



Board Report

File #: 2019-0759, **File Type:** Project

Agenda Number: 6.

**PLANNING AND PROGRAMMING COMMITTEE
NOVEMBER 20, 2019**

SUBJECT: SEPULVEDA TRANSIT CORRIDOR FEASIBILITY STUDY

ACTION: RECEIVE AND FILE

RECOMMENDATION

RECEIVE AND FILE Sepulveda Transit Corridor Feasibility Study.

ISSUE

On November 30, 2017, Metro awarded a contract to conduct a technical feasibility study of alternatives for the Sepulveda Transit Corridor (Project). The study was completed in November 2019 and is now available for Board consideration and to inform future phases of the Project.

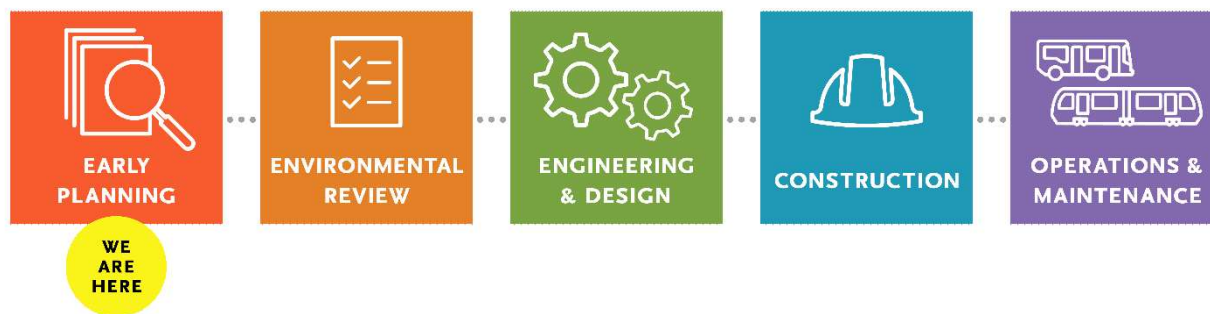
BACKGROUND

The Sepulveda Transit Corridor Project will provide an essential transportation link across the Santa Monica Mountains, connecting the heavy concentration of households in the San Fernando Valley with major employment and activity centers on the Westside, including the Los Angeles International Airport (LAX).

The Project is included in Metro's 2009 Long Range Transportation Plan (LRTP) and was accelerated by the Measure M expenditure plan approved in 2016. The Measure M Expenditure Plan identified funding for a transit project in the Sepulveda Corridor in two phases. The first phase, Valley-Westside, has \$5.7 billion in identified funding and a target opening year of FY 2033. The second phase, Westside-LAX, has \$3.8 billion in identified funding and a target opening year of FY 2057.

Figure 1 below shows the current Project status along the overall project development process. The Project concludes the early planning phase with the completion of the feasibility study.

Figure 1: Project Development Process - Current Status



DISCUSSION

The Project Study Area encompasses approximately 60 square miles on both sides of the I-405 freeway and is split into the two phases identified in Measure M: Valley-Westside and Westside-LAX. More than 400,000 people pass through the Study Area every day to commute to work, school, and other destinations; yet, there are few travel options for people to move between the San Fernando Valley and the Westside aside from the highly congested I-405 freeway. The Project’s feasibility study alternatives were developed in response to the mobility needs for the two areas of the corridor.

The purpose of the Project is to provide high-quality transit service that effectively serves a large and growing travel market between the San Fernando Valley and the Westside, including the LAX area.

Development and Screening of Valley-Westside Alternatives

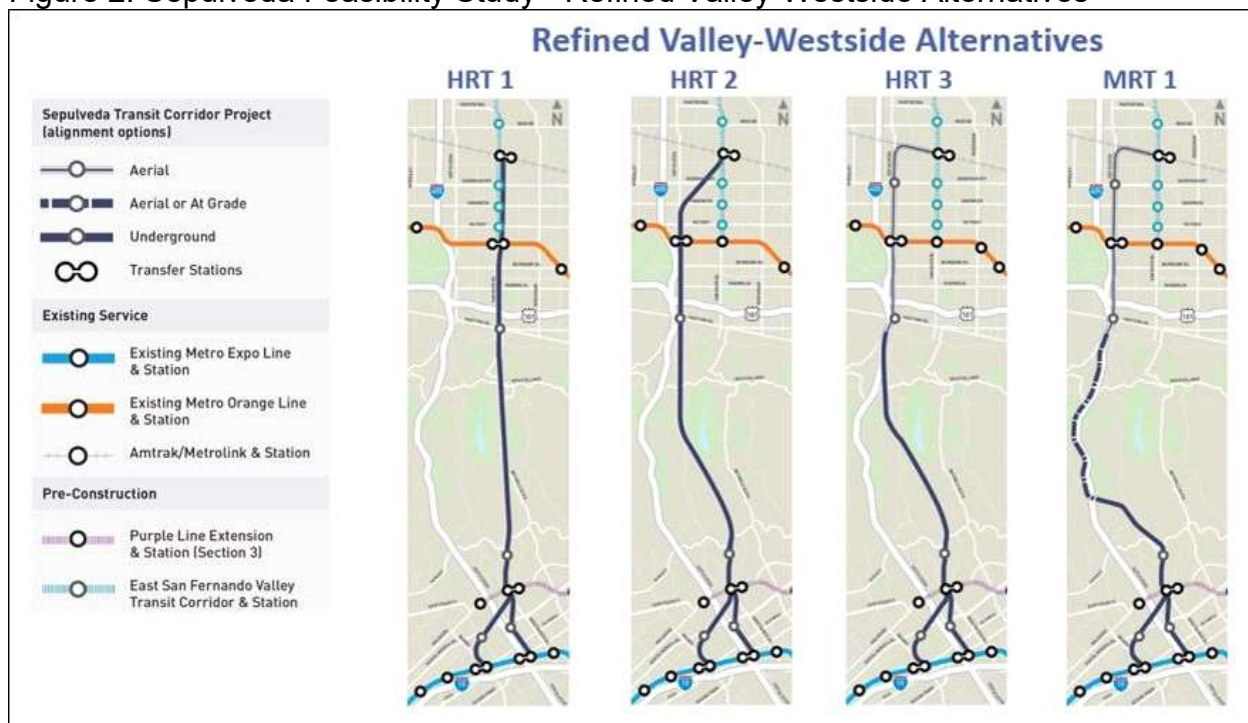
The Project aims to serve the different travel markets within the Study Area by connecting key activity centers and by connecting major existing or planned transit between the San Fernando Valley and the Westside (such as the planned East San Fernando Valley (ESFV) Light Rail Transit Line, the Orange Line, the Expo Line, and the future Purple Line extension). The Santa Monica Mountains present technical and physical challenges to make those connections. A review of various transit technologies was conducted to examine options for either tunneling underneath the mountains or for going over the mountains through the Sepulveda Pass. The analysis resulted in the selection of four transit modes for the development of the initial transit concepts for Valley-Westside: heavy rail transit (HRT), light rail transit (LRT), and monorail or rubber-tire transit (MRT). The initial Valley-Westside transit concepts also considered design configurations that included at grade (or street-running), aerial (or elevated), and below grade (tunnel).

Passenger ridership forecasts for the initial Valley-Westside concepts revealed that demand on the Sepulveda Corridor would be substantial enough to cause all initial concepts to increase the ridership demand on the ESFV LRT Line near or beyond its capacity. The over-capacity conditions would be most severe for the initial LRT concepts that proposed extending the planned ESFV LRT Line through the Santa Monica Mountains and into the Westside. To serve the capacity issues on the ESFV LRT Line caused by the initial HRT and MRT concepts, the initial alignments were extended further north to include a connection at the Metrolink Van Nuys station, thereby potentially mitigating the overcrowding on the ESFV LRT Line.

The refined Valley-Westside alternatives have varying characteristics: HRT 1 and 2 each measure

about 13 miles in length and each have seven underground stations; HRT 3 and MRT 1 each measure nearly 15 miles and each include four underground stations and four aerial stations. All Valley-Westside alternatives include connections to Metrolink, the planned ESFV LRT line, the Orange Line, the future Purple Line extension, and the Expo Line. Figure 2 below provides a map of the refined Valley-Westside alternatives.

Figure 2: Sepulveda Feasibility Study - Refined Valley-Westside Alternatives



Source: Sepulveda Mobility Partners, 2019

A maintenance and storage facility (MSF) will be required for any of the alternatives under consideration. Three potential MSF sites were identified for the Valley-Westside alternatives. Additional MSF sites may be identified during the environmental review phase.

The Feasibility Study Executive Summary (Attachment A) describes the four refined Valley-Westside alternatives and potential MSF sites in greater detail.

Development and Screening of Westside-LAX Concepts

The Westside-LAX concepts were developed primarily as extensions of the refined Valley-Westside alternatives. The extensions would begin from the Expo/Bundy Station or the Expo/Sepulveda Station. Figure 3 shows the Westside-LAX concepts that extend from the Expo/Sepulveda Station, and Figure 4 shows the Westside-LAX concepts that extend from the Expo/Bundy Station.

The Westside-LAX concepts generally follow the major north-south roadways within the southern part of the Study Area. The Airport Metro Connector (AMC) 96th Street Transit Station on the future Crenshaw/LAX was identified as the logical endpoint and connection for all Westside-LAX concepts.

At this location, the Project could connect with the Crenshaw/LAX and Green Lines, the future LAX automated people mover, and multiple local bus lines serving this intermodal transfer facility.

The Westside-LAX concepts have varying characteristics: the alignments range in length from about 8 to 10 miles and include four to six stations each. All but one of the stations along I-405 would be underground.

Figure 3: Sepulveda Feasibility Study - Westside-LAX Concepts Via Expo/Sepulveda Station



Source: Sepulveda Mobility Partners, 2019

Figure 4: Sepulveda Feasibility Study - Westside-LAX Concepts Via Expo/Bundy Station



Source: Sepulveda Mobility Partners, 2019

More information on the six Westside-LAX concepts can also be found in Attachment A.

Consistency with Metro's Equity Platform Framework

To help address disparities in access to opportunity across Los Angeles County, the Metro Board adopted the Equity Platform policy framework in February 2018 and a working definition of Equity Focus Communities (EFC) in June 2019. The Sepulveda Transit Corridor is consistent with the Metro Equity Platform in that the alternatives help address accessibility for residential and employment centers, support for transit-oriented communities policies, support for first/last-mile connections, and investment in disadvantaged communities. In addition, ridership estimates suggest that a large share of the ridership demand would include low-income riders. Going forward, the Project will use the working definition of EFC along with other metrics as appropriate to guide analyses and to conduct robust community engagement.

Public Outreach and Agency Coordination

Metro engaged in a robust public outreach process for this Feasibility Study, guided by Metro's Equity Platform. Metro designed a wide range of opportunities for feedback in an inclusive and transparent way and provided multiple forums in-person and online for bilingual English and Spanish community engagement. This included engaging stakeholders at a variety of events and locations in the Valley and on the Westside, reaching thousands of stakeholders in person. Metro also conducted significant outreach with many public agencies that have jurisdiction throughout the Study Area. Coordination with these agencies allowed concerns to be identified early in the process.

Public Meetings

Metro hosted three rounds of public meetings (for a total of 10 individual public meetings) as part of the public outreach efforts for the study. Meetings were held to coincide with the introduction, refinement, and evaluation of the transit concepts. All materials were available in English and Spanish, and interpreters were available to translate and assist with submission of comments.

To promote each round of public meetings, Metro distributed thousands of take-ones with information about the meetings in English and Spanish on bus routes that operate in the Study Area. Electronic versions of each meeting notice, with a link to a Spanish translation, were distributed via e-blast to all contacts included in the Project database, and a targeted social media campaign using Metro's Facebook account was conducted to promote the Project video and to share meeting notices. Support was also requested from elected offices, cities, public facilities, and other key stakeholders to promote public meetings through their own communication tools.

Additionally, targeted outreach in Spanish based on a careful analysis of Spanish speakers with limited English proficiency in the Study Area was conducted to encourage attendance of Spanish speakers.

Outreach at Community Events

Many factors may prevent in-person attendance at public meetings; therefore, the outreach was conducted at places where community stakeholders already gather. This included making announcements and presentations at community meetings, such as neighborhood councils and homeowners associations. In addition, the outreach team staffed information booths at approximately

20 free or low-cost community festivals that drew thousands of diverse attendees throughout the Study Area.

Public Agency Meetings

Metro coordinated with many public agencies that have jurisdiction throughout the Study Area, holding both multi-agency briefings and individual meetings. This effort was designed to present information on the Project concepts, to discuss relevant issues related to each agency's jurisdiction, and proactively consult with these agencies prior to formal agency consultation, which is a prerequisite under the National Environmental Policy Act (NEPA) environmental review process.

Additional outreach information is available on the Project website.

DETERMINATION OF SAFETY IMPACT

This item does not impact the safety of Metro's customers or employees.

FINANCIAL IMPACT

This item does not impact the Metro budget.

IMPLEMENTATION OF STRATEGIC PLAN GOALS

The Sepulveda Transit Corridor Project will support the first goal of the Vision 2028 Metro Strategic Plan by providing high-quality mobility options that enable people to spend less time traveling. Travel times for the Feasibility Study alternatives are less than 30 minutes for Valley-Westside (from the Ventura County Metrolink Line in the north to the Expo Line in the south), and less than 40 minutes for Valley-Westside-LAX (from Metrolink to the Crenshaw/LAX Line). This performance is highly competitive with travel by car on the I-405 freeway.

ALTERNATIVES CONSIDERED

No decisions are required at this time.

NEXT STEPS

The next steps for the Project include awarding the PDA and the environmental contracts and selecting the alternatives for environmental clearance. Attachment B provides a general overview of the Project timeline through the start of the environmental review phase. To allow the Board to consider the full range of alternatives that may enter into the environmental process, Metro will seek Board selection of Project alternatives to be studied in the environmental process in June/July 2020. Robust public outreach to all stakeholders, particularly Equity Focus Communities, will continue to be a critical element of the Project as it advances. A separate community outreach contract will be awarded in summer 2020 to support the environmental review process.

