

West Santa Ana Branch Transit Corridor

Northern Alignment Options Screening Report
April 2017



Metro®

**WEST SANTA ANA BRANCH TRANSIT CORRIDOR
ENVIRONMENTAL STUDY
Contract No. AE5999300**

**Final
Northern Alignment Options Screening Report**

Task 2.5, 3.2 and 3.4 (Del. No. 2.5a, 3.2a and 3.4a)

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ACRONYMS AND ABBREVIATIONS

AA	Alternatives Analysis
BRT	Bus Rapid Transit
CEQA	California Environmental Quality Act
COG	Council of Governments
FTA	Federal Transit Administration
EJ	Environmental Justice
GCCOG	Gateway Cities Council of Governments
HOV	High Occupancy Vehicle
IVT	In-Vehicle Time
LOS	Level of Service
LRT	Light Rail Transit
LRTP	Long Range Transportation Plan
Metro	Los Angeles County Metropolitan Transportation Authority
NEPA	National Environmental Policy Act
OCTA	Orange County Transportation Authority
OLDA	Orange Line Development Authority
OVT	Out-of-Vehicle
PEROW/WSAB	Pacific Electric Right-of-Way/West Santa Ana Branch
ROW	Right-of-Way
SCAG	Southern California Association of Governments
SCC	Standard Cost Category
STP	Strategic Transportation Plan
TOD	Transit-Oriented Development
TRS	Technical Refinement Study
USDOT	U.S. Department of Transportation
VMT	Vehicle Miles Traveled
WSAB	West Santa Ana Branch

1 INTRODUCTION

1.1 Study Background

The West Santa Ana Branch (WSAB) Transit Corridor (the Project) is a proposed light rail transit (LRT) line that would extend approximately 20 miles from downtown Los Angeles through southeast Los Angeles County (LA County), traversing densely populated, low-income and heavily transit dependent communities. The Project would provide reliable, fixed guideway transit service that would increase mobility and connectivity for historically underserved, transit-dependent and environmental justice (EJ) communities; reduce travel times on local and regional transportation networks; and accommodate substantial future employment and population growth.

The Project is one of the many transit projects funded by Measure R (approved in November 2008) and Measure M (approved in November 2016). The Project is identified in the Los Angeles County Metropolitan Transportation Authority's (Metro) 2009 Long-Range Transportation Plan.

In March 2010, the Southern California Association of Governments (SCAG) initiated the Pacific Electric Right-of-Way (PEROW)/WSAB Alternatives Analysis (AA) Study in coordination with the relevant cities, the Orangeline Development Authority (now known as Eco-Rapid Transit), the Gateway Cities Council of Governments, Metro, the Orange County Transportation Authority (OCTA), and the owners of the right-of-way (ROW). The AA Study evaluated a wide variety of transit connections and modes for the 34-mile corridor from Union Station in downtown Los Angeles to the City of Santa Ana in Orange County. In February 2013, SCAG completed the PEROW/WSAB AA Study and recommended LRT with two northern alternatives for further study: the East Bank and the West Bank Option 3 (West Bank 3).

In January 2014, following the completion of the AA Study, Metro initiated a Technical Refinement Study (TRS) of the WSAB Transit Corridor, focusing on five key issue areas along the 20 mile portion of the Corridor within LA County:

- Access to Union Station
- Northern Alignment Options
- Huntington Park Alignment and Stations
- New Green Line Station
- Southern Terminus at Pioneer Station

In addition to the East Bank and West Bank 3 alignments recommended in the PEROW/WSAB AA Study, the TRS identified and recommended four variations of the West Bank 3 alignment between the City of Huntington Park and downtown Los Angeles: 1) the Pacific/Alameda and Pacific/Vignes alignment options that followed Pacific Boulevard through the cities of Huntington Park and Vernon, and 2) the

Alameda and Alameda/Vignes alignment options that followed the existing Metro Blue Line ROW from Slauson Avenue to Washington Boulevard and headed north along Alameda Street (see Section 4 for Northern Alignment Option maps).

In September 2016, Metro initiated the WSAB Transit Corridor Environmental Study (Environmental Study) with the goal of environmentally clearing the Project under the California Environmental Quality Act.

1.2 Report Purpose and Structure

The purpose of this Northern Alignment Options Screening Report is to evaluate the project's northern alignment options that were analyzed in the TRS, which are defined as the alignment between downtown Los Angeles and the City of Huntington Park, and to identify the Project alternative(s) to be carried forward into scoping for the environmental process.

This report is organized as follows:

- Review of the screening process and methodology
- Overview of the project's purpose and need, goals and objectives, and evaluation criteria
- Description of the northern alignment options
- Results of the initial screening
- Summary of findings and recommendations of alternative(s) to advance through the environmental process

2 EVALUATION PROCESS AND METHODOLOGY

This chapter summarizes the evaluation process and methodology utilized for screening the northern alignment options.

2.1 Evaluation Process

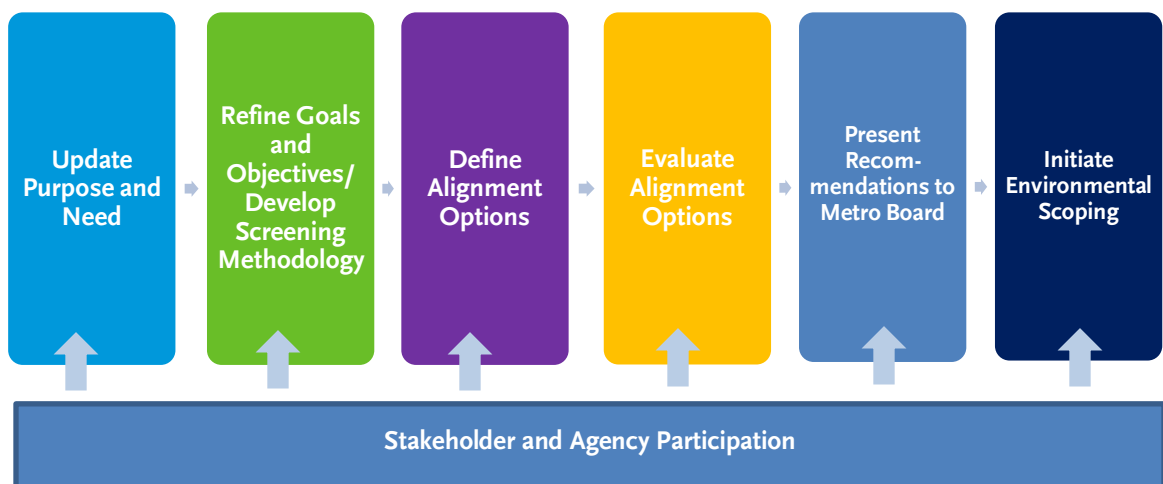
The development and evaluation of the northern alignment options generally follows a six-step process:

- Update the purpose and need of the project that was described in the AA Report
- Refine goals and objectives from the AA Report and develop screening methodology
- Define northern alignment options
- Evaluate the alignment options and develop recommendations
- Present recommendations to the Metro Board of Directors for approval to initiate environmental scoping
- Initiate environmental scoping for the recommended alternative(s)

During this process, stakeholders and agency participants are heavily involved with project coordination, meetings, and briefings through which they can provide input and feedback on the alternatives. Stakeholder and agency participation is critical in the screening process to reach an informed recommendation for the decision makers.

Figure 2-1 below presents a flow chart of the evaluation process for the WSAB Transit Corridor Project.

Figure 2-1. Evaluation Process



2.2 Methodology

Section 3 identifies the goals and objectives as well as the evaluation criteria utilized in this Screening Report. Alignment options are assessed against each evaluation criterion on their potential performance in qualitative and quantitative measures. A “high”, “medium”, or “low” rating is assigned based on the alignment option’s ability to meet the project’s goals and objective. Table 2-1 presents the typical screening threshold for each criterion.

Table 2-1. Scoring Methodology

Score		Description
●	High	A high score indicates the alternative highly supports and satisfies the criterion, or has a low potential for negative impacts.
◐	Medium	A medium score indicates the alternative moderately supports the criterion, or has a moderate potential for negative impacts.
○	Low	Low scores indicates that an alternative does not support or conflicts with the criterion, or has a high potential for negative impacts.

The purpose of providing this comparison ranking is to determine the overall performance of each alignment option based on the goals and objectives of the project. It is typical in the screening process to have an alternative perform well for some goals objectives but less satisfactory for others. This overall summary of an alternative’s performance provides a clear understanding of benefits and tradeoffs so stakeholders and decision makers can interpret the results of the evaluation and reasoning for any recommendations.

3 PURPOSE AND NEED, GOALS AND OBJECTIVES, AND EVALUATION CRITERIA

This chapter provides a description of the WSAB Transit Corridor Study Area followed by the purpose and need and goals and objectives for the WSAB Transit Corridor Project.

Over the past five years, the Southern California Association of Governments (SCAG), Metro, Eco-Rapid Transit¹ (a Joint Powers Authority for the WSAB Transit Corridor comprised of corridor cities), and the Gateway Cities Council of Governments² (GCCOG) have conducted studies evaluating the potential reestablishment of passenger rail service along the WSAB Transit Corridor, including the following:

- 2011 SCAG: Pacific Electric Right-of-Way/West Santa Ana Branch Corridor Alternatives Analysis Initial Screening Report
- 2013 SCAG: Pacific Electric Right-of-Way/West Santa Ana Branch Corridor Alternatives Analysis Report
- 2013 Eco-Rapid Transit: City of South Gate/Orange Line Development Authority (OLDA) Southern Rail Corridor Community Impacts and Opportunities Assessment
- 2015 Metro: West Santa Ana Branch Technical Refinement Study (TRS)
- 2016 GCCOG: Strategic Transportation Plan (STP)

More detailed descriptions of the prior studies, plans, policies and reports are provided in the Metro West Santa Ana Branch Transit Corridor Environmental Study Prior Studies and Plans Report (January 2017).

3.1 WSAB Transit Corridor Study Area

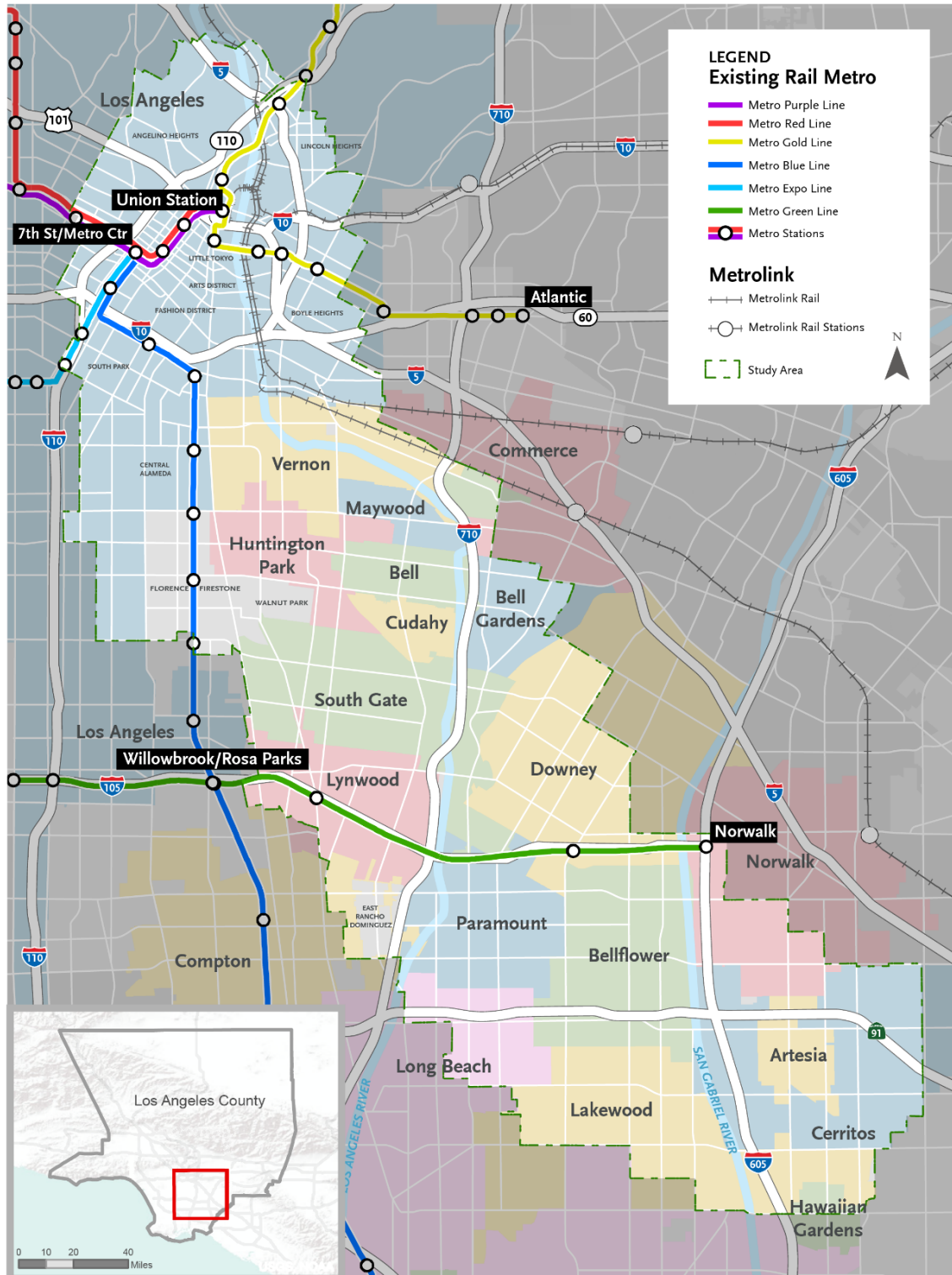
Stretching over 20 miles from Elysian Park on the north to the Los Angeles/Orange County line on the south, the WSAB Transit Corridor Study Area (Study Area) encompasses downtown Los Angeles, Southeast Los Angeles, and much of the Gateway Cities subregion (see Figure 3-1). The Study Area is approximately 98 square miles and incorporates 20 individual cities – the Cities of Los Angeles, Vernon, Maywood, Huntington Park, Commerce, Bell, Cudahy, Bell Gardens, South Gate, Lynwood, Compton, Downey, Paramount, Bellflower, Long Beach, Lakewood, Norwalk, Artesia, Cerritos and Hawaiian Gardens – as well as portions of unincorporated LA County. The Study Area includes some of LA County's most densely-developed and

¹ Eco-Rapid Transit is the current name of the Joint Powers Authority. It was formerly known as the Orange Line Development Authority (OLDA).

² GCCOG includes 29 cities/agencies: Artesia, Avalon, Bell, Bellflower, Bell Gardens, Cerritos, Commerce, Compton, Cudahy, Downey, Hawaiian Gardens, Huntington Park, Industry, La Mirada, Lakewood, Long Beach, Lynwood, Maywood, Montebello, Norwalk, Paramount, Pico Rivera, Port of Long Beach, Santa Fe Springs, Signal Hill, South Gate, Vernon, Whittier and unincorporated LA County.

low-income residential neighborhoods and encompasses major regional employment centers, including the industrial and manufacturing backbone of the County.

Figure 3-1. WSAB Transit Corridor Study Area



Source: WSP | Parsons Brinckerhoff (2016)

3.1.1 WSAB Transit Corridor Study Area Transportation Network

Currently, residents within the Study Area have two primary travel options for regional trips: private automobile and transit. The following sections provide an overview of the freeway and roadway and transit networks, as well as the performance of these networks.

3.1.1.1 Freeway and Roadway Network

The Study Area is served by seven major freeways and a grid of north-south and east-west arterials. The freeways generally have four or more general purpose lanes in each direction plus one or two High Occupancy Vehicle (HOV) lanes along segments. As shown in Figure 3-2, which presents the level of service on freeways and roadways during the AM peak hour, much of the network is currently operating at level-of-service (LOS) E or F, indicating that the roadway network is already at or beyond capacity. These conditions are also typical during the PM peak hour. In fact, every freeway within the Study Area has segments operating at LOS E or F during the weekday AM and PM peak commute periods, with congestion often lasting for several hours each day. As a result of these reoccurring congestion levels, drivers encounter an increase in travel times associated with the low travel speeds. Exacerbating the issue is the low degree of travel time reliability, as travel speeds and travel times have significant daily variation. With traffic volumes forecasted to increase by 2040, these conditions will only worsen, as demonstrated in Figure 3-3.

Roadway congestion affects travel time and speed for all vehicles utilizing the roadway, including buses. Table 3-1 is a summary of current peak hour travel times along five major arterials which represent high-volume north-south and east-west surface streets in the Study Area. Travel times were measured using data obtained through Google Maps in 2016. Similar to the freeway network, low speeds are made worse by unreliable travel times.

Table 3-1. High Volume Arterial Peak Hour Travel Times and Average Travel Speeds (2016)

Description	Distance (mi)	Peak AM ³ Travel Time (Travel Speed)	Peak PM ⁴ Travel Time (Travel Speed)
Slauson Avenue from I-110 to Atlantic Boulevard	5.4	16 to 40 min (8 to 20 mph)	18 to 45 min (7 to 18 mph)
Florence Avenue from I-110 to Lakewood Boulevard	9.8	30 to 70 min (8 to 20 mph)	35 to 68 min (9 to 17 mph)
Alameda Street from 1st Street to El Segundo Boulevard	9.2	27 to 72 min (8 to 20 mph)	28 to 73 min (8 to 20 mph)
State Street from Slauson Avenue to SR 91	7.2	28 to 48 min (9 to 15 mph)	24 to 48 min (9 to 18 mph)

³ Peak AM Hours are 6 AM to 9 AM

⁴ Peak PM Hours are 3 PM to 7 PM

Description	Distance (mi)	Peak AM ³ Travel Time (Travel Speed)	Peak PM ⁴ Travel Time (Travel Speed)
Atlantic Avenue from I-5 to Orange County line	11.2	29 to 72 min (9 to 23 mph)	30 to 69 min (10 to 22 mph)

Source: <https://www.google.com/maps>

3.1.1.2 Transit Network

Most of the transit service in the Study Area is provided by local and limited/express buses operating on the congested roadway network. Figure 3-4 shows a compilation of the Study Area bus service. While there are many bus routes serving the Study Area, most do not serve the predominant north-south direction of travel in the Study Area. In addition, traveling through the length of the Study Area requires several transfers between transit routes.

While the urban rail system in LA County is expanding, the rail network serves only a small percentage of the Study Area. Current regional commuter rail service is largely peripheral to the Study Area with Metrolink stations located at the edge of the Study Area (Union Station at the north end, California State University, Los Angeles and Commerce to the east, and Norwalk to the south) and Amtrak providing a connection to the Study Area only at Union Station. Within the Study Area, there are six Metro Rail Lines (Red, Gold, Blue, Expo, Green and Purple Lines); five of the six have stations in downtown Los Angeles. However, south of downtown Los Angeles, only two Metro Rail Lines (Blue and Green) have stations located within the communities that comprise the Study Area. The Metro Blue Line runs north-south through the Study Area along Flower Street, Washington Boulevard and Long Beach Avenue (from Union Station to Long Beach Station). There are eight stations along the Metro Blue Line located within Study Area communities. The Metro Green Line runs east-west through the Study Area, primarily along the I-105 Freeway (from the Redondo Beach Station to the Norwalk Station) with three stations located within Study Area communities. As shown on Figure 3-1, these lines serve only a small portion of the Study Area.

To understand transit constraints currently experienced by residents within the WSAB Transit Corridor, a review was conducted of total transit travel times based on the Metro Travel Demand model. Total transit travel time is defined as the door-to-door travel time based on the origin and destination of a trip. This includes access time (from the place of origin to a transit stop/station), wait time, in-vehicle travel time (IVT), transfer time (if applicable) and egress time (from a transit stop/station to the final destination). To determine transit travel mobility issues, it is important to review the portion of the trip that is IVT versus out-of-vehicle travel time (OVT). If a significant portion of the trip time is spent traveling to and from the stations/stops or waiting for the bus, this demonstrates major mobility constraints, particularly for those who are transit dependent.

Table 3-2 presents total travel time between key nodes within the Study Area to major regional destinations, and the percentage of the travel time which is IVT versus OVT under Existing 2012 conditions. The longest total transit times are from Paramount and Artesia to regional destinations with door-to-door transit travel times from 1.5 hours to almost 3.5 hours. Additionally, as shown in Table 3-2 a significant portion of total travel time is spent accessing transit, which OVT generally accounting for over 50 percent of total trip time.

Table 3-2. Total Transit Travel Time (Existing 2012 AM Peak Period)

	Downtown Los Angeles (7th/ Metro Station)	North Hollywood (Red Line Station)	Pasadena (Del Mar Gold Line Station)	El Segundo (Sepulveda/ El Segundo)	Long Beach (Downtown Long Beach Blue Line Station)	Santa Ana (1st Street/Main Street)
Downtown Los Angeles (7th/Metro Station)	N/A	64 minutes (62% OVT + 38% IVT)	58 minutes (57% OVT + 43% IVT)	68 minutes (45% OVT + 55% IVT)	72 minutes (27% OVT + 83% IVT)	183 minutes (37% OVT + 73% IVT)
Huntington park (Pacific/Randolph)	61 minutes (59% OVT + 41% IVT)	107 minutes (56% OVT + 44% IVT)	82 minutes (42% OVT + 58% IVT)	74 minutes (54% OVT + 46% IVT)	83 minutes (47% OVT + 53% IVT)	193 minutes (42% OVT + 58% IVT)
Paramount (Paramount/ Rosecrans)	100 minutes (68% OVT + 32% IVT)	146 minutes (63% OVT + 37% IVT)	141 minutes (61% OVT + 39% IVT)	98 minutes (72% OVT + 28% IVT)	92 minutes (65% OVT + 35% IVT)	200 minutes (53% OVT + 47% IVT)
Artesia (Pioneer/South Street)	122 minutes (54% OVT + 46% IVT)	168 minutes (53% OVT + 47% IVT)	162 minutes (51% OVT + 49% IVT)	120 minutes (56% OVT + 44% IVT)	107 minutes (59% OVT + 41% IVT)	167 minutes (62% OVT + 38% IVT)

Source: Metro Travel Demand Model 2012-2040

Notes: OVT = Out-of-Vehicle Travel Time (includes access, wait, transfer, and egress time); IVT = In-Vehicle Travel Time (includes time spent on regional rail or bus system). Because OVT is considered to be more onerous on the passenger than IVT, OVT is weighted by two.

The freeway, roadway, and rail network within the Study Area is also instrumental in supporting goods movement. The Study Area is home to the Alameda Corridor and intermodal rail yards, truck depots, warehouses, and distribution centers. Although these good movement facilities provide significant economic benefits within the Study Area, they also result in significant community and regional affects from truck and train activity, such as historically poor air quality and congestion on arterials and freeways.

3.1.2 WSAB Transit Corridor Study Area Demographics

Located in southeastern LA County, the Study Area includes some of LA County's most densely-developed and low-income residential neighborhoods and encompasses major regional employment centers, including the industrial and manufacturing backbone of the County.

The Study Area is currently home to 1.2 million residents and 584,000 jobs, which equates to 12 percent of the residents and 14 percent of the jobs in LA County. The Study Area's population and employment are both projected to increase by 2040—with population increasing by 25 percent to 1.5 million persons and employment increasing by 14 percent to 670,000 jobs. The Study Area is also characterized by high population and employment densities. Of the top 100 US cities with the highest population densities, the Cities of Maywood, Cudahy, Huntington Park, and Bell Gardens are in the top 25. The Cities of Bell, Lynwood, Hawaiian Gardens, South Gate, Bellflower, and Paramount are also within the top 100. Densities in 2040 will average 15,000 people per square mile, with portions of the Cities of Maywood and Huntington Park exceeding 20,000 residents per square mile. Employment densities in 2040 will average 7,000 jobs per square mile. For context, employment densities served by current rail service in LA County range from 2,500 (light rail) to 14,000 (heavy rail) jobs per square mile.

The Study Area has a high number of transit-dependent households, or households that do not have a private automobile, are low income, and/or are comprised of minors and seniors. Approximately 60,900 households currently do not have access to their own car (zero-vehicle households), which represent 20 percent of all zero-vehicle households in LA County. Furthermore, more than 25 percent of residents in the Study Area live below the poverty level, and 37 percent of the Study Area residents are minors or seniors. As access to a vehicle is either nonexistent or limited, these transit-dependent populations rely primarily on the bus network within the Study Area, which as stated previously, is characterized by slow travel speeds/long travel times, unreliable, and often requires multiple transfers to reach a destination.

The Study Area is also comprised of EJ communities. EJ communities are commonly identified as communities with a high combination of minority populations and/or low-income populations based on the U.S. Department of Transportation (USDOT) Order on Environmental Justice (5610.2). Minority residents comprise 66 percent of the total Study Area population, with Hispanic/Latino groups alone accounting for 54 percent of the total population. In addition, 25 percent of Study Area residents live below the poverty line, which is greater than the County average of 17 percent.

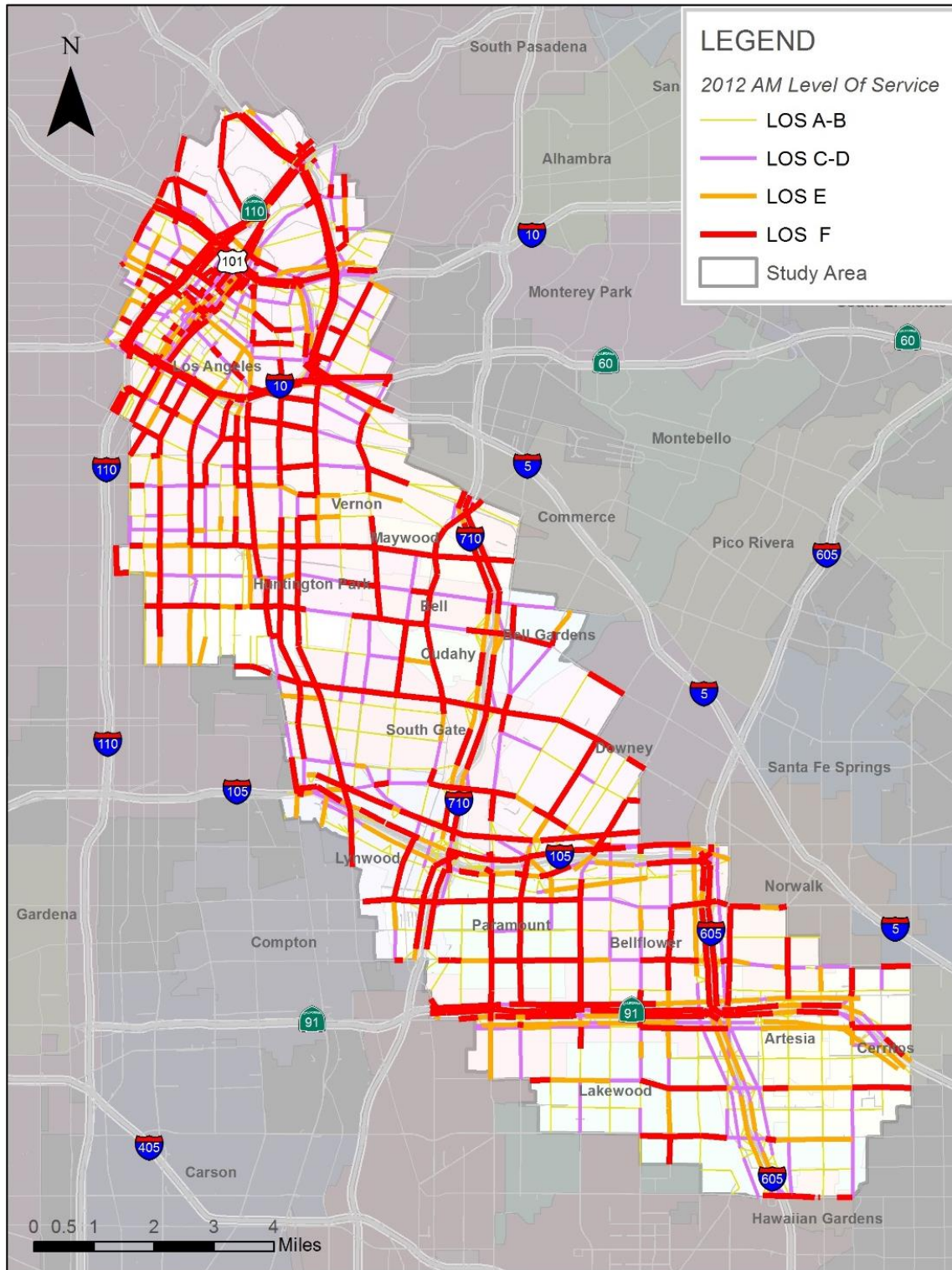
3.1.3 Travel Demand

As population and employment continue to increase within the Study Area, daily travel too will increase. Under current (2012) conditions, the Study Area has 6.45 million daily person trips. Of these trips, 32 percent are trips within the Study Area, 31 percent

are trips from the Study Area to destinations outside the Study Area, and 37 percent are trips into the Study Area from points outside the Study Area. By the year 2040, the daily person trips are projected to increase by 19 percent to approximately 7.67 million daily person trips. Of the 2040 daily person trips, 34 percent are trips within the Study Area, 30 percent are trips from the Study Area to destinations outside the Study Area, and 36 percent are trips into the Study Area from points outside the Study Area.

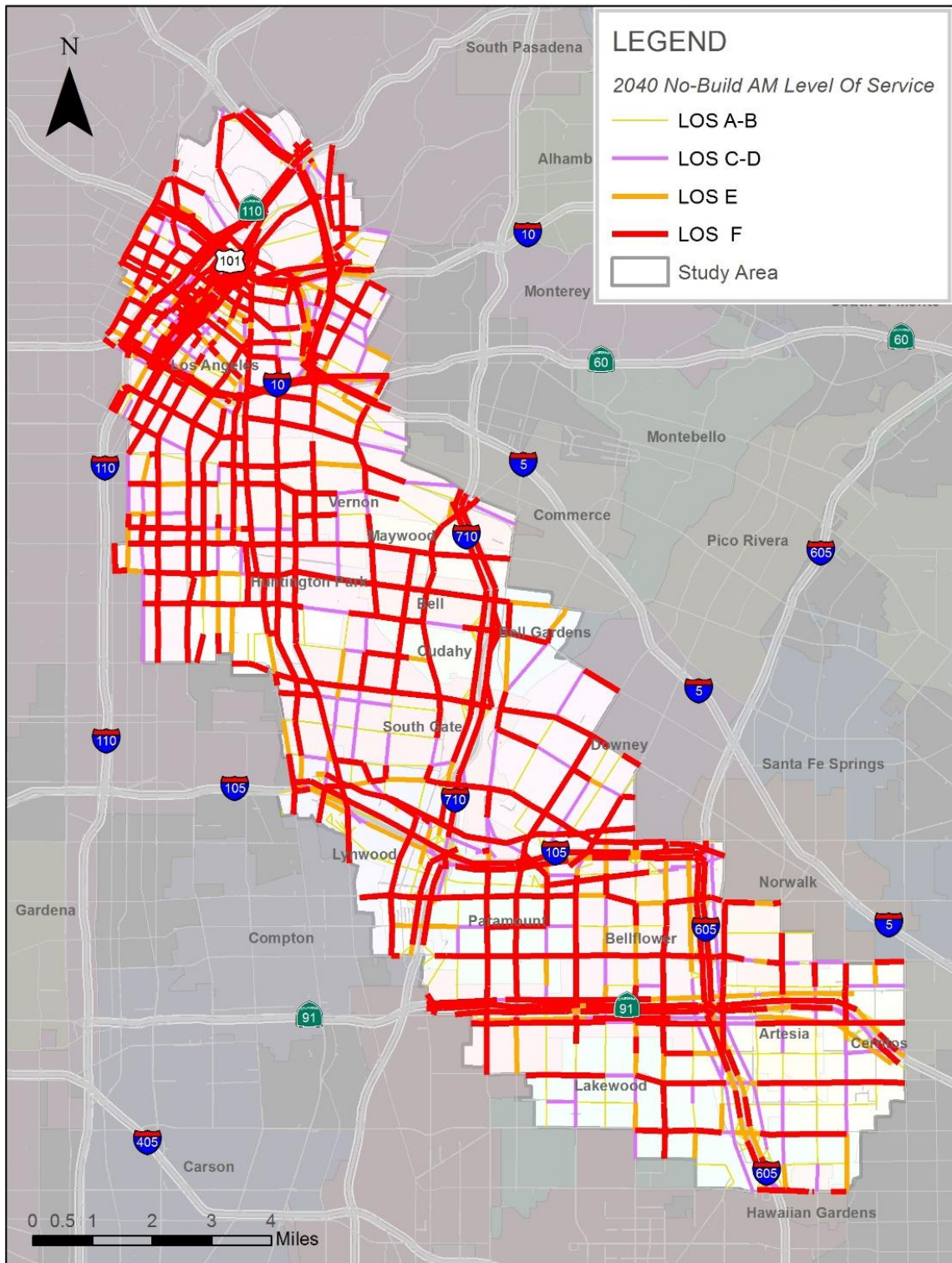
This increase of 1.22 million daily person trips between 2012 and 2040 will further burden the existing transportation network. Although auto travel is the predominant travel mode (with 78 percent of home-based work trips made by car), there is significant transit demand given the high proportion of transit-dependent populations. Overall, around 12 percent of the home-based work trips made by Study Area residents are currently made by transit, which is twice as high as the transit mode share of LA County as a whole.

