While it would be less effective at meeting purpose and need, it would not compromise the project to a degree that it is unreasonable to proceed.

Safety and Operational Considerations

The Century Park B Alternative would result in less efficient operations than the Project. It would add more than half a minute to each transit trip traveling on the Purple Line. The increased operating time, along with longer alignment (approximately a 6 percent increase in the track distance between the Wilshire/Rodeo and Westwood/UCLA stations) would increase operation and maintenance requirements for the Century Park B Alternative relative to the Project. The increased operating time, if served with the same vehicle fleet, would decrease the schedule recovery time at the end of each trip, thereby increasing the occurrences of cascading schedule delays.

In addition to operational concerns, substantial safety risks are associated with tunneling under high-rise buildings, and any structural damage to such buildings would be difficult and costly to repair. The Century Park B Alternative would be designed with a minimum clearance distance of 15 feet below existing structures because the alignment is constrained by station depth, vertical curve, and grade limits. Even with this minimum clearance distance, the Century City Station would be approximately 12 feet deeper than required for the Project. Structural damage to high-rise buildings could require repair or replacement of major structural elements within the building, or in the extreme case of cumulative damage beyond safety limits, demolition of the building. The Century Park B Alternative would be operationally less efficient than the Project and has additional tunneling risks related to safely tunneling under high-rise structures. The safety risks of tunneling under high-rise buildings would make it imprudent to proceed with the alternative.

Social, Economic, Environmental, and Community Impacts

Because the Century Park B Alternative would operate in tunnels and therefore would avoid surface impacts and would serve the same areas as the Project, the long-term social, economic, environmental, and community impacts would be similar. The increased transit travel time for the Century Park B Alternative would result in lost time and productivity for transit users.

The Century Park B alternative, however, differs substantially in construction-phase impacts in comparison to the Project. The tunnel alignment for Century Park B would not be accessible from the construction staging sites that are proposed for the Project located between 1940 and 2040 Century Park East; therefore, as described for the Century Park A Alternative, an alternative site in the developed area between North Santa Monica Boulevard and South Santa Monica Boulevard south and west of Wilshire Boulevard extending to South Moreno Drive would be required to launch the tunnel boring machine and support tunnel boring (Figure 5-27). Because the site is in the center of the reach between stations, the tunnel boring machine would have to be launched first in one direction, then brought back to the launch site and sent in the other direction. This would add several months to the construction period and associated disturbance. The construction staging would substantially increase the number of business displacements in Century City and west Beverly Hills.

In addition, the Century City Station would be approximately 12 feet deeper and shifted to the west compared to the Project, which would increase the disruption during construction. Construction would require decking and excavation in front of the entrance to Westfield Mall. It would also require long-term lane closures above the station module footprint to provide a staging area for station construction. Compared to the Project, Century Park B would have a longer period of road closures while the station is being excavated and greater quantities of material trucked away on local roads, resulting in both increased traffic congestion and air pollution from the haul vehicles. Station excavation would be nearer residences west of Century Park West.

The lengthened construction schedule, combined with the likely multiple-year delay that would result from the need to perform structural assessments on existing high-rise buildings, and negotiate subsurface easements with the building owners, would affect the community by delaying realization of the benefits of the Westside Purple Line Extension by approximately two to four years. The two-to-four-year delay to Section 2 would prevent operation of Section 3 until Section 2 is complete, resulting in an approximately 18-month to three-year delay to Section 3.

Costs of an Extraordinary Magnitude

The longer alignment, deeper station and crossover, schedule delay, increased construction duration, and requirements for alternative tunnel boring machine launch and construction staging areas would increase the costs for the Century Park B Alternative relative to the Project by approximately $119 million YOE dollars (Table 5-8). This approximately 5 percent increase in capital costs would be a substantial increase. In addition to the increased project costs, there would be costs associated with the likely two-to-four-year delay, which are not included in this comparison.

Unique Problems or Unusual Factors

The tunnels would cross below 1950 Avenue of the Stars. The developers of 1950 Avenue of the Stars have recently indicated that they intend to begin construction of a high-rise development prior to the scheduled construction of the Century City Station. The top of the tunnels would be at a depth of 15 feet below the building foundations (approximately 60 feet below street level) and would require a tunnel design that allows for construction of the building foundation above and around the tunnel sufficient to construct the entitled high-rise property above. The design of the high-rise foundations would need to be carefully coordinated with the tunnel alignment to avoid any conflicts with foundation elements of the building, which is adjacent to the Century City Station. Selection of the Century Park B Alternative would cause delays and redesign of 1950 Avenue of the Stars to accommodate the tunnels. This would introduce Metro liability for redesign costs and a substantial risk regarding the safe constructability of the tunnels once 1950 Avenue of the Stars is complete.

Cumulative Consideration of Factors

The Century Park B Alternative, when compared to the Project, would operate less efficiently by increasing travel time for patrons and operation and maintenance requirements for the system, would have substantially increased construction-phase risks of damage to high-rise buildings and impacts including displacements and construction closures and delays, would have a substantially higher cost, would delay the benefits of the project by between two and four years, and would include a risk associated with construction of the deep tunnel section under 1950 Avenue of the Stars and existing high-rise buildings in Century City. The station entrance would be less central to the intersection of Constellation Boulevard and Avenue of the Stars making it less convenient for Metro riders. The cumulative consideration of these factors would make the Century Park B Alternative not prudent. Since the alternative is not prudent, it was not carried forward for further consideration.

5.4.5 Century Park C

The Century Park C Alternative (Figure 5-28) is another of the alternatives identified in the May 24, 2012 presentation to the Metro Board of Directors. The Century Park C Alternative would travel below and between the foundations of several high-rise buildings in Century City, including the 24-story 1925 Century Park East, the 21-story 1888 Century Park East, the 15-story 1880 Century Park East, and the 40-story 10000 Santa Monica Boulevard. These buildings have up to three basement levels of parking

Figure 5-28. Century Park C Alternative

below ground level. The Century Park C Alternative crosses under the northwest corner of BHHS, outside the boundary of the NRHP-eligible historic property. The station at Constellation Boulevard and the tunnels would have to be lowered by 9 feet compared to the design for the Project to provide the necessary clearance for the building foundations at 1975 Century Park East.

Evaluation of Feasibility

The Century Park C Alternative would travel below and between the foundations of several high-rise buildings in Century City. There are substantial risks associated with tunneling under high-rise buildings similar to the Century Park A Alternative. This would create construction challenges and reduce operational efficiency, which are factors in considering the prudence of the alternative, but they would not make the alternative infeasible.

Evaluation of Prudence

Effectiveness at Meeting Purpose and Need

Elements of the Project's purpose and need to improve transit services within the Study Area and provide a fast, reliable, and environmentally sound transit alternative, the Century Park C Alternative would have a greater length and lower average operating speed, which would increase travel time between both the Wilshire/Rodeo and Westwood/UCLA stations and Century City relative to the Project (Table 5-6). The increased travel time would result in a small reduction in boardings for the Century City Station. The 56,680 passengers that board and alight daily at Century City and stations farther west would experience a collective 680 hours of travel time increase daily compared to the Project. While it would be less effective at meeting purpose and need, it would not compromise the project to a degree that it is unreasonable to proceed.

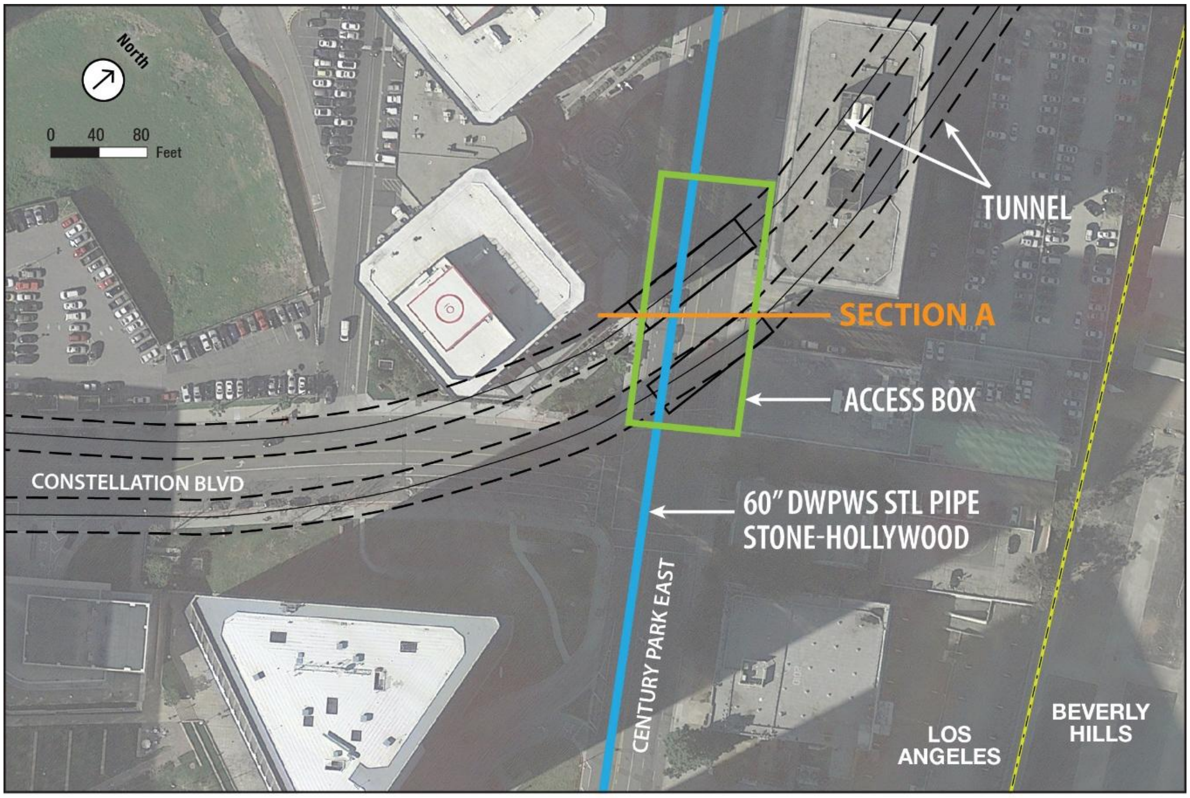
Safety and Operational Considerations

The Century Park C Alternative would result in less efficient operations than the Project. It would add approximately two-thirds of a minute to each transit trip traveling on the Project. The increased operating time, along with the longer alignment (approximately a 5 percent increase in the track distance between the Wilshire/Rodeo and Westwood/UCLA stations) would increase operation and maintenance requirements for the Century Park C Alternative relative to the Project (Table 5-6). The increased operating time, if served with the same vehicle fleet, would decrease the schedule recovery time at the end of each trip, thereby increasing the occurrences of cascading schedule delays.

In addition to the operational concerns, as detailed for the Century Park A Alternative, there are substantial safety risks associated with tunneling under high-rise buildings, and any structural damage to such buildings would be difficult and costly to repair. The Century Park C Alternative would be designed with a minimum clearance distance of 15 feet below existing structures because the alignment is constrained by station depth, vertical curve, depth of the access box for construction, and grade limits. Even with this minimum clearance distance, the Century City Station would be approximately 9 feet deeper than required for the Project. Structural damage to high-rise buildings could require repair or replacement of major structural elements within the building, or in the extreme case of cumulative damage beyond safety limits, demolition of the building.

Unlike the Century Park A and B Alternatives, the Century Park C Alternative could use the construction staging sites that are proposed for the Project located between 1940 and 2040 Century Park East to launch and support the tunnel boring machines. However, the distance is too great to be able to directly connect underground and use the access shaft location proposed for the Project. An access box would have to be constructed on Century Park East to provide access between the tunnels and the construction staging sites for materials supply and removal of spoils.

Running through the proposed access box footprint for the Century Park C Alternative is the 60-inch Los Angeles Department of Water and Power Stone–Hollywood trunk line. This water line would have to run through the access box or be relocated to a corridor outside the shaft shoring. Figure 5-29 shows the relationship of the access box to the water line and the adjoining properties. The Project and other avoidance alternatives would not require an access box in this vicinity and would tunnel under the trunk line without affecting it.



