

Westside Subway Extension

Final Environmental Impact Statement/Environmental Impact Report—Volume 1
State Clearinghouse No. 2009031083



U.S. Department
of Transportation
Federal Transit
Administration

Final Environmental Impact Statement/ Final Environmental Impact Report

for the

Westside Subway Extension

prepared by the

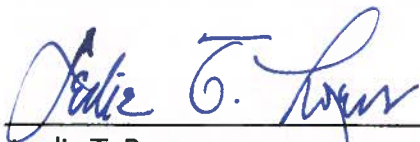
**U.S. Department of Transportation
Federal Transit Administration**

and the

**Los Angeles County
Metropolitan Transportation Authority**

pursuant to

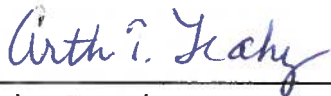
National Environmental Policy Act (42 USC 4332), 49 USC 53, 49 USC 303, 16 USC 470, 23 CFR 771, 23 CFR 450, Executive Order 12898 Section 6002 SAFETEA-LU, 40 CFR 1500-1508, and California Environmental Quality Act, PRC 21000 *et seq.*; and the State of California CEQA Guidelines, California Administrative Code, 15000 *et seq.*



Leslie T. Rogers
Region IX Regional Administrator
Federal Transit Administration

MAR - 9 2012

Date



Arthur T. Leahy
Chief Executive Officer
Los Angeles County
Metropolitan Transportation Authority

MAR - 5 2012

Date

FINAL ENVIRONMENTAL IMPACT STATEMENT/ ENVIRONMENTAL IMPACT REPORT

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

STATE CLEARINGHOUSE NO—2009031083

TITLE OF PROPOSED ACTION—Westside Subway Extension Project

ABSTRACT—The Los Angeles County Metropolitan Transportation Authority (Metro) proposes to 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 terminus 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 Westside Subway Extension 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 Final Environmental Impact Statement/Environmental Impact Report (EIS/EIR) provides a detailed description of the Locally Preferred Alternative (LPA), including station locations, entrance locations, construction staging and laydown areas, and other elements associated with the Project. The No Build Alternative is included in this Final EIS/EIR for comparative purposes.

This report is a combined Final EIS/EIR satisfying the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). It 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.

This Final EIS/EIR addresses agency and public comments on the Draft EIS/EIR and describes the associated transportation and environmental impacts, operating and maintenance and capital costs, and potential funding sources. Areas of consideration in the Final EIS/EIR include transit; traffic; parking; land use/neighborhoods; land acquisition; displacement and relocation; equity and environmental justice considerations; visual quality; air quality; noise and vibration; geology, soils, and seismicity; exposure to hazardous substances; water resources; biological resources; energy resources; safety and security; historic, archaeological, and paleontological resources; community facilities and parklands; construction impacts; and other CEQA determinations. Mitigation measures for the impacts resulting from the LPA are also identified. The information contained in this report will be used by the Metro Board of Directors to decide whether to implement the LPA.

Additional written comments and questions concerning this document should be directed to the following:

Mr. David Mieger
Project Director
Los Angeles County Metropolitan
Transportation Authority
One Gateway Plaza, MS 99/22/5
Los Angeles, CA 90012
Phone (213) 922-3040

Mr. Raymond Sukys
Director
Office of Planning and Program
Development
Federal Transit Administration
Region IX
201 Mission St., Suite 1650
San Francisco, CA 94105
Phone (415) 744-3133

Mr. Ray Tellis
Team Leader
Federal Transit Administration
Region IX
Los Angeles Metropolitan Office
888 S. Figueroa St., Suite 1850
Los Angeles, CA 90017
Phone (213) 202-3950

PREFACE

The Federal Transit Administration (FTA) and the Los Angeles County Metropolitan Transportation Authority (Metro) have prepared this Final Environmental Impact Statement/Environmental Impact Report (EIS/EIR) on a proposed major transit investment in Los Angeles County, California. The Proposed Action is an extension of the existing Metro Purple Line heavy rail transit subway system from its current western terminus 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 results from nearly 30 years of planning and environmental review. In January 2009, Metro completed an Alternatives Analysis that evaluated transit mode and alignment alternatives in the Westside Corridor. This resulted in Metro's selection of a heavy rail transit subway extension as the preferred transit mode for this corridor. The Westside Subway Extension Project is included in Metro's Long Range Transportation Plan and is part of the Regional Transportation Plan adopted in 2008 by the Southern California Association of Governments, the designated Metropolitan Planning Organization.

This Final EIS/EIR provides a detailed description of the Locally Preferred Alternative (LPA), including station locations, entrance locations, construction staging and laydown areas, and other elements associated with the Project. The No Build Alternative is included in the Final EIS/EIR for comparative purposes.

The LPA will extend heavy rail transit, in subway, from the existing Metro Purple Line Wilshire/Western Station to a Westwood/VA Hospital Station. The extension will be nearly 9 miles and will include a total of seven new stations:

- Wilshire/La Brea
- Wilshire/Fairfax
- Wilshire/La Cienega
- Wilshire/Rodeo
- Century City (Century City Santa Monica or Century City Constellation)
- Westwood/UCLA (Westwood/UCLA On-Street or Westwood/UCLA Off-Street)
- Westwood/VA Hospital (Westwood/VA Hospital South or Westwood/VA Hospital North)

This document builds on the findings of the *Westside Transit Corridor Alternatives Analysis Study* (Metro 2009c) and the *Westside Subway Extension Draft Environmental Impact Statement/Environmental Impact Report* (Metro 2010). This Final EIS/EIR presents the results of a comprehensive analysis of the LPA and No Build Alternative. In Chapter 1, the Final EIS/EIR presents the Purpose and Need for a transit investment within the Westside Corridor. Chapter 2 summarizes the LPA considered, including physical features and operating characteristics. Chapter 3 summarizes the transportation benefits and impacts of the LPA. Environmental factors, impacts, and mitigations, including the Section 4(f) evaluation, are discussed in Chapters 4 and 5. Chapter 6 addresses the LPA's cost and financial feasibility. Chapter 7 provides a comprehensive evaluation focused on



the decisions at hand. Chapter 8 addresses public outreach and also summarizes comments received on the Draft EIS/EIR and the responses to those comments. More detailed technical documentation is available for those interested in the analysis methodology and results.

The LPA project definition scope was submitted to FTA for approval into the New Starts Preliminary Engineering (PE) phase of project development. As part of the PE process, the project was further refined as more detailed decisions were made within the designated project scope. Refinements will be confirmed during Final Design. The PE phase also includes completion of the CEQA process with the certification of the EIR and the adoption of an LPA for implementation by the Metro Board of Directors as well as the completion of the NEPA process with a Record of Decision issued by the FTA.

TABLE OF CONTENTS

VOLUME 1

Acronyms and Abbreviations	xxv
Glossary	xxxiii
EXECUTIVE SUMMARY	S-1
Introduction.....	S-2
History and Background of the Westside Subway Extension Project.....	S-12
Purpose and Need for Transit Improvements in the Study Area	S-15
Major Activity Centers and Destinations	S-16
Travel Markets, Transit Usage, Congestion, and Mobility in the Study Area	S-16
Regional Objectives	S-19
Alternatives Considered.....	S-20
Development of Draft EIS/EIR Alternatives	S-20
Evaluation of Alternatives in the Draft EIS/EIR.....	S-23
Agency and Public Comments on Draft EIS/EIR.....	S-24
Metro Board of Directors’ Decision on Draft EIS/EIR and Initiation of Final EIS/EIR.....	S-26
Transportation Analysis, Consequences, and Mitigation during Construction and Operation	S-26
Environmental Analysis, Consequences, and Mitigation during Operation	S-41
Construction Impacts and Mitigation.....	S-58
Station Construction Methods.....	S-59
Tunnel Construction Methods	S-59
Construction Impacts and Mitigation.....	S-60
Cost and Financial Plan.....	S-77
Comparative Benefits and Costs	S-79
Evaluation of No Build Alternative and Locally Preferred Alternative.....	S-79
Evaluation of Station and Alignment Options	S-82
Evaluation of Station Entrances and Refinements to Stations.....	S-87
Recommendations for Refinements to the Locally Preferred Alternative.....	S-87
Public and Agency Outreach and Comments on Draft EIS/EIR.....	S-95
CHAPTER 1—PURPOSE AND NEED	1-1
1.1 Project Purpose and Need.....	1-1
1.2 History and Background of the Westside Subway Extension Project.....	1-2
1.3 Description of the Westside Subway Extension Study Area.....	1-3
1.3.1 Study Area Population and Employment	1-3
1.3.2 Major Activity Centers and Destinations	1-5



- 1.4 Transportation Network in the Study Area 1-9
 - 1.4.1 Travel Markets 1-9
 - 1.4.2 Transit Usage..... 1-11
 - 1.4.3 Congestion and Mobility..... 1-11
- 1.5 Regional Transportation Objectives in the Study Area 1-17

CHAPTER 2—ALTERNATIVES CONSIDERED2-1

- 2.1 Introduction 2-1
- 2.2 Changes to this Chapter in Response to Draft Environmental Impact Statement/Environmental Impact Report Comments and Selection of Locally Preferred Alternative 2-4
- 2.3 Alternatives Analysis Study Screening and Selection Process 2-5
 - 2.3.1 Screening of a Broad Range of Alternatives/Alternatives Considered in the Alternatives Analysis (October 2007 through February 2009) 2-6
 - 2.3.2 Alternatives Consideration after the Alternatives Analysis (March 2009 through October 2009) 2-12
- 2.4 Alternatives Evaluated in the Draft Environmental Impact Statement/Environmental Impact Report 2-17
 - 2.4.1 No Build Alternative..... 2-17
 - 2.4.2 TSM Alternative..... 2-21
 - 2.4.3 Build Alternatives 2-23
 - 2.4.4 Base Stations, and Station and Alignment Options..... 2-32
 - 2.4.5 Maintenance Yards and Other Elements 2-37
- 2.5 Locally Preferred Alternative Identification Process 2-37
 - 2.5.1 Evaluation of Alternatives in the Draft EIS/EIR..... 2-38
 - 2.5.2 Determination of Station Options and Alignments in the Draft EIS/EIR 2-42
- 2.6 Locally Preferred Alternative: Westwood/VA Hospital Extension 2-44
 - 2.6.1 Operating Plan..... 2-50
 - 2.6.2 Bus Network 2-50
 - 2.6.3 HRT Station Components 2-51
 - 2.6.4 Stations and Alignments..... 2-54
 - 2.6.5 Additional Construction Staging and Laydown Sites..... 2-94
 - 2.6.6 Traction Power Substations 2-97
 - 2.6.7 Emergency Generators 2-97
 - 2.6.8 Station Appendages..... 2-98
 - 2.6.9 Special Trackwork..... 2-100
 - 2.6.10 Maintenance Yard 2-103
 - 2.6.11 Construction Schedule..... 2-103