Figure 3-2. Existing Study Area Average AM Peak Hour Level of Service (2012)



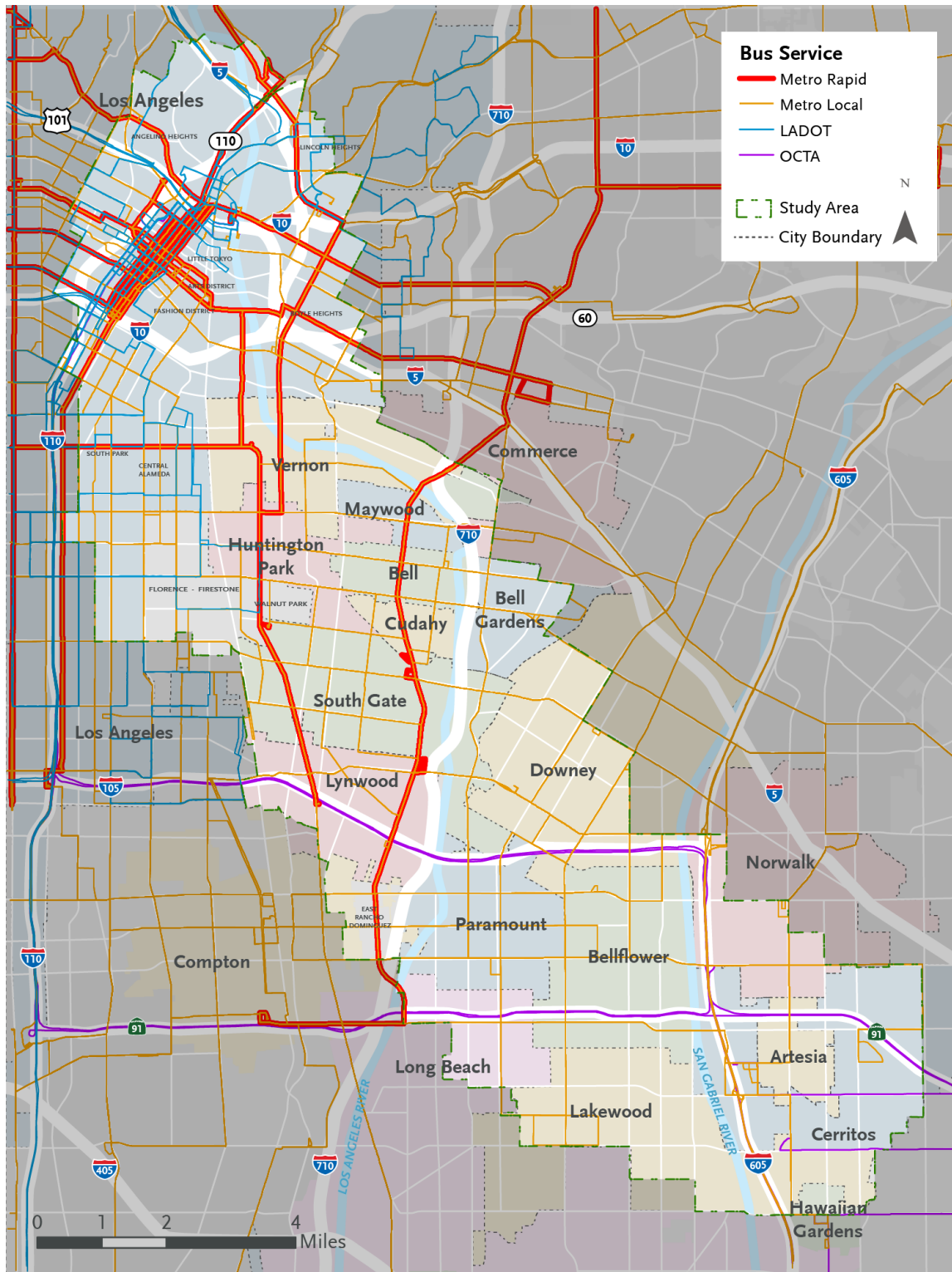
Source: Metro Travel Demand Model 2012-2040

Figure 3-3. Future Study Area AM Peak Freeway and Major Arterial Level of Service (2040)



Source: Metro Travel Demand Model 2012-2040

Figure 3-4. Existing Study Area Bus Service



Source: Compiled by TransLink Consulting, LLC and WSP | Parsons Brinckerhoff

3.2 Purpose and Need Statement

As population and employment in the WSAB Transit Corridor Study Area continues to grow, the already congested roadway network will become even more congested. This congestion affects not only automobiles but also the travel time, speeds, and reliability of the buses that operate in mixed-flow traffic. As the Study Area is home to communities that are heavily reliant on transit as their primary mode of travel to access jobs and other key destinations, this increasingly unreliable bus network will be insufficient to meet their mobility needs. Rail transit that operates in a dedicated ROW provides greater reliability and faster travel times during peak periods than buses because this service is not as affected by roadway congestion. However, the existing rail network only provides service along the periphery of the Study Area, thereby requiring transfers to reach the rail stations.

The purpose of the Project is to provide reliable transit service to meet the future mobility needs of residents, employees, and visitors who travel within the Study Area, which includes downtown Los Angeles, parts of southeast Los Angeles, and portions of the Gateway Cities subregion. This new transit service will increase mobility and connectivity for historically underserved transit-dependent and EJ communities; reduce travel times on local and regional transportation networks; and accommodate substantial future employment and population growth.

More specifically, the Project's purpose is as follows:

- Establish a reliable transit service that will enhance the connectivity of the existing transit network and reduce transit travel times to local and regional destinations
- Accommodate future travel demand, including the high number of transit trips made by Study Area residents
- Improve access for the densely populated neighborhoods, major employment centers, and other key regional destinations where future growth is forecasted to occur within the Study Area
- Address mobility and access constraints faced by transit-dependent communities, thereby improving transit equity

3.3 Goals and Objectives and Evaluation Criteria

Based on the purpose and need statement as well as extensive stakeholder and agency outreach, a set of goals and objectives have been established for the WSAB Transit Corridor. As part of the AA Report, goals and objectives of the WSAB Transit Corridor were developed through a 24-month period of public meetings and work sessions with elected officials, stakeholders, advisory committee members, and communities. As part of the TRS Report, goals of the project were further confirmed through technical meetings with various stakeholders including Eco-Rapid Transit, corridor cities, and the California Department of Transportation (Caltrans). In addition, Metro and participating stakeholders have developed related studies and reports within the past five years which provide additional input for the overall goals and objectives of the

project. These studies and reports include GCCOG's Strategic Transportation Plan (STP) (2016), Gateway Cities STP and Nexus with Mobility Matrix (2015), Metro's Long Range Transportation Plan (LRTP) Measure M Framework (2016), and other relevant plans and reports. Based on the planning and community involvement activities conducted, five goals were developed for the WSAB Transit Corridor:

- Provide Mobility Improvements
- Support Local and Regional Land Use Plans and Policies
- Minimize Environmental Impacts
- Ensure Cost Effectiveness and Financial Feasibility
- Ensure Equity

For each goal, objectives and corresponding evaluation criteria were developed as presented in Table 3-3. Evaluation criteria were developed to assess how well each of the proposed northern alignment options satisfies the goals and objectives. The criteria incorporate Metro and Federal Transit Administration (FTA) standards for other similar LRT projects.

Table 3-3. Evaluation Criteria

#	Goals	Objectives	Evaluation Criteria
1	Provide Mobility Improvements	<ul style="list-style-type: none"> Improves travel speeds and reduces travel times 	<ul style="list-style-type: none"> Daily hours of user benefits
		<ul style="list-style-type: none"> Relieves high use (overcrowded) transit systems along the corridor 	<ul style="list-style-type: none"> Decrease in boardings on North-South Line (current Metro Blue Line)
		<ul style="list-style-type: none"> Connects with the transit network 	<ul style="list-style-type: none"> Number of connections to other Metro Rail Lines Provides direct access to regional rail
		<ul style="list-style-type: none"> Provides an alternative to a congested freeway and arterial network. Serves local and regional trips 	<ul style="list-style-type: none"> Number of daily boardings Number of new transit trips
		<ul style="list-style-type: none"> Supports active transportation and first/last mile connections 	<ul style="list-style-type: none"> Number of connections to bicycle facilities
2	Support Local and Regional Land Use Plans and Policies	<ul style="list-style-type: none"> Serves major employment centers and high-density residential neighborhoods 	<ul style="list-style-type: none"> 2040 population density within ½ mile of stations 2040 employment density within ½ mile of stations
		<ul style="list-style-type: none"> Supports local economic development, projects, plans, and jobs 	<ul style="list-style-type: none"> Plans and policies supporting Transit-Oriented Development around stations
		<ul style="list-style-type: none"> Serves affordable housing developments 	<ul style="list-style-type: none"> Number of existing affordable housing units within ½ mile of stations
		<ul style="list-style-type: none"> Supports and is consistent with local plans 	<ul style="list-style-type: none"> Supported by existing local plans and programs
3	Minimize Environmental Impacts	<ul style="list-style-type: none"> Minimizes environmental and community impacts 	<ul style="list-style-type: none"> Reduction in regional vehicle miles traveled
		<ul style="list-style-type: none"> Minimizes impacts to the transportation network 	<ul style="list-style-type: none"> Impacts to roadway lanes, parking, and truck movement Minimal disruption to existing railroad ROW
4	Ensure Cost Effectiveness and Financial Feasibility	<ul style="list-style-type: none"> Costs are financially feasible 	<ul style="list-style-type: none"> Rough order of magnitude capital costs
		<ul style="list-style-type: none"> Provides cost-effective project 	<ul style="list-style-type: none"> Cost/benefit (capital costs/boarding)
		<ul style="list-style-type: none"> Minimizes risk of cost increase 	<ul style="list-style-type: none"> Engineering challenges Number of property acquisitions
5	Ensure Equity	<ul style="list-style-type: none"> Provides benefits to transit-dependent and minority populations 	<ul style="list-style-type: none"> Percentage of transit-dependent persons within ½ mile of stations Percentage of station areas that qualify as EJ communities Provision of new reliable fixed service to underserved communities

Source: WSP | Parsons Brinckerhoff/TransLink Consulting. 2017

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4 NORTHERN ALIGNMENT OPTIONS

4.1 Development of Northern Alignment Options

In 2013, SCAG, in coordination with Metro and OCTA, completed the PEROW/WSAB Corridor AA Study. It was documented in the *PEROW/WSAB Corridor AA Report* to explore opportunities for connecting Los Angeles and Orange Counties through the reuse of the PEROW/WSAB Corridor. The study evaluated a wide variety of transit connections and modes for the 34-mile corridor from Union Station in Downtown Los Angeles to the City of Santa Ana in Orange County. The modes included low speed maglev, heavy rail (like the Metro Red and Purple Lines), LRT (like the Metro Blue and Green Lines), streetcar, and bus rapid transit (BRT) (like the Metro Orange Line).

The PEROW/WSAB Corridor AA Study found that the development of an effective transit system is imperative to the future mobility needs of the PEROW/WSAB Corridor residents. Use of the existing ROW would minimize displacement affects and reduce ROW acquisition costs. The PEROW/WSAB Corridor AA Study recommended two LRT alternatives for further consideration by the agency of jurisdiction (Metro in Los Angeles County) with specific station locations, vertical configurations, horizontal alignments, and phasing options be further explored in subsequent studies and reports.

The two recommended LRT alternatives in Los Angeles County were the East Bank and West Bank Option 3 alignments (Figure 4-1). The term East Bank refers to the alignment proposed within a right-of-way east of the Los Angeles River, and West Bank refers to alignments proposed west of the Los Angeles River. The East Bank alignment begins at Union Station on the north and the West Bank 3 begins at the Little Tokyo Station. Both alignments converge in the City of Huntington Park and continue south within the existing rail right-of-way until the City of Artesia, where the line would terminate. The West Bank 3 alignment was recommended as the preferred choice because it served a greater number of high density residential areas, major activity centers and destinations and provided convenient connections to the existing Metro rail system, all of which contributed to higher ridership on the alignment. Additionally, this alignment had stronger support from the cities and agencies than the East Bank alignment. The East Bank alignment was recommended as the second choice because while this alignment showed the greatest ridership potential of all alternatives that terminated at Union Station, it had significant engineering and right of way challenges that required additional studies.

During the TRS process, variations of the West Bank 3 alignment were developed to determine potential alignments west of the LA River that would connect into Union Station (Figure 4-2) as the recommended West Bank 3 alignment option terminated at the Little Tokyo Station. The alignments followed either the Pacific Boulevard corridor, which primarily follows the recommended West Bank 3 alignment, or the Metro Blue Line/Alameda corridor with variations on Union Station was approached in the north.

In total, five west bank and one east bank alignment options were brought to an approximately five percent level of engineering design, which included the guideway type (i.e., at-grade, aerial, or underground).

The six alignment options considered in the TRS are:

- East Bank (SCAG AA recommendation)
- West Bank 3 (SCAG AA recommendation)
- Pacific/Alameda
- Pacific/Vignes
- Alameda
- Alameda/Vignes

The TRS concluded by recommending the elimination of East Bank and West Bank 3 from further consideration. Based on the TRS analysis, the East Bank alignment was not recommended to go forward due to right-of-way constraints from existing railroad usage. In addition, the adjacent high-tension power lines to the west and commercial buildings to the east made expansion of the right-of-way expensive and/or unattainable. The West Bank 3 alignment was also not recommended to go forward because its northern terminus fell short of Union Station, which resulted in lower ridership due to the lack of direct access to other regional transit services available at Union Station. However, the West Bank 3 served as a foundation for four more viable alignments: Pacific/Alameda, Pacific/Vignes, Alameda, and Alameda/Vignes, which were recommended to be carried forward for further study.

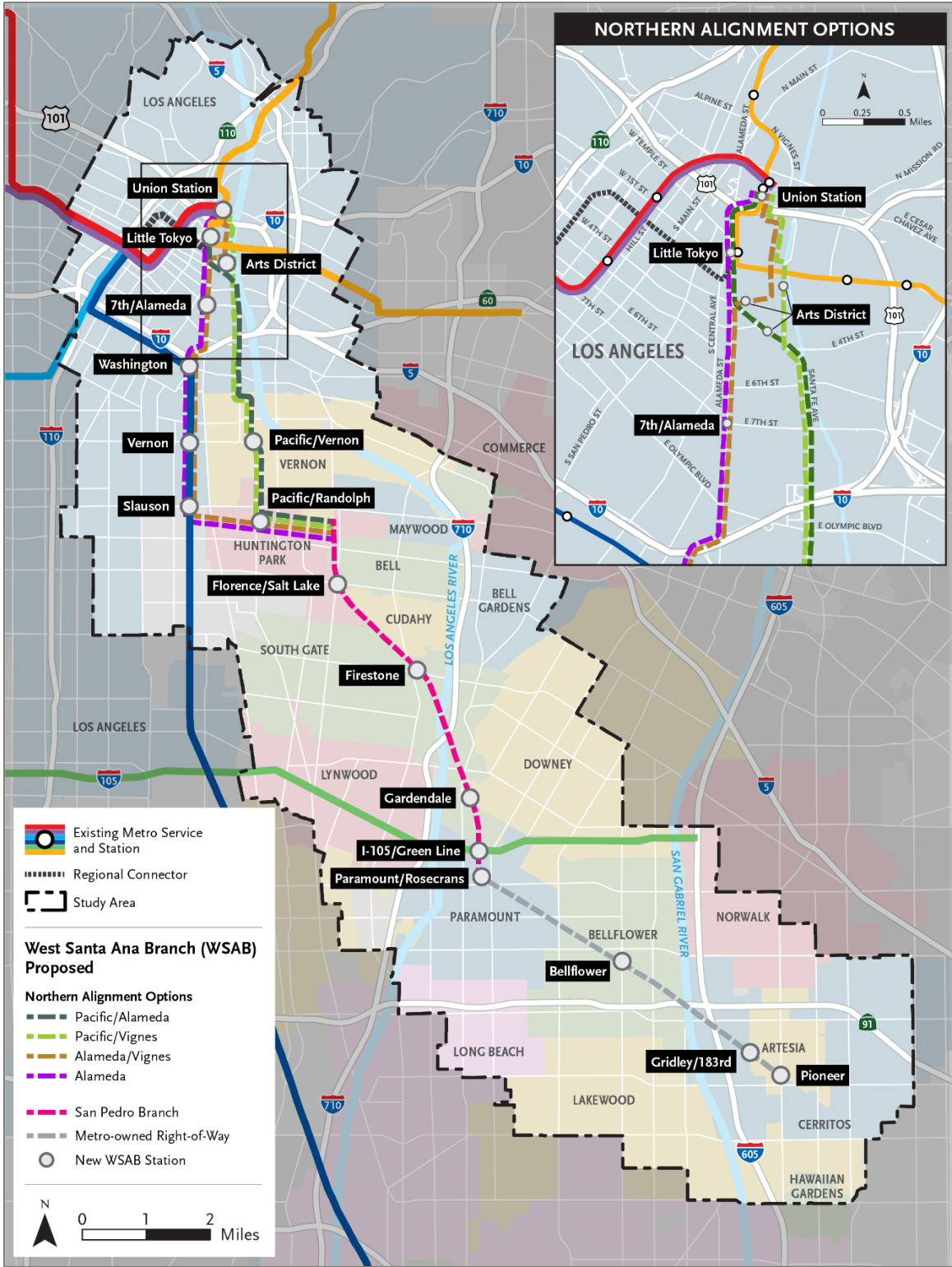
The purpose of this Northern Alignment Options Screening Report is to further refine and evaluate the project's northern alignment (between downtown Los Angeles and the City of Huntington Park) to validate the recommendations in the TRS and to identify the project alternative(s) to be carried forward into scoping for the environmental process.

Figure 4-1: East Bank and West Bank Options Recommended by SCAG



Source: PEROW/WSAB Corridor AA Report, SCAG (2013)

Figure 4-2. WSAB Transit Corridor Northern Alignment Options



Source: West Santa Ana Branch Technical Refinement Study (Metro 2015)

4.2 Alignment Options Under Consideration

The WSAB Transit Corridor Project would provide LRT service for approximately 20 miles from downtown Los Angeles on the north to Artesia on the south (Figure 4-2). The LRT would be primarily at-grade with grade-separated portions in areas of constrained right-of-way or conflicts with traffic based on Metro Grade Crossing Policy. As described in the preceding section, six alignment options are under consideration for the northern portion of the alignment (from downtown Los Angeles to the Florence/Salt Lake Station in the City of Huntington Park⁵). These alignment options are shown in Figure 4-3 and described as follows:

- **East Bank** – extends approximately 7.7 miles between Union Station to the Florence/Salt Lake Station along the east side of the LA River (see Figure 4-4). This alignment option would provide three stations north of Florence/Salt Lake: Union Station, Soto, and Leonis/District. The East Bank alignment option was originally developed as part of the AA Report.
- **West Bank 3** – extends approximately 6.9 miles between the Little Tokyo Station and the Florence/Salt Lake Station (see Figure 4-5). This alignment option would provide four stations north of Florence/Salt Lake: Little Tokyo, 7th/Alameda, Pacific/Vernon, and Pacific/Randolph. The West Bank 3 alignment option was original developed as part of the AA Report.
- **Pacific/Alameda** – extends approximately 7.4 miles between Union Station and Florence/Salt Lake Station (see Figure 4-7). This alignment option utilizes Alameda Street to connect with Union Station and would provide five stations north of Florence/Salt Lake: Union Station, Little Tokyo, Arts District, Pacific/Vernon, and Pacific/Randolph. The Pacific/Alameda alignment option was developed during the TRS as a variation of the West Bank 3 alignment option, but with a direct connection to Union Station on the north.
- **Pacific/Vignes** – extends approximately 7.2 miles between Union Station and the Florence/Salt Lake Station (see Figure 4-8). This alignment option utilizes Vignes Street to connect with Union Station and would provide four stations north of Florence/Salt Lake: Union Station, Arts District, Pacific/Vernon, and Pacific/Randolph. The Pacific/Vignes alignment option was developed during the TRS as a variation of the West Bank 3 alignment option, but with a direct connection to Union Station on the north
- **Alameda** – extends approximately 8.0 miles between Union Station and the Florence/Salt Lake Station along Alameda Street and Metro Blue Line (see Figure 4-10). This alignment option utilizes Alameda Street to connect with Union Station and would provide seven stations north of Florence/Salt Lake: Union Station, Little Tokyo, 7th/Alameda, Washington, Vernon, Slauson, and Pacific/Randolph. This alignment option was developed during the TRS.
- **Alameda/Vignes** – extends approximately 8.1 miles between Union Station and the Florence/Salt Lake Station along Alameda Street and Metro Blue Line (see Figure

⁵ The TRS recommended shifting the Gage/Salt Lake Station identified in the SCAG AA Study south to the Florence/Salt Lake intersection.

4-11). This alignment option utilizes Vignes Street to connect with Union Station and would provide seven stations north of the Florence/Salt Lake Station: Union Station, Arts District, 7th/Alameda, Washington, Vernon, Slauson, and Pacific/Randolph. This alignment option was developed during the TRS.

Table 4-1 provides a summary of the characteristics of each station proposed for the northern alignment options. Each of these six alignment options is described in further detail in the following sections followed by comparisons between the alignment options. Table 4-2 presents a summary of the characteristics of each of the northern alignment options.

All six alignment options merge in the City of Huntington Park and would follow a single alternative south 11 miles to the Pioneer Station in City of Artesia with eight proposed stations along this southern portion (see Table 4-3). From the at-grade Florence/Salt Lake Station, the alignment would continue south following the San Pedro Subdivision, now owned by the Ports of Long Beach and Los Angeles. Along this portion of the alignment, stations are proposed at Firestone Boulevard, Gardendale Street, and I-105/Green Line. The I-105/Green Line Station would provide transfers and connections between the WSAB line and the Green Line⁶. South of the I-105/Green Line Station, the alignment would transition to the Metro owned PEROW. Along this southern portion of the alignment, stations are proposed at Paramount/Rosecrans, Bellflower, Gridley/183rd, and Pioneer⁷. With the exception of the Florence/Salt Lake and Gardendale stations, parking is proposed for all other stations along the southern portion of the alignment.

More detailed conceptual engineering will occur in support of the refinement of alternatives following scoping.

⁶ Building from the SCAG AA Study, the feasibility of the I-105/Metro Green Line Station was assessed during the TRS, which concluded that siting a station in the I-105 median was feasible and recommended.

⁷ The TRS analyzed the potential new terminus at the Pioneer Station in the City of Artesia in lieu of the Bloomfield Station in the City of Cerritos, which was part of the SCAG AA Study. The TRS concluded that the Pioneer Station terminus is feasible and recommended.

Figure 4-3. WSAB Northern Alignment Options



Source: West Santa Ana Branch Technical Refinement Study (Metro 2015)

Table 4-1: Station Served by Northern Alignment Options

Stations	General Location	Proposed Configuration	Parking Planned	City/ Jurisdiction	East Bank	West Bank 3	Pacific Blvd Corridor		Metro Blue Line/ Alameda St Corridor	
							Pacific/ Alameda	Pacific/ Vignes	Alameda	Alameda/ Vignes
Union Station	Alameda St/Vignes St/E. Cesar Chavez	Aerial	Yes (existing)	City of Los Angeles	●		●	●	●	●
Little Tokyo	1st/Alameda St	At-grade or Aerial or Underground	No	City of Los Angeles		●	●		●	
Arts District	4th Street/Santa Fe Ave 3rd St /Santa Fe Ave	Underground	No	City of Los Angeles			●	●		●
7th/Alameda	7th St/Alameda St	Underground or Aerial	No	City of Los Angeles		●			●	●
Pacific/ Vernon	Pacific Ave/Vernon Ave	At-Grade	No	City of Vernon		●	●	●		
Pacific/ Randolph	Pacific Ave/Randolph St	At-Grade	No	City of Huntington Park		●	●	●	●	●
Washington	Washington Blvd/Long Beach Ave	Aerial	No	City of Los Angeles					●	●
Vernon	Vernon Ave/Long Beach Ave	Aerial	No	City of Los Angeles					●	●
Slauson	Slauson Ave/Long Beach Ave	Aerial	No	City of Los Angeles					●	●
Soto	Soto St/Washington Blvd	Aerial	No	City of Los Angeles	●					
Leonis/ District	Downey Rd/Leonis Blvd/District Blvd	Aerial	No	City of Vernon	●					

Table 4-2. Northern Alignment Options Characteristics

Alignment Option	Length (Northern Terminus to Florence/Salt Lake Station)	Preliminary Proposed Configuration	# of Proposed Stations (Northern Terminus to Florence/Salt Lake Station)
East Bank	7.7 miles	3.7 miles aerial 4.0 miles at-grade	3
West Bank 3	6.9 miles	1.9 miles aerial 3.3 miles at-grade 1.7 miles underground	4
Pacific/ Alameda	7.4 miles	2.7 miles aerial 3.3 miles at-grade 1.4 miles underground	5
Pacific/ Vignes	7.2 miles	2.4 miles aerial 3.2 miles at-grade 1.6 miles underground	4
Alameda	8.0 miles	6.0 miles aerial 2.0 miles at-grade	7
Alameda/ Vignes	8.1 miles	5.5 miles aerial 1.9 miles at-grade 0.7 miles underground	7

Source: West Santa Ana Branch Technical Refinement Study (Metro 2015)

Table 4-3. Proposed Stations in the Southern Portion of the WSAB Transit Corridor

Station	General Location	Proposed Configuration	Parking Planned	City/Jurisdiction
Florence/Salt Lake	Florence Avenue/Salt Lake Avenue	At-Grade	No	City of Huntington Park
Firestone	Firestone Blvd	Aerial	Yes	City of South Gate
Gardendale	Gardendale St/Dakota Ave	At-Grade	No	City of South Gate
I-105/Green Line	I-105 Freeway/Green Line Station	Aerial	Yes	City of Paramount
Paramount/Rosecrans	Paramount Blvd/Rosecrans Ave	Aerial	Yes	City of Paramount
Bellflower	Bellflower Blvd/Pacific Ave	At-Grade	Yes	City of Bellflower
Gridley/183rd	Gridley Rd/183rd St	At-Grade	Yes	Cities of Artesia and Cerritos
Pioneer	Pioneer Blvd/187th St	At-Grade	Yes	City of Artesia

Source: West Santa Ana Branch Technical Refinement Study (Metro 2015)

4.2.1 East Bank Alignment Option

The East Bank alignment option concept was initially developed and defined as part of the SCAG AA Report recommendation. The alignment option as evaluated in this scoping report remains unchanged from the AA Report. From Union Station to the Florence/Salt Lake Station, the East Bank alignment option would be approximately 7.7 miles with three stations; parking would be provided at Union Station (see Figure 4-4 and Table 4-1).

At Union Station, the alignment would be located either above or adjacent to the existing Metro Gold Line platforms. From Union Station, the alignment would turn north, at-grade, and then would transition into an aerial configuration to cross over the Los Angeles River.

On the east side of the Los Angeles River, the alignment would turn south in the Metro-owned ROW, which is immediately adjacent to existing Union Pacific Railroad (UPRR) tracks that are used for freight, Metrolink, and Amtrak operations. South of Olympic Boulevard, the alignment would transition to an aerial configuration continuing along the Metro owned ROW with an aerial station at Soto Street/Washington Boulevard.

From the Soto Station, the alignment would continue east in an aerial configuration above the Ports of LA and Long Beach ROW, and then descend to grade along the Ports of LA and Long Beach ROW near Evergreen Avenue. After crossing Downey Road, the alignment would turn south to follow the Ports of LA and Long Beach ROW. South of Washington Boulevard in the northern edge of the City of Vernon, the alignment would return to an aerial configuration to cross over the BNSF ROW and continue south along the Ports of LA and Long Beach ROW, adjacent to Downey Road. The alignment would cross over the Los Angeles River to an aerial station at Leonis Boulevard/District Boulevard.

From the Leonis/District Station, the alignment would continue south in an aerial configuration to cross the UP tracks along Randolph Street, then transition to at-grade near Gage Avenue. The alignment would continue south along the Ports of LA and Long Beach ROW with an at-grade station at Florence/Salt Lake.

In general, the East Bank alignment option serves industrial, manufacturing and institutional uses with its stations located in the industrial cores of the Cities of Vernon and Los Angeles. The Leonis/District Station would serve the adjacent residential neighborhoods in Maywood and the Soto Station would provide access to East Los Angeles and Boyle Heights residents.

Figure 4-4. East Bank Alignment Option



Source: West Santa Ana Branch Technical Refinement Study (Metro 2015)

4.2.2 West Bank 3 Alignment Option

The West Bank 3 alignment option concept was also initially developed and defined as part of the AA Report recommendation; this alignment remains unchanged in this Screening Report. The northern portion of this alignment is 6.9 miles in length from the Little Tokyo Station in downtown Los Angeles to the Florence/Salt Lake Station. This alignment option has four stations north of the Florence/Salt Lake Station; parking is not provided at these stations (see Figure 4-5 and Table 4-1).

This alignment option would begin with a station near the existing Metro Gold Line Little Tokyo Station at 1st and Alameda Streets⁸. Connection to Union Station in downtown Los Angeles would be via a transfer to the Gold Line at this location. From the Little Tokyo Station, the alignment would run south at-grade along Alameda Street then transition to an underground configuration north of 2nd Street. The alignment would continue underground with an underground station at 7th/Alameda.