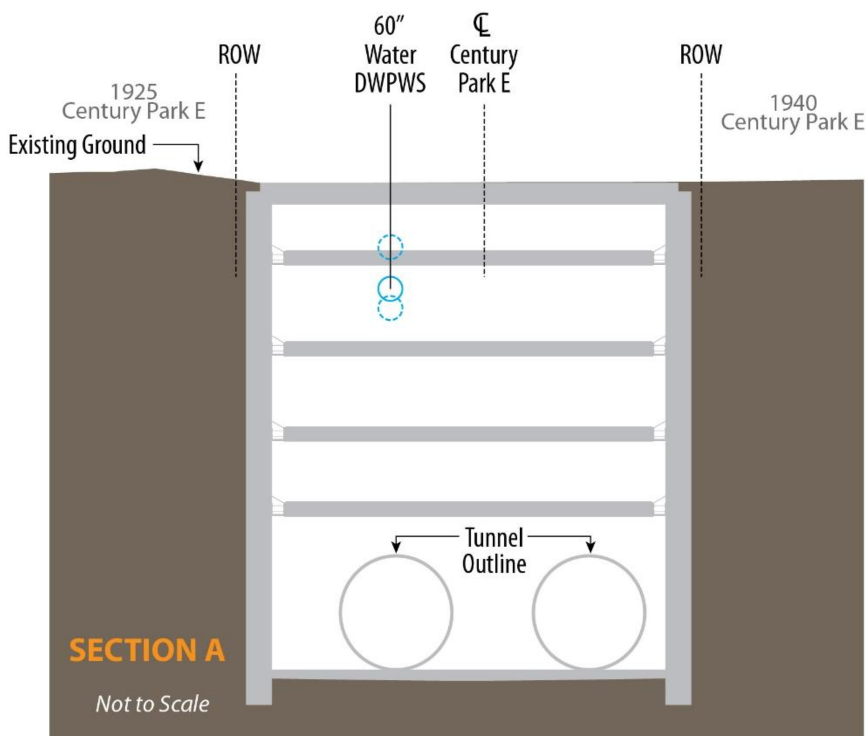


Figure 5-29. Century Park C Access Box Excavation Relative to the Stone-Hollywood Trunk Line

An access box large enough to support tunneling would not leave space to reroute the 60-inch water main around the box, and therefore the water line would have to be reinforced or replaced and then supported as it runs through the box. Having such a large water line running through the access box carries the risk of it being damaged during construction, the consequences of which would be catastrophic. The rupture of a 30-inch water line near UCLA in July 2014 flooded sections of the campus and surrounding properties and caused substantial damage to property. A rupture of the 60-inch line would release four times the volume of water. Any rupture of the 60-inch line would immediately flood the tunnels. The tunnels slope down away from the access shaft, so workers in the tunnels would be unlikely to be able to escape in the event of a pipe rupture. Properties and streets near the shaft and underground garages at Century City would likely be flooded, resulting in major property damage and risk to people in these facilities.

The Century Park C Alternative would be operationally less efficient than the Project and have additional tunneling risks related to safely tunneling under high-rise buildings and the 60-inch Stone-Hollywood trunk line. These safety risks would make it imprudent to proceed with the alternative.

Social, Economic, Environmental, and Community Impacts

Because the Century Park C Alternative would operate in a tunnel and therefore would avoid surface impacts and would serve the same areas as the Project, the long-term social, economic, environmental, and community impacts would be similar between the alternatives. The increased transit travel time for the Century Park C Alternative would result in lost time and productivity for transit users.

The alternatives, however, would differ in construction-phase impacts. The Century Park C Alternative could use the construction staging sites that are proposed for the Project located between 1940 and 2040 Century Park East to launch and support the tunnel boring machines. However, the tunnels would not directly connect to the access shaft location proposed for the Project and an access box would have to be constructed on Century Park East to provide access between the tunnels and the construction staging sites for materials supply and removal of spoils. The access box would require additional utility relocation work on Century Park East to clear pile corridors for the shoring and decking. Access box construction would require partial closures of Century Park East to install soldier piles and full closures to install and later remove decking and for street restoration.

In addition, the Century City Station would be approximately 9 feet deeper compared to the Project, which would increase the disruption during construction. Construction would require long-term lane closures above the station module footprint to provide a staging area for station construction. Compared to the Project, this alternative would have a longer period of road closures while the station is being excavated and greater quantities of material trucked away on local roads, resulting in both increased traffic congestion, noise, and air pollution from the haul vehicles.

The lengthened construction schedule, combined with the likely multiple-year delay that would result from the need to perform structural assessments on existing high-rise buildings, and negotiate subsurface easements with the building owners and their insurers, would affect the community by delaying realization of the benefits of the Westside Purple Line Extension by approximately two to four years. The two-to-four-year delay to Section 2 would prevent operation of Section 3 until Section 2 is complete, resulting in an approximately 18-month to three-year delay to Section 3.

Construction-phase impacts and risks would be substantially greater for the Century Park C Alternative than for the Project.

Costs of an Extraordinary Magnitude

The longer alignment, deeper station, schedule risk, depth of the crossover, and increased construction duration and risks would increase the capital costs for the Century Park C Alternative relative to Section 2 of the Project by approximately $105 million YOE dollars (Table 5-8). This approximately 4 percent increase in capital costs would be a substantial increase. In addition to the increased project costs, there would be costs associated with the likely two-to-four-year delay, which are not included in this comparison.

Unique Problems or Unusual Factors

The access box on Century Park East would require excavating below the 60-inch Stone–Hollywood trunk line, which is a major regional water line below ground under Century Park East, with an open cut (Figure 5-29). The water line would be exposed for the entire length of the approximately 200-foot-long access box in Century Park East. The line would have to be protected, reinforced, and supported or replaced with modern pipe to reduce the risk of rupture, which could flood the tunnels under construction below the pipe while disrupting water service to a large area. This would introduce additional worker and public safety risk, including potential flooding of the tunnel and nearby buildings including BHHS, into the tunnel construction. The open-cut access within Century Park East also would increase the disruption to traffic on Century Park East while the work is in progress.

Cumulative Consideration of Factors

The Century Park C Alternative, when compared to the Project, would operate less efficiently, increase travel time for patrons and operation and maintenance requirements for the system, would have increased construction-phase impacts, would have a substantially higher cost, would delay the benefits of the project by between two and four years, and would include substantial risks associated with construction of the tunnels under several high-rise buildings and the access box under the Stone–Hollywood trunk line. The cumulative consideration of these factors would make the Century Park C Alternative not prudent. Since the alternative is not prudent, it is not carried forward for further consideration.

5.4.6 Summary of Feasibility and Prudence of Avoidance Alternatives

The Wilshire Boulevard Alternative would be feasible but would not be prudent to construct because it fails to meet key elements of the Project's purpose and need, resulting in a decrease in system boardings by 12 percent and reduced transit access to 49,970 jobs in Century City. It also would have less benefit in regards to improving regional air quality and reducing energy consumption, as well as social, economic, and community effects of displacing 32 individual businesses and an additional two multi-tenant office buildings and reducing connectivity to jobs for low-income populations (Table 5-5).

The Santa Monica Boulevard Alternative is not feasible and prudent because it would not be seismically safe to construct and operate the alternative, would reduce system boardings by 7 percent, and would displace 32 individual businesses and an additional two multi-tenant office buildings.

The Century Park A Alternative would not be feasible to construct if development of 1950 Avenue of the Stars precedes the Project. If development of 1950 Avenue of the Stars is delayed until after completion of the crossover structure, it would not be prudent when cumulatively considering its efficiency, operating requirements, environmental impacts during construction, delay in project benefits of between two and four years, higher cost than the Project by an extraordinary magnitude, and construction risks associated with excavating and tunneling under high-rise buildings.

The Century Park B Alternative would be feasible to construct, but it would not be prudent to construct when cumulatively considering its efficiency, operating requirements, schedule risks around timing of development of 1950 Avenue of the Stars, environmental impacts during construction, delay in project benefits of between two and four years, substantially higher cost than the Project, and construction risks associated with excavating and tunneling under high-rise buildings.

The Century Park C Alternative would be feasible to construct, but it would not be prudent to construct when cumulatively considering its efficiency, operating requirements, environmental impacts during construction, delay in project benefits of between two and four years, substantially higher cost than the Project, and construction risks associated with excavating and tunneling under high-rise buildings and excavating the access box under the Stone–Hollywood trunk line.

There are no feasible and prudent alternatives that would have no use, in the form of a subsurface easement, of Section 4(f) properties in the west Beverly Hills and Century City area.

5.5 Evaluation of Least Overall Harm

Because none of the avoidance alternatives evaluated in Section 5.4 would be feasible and prudent alternatives to the Project, this section provides an evaluation of other alternatives that would use land below one or more Section 4(f) properties in the west Beverly Hills and Century City area (Figure 5-30). The evaluation includes a representative range of alternatives that encompasses all of the alternatives that have been previously identified to serve Century City, including alternative alignments identified after issuance of the ROD, and would use land from one or more Section 4(f) properties. The least overall harm analysis compares:

- The ability to mitigate adverse impacts to each Section 4(f) property (including any measures that result in benefits to the property);
- The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection;
- The relative significance of each Section 4(f) property;
- The views of the officials with jurisdiction over each Section 4(f) property;
- The degree to which each alternative meets the purpose and need for the project;
- After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f); and
- Substantial differences in costs among the alternatives.

The evaluation is summarized in Table 5-10.

As explained in Section 3.3.1 of the Section 4(f) Policy Paper, *de minimis* impacts are generally not differentiators in a least overall harm analysis because the net harm resulting from the *de minimis* impact is negligible (USDOT 2012). The FTA preliminarily determined that impacts from the Project on Section 4(f) resources would be *de minimis*; therefore, the net harm to Section 4(f) resources from the Project and other alternatives with similar impacts is not a significant factor in determining least overall harm between the alternatives.

Figure 5-30. Alternatives Considered for Least Overall Harm

Table 5-10. Summary Comparison of Alternatives for Least Overall Harm

Alternative[1]	Ability to Mitigate Adverse Impacts on Each Section 4(f) Property	Relative Severity of Remaining Harm	Relative Significance of Each Section 4(f) Property	The Official(s) with Jurisdiction	Meets the Purpose and Need for the Project	Magnitude of Other Adverse Impacts	Differences in Costs
The Project	Impacts avoided by tunneling under 4(f) properties	None	Two NRHP-eligible sites, one of which is a shared-use recreational resource	SHPO, BHUSD, and the City of Beverly Hills	Meets purpose and need	No adverse impacts to resources not protected by Section 4(f); subsurface easements from 30 commercial and 90 residential properties	Cost for the Project is $2,411 M YOE
Century Park D	Impacts avoided by tunneling under 4(f) properties	None	Two NRHP-eligible sites, one of which is a shared-use recreational resource; would cross under BHHS Building B2	SHPO, BHUSD, and the City of Beverly Hills	30 person-hours of daily travel time savings relative to the Project; similar to the Project in meeting purpose and need	Subsurface easements from 27 commercial and 90 residential properties	$60M greater than the Project YOE
Constellation Direct	Impacts avoided by tunneling under 4(f) properties	None	Three NRHP-eligible sites, one of which is a shared-use recreational resource; would cross under BHHS Building B2	SHPO, BHUSD, and the City of Beverly Hills	50 person-hours of daily travel time increase relative to the Project; similar to the Project in meeting purpose and need	Subsurface easements from 23 commercial and 93 residential properties	$8M greater than the Project YOE
Lasky Drive A	Impacts avoided by tunneling under 4(f) properties	None	Three NRHP-eligible sites, one of which is a shared-use recreational resource	SHPO, BHUSD, and the City of Beverly Hills	240 person-hours of daily travel time increase relative to the Project; less effective than the Project in meeting purpose and need	Subsurface easements from 23 commercial and 88 residential properties	$6M greater than the Project YOE
Lasky Drive B	Impacts avoided by tunneling under 4(f) properties	None	Three NRHP-eligible sites, one of which is a shared-use recreational resource	SHPO, BHUSD, and the City of Beverly Hills	660 person-hours of daily travel time increase relative to the Project; less effective than the Project in meeting purpose and need	Subsurface easements from 21 commercial and 107 residential properties	$12M greater than the Project YOE

Alternative[1]	Ability to Mitigate Adverse Impacts on Each Section 4(f) Property	Relative Severity of Remaining Harm	Relative Significance of Each Section 4(f) Property	The Official(s) with Jurisdiction	Meets the Purpose and Need for the Project	Magnitude of Other Adverse Impacts	Differences in Costs
Spalding	Impacts avoided by tunneling under 4(f) properties	None	Three NRHP-eligible sites, one of which is a shared-use recreational resource	SHPO, BHUSD, and the City of Beverly Hills	350 person-hours of daily travel time increase relative to the Project; less effective than the Project in meeting purpose and need	Subsurface easements from 19 commercial and 100 residential properties	$3M greater than the Project YOE
Constellation South	Impacts avoided by tunneling under 4(f) properties	None	Three NRHP-eligible sites, one of which is a shared-use recreational resource; would cross under BHHS Building B2	SHPO, BHUSD, and the City of Beverly Hills	50 person-hours of daily travel time savings relative to the Project; similar to the Project in meeting purpose and need	Subsurface easements from 20 commercial and 97 residential properties	$42M less than the Project YOE
Avenue of the Stars	Permanent impacts avoided by tunneling under 4(f) properties, except for Roxbury Memorial Park	Construction activities would use Roxbury Memorial Park; Park Access limited during construction	One NRHP-eligible site and Roxbury Memorial Park, a significant recreational resource	SHPO and the City of Beverly Hills	680 person-hours of daily travel time increase relative to the Project; less effective than the Project in meeting purpose and need	Subsurface easements from 11 commercial and 130 residential properties	$12M greater than the Project YOE

[1]Other alternatives were identified that would fail to meet minimum design or safety requriements. The Santa Monica Boulevard East Alternative would fail to meet seismic safety requirements. The Lasky Drive C, D, and E and Olympic Boulevard Alternatives would fail to meet minimum design criteria for curve radius.

5.5.1 Alternatives Considered for Least Overall Harm

This Section 4(f) Evaluation considers a representative range of alternatives that encompasses the alternatives that have been previously identified to serve Century City, including alternative alignments identified after issuance of the ROD (Figure 5-30). For all of the alternatives considered, no project features would reach the surface within the boundaries of any Section 4(f) property.

Santa Monica Boulevard East

The Final EIS/EIR considered this variation on the Santa Monica Boulevard Alternative that is discussed in Section 5.4.2 of this Draft SEIS, but with the station located farther east at Century Park East to avoid seismic faults identified at Avenue of the Stars (Figure 5-31). This alternative was identified in the Final EIS/EIR as not being viable because of safety issues related to seismic faults identified in this section of Santa Monica Boulevard as well as requiring the crossover to be separated from the main station excavation, resulting in an additional ventilation zone and the need to mine beneath the Benedict Canyon storm drain. The Santa Monica Boulevard Alternative would tunnel under the southwest corner of the Los Angeles Country Club.