CHAPTER 3—TRANSPORTATION 3-1

- 3.1 Introduction 3-1
- 3.2 Changes to this Chapter in Response to Draft Environmental Impact Statement/Environmental Impact Report Comments and Selection of the Locally Preferred Alternative 3-2
- 3.3 Methodology 3-15
 - 3.3.1 Analytical Tools and Data Sources 3-15
 - 3.3.2 Approach to Estimating Transportation Effects 3-17
- 3.4 Public Transit 3-18
 - 3.4.1 Affected Environment/Existing Conditions 3-18
 - 3.4.2 Environmental Impacts/Environmental Consequences 3-24
 - 3.4.3 Mitigation Measures 3-43
 - 3.4.4 California Environmental Quality Act Determination..... 3-43
- 3.5 Streets and Highways..... 3-43
 - 3.5.1 Affected Environment/Existing Conditions 3-43
 - 3.5.2 Environmental Impacts/Environmental Consequences 3-49
 - 3.5.3 Mitigation Measures 3-59
 - 3.5.4 California Environmental Quality Act Determination..... 3-59
- 3.6 Parking..... 3-62
 - 3.6.1 Affected Environment/Existing Conditions 3-62
 - 3.6.2 Environmental Impacts/Environmental Consequences 3-64
 - 3.6.3 Mitigation Measures 3-69
 - 3.6.4 California Environmental Quality Act Determination..... 3-71
- 3.7 Pedestrian, Bicycle, and Bus Transit..... 3-71
 - 3.7.1 Affected Environment/Existing Conditions 3-71
 - 3.7.2 Environmental Impacts/Environmental Consequences 3-75
 - 3.7.3 Mitigation Measures 3-88
 - 3.7.4 California Environmental Quality Act Determination..... 3-91
- 3.8 Construction-related Transportation Impacts 3-92
 - 3.8.1 Construction Activities and Methodologies..... 3-92
 - 3.8.2 Traffic and Circulation Construction-Related Environmental Impacts/Environmental Consequences..... 3-98
 - 3.8.3 Public Transit Construction-Related Environmental Impacts/Environmental Consequences..... 3-105
 - 3.8.4 Parking Construction-Related Environmental Impacts/Environmental Consequences 3-106
 - 3.8.5 Pedestrian and Bicycle Access Construction-Related Environmental Impacts/Environmental Consequences..... 3-109
 - 3.8.6 Mitigation Measures 3-109
 - 3.8.7 California Environmental Quality Act Determination..... 3-113

Figures

Figure S-1. Steps in the FTA Project Development Process	S-2
Figure S-2. Westside Subway Extension Project Area	S-3
Figure S-3. Westside Subway Extension Project	S-4
Figure S-4. Typical Subway Tunnels	S-7
Figure S-5. Typical Subway Station	S-7
Figure S-6. Wilshire/La Brea Station.....	S-8
Figure S-7. Wilshire/Fairfax Station.....	S-8
Figure S-8. Wilshire/La Cienega Station.....	S-8
Figure S-9. Wilshire/Rodeo Station.....	S-9
Figure S-10. Century City Santa Monica Boulevard Station (not recommended)	S-10
Figure S-11. Century City Constellation Boulevard Station (recommended)	S-10
Figure S-12. Westwood/UCLA Off-Street Station (not recommended)	S-11
Figure S-13. Westwood/UCLA On-Street Station (recommended)	S-11
Figure S-14. Westwood/VA Hospital South Station (recommended)	S-12
Figure S-15. Westwood/VA Hospital North Station (not recommended)	S-13
Figure S-16. Westside Subway Extension Timeline	S-14
Figure S-17. Steps in the FTA Project Development Process	S-15
Figure S-18. Century City	S-16
Figure S-19. Activity Centers in the Study Area.....	S-17
Figure S-20. Home-Based Work Peak Person Trip Comparison: 2006 to 2035	S-18
Figure S-21. Degradation in Transit Travel Times due to Road Congestion—Metro Bus Routes in Study Area, 2003 to 2006.....	S-19
Figure S-22. Alternatives Considered (AA through Final EIS/EIR)	S-21
Figure S-23. All Build Alternatives	S-22
Figure S-24. Fault Zones in Century City Area.....	S-57
Figure S-25. Simulated Wilshire/Rodeo Station entrance at the current site of Ace Gallery	S-58
Figure S-26. Station Excavation.....	S-59
Figure S-27. Tunneling in Gassy Areas with Pressurized-Face TBM	S-60
Figure S-28. Transit Travel Times to Westwood/UCLA Station.....	S-80
Figure S-29. Recommended Station and Alignment Locations.....	S-94
Figure 1-1. Project Study Area	1-4
Figure 1-2. Employment and Percent of Retail Jobs within One-half Mile of Stations, 2000.....	1-6
Figure 1-3. Aerial Views of Westwood (left) and Century City (right) Central Business Districts	1-7
Figure 1-4. Los Angeles Centers Concept	1-8
Figure 1-5. Study Area Activity Centers.....	1-9
Figure 1-6. Home-based Work Peak Person Trip Comparison, 2006 to 2035.....	1-10
Figure 1-7. Existing Metro Rail, Bus Rapid Transit, and Metrolink System Map	1-12

Figure 1-8. Top 10 Bus Routes within the Study Area’s Existing Transportation System..... 1-13

Figure 1-9. Existing Boardings and Alightings in the Study Area..... 1-14

Figure 1-10. Percent Increases in Transit Travel Times—Metro Bus Routes in the Study Area,
2003 to 2006 1-17

Figure 2-1. Wilshire Boulevard Corridor looking West from Western Avenue 2-2

Figure 2-2. Locally Preferred Alternative..... 2-3

Figure 2-3. Alternatives Considered (AA through Final EIS/EIR) 2-7

Figure 2-4. Goals, Objectives, and Evaluation Criteria..... 2-9

Figure 2-5. Universe of Alignment and Station Alternatives Identified following Early Scoping
for Evaluation in the AA Study 2-10

Figure 2-6. Transit Technologies 2-11

Figure 2-7. AA Study Alternative 1 2-13

Figure 2-8. AA Study Alternative 11 2-14

Figure 2-9. Summary of Wilshire/Crenshaw, Wilshire/Fairfax, Wilshire/La Cienega, and West
Hollywood Station and Alignment Options..... 2-15

Figure 2-10. Summary of Century City Station and Alignment Options 2-16

Figure 2-11. Summary of Westwood/UCLA and Westwood/VA Hospital Station Options..... 2-17

Figure 2-12. No Build Alternative Bus and Rail Service within the Study Area 2-19

Figure 2-13. TSM Alternative..... 2-22

Figure 2-14. All Build Alternatives 2-25

Figure 2-15. Alternative 1—Westwood/UCLA Extension 2-27

Figure 2-16. Alternative 2—Westwood/VA Hospital Extension..... 2-28

Figure 2-17. Alternative 3—Santa Monica Extension..... 2-29

Figure 2-18. Alternative 4—Westwood/VA Hospital Extension plus West Hollywood Extension 2-30

Figure 2-19. Alternative 5—Santa Monica Extension plus West Hollywood Extension 2-31

Figure 2-20. Base Stations and Station and Alignment Options 2-35

Figure 2-21. Locally Preferred Alternative Compared to Draft EIS/EIR Build Alternatives..... 2-45

Figure 2-22. Construction Phases for Westside Subway Extension (either concurrent or phased
construction) 2-46

Figure 2-23. Activity Centers Served by the LPA (Existing Wilshire/Western Station to
Wilshire/La Cienega Station) 2-47

Figure 2-24. Activity Centers Served by the LPA (West of Wilshire/La Cienega Station to
Westwood/VA Hospital Station) 2-48

Figure 2-25. Existing Metro HRT Train and Station 2-51

Figure 2-26. Typical Subway Station 2-51

Figure 2-27. Prototypical Center Loaded Concourse 2-52

Figure 2-28. Prototypical Single-End Loaded Concourse 2-52

Figure 2-29. Prototypical Double-End Loaded Concourse 2-53

Figure 2-30. Typical Double-End Loaded Concourse Station (Existing Civic Center Station)..... 2-53

