

Metro Green Line to LAX

Alternatives Analysis Report

April 2012



Metro

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ABBREVIATIONS / ACRONYMS

AA.....	Alternatives Analysis
APM	Automated People Mover
ACRP	Airport Cooperative Research Program
BRT.....	Bus Rapid Transit
Caltrans.....	California Department of Transportation
CEQA.....	California Environmental Quality Act
CTA.....	Central Terminal Area
EIR.....	Environmental Impact Report
EIS	Environmental Impact Statement
FAA.....	Federal Aviation Administration
FTA.....	Federal Transportation Administration
GTC	Ground Transportation Center
HOV	High-Occupancy Vehicle
ITC.....	Intermodal Transportation Center
LADOT	Los Angeles Department of Transportation
LAWA	Los Angeles World Airports
LAX.....	Los Angeles International Airport
LPA.....	Locally Preferred Alternative
LRT	Light Rail Transit
L RTP	Long Range Transportation Plan
MAP	Million Annual Passengers
MAX	Municipal Area Express Transit
Metro	Los Angeles County Metropolitan Transportation Authority
mph.....	Miles per Hour
NEPA.....	National Environmental Policy Act
PeMs	Caltrans Performance Measurement Systems
PRT.....	Personal Rapid Transit
ROW.....	Right-of-Way
SEIR.....	Supplemental Environmental Impact Report
SCAG.....	Southern California Association Governments
SOV.....	Single-Occupancy Vehicle
SPAS.....	Specific Plan Amendment Study
TBIT.....	Tom Bradley International Terminal
TSM.....	Transportation Systems Management
UCLA.....	University of California, Los Angeles

1. INTRODUCTION

1.1. STUDY BACKGROUND

The Los Angeles County Metropolitan Transportation Authority (Metro) has initiated an Alternatives Analysis (AA) for the Metro Green Line to Los Angeles International Airport (LAX) project. A Draft Environmental Impact Statement / Draft Environmental Impact Report (Draft EIS/EIR) will be prepared to comply with the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA). It is anticipated that the Federal Transit Administration (FTA) and the Federal Aviation Administration (FAA) will serve as federal co-lead agencies for the purposes of NEPA environmental clearance. LACMTA is serving as the local lead agency for the purposes of CEQA environmental clearance.

The focus of the AA study is to identify, screen, and recommend alternatives for further study in the environmental process. A connection between the Metro Rail system and LAX has been the subject of study by Metro, Los Angeles World Airports (LAWA), and other agencies, with recent efforts including the LAX/Metro Green Line Interagency Task Force (2008), the LAX Master Plan (2004) and the Metro Green Line Northern Extension Supplemental EIR (1994). The Measure R sales tax, passed by Los Angeles County voters in 2008, included \$200 million (2008 dollars) in funding for a fixed guideway connection to LAX. It is also identified in the financially constrained portion of Metro's current Long Range Transportation Plan (LRTP).

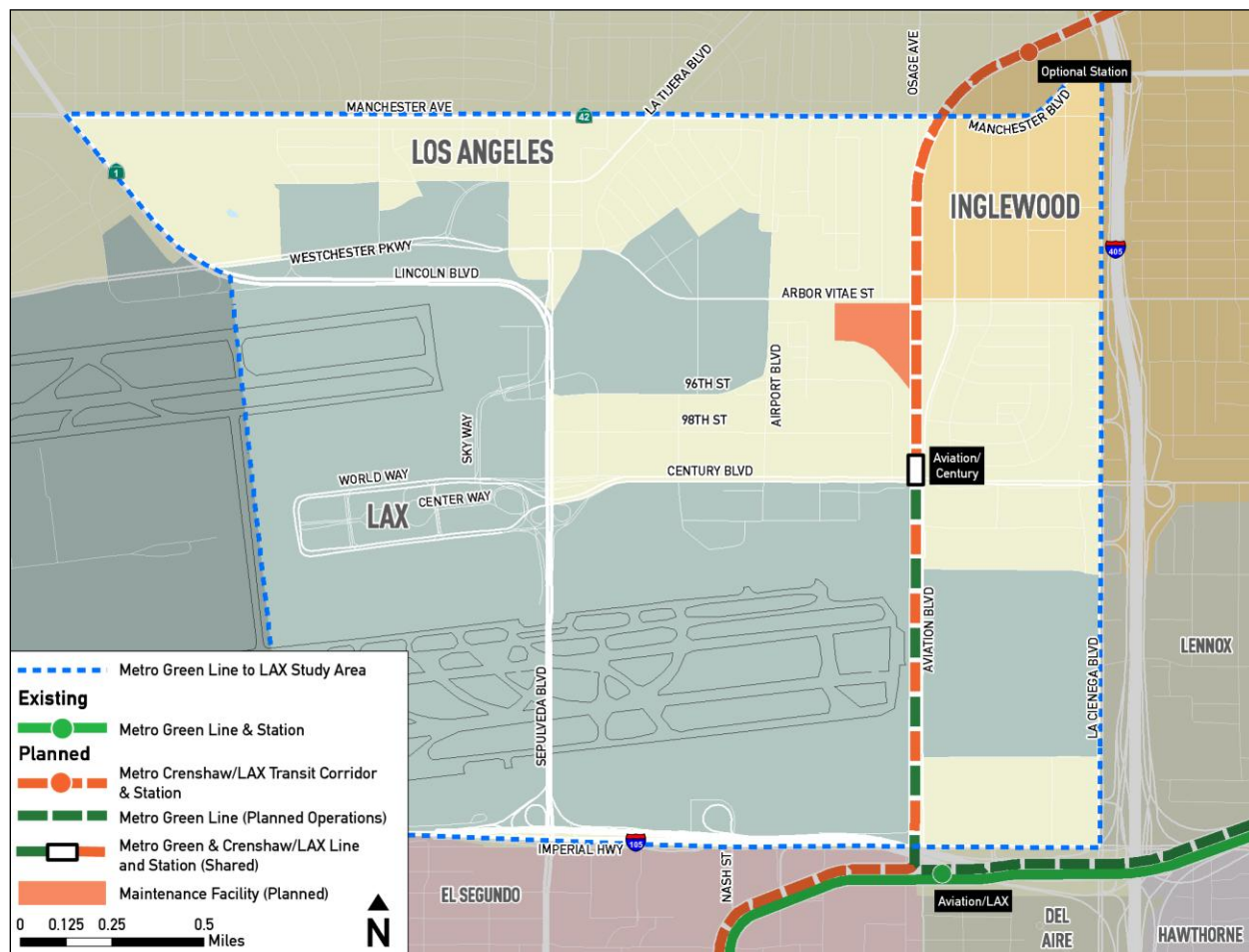
This study will examine potential connections between the Metro Rail system and LAX. Alternatives considered are summarized in Figure 1.1. The Project Study Area is bounded by Manchester Avenue to the north, La Cienega Boulevard to the east, Imperial Highway to the south and the LAX air cargo area to the west, and includes portions of the Cities of Los Angeles and Inglewood. An overview of the Project Study Area is shown in Figure 1.1.

1.1.1. Alternatives Considered

Several potential alternatives, which include various routing and station options, are currently under study as part of this Alternatives Analysis. The number of alternatives and options is expected to decrease as the analysis advances and options that are determined not to meet the purpose and need or initial screening criteria are set aside. The alternatives being studied include:

- **No Build** – Existing transit and highway plans and programmed improvements through the year 2035.
- **Transportation Systems Management (TSM)** – Lower cost capital and operational improvements to roadways designed to improve bus speeds along existing roadways from the Aviation/Century Station to LAX.
- **Build Alternatives** – Transit system(s) designed to connect or provide a more convenient connection to the airport for Metro Green and Crenshaw/LAX passengers. System can make use of a variety of technologies, such as light rail transit (LRT), automated people mover (APM), or bus rapid transit (BRT).

Figure 1.1. Project Study Area – Overview



Source: ConnectLAX, 2011

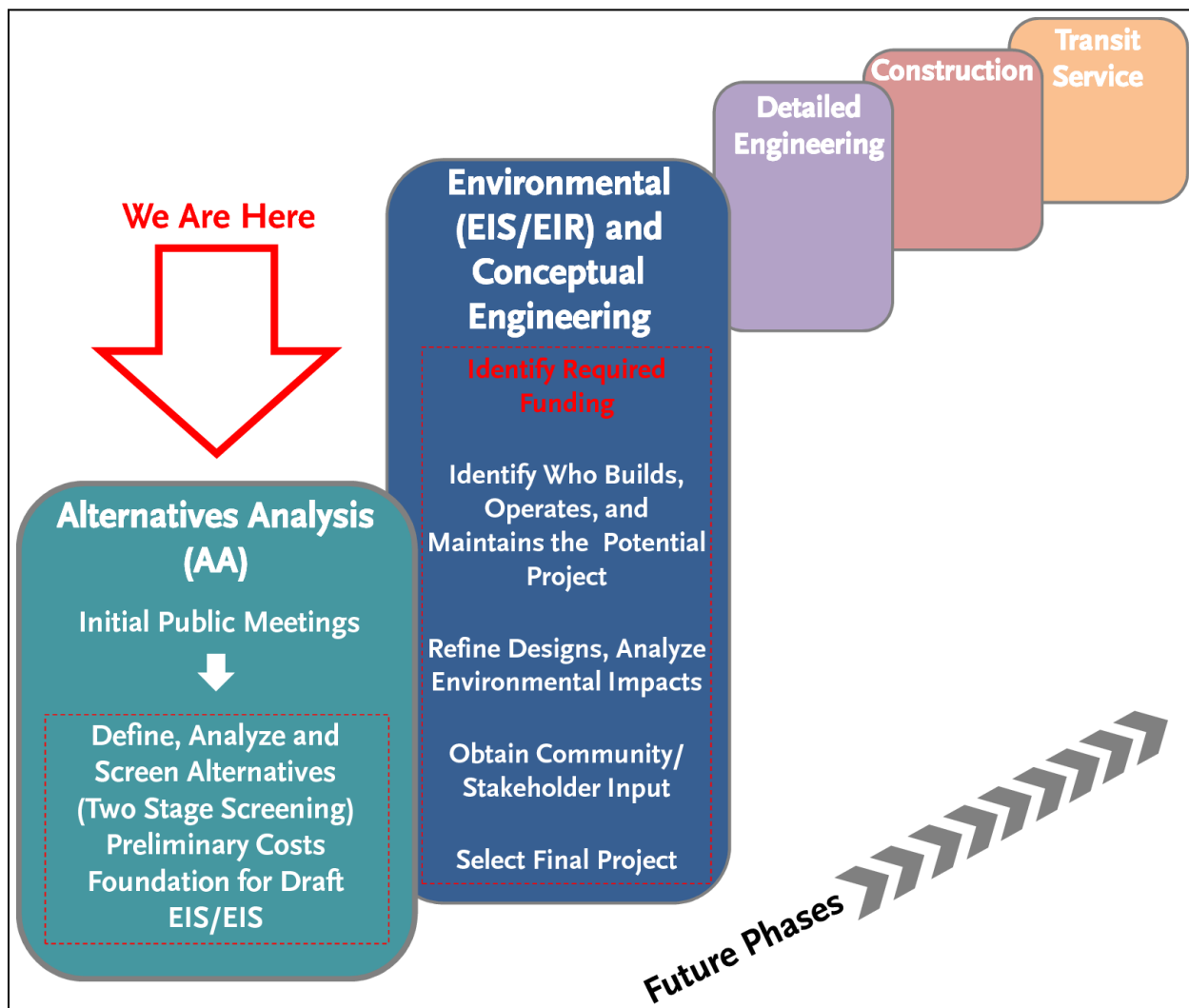
1.2. ALTERNATIVES ANALYSIS REPORT PURPOSE AND STRUCTURE

An AA is the first step of a process that is required to complete the planning, environmental assessment, design and construction of a large-scale transit project. Figure 1.2 illustrates the project development process for the Metro Green Line to LAX project. The AA Report begins with the Purpose and Need in Section 2. The Purpose and Need analyzes the travel markets and existing transportation conditions within the Project Study Area and details a range of project objectives designed to address specific mobility problems. Section 3 introduces the Preliminary Definition of Alternatives, which characterizes the transit alternatives that could potentially connect the Metro Rail system to the airport.

Screening, a two-stage screening process discussed in Section 4, examines the constraints of transit modes, route and station combinations (Stage I) and then compares performance between alternatives, including a trade-off analysis (Stage II). The purpose of the screening process is to narrow down the number of alternatives that are ultimately advanced to the draft environmental review process, the next step in project development.

Section 5 discusses the public outreach engaged to inform the public about the project, and Section 6 describes which alternatives will be carried forward to be studied in detail in the Draft EIS/EIS based on the screening process and public input.

Figure 1.2. Project Development Process



Source: ConnectLAX, 2012

2. PURPOSE AND NEED

The purpose of this project is to improve public transit service to LAX. In particular, the project will provide a reliable, fast and convenient transit connection for air passengers and employees traveling between the LAX area and the regional Metro Rail system.

2.1. HISTORY AND BACKGROUND

LAX is located in southwest Los Angeles County (Figure 2.1). It was the sixth busiest airport in the world, accommodating 59 million annual passengers (MAP) in 2010 (Airports Council International, 2011; LAWA, 2011). On the national level, LAX is the third busiest airport in the U.S. Table 2.1 ranks U.S. airports according to annual MAP (January through October 2011). By 2020, 78.9 MAP are projected to pass through LAX annually (LAWA, 2011).

Table 2.1. Top U.S. Airports by Million Annual Passengers, 2010

Rank	Airport	Enplaned Passengers (millions)
1	Atlanta (ATL)	89.3
2	Chicago O'Hare (ORD)	66.8
3	Los Angeles (LAX)	59.1
4	Dallas/Fort Worth (DFW)	56.9
5	Denver (DEN)	52.2
6	New York (JFK)	46.5
7	Houston Bush (IAH)	40.5
8	Las Vegas (LAS)	39.8
9	San Francisco (SFO)	39.3
10	Phoenix (PHX)	38.6

Source: Airports Council International, 2012

Note: MAP rounded to the nearest hundred thousand passenger

Table 2.2. Public Transportation Mode Share to US Airports

Rank	Airport	Total	Rail	Bus/Van
1	San Francisco	23%	7%	16%
2	New York (JFK)	19%	8%	11%
3	Boston	18%	6%	12%
4	Washington, DC (DCA)	17%	13%	4%
5	Oakland	15%	9%	6%
6	New Orleans	15%	0%	15%
7	Newark	14%	5%	9%
8	Atlanta	14%	10%	4%
9	Denver	14%	0%	14%
10	Los Angeles	13%	Less than 0.5%	13%

Source: ACRP Report, 2008

Note: Rail mode share for LAX includes shuttle bus connecting the Aviation/LAX Green Line station to LAX

Other airports have higher bus and/or rail shares than LAX because they are served by convenient, customer-friendly fixed guideway airport connection links. The Boston metropolitan area, for example, is connected to Boston Logan International Airport via bus rapid transit, express bus and rail. Similarly, the Atlanta metropolitan area is connected to Hartsfield-Jackson International Airport by rail and bus (ACRP, 2008).

In 2005, LAWA introduced the LAX FlyAway program, a frequent, low-cost shuttle service running between LAX and several important regional activity centers. The FlyAway program has seen a 150 percent ridership increase from 2005 to 2010, suggesting a strong market for airport transit trips in the Southern California region (LAWA, 2010). The passage of Measure R in 2008 includes \$200M (2008 \$) for a fixed-guideway connection to LAX, which would serve an air passenger market similar to the one served by FlyAway, albeit to/from different activity centers.

2.1.1. LAX Master Plan and Specific Plan Amendment Study

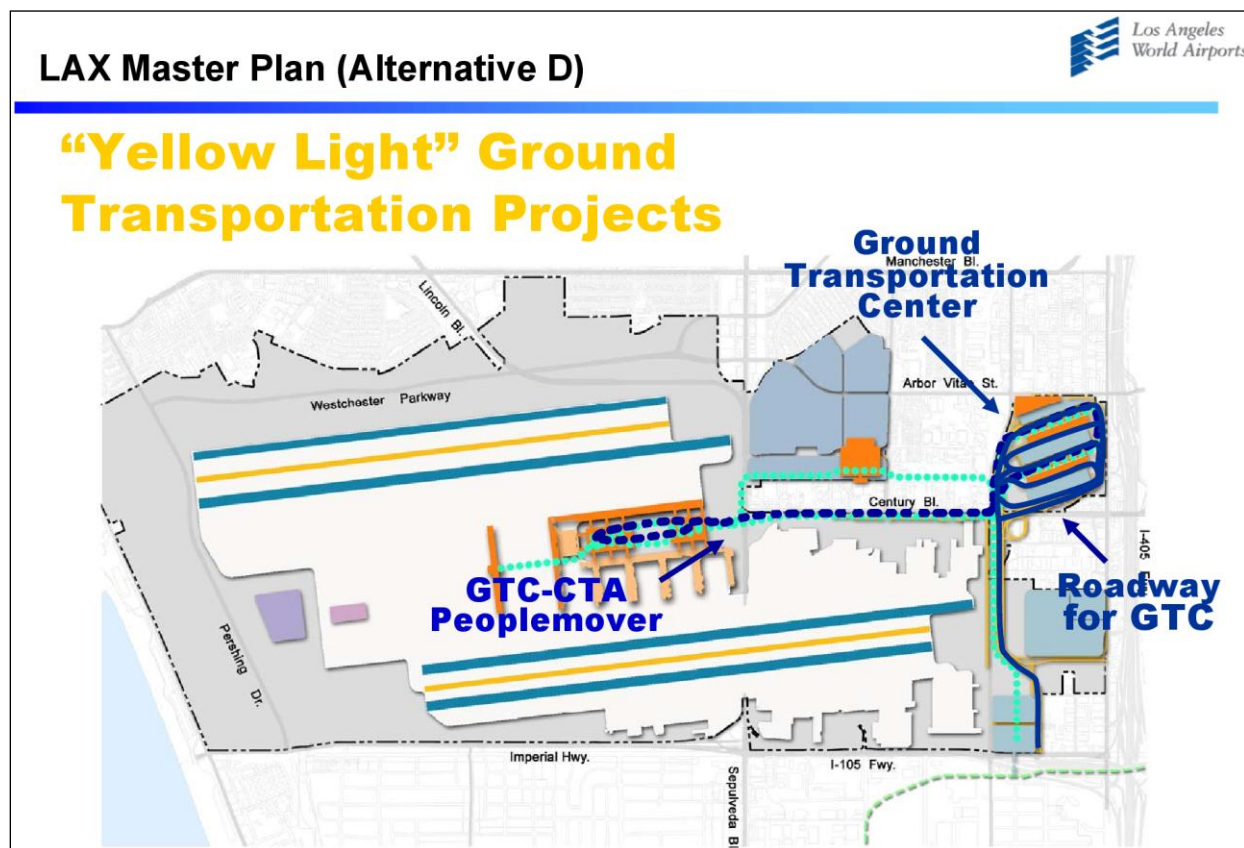
In late 2004, the Los Angeles City Council approved the LAX Master Plan, a strategic program of projects intended to modernize the airport. Included in the Master Plan and relevant to this Study are two APM systems. APM1 is intended to connect the LAX terminals (Central Terminal Area or CTA) to the Metro Green Line at an Intermodal Transportation Center (ITC) near Imperial Highway with an intermediate stop at a Consolidated Rent-A-Car Center (RAC or ConRAC). APM2 is intended to connect the LAX terminals to a proposed Ground Transportation Center (GTC) at the northeast corner of Aviation and Century Boulevards.

Following approval of the LAX Master Plan, a number of lawsuits were filed that resulted in a legal settlement requiring LAWA to conduct a separate Specific Plan Amendment Study (SPAS) for a subset of LAX Master Plan projects, known as “Yellow Light” projects. In 2008, LAWA initiated the SPAS process to evaluate the “Yellow Light” projects as required in the settlement agreement that included runway, terminal and ground access improvements. The APM2 project was designated as one of the “Yellow Light” projects. As part of SPAS, LAWA is

considering alternatives to the APM2 system that could connect the airport to the Metro Rail system at Aviation and Century Boulevards. The goal of LAWA’s planning effort is to update the LAX Specific Plan through a Program-level EIR. Individual projects would be environmentally cleared for advancement to construction through a subsequent Project-level EIR. The Draft EIR for the SPAS is scheduled to be released in Summer 2012. It is anticipated that once the final SPAS EIR is certified, LAWA will prepare an EIS for the SPAS and/or initiate the project-level environmental clearance process for a project(s) within the SPAS.

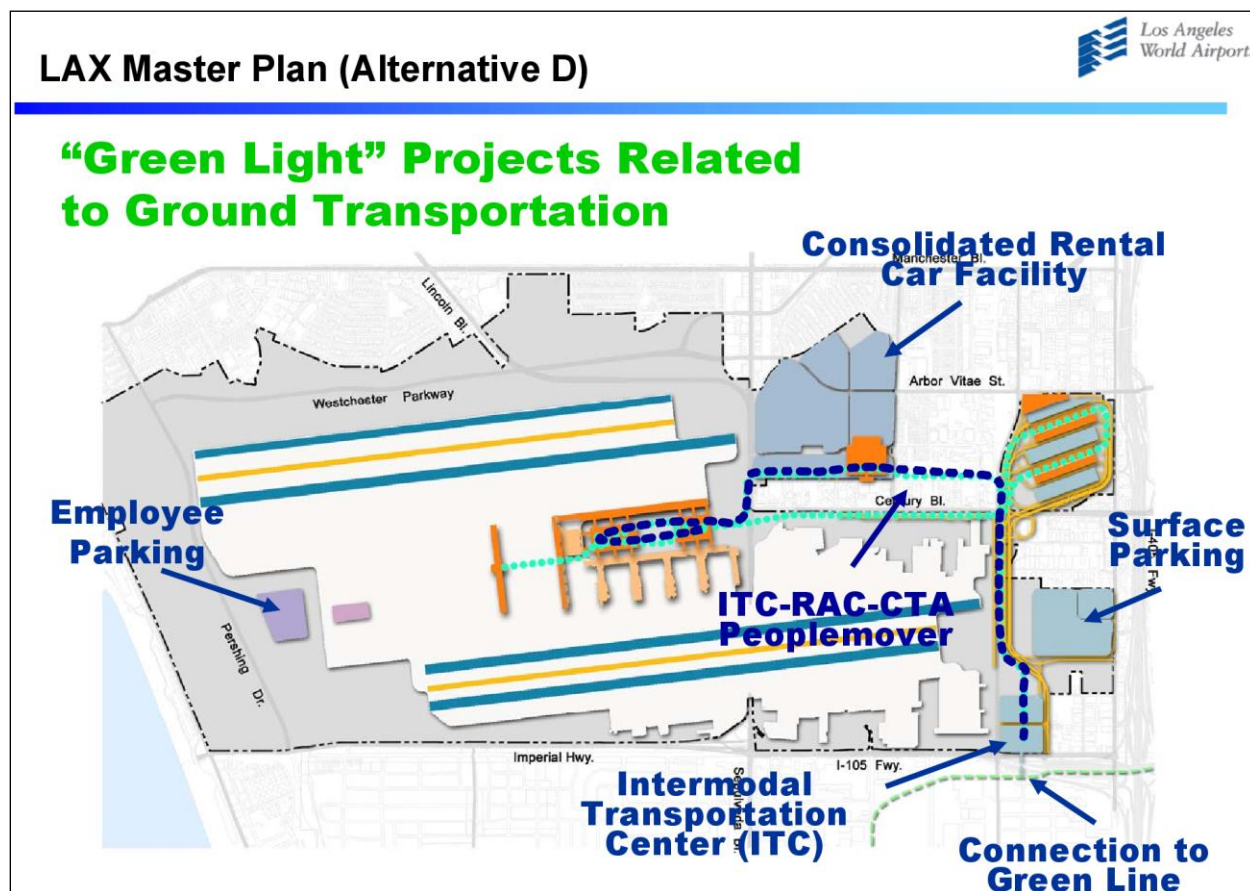
Concurrent with the SPAS update process, LAWA has pursued the development of projects not disputed as part of the settlement agreement (“Green Light” projects) through project-level EIRs. A project-level EIR for the APM1 system (one of the “Green Light” projects) to the Metro Green Line and the ITC has not yet been initiated. See Figure 2.2 and Figure 2.3 for images of both APM systems.

Figure 2.2. Alternative D Overview – “Yellow Light” Ground Transportation Projects



Source: LAWA, 2010

Figure 2.3. Alternative D Overview – “Green Light” Ground Transportation Projects



Source: LAWA, 2010

The Metro Green Line to LAX study and environmental review is conducted in parallel to LAWA’s Master Plan and SPAS Studies. Project development for the Metro Green Line to LAX can either continue to in parallel to SPAS or eventually be used for Project-Level environmental review for projects within SPAS. The Metro Green Line to LAX planning efforts will be done in coordination with LAWA to ensure compatibility with future airport plans.

2.2. PURPOSE AND NEED OBJECTIVES

The purpose of this section is to establish project objectives and present information that characterizes the travel market conditions and transportation system deficiencies that underscore the Purpose and Need for the project. These objectives were presented to the public in a round of community workshops and were reviewed by the Metro Green Line to LAX Technical Advisory Committee (TAC) in August 2011. The four project objectives are:

1. Provide a reliable, fast, and convenient connection for passengers traveling between LAX area and the regional transit system
2. Integrate with existing and future transit connections and airport facilities.
3. Increase the share of transit trips to and from LAX and reduce air pollution with minimal impact on airport facilities and surrounding communities.

- 4. Satisfy the surface transportation and travel demands of the high volume of passengers connecting to LAX.

2.3. OBJECTIVE #1: PROVIDE A RELIABLE, FAST, AND CONVENIENT CONNECTION FOR PASSENGERS TRAVELING BETWEEN THE LAX AREA AND THE REGIONAL TRANSIT SYSTEM.

This section summarizes the performance of existing transportation facilities in the Project Study Area and compares travel times to LAX by mode. The transportation facilities serving air passengers and airport employees destined to and from LAX is characterized by localized traffic congestion, unpredictable trip times, and inconvenient transit connections requiring multiple transfers. Given the time-critical nature of air travel and the volume of employees traveling to and from LAX at various times throughout the day, there is a need for system improvements that can provide reliable, fast and convenient travel to LAX.

2.3.1. Existing Freeways/Arterial Roadways

The Project Study Area is served by both freeway and arterial roadway systems. Two major freeways serve the Project Study Area and its immediate vicinity: 1-405, running slightly east of the eastern border of the Project Study Area, and I-105, running along the southern border of the Project Study Area. Major arterial roadways are listed in Table 2.3. Figure 2.4 depicts the major arterial roadways, highways and existing Metro Rail routes in the Project Study Area.

Table 2.3. Major Arterial Roadways in the Project Study Area

North/South	East/West
Lincoln Blvd. Sepulveda Blvd. La Tijera Blvd. Aviation Blvd. La Cienega Blvd.	Manchester Ave./Manchester Blvd. Westchester Pkwy. Arbor Vitae St. Century Blvd. Imperial Hwy.