From the 7th/Alameda Station, the alignment would continue southeast in a bored tunnel configuration beneath private properties to Santa Fe Avenue, where the tunnel would turn south to cross under the I-10 Freeway. Near Olympic Boulevard, the alignment would transition to an aerial configuration. The aerial alignment would run south on Santa Fe Avenue to 15th Street where it would turn southeast to follow 15th Street to Washington Boulevard to Minerva Avenue, which it would follow south (see Figure 4-6). At 26th Street, the alignment would connect to the Harbor Subdivision. The aerial alignment would run south along the Harbor Subdivision and return to at-grade for a station at Pacific Boulevard/Vernon Avenue.

From the Pacific/Vernon Station, the alignment would continue south at-grade along the Pacific Boulevard median. At Randolph Street, the alignment would turn east to utilize the UPRR ROW (La Habra Branch) to an at-grade station at Pacific Boulevard/Randolph Street.

From the Pacific/Randolph Station, the alignment would continue east along Randolph Street. Just west of the San Pedro Subdivision, the alignment would transition to an aerial configuration and then connect south to the San Pedro Subdivision (west of Maywood Avenue). The alignment would transition to at-grade south of Gage Avenue and continue along the San Pedro Subdivision to an at-grade station at Florence Avenue/Salt Lake Avenue.

In general, the West Bank 3 alignment's northern portion serves a mix of land uses including industrial, commercial and residential. The downtown Los Angeles stations of 7th/Alameda and Little Tokyo would serve high densities of mixed uses including commercial, industrial/warehouse, and residential as well as the Arts District and the cultural center of Little Tokyo. The Pacific/Vernon Station would provide new access for

⁸ Note that at the time of this report, the existing Metro Gold Line Little Tokyo/Arts District Station at 1st and Alameda Streets is currently under construction as part of Metro's Regional Connector Project.

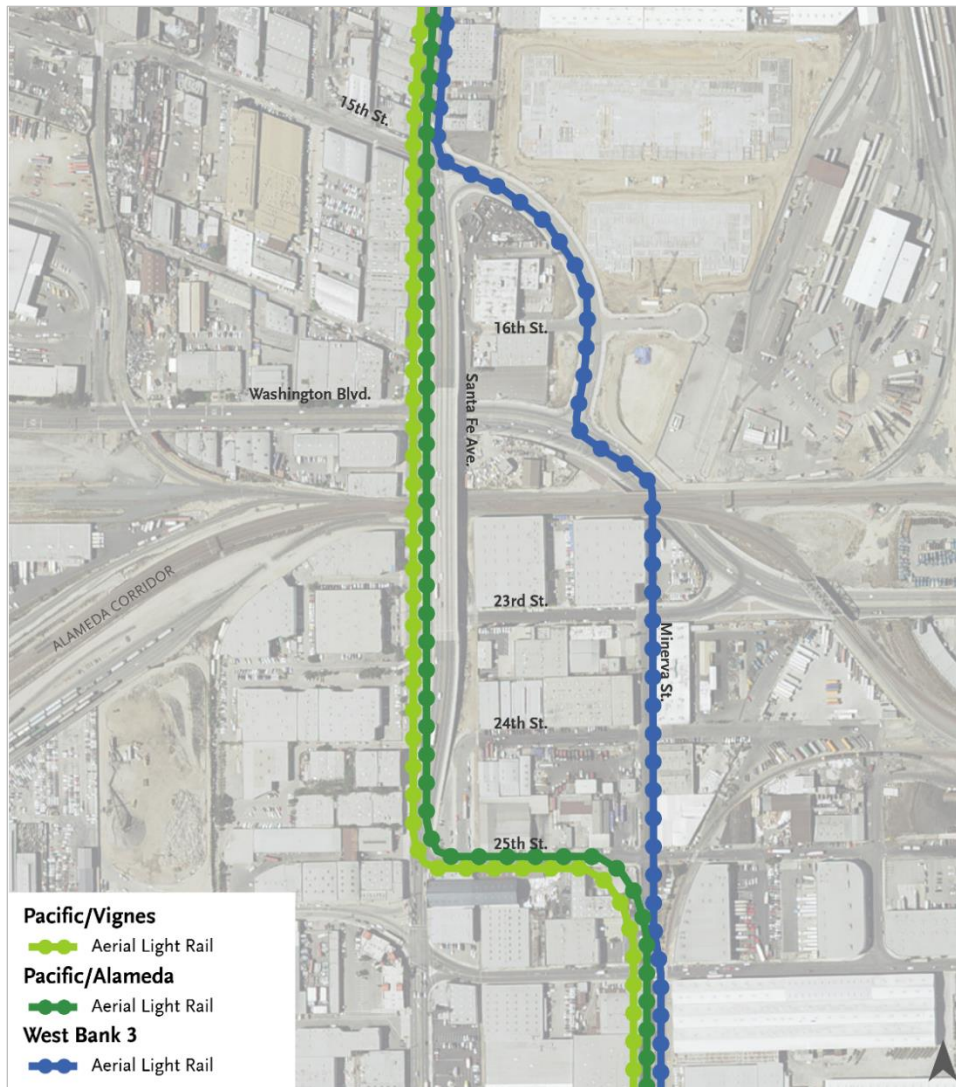
commercial areas along Pacific Avenue and industrial workers in the City of Vernon. The Pacific/Randolph Station would serve the adjacent residential neighborhoods in the Cities of Huntington Park and Maywood.

Figure 4-5. West Bank 3 Alignment Option



Source: West Santa Ana Branch Technical Refinement Study (Metro 2015)

Figure 4-6. West Bank 3, Pacific/Alameda and Pacific/Vignes Alignments' Transition to the Harbor Subdivision ROW



Source: West Santa Ana Branch Technical Refinement Study (Metro 2015)

4.2.3 Pacific/Alameda Alignment Option

The Pacific/Alameda alignment option was developed as part of the TRS Report recommendation. The Pacific/Alameda alignment uses the Santa Fe and Pacific Boulevard corridors to connect from Union Station to Randolph Street. The northern portion of this alignment is 7.4 miles in length from the Union Station to the Florence/Salt Lake Station. This alignment option has five stations north of the Florence/Salt Lake Station; parking is provided only at Union Station (see Figure 4-7 and Table 4-1).

From Union Station, the alignment would be an aerial configuration adjacent to or above the existing Metro Gold Line. In an aerial configuration, the alignment would cross over the US-101 Freeway and the Metro Gold Line structure via Alameda Street.

The alignment would continue in an aerial configuration south on Alameda Street with a station above the existing Metro Gold Line Little Tokyo Station at 1st and Alameda Streets.

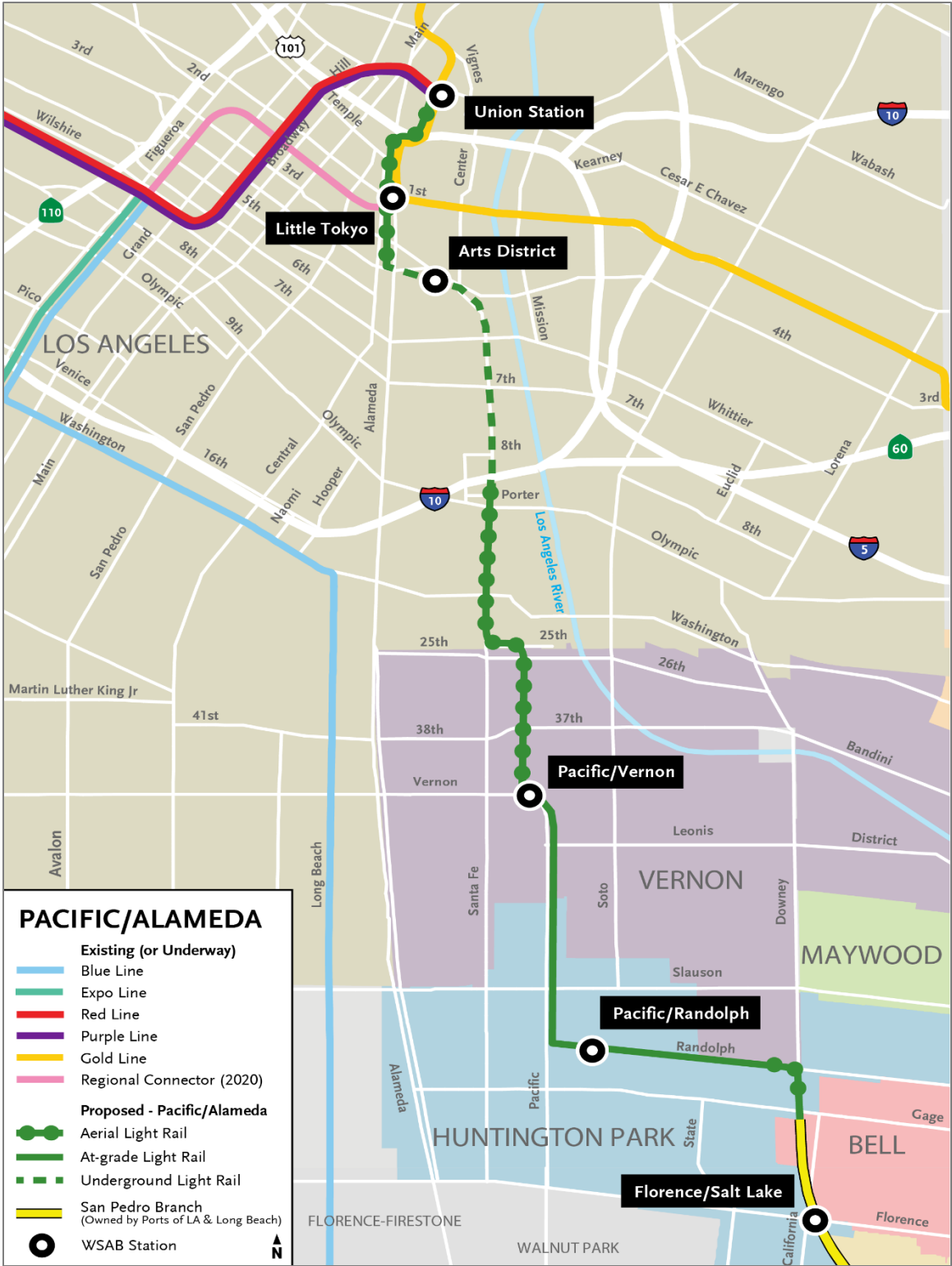
From the Little Tokyo Station, the alignment would continue south along Alameda Street in an aerial configuration. At the 4th Place and Alameda Street intersection, the alignment would transition into an underground (cut and cover) configuration and turn southeast to follow 4th Place to an Arts District Station. An open air underground station is proposed for the Arts District just west of 4th Street at Santa Fe Avenue.

From the Arts District Station, the alignment would continue south in a bored tunnel configuration beneath Santa Fe Avenue. The alignment would follow Santa Fe Avenue until just south of the I-10 Freeway where it would transition to an aerial configuration. The aerial alignment would continue south on Santa Fe Avenue, turning east on 25th Street then south on Minerva Street, where it would transition to the Harbor Subdivision (Figure 4-6). The aerial alignment would run south along the Harbor Subdivision and then return to at-grade for a station at Pacific Boulevard/Vernon Avenue.

From the Pacific/Vernon Station, the alignment would continue south at-grade along the Pacific Boulevard median. At Randolph Street, the alignment would turn east to utilize the UPRR ROW (La Habra Branch) to an at-grade station at Pacific Boulevard/Randolph Street.

From the Pacific/Randolph Station, the alignment would continue east along Randolph Street. Just west of the San Pedro Subdivision, the alignment would rise to an aerial configuration and then connect south to the San Pedro Subdivision (west of Maywood Avenue). The alignment would transition to at-grade south of Gage Avenue and continue along the San Pedro Subdivision to an at-grade station at Florence Avenue/Salt Lake Avenue.

Figure 4-7. Pacific/Alameda Alignment Option



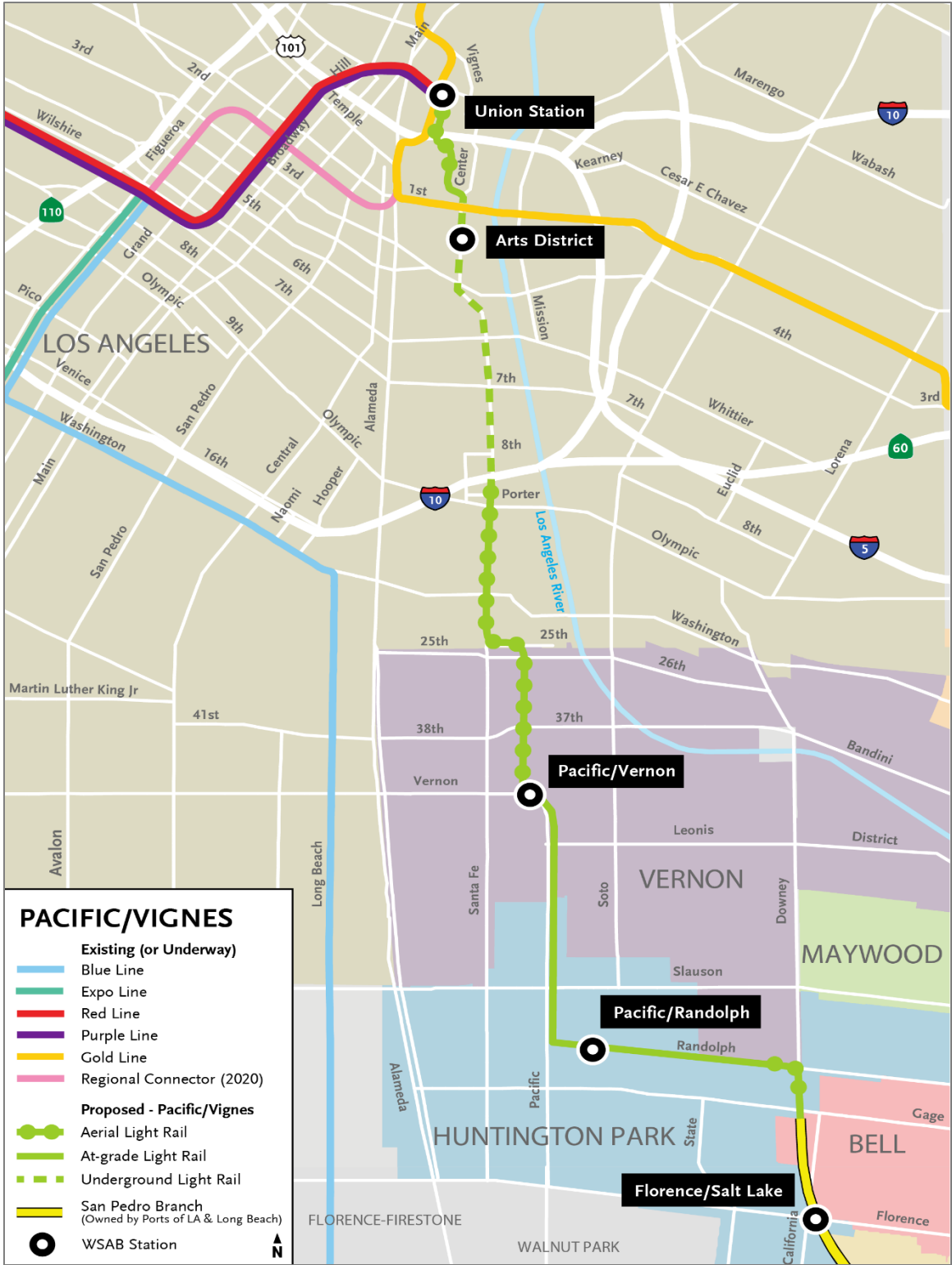
Source: West Santa Ana Branch Technical Refinement Study (Metro 2015)

4.2.4 Pacific/Vignes Alignment Option

The Pacific/Vignes alignment option was developed as part of the TRS Report recommendation. Like the Pacific/Alameda alignment option, the Pacific/Vignes alignment option uses the Santa Fe and Pacific Boulevard corridors to connect from Union Station to Randolph Street. The northern portion of this alignment is 7.2 miles in length from the Union Station to the Florence/Salt Lake Station. This alignment option has four stations north of the Florence/Salt Lake Station; parking is provided only at Union Station (see Figure 4-8 and Table 4-1).

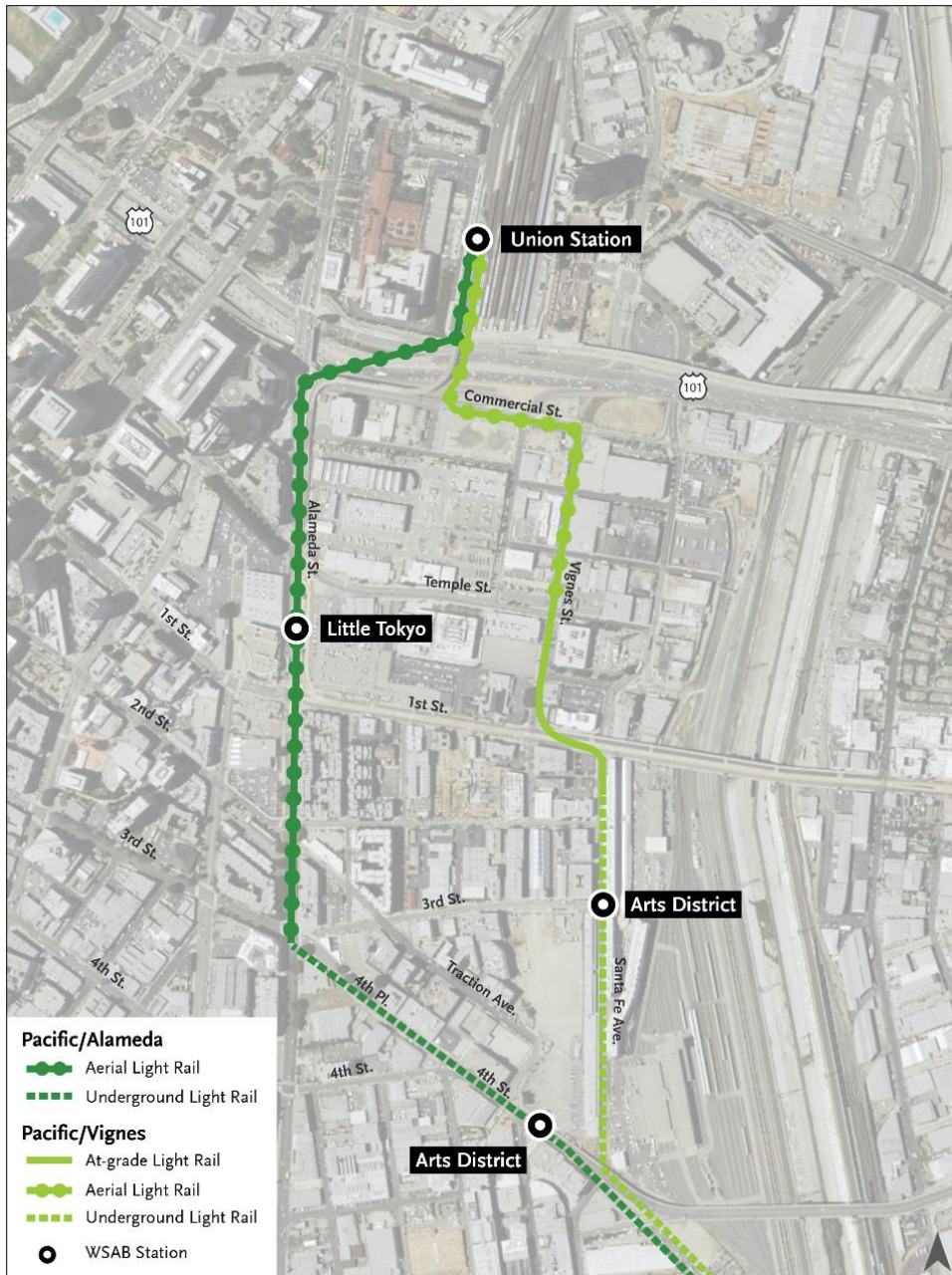
From Union Station, the alignment would be an aerial configuration adjacent to or above the existing Metro Gold Line. In an aerial configuration, the alignment would cross over the US-101 Freeway alongside the Link US alignment. At Commercial Street, the alignment would turn southeast and follow Commercial Street to Vignes Street, where the alignment would turn south. The alignment would continue in an aerial configuration south along Vignes Street to Temple Street, where the alignment would transition to an underground configuration. At Banning Street, the alignment would turn east and then south at Santa Fe Avenue. The alignment would then continue south in an underground (bored tunnel) configuration under Santa Fe Avenue to an underground Arts District Station at 3rd Street and Santa Fe Avenue. From the Arts District Station, the alignment would continue in a bored tunnel under Santa Fe Avenue and then follow the same alignment as the Pacific/Alameda Option described in the preceding section.

Figure 4-8. Pacific/Vignes Alignment Option



Source: West Santa Ana Branch Technical Refinement Study (Metro 2015)

Figure 4-9. Connection into Union Station for Pacific/Alameda and Pacific/Vignes Alignment Options



Source: West Santa Ana Branch Technical Refinement Study (Metro 2015)

4.2.5 Alameda Alignment Option

The Alameda alignment option was developed and defined as part of the TRS Report recommendation. The Alameda alignment option uses the Alameda Street and Metro Blue Line corridors to connect from Union Station to Randolph Street. The northern portion of this alignment is 8.0 miles in length from the Union Station to the Florence/Salt Lake Station. This alignment option has seven stations north of the Florence/Salt Lake Station; parking is provided only at Union Station (see Figure 4-10 and Table 4-1).

On the northern end, this option would be similar to the Pacific/Alameda alignment option. The alignment would be an aerial configuration adjacent to or above the existing Metro Gold Line. In an aerial configuration, the alignment would cross over the US-101 Freeway and the Metro Gold Line structure via Alameda Street. The alignment would continue in an aerial configuration south on Alameda Street with a station above the existing Metro Gold Line Little Tokyo Station at 1st and Alameda Streets.

From the Little Tokyo Station, the alignment would differ from the Pacific/Alameda alignment option by continuing south along Alameda Street in an aerial configuration to an aerial station at the intersection of 7th Street/Alameda Street.

From the 7th/Alameda Station, the alignment would continue south in an aerial configuration along Alameda Street until just north of the I-10 Freeway, where it would transition to at-grade and turn west at 14th Street. The alignment would run parallel to the I-10 Freeway at-grade, and then cross under the I-10 Freeway on the former PEROW currently owned by Metro (near Long Beach Avenue). The alignment would cross 17th Street at-grade before transitioning back to an aerial structure on Long Beach Avenue. The alignment would continue in an aerial configuration south on Long Beach Avenue adjacent to the existing Metro Blue Line with three aerial stations providing a connection to the Metro Blue Line – the Washington Station, the Vernon Station, and the Slauson Station.

From the Slauson Station, the alignment would turn east and merge with the UPRR ROW (La Habra Branch) along Randolph Street. The aerial alignment would continue east on Randolph Street then transition to at-grade just west of Pacific Boulevard. An at-grade station would be located east of the Pacific Boulevard/Randolph Street intersection.

From the Pacific/Randolph Station, the alignment would continue east along Randolph Street. Just west of the San Pedro Subdivision, the alignment would rise to an aerial configuration and then connect south along the San Pedro Subdivision (west of Maywood Avenue). The alignment would transition to at-grade south of Gage Avenue and continue along the San Pedro Subdivision to an at-grade station at Florence Avenue/Salt Lake Avenue.

Figure 4-10. Alameda Alignment Option



Source: West Santa Ana Branch Technical Refinement Study (Metro 2015)

4.2.6 Alameda/Vignes Alignment Option

The Alameda/Vignes alignment option was developed and defined as part of the TRS Report recommendation. Like the Alameda alignment, the Alameda/Vignes alignment option uses the Alameda Street and Metro Blue Line corridors to connect from Union Station to Randolph Street. The northern portion of this alignment is 8.1 miles in length from the Union Station to the Florence/Salt Lake Station. This alignment option has seven stations north of the Florence/Salt Lake Station; parking is provided only at Union Station (see Figure 4-10 and Table 4-1).

On the northern end, this option would be similar to the Pacific/Vignes alignment option. From Union Station, the alignment would be an aerial configuration adjacent to or above the existing Metro Gold Line. In an aerial configuration, the alignment would cross over the US-101 Freeway alongside the Link US alignment and turning southeast along Commercial Street. The alignment would then turn south along Vignes Street. Just south of Temple Street, the alignment would transition to an underground (cut and cover) configuration and continue under Vignes Street. The alignment would cross under the 1st Street Bridge and continue south of 2nd Street. At 3rd Street, the alignment would then turn west towards Alameda Street. An underground station is proposed for the Arts District near 3rd Street near Traction Avenue.

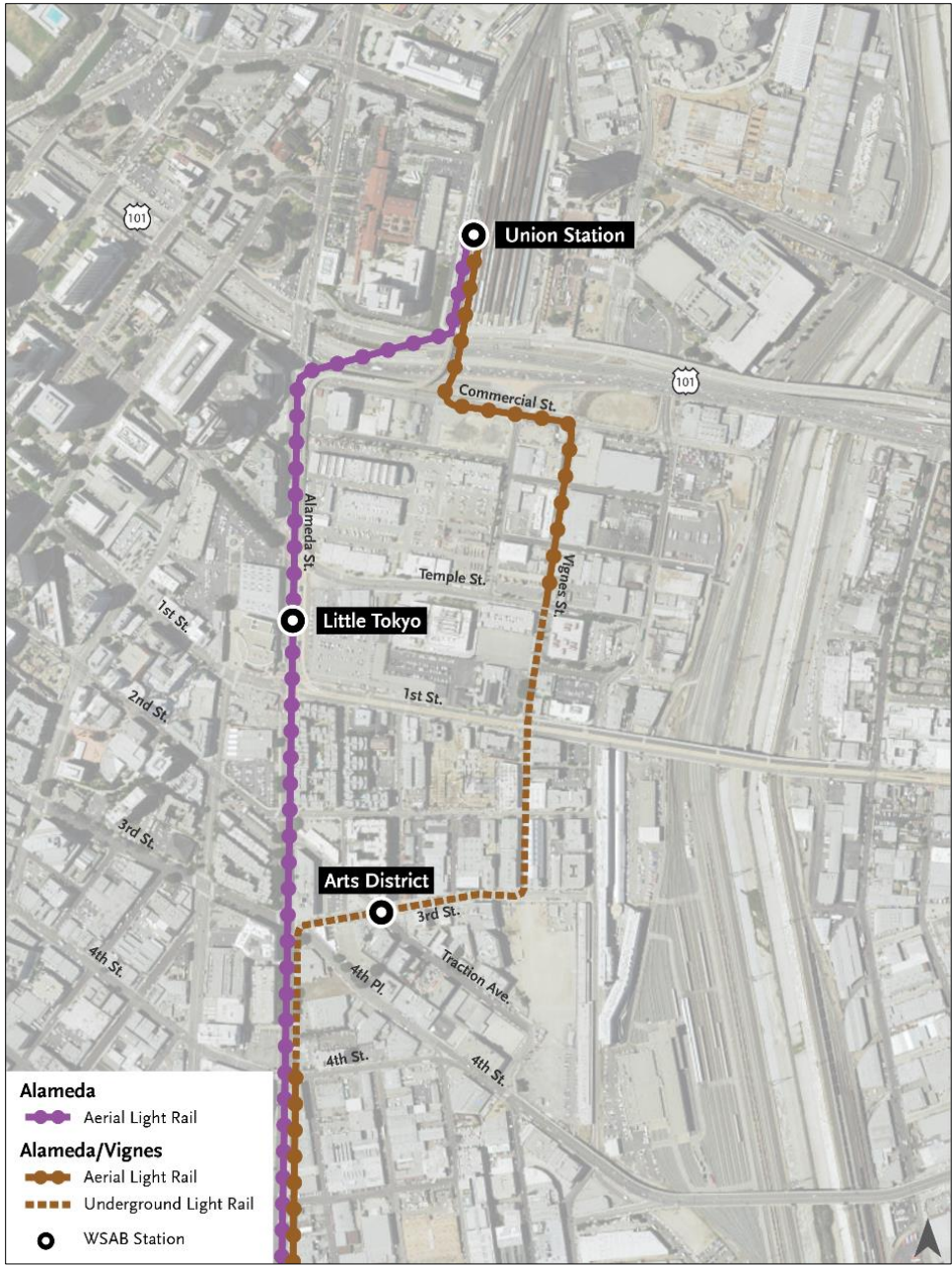
From the Arts District Station, the alignment would proceed west in a cut and cover tunnel configuration to Alameda Street, where the alignment would turn south. At 4th Street, the alignment would return to an aerial configuration and follow the alignment of the Alameda Option as described the preceding section.

Figure 4-11. Alameda/Vignes Alignment Option



Source: West Santa Ana Branch Technical Refinement Study (Metro 2015)

Figure 4-12. Connection into Union Station for Alameda and Alameda/Vignes Alignment Options



Source: West Santa Ana Branch Technical Refinement Study (Metro 2015)

5 SCREENING RESULTS

The screening evaluation was conducted to determine how well each of the six northern alignment options met the goals and objectives of the Project, as summarized in Table 3-3. The five project goals are as follows:

- Goal 1: Provide Mobility Improvements
- Goal 2: Support Local and Regional Land Use Plans and Policies
- Goal 3: Minimize Environmental Impacts
- Goal 4: Ensure Cost Effectiveness and Financial Feasibility
- Goal 5: Ensure Equity

For each goal, a set of criteria was evaluated and a score was given based on how well the alignment option meets the criteria. The northern alignment options were assessed against each evaluation criterion on their performance in qualitative and quantitative measures. A high, medium, or low rating was assigned based on the alignment option's ability to meet the stated objective.

The comparison of northern alignment options presented in the following sections demonstrates the performance of the northern alignment options based on the goals and objectives of the Project. It also highlights the trade-offs among the northern alignment options to develop a recommendation of which alignment option(s) to carry forward into scoping for the environmental analysis.

5.1 Mobility Improvements

The purpose of the mobility improvements goal is to advance a project that meets the following objectives:

- Improves travel speeds and reduces travel times
- Relieves high use (overcrowded) transit systems along the corridor
- Connects with the transit network
- Provides an alternative to the congested freeway and arterial network. Serves local and regional trips.
- Supports active transportation and first/last mile connections

The following sections evaluate each alignment option against the evaluation criteria developed for the mobility improvements goal.

5.1.1 Estimated Daily Hours of User Benefits

User benefits describe the overall time savings new riders and existing riders would experience with implementation of the transit alternative. User benefits are estimated from the Metro Travel Forecasting Model for each of the alternatives versus a No Build

scenario. User benefits (or disbenefits) are assumed to arise from changes in mobility for individual travelers that result from implementation of a project (or policy) and are measured in hours of travel time, aggregated over all travelers. In the case of the WSAB Transit Corridor Project, each alignment option would provide user benefits in terms of faster and more reliable service compared to that provided by bus or autos.

The daily hours of user benefits are evaluated for the full length of the project (from northern terminus to Artesia). Table 5-1 describes the rating system of “high”, “medium”, or “low” daily user benefit hours. Table 5-2 present the daily user benefits (in hours) for each of the alignment options under consideration, and the corresponding scores.

The daily user benefit hours for each alignment option range from 14,320 hours for West Bank 3 to 18,580 hours for Pacific/Alameda. The Pacific/Alameda, Pacific/Vignes and the East Bank alignment options provide the greatest daily user benefits. In contrast, the West Bank 3 alignment option provides the least daily user benefit hours, likely due to the fact that a transfer is required to reach Union Station.