ATTACHMENTS

Attachment A - Feasibility Study Executive Summary

Attachment B - Project Timeline

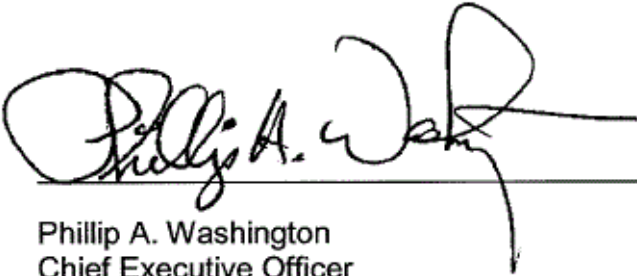
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Los Angeles County
Metropolitan Transportation Authority

Final Feasibility Report

SEPULVEDA TRANSIT CORRIDOR PROJECT



October 2019



Metro



List of Acronyms

AMC	Airport Metro Connector
APM	Automated People Mover
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CIG	Capital Investment Grants
EJ	environmental justice
ESFV	East San Fernando Valley Light Rail Transit Corridor
FTA	Federal Transit Administration
HOT	high-occupancy toll
HOV	high-occupancy vehicle
HRT	heavy rail transit
I-	Interstate
LACFCD	Los Angeles County Flood Control District
LADCP	Los Angeles Department of City Planning
LADOT	Los Angeles Department of Transportation
LADWP	Los Angeles Department of Water and Power
LAX	Los Angeles Airport
LEP	limited English proficiency
LOSSAN	Los Angeles – San Diego – San Luis Obispo
LRT	light rail transit
L RTP	Long-Range Transportation Plan
Metro	Los Angeles County Metropolitan Transportation Authority
mph	miles per hour
MRT	monorail/rubber-tire transit
MSF	maintenance and storage facility
MWD	Metropolitan Water District
NEPA	National Environmental Policy Act
O&M	operations and maintenance
Q&A	question and answer
SMMC	Santa Monica Mountains Conservancy
SR	State Route
TBM	tunnel boring machine
TOC	transit-oriented communities
UCLA	University of California, Los Angeles
USACE	United States Army Corps of Engineers
VHT	vehicle hours traveled
VMT	vehicle miles traveled

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Executive Summary

The Feasibility Study for the Sepulveda Transit Corridor Project reviewed transportation conditions and travel patterns in the Sepulveda corridor to identify mobility problems affecting travel between the San Fernando Valley, the Westside, and the LAX area. Using an iterative evaluation process, feasible transit solutions for the Valley-Westside segment and the Westside-LAX segment were developed to address the Project's Purpose and Need.

ES-1 Introduction

The Los Angeles County Metropolitan Transportation Authority (Metro) has prepared a Final Feasibility Report for the Sepulveda Transit Corridor Project (the Project). The corridor extends between the San Fernando Valley and the Westside of Los Angeles, including the Los Angeles International Airport (LAX) area of Los Angeles County. The purpose of the Project is to provide a high-quality transit service that effectively serves the large and growing travel demand between the San Fernando Valley and the Westside, including the LAX area. For transit to be a competitive travel option that attracts new riders, there is a need to increase the speed, frequency, capacity, and reliability of transit service and provide convenient connections to existing and planned transit lines.

The Sepulveda corridor has been the major transportation corridor between the San Fernando Valley and the Westside for 90 years. As Los Angeles' San Fernando Valley and Westside have grown, Metro, the California Department of Transportation (Caltrans), and their predecessor agencies have undertaken multiple efforts to improve mobility in the Sepulveda corridor. In 2016, the voters of Los Angeles County approved Measure M, the Los Angeles County Traffic Improvement Plan, to fund transportation improvements throughout the County. The *Measure M Expenditure Plan* (Metro, 2016a) provides for implementation of the Sepulveda Transit Corridor Project in two phases: the first segment between the San Fernando Valley and the Westside of Los Angeles (Valley-Westside) by 2033-2035 and an extension to LAX (Westside-LAX) by 2057-2059. Figure ES-1 shows the Study Area for the Sepulveda Transit Corridor Project in the context of other Measure M projects in the San Fernando Valley and the Westside.

This Sepulveda Transit Feasibility Study is being conducted so that the study can be referenced during scoping under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) in the next phase of the Project. The intent is for the results and decisions of this study to support the environmental review process by informing the purpose and need or goals and objectives. To meet the requirements of 23 Code of Federal Regulations Part 450 – Linking the Transportation and NEPA Processes, the study is being conducted with input from an extensive public outreach effort and through close coordination with local, state, and federal agencies and by ensuring that the process for

developing and screening of alternatives, the level of definition of the alternatives, and the types and level of analyses are commensurate with the decisions that need to be made.

ES-2 Purpose and Need

Study Area Characteristics

The Sepulveda Transit Corridor Project Study Area encompasses approximately 60 square miles on both sides of I-405 between Roscoe Boulevard in the San Fernando Valley and 111th Street near LAX. Within the Study Area, there are three distinct, yet interrelated, geographic areas: the San Fernando Valley (the Valley), the Westside, and the LAX area.

The Valley, the northernmost part of the Study Area, is located north of Mulholland Drive. Within the Study Area, the San Fernando Valley has a well-defined arterial grid, with major streets every half mile, lined largely with a combination of apartment buildings and businesses. The Valley portion of the Study Area is bisected by the Metro Orange Line, which has three stations in the Study Area. The Ventura Freeway (US 101) provides east/west connections through the Valley. The Los Angeles – San Diego – San Luis Obispo (LOSSAN) Rail Corridor, in which both Amtrak and Metrolink provide passenger service, runs through the northern part of the Study Area.

The Westside within the Study Area is generally between Mulholland Drive and the Santa Monica Freeway (I-10) and includes a major regional attractor, the University of California, Los Angeles (UCLA). I-10 runs through the southern part of the Westside within the Study Area, and the Metro Expo Line includes three stations in the Study Area. The Metro Purple Line is being extended into the Westside in the Study Area and is slated to open in 2026. Between the Valley and the Westside lies the Sepulveda Pass, a highly constrained area with steep hillsides, some of which have been cut back to accommodate I-405 and are retained by walls. Within the Pass, I-405 has grades of five percent, with one section steeper than six percent.

The southernmost portion of the Study Area includes another major regional attractor, LAX. The Metro Crenshaw/LAX Line, currently under construction, will connect the LAX area to the Metro Expo Line at the Expo/Crenshaw Station about 4.5 miles outside of the Study Area, as well as to the South Bay via the Metro Green Line.



Figure ES-1. Study Area and Related Projects

Source: Sepulveda Mobility Partners, 2019

As shown in Figure ES-2, while residential land uses are spread throughout the Study Area, commercial land uses (both retail and office) that support high levels of employment tend to be clustered in a limited number of geographic areas, primarily in the Westside and the LAX area. This type of land use pattern can result in frequent travel by residents outside of their communities for work, leisure, or educational purposes.

Patterns of population and employment density follow from the distribution of land uses: areas with high concentrations of residential land uses, particularly multi-family residential uses, have high population densities; similarly, areas with high concentrations of commercial land uses, particularly office uses, have high employment densities.

As shown in Figure ES-3, several portions of the Study Area are densely populated, with the highest density located in parts of Westwood, West Los Angeles, and Brentwood on the Westside. As shown in Figure ES-4, the Westside also has the greatest concentration of jobs within the Study Area. Although there are some job centers within the Study Area in the Valley and the LAX area, those areas generally have substantially less density than the Westside. When population centers and employment centers are in different areas, many people’s daily activities require them to travel between the two areas.

Vehicle ownership is a key factor influencing transit ridership, as households without access to a personal vehicle are more likely to utilize transit. The Valley has the highest concentration of zero-vehicle households in the Study Area. In several areas, such as along Van Nuys Boulevard, more than 20 percent of households do not have a vehicle.

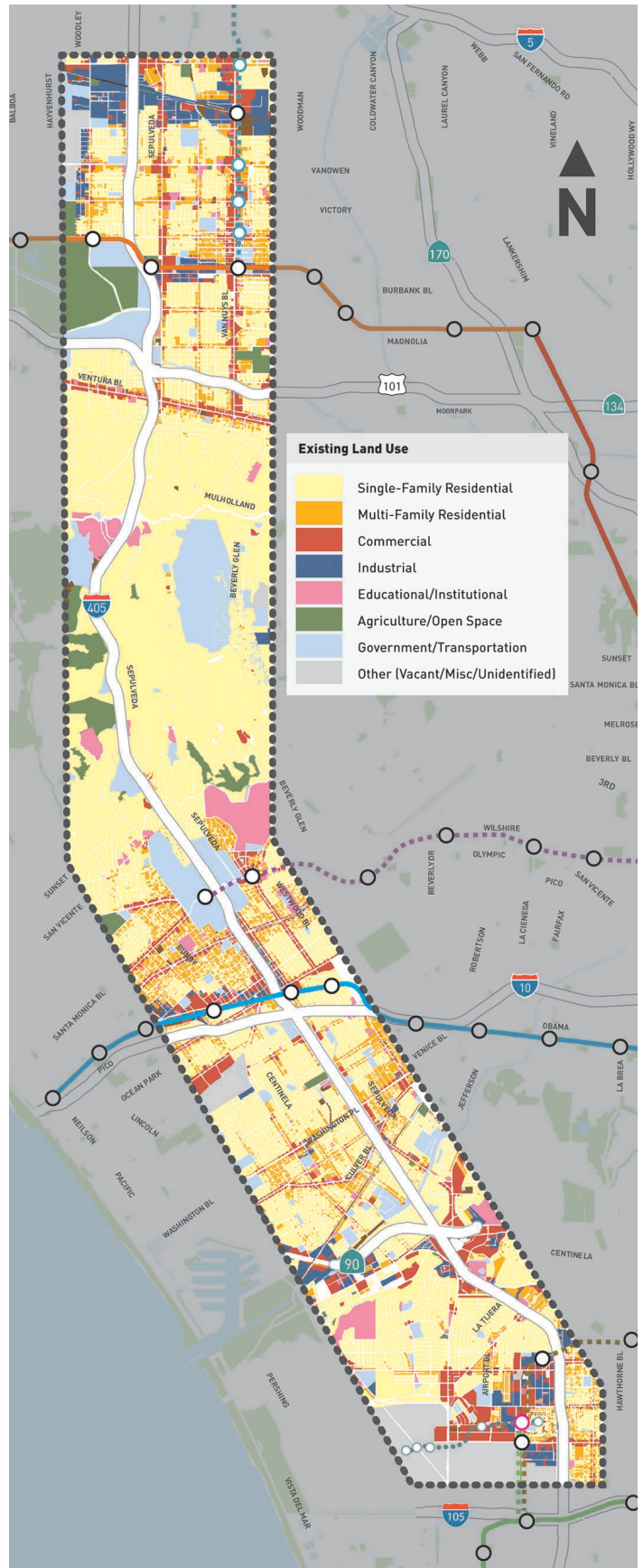


Figure ES-2. Existing Land Uses

Source: Los Angeles County Office of the Assessor, Property Tax Assessment Roll, 2016; Terry A. Hayes Associates, 2018

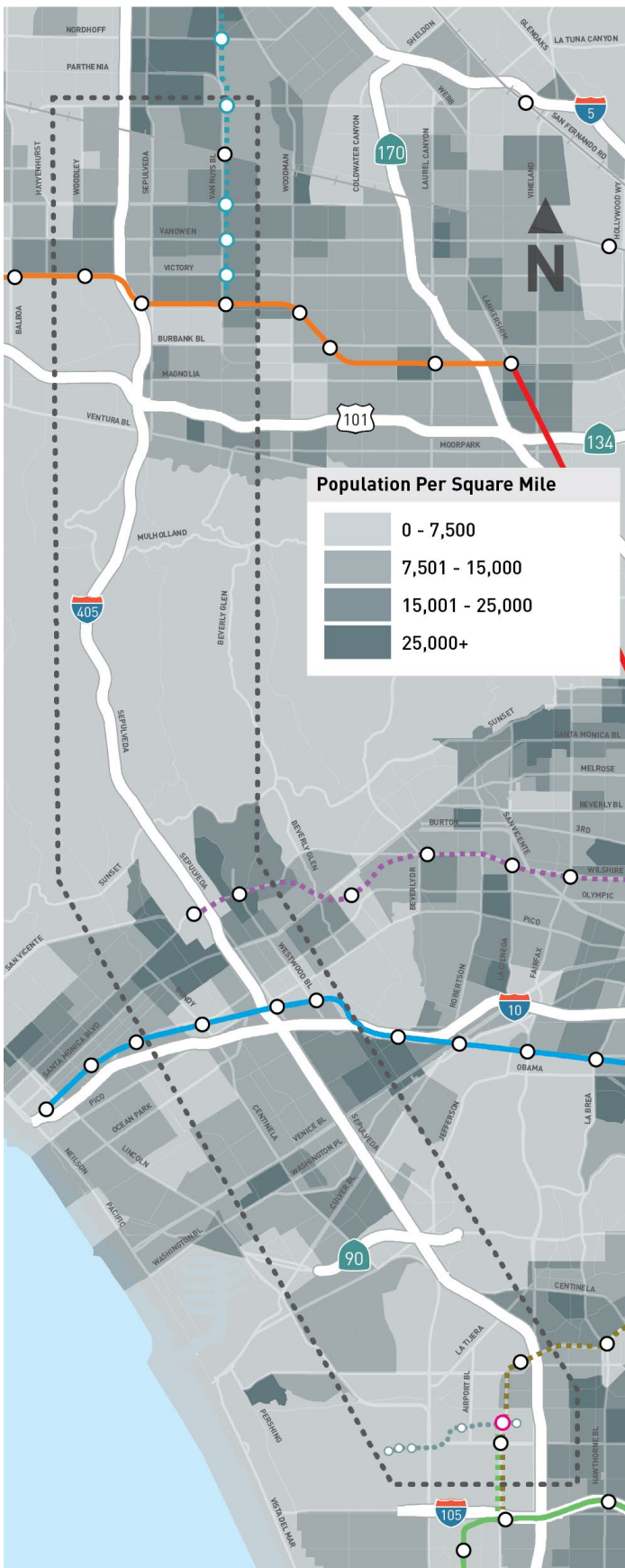


Figure ES-3. Population Density

Source: US Census American Community Survey, 2017; Fehr & Peers, 2018

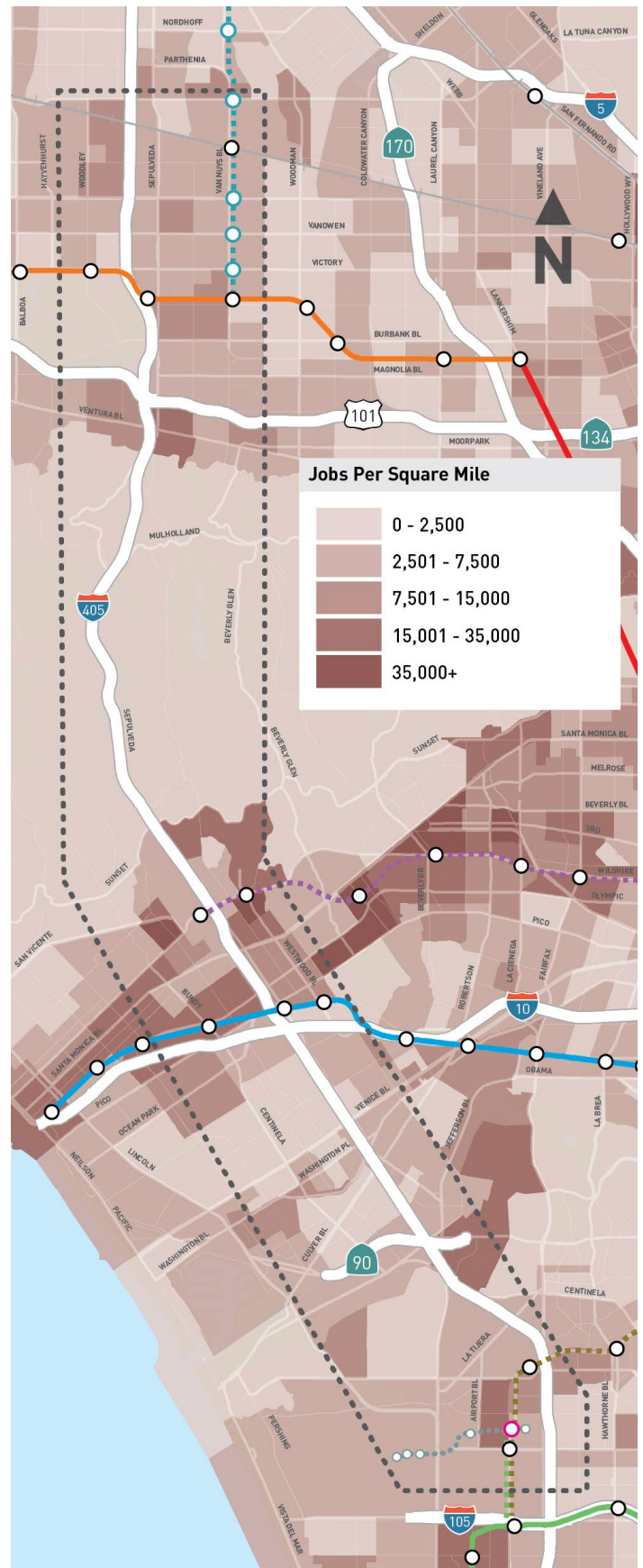


Figure ES-4. Job Density

Source: Longitudinal Employer-Household Dynamics, 2014; Fehr & Peers, 2018

Existing Transportation Conditions

To provide a measure of the volume of daily travel through the Sepulveda corridor made by private vehicles and by transit, total daily person throughput (all people moving through a corridor, whether carried in private vehicles or by transit) was calculated at two points along the Sepulveda corridor: in the Sepulveda Pass just north of Getty Center Drive and at Ballona Creek just north of SR 90. Figures ES-5 and ES-6 summarize the daily person throughput of the roadways at these two points, revealing a transit mode share of about two percent at each location.