Figure 5-31. Santa Monica Boulevard East Alternative

The Santa Monica Boulevard East Alternative would locate the Century City Santa Monica Station east of the location for the Santa Monica Boulevard Alternative evaluated in Section 5.4.2, Avoidance Alternatives. The station would still be within the Santa Monica fault zone in the vicinity of Santa Monica Boulevard. Because of seismic risks (refer to Section 4.3 of this Draft SEIS) associated with constructing and operating a subway station across a seismic fault, the Santa Monica Boulevard East Alternative would fail to meet safety requirements. The Santa Monica Boulevard East Alternative is not a feasible alternative.

Century Park D

The Century Park D Alternative is a variation on the Century Park Alternatives that are discussed as avoidance alternatives in Section 5.4 of this Draft SEIS. Subsequent to the May 24, 2012 presentation to the Metro Board of Directors where the Century Park Alternatives were presented, multiple developments have begun in Century City, which were factors in the evaluation of those alternatives as not being feasible and prudent avoidance alternatives. The Century Park D Alternative was developed within the constraints of the new developments (Figure 5-32). The Century Park D Alternative would tunnel under BHHS Building A and the northwest corner of the BHHS historic property, including under Buildings B3 and B4 (Figure 5-5), and the AAA Building.

Figure 5-32. Century Park D Alternative

Constellation Direct

The Constellation Direct Alternative is located farther west than the Project between Wilshire Boulevard and the Constellation Boulevard station. It was considered during Alternatives Analysis prior to issuance of the Draft EIS/EIR (Figure 5-33). The Constellation Direct Alternative would tunnel under the Perpetual Savings Bank parcel, BHHS, and AAA Building historic properties and the recreational resources associated with BHHS. The Constellation Direct Alternative would tunnel under BHHS Building B2.

Figure 5-33. Constellation Direct Alternative

Lasky Drive A

The Lasky Drive A Alternative crosses BHHS south of the Project (Figure 5-34). The Lasky Drive A Alternative would tunnel under the Perpetual Savings Bank parcel, BHHS, and AAA Building historic properties and the recreational resources associated with BHHS.

Lasky Drive B

The Lasky Drive B Alternative crosses BHHS south of the Project (Figure 5-35). The Lasky Drive B Alternative would tunnel under the Perpetual Savings Bank parcel, BHHS, and AAA Building historic properties and the recreational resources associated with BHHS.

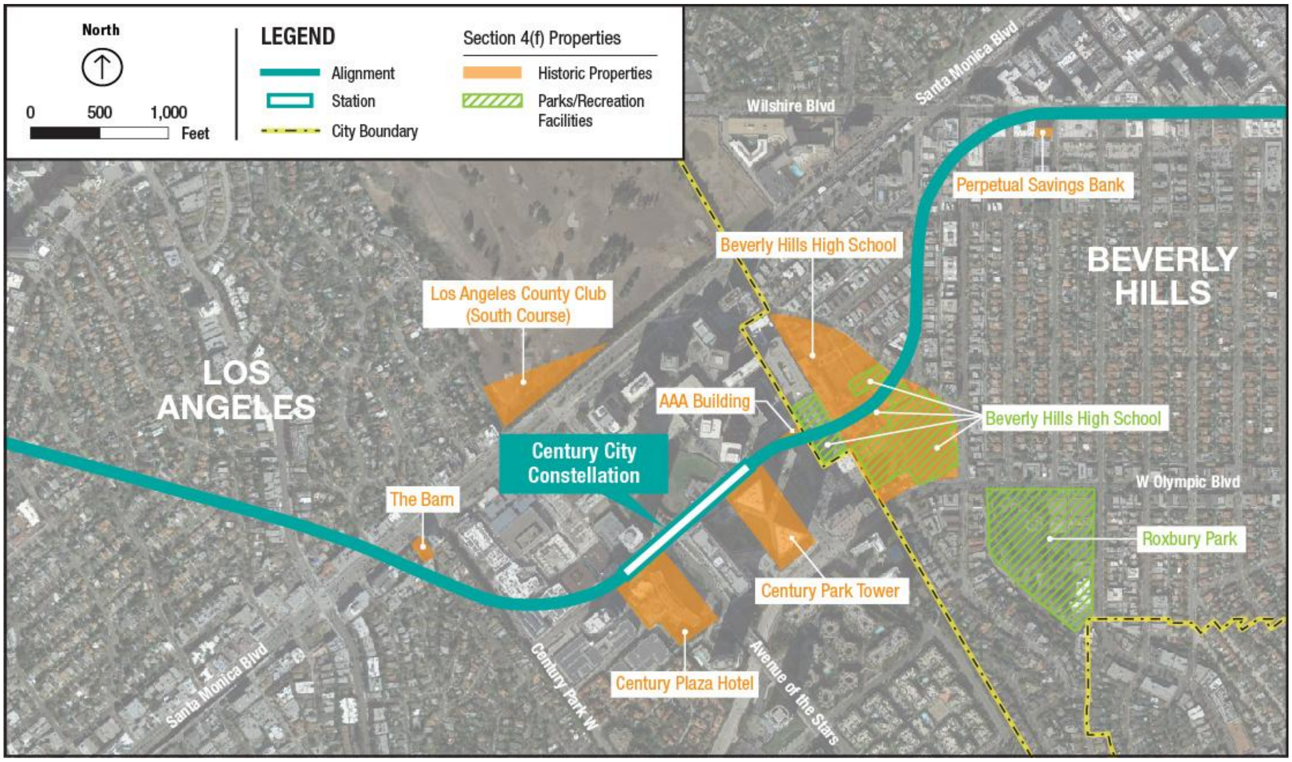


Figure 5-34. Lasky Drive A Alternative

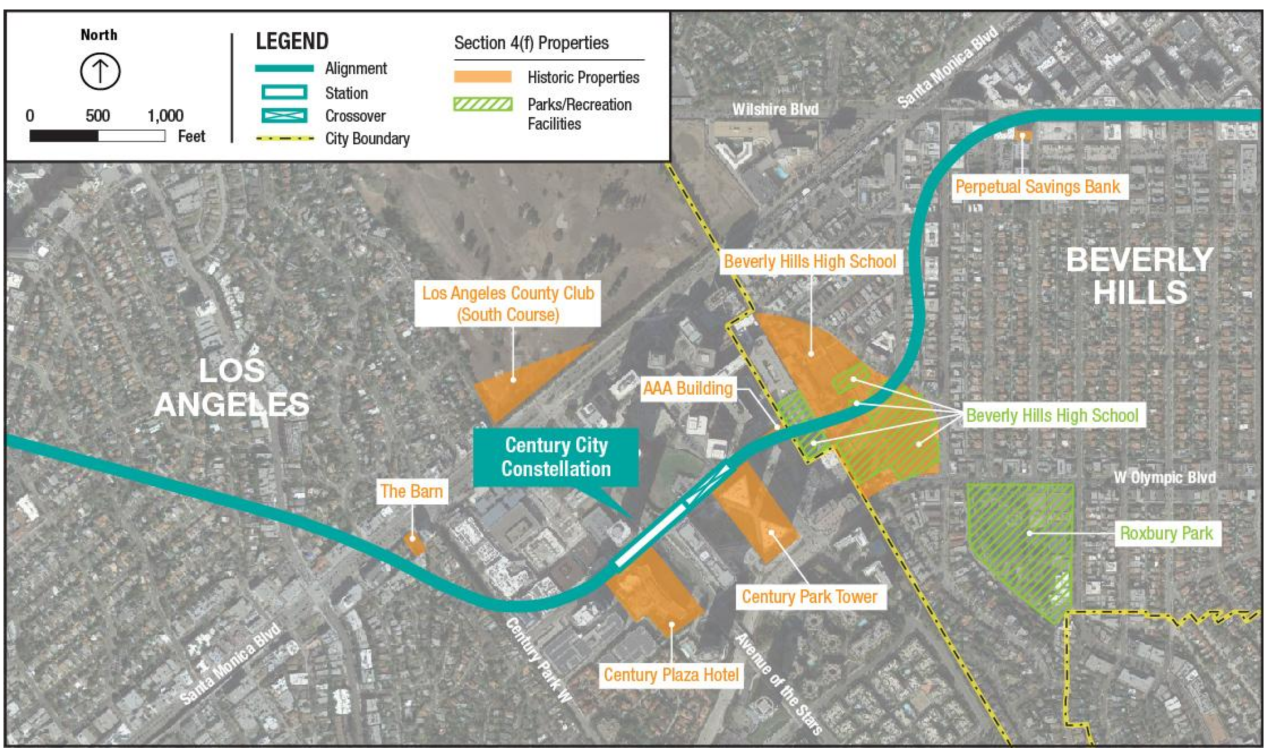


Figure 5-35. Lasky Drive B Alternative

Lasky Drive C

The Lasky Drive C Alternative crosses BHHS south of the Project (Figure 5-36). The Lasky Drive C Alternative would tunnel under the Perpetual Savings Bank parcel, BHHS, and AAA Building historic properties and the recreational resources associated with BHHS.

Figure 5-36. Lasky Drive C Alternative

The Lasky Drive C Alternative would have a minimum curve radius less than 750 feet (Table 5-11). Metro has a design criterion of 1,000 feet minimum curve radius for the Westside Purple Line Extension (Metro 2011o). If local conditions make it impractical to meet the design criterion, a design deviation can be granted to allow individual curves of less than a 1,000-foot radius. As the radius of a curve is reduced, the speed of trains must also be reduced to prevent the trains from derailing. In addition to requiring slower train speeds, smaller curve radii increase the cost of maintaining the track and the train wheels. Train wheels make more contact with the rails on tighter curves, causing wear on both the wheels and the rail, as well as resulting in rail squeal, which is an annoyance for passengers.

The lower-limit for curve radius is 750 feet, based on operational requirements of Metro's subway vehicles. At a radius of less than 750 feet, the increased risk of derailments caused by wheels binding and climbing onto the outside rail is unacceptable and design deviations would not be approved. Because the Lasky Drive C Alternative would have a minimum curve radius of less than 750 feet, it would not be a feasible alternative (Table 5-11).

Table 5-11. Limiting Curve Radius for Lasky Drive C, D, and E Alternatives and Olympic Boulevard Alternative

Alternative	Minimum Design Criteria: Limiting Curve Radius	Comparison to lower limit curve radius of 750 feet	Feasible?
Lasky Drive C	630 feet	Less than 750 feet	Not feasible
Lasky Drive D	450 feet	Less than 750 feet	Not feasible
Lasky Drive E	400 feet	Less than 750 feet	Not feasible
Olympic Boulevard	675 feet	Less than 750 feet	Not feasible

Note: Metro has a design criterion of 1,000 feet minimum curve radius for the Westside Purple Line Extension (Metro 2011o). A design deviation can be granted to allow individual curves to have a radius of between 750 and 1,000 feet.

Lasky Drive D

The Lasky Drive D Alternative approaches BHHS following Spalding Drive, then crosses BHHS south of the Project and under the football field and track (Figure 5-37). The Lasky Drive D Alternative would tunnel under the Perpetual Savings Bank parcel, BHHS, and the AAA Building historic properties and the recreational resources associated with BHHS. The lower-limit for curve radius is 750 feet. Because the Lasky Drive D Alternative would have a minimum curve radius of less than 750 feet it would not be a feasible alternative (Table 5-11).

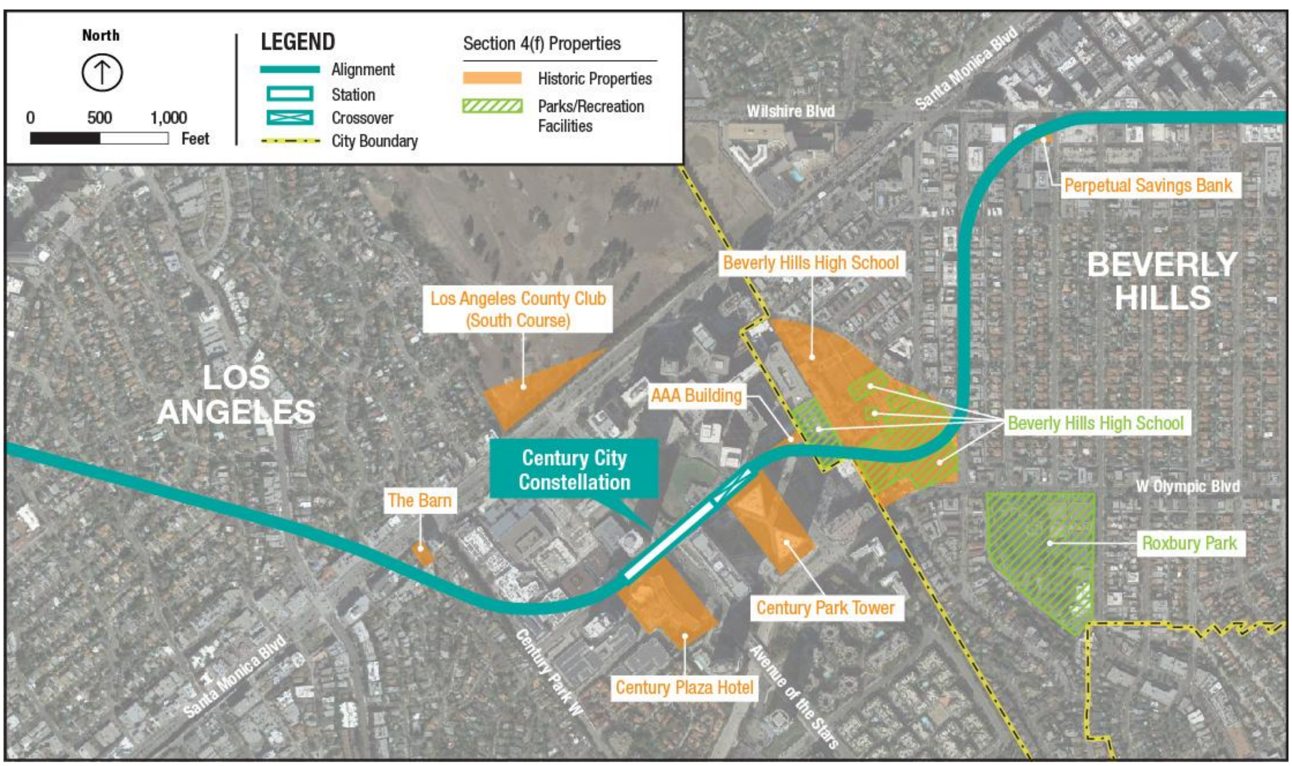


Figure 5-37. Lasky Drive D Alternative

Lasky Drive E

The Lasky Drive E Alternative crosses BHHS south of the Project and under the BHHS football field and track (Figure 5-38). The Lasky Drive E Alternative would tunnel under the Perpetual Savings Bank parcel, BHHS, and the AAA Building historic properties and the recreational resources associated with BHHS. The lower-limit for curve radius is 750 feet. Because the Lasky Drive E Alternative would have a minimum curve radius of less than 750 feet it would not be a feasible alternative (Table 5-11).