Figure 2-31. Typical Construction Staging and Laydown Site—Wilshire/La Brea 2-55

Figure 2-32. Wilshire/La Brea Station—North of Wilshire.....	2-57
Figure 2-33. Wilshire/La Brea Station—South of Wilshire	2-58
Figure 2-34. Wilshire/Fairfax Station—Johnie’s Coffee Shop.....	2-60
Figure 2-35. Proposed Entrance at Wilshire/Fairfax Station (Johnie’s Coffee Shop).....	2-61
Figure 2-36. Wilshire/Fairfax Station—LACMA	2-63
Figure 2-37. Wilshire/Fairfax Station—South of Wilshire.....	2-64
Figure 2-38. Wilshire/La Cienega Station	2-66
Figure 2-39. Proposed Entrance for the Wilshire/La Cienega Station	2-67
Figure 2-40. Wilshire/Rodeo Station—Ace Gallery.....	2-70
Figure 2-41. Proposed Entrance at Wilshire/Rodeo Station (Ace Gallery Entrance).....	2-71
Figure 2-42. Wilshire/Rodeo Station—Bank of America.....	2-72
Figure 2-43. Wilshire/Rodeo Station—Union Bank.....	2-72
Figure 2-44. Century City Santa Monica Station—Construction Staging and Laydown Scenario A.....	2-74
Figure 2-45. Century City Santa Monica Station—Construction Staging and Laydown Scenario B.....	2-74
Figure 2-46. Beverly Hills to Century City Station and Alignment Options.....	2-76
Figure 2-47. Century City to Westwood/UCLA Station and Alignment Options.....	2-76
Figure 2-48. Century City Constellation Station—Northeast Corner.....	2-80
Figure 2-49. Century City Constellation Station—Southwest Corner.....	2-81
Figure 2-50. Westwood/UCLA Stations	2-82
Figure 2-51. Westwood/UCLA Off-Street Station.....	2-83
Figure 2-52. Westwood/UCLA On-Street Station—North of Wilshire	2-85
Figure 2-53. Westwood/UCLA On-Street Station—South of Wilshire	2-85
Figure 2-54. Westwood/VA Hospital Stations	2-86
Figure 2-55. Westwood/VA Hospital South Station Area Plan.....	2-89
Figure 2-56. Westwood/VA Hospital South Station Site Plan.....	2-89
Figure 2-57. Westwood/VA Hospital South Station Cross Section.....	2-89
Figure 2-58. Double Crossover at GSA for Westwood/VA Hospital (South of Wilshire) Station	2-91
Figure 2-59. Westwood/VA Hospital North Station.....	2-92
Figure 2-60. Westwood/VA Hospital North Station Cross-section.....	2-93
Figure 2-61. Wilshire/Western Station—Transitional Structure and Construction Staging and Laydown—North of Wilshire	2-96
Figure 2-62. Wilshire/Western Station—Transitional Structure and Construction Staging and Laydown—South of Wilshire	2-96
Figure 2-63. Wilshire/Crenshaw Construction Staging and Laydown.....	2-97
Figure 2-64. Existing Emergency Generator Structure at Wilshire/Vermont Station.....	2-98
Figure 2-65. Emergency Exit Shaft—Westwood/VA Hospital South.....	2-99
Figure 2-66. Emergency Exit Shaft—Westwood/VA Hospital North.....	2-99
Figure 2-67. Special Trackwork Locations for the LPA.....	2-101

Figure 2-68. Division 20 Maintenance Yard Site 2-102

Figure 2-69. Expanded Division 20 Yard 2-104

Figure 2-70. Bird’s Eye View of Existing Division 20 Yard 2-105

Figure 2-71. Project Construction Schedule under Concurrent Construction Scenario—
 Wilshire/Western to Westwood/VA Hospital..... 2-106

Figure 2-72. Project Construction Schedule under Phased Construction Scenario—
 Wilshire/Western to Westwood/VA Hospital..... 2-107

Figure 2-73. Phase 1 to Wilshire/La Cienega..... 2-108

Figure 2-74. Phase 2 to Century City..... 2-109

Figure 2-75. Phase 3 to Westwood/VA Hospital (LPA)..... 2-110

Figure 3-1. Existing Bus and Rail Service within the Study Area with Top 10 Ridership
 Corridors 3-19

Figure 3-2. Major Transfer Points in the Study Area 3-23

Figure 3-3. Origins and Destinations for Transit Travel Times 3-25

Figure 3-4. Transit Travel Times—Pasadena to Westside 3-29

Figure 3-5. Transit Travel Times—Downtown Los Angeles to Westside 3-29

Figure 3-6. Transit Travel Times—South Los Angeles to Westside..... 3-29

Figure 3-7. Transit Travel Times—Reseda to Westside 3-30

Figure 3-8. Transit Travel Times—Covina to Westside 3-30

Figure 3-9. Transit Travel Times—Wilshire/Western to Westside..... 3-30

Figure 3-10. Transit Travel Times—North Hollywood to Westside..... 3-31

Figure 3-11. Transit Operating Speeds..... 3-32

Figure 3-12. Extent of Passenger Miles in Exclusive Guideway Service 3-33

Figure 3-13. Daily Bus Ridership in Westside, 2035 3-39

Figure 3-14. Existing Intersection Levels-of-service in Study Area..... 3-47

Figure 3-15. Reduction in Auto Trips under LPA during Seven-hour Peak Period..... 3-52

Figure 3-16. Station Locations with High Volumes of Pedestrian Activity..... 3-73

Figure 3-17. Existing and Proposed Bicycle Facilities in the Study Area 3-74

Figure 3-18. Station/Bus/Pedestrian-Bicycle Impact Analysis—Wilshire/La Brea Station..... 3-76

Figure 3-19. Station/Bus/Pedestrian-Bicycle Impact Analysis—Wilshire/Fairfax Station..... 3-77

Figure 3-20. Station/Bus/Pedestrian-Bicycle Impact Analysis—Wilshire/La Cienega Station..... 3-78

Figure 3-21. Station/Bus/Pedestrian-Bicycle Impact Analysis—Wilshire/Rodeo Station..... 3-79

Figure 3-22. Station/Bus/Pedestrian-Bicycle Impact Analysis—Century City Santa Monica
 Station..... 3-80

Figure 3-23. Station/Bus/Pedestrian-Bicycle Impact Analysis—Century City Constellation
 Station..... 3-81

Figure 3-24. Station/Bus/Pedestrian-Bicycle Impact Analysis—Westwood/UCLA Off-Street
 Station..... 3-82

Figure 3-25. Station/Bus/Pedestrian-Bicycle Impact Analysis—Westwood/UCLA On-Street
 Station..... 3-83

Figure 3-26. Station/Bus/Pedestrian-Bicycle Impact Analysis—Westwood/VA Hospital South Station.....	3-84
Figure 3-27. Station/Bus/Pedestrian-Bicycle Impact Analysis—Westwood/VA Hospital North Station.....	3-85
Figure 3-28. Proposed Construction Sequencing—Wilshire/La Brea Station.....	3-97

Tables

Table S-1. LPA Elements.....	S-6
Table S-2. Southern California Association of Governments Performance Indicators.....	S-20
Table S-3. Evaluation Results for TSM and Build Alternatives in Draft EIS/EIR.....	S-24
Table S-4. Common Comment Topics on the Draft EIS/EIR.....	S-25
Table S-5. Environmental Impacts and Impacts Remaining after Mitigation.....	S-27
Table S-6. Transportation Environmental Impacts, Mitigation Measures, and Impacts Remaining after Mitigation.....	S-29
Table S-7. Environmental Impacts and Mitigation Measures—Operations.....	S-43
Table S-8. Environmental Impacts and Mitigation Measures—Construction.....	S-61
Table S-9. Comparison of Station and Alignment Option Combinations.....	S-78
Table S-10. Comparison of Project Costs under Concurrent Construction Scenario versus Phased Construction Scenario.....	S-79
Table S-11. Evaluation Results for LPA Compared to No Build Alternative.....	S-79
Table S-12. Comparison of Station Location Options at Century City.....	S-83
Table S-13. Comparison of Station Location Options at Westwood/UCLA.....	S-84
Table S-14. Comparison of Station Location Options at Westwood/VA Hospital Station.....	S-86
Table S-15. Comparison of Station Entrance Options.....	S-87
Table S-16. Recommended Station and Entrance Locations.....	S-94
Table 1-1. Total Employment and Employment Density Data of Comparable Central Business Districts.....	1-5
Table 1-2. Daily Study Area Transit Trips, 2006 and 2035.....	1-10
Table 1-3. Traffic Volumes for Key Study Area Arterial Segments.....	1-16
Table 1-4. Westbound Bus Speeds along Wilshire, Olympic, and Santa Monica Boulevard Corridors under Existing Conditions.....	1-16
Table 1-5. Southern California Association of Governments Performance Indicators.....	1-18
Table 2-1. LPA Elements.....	2-4
Table 2-2. Future Transit Network Changes between No Build and TSM Alternatives.....	2-23
Table 2-3. Base Stations and Options for Alternatives Considered in the Draft EIS/EIR.....	2-33
Table 2-4. Summary of Data for Alternatives Considered in the Draft EIS/EIR.....	2-39
Table 2-5. Substation and Emergency Generator Locations.....	2-97
Table 2-6. Special Trackwork Locations.....	2-100

Table 3-1. Summary of Transportation Impacts and Mitigation Measures	3-3
Table 3-2. Major East-West Streets/Bus Lines in Study Area	3-20
Table 3-3. Existing Study Area Transit Service and Weekday Boardings.....	3-21
Table 3-4. Distance and Run Time along LPA Alignment (from Wilshire/Western).....	3-28
Table 3-5. LPA Daily Station Boardings	3-35
Table 3-6. Daily Mode of Access Percentages.....	3-36
Table 3-7. Traffic Volumes for Key Arterial Segments in the Study Area.....	3-46
Table 3-8. Level-of-service Definitions for Signalized Intersections	3-49
Table 3-9. Performance Measures for Existing Conditions and Alternatives.....	3-51
Table 3-10. Intersection Level-of-service Analysis—Number of Locations at Specified LOS Conditions.....	3-55
Table 3-11. Number of Locations with Intersection Level-of-service Improvement—with LPA	3-56
Table 3-12. Westside Subway Extension Traffic Impact Criteria	3-60
Table 3-13. LPA Impact Assessment with Bank of America Station Entrance at Wilshire/Rodeo Station.....	3-61
Table 3-14. Parking Occupancy—Unrestricted On-street Spaces within One-half Mile of Stations.....	3-62
Table 3-15. Station Area Off-street Parking Supply within One-half Mile of Primary Station Entrance	3-64
Table 3-16. Estimated On-street Parking Demand by Station.....	3-67
Table 3-17. Parking Spillover Impact Summary	3-68
Table 3-18. Effects to the Pedestrian, Bicycle, and Bus Networks.....	3-87
Table 3-19. Traffic-control Activities during Station Construction	3-93
Table 3-20. Haul Routes for Construction Activities	3-99
Table 3-21: Estimated Daily Haul Truck Trips	3-100
Table 3-22. Traffic Control Zones	3-102

