



WESTSIDE SUBWAY EXTENSION PROJECT

Energy Memorandum

Metro

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1.0 INTRODUCTION

This memorandum supplements the *Westside Subway Extension Project Energy Technical Report* (the Report) dated August 2010 and supports the Final EIS/EIR. This memorandum updates the analysis in the Environmental Impact/Environmental Consequences Section of the Report to incorporate modifications to the LPA (Alternative 2) since the release of the Draft EIS/EIR. The analysis has been revised to reflect modifications to the operating plans, station locations and construction plans. This memorandum also includes an analysis of existing versus existing plus project conditions. Only the LPA (Alternative 2) is included in this memorandum.

The LPA could either be constructed as a single phase under the America Fast Forward (30/10) Scenario (Concurrent Construction), or as three consecutive phases under the Metro Long Range Transportation Plan (LRTP) Scenario (Phased Construction). The opening of the LPA as a single phase or in three sequential phases does not substantially change the energy analysis that was presented in the Draft EIS/EIR.

Information on regulatory framework, analysis methodology and existing conditions/affected environment can be found in the *Westside Subway Extension Project Energy Technical Report*. The regulatory framework, analysis methodology and existing conditions/affected environment for the LPA are the same whether the LPA is constructed under the Concurrent Construction Scenario or the Phased Construction Scenario.

2.0 PROJECT DESCRIPTION

On October 28, 2010, the Metro Board selected the Westwood/VA Hospital Extension (Alternative 2 in the Draft EIS/EIR) as the Locally Preferred Alternative (LPA) and authorized the preparation of the *Westside Subway Extension Final EIS/EIR* (the Final EIS/EIR) to analyze the LPA. This alternative would extend HRT, in subway, approximately nine-miles from the existing Metro Purple Line Wilshire/Western Station to a Westwood/VA Hospital Station. The extension would 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)

The estimated one-way running time for the project would be approximately 15 minutes from the Wilshire/Western Station to the Westwood/VA Hospital Station. The extension

would operate at headways of 4 minutes during peak periods and 10 minutes during off-peak periods. As part of the project, Metro is also planning several enhancements to the Division 20 Maintenance and Storage Facility.

The construction schedule for the Project is partially dependent on the timing of Federal funding availability. Two LPA construction scenarios are considered. Both scenarios will contain the same elements with differences only in the timing of when they are built and operational. The first construction scenario assumes that under the America Fast Forward (30/10) Scenario (Concurrent Construction), the LPA would open in its entirety to the Westwood/VA Hospital Station in 2022 with the three construction segments built concurrently (Wilshire/Western to Wilshire/La Cienega, Wilshire/La Cienega to Century City and Century City to Westwood/VA Hospital). The second construction scenario assumes that under the Metro Long Range Transportation Plan (LRTP) Scenario (Phased Construction), the LPA would open in three consecutive phases (Phase 1 to Wilshire/La Cienega, Phase 2 to Century City, and Phase 3 to Westwood/VA Hospital), with the entire LPA operational to the Westwood/VA Hospital Station in 2036.

A detailed description of the LPA is provided in Chapter 2 of the Final EIS/EIR.

3.0 ENVIRONMENTAL IMPACT/ENVIRONMENTAL CONSEQUENCES

3.1 Methodology

Operational energy use for the LPA, under either the Concurrent Construction Scenario or the Phased Construction Scenario was calculated based on the British Thermal Units per vehicle-mile rate. Table 3-1 displays the energy requirements for various modes of transportation, including automobile, bus, and rail transit.

Table 3-1. Transportation Energy Intensity

Transport Mode	BTU/Passenger-Mile	BTU/VMT
Automobile	3,538	5,484
Transit Bus (all vehicle types)	4,242	39,160
Commuter Rail	2,812	91,936
Urban Rail	2,516	61,663

Source: Oak Ridge National Laboratory, *Transportation Energy Data Book*: Edition 30-2011, 2011