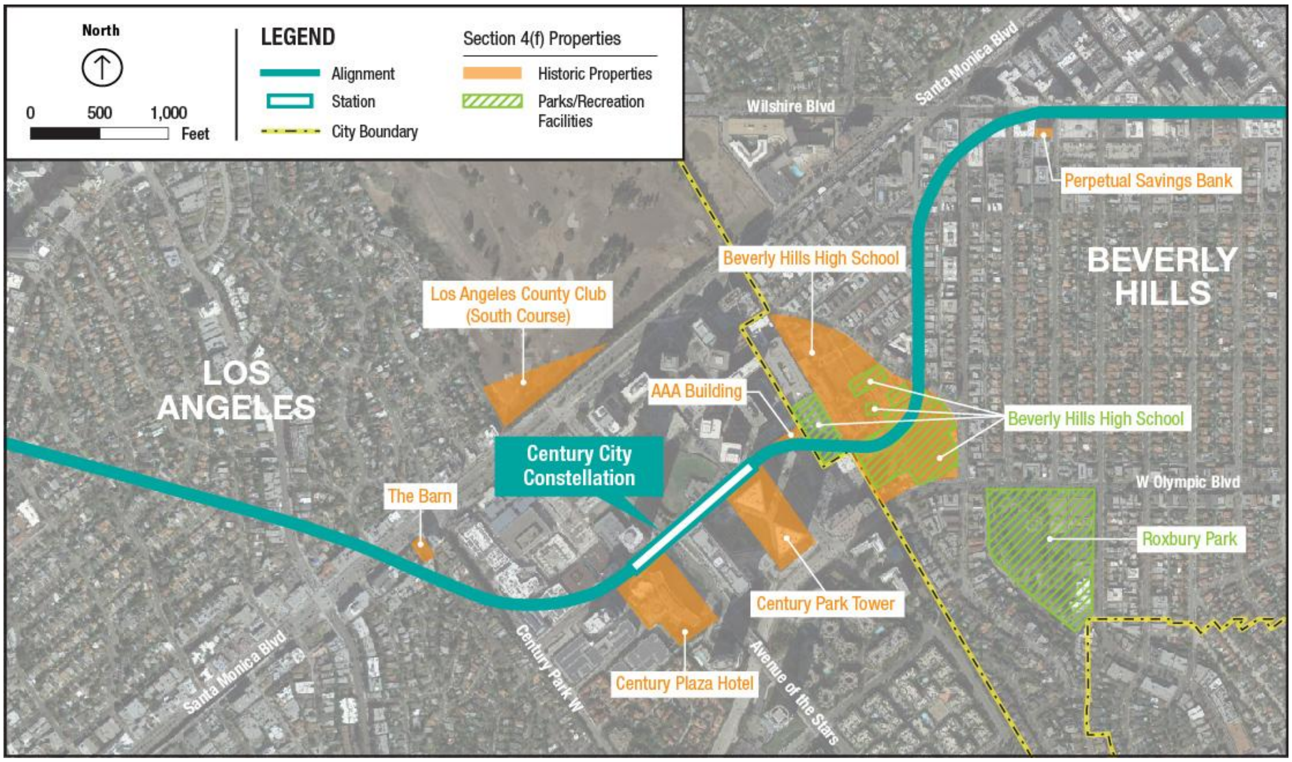


Figure 5-38. Lasky Drive E Alternative

Spalding

The Spalding Alternative approaches BHHS following Spalding Drive, then crosses BHHS south of the Project (Figure 5-39). The Spalding Alternative would tunnel under the Perpetual Saving Bank parcel, BHHS, and the AAA Building historic properties and the recreational resources associated with BHHS.

Constellation South

The Constellation South Alternative is located farther west than the Project between Wilshire Boulevard and the Constellation Boulevard station. It was considered during the Alternatives Analysis prior to issuance of the Draft EIS/EIR (Figure 5-40). The Constellation South Alternative would tunnel under Building B2 at BHHS, the AAA Building, and the Barn historic properties and the recreational resources associated with BHHS.

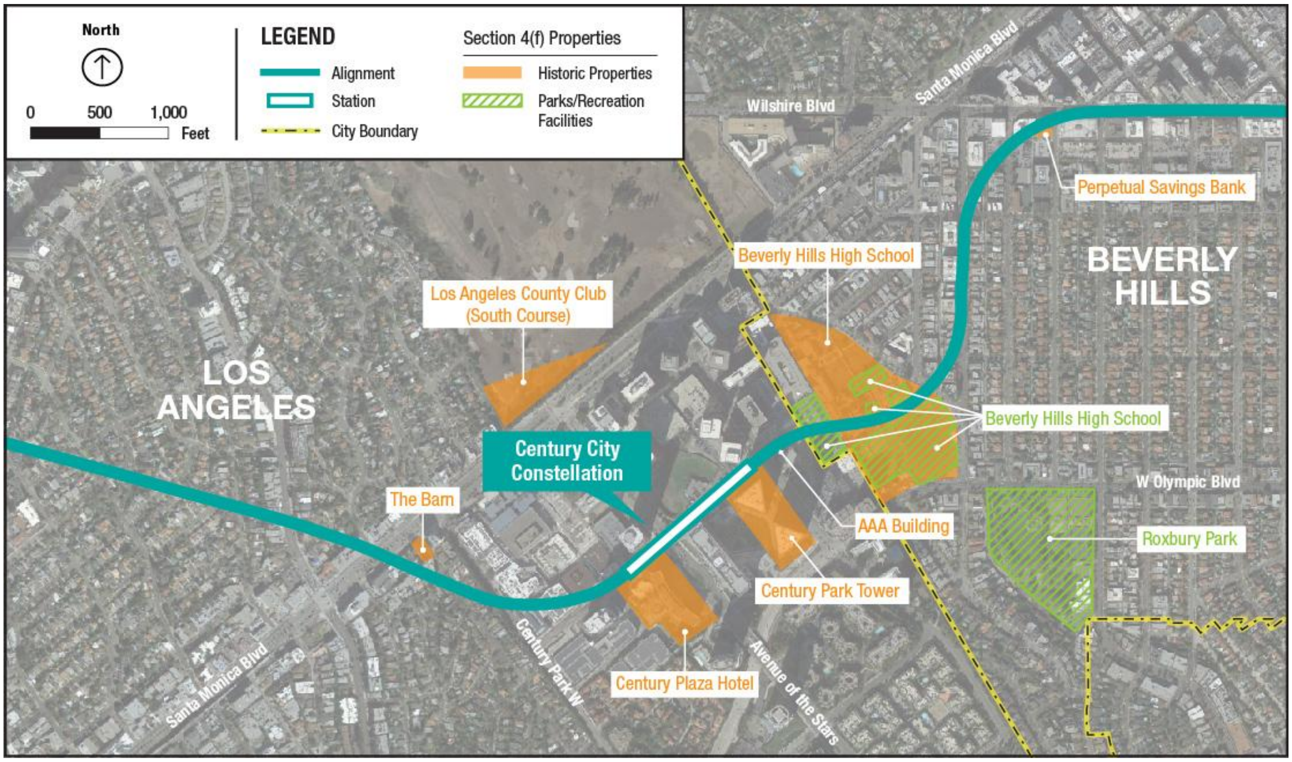


Figure 5-39. Spalding Alternative

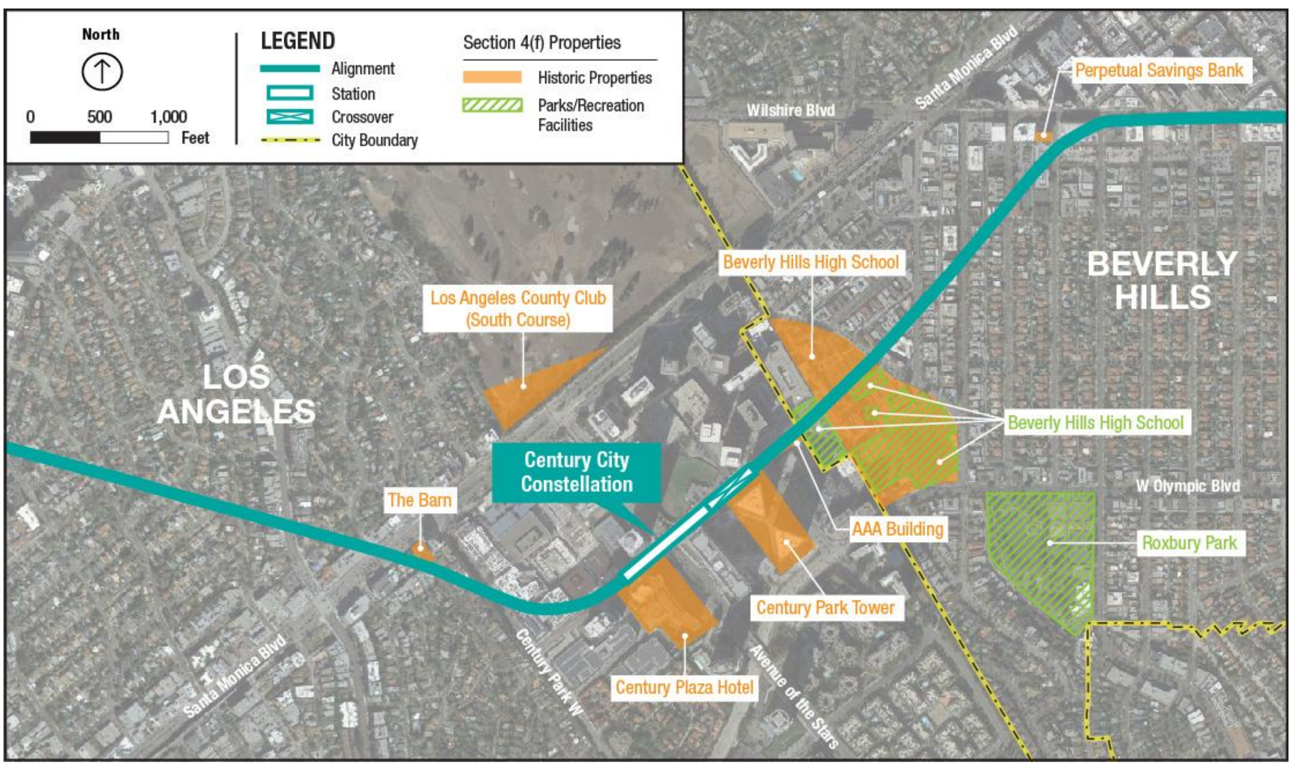


Figure 5-40. Constellation South Alternative

Avenue of the Stars

During the Alternatives Analysis prior to issuance of the Draft EIS/EIR, a tunnel alternative was developed that would reach Century City by traveling south along South Bedford Drive, crossing south of West Olympic Boulevard, then loop back to the north under Avenue of the Stars, with a station located between Constellation Boulevard and Santa Monica Boulevard (Figure 5-41). The Avenue of the Stars Alternative would tunnel under Roxbury Memorial Park and the southwest corner of the Los Angeles Country Club (South Course).