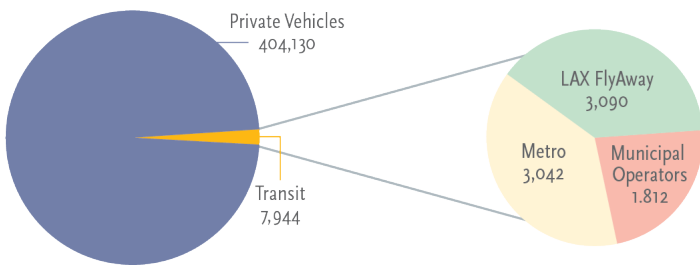


Figure ES-5. Daily Corridor Throughput in Sepulveda Pass

Source: Metro; Municipal operators; Los Angeles World Airports; Fehr & Peers, 2018

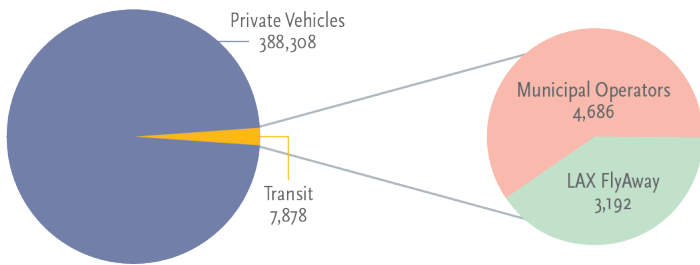


Figure ES-6. Daily Corridor Throughput at Ballona Creek

Source: Culver CityBus, Los Angeles World Airports; Fehr & Peers, 2018

Freeway Conditions

I-405 is heavily traveled throughout the Study Area, with daily volumes of over 300,000 vehicles and daily person throughput of over 400,000 people at some locations within the Study Area. The direction of the peak traffic demand varies over the course of the day, with the greatest demand for travel occurring from the Valley and LAX areas to the Westside during the morning commute period and the reverse pattern during the evening commute period.

The high level of demand on I-405 results in congestion and low travel speeds. Figure ES-7 shows travel speeds during the evening peak hour on I-405; the slowest speeds are generally for travel out of the Westside.

Transit Service

While Metro and municipal transit providers offer a broad range of services within the Study Area, transit connections between the Valley and the Westside are limited. Figure ES-8 displays the frequency of transit service on major corridors throughout the Study Area. The link through the Sepulveda Pass is currently served by routes offering infrequent service or by express services that operate only during peak commuter periods. These are summarized in Table ES-1.

Bus boardings are greatest along corridors that have higher-frequency service throughout the Study Area. Within the Valley, transit ridership is highest around the Metro Orange Line and north of the Metro Orange Line, with ridership decreasing southward until Ventura Boulevard. Boardings for local transit in the Valley are greatest along Van Nuys Boulevard.

Table ES-1. Performance Statistics for Rapid and Express Routes between the San Fernando Valley and the Westside

ROUTE	DESCRIPTION	SPAN OF SERVICE	PEAK-PERIOD HEADWAY	AVERAGE SPEED	ON-TIME PERFORMANCE
Metro Rapid 734	Sylmar to Metro Expo Line	18 hours per day	15-20 minutes	<15 mph	<50%
Metro Rapid 788	Panorama City to Metro Expo Line	Peak period only	15-20 minutes	<15 mph	<50%
LADOT Commuter Express 573	Granada Hills to Century City	Peak period only	10-15 minutes	17 mph	73%
LADOT Commuter Express 574	Sylmar to Redondo Beach	Peak period only	25-30 minutes	24 mph	65%
LAX FlyAway	Van Nuys to LAX	24 hours per day	15 minutes	N/A	N/A

Source: Metro on-time performance data, February-November 2017

Notes: Metro's *Transit Service Policy* (Metro, 2015) defines "on-time" as a bus arriving no more than 1 minute early or 5 minutes late at each time-point along a route.

LADOT = Los Angeles Department of Transportation; mph = miles per hour; N/A = not available

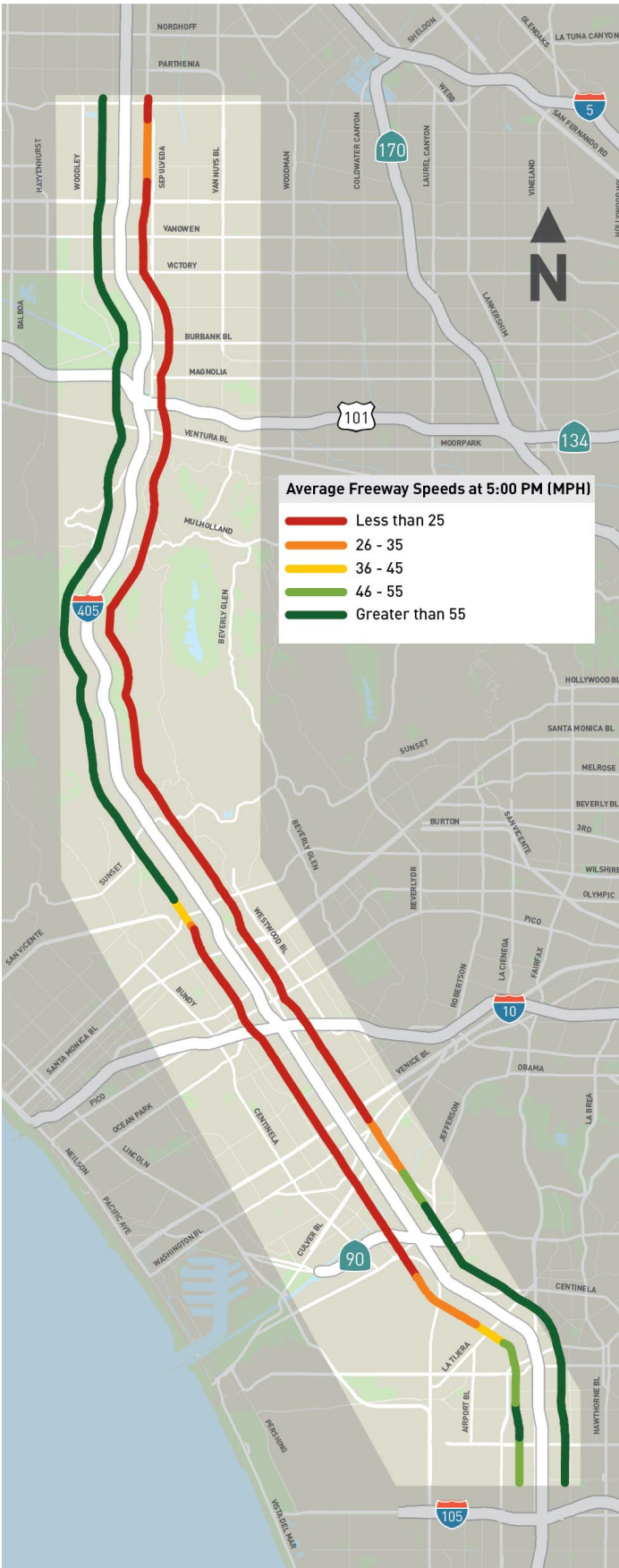


Figure ES-7. Average Speeds on I-405, PM Peak Hour

Source: INRIX; System Metrics Group, 2018

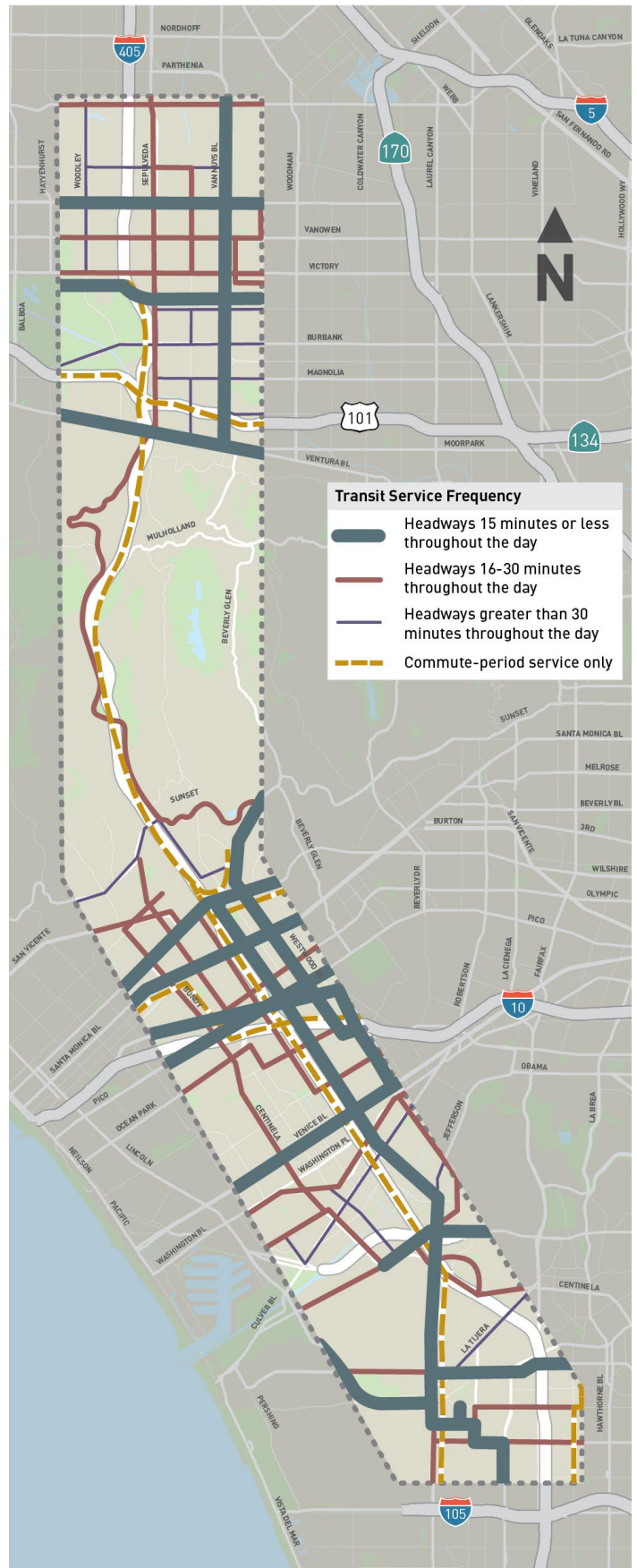


Figure ES-8. Transit Service Frequency

Source: Metro and Municipal Operators, 2018, Fehr & Peers, 2018

On the Westside, the greatest concentrations of transit boardings are in Westwood and on the UCLA campus where frequent headways are maintained throughout the day. Major roads with transit services at headways of 15 minutes or less also have many boardings.

Existing transit ridership is not as high in the LAX area as in the Valley or the Westside. The greatest concentrations of boardings within this area occur along Venice and Sepulveda Boulevards, as well as in the area immediately adjacent to LAX. As throughout the Study Area, these are the corridors with the most frequent transit service for this area, all with headways of 15 minutes or less.

Congestion on roadways and freeways in the Study Area affects transit service as well as privately operated vehicles, making travel times unpredictable and transit service unreliable. As shown in Table ES-1, the Metro bus services that currently operate on I-405 and Sepulveda Boulevard between the Valley and the Westside are on time less than 50 percent of the time during the morning and evening peak periods, and those operated by the Los Angeles Department of Transportation are on time less than 75 percent of the time.

Travel Patterns

In 2017, the Study Area produced approximately 2.26 million trips and attracted approximately 3.04 million trips each day. As much of the travel in the Study Area has an origin and/or destination outside the Study Area, a broader look at trips in the region is required to understand the type of travel demand served by the Sepulveda corridor.

Every trip has two ends—an origin and a destination. Pairs of trip ends with large numbers of trips between them constitute

major travel markets. Figure ES-9 illustrates the primary travel markets for trips through the Sepulveda Pass and across Ballona Creek.

Forecast Growth in Travel

Travel to and from the Study Area is forecast to increase; the total number of trips generated within the Study Area is forecast to grow by approximately 17 percent by 2042 and a total of 24 percent by 2057. This increase is in part the result of expected population and employment growth throughout the areas illustrated in Figure ES-9 that generate the most trips through the Sepulveda corridor, as summarized in Table ES-2.

Project Purpose

The Sepulveda corridor provides a crucial transportation link across the Santa Monica Mountains and through the Westside of Los Angeles, connecting the heavy concentration of households in the San Fernando Valley with major employment and activity centers on the Westside, including such major travel destinations as Westwood, UCLA, Century City, and LAX. More broadly, the corridor serves trips from throughout western Los Angeles County and beyond.