Source: ConnectLAX, 2011

Figure 2.4. Project Study Area Freeways and Arterial Roadways



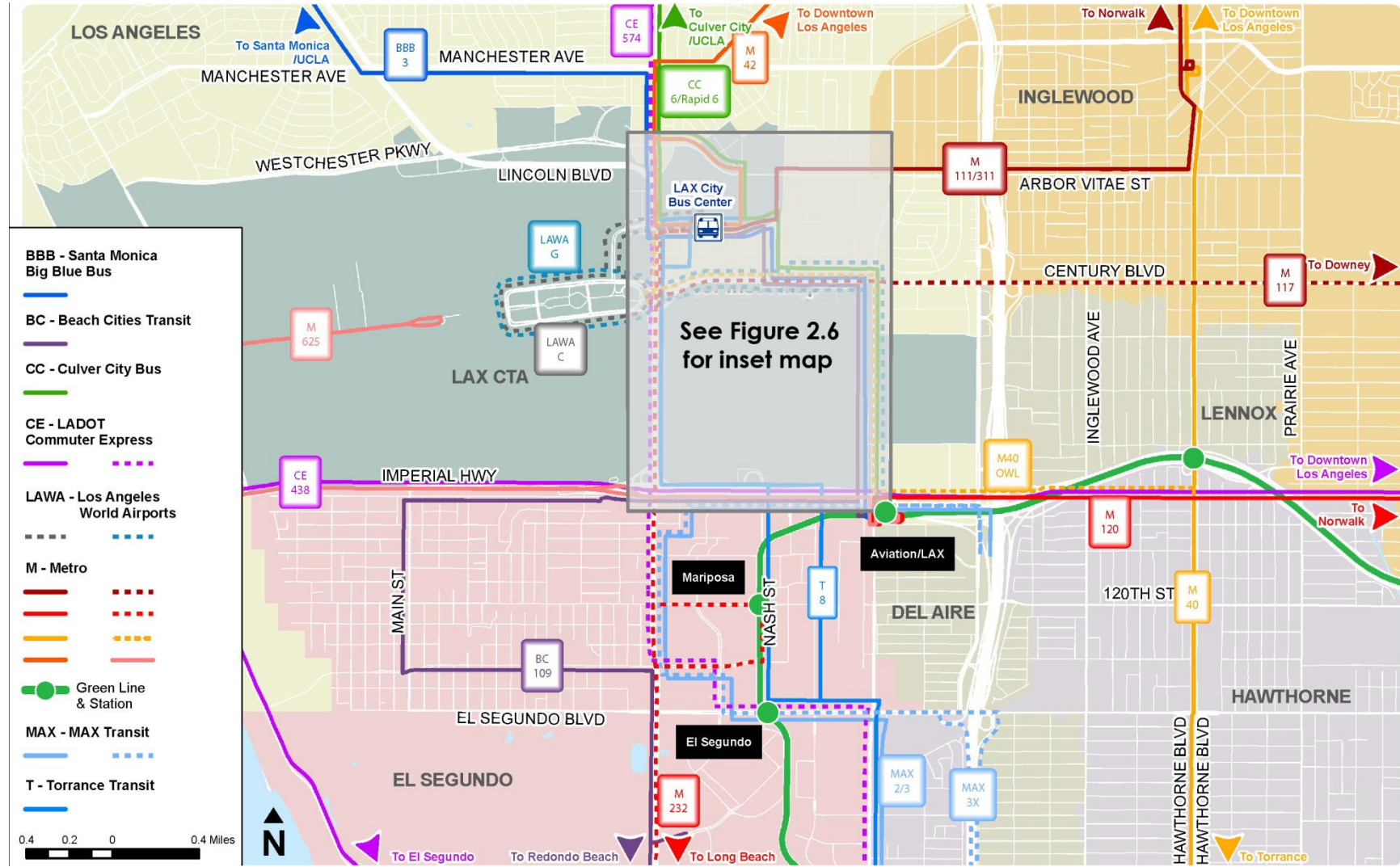
Source: ConnectLAX, 2011

2.3.2. Existing Transit Network

Transit service in the Project Study Area is provided by Metro and seven municipal bus operators. With the exception of the FlyAway, all other transit connections to LAX currently require at least one transfer to a LAWA-run shuttle at the LAX City Bus Center or the Aviation/LAX station to access the Central Terminal Area (CTA). This is because public transit buses do not operate in the CTA.

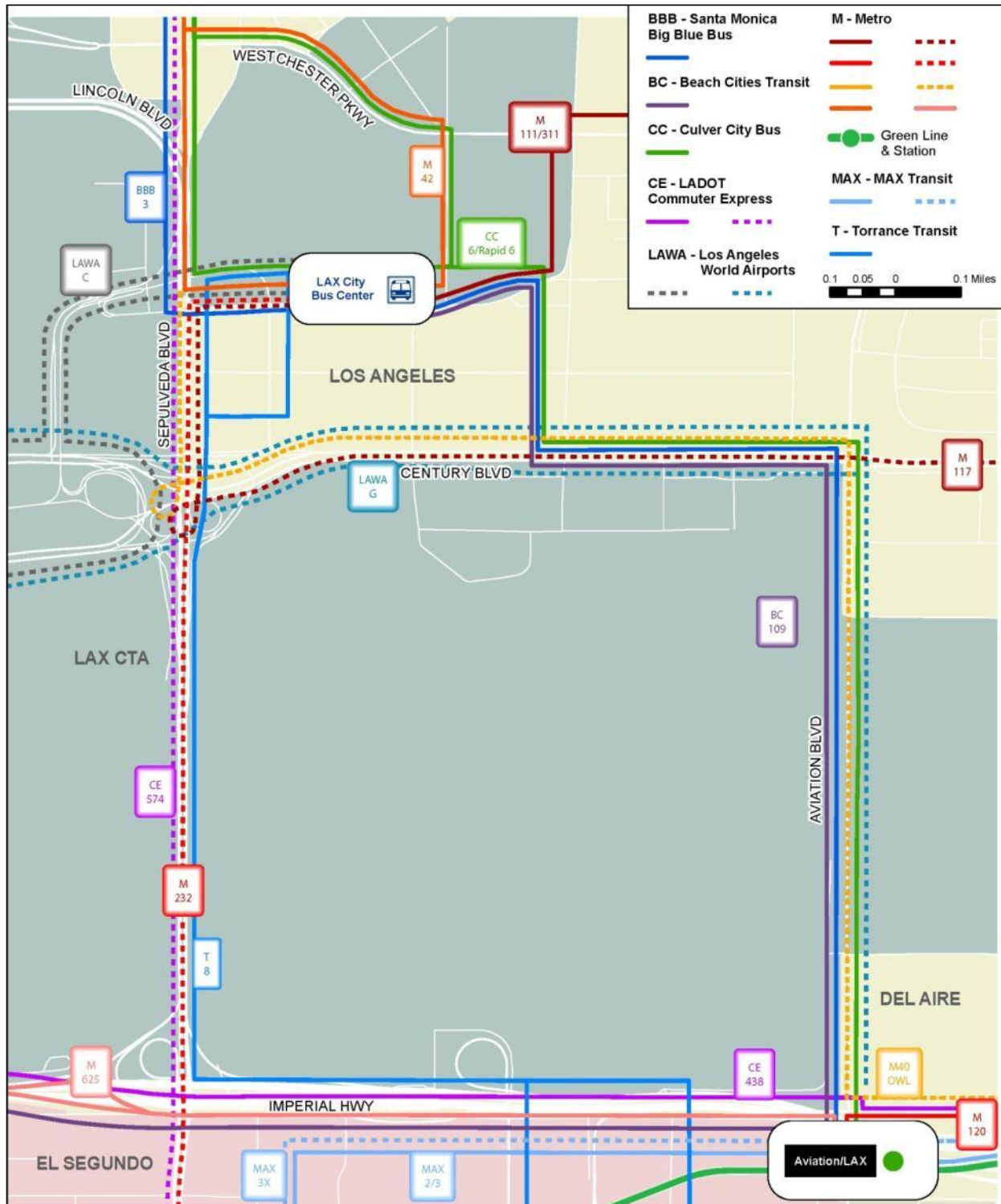
Figure 2.5 shows rail and bus services in the Project Study Area. The Metro Rail station closest to LAX is the Metro Green Line Aviation/LAX Station located about two miles from the CTA. Passengers traveling between this station and the CTA must transfer to the free LAWA-operated Shuttle G. Figure 2.6 shows the closest municipal bus station to LAX, the LAX City Bus Center, and the routes that serve that location. Passengers traveling between the LAX City Bus Center and the CTA must transfer to the LAWA-run Shuttle C. Some municipal buses also serve the Aviation/LAX Station, which requires a transfer to Shuttle G.

Figure 2.5. Project Study Area Existing Transit Lines



Source: ConnectLAX, 2011

Figure 2.6. Inset Map of Existing Transit Lines near CTA



Source: ConnectLAX, 2011

2.3.3. Future Highway / Arterial Roadway Projects

Several arterial improvements are currently in development throughout the Project Study Area as defined in the SCAG 2008 Regional Transportation Plan and the Metro 2009 LRTP, as shown in Table 2.3.

These projects are intended to alleviate congestion hotspots and improve traffic flow on several arterial roadways within and adjacent to the Project Study Area, including Lincoln Boulevard, Sepulveda Boulevard and Aviation Boulevard. Additionally, there are several improvements on the I-405 freeway underway.

Table 2.4. Summary of Planned Freeway/Arterial Projects in Project Study Area

Route	City	Description
I-105	Los Angeles	Study on a new interchange at LAX
I-405	Los Angeles	Added auxiliary lane from La Tijera Blvd. to Jefferson Blvd.
I-405	Inglewood	Improve turn radii at northbound I-405 off-ramp at Manchester Blvd.
Multiple Arterials	Los Angeles	Projects within and near LAX to eliminate traffic bottlenecks
Arbor Vitae Street	Los Angeles	Widening of Arbor Vitae St. between La Cienega Blvd. and Airport Blvd. at narrow and bottleneck locations to provide for two lanes of traffic in each direction and median left-turn channelization
Century Boulevard	Inglewood	On Century Blvd. between Crenshaw Blvd. and Inglewood Ave., add east/west exclusive right- turn lanes and north/south exclusive right-turn lanes at Crenshaw Blvd., Prairie Ave., Hawthorne Blvd./La Brea Ave. and Inglewood Ave.; Construction of a raised median along Century from Crenshaw Blvd. to Inglewood Ave.; and an addition northbound left-turn lane at Crenshaw Blvd. at Century Blvd. with an overhead sign directing traffic to LAX.
Lincoln Boulevard	Marina del Rey	Widen Lincoln Blvd. from Jefferson Blvd. to Fiji Way to four through-lanes in each direction. Construct new bridge over Ballona Creek
Nash Street	El Segundo	Nash St./Douglas St.: converted one-way couplet system to a two-way street
Nash Street	Manhattan Beach	Nash St./Douglas St. and Rosecrans Ave. intersection improvements. Provided westbound left-hand turn lane and east bound right-hand turn lane
Sepulveda Boulevard	Culver City	Add third southbound lane on Sepulveda Blvd. between Jefferson Blvd. and Green Valley Circle
Sepulveda Boulevard	Manhattan Beach	On Route 1 between 33 rd St. and Rosecrans Ave. add one through lane to northbound Sepulveda Blvd. to widen existing structure from six to seven through lanes

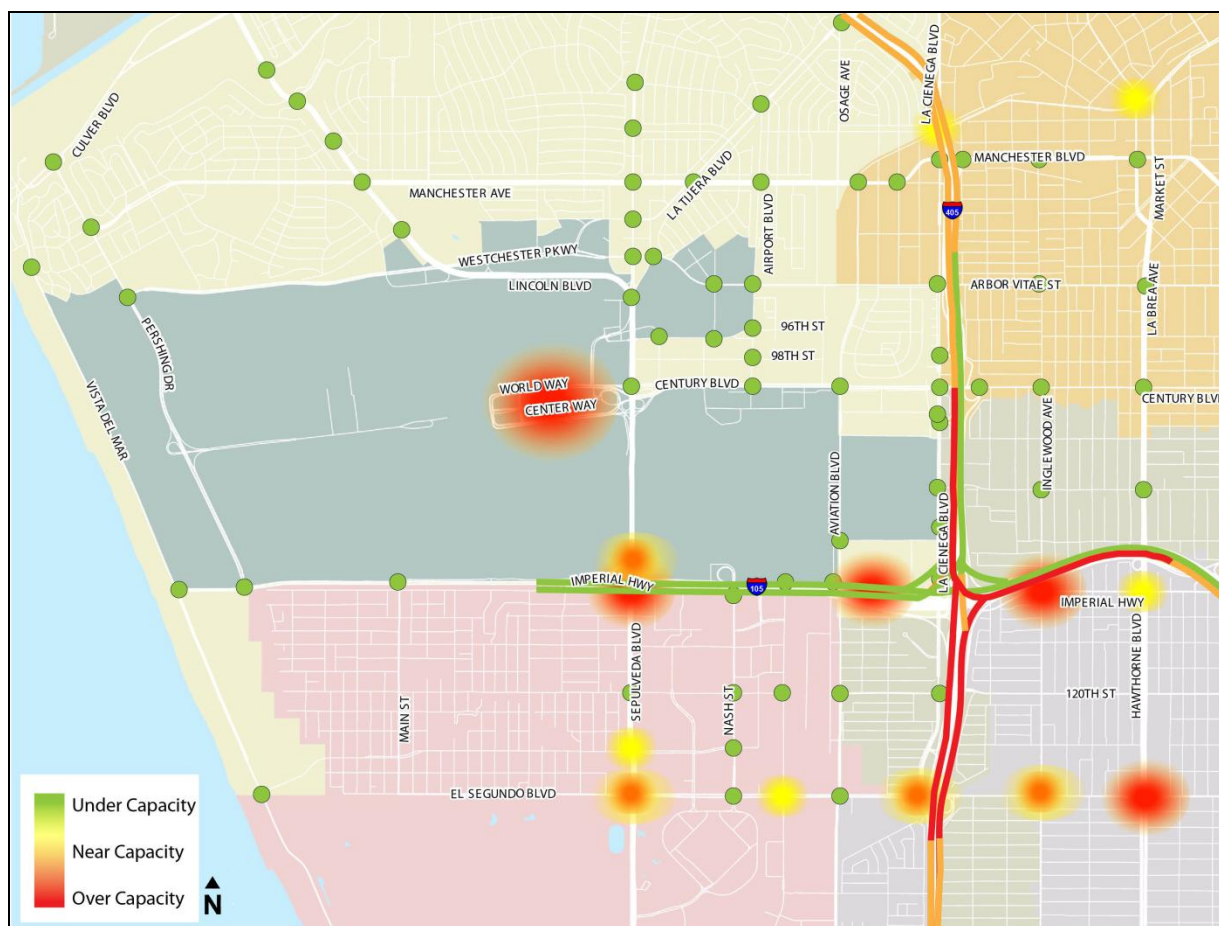
Source: Regional Transportation Improvement Program [RTIP] (SCAG, 2008-2011); Federal Transportation Improvement Program [FTIP] (SCAG, 2011); RTP (SCAG, 2012); LRTP (Metro, 2009)

2.3.4. Highway/Arterial System Performance

The Project Study Area experiences a substantial amount of traffic attributable both to trips to LAX, as well as traffic passing through the area that is not attributable to airport trips. Congestion on the I-405 freeway, and to a lesser extent the I-105 freeway, adds substantial delay and unpredictability to travel times to/from LAX. Figure 2.7 depicts existing congestion hotspots in the Project Study Area in the PM peak. Generally, congestion on both arterial and freeway facilities in and adjacent to the Project Study Area is worse during the PM peak period, where significant congestion on I-405 southbound, and I-105 eastbound can cause significantly longer travel times.

Due to ample roadway capacity, arterials operate well within and adjacent to the Project Study Area, with the exception of some localized hotspots of congestion on Imperial Highway at Sepulveda Boulevard and Inglewood Avenue, and on El Segundo Boulevard at Sepulveda Boulevard, La Cienega Boulevard, Inglewood Avenue, and Hawthorne Boulevard. The CTA itself experiences significant congestion during peak arrival and departure periods.

Figure 2.7. Project Study Area Congestion Hotspots, PM Peak, 2010



Source: ConnectLAX, 2011

Table 2.5 displays peak traffic volumes in the AM peak (6:00 to 9:00 AM) and PM peak (3:00 to 7:00 PM) on key roadways in the Project Study Area for both inbound (traveling to LAX)

and outbound traffic (traveling away from LAX). The segment that experiences the highest traffic volumes is the I-405 freeway between Century Boulevard and the I-105 interchange. Between 2010 and 2035, AM peak inbound traffic to LAX on this segment is expected to increase by seven percent, while PM peak inbound traffic is expected to increase by eight percent.

Table 2.5. Traffic Volumes for Key Project Study Area Roadway Segments

Roadway	Segment	2010 AM Peak		2010 PM Peak		2035 AM Peak		2035 PM Peak	
		Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
I-405 Freeway	Century Blvd to I-105 Interchange	21,100	19,800	27,500	29,100	22,600	20,400	29,700	31,400
I-105 Freeway	I-405 interchange to Sepulveda Blvd	12,300	7,300	11,000	16,500	12,900	9,100	13,100	17,400
Lincoln Boulevard	Manchester Ave to Westchester Pkwy	3,500	4,000	5,600	5,200	4,500	5,300	7,200	7,200
Sepulveda Boulevard	Century Blvd to Imperial Hwy	15,400	7,600	12,900	19,800	15,400	9,300	16,000	21,800
Aviation Boulevard	Century Blvd to Imperial Hwy	5,100	2,400	4,500	7,200	5,800	3,600	6,400	8,600
Century Boulevard	Airport Blvd to Sepulveda Blvd	6,000	1,000	2,800	8,100	6,800	1,300	3,500	9,000
Imperial Highway	Sepulveda Blvd to Aviation Blvd	3,200	400	1,000	3,700	3,800	700	1,700	5,000

Source: 2010 Metro Mode Choice Model, 2035 Metro Mode Choice Model

In general, travel speeds in the Project Study Area are projected to decrease in the forecast year; travel times are expected to subsequently increase. The segment projected to experience the greatest travel speed decrease is I-105 between Sepulveda Boulevard and Crenshaw Boulevard. Speed on this segment is projected to slow from 42 miles per hour in 2010 to about 35 miles per hour in 2035.

Table 2.6 defines peak period congestion on key Project Study Area segments in 2010 and 2035, defined in terms of both travel time and average speed. Overall, arterials in the Project Study Area operate adequately, with some localized traffic congestion at major approaches to the CTA. Lincoln Boulevard between SR-90 and Rosecrans is projected to slow from 24 to about 18 miles per hour by 2035. Overall, speeds are expected to decrease by the forecast year (2035).

Table 2.6. AM Peak Period Congestion on Key Segments, 2010 and 2035

Roadway	Segment	Distance	2010		2035		Percent Change	
			Travel time (minutes)	Avg. speed (mph)	Travel time (minutes)	Avg. speed (mph)	Travel time	Avg. speed
North/South Segments								
I-405	SR-90 to Rosecrans Ave.	6.2	14	25	18	21	20%	-17%
Lincoln Boulevard	Jefferson Blvd. to El Segundo Blvd.	4.9	13	24	17	18	35%	-26%
Sepulveda Boulevard	Jefferson Blvd. to El Segundo Blvd.	5.2	14	21	19	17	23%	-18%
La Tijera Boulevard	Centinela Ave. to Sepulveda Blvd.	2.0	5	24	6	21	12%	-11%
Airport Boulevard	La Tijera Blvd. to Century Blvd.	1.4	4	23	5	18	29%	-22%
Aviation Boulevard	Florence Ave. to El Segundo Blvd.	3.0	7	27	8	24	11%	-10%
La Cienega Boulevard	Centinela Blvd. to El Segundo Blvd.	4.2	11	14	12	21	18%	-15%
East/West Segments								
I-105	Sepulveda Blvd. to Crenshaw Blvd.	4.0	6	42	7	34	21%	-17%
Manchester Avenue/Boulevard	Pershing Dr. to La Brea Ave.	5.2	11	28	15	21	33%	-25%
Westchester Parkway/Arbor Vitae Street	Pershing Dr. to La Brea Ave.	8.0	11	27	*	*	*	*
Century Boulevard	96 th St. to La Brea Ave.	2.7	10	16	*	*	*	*
Imperial Highway	Pershing Dr. to Hawthorne Blvd.	4.4	11	25	13	21	22%	-18%

Source: Metro, 2010; ConnectLAX, 2011

Notes: *Link data not available in model data set; distance rounded to the nearest tenth of a mile, minutes rounded to the nearest minute

2.3.5. Transit System Performance

Bus transit system performance is affected by the performance of the highway and arterial system. When roadways are congested, bus speeds decrease and travel times increase. The effectiveness of the bus system is also affected by non-recurring traffic incidents (e.g. congestion caused by traffic collisions), which lead to unpredictable travel times and unreliable connections.

Of the transit lines in the vicinity of the CTA, the Metro Green Line has the highest ridership due to its reliable, high speed service along a dedicated right-of-way. Table 2.7 summarizes headways, operating hours, and daily ridership of the transit lines serving the Project Study Area. Based on daily transit ridership, transit demand is highest on east-west lines that link the Project Study Area to downtown Los Angeles to the northeast, or South Los Angeles and the City of Norwalk to the east. Metro Local lines 40 and 42, combined, serve the most riders of any of the bus lines in the Project Study Area, operating between downtown Los Angeles to the northeast and the Project Study Area. Metro Local Line 111/311 has the third-highest combined daily ridership, operating between the LAX City Bus Center, and the City of Norwalk to the east, through South Los Angeles.

However, demand is also high for north-south travel from the University of California, Los Angeles (UCLA) and the City of Santa Monica to the Project Study Area. Big Blue Bus Local Line 3 and Rapid 3 combined have the fourth highest total daily ridership, operating between the Project Study Area, and downtown Santa Monica and UCLA to the north.

Table 2.7. Transit Lines Serving the Project Study Area

Operator	Route	Weekday Headway (minutes)		Operating Hours	Average Daily Riders
		Peak	Off-Peak		
Beach Cities Transit	109	30–45	45	6 AM–10 PM Mon – Sun	600
Culver CityBus – Local	6	20	15	5 AM–11 AM Mon – Sun	3,643
Culver CityBus – Rapid	Rapid 6	15	n/a	6 AM–10 AM, 2:30 PM–7:30 PM Mon–Fri	2,071
Los Angeles Department of Transportation Commuter Express (LADOT)	438	10–45	n/a	6 AM–9 AM, 4:00 PM–7:30 PM Mon–Fri	660
	574	25–60	n/a	5:30 AM–9 AM 3:30 PM–7:30 PM Mon–Fri	297
Los Angeles World Airports (LAWA)	Irvine FlyAway	120	120	5 AM–10 PM Mon–Sun	44
	Union Station	20–30	30	24 hours, daily Mon–Sun	1,220
	Van Nuys FlyAway	15	30	24 hours, daily Mon–Sun	2,515
	Westwood FlyAway	60	60	6 AM–10 PM Mon–Sun	274
	Shuttle C	12–15	12–15	24 hours, daily Mon–Sun	n/a
	Shuttle G	12–15	12–15	24 hours, daily Mon–Sun	n/a
Metro Rail	Green Line	7–10	10–15	4:30 AM–12:00 AM Mon–Sun	32,259
Metro – Local Bus	40	1–20	10–40	4:30 AM–1:00 AM Mon–Sun	20,188
	42	2–30	30	5:30 AM–12:00AM Mon–Sun	3,602

Operator	Route	Weekday Headway (minutes)		Operating Hours	Average Daily Riders
		Peak	Off-Peak		
	111/311	10–15	15–20	4:30 AM–10 PM	18,954
	117	20	20	5:30 AM–1:30 AM Mon–Sun	9,265
	120	30–60	30–60	4:30 AM–12:30 AM Mon–Sun	4,231
	232	20	30	4:00 AM–1:00 AM Mon–Sun	7,041
Metro – Express Bus	625	15	n/a	5:00 AM–9:00 AM 4:00 PM–7:00 PM Mon–Fri	291
Santa Monica’s Big Blue Bus – Local	3	15	15	5:30 AM –12:30 AM Mon–Sun	9,000
Santa Monica’s Big Blue Bus – Rapid	Rapid 3	15	n/a	5:45 AM–10:30 AM 1:30 PM–8:00 PM Mon–Fri	2,533
Municipal Area Express (MAX)	2	30–50	n/a	6:30 AM–8:00 AM 4:30 PM–6:30 PM Mon–Fri	73
	3	20–30	n/a	5:00 AM–8:00 AM 3:30 PM –6:30 PM Mon–Fri	151
	3x	20–30	n/a	6:00 AM–8:00 AM 3:30 PM–6 PM Mon–Fri	116
Torrance Transit	8	20–30	20–30	5:00 AM–11:15 PM Mon–Sun	2,165

Source: ConnectLAX, 2011

Note: Operating hours rounded to the nearest half hour

2.3.6. Transit Operating Speeds

Table 2.8 displays peak period travel speeds for all transit routes serving the Project Study Area. Average transit operating speeds vary from 9 to 50 mph.

Generally, transit speeds for the lines that serve the Project Study Area are fastest for grade separated service (Metro Green Line) and the limited stop/express commuter services (FlyAway, LADOT Commuter Express).

Of the transit services that serve the Project Study Area, the highest speeds are attained by the FlyAway services from Union Station (25-50 mph), Irvine (35-50 mph), and Van Nuys (25-45 mph). Because the FlyAway buses are subject to traffic congestion, however, their speeds and corresponding travel times are highly variable. The Metro Green Line has a slightly lower operating speed than the FlyAways because it serves more stations, but because the Green Line is grade separated, its average speed (33.6 mph) is attained consistently and travel times do not vary. Variance in speed and travel times is important as a factor in transit passengers' travel experience and choice of mode.

Table 2.8. Peak Period Transit Speeds

Operator	Route	One-way Route Length (miles)	2010	
			PM Peak Period One-way travel time (minutes)	PM Peak Period One-Way Travel Speed (miles per hour)
Beach Cities Transit	109	18	75	14.4
Culver CityBus – Local	6	12.6	81	9.3
Culver CityBus – Rapid	Rapid 6	12.6	N/A	N/A
LADOT Commuter Express	438	28.3	72	23.6
	574	38	103	22.1
LAWA	Irvine FlyAway	49.2	60–80	35–50
	Union Station	19.8	30–50	25–40
	Van Nuys FlyAway	22.5	30–60	25–45
	Westwood FlyAway	11.5	25–45	15–30
	Shuttle C	1.8	Highly variable	Highly variable
	Shuttle G	3.6	Highly variable	Highly variable
Metro Rail	Green Line	19.6	35	33.6
Metro – Local Bus	40	20.2	81	15
	42	15.8	59	16.1
	111/311	21.2	106	12
	117	18.4	94	11.7
	120	29.8	133	13.4
	232	25.8	109	14.2
Metro – Express Bus	625	10.5	30	21
Santa Monica’s Big Blue Bus – Local	3	17.6	119	8.9
Santa Monica’s Big Blue Bus – Rapid	Rapid 3	11	61	10.8
MAX	2	21.4	59	21.8
	3	25.1	89	16.9
	3x	25.8	60	25.8
Torrance Transit	8	14.5	60	14.5

Source: ConnectLAX, 2011

Note: Operating hours rounded to the nearest half hour

Table 2.9 shows the schedule variability ratio of transit options that serve LAX and compares them with some of the modes that are under consideration for Metro Green Line to LAX.¹ Variability is shown for each route as a ratio between the longest (i.e., congested) scheduled weekday travel time and the baseline (uncongested) scheduled weekday travel time in either travel direction.

The closer the ratio is to 1.0, the less variance exists in the schedule and the more consistent travel times are throughout the day. A higher number indicates the extent to which travel times on a route are longer at certain times of day than at other times.

The Metro Green Line has the lowest schedule variance (1.0). The Santa Monica Big Blue Bus 3 has the highest variance (2.3), reflecting the severe congestion that occurs along its route.

Table 2.9. Schedule Variability by Mode

Mode	Service Provider, Route	Avg./Min.	Max./Min.
Local Bus	Metro Local 40/42*	1.1	1.2
	Culver City 6	1.1	1.3
	Santa Monica Big Blue Bus 3**	1.5	2.3
	Local Bus Average	1.3	1.6
BRT***	Metro Orange Line	1.1	1.2
	Metro Silver Line	1.1	1.3
	BRT Average	1.1	1.2
TSM****	Metro Rapid 720 (Santa Monica-Midcity)	1.5	2.1
	Metro Rapid 720 (Midcity-Commerce)	1.3	1.6
	Metro Rapid 720 (Full)	1.4	1.8
	TSM Average	1.4	1.8
LRT	Metro Green Line	1.0	1.0
	LRT (grade-separated guideway) Average	1.0	1.0

Source: ConnectLAX, 2012

*LAX City Bus Center to/from Broadway/Washington (Downtown Los Angeles)

*Aviation/LAX Green Line to/from 4th/Santa Monica

-No BRT serves the Study Area. Metro Orange Line and Metro Silver Line are used as proxies.

-No TSM serves the Study Area. Metro Rapid 720 is used as a proxy.

2.3.7. Travel to LAX by Transit and Private Vehicle: A Comparison

Travel by private vehicle to and from LAX is faster than transit, but more costly. This section compares trip performance by transit and private vehicle for six origins in Southern California, all terminating at the CTA. Six origin-destination pairs were chosen on the basis of their being populous and/or highly-traveled points of interest that represent a dispersed area of the Southern California region. The six origin-destination pairs analyzed are as follows:

¹ APM schedule data not available.

1. **Miracle Mile to LAX:** Miracle Mile, located about 12 miles north of LAX, is a densely-developed corridor along Wilshire Boulevard with many nearby cultural and shopping destinations, popular with both tourists and residents.
2. **Van Nuys to LAX:** Van Nuys is located in the San Fernando Valley about 25 miles north of LAX, offers direct access to the San Diego Freeway (I-405), which connects to LAX and to other locations in the San Fernando Valley.
3. **Santa Monica to LAX:** Santa Monica, located nine miles north of LAX directly on the coast, is a major employment and residential destination in Los Angeles County. It is also a popular destination for tourists and city residents, as it is home to many beaches and beachfront activities.
4. **Huntington Park to LAX:** Huntington Park is a city located about 16 miles northeast of LAX. Although it is primarily residential, Huntington Park is home to a vibrant commercial district along Pacific Boulevard. The City is near a number of major highways, including I-110, I-105, and I-710.
5. **Long Beach to LAX:** Long Beach is a major coastal city located at the southern tip of Los Angeles County, about 25 miles south of LAX.
6. **Los Angeles Union Station to LAX:** Los Angeles Union Station is a major transit origin, connection, and destination point in Los Angeles County for multiple transit services, including Metro bus, Metro Rail, Amtrak, Metrolink, and the FlyAway.