VOLUME 2

Acronyms and Abbreviations	xxv
Glossary.....	xxxiii

CHAPTER 4—ENVIRONMENTAL ANALYSIS, CONSEQUENCES, AND MITIGATION4-1

4.1 Land Use	4-1
4.1.1 Regulatory Setting	4-1
4.1.2 Affected Environment/Existing Conditions	4-2
4.1.3 Environmental Impacts/Environmental Consequences.....	4-10
4.1.4 Mitigation Measures.....	4-19
4.1.5 California Environmental Quality Act Determination.....	4-19
4.2 Socioeconomic Characteristics	4-20
4.2.1 Affected Environment/Existing Conditions	4-20
4.2.2 Acquisition and Displacement of Existing Uses	4-37
4.2.3 Environmental Consequences.....	4-48
4.2.4 Mitigation Measures.....	4-56
4.2.5 California Environmental Quality Act Determination.....	4-57
4.2.6 Environmental Justice Considerations	4-58
4.3 Visual Quality	4-87
4.3.1 Regulatory Setting	4-88
4.3.2 Affected Environment/Existing Conditions	4-89
4.3.3 Environmental Impacts/Environmental Consequences.....	4-90
4.3.4 Mitigation Measures.....	4-106
4.3.5 California Environmental Quality Act Determination.....	4-107
4.4 Air Quality.....	4-108
4.4.1 Regulatory Setting	4-108
4.4.2 Affected Environment/Existing Conditions	4-112
4.4.3 Environmental Impacts/ Environmental Consequences.....	4-112
4.4.4 Conformity Assessment.....	4-124
4.4.5 Mitigation Measures.....	4-125
4.4.6 California Environmental Quality Act Determination.....	4-125
4.5 Climate Change	4-126
4.5.1 Regulatory Setting	4-127
4.5.2 Affected Environment/Existing Conditions	4-128
4.5.3 Environmental Impacts/Environmental Consequences.....	4-131
4.5.4 Mitigation Measures.....	4-135
4.5.5 California Environmental Quality Act Determination.....	4-135

4.6	Noise and Vibration	4-136
4.6.1	Background and Methodology.....	4-136
4.6.2	Affected Environment/Existing Conditions	4-140
4.6.3	Environmental Impacts/Environmental Consequences	4-146
4.6.4	Mitigation Measures	4-159
4.6.5	California Environmental Quality Act Determination.....	4-160
4.7	Energy	4-162
4.7.1	Regulatory Setting.....	4-162
4.7.2	Affected Environment/Existing Conditions	4-163
4.7.3	Environmental Impacts/Environmental Consequences	4-165
4.7.4	Mitigation Measures	4-168
4.7.5	California Environmental Quality Act Determination.....	4-168
4.8	Geologic Hazards	4-170
4.8.1	Regulatory Setting.....	4-171
4.8.2	Affected Environment/Existing Conditions	4-172
4.8.3	Environmental Impacts/Environmental Consequences	4-190
4.8.4	Summary of Impacts.....	4-201
4.8.5	Mitigation Measures	4-201
4.8.6	California Environmental Quality Act Determination.....	4-207
4.9	Hazardous Waste and Materials	4-208
4.9.1	Regulatory Setting.....	4-208
4.9.2	Affected Environment/Existing Conditions	4-210
4.9.3	Environmental Impacts/Environmental Consequences	4-219
4.9.4	Mitigation Measures	4-222
4.9.5	California Environmental Quality Act Determination.....	4-222
4.10	Ecosystems/Biological Resources	4-224
4.10.1	Regulatory Setting.....	4-224
4.10.2	Affected Environment/Existing Conditions	4-225
4.10.3	Environmental Impacts/Environmental Consequences	4-228
4.10.4	Mitigation Measures	4-229
4.10.5	California Environmental Quality Act Determination.....	4-229
4.11	Water Resources.....	4-230
4.11.1	Regulatory Setting.....	4-230
4.11.2	Affected Environment/Existing Conditions	4-231
4.11.3	Environmental Impacts/Environmental Consequences	4-235
4.11.4	Mitigation Measures	4-240
4.11.5	California Environmental Quality Act Determination.....	4-241



- 4.12 Safety and Security 4-242
 - 4.12.1 Regulatory Setting 4-243
 - 4.12.2 Affected Environment/Existing Conditions 4-243
 - 4.12.3 Environmental Impact/Environmental Consequences 4-244
 - 4.12.4 Mitigation Measures..... 4-251
 - 4.12.5 California Environmental Quality Act Determination 4-254
- 4.13 Parklands and Community Services and Facilities 4-254
 - 4.13.1 Regulatory Setting 4-255
 - 4.13.2 Affected Environment/Existing Conditions 4-256
 - 4.13.3 Environmental Impacts/Environmental Consequences..... 4-270
 - 4.13.4 Mitigation Measures..... 4-280
 - 4.13.5 California Environmental Quality Act Determination 4-281
- 4.14 Historic, Archaeological, and Paleontological Resources 4-284
 - 4.14.1 Regulatory Setting 4-284
 - 4.14.2 Process for Applying Regulations 4-285
 - 4.14.3 Methodology 4-291
 - 4.14.4 Affected Environment/Existing Conditions 4-296
 - 4.14.5 Environmental Impacts/Environmental Consequences..... 4-303
 - 4.14.6 Mitigation Measures..... 4-317
 - 4.14.7 Construction 4-319
 - 4.14.8 California Environmental Quality Act Determination 4-325
- 4.15 Construction Impacts and Mitigation 4-327
 - 4.15.1 Overview of Construction Activities 4-327
 - 4.15.2 Construction Scenarios 4-328
 - 4.15.3 Construction Impacts..... 4-339
- 4.16 Growth Inducing Impacts..... 4-391
 - 4.16.1 Regulatory Setting 4-391
 - 4.16.2 Affected Environment/Existing Conditions 4-392
 - 4.16.3 Environmental Impact/Environmental Consequences 4-395
 - 4.16.4 Mitigation Measures..... 4-397
 - 4.16.5 California Environmental Quality Act Determination 4-397
- 4.17 Cumulative Impacts 4-398
 - 4.17.1 Regulatory Setting 4-398
 - 4.17.2 Methodology 4-399
 - 4.17.3 Affected Environment/Existing Conditions 4-400
 - 4.17.4 Environmental Impact/Environmental Consequences 4-400
- 4.18 Relationship between Short-term Uses of the Environment and Long-term Productivity..... 4-423
- 4.19 Irreversible and Irretrievable Commitments of Resources 4-425
- 4.20 Anticipated Permits and Approvals..... 4-427

CHAPTER 5—SECTION 4(F) EVALUATION	5-1
5.1 Section 4(f) Evaluation Overview.....	5-1
5.2 Section 4(f) “Use” Definitions	5-1
5.2.1 Direct Use	5-1
5.2.2 Temporary Use.....	5-2
5.2.3 Constructive Use	5-2
5.2.4 De Minimis.....	5-2
5.3 Description of Section 4(f) Properties.....	5-3
5.3.1 Historic Resources	5-3
5.3.2 Public Parks and Recreational Resources.....	5-9
5.4 Direct Use of Section 4(f) Properties	5-10
5.4.1 Historic Resources	5-10
5.5 Determination of Section 4(f) Use	5-39
5.5.1 Historical Resources	5-39
5.5.2 Public Park or Recreational Resources	5-39
5.6 Least Overall Harm	5-39
5.7 Agency Coordination and Consultation.....	5-40
CHAPTER 6—COST AND FINANCIAL ANALYSIS	6-1
6.1 Cost Estimate Methodology	6-1
6.1.1 Capital Cost Methodology.....	6-1
6.1.2 Operating and Maintenance Costs Methodology.....	6-2
6.2 Capital Financial Plan	6-2
6.2.1 Capital Cost Estimate	6-2
6.2.2 Proposed Capital Funding Sources.....	6-4
6.2.3 Evaluation of Financial Capacity	6-7
6.3 Operating and Maintenance Plan	6-8
6.3.1 Operating and Maintenance Costs.....	6-8
6.3.2 Operating and Maintenance Funding Sources	6-8
6.4 Risks and Uncertainties	6-9
6.4.1 Project Cost Uncertainties.....	6-9
6.4.2 Funding Uncertainties.....	6-10
CHAPTER 7—EVALUATION OF ALTERNATIVES.....	7-1
7.1 Evaluation Methodology	7-1
7.1.1 Goals, Objectives, and Evaluation Measures	7-1
7.1.2 Decision Tree Framework	7-3



- 7.2 Locally Preferred Alternative..... 7-3
 - 7.2.1 Mobility Improvements 7-3
 - 7.2.2 Transit-Supportive Land Use Policies and Conditions 7-5
 - 7.2.3 Cost-Effectiveness..... 7-7
 - 7.2.4 Project Feasibility 7-7
 - 7.2.5 Equity..... 7-8
 - 7.2.6 Environmental Considerations 7-8
 - 7.2.7 Public Acceptance..... 7-8
- 7.3 Station and Alignment Options..... 7-9
 - 7.3.1 Century City Station Options..... 7-12
 - 7.3.2 Westwood/UCLA Station Options 7-15
 - 7.3.3 Westwood/VA Hospital Station Options 7-16
- 7.4 Station Entrance Locations 7-18
 - 7.4.1 Wilshire/LaBrea Station Entrance Options 7-18
 - 7.4.2 Wilshire/Fairfax Station Entrance Options 7-18
 - 7.4.3 Wilshire/La Cienega Station Entrance..... 7-25
 - 7.4.4 Wilshire/Rodeo Station Entrance Options 7-26
 - 7.4.5 Century City Station Entrance Options..... 7-27
 - 7.4.6 Westwood/UCLA Station Entrance Options 7-28
 - 7.4.7 Westwood/VA Hospital Station Entrance..... 7-29
- 7.5 Recommendations for Refinements to the Locally Preferred Alternative 7-29
- 7.6 Financial/Phasing Options 7-31