Table 5-1. Daily Hours of User Benefits Scoring Thresholds

	Score	Description
●	High	More than 17,000 hours of daily user benefits
◐	Medium	Between 15,000 and 17,000 hours of daily user benefits
○	Low	Less than 15,000 hours of daily user benefits

Table 5-2. Daily Hours of User Benefits Evaluation

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda Option	Pacific/ Vignes Option	Alameda Option	Alameda/ Vignes Option
Estimated daily user benefits (in hours)	17,240 hours	14,320 hours	18,580 hours	17,000 hours	15,380 hours	14,770 hours
Daily user benefits scores	●	○	●	●	◐	○

Source: West Santa Ana Branch Technical Refinement Study: Task 3.1 B - Travel Demand Modeling Forecasting Results Report. (Metro 2015).

5.1.2 Decrease in Boardings on North-South Line (current Metro Blue Line)

From a systemwide perspective, the WSAB Transit Corridor Project has the potential to relieve parallel north-south high use transit systems that are anticipated to be overcrowded during peak periods and are near operational capacity. With the opening of the Regional Connector, the current Metro Blue Line and Metro Gold Line will operate as a single north-south line from Citrus/Sierra Madre Villa to Long Beach (the North-South Line). Boardings along this North-South Line are anticipated to approach

200,000 boardings per day in 2040. By providing parallel north-south service, the WSAB Transit Corridor could alleviate some of this ridership by serving similar riders.

Relief of the North-South Line is measured by comparing the daily boardings on the North-South Line under a No Build scenario against daily boardings under each of the alignment options to determine any decreases in daily boarding along the North-South Line. Table 5-3 describes the rating system for the “high”, “medium”, or “low” ranking. Table 5-4 presents the decrease in boardings under each alignment option and the corresponding score.

The relief on the North-South Line ranges from three percent for West Bank 3 to 11 percent for Pacific/Alameda. The West Bank 3 alignment option provides the least amount of relief because it does not connect to Union Station. The Pacific/Alameda and Pacific/Vignes alignment options provide slightly more relief than the Alameda and Alameda/Vignes alignment options, but, with the exception of West Bank 3 alignment option, all alignment options provide an alternative north-south connection into downtown Los Angeles, thus providing at least some relief to the North-South Line.

Table 5-3. Relieves Overcrowded Existing Rail Line Scoring Thresholds

	Score	Description
●	High	10% or higher decrease in boardings on North-South Line
◐	Medium	5% to 9% decrease in boardings on North-South Line
○	Low	Less than 5% decrease in boardings on North-South Line

Table 5-4. Relieves Overcrowded Existing Rail Line Evaluation

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/Alameda Option	Pacific/Vignes Option	Alameda Option	Alameda/Vignes Option
Decrease in Boardings on North-South Line (current Metro Blue Line)	5% to 9% decrease in boardings	Less than 5% decrease in boardings	Higher than 10 % decrease in boardings	Higher than 10 % decrease in boardings	5% to 9% decrease in boardings	5% to 9% decrease in boardings
Relieves Overcrowded Existing Rail Line scores	◐	○	●	●	◐	◐

Source: West Santa Ana Branch Technical Refinement Study (Metro 2015)

5.1.3 Number of Direct Connections to Other Metro Rail Lines

Providing direct linkages to other planned and existing Metro Rail lines is important to enhance mobility and regional connectivity. This criterion reviews the opportunities for

transfers along each alignment option, taking into consideration transfers to/from planned or existing Metro Rail lines within 0.5 mile of the alignment option's proposed stations.

Table 5-5 describes the rating system for the “high”, “medium”, or “low” Rating. Table 5-6 presents each alignment option's number of connections to existing or planned Metro Rail Lines and the respective score.

The Pacific/Alameda, Alameda and Alameda/Vignes alignment options score “high” due to connections to the existing Red and Purple Metro lines at Union Station, as well as connections to the proposed East-West and North-South lines at Little Tokyo that will be established with the completion of the Regional Connector project. These three alignment options offer the ability to transfer to four Metro Rail lines within 0.5 mile of stations along the alignment. The East Bank and Pacific/Vignes alignment options score “medium” due to direct linkages to three rail lines – the Red, Purple and North-South Metro rail lines – all provided at Union Station. Similarly, the West Bank 3 alignment option scores “medium” with a connection to two rail lines - the East-West and North-South lines - at the Little Tokyo Station.

Table 5-5. Connections to Other Metro Rail Lines Scoring Thresholds

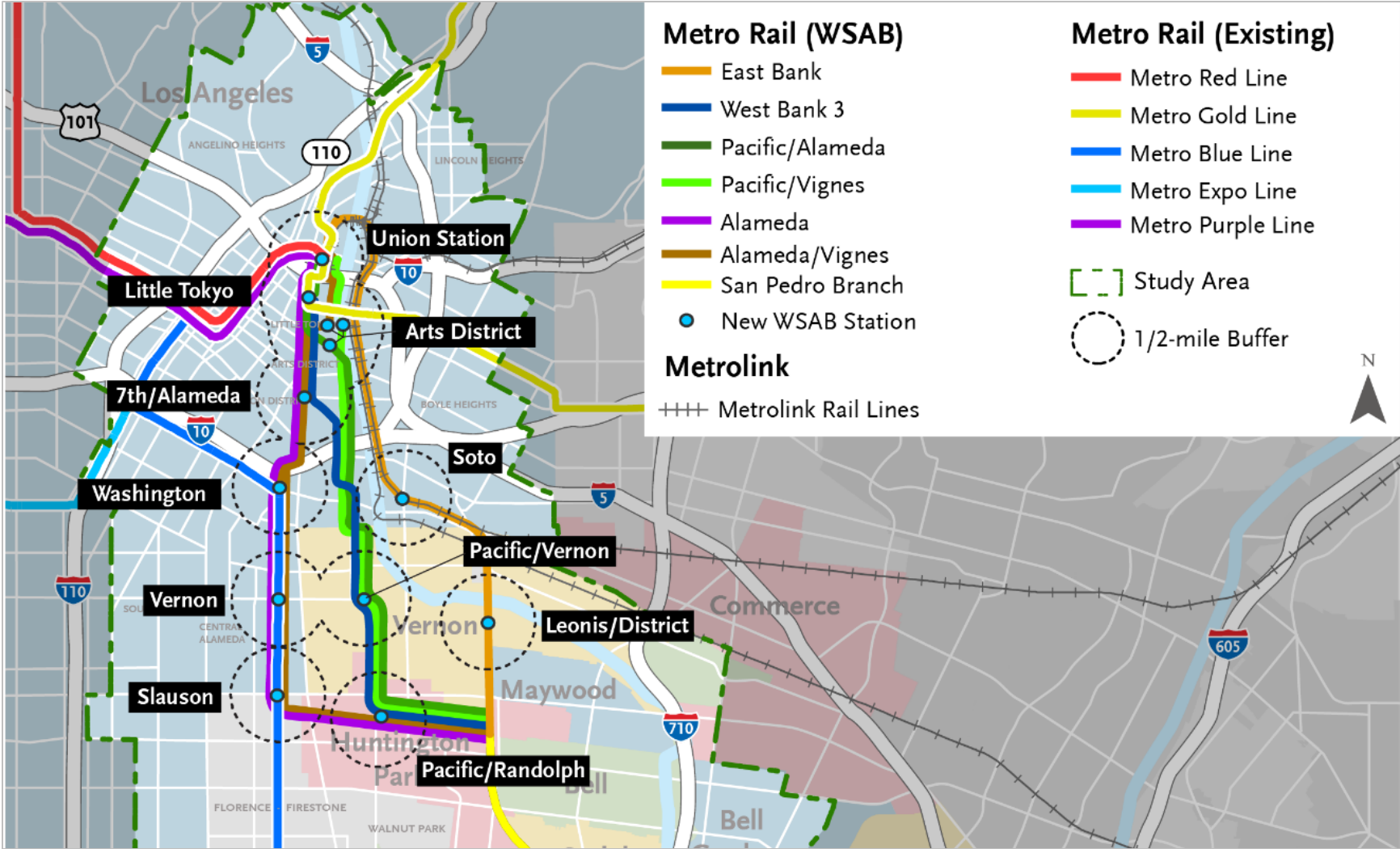
	Score	Description
●	High	4 or more connections to existing or planned Metro Rail lines within 0.5 mile of proposed stations
◐	Medium	2 or 3 connections to existing or planned Metro Rail lines within 0.5 mile of proposed stations
○	Low	Zero or 1 connection to existing or planned Metro Rail lines within 0.5 mile of proposed stations

Table 5-6. Connections to Other Metro Rail Evaluation

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda Option	Pacific/ Vignes Option	Alameda Option	Alameda/ Vignes Option
Number of connections to other Metro Rail Lines	3 connections	2 connections	4 connections	3 connections	4 connections	4 connections
Number of connections to other Metro Rail Lines scores	◐	◐	●	◐	●	●

Source: West Santa Ana Branch Technical Refinement Study (Metro 2015)

Figure 5-1. Connections to Metro Rail



Source: WSP | Parsons Brinckerhoff. 2017.

5.1.4 Provides Direct Access to Regional Rail

Providing direct access to a regional rail station is important when considering connections to destinations across southern California. Union Station provides a myriad of multi-modal options – including Metrolink which provides service to surrounding counties, Amtrak which provides interstate service, as well as a potential future connection to California High Speed Rail. Therefore, this criterion evaluates the ability to provide direct access to Union Station, which serves as a crucial regional rail hub.

The rating system is shown in Table 5-7. A high rating was given to those alignment options that directly connect to regional rail at Union Station while a low score was given to those alignment options that do not serve regional rail at Union Station; there were no medium scores. Table 5-8 summarizes the score for each alignment option.

The West Bank 3 alignment option is the only alignment option that requires a transfer to reach Union Station from its northern terminus at Little Tokyo; therefore receiving a “low” score. All of the other alignment options score “high” in this criterion because their proposed northern terminus is at Union Station.

Table 5-7. Provides Direct Access to Regional Rail Scoring Thresholds

	Score	Description
●	High	Offers direct access to regional rail without a transfer
◐	Medium	N/A
○	Low	Does not offer direct access to regional rail, transfer required

Table 5-8. Provides Direct Access to Regional Rail Evaluation

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda Option	Pacific/ Vignes Option	Alameda Option	Alameda/ Vignes Option
Provides Direct access to regional rail	Yes	No	Yes	Yes	Yes	Yes
Direct access to regional rail score	●	○	●	●	●	●

Source: West Santa Ana Branch Technical Refinement Study (Metro 2015)

5.1.5 Number of Daily Boardings

Each time a transit passenger boards a transit vehicle that is counted as a boarding (a trip that requires one transfer to reach a destination equates to two boardings). The daily boardings presented in this report for each alignment option are based on Metro Model runs that were conducted for the TRS (2015).

Table 5-9 summarizes the rating system for the “high”, “medium”, or “low” ranking for the daily boardings category. Table 5-10 provide the number of daily boardings for each alignment option and the respective scores.

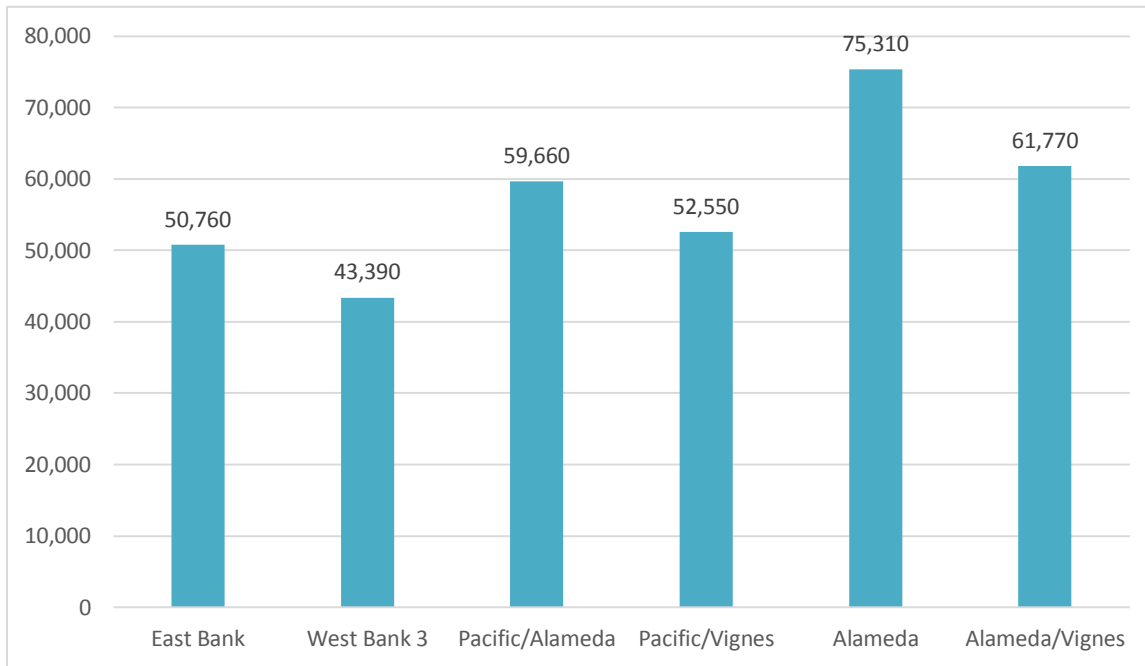
The number of daily boardings for the alignment options range from 43,390 for West Bank 3 to 75,310 for the Alameda and Alameda/Vignes alignment option. The Alameda alignment option is the only alignment option with a “high” score because the daily boardings are significantly higher than the other alignment options. The Pacific/Alameda and Pacific/Vignes alignment options and Alameda/Vignes alignment option scored “medium”, with forecasted boardings between 50,000 and 70,000 per day. The West Bank 3 alignment option scored “low” with 43,390 daily boardings.

The alignment options that parallel the Metro Blue Line – the Alameda and Alameda/Vignes alignment options – have the highest daily boardings in part due to passengers transferring from the Metro Blue Line to the WSAB Transit Corridor for a more direct and faster connection to Union Station. Without the WSAB Transit Corridor, passengers would take the Metro Blue Line to the 7th Street/Metro Center Station, where they would transfer to the Red or Purple Line to Union Station. The trip to Union Station without the WSAB Transit Corridor would take significantly longer. The travel time from the Metro Blue Line Slauson Station to Union Station without the Project is approximately 22 minutes. In contrast, the travel time from the Slauson Station to Union Station on the Project would be approximately nine minutes due to the more direct alignment.

Table 5-9. Number of Daily Boardings Scoring Thresholds

	Score	Description
●	High	Over 70,000 daily boardings
◐	Medium	Between 50,000 and 70,000 daily boardings
○	Low	Less than 50,0000 daily boardings

Figure 5-2. Daily Boardings by Alignment Option



Source: West Santa Ana Branch Technical Refinement Study: Task 3.1 B - Travel Demand Modeling Forecasting Results Report (Metro 2015)

Table 5-10. Number of Daily Boardings Evaluation

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda Option	Pacific/ Vignes Option	Alameda Option	Alameda/ Vignes Option
Estimated number of Daily Boardings	50,760 daily boardings	43,390 daily boardings	59,660 daily boardings	52,550 daily boardings	75,310 daily boardings	61,770 daily boardings
Number of Daily Boardings scores	●	○	●	●	●	●

Source: West Santa Ana Branch Technical Refinement Study: Task 3.1 B - Travel Demand Modeling Forecasting Results Report (Metro 2015)

5.1.6 Number of New Transit Trips

Daily new transit trips is an indicator of the number of person trips that switch from other modes of travel (e.g., automobile) to transit. New transit trips are an important measurement because they represent people who would likely take transit rather than drive a car to reach their destination if a convenient, reliable transit option were currently available to them.

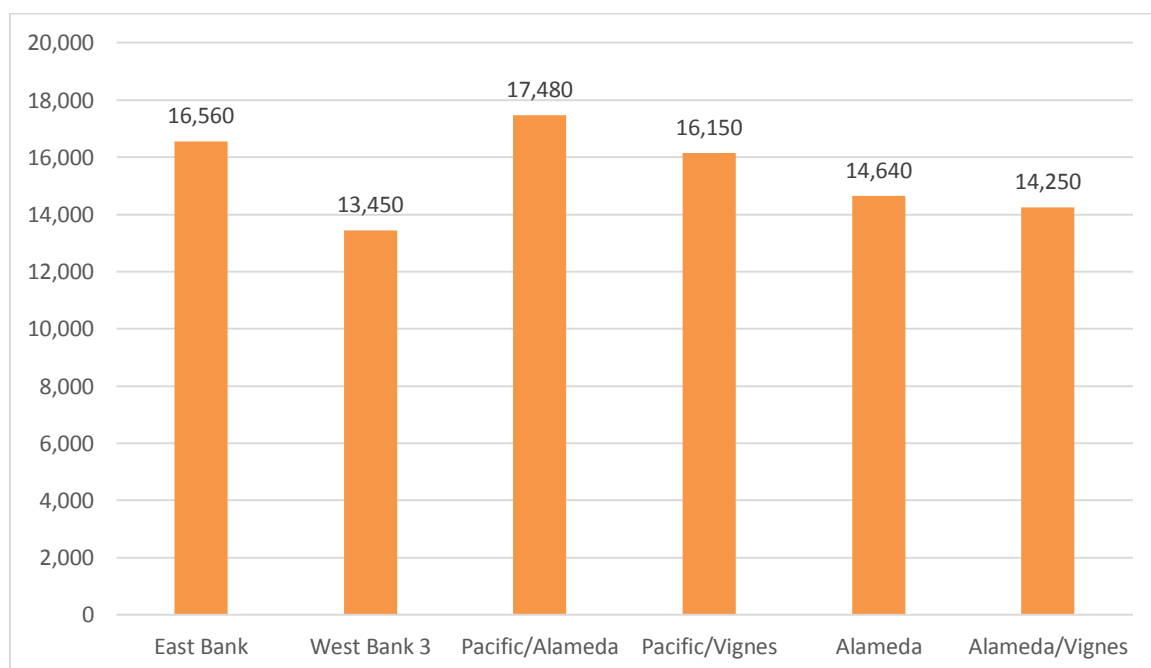
Table 5-11 summarizes the rating system for the “high”, “medium”, or “low” ranking for the new transit trips category. Figure 5-3 and Table 5-10 provide the number of new transit trips for each the alignment option and the respective score.

The number of new transit trips per day ranges from 13,450 trips for West Bank 3 to 17,480 trips for the Pacific/Alameda alignment option. The Pacific/Alameda, Pacific/Vignes and East Bank alignment options would result in the greatest number of new transit trips and score “high”. All of the alignment options that connect directly into Union Station attract more new riders than the West Bank 3, which does not. The alignment options that have a Little Tokyo Station (Pacific/Alameda and Alameda) attract more new riders relative to alignment options without this station (Pacific/Vignes and Alameda/Vignes), because the Little Tokyo Station provides a direct transfer to both the North-South and East-West Lines.

Table 5-11. Number of New Transit Trips Scoring Thresholds

	Score	Description
●	High	Over new 16,000 new transit trips
◐	Medium	Between 14,000 and 16,000 new transit trips
○	Low	Less than 14,000 new transit trips

Figure 5-3. Number New Transit Trips by Alignment Option



Source: West Santa Ana Branch Technical Refinement Study: Task 3.1 B - Travel Demand Modeling Forecasting Results Report (Metro 2015)

Table 5-12. Number of New Transit Trips Evaluation

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda Option	Pacific/ Vignes Option	Alameda Option	Alameda/ Vignes Option
Estimated number of Linked Transit Trips	16,560 new trips	13,450 new trips	17,480 new trips	16,150 new trips	14,640 new trips	14,250 new trips
Number of New Transit Trips scores	●	○	●	●	◐	◐

Source: West Santa Ana Branch Technical Refinement Study: Task 3.1 B - Travel Demand Modeling Forecasting Results Report (Metro 2015)

5.1.7 Number of Connections to Bicycle Facilities

Existing and planned bicycle facilities in the Study Area are documented in the County of Los Angeles Bicycle Master Plan (2012). These existing and planned bicycle facilities further support Metro's active transportation and first/last mile policies by providing alternative means to access or depart LRT stations. The Metro First/Last Mile Strategic Plan outlines Metro's policies which facilitate easy, safe, and efficient access to and from the Metro system. The goal of the Metro First/Last Mile Strategic Plan is to better coordinate infrastructure investments in station areas to extend the reach of transit, with the ultimate goal of increasing ridership.

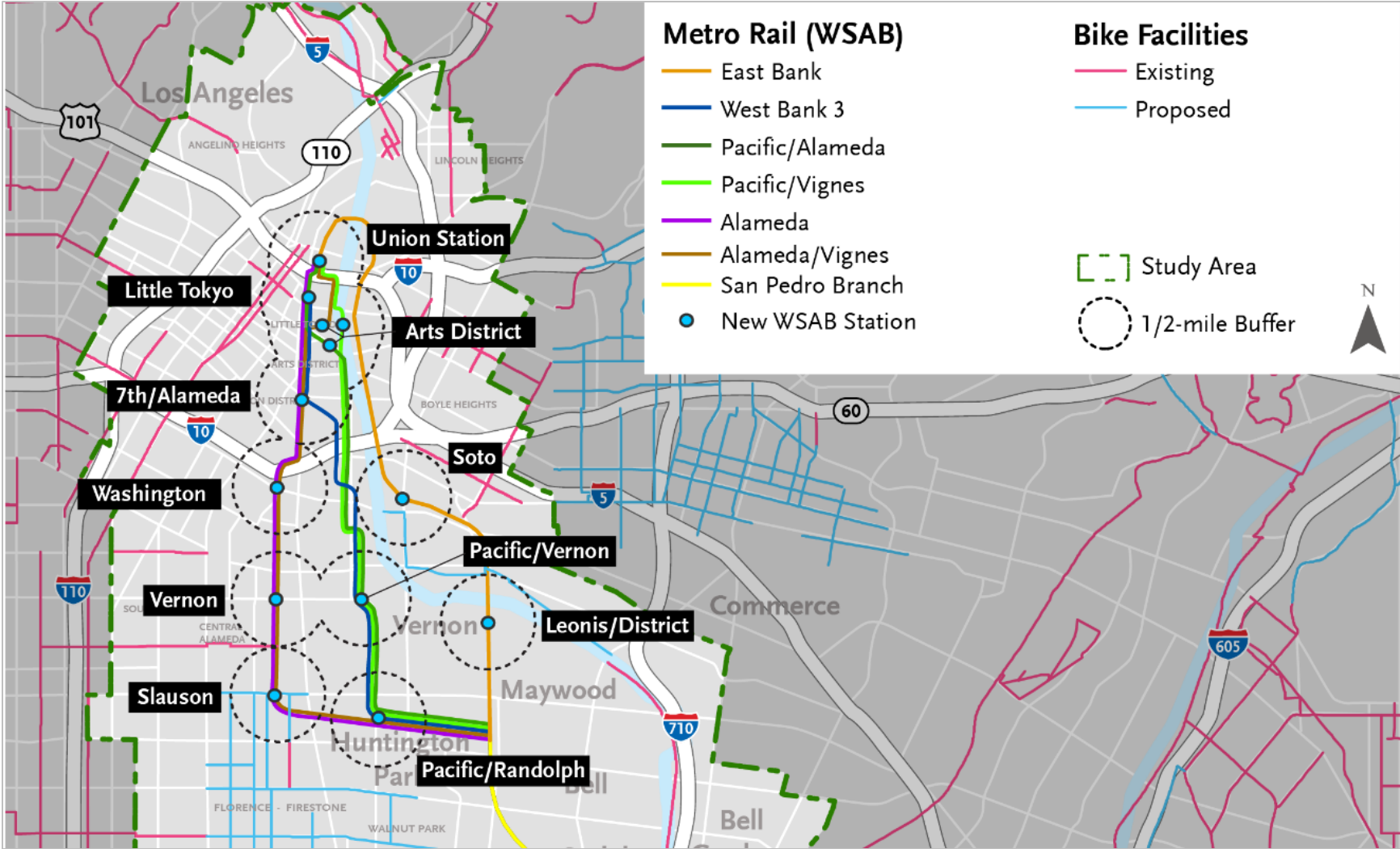
For this criterion, the connection between stations along each alignment option and proposed and existing bicycle paths was reviewed to determine each alignment option's potential to support first/last mile connections. The potential connection was assessed based on a rating system of "high", "medium", or "low" as described in Table 5-13. Table 5-14 presents the number of existing and planned bicycle facilities that connect to stations along each alignment option and the respective score.

The number of connections to existing and planned bicycle facilities for each alignment option ranges from three for West Bank 3 and Pacific/Vignes to ten for the Alameda alignment option.

Table 5-13. Connections to Existing and Planned Bicycle Facilities Scoring Thresholds

	Score	Description
●	High	Connects to more than 10 planned or existing bicycle facilities within 0.5 mile of the proposed stations
◐	Medium	Connects to between 6 and 9 planned or existing bicycle facilities within 0.5 mile of the proposed stations
○	Low	Connects to between 1 and 5 planned or existing bicycle facilities within 0.5 mile of the proposed stations

Figure 5-4. Connections to Existing and Planned Active Transportation Facilities



Source: WSP | Parsons Brinckerhoff, 2017

Table 5-14. Number of Connecting to Existing and Planned Bicycle Facilities Evaluation

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda Option	Pacific/ Vignes Option	Alameda Option	Alameda/ Vignes Option
Number of connections to bicycle facilities	5 connections	3 connections	6 connections	3 connections	10 connections	7 connections
Connection to bicycle facilities score	○	○	◐	○	●	◐

Source: County of Los Angeles Bicycle Master Plan (2012); Existing Bicycle Data, Los Angeles County (2012).

5.1.8 Mobility Improvements Summary

Based on the criterion analyzed, the Pacific/Alameda, Pacific/Vignes, Alameda, and Alameda/Vignes alignment options would provide the greatest overall mobility improvement benefits (see Table 5-15). These alignment options connect directly to Union Station and serve high density residential and employment corridors, resulting in greater user benefits (overall time savings) and higher daily boardings (each time a passenger boards a vehicle) than the other alignment options. These alignment options also directly serve numerous existing and planned Metro rail lines and bicycle facilities, which enhances the connectivity of the transit network. Furthermore, the Pacific/Alameda and Pacific/Vignes alignment options provide the greatest relief to overcrowded conditions on the North-South Line (current Metro Blue Line).

The East Bank and Alameda/Vignes alignment options provide overall average mobility improvements. The West Bank 3 alignment option would provide the fewest mobility improvement benefits primarily because this alignment option does not have a direct connection to the regional mobility hub of Union Station. By terminating at Little Tokyo instead of Union Station, this alignment option provides little relief to the overcrowded North-South Line and results in the least amount of user benefits and daily boardings.

Table 5-15. Overall Mobility Improvements

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda Option	Pacific/ Vignes Option	Alameda Option	Alameda/ Vignes Option
Estimated daily hours of user benefits	● 17,240 hours	○ 14,320 hours	● 18,580 hours	● 17,000 hours	◐ 15,380 hours	○ 14,770 hours
Decrease in boardings on North-South Line (current Metro Blue Line)	◐ 5% to 9% relief	○ Less than 5% relief	● Higher than 10% relief	● Higher than 10% relief	◐ 5% to 9% relief	◐ 5% to 9% relief
Number of connections to other Metro Rail Lines	◐ 3 connections	◐ 2 connections	● 4 connections	◐ 3 connections	● 4 connections	● 4 connections
Provides direct access to regional rail	● Yes	○ No	● Yes	● Yes	● Yes	● Yes
Number of daily boardings	◐ 50,760 daily boardings	○ 43,390 daily boardings	◐ 59,660 daily boardings	◐ 52,550 daily boardings	● 75,310 daily boardings	◐ 61,770 daily boardings
Number of new transit trips	● 16,560 new trips	○ 13,450 new trips	● 17,480 new trips	● 16,150 new trips	◐ 14,640 new trips	◐ 14,250 new trips
Number of connections to bicycle facilities	○ 5 connections	○ 3 connections	◐ 6 connections	○ 3 connections	● 10 connections	◐ 7 connections
Overall Rankings and Scores	Medium 4.5	Low 0.5	High 6.0	High 5.0	High 5.5	Medium 4.0

5.2 Support Local and Regional Land Use Plans and Policies

The purpose of the land use compatibility goal is to advance a project that meets the following objectives:

- Serves major employment centers and high density residential neighborhoods
- Supports local economic development, projects, plans and jobs
- Serves affordable housing developments
- Supports and is consistent with local plans

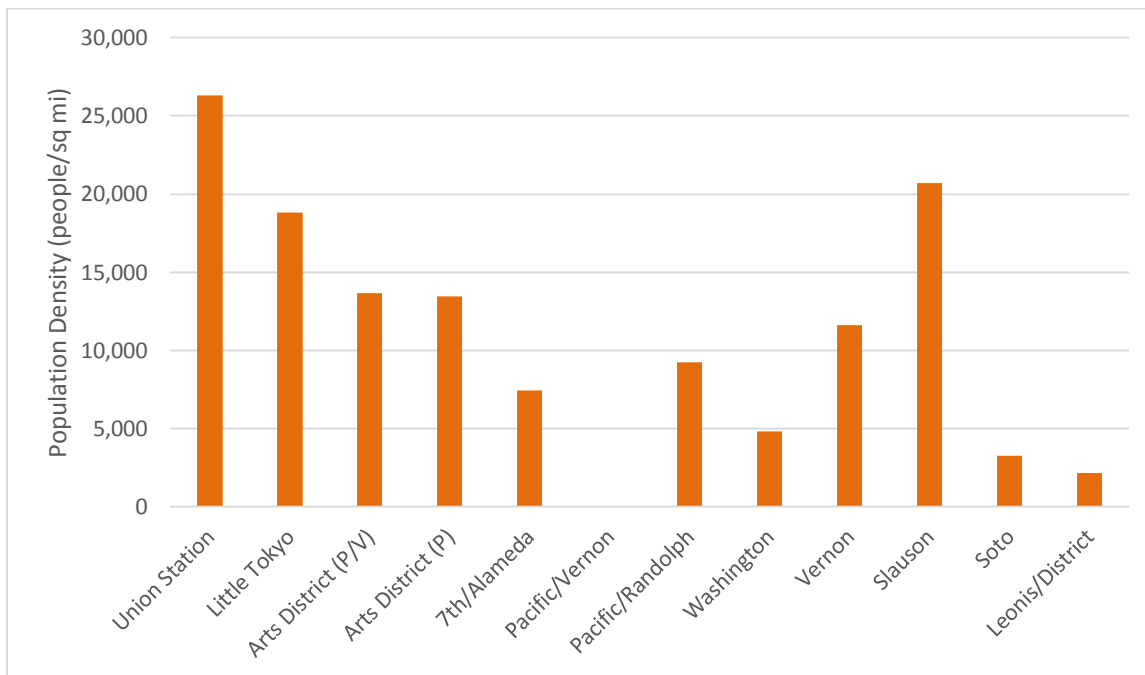
The following sections evaluate each alignment option against the evaluation criteria developed for the land use compatibility goal.

5.2.1 2040 Population Density

Population density refers to the concentration of residents within a specific area of land, such as population per square mile. Alignment options with stations proposed in densely populated areas are likely to have higher ridership because these stations are more accessible to a larger concentration of residents than stations located in less densely populated areas. Alignment options that would serve more densely populated areas would be preferred over alignment options that would serve less populated areas. Future (2040) population density were used to reflect planned growth patterns.

Figure 5-5 presents the average 2040 population densities within 0.5 mile of the proposed stations for each alignment option and the corresponding score for this criterion, and Figure 5-6 presents the 2040 population density for the northern alignment area. Table 5-17 presents the average 2040 population densities within 0.5 mile of the proposed stations for each alignment option and the corresponding score for this criterion.