Figure 2.8 provides an overview of all six origin-destination pairs. The general path a traveler would take to get to LAX is represented by the large, sweeping arrows in the figure.

Figure 2.8. Origin Destination Pairs



Source: ConnectLAX, 2011

2.3.7.1. Travel by Public Transit

Transit travel times to LAX are variable, especially for non-grade separated services. Transit travel times to LAX were calculated primarily using two web-based trip planning tools – Google Transit Calculator and the Metro Trip Planner (Google, 2011; Metro, 2011). Trips were calculated for arrivals at LAX at noon to capture a peak in CTA groundside traffic (which follows a peak in air traffic) and between 6:00 and 7:00 PM to capture a period of congestion outside the CTA on routes to the airport, and traffic affecting employee travel. Peak travel times to the airport and around Los Angeles County differ. Travel times are expressed as range.

Table 2.10 displays travel times and related variables for each origin-destination pair. The following variables were used for analysis:

- **Fastest Route:** Fastest route is a calculation function of Google Transit, which determines what transit route(s) from origin to destination (LAX) are fastest in terms of time spent in vehicle and waiting for transfers, if a transfer is involved.

- **Number of Transfers:** Number of vehicle or mode transfers involved in completing a trip to LAX.
- **Travel Time:** The total door-to-door travel time involved in a trip, including a wait time that varies based on the passenger's presumed arrival at a bus stop and the next arrival of a transit vehicle. Travel times were rounded to the nearest five minute interval for simplicity.
- **Fare:** Total cash cost of the trip to LAX using single-trip, one-way fare media, and accounting for Metro's per-trip payment policy (no free transfers).
- **Frequency:** The frequency with which the train or bus arrives, in minutes (also known as "headway"). A frequency or headway of 20 minutes means that the train or bus is scheduled to arrive every 20 minutes.

2.3.7.2. Travel by Private Vehicle

Travel times to LAX by private vehicle are highly variable, due to traffic conditions affected by weather, accidents/collisions, time of day, travel direction, and season.

The data sources used to calculate estimated travel time with traffic in Table 2.10 likely capture some, but not all of this variation. Private vehicle travel time estimates do not include the length of time required to park at LAX, which can vary significantly depending on where in the Project Study Area a person chooses to park.

Driving times to LAX were calculated using three tools: 1) the California Department of Transportation (Caltrans) Performance Measurement Systems (PeMS) (State of California, 2010), 2) Metro Mode Choice Model (Metro, 2010), and 3) the Bing Maps web-based trip planning tool (Microsoft, 2011). Bing Maps was used to determine the fastest route, which is Bing Map's default function. The trip distances and base trip times were derived from Bing Maps.

For routes that are predominantly freeway-based (Van Nuys-LAX, Long Beach-LAX, Union Station-LAX), PeMS was used to assess average traffic speeds over the segments of freeway that comprised the routes between cities. Average speed data for the noon hour (12:00 – 12:59 PM) and the 5:00 PM hour (5:00 PM – 5:59 PM) were collected from each weekday in October 2011 and averaged.

Travel times for these freeway segments were calculated based on the distance of the PeMS freeway segments used and the average speed (miles / average speed (mph), multiplied by 60 minutes). Travel times were also collected from Bing Maps, which uses predictive traffic technology based on a statistical analysis of past traffic data for that route. Travel times are expressed as range.

PeMS data are not available for arterial roadways in Caltrans District 7, which encompasses Los Angeles and Ventura Counties. For routes that are predominantly arterial-based or have a lengthy arterial segment (Miracle Mile-LAX, Santa Monica-LAX, Huntington Park-LAX), the 2010 Metro Mode Choice Model was used to provide origin-destination travel time estimates

for off-peak and AM peak times of day. Table 2.10 displays travel times and related variables for each origin-destination pair. The following variables were used for analysis:

- **Estimated Travel Time:** The total door-to-door travel time involved in a trip is calculated by PeMS and/or Bing Maps for freeway routes and the 2010 Metro Mode Choice Model for predominantly arterial routes. A range accounts for variation due to traffic, as calculated using PeMS and/or Bing Maps for freeway routes and the 2010 Metro Mode Choice Model for predominantly arterial routes. Minute ranges were rounded to the nearest 5 minute interval for simplicity.
- **Cost:** Total monetary cost of driving, based on the 2011 Internal Revenue Service allowable deduction rate of 55.5 cents per mile.

Table 2.10. Travel by Transit to LAX

Origin/ Destination	Approx. Distance (miles)	Transit					Private Vehicle	
		Fastest Route*	Number of Transfers	Travel Time (minutes)	Frequency (minutes)	Fare	Travel Time (minutes)	Cost**
Miracle Mile to LAX	11-15	Metro Rapid Line 720 / Westwood FlyAway***	1	80-100	3-20 / 60	\$11.50	25-45	\$6
Van Nuys to LAX	23-25	Van Nuys FlyAway	0	35-60	30	\$7	30-45	\$13
Santa Monica to LAX	9-13	Big Blue Bus 3 / LAX Lot C Shuttle	1	50-75	15 / 12-15	\$1	20-40	\$5
Huntington Park to LAX	15-17	Metro Rapid Line 760 / Metro Green Line / LAX Shuttle Bus G	2	70-80	12-20/ 7-15 / 12-15	\$3	20-45	\$9
Long Beach to LAX	23-27	Metro Blue Line / Metro Green Line / LAX Shuttle Bus G	2	80-105	12-20/ 12-20/ 12-15	\$3	30-40	\$12
Union Station to LAX	17-21	Union Station FlyAway	0	30-50	30	\$7	25-40	\$11

Source: Google Transit Calculator; Metro Trip Planner; and Metro and Big Blue Bus Timetables (Collected by ConnectLAX, October 2011)

* Routes are based on fastest travel time. The fastest route to/from LAX varies throughout the day.

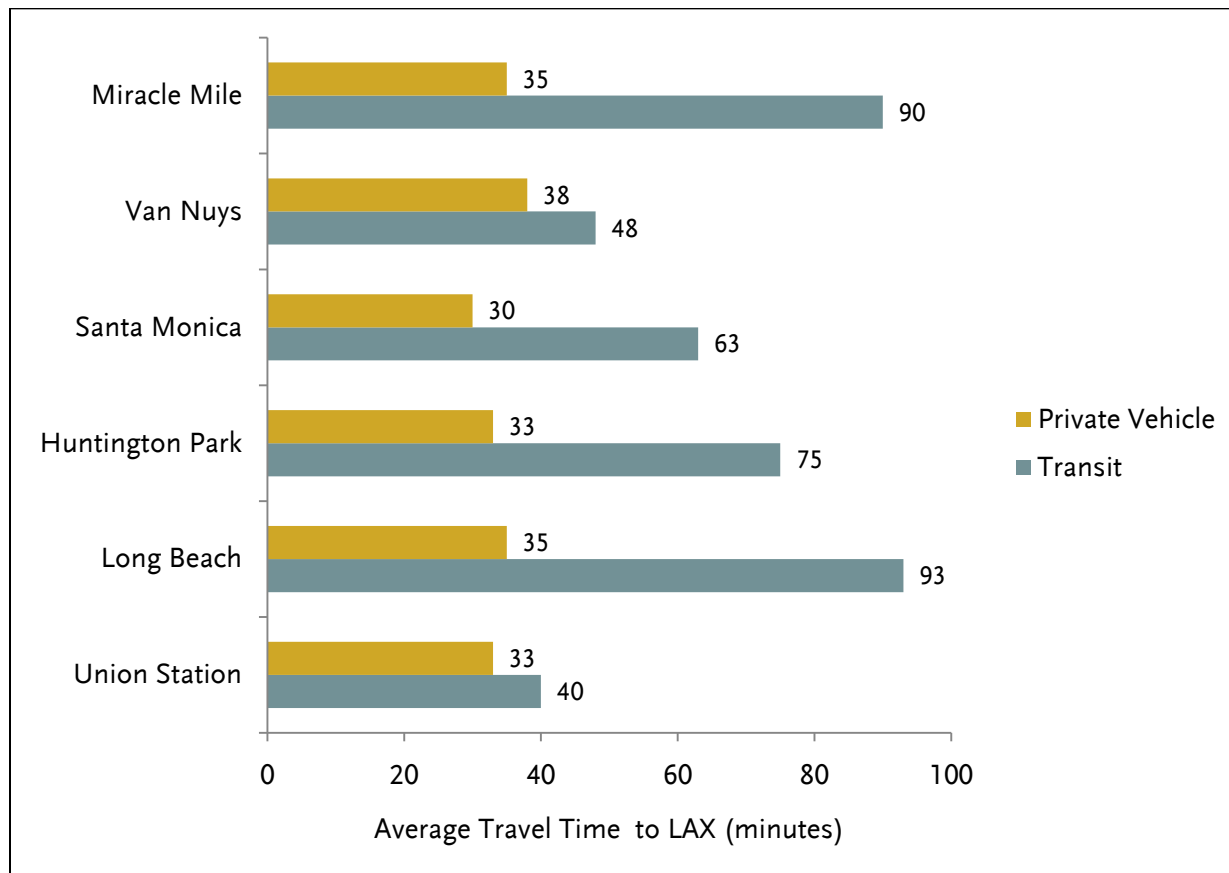
** Cost is based on the IRS' 2011 55.5 cent per mile allowable deduction. Cost does not include parking.

*** Does not include bus transfer from Metro Rapid 720 at Westwood Avenue to Westwood FlyAway on Kinross Avenue

2.3.7.3. Mode Comparison

Transit trips are reasonably time-competitive with the private vehicle only for trips from Van Nuys to LAX and Union Station to LAX. In most cases, transit trips require one to two transfers, which add to travel time and impair customer convenience. Private vehicle trips are more costly than transit trips, except on trips from Miracle Mile to LAX, due to the comparatively high cost of the Westwood FlyAway (\$10). Figure 2.9 displays average travel times to LAX, by mode, for the six origin-destination pairs discussed.

Figure 2.9. Average Travel Time to LAX by Mode



Source: ConnectLAX, 2012

Transit-dependent passengers use transit for lack of an alternative (Schaller, 2005). For these individuals, their only means of travel to LAX is transit, taxi, or shuttle. Choice passengers – people who use transit service for a reason other than a need for a mode of transportation due to automobile unavailability – do have the ability to choose transit or private vehicle based on the variables described in this section.

When deciding what mode to take to the airport, people weigh a number of variables such as time, cost, and automobile availability. Overall, travel by private vehicle is more time-efficient than transit, but more costly (except for travel from Miracle Mile). The two transit routes that make use of the FlyAway (Van Nuys and Union Station) offer travel times that may be competitive to private vehicle travel times along the same routes, depending on traffic

conditions. FlyAway vehicles travel on the same freeways and arterials as private vehicles, therefore adding the unpredictability of various traffic delays.

Five of the routes shown in Table 2.10 are less expensive than private vehicle travel, costing a traveler \$3 or less. Only one transit route is more expensive than travel by private vehicle for the same origin and destination pair (the fastest transit route from Miracle Mile costs more than the cost of travel by private vehicle). Parking costs at the airport vary significantly, but can be substantial; these costs are not considered in this analysis, but could be expected to be a major factor in a person's choice of travel.

2.4. OBJECTIVE #2: INTEGRATE WITH EXISTING AND FUTURE TRANSIT CONNECTIONS AND AIRPORT FACILITIES.

The purpose of this section is to identify opportunities to link the regional transportation system with LAX. Several existing and planned Metro Rail lines will improve transit access to the Project Study Area, including Crenshaw/LAX, Exposition (Expo), and South Bay Metro Green Line. These projects are displayed in Figure 2.10 and discussed in further detail in this section.

Figure 2.10. Future Transit Network Funded by Measure R



Source: Metro, 2011; ConnectLAX, 2011

2.4.1. Existing and Future Transit Projects

The Project Study Area is positioned at the nexus of several existing or planned Metro Rail lines. The following existing and future lines will greatly improve the overall interconnectivity of the regional transportation network and better serve airport-bound passengers:

- Crenshaw/LAX Transit Corridor:** The Crenshaw/LAX Transit Corridor project is a planned 8.5 mile light rail line that will extend from the Expo Line at the intersection of Exposition and Crenshaw Boulevards to the Metro Green Line via the Harbor Subdivision and terminate in Redondo Beach (Figure 2.10). As the alignment heads south from the Expo

Line connection, it will connect to the Metro Green Line and provide a Metro Rail station nearer to the airport at the intersection of Aviation and Century Boulevards. The project will serve the cities of Los Angeles, Inglewood, Hawthorne, El Segundo and portions of unincorporated Los Angeles County. The major transit connections along the Corridor will be: Metro Green Line, the Expo Line, and the county-wide bus network. Daily ridership between the Metro Green Line station in Redondo Beach to the Expo Line is projected to be 15,200 to 21,300 (Metro, 2011).

- **Metro Green Line and South Bay Extension:** The Metro Rail system includes the Green Line, which currently operates between Norwalk and North Redondo Beach. The Metro Green Line includes a station that is located approximately 2.5 miles from LAX. Metro is currently conducting the environmental review for the South Bay Metro Green Line Extension project, which will extend the Metro Green Line from the existing Marine Station south into the South Bay (Figure 2.10). The study will examine options for extending Metro Green Line service in the South Bay using an existing Metro-owned right-of-way, the Harbor Subdivision. The extension would provide traffic congestion relief along the 1-405 Corridor and improve connections to the regional transit network. The Crenshaw/LAX Transit Corridor would be the major transit service along the South Bay extension.
- **Exposition Transit Corridor Phase 1:** Phase 1 of the Expo Transit Corridor project is an 8.6 mile extension of the Metro Rail system from the 7th Street/Metro Center Station in downtown Los Angeles to Culver City (Figure 2.10). The Expo Line will include ten new stations and upgrades to two existing stations. Both Phase 1 and 2 of the Corridor are being implemented by the Exposition Metro Line Construction Authority, a chartered entity guided by a Board of Directors. The Final EIS/EIR was certified by the Metro Board in 2005 and construction began in 2006. This line is scheduled to open in 2012.
- **Exposition Transit Corridor Phase 2:** Phase 2 of the Expo Transit Corridor project will extend 6.6 miles westward from the Culver City Station (Phase 1) to Santa Monica (Figure 2.10). The alignment will run along the former Pacific Electric Exposition right-of-way owned by Metro to 4th Street and Colorado Avenue in downtown Santa Monica and will include 7 stations. Construction is projected to begin in 2012. The line is projected to be completed in 2015.
- **Westside Mobility Study:** Study by the Los Angeles Department of Transportation (LADOT) that explores transportation improvements in the West Los Angeles and the Coastal Corridor Transportation Specific Plan Areas. The study will examine potential extensions of Metro Rail from the LAX area north and northwest toward Westchester.

With the completion of these future transportation projects, travelers will have new transit options and expanded connectivity throughout Los Angeles County.

2.4.2. Potential Airport Facilities

The Project Study Area has the potential to include several airport facilities that are included in the LAX Master Plan or are being evaluated by LAWA in the Specific Plan Amendment Study (SPAS). Ground transportation facilities, intermodal transportation facilities and consolidated rental car facilities may potentially be located near Parking Lot C and/or Aviation/Century Boulevards.

2.5. OBJECTIVE #3: SATISFY THE SURFACE TRANSPORTATION AND TRAVEL DEMANDS OF THE HIGH VOLUME OF PASSENGERS CONNECTING TO LAX.

Passengers and employees who travel to and from the area daily constitute a large share of the travel demand in the Project Study Area. For the purposes of this analysis, travel to the Project Study Area is divided into three markets, which are summarized in Table 2.11.

Table 2.11. Travel Markets to Project Study Area, 2010

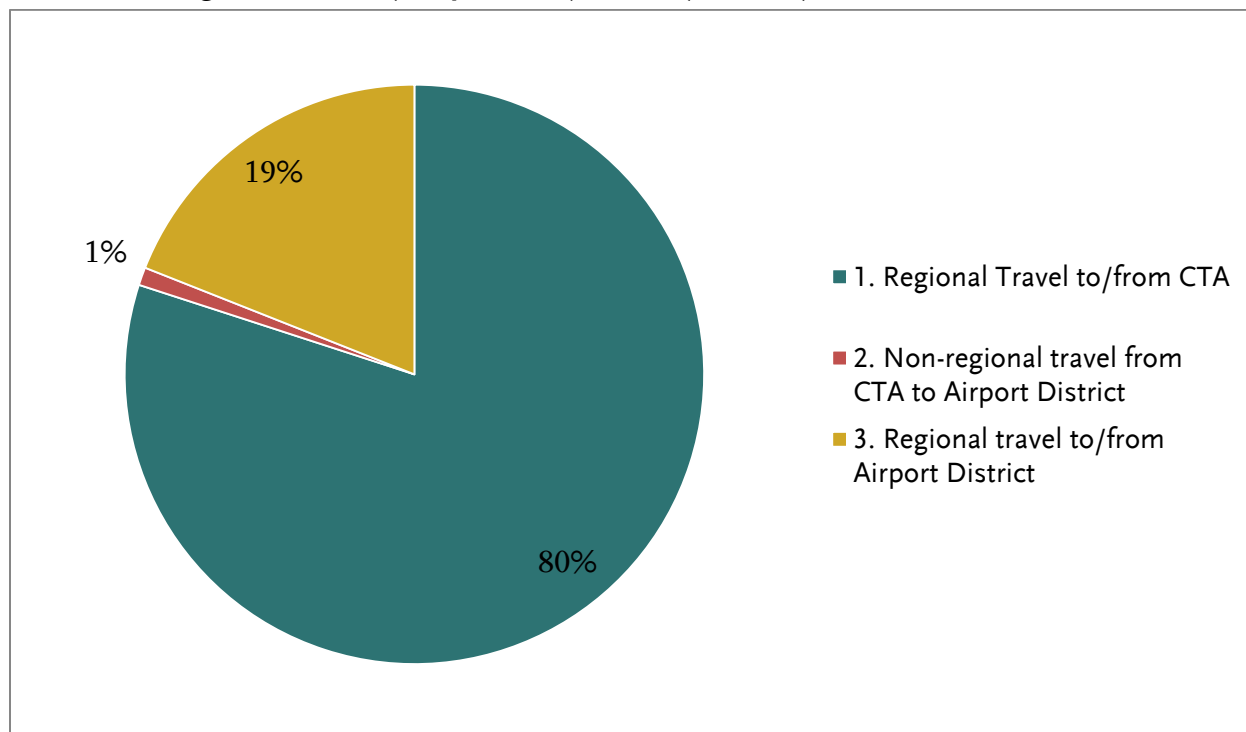
Market	Submarkets	Number of Daily Trips	Total Daily Trips to Project Study Area
1. Regional travel to/from CTA	Air passengers, resident and visitor	52,385	107,609
	Employees	33,218	
2. Non-regional travel to/from CTA and the Airport District	Air passengers, resident and visitor	1,191	
3. Regional travel to/from Airport District	Employees	20,815	

Source: Metro, 2009; ConnectLAX, 2012

There are a total of 107,609 daily trips to the Project Study Area (Metro, 2009; ConnectLAX, 2012). Figure 2.11 shows the proportion of daily trips captured in each market. Eighty percent of the total daily trips is regional travel to/from the CTA. This market constitutes the majority of trips and is considered the primary travel market. Because of the large trip volumes and their convergence at the CTA, this market would be best served by a high-volume dedicated fixed guideway link that connects Metro Rail to the airport.

The remainder of trips is comprised of two markets: regional travel to/from the Airport District (19 percent) and non-regional travel from the CTA to the Airport District (one percent). Regional travel to/from the Airport District is characterized by work trips to off-airport businesses dispersed throughout the Airport District. Non-regional travel from the CTA to the airport is characterized by frequent, short-distance travel to/from the CTA to locations throughout the Airport District. These markets are considered to be secondary. With the exception of the dense Century Boulevard corridor, these markets are best served by a small scale, network-based shuttle system because of the dispersed nature of off-airport destinations.

Figure 2.11. Daily Trips to Project Study Area, by Travel Market, 2010



Source: Metro, 2009; ConnectLAX, 2012

2.5.1. Regional Travel to/from the Central Terminal Area Market

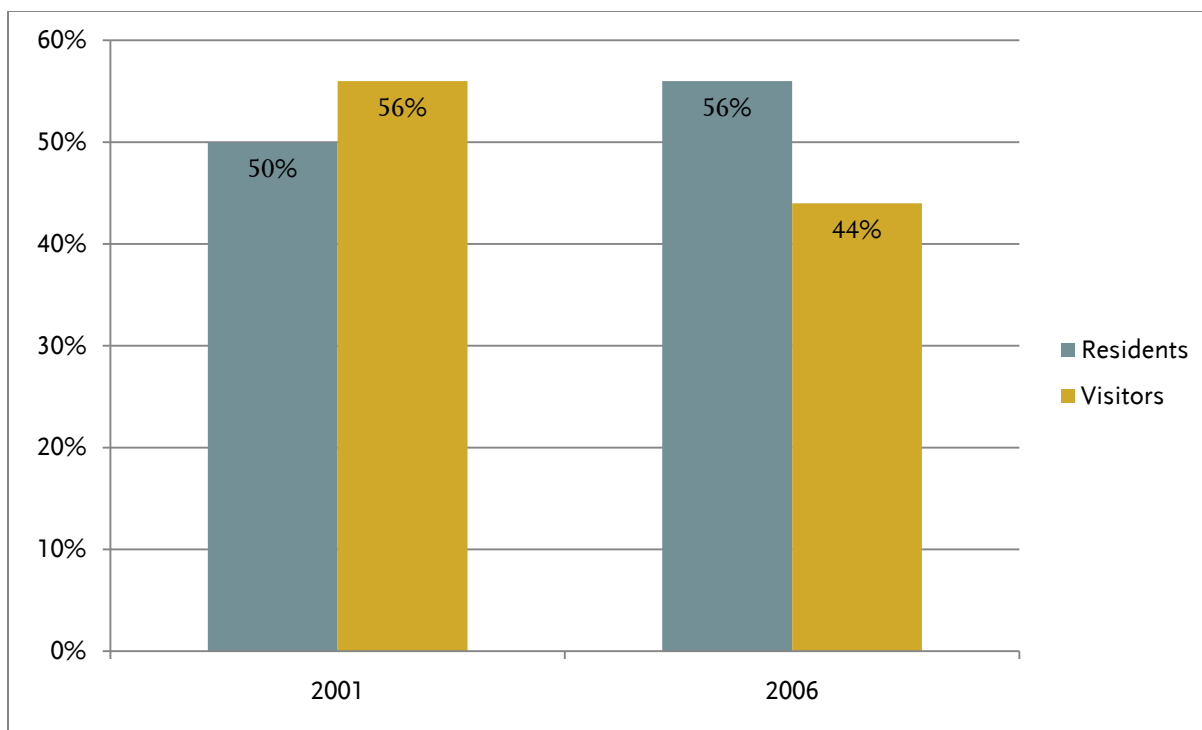
Regional travel to the CTA is comprised of two submarkets: 1) air passengers, both residents and visitors; and 2) airport employees. This market produces the most trips to the Project Study Area (85,603 daily trips). Air passengers produce about 52,380 daily trips to the Project Study Area. Employees produce about 33,200 trips to the Project Study Area (Metro, 2009; ConnectLAX, 2012).

2.5.1.1. Air Passengers Submarket

The air passenger submarket is comprised of 1) residents of the Southern California region; and 2) visitors to the Southern California region from domestic and international locations.² Figure 2.12 illustrates the proportion of annual residents and visitors at LAX in 2001 and 2006. In 2006, resident air passengers slightly outnumbered visiting air passengers.

Figure 2.12. Proportion of Annual Residents and Visitors at LAX, 2001 and 2006

² Data on this submarket are primarily sourced from the 2006 LAX Passenger Survey. The survey was conducted during summer and fall of 2006, and was subsequently weighted to reflect the actual distribution of peak and non-peak travel. A total of 27,949 participants were interviewed within the target population of departing passengers at LAX (both originating and connecting passengers). Margin of error for the entire sample was less than 1 percent (+/- 0.6 percent). Results from this survey are only estimates of the actual target population, as only a sampling of the target population rather than a full census was conducted.



Source: LAWA, 2006; ConnectLAX, 2011

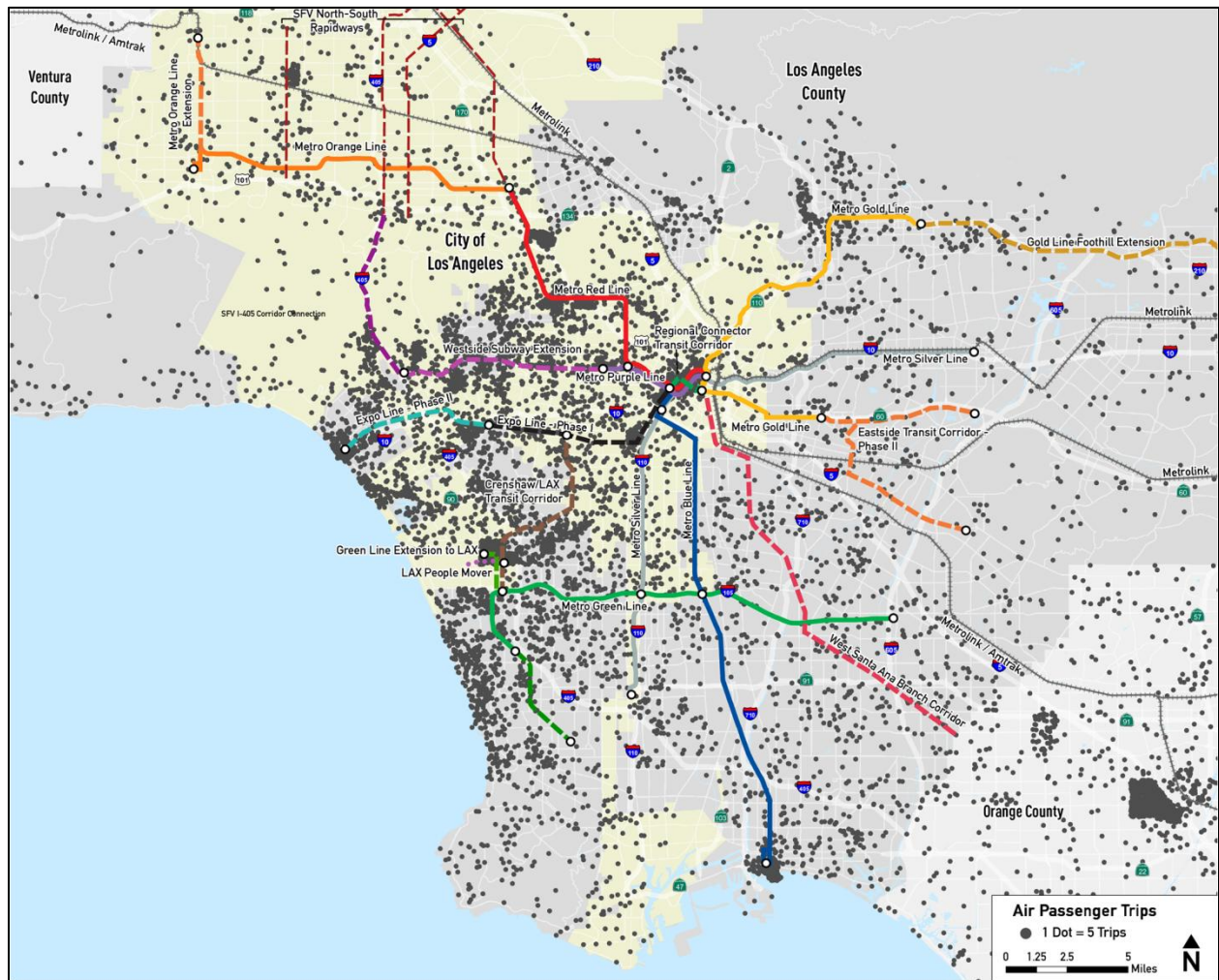
The travel patterns of air passengers are irregular in that their trips to LAX are not undertaken with the daily regularity of work trips. A small market of business travelers make roundtrip air flights each day, usually between California or West Coast airports. However, the majority of air passengers travel irregularly for business or leisure. An example of an irregular traveler is a resident air passenger who makes a leisure trip every few months. The trip purposes of air passengers is almost evenly split between business and vacation, followed by personal/other (36, 27, and 28 percent respectively) (LAWA, 2006).

Air passengers' trips typically originate at one of four types of locations:

- Hotel/motel
- Private residence
- Work site/place of business
- Local attraction/other

Figure 2.13 depicts the range of locations where air passenger trips begin their trips in Southern California. Trips originate from throughout the region, but most trip clusters occur within ten miles of LAX.