CHAPTER 8—PUBLIC AND AGENCY OUTREACH 8-1

- 8.1 Public Outreach Techniques..... 8-1
 - 8.1.1 Stakeholder Identification..... 8-1
 - 8.1.2 Outreach Materials 8-6
- 8.2 Government and Other Agency Consultation 8-8
 - 8.2.1 Section 6002 of the Safe, Accountable, Flexible, and Efficient Transportation Equity Act—A Legacy for Users 8-8
 - 8.2.2 Section 106 Consultation 8-9
 - 8.2.3 Urban Design Working Group 8-10
- 8.3 Community Outreach during the Alternatives Analysis Phase..... 8-12
 - 8.3.1 Early Scoping Meetings..... 8-12
 - 8.3.2 Agency Scoping Meeting 8-13
 - 8.3.3 Community Meetings 8-14
 - 8.3.4 Stakeholder Briefings..... 8-15
 - 8.3.5 Elected Officials Briefings..... 8-16

8.4 Community Outreach during the Draft EIS/EIR Phase..... 8-16

 8.4.1 Scoping Meetings..... 8-16

 8.4.2 Agency Scoping Meeting..... 8-18

 8.4.3 Community Meetings..... 8-19

 8.4.4 Stakeholder Briefings..... 8-25

 8.4.5 Elected Officials Briefings..... 8-26

8.5 Draft EIS/EIR Public Hearings..... 8-27

8.6 Activities Since Close of the Draft EIS/EIR Public Review Period..... 8-29

8.7 Accommodations for Minority, Low-Income, and Persons with Disabilities..... 8-30

8.8 Draft EIS/EIR Comments..... 8-31

 8.8.1 Length of the Project’s Locally Preferred Alternative (LPA)..... 8-33

 8.8.2 Century City Station Locations..... 8-34

 8.8.3 Alignment between the Wilshire/Rodeo, Century City, and Westwood/UCLA Stations..... 8-38

 8.8.4 Geotechnical Concerns..... 8-43

 8.8.5 Westwood/VA Hospital Station Location..... 8-49

 8.8.6 Other Optional Station Locations..... 8-54

 8.8.7 Project Schedule..... 8-60

 8.8.8 Station Connectivity..... 8-60

 8.8.9 Transportation Issues..... 8-67

 8.8.10 Alternative Mode/TSM Preference..... 8-70

 8.8.11 Noise and Vibration during Operation..... 8-72

 8.8.12 Impact on Property Values..... 8-74

 8.8.13 Construction Impacts..... 8-75

REFERENCES

LIST OF PREPARERS

LIST OF RECIPIENTS

Figures

Figure 4-1. Jurisdiction and Planning Areas..... 4-4

Figure 4-2. Land Use (Existing Wilshire/Western Station to Wilshire/Fairfax Station)..... 4-7

Figure 4-3. Land Use (Wilshire/La Cienega Station to Westwood/VA Hospital Station)..... 4-8

Figure 4-4. Land Use Distribution within One-quarter Mile of Station Locations..... 4-9

Figure 4-5. Development Opportunities—SCAG-projected New Employment and New Housing Units (2035) within One-quarter Mile of Station Locations..... 4-9

Figure 4-6. Existing Level of Development at Each Station Location—One-quarter Mile from Stations..... 4-17

Figure 4-7. Existing Land Use Controls at Each Station Location..... 4-17

Figure 4-8. Study Area Population Density, 2006	4-22
Figure 4-9. Racial and Ethnic Distribution of Population within Los Angeles County.....	4-23
Figure 4-10. Racial and Ethnic Distribution of Population within Study Area	4-23
Figure 4-11. Age Distribution within Study Area	4-23
Figure 4-12. Study Area Owner-Occupied Housing Units—Distribution of Household Sizes	4-23
Figure 4-13. Study Area Renter-Occupied Housing Units—Distribution of Household Sizes	4-24
Figure 4-14. Study Area Employment Densities, 2006	4-25
Figure 4-15. Distribution of Annual Household Income within Study Area, 2000	4-26
Figure 4-16. Study Area Communities and Neighborhoods.....	4-27
Figure 4-17. Minority Population Distribution	4-28
Figure 4-18. Acquisitions and Easements for the LPA under the Concurrent Construction Scenario	4-40
Figure 4-19. Wilshire/Rodeo to Westwood/UCLA Station and Alignment Options	4-42
Figure 4-20. Acquisitions and Easements for the LPA under the Phased Construction Scenario.....	4-45
Figure 4-21. O&M-related Job Creation by Earnings for Locally Preferred Alternative	4-53
Figure 4-22. Wilshire/La Brea Station Entrance, Replacing the Metro Service Center and Blockbuster Video (Existing View and Visual Simulation)	4-99
Figure 4-23. Wilshire/Fairfax Station—Entrance West of Johnie’s Coffee Shop (Existing View and Visual Simulation).....	4-100
Figure 4-24. Wilshire/Fairfax Station—Entrance at LACMA (Existing View and Visual Simulation)	4-101
Figure 4-25. Wilshire/La Cienega Station (Existing View and Visual Simulation)	4-102
Figure 4-26. Wilshire/Rodeo Station—Station Entrance at the Southwest Corner of South Beverly Drive and Wilshire Boulevard (Existing View and Visual Simulation).....	4-103
Figure 4-27. Air Quality Analysis Sites.....	4-118
Figure 4-28. National MSAT Emission Trends 1999–2050 for Vehicles Operating on Roadways Using EPA Mobile 6.2 Model.....	4-123
Figure 4-29. The Greenhouse Effect.....	4-128
Figure 4-30. Typical Day-Night (Ldn) Sound Levels.....	4-137
Figure 4-31. Noise Impact Criteria for Transit Projects.....	4-138
Figure 4-32. Map of Noise Measurement Sites.....	4-142
Figure 4-33. Typical Ground Vibration Levels	4-143
Figure 4-34. Transfer Mobility Determined by Vibration Measurements.....	4-144
Figure 4-35. Location of Transfer Mobility Tests	4-145
Figure 4-36. Measured Metro Red Line Force Density Level	4-147
Figure 4-37. Vibration-Sensitive Locations (Existing Wilshire/Western Station to Wilshire/La Cienega Station).....	4-153
Figure 4-38. Vibration-Sensitive Locations (Wilshire/La Cienega Station to Westwood/VA Hospital Station).....	4-154
Figure 4-39. Surface Geology and Earthquake Faults	4-174
Figure 4-40. Geologic Cross Section (with Century City Constellation option)	4-175
Figure 4-41. Santa Monica Fault Zone Schematic.....	4-178

Figure 4-42. Fault Zones in Century City Area 4-179

Figure 4-43. Liquefaction Hazard Zones 4-182

Figure 4-44. Oil Fields/Wells in Project Study Area..... 4-185

Figure 4-45. Mapped Oil Wells in Century City Area..... 4-186

Figure 4-46. Methane Risk Zone..... 4-187

Figure 4-47. Potential Hazardous Materials Sites near the Locally Preferred Alternative 4-215

Figure 4-48. Potential Hazardous Materials Sites near Division 20 Vehicle Storage and Maintenance Facility..... 4-216

Figure 4-49. Floodplains—Study Area 4-234

Figure 4-50. Floodplains—Maintenance Yard 4-235

Figure 4-51. Parkland and Community Facilities (Wilshire/Crenshaw Station to Wilshire La Brea Station) 4-259

Figure 4-52. Parkland and Community Facilities (Wilshire/Fairfax Station and Beverly Area Station to Wilshire/Rodeo Station) 4-260

Figure 4-53. Parkland and Community Facilities (Century City Station to Westwood/VA Hospital Station) 4-261

Figure 4-54. Parkland and Community Facilities (Division 20 Maintenance Yard)..... 4-262

Figure 4-55. Historic, Architectural, and Archaeological Resources (Existing Wilshire/Western Station to Wilshire La Brea Station)..... 4-287

Figure 4-56. Historic, Architectural, and Archaeological Resources (Wilshire/Fairfax Station to Wilshire/Rodeo Station)..... 4-288

Figure 4-57. Historic, Architectural, and Archaeological Resources (Century City Station to Westwood/VA Hospital Station)..... 4-289

Figure 4-58. Historic, Architectural, and Archaeological Resources (Division 20 Maintenance Yard)..... 4-290

Figure 4-59. Johnie’s Coffee Shop Exterior in 2007..... 4-297

Figure 4-60. The Beverly Wilshire Hotel in 1959..... 4-297

Figure 4-61. Century Plaza Hotel exterior in 2011..... 4-298

Figure 4-62. 1941 View of Hancock Park La Brea Tar Pits Pond..... 4-302

Figure 4-63. Columbian mammoth skeleton from the tar pits displayed in the George C. Page Museum 4-302

Figure 4-64. Ace Gallery 4-310

Figure 4-65. La Brea Tar Pits and Page Museum 4-316

Figure 4-66. Construction Schedule under Concurrent Construction Scenario..... 4-332

Figure 4-67. Construction Schedule under Phased Construction Scenario 4-334

Figure 4-68. Pressurized-Face Tunnel Boring Machine 4-334

Figure 4-69. Twin Tunnels on Eastside Extension..... 4-335

Figure 4-70. Tunneling in Gassy Areas with Pressure Face TBM..... 4-336

Figure 4-71. Typical Cut-and-Cover Construction Sequence..... 4-337

Figure 4-72. Typical Street Excavation..... 4-337

Figure 4-73. Concrete Decking on Street..... 4-337

Figure 4-74. Construction Activities below Concrete Decking..... 4-338

Figure 4-75. Off-Street Station Box Excavation	4-338
Figure 4-76. Off-Street Construction Area on Metro’s Eastside Extension	4-338
Figure 4-77. On Street Construction Area Used for 7th/Metro Station.....	4-339
Figure 4-78. Breakdown of Construction Related Job Creation by Industry	4-389
Figure 4-79. Breakdown of Construction Related Job Creation by Earnings Range	4-390
Figure 5-1. Section 4(f) Resources (Existing Wilshire/Western Station to Wilshire/La Brea Station).....	5-5
Figure 5-2. Section 4(f) Resources (Wilshire/Fairfax Station to Wilshire/Rodeo Station)	5-6
Figure 5-3. Section 4(f) Resources (Century City Station to Westwood/VA Hospital Station)	5-7
Figure 5-4. Section 4(f) Resources (Division 20 Maintenance Yard).....	5-8
Figure 5-5. Wilshire/Fairfax Station—May Company Wilshire/LACMA West	5-16
Figure 5-6. Wilshire/Rodeo Station—Ace Gallery Building	5-18
Figure 5-7. Wilshire/Rodeo Station—Adjacent Properties	5-19
Figure 5-8. Wilshire/Rodeo Station—Ace Gallery.....	5-26
Figure 5-9. Westwood/UCLA On-Street Station North of Wilshire Option.....	5-34
Figure 5-10. Westwood/UCLA On-Street Station South of Wilshire Option.....	5-34
Figure 5-11. Westwood/VA Hospital North Station.....	5-35
Figure 5-12. Westwood/VA Hospital South Station.....	5-35
Figure 5-13. Veterans Affairs Medical Center District	5-36
Figure 7-1. Activity Centers and High-opportunity Areas in Study Area	7-6
Figure 7-2. Recommended Station and Alignment Locations.....	7-30
Figure 8-1. User Benefits Distribution, Daily All Purposes, Production (with Century City Constellation)	8-72