Figure 5-5. 2040 Population Density within a Half-Mile of Proposed Stations



The Pacific/Alameda, Alameda and Alameda/Vignes alignment options score “high” in this criterion with an average of over 13,000 persons per square mile within 0.5 mile of their proposed stations. The Alameda and Alameda/Vignes alignment options serve the densely populated neighborhoods of southeast Los Angeles with the Slauson Station having a population density of over 20,000 people/square mile. The Pacific/Alameda and Alameda alignment options also serve the Little Tokyo Station, which is also a densely populated area. With the exception of West Bank 3, all alignment options serve Union Station, which is the most densely populated station

area with a population density of over 25,000 people per square mile. While the Pacific/Vignes and East Bank alignment options both connect into Union Station, neither has a Little Tokyo Station and they both serve primarily industrial areas with lower population densities.

Table 5-16. 2040 Population Density Scoring Thresholds

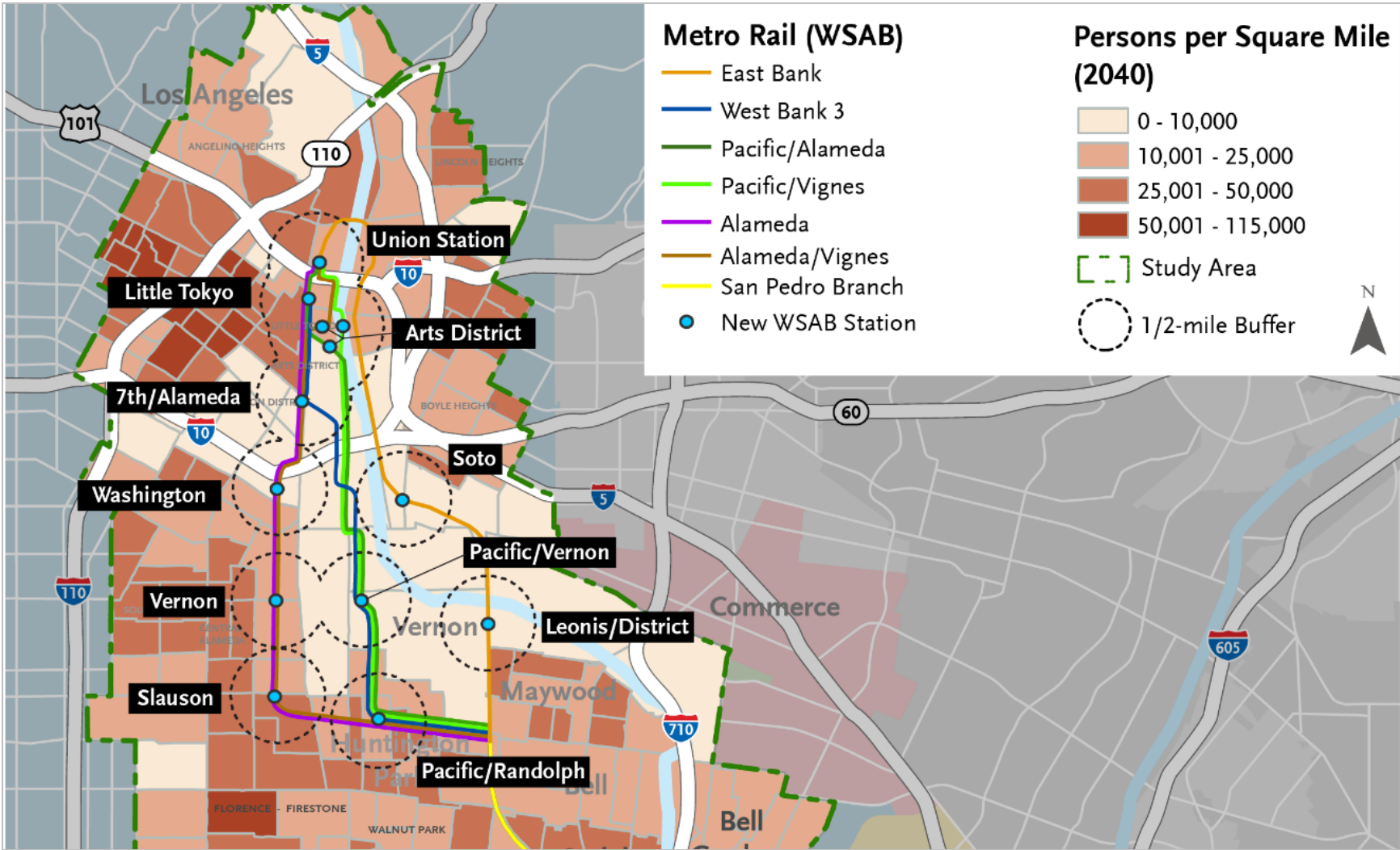
	Score	Description
●	High	Greater than an average of 13,000 persons per square mile within 0.5 mile the proposed stations.
◐	Medium	Between an average of 10,000 and 13,000 persons per square mile within 0.5 mile the proposed stations.
○	Low	Less than an average of 10,000 persons per square mile within 0.5 mile the proposed stations.

Table 5-17. 2040 Population Density Evaluation

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda Option	Pacific/ Vignes Option	Alameda Option	Alameda/ Vignes Option
2040 population densities within ½ mile of stations	10,580 persons/square mile	8,880 persons/square mile	13,570 persons/square mile	12,310 persons/square mile	14,140 persons/square mile	13,400 persons/square mile
2040 population density score	◐	○	●	◐	●	●

Source: Metro Travel Demand Model 2012-2040

Figure 5-6. 2040 Population Density



Source: Metro Travel Demand Model 2012-2040

5.2.2 2040 Employment Density

Employment density refers to the concentration of jobs within a specific area of land, such as the amount of jobs per square mile. The alignment options with proposed stations that would serve areas of high concentration of employment would be preferred over alignment options that would serve fewer employment areas. Future (2040) employment densities were used for the analysis to reflect planned employment growth.

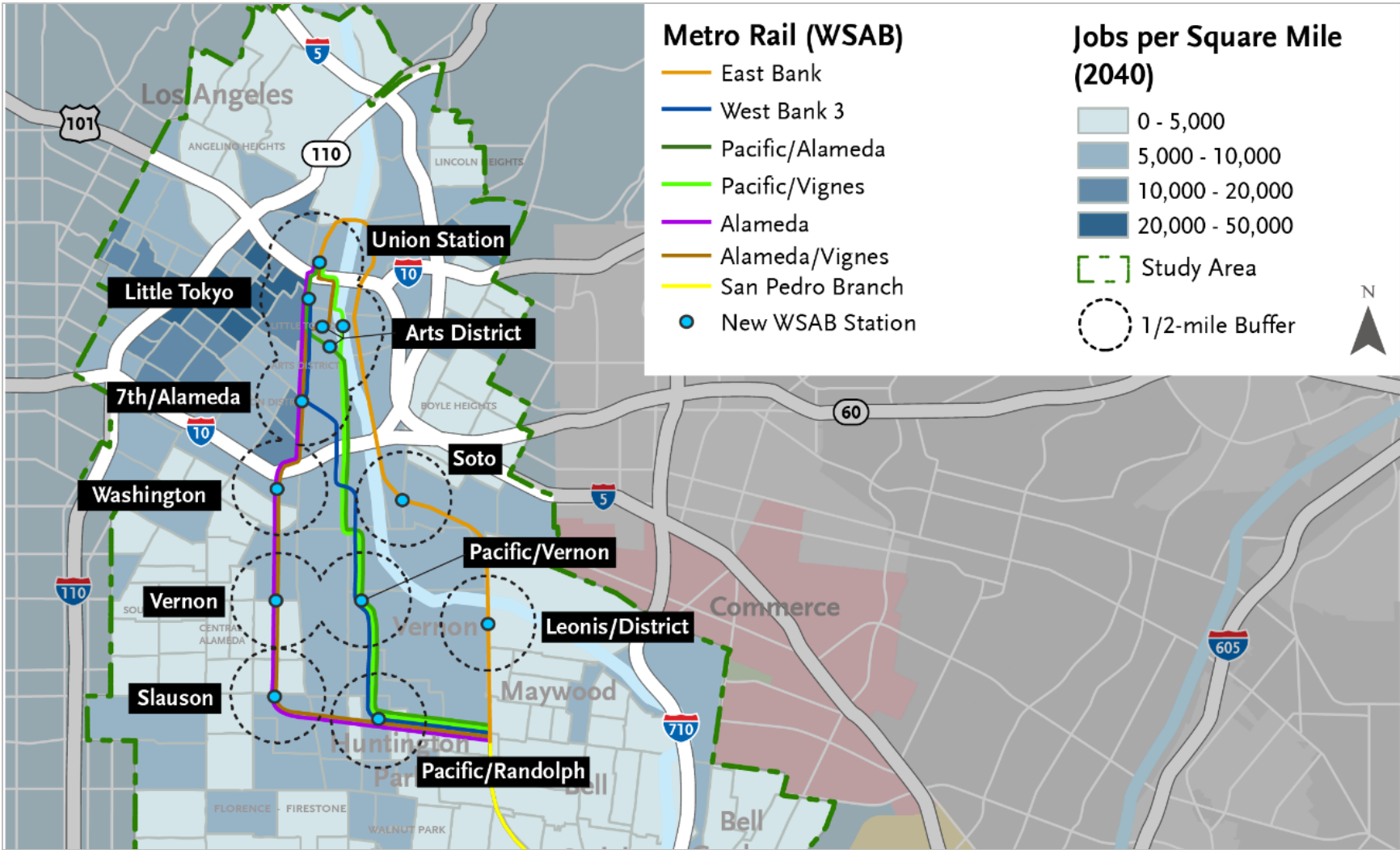
Table 5-18 describes the rating system for the “high”, “medium”, or “low” ranking. For this evaluation, the average employment density is calculated within a 0.5 miles of the proposed station areas along each alignment option. Figure 5-7 illustrates the employment density along the northern alignment and Figure 5-8 shows the calculated employment density within a half-mile of each station. Table 5-19 summarizes the average employment densities within 0.5 miles of the alignment options and the respective score.

The West Bank 3, Pacific/Vignes and Pacific/Alameda alignment options all serve the City of Vernon, which has a higher concentration of jobs than southeast Los Angeles, which is served by the Alameda and Alameda/Vignes alignment options. The stations in downtown Los Angeles (Union Station, Little Tokyo, Arts District and 7thStreet/Alameda) serve the densest job centers. With the exception of East Bank, all alignment options connect to at least two of these stations, with all except West Bank 3 connecting to Union Station, which has the highest concentration of jobs.

Table 5-18. 2040 Employment Density Scoring Thresholds

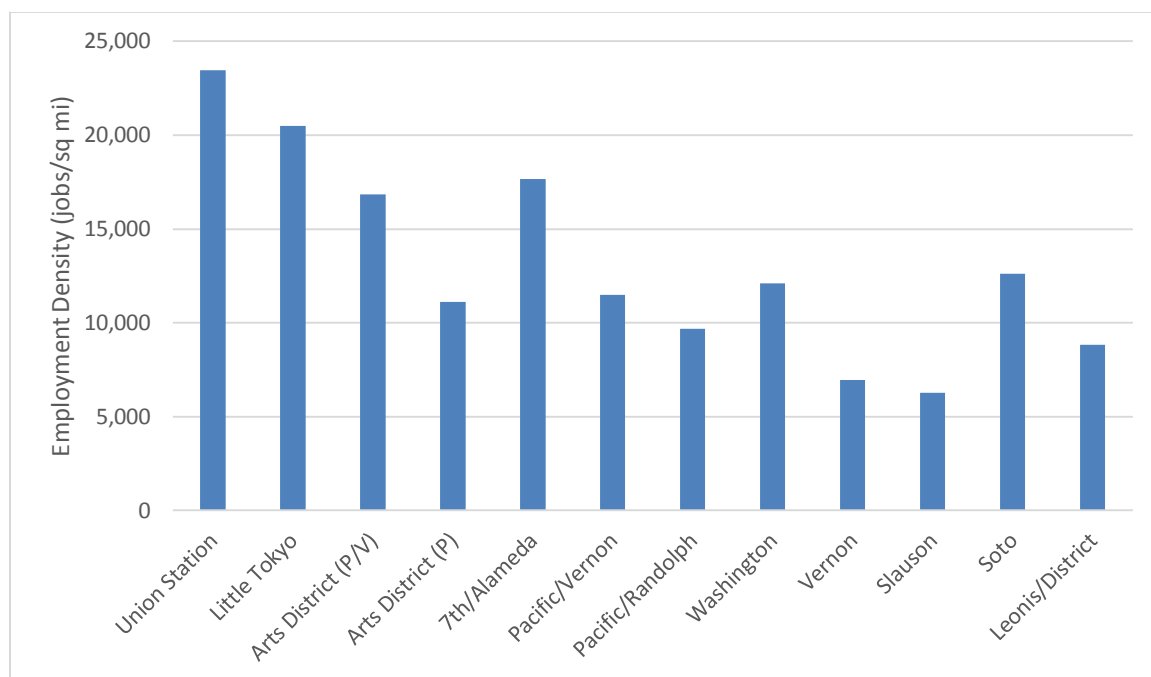
	Score	Description
●	High	Greater than 15,000 jobs per square mile within 0.5 mile the proposed stations.
◐	Medium	Between 14,000 and 15,000 jobs per square mile within 0.5 mile the proposed stations.
○	Low	Less than 14,000 jobs per square mile within 0.5 mile the proposed stations.

Figure 5-7. 2040 Employment Density



Source: Metro Travel Demand Model 2012-2040

Figure 5-8. 2040 Employment Density within a Half-Mile of Proposed Stations



Source: Metro Travel Demand Model 2012-2040

Table 5-19. 2040 Employment Density Evaluation

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda Option	Pacific/ Vignes Option	Alameda Option	Alameda/ Vignes Option
2040 employment densities within ½ mile of stations	14,970 jobs/square mile	14,830 jobs/square mile	15,250 jobs/square mile	15,370 jobs/square mile	13,800 jobs/square mile	13,280 jobs/square mile
2040 employment density score	●	●	●	●	○	○

Source: Metro Travel Demand Model 2012-2040

5.2.3 Plans and Policies Supporting Transit Oriented Development around Stations

Transit Oriented Development (TOD) has the potential to concentrate future residential and employment growth around the transit network, potentially increasing ridership while also providing economic benefits for the local jurisdictions. TOD opportunities have been identified along the WSAB Transit Corridor by local jurisdictions in their General Plans and Specific Plans and programmed in development projects. As described in the *SCAG AA Urban Design Report (2012)*, strategic TOD development is a key in supporting a transit system investment, as

“these influences took the form of the identification of civic assets and redevelopment opportunities to strengthen civic identity and provide strategic community linkages. All of these opportunities and influences had benefits that ranged from serving as supporting factors for a better quality of life (“livability factors”), economic benefits, and support for a transit system investment.”

Table 5-20 describes the rating system for the “high”, “medium”, or “low” ranking. For this criterion, each proposed station area was qualitatively evaluated based on the potential to capture a growing share of mixed-use development. The evaluation for each station area was considered to develop an overall score for each alignment option. Those alignment options that would serve an area with high TOD potential would be preferred as concentrating future growth around the transit network is beneficial for both transit ridership as well as economic development. The overall score for each alignment option is summarized in Table 5-21.

The following sections summarize TOD potential for each station.

Union Station

Union Station is a major regional hub. Extensive planning is underway for the area surrounding Union Station to fully realize its high-density TOD potential. The Union Station Master Plan establishes TOD opportunities within the Union Station property while the Metro Gateway Union Station Linkages Study identifies pedestrian and bicycle connections to nearby neighborhoods, such as Little Tokyo and the Arts District.

TOD Potential: High

Little Tokyo

The Little Tokyo Station area is a thriving neighborhood with dense, mixed use development and highly walkable streets. The Little Tokyo Station area is also a high priority neighborhood for future development for the City of Los Angeles and Metro. The Downtown Development Strategy, Little Tokyo Community Design Overlay District, and Regional Connector TOD Planning all lay out guidelines to encourage pedestrian-friendly, mixed use development in Little Tokyo. The Metro Gateway Union Station Linkages Study is developing a plan to enhance access via foot or bicycle between 1st/Central Station, Little Tokyo and Arts District as well as between neighboring areas.

TOD Potential: High

Arts District

The Arts District Station would serve one of the most active real estate markets in the Los Angeles area. While this area was formerly an industrial area, the neighborhood is now heavily residential with many of the former warehouses converted into residential lofts and artist galleries. The City of Los Angeles is in the process of updating the

Central City North Community Plan, which will provide policies guiding development in this rapidly changing neighborhood. Numerous mixed-use projects are proposed for development in the near future, suggesting the population of this neighborhood will only grow.

TOD Potential: High

7th/Alameda

The area surrounding the proposed 7th Street/Alameda Station is primarily industrial and wholesale commercial. The Metro bus maintenance yard immediately adjacent to the proposed station occupies an entire city block. However, this bus maintenance yard may provide a potential TOD opportunity, especially considering the proximity of this site to downtown and the Arts District. Due to the industrial nature of the surrounding uses, the area is not oriented towards pedestrians, with large blocks and many properties blocked with fences. The 7th Street/Alameda Station is also adjacent to the Arts District neighborhood, which is a quickly developing area with a mix of uses, including residential lofts.

TOD Potential: Medium

Pacific/Vernon

The Pacific/Vernon Station is heavily industrial with low population and employment in the station area. Due to the surrounding industrial and manufacturing uses, the station vicinity is not pedestrian-oriented and has heavy truck traffic serving the nearby warehouses.

In the City of Vernon's plans, the station area is zoned for industrial use and maintaining the industrial focus is a priority of the City. The City has designated a commercial zone within a half-mile of the station, but the area remains predominantly industrial.

TOD Potential: Low

Pacific/Randolph

The Pacific/Randolph Station is located in the middle of the Pacific Boulevard retail district, which is a regional shopping destination. Pacific Boulevard is a pedestrian-friendly street with a mix of retail uses and bustling activity.

The City of Huntington Park recognizes the potential of Pacific Boulevard to support future growth and has developed the Downtown Huntington Park Specific Plan and the Downtown Huntington Park Business Improvement District Strategic Plan for Downtown Management. The City is also working on streetscape plans for Pacific Boulevard.

TOD Potential: Medium

Washington

The immediate area surrounding the proposed Washington Station is primarily industrial. This proposed station would be located immediately adjacent to the existing Metro Blue Line Washington Station. The City of Los Angeles Southeast Los Angeles Community Plan identifies the area surrounding the existing Metro Blue Line Vernon Station as a Transit Oriented District with the intent of tailoring development potential to the existing scale, infrastructure and land uses at each Metro Blue Line Station. The City of Los Angeles Southeast Los Angeles Community Plan also identifies Washington Boulevard as a Regional Center, setting out policies along this corridor to create pedestrian-friendly streets and a vibrant and livable district. This would be achieved by: promoting a mixed-use, Transit Oriented District; requiring high quality and well-designed development; attracting major retail providers that are currently lacking in the community; providing housing at all levels of affordability; and enhancing the identity of the Washington Boulevard Corridor.

TOD Potential: Medium

Vernon

The proposed Vernon Station straddles a heavily industrial area to the east and primarily residential neighborhoods to the west of the station. The proposed Vernon Station would be adjacent to the existing Metro Blue Line Vernon Station. The City of Los Angeles Southeast Los Angeles Community Plan identifies the area surrounding the existing Metro Blue Line Vernon Station as a Transit Oriented District with the intent of tailoring development potential to the existing scale, infrastructure and land uses at each station.

TOD Potential: High

Slauson

The Slauson Station would be located adjacent to the existing Metro Blue Line Slauson Station, which has already been the subject of TOD focus. The area surrounding the Slauson Station is densely populated with one of the highest population densities of any of the stations along the WSAB alignment options. The Slauson Station is located in unincorporated Los Angeles County, whose General Plan designates the half mile around the station as a Transit Oriented District with the intent of encouraging infill development and pedestrian-friendly and community serving uses near transit stops. In 2010 the Urban Land Institute published a report specifically looking at the challenges and opportunities for the future TOD at the existing Metro Blue Line Slauson Station and laid out a road map to guide and encourage TOD around this station.

TOD Potential: High

Soto

The Soto Station is located in a heavily industrial area with low population densities. Due to the industrial nature of the area, the road network was developed to primarily serve trucks and cargo vehicles and was not designed with the pedestrian in mind. There are very few sidewalks near the station and vehicular traffic travels at high speeds along arterials.

The Soto Street Station is located within the Cleantech Corridor, which will continue the development of manufacturing along this corridor. With this investment designation, there is opportunity to re-consider the types of manufacturing and how these new developments fit with the urban fabric.

TOD Potential: Low

Leonis/District

The Leonis/District Station is also located in a heavily industrial area with low population and employment densities. Similar to Soto Street, the station vicinity is not pedestrian-oriented and has heavy truck traffic serving the nearby warehouses.

In the City of Vernon's plans, the station area is zoned for industrial uses and the City has no plans for redevelopment in the station vicinity. In terms of station linkages, it may be more effective to focus efforts on improving bicycle linkages to the nearby warehouses and industrial jobs rather than pedestrian linkages. Bicycle connections would better serve the existing street grid and expand the number of jobs that can be accessed from the station.

TOD Potential: Low

Summary

The station areas with the greatest potential for TOD are those located in downtown Los Angeles – specifically, Union Station, Little Tokyo and the Arts District – where TOD-supportive policies and planning are in place and mixed use projects are already under construction. The alignment options along Alameda that overlap with the existing Metro Blue Line present the most promising TOD opportunities as plans and policies have already been adopted and the station areas are characterized by densely developed residential neighborhoods to the west. The Pacific and West Bank 3 alignment options pass through more industrial uses in the City of Vernon, which are planned to remain industrial in the future. The West Bank 3 alignment option scores lower than the Pacific/Alameda and Pacific/Vignes alignment options because it does not reach Union Station, which offers more TOD potential. Likewise, the stations along the East Bank alignment option are also located in primarily industrial areas with few plans in place to support future TOD.

Table 5-20. TOD Potential Opportunities Scoring Threshold

	Score	Description
●	High	Provides high potential for TOD opportunities
◐	Medium	Provides moderate potential for TOD opportunities
○	Low	Provides minimal potential for TOD opportunities

Table 5-21. TOD Potential Opportunities Summary

Station Area	East Bank	West Bank 3	Pacific/ Alameda	Pacific/ Vignes	Alameda	Alameda/ Vignes
Union Station	High	n/a	High	High	High	High
Little Tokyo	n/a	High	High	n/a	High	n/a
Arts District	n/a	n/a	High	High	n/a	High
7th/Alameda	n/a	Medium	n/a	n/a	Medium	Medium
Pacific/ Vernon	n/a	Low	Low	Low	n/a	n/a
Pacific/ Randolph	n/a	High	High	High	High	High
Washington	n/a	n/a	n/a	n/a	Medium	Medium
Vernon	n/a	n/a	n/a	n/a	High	High
Slauson	n/a	n/a	n/a	n/a	High	High
Soto	Low	n/a	n/a	n/a	n/a	n/a
Leonis/ District	Low	n/a	n/a	n/a	n/a	n/a
Overall TOD Potential Opportunities Rating	Low	Medium	High	High	High	High
TOD Potential Opportunities Score	○ Stations located in primarily industrial station areas	◐ One downtown LA station, and stations in commercial and industrial areas	● Three downtown LA stations, and stations in commercial and industrial areas	● Two downtown LA stations, and stations in commercial and industrial areas	● Three downtown LA stations and adopted TOD station areas along the Metro Blue Line	● Three downtown LA stations and adopted TOD station areas along the Metro Blue Line

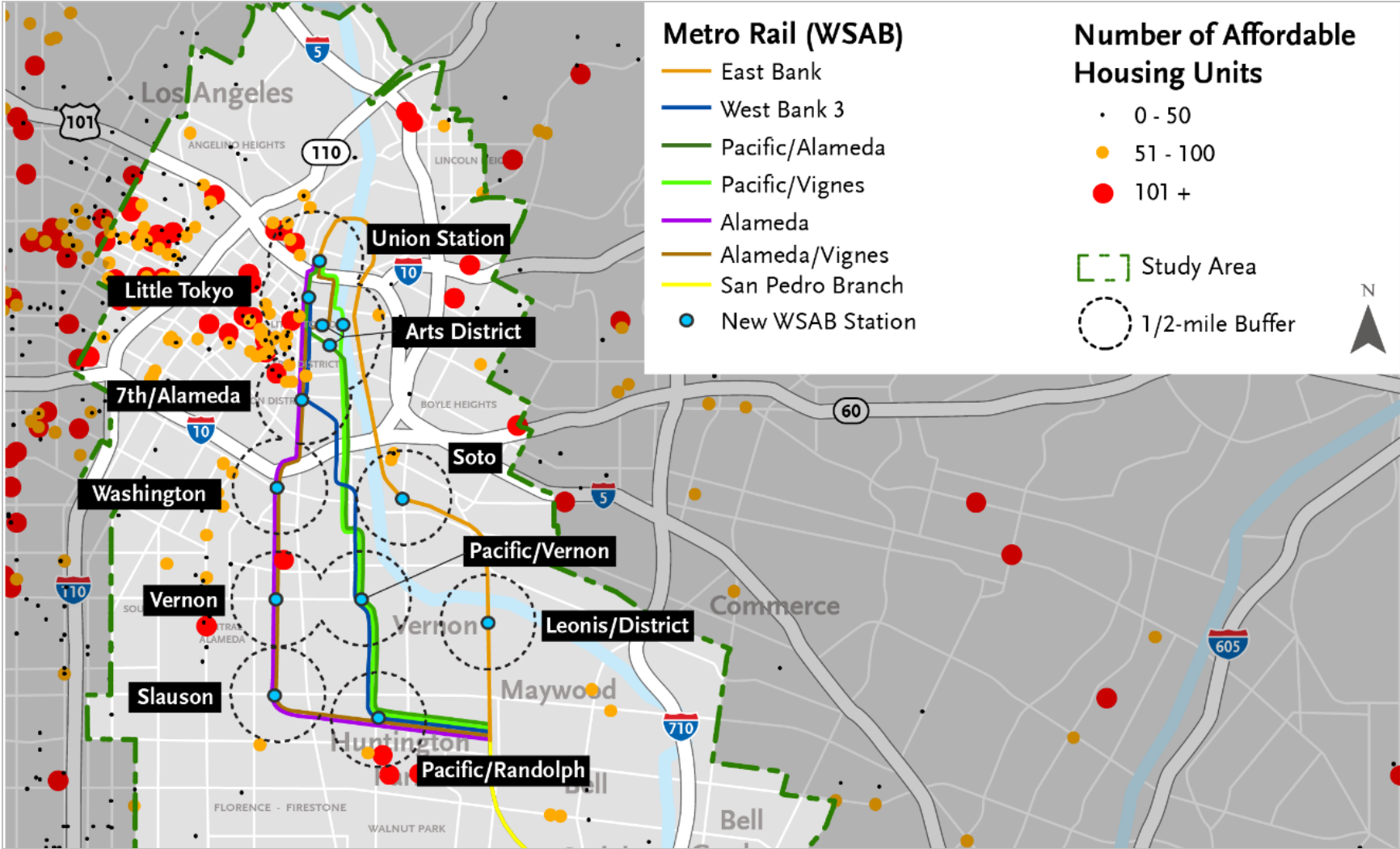
5.2.4 Affordable Housing Opportunities

The FTA places great emphasis on the importance of affordable housing near transit. Locating stations near affordable housing could help low-income residents, who are more likely to be transit-dependent, by providing improved travel options to employment opportunities and other regional destinations.

Affordable housing data was collected from the Los Angeles County Housing and Urban Development Properties. Table 5-22 describes the rating system for the “high”, “medium”, or “low” ranking for affordable housing opportunities. Those alignment options that would serve a greater number of affordable housing units received a higher score than alignment options that served fewer units. Table 5-23 presents the total number of affordable housing units within a half-mile of the stations along each alignment option, and the corresponding score for this criterion.

The number of affordable housing units within a half-mile of the proposed stations along each alignment option range from 954 units for East Bank alignment option to 2,825 for the Alameda alignment option. It is estimated that more than 2,000 affordable housing units exist within a half-mile of the stations along the Pacific/Alameda, Alameda, and Alameda/Vignes alignment options, largely due to the high concentration of affordable housing units around the Little Tokyo Station, giving these alignment options a “high” score.

Figure 5-9. Location of Existing Affordable Housing Units



Source: Los Angeles County Housing and Urban Development Properties; Los Angeles County Tax Credit Properties

Table 5-22. Affordable Housing Opportunities Scoring Thresholds

	Score	Description
●	High	Greater than 2,000 affordable housing units within 0.5 mile the proposed stations.
◐	Medium	Between 1,000 and 2,000 affordable housing units within 0.5 mile the proposed stations.
○	Low	Less than 1,000 affordable housing units within 0.5 mile the proposed stations.

Table 5-23. Affordable Housing Opportunities Evaluation

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda Option	Pacific/ Vignes Option	Alameda Option	Alameda/ Vignes Option
Number of existing affordable housing units within ½ mile of stations	954 affordable housing units	1,713 affordable housing units	2,107 affordable housing units	1,659 affordable housing units	2,825 affordable housing units	2,798 affordable housing units
Affordable housing opportunities scores	○	◐	●	◐	●	●

Source: Los Angeles County Housing and Urban Development Properties; Los Angeles County Tax Credit Properties

5.2.5 Supports Existing Local Plans and Programs

Support for the WSAB Transit Corridor has long been a priority for communities. Policies supporting the project have been integrated in local cities and jurisdictions as part of their General Plans/Circulation and Mobility Elements as well as their strategic plans.

This criterion reviews the proposed projects and plans within the Study Area that would connect to and/or support the alignment options. Table 5-24 describes the rating system for the “high”, “medium”, or “low” ranking and Table 5-25 provides the score for each alignment option.

The alignment options traverse many jurisdictions within the Study Area, including the cities of Huntington Park, Vernon and Los Angeles as well as unincorporated LA County, each of which has their own adopted plans and policies.

- The City of Los Angeles Mobility Plan 2035, which is an element of the General Plan, identifies the WSAB Transit Corridor as a key regional transit connection providing service between Union Station and the south/eastern cities. All alignment options with the exception of West Bank 3 meet that objective.

- The City of Vernon’s General Plan Policy CI-1.6 encourages the improvement of services provided by Metro to Vernon and adjacent cities to provide access to employment and residential centers. This policy is supported by the East Bank, West Bank 3, Pacific/Alameda, and Pacific/Vignes alignment options.
- The City of Huntington Park’s General Plan Policy 4.2 states work with Metro to coordinate connections to the light rail Blue Line. The General Plan also promotes public transit use by encouraging employers to provide incentives such as reduced rate passes to potential transit users, and by identifying locations where improvements such as bus turnouts and shelters would improve operations and security. The Alameda and Alameda/Vignes alignment options best meet the goals set out in this plan by providing a connection to the Metro Blue Line.

All of the alignment options meet the goals and objectives set forth in at least one plan or policy considered. With the exception of the City of Vernon General Plan, the Alameda and Alameda/Vignes alignment options meet the goals and objectives of all local plans and policies. Due to the lack of connection to Union Station, the West Bank 3 alignment option meets the fewest goals and objectives. Due to the numerous jurisdictions the alignment options pass through, it is challenging for a single alignment to meet the goals and objectives in all of the plans and policies.