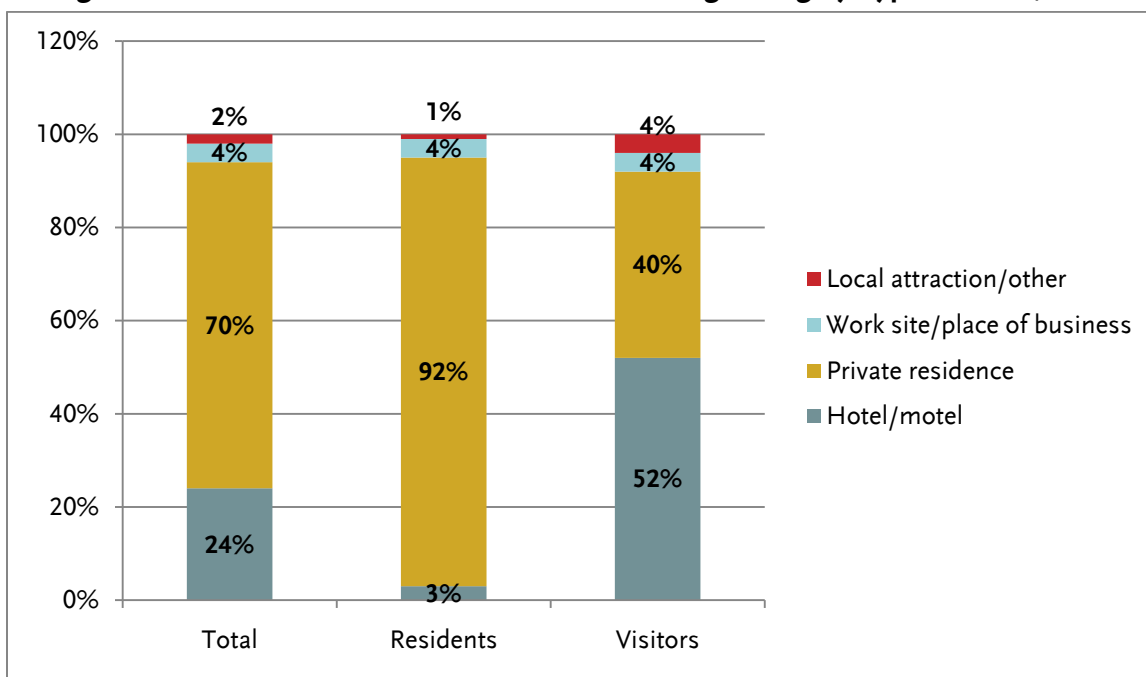
Figure 2.13. Origins of Air Passenger Trips to LAX



Source: LAWA, 2006; ConnectLAX, 2011

Figure 2.14 depicts the origins of air passengers by location type. Origins vary between residents and visitors. Higher proportions of visitors originate from hotels/motels or local attractions than residents (e.g., tourist attractions, such as amusement parks). The majority (52 percent) of visitors originate from hotel/motel. In contrast, only four percent of residents originated from a work site/place of business. Nine out of ten residents surveyed (92 percent) reported they originated from a private residence (LAWA, 2006).

Figure 2.14. Percent of Residents and Visitors Originating by Type of Place, 2006

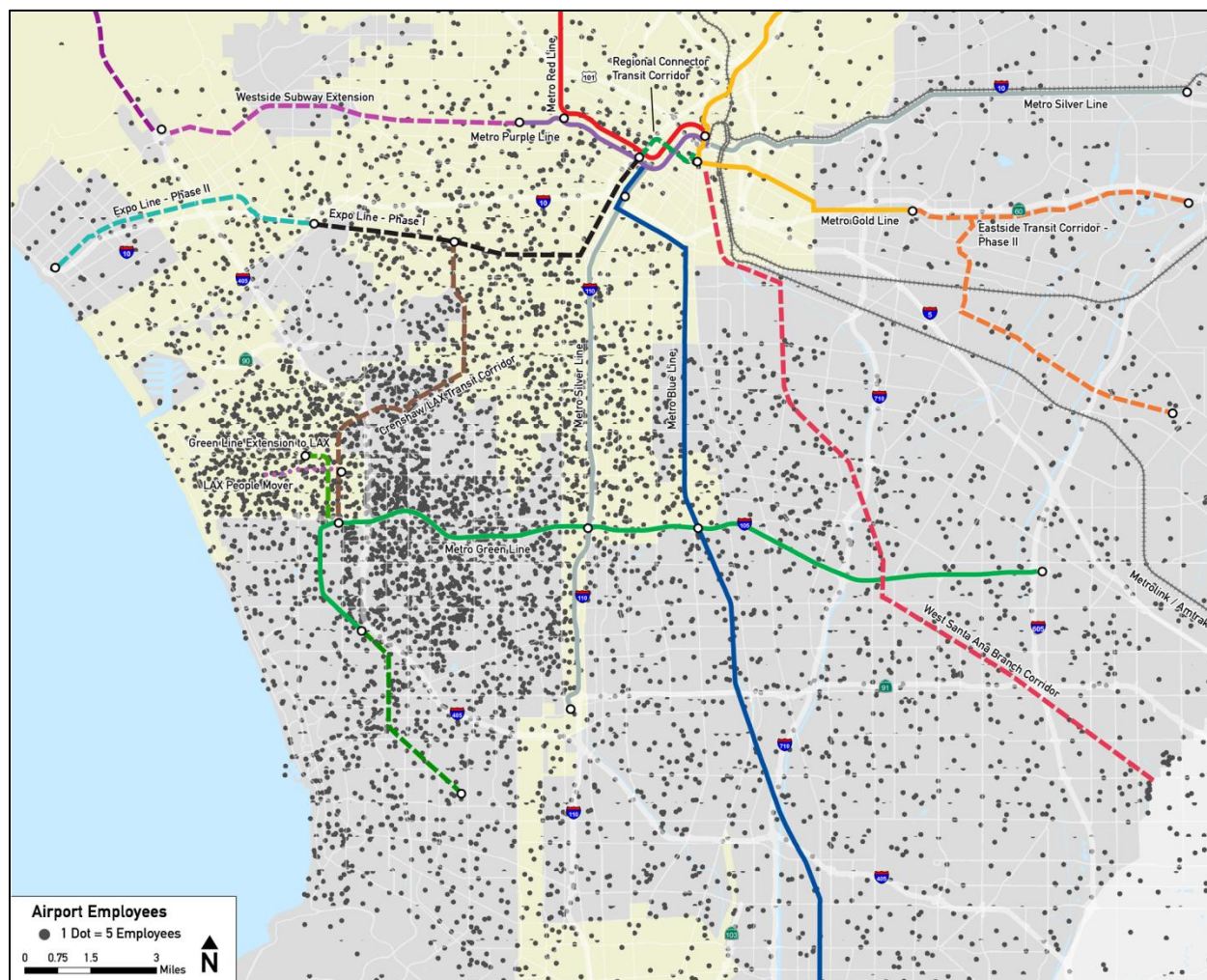


Source: LAWA Air Passenger Survey, 2006; ConnectLAX, 2011

2.5.1.2. Airport Employee Submarket

This submarket consists of employees who perform work duties on airport property. A variety of employees work on airport property, including: firefighters, parking attendants, in-flight food service providers, airline employees, freight and cargo employees, Transportation Security Administration screeners, and LAWA administrative employees. According to Metro Travel Demand Simulation Model, this submarket produces 33,218 daily trips to the Project Study Area (Metro, 2009; ConnectLAX, 2012). Airport employee trips originate from throughout the Southern California region, with concentrations along the existing Metro Green Line and future Crenshaw/LAX Transit Corridor, as shown in Figure 2.15.

Figure 2.15. Origins of Airport Employee Trips to LAX



Source: LAWA Employee Data, 2011; ConnectLAX, 2011

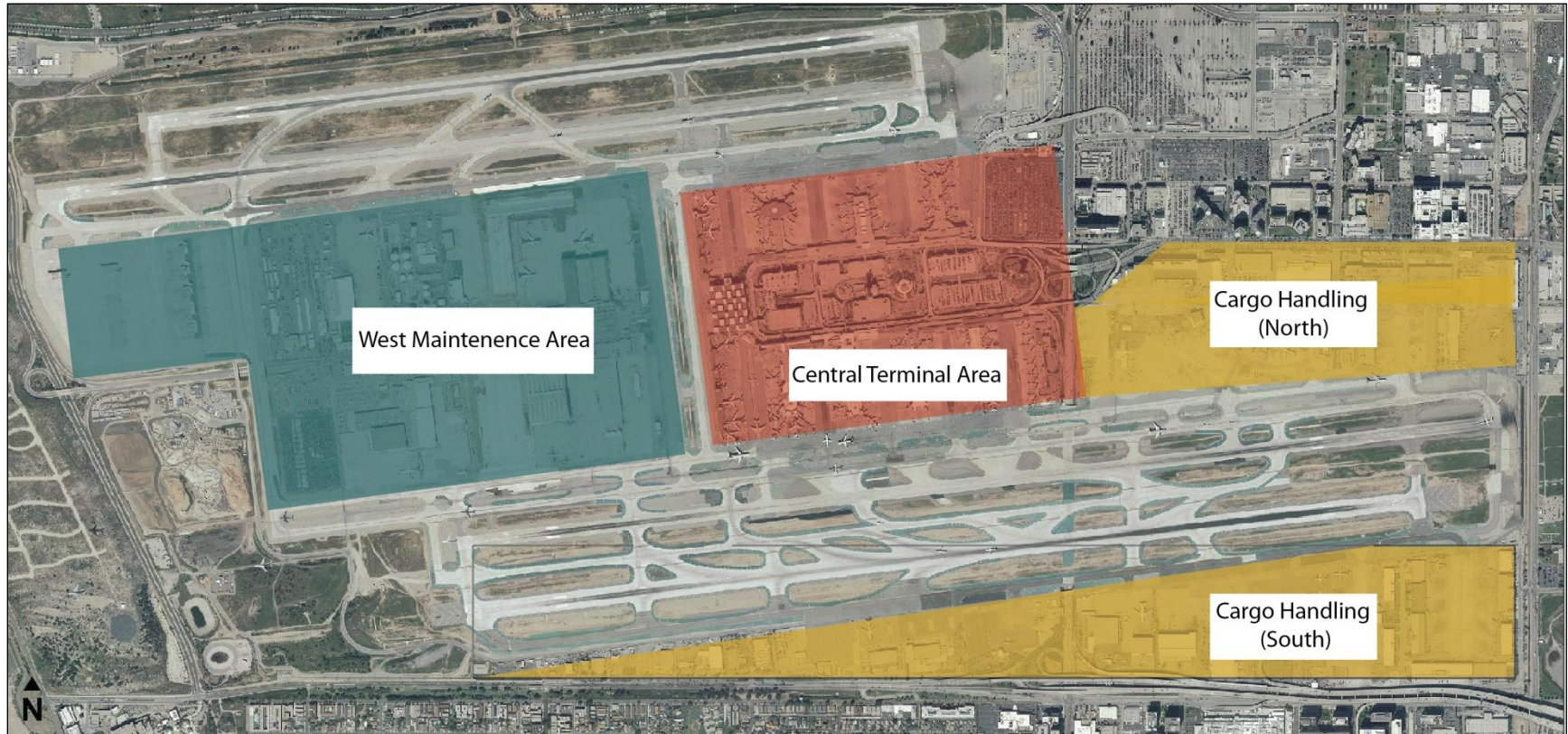
The commute patterns of many airport employees closely follow flight schedule peak and off-peak periods. The varied peaks that define many commute patterns are caused by time differences between markets and passenger preferential time periods (LAX Master Plan, 2005). Many of the long-haul markets served by LAX—domestic and international—are located in different time zones than LAX. Daily concentrations of departing and arriving flights correspond with ground traffic concentrations. Air passenger flow at CTA curbsides (ground traffic) peaks twice: first between 11:10 AM and 12:10 PM for departing flights and second between 9:00 and 10:00 PM for arriving flights (LAWA, 2009).

Figure 2.16 geographically depicts the locations of airport work sites. At the center of the CTA are four employee work site locations: air traffic control tower; Central Utilities Plant; the Theme Building; and parking garages. There are 17 parking structures in the CTA. Not all are open to the public; some are for airport employees only.

Airline employees who work directly with air passengers primarily report to work sites in the terminals. LAWA administrative staff work in two main office buildings: Administrative East

and Administrative West. The West Maintenance Area is home to a variety of work sites for employees of airlines, government agencies and private companies. It is located just west of Tom Bradley International Terminal (TBIT). Airline employees who maintain and service aircraft machinery report to work sites in the West Maintenance Area. LAWA employees who report to the Administrative West building also work in the West Maintenance Area. Cargo and freight handling work sites are located north and south of the South Runway.

Figure 2.16. Airport Employee Work Sites



Source: ConnectLAX, 2011

Note: See Figure 2.23 for detail on CTA employee work sites

2.5.2. Non-Regional Travel to/from the Central Terminal Area and Airport District

The Airport District is bounded by Manchester Boulevard to the north, Aviation Boulevard to the east, Century Boulevard to the south, and Sepulveda Boulevard to the west (Figure 2.17). The LAX Airport District consists of numerous businesses that directly serve the LAX air passenger markets, both resident and visitor. Table 2.12 provides more detail on the businesses and patrons who generally frequent each type of business. Airport District hotels and restaurant/hospitality businesses are concentrated along Century Boulevard between Aviation and Sepulveda Boulevards, while the rental car and long-term parking businesses are more dispersed throughout the area.

Figure 2.17. Airport District Boundaries



Source: ConnectLAX, 2011

Table 2.12. Airport District Businesses

Business Type	Patrons	Trip Purpose
Rental car	Air passengers, primarily visitors	Renting vehicle for business or recreational travel
Long-term parking facilities	Air passengers, primarily residents	Storing vehicle during extended trips
Hotels	Air passengers, primarily visitors Airline employees (transient)	Business and recreational events and lodging
Restaurants and bars	Air passengers, residents and visitors	Business and recreational events/needs
Miscellaneous airport-related tourism	Air passengers, residents and visitors	Business and recreational events/needs

Source: ConnectLAX, 2011

In this market, air passengers are traveling in a non-regional context, where non-regional travel to/from CTA and Airport District is defined by short trips of one to three miles that circulate between the CTA and the Airport District. This market produces the fewest trips of the primary travel markets (1,191 daily trips) (Metro, 2009; ConnectLAX, 2012).

2.5.3. Regional Travel to/from Airport District Market

Regional travel to/from the Airport District is comprised entirely of Airport District employees. These employees are Southern California residents who commute to work sites at hotels, rental cars, long-term parking, offices, restaurants and miscellaneous airport-related businesses. The job purposes of these employees tend to be customer and retail service-based, oriented toward serving the hospitality needs of air passengers. This market is the second largest of the three, producing 20,815 daily trips to the Project Study Area (Metro, ConnectLAX, 2012).

2.5.4. Future Market Growth

The high volume of trips to the Project Study Area is expected to grow. From 2010 to 2035, total daily trips to the Project Study Area are expected to increase by 21 percent (Metro, 2009; ConnectLAX, 2012). Section 2.3 discussed the performance of the transportation system and the impact of future growth on mobility and access to the airport.

2.6. OBJECTIVE #4: INCREASE THE SHARE OF TRANSIT TRIPS TO AND FROM LAX AND REDUCE AIR POLLUTION WITH MINIMAL IMPACT ON AIRPORT FACILITIES AND SURROUNDING COMMUNITIES.

Despite unpredictable travel times to LAX due to traffic congestion and other factors, the majority of air passengers, airport employees, and Airport District employees travel to the Project Study Area by private vehicle. This is because the other available mode options are non-competitive with the automobile, especially for air passengers. The overwhelmingly high share of auto trips results in traffic congestion, affecting the quality of life for surrounding residential communities, in terms of air quality, noise, and pedestrian safety.

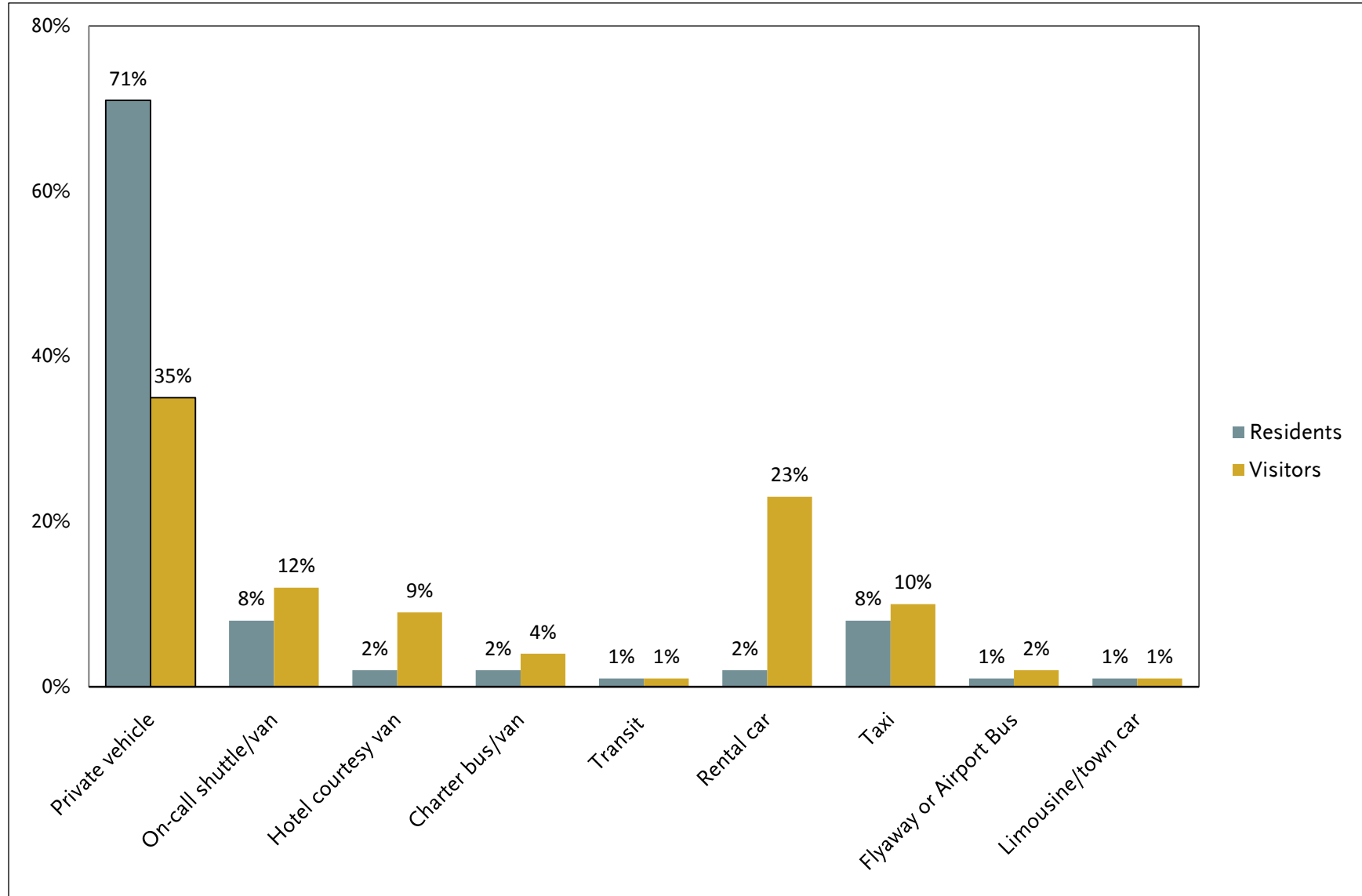
2.6.1. Primary Market Mode Share: Regional Travel to/from the Central Terminal Area

2.6.1.1. Air Passengers

According to the 2006 LAX Air Passenger Survey, the primary mode of travel for both resident and visitor air passengers is private vehicle. Seventy-one percent of residents and 35 percent of visitors access LAX via private automobile (LAWA, 2006). However, not all of these private vehicles were parked temporarily or for the long-term. In 2006, 76 percent of passengers who drove to the airport in a private vehicle were dropped off at the curb (LAWA, 2006).

The secondary mode of travel for residents is on-call shuttles/vans (e.g., SuperShuttle) and taxis, which account for eight percent of all resident air traveler trips to LAX (LAWA, 2006). The secondary mode of travel mode of travel for visitors arriving at LAX is rental car (23 percent). Public transit to the airport currently accounts for one percent of residents and visitors air passenger trips to LAX. Figure 2.18 depicts the mode shares for resident and visiting air passengers (LAWA, 2006).

Figure 2.18. Air Passenger Modes of Access to LAX, 2006

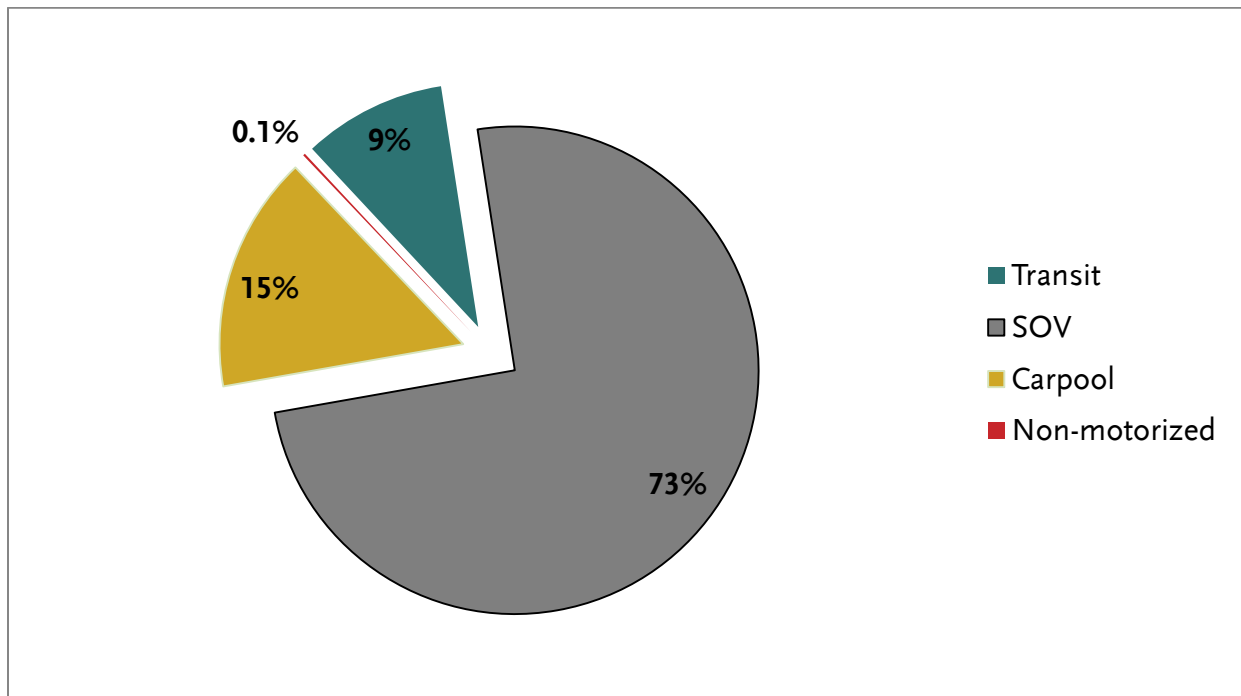


Source: LAWA, 2006; ConnectLAX, 2011

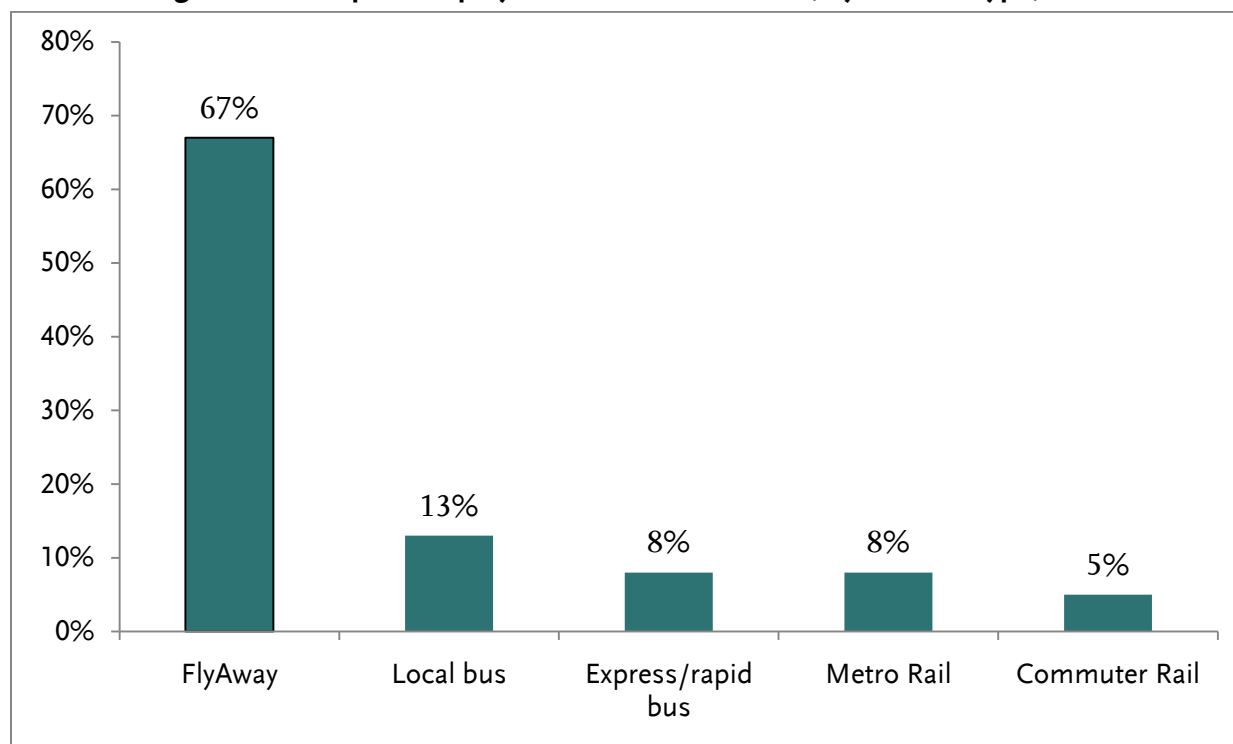
2.6.1.2. Airport Employees

The majority of airport employees drive alone to work in single-occupancy vehicles (SOVs) (73 percent). Figure 2.19 displays the mode share of airport employees. The second most commonly used mode of transportation to work sites is carpooling (15 percent), followed by transit (nine percent) (Metro, 2009; ConnectLAX, 2012). Figure 2.20 presents greater detail on airport employee trips made by transit. The FlyAway is the most popular means of public transit to work sites, capturing 67 percent of airport employees who ride transit. Local buses and the Metro Green Line capture 13 percent and nine percent of airport employees who ride transit, respectively.

Figure 2.19. Airport Employee Mode Share, 2010



Source: Metro, 2009; ConnectLAX, 2012

Figure 2.20. Airport Employee Transit Mode Share, by Service Type, 2010

Source: Metro, 2009; ConnectLAX, 2012

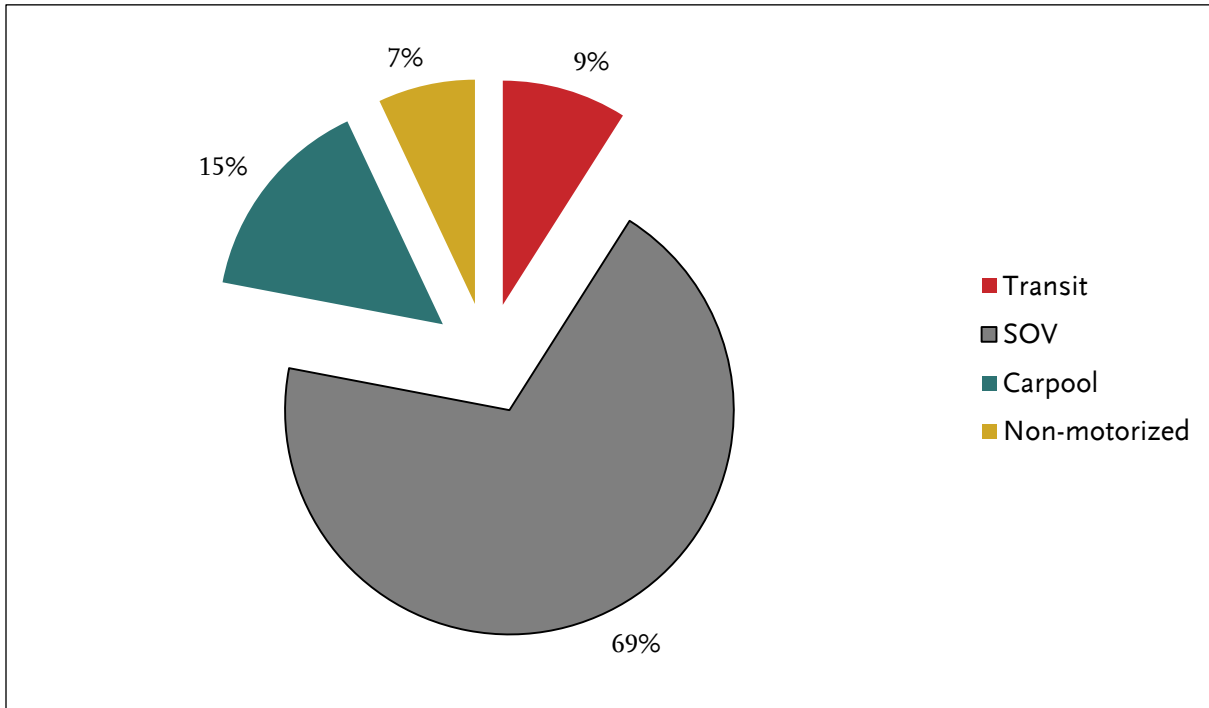
2.6.2. Secondary Markets Mode Share: Regional and Non-Regional Travel to/from Airport District

2.6.2.1. Regional Trips to/from the Airport District

Figure 2.21 displays the mode share for daily trips made by Airport District employees to/from their residences and work sites. As with the first travel market, the most popular mode of transport for airport employees is SOV. Carpooling is the second most popular mode. The proportion of trips made by carpool and transit is equal for both Airport District employees and airport employees (15 and nine percent, respectively).