Tables

Table 4-1. Relevant Local Land Use Policies.....	4-5
Table 4-2. Summary of Impacts to Land Use.....	4-10
Table 4-3. Comparison of LPA to SCAG Regional Policies.....	4-12
Table 4-4. Comparison of LPA to Local Land Use Policies and Goals	4-15
Table 4-5. Demographic and Socioeconomic Information for Study Area Communities	4-29
Table 4-6. Acquisitions and Easements for Station Combinations	4-40
Table 4-7. Permanent Underground Easements.....	4-43
Table 4-8. Estimated Property Tax Losses for the LPA.....	4-49
Table 4-9. Estimated Tax Revenues/Losses by Tax District.....	4-49
Table 4-10. Employment Loss in Study Area due to Property Acquisitions	4-51
Table 4-11. Full-Time Employment Generated by Annual O&M Expenditures	4-53
Table 4-12. Estimated O&M-related Economic Output	4-53
Table 4-13. Impacts without Mitigation by Environmental Resource to EJ Communities during Construction and Operation.....	4-68

Table 4-14. Distribution of Local-serving Businesses near Station Areas	4-80
Table 4-15. Summary of Impacts to EJ Communities after Mitigation	4-83
Table 4-16. Stations and Maintenance Facility Visual Character, Category, and Impacts	4-91
Table 4-17. State and Federal Ambient Air Quality Standards.....	4-110
Table 4-18. Air Quality Summary for Project Study Area Monitoring Stations.....	4-113
Table 4-19. Project Area Attainment Status.....	4-114
Table 4-20. Regional Emission Burden Assessment.....	4-115
Table 4-21. Study Area Emission Burden Assessment	4-116
Table 4-22. CO Microscale Analysis Sites	4-117
Table 4-23. Predicted Conservative One-hour CO Concentrations (ppm).....	4-119
Table 4-24. Predicted 8-hour CO Concentrations (ppm).....	4-119
Table 4-25. California Greenhouse Gas Inventory for 2002–2008 by Category	4-129
Table 4-26. Regional Roadway CO ₂ e Emission Burden Assessment (metric tons/day)	4-132
Table 4-27. CO ₂ e Emission Burdens from Power Requirements (metric tons/day)	4-133
Table 4-28. Regional CO ₂ e Emission Burden Assessment (metric tons/day)	4-133
Table 4-29. FTA Land Use Categories and Metrics for Transit Noise	4-137
Table 4-30. FTA Ground-borne Vibration and Ground-borne Noise Impact Criteria for General Assessment.....	4-139
Table 4-31. FTA Ground-borne Vibration and Ground-borne Noise Impact Criteria for Special Buildings	4-140
Table 4-32. Existing Noise Levels	4-141
Table 4-33. Location of Transfer Mobility Tests	4-144
Table 4-34. Predicted Ground-borne Vibration and Ground-borne Noise along Tangent Track at Vibration-sensitive Receivers.....	4-148
Table 4-35. Predicted Ground-borne Vibration and Ground-borne Noise along Crossover Track at Vibration-sensitive Receivers.....	4-151
Table 4-36. Receivers Exceeding the FTA Ground-borne Noise Criteria	4-159
Table 4-37. Energy Comparisons	4-164
Table 4-38. Transportation Energy Intensity	4-165
Table 4-39. 2035 Regional Daily Vehicle Miles and Energy Consumption Compared to No Build Alternative.....	4-166
Table 4-40. Topography of Alternatives along Wilshire Boulevard.....	4-172
Table 4-41. Geologic Units.....	4-173
Table 4-42. Active Faults and Fault Segments.....	4-176
Table 4-43. Estimated Ground Shaking Levels in the Study Area	4-180
Table 4-44. Groundwater Measurements	4-184
Table 4-45. Identified Oil Wells.....	4-190
Table 4-46. Summary of Geologic Hazard Impacts and Mitigation Measures.....	4-202
Table 4-47. Properties with High Potential for Hazardous Material Impacts in the Study Area as Indicated in Environmental Regulatory Databases	4-213

Table 4-48. Summary of Environmental Borings.....	4-218
Table 4-49. Special Status Wildlife and Plant Species Potentially in the Study Area	4-227
Table 4-50. Parks, Recreation Centers, and Museums within One-quarter Mile of LPA Stations, Structures, Maintenance Yard, or Adjacent to the Alignment.....	4-263
Table 4-51. Police Stations with Service Areas that Include the LPA	4-264
Table 4-52. Fire Stations with Service Areas that Include the LPA.....	4-265
Table 4-53. Schools within One-quarter Mile of LPA Stations, Structures, Maintenance Yards, or Adjacent to the Alignment.....	4-266
Table 4-54. Libraries within One-quarter Mile of LPA Stations, Structures, Maintenance Yards, or Adjacent to the Alignment.....	4-269
Table 4-55. Medical Facilities within One One-quarter Mile of LPA Stations, Structures, Maintenance Yards, or Adjacent to the Alignment	4-269
Table 4-56. Religious Institutions and Cemeteries within One-quarter Mile of LPA Stations, Structures, Maintenance Yards, or Adjacent to the Alignment	4-271
Table 4-57. Social Services within One-quarter Mile of LPA Stations, Structures, Maintenance Yards or Adjacent to the Alignment.....	4-272
Table 4-58. Archaeological Resources Recorded within the APE at the Division 20 Vehicle Storage and Maintenance Facility.....	4-301
Table 4-59. Historic Properties within LPA and Effect Determination under Section 106.....	4-304
Table 4-60. Generalized Sequence and Approximate Duration of Construction Activities	4-330
Table 4-61. Construction Activity Summary	4-331
Table 4-62. Construction-related Impacts Remaining after Mitigation	4-341
Table 4-63. Acquisitions, Easements, and Job Losses Associated with the LPA.....	4-342
Table 4-64. Estimated Construction Impacts for Concurrent Construction Scenario Construction Elements (pounds/day).....	4-349
Table 4-65. Estimated Construction Impacts for Phased Construction Scenario Construction Elements (pounds/day).....	4-350
Table 4-66. City of Los Angeles Presumed Ambient Noise Levels	4-357
Table 4-67. Noise Level of Typical Construction Equipment at 50' (dBA Lmax)	4-358
Table 4-68. Damage Risk Vibration Criteria.....	4-364
Table 4-69. Population Growth in Cities within the Study Area, 2000–2009	4-393
Table 4-70. Households in Cities within the Study Area, 2000–2009	4-393
Table 4-71. Population, Households, and Employment Growth in Cities within the Study Area, 2010–2035	4-395
Table 5-1. Park and Recreation Areas on or Adjacent to Westside Subway Extension LPA Alignment or within One-quarter Mile of a Station or Maintenance Facility	5-11
Table 5-2. Historic Properties with Section 4(f) Use in the Study Area	5-13
Table 6-1. Capital Cost Ranges of LPA Configurations in 2011 dollars (millions)	6-2
Table 6-2. Total Capital Cost Estimate for the LPA by Standardized Cost Category (millions)	6-3
Table 6-3. Phased Construction Scenario, LPA Capital Cost Estimate, Phases 1–3 (millions).....	6-4
Table 6-4. Total Allocated and Unallocated Contingency for the LPA in 2011 Dollars (millions).....	6-4

Table 6-5. Phased Construction Scenario, Total New Starts Funding by Phase in YOE Dollars (millions)	6-5
Table 6-6. Capital Funding Sources and Uses in YOE Dollars (millions).....	6-7
Table 6-7. Annual O&M Costs for Year 2035 for No Build Alternative and LPA in YOE Dollars (millions)	6-8
Table 7-1. Summary of LPA Costs, Benefits, and Impacts	7-4
Table 7-2. LPA Station and Alignment Combination Criteria	7-10
Table 7-3. Comparison of Station Location Options at Century City.....	7-13
Table 7-4. Daily Boardings with Century City Station Options from Travel Demand Model	7-14
Table 7-5. Comparison of Station Location Options at Westwood/UCLA.....	7-16
Table 7-6. Comparison of Station Location Options at Westwood/VA Hospital Station.....	7-17
Table 7-7. Comparison of Station Entrance Options.....	7-19
Table 7-8. Recommended Station and Entrance Locations	7-30
Table 7-9. Comparison of Project Costs under Concurrent Construction Scenario versus Phased Construction Scenario.....	7-31
Table 7-10. LPA Daily Station Boardings	7-32
Table 8-1. Station Area Advisory Group Meetings.....	8-11
Table 8-2. Westside Subway Extension Early Scoping Meetings	8-12
Table 8-3. Community Update Meetings.....	8-15
Table 8-4. Westside Subway Extension Draft EIS/EIR Scoping Meetings	8-17
Table 8-5. Community Update Meetings after Scoping.....	8-19
Table 8-6. Westside Subway Extension Station Area Information Meetings	8-20
Table 8-7. Westside Subway Extension Station Area Spring 2010 Community Meetings.....	8-22
Table 8-8. Westside Subway Extension Station Area Summer 2010 Community Meetings	8-23
Table 8-9. Area Public Libraries.....	8-27
Table 8-10. Draft EIS/EIR Public Hearings.....	8-28
Table 8-11. Westside Subway Extension Station Area Winter and Spring 2011 Community Meetings	8-29
Table 8-12: Common Comment Topics on the Draft EIS/EIR.....	8-32
Table 8-13. Fixed Guideway System Benefits Research Summary.....	8-74

VOLUME 3

Appendices

Appendix A—Plan and Profile, and Typical Section Drawings

Appendix B—Station Plan Report

VOLUME 4

The following appendices and technical reports can be found on the CD accompanying the printed version of the Final EIS/EIR or on the Metro Westside Subway Extension Project website:

www.metro.net/projects/westside/. Technical reports include those prepared for the Draft EIS/EIR (2010) and for the Final EIS/EIR (2012).