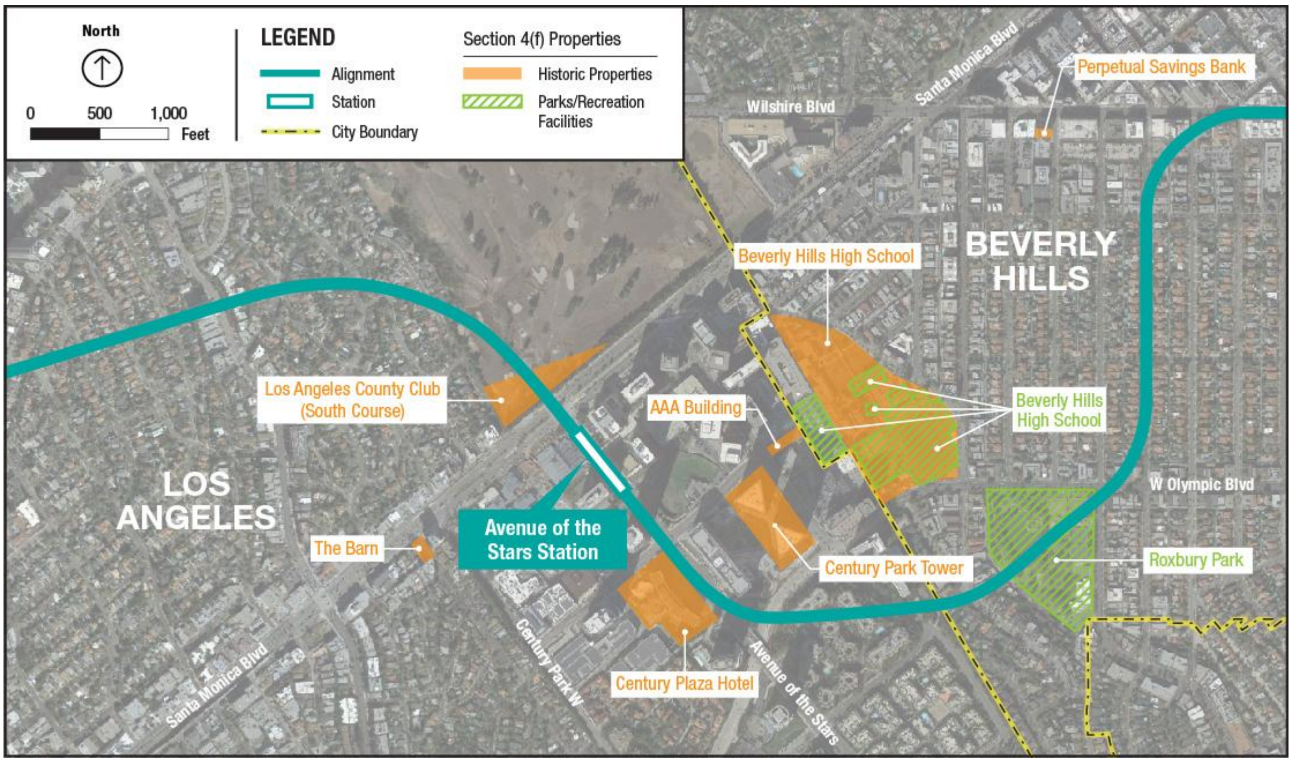


Figure 5-41. Avenue of the Stars Alternative

Olympic Boulevard

The Olympic Boulevard Alternative travels south of and avoids BHHS historic buildings and Roxbury Memorial Park (Figure 5-42). The Olympic Boulevard Alternative would tunnel under BHHS, the Century Park North Tower, and Century Plaza Hotel historic properties and the recreational resources associated with BHHS. The lower-limit for curve radius is 750 feet. Because the Olympic Boulevard Alternative would have a minimum curve radius of less than 750 feet it would not be a feasible alternative (Table 5-11).

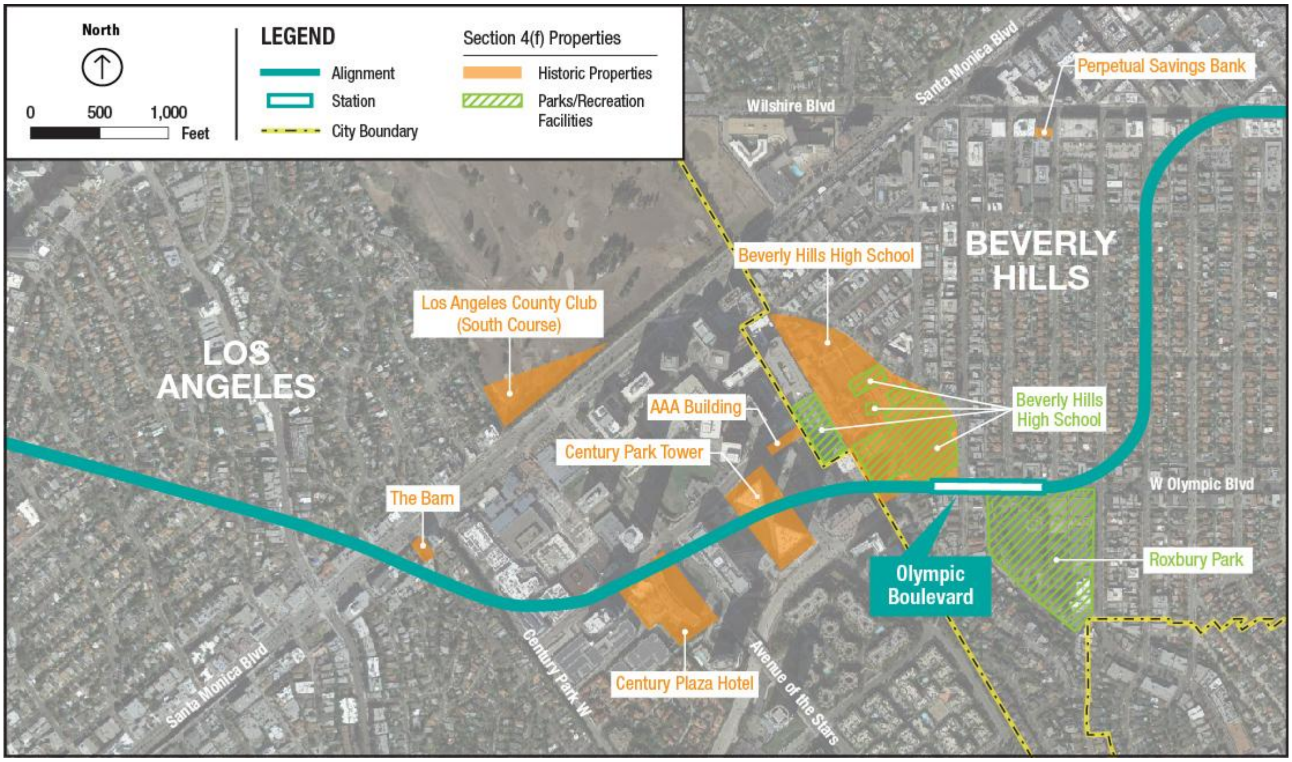


Figure 5-42. Olympic Boulevard Alternative

5.5.2 Ability to Mitigate Adverse Impacts on Each Section 4(f) Property

All of the alternatives, including the Project, would be entirely below ground with no project features reaching the surface within any of the Section 4(f) properties in the west Beverly Hills and Century City area. For the Project, the maximum operational ground-borne noise level for a tunnel under BHHS was predicted at 33 dBA, and the maximum operational vibration level was predicted at 64 VdB for any existing location on the BHHS campus, which would be less than the FTA impact criteria for institutional land uses of 40 dBA and 75 VdB (Table 4-34 of the Final EIS/EIR [Metro 2012j]). Section 4.2 of this Draft SEIS provides analysis to confirm that, with mitigation, ground-borne noise and vibration levels inside the planned future gymnasium also would be below the criteria. Vibration levels for other alternatives that include tunnels under the campus would be similar.

Tunneling with a tunnel boring machine, along with compensation grouting where required, would not cause significant ground settlement that would result in damage to the historic buildings, as discussed in Sections 4.15.3 and 8.8.4 of the Final EIS/EIR (Metro 2012). As detailed in Sections 4.3 and 4.5.5 of this Draft SEIS, construction and operation of the project would not affect methane gas movement below the Section 4(f) properties. As discussed in Section 5.3 of this Draft SEIS, the design would avoid or mitigate potential long-term adverse impacts for the Project. The same design elements would be incorporated for each of the feasible alternatives and there would be no remaining long-term harm with any of the feasible alternatives.

Construction-phase effects to Section 4(f) properties would be similar to those for the Project for all feasible alternatives except for the Avenue of the Stars Alternative. The Avenue of the Stars Alternative would require different construction staging areas because this alternative would not be adjacent to the staging areas that would be used for the Project (Figure 5-43). For the Avenue of the Stars Alternative, a site above the tunnel would be required to launch the tunnel boring machine and support tunnel boring. The only identified open area above the alignment with sufficient space to launch the tunnel boring machine is within Roxbury Memorial Park. This would require excavating a large open pit within the Park and use of parkland for staging for several years to support tunnel construction. The park would be fully restored once tunneling is complete. During that period, public park access would be limited, and several sports and recreational features would be out of service.

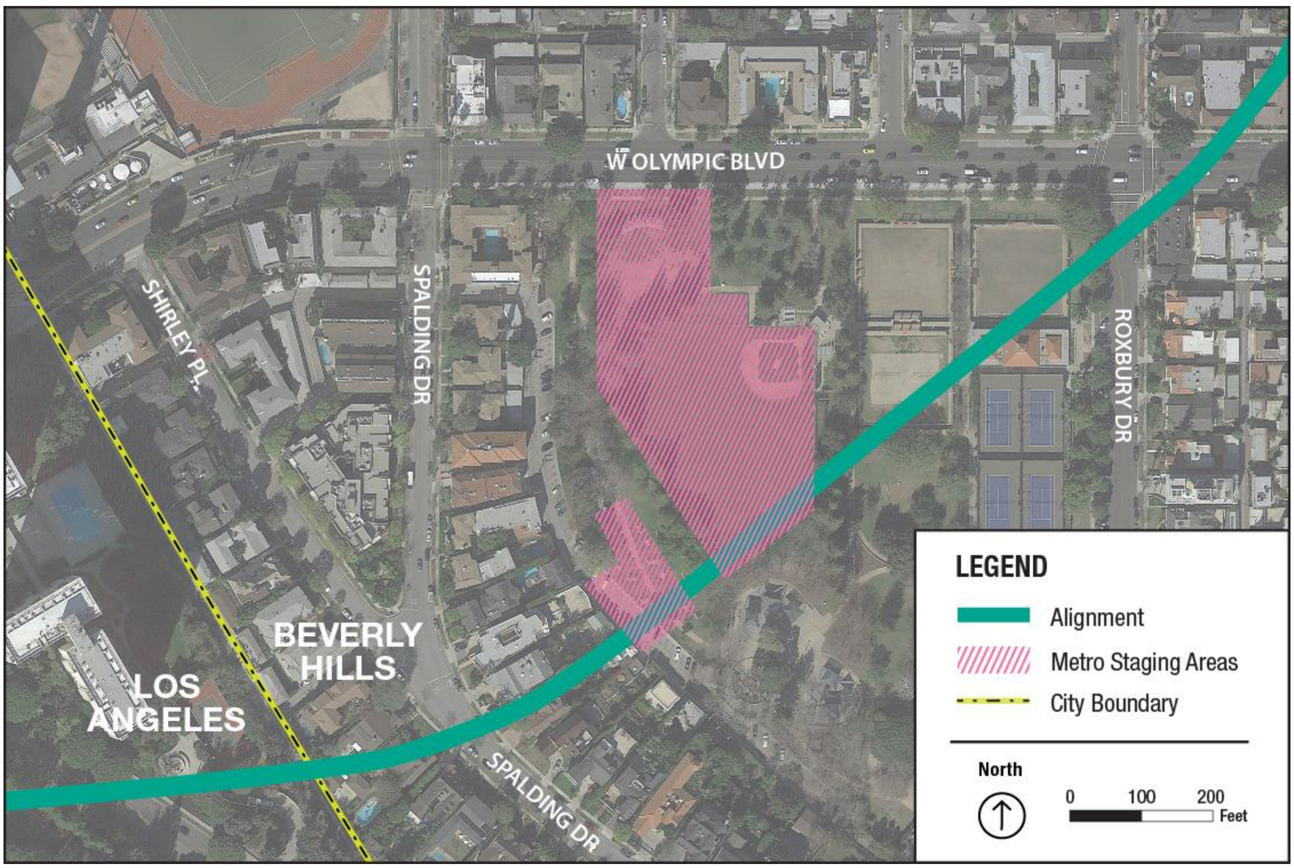


Figure 5-43. Avenue of the Stars Alternative Construction Staging Areas

5.5.3 Relative Severity of Remaining Harm, after Mitigation, to Protected Activities, Attributes, or Features that Qualify Each Section 4(f) Property for Protection

Because, as discussed in Section 5.5.2 of this Draft SEIS, there would be no permanent adverse impacts to Section 4(f) properties as a result of the tunnel, after tunnel completion there would not be any remaining harm to any Section 4(f) property in the west Beverly Hills and Century City area. The Avenue of the Stars Alternative would have construction-phase impacts to Roxbury Memorial Park that would be relatively more severe than any harm to Section 4(f) properties caused by any of the other alternatives. Because of the magnitude and duration of the use of Roxbury Memorial Park, including loss of recreational access, this would constitute a greater than *de minimis* use under Section 4(f).

5.5.4 Relative Significance of Each Section 4(f) Property

The historic sites that would require underground easements for the evaluated alternatives are all eligible for listing in the NRHP (Table 5-12). By being eligible for NRHP listing, all of the historic sites are historically significant. None of the properties are designated National Historic Landmarks or historic districts; therefore, each historic property is treated as equally significant. The FTA determined that the Project would not have an adverse effect on any of the NRHP-eligible properties in the west Beverly Hills and Century City area, and the California SHPO concurred with the determination on December 8, 2011. BHUSD has indicated in prior correspondence that it preferred that alternatives not cross under the 1927 academic building (Building B2). While consultation with the SHPO did not identify any of the historic buildings at BHHS as being more significant than others, the views of BHUSD were considered in assessing relative significance. The Century Park D, Constellation Direct, and Constellation South Alternatives would all cross under Building B2.