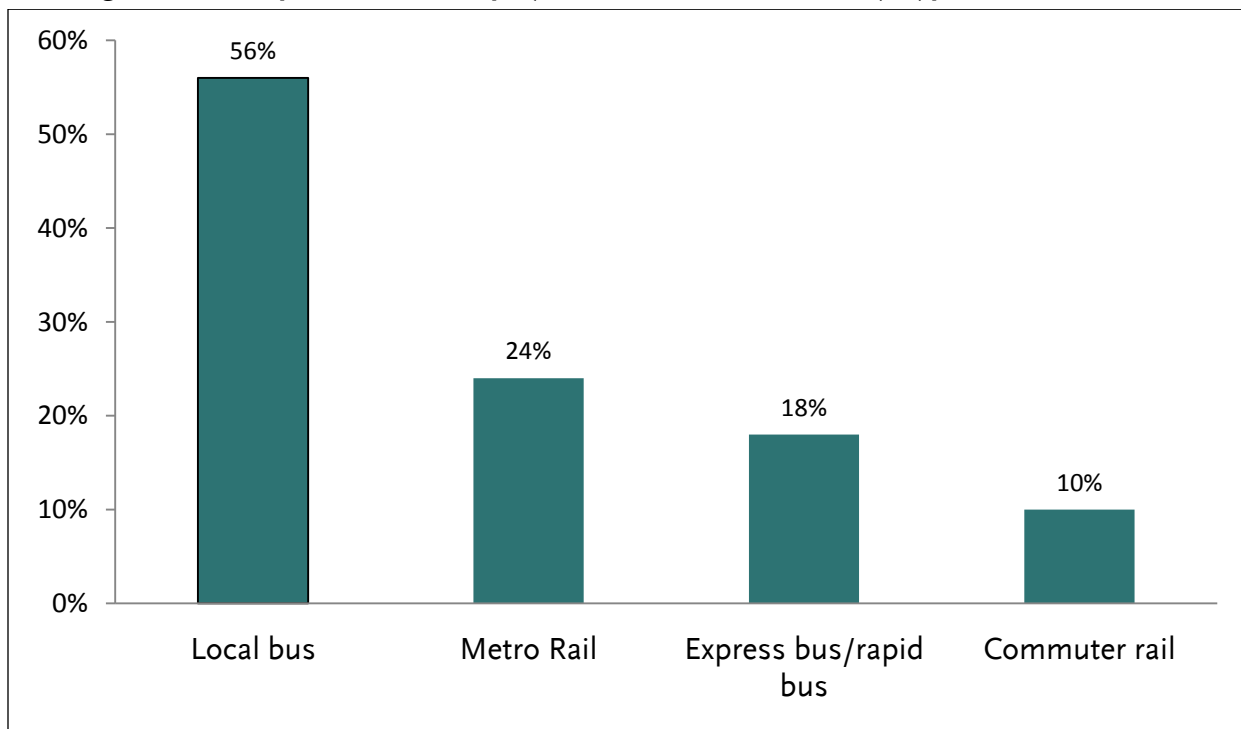
However, the share of trips made by non-motorized modes (walking and biking) is almost nine percent higher for Airport District employees than airport employees. Figure 2.22 displays greater detail on Airport District trips made by transit. The most popular mode of Airport District employees who commute by transit is local bus (56 percent), followed by Metro Rail (18 percent), and express/rapid bus (18 percent). Existing transit lines serving the Project Study Area are discussed in Section 2.3.2.

Figure 2.21. Airport District Employee Mode Share, 2010



Source: (Metro, 2009; ConnectLAX, 2012)

Figure 2.22. Airport District Employee Transit Mode Share, by Type of Service, 2010



Source: (Metro, 2009; ConnectLAX, 2012)

2.6.2.2. Non-Regional Travel to/from Airport District

Although the market of non-regional travel to/from the Airport District represents a smaller proportion of total trips to the Project Study Area, these trips contribute much of the traffic in the CTA. The CTA experiences significant congestion during peak arrival and departure periods, with localized hotspots of congestion along World Way North and World Way South. Shuttles circulate from terminal to terminal, jockeying for curbside space. Table 2.13 shows the mode split for the CTA (Los Angeles Airport Bradley West Project Draft EIR). Private vehicles represent approximately half of all vehicles in the CTA, with taxicabs and various shuttles accounting for most of the other vehicles in the CTA.

Table 2.13. CTA Mode Split, by Vehicle Type

Mode	Departure Level	Arrival Level
Private Vehicles	49.9%	50.9%
Rental Cars	0.7%	1.1%
Taxicabs	8.5%	7.9%
FlyAway Bus/Long Distance Vans	5.5%	3.8%
Shared Ride Vans	6.9%	6.4%
Rental Car Shuttle	11.9%	10.8%
LAX Shuttle	2.7%	1.7%
Hotel/Courtesy Shuttle	5.5%	3.4%
Private Parking Shuttle	6.5%	10.4%

Source: LAWA, 2009

2.6.3. Parking Patterns

Parking is an important consideration because the availability and cost of both short-term and long-term parking influence how people travel to the airport. In the case of LAX, much of the high automobile mode share can be attributed to the abundance of parking options near LAX.

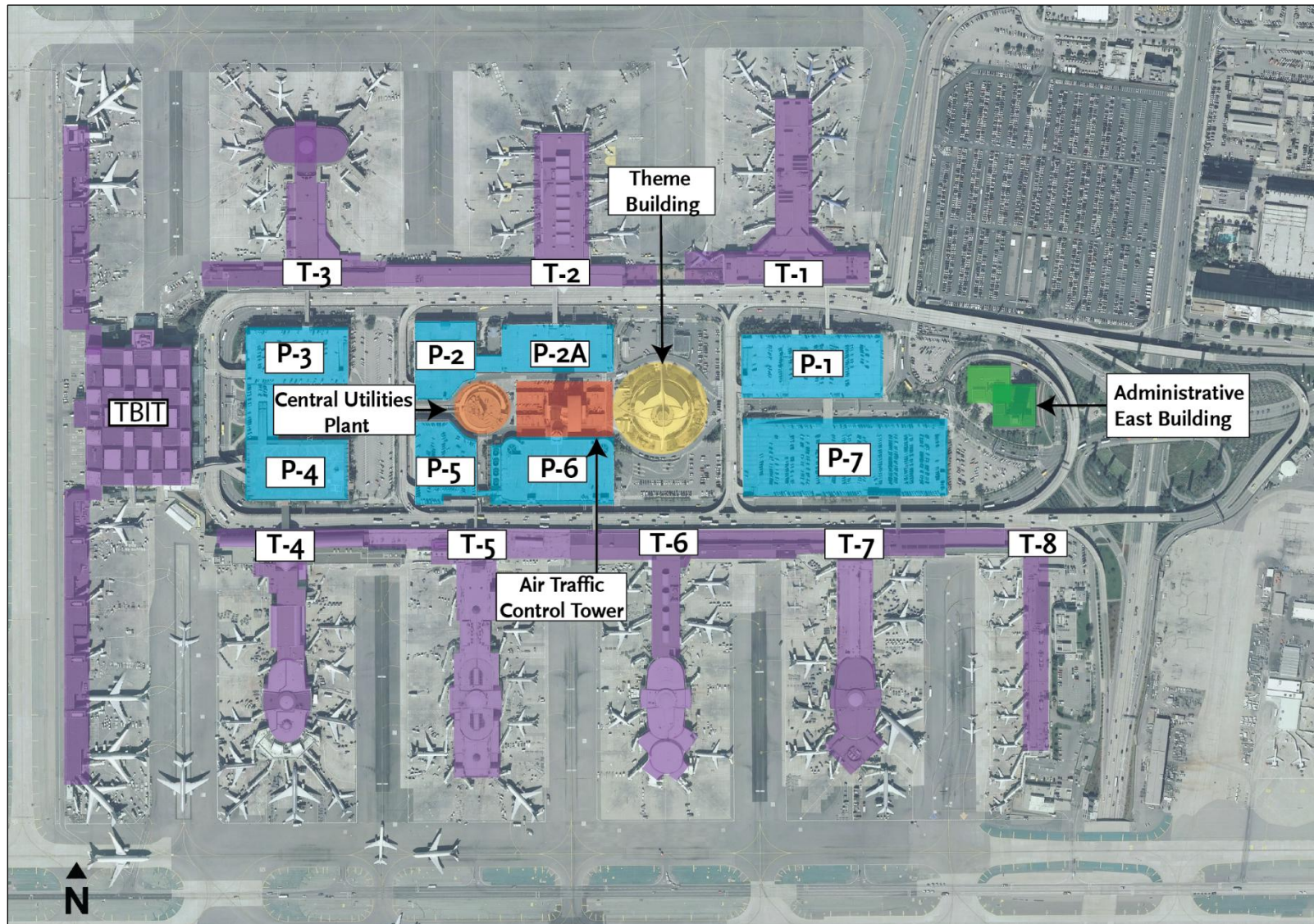
2.6.3.1. Air Passenger Parking

When traveling to LAX by private vehicle, air passengers select from the following vehicle storage options:

1. Short-term parking in CTA (parking structures and parking meters)
2. Long-term parking in CTA or LAWA-owned Lot C
3. Short-term parking in privately-operated lots in Airport District
4. Long-term parking in privately-operated lots in Airport District

Air passengers' parking choice is informed by several factors: monetary cost; time cost; proximity to terminals/gates, security, and availability. Figure 2.23 depicts the locations of parking facilities inside the CTA. CTA parking structures 1 through 7 are available for short-term parking, which includes daily, hourly or fraction of an hour parking trips. Non-flyers dropping off or picking up air passengers can also park in short-term CTA parking facilities. For extended trips, LAWA provides one long-term parking lots just northeast of the CTA (Lot C).

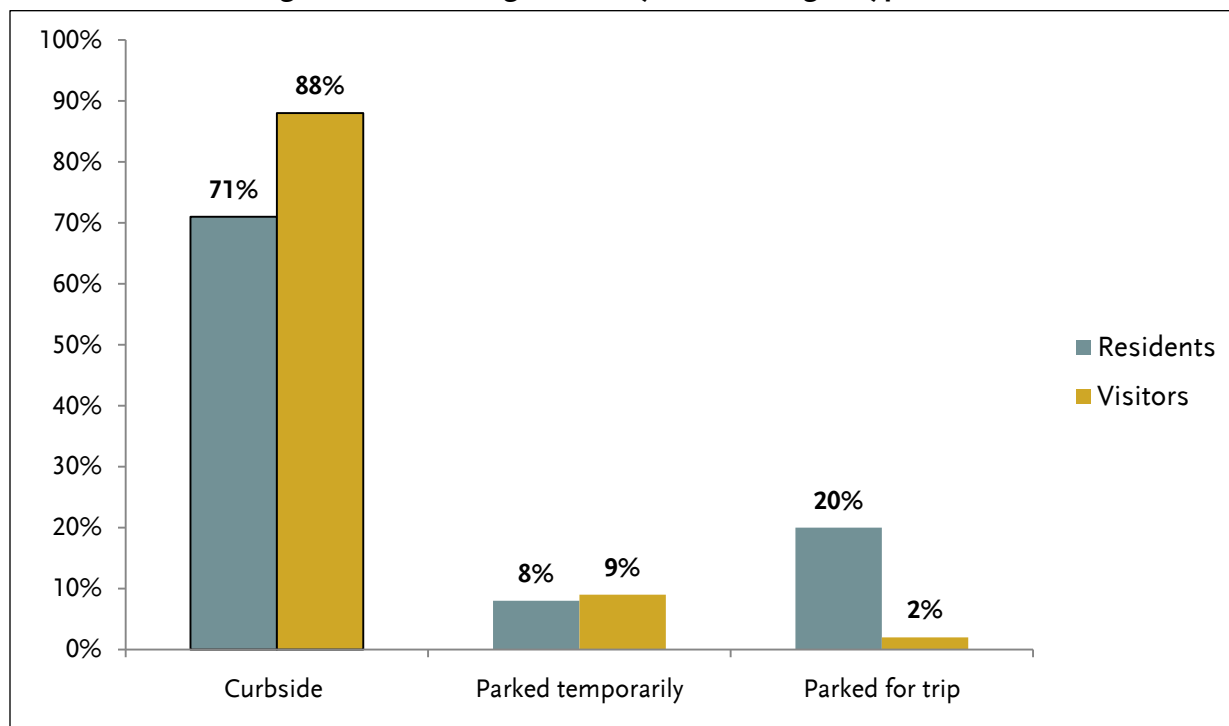
Figure 2.23. CTA Parking Facilities



Source: ConnectLAX, 2011

Figure 2.24 presents air passenger parking trends in the CTA, including non-flyers who choose to drop off and/or pick up their passenger(s) curbside. Curbside pick-up/drop-off occurs more frequently than parking temporarily or for a day trip.

Figure 2.24. Parking in CTA by Air Passenger Type, 2006



Source: LAWA, 2006; ConnectLAX, 2011

Many resident air passengers choose to park their vehicles at long-term parking sites in the Airport District and a robust market has developed in response to air passenger demand. About 54 percent of air passengers store private vehicles at one of the 22 privately-operated long-term parking facilities in the Airport District when traveling overnight or for an extended period of time (LAWA, 2006).

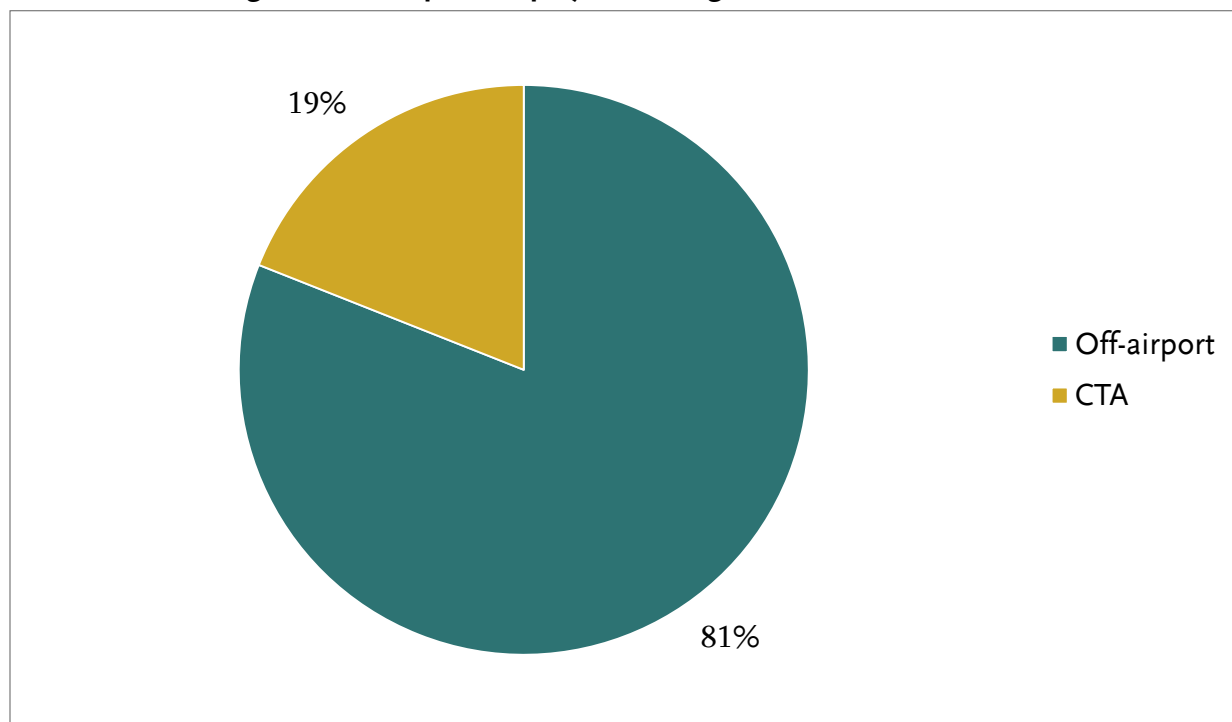
Approximately 26,500 parking spaces are available for long-term parking.³ Daily rates range from \$7.50 to \$30.00. The relatively low prices of parking reflect the abundance of supply that exceeds demand: about 20 percent of off-airport parking spaces are underutilized (LAWA, 2005).

³ In addition to transporting visiting air passengers, some hotels offer their parking customers free transportation to/from the CTA via hotel shuttle buses. According to the LAX Traffic Generation Report, some private long-term parking facilities also cater to customers who are not traveling to the airport and are storing their vehicle for other purposes (LAWA, 2010).

2.6.3.2. Airport Employee Parking

Employees driving in private vehicles, either alone or as part of a carpool, store their vehicles at lots that are either in the CTA or off-Airport. Figure 2.25 displays the proportions of airport employees who park off-airport and in the CTA. The majority of airport employees park off-airport. Only 19 percent of employees park directly in the CTA. (Metro, 2009; ConnectLAX, 2012).

Figure 2.25. Airport Employee Parking Location Choices, 2010



Source: Metro, 2009; ConnectLAX, 2012

In the absence of competitive transit options, most airport travelers and employees are likely to continue to drive. Transit must be made reliable, fast, and convenient in order to gain greater market share of trips to the CTA.

Section 3 discusses the alternatives that were developed to address the purpose and need objectives as described in the section.

3. PRELIMINARY DEFINITION OF ALTERNATIVES

The purpose of the Preliminary Definition of Alternatives is to introduce the alternatives, including modes and off- and on-airport routes that will be carried forward into alternatives screening as part of the Metro Green Line to LAX Project. Additionally, possible operating scenarios are presented that will be further explored in the Draft EIS/EIR for the Project. The alternatives being considered would provide transit service between the CTA and the existing and planned Metro Rail system. Alternatives for this project consider existing and future conditions in and around the airport, and are informed by transit connections in operation at other major airports.

Section 3.1 describes the alternatives being considered, which include the No Build Alternative, TSM Alternative, Direct LRT Branch Alternative, Circulator Alternative, Intermediate LRT and Circulator Alternative and Modified LRT Trunk Alternative. Section 3.3.5 defines the possible modes being considered, including Bus Rapid Transit (BRT), LRT and Automated People Mover (APM). Section 3.3.6 discusses the possible routes being considered. The discussion of routes is divided into two distinct geographic areas: off-airport (east of Sepulveda Boulevard) and on-airport (west of Sepulveda Boulevard). The final section identifies the potential operating characteristics of the Build Alternatives.

3.1. PRELIMINARY ALTERNATIVES

3.1.1. No Build Alternative

The National Environmental Policy Act and California Environmental Quality Act require that existing conditions and Build Alternatives be evaluated against a No Build Alternative in a Draft EIS/EIR. The No Build Alternative is used as a baseline against which the costs, benefits and impacts of other alternatives can be evaluated. The No Build Alternative represents the Project Study Area in the year 2035, if the Metro Green Line to LAX project is not built, and includes funded transportation improvements specified in SCAG's 2008 Regional Transportation Plan and the financially-constrained element of Metro's 2009 LRTP.

Existing and funded major transportation facilities included in the No Build Alternative are:

- **Freeways (Current)** – Interstates 405 and 105
- **Fixed Guideway (Current)** – Metro Green Line (LRT)
- **Fixed-Guideway Projects (Future Near-Term)** – Metro Crenshaw/LAX Transit Corridor (LRT)
- **Fixed-Guideway Projects (Future Long-Term)** – South Bay Metro Green Line Extension (LRT)

In addition, the Project Study Area is served by a bus network operated by Metro and a variety of municipal operators including Beach Cities Transit, Culver CityBus, Torrance Transit and Santa Monica Big Blue Bus. Several routes serve the LAX City Bus Center, located on 96th Street between Vicksburg Avenue and Avion Drive. The Project Study Area is also served by LAWA FlyAway buses and airport shuttles. The FlyAway is an airport express bus service that

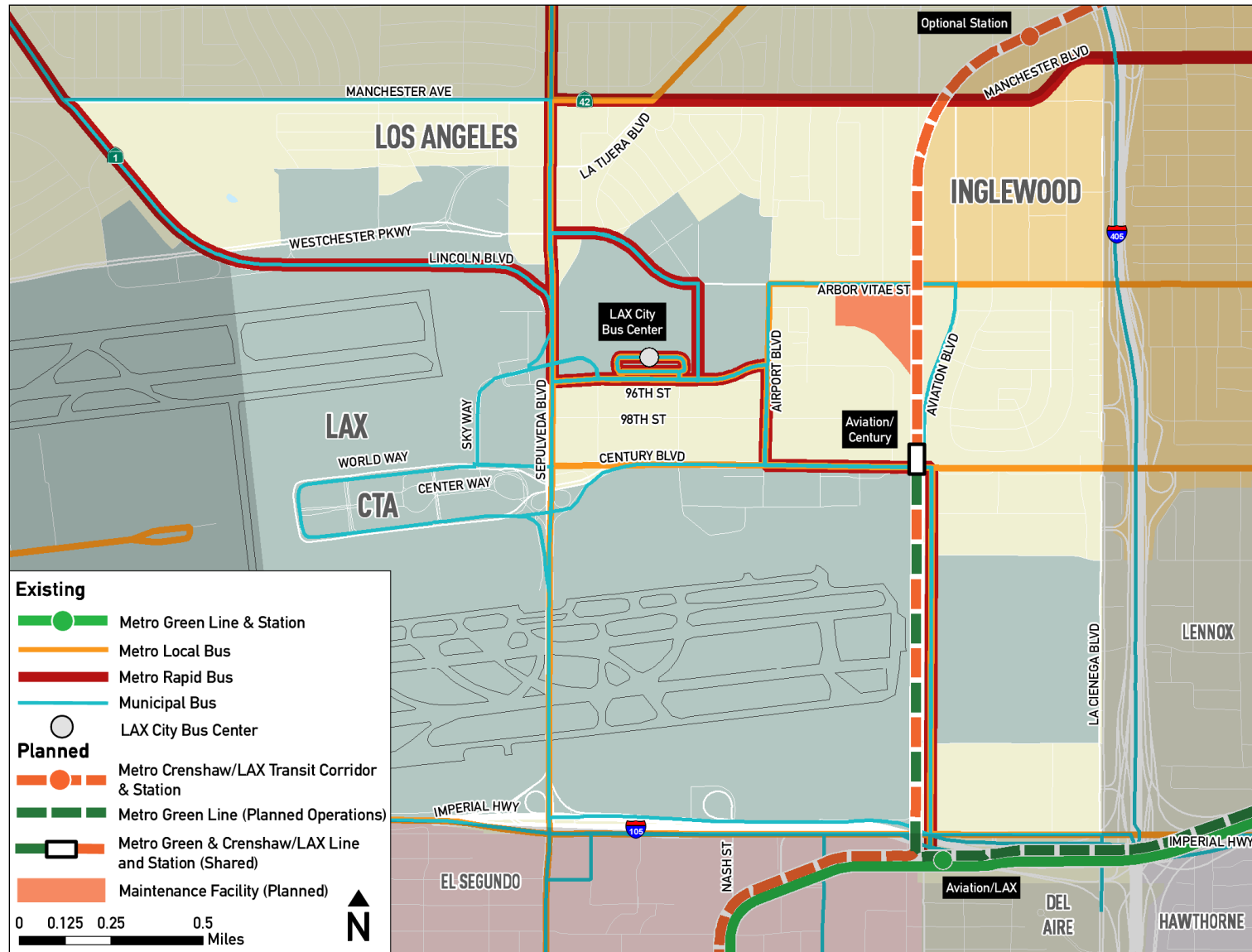
operates between LAX and Van Nuys, Los Angeles Union Station, Westwood and Irvine. The airport operates the following five shuttle lines:

- Shuttle A – Circulates throughout the CTA and connects all terminals
- Shuttle C – Connects the CTA to Lot C (long-term parking) and is a short walk to the LAX City Bus Center
- Shuttle D – LAX employee shuttle between Lot D and the CTA
- Shuttle E – LAX employee shuttle between Lot E and the CTA
- Shuttle G – Currently transports passengers between the Aviation/LAX Metro Green Line Station and the CTA.

It is assumed that Shuttle G, which currently operates between the Metro Green Line Aviation/LAX Station and the CTA, will be shortened to serve the Crenshaw/LAX station at Aviation and Century Boulevards, once that project is operational in 2018. The other airport shuttle services described above are assumed to remain unchanged in the year 2035.

An overview of the No Build Alternative is shown in Figure 3.1.

Figure 3.1. No Build Alternative – Overview



Source: ConnectLAX, 2011

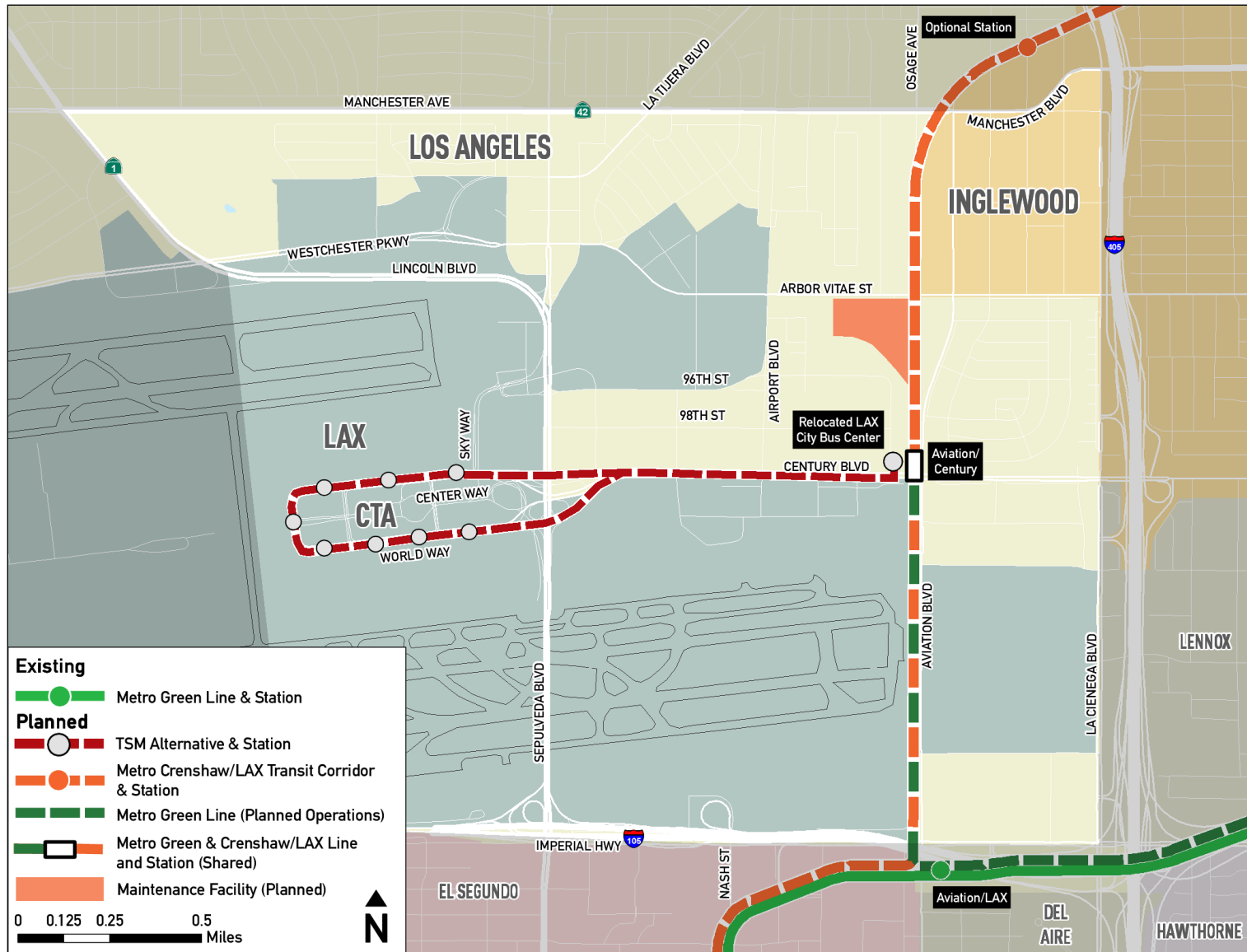
3.2. TRANSPORTATION SYSTEMS MANAGEMENT ALTERNATIVE

The Transportation Systems Management (TSM) Alternative consists of operational improvements to current transit facilities and services that produce the greatest benefits from existing infrastructure, with minimal capital expenditure. These include transportation system upgrades such as intersection improvements, minor roadway widening, bus route restructuring, more frequent bus service, expanded use of high-capacity buses, and traffic signalization improvements. The TSM Alternative was developed based on the recommendations of statewide and metropolitan planning guidelines and the FTA Major Investment Guidelines. These guidelines require the TSM Alternative to provide the basis of comparison to the higher capital investment Build Alternative(s).