The primary source of energy use for the Locally Preferred Alternative (LPA) under either the Concurrent Construction Scenario or the Phased Construction Scenario would be train travel. The LPA would increase rail vehicle miles traveled and decrease automobile and bus vehicle miles traveled. The miles for the LPA were obtained from the transportation analysis completed by Parsons Brinckerhoff. A revised vehicle miles traveled (VMT) analysis was completed for the Final EIS/EIR that Concurrent Construction Scenario as well as the Phased Construction Scenario. This revised analysis was conducted for the LPA assuming both the Century City Santa Monica Station and the Century City Constellation Station. The model also included the Westwood/UCLA On-Street Station and the Westwood/VA Hospital South Station. Table 3-2 shows the number of vehicle-miles that would be either added or subtracted from the region when compared to the No Build Scenario (conditions without the project). Under the Phased Construction Scenario the Automobile VMT generally decreases and the rail VMT increases from Phase 1 through Phase 3. Also, the difference in reduction of VMT for automobiles between the LPA with the Century City Constellation Station versus the LPA with the Century City Santa Monica Station seems to be large under the Concurrent Construction Scenario and Phase 2 of the Phased Construction Scenario; however, the regional VMT is in the 530 Million range.

Table 3-2. 2035 Regional Vehicle-Miles by Transportation Mode

LPA	Automobile	Rail	Bus
Concurrent Construction Scenario			
No Build vs. LPA with Century City Constellation	(581,000)	16,057	(8,390)
No Build vs. LPA with Century City Santa Monica	(318,000)	15,622	(8,390)
Phased Construction Scenario			
No Build vs. Phase 1	(214,000)	8,888	(8,390)
No Build vs. Phase 2 with Century City Constellation	(394,000)	12,910	(8,390)
No Build vs. Phase 2 with Century City Santa Monica	(147,000)	12,452	(8,390)
No Build vs. Phase 3 with Century City Constellation	(581,000)	16,057	(8,390)
No Build vs. Phase 3with Century City Santa Monica	(318,000)	15,622	(8,390)

Source: Parsons Brinckerhoff. 2011

3.2 Operational Impacts

3.2.1 America Fast Forward (30/10) Scenario (Concurrent Construction)

The primary source of energy use for the LPA would be train travel. The LPA would increase rail vehicle miles traveled and decrease automobile and bus vehicle miles traveled. Table 3-3 shows energy consumption for the LPA. Under the Concurrent Construction Scenario Mobile source energy consumption would decrease between approximately 405 and 921 billion British Thermal Units per year.

Table 3-3. 2035 Estimated Mobile Source Energy Consumption

LPA	Change in Energy Consumption (Million British Thermal Units/Year)
Concurrent Construction Scenario	
No Build vs. LPA with Century City Constellation	(921,491)
No Build vs. LPA with Century City Santa Monica	(404,845)
Phased Construction Scenario	
No Build vs. Phase 1	(348,235)
No Build vs. Phase 2with Century City Constellation	(618,010)
No Build vs. Phase 2 with Century City Santa Monica	(133,909)
No Build vs. Phase 3 with Century City Constellation	(921,491)
No Build vs. Phase 3with Century City Santa Monica	(404,845)

Source: Terry A. Hayes Associates Inc., 2011

The LPA would include seven stations. Each of the seven stations would use approximately 175 million British Thermal Units per year during operational activity. The resulting station energy consumption would be 1.2 Billion Thermal Units per year for the entire LPA The LPA includes significant decreased system-wide vehicle-miles which results in less energy consumption than baseline conditions. The LPA would result in a beneficial energy impact.

The analysis presented above indicates that the LPA with the Century City Constellation Station will result in greater decreases in regional energy consumption than the LPA with Century City Santa Monica Station. As such, the LPA with the Century City Constellation Station will result in a greater beneficial energy effect than the LPA with the Century City Santa Monica Station.

The California Department of Transportation has estimated that operation of a maintenance and storage facility will result in the use of approximately 8.7 billion BTUs per year. This represents less than 0.00001 percent of overall operational energy consumption. Energy use associated with the maintenance yard will not substantially affect overall regional energy use.

3.2.2 Metro Long Range Transportation Plan (LRTP) Scenario (Phased Construction)

Under the Phased Construction Scenario, the operational energy impacts will be the same as under the Concurrent Construction Scenario. The only difference between the two scenarios is the timing of when operational energy impacts would occur. Under the Phased Construction Scenario, potential impacts related to energy along Phase 2 and Phase 3 will occur later than under the Concurrent Construction Scenario due to an extended construction timeline. The timing for potential impacts related to energy along Phase 1 of the LPA will occur earlier than under the Concurrent Construction Scenario since Phase 1 will open for operation in 2020.