While the various alternatives would tunnel under or near different historic properties, the effect on historic properties would be similar for all of the alternatives.

BHHS provides public recreational opportunities during times when the campus is not in use as a school. Roxbury Memorial Park is a significant recreational property that is available for public use during all open hours. The Avenue of the Stars Alternative is the only alternative that would use land from Roxbury Memorial Park or impact the park during construction.

All of the considered Section 4(f) properties are significant; however, Building B2 has been identified as being of relatively greater concern than other historic buildings on the BHHS campus and Roxbury Memorial Park as providing more public recreational benefits than the BHHS campus. After completion of construction, there would not be any remaining harm to any of these properties. During construction, only the Avenue of the Stars Alternative would generate harm to a Section 4(f) property.

Table 5-12. Section 4(f) Properties with Use

Alternative	Section 4(f) Historic Properties with Use	Section 4(f) Recreational Properties with Use
The Project	Beverly Hills High School (Building B1) and AAA Building	Beverly Hills High School Recreational Resources (future gymnasium and future half soccer field)
Century Park D	Beverly Hills High School (Buildings B2, B3, and B4), and AAA Building	Beverly Hills High School Recreational Resources (future half soccer field)
Constellation Direct	Perpetual Savings Bank, Beverly Hills High School (Building B2), and AAA Building	Beverly Hills High School Recreational Resources (future half soccer field)
Lasky Drive A	Perpetual Savings Bank, Beverly Hills High School (Building B1), and AAA Building	Beverly Hills High School Recreational Resources (future swimming pool, future gymnasium, and future half soccer field)
Lasky Drive B	Perpetual Savings Bank, Beverly Hills High School (Building B1 and Swim-Gym), and AAA Building	Beverly Hills High School Recreational Resources (Swim-Gym, future swimming pool, and future half soccer field)
Spalding	Perpetual Savings Bank, Beverly Hills High School, and AAA Building	Beverly Hills High School Recreational Resources (future track, future baseball field, and future half soccer field)
Constellation South	Beverly Hills High School (Buildings B1 and B2), AAA Building, and the Barn	Beverly Hills High School Recreational Resources (future half soccer field)
Avenue of the Stars	Los Angeles Country Club (South Course)	Roxbury Memorial Park

5.5.5 Views of the Official(s) with Jurisdiction over Each Section 4(f) Property

Consultation with officials with jurisdiction over the Section 4(f) properties associated with the Section 2 of the Project is discussed in Section 5.6 of this Draft SEIS. Correspondence with the California SHPO is consistent in documenting that tunneling under any of the historic properties in the Project's APE would not have an adverse effect under Section 106 on the property unless there are ground-borne noise, vibration, or other direct effects of the construction or operation of the tunnel on the historic property. Tunneling would have similar effects on historic properties for all of the alternatives considered in the least overall harm analysis.

BHUSD has indicated in prior correspondence that it preferred that alternatives not cross under the 1927 academic building (Building B2). The Century Park D, Constellation Direct, and Constellation South Alternatives would all cross under the individually NRHP-eligible 1927 building that is part of the BHHS historic property.

During coordination in 2017, BHUSD and the City of Beverly Hills expressed their concerns about construction access shaft location, its purpose, and whether there were other options for the access shaft. Analysis of alternative access locations is included in Section 5.3.4 of this Draft SEIS. BHUSD asked about subsurface conditions, including abandoned oil wells on the BHHS campus, methane, and fault displacement. BHUSD also expressed concerns related to air quality, noise, public health and safety during construction. The City of Beverly Hills provided questions related to air quality modeling methodology and methane gas assessment in the vicinity of BHHS. The analysis included in Chapter 4 of this Draft SEIS considers the City and BHUSD's comments.

5.5.6 Degree to which Each Alternative Meets the Purpose and Need of the Project

As discussed in Chapter 1 of the Final EIS/EIR and reiterated in Chapter 2 of this Draft SEIS, the project's purpose is to:

- Improve Study Area mobility and travel reliability
- Improve transit services within the Study Area
- Improve access to major activity and employment centers in the Study Area
- Improve opportunities for transit-supporting land use policies and conditions
- Improve transportation equity
- Provide a fast, reliable, and environmentally sound transit alternative
- Meet Regional Transit Objectives through the Southern California Association of Governments' performance indicators of mobility, accessibility, reliability, and safety

Because all of the alternatives would provide a similar service, serve a similar area, and connect to the same transit system beyond the west Beverly Hills and Century City area, they would have similar performance relative to the project purpose and need for most of these elements. Areas where they differ would be in improving study area mobility and travel reliability and providing fast and reliable transit, which are factors of travel time for passengers; the accessibility of the station to housing and employment, which can be illustrated in the difference in total system boardings between alternative station locations; and in the safety of passengers, including environmental risks to the system (Table 5-13).

All of the alternatives with station entrances in the vicinity of Constellation Boulevard and Avenue of the Stars would have similar accessibility to nearby residential and commercial uses. The Avenue of the Stars (Figure 5-41) Alternative would relocate the Century City Station north from the center of the concentration of development in Century City; however, entrances connecting to the south end of the station would be located near Constellation Boulevard, making the increase in walking distance relatively small.

Travel times would differ between the alternatives depending on the length and limiting speed of the alignment between the Wilshire/Rodeo and the Century City stations (Table 5-13). Of the feasible alternatives, Century Park D, Constellation Direct, the Project, and the Spalding Alternatives would have the shortest travel times. Travel time for the other alternatives would be up to 43 seconds longer than for the Project. For the 56,680 passengers that board and alight daily at Century City and stations farther west, they would collectively experience between 50 daily hours of travel time savings with the Constellation South Alternative and 680 additional hours of travel time with the Avenue of the Stars Alternative compared to the Project.

Table 5-13. Factors in the Effectiveness of Alternatives in Meeting Purpose and Need

Alternative	Travel Time between Rodeo and UCLA Stations (min:sec)	Distance between Wilshire/Rodeo and Westwood/UCLA Stations	Ridership	Safety and Operating Concerns
The Project	5:14	16,390 feet	49,340 daily system boardings[1]	No safety concerns related to faults
Century Park D	5:12	16,690 feet	Similar to the Project	No safety concerns related to faults
Constellation Direct	5:17	16,600 feet	Similar to the Project	No safety concerns related to faults
Lasky Drive A	5:29	16,530 feet	Similar to the Project	No safety concerns related to faults
Lasky Drive B	5:56	16,630 feet	48,630 daily system boardings[2]	No safety concerns related to faults
Spalding	5:36	16,510 feet	Similar to the Project	No safety concerns related to faults
Constellation South	5:11	16,040 feet	Similar to the Project	No safety concerns related to faults
Avenue of the Stars	5:57	18,030 feet	48,630 daily system boardings[2]	Safety concerns related to faults in vicinity of the station

[1]Final EIS/EIR, Table 3-5
[2]Supplemental travel demand forecasting completed to support this Draft SEIS

5.5.7 After Reasonable Mitigation, the Magnitude of any Adverse Impacts to Resources not Protected by Section 4(f)

In the west Beverly Hills and Century City area, none of the alternatives would have significant differences in adverse impacts to elements of the environment not protected by Section 4(f). For most of the alternatives, construction staging and access areas would be the same as for the Project (refer to Section 2.3.2 of this Draft SEIS); therefore, construction-phase impacts would be similar. As discussed in Section 5.5.2 of this Draft SEIS, unlike the other alternatives, the Avenue of the Stars Alternative would require different construction staging areas that would limit access to and recreational use of Roxbury Memorial Park during construction (Figure 5-43). All of the alternatives would require subsurface easements from private properties for the tunnel (Table 5-14). While the Project and Century Park D Alternatives would tunnel under more commercial properties than the other alternatives, the Project, Century Park D, and Lasky Drive A Alternatives would tunnel under the fewest residential properties of all of the alternatives. The Avenue of the Stars Alternative would require the greatest number of subsurface easements from residential properties.

Table 5-14. Required West Beverly Hills and Century City Subsurface Easements

Alternative	Easements from Commercial Properties	Easements from Residential Properties
The Project	30	90
Century Park D	27	90
Constellation Direct	23	93
Lasky Drive A	23	88
Lasky Drive B	21	107
Spalding	19	100
Constellation South	20	97
Avenue of the Stars	11	130

5.5.8 Substantial Differences in Costs among Alternatives

Capital costs would differ between the Project and the other feasible avoidance alternatives (Table 5-15). The Constellation South Alternative would be the least costly overall, followed by the Project.

Table 5-15. Comparison of Costs

Alternative	Capital Cost[1]	Difference from the Project
The Project	$2,411	N/A
Century Park D	$2,471	$60 (2.5%)
Constellation Direct	$2,419	$8 (0.3%)
Lasky Drive A	$2,417	$6 (0.2%)
Lasky Drive B	$2,423	$12 (0.5%)
Spalding	$2,414	$3 (0.1%)
Constellation South	$2,368	-$42 (-1.8%)
Avenue of the Stars	$2,423	$12 (0.5%)

[1]Values are in millions (year of expenditure dollars)

5.5.9 Summary of Finding of Least Overall Harm

The Project would generate the least overall harm considering the degree to which the alternative meets the purpose and need, the magnitude of other adverse impacts, and substantial differences in costs among the alternatives. This conclusion is supported by the least overall harm evaluation detailed in subsections 5.5.2 through 5.5.8 of this Draft SEIS.

Compared to the Project, the Century Park D Alternative would cross below BHHS Building B2, B3, and B4 and have a substantially greater cost (Table 5-16). The Constellation Direct Alternative would cross below BHHS Building B2, tunnel under an additional Section 4(f) property (Perpetual Savings Bank) and would have increased travel time, residential subsurface easements, and cost relative to the Project (Table 5-16). The Lasky Drive A Alternative would travel under the same existing Section 4(f)-protected features at BHHS as the Project as well as below the planned future swimming pool, would tunnel under an additional Section 4(f) property (Perpetual Savings Bank), and have increased travel time and cost relative to the Project (Table 5-16). The Lasky Drive B Alternative would tunnel under the Swim-Gym as well as the future swimming pool and an additional Section 4(f) property (Perpetual Savings Bank) and would have increased travel time, residential subsurface easements, and cost relative to the Project (Table 5-16). The Spalding Alternative would tunnel under an additional Section 4(f) property (Perpetual Savings Bank) and would have increased residential subsurface easements and cost relative to the Project (Table 5-16). While the Constellation South Alternative would be less costly than the Project, it would require subsurface easements from more residential properties, tunnel under an additional Section 4(f) property (the Barn), and would cross below BHHS Building B2 (Table 5-16). The Avenue of the Stars Alternative would have substantial construction-phase impacts to Roxbury Memorial Park, a significant recreational resource, that are relatively more severe than the remaining harm of any other alternative to Section 4(f) properties. It would also have increased travel time, travel under Roxbury Memorial Park, require subsurface easements from substantially more residential properties, and have increased cost relative to the Project (Table 5-16).

Table 5-16. Least Overall Harm

Alternative	Subsurface easements below Section 4(f) Historic Properties	Subsurface easements below Section 4(f) Recreational Properties	Construction phase impacts to Section 4(f) Properties	Transit Travel Time Relative to the Project	Subsurface Easements	Capital Cost Relative to the Project (YOE)
The Project (**Least Overall Harm**)	BHHS (Building B1) and AAA Building	BHHS School Recreational Resources (future gymnasium and future half soccer field)	Monitoring instruments at BHHS and construction staging at AAA Building	-	90 residential 30 commercial	-
Century Park D	BHHS (Buildings B2, B3, and B4), and AAA Building	BHHS School Recreational Resources (future half soccer field)	Monitoring instruments at BHHS and construction staging at AAA Building	30 person-hours of daily travel time savings	90 residential 27 commercial	$60M greater
Constellation Direct	Perpetual Savings Bank, BHHS (Building B2), and AAA Building	BHHS Recreational Resources (future half soccer field)	Monitoring instruments at BHHS and construction staging at AAA Building	50 person-hours of daily travel time increase	93 residential 23 commercial	$8M greater
Lasky Drive A	Perpetual Savings Bank, BHHS (Building B1), and AAA Building	BHHS Recreational Resources (future swimming pool, future gymnasium, and future half soccer field)	Monitoring instruments at BHHS and construction staging at AAA Building	240 person-hours of daily travel time increase	88 residential 23 commercial	$6M greater
Lasky Drive B	Perpetual Savings Bank, BHHS (Building B1 and Swim-Gym), and AAA Building	BHHS Recreational Resources (Swim-Gym, future swimming pool, and future half soccer field)	Monitoring instruments at BHHS and construction staging at AAA Building	660 person-hours of daily travel time increase	107 residential 21 commercial	$12M greater
Spalding	Perpetual Savings Bank, BHHS, and AAA Building	BHHS Recreational Resources (future track, future baseball field, and future half soccer field)	Monitoring instruments at BHHS and construction staging at AAA Building	350 person-hours of daily travel time increase	100 residential 19 commercial	$3M greater
Constellation South	BHHS (Buildings B1 and B2), AAA Building, and the Barn	BHHS Recreational Resources (future half soccer field)	Monitoring instruments at BHHS and construction staging at AAA Building	50 person-hours of daily travel time savings	97 residential 20 commercial	$42M less
Avenue of the Stars	Los Angeles Country Club (South Course)	Roxbury Memorial Park	Construction activities would use Roxbury Memorial Park; Park access limited during construction	680 person-hours of daily travel time increase	130 residential 11 commercial	$12M greater

The Project would generate the least overall harm. Table 5-16 summerizes information detailed in subsections 5.5.2 through 5.5.8 of this Draft SEIS. Text in black denotes impact similar to the Project. Text in red indicates greater impact or worse performance than the Project. Text in green indicates less impact or better performance than the Project.