The TSM Alternative would be an enhancement of the proposed LAX G shuttle between the CTA and the Aviation/Century Metro Crenshaw/LAX Transit Corridor Station. The headway of the shuttle would be increased from the current 12 to 15-minutes to five-minutes during the peak period. Additionally, the LAX City Bus Center, which is currently located on 96th Street between Vicksburg Avenue and Avion Drive, would be relocated to a site directly adjacent to the planned Aviation/Century Station. The relocation of the bus center would allow for improved connectivity between local bus service, regional rail service and the CTA. The TSM Alternative would attempt to resemble passenger service provided by the Build Alternative(s), but at a lower cost.

An overview of the TSM Alternative is provided in Figure 3.2.

Figure 3.2. TSM Alternative – Overview



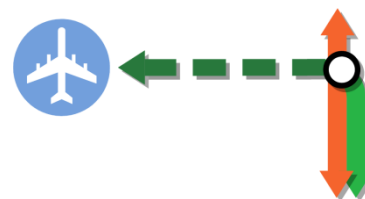
Source: ConnectLAX, 2011

3.3. BUILD ALTERNATIVES – GENERAL CONNECTION TYPES

Build Alternatives are considered based on one of four general connection types. The four classes listed below provided a foundation from which to identify viable transit modes and various alignments associated with each connection type.

3.3.1. Direct LRT Branch

Alternatives that are in the Direct LRT Branch class would extend the Metro light rail system (Metro Green Line and/or Metro Crenshaw/LAX Transit Corridor) into the CTA. It would provide some Metro passengers with a direct connection to the CTA without requiring a transfer. As seen in other major airports throughout the country with a direct rail connection, such as Portland International Airport, Seattle-Tacoma International Airport, and San Francisco International Airport, this alternative may operate with a single station inside the CTA, or with multiple stations serving multiple terminals. Passengers would walk varying distances to reach their final terminal destination. To shorten walking distances, pedestrian bridges and moving sidewalks may be utilized where appropriate. Two-, three-, four-, five-, and eight-station loop configurations are also being considered, which would reduce walking distances, but may cause greater impacts to the CTA’s existing infrastructure.



Since the Direct LRT Branch Alternative is an extension of the existing Metro light rail system, the mode option is limited to LRT (the APM and BRT modes would require a transfer). Modes are discussed further in Section 3.3.5, and route options are discussed in Section 3.3.6.

3.3.2. Circulator

Alternatives in the Circulator class would consist of a new system connecting the CTA to the approved Aviation/ Century Station, as part of the Metro Crenshaw/LAX Transit Corridor project. As seen in other major airports throughout the country with a circulator connection, such as JFK International Airport and Phoenix Sky Harbor International Airport, this system would operate separately from the existing Metro Rail system and would require passengers to transfer at Aviation/Century. Generally, these systems serve two primary functions: 1) circulate passengers and employees to multiple terminals, 2) connect to off-airport facilities such as rental cars, long-term parking, employee parking, and regional rail stations. This system would operate inside the CTA and would have stations located in close proximity to terminals.



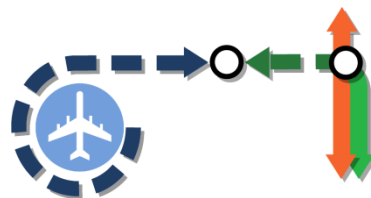
A circulator system could use rail (APM) or bus (BRT) because it would not need to be interoperable with the existing Metro Rail system. Trains operating on the Crenshaw/LAX and Metro Green Lines would not operate on this system. This would allow the system to operate at more frequent headways during peak airport travel times, which do not correspond with

peak Metro Rail travel times. The differing peaks at LAX are due to the variable nature of flight scheduling.

These circulator systems, which operate at many of the largest airports in the country, are typically airport-funded and airport-owned.

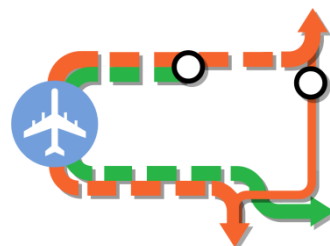
3.3.3. Intermediate LRT and Circulator

Alternatives that are in the Intermediate LRT and Circulator class combine elements from the Direct LRT Branch and Circulator Alternatives. As seen in other major airports throughout the country with this type of system, such as Miami International Airport, the Metro Rail system would branch off to an intermediate off-airport station closer and be more convenient to airport operations than the Aviation/Century Station. A circulator system (APM or BRT) would provide service between the intermediate station and the airport.



3.3.4. Modified LRT Trunk

Alternatives in the Modified LRT Trunk class would consist of an alignment west of the approved Metro Crenshaw/LAX Line. The Crenshaw/LAX line would be built as environmentally cleared and designed. The alignment would have a single station in the airport. As seen in other major airports throughout the country with this type of system, such as Minneapolis St. Paul International Airport, this alternative would provide all Metro Green and Crenshaw/LAX passengers with more convenient access to the airport. Passengers would utilize a circulator system, internal shuttle bus, pedestrian bridges, crosswalks, or moving walkways to reach their airport terminal destination from the single station.



Since the Modified LRT Trunk Alternative is an extension of the existing Metro light rail system, the only feasible mode is LRT. The operational characteristics would be consistent with those of the existing Metro Rail system.

3.3.5. Possible Modes

The following sections provide a brief description of the various transit modes that are considered for all or part of the connection types described in Sections 3.3.1-3.3.4.

3.3.5.1. Bus Rapid Transit (BRT)

BRT incorporates specialized buses generally operating on a dedicated right-of-way (ROW) with enhanced stations to provide a higher level of service than is typical of standard bus transit service, but at a much lower capital investment than a rail service. The BRT may also operate in mixed-flow traffic. An example of BRT in Los Angeles County is the Metro Orange Line, shown in Figure 3.3. Some elevated sections of busway may be considered for this type of transit service.

BRT typically serves local trips and offers higher frequency, faster speeds and better reliability compared to traditional bus lines. Improved service and operational efficiency can be attributed to several BRT features. BRT typically operates at higher frequencies and with greater speeds and improved reliability of service, which are facilitated by exclusive guideway facilities. BRT may also include preferential treatment of buses at signalized intersections, including the extension of green time or actuation of the green light upon detection of an approaching bus. Low-cost infrastructure like bus turnouts, boarding islands and curb realignments further enhance the BRT service. The BRT mode's configuration can vary throughout the Project Study Area taking into account existing physical constraints.

BRT would be considered for the Circulator, Intermediate LRT and Circulator, and some of the Modified LRT Trunk Alternatives.

Figure 3.3. BRT Example – Metro Orange Line



Source: Metro, 2006

3.3.5.2. Light Rail Transit (LRT)

LRT consists of an electric railway with passenger rail cars that operate at moderate speeds and have a passenger-carrying capacity greater than buses. LRT has the ability to utilize infrastructure associated with other rail lines already in operation in the corridor such as the Metro Green and Crenshaw/LAX Lines. Examples of LRT lines in Los Angeles include the existing Metro Blue, Green and Gold Lines and the Expo Line, which is scheduled to begin operation in 2012. A typical Metro LRT vehicle is shown in Figure 3.4.

Frequency of service is generally high (10-minute headways or less during peak travel periods) and, if operating on a dedicated ROW, it offers greater speeds and reliability than buses. Even with shorter distances between stations, LRT can reach speeds of up to 65 miles per hour (mph) partly because electric motors can accelerate more quickly than internal combustion engines. However, speeds often decrease with frequent stations, crossings and in-street segments. Electric cars also emit no local pollutants and generate less noise than internal combustion vehicles.

LRT would be considered for three of the four Build Alternatives (Direct, Intermediate LRT and Circulator and Modified LRT Trunk).

Figure 3.4. LRT Example – Metro Gold Line



Source: ConnectLAX, 2011

3.3.5.3. Automated People Mover (APM)

APM systems operate with automated (driverless) vehicles that are capable of operating at speeds of 30 to 50 mph depending on the technology and alignment. A typical APM vehicle is shown in Figure 3.3. The vehicles provide a high level of reliability, passenger comfort and safety. APM systems can be divided into two primary groups:

- **Cable-Propelled** – medium / large capacity vehicles that are driven by a high speed cable with a variety of possible suspension systems.
- **Self-Propelled** – large capacity vehicles with a variety of possible suspension systems, (includes monorail). Self-propelled APM vehicles are typically powered by way of an electrified third rail.

Both cable and self-propelled vehicles can be supported in several ways, including rubber tires, steel wheels, air levitation, or magnetic levitation. Steering and guidance use center guide beams, running rails, guidance surfaces or rails that are integrated into guideway sidewalls or the center of the running surface. APM systems are capable of multiple vehicle train consists up to four vehicles per train. APM vehicles have mostly standing area with limited seating around the perimeter of the vehicle. APM vehicle passenger capacity is estimated to be roughly 40 passengers per APM vehicle.

APM systems can be considered for circulator elements as part of the Circulator, Intermediate LRT and Circulator and Modified LRT Trunk with Circulator alternatives.

Figure 3.5. APM Example – San Francisco International Airport AirTrain



Source: ConnectLAX, 2011

One variation of the APM vehicle class described above is a Personal Rapid Transit (PRT) vehicle. PRT vehicles are typically much smaller than those described above, with a capacity of approximately 4-6 passengers. This type of APM system typically operates with flexible destinations, meaning that a passenger or group of passengers entering a vehicle could select a specific destination from a number of options and travel to that destination without making any intermediate stops.

PRT would not serve the Purpose and Need of this project, as it would not provide adequate capacity to carry the passenger loads being delivered by the Metro Rail system. Additionally, the nature of the trip that this project is targeting is the line-haul trip between the Metro Rail system and the CTA; its purpose is not to provide comprehensive service to Airport District uses (see Section 2 – Purpose and Need for additional discussion of travel markets). Therefore, PRT will not be considered further as a potential mode for this project. However, PRT could potentially be employed to provide supplementary connections to a variety of off-airport destinations.

3.3.6. Possible Routes

The routes being considered for the four general connection types are split into two general areas; off-airport (east of Sepulveda Boulevard) and on-airport (west of Sepulveda Boulevard). The possible routes are presented in the following sections.

3.3.6.1. Off-Airport

Nine off-airport routing options in four groups are described in this section and shown in Figure 3.6.

Figure 3.6. Off-Airport Routing Options – Overview



Source: ConnectLAX, 2012

Century Boulevard Alignments

Century Boulevard

- Travel west from the planned Aviation/Century Station along Century Boulevard
- An intermediate or terminal station may be located along Century Boulevard to serve local trips and visitors
- If the terminal station is located off-airport, passengers would board a circulator system to reach the CTA
- Continue along Century Boulevard until entering the CTA
- If LRT is the chosen mode, an additional station will need to be constructed in proximity to the Aviation/Century Station to allow for Metro Crenshaw/LAX passengers to transfer to the Metro Green Line to LAX



1994 SEIR Alternative

- Option is based on the approved alternative in the Metro Green Line Northern Extension 1994 SEIR
- Travel west from the planned Aviation/Century Station along Century Boulevard
- Turn north through a parking lot west of Avion Drive (dashed line represents possible future extension of Metro Green Line)
- Option would not directly serve the CTA; Metro Green Line passengers would board a shuttle service to reach the CTA
- Crenshaw/LAX alignment would remain at Aviation Boulevard and would not directly serve the CTA
- Ability to accommodate an extension to the north at some future date
- If LRT is the chosen mode, an additional station will need to be constructed in proximity to the Aviation/Century Station to allow for Metro Crenshaw/LAX passengers to transfer to the Metro Green Line to LAX



98th Street Alignments

98th Street

- Travel north from the planned Aviation/ Century Station
- Turn west at 98th Street
- An intermediate or terminal station may be located south of Lot C
- If the terminal station is located off-airport, passengers would board a circulator system to reach the CTA
- Continue west along 98th Street to Sepulveda Boulevard, turn south into the CTA



98th Street North

- Travel north from the planned Aviation/ Century Station
- Turn west midway between Arbor Vitae Street and 96th Street
- Curve southwest before Airport Boulevard and join 98th or 96th Street east of Avion Drive
- Two route and station options are being considered near Avion Drive; route and station location are dependent on future LAX plans in the area
- An intermediate or terminal station may be located south of Lot C
- If the terminal station is located off-airport, passengers would board a circulator system to reach the CTA
- Continue along 98th Street until Sepulveda Boulevard, turn south into the CTA
- If LRT is the chosen mode, additional studies will determine if it is possible to connect Metro Crenshaw/LAX trains from the north into the CTA



96th Street Alignments

96th Street

- Travel north from the planned Aviation/ Century Station
- Turn west at 96th Street
- An intermediate or terminal station may be located south of Lot C
- If the terminal station is located off-airport, passengers would board a circulator system to reach the CTA
- Continue west along 96th Street to Sepulveda Boulevard, turn south into the CTA



96th Street North

- Travel north from the planned Aviation/ Century Station
- Turn west midway between Arbor Vitae Street and 96th Street
- Curve southwest before Airport Boulevard and join 96th Street west of Airport Boulevard
- An intermediate or terminal station may be located south of Lot C
- If the terminal station is located off-airport, passengers would board a circulator system to reach the CTA
- Continue along 96th Street until Sepulveda Boulevard, turn south into the CTA
- If LRT is the chosen mode, additional studies will determine if it is possible to connect Metro Crenshaw/LAX trains from the north into the CTA



Trunk Alignments

A trunk line is the main line of a rail network that often hosts more than one high-frequency rail line. The alignments presented below represent alternative routes for the main line of the planned Metro Rail network (Metro Green and Crenshaw/LAX lines) along Aviation Boulevard.

Airport Boulevard

- Curve west off the Harbor Subdivision ROW south of Century Boulevard
- Travel along Century Boulevard until reaching Airport Boulevard where the alignment will curve north on Airport Boulevard
- Station would be located at 98th Street and Airport Blvd to allow passengers to transfer to a circulator system to reach the CTA
- Crenshaw/LAX trains would continue along the planned alignment to the north
- The intermediate station would serve as the western terminus of the Metro Green Line



Through LAX

- Alignment turns to the north off the existing Metro Green Line at Douglas Ave
- Route would travel underground below the south runways
- One station would be located underground within the CTA near the Theme Building
- After light rail trains exit the CTA they would continue under the north runways and return to grade near Lot C
- An additional station would be located near Lot C
- Crenshaw/LAX trains would continue along the planned alignment to the north
- The Lot C station may serve as the terminus of the Metro Green Line



3.3.6.2. On-Airport

Four on-airport routing/station options in two groups are described in this section, as shown in Figure 3.7.

Figure 3.7. On-Airport Routing Options – Overview



Source: ConnectLAX, 2012

Loop Alignments

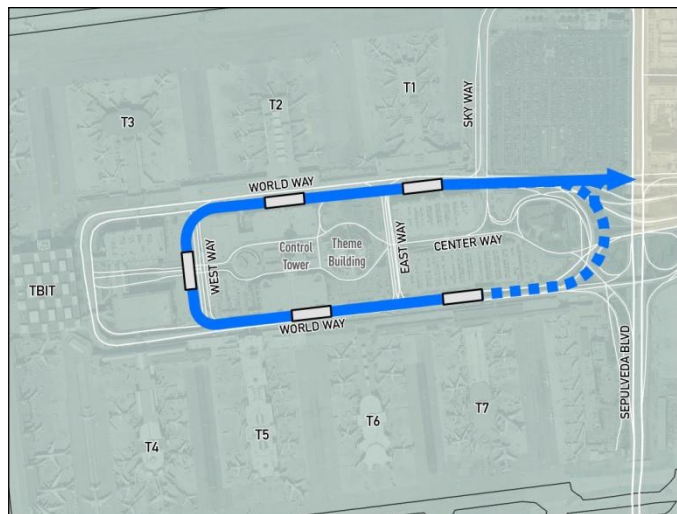
Long Loop

- Enter the CTA at the east end of World Way and follow the existing roadway loop configuration
- Between three and eight stations would be located within the CTA, with either center or side platforms
- Alignment would either exit the CTA at the east end of World Way and link back to the incoming tracks (full loop), or would reverse direction at the terminal station (pinched loop)



Short Loop

- Enter the CTA at the east end of World Way and follow the existing roadway loop configuration
- Turn south to parallel West Way and utilize the undeveloped area west of West Way
- Curve east to rejoin World Way
- Between three and five stations would be located within the CTA, with either center or side platforms
- Alignment would either exit the CTA at the east end of World Way and link back to run parallel to incoming tracks (full loop), or would reverse direction at the terminal station (pinched loop)



Center Way Alignment

- Enter the CTA at the east end of Center Way and follow the existing roadway between the parking garages and either around (aerial) or under (below grade) the Theme Building and control tower
- Between one and two stations would be located within the CTA, with either center or side platforms
- Once vehicles reach the end of the line, they would reverse direction and exit the same way they arrived



Through Alignments

- This option provides the opportunity for a new alignment of the Metro Crenshaw/LAX transit line to travel underground below the south and north runways
- One station would be located underground within the CTA near the Theme Building
- A circulator bus operating on the existing roadway would transfer passengers to their terminal destination
- After light rail trains exit the CTA they would continue along the planned alignment to the north and south
- Option is limited to the LRT mode as it would require the vehicles to be operable on existing Metro Rail lines



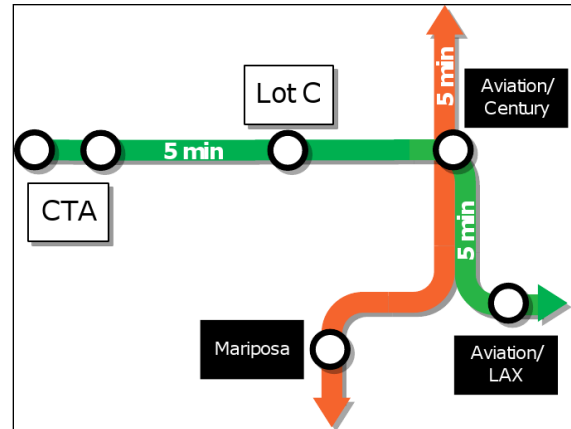
3.4. POSSIBLE OPERATIONS

This section defines the possible operational characteristics (i.e., market connections, headways) of the four alternative classes being considered.

3.4.1. Direct LRT Branch Alternative

Only Metro Green Line to LAX

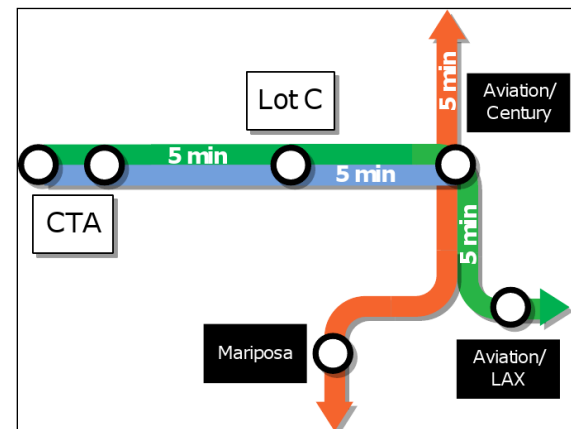
The option assumes that the Metro Green Line would be extended to connect riders between Norwalk and the CTA without a transfer. Metro Crenshaw/LAX trains would operate between the proposed Crenshaw/Expo Station and the existing Redondo Beach (Marine) Station, but would not directly serve the airport. Passengers on the Crenshaw/LAX Line would need to transfer at the planned Aviation/Century Station to the Metro Green Line in order to reach the airport. Headways for this system would be consistent with what is being planned for the Metro Crenshaw/LAX Line (five-minute peak; ten-minute off-peak). The following summarizes the peak headways for the different origins and destinations that would be served by this alternative:



- 5 min. headway Norwalk \leftrightarrow CTA (Green Line)
- 5 min. headway Expo \leftrightarrow South Bay (Crenshaw Line)
- 5 min. headway Aviation/Century \leftrightarrow CTA (Green Line)

Metro Green Line and Supplemental Service to LAX

Further study will determine if it is possible to add a supplemental train that would only operate on the Metro Green Line to LAX extension between Aviation/Century and LAX to provide 2.5-minute headways during the airport’s peak travel periods. The following summarizes the peak headways for the different origins and destinations that would be served by this alternative:

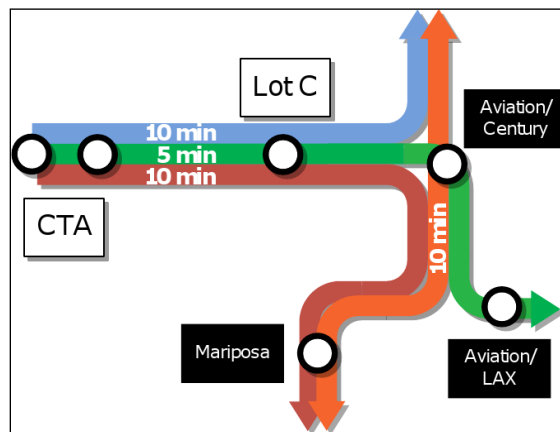


- 5 min. headway Norwalk \leftrightarrow CTA (Green Line)
- 5 min. headway Aviation/Century \leftrightarrow CTA (supplemental LRT service)
- 5 min. headway Expo \leftrightarrow South Bay (Crenshaw Line)

- 2.5 min. combined headway Aviation/Century ↔ CTA (Green Line with supplemental service)

Metro Green and Crenshaw/LAX Lines to LAX

This option would allow Metro Green Line and Metro Crenshaw/LAX Line passengers to directly connect to airport without transferring. The Metro Green Line would operate at five-minute headways between Norwalk and Aviation and the CTA. The Expo-LAX Metro Crenshaw/LAX Line would be split into three separate lines running at 10 minute headways: Expo to South Bay, Expo to CTA, and South Bay to CTA. This would result in combined five-minute headways in the peak period on the Crenshaw Line, and 2.5 minute headways between Aviation/Century and the CTA.

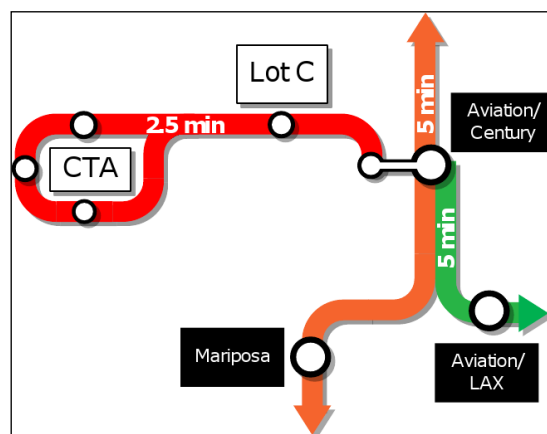


Further analysis is required to determine the operational feasibility of this option. The following summarizes the peak headways for the different origins and destinations that would be served by this alternative:

- 5 min. headway Norwalk ↔ CTA (Green Line)
- 10 min. headway Expo ↔ South Bay (Crenshaw Line A)
- 10 min. headway Expo ↔ CTA (Crenshaw Line B)
- 10 min. headway South Bay ↔ CTA (Crenshaw Line C)
- 2.5 min. combined headway Aviation/Century ↔ CTA (Green Line, Crenshaw Line B & C)

3.4.2. Circulator Alternative

The Circulator Alternative would be completely separate from the existing Metro Rail system, and therefore would not be directly influenced by the design or scheduling restrictions of the Metro Rail system. Instead, the system would be designed to maximize system performance during the airport’s peak demand. The Circulator Alternative is designed to operate at 2.5-minute peak headways. As previously mentioned, the airport’s peak travel periods may differ from Metro’s peaks. Reduced frequencies would be offered during the late-night and early morning periods.

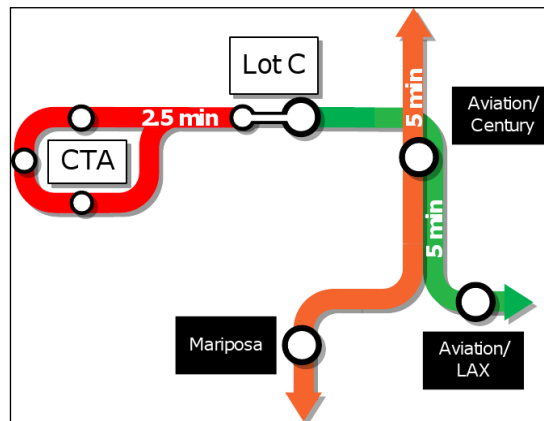


The Circulator Alternative would support both APM and BRT mode options. Both APM and BRT would operate on a dedicated guideway off-airport; once inside the airport, BRT would operate in mixed traffic on existing roadways while APM would continue to operate on a

dedicated guideway. A dedicated ROW was considered for the BRT option, but was ultimately screened due to potential impacts. The conversion of traffic lane within the CTA to host a BRT service would likely reduce roadway capacity and increase traffic congestion. In terms of a separated guideway, the width of an aerial busway would likely impact parking structures and/or the existing loop roadway more than an aerial rail structure.

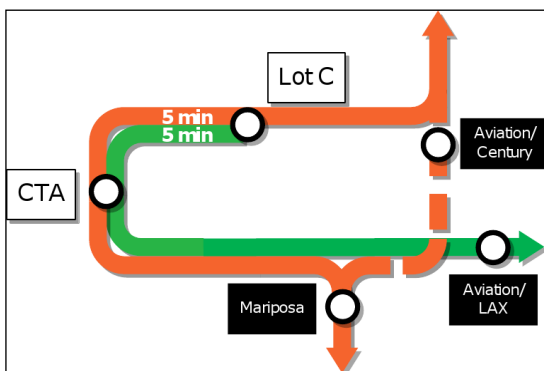
3.4.3. Intermediate LRT and Circulator Connection Alternative

As indicated by the name, operating characteristics for the Intermediate LRT and Circulator Connection Alternative would be some combination of the Direct LRT Branch and Circulator Alternatives described above.



3.4.4. Modified LRT Trunk Alternative

This alternative would allow for an additional Metro Crenshaw/LAX alignment in a tunnel beneath the CTA, allowing Metro Green and Crenshaw/LAX Line passengers to directly connect to the airport area without transferring. Both lines would operate at five-minute headways. The Metro Green Line would operate between Norwalk and the airport, while the Metro Crenshaw/LAX Line would operate between the Expo Line and the South Bay with an intermediate station at the airport. This would result in combined 2.5-minute headways during peak periods at the airport station. The following summarizes the peak headways for the different origins and destinations under this alternative:



- 5 min. headway Norwalk ↔ Airport (Green Line)
- 5 min. headway Expo ↔ Airport ↔ South Bay (Crenshaw/LAX Line)

3.4.5. Operations Summary

A summary of potential operations for the four alternative classes is shown in Table 3.1.

Table 3.1. Possible Operations – Summary

Alternative	Option	Maximum Peak Headway		
		Metro Green Line	Metro Crenshaw/ LAX Line	Circulator/ Supplemental Service
Direct LRT Branch	Metro Green Line to LAX	5 minute	5 minute	N/A
	Metro Green Line and supplemental service to LAX	5 minute	5 minute	5 minute
	Metro Green and Crenshaw/LAX Lines to LAX	5 minute	10 minute	N/A
Circulator		N/A	N/A	2.5 minute
Intermediate LRT and Circulator		Would be a combination of the Direct LRT Branch and Circulator Alternatives		
Modified LRT Trunk		5 minute	5 minute	N/A

Source: ConnectLAX, 2012

3.5. RIDERSHIP MODELING

Air passenger and employee ridership data presented in this report are generated from the 2012 Air Passenger Model, which is developed based on the 2006 LAWA Passenger Survey. The model is incorporated into Metro’s current Mode Choice Model, allowing the use of regional model inputs such as highway and transit skim data (ConnectLAX, 2012).

As part of the model development process, the base year and 2035 transit and highway networks in the Project Study Area were updated to provide a more granular network detail. In addition, TAZ 921, which encompasses all of LAX, was subdivided into more focused zones corresponding to terminal and cargo facilities. Additional data on off-airport parking capacity, employee worksites in the CTA and employees by sub-TAZ were collected to better inform air passenger and employee trip assignments.

Following the calibration of the Air Passenger Model, the model was used to forecast ridership for 14 alternatives. The 2012 Air Passenger Model produces forecasts for air passenger and employee trips to LAX by mode for the Year 2035 No Build and 2035 Build Alternatives. Per the model structure, the mode is defined as ‘public transit’ if one arrives into the Airport District via a public transit mode – local bus, Metro bus or Metro Rail – and either continues into the CTA or is a LAX employee destined to their job site in the Airport District via transit. For evaluation purposes, the model’s strict definition of ‘public transit’ trips is used to allow for a comparison between alternatives.