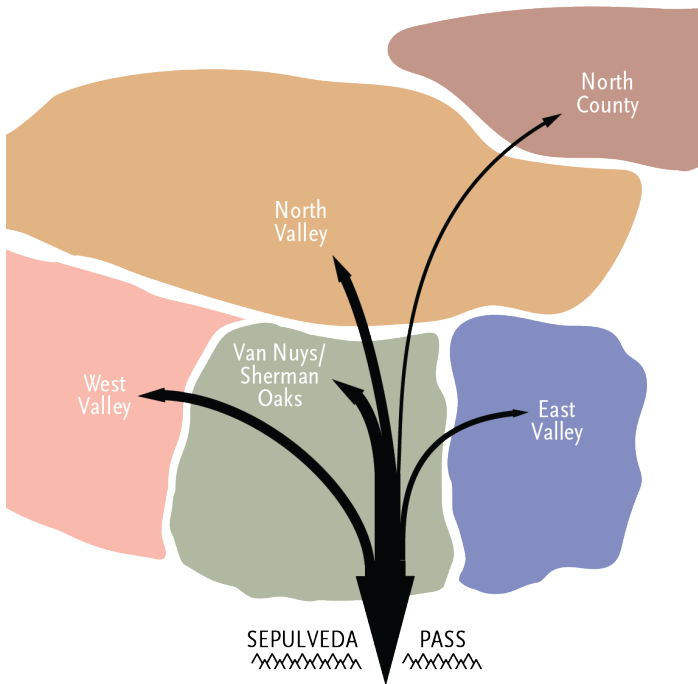
Based on the considerations discussed in this report, Metro has identified the following purpose for the Sepulveda Transit Corridor Project:

The purpose of the Project is to provide a high-quality transit service that effectively serves a large and growing travel market between the San Fernando Valley and the Westside, including the LAX area. For transit to be a competitive travel option that attracts new riders, there is a need to increase the speed, frequency, capacity, and reliability of transit service and provide convenient connections to existing and planned transit corridors.

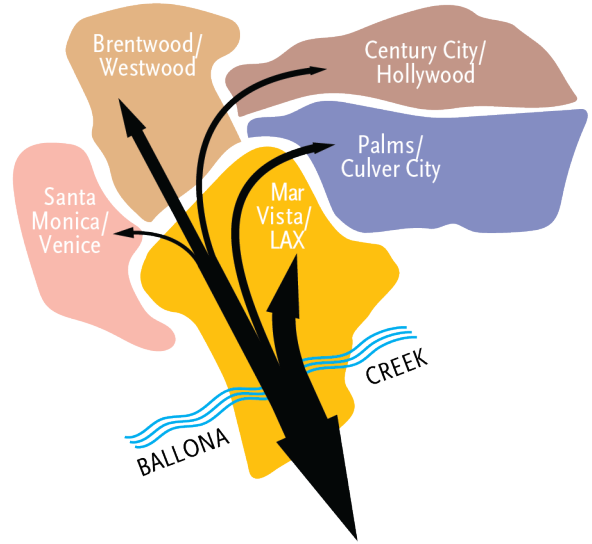
Table ES-2. Population and Employment Growth in Primary Areas Served by the Sepulveda Corridor

	2017	2042	GROWTH 2017-2042	2057	GROWTH 2017-2057
Population	7,741,310	8,807,877	13.8%	9,447,803	22.0%
Employment	3,370,911	4,058,268	20.4%	4,470,618	32.6%

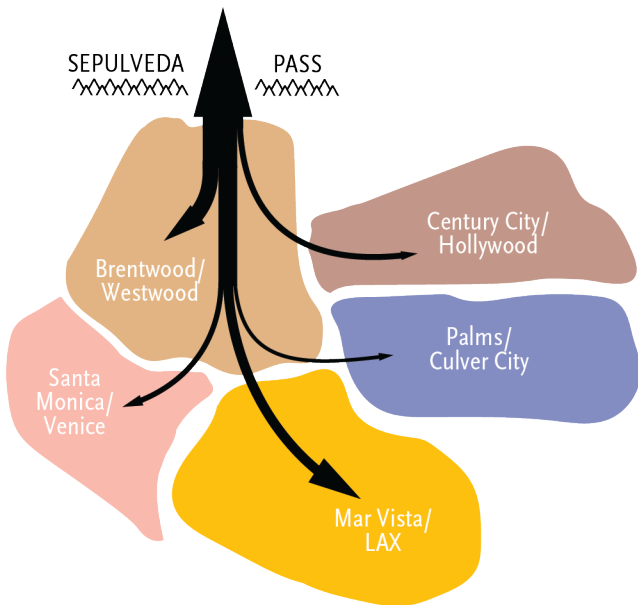
Source: Metro Travel Demand Model, 2017a



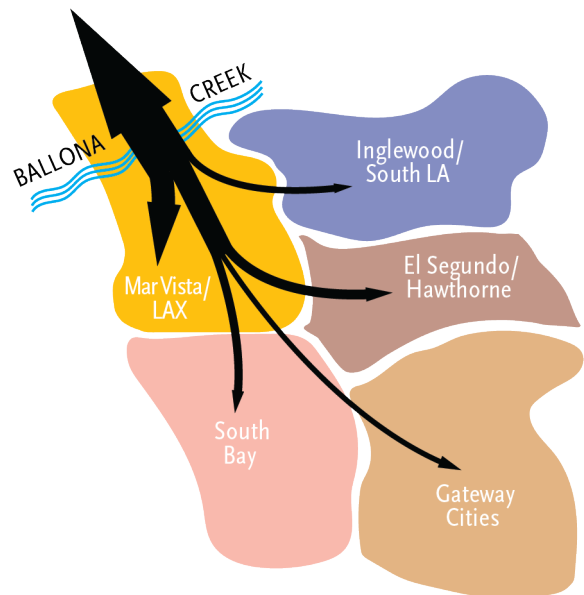
Panel A. The northern ends of trips through the Sepulveda Pass are primarily located in Van Nuys/Sherman Oaks, North Valley, West Valley, East Valley, and North County.



Panel C. The northern ends of trips across Ballona Creek are primarily located in Brentwood/Westwood, Mar Vista/LAX, Century City/Hollywood, Palms/Culver City, and Santa Monica/Venice.



Panel B. The southern ends of trips through the Sepulveda Pass are primarily located in Brentwood/Westwood, Mar Vista/LAX, Century City/Hollywood, Santa Monica/Venice, and Palms/Culver City.



Panel D. The southern ends of trips across Ballona Creek are primarily located in Mar Vista/LAX, El Segundo/Hawthorne, the South Bay, Gateway Cities, and Inglewood/South Los Angeles.

Figure ES-9. Primary Sources of Trips Through the Sepulveda Pass and Across Ballona Creek

Source: Sepulveda Mobility Partners, 2019

Note: Widths of arrows are proportional to the number of trips to/from each area.

ES-3 Evaluation Methodology

Goals and Objectives

Based on Metro's adopted *Performance Metrics Framework for Major Projects* (Metro, 2017b) and the Project's Purpose and Need, Metro has established the five goals listed in Table ES-3 for the Sepulveda Transit Corridor Project, along with objectives that support each goal.

Table ES-3. Project Goals and Objectives

IMPROVE MOBILITY
<ul style="list-style-type: none"> > Increase transit ridership by directly serving locations with the greatest potential for attracting new riders > Increase transit frequency and operating speeds > Reduce the need to transfer and/or the time spent transferring for the most common trips > Improve on-time performance > Provide sufficient capacity to accommodate anticipated demand > Provide convenient connections between existing and planned transit lines
IMPROVE EQUITY OF ACCESS
<ul style="list-style-type: none"> > Improve accessibility for residential and employment centers > Support transit-oriented communities (TOC) policies > Support first/last-mile connections > Promote investment in disadvantaged communities
PROTECT THE ENVIRONMENT AND SUPPORT COMMUNITY AND ECONOMIC DEVELOPMENT
<ul style="list-style-type: none"> > Reduce vehicle miles traveled (VMT) > Reduce air pollutant emissions > Minimize effects to communities > Minimize impacts to transportation network > Minimize other environmental impacts
PROVIDE A COST-EFFECTIVE SOLUTION
<ul style="list-style-type: none"> > Minimize cost to achieve benefits > Match cost to available funding
MINIMIZE PROJECT DELIVERY RISK
<ul style="list-style-type: none"> > Minimize potential for cost increases and delays

Source: Sepulveda Mobility Partners, 2018

Evaluation Process

The sequential evaluation process began with transit concepts for the Valley-Westside segment, followed by extensions of those concepts in the Westside-LAX segment. Qualitative and quantitative evaluation criteria were derived from the Project's goals and objectives. At the initial screening stage, the measures relied on either qualitative or high-level quantitative data appropriate to the level of detail available about the transit concepts. During the detailed evaluation, alignments and station locations were more precisely defined, with ridership forecasts and community impacts reflecting this increased detail and the addition of cost and risk-related evaluation criteria.

Figure ES-10 illustrates the process of development and evaluation of the transit concepts. The development and evaluation of the concepts were informed by three rounds of public meetings and extensive agency coordination.

A set of initial transit concepts for the Valley-Westside segment was first evaluated using the high-level evaluation criteria, measuring performance on improving mobility, improving equity of access, and protecting the environment and supporting community and economic development.

Following the evaluation of the Valley-Westside concepts, transit concepts for the Westside-LAX segment were developed as extensions of those concepts. These concepts were then evaluated using the same high-level evaluation criteria.

The Valley-Westside concepts were developed into full alternatives, including specification of operating plans and support facilities, and conceptual designs were prepared for each alternative. Detailed evaluation was then conducted of the alternatives, and evaluation criteria for performance on all goals and objectives were applied for both the Valley-Westside segment and the Westside-LAX segment.

ES-4 Development and Screening of Initial Concepts

Screening of Modes, Termini, Alignment Segments, and Configurations

After a review of the characteristics of a variety of transit technologies and their applicability in the Sepulveda corridor, four modes that were proven in revenue operations, able to operate at high speeds, and that employ a vehicle design capable of quickly loading and unloading passengers were selected for development of the initial transit concepts: heavy rail transit (HRT), light rail transit (LRT), monorail, and rubber-tire trains. The monorail and rubber-tire modes were selected for evaluation because of their unique ability to traverse the grades in the Sepulveda Pass. Because of the similar performance characteristics of these two modes, they were identified as monorail/rubber-tire transit (MRT) and considered to be equivalent in the evaluation of the transit concepts.

Following the selection of modes to study, southern termini at each of the Metro Expo Line stations within the Study Area were considered, and connection points to the Metro Orange Line at each of the Metro Orange Line stations within the Study Area were considered. The significantly lower existing ridership of the Metro Expo Line Westwood/Rancho Park Station and the Metro Orange Line Woodley Station compared to the other stations on their respective lines and the low density, residential nature of their surrounding land uses led these potential termini to be dismissed from consideration early in the alternative development process.

Alignments were identified that followed roadway rights-of-way or connected potential termini directly. These alignments were screened based on major physical constraints and the ability to connect key activity centers. The design configurations considered for the initial Valley-Westside transit concepts included at grade, aerial, and below grade; the applicability of each configuration was determined based on the physical characteristics of the alignment.

The screening of alignments and configurations resulted in the development of several HRT, LRT, and MRT concepts for initial evaluation, including public review and comment. The initial alignment concepts, alternative termini, and general station locations are shown in Figure ES-11. Transit concepts considered included new lines for the Metro system, extensions of the East San Fernando Valley Light Rail Transit Corridor, and an extension of the Metro Purple Line.

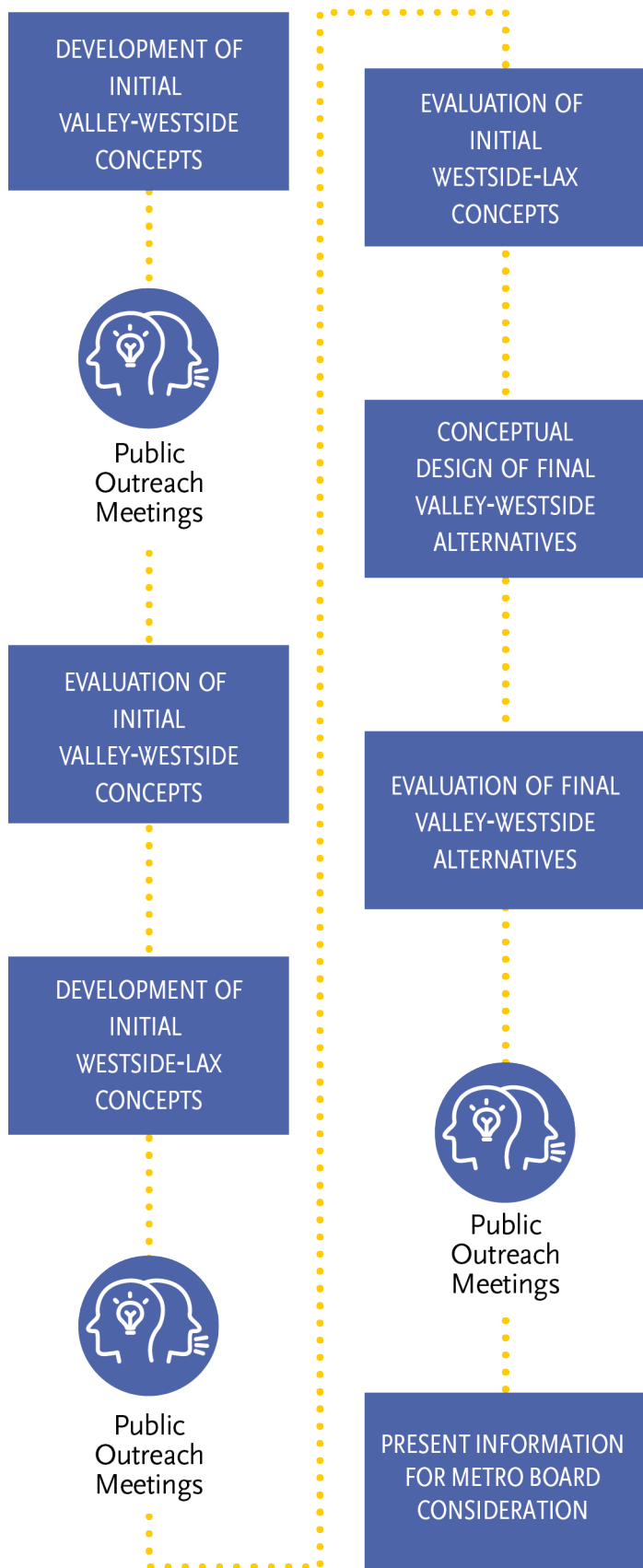
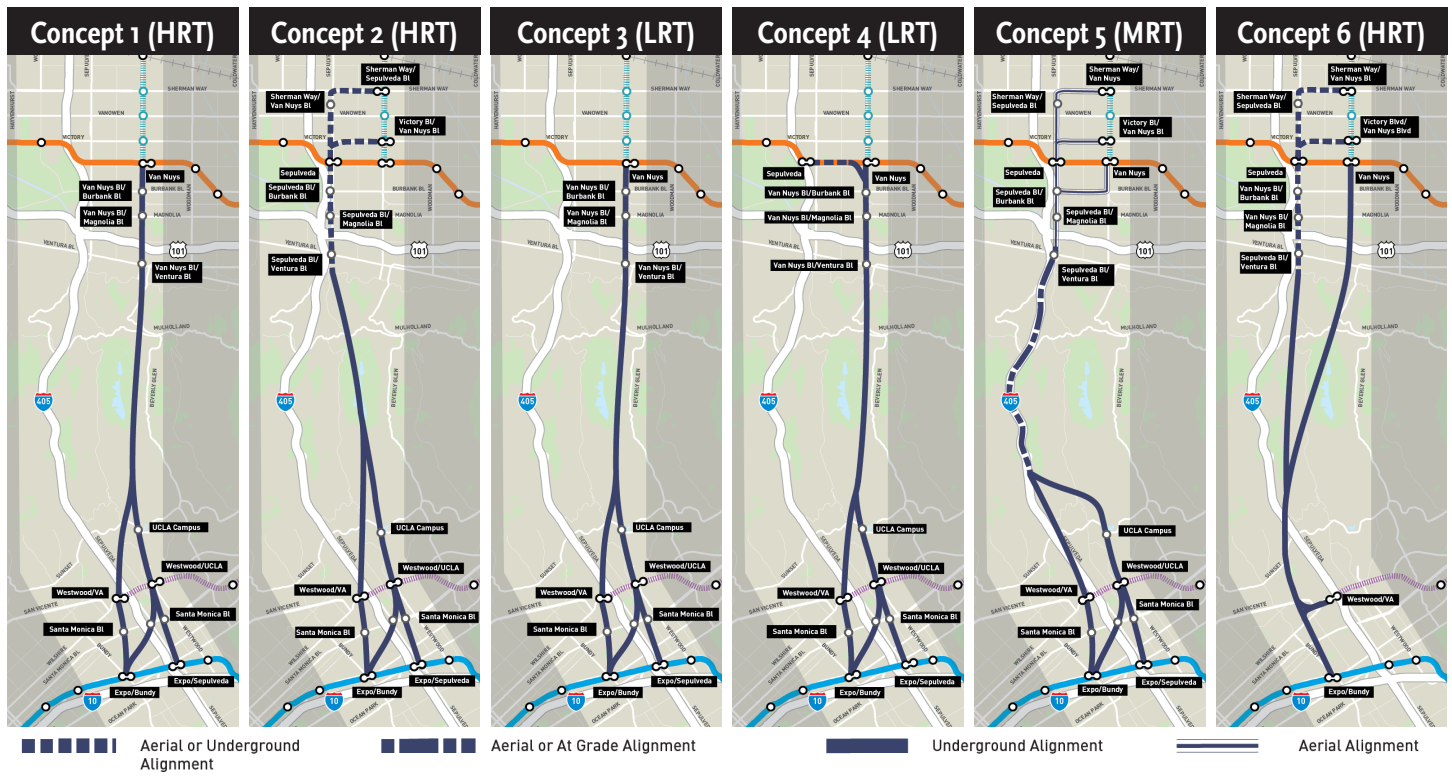