Table 5-24. Existing Local Plans and Programs Scoring Threshold

	Score	Description
●	High	Would highly support local plans and programs for the WSAB Transit Corridor
◐	Medium	Would moderately support local plans and programs for the WSAB Transit Corridor
○	Low	Would minimally support local plans and programs for the WSAB Transit Corridor

Table 5-25. Existing Local Plans and Programs Summary

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/Alameda Option	Pacific/Vignes Option	Alameda Option	Alameda/Vignes Option
Supported by existing local plans and programs	Effectively meets local plans	Moderately meets local plans	Effectively meets local plans	Effectively meets local plans	Effectively meets local plans	Effectively meets local plans
Local Plans and Programs Score	●	◐	●	●	●	●

Source: West Santa Ana Branch Technical Refinement Study: Technical Report: Compatibility with Surrounding Land Uses (Metro 2015).

5.2.6 Support Local and Regional Land Use Plans and Policies Summary

Overall, the Pacific/Alameda, Pacific/Vignes, Alameda, and Alameda/Vignes alignment options provide the greatest compatibility with existing and planned land uses (see The West Bank 3, Pacific/Alameda, and Pacific/Vignes alignment options serve a corridor with high employment density through the City of Vernon, while the Alameda and Alameda/Vignes alignment options would operate along a densely populated corridor bordering southeast Los Angeles. The northern alignment options with stations that serve the core of downtown Los Angeles (Union Station and Little Tokyo) have higher average population and employment densities than the northern alignment options that do not.

These downtown station areas, along with the Arts District Station, are also areas primed for future TOD with policies already in place to encourage mixed-use, high-density development. The proposed stations along the Alameda and Alameda/Vignes alignment options overlap with the existing Metro Blue Line stations, which also have TOD plans and policies already in place to encourage transit-friendly development. The northern alignment options along Pacific Boulevard provide little opportunity for future TOD due to the industrial nature of the corridor. Likewise, the East Bank alignment option passes through primarily industrial areas with limited TOD plans and policies in place. While the West Bank 3 alignment option is similar to the Pacific/Alameda alignment option, it does not connect to Union Station, which is a major planned TOD center. Most of the existing affordable housing units are concentrated along the Alameda and Alameda/Vignes alignment options, as well as in downtown Los Angeles, with an especially high number within a half-mile of the Little Tokyo Station. The northern alignment options that serve more industrial areas have fewer affordable housing units around the station areas.

All of the northern alignment options meet the goals and objectives set forth in adopted plans and policies of the local jurisdictions. However, due to the lack of connection into Union Station or the Metro Blue Line, West Bank 3 only meets the goals set forth in the City of Vernon General Plan.

Table 5-26). The West Bank 3, Pacific/Alameda, and Pacific/Vignes alignment options serve a corridor with high employment density through the City of Vernon, while the Alameda and Alameda/Vignes alignment options would operate along a densely populated corridor bordering southeast Los Angeles. The northern alignment options with stations that serve the core of downtown Los Angeles (Union Station and Little Tokyo) have higher average population and employment densities than the northern alignment options that do not.

These downtown station areas, along with the Arts District Station, are also areas primed for future TOD with policies already in place to encourage mixed-use, high-density development. The proposed stations along the Alameda and Alameda/Vignes alignment options overlap with the existing Metro Blue Line stations, which also have TOD plans and policies already in place to encourage transit-friendly development. The

northern alignment options along Pacific Boulevard provide little opportunity for future TOD due to the industrial nature of the corridor. Likewise, the East Bank alignment option passes through primarily industrial areas with limited TOD plans and policies in place. While the West Bank 3 alignment option is similar to the Pacific/Alameda alignment option, it does not connect to Union Station, which is a major planned TOD center. Most of the existing affordable housing units are concentrated along the Alameda and Alameda/Vignes alignment options, as well as in downtown Los Angeles, with an especially high number within a half-mile of the Little Tokyo Station. The northern alignment options that serve more industrial areas have fewer affordable housing units around the station areas.

All of the northern alignment options meet the goals and objectives set forth in adopted plans and policies of the local jurisdictions. However, due to the lack of connection into Union Station or the Metro Blue Line, West Bank 3 only meets the goals set forth in the City of Vernon General Plan.

Table 5-26. Overall Local and Regional Land Use Compatibility

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda Option	Pacific/ Vignes Option	Alameda Option	Alameda/ Vignes Option
2040 population densities within ½ mile of stations	● 10,580 persons/ square mile	○ 8,880 persons/ square mile	● 13,570 persons/ square mile	● 12,310 persons/ square mile	● 14,140 persons/ square mile	● 13,400 persons/ square mile
2040 employment densities within ½ mile of stations	● 14,970 jobs/ square mile	● 14,830 jobs/ square mile	● 15,250 jobs/ square mile	● 15,370 jobs/ square mile	○ 13,800 jobs/ square mile	○ 13,280 jobs/ square mile
Plans and policies supporting TOD around stations	○ Stations located in primarily industrial station areas	● One downtown LA station, and stations in commercial and industrial areas	● Three downtown LA stations, and stations in commercial and industrial areas	● Two downtown LA stations, and stations in commercial and industrial areas	● Three downtown LA stations and adopted TOD station areas along the Metro Blue Line	● Three downtown LA stations and adopted TOD station areas along the Metro Blue Line
Number of existing affordable housing units within ½ mile of stations	○ 954 affordable housing units	● 1,713 affordable housing units	● 2,107 affordable housing units	● 1,659 affordable housing units	● 2,825 affordable housing units	● 2,798 affordable housing units
Supported by existing local plans and programs	● Effectively meets local plans	● Moderately meets local plans	● Effectively meets local plans	● Effectively meets local plans	● Effectively meets local plans	● Effectively meets local plans
Overall Rankings and Scores	Low 2.0	Low 2.0	High 5.0	High 4.0	High 4.0	High 4.0

5.3 Minimize Environmental Impacts

The purpose of the goal to minimize environmental impacts is to advance a project that meets the following objectives:

- Minimizes environmental and community impacts
- Minimizes impacts to the transportation network

The following sections evaluate each alignment option against the evaluation criteria developed for the goal to minimize environmental impacts.

5.3.1 Reduction in Vehicle Miles Traveled

Vehicle miles traveled (VMT) is the basis of evaluating potential emissions reductions with implementation of a new transit system. According to Metro’s Countywide Sustainable Planning Policy and Implementation Plan (2012), reductions in VMT would result in a multitude of benefits including but not limited to: reduced greenhouse gas emissions, reduced emissions of pollutants, increased physical activity, and increased use of active transportation and transit. Also included within the Countywide Sustainable Planning Policy and Implementation Plan is a focus on increasing sustainable transportation modes.

Alignment options that provide the greatest VMT savings would result in greater reductions in emissions and other sustainability benefits pursuant to Metro’s Countywide Sustainable Planning Policy and Implementation Plan. Table 5-27 describes the rating system for the “high”, “medium”, or “low” ranking and

Table 5-28 provides the VMT savings and associated score for each alignment option.

The East Bank, Pacific/Alameda and Pacific/Vignes alignment options are anticipated to provide the greatest reduction in VMT, approximately 290,000, 312,000 and 284,000 miles, respectively. The West Bank 3 alignment option is forecasted to provide the smallest reduction in VMT, approximately 163,000, which aligns with the lower ridership projections due to the lack of a connection to Union Station.

Table 5-27. Reduction in VMT Scoring Threshold

	Score	Description
●	High	Greater than 250,000 VMT reduced
◐	Medium	Between 200,000 and 250,000 VMT reduced
○	Low	Less than 200,000 VMT reduced

Table 5-28. Reduction in VMT Summary

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/Alameda Option	Pacific/Vignes Option	Alameda Option	Alameda/Vignes Option
Reduction in vehicle miles traveled (VMT)	289,960 VMT reduced	162,510 VMT reduced	312,150 VMT reduced	283,710 VMT reduced	214,930 VMT reduced	216,820 VMT reduced
Reduction in VMT score	●	○	●	●	◐	◐

Source: West Santa Ana Branch Technical Refinement Study: Task 3.1 B - Travel Demand Modeling Forecasting Results Report (Metro 2015).

5.3.2 Impacts to Roadway Lanes, Parking and Freight Movement

The LRT within the street right-of-way poses the potential to disrupt the street network both during construction and long-term while in operations. Each alignment option was reviewed for the following potential affects:

- Removal of traffic lanes
- Removal of parking
- Removal of pedestrian or bicycle facilities
- Affect to freight operations (analysis shown in following section)

The alignment options are at a highly conceptual level, so potential affects were identified for areas where there is a high likelihood of a conflict. As design progresses, it is possible for some of these affects to be eliminated or minimized and additional affects identified.

East Bank

Removal of Traffic Lanes

The East Bank alignment option would not require the removal of any traffic lanes as it is planned to be located almost entirely within existing railroad ROW.

Removal of Parking

The East Bank alignment option would not require the removal of any on or off street parking as it is planned to be located almost entirely within existing railroad ROW.

Removal of Pedestrian or Bicycle Facilities

The East Bank alignment option would not result in impacts to any pedestrian or bicycle facilities as it is located almost entirely within existing railroad ROW.

West Bank 3

Removal of Traffic Lanes

The West Bank 3 alignment option would require the removal of one lane of traffic in each direction on Santa Fe Avenue, 15th Street, and Pacific Boulevard.

Removal of Parking

The West Bank 3 alignment option would require the removal of on-street parking along Alameda Street, Minerva Avenue, Pacific Boulevard, and Randolph Street. There would also be a loss of off-street parking within the La Habra Branch.

Removal of Pedestrian or Bicycle Facilities

The West Bank 3 alignment option would not result in impacts to any pedestrian or bicycle facilities.

Pacific/Alameda

Removal of Traffic Lanes

The Pacific/Alameda alignment option would require the removal of one lane of traffic in each direction along 4th Place, Santa Fe Avenue, and Pacific Boulevard.

Removal of Parking

The Pacific/Alameda alignment option would result in the loss of on-street parking along Alameda Street, Santa Fe Avenue, 25th Street, Minerva Avenue, Pacific Boulevard, and Randolph Street. There would also be a loss of off-street parking within the La Habra Branch.

Removal of Pedestrian or Bicycle Facilities

The Pacific/Alameda alignment option would not result in impacts to any pedestrian or bicycle facilities.

Pacific/Vignes

Removal of Traffic Lanes

The Pacific/Vignes alignment option would require the removal of one lane of traffic in each direction on Commercial Street, Santa Fe Avenue, and Pacific Boulevard.

The Pacific/Vignes alignment option may require the permanent closure of cross traffic along Vignes Street where the aerial structure transitions to at-grade north of Temple Street and transitions from at-grade to tunnel south of Temple Street.

Removal of Parking

The Pacific/Vignes alignment option would result in the loss of on-street parking along Commercial Street, Vignes Street, Santa Fe Avenue, 25th Street, Minerva Avenue, Pacific Boulevard, and Randolph Street. There would also be a loss of off-street parking within the La Habra Branch.

Removal of Pedestrian or Bicycle Facilities

The Pacific/Vignes alignment option would not result in impacts to any pedestrian or bicycle facilities.

Alameda

Removal of Traffic Lanes

The Alameda alignment option may require the modification to left-turn movements along Alameda Street between 4th Street and 14th Street to accommodate the support columns for the aerial structure.

Removal of Parking

The Alameda alignment option would result in the loss of on-street parking along Alameda Street and Randolph Street. There would also be a loss of off-street parking within the La Habra Branch.

Removal of Pedestrian or Bicycle Facilities

The Alameda alignment option could narrow the sidewalks along Alameda Street between 4th Street and 14th Street to accommodate the support columns for the aerial structure and would require modification to the 53rd Street pedestrian overcrossing

Alameda/Vignes

Removal of Traffic Lanes

The Alameda/Vignes alignment option may require the permanent closure of cross traffic along Vignes Street where the aerial structure transitions to at-grade north of Temple Street and transitions from at-grade to tunnel south of Temple Street.

Where the alignment transitions from tunnel to aerial at Alameda Street south of 3rd Street, traffic lanes may be removed to accommodate the structure. Also, the option may require modification to left-turn movements along Alameda Street between 4th Street and 14th Street to accommodate the support columns for the aerial structure.

Removal of Parking

The Alameda/Vignes alignment option would result in the loss of on-street parking along Alameda Street and Randolph Street. There would also be a loss of off-street parking within the La Habra Branch.

Removal of Pedestrian or Bicycle Facilities

The Alameda/Vignes alignment option could narrow the sidewalks along Alameda Street between 4th Street and 14th Street to accommodate the support columns for the aerial structure and would require modification to the 53rd Street pedestrian overcrossing

Summary

Table 5-30 presents the summary of transportation facility impacts for each alignment option as well as a score. The East Bank alignment option results in no affects to transportation facilities as it is planned to be constructed and operate almost entirely within existing railroad ROW. However, this alignment option does present a potential conflict with existing freight lines as discussed below in Section 5.3.3. Both the Pacific/Vignes and Alameda/Vignes alignment options may require restrictions to cross traffic along a portion of Vignes Street to accommodate the transition from aerial to tunnel. However, the Pacific/Vignes alignment option would also require the removal of a lane from numerous streets, whereas the Alameda/Vignes alignment option would only affect left-turn lanes along Alameda Street. With the exception of East Bank, all alignment options would require the removal of on-street parking and off-street parking along Randolph Street. Only Alameda and Alameda/Vignes alignment options would affect pedestrian facilities with the modification of an existing pedestrian bridge and potential narrowing of sidewalk width along Alameda Street. Therefore, due to the restriction of cross traffic along Vignes Street and the loss of through lanes, the Pacific/Vignes alignment option has the greatest overall potential affect to transportation facilities.

Table 5-29. Impacts to Roadway Lanes, Parking and Freight Movement Threshold

	Score	Description
●	High	Major impacts to roadway lanes, parking and freight movement
◐	Medium	Moderate impacts to roadway lanes, parking and freight movement
○	Low	Minimal impacts to roadway lanes, parking and freight movement

Table 5-30. Impacts to Roadway Lanes, Parking and Freight Movement Summary

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/Alameda Option	Pacific/Vignes Option	Alameda Option	Alameda/Vignes Option
Removal of traffic lanes	None	Moderate	Moderate	Major	Minor	Moderate
Removal of parking (on- or off-street)	None	Moderate	Moderate	Moderate	Moderate	Moderate
Removal of pedestrian or bicycle facilities	None	None	None	None	Minor	Minor
Impacts to Roadway Lanes, Parking and Freight Movement score	●	◐	◐	○	◐	◐

5.3.3 Minimize Disruption to Existing Railroad ROW

The Study Area includes railroad ROW that are located adjacent to the alignment options. Various rail operators including Metro, UPRR, BNSF, and the Ports of LA and Long Beach would constrain construction of and operation for many of the alignment options. In order to construct LRT tracks within an existing railroad ROW not owned by Metro, Metro would require an easement to operate on a portion of the ROW.

Table 5-31 describes the rating system for the “high”, “medium”, or “low” ranking. Table 5-32 presents the percentage of miles each alignment option overlaps with existing railroad ROW north of the Florence/Salt Lake Station, and the corresponding score.

The West Bank 3, Pacific/Alameda, and Pacific/Vignes alignment options score “high” with the least overlap of all alignment options. These alignment options would operate primarily in the street ROW. The East Bank alignment option poses the greatest potential disruption, with most of its alignment overlapping with existing rail lines and

therefore scores “low”. This alignment option would share the Metro ROW with UPRR along the east side of the LA River and then share the San Pedro Subdivision with UPRR, posing a potential conflict due to limited ROW width. The Alameda and Alameda/Vignes alignment options scored “medium” as these alignment options would be adjacent to the freight that runs parallel to and in between the Metro Blue Line and Long Beach Boulevard.

Table 5-31. Disruption to Existing Railroad ROW Scoring Threshold

	Score	Description
●	High	Less than 20% of alignment overlaps with existing rail operations
◐	Medium	Between 20% and 32% of alignment overlaps with existing rail operations
○	Low	More than 33% of alignment overlaps with existing rail operations

Table 5-32. Disruption to Existing Railroad ROW Summary

Evaluation Criteria	Alternatives					
	East Bank	West Bank 3	Pacific/Alameda Option	Pacific/Vignes Option	Alameda Option	Alameda/Vignes Option
Minimal disruption to existing railroad ROW (% of miles overlap with existing railroad ROW)	38%	11%	12%	11%	26%	25%
Disruption to Existing Railroad ROW Score	○	●	●	●	◐	◐

Source: West Santa Ana Branch Technical Refinement Study (Metro 2015)

5.3.4 Minimize Environmental Impacts Summary

The Pacific/Alameda alignment option provides the greatest overall potential to minimize environmental impacts during both construction and operations (see Table 5-33). The Pacific/Alameda, Pacific/Vignes, and East Bank alignment options result in the largest reduction in vehicle miles traveled during operation, resulting in improved air quality and other associated health and environmental benefits. With the exception of the East Bank alignment option, all northern alignment options may result in some impacts to the roadway network by either requiring the removal of parking or traffic lanes. These impacts are most likely to occur where the alignment is aerial or transitioning from aerial to underground. While the East Bank alignment option would not affect the roadway network, over a third of the alignment would overlap with active freight routes, which would potentially disrupt service.

Table 5-33. Overall Minimize Environmental Impacts

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda Option	Pacific/ Vignes Option	Alameda Option	Alameda/ Vignes Option
Reduction in vehicle miles traveled (VMT)	● 289,960 VMT reduced	○ 162,510 VMT reduced	● 312,150 VMT reduced	● 283,710 VMT reduced	◐ 214,930 VMT reduced	◐ 216,820 VMT reduced
Impacts to roadway lanes, parking, and truck movement	● No removal of parking or traffic lanes and minimal impacts to truck movement	◐ Minimal removal of parking or traffic lanes and minimal impacts to truck movement	◐ Minimal removal of parking or traffic lanes and minimal impacts to truck movement	○ Moderate removal of parking or traffic lanes and minimal impacts to truck movement	◐ Minimal removal of parking or traffic lanes and minimal impacts to truck movement	◐ Minimal removal of parking or traffic lanes and minimal impacts to truck movement
Minimal disruption to existing railroad ROW (% of miles overlap with existing railroad ROW)	○ 38%	● 11%	● 11%	● 11%	◐ 25%	◐ 25%
Overall Rankings and Scores	Medium 2.0	Low 1.5	High 2.5	Medium 2.0	Low 1.5	Low 1.5

5.4 Ensure Cost Effectiveness and Financial Feasibility

The purpose of the cost effectiveness and financial feasibility goal is to advance a project that meets the following objectives:

- Costs are financially feasible
- Provides cost effective project
- Minimizes risk of cost increase

The following sections evaluate each alignment option against the evaluation criteria developed for the cost effectiveness and financial feasibility goal.

5.4.1 Rough Order of Magnitude Capital Costs

Capital cost estimates for each alignment option were prepared in support of the TRS. These preliminary cost estimates were developed for each alignment option in accordance with FTA guidelines and using the latest revision of FTA's Standard Cost Categories (SCC). These estimates were prepared in a standard estimating format

appropriate for 5 percent level of design of project development. These cost estimates will be refined as design progresses.

The FTA guidelines require cost estimates to be prepared and reported using the latest version of the SCC. Cost categories form the basis of the cost estimate. The cost categories consist of the following:

- Guideway: At-Grade, Aerial, Tunnel, Cut and Cover
- Stations: At-Grade, Aerial, and Underground
- Support Facilities
- Sitework and Special Conditions
- Systems
- ROW, Land, Existing Improvements
- Vehicles
- Professional Services
- Contingency
- Finance Charges
-

Table 5-34 describes the rating system for the “high”, “medium”, or “low” ranking. Table 5-35 presents the capital cost (in millions, 2015 dollars) for each of the alignment options under consideration. These costs are for the full length of the alignment (northern terminus to Artesia).

The capital costs range from \$3,796.3 million (East Bank) to \$4,624.4 million (Alameda/Vignes). In general, the alignments that are longer and with longer tunnel segments are more expensive than shorter alignments that are predominantly at-grade. The Alameda/Vignes alignment option has the longest portion of the alignment that would be cut and cover tunnel, resulting in the higher cost. Compared to the Pacific/Alameda and Pacific/Vignes alignment options, the West Bank 3 alignment option is slightly less expensive because it does not extend all the way into Union Station.

Although the East Bank alignment option had the lowest estimated capital cost in the TRS, it is likely that the ROW costs were underestimated. Due to the constraints of existing railroad usages and adjacent high-tension power lines to the west, the construction of the East Bank alignment option would require the acquisition of commercial buildings immediately to the east of the ROW, which will likely result in higher ROW costs. Therefore, although it has the lowest capital cost estimate from the TRS, the East Bank does not score the highest due to a high contingency for ROW costs.

Table 5-34. Capital Cost Scoring Thresholds

	Score	Description
●	High	Less than \$3,800 million in capital costs
◐	Medium	Between \$3,800 million and \$4,500 million in capital costs
○	Low	Over \$4,500 million in capital costs

Table 5-35. Capital Costs Summary

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda Option	Pacific/ Vignes Option	Alameda Option	Alameda/ Vignes Option
Capital cost (rough order of magnitude in millions \$2015)	\$ 3,796.3 ⁹	\$ 4,315.5	\$ 4,420.5	\$ 4,416.2	\$ 4,309.4	\$ 4,624.4
Capital Cost Score	◐	◐	◐	◐	◐	○

Source: West Santa Ana Branch Technical Refinement Study (Metro 2015)

5.4.2 Cost Effectiveness

A common measure of project cost effectiveness is the project's cost compared to the number of riders served. For this analysis, the lower the cost per rider, the more cost effective the alignment option. Similarly, the higher the cost per rider, the less cost effective the alignment option. Table 5-36 describes the rating system for the "high", "medium", or "low" ranking. Table 5-37 summarizes the cost/boarding for each alignment option and the respective score for this criterion. It should be noted that this cost effectiveness calculation should not be compared to the FTA New Starts criteria, which uses a different methodology.

The Alameda alignment option with its high projected ridership and average cost among the other alignment options scores "high" for cost effectiveness with a cost of \$59 per rider. In contrast the West Bank 3 alignment option, with a cost effectiveness of \$99 per rider scores "low" due to its lower ridership projections and average cost. The East Bank, Pacific/Alameda, Pacific/Vignes and Alameda/Vignes alignment options score "medium" in this criterion.

⁹ ROW costs were considered during the TRS Capital Cost estimates but may be underestimated due to the lack of detailed design. The constrained ROW along the East Bank alignment option requires obtaining easements or purchasing the ROW.

Table 5-36. Cost/Benefits Thresholds

	Score	Description
●	High	Less than \$70 per rider
◐	Medium	Between \$70 to \$90 per rider
○	Low	Over \$90 per rider

Table 5-37. Cost/Benefits Summary

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda Option	Pacific/ Vignes Option	Alameda Option	Alameda/ Vignes Option
Cost/ Benefit (capital costs per boarding)	\$ 75	\$ 99	\$ 74	\$ 84	\$ 59	\$ 75
Cost/ Benefit (capital costs per boarding) score	◐	○	◐	◐	●	◐

Source: West Santa Ana Branch Technical Refinement Study: Task 3.1 B - Travel Demand Modeling Forecasting Results Report (Metro 2015).

5.4.3 Engineering Challenges

Three factors were considered to evaluate the potential engineering challenges for each alignment option:

- Guideway configuration
- ROW and infrastructure constraints/conflicts
- Third party approvals

The engineering challenges are considered in terms of risk and uncertainty, where alignment options with greater engineering challenges present greater potential for unforeseen cost increases.

Guideway Configuration

Table 5-38 presents the guideway configuration by alignment option. The guideway configurations were developed during the TRS up to a 5% level of design that was based upon applicable criteria and standards for a Metro light rail system. With the exception of East Bank and Alameda alignment options, all alignment options include at-grade, aerial, and underground profile components. The West Bank, Pacific/Alameda and Pacific/Vignes alignment options all have approximately the same distance of tunneling with the West Bank 3 having the longest underground portion of all alignment options. Tunneling presents a higher degree of uncertainty and risk than building at-grade or aerial, where the challenges are more clearly defined. Therefore,

alternatives with the longest tunnel alignments present the greatest risk and higher potential to pose significant engineering challenges.

Table 5-38. Guideway Configuration by Alignment Option

	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda Option	Pacific/ Vignes Option	Alameda Option	Alameda/ Vignes Option
Guideway Configuration	3.7 miles aerial 4.0 miles at- grade	1.9 miles aerial 3.3 miles at- grade 1.7 miles underground	2.7 miles aerial 3.3 miles at- grade 1.4 miles underground	2.4 miles aerial 3.2 miles at- grade 1.6 miles underground	6.0 miles aerial 2.0 miles at- grade	5.5 miles aerial 1.9 miles at- grade 0.7 miles underground

Table 5-39 through Table 5-41 present the ROW and infrastructure constraints/conflicts for each alignment option by segment. Most of the northern alignment options would be located in a highly constrained urban environment with numerous potential conflicts, including existing rail lines, utilities, and bridges.

Table 5-39. East Bank ROW and Infrastructure Constraints/Conflicts

Alignment Segment	ROW and Infrastructure Constraints/Conflicts
Union Station to Los Angeles River	<p>This ROW into Union Station is constrained by existing Metrolink/Amtrak tracks to the east and existing, adjacent occupied properties to the west.</p> <p>An aerial station is proposed over the existing Metro Gold Line station or to the west of that station above the relocated bus plaza. This station would need to provide sufficient clearance over the existing Metro Gold Line station or the bus plaza along with coordination of station features that would connect the two stations, such as stairs and elevators.</p> <p>The WSAB aerial structure would pass over other multiple, large live tracks in the “throat” approach to Union Station; these tracks are used by Metro Gold Line, Metrolink, and Amtrak. These existing tracks may need to be modified to allow for WSAB alignment columns.</p> <p>The WSAB alignment would then cross the Los Angeles River on a new bridge to reach the east bank. The bridge would need to have a clear span of the river to meet hydraulic requirements and to avoid conflict with the existing UPRR tracks and yard on the east bank. Note, all other northern alignment options require only one crossing of the Los Angeles River (within City of South Gate).</p>

Alignment Segment	ROW and Infrastructure Constraints/Conflicts
Los Angeles River to San Pedro Subdivision (east bank of Los Angeles River)	<p>This ROW is constrained by the existing Metrolink and UPRR tracks and yard. Relocation of the Metrolink and/or UPRR tracks may be required to accommodate the WSAB alignment, but the ROW is constrained on both sides. High-voltage power lines (SCE and LADWP) and the Los Angeles River are located west of the ROW. The high-voltage power lines may require relocation to accommodate the WSAB alignment. Multi-story businesses (from two to ten stories) are located east of the ROW.</p> <p>UPRR ROW that contains UPRR tracks and storage tracks at select locations are located east of the ROW.</p> <p>Potential constrained ROW underneath the existing Caltrans river bridges (i.e., US-101 and I-10) requires confirmation of sufficient clearance. Modification to the UPRR and/or Metrolink tracks under the Caltrans river bridges may be required to accommodate the WSAB alignment.</p> <p>ROW underneath the existing Los Angeles River bridges (i.e., Cesar Chavez, 1st, 4th, 6th (new), 7th, and Olympic) is constrained and requires confirmation of sufficient clearance. Modifications to these bridges may be required to accommodate the WSAB alignment.</p>
San Pedro Subdivision	<p>This ROW is constrained by existing freight tracks and existing adjacent uses. The alignment would require relocation of existing freight tracks and spur tracks. Between Soto Street and Bandini Boulevard, the ROW is adjacent to commercial businesses located on both sides of the alignment. Between Bandini Boulevard and Randolph Street, the ROW is adjacent to commercial and residential buildings to the east and Downey Road to the west.</p> <p>A new bridge over the Los Angeles River south of Bandini Boulevard and north of the WSAB proposed Leonis Station would be required to accommodate the WSAB alignment. Existing railroad bridges, such as at Soto Street, Downey Road, and Washington Boulevard, are not sufficiently wide to accommodate the addition of WSAB tracks and therefore it would be required to construct a new, adjacent bridge.</p> <p>The WSAB alignment would require new aerial structures to accommodate WSAB tracks crossing multiple freight tracks, spur tracks and city streets along the San Pedro Subdivision at 26th Street, Charter Street, Exchange Avenue, District Boulevard, Slauson Avenue, and Randolph Street.</p> <p>Accommodation of the WSAB alignment and existing freight tracks at grade crossings would require new grade-crossing configurations and equipment to meet CPUC requirements.</p>

Table 5 40. West Bank 3 ROW and Infrastructure Constraints/Conflicts

Alignment Segment	ROW and Infrastructure Constraints/Conflicts
Alameda Street to 7 th Street (bored tunnel)	<p>Although the tunnel would be bored, ideally the tunnels would be within the street ROW as there are limited underground features. However, when transitioning from aerial to tunnel, the city street ROW will be a challenge due to its constrained width. Alameda Street is a public street comprised of two through traffic lanes and a dedicated left-turn lane; some street parking is also provided in each direction. East and west of the Alameda Street ROW are multi-story businesses and residences (up to four stories).</p> <p>Relocation or protection of utilities underneath Alameda Street could be required where the tunnel passes under Alameda Street</p>
7 th Street to Santa Fe Avenue (bored tunnel)	<p>Requires multiple easements under private properties, including beneath multiple industrial buildings of varying construction types which could need settlement monitoring and some building protection.</p> <p>Crosses some public streets with potential impacts on utilities</p> <p>Requires sites for launching and retrieving tunnel boring machine (TBM) and supporting tunneling activities alongside or within the route between Alameda and Santa Fe.</p>
Santa Fe Avenue to Harbor Subdivision (aerial)	<p>Constrained city street ROW – Santa Fe Avenue is a public street comprised of two traffic lanes and dedicated left-turn lanes; some street parking is also provided in each direction. A traffic lane in each direction would be removed to accommodate the WSAB alignment. East and west of the Santa Fe Avenue ROW are adjacent multi-story businesses and residences (up to four stories).</p> <p>Constrained ROW underneath the existing Caltrans aerial structure at I-10 would require confirmation of sufficient clearance. Modification to Santa Fe Avenue may be required to accommodate the WSAB alignment.</p> <p>Constrained city street ROW – 15th Street is a public street comprised of two traffic lanes in each direction. A traffic lane in each direction would be removed to accommodate the WSAB alignment. East and west of the 15th Street ROW are adjacent multi-story businesses (up to four stories).</p> <p>Constrained city street ROW – Minerva Avenue is a public street comprised of one traffic lane and some street parking in each direction. A traffic lane in each direction would be removed to accommodate the WSAB alignment. East and west of the Minerva Avenue ROW are adjacent multi-story businesses (up to four stories).</p> <p>Between 15th Street and Minerva Avenue is the elevated Redondo Junction, comprised of freight and Amtrak tracks. A new aerial structure over Redondo Junction would be required to accommodate the WSAB aerial alignment.</p> <p>Overhead power/communication utilities and street lighting along Santa Fe Avenue and Minerva Avenue are located above or within existing sidewalks. Relocation of utilities underneath Santa Fe Avenue would be required to accommodate the WSAB viaduct foundations. Relocation of overhead power/communication lines that cross perpendicular to Santa Fe Avenue, 15th Street, and Minerva Street would be required to accommodate the WSAB aerial structure.</p>