5.6 Coordination and Consultation

This section provides a summary of consultation and coordination with officials with jurisdiction over Section 4(f) properties that could be affected by the Project and an outline of the public and agency review and comment opportunity on the Section 4(f) evaluation.

In 2010 and 2011, the FTA consulted with the California SHPO regarding the area of potential effects on historic properties, the eligibility of historic properties, and the effects of the project on historic properties. The FTA determined, and the California SHPO concurred in a letter dated December 8, 2011, that the Project would not have an adverse effect on BHHS or the AAA Building.

When the FTA intends to make a *de minimis* impact determination for historic properties, it is required to obtain concurrence from the California SHPO that the project would not have an adverse effect on the site and notify the California SHPO of its intent to make the *de minimis* impact determination (23 CFR 774.5(b)). The FTA notified the California SHPO of its finding of effect on September 16, 2011, and the California SHPO concurred with the determination on December 8, 2011. The public was given an opportunity to review and comment on the determination of effect when the FTA solicited comments on the Final EIS/EIR in March 2012.

The level of detail about construction staging near the AAA Building has increased since the Final EIS/EIR (Metro 2012); therefore, FTA reassessed project effects related to construction staging, as described in Section 4.4.2 of this Draft SEIS. FTA has made a finding that the construction staging would have no new adverse effect on historic properties and is consulting with the California SHPO. As part of the consultation, FTA is informing the California SHPO of its intent to make a Section 4(f) finding based on their concurrence with the Section 106 determination.

When the FTA intends to make a *de minimis* impact determination for recreational Section 4(f) properties, it must inform the official with jurisdiction of its intent to make a *de minimis* impact finding. On January 25, 2017, per 23 CFR 774.5, FTA consulted with and informed the City of Beverly Hills Community Services Department and the BHUSD, the officials with jurisdiction over the public use of the BHHS sports fields, of its intent to make a *de minimis* impact determination for the recreational facilities, below which the project would construct and operate a tunnel in a subsurface easement.

The City of Beverly Hills responded to the FTA on February 2, 2017, requesting consultation under Section 106 and requesting additional information related to the Project's construction schedule, analysis of subsurface conditions, measures to minimize risk to public safety, proposed survey and monitoring activities, analysis of atmospheric effects from staging areas, feasible and prudent avoidance alternatives, and information related to the Project's Section 106 process. The City also requested a meeting with FTA.

The BHUSD responded to the FTA on February 8, 2017, requesting consultation under Section 106 and requesting additional information related to the Project's lack of impairment to recreational features, construction schedule, analysis of subsurface conditions, measures to minimize risk to public safety, proposed survey and monitoring activities, documentation that the survey and monitoring would not affect public use of recreational facilities, analysis of atmospheric effects from staging areas, feasible and prudent avoidance alternatives, and information related to the Project's Section 106 process. BHUSD also requested a meeting with FTA.

On February 15, 2017, FTA and Metro met with the City of Beverly Hills and BHUSD representatives to discuss the findings and provide the additional information requested by the reviewing parties. BHUSD and the City of Beverly Hills asked about construction access shaft location and purpose and whether there were other options for the access shaft. BHUSD asked about subsurface conditions, including abandoned oil wells on the BHHS campus, methane, and fault displacement. BHUSD also expressed concerns related to air quality, noise, and safety during construction.

On April 4, 2017, the City of Beverly Hills responded to FTA with questions related to air quality modeling methodology and methane gas assessment in the vicinity of BHHS. The analysis included in Chapter 4 of this Draft SEIS considers the City's comments.

On April 7, 2017, BHUSD responded to FTA with questions related to subsurface methane gas, seismic analysis, noise and vibration, and air quality and public health. The analysis included in Chapter 4 of this Draft SEIS considers BHUSD's comments.

With this Draft SEIS, the FTA is seeking public review and comment on its intent to make a *de minimis* impact determination regarding the Section 4(f) properties evaluated in Section 5.3 of this Draft SEIS. Following the opportunity for public comment, the FTA will request the concurrence of the City of Beverly Hills Community Services Department and the BHUSD with FTA's determination of *de minimis* impact on the BHHS recreational facilities.

5.7 Preliminary Section 4(f) Finding

The FTA has made a preliminary determination that the Project would have a *de minimis* impact on the historic activities, attributes, or features that qualify BHHS and the AAA Building for protection under Section 4(f) as historic properties. Recreational facilities located at BHHS also qualify for protection as publicly owned recreational resource that is open to the public at times when they are not in use by the school. The FTA also has made a preliminary determination that the Project would have a *de minimis* impact on the activities, attributes, or features that qualify BHHS recreational facilities for protection as publicly owned recreational facilities that are open to the public. Even if the final determination is that the impact of the Project on Section 4(f) properties is not *de minimis*, FTA has determined that the Project would satisfy the requirements of Section 4(f) because (1) as documented in Section 5.4, there is no prudent and feasible alternative that would avoid use of the 4(f) properties; and (2) as documented in Section 5.5, the Project, when compared to other alternatives, would generate the least overall harm.

CHAPTER 6—PUBLIC AND AGENCY OUTREACH

This chapter documents the Westside Purple Line Extension Project (the Project) Public Participation Plan for the Draft Supplemental Environmental Impact Statement (Draft SEIS) and Section 4(f) Evaluation, in compliance with the National Environmental Policy Act (NEPA) (42 United States Code (USC) (4321-4347) and its implementing regulations (23 Code of Federal Regulations (CFR) Part 771).

6.1 Highlights of Previous Outreach Efforts

Over the past 30 years, tremendous population growth, employment growth, worsening congestion, changing land use and traffic patterns, and the growing challenge of the Los Angeles County Metropolitan Transportation Authority (Metro) to meet transit demands have collectively led to the need to improve mobility in the West Los Angeles area. The Westside Purple Line Extension Project (the Project) was initiated to address these mobility needs. The project garnered considerable stakeholder interest and involvement throughout the environmental process, from the Alternatives Analysis (AA) and Draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR) through the Final EIS/EIR phases of the Project. Outreach efforts continue today as construction of Section 1 is underway.

In fall 2007, Metro began an AA for the Purple Line Extension Transit Corridor. The AA considered whether a transit improvement was needed in the area and evaluated different types of transit improvements and alignments. The AA concluded in January 2009 when the Metro Board of Directors approved moving forward with the Draft EIS/EIR, which analyzed five subway alternatives. A robust community outreach process was deployed throughout this phase, including five early scoping meetings, key stakeholder meetings, inter-agency coordination, and outreach in multiple languages.

The Draft EIS/EIR began in spring 2009 to assess the impacts of alternatives both during construction and once the system is operational, and to look at potential mitigation measures. Issues were addressed as the alternatives were refined, including decisions about station locations and ultimate alignments in order to best address the mobility needs of residents, workers, and visitors traveling to, from, and within the highly congested Corridor Study Area by providing faster and more reliable high-capacity public transportation than existing services. In a collaborative effort, Metro worked closely with the community to address appropriate mitigation measures regarding construction and operational impacts, including station alignment options and tunneling safety.

The Draft EIS/EIR process concluded in October 2010 with Metro's staff recommendation for a Locally Preferred Alternative to advance into the Final EIS/EIR process. A thorough stakeholder outreach and public engagement process was conducted, including five public hearings and several community update meetings covering a range of topics. In 2010, Metro also established Station Area Advisory Groups (SAAGs) for each of the stations, with the exception of the Westwood/Veterans Affairs Hospital Station. Each SAAG was comprised of stakeholders within the project area to represent the public's concerns and stay up to date on the status of the project. The SAAG meetings were held quarterly to address outstanding issues and update the group on the status of the project. The formation and success of the SAAGs, accompanied by Metro's desire to implement a transparent and proactive process in engaging the community, collectively provided an exceptional opportunity for stakeholder engagement to address pertinent issues, and in the process built trust and support for the completion of a large transit project.

In October 2010, the Metro Board authorized the preparation of the Final EIS/EIR to refine the Board-selected Locally Preferred Alternative, alignment, station and entrance locations, ridership data, and costs, as well as to present mitigation measures and to respond to comments on the Draft EIS/EIR. The public engagement effort continued with ongoing community update meetings and a series of SAAG meetings. Beginning in 2012, Metro also began hosting pre-construction meetings and more recently construction update meetings. The Final EIS/EIR was released in March 2012 for public review. In April 2012, the Metro Board of Directors certified the Final EIS/EIR and approved Section 1 of the project, extending the Purple Line to Wilshire/La Cienega. In May 2012, the Metro Board approved Sections 2 and 3 of the Project extending the Purple Line to the Westwood/Veterans Affairs Hospital.

Subsequent to the completion of the Final EIS/EIR, Metro has continued its proactive public engagement efforts. Metro initiated pre-construction and construction update meetings for communities near Section 1 of the Project beginning in fall 2014, hosting small gatherings and larger community meetings to keep the public informed as the project moves forward. These meeting are ongoing where the project team provides construction updates, including station progress, a construction schedule of what to expect that include impacts related to noise and vibration, and updated fact sheets for reference. Project business cards are also available to the public with a point of contact to address any issues or concerns that could arise from the daily impacts of construction. Metro initiated the first pre-construction community meeting for the Section 2 portion of the project in October 2016 and will continue these similar to the outreach for the Section 1 communities.

Additionally, Metro's Purple Line Extension public outreach program has been recognized twice by the Innovations in American Government competition that is run by the Harvard Kennedy School's Ash Center for Democratic Governance and Innovation. It was initially recognized as "Bright Idea" in 2012 and was named as a semi-finalist in the 2015 competition. These awards recognized the project for using new communication tools integrated with long-standing outreach strategies and for being all inclusive during the AA, Draft EIS/EIR, and Final EIS/EIR phases. The Project is recognized as the first NEPA project to fully incorporate new media strategies that included blogs, online publications, social networking tools such as Facebook and Twitter, and live streaming of community meetings, along with traditional outreach tools.

6.2 Public Participation Plan

Recognizing the unique challenges and opportunities of the proposed Project, Metro developed a creative approach to outreach to ensure an inclusive, engaging, and transparent public participation process from the AA through the Final EIS/EIR. The community outreach effort was designed to build awareness and understanding of the Project, provide opportunities for ongoing stakeholder involvement and input, and assist in the identification of potential mitigation measures. Outreach included engagement with a wide diversity of stakeholders and opinion leaders, including business organizations, chambers of commerce, business improvement districts, neighborhood councils, community councils, homeowners and residents associations, arts organizations, and elected officials representing the project area. Multi-lingual outreach was conducted, where appropriate, in Spanish, Korean, and Russian. The Public Participation Plan (PPP) is provided in the *Westside Subway Extension Alternatives Screening and Refinement following Scoping Report* (Metro 2010b) as Appendix A.

Elements of the PPP included a stakeholder database, communications protocols, public input tracking, a schedule for interfacing with the public, and recommendations for how meetings should be conducted. Project notifications, mailers, and updates will follow the specification outlined in the PPP, including newspaper ads and media outreach in appropriate languages.

This proactive PPP is ongoing through the SEIS phase, including direct outreach to businesses, stakeholders, and chambers of commerce with membership within the Study Area, as well as a new media emphasis on the avenues and opportunities to provide public comment to maximize community participation.

6.3 Public and Agency Comment for the Draft EIS

This Draft SEIS is intended to provide additional detail on Section 2 of the Project as it was approved by the Metro Board of Directors in May 2012. Therefore, the public outreach for this Draft SEIS will be focused on Section 2 of the Project, specifically the West Beverly Hills and Century City areas. Public notice of the availability of the Draft SEIS, a 45-day public review period, and notification of the completion of the Final SEIS will be provided in compliance with NEPA and the implementing regulations (23 CFR 771.130; 40 CFR 1502.9).

This Draft SEIS is being distributed for public review and comment for a 45-day period. Copies of the Draft SEIS may be reviewed at the Metro Transportation Library at One Gateway Plaza, 15th floor, Los Angeles, CA 90012; and at the following public library locations:

- Beverly Hills Public Library, 444 North Rexford Dr., Beverly Hills, CA 90210
- Donald Bruce Kaufman -Brentwood Library, 11820 San Vicente Blvd., Los Angeles 90049
- Fairfax Library, 161 S. Gardner St., Los Angeles 90036
- Felipe de Neve Library, 2820 W. Sixth St., Los Angeles 90057
- Frances H. G. Hollywood Regional Library, 1623 N. Ivar Ave., Hollywood 90028

- John C. Fremont Library, 6121 Melrose Ave., Los Angeles 90038
- Memorial Library, 4625 W. Olympic Blvd., Los Angeles 90019
- Pio Pico Koreatown Library, 694 S. Oxford Ave., Los Angeles 90005
- Robertson Branch Library, 1719 S. Robertson Blvd, Los Angeles 90035
- Santa Monica Main Library, 601 Santa Monica Blvd, Santa Monica 90401
- West Hollywood Public Library, 715 North San Vicente, West Hollywood 90069
- West Los Angeles Regional Library, 11360 Santa Monica Blvd, Los Angeles 90025
- Westwood Library, 1246 Glendon Ave., Los Angeles 90024
- Will & Ariel Durant Library, 7140 W. Sunset Blvd., Los Angeles 90046
- Wilshire Library, 149 N. St. Andrews Pl., Los Angeles 90004

A Notice of Availability about this Draft SEIS has been published in the *Federal Register*. One public hearing will be held on the content and findings of this Draft SEIS. Information on the public hearing and the Draft SEIS may be found on the project website at: www.metro.net/projects/westside.