Figure ES-10. Process for Developing and Evaluating Transit Concepts

Source: Sepulveda Mobility Partners, 2018



<p>CONCEPT 1 (HRT)</p> <ul style="list-style-type: none"> > Northern terminus at Metro Orange Line Van Nuys Station > Total alignment length of approximately 10 miles 	<p>CONCEPT 2 (HRT)</p> <ul style="list-style-type: none"> > Northern terminus at Metro East San Fernando Valley Light Rail Transit Corridor Sherman Way or Victory Boulevard Stations > Total alignment length of approximately 9 to 14 miles (3 to 5 miles of aerial guideway) 	<p>CONCEPT 3 (LRT)</p> <ul style="list-style-type: none"> > Northern endpoint at Sylmar/San Fernando Metrolink Station > Two train routings. Every other train would: <ul style="list-style-type: none"> • Continue north to serve East San Fernando Valley Light Rail Transit Corridor stations • Turn around at Metro Orange Line Van Nuys Station and continue southbound service > Total new alignment length of approximately 10 miles
<p>CONCEPT 4 (LRT)</p> <ul style="list-style-type: none"> > Northern endpoints at both Sylmar/San Fernando Metrolink Station and Metro Orange Line Sepulveda Station > Two train routings. Every other train would: <ul style="list-style-type: none"> • Continue north to serve East San Fernando Valley Light Rail Transit Corridor stations • Branch west to Metro Orange Line Sepulveda Station > Total new alignment length of approximately 11 miles, including up to 1 mile of aerial guideway 	<p>CONCEPT 5 (MRT)</p> <ul style="list-style-type: none"> > Northern endpoint at either: <ul style="list-style-type: none"> • Sherman Way • Victory Boulevard • Metro Orange Line Van Nuys Station > Total alignment length of approximately 10 to 15 miles (7 to 9 miles of aerial guideway) 	<p>CONCEPT 6 (HRT)</p> <ul style="list-style-type: none"> > Extension of Purple Line to Metro Orange Line > Northern endpoint at Metro Orange Line Van Nuys Station or East San Fernando Valley Light Rail Transit Corridor Sherman Way or Victory Boulevard Station > Trains would follow three routings: <ul style="list-style-type: none"> • Metro Orange Line to Downtown LA • Metro Orange Line to Metro Expo Line • Downtown LA to Metro Expo Line > Total alignment length of approximately 9 to 15 miles (4 to 5 miles of aerial guideway)

Figure ES-11. Initial Valley-Westside Concepts

Source: Sepulveda Mobility Partners, 2018

Initial Screening

To evaluate the project goal to improve mobility, ridership forecasts were conducted for the year 2042 and included all projects identified as being completed by 2042 in the *Measure M Expenditure Plan* (Metro, 2016a). Figure ES-12 compares the ridership performance of each concept.

Closer inspection of the ridership forecasts revealed that demand in the Sepulveda corridor would be so great that all concepts would increase the demand on the East San Fernando Valley Light Rail Transit Corridor near or beyond its planned capacity, as shown in Figure ES-13. The over-capacity conditions would be most severe for the LRT concepts (Concepts 3 and 4), on which the peak passenger load between the Metrolink Van Nuys Station and the Metro Orange Line would exceed the line's hourly capacity by thousands of riders.

Because of the inability of the connecting service on the East San Fernando Valley Light Rail Transit Corridor to

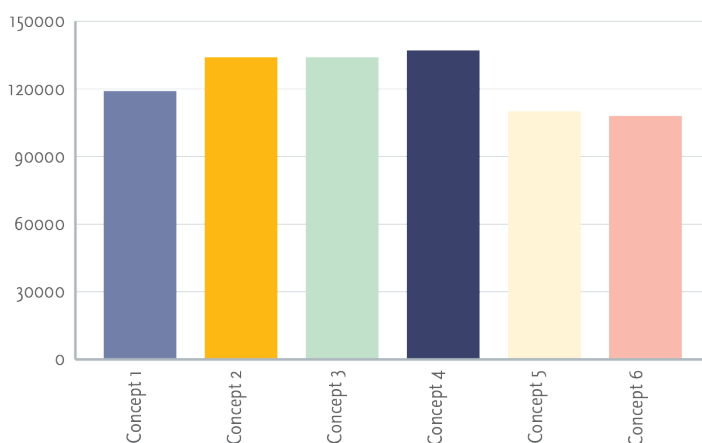


Figure ES-12. Daily Boardings on Initial Concepts

Source: Sepulveda Mobility Partners, 2018

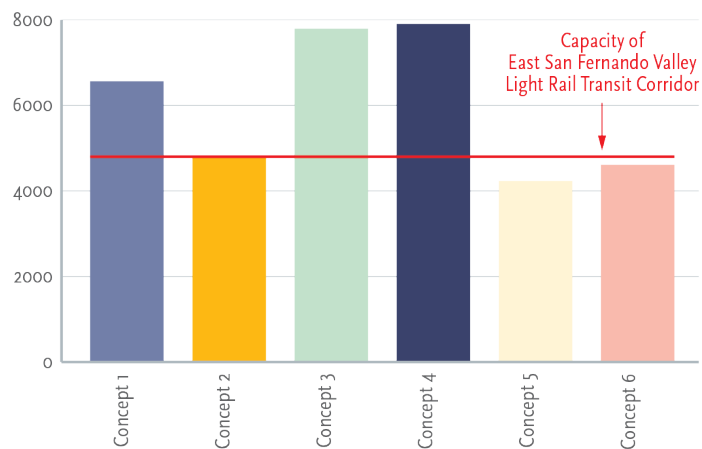


Figure ES-13. East San Fernando Valley Light Rail Transit Corridor Peak Load

Source: Sepulveda Mobility Partners, 2018

Note: LRT capacity of 4,800 passengers per hour is based on a 3-car train running at a 5-minute headway, with each car accommodating approximately 133 passengers.

accommodate the demand attracted by the Sepulveda Transit Corridor Project, none of the initial transit concepts would be able to fully address the Project's Purpose and Need. Therefore, refined concepts were developed for the Valley-Westside.

Refined Valley-Westside Concepts

To serve the demand to access the Sepulveda corridor from the north, the HRT and MRT initial concepts were refined and extended farther north, alleviating passenger loads on the East San Fernando Valley Light Rail Transit Corridor. Additionally, because the option to connect to the Purple Line at the Westwood/VA Station performed poorly in terms of ridership compared to the option to connect at the Westwood/UCLA Station, this option was eliminated from consideration. The refined concepts are illustrated in Figure ES-14.

The LRT concepts (Concepts 3 and 4) were eliminated from further consideration because they could not be refined to provide additional capacity between the Metrolink Van Nuys Station and the Metro Orange Line. The Purple Line Extension (Concept 6) was eliminated because its inability to support a UCLA campus station resulted in the lowest ridership. The remaining concepts were regrouped by mode.

Why not refine LRT?

- > Additional capacity cannot be provided by operating longer LRT trains because longer trains and station platforms on the East San Fernando Valley Light Rail Transit Corridor would block cross streets in the San Fernando Valley.
- > Changing the design of the East San Fernando Valley Light Rail Transit Corridor to support longer trains and/or more frequent service would require grade separations and reduction in the number of stations, changing the local-serving nature of the planned line.

Why not refine the Purple Line extension?

- > An extension of the Purple Line past the Westwood/VA Station would not allow for a station on the UCLA campus, resulting in lower ridership than other concepts.
- > An extension of the Purple Line providing service to both the north and the south would require a complex three-way junction, which would increase property and construction impacts.

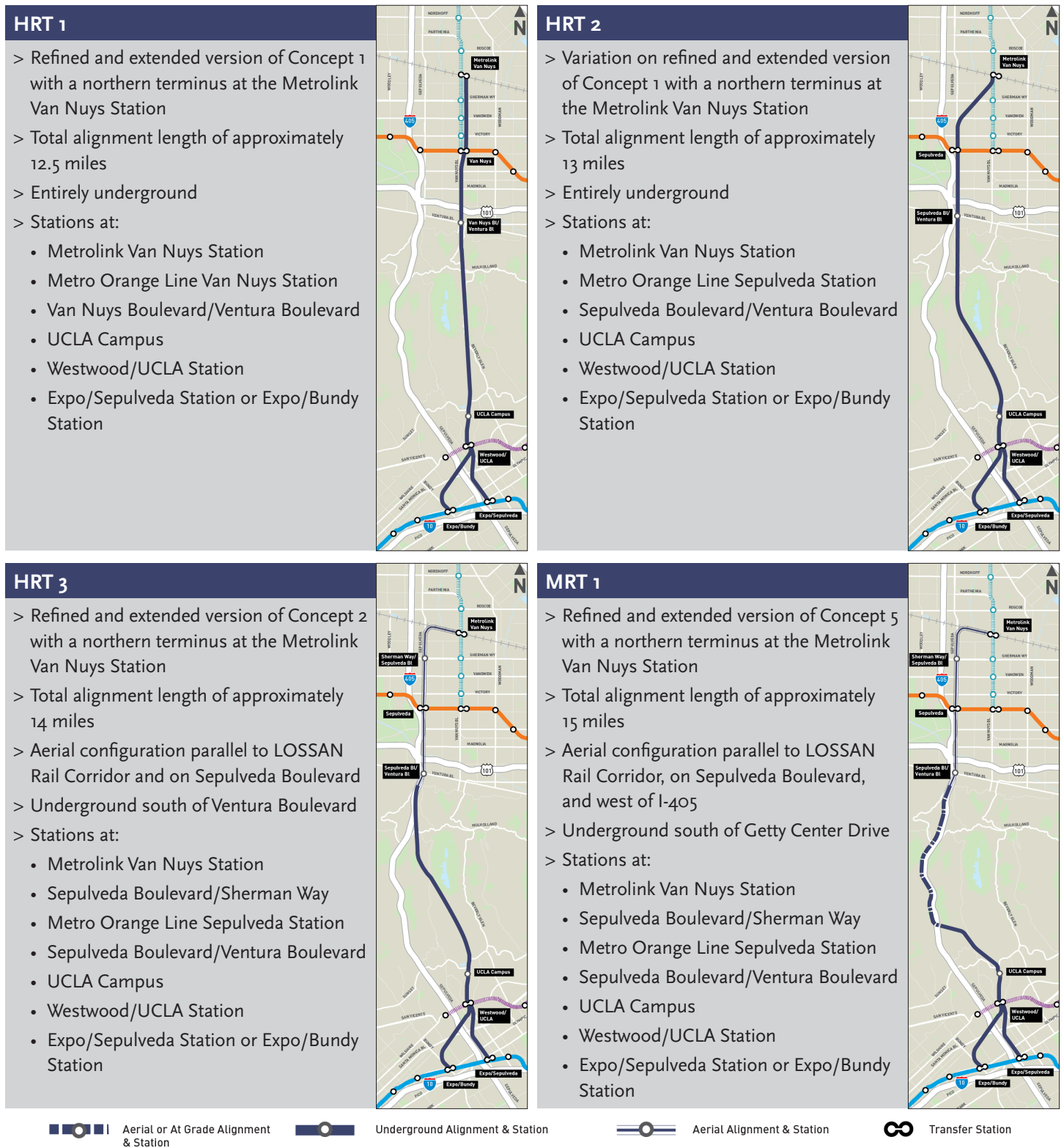


Figure ES-14. Refined Valley-Westside Concepts

Source: Sepulveda Mobility Partners, 2018

Note: Alignment lengths are for option to Expo/Sepulveda. Alignments to Expo/Bundy are approximately 0.5 mile longer.

Evaluation of Refined Concepts

To evaluate the performance of the refined concepts and to confirm that all address the Project's Purpose and Need, the same evaluation criteria that had been applied to the initial concepts were applied to the refined concepts.

Improve Mobility

HRT 3 is forecast to have the highest ridership, as shown in Figure ES-15. However, it would attract some of its riders from people who might otherwise use the East San Fernando Valley Light Rail Transit Corridor. Although all concepts would increase ridership on the East San Fernando Valley Light Rail Transit Corridor, boardings on that project would be lower under HRT 3 than under the other HRT concepts. HRT 1 would have the fastest end-to-end travel time, as shown in Figure ES-16. The concepts all performed similarly on the other objectives for this goal.



Figure ES-15. Daily Boardings on Refined Concepts

Source: Sepulveda Mobility Partners, 2018

Note: ESFV = East San Fernando Valley Light Rail Transit Corridor

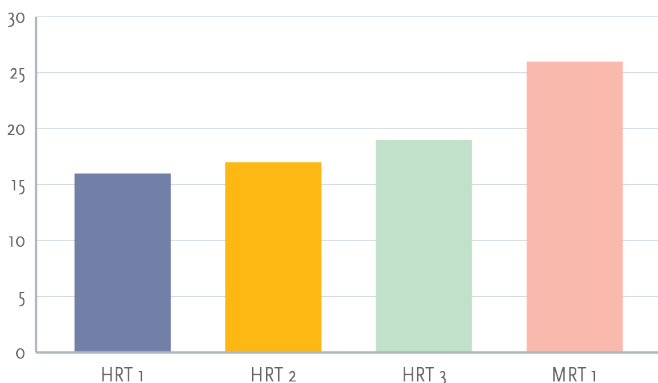


Figure ES-16. Travel Time (in Minutes) for Refined Concepts, Metrolink to Metro Expo Line

Source: Sepulveda Mobility Partners, 2018

Improve Equity of Access

All refined concepts have the same station options on the Westside and the same northern terminus at the Metrolink Van Nuys Station. Therefore, the evaluation of equity of access measures focused on stations that differ across the concepts—intermediate stations on Van Nuys Boulevard and Sepulveda Boulevard in the Valley. Stations on Van Nuys Boulevard generally perform better on equity of access measures than do stations on Sepulveda Boulevard, with more zoning supportive of transit-oriented communities (TOC) and proximity to more minority, low-income, and zero-car households.

Protect the Environment and Support Community and Economic Development

The refined concepts that attract greater ridership also reduce vehicle miles traveled (VMT) and vehicle hours traveled (VHT) the most, which would in turn reduce particulate and greenhouse gas emissions. With the highest ridership, HRT 3 would provide the greatest reductions in VMT and VHT. HRT 1 and HRT 2 would be entirely underground, limiting most potential environmental and community impacts to station areas. HRT 3 and MRT 1, which have aboveground segments, have greater potential visual, construction, and transportation impacts.

Recommendation of Concepts for Further Study

All four concepts were recommended for further study and development into conceptual alternatives, including preparation of conceptual drawings, development of operating plans, and identification of ancillary facilities, for the following reasons:

- > HRT 1 would have the fastest end-to-end travel time and preserves an option on Van Nuys Boulevard in the Valley if any engineering challenges on Sepulveda Boulevard prove to be prohibitive.
- > HRT 2 preserves a tunnel option on Sepulveda Boulevard if any engineering challenges on Van Nuys Boulevard prove to be prohibitive.
- > HRT 3 would have the highest daily project boardings, and its aerial section has the potential to provide a lower-cost alternative to the other HRT concepts.
- > MRT 1 has a longer aerial section with the potential to provide a lower-cost alternative to the HRT concepts.

ES-5 Final Valley-Westside Alternatives

The four refined concepts were developed into final alternatives, including the identification of ancillary facilities and development of operating plans. The alignments of each of the final alternatives extend between the Metro Expo Line in the south and the Metrolink Van Nuys Station in the north. The alignments and station locations of the four final

alternatives are illustrated in Figure ES-17. All stations would be underground or aerial, depending on the vertical configuration of the alignment at each station location.

In the Westside, the base alignment for all alternatives was defined as having a southern terminus at the Expo/Sepulveda Station and a connection to the Metro Purple Line Westwood/



Figure ES-17. Final Valley-Westside Alternatives

Note: Alignment lengths are for option to Expo/Sepulveda. Alignments to Expo/Bundy are approximately 0.5 mile longer.

Source: Sepulveda Mobility Partners, 2019



Figure ES-18. Westside Alignment Option

Source: Sepulveda Mobility Partners, 2019

UCLA Station at Westwood Boulevard. Two additional alignment options on the Westside, illustrated in Figure ES-18, were developed to provide different ways to connect to the Metro Purple Line and Metro Expo Line:

- > Sepulveda-Gayley Alignment Option
 - Southern terminus at Expo/Sepulveda Station
 - Santa Monica Boulevard Station at Bentley Avenue
 - Station directly under Metro Purple Line Westwood/UCLA Station at Gayley Avenue/Midvale Avenue
- > Bundy-Veteran Alignment Option
 - Southern terminus at Expo/Bundy Station
 - Santa Monica Boulevard Station at Purdue Avenue
 - Station under Veteran Avenue at Wilshire Boulevard with underground pedestrian connection to Metro Purple Line Westwood/UCLA Station



Could an alignment be located in the I-405 median?

A number of major constraints would make an aerial alignment in the median of I-405 challenging:

- > **I-405 ExpressLanes Project.** The combination of an aerial transit guideway and the addition of one lane in each direction would require widening of the freeway in this very constrained area.
- > **Columns in the median supporting the transit guideway.** On curves, these columns would block drivers' view of stopped vehicles or other obstructions, violating Caltrans' safety and design standards.
- > **I-405 has no median between US 101 and Sherman Way.** Adding columns to support a transit guideway in this area would require widening the freeway, which is constrained in this area.
- > **Drainage Infrastructure.** In many parts of the freeway, storm drains are in the median and a drainage pipe is underneath the median to prevent flooding. The foundations of columns for a transit guideway would conflict with these facilities.

Tunnel Configuration Options

Metro’s standard tunnel configuration consists of two tunnels, each approximately 20 feet in diameter. This “twin-bore” configuration, illustrated in Figure ES-19, accommodates one set of tracks in each tunnel and would require mining of cross-passages between the tunnels and up to two vertical shafts in the mountains for ventilation to meet Metro safety standards. A tunnel configuration option consisting of twin-bore 27-foot-diameter tunnels, illustrated in Figure ES-20, would allow for a longitudinal ventilation duct to be incorporated into each tunnel, eliminating the need for ventilation shafts in the mountains but would still require mining of cross-passages. Alternatively, a single-bore 40-foot-diameter tunnel, illustrated in Figure ES-21, would accommodate both sets of tracks and ventilation ducts in a single tunnel, eliminating the need for mined cross-passages and for ventilation shafts.

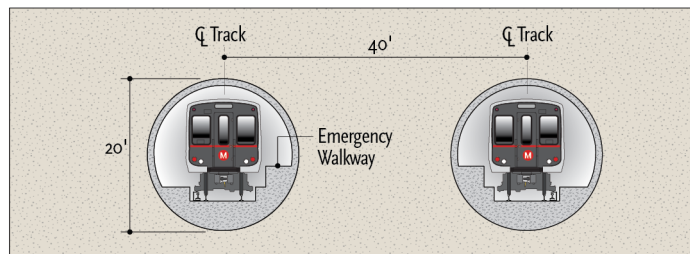


Figure ES-19. Twin-Bore Tunnel Configuration (20' Diameter)

Source: Sepulveda Mobility Partners, 2019

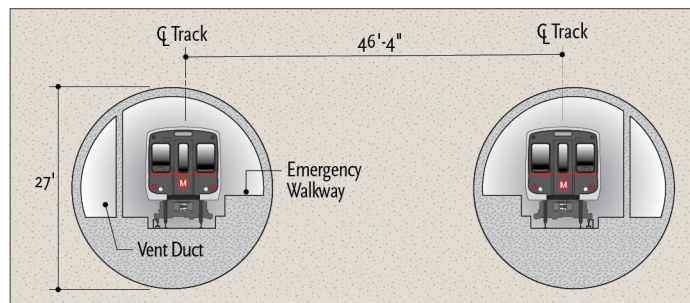


Figure ES-20. Twin-Bore Tunnel Configuration (27' Diameter)

Source: Sepulveda Mobility Partners, 2019

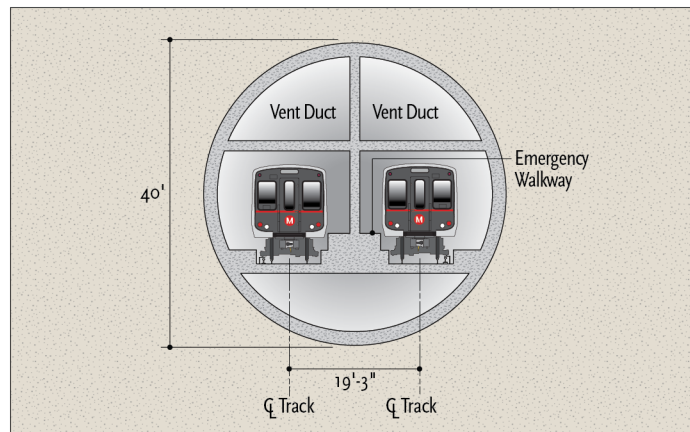


Figure ES-21. Single-Bore Tunnel Configuration (40' Diameter)

Source: Sepulveda Mobility Partners, 2019

Tunnels would generally be constructed using tunnel boring machines (TBM) operating below the ground surface, leaving the ground above the tunnel undisturbed (except at the TBM launch and retrieval locations). Underground stations and crossovers to allow trains to switch tracks would generally be constructed by excavating from the ground surface. With the single-bore configuration, crossovers can be constructed within the tunnel created by the TBM since both tracks are in the single tunnel, further reducing disruption at the surface.

Maintenance and Storage Facility

All alternatives would require a maintenance and storage facility (MSF) sized to accommodate its fleet. The MSF would be a stand-alone facility capable of performing all levels of service and maintenance of the HRT or MRT vehicles, including overnight storage of vehicles. The MSF would also include facilities for the storage and maintenance of equipment for maintaining the guideway and right-of-way.

During the development of the alternatives, the availability of suitable, industrially zoned land adjacent to the refined concepts was reviewed, and three potential MSF sites were identified:

- > Sepulveda Boulevard at Nebraska Avenue: This 26-acre site is located between I-405 and Sepulveda Boulevard, south of Nebraska Avenue and north of Olympic Boulevard. It could serve all alternatives.
- > Van Nuys Boulevard at Arminta Street: This 25-acre site is located on the north side of Arminta Street, east of Van Nuys Boulevard. It could serve HRT 1 and HRT 2.
- > Metrolink at Woodman Avenue: This 39-acre site is located south of the LOSSAN Rail Corridor, west of Hazeltine Avenue and east of Woodman Avenue. It could serve HRT 3 and MRT 1.

ES-6 Comparative Performance Analysis of Valley-Westside Alternatives

The alternatives were evaluated for their ability to meet the five project goals—improve mobility, improve equity of access, protect the environment and support community and economic development, provide a cost-effective solution, and minimize risk—using evaluation criteria more detailed than those used to evaluate the initial and refined concepts. Table ES-4 compares key results of the evaluation by alternative.

Improve Mobility

HRT 1 and HRT 3 each perform strongly on different measures of mobility improvement. Overall, HRT 3 would have the highest number of daily boardings, new transit trips, and hours of daily time savings, while HRT 1 links major origins and destinations most quickly and directly.

Table ES-4. Performance of Alternatives on Select Project Objectives and Evaluation Measures

MEASURE		HRT 1	HRT 2	HRT 3	MRT 1
Improve Mobility					
Objective: Increase transit ridership by directly serving origin-destination pairs with greatest potential for attracting new riders					
Daily boardings		128,246	126,078	137,177	121,740
New transit trips		54,108	53,691	57,608	49,815
Objective: Increase transit frequency and operating speeds					
Average operating speed (miles per hour)		45.4	42.2	43.6	34.5
Travel time from Metrolink to Expo Line		16 minutes	17 minutes	19 minutes	26 minutes
Daily time savings (hours)		41,307	41,180	43,826	40,400
Improve Equity of Access¹					
Objective: Improve accessibility for residential and employment centers					
2042 population density (persons per square mile)	Metro Orange Line	17,176		7,129	
	Ventura Boulevard	12,809		11,480	
2042 employment density (jobs per square mile)	Metro Orange Line	12,862		13,275	
	Ventura Boulevard	12,050		21,974	
Objective: Investment in disadvantaged communities					
Low-income residents		3,977		792	
Minority residents		8,791		3,070	
Zero-car households		761		190	
Number of low-income riders		81,500	80,200	87,600	79,900
Protect the Environment and Support Community and Economic Development					
Objective: Reduce VMT					
Regional VMT reduction		991,600	985,900	1,038,600	861,800
Objective: Reduce air pollutant emissions					
Regional VHT reduction		69,500	68,700	72,000	60,100
Objective: Minimize effects to communities					
Potential for property impacts		Likely impact	Likely impact	Likely impact	Likely impact
Potential for visual impacts		Unlikely to impact	Unlikely to impact	Likely impact	Likely impact
Objective: Minimize other environmental impacts					
Environmental justice		Potential impact	Potential impact	Likely impact	Likely impact
Noise and vibration		Potential impact	Potential impact	Likely impact	Likely impact
Provide a Cost-Effective Solution					
Objective: Minimize cost to achieve benefits					
Capital cost		\$10.9 to \$13.4 billion	\$11.0 to \$13.6 billion	\$10.0 to \$12.4 billion	\$9.4 to \$11.6 billion
Annual O&M cost		\$112 to 119 million	\$112 to \$129 million	\$123 to \$137 million	\$84 to \$92 million
Annualized capital and O&M cost per project trip		\$9.85 to \$11.69	\$10.13 to \$12.28	\$9.27 to \$11.11	\$9.26 to \$11.15
Cost per hour of time savings		\$30.58 to \$36.30	\$31.03 to \$37.61	\$29.02 to \$34.77	\$27.90 to \$33.58

Table ES-4. Performance of Alternatives on Select Project Objectives and Evaluation Measures (continued)

MEASURE	HRT 1	HRT 2	HRT 3	MRT 1
Minimize Risk				
Objective: Minimize potential for cost increases and delays				
Qualitative assessment of unresolved major engineering challenges	> Potential construction conflict with East San Fernando Valley Light Rail Transit Corridor	> Potential construction conflict with East San Fernando Valley Light Rail Transit Corridor	> Major utility constraints under Sepulveda Boulevard	> Major utility constraints under Sepulveda Boulevard > High-capacity MRT would be new technology in United States

Source: Connetics Transportation Group, 2019; Fehr & Peers, 2018; Sepulveda Mobility Partners, 2019; Terry A. Hayes Associates, 2019; Torti Gallas + Partners, 2019

¹ All equity of access metrics reflect population within one-half mile of the station site. For evaluation purposes, HRT 2, HRT 3, and MRT 1 are considered to have identical station locations.

Notes: Table summarizes major differences among alternatives. Detailed data presented in Appendix C.

Twin-bore tunnel configuration assumed for all alternatives to present largest potential project footprint and impacts; alternative configurations could reduce potential impacts.

Costs shown in 2019 dollars. Costs are for 20-foot diameter twin-bore tunnel configuration. Cost per project trip considers only 2042 ridership forecasts.

O&M = operating and maintenance; VHT = vehicle hours traveled; VMT = vehicle miles traveled

The disparity in ridership between MRT 1 and the HRT alternatives is a result of the slower speeds of MRT technology and its longer route through the Sepulveda Pass. These factors also result in MRT 1 requiring the longest travel times between major origin-destination pairs.

Improve Equity of Access

As with the refined concepts, differences in station access occur in the Valley, where HRT 1 follows Van Nuys Boulevard and HRT 2, HRT 3, and MRT 1 generally follow Sepulveda Boulevard. Therefore, the evaluation of equity of access measures focused on stations that differ across the alternatives.

HRT 1 would serve higher population densities, while HRT 2, HRT 3, and MRT 1 would serve higher employment densities. HRT 1 would also have better bicycle access and have better pedestrian connections with fewer walking barriers. However, while more low-income residents live near Van Nuys Boulevard, HRT 3 along Sepulveda Boulevard serves the most low-income riders because of its overall higher ridership. Overall, HRT 1 is more supportive of TOC than HRT 2, HRT 3, and MRT 1 because of the land uses and development potential around the different Metro Orange Line Stations that would be served by each alternative. Existing zoning around the Metro Orange Line Sepulveda Station does not support TOC to the same degree as the zoning around the Van Nuys Station.

Protect the Environment and Support Community and Economic Development

Reduction in VMT and VHT for each alternative is directly correlated with the ridership it attracts. As a result, reductions are greatest for HRT 3, which has the highest ridership, and are least for MRT 1, which has the lowest ridership.

The potential for traffic, visual, noise, and environmental justice (EJ) impacts are generally greater for alternatives with more aboveground configurations because of the physical space they occupy in a community. Aerial structures are also more susceptible to seismic impacts than are tunnel or at-grade alignments. As a result, HRT 3 and MRT 1 have the most potential for impact in these categories. HRT 1 would also have an increased potential for traffic impact during construction because of overlap with the construction and operation of the East San Fernando Valley Light Rail Transit Corridor.

Many of the potential impacts of the alternatives are associated with the locations of stations and crossovers, which have been assumed to be excavated from above. The potential property impacts could be reduced through refinement of the alignments, changes to guideway or tunnel design, or the use of alternative construction methods. With a single-bore configuration, crossovers can be constructed inside the bored tunnel rather than excavated from the ground above. In certain geological conditions, and for additional cost, stations and crossovers could be mined from underground. Both

methods would decrease the amount of surface, thus property, disturbed during construction.

Provide a Cost-Effective Solution

Cost estimates were prepared for each alternative using a methodology consistent with Federal Transit Administration (FTA) guidelines for estimating capital costs. Because no MRT systems with the capacity required for the Project have been constructed or operated in the United States, MRT 1 costs were based on HRT costs, modified to reflect the unique characteristics of MRT.

Since underground construction is more expensive than aboveground construction, the main factors influencing the capital cost of the alternatives are the overall length of the alignment and the amount of the alignment that is underground. Additionally, annual operating and maintenance (O&M) costs would be lower for MRT 1 than for the HRT alternatives, in part because the industry standard of driverless operations of monorails has been assumed in estimating costs.

Because of the lower capital and O&M costs, MRT 1 performs better than the HRT alternatives in terms of cost per hour of time savings, even though it has lower ridership. However, because MRT 1 has lower ridership, the cost per project trip for HRT 1, HRT 3, and MRT 1 are relatively similar.

Because the preliminary cost of the Sepulveda Transit Corridor Project is greater than the funding identified in the *Measure M Expenditure Plan*, additional funding would be sought from other sources. Two key potential sources of additional funding are the FTA's Capital Investment Grants (CIG) program, which will consider funding transit projects that achieve an annualized cost per project trip of \$10 or less, and partnerships with private business entities. Because design is still in the early stages, all alternatives are therefore considered relatively equally competitive for CIG funding. Additionally, because all alternatives could be operated and maintained independently of other Metro transit facilities, all alternatives are considered equally likely to attract private investment.

Minimize Risk

All large infrastructure projects face risks along the process from project development through design and construction to the commencement of operations. Therefore, the alternatives were evaluated for the ability to minimize risk—issues that may affect the ability of each alternative to achieve project objectives.

Overall risk associated with HRT 3 and MRT 1 is higher than that of HRT 1 and HRT 2, primarily because of the need to relocate parts of the Metropolitan Water District (MWD) Sepulveda Feeder water transmission line. Additionally, the lack of experience in the United States constructing and operating MRT with the capacity required for the Project creates additional uncertainty for MRT 1.

MSF Options

MSF options were also evaluated during this step of the evaluation process. Because riders do not directly interact with MSFs, only the goals to protect the environment and support community and economic development, provide a cost-effective solution, and minimize risk are applicable.

Protect the Environment and Support Community and Economic Development

Because the Metrolink at Woodman and Van Nuys at Arminta sites are primarily occupied by large-scale industrial and commercial uses, fewer businesses would be displaced than at the Sepulveda at Nebraska site. The Sepulveda at Nebraska site also has potential impacts associated with potentially historic structures (buildings over 50 years old with architectural characteristics of the time and culture in which they were built) and water resources (as a result of excavation).

The Van Nuys at Arminta site is in an EJ census tract that does not contain residences, although it is adjacent to EJ communities. It also has a potentially historic structure on the site. The Metrolink at Woodman site is in an EJ census tract that does not contain residences and has the fewest potential impacts of the three options.

Provide a Cost-Effective Solution

The Sepulveda at Nebraska site would be four to five times more costly than either the Metrolink at Woodman site or the Van Nuys at Arminta site because it would have to be constructed below the level of the existing ground to allow rail access to the site while avoiding MWD's Sepulveda Feeder line under Sepulveda Boulevard. Additionally, real estate is more costly in the vicinity of the Sepulveda at Nebraska site than at the other sites.

Minimize Risk

While the MSF options at the Metrolink at Woodman and Van Nuys at Arminta sites do not have additional risks associated with them, the Sepulveda at Nebraska site does. These additional risks are related to excavating the site, crossing a major water transmission line, and vacating public roadways.

ES-7 Identification and Screening of Westside-LAX Concepts

Development of Westside-LAX Concepts

The Westside-LAX concepts were developed as extensions of the refined Valley-Westside concepts, or, in one case, as an extension of the Metro Purple Line. Therefore, each Westside-LAX concept must be compatible with the mode and the terminus of a Valley-Westside concept or the Metro Purple Line. As a consequence, only HRT and MRT concepts connecting to the Expo/Bundy Station, Expo/Sepulveda Station, or Westwood/VA Station were considered.

The Airport Metro Connector (AMC) 96th Street Transit Station on the future Metro Crenshaw/LAX and Metro Green Lines was identified as the logical southern terminus of the Westside-LAX concepts. The Westside-LAX concepts generally follow the major north-south corridors within the southern part of the Study Area: Centinela Avenue, Sepulveda Boulevard, I-405, and Overland Avenue.

An aerial configuration was only considered along I-405 since the refined Valley-Westside segment concepts all end in a tunnel configuration and all the arterial corridors to the south have extensive segments in which the right-of-way is not sufficient to accommodate the addition of an aerial guideway without removal of travel lanes and/or substantial property impacts.

Westside-LAX Concepts

The six Westside-LAX concepts are illustrated in Figure ES-22. Four of the concepts are extensions of Valley-Westside HRT alternatives from the Expo/Sepulveda Station, one is an extension of the Valley-Westside MRT alternative from the Expo/Sepulveda Station, and one is an extension of the Metro Purple Line from the Westwood/VA Station. In addition, one HRT extension concept includes an option to connect to the Expo/Bundy Station instead of the Expo/Sepulveda Station.

Additional rail vehicles would be needed to operate any of the Westside-LAX concepts. None of the MSF sites identified for the Valley-Westside segment of the Project would be large enough to accommodate these additional vehicles. Because land uses change over time, a suitable site to accommodate an expanded fleet should be identified closer to the anticipated date of construction of the Westside-LAX segment.

Evaluation of Westside-LAX Concepts

The Westside-LAX concepts were evaluated in the same manner as the refined Valley-Westside concepts, as well as on cost and cost-effectiveness measures.

Improve Mobility

Ridership forecasts for the entire Project between the Valley and LAX are shown in Figure ES-23. While the Purple Line Extension concept would result in the greatest number of daily boardings, this is in part because passengers using both the Valley-Westside and Westside-LAX segments of the Project would be forced to transfer to complete their journey, and their boardings are counted twice in the ridership since they must board two trains.

In addition, the Purple Line Extension would result in substantially lower ridership on the Valley-Westside segment than the other HRT concepts because it requires an extra transfer for passengers traveling between the Valley or UCLA and LAX. As a result, the Purple Line Extension would also generate fewer new transit trips on the Metro system than the other HRT concepts.

Travel times from the Expo Line to AMC 96th Street Transit Station range from 10.5 to 12.5 minutes across concepts, with HRT Sepulveda being the fastest and MRT I-405 being the slowest.

Improve Equity of Access

Since the Westside-LAX concepts are along three primary corridors (Centinela Avenue, I-405/Sepulveda Boulevard, and Overland Avenue), the concepts were grouped by corridor and the equity of access evaluation was conducted for each of these corridors.

The HRT Overland concept would provide the greatest equity of access benefits. Its intermediate stations at Overland/Venice and Overland/Jefferson are forecast to have employment densities greater than comparable stations on the other corridors. The Overland/Venice Station is also surrounded by transit-supportive land uses and a significant number of low-income, minority, and zero-car households. The Centinela corridor (HRT Centinela and Purple Line Extension) would perform the lowest on this measure because it would provide the weakest opportunities for bicycle and pedestrian access.

Protect the Environment and Support Community and Economic Development

Concepts that are entirely underground perform better than those with aerial sections (HRT I-405 and MRT I-405) on measures of protecting the environment and supporting community and economic development since they have lower potential for property, construction, transportation, noise, vibration, and historic impacts.

HRT Sepulveda and HRT Centinela concepts perform best at protecting the environment because they would not pass through potentially hazardous oil fields or Methane and

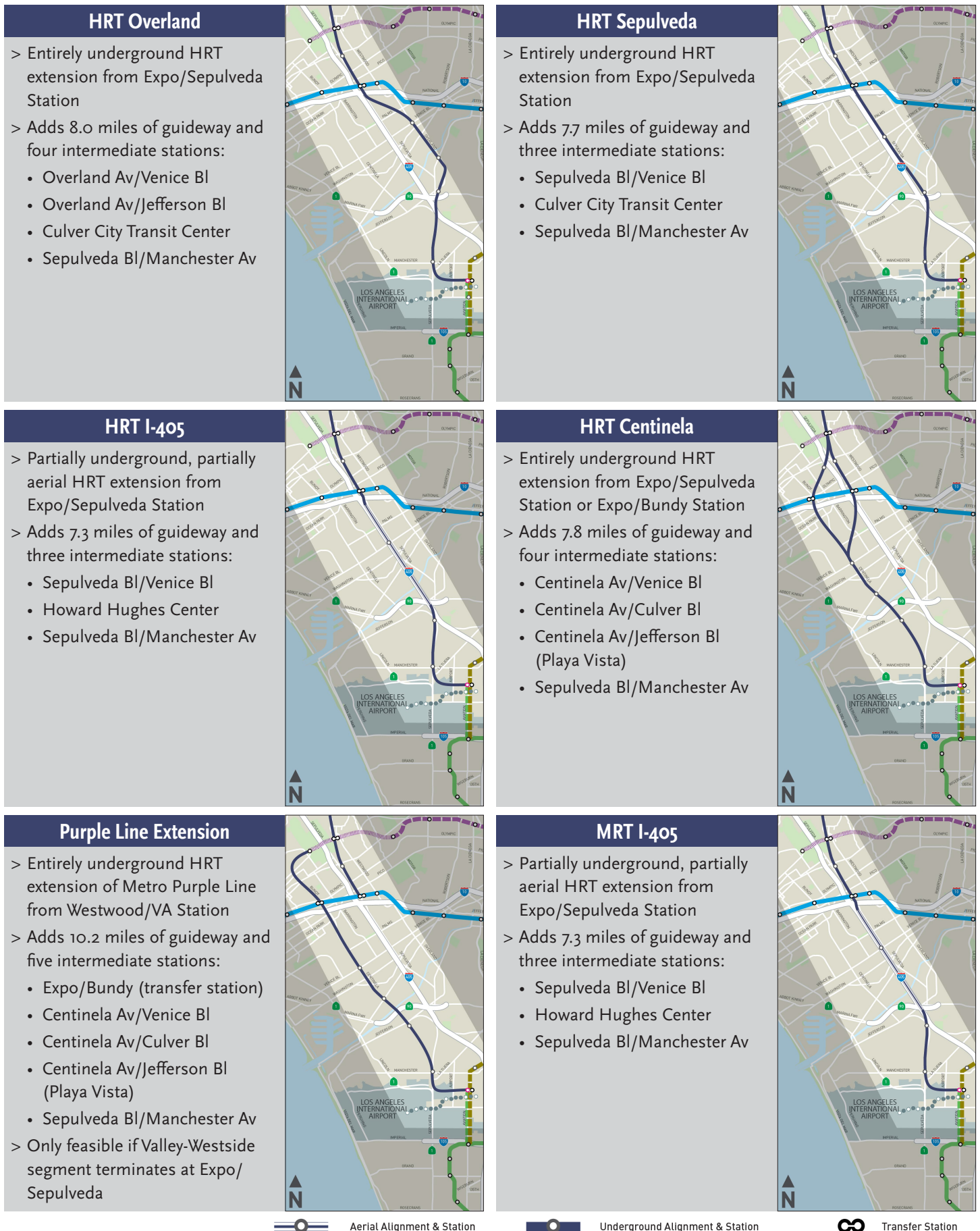


Figure ES-22. Westside-LAX Concepts

Source: Sepulveda Mobility Partners, 2019

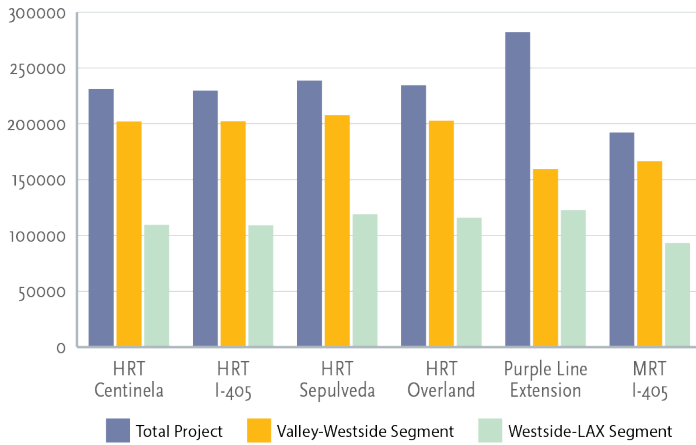


Figure ES-23. Project Trips on Westside-LAX Concepts (2057)

Source: Sepulveda Mobility Partners, 2019

Note: Total project trips are less than the sum of Valley-Westside trips and Westside-LAX trips because some trips use both segments of the Project.

Methane Buffer Zones as other tunnel concepts would. Additionally, the Purple Line Extension concept also has increased potential for historic impacts near the West Los Angeles Veterans Affairs Medical Center and seismic impacts along the portion of its alignment through the Santa Monica Fault Zone.

Provide a Cost-Effective Solution

The main factors influencing the cost of the Westside-LAX concepts are the overall length of the alignment, the amount of the alignment that is underground, and the amount of right-of-way acquisition required.

ES-8 Public Outreach and Agency Coordination

Metro engaged in a robust public outreach process for this Feasibility Study, guided by Metro’s Equity Platform. Metro designed a wide range of opportunities for feedback in an inclusive and transparent way and held multiple forums for bilingual English and Spanish community engagement. This included engaging stakeholders at a variety of events and locations in the Valley and on the Westside, reaching thousands of stakeholders in person. Metro also conducted significant outreach with many public agencies that have jurisdiction throughout the Study Area. Coordination with these agencies allowed concerns to be identified and addressed early in the process.

Project Materials and Resources

To inform and update stakeholders about the Project’s progress, the outreach team developed collateral materials for distribution through various channels and means of communication. A Project website <https://www.metro.net/projects/sepulvedacorridor/>

serves as a central location where the public can go to obtain all project-related information.

The project team also conducted two online bilingual surveys. The first survey focused on learning about those who travel in the Study Area and the characteristics of their travel. The second survey focused generally on the concepts that had been presented at the second round of public meetings in January/February 2019.

Public Meetings

Metro hosted three rounds of informational public meetings (for a total of 10 individual public meetings) as part of the public outreach efforts for the study. Meetings were held to coincide with the introduction, refinement, and evaluation of the transit concepts. All materials were available in English and Spanish, and interpreters were available to translate and assist with submission of comments.

To promote each round of public meetings, Metro distributed thousands of take-ones with information about the meetings in English and Spanish on bus routes that operate in the Study Area. Electronic versions of each meeting notice, with a link to a Spanish translation, were distributed via e-blast to all contacts included in the project database. Support was also requested from elected offices, cities, public facilities, and other key stakeholders to promote public meetings through their own communication tools.

Additionally, targeted outreach in Spanish based on a careful analysis of Spanish speakers with limited English proficiency in the Study Area was conducted to encourage attendance of Spanish speakers.



Throughout the study, hundreds of community members attended public meetings to learn about the Project and provide input.

Source: Arellano Associates, 2019

Outreach at Community Events

Many factors may prevent in-person attendance at public meetings; therefore, the outreach was conducted at places where community stakeholders already gather. This included making announcements and presentations at community meetings, such as neighborhood councils and homeowners' associations. In addition, the outreach team staffed information booths at approximately 20 free or low-cost community festivals that drew thousands of diverse attendees throughout the Study Area.

Public Agency Meetings

Metro coordinated with many public agencies that have jurisdiction throughout the Study Area, holding both multi-agency briefings and individual meetings. This effort was designed to present information on the project concepts, to discuss relevant issues related to each agency's jurisdiction, and proactively consult with these agencies prior to formal agency consultation, which is a prerequisite under the NEPA environmental review process.

Metro held individual meetings with the following agencies to discuss issues related to the Project and resources under each agency's jurisdiction:

- > Caltrans
- > County of Los Angeles Department Regional Planning
- > Los Angeles Department of City Planning (LADCP)
- > Los Angeles Department of Transportation
- > Los Angeles Department of Water and Power
- > Metropolitan Water District
- > Santa Monica Mountain Conservancy
- > Southern California Regional Rail Authority (Metrolink)
- > United States Army Corps of Engineers
- > UCLA

Feedback Received

Although the public meetings were not formal public hearings, Metro received comments at the public meetings and via the project email address and website and through postal mail, with almost unanimous support to move forward with the study and interest in seeing the Project completed as quickly as possible. Public comments generally fell into four different topical areas:

- > Alternative concepts and modes
 - Interest in a convenient ride without needing to transfer from the San Fernando Valley to LAX



Many people who travel in the Sepulveda corridor live and work outside the Study Area, so Metro engaged the community at popular events such as the Santa Monica Summer SOULstice in June 2018.

Source: Arellano Associates, 2019

- Connectivity to other destinations, including Santa Clarita, Santa Monica and the Santa Monica Airport, Culver City, and Playa Vista
- Changes to the East San Fernando Valley Light Rail Transit corridor to improve connectivity
- Stakeholders in the Mar Vista area expressed strong support for the Sepulveda alignment for the Westside-LAX segment
- Sherman Oaks stakeholders expressed opposition to aboveground options and support for an underground option
- > Stations
 - Strong desire for a station at UCLA
 - Interest in both the Expo/Sepulveda and Expo/Bundy Stations as possible southern termini
 - Requests for a station between the Purple and Expo Lines on Santa Monica Boulevard or another point in between
 - Interest in a station at The Getty
 - Preference for a Centinela/Washington station option over Centinela/Venice
 - Evaluation of parking
 - Support for transit connectivity and transit-oriented development around stations
- > Evaluation criteria
 - Concerns regarding noise and vibration during construction and operation of aerial segments
 - Concerns regarding tunneling

> Study scope

- Some suggested extending the geographic scope of the analysis and physical boundaries of the Project farther north and south

ES-9 Next Steps

This Feasibility Study has determined that a reliable, high-capacity fixed-guideway transit system connecting the San Fernando Valley to the Westside and the LAX area could be constructed along several different alignments. Such a transit system, operated as either HRT or MRT, would serve the major travel markets in the Sepulveda corridor and would provide travel times competitive with the automobile. While not recommending a particular alternative, this study has also identified potential environmental and community impacts that could result from construction and operation of this transit line and developed cost estimates for construction and operations.

The Metro Board of Directors will select alternatives to be included in the environmental process based on this study and upcoming proposals resulting from Metro's predevelopment

agreement process. These alternatives will be presented to the public and public agencies for feedback through the NEPA and CEQA scoping process; all reasonable alternatives will be considered during environmental review.

Any fixed-guideway system in the corridor, whether an alternative developed during this study or one developed independently, will confront many of the same key challenges. Based on the design and analysis conducted during this study, the following steps should be taken to address the key challenges:

- > Seek additional community input on station locations and designs
- > Consider interactions with and connections to other Metro Lines
- > Advance engineering studies of key design issues
- > Identify ways to reduce impacts, including further evaluation of tunnel configurations
- > Identify cost reductions and consider project phasing

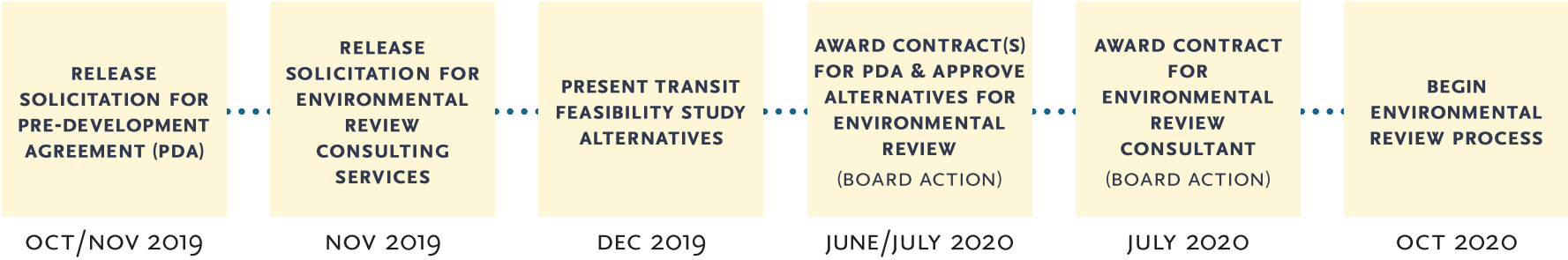
Los Angeles County
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ATTACHMENT B - PROJECT TIMELINE



Next stop: exploring alternatives to the 405.

SEPULVEDA TRANSIT CORRIDOR PROJECT



Metro®





Planning & Programming Committee

November 20, 2019


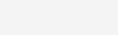

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Refined Valley-Westside Alternatives

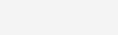
Sepulveda Transit Corridor Project (alignment options)

-  Aerial
-  Aerial or At Grade
-  Underground
-  Transfer Stations

Existing Service

-  Existing Metro Expo Line & Station
-  Existing Metro Orange Line & Station
-  Amtrak/Metrolink & Station

Pre-Construction

-  Purple Line Extension & Station (Section 3)
-  East San Fernando Valley Transit Corridor & Station

HRT 1



HRT 2



HRT 3



MRT 1



Refined Westside-LAX Concepts

Via Expo/Sepulveda Station

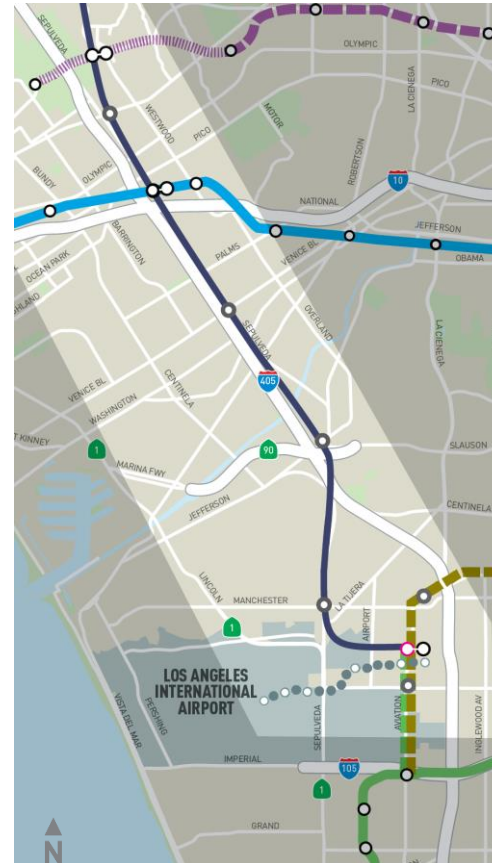
HRT or MRT I-405



HRT Centinela



HRT Sepulveda



HRT Overland



- Sepulveda Transit Corridor Project (alignment options)**
- Aerial
 - Underground
 - ∞ Transfer Station
- Existing Service**
- Existing Metro Expo Line & Station
 - Existing Metro Green Line & Station
- Under Construction**
- Crenshaw/LAX Transit Project & Station
 - Purple Line Extension & Station
- Pre-Construction**
- Purple Line Extension & Station (Section 3)
 - Airport Metro Connector 96th Street Transit Station
- Los Angeles World Airports (LAWA)**
- LAX Automated People Mover (APM) (Under construction)



Refined Westside-LAX Concepts

Via Expo/Bundy Station

HRT Centinela

Purple Line Extension

Sepulveda Transit Corridor Project (alignment options)

- Aerial
- Underground
- Transfer Station

Existing Service

- Existing Metro Expo Line & Station
- Existing Metro Green Line & Station

Under Construction

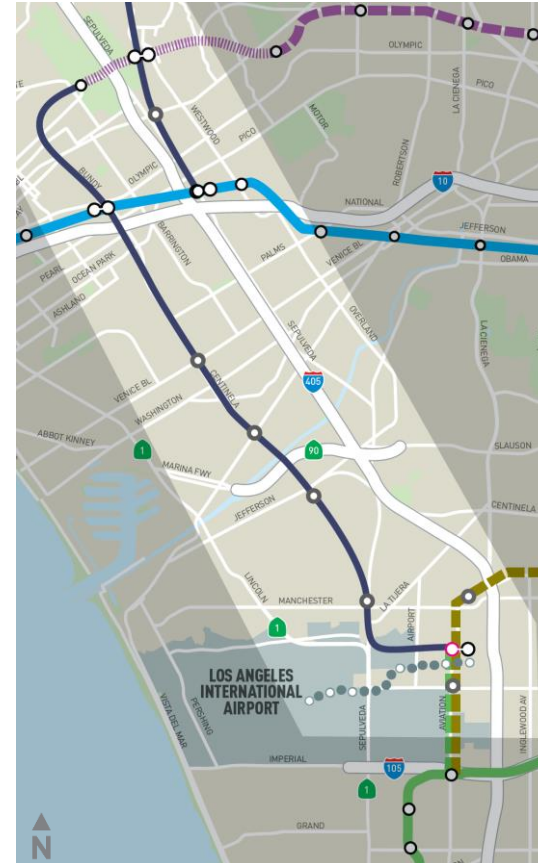
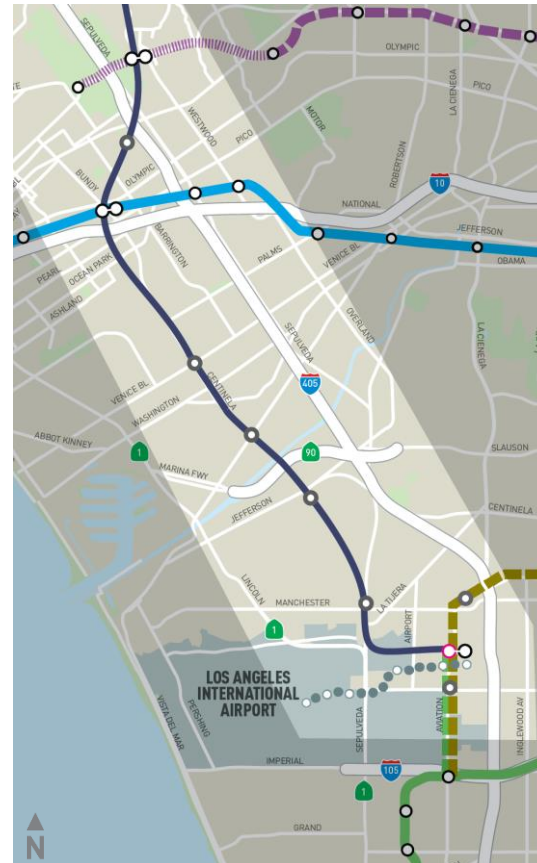
- Crenshaw/LAX Transit Project & Station
- Purple Line Extension & Station

Pre-Construction

- Purple Line Extension & Station (Section 3)
- Airport Metro Connector 96th Street Transit Station

Los Angeles World Airports (LAWA)

- LAX Automated People Mover (APM) (Under construction)



Next Steps / Q&A

- > November 2019 – Federal, state and municipal staff roundtables
 - Monday, November 18, 2:00-3:30; webcast and live at Culver City Hall
 - Tuesday, November 19, 11:00-12:30; Van Nuys State Office Building, Auditorium
- > November 2019 – Release RFP for EIS/EIR
- > December 2019 – Present Feasibility Study to Metro Board of Directors
- > Spring 2020 – Procure Outreach Contractor through Metro Communications Bench
- > June/July 2020
 - Award PDA contract(s)
 - Award EIS/EIR contract
 - Approve alternatives for environmental review
- > Fall 2020 – Begin NEPA/CEQA Scoping Process