Appendices

Appendix C—Acquisitions

Appendix D—Memorandum of Agreement and Section 106 Correspondence

Appendix E—Construction Methods

Appendix F—Notice of Intent/Notice of Preparation/Notices of Availability/Notice of Completion

Appendix G—Memorandum of Understanding for Paleontological Resources

Appendix H—Response to Comments

Appendix I—Mitigation Monitoring and Reporting Plan

Appendix J—Environmental Justice Reports

- Analysis of Environmental Justice Technical Report

- Analysis of Environmental Justice Memorandum

Appendix K—Section 4(f) and Section 106 Reports

- Cultural Resources Technical Report

- Historic Property Survey Report

- Archaeological Resources Supplemental Survey Technical Report

- Historic Properties Supplemental Survey Technical Report

- Section 4 (f) Evaluation Technical Report

Appendix L—Geotechnical Reports

- Geotechnical and Hazardous Materials Technical Report

- Addendum to the Geotechnical and Hazardous Materials Technical Report

- Century City Area Fault Investigation Report

- Century City Area Tunneling Safety Report

- Preliminary Geotechnical and Environmental Report

Draft EIS/EIR Technical Reports

Addendum to the Operations and Maintenance Cost Report
Air Quality Technical Report
Alternatives Screening and Refinement Following Scoping Report
Climate Change Technical Report
Community and Neighborhood Technical Report
Comparative Benefits and Costs Analysis Technical Report
Construction and Mitigation Technical Report
Cost and Financial Analysis Technical Report
Cumulative Impact Assessment Technical Report
Economic and Fiscal Impacts Analysis and Mitigation
Ecosystems and Biological Resources Technical Report
Energy Technical Report
Growth Inducing Impacts Technical Report
Hydrology and Water Quality Technical Report
Land Use and Development Opportunities Report
Noise and Vibration Technical Report
Operations and Maintenance Cost Report
Parking Impacts and Policy Plan
Parklands and Other Community Facilities Technical Report
Public Participation and Community Outreach Report
Real Estate and Acquisitions Technical Report
Safety and Security Hazards and Threat Assessment Technical Report
Smart Growth Evaluation Report
Traffic Analysis Impact Report
Transit Impact Assessment Report
Transportation Impacts Report
Visual and Aesthetics Impacts Report

Final EIS/EIR Technical Reports

Accelerated Financial Plan
Acquisitions and Displacement Supplemental Report
Addendum to the Community and Neighborhood Technical Report
Addendum to the Hydrology and Water Quality Technical Report
Addendum to the Land Use and Development Opportunities Technical Report
Addendum to the Safety and Security Hazards and Threat Assessment Technical Report
Addendum to the Visual and Aesthetic Impacts Technical Report
Addendum to Transportation Impacts Report
Air Quality Memorandum
Alternative Financial Plan
Century City Station Location Report
Century City TOD and Walk Access Study
Climate Change Memorandum
Construction Traffic Analysis Report
Economic and Fiscal Impacts Analysis and Mitigation Memorandum
Energy Memorandum
Existing Plus Project Traffic Impact Analysis Report
Financial Plan Appendices to both the Accelerated Financial Plan and Alternative Financial Plan
Noise and Vibration Study
Parklands and Other Community Facilities Supplemental Technical Report
Station Circulation Report
Station Entrance Location Report and Recommendations
Technical Report Summarizing the Results of the Forecasted Alternatives
Updated Off-Street Parking Analysis Memorandum
Wilshire/La Cienega Terminus (Phase 1) Traffic Impact Analysis Report
Westwood/UCLA Station and the Westwood/VA Hospital Station Locations Report
Wilshire/Rodeo Station Bank of America Portal Traffic Impact Analysis Report

ACRONYMS AND ABBREVIATIONS

$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
AA	Alternatives Analysis
AB	State of California Assembly Bill
ACHP	Advisory Council on Historic Preservation
ACI	American Concrete Institute
ADA	Americans with Disabilities Act of 1990
AFF	America Fast Forward
AMSL	above mean sea level
ANSI	American National Standards Institute
APCD	Air Pollution Control District
APE	Area of Potential Effect
APM	Automated People Mover
APTA	American Public Transportation Association
ASTM	formerly known as American Society for Testing and Materials International
BBB	Santa Monica Big Blue Bus
bgs	below-ground surface
BHFD	Beverly Hills Fire Department
BHPD	Beverly Hills Police Department
BMP	best management practice(s)
BOC	Bus Operations Center
BRT	bus rapid transit
BTU	British thermal unit
CAA	Community Redevelopment Agency
CAAA	Clean Air Act Amendments
CAAQS	California Ambient Air Quality Standards
Cal/OSHA	California Occupational Safety and Health Administration
California Act	California Relocation Act
Caltrans	California Department of Transportation
CARB	California Air Resource Board
CBC	California Building Code
CBD	Los Angeles Central Business District
CCR	California Code of Regulations
CDC	California Department of Conservation
CDFG	California Department of Fish and Game
CEI	cost effectiveness index

CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act (PRC 21000-21177)
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980, also known as “Superfund Act”
CESA	California Endangered Species Act
CFC	chlorofluorocarbons
CFR	Code of Federal Regulations
CGS	California Geological Surveys
CH ₄	methane
CMAQ	Congestion Management and Air Quality
CNDDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CO	carbon monoxide
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalent
COG	Council of Governments
Cortese	Hazardous Waste and Substance Sites List
CPT	cone petrometer test
CPUC	California Public Utilities Commission
CRHR	California Register of Historic Resources
DASH	Downtown Area Shuttle
dB	decibels
dBA	A-weighted decibels
DOGGR	State of California Division of Oil, Gas, and Geothermal Resources
DOMS	State of California Division of Oil, Gas, and Geothermal Resources Online Mapping System
DPR	California Department of Parks and Recreation
DTSC	Department of Toxic Substances Control
EB	eastbound
EIS/EIR	environmental impact statement/environmental impact report
EJ	environmental justice
EPA	U.S. Environmental Protection Agency
EPB	earth pressure balance
ESA	environmental site assessment
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FRM	Federal Reference Method

FTA	Federal Transit Administration
FY	fiscal year
g	gravity
GBN	ground-borne noise
GBV	ground-borne vibration
GHG	greenhouse gas
GIS	Geographic Information System
GSA	General Services Administration
GWP	global warming potential
H ₂ S	hydrogen sulfide
HABS	Historic American Building Survey
HAER	Historic American Engineering Record
HALS	Historic American Landscape Survey
Haznet	Facility and Manifest Data
HCFC	hydrochlorofluorocarbon
HCM	Highway Capacity Manual
HFC	hydrofluorocarbons
HFE	hydrofluorinated ether
HHS	Department of Health and Human Services
HIST UST	Historical Record Hazardous Substance Storage Container Database
HOV	high-occupancy vehicle
HRT	heavy rail transit
HUD	U.S. Department of Housing and Urban Development
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ka	thousand years old
Kg	kilogram
kWh	kilowatt-hour
LACMA	Los Angeles County Museum of Art
LACoFD	Los Angeles County Fire Department
LADOT	Los Angeles Department of Transportation
LADWP	Los Angeles Department of Water and Power
LAFD	Los Angeles Fire Department
LAPD	Los Angeles Police Department
LARWQCB	Los Angeles Regional Water Quality Control Board
LASD	Los Angeles Sheriff's Department
LATC	Los Angeles Transportation Center
LAWA	Los Angeles World Airports

LAX	Los Angeles International Airport
lbs	pounds
Ldn	average day-night noise level
LEL	lower explosive limit
LEP	limited English proficiency
Leq	equivalent sound level
Leq(h)	hourly equivalent sound level
Lmax	maximum noise level during an event
LONP	Letters of No Prejudice
LOS	level of service
LPA	Locally Preferred Alternative
LRFD	load and resistance factor design
LRT	light rail transit
LRTP	Long Range Transportation Plan
LTF	Local Transportation Fund
LUST	leaking underground storage tank
ma	million years old
MDE	maximum design earthquake
Metro	Los Angeles County Metropolitan Transportation Authority
mg	milligrams
mg/m ³	milligrams per cubic meter
MOA	Memorandum of Agreement
MOS	minimum operable segments
mph	miles per hour
MPO	metropolitan planning organization
MS4	Municipal Separate Storm Sewer System
MSAT	mobile source air toxics
MSHA	U.S. Mine Safety and Health Administration
MUTCD	Manual on Uniform Traffic Control Devices
Mw	earthquake magnitude
N ₂ O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NDIR	non-dispersive infrared photometry
NEPA	National Environmental Policy Act
NF ₃	nitrogen trifluoride
NHDVS	National Home for Disabled Volunteer Soldiers

NO ₂	nitrogen dioxide
NOAA/FS	National Oceanic and Atmospheric Administration/Fisheries Service
NOI	Notice of Intent
NOP	Notice of Preparation
NO _x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
O&M	operating and maintenance
O ₃	ozone
OCC	Operations Control Center
ODE	operating design earthquake
ODS	ozone depleting substance
OHP	Office of Historic Preservation
OPR	The California Governor’s Office of Planning and Research
OSHA	U.S. Occupational Safety and Health Administration
PCB	polychlorinated biphenyls
pCi/l	pico Curies per liter of air
PDF	project design features
PE	preliminary engineering
PEIR	Program Environmental Impact Report
PFC	perfluorocarbons
PGA	peak ground acceleration
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
PPV	peak particle velocity
PRC	State of California Public Resources Code
PRMMP	Paleontological Resources Monitoring and Mitigation Plan
Project	Westside Subway Extension Project
PSHA	probabilistic seismic hazard analysis
QTIB	Qualified Transportation Improvement Bond
RCEM	Road Construction Emissions Model, Version 6.3.2
RCPG	Regional Comprehensive Plan and Guide
RCRA	Resource Conservation and Recovery Act
RMS	root mean squared