It is worth noting that this strict definition does not account for those trips that use transit to get to the CTA, but arrive in the Airport District via a non-public transit mode such as drive alone or carpool, park and then board transit or take a shuttle into the CTA. In addition, it does not account for future airport plans. Taking these considerations into account, there

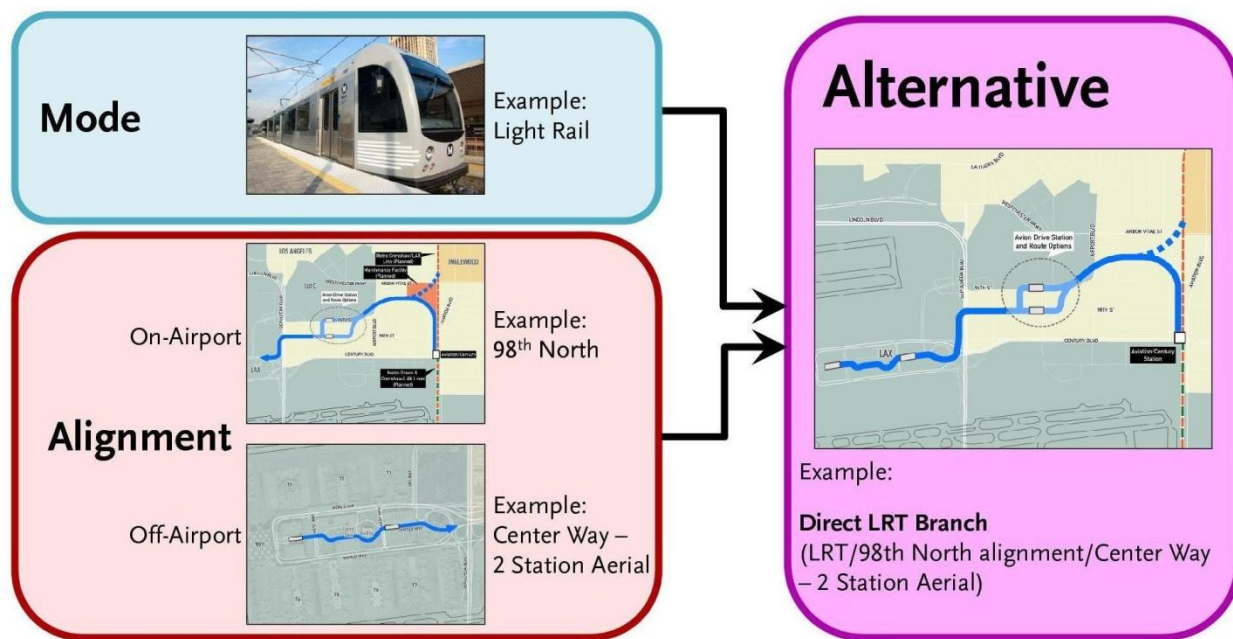
would likely be 5,000-10,000 additional riders per day traveling between the CTA and airport related functions in the vicinity of stations in the Airport District outside of the terminals.

4. SCREENING OF ALTERNATIVES

The screening process is divided into two stages. Stage I matches modes to alternative connection types and evaluates the feasibility of alignment options for each of the connection types. Stage II evaluates the performance of each Build alternative. See Figure 4.1 for the composition of a Build Alternative. The focus of Stage I screening that will support the development of the packaged alternatives to be carried forward into Stage II. Options that would result in significant issues (fatal flaws) will not advance to the Stage II screening evaluation.

The Stage II evaluation consists of a comparative analysis of trade-offs between alternatives to identify alternatives that will be carried forward into the Draft EIS/EIR. The criteria were developed to reflect the project objectives as defined in the Purpose and Need section.

Figure 4.1. Alternative Components



Source: ConnectLAX, 2011

4.1. STAGE I SCREENING PROCESS

The first step in the screening analysis is to match the transit mode(s) appropriate for each connection type. Listed below are the objectives, and transit modes, associated with each connection type. The evaluation criteria for Stage I screening include:

- **Direct LRT Branch Alternative** – a light rail transit (LRT) branch of the Metro Green Line (and possibly Crenshaw/LAX line) west from Aviation Boulevard to the LAX terminal area. Provides a direct connection for Metro Rail passengers to LAX.

- **Circulator Alternative** – a separate, independent transit system (APM or BRT) suited to the airport’s unique travel demands/operating environment. System would connect the airport to the Metro Rail station at Aviation and Century Boulevards.
- **Intermediate LRT and Circulator Alternative** – a LRT branch of the Metro Green Line (and possibly Crenshaw/LAX line) west from Aviation Boulevard to an intermediate transfer station located east of Sepulveda Boulevard. A Circulator system (APM or BRT) would provide service between the intermediate station and the LAX terminal area.
- **Modified LRT Trunk Alternative** – shifts the main line of the Metro LRT system west of Aviation Boulevard to provide more direct service to the LAX terminal area for the Metro Green and Crenshaw/LAX lines.

The Stage I evaluation criteria include:

- **Physical fit and constructability** – Developing an alternative that will reduce conflicts with the existing infrastructure in the Project Study Area is important to reduce the project’s potential construction and operational impacts. Physical fit and constructability includes impacts to the approved Metro Crenshaw/LAX light rail extension, existing structures, utilities and other major infrastructure.
- **Conflicts with Runway Protection Zone (RPZ)** – The dedicated guideway or stations for a transit system are subject to regulations and policies established by FAA to protect the safety of runway operations and minimize interference with air traffic control systems. In particular, off-airport routing options that encroach into areas designated as RPZs may result in significant issues.
- **Compatibility with Other Plans/Facilities** – It is important to have flexibility to integrate with future transit and airport plans and to serve potential airport facilities, such as ground transportation improvements in the LAX Master Plan and intermodal transportation facilities and Rent-a-Car facilities which are explored in LAWA’s Specific Plan Amendment Study (SPAS). Future transit facilities include the Crenshaw/LAX line (with completed environmental review), the South Bay Metro Green Line Extension and the Coastal Corridor Study (in the unfunded Strategic Element of Metro’s LRTP). Incorporating this sensibility ensures that the project is compatible with future Metro and LAWA goals.
- **Average Travel Time** – The initial screening considers average travel times as one component in the determination of the most appropriate on-airport route and station option. This criterion considers number of stations, and walking distance between the station(s) and the airport terminals, station dwell times, and vehicle operating speeds.
- **Cost** – The initial screening considers capital and construction cost as a component in determining the most appropriate on-airport route and station option(s). The cost includes the construction of the guideway, stations, vehicles and supporting facilities. Since the Metro Green Line to LAX project only has approximately \$200 million allocated as part of Measure R, any costs in excess of this amount will need to be funded by other sources.

Cost and travel time are used to evaluate the large set of on-airport alternatives with the purpose of narrowing down the number of configurations for each connection type. Cost and travel time for off-airport alignments are considered in the context of the entire alternative in Stage II.

4.2. STAGE II SCREENING PROCESS

Several performance measures were developed to assess the pros and cons of each alternative. These performance measures are described below and the components of each are provided in Table 4.1.

- **Daily Ridership** – System-wide ridership (Metro Rail) will be examined to determine the impact the Alternatives may have on increasing the transit share of trips to and from the airport.
- **Travel Time** – System-wide travel times (Metro Rail) will be examined to determine the Alternative(s) that provide the best travel times to the airport and balances travel time impacts to non-airport bound Metro passengers.
- **Passenger Convenience** – Walking distance, vertical level changes, luggage accommodations, and fare collection will all be considered in determining which alternative(s) provides the highest quality experience for Metro passengers.
- **Cost** – Capital construction costs for each alternative, which will include the construction of the guideway, stations, vehicles, and supporting facilities, determine the potential fiscal impacts and cost effectiveness of each alternative. As noted previously, the Metro Green Line to LAX project only has approximately \$200 million allocated as part of Measure R, any costs in excess of this amount will need to be funded by other sources.
- **Constructability** – The physical constructability of each alternative will be determined to ensure that alternatives fit within acceptable parameters for utility and construction disruption, and airport constraints.
- **Potential Environmental Impacts** – alternatives may impacts to specific environmental resources, especially traffic, visual and cultural resources. Traffic and transportation access are critical to some local businesses and the airport terminal area. Visual impacts, especially to landscaping and culturally significant structures such as the Theme Building, the original airport control tower and public art may also be affected by various alternatives.

The Stage II screening criteria provides a more quantitative comparison of alternatives. However, this information, by itself, is not intended to inform which of the alternatives should move forward to be studied in the Draft EIS/EIR. For example, an alternative may score high for one or two of the criteria, but does not score well for other criteria. Because all criteria are treated equally in this analysis (i.e., one criteria is not weighted more heavily than another), there are no clear winners or losers.

For this reason, another level of analysis is necessary to complete the Stage II screening – a trade-off analysis. This approach was used because it allows for a more nuanced method to revealing the preferences of project stakeholders and the public.

The four trade-off analyses explore:

- **Passenger Convenience by Connection Type** - How passenger experience variables (transfers, level changes, and travel time savings) vary by major connection type as well as ridership and cost;
- **Direct LRT Branch v. Through LAX** - How the two LRT connection alternatives compare to each other;
- **Alignments in the Airport Terminal Area (on-airport options)** - How the alignments within the CTA compare; and
- **Century Blvd v. 98th St.** - How Century Boulevard and 98th Streets compare to each other as alignments for the Direct LRT Branch and Circulator connection types.

Table 4.1. Stage II Evaluation Criteria & Performance Measures

Evaluation Criteria	Performance Measures
Daily Ridership	<ul style="list-style-type: none"> • System-wide ridership (Metro Rail) • Base ridership on system • Base ridership on Crenshaw/Green Line/South Bay System • Additional passengers on Circulator System • Additional Passengers on Crenshaw/Green Line/South Bay System • Travel markets ridership
Travel Time	<ul style="list-style-type: none"> • Regional travel time to LAX (from Metro Center, Exposition, Redondo Beach, Norwalk) • Travel time to LAX from/within Project Study Area (from Airport Blvd./98th St., Aviation/Century) • Additional travel time to Tom Bradley International Terminal (TBIT) • Other Regional Travel Times (Exposition to Redondo Beach) • Average walk distance to terminals
Passenger Convenience	<ul style="list-style-type: none"> • Number of transfers (from Metro Center, Exposition, Redondo Beach, Norwalk, TBIT) • Number of vertical level changes (i.e. the number of times that a passenger would need to use stairs, elevators or escalators to make their trip. This affects passengers with luggage)
Cost	<ul style="list-style-type: none"> • Total cost of stand-alone system (APM and bus only) • Total cost of light rail infrastructure • Parking structure demolition and replacement • Property acquisition (private) • Property acquisition (LAWA-owned)
Compatibility with Other Plans/Facilities	<ul style="list-style-type: none"> • Consistency with LAWA Plans • Security • Capacity • Operational scalability for future passenger loads • Would not preclude future extension of Metro Rail
Constructability	<ul style="list-style-type: none"> • RPZ encroachment • Utility disruption • Construction disruption • Airport constraints on construction

In addition to the performance measures described above, community acceptability was also considered based on comments received at the public meetings held in February/March 2012. Finally, Stage II culminates in a trade-offs analysis intended to highlight key differences in performance between options.

4.3. STAGE I EVALUATION

This section evaluates each modal, and on- and off-airport routing option for each Build Alternative based on the criteria presented in Section 4.1. A complete description of the options is provided in the Preliminary Definition of Alternatives Report. Once each modal and routing option has been analyzed, those that advance to Stage II will be combined to form “packaged alternatives.”

4.3.1. Direct LRT Branch

4.3.1.1. Mode

Since the Direct LRT Branch Alternative is an extension of the existing Metro light rail system, the mode option is limited to LRT (the APM and BRT modes would require a transfer).

4.3.1.2. Off-Airport Options

The screening analysis of off-airport options for the Direct LRT Branch Alternative is shown in Table 4.2, and the significant issues are shown in bold. The evaluation is based on the physical fit and constructability and encroachment into the RPZ as discussed in Section 4.1.

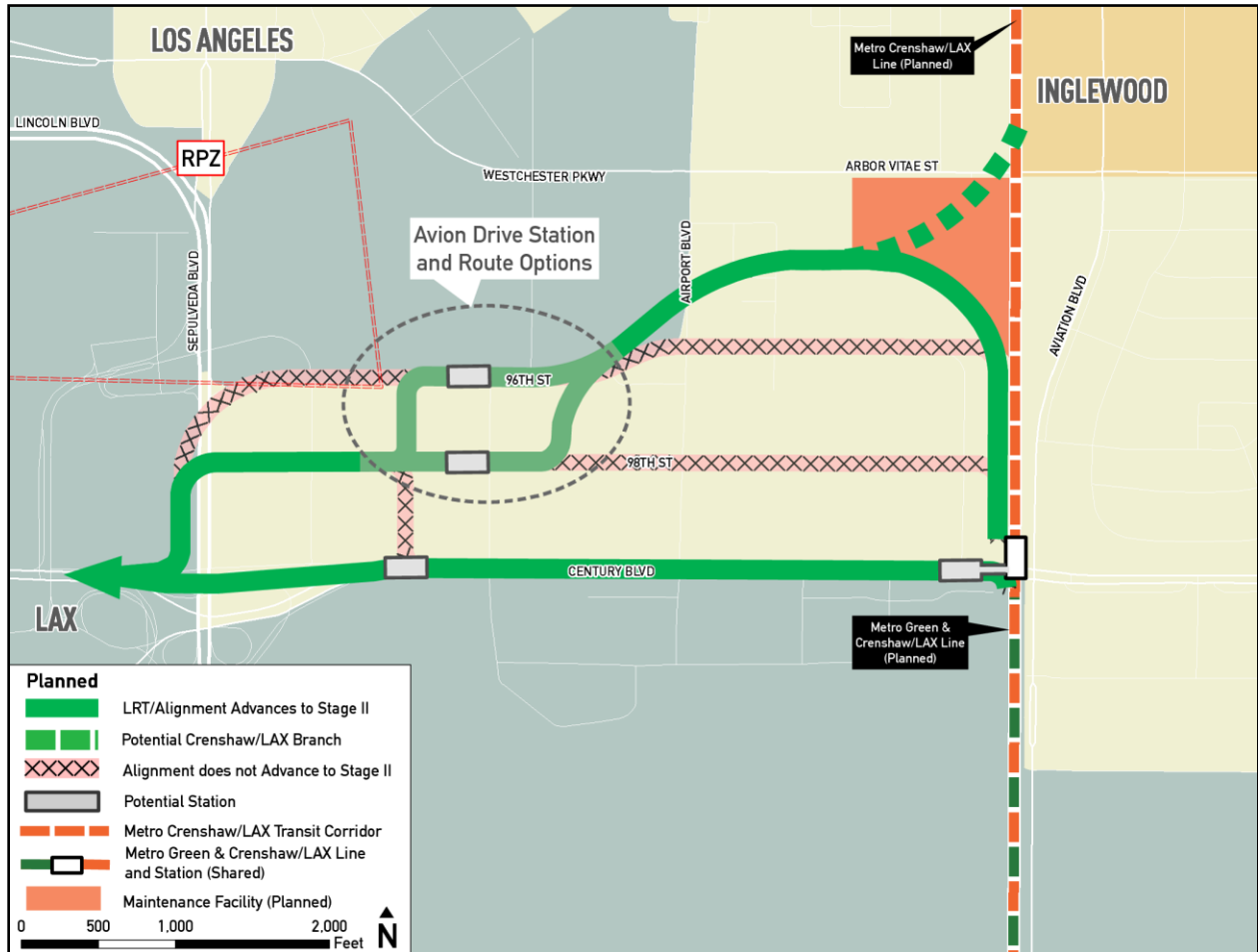
Table 4.2. Stage I Evaluation of Direct LRT Branch – Off-Airport Options

Off-Airport Options	Performance	Advance to Stage II
Century Blvd	<ul style="list-style-type: none"> • No transfer required for Metro Green Line passengers to the airport • Alignment could be designed with minimal physical fit and constructability issues • Alignment would not encroach into the RPZ • Alignment would serve potential airport facilities near Parking Lot C and/or near Aviation/Century • Transfers possible with Crenshaw/LAX line with second station at Aviation/Century • Future extension to Coastal Corridor from Aviation/Century is not precluded 	✓
1994 SEIR Alternative	<ul style="list-style-type: none"> • Alignment would require a transfer from Metro Rail to an airport circulator system to reach the CTA and therefore does not meet the objective of the connection type • Alignment could be designed with minimal physical fit and constructability issues • Alignment would not encroach into the RPZ • Alignment would serve potential airport facilities near Parking Lot C and/or near Aviation/Century • Transfers possible with Crenshaw/LAX line with second station at Aviation/Century • Future extension to Coastal Corridor from Aviation/Century is not precluded 	X
98 th Street	<ul style="list-style-type: none"> • No transfer required for Metro Green Line passengers to the airport • Alignment would require the planned Aviation/Century Station to be shifted to the south to allow for a turn onto 98th St; therefore, this reconfiguration would result in constructability issues with the track gradient south of the station, making this option infeasible • Potential impacts to parking garages and existing uses, involving potentially expensive property acquisitions. • Alignment would not encroach into the RPZ • Alignment issues make service to Aviation/Century difficult 	X

Off-Airport Options	Performance	Advance to Stage II
98 th Street North	<ul style="list-style-type: none"> No transfer required for Metro Green Line passengers to the airport Alignment could be designed with minimal physical fit and constructability issues Alignment would not encroach into with RPZ Alignment would serve potential airport facilities near Parking Lot C and/or near Aviation/Century Transfers with Crenshaw/LAX line possible with cross-platform transfer 	✓
96 th Street	<ul style="list-style-type: none"> No transfer required for Metro Green Line passengers to the airport Potential impacts to parking garages and existing uses, involving potentially expensive property acquisitions. Alignment would encroach into the RPZ, which would trigger significant regulatory constraints and would likely necessitate a less cost-effective below-grade configuration Alignment issues make service to Aviation/Century difficult 	✗
96 th Street North	<ul style="list-style-type: none"> No transfer required for Metro Green Line passengers to the airport Alignment could be designed with minimal physical fit and constructability issues Alignment would encroach into the RPZ, which would trigger significant regulatory constraints and would likely necessitate a less cost-effective below-grade configuration Alignment would serve potential airport facilities near Parking Lot C and/or near Aviation/Century Transfers with Crenshaw/LAX line possible with cross-platform transfer 	✗

Significant issues were identified for four of the nine off-airport options for the Direct LRT Branch Alternative based on the screening criteria. No significant issues for the 98th Street North or Century Boulevard options were found, and therefore, they will be carried forward as the off-airport options for the Direct LRT Branch Alternative. The routes to be carried forward are shown in Figure 4.2.

Figure 4.2. Off-Airport Routes to Advance to Stage II – Direct LRT Branch



Source: ConnectLAX, 2012

Note: Route and station location for the 98th North option are dependent on future LAX plans

4.3.1.3. On-Airport Options

The comparative analysis of on-airport options for the Direct LRT Alternative is shown in Table 4.3, with significant issues indicated in bold. The evaluation is based on average travel times between the Aviation/Century Station and terminal door (including in-vehicle and walking times)⁴ and capital cost relative to the least expensive option (Center Way – 1 Station Aerial) at approximately \$440 million. Cost estimate includes aerial off-airport configuration between Aviation and Sepulveda boulevards. Similarly, the travel time analysis assumes a given off-airport alignment with fixed travel time for the purposes of this comparison.

⁴ Assumes an equal travel time for the off-airport portion of the trip.

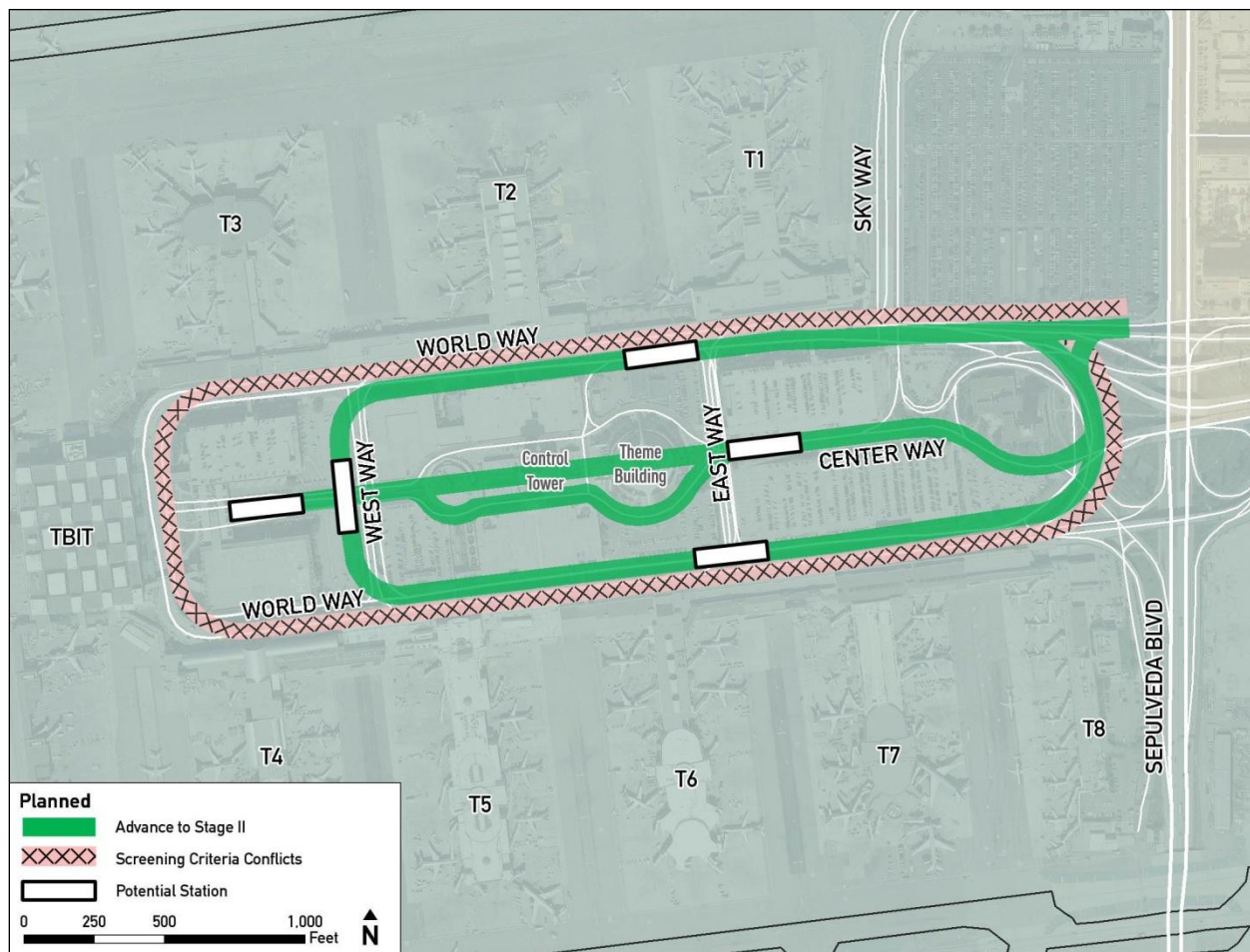
Table 4.3. Stage I Evaluation of Rail Alignments – On-Airport Options

On-Airport Options	Performance	Advance to Stage II
Center Way – 1 Station Aerial	<ul style="list-style-type: none"> Average Travel Time = 12.4 minutes between Aviation/Century and Terminals Relative Cost = 1.0x (baseline) Longest average travel time of all options = poor passenger experience 	X
Center Way – 1 Station Tunnel	<ul style="list-style-type: none"> Average Travel Time = 12.1 minutes between Aviation/Century and Terminals Relative Cost = approx. 1.5x baseline estimate Travel times are slightly less than the Center Way – 1 Station Aerial, but costs 1.5x as much; therefore, the added cost would not result in substantial travel time benefits 	X
Through LAX – 1 Station Tunnel	<ul style="list-style-type: none"> This option advances to Stage II for the Modified Trunk Alternative (see Section 4.3.4), as that alternative is designed to capture the benefits of this option 	N/A
Center Way – 2 Station Aerial	<ul style="list-style-type: none"> Average Travel Time = 11.1 minutes between Aviation/Century and Terminals Relative Cost = approx. 1.2x baseline estimate Option provides a 1.3 min travel time improvement while only increasing costs by 1.1x over the baseline option (Center Way – 1 Station Aerial) 	✓
Center Way – 2 Station Tunnel	<ul style="list-style-type: none"> Average Travel Time = 10.1 minutes between Aviation/Century and Terminals Relative Cost = approx. 2.4x baseline estimate Option offers the best average travel time for all on-airport options 	✓
Loop – 3 Station Aerial	<ul style="list-style-type: none"> Average Travel Time = 10.2 minutes between Aviation/Century and Terminals Relative Cost = approx. 2.4x baseline estimate Option is a good mix of cost (fourth least expensive) and average travel time (second fastest); therefore, it performs well across all measures Potential impacts to parking structures, including demolition 	✓
Loop – 3 Station Tunnel	<ul style="list-style-type: none"> Average Travel Time = 10.2 minutes between Aviation/Century and Terminals Relative Cost = approx. 2.7x baseline estimate Travel times are equal to the Loop – 3 Station Aerial, but costs are 2.4x the baseline option (Center Way – 1 Station Aerial); therefore, the added cost would not result in any travel time benefit 	X
Loop – 4 Station Aerial	<ul style="list-style-type: none"> Average Travel Time = 10.4 minutes between Aviation/Century and Terminals Relative Cost = approx. 2.6x baseline estimate Average travel times and relative cost are more than the Loop – 3 Station Aerial; therefore, the added cost would not result in any travel time benefit Potential impacts to parking structures, including demolition 	X
Loop – 5 Station Aerial	<ul style="list-style-type: none"> Average Travel Time = 10.7 minutes between Aviation/Century and Terminals Relative Cost = approx. 2.7x baseline estimate Average travel times and relative cost are more than the Loop – 3 Station Aerial; therefore, the added cost would not result in any travel time benefit Potential impacts to parking structures, including demolition 	X

On-Airport Options	Performance	Advance to Stage II
<p>Loop – 8 Station Aerial</p>	<ul style="list-style-type: none"> • Average Travel Time = 10.5 minutes between Aviation/Century and Terminals • Relative Cost = approx. 3.2x baseline estimate • Average travel times and relative cost are more than the Loop – 3 Station Aerial; therefore, the added cost would not result in any travel time benefit • Potential impacts to parking structures, including demolition 	<p>X</p>

Due to the relatively long average travel times (in-vehicle and walk time) associated with the one-station options, and the higher relative cost and average travel times of the four, five and eight station options, they have been screened and will not be evaluated further. No significant issues for the two (aerial and tunnel) and three station options were found. They are carried forward into Stage II as on-airport options for the Direct LRT Branch Alternative. The routes to be carried forward are shown on Figure 4.3.

Figure 4.3. On-Airport Routes to Advance to Stage II – Direct LRT Branch



Source: ConnectLAX, 2012

4.3.1.4. Packaged Alternatives

The packaged alternatives for the Direct LRT Branch Alternative contain the following three components: mode, off-airport option and on-airport option. Table 4.4 lists the six Direct LRT Branch Alternatives that will be carried forward into Stage II for further consideration.

Table 4.4. Packaged Alternative – Direct LRT Branch

ID	Mode	Off-Airport Option	On-Airport Option
B-1	LRT	98th Street North	Center Way – 2 Station Aerial
B-2			Center Way – 2 Station Tunnel
B-3			Loop – 3 Station Aerial
B-4		Century Blvd	Center Way – 2 Station Aerial
B-5			Center Way – 2 Station Tunnel
B-6			Loop – 3 Station Aerial

4.3.2. Circulator


4.3.2.1. Mode

A separate, independent APM or BRT system suited to the airport’s unique travel demands/operating environment. System would connect the airport to the Metro Rail station at Aviation and Century Boulevards.

4.3.2.2. Off-Airport Options

The screening analysis of off-airport options for the Circulator Alternative is shown in Table 4.5, and the significant issues are indicated in bold. The evaluation is based on the fulfillment of the goals of the alternative, physical fit and constructability, and encroachment into the RPZ as discussed in Section 4.1.