The primary source of energy use for the LPA under the Phased Construction Scenario would be train travel. Each of the three phases of the LPA would increase rail vehicle

miles traveled and decrease automobile and bus vehicle miles traveled. Table 3-3 shows energy consumption for Phase 1, Phase 2, and Phase 3 of the LPA. Mobile source energy consumption would decrease by approximately 348 billion British Thermal Units per year during Phase 1. Mobile source energy consumption would decrease between approximately 134 and 618 billion British Thermal Units per year during Phase 2. Mobile source energy consumption would decrease between approximately 405 and 921 billion British Thermal Units per year during Phase 3.

Three stations would be constructed during Phase 1 and two each during Phases 2 and 3. Each of the stations would use approximately 175 million British Thermal Units per year during operational activity. The resulting station energy consumption would be 525 million British Thermal Units per year during Phase 1, 875 million British Thermal Units per year during Phase 2, and 1.2 billion British Thermal Units per year during Phase 3.

The analysis presented in Table 3-3 indicates that the LPA with the Century City Constellation Station will result in greater decreases in regional energy consumption than the LPA with Century City Santa Monica Station. During Phase 2, energy consumption associated with the Century City Constellation Station would be approximately 618 billion British Thermal Units per year less than the No Build Alternative while energy consumption associated with the Century City Santa Monica Station would be approximately 134 billion British Thermal Units per year less than the No Build Alternative. During Phase 3, energy consumption associated with the Century City Constellation Station would be approximately 921 billion British Thermal Units per year less than the No Build Alternative while energy consumption associated with the Century City Santa Monica Station would be approximately 405 billion British Thermal Units per year less than the No Build Alternative. As such, the LPA with the Century City Constellation Station will result in a greater beneficial energy effect than the LPA with the Century City Santa Monica Station.

The California Department of Transportation has estimated that operation of a maintenance and storage facility (in operation during Phase 1) will result in the use of approximately 8.7 billion BTUs per year. This represents less than 0.00001 percent of overall operational energy consumption. Energy use associated with the maintenance yard will not substantially affect overall regional energy use.

3.3 Construction Impacts (Construction Equipment Energy Consumption)

3.3.1 America Fast Forward (30/10) Scenario (Concurrent Construction)

The LPA is approximately nine miles in length and would include the construction of seven stations, three of which would be tunnel boring machine launch sites and one would be a mucking station. Under the Concurrent Construction Scenario construction of the LPA would occur concurrently. As shown in Table 3-4, approximately 2.3 trillion British Thermal Units would be consumed during construction of the LPA. This represents less than 0.02 percent of the total energy consumed per year in the State of California.

Table 3-4. Estimated Construction Energy Consumption

LPA	Energy Consumption (Billion British Thermal Units)
Concurrent Construction Scenario	
LPA	2,256
Maintenance Facility	5
Phased Construction Scenario	
Phase 1	912.9
Maintenance Facility (Phase 1)	5
Phase 2	671.4
Phase 3	671.4

Source: Terry A. Hayes Associates Inc., 2011

Metro would require the construction contractor to implement energy conserving Best Management Practices in accordance with Metro's Energy and Sustainability Policy. Best Management Practices would include, but are not limited to, implementing a construction energy conservation plan, using energy-efficient equipment, consolidating material delivery to ensure efficient vehicle utilization, scheduling delivery of materials during non-rush hours to maximize vehicle fuel efficiency, encouraging construction workers to carpool, and maintaining equipment and machinery in good working condition. With implementation of Best Management Practices, the LPA would not lead to a wasteful, inefficient, or unnecessary usage of fuel or energy. Construction of the LPA would not result in an adverse energy impact.

Approximately 5.1 billion British Thermal Units would be consumed during construction of the Division 20 Maintenance Facility. This represents approximately .00001 percent of the total energy consumed per year in the State of California. With implementation of Best Management Practices, the proposed project would not lead to a wasteful, inefficient, or unnecessary usage of fuel or energy. Construction of the maintenance facility would not result in an adverse energy impact.

3.3.2 Metro Long Range Transportation Plan (LRTP) Scenario (Phased Construction)

Under the Phased Construction Scenario the LPA would open in three consecutive phases. Construction activity would occur from Wilshire/Western to Wilshire/La Cienega, Wilshire/La Cienega to Century City, and Century City to Westwood/VA Hospital. The Phased Construction Scenario would consume the same amount of total energy as the Concurrent Construction Scenario. However, as shown in Table 3-4, the consumption of energy would vary between phase 1 and phases 2 and 3. The energy consumed during each phase represents less than 0.01 percent of the total energy consumed per year in the State of California.