ROC	Rail Operations Center
ROD	Record of Decision
ROW	right-of-way
RPP	residential permit parking
RTIP	Regional Transportation Improvement Plan
RTP	Regional Transportation Plan
SAAG	Station Area Advisory Group
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (U.S. Public Law 109-59)
SB	State of California Senate Bill
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCC	standardized cost categories
SCRTD	Southern California Regional Transit 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.)
SED	socioeconomic data
sf	square foot
SF ₆	sulfur hexafluoride
SHPO	State Historic Preservation Office/Officer
SIP	State Implementation Plan
SO ₂	sulfur dioxide
SOP	standard operating procedure
SPT	standard penetration test
SVP	Society of Vertebrate Paleontology
SWPPP	Storm Water Pollution Prevention Plan
TAHA	Terry A. Hayes Associates
TAP	Tunnel Advisory Panel
TAZ	traffic analysis zone
TBM	tunnel boring machine
TCON	traffic control plan
TDA	Transportation Development Act
TDM	transportation demand management
TEA-21	Transportation Equity Act for the 21 st Century
TIFIA	Transportation Infrastructure Finance and Innovation Act

TIP	Transportation Improvement Plan
TMP	Transportation Management Plan
TOD	transit-oriented development
TOG	total organic gases
TPH	total petroleum hydrocarbons
TPSS	traction power substation
TSM	Transportation Systems Management
TVA	threat and vulnerability assessment
UCLA	University of California, Los Angeles
UDWG	Urban Design Working Group
Uniform Act	Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended
UP	Union Pacific Railroad
URBEMIS	California Air Resources Board’s Urban Emissions Model
USACE	U.S. Army Corps of Engineers
USC	United States Code
USC	University of Southern California
USDA	U.S. Department of Agriculture
USDOJ	U.S. Department of Interior
USDOT	U.S. Department of Transportation
USEO	U.S. Executive Order
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
VA	Veterans Affairs
VdB	vibration decibels
VHT	vehicle hours traveled
VMT	vehicle miles traveled
VOC	volatile organic compounds
WATCH Manual	Work Area Traffic Control Handbook
WB	westbound
WDR	waste discharge requirements
YOE	year of expenditure

GLOSSARY

above mean sea level (AMSL)	A measure of elevation above sea level.
alluvium	Loose, unconsolidated soil or sediments that are eroded or reshaped by water.
Alternatives Analysis (AA)	<p>An alternatives analysis is the Federal Transit Administration planning requirement for projects seeking New and Small Starts funding. The objective of the Alternatives Analysis program (49 U.S.C. 5339) is to assist in financing the evaluation of all reasonable modal and multimodal alternatives and general alignment options for identified transportation needs in a particular, broadly defined travel corridor. The transportation planning process of the Alternatives Analysis:</p> <ul style="list-style-type: none">• Includes an assessment of a wide range of public transportation or multimodal alternatives, which will address transportation problems within a corridor or subarea.• Provides ample information to enable the Secretary to make the findings of project justification and local financial commitment.• Supports the selection of a Locally Preferred Alternative.• Enables the local Metropolitan Planning Organization to adopt the Locally Preferred Alternative as part of the long-range transportation plan.
aquifer	An underground layer of permeable rock from which groundwater can be extracted.
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.
bus rapid transit (BRT)	An enhanced bus system that operates on bus lanes or other transitways in order to combine the flexibility of buses with the efficiency of rail.
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.
carbon dioxide equivalent (CO ₂ e)	A metric measure used to compare the emissions from various greenhouse gases based upon their global warming potential.
Centers Concept	Characterization of Los Angeles as a collection of urban centers rather than a single downtown served by adjacent areas.
Concurrent Construction Scenario	Under the America Fast Forward (30/10) Scenario (Concurrent Construction Scenario), accelerated federal funding would allow the LPA to open in its entirety to the Westwood/VA Hospital Station in 2022 with the three construction segments built concurrently.

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 that account for human perception of sound and unwanted noise.
<i>de minimis</i>	<p>The requirements of Section 4(f) would be considered satisfied if it is determined that a transportation project would have only a <i>de minimis</i> impact on the Section 4(f) resource. <i>De minimis</i> impact is defined in 23 CFR 774.17 as follows:</p> <ul style="list-style-type: none"> • For parks, recreation areas, and wildlife and waterfowl refuges, a <i>de minimis</i> 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, <i>de minimis</i> 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.
earth pressure balance (EPB)	A type of pressurized tunnel boring.
Enhanced Transportation Infrastructure Finance and Innovation Act (TIFIA)	A federal funding mechanism proposed in the America Fast Forward Plan.
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.
Environmental Justice (EJ)	To avoid, minimize, or mitigate disproportionately high and adverse human health, environmental effects, social and economic effects on minority and low income populations; to ensure full and fair participation in the transportation decision-making process by affected communities; and to prevent the denial of, reduction in, or delay the receipt of benefits by minority and low-income populations.
façade	The front of a building; any face of a building given special architectural treatment.
fixed guideway	Any transit service that uses exclusive or controlled rights-of-way or rails, entirely or in part.
Full Funding Grant Agreement (FFGA)	Establishes the terms and conditions for federal financial participation in a New Starts project; defines the project; sets the maximum amount of federal new starts funding for a project; covers the period of time for completion of the project; and facilitates efficient management of the project in accordance with applicable federal statutes, regulations, and policy.
geologic epoch	A timescale based on rock layering.

global warming potential (GWP)	A-weighting factor used to compare emissions of different greenhouse gases. The heat trapping ability of 1 metric ton (1,000 kilograms) of CO ₂ is taken as the standard, and emissions are expressed in terms of CO ₂ equivalent (CO ₂ e) but can also be expressed in terms of carbon equivalent.
ground-borne noise (GBN)	A low-frequency rumble related to operational vibration.
heavy rail transit (HRT)	An electric railway that has high passenger capacity and is characterized by exclusive rights-of-way, multicar trains, high speed, rapid acceleration, sophisticated signaling, and high-platform loading.
joint development	An effort by a public agency and a private developer to undertake a construction project. Joint developments are usually a voluntary joining of governmental entities with private for-profit organizations to undertake mutually beneficial development in connection with public infrastructure.
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 1-hour period
Letters of No Prejudice (LONP)	LONP authority allows an applicant to incur costs on a project using non-federal resources with the understanding that the costs incurred subsequent to the issuance of the LONP may be reimbursable as eligible expenses or eligible for credit toward the local match should FTA approve the project at a later date.
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.
light rail transit (LRT)	A form of rail service operated on city streets, semi-exclusive rights-of-way, or exclusive rights-of way. This type of rail generally has a lower passenger capacity than heavy rail.
liquefaction	A process by which loosely packed sandy or silty materials saturated with water are shaken hard enough to lose strength and stiffness.
maximum design earthquake (MDE)	A level of ground-shaking hazard that has 4 percent probability of exceedance in 100 years.
Measure R	A half-cent sales tax approved by Los Angeles County voters in November 2008.
Memorandum of Understanding (MOU)	A document providing a general description of the responsibilities that are assumed by two or more parties in their pursuit of the same goal.

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 the Richter scale.
non-dispersive infrared photometry (NDIR)	A tool used to determine a 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.
Phased Construction Scenario	Under the Metro Long Range Transportation Plan Scenario (Phased Construction Scenario), the LPA would be constructed and opened in three phased segments with the entire Project operational to the Westwood/VA Hospital Station in 2036; Phase 1 to the Wilshire/La Cienega Station would open in 2020; and Phase 2 to Century City would open in 2026. This is the construction scenario if accelerated federal funding cannot be secured.
Qualified Transportation Improvement Bonds (QTIBIS)	A federal funding mechanism proposed in the American Fast Forward Plan.
Regional Transportation Plan (RTP)	The RTP is a long-term blueprint of a region’s transportation system. Usually RTPs are conducted every five years and include plans for 30 years into the future. The RTP identifies and analyzes transportation needs of the metropolitan region and creates a framework for project priorities.
root mean squared (RMS)	A formula used to calculate ground-borne vibration from transit vehicles.
Sanborn Maps	Historical and current maps of U.S. cities and towns that were initially created to estimate fire insurance liabilities.
scoping	A process to determine and ensure that a range of issues are identified and properly studied in an environmental document produced for public review.
standardized cost categories (SCC)	Categories that summarize budget baselines in a consistent framework.

Storm Water Pollution Prevention Plan (SWPPP)	<p>A SWPPP is a site-specific, written document that:</p> <ul style="list-style-type: none">• Identifies potential sources of stormwater pollution at the construction site• Describes practices to reduce pollutants in stormwater discharges from the construction site. Reduction of pollutants is often achieved by controlling the volume of stormwater runoff (e.g., taking steps to allow stormwater to infiltrate into the soil).• Identifies procedures the operator will implement to comply with the terms and conditions of a construction general permit.
study area	<p>Thirty-eight square miles of land in western Los Angeles County. The area is oriented east-west and includes portions of five jurisdictions: the Cities of Los Angeles, West Hollywood, Beverly Hills, and Santa Monica, plus portions of unincorporated Los Angeles County. The boundaries extend north to 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.</p>
transit-oriented development (TOD)	<p>Compact, medium- to high-density mixed-use development within walking distance of transit facilities.</p>
tunnel boring machine (TBM)	<p>A machine used to excavate tunnels with the ability to penetrate through a variety of soil and hard rock.</p>
vibration decibels (VdB)	<p>An expression of ground-borne vibration.</p>
watershed	<p>An area of land where all of the water that is under it or drains off it converges into the same place.</p>
zone pairs	<p>Selected origin and destinations.</p>