Table 5 40. West Bank 3 ROW and Infrastructure Constraints/Conflicts

Alignment Segment	ROW and Infrastructure Constraints/Conflicts
Harbor Subdivision to Pacific Boulevard (at-grade)	<p>The Metro ROW is constrained by the existing BNSF tracks and spur tracks. Relocation of the freight tracks would be required to accommodate the WSAB alignment.</p> <p>West and east of the ROW are multi-story businesses (up to three stories) and overhead power/communication utilities.</p> <p>Relocation of overhead power/communication lines that cross perpendicular to the Harbor subdivision would be required to accommodate the WSAB aerial structure.</p>
Pacific Boulevard to La Habra Branch/Randolph Street (at-grade)	<p>Constrained city ROW – Pacific Boulevard is a public street comprised of two traffic lanes and dedicated left-turn lanes; street parking is also provided in each direction. A traffic lane would be removed in each direction to accommodate the WSAB alignment. East and west of the Pacific Boulevard ROW are adjacent multi-story businesses (up to two stories).</p> <p>Overhead power/communication utilities and street lighting along Pacific Boulevard are located above or within existing sidewalks. Relocation of overhead power/communication lines that cross perpendicular to the Harbor subdivision would be required to accommodate the WSAB alignment.</p>
La Habra Branch Street/Randolph Street to San Pedro Subdivision	<p>The UPRR ROW is constrained because of existing UPRR tracks, mature trees, landscaping, and parking lots. The freight tracks would be relocated to accommodate the WSAB alignment, and the landscaping and parking lots would be removed.</p> <p>Randolph Street, located adjacent and parallel to the UPRR ROW, is a public street comprised of two traffic lanes, a dedicated left-turn lane, and on-street parking in each direction. The on-street parking would be removed to accommodate the WSAB alignment. North and south of the Randolph Street ROW are adjacent multi-story residences and businesses (up to two stories).</p> <p>Overhead power/communication utilities and street lighting along Pacific Boulevard are located above or within existing sidewalks. Relocation of overhead power/communication lines that cross perpendicular to La Habra Branch/Randolph Street would be required to accommodate the WSAB aerial structure.</p>

Table 5-40. Pacific/Alameda and Pacific/Vignes ROW and Infrastructure Constraints/Conflicts

	Alignment Segment	ROW and Infrastructure Constraints/Conflicts
Pacific/Alameda	Union Station to Alameda Street (aerial)	<p>A WSAB aerial station is proposed over the existing Metro Gold Line station or to the west of that station above the relocated bus plaza. This station would need to provide sufficient clearance over the existing Metro Gold Line station or the bus plaza along with coordination of station features that would connect the two stations, such as stairs and elevators.</p> <p>The Metro ROW is constrained by the existing Metrolink/Amtrak tracks to the east and the existing adjacent occupied properties to the west.</p> <p>The Caltrans ROW is constrained when crossing US-101 with the Alameda Street overcrossing to the west and the Metro Gold Line aerial structure to the east.</p> <p>A new bridge would be required over US-101 to accommodate the WSAB alignment.</p>
	Alameda Street to 4th Place (aerial to tunnel)	<p>Constrained city ROW – Alameda Street is a public street comprised of two traffic lanes, a dedicated left turning lane, and some on-street parking in each direction. Removal of parking and/or narrowing of sidewalks in each direction on Alameda Street would be required to accommodate WSAB aerial structure. East and West of Alameda St ROW are adjacent multi-story businesses (up to four stories) and residential (up to four stories)</p> <p>Overhead power/communication utilities and street lighting along Alameda Street are located above or within existing sidewalks. Relocation of overhead power/communication lines that cross perpendicular to Alameda Street would be required to accommodate WSAB aerial structure.</p> <p>Relocation of utilities underneath Alameda Street and where the alignment transitions to 4th Place would be required to accommodate WSAB tunnel.</p>

Table 5-40. Pacific/Alameda and Pacific/Vignes ROW and Infrastructure Constraints/Conflicts

	Alignment Segment	ROW and Infrastructure Constraints/Conflicts
	4th Place to Santa Fe Avenue at 7 th Street (tunnel)	<p>Constrained city ROW – 4th Place is a public street comprised of four traffic lanes one-way along with street parking on both sides. Removal of parking on both sides of 4th Place would be required to accommodate WSAB trench and Arts District Station. North and South of 4th Place ROW are adjacent multi-story businesses (mostly two stories with one three story) and one parking structure (six stories).</p> <p>Overhead power/communication utilities and street lighting along 4th Place are located above or within existing sidewalk. Relocation of utilities underneath 4th Place would be required to accommodate WSAB tunnel.</p> <p>Design would need to avoid conflicts between the WSAB underground alignment and the 4th Street bridge supports.</p> <p>Constrained city ROW – Santa Fe Ave is a public street comprised of one lane and street parking on both sides to 7th Street. East and West of Santa Fe Ave ROW are adjacent multi-story businesses (up to two stories until 7th Street) and residences (none until 7th Street); most buildings are located adjacent to the back of the existing sidewalk.</p> <p>Overhead power/communication utilities and street lighting along Santa Fe Ave are located above or within existing sidewalks</p> <p>There is an electrical substation located south of 6th Street.</p>
Pacific/Vignes	Union Station to Commercial Street (aerial)	<p>The Metro ROW is constrained by the existing Metrolink/Amtrak tracks to the east and the existing adjacent occupied properties to the west.</p> <p>The Caltrans ROW is constrained when crossing the US-101 with the Metro Gold Line aerial structure to the west and the future LinkUS tracks to the east.</p> <p>The support columns and aerial viaduct for the alignment would cross US-101 and Commercial Street and could impact the existing Metro Gold Line bridge, the US-101 freeway and ramps, and the LinkUS project.</p>

Table 5-40. Pacific/Alameda and Pacific/Vignes ROW and Infrastructure Constraints/Conflicts

	Alignment Segment	ROW and Infrastructure Constraints/Conflicts
	Commercial Street to Temple Street (aerial to tunnel)	<p>Constrained city ROW – Commercial Street is a public street comprised of two traffic lanes and a dedicated left-turn lane in each direction. The Commercial Street ROW is constrained on the north by US-101 and on the south by adjacent multi-story businesses (up to two stories) and a future LADOT bus maintenance facility at Hewitt Street.</p> <p>Constrained city ROW – Vignes Street is a public street comprised of one traffic lane and on-street parking in each direction. Removal of parking, loss of through traffic lanes, and/or narrowing of sidewalks in each direction on Vignes Street would be required to accommodate columns for the WSAB aerial and transition structures. East and west of Vignes Street are businesses (up to three stories), a Buddhist Temple located at the northwest corner of Vignes Street and 1st Street, and residences (up to three stories and with underground parking) south of 1st Street. Most of the buildings are adjacent to the back of the sidewalk.</p> <p>Overhead power/communication utilities and street lighting are located along Commercial Street and Vignes Street, above or within the existing sidewalk.</p> <p>Overhead power/communication lines that cross perpendicular to Vignes Street would be relocated to accommodate the WSAB aerial and transition structures.</p> <p>The transition from aerial to underground between Commercial Street and Temple Street will permanently close a section of Vignes and also close Ducommun and Jackson Streets to traffic between Garey Street and Center Street. Traffic will divert to Commercial Street (north of Ducommon Street) and Temple Avenue (south of Jackson Street), which will be kept as is. The transition section from aerial structure to tunnel will be located to avoid impacting Temple Street (a major east-west corridor). At least two driveways would permanently close along Vignes Street as a result of the adjacent street closure. The provision of alternative access to these properties is unknown at this time.</p> <p>A travel lane and street parking would be affected on Vignes Street.</p> <p>Use of a TBM to construct the tunnels would require identifying an off-street site for the TBM launch pit in this area as well as to support tunneling activities.</p>
	Temple Street to Santa Fe Avenue at 7 th Street (tunnel)	<p>Metro Gold Line is perpendicular to Vignes Street at 1st Street. The WSAB tunnel would pass under the Metro Gold Line Eastside Extension at 1st Street. The design would need to accommodate or avoid support features for the Metro Gold Line.</p> <p>The area of the proposed Arts District Station on Santa Fe Avenue is highly constrained, making the cut and cover construction of the station challenging. Along Santa Fe Avenue, there is limited public ROW width with one traffic lane and one parking lane in each direction with a center turn lane.</p> <p>The tunnels will need adequate clearance to pass beneath abutments and foundations of the historic 1st Street, 4th Street and 4th Place bridges and the new 6th Street bridge.</p>

Table 5-40. Pacific/Alameda and Pacific/Vignes ROW and Infrastructure Constraints/Conflicts

	Alignment Segment	ROW and Infrastructure Constraints/Conflicts
Pacific/Alameda and Pacific/Vignes	Santa Fe Avenue at 7 th Street to Harbor Subdivision (tunnel to aerial)	<p>Constrained city ROW – Santa Fe Avenue is a public street comprised of two traffic lanes and street parking on both sides until 25th Street. A traffic lane in each direction would be required on Santa Fe Ave between 7th and 25th Streets to accommodate columns for the WSAB aerial structure. East and West of Santa Fe Avenue ROW are adjacent multi-story businesses (up to four stories until 25th Street) and residences (up to three stories mostly by 7th Street); most buildings are located adjacent to the back of the existing sidewalk</p> <p>Utilities underneath Santa Fe Avenue would require relocation to accommodate the WSAB tunnel.</p> <p>Modification to Santa Fe Avenue under the Caltrans I-10 bridge may be required to accommodate WSAB tracks. Constrained ROW underneath the existing Caltrans aerial structure at I-10 that would require confirmation of sufficient clearance.</p> <p>Between Washington Boulevard and 25th Street is the at-grade Redondo Junction, comprised of freight and Amtrak tracks. A new aerial structure over Redondo Junction would be required to accommodate the WSAB aerial alignment.</p> <p>Constrained city ROW – 25th Street is a public street comprised of one traffic lane and street parking in each direction. Parking would be removed on 25th Street to accommodate columns for the WSAB aerial alignment. North and South of 25th Street are adjacent multi-story industrial businesses (up to two stories).</p> <p>Constrained City ROW – Minerva Avenue is a public street comprised of one traffic lane and some street parking in each direction. East and West of Minerva Avenue ROW are adjacent multi-story businesses (up to four stories)</p> <p>Overhead power/communication utilities and street lighting along Minerva Avenue are located above or within existing sidewalks</p> <p>Relocation of overhead power/communication lines that cross perpendicular to Santa Fe Avenue, 25th Street, and Minerva Avenue would be required to accommodate WSAB aerial structure.</p>
	Harbor Subdivision to Pacific Boulevard (aerial to at-grade)	<p>Constrained Metro ROW due to existing BNSF tracks and spur tracks. The freight tracks would be relocated to accommodate the WSAB alignment. West and east of ROW are multi-story businesses (up to three stories) and overhead power/communication utilities.</p> <p>Relocation of overhead power/communication lines that cross perpendicular to Harbor Subdivision would be required to accommodate WSAB aerial structure.</p> <p>Relocation of overhead power/communication lines that cross perpendicular to Harbor Subdivision and Pacific Boulevard would be required to accommodate WSAB aerial structure transition.</p>

Table 5-40. Pacific/Alameda and Pacific/Vignes ROW and Infrastructure Constraints/Conflicts

	Alignment Segment	ROW and Infrastructure Constraints/Conflicts
	Pacific Boulevard to La Habra Branch/ Randolph Street (at-grade)	<p>Constrained city ROW – Pacific Boulevard is a public street comprised of three traffic lanes, dedicated left turning lanes, and on-street parking in each direction. A traffic lane in each direction would be removed to accommodate the WSAB alignment. East and West of Pacific Blvd ROW are adjacent multi-story businesses (up to two stories).</p> <p>Overhead power/communication utilities and street lighting along Pacific Boulevard are located above and within existing sidewalks.</p>
	La Habra Branch/ Randolph Street to San Pedro Subdivision (at-grade)	<p>Constrained La Habra Branch ROW, which is owned by UPRR, due to existing UPRR tracks, mature trees, landscaping and parking lots. The freight tracks would require relocation and the mature trees, landscaping, and parking lots would be removed to accommodate the WSAB alignment.</p> <p>Adjacent and parallel to the La Habra Branch ROW is Randolph Street, which is a public street comprised of two traffic lanes, dedicated left turning lanes, and on-street parking in each direction. On-street parking would be removed to accommodate widening of the La Habra Branch ROW. North and South of Randolph Street ROW are adjacent multi-story residential (up to two stories) and businesses (up to two stories).</p> <p>Overhead power/communication utilities and street lighting along Randolph Street are located above or within existing sidewalks.</p> <p>Relocation of overhead power/communication lines that cross perpendicular to San Pedro Subdivision to accommodate the transition of WSAB to an aerial structure.</p>

Table 5-41. Alameda and Alameda/Vignes ROW and Infrastructure Constraints/Conflicts

	Alignment Segment	ROW and Infrastructure Constraints/Conflicts
Alameda	Union Station to Alameda Street (aerial)	<p>A WSAB aerial station is proposed over the existing Metro Gold Line station or to the west of that station above the relocated bus plaza. This station would need to provide sufficient clearance over the existing Metro Gold Line station or the bus plaza along with coordination of station features that would connect the two stations, such as stairs and elevators.</p> <p>The Metro ROW is constrained by the existing Metrolink/Amtrak tracks to the east and the existing adjacent occupied properties to the west.</p> <p>The Caltrans ROW is constrained when crossing US-101 with the Alameda Street overcrossing to the west and the Metro Gold Line aerial structure to the east.</p> <p>A new bridge would be required over US-101 to accommodate the WSAB alignment.</p>
Alameda/Vignes	Union Station to Commercial Street (aerial)	<p>The Metro ROW is constrained by the existing Metrolink/Amtrak tracks to the east and the existing adjacent occupied properties to the west.</p> <p>The Caltrans ROW is constrained when crossing the US-101 with the Metro Gold Line aerial structure to the west and the future LinkUS tracks to the east.</p> <p>The support columns and aerial viaduct for the alignment would cross US-101 and Commercial Street and could impact the existing Metro Gold Line bridge, the US-101 freeway and ramps, and the LinkUS project.</p>

	<p>Commercial Street to 3rd Street (tunnel)</p>	<p>Constrained city ROW – Commercial Street is a public street comprised of two traffic lanes and a dedicated left-turn lane in each direction. The Commercial Street ROW is constrained on the north by US-101 and on the south by adjacent multi-story businesses (up to two stories) and a future LADOT bus maintenance facility at Hewitt Street.</p> <p>Constrained city ROW – Vignes Street is a public street comprised of one traffic lane and on-street parking in each direction. Removal of parking, loss of through traffic lanes, and/or narrowing of sidewalks in each direction on Vignes Street would be required to accommodate columns for the WSAB aerial and transition structures. East and west of Vignes Street are businesses (up to three stories), a Buddhist Temple located at the northwest corner of Vignes Street and 1st Street, and residences (up to three stories and with underground parking) south of 1st Street. Most of the buildings are adjacent to the back of the sidewalk. A travel lane and street parking would be affected on Vignes Street.</p> <p>Overhead power/communication utilities and street lighting are located along Commercial Street and Vignes Street, above or within the existing sidewalk. Overhead power/communication lines that cross perpendicular to Vignes Street would be relocated to accommodate the WSAB aerial and transition structures. Underground utilities along Vignes Street and where the alignment transitions to 3rd Street would be relocated to accommodate the alignment in a tunnel.</p> <p>The transition section from an aerial to underground alignment would need to be located so as to avoid affecting Temple Street (a major east-west corridor). The transition from an aerial to underground configuration between Commercial Street and Temple Street would permanently close a section of Vignes, Ducommun, and Jackson Streets to traffic between Garey Street and Center Street. Traffic would be diverted to Commercial Street (north of Ducommun Street) and Temple Avenue (south of Jackson Street), which will be kept as is. At least two driveways would be permanently closed along Vignes Street as a result of the adjacent street closure. The provision of alternative access to these properties is unknown at this time.</p> <p>Metro Gold Line is perpendicular to Vignes Street at 1st Street. The WSAB tunnel would pass under the Metro Gold Line Eastside Extension at 1st Street. The design would need to accommodate or avoid support features for the Metro Gold Line.</p> <p>Use of a TBM to construct the tunnels would require identifying an off-street site for the TBM launch pit in this area.</p> <p>If cut-and-cover construction is used instead of TBM-driven tunnels, temporary street closures would be needed along Vignes Street and property acquisitions would be needed for the curve into 3rd Street.</p> <p>Constrained city ROW – 3rd Street is a public street comprised of one traffic lane and on-street parking in each direction. East and west of 3rd Street are business and new residential buildings, mostly adjacent to the back of the sidewalk.</p> <p>Overhead power/communication utilities and street lighting along 3rd Street are located above or within the existing sidewalk.</p> <p>On 3rd Street near Traction Avenue, the Arts District Station would be in a cut-and-cover box structure with entrance structures located within adjacent property.</p>
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Table 5-41. Alameda and Alameda/Vignes ROW and Infrastructure Constraints/Conflicts

	Alignment Segment	ROW and Infrastructure Constraints/Conflicts
	3 rd Street to Alameda Street (tunnel to aerial)	<p>From the station box for the WSAB station, the tunnel would continue west along 3rd Street, possibly via a cut-and-cover construction method, and turn south into Alameda Street.</p> <p>The tunnel profile would transition into the median of the street in a trench and would continue to an aerial viaduct structure occupying the middle lanes of Alameda Street.</p>
Alameda and Alameda/Vignes	Alameda Street to Long Beach Avenue (aerial)	<p>Constrained city ROW – Alameda Street is a public street comprised of two traffic lanes and a dedicated left-turn lane; some on-street parking is provided in each direction. Accommodation of columns for the WSAB aerial structure would require removal of parking and/or narrowing of the sidewalk in each direction. East and West of the Alameda Street ROW are adjacent multi-story businesses (up to six stories) and residences (up to three stories). Buildings on the north end of Alameda Street are adjacent to the back of the sidewalk, and buildings on the south end are set back from the sidewalk but have parking lots between the street and building.</p> <p>Overhead power/communication utilities and street lighting along Alameda Street are located above or within existing sidewalks. Relocation of overhead power/communication lines that cross perpendicular to Alameda Street would be required to accommodate the WSAB aerial structure. Relocation of utilities underneath Alameda Street would be required to accommodate columns for the WSAB aerial structure.</p> <p>Support columns on Alameda Street from 4th Street to 14th Street may affect the left turn movements on Alameda Street</p> <p>Constrained Caltrans and city ROW occurs where the alignment would transition from Alameda Street to Long Beach Avenue due to an I-10 on-ramp located at Newton Street, existing businesses, and I-10 freeway. Modification to Caltrans I-10 on-ramp located at Newton Street and overbridges at Newton Street and Long Beach Avenue would be required.</p>

Table 5-41. Alameda and Alameda/Vignes ROW and Infrastructure Constraints/Conflicts

	Alignment Segment	ROW and Infrastructure Constraints/Conflicts
Alameda and Alameda/Vignes	Long Beach Avenue to La Habra Branch/Randolph Street	<p>The Metro ROW is constrained by the Metro Blue Line at-grade and aerial tracks and three stations. East of the Metro ROW, Long Beach Avenue is a one-way public street comprised of one traffic lane, one parking lane, and a dedicated left-turn lane at intersections. West of the Metro ROW, Long Beach Avenue from I-10 to 24th Street is a one-way public street comprised of one traffic lane, one parking lane, and a dedicated left-turn lane at intersections.</p> <p>The Metro ROW between 24th Street and the existing Slauson Station currently accommodates a total of three to five tracks for the Metro Blue Line and freight. In order to accommodate the columns for the proposed aerial alignment adjacent to the Metro Blue Line, a reduction in the existing street width on the northbound side of Long Beach Avenue (east of the Metro ROW) between Washington Station and Slauson Station may be required. This will allow sufficient space for the columns</p> <p>Long Beach Avenue may require modifications to accommodate the WSAB alignment underneath I-10. Traffic lanes along other segments of Long Beach Avenue may also require narrowing to accommodate columns for the WSAB aerial structure.</p> <p>The UPRR ROW with freight tracks and spur tracks is located west of the Metro ROW from 24th Street to the La Habra Branch (south of Slauson Avenue).</p> <p>East and west of the Long Beach Avenue ROW are adjacent mostly single-story businesses and residences; buildings on the north end of Long Beach Avenue are set back, but parking lots are located between the street and buildings. The remainder of the buildings are adjacent to the back of the sidewalk.</p> <p>Overhead power/communication utilities and street lighting along Long Beach Avenue are located above or within existing sidewalks.</p> <p>The WSAB vertical profile is constrained by a pedestrian overcrossing at 53rd Street, which would require modifications.</p> <p>The WSAB alignment and structural configuration is constrained by the crossing of the Harbor Subdivision and Metro ROW.</p>
	La Habra Branch/Randolph Street to San Pedro Subdivision	<p>The La Habra Branch ROW, which is owned by UPRR, is constrained by the existing UPRR tracks, mature trees, landscaping, and parking lots. The UPRR tracks would require relocation to accommodate the WSAB alignment. The mature trees, landscaping, and parking lots would be removed.</p> <p>Adjacent and parallel to the La Habra Branch ROW is Randolph Street, which is a public street comprised of two traffic lanes and dedicated left-turn lanes. On-street parking is also provided in each direction, which would be removed to accommodate the WSAB alignment.</p> <p>Overhead power/communication lines that cross perpendicular to La Habra Branch/Randolph Street would be relocated to accommodate the WSAB aerial structure.</p>

Third Party Approvals

Table 5-42 through Table 5-45 presents the major third party approvals that are anticipated for each alignment options. The anticipated approvals are similar for many of the alignment options, with approvals required from the appropriate jurisdictions for each alignment. The East Bank, West Bank 3, Pacific/Alameda and Pacific/Vignes alignment options would require slightly more extensive coordination with other rail operators, such as the Ports of Los Angeles and Long Beach, Metrolink, and Amtrak due to the proposed shared ROW.

Table 5-42. East Bank Third Party Approvals

Third Party	East Bank Third Party Approvals
City of Los Angeles	Approval for Los Angeles River bridge crossings east and south of Union Station
	Approval for Los Angeles River bridge crossing within the San Pedro subdivision south of Bandini Boulevard and north of the WSAB Leonis Station
	Approval for modifications to City of Los Angeles bridges east of the Los Angeles River at Cesar Chavez, 1st, 4th, 6th, 7th , and Olympic to accommodate the WSAB tracks, if necessary
	Approval for new WSAB aerial structures because existing freight bridges were not designed to accommodate WSAB tracks at Soto Street, Downey Road, and Washington Boulevard
	Approval for new WSAB aerial structures that cross freight tracks and city streets at 26th Street, Charter Street, Exchange Avenue, District Boulevard, Slauson Avenue, and Randolph Street
City of Huntington Park	Approval for new WSAB aerial structures that cross freight tracks and city streets at Slauson Avenue and Randolph Street
Utilities	Approval for relocation of overhead power lines west of Union Station, adjacent to Metro ROW, to accommodate WSAB Approval for relocation of overhead high voltage power lines and towers (SCE and LADWP) east of the Los Angeles River and adjacent to Metro ROW/San Pedro subdivision to accommodate the WSAB Soto Station and tracks at Soto Street
	Approval for relocation of overhead power/communication lines north of 26th Street to accommodate WSAB tracks adjacent to the San Pedro subdivision tracks
Caltrans	Approval for placement of WSAB tracks underneath the existing US-101 and I-10 bridges
CPUC	Approval for new grade crossings
FRA	Approval for placement of WSAB tracks for a shared corridor from Union Station to Soto Street in Metro ROW and from Soto Street to Randolph Street within the San Pedro subdivision
UPRR	Approval to relocate UPRR tracks and potentially yard, yard lead, and spur tracks to accommodate WSAB tracks east of the Los Angeles River within Metro ROW
	Approval to relocate UPRR tracks within the San Pedro subdivision

Third Party	East Bank Third Party Approvals
Ports of Los Angeles and Long Beach	Approval for an easement to construct and operate LRT tracks within the San Pedro subdivision
US Army Corps of Engineers	Approval for placement of a new bridge over the Los Angeles River east of Union Station Approval for placement of a new bridge over the Los Angeles River within the San Pedro subdivision located south of Bandini Boulevard and north of the WSAB Leonis Station
Metrolink	Approval to relocate Metrolink tracks to accommodate WSAB tracks east of the Los Angeles River within Metro ROW
Amtrak	Approval to relocate tracks at Union Station's northern approaches

Table 5-43. West Bank 3 Third Party Approvals

Third Party	West Bank 3 Third Party Approvals
City of Los Angeles	Approval for WSAB tunnel located underneath Alameda Street and Santa Fe Avenue. Approval for WSAB aerial structure located in center of Santa Fe Avenue, 25th Street, Minerva Avenue.
City of Vernon	Approval for WSAB aerial structure located in center of Santa Fe Avenue and Pacific Boulevard.
City of Huntington Park	Approval for WSAB aerial structure and at-grade alignment located in center of Pacific Boulevard and Randolph Avenue.
Utilities	Relocation of utilities underneath Alameda Street, transition from Alameda Street to Santa Fe Avenue (beneath private properties and public streets), and Santa Fe Avenue to I-10 to accommodate WSAB tunnel Relocation of overhead power/communication lines that cross perpendicular to Santa Fe Avenue, 15th Street, Minerva Street, the Harbor subdivision, and Pacific Boulevard to accommodate the WSAB aerial structure
Caltrans	Approval to go underneath the existing I-10 bridge
CPUC	Approval for new grade crossings
FRA	Approval for placement of WSAB tracks for a shared corridor within the Harbor subdivision and UPRR ROW
UPRR	Approval for an aerial easement for the WSAB structure to cross Redondo Junction between 15th Street/Washington Boulevard and Minerva Street Approval for an easement for Metro within the UPRR ROW along Randolph Street to accommodate the WSAB tracks Approval to relocate the UPRR tracks within the UPRR ROW
BNSF	Approval to relocate the BNSF tracks within the Harbor subdivision, Metro ROW

Table 5-44. Pacific/Alameda and Pacific/Vignes Third Party Approvals

Third Party	Pacific/Alameda and Pacific/Vignes Third Party Approvals
City of Los Angeles	Approval for WSAB tunnel located underneath 4 th Place (Pacific/Alameda), Vignes (Pacific/Vignes) and Santa Fe Avenue, including the historic bridges and new 6 th Street Bridge Approval for WSAB aerial structure and at-grade alignment located in center of Alameda Street, Santa Fe Avenue, 25 th Street and Minerva Avenue.
City of Vernon	Approval for WSAB aerial structure located in center of Pacific Boulevard.
City of Huntington Park	Approval for WSAB at-grade alignment located in center of Pacific Boulevard and Randolph Avenue
Utilities	Relocation of utilities underneath 4 th Place (Pacific/Alameda), Vignes (Pacific/Vignes) and Santa Fe Avenue to accommodate WSAB tunnel Relocation of overhead power/communication lines that cross perpendicular to Alameda Street, Santa Fe Avenue, 15 th Street, Minerva Street, the Harbor subdivision, and Pacific Boulevard to accommodate the WSAB aerial structure
Caltrans	Approval to construct aerial viaduct and foundations across US-101 Approval to go underneath the existing I-10 bridge
CPUC	Approval for new grade crossings
Alameda Corridor	Approval to cross over Alameda Corridor trench and tracks
FRA	Approval for placement of WSAB tracks for a shared corridor within the Harbor subdivision and UPRR ROW
UPRR	Approval for an aerial easement for the WSAB structure to cross Redondo Junction between 15 th Street/Washington Boulevard and Minerva Street Approval for an easement for Metro within the UPRR ROW along Randolph Street to accommodate the WSAB tracks Approval to relocate the UPRR tracks within the UPRR ROW
BNSF	Approval to relocate the BNSF tracks within the Harbor subdivision, Metro ROW

Table 5-45. Alameda and Alameda/Vignes Third Party Approvals

Third Party	Alameda and Alameda/Vignes Third Party Approvals
City of Los Angeles	<p>Approval for WSAB aerial structure located in center of Alameda Street and over Long Beach Avenue</p> <p>Approval for WSAB aerial and underground structure along Vignes Street (Alameda/Vignes)</p> <p>Approval for permanent closure of sections of Vignes Street to accommodate transition of alignment from aerial to underground (Alameda/Vignes)</p> <p>Possible approval for cut-and-cover tunnel construction on Vignes and 3rd Streets (Alameda/Vignes)</p>
City of Huntington Park	Approval for street reconfiguration on Randolph Avenue
Utilities	<p>Approval for relocation of utilities underneath Commercial Street, Vignes Street, 3rd Street, Alameda Street, Long Beach Boulevard, and Randolph Street to accommodate the WSAB aerial and station structures</p> <p>Approval for relocation of overhead power/communication lines that cross perpendicular to Vignes Street, Alameda Street, Long Beach Avenue, Randolph Street, the Harbor subdivision, and the La Habra Branch to accommodate the WSAB aerial structure</p>
Caltrans	<p>Approval to construct aerial viaduct and foundations across US-101</p> <p>Approval to go underneath existing I-10 bridge and reconfigure on-ramp at Newton Street</p>
CPUC	Approval for new grade crossings
Alameda Corridor	Approval to cross over Alameda Corridor trench and tracks
FRA	Approval for placement of WSAB tracks for a shared corridor within the UPRR ROW
UPRR	<p>Approval for an aerial easement for the WSAB aerial structure over the UPRR ROW east of the Metro Blue Line</p> <p>Approval for an easement within the La Habra Branch ROW and to relocate the UPRR tracks to accommodate the WSAB tracks</p>

Summary

Table 5-46 presents the thresholds for scoring the engineering challenges. Table 5-47 summarizes the three categories considered and presents the overall scores for each alignment option.

By tunneling through the Arts District, the West Bank 3, Pacific/Alameda, Pacific/Vignes, and Alameda/Vignes alignment options avoid direct conflicts with the dense urban environment. However, these alignment options still have the potential to conflict with utilities or structural foundations below-grade and there is greater uncertainty as to exactly where these conflicts would occur. The options involving tunneling also require siting the TBM launch and tunneling support activities, which requires a substantial footprint. Furthermore, the transition structures from aerial or at-grade to underground would potentially have a significant impact and require permanent street closures in some cases.

While the East Bank alignment option does not involve any tunneling, it would be located along the highly constrained ROW, which is not wide enough to accommodate existing Metrolink and UPRR tracks as well as new WSAB tracks. Due to high-voltage power lines and the Los Angeles River on the west and multi-story businesses to the east, expanding the ROW is not a prudent option.

The Alameda alignment option also does not involve tunneling and would primarily be in an aerial configuration. The major challenges associated with this alignment option are conflicts with aerial utilities and other existing aerial structures, such as pedestrian bridges. Although the alignment may result in the narrowing of some roads, it is feasible to construct. While the challenges of placing an aerial structure in an urban environment are not insignificant, they are more predictable than the challenges that may be encountered through tunneling.

Table 5-46. Engineering Challenges Thresholds

	Score	Description
●	High	Engineering issues are well understood and can be addressed through design
◐	Medium	Engineering issues present a moderate degree of uncertainty
○	Low	Engineering issues present high degree of uncertainty

Table 5-47. Engineering Challenges Summary

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda Option	Pacific/ Vignes Option	Alameda Option	Alameda/ Vignes Option
Guideway configuration	Aerial and at-grade	Aerial, at-grade and underground	Aerial, at-grade and underground	Aerial, at-grade and underground	Aerial and at-grade	Aerial, at-grade and underground
ROW and infrastructure constraints/ conflicts	Significant	Moderate	Moderate	Moderate	Minimal	Minimal
Third-party approvals	Moderate (11)	Moderate (9)	Moderate (10)	Moderate (10)	Moderate (8)	Moderate (8)
Engineering Challenges score	○	◐	◐	◐	●	●

5.4.4 Property Acquisitions

Based on the current level of conceptual design, the alignment options were reviewed to determine whether the existing ROW along each alignment is sufficient or whether extensive property acquisitions would be required. Specific property acquisitions will be determined as design progresses and therefore an exact count is unavailable at this stage of design.