Table 4.5. Stage I Evaluation of Circulator Connection – Off-Airport Options

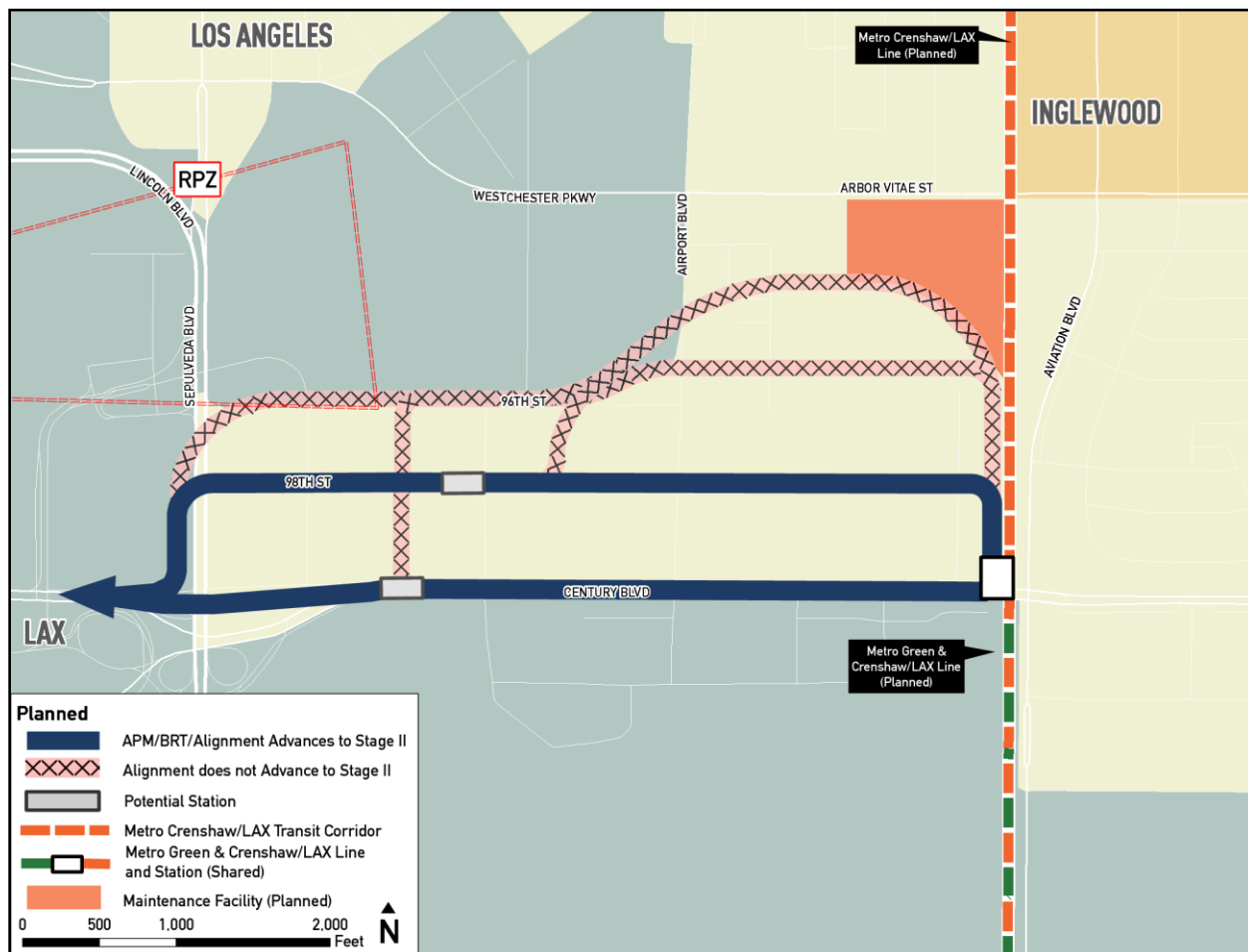
Off-Airport Options	Performance	Advance to Stage II
Century Blvd	<ul style="list-style-type: none"> Option would support a transfer from the Metro Green Line and Metro Crenshaw/LAX rail corridor to an airport circulator system at the Aviation/Century Station Alignment could be designed with minimal physical fit and constructability issues Alignment would not encroach into the RPZ Alignment would serve potential airport facilities near Parking Lot C but requires a transfer to facilities near Aviation/Century Alignment could straddle the LRT station at Aviation/Century to provide a transfer connection Future LRT extension to Coastal Corridor from Aviation/Century is not precluded 	

Off-Airport Options	Performance	Advance to Stage II
98 th Street	<ul style="list-style-type: none"> Option would support a transfer from the Metro Green Line and Metro Crenshaw/LAX rail corridor to an airport circulator system at the Aviation/Century Station Alignment could be designed with minimal physical fit and constructability issues Alignment would not encroach into the RPZ Alignment would serve potential airport facilities near Parking Lot C but requires a transfer to facilities near Aviation/Century Alignment could straddle the LRT station at Aviation/Century to allow a transfer connection 	✓
98 th Street North	<ul style="list-style-type: none"> Option would support a transfer from the Metro Green Line and Metro Crenshaw/LAX rail corridor to an airport circulator system at the Aviation/Century Station Potential impacts to parking garages and existing uses with potentially expensive property acquisition Alignment would not encroach into the RPZ Alignment would serve potential airport facilities near Parking Lot C but requires a transfer to facilities near Aviation/Century Alignment may limit the ability to extend LRT to the north as part of a strategic, unfunded project 	X
96 th Street	<ul style="list-style-type: none"> Option would support a transfer from the Metro Green Line and Metro Crenshaw/LAX rail corridor to an airport circulator system at the Aviation/Century Station Potential impacts to parking garages and existing uses with potentially expensive property acquisition Alignment would encroach into the RPZ, which would trigger significant regulatory constraints and would likely necessitate a less cost-effective below-grade configuration Alignment would serve potential airport facilities near Parking Lot C but requires a transfer to facilities near Aviation/Century Alignment may limit the ability to extend LRT to the north as part of a strategic, unfunded project 	X
96 th Street North	<ul style="list-style-type: none"> Option would support a transfer from the Metro Green Line and Metro Crenshaw/LAX rail corridor to an airport circulator system at the Aviation/Century Station Potential impacts to parking garages and existing uses with potentially expensive property acquisition Alignment would encroach into the RPZ, which would trigger significant regulatory constraints and would likely necessitate a less cost-effective below-grade configuration Alignment would serve potential airport facilities near Parking Lot C but requires a transfer to facilities near Aviation/Century Alignment may limit the ability to extend LRT to the north as part of a strategic, unfunded project 	X

Significant issues were identified for all but two of the nine off-airport options for the Circulator Alternative based on the analysis criteria. The benefits of the Airport Boulevard and Through LAX options are better captured in the Direct Trunk Alternative, and are not analyzed

as part of the Circulator Alternative. No significant issues for the 98th Street and Century Boulevard options were found. They are carried forward as the off-airport options for the Circulator Alternative. The routes to be carried forward are shown in Figure 4.4.

Figure 4.4. Off-Airport Routes to Advance to Stage II – Circulator



Source: ConnectLAX, 2012

4.3.2.3. On-Airport Options

The comparative analysis of on-airport options for the Circulator Alternative is the same as the analysis provided for the Direct LRT Branch Alternative in Section 4.3.1.3. Center Way – 2 Station Aerial, Center Way – 2 Station Tunnel, and Loop – 3 Station Aerial will be carried forward to Stage II for further evaluation as on-airport options for the Circulator Alternative.

4.3.2.4. Packaged Alternatives

The packaged alternatives for the Circulator Alternative contain the following three components: mode, off-airport option and on-airport option. BRT was not previously included in the on-airport screening options because it is assumed that buses would operate

on surface streets in mixed traffic inside the CTA with stops in front of each of the eight terminals. Table 4.6 lists the eight Circulator Alternatives that will be carried forward into Stage II for further consideration.

Table 4.6. Packaged Alternative – Circulator

ID	Mode	Off-Airport Option	On-Airport Option
C-1	APM	98th Street	Center Way – 2 Station Aerial
C-2			Center Way – 2 Station Tunnel
C-3			Loop – 3 Station Aerial
C-4	BRT		Loop – 8 Station At-Grade
C-5	APM	Century Blvd	Center Way – 2 Station Aerial
C-6			Center Way – 2 Station Tunnel
C-7			Loop – 3 Station Aerial
C-8	BRT		Loop – 8 Station At-Grade

4.3.3. Intermediate LRT and Circulator

4.3.3.1. Mode

The Intermediate LRT and Circulator Alternative would consist of an extension of the existing Metro light rail system to an intermediate location between the Aviation/Century Station and the airport; therefore, the mode option is limited to LRT for the initial segment. APM and BRT modes would both be suitable to complete the trip between the intermediate station and the CTA.

4.3.3.2. Off-Airport Options

The screening analysis of off-airport options for the Intermediate LRT and Circulator Alternative is shown in Table 4.7 with significant issues indicated in bold. The evaluation is based on the fulfillment of the goals of the alternative, physical fit and constructability, and encroachment into the RPZ as discussed in Section 4.1.

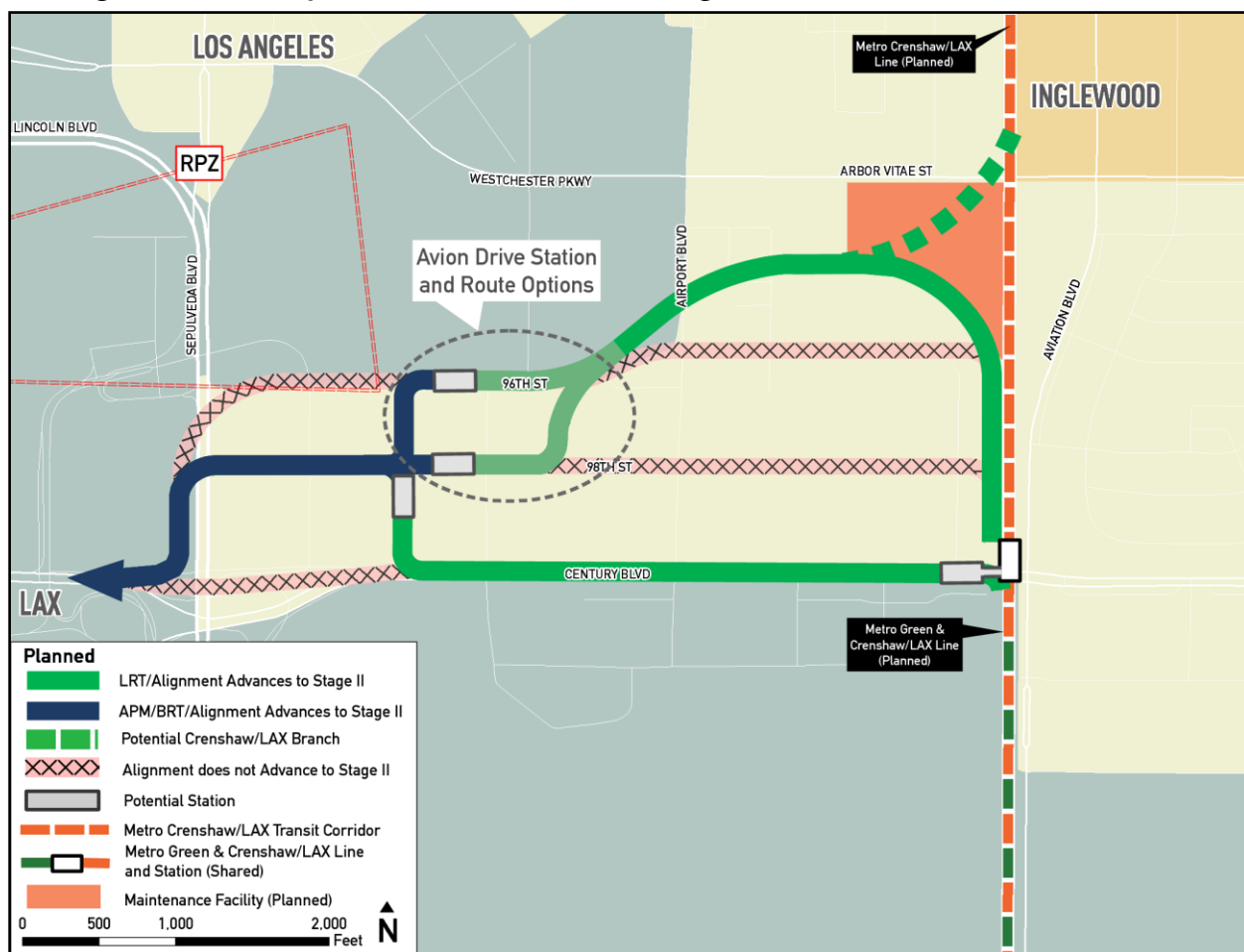
Table 4.7. Stage I Evaluation of Intermediate LRT and Circulator – Off-Airport Options

Off-Airport Option	Performance	Advance to Stage II
Century Blvd	<ul style="list-style-type: none"> • Option would not support an intermediate station near future LAX off-airport operations as no airport development is planned along Century Blvd • Alignment could be designed with minimal physical fit and constructability issues • Alignment would not encroach into the RPZ • Transfers to Crenshaw/LAX line possible with second station at Aviation/Century • A future extension to Coastal Corridor from Aviation/Century is not precluded 	X
1994 SEIR Alternative	<ul style="list-style-type: none"> • Option would support an intermediate station near future LAX off-airport operations in the vicinity of Lot C • Alignment could be designed with minimal physical fit and constructability issues • Alignment would not encroach into the RPZ • Transfers to Crenshaw/LAX line possible with second station at Aviation/Century • A future extension to Coastal Corridor from Aviation/Century is not precluded 	✓
98 th Street	<ul style="list-style-type: none"> • Option would support an intermediate station near future LAX off-airport operations in the vicinity of Lot C • Alignment would require the planned Aviation/Century Station to be shifted to the south to allow for a turn onto 98th St, resulting in constructability issues with the track gradient south of the station, making this option infeasible • Alignment would not encroach into the RPZ 	X
98 th Street North	<ul style="list-style-type: none"> • Option would support an intermediate station near future LAX off-airport operations in the vicinity of Lot C • Alignment could be designed with minimal physical fit and constructability issues • Alignment would not encroach into the RPZ • Transfers with Crenshaw/LAX line possible with a cross-platform transfer • A future extension to Coastal Corridor from Aviation/Century is not precluded, but alignment may be less direct 	✓
96 th Street	<ul style="list-style-type: none"> • Option would support an intermediate station near future LAX off-airport operations in the vicinity of Lot C • Potential impact to parking garages and existing uses with potentially expensive property acquisition • Alignment would encroach into the RPZ, which would trigger significant regulatory constraints and would likely necessitate a less cost-effective below-grade configuration 	X

Off-Airport Option	Performance	Advance to Stage II
96 th Street North	<ul style="list-style-type: none"> • Option would support an intermediate station near future LAX off-airport operations in the vicinity of Lot C • Alignment could be designed with minimal physical fit and constructability issues • Alignment would encroach into the RPZ, which would trigger significant regulatory constraints and would likely necessitate a less cost-effective below-grade configuration • Transfers with Crenshaw/LAX line possible with a cross-platform transfer • A future extension to Coastal Corridor from Aviation/Century is not precluded, but alignment may be less direct 	X

Significant issues were identified for all but two of the eight off-airport options for the Intermediate LRT and Circulator Alternative based on the analysis criteria. No significant issues for the 1994 SEIR Alternative or 98th Street North options were found. They are carried forward for further evaluation in Stage II. The benefits of the Airport Boulevard and Through LAX options are better captured in the Modified LRT Trunk Alternative, and are not analyzed as part of this alternative. The routes to be carried forward are shown in Figure 4.5.

Figure 4.5. Off-Airport Routes to Advance to Stage II – Intermediate LRT & Circulator



Source: ConnectLAX, 2012

Note: Route and station location for the 98th North option are dependent on future LAX plans

4.3.3.3. On-Airport Options

The comparative analysis of on-airport options for the Intermediate LRT and Circulator Alternative is the same as the analysis provided for the Direct LRT Branch Alternative in Section 4.3.1.3. Center Way – 2 Station Aerial, Center Way – 2 Station Tunnel, and Loop – 3 Station Aerial will be carried forward to Stage II for further evaluation as on-airport options for the Circulator Alternative.

4.3.3.4. Packaged Alternatives

The packaged alternatives for the Intermediate LRT and Circulator Alternative contain three components: mode, off-airport option and on-airport option. BRT was not previously included in the on-airport screening options because it is assumed that buses would operate on surface streets in mixed traffic inside the CTA with stops in front of each of the eight terminals. Table 4.8 lists the eight Intermediate LRT and Circulator Alternatives that will be carried forward into Stage II for further evaluation.

Table 4.8. Packaged Alternative – Intermediate LRT and Circulator

ID	Mode	Off-CTA Option	On-CTA Option
I-1	LRT/APM	98th Street North	Center Way – 2 Station Aerial
I-2			Center Way – 2 Station Tunnel
I-3			Loop – 3 Station Aerial
I-4	LRT/BRT		Loop – 8 Station At-Grade
I-5	LRT/APM	1994 SEIR Alt	Center Way – 2 Station Aerial
I-6			Center Way – 2 Station Tunnel
I-7			Loop – 3 Station Aerial
I-8	LRT/BRT		Loop – 8 Station At-Grade

4.3.4. Modified LRT Trunk

4.3.4.1. Mode

This connection type involves shifting the main line of the Metro LRT system west of Aviation Boulevard to provide more direct service to the LAX terminal area for the Metro Green and Crenshaw/LAX lines.

4.3.4.2. Off-Airport Options

The screening analysis of off-airport options for the Modified LRT Trunk Alternative is shown in Table 4.9, with significant issues indicated in bold. The evaluation is based on the fulfillment of the goals of the alternative, physical fit and constructability, and encroachment into the RPZ as discussed in Section 4.1.

Table 4.9. Stage I Evaluation of Modified LRT Trunk – Off-Airport Options

Off-Airport Option	Performance	Advance to Stage II
Century Blvd	<ul style="list-style-type: none"> Would not support the addition of a new alignment of the approved Metro Crenshaw/LAX line underneath the CTA Alignment could be designed with minimal physical fit and constructability issues Alignment would not encroach into the RPZ 	X
1994 SEIR Alternative	<ul style="list-style-type: none"> Would not support the addition of a new alignment of the approved Metro Crenshaw/LAX line underneath the CTA Alignment could be designed with minimal physical fit and constructability issues Alignment would not encroach into the RPZ 	X
98 th Street	<ul style="list-style-type: none"> Would not support the addition of a new alignment of the approved Metro Crenshaw/LAX line underneath the CTA Alignment would require the planned Aviation/Century Station to be shifted to the south to allow for a turn onto 98th St, resulting in constructability issues with the track gradient south of the station, making this option infeasible Alignment would not encroach into the RPZ 	X

<p>98th Street North</p>	<ul style="list-style-type: none"> • Would not support the addition of a new alignment of the approved Metro Crenshaw/LAX line underneath the CTA • The alignment would avoid direct impacts to local businesses • Alignment would not encroach into the RPZ 	<p>X</p>
<p>96th Street</p>	<ul style="list-style-type: none"> • Would not support the addition of a new alignment of the approved Metro Crenshaw/LAX line underneath the CTA • Alignment could be designed with minimal physical fit and constructability issues • Alignment would not encroach into the RPZ 	<p>X</p>
<p>96th Street North</p>	<ul style="list-style-type: none"> • Would not support the addition of a new alignment of the approved Metro Crenshaw/LAX line underneath the CTA • Alignment could be designed with minimal physical fit and constructability issues • Alignment would encroach into the RPZ, which would trigger significant regulatory constraints and would likely necessitate a below-grade configuration 	<p>X</p>
<p>Airport Blvd</p>	<ul style="list-style-type: none"> • Would support the addition of a new alignment of the approved Metro Crenshaw/LAX line, but would require an APM or BRT circulator to reach the CTA • Alignment could be designed with minimal physical fit and constructability issues • Alignment would not encroach into the RPZ • Alignment would serve potential airports facilities near Parking Lot C and/or near Aviation/Century • Alignment connects with service from the Crenshaw/LAX corridor • Future extension to Coastal Corridor from Airport Boulevard is not precluded 	<p>✓</p>
<p>Through LAX</p>	<ul style="list-style-type: none"> • Would support the addition of a new alignment of the approved Metro Crenshaw/LAX line underneath the CTA • Alignment could be designed with minimal physical fit and constructability issues • Alignment would not encroach into the RPZ as it run in a tunnel under the North and South Runways • Alignment would serve potential airports facilities near Parking Lot C and/or near Aviation/Century • Alignment would serve potential airports facilities near Parking Lot C and/or near Aviation/Century • Alignment connects with service from the Crenshaw/LAX corridor • Future extension to Coastal Corridor from Airport Boulevard is not precluded 	<p>✓</p>

Significant issues were identified for seven of the nine off-airport options based on the analysis criteria. The Airport Boulevard and Through LAX off-airport options will be the only ones carried forward into Stage II for further consideration, as shown in Figure 4.6.

Figure 4.6. Off-Airport Route to Advance to Stage II – Modified LRT Trunk

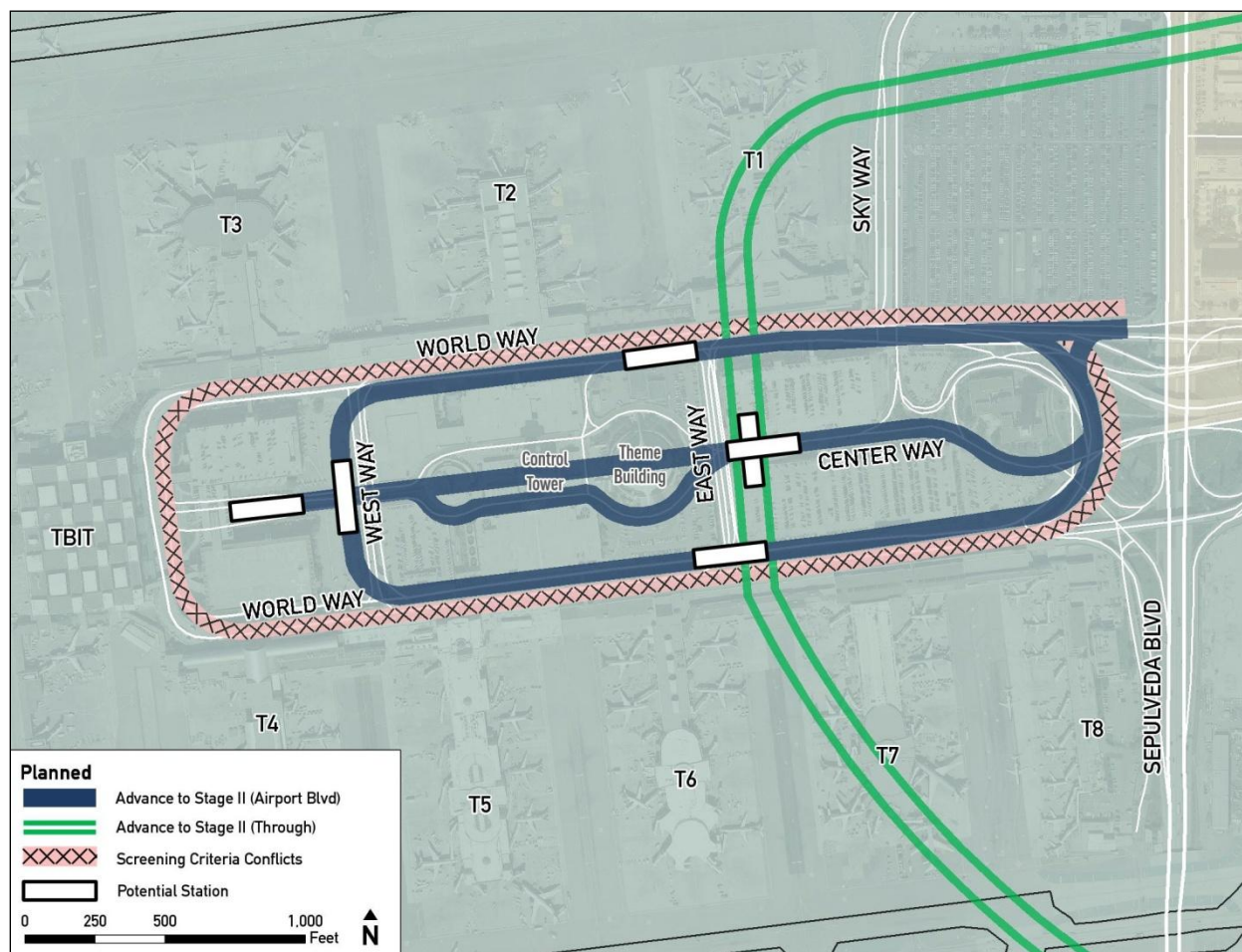


Source: ConnectLAX, 2012

4.3.4.3. On-Airport Options

The screening analysis of on-airport options for the Modified LRT Trunk is the same as the analysis provided for the Direct LRT Branch Alternative in Section 4.3.1.3. The only substantial difference is that the configuration of the off-airport Through LAX option would only be compatible with the Through LAX – 1 Station Tunnel on-airport option. Therefore, the one station tunnel (Through LAX) two station (aerial and tunnel) and three station options will be carried forward to Stage II for further evaluation as on-airport options for the Modified LRT Trunk Alternative. The routes to be carried forward are shown on Figure 4.7.

Figure 4.7. On-Airport Routes to Advance to Stage II – Modified LRT Trunk



Source: ConnectLAX, 2012

4.3.4.4. Packaged Options

The packaged alternatives for the Modified LRT Trunk contain three main components: mode, off-airport, and on-airport options. BRT was not previously included in the on-airport screening options because it is assumed that buses would operate on surface streets in mixed traffic inside the CTA with stops in front of each of the eight terminals. Table 4.10 lists the five Modified LRT Trunk Alternatives that will be carried forward into Stage II for further evaluation.

Table 4.10. Packaged Alternative – Modified LRT Trunk

ID	Mode	Off-Airport Option	On-Airport Option
T-1	LRT	Through LAX	Through LAX – 1 Station Tunnel
T-2	LRT/APM	Airport Blvd	Center Way – 2 Station Aerial
T-3			Center Way – 2 Station Tunnel
T-4			Loop – 3 Station Aerial
T-5	LRT/BRT		Loop – 8 Station At-Grade

4.3.5. Stage I Screening Results

Based on the results of the Stage I screening, 27 packaged alternatives were carried forward to be evaluated further in Stage II. The 27 packaged alternatives were selected based on the Stage I screening criteria, which emphasizes feasibility of the modes and routes for the options within each of the four connection type described in Section 3.3.

4.4. STAGE II EVALUATION

Several performance measures were developed to assess the pros and cons of each alternative. These measures include ridership, capital cost, travel time, passenger convenience, compatibility with other plans/facilities, and constructability. In addition to these performance measures, community acceptability was also considered based on comments received at the public meetings held in February/March 2012.

The performance of each of the 27 packaged alternatives, as characterized by the Stage II quantitative performance measures, is provided below in Table 4.11.

Table 4.11. Stage II Performance Summary

Class	Alternative	Mode	Off-Airport Route	On-Airport Stations	Average Transfers	Average Vertical Level Changes	Average Travel Time (min)	Ridership	Cost (millions)	
									Low	High
Direct LRT Branch	B-1	LRT	98th N	2 Aerial	0.7	2.0	29.7	5,300	\$540	\$650
	B-2	LRT	98th N	2 Tunnel	0.7	2.0	29.0	5,300	\$970	\$1,160
	B-3	LRT	98th N	3 Aerial	0.7	2.0	28.7	5,400	\$970	\$1,160
	B-4	LRT	Century	2 Aerial	0.7	3.3	31.8	4,900	\$470	\$560
	B-5	LRT	Century	2 Tunnel	0.7	3.3	31.1	5,000	\$900	\$1,080
	B-6	LRT	Century	3 Aerial	0.7	3.3	30.8	5,100	\$900	\$1,080
Circulator	C-1	APM	98th	2 Aerial	1.0	4.0	32.2	4,600	\$620	\$740
	C-2	APM	98th	2 Tunnel	1.0	4.0	31.5	4,600	\$1,040	\$1,250
	C-3	APM	98th	3 Aerial	1.0	4.0	31.2	4,700	\$1,060	\$1,270
	C-4	BRT	98th	8 At-Grade	1.0	1.0	34.3	5,000	\$110	\$130
	C-5	APM	Century	2 Aerial	1.0	4.0	30.0	4,900	\$600	\$720
	C-6	APM	Century	2 Tunnel	1.0	4.0	29.5	4,900	\$1,020	\$1,220
	C-7	APM	Century	3 Aerial	1.0	4.0	29.2	5,000	\$1,030	\$1,240
	C-8	BRT	Century	8 At-Grade	1.0	1.0	33.6	5,100	\$120	\$140
Intermediate LRT and Circulator	I-1	LRT/APM	98th N	2 Aerial	1.7	4.0	33.7	3,900	\$680	\$820
	I-2	LRT/APM	98th N	2 Tunnel	1.7	4.0	33.0	4,000	\$1,140	\$1,370
	I-3	LRT/APM	98th N	3 Aerial	1.7	4.0	32.7	4,000	\$1,110	\$1,330
	I-4	LRT/BRT	98th N	8 At-Grade	1.7	1.0	35.5	4,300	\$320	\$380
	I-5	LRT/APM	1994 SEIR	2 Aerial	1.7	5.3	36.3	3,600	\$640	\$770
	I-6	LRT/APM	1994 SEIR	2 Tunnel	1.7	5.3	35.6	3,700	\$1,090	\$1,310
	I-7	LRT/APM	1994