As described in the Concurrent Construction Scenario above Metro would require the construction contractor to implement energy conserving Best Management Practices in accordance with Metro's Energy and Sustainability Policy for construction of Phase 1, Phase 2, and Phase 3 of the LPA. With implementation of Best Management Practices,

Phase 1, Phase 2, and Phase 3 of the LPA would not lead to a wasteful, inefficient, or unnecessary usage of fuel or energy. Construction of Phase 1, Phase 2, and Phase 3 of the LPA would not result in an adverse energy impact.

Approximately 5.1 billion British Thermal Units would be consumed during construction of the Division 20 Maintenance Facility as part of Phase 1. This represents approximately .00001 percent of the total energy consumed per year in the State of California. With implementation of Best Management Practices, the proposed project would not lead to a wasteful, inefficient, or unnecessary usage of fuel or energy. Construction of the maintenance facility would not result in an adverse energy impact.

4.0 MITIGATION MEASURES

4.1 Mitigation for Operational Impacts

As shown above, operational activity associated with the LPA under either the Concurrent Construction Scenario or the Phased Construction Scenario would decrease regional energy consumption. Operational activity would result in beneficial energy effects, and mitigation measures are not required.

4.2 Mitigation for Construction Impacts

Under either the Concurrent Construction Scenario or the Phased Construction Scenario Metro would require the construction contractor to implement energy conserving Best Management Practices in accordance with Metro's Energy and Sustainability Policy. Construction activity would not result in an adverse energy impact with implementation of Best Management Practices. Mitigation measures are not required.

5.0 CALIFORNIA ENVIRONMENTAL QUALITY ACT DETERMINATION

The CEQA determination compares the effects of the LPA with the existing conditions described in the affected environment/existing conditions section. To ensure that energy implications are considered in project decisions, CEQA requires that environmental documents include a discussion of potential energy impacts of proposed projects, with particular emphasis on avoiding or reducing inefficient, wasteful, and unnecessary consumption of energy (see Public Resources Code, Section 21100(b)(3)). Energy conservation implies that a project's cost-effectiveness be reviewed not only in dollars, but also in terms of energy requirements.

Appendix F (Energy Conservation) of the CEQA Guidelines states that the goal of conserving energy implies the wise and efficient use of energy. The means of achieving this goal include decreasing overall per capita energy consumption, decreasing reliance on fossil fuels, and increasing reliance on renewable energy sources. As previously discussed, the LPA under either the Concurrent Construction Scenario or the Phased Construction Scenario would decrease per capita energy consumption by removing

automobile VMT and increasing transit ridership. This analysis took into account that transit activity uses more BTUs per VMT than automobiles.

The regional shift from automobiles to transit would also shift fuel use from gasoline for on-road vehicles to electricity for powering rail movements. Gasoline and the majority of electricity are created from fossil fuels. It is important to note that renewable energy can be used to create electricity but not gasoline. Under either Concurrent Construction Scenario or the Phased Construction Scenario, the LPA would assist in the regional goal of decreasing fossil fuel reliance by decreasing per capita energy consumption. In addition, development of the LPA would not preclude regional electricity suppliers from obtaining a higher percentage of electricity from renewable sources. The LPA will increase peak hour electricity demand but it will not lead to wasteful, inefficient, or unnecessary usage of fuel or energy. Project operational activities will not result in significant energy impacts.

CEQA requires a comparison of existing conditions to existing plus project conditions. Existing plus project conditions includes decreased system-wide VMT, which results in less energy consumption as compared to the No Build Alternative. Existing plus project conditions will decrease automobile VMT by 276,000 but will not change bus passenger VMT. Rail VMT is expected to increase by approximately 15,700.

It is assumed that existing plus project conditions will include seven stations and associated stationary energy consumption. Each of the seven stations will use approximately 175 million BTUs per year during operational activity. The total energy consumption associated with all seven stations will be approximately 1.2 billion BTUs per year. Mobile source BTU consumption will decrease by approximately 196 billion BTU per year compared to the No Build Alternative. As such, the existing plus project conditions will result in a beneficial energy impact.

5.1 Impacts Remaining After Mitigation

Under either the Concurrent Construction Scenario or the Phased Construction Scenario, Construction and operational activity of the LPA would not result in adverse energy impacts, and mitigation measures are not required.