6.4 Section 106 Consultation

An extensive consultation process with various cultural resources groups and historic preservation agencies to identify traditional cultural properties, cultural practices, historic properties, and areas of archeological interest or potential was conducted during all phases of the environmental planning process and has been documented for the Section 106 consultation process. Detailed information can be found in Chapter 8, Public and Agency Outreach, of the Final EIS/EIR.

The level of detail about construction staging near the AAA Building has increased since the Final EIS/EIR (Metro 2012); therefore, the Federal Transit Administration (FTA) reassessed project effects related to construction staging, as described in Section 4.4.2 of this Draft SEIS. FTA has made a finding that the construction staging would have no new adverse effect on historic properties and is consulting with the California State Historic Preservation Officer (SHPO). As part of the consultation, FTA has prepared a letter to the California SHPO explaining the purpose of the SEIS, court order, the alternatives under evaluation and anticipated impacts. FTA is also informing the California SHPO of its intent to make a Section 4(f) finding based on their concurrence with the Section 106 determination. FTA is in consultation with the California SHPO regarding the reassessment of effects on historic properties as of the date of issue of this Draft SEIS.

As part of the ongoing project design development and refinements, Beverly Hills Unified School District and the City of Beverly Hills have requested to be Section 106 consulting parties. FTA has granted this request and both groups will be included in forthcoming Section 106 consultation, affording them the opportunity to comment on historic preservation-related aspects of the Project.

6.5 Section 4(f) Consultation

This consultation and coordination has continued through this Draft SEIS phase in regard to Section 4(f) and is summarized below and detailed in Chapter 5 of this Draft SEIS.

On January 25, 2017, per 23 CFR 774.5, FTA consulted with and informed the City of Beverly Hills Community Services Department and the Beverly Hills Unified School District (BHUSD), the officials with jurisdiction over the public use of the Beverly Hills High School (BHHS) sports fields, of its intent to make a *de minimis* impact determination for the recreational facilities, below which the project would construct and operate a tunnel in a subsurface easement.

The City of Beverly Hills responded to the FTA on February 2, 2017, requesting consultation under Section 106 and requesting additional information The City also requested a meeting with FTA.

The BHUSD responded to the FTA on February 8, 2017, requesting consultation under Section 106 and requesting additional Project information. BHUSD also requested a meeting with FTA.

On February 15, 2017, FTA and Metro met with the City of Beverly Hills and BHUSD representatives to discuss the findings and provide the additional information requested by the reviewing parties.

On April 4, 2017, the City of Beverly Hills responded to FTA with questions related to air quality modeling methodology and methane gas assessment in the vicinity of BHHS. The analysis included in Chapter 4 of this Draft SEIS considers the City's comments.

On April 7, 2017, BHUSD responded to FTA with questions related to subsurface methane gas, seismic analysis, noise and vibration, and air quality and public health. The analysis included in Chapter 4 of this Draft SEIS considers BHUSD's comments.

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City of Los Angeles, Public Works/ Street Services	Nazario Sauceda, Interim Director	1149 South Broadway, Suite 700, Los Angeles, CA 90015
City of Los Angeles, Public Works/Engineering	Gary Lee Moore, Director	1149 South Broadway, Suite 700, Los Angeles, CA 90015
City of Los Angeles, Public Works/Street Lighting	Ed Ebrahimian, Director	1149 South Broadway, Suite 200, Los Angeles, CA 90015
City of Los Angeles, Street Improvement and Stormwater Division	Curtis Tran, Civil Engineer	1149 South Broadway, Suite 700, Los Angeles, CA 90015

Agency	Contact	Contact Information
City of Los Angeles, Recreation and Parks	Jon Kirk Mukri, General Manager	221 North Figueroa Street, Suite 100, Los Angeles, CA 90012
City of Los Angeles, Recreation and Parks	Melinda Gejer, Planning Associate	221 North Figueroa Street, Suite 100, Los Angeles, CA 90012
City of Los Angeles, Water and Power	David Wright Chief Executive Officer/General Manager	111 North Hope Street, Los Angeles, CA 90012
City of Los Angeles: Public Works: Bureau of Engineering	Julie Sauter, Deputy City Engineer	1149 South Broadway, Los Angeles, CA 90015
Community Redevelopment Agency	Steve Valenzuela, CEO	354 South Spring Street, Suite 800, Los Angeles, CA 90013
City of Los Angeles: Public Works: Bureau of Engineering	Dung Tran, Bridge Improvement Program	1149 South Broadway, Suite 700, Los Angeles, CA 90015
City of Los Angeles, Building and Safety	Frank Bush, General Manager	201 North Figueroa Street, Suite 1000, Los Angeles, CA 90012
City of Los Angeles Housing Authority	Ken Simmons, President/CEO	2600 Wilshire Boulevard, Los Angeles, CA 90057
City of Los Angeles, Office of Historic Resources	Ken Bernstein, Manager and Principal City Planner	200 North Spring Street, Room 620, Los Angeles, CA 90012
Los Angeles Convention Center	Brad Gessner, Senior Vice President and General Manager	1201 South Figueroa Street, Los Angeles, CA 90015
City of Santa Monica		
City of Santa Monica	Rick Cole, City Manager	1660 Seventh Street, Santa Monica, CA 90401-3324
City of Santa Monica Civil Engineering Division	Lee Swain, City Engineer	1437 4th Street, Suite 300, Santa Monica, CA 90401
City of Santa Monica Environmental and Public Works	Susan Cline, Director	1685 Main Street, Room 116, Santa Monica, CA 90401-3324
City of Santa Monica, Planning and Community Development	Eileen Fogarty, Assistant Director	1685 Main Street, Room 214, Santa Monica, CA 90401-3324
City of Santa Monica	Beth Rolandson, Principal Transportation Planner	1685 Main Street, Room 214, Santa Monica, CA 90401-3324
City of Santa Monica, Community and Cultural Services	Barbara Stinchfield, Director	1685 Main Street, Room 210, Santa Monica, CA 90401-3324
City of Santa Monica,	Elaine Polachek, Assistant City Manager	2600 Ocean Park Boulevard, Santa Monica, CA 90405
Santa Monica Fire Department	Bill Walker, Chief	333 Olympic Drive, 2nd Floor, Santa Monica, CA 90401
Santa Monica Fire Department	Brad Lomas, Assistant Fire Marshal	333 Olympic Drive, 2nd Floor, Santa Monica, CA 90401
Santa Monica Police Department	Jacqueline A. Seabrooks, Chief	333 Olympic Drive, 2nd Floor, Santa Monica, CA 90401
Santa Monica Water Resources Division	Gil Balboa, Director	1212 5th Street, 3rd Floor, Santa Monica, CA 90401

Metro

Agency	Contact	Contact Information
City of West Hollywood		
City of West Hollywood, City Manager's Office	Paul Arevalo, City Manager	8300 Santa Monica Boulevard, West Hollywood, CA 90069
City of West Hollywood, City Manager's Office	Lisa Belsanti, Director of Communications	8300 Santa Monica Boulevard, West Hollywood, CA 90069
City of West Hollywood, Community Development Department	Stephanie DeWolfe, Community Development Director	8300 Santa Monica Boulevard, West Hollywood, CA 90069
West Hollywood, Dept. of Public Works	Oscar Delgado, Director	8300 Santa Monica Boulevard, West Hollywood, CA 90069
West Hollywood, Planning Division	John Keho, Assistant Director	8300 Santa Monica Boulevard West Hollywood, CA 90069
West Hollywood, Public Safety & Community Services	Kristen Cook, Public Safety Director	8300 Santa Monica Boulevard, West Hollywood, CA 90069
West Hollywood Transportation and Public Works	Bob Cheung, Senior Transportation Planner	8300 Santa Monica Boulevard, West Hollywood, CA 90069
Regional Agencies		
South Coast Air Quality Management District	Wayne Nastri, Executive Officer	21865 East Copley Drive, Rosemead, CA 91770
Southern California Association of Governments	Hasan Ikhrata, Executive Director	818 West Seventh Street, Los Angeles, CA 90054
Southern California Association of Governments	Hausha Liu, Land Use and Environmental Planning	818 West Seventh Street, Los Angeles, CA 90054
Southern California Association of Governments	Naresh Amatya, Acting Transportation Director	818 West Seventh Street, Los Angeles, CA 90054
Southern California Association of Governments	Matt Gleason, Transit Planner	818 West Seventh Street, Los Angeles, CA 90054
Los Angeles Regional Water Quality Control Board	Irma Munoz, Chair	300 West 4th Street Suite 200, Los Angeles, CA 90013
Los Angeles National Cemetery	Mary Jones, Manager	950 South Sepulveda Boulevard, Los Angeles, CA 90049
Universities		
University of California, Los Angeles Transportation	Gene Block, Chancellor	UC Los Angeles Chancellor's Office, Box 951405, 2147 Murphy Hall, Los Angeles, CA 90095-1405
University of California, Los Angeles Transportation	Steven Olsen, Vice Chancellor, Finance, Budget and Capital Programs	UC Los Angeles Chancellor's Office, Box 951405, 2147 Murphy Hall, Los Angeles, CA 90095-1405
University of California, Los Angeles Transportation	Manny Garza, Interim Chief	601 Westwood Plaza, Los Angeles, CA 90095
University of California, Los Angeles Transportation	David Karwaski, Transportation Planning and Policy Manager	555 Westwood Plaza Suite 102, Los Angeles, CA 90095
University of California, Los Angeles Transportation	Renee Fortier, Director	555 Westwood Plaza Suite 100, Los Angeles, CA 90095

Agency	Contact	Contact Information
University of California, Los Angeles, Community & Local Government Relations	Eleanor Felicia Brannon, Executive Director	10920 Wilshire Boulevard Suite 1500, Los Angeles, CA 90024
Los Angeles Community College District	Dr. Francisco Rodriguez, Chancellor	778 Wilshire Boulevard, Los Angeles, CA 90017
Los Angeles Community College District	Dr. Adriana Barrera, Deputy Chancellor	707 Wilshire Boulevard, Los Angeles, CA 90017
School Districts		
Beverly Hills Unified School District	Dr, Michael Bregy, Superintendent	255 Lasky Drive, Beverly Hills, CA 90212
Beverly Hills Unified School District	Eitan Aharoni, Chief Facilities Officer	255 Lasky Drive, Beverly Hills, CA 90212
Los Angeles Unified School District	Michelle King, Superintendent	333 Beaudry Avenue, 24th Floor, Los Angeles, CA 90017
Los Angeles Unified School District	Robert Newman, Special Assistant to Superintendent	3000 Robertson Boulevard, Los Angeles, CA 90034
Los Angeles Unified School District	Scott Scherelson, Board Member, District 3	3000 Robertson Boulevard, Los Angeles, CA 90034
Santa Monica – Malibu Unified School District	Dr. Christopher King, Co - Superintendent	1651 Sixteenth Street, Santa Monica, CA 90404
Santa Monica – Malibu Unified School District	Dr. Sylvia Rousseau, Co-Superintendent	1651 Sixteenth Street, Santa Monica, CA 90404
Railroad Agencies		
Southern California Regional Rail Authority	Art Leahy, Chief Executive Officer	One Gateway Plaza, Los Angeles, CA. 90012
Southern California Regional Rail Authority	Elissa Konove, Deputy CEO	One Gateway Plaza, Los Angeles, CA. 90012
Southern California Regional Rail Authority	Gary Lettengarver, Chief Operating Officer	One Gateway Plaza, Los Angeles, CA. 90012
AMTRAK	Jonathan Hutchinson, Senior Director of Corridor Development	530 Water Street, Oakland, CA 94607
AMTRAK	Todd Almilli, Division Engineer	810 North Alameda, 2nd Floor, Los Angeles, CA 90012
AMTRAK	Michael Chandler, General Superintendent	810 North Alameda, 2nd Floor, Los Angeles, CA 90012
Transportation Agencies		
Santa Monica Big Blue Bus	Suja Lowenthal, Planning and Community Engagement Manager	1660 7th Street, Santa Monica, CA 90401-3324
Santa Monica Big Blue Bus	Edward King, Director of Transit Services	1660 7th Street, Santa Monica, CA 90401-3324
Utilities		
Southern California Edison	Ronald Nichols, President	P.O. Box 800, Los Angeles, CA 90054
Southern California Edison	Theodore F. Craven, Jr., Chairman and CEO	P.O. Box 800, Los Angeles, CA 90054

Agency	Contact	Contact Information
Tribal		
Gabrielino Tongva Indians of California Tribal Council	Robert Dorame, Tribal Chair, Cultural Resources	P.O. Box 490, Bellflower, CA 90707
Gabrielino Tongva Nation	Sandonne Goad, Chairperson	106 ½ Judge John Aiso St., #231, Los Angeles, CA 90012
Gabrielino Tongva San Gabriel Band of Mission Indians	Anthony Morales, Chairperson	P.O. Box 693, San Gabriel, CA 91778
Gabrielino Tongva Tribe	Linda Candelaria, Co-Chairperson	1999 Avenue of the Stars #1100, Los Angeles, CA 90067
Los Angeles City/County Native American Indian Commission	Ron Andrade, Executive Director	3175 West 6th Street, Suite 403, Los Angeles, CA 90020
Ti'At Society	Cindi Alvitre, Professor	1250 Bellflower Boulevard, Long Beach, CA 90803