Table 5-48 through Table 5-51 summarize the anticipated property acquisitions and easements for each alignment option based on the current level of design. Acquisitions are presented separately from easements because acquisitions often necessitate the demolition of existing uses, whereas the existing uses often continue under an easement. The alignment options that require a greater number of acquisitions are therefore more disruptive than the alignment options that may require easements, particularly underground easements. Table 5-52 presents the scoring thresholds and criteria for the property acquisitions category.

Table 5-53 presents the scoring for this category. The East Bank alignment option would require the greatest number of property acquisitions due to the constrained ROW on the east side of the Los Angeles River. The existing ROW is insufficient to fit both the relocated UPRR tracks and the new WSAB tracks, thereby necessitating the acquisition of private property for the length of this portion of the alignment. In contrast, the only acquisitions required along the West Bank 3, Pacific/Alameda, Pacific/Vignes, Alameda, and Alameda/Vignes alignment options would be at profile transitions, alignment turns, or to support tunneling activities. The Pacific/Alameda and Pacific/Vignes alignment options do require slightly more acquisitions than West

Bank 3, Alameda, and Alameda/Vignes. All of these alignment options also require easements for the portions of the alignment located within the street ROW and subsurface easements where there are tunnels. However, these easements are not anticipated to disrupt existing uses on private property.

Table 5-48. East Bank Potential Property Acquisitions and Easements

Alignment Segment	Potential Property Acquisitions	Potential Easements
Union Station to San Pedro Subdivision	Numerous potential acquisitions of UPRR or private ROW adjacent to the Metro ROW to accommodate WSAB tracks and/or relocation of Metrolink or UPRR tracks for the length of the alignment along the east bank of the Los Angeles River	Easement from UPRR for WSAB tracks
San Pedro Subdivision	Potential acquisition of ROW adjacent to the San Pedro subdivision for new bridges for WSAB tracks at Soto Street, Downey Road, and Washington Boulevard Potential acquisition of ROW adjacent to the San Pedro subdivision for new bridges for WSAB tracks at 26th Street, Charter Street, Exchange Avenue, District Boulevard, Slauson Avenue, and Randolph Street	Easement from Soto Street to Randolph Street for WSAB tracks

Table 5-49. West Bank 3 Potential Property Acquisitions and Easements

Alignment Segment	Potential Property Acquisitions	Potential Easements
Alameda Street to Santa Fe Avenue	None	Easement from City of Los Angeles for WSAB tracks at-grade and below Alameda Street Easement from private properties for WSAB tracks below grade between Alameda Street to Santa Fe Avenue
Santa Fe Avenue to Harbor Subdivision	None	Easement from Cities of Los Angeles and Vernon for WSAB tracks at-grade and aerial along Santa Fe Avenue, 15th Street, and Minerva Avenue Easement from UPRR for WSAB aerial structure over Redondo Junction
Harbor Subdivision to Pacific Boulevard	Potential acquisition of property for the WSAB aerial structure transitioning from the Harbor Subdivision to Pacific Boulevard	None

Alignment Segment	Potential Property Acquisitions	Potential Easements
Pacific Boulevard to La Habra Branch/Randolph Street	Potential acquisition of property for WSAB tracks transitioning from Pacific Boulevard to Randolph Street	Easement from City of Vernon for WSAB tracks at-grade in Pacific Boulevard
La Habra Branch Street/Randolph Street to San Pedro Subdivision	Potential property acquisition(s) (partial or full, to be determined) on southwest corner of Randolph Street and the San Pedro subdivision for WSAB aerial structure columns from La Habra Branch/Randolph Street to the San Pedro Subdivision	Easement from UPRR for WSAB tracks Easement from City of Huntington Park for widening of La Habra Branch/UPRR ROW to accommodate the WSAB and UPRR tracks, particularly at the WSAB station

Table 5-50. Pacific/Alameda and Pacific/Vignes Potential Property Acquisitions and Easements

	Alignment Segment	Potential Property Acquisitions	Potential Easements
Pacific/Alameda	Union Station to Alameda Street	None	Easement from Caltrans for WSAB aerial structure crossing over the US-101
	Alameda Street to 4th Place	None	Easement from City of Los Angeles for WSAB aerial structure along Alameda Street and the transition structure to tunnel along Alameda Street
	4th Place to Santa Fe Avenue at I-10 Bridge	Acquisitions or easements for construction staging sites to launch the TBMs and support tunneling activities	Easement from City of LA for WSAB tracks below 4th Place and Santa Fe Avenue
Pacific/Vignes	Union Station to Commercial Street	None	Easement from Caltrans for WSAB aerial structure crossing over the US-101
	Commercial Street to 1st Street	Acquisitions or easements for construction staging sites to launch the TBMs and support tunneling activities	None
	1st Street to Santa Fe Ave at I-10 Bridge	Acquisition of private property for WSAB aerial connection from Santa Fe, Minerva Street and Harbor Subdivision	None

	Alignment Segment	Potential Property Acquisitions	Potential Easements
Pacific/Alameda and Pacific/Vignes	Santa Fe Avenue at I-10 Bridge to Harbor Subdivision	Acquisition of private property for WSAB aerial connection from Santa Fe , Minerva Street and Harbor Subdivision	Easement from UPRR for WSAB aerial structure over Redondo Junction Easement from Cities of LA and Vernon for WSAB aerial structure within Santa Fe Avenue, 25th Street and Minerva Avenue
	Harbor Subdivision to Pacific Boulevard	Potential acquisition of property for WSAB aerial structure transitioning from Harbor Subdivision to Pacific Boulevard	Easement and possible acquisition to locate aerial WSAB Vernon Station and entrances above Harbor Subdivision Agreement within Metro to encroach on Metro Vernon Yard site
	Pacific Boulevard to La Habra Branch/ Randolph Street	Potential acquisition of property for WSAB tracks transitioning from Pacific Boulevard to Randolph Street	Easement from City of Vernon for WSAB tracks at-grade in Pacific Boulevard
	La Habra Branch/ Randolph Street to San Pedro Subdivision	Potential property acquisition(s) (partial or full, to be determined) on southwest corner of Randolph Street and the San Pedro subdivision for WSAB aerial structure columns from La Habra Branch/Randolph Street to the San Pedro Subdivision	Easement from UPRR for WSAB tracks and Pacific/Vernon Station

Table 5-51. Alameda and Alameda/Vignes Potential Property Acquisitions and Easements

	Alignment Segment	Potential Property Acquisitions	Potential Easements
Alameda	Union Station to Alameda Street	None	Easement from Caltrans for WSAB aerial structure crossing over the US-101
Alameda/Vignes	Union Station to Alameda Street	<p>Potential acquisition of property along Vignes Street if bored tunnel is used</p> <p>Possible property acquisition if cut-and-cover tunnel is used at curve from Vignes to 3rd Streets</p> <p>Acquisition of property at 3rd Street/Traction Avenue for Arts District Station access</p>	<p>Easement from Caltrans for WSAB aerial structure crossing over the US-101</p> <p>Underground easement if bored tunnel is used to make curve from Vignes Street to 3rd Street</p>
Alameda and Alameda/Vignes	Alameda Street to Long Beach Avenue	Potential property acquisition(s) (partial or full, to be determined) along Newton Street between Alameda Street and Long Beach Avenue for the WSAB aerial structure	Easement from City of Los Angeles for the WSAB aerial structure in center of Alameda Street, Newton Street, and all streets perpendicular to Alameda Street
Alameda and Alameda/Vignes	Long Beach Avenue to La Habra Branch/Randolph Street	WSAB Vernon and Slauson Stations may require localized property acquisition on northbound side of Long Beach Boulevard	Easement from City of Los Angeles and possibly UPRR for the WSAB aerial structure along Long Beach Avenue
	La Habra Branch/Randolph Street to San Pedro Subdivision	Potential property acquisition(s) (partial or full, to be determined) on southwest corner of Randolph Street and the San Pedro subdivision for WSAB aerial structure columns from La Habra Branch/Randolph Street to the San Pedro Subdivision	<p>Easement from UPRR for the WSAB aerial structure and tracks</p> <p>Easement from City of Huntington Park to widen UPRR ROW to accommodate both WSAB and UPRR tracks</p>

Table 5-52. Property Acquisitions Thresholds

	Score	Description
●	High	Sufficient ROW with minimal number of acquisitions
◐	Medium	Limited ROW requiring moderate number of acquisitions
○	Low	Highly constrained ROW requiring significant number of acquisitions

Table 5-53. Property Acquisitions Summary

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda Option	Pacific/ Vignes Option	Alameda Option	Alameda/ Vignes Option
Number of property acquisitions	Significant	Minimal	Moderate	Moderate	Minimal	Minimal
Number of easements	Minimal	Moderate	Moderate	Moderate	Moderate	Moderate
Property Acquisitions score	○	●	◐	◐	●	●

5.4.5 Cost Effectiveness and Financial Feasibility Summary

Overall, the Alameda alignment option would be the most cost-effective and poses the smallest risk to cost with the fewest engineering challenges (Table 5-54). In part, this is due to the aerial and at-grade configurations, which reduce costs when compared to the costs for an underground alignment. The East Bank alignment option presents the greatest engineering challenges with the need to address crossing existing LA River bridges, ROW constraints from adjacent established properties and utilities, and securing third-party agreements with UPRR and Metrolink to share the ROW. These engineering challenges result in significant risks, which could decrease the cost-effectiveness of this alignment option even further. In addition, when comparing the northern alignment options that require tunneling, the West Bank 3 alignment option has the highest risk due to the longest length of tunneling required.

Table 5-54. Overall Cost Effectiveness and Financial Feasibility

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda Option	Pacific/ Vignes Option	Alameda Option	Alameda/ Vignes Option
Capital cost (rough order of magnitude in millions \$2015)	● \$3,796.3 ¹⁰	● \$4,315.5	● \$4,420.5	● \$4,416.2	● \$4,309.4	○ \$4,624.4
Cost/benefit (capital costs per boarding)	● \$75	○ \$99	● \$74	● \$84	● \$59	● \$75
Engineering challenges	○ Extensive potential conflicts with infrastructur e and requires numerous third-party approvals	● Risk associated with tunneling	● Risk associated with tunneling	● Risk associated with tunneling	● Minimal risk as entirely aerial or at- grade	● Minimal risk associated with shortest tunneling segment
Number of property acquisitions (initial estimate)	○ Significant ROW constraints	● Sufficient ROW	● Limited ROW	● Limited ROW	● Sufficient ROW	● Sufficient ROW
Overall Rankings and Scores	Low 1.0	Medium 2.0	Medium 2.0	Medium 2.0	High 3.5	Medium 2.5

5.5 Ensure Equity

The purpose of the equity goal is to advance a project that provides benefits to transit dependent and minority populations. The following sections evaluate each alignment option against the evaluation criteria developed for the equity goal.

5.5.1 Transit-Dependent Populations

According to the 2012 Metro Model, the Study Area's high percentage of zero-vehicle households (20 percent), minors (18 percent), and elderly populations (11 percent) demonstrate the need to serve these communities with high quality fixed transit. Alignment options with stations located within proximity of the highest number of minors, elderly, and zero-vehicle households would increase travel opportunities for these transit-dependent populations. Alignment options are evaluated based on an average of the percentages of zero-vehicle households, and elderly and minor persons

¹⁰ ROW costs were not factored during the TRS Capital Cost estimates. The substantial length of the East Bank alignment requires obtaining easements or purchasing the ROW.

within a half-mile of the stations along that alignment option. Table 5-55 describes the rating system for the “high”, “medium”, or “low” ranking and Table 5-56 provides the transit-dependent population percentage and associated score for each alignment option.

All alignment options serve a higher percentage of transit-dependent populations than the Study Area as a whole (16 percent). The Alameda and Alameda/Vignes alignment options serve the highest percentage of transit-dependent populations, 20 and 21 percent, respectively. The remaining alignment options serve between 18 and 19 percent. Because a significant percentage of the population served by each alignment option is considered transit-dependent, all alignment options scored either medium or high.

Table 5-55. Transit-Dependent Populations Scoring Threshold

	Score	Description
●	High	20% and over of persons and households with transit-dependent traits within 0.5 mile of the proposed stations
◐	Medium	15% to 19% of persons and households with transit-dependent traits within 0.5 mile of the proposed stations
○	Low	Less than 15% of persons and households with transit-dependent traits within 0.5 mile of the proposed stations

Table 5-56. Transit-Dependent Populations Summary

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/Alameda Option	Pacific/Vignes Option	Alameda Option	Alameda/Vignes Option
Percentage of transit-dependent persons within ½ mile of stations	15% to 19%	15% to 19%	15% to 19%	15% to 19%	Over 20%	Over 20%
Transit-Dependent Populations Score	◐	◐	◐	◐	●	●

Source: Census American Factfinder ACS 2012 5-year estimates 2008-2012

5.5.2 Environmental Justice Communities

EJ populations are defined as those that are minority or low-income based on guidance provided by the USDOT Order on Environmental Justice (5610.2). The FTA Circular 4703.1 Environmental Policy Guidance for Federal Transit Administration Recipients considers a population to be an EJ population if: a) at least 50 percent of the population in the Census block is minority and at least 50 percent of the Census tract is low-income; or b) the proportion of minority residents in the Census block is greater

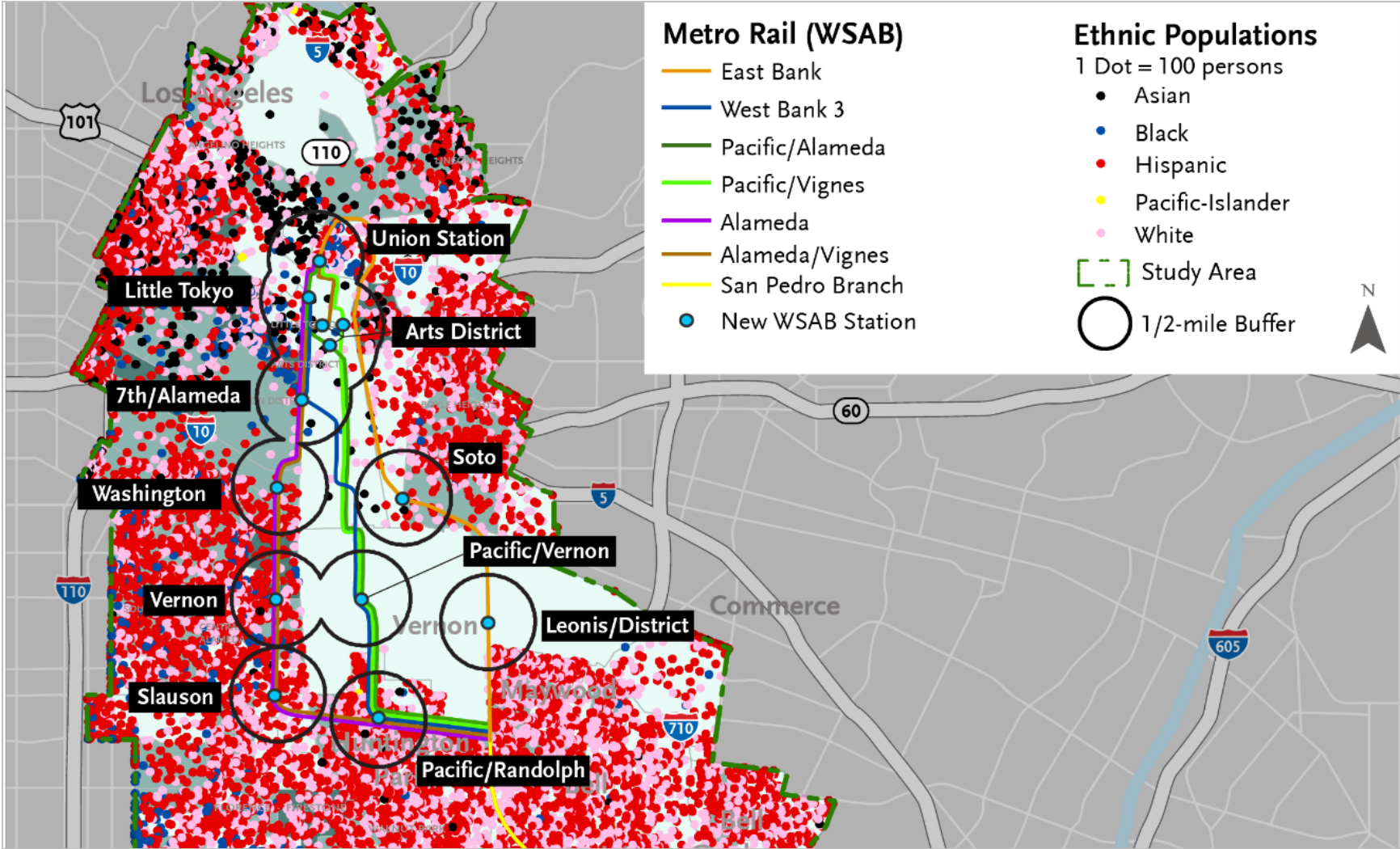
than the average for minority populations in the County, or the proportion of low-income residents in the Census tract is greater than the average of the County low-income population. Metro's LRTP also includes guidelines and planning policies regarding EJ issues, which and complies with federal EJ and Title VI requirements.

According to the 2012 Census, approximately 66 percent of the Study Area's population are minorities. This represents a higher proportion of minorities when compared to LA County as a whole (57 percent). These populations are most concentrated within the cities of Bell, Cudahy, Huntington Park, Maywood and Bell Gardens.

Alignment options with stations in proximity to the highest number of minority and low-income populations would increase travel opportunities for these EJ groups. Alignment options are evaluated based on the percentage of station areas along each alignment option that qualify as EJ communities under FTA guidance. Table 5-57 describes the rating system for the "high", "medium", or "low" ranking and Table 5-58 provides the percentage of station areas along each alignment that are considered EJ communities under FTA guidance.

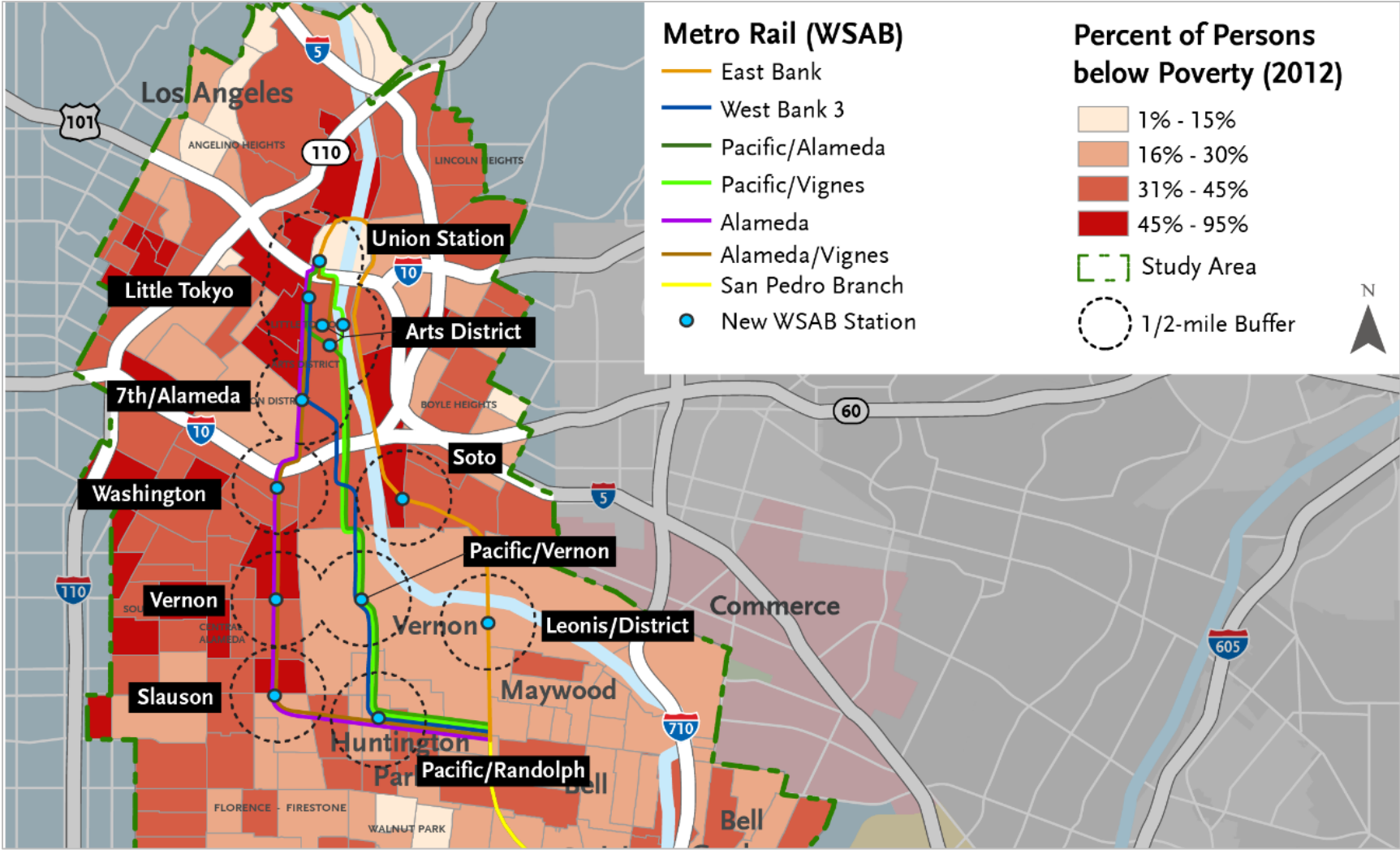
All station areas surpass the LA County averages of 17 percent of people living below poverty and 57 percent of the population being minorities and therefore would be considered EJ communities. Therefore, all alignment options scored "high".

Figure 5-10. Minority Populations



Source: Census American Factfinder ACS 2012 5-year estimates 2008-2012

Figure 5-11. Persons below Poverty



Source: Census American Factfinder ACS 2012 5-year estimates 2008-2012

Table 5-57. Environmental Justice Communities Scoring Threshold

	Score	Description
●	High	Over 67% of station areas qualify as EJ communities
◐	Medium	Between 34% and 66% of station areas qualify as EJ communities
○	Low	Less than 33% of station areas qualify as EJ communities

Table 5-58. Environmental Justice Communities Summary

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/Alameda Option	Pacific/Vignes Option	Alameda Option	Alameda/Vignes Option
Percentage of station areas that qualify as EJ communities	100% of station areas	100% of station areas	100% of station areas	100% of station areas	100% of station areas	100% of station areas
Environmental Justice Communities Score	●	●	●	●	●	●

Source: Census American Factfinder ACS 2012 5-year estimates 2008-2012

5.5.3 Provides New Service to Underserved Communities

One of the major benefits of a new transit service is providing new travel opportunities for those communities that are not currently served by a high quality fixed transit service. Portions of the Study Area are currently served by the Metro Green Line, Metro Blue Line, Metro Red Line, Metro Purple Line, and Metro Gold Line. However, much of this service is on the periphery of the Study Area and only the Metro Blue Line provides a north-south connection.

Table 5-59 describes the rating system for the “high”, “medium”, or “low” ranking.

Table 5-60 presents the comparison of the alignment options in terms of service to underserved communities.

The East Bank, West Bank 3, Pacific/Alameda, and Pacific/Vignes alignment options provide new service to the greatest number of underserved communities. This is in large part due to the fact that the areas these alignments serve currently do not have any high-quality fixed transit service. Portions of the Alameda and Alameda/Vignes alignment options overlap with the existing Metro Blue Line alignment, meaning that the Alameda and Alameda/Vignes alignment options will provide service to communities that already have access to some high-quality fixed service. However, the Alameda/Vignes alignment does include a new Arts District Station, which is a community that lacks fixed transit service. Although stations along the Alameda alignment option would be located adjacent to existing Metro Blue Line stations, the

WSAB Transit Corridor Project would enhance the transit network, providing additional transportation options for these communities, which are low-income and transit-dependent.

Table 5-59. New Service to Underserved Communities Scoring Threshold

	Score	Description
●	High	Would provide new service to a high number of underserved communities
◐	Medium	Would provide new service to a moderate number of underserved communities
○	Low	Would provide new service to a limited number of underserved communities

Table 5-60. New Service to Underserved Communities Summary

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda Option	Pacific/ Vignes Option	Alameda Option	Alameda/ Vignes Option
Provision of new reliable fixed service to underserved communities	New service	New service	New service	New service	Overlaps with existing Metro Blue Line and existing Metro Gold Line Little Tokyo Station	Overlaps with existing Metro Blue Line and provides new Arts District Station
New Service to Underserved Communities Score	●	●	●	●	◐	●

5.5.4 Ensure Equity Summary

All of the northern alignment options meet the goal of ensuring equity in the provision of new transit service by serving highly transit-dependent and EJ communities (Table 5-61). The proportion of transit-dependent households is slightly higher along the Alameda and Alameda/Vignes alignment options because of the corridor's proximity to southeast Los Angeles. However, these communities are already served by the Metro Blue Line; therefore, the Alameda and Alameda/Vignes alignment options would not provide new service to an underserved community. All station areas surpass the LA County averages of 17 percent of people living below poverty and 57 percent of the population being minorities and therefore would be considered EJ communities.

Table 5-61. Overall Community and Stakeholder Needs Summary

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda	Pacific/ Vignes	Alameda	Alameda/ Vignes
Percentage of transit-dependent persons within ½ mile of stations	● 15% to 19%	● 15% to 19%	● 15% to 19%	● 15% to 19%	● Over 20%	● Over 20%
Percentage of station areas that qualify as EJ communities	● 100% of station areas	● 100% of station areas	● 100% of station areas	● 100% of station areas	● 100% of station areas	● 100% of station areas
Provision of new reliable fixed service to underserved communities	● New service	● New service	● New service	● New service	● Overlaps with existing Metro Blue Line and existing Metro Gold Line Little Tokyo Station	● Overlaps with existing Metro Blue Line and provides new Arts District Station
Overall Rankings and Scores	High 2.5	High 2.5	High 2.5	High 2.5	High 2.5	High 3.0

6 SUMMARY AND RECOMMENDATIONS

6.1 Summary of Results

Each of the northern alignment options provides a unique set of benefits that must be considered against the potential costs and challenges. Table 6-1 presents the results for each alignment option considered, and the following bullets summarize the key findings for each alignment option:

- **East Bank:** Because of its direct connection into Union Station, the East Bank alignment option provides substantial mobility benefits; however, the stations along this alignment serve predominantly industrial areas with lower population and employment densities and limited opportunities for future TOD. Most importantly, this alignment option presents significant engineering challenges because of the constrained ROW from adjacent established properties and utilities, conflicts with existing infrastructure (such as LA River bridges), and requires securing third-party agreements with rail agencies. Combined, these are likely to result in higher costs.
- **West Bank 3:** This alignment option provides limited mobility benefits because of its northern terminus in Little Tokyo instead of Union Station. The lack of connection to Union Station also limits TOD opportunities and connections to a major population and employment center. Furthermore, while the benefits of West Bank 3 are substantially lower than the other northern alignment options, the associated costs and engineering challenges are not significantly lower and thus do not offset the lack of connection into Union Station.
- **Pacific/Alameda:** By serving both an Arts District and a Little Tokyo Station, this alignment option provides significant mobility benefits, presents numerous TOD opportunities, and meets the needs of the local communities and stakeholders. By serving Pacific Boulevard, this alignment option introduces new transit service to a currently underserved area while also providing congestion relief along the Metro Blue Line (North-South Line). However, by serving Santa Fe Avenue and Pacific Boulevard, this alignment option provides service to a primarily industrial area rather than enhancing transit service along the Metro Blue Line, which is heavily residential and presents promising TOD opportunities in the future.
- **Pacific/Vignes:** The Pacific/Vignes alignment option provides many of the same benefits as the Pacific/Alameda alignment option. However, by not connecting to the Little Tokyo Station, this alignment option misses a key connection to the East-West Line (the future Regional Connector) thereby limiting mobility benefits and a heavily populated area with numerous TOD opportunities. Furthermore, the estimated capital cost is not significantly lower than the Pacific/Alameda alignment option, but the benefits are lower.
- **Alameda:** The Alameda alignment option provides connections to Union Station, Little Tokyo, and Metro Blue Line (North-South Line), resulting in

significant mobility benefits. By following the Metro Blue Line, this alignment option serves low-income and densely populated areas that would benefit from additional transit service and helps to address overcrowding on the Metro Blue Line. By avoiding tunneling, this alignment option is also estimated to be one of the lower cost options. However, this alignment option does not minimize environmental impacts as effectively as other alignment options because of a moderate reduction in VMT and an exclusively aerial alignment, which could result in conflict with existing roadway or rail (Metro Blue Line and freight) networks.

- Alameda/Vignes:** As with the Alameda alignment option, this alignment option provides new transit service to a transit-dependent community along the Metro Blue Line (North-South Line) and results in substantial mobility benefits. While this alignment option does provide a station in the Arts District with significant potential for future growth, it does not include a station at Little Tokyo, limiting the connection to the East-West Line (the future Regional Connector). This alignment option is also estimated to be the most expensive because of the required tunneling.

Table 6-1. Summary of Results

Evaluation Criteria	Northern Alignment Options					
	East Bank	West Bank 3	Pacific/ Alameda	Pacific/ Vignes	Alameda	Alameda/ Vignes
Provide Mobility Improvements	Medium	Low	High	High	High	Medium
Support Local and Regional Land Use Compatibility	Low	Low	High	High	High	High
Minimize Environmental Impacts	Medium	Low	High	Medium	Low	Low
Ensure Cost Effectiveness and Financial Feasibility	Low	Medium	Medium	Medium	High	Medium
Ensure Equity	High	High	High	High	High	High
Overall Rankings	Low	Low	High	High	High	Medium

6.2 Recommendations and Next Steps

Based on the results of the northern alignment options screening analysis, it is recommended that the East Bank and West Bank 3 alignment options be dropped from further consideration and the Pacific/Alameda, Pacific/Vignes, Alameda, and Alameda/Vignes alignment options be carried forward into scoping for the

environmental analysis. The East Bank and West Bank 3 alignment options were developed during the SCAG AA phase and do not meet the purpose and need of the project as effectively as the Pacific/Alameda, Pacific/Vignes, Alameda, and Alameda/Vignes alignment options.

In particular, the East Bank alignment option serves a primarily industrial area with limited opportunities for future TOD and poses significant engineering challenges that present higher risk and cost. The West Bank 3 alignment option does not connect directly into Union Station, forcing passengers to transfer to reach this major transportation hub, thus limiting the mobility improvements. The Pacific/Alameda and Pacific/Vignes alignment options follow the general alignment of the West Bank 3, but provide the valuable direct connection to Union Station.

By providing a direct connection into Union Station, the Pacific/Alameda, Pacific/Vignes, Alameda, and Alameda/Vignes alignment options provide a reliable transit service that connects southeastern LA County to the regional transportation network. The Pacific/Alameda, Pacific/Vignes, Alameda, and Alameda/Vignes alignment options increase mobility and connectivity for historically underserved transit-dependent and EJ communities; reduce travel times on local and regional transportation networks; and accommodate substantial future population and employment growth. Therefore, it is recommended that the Pacific/Alameda, Pacific/Vignes, Alameda, and Alameda/Vignes alignment options be carried into scoping for the environmental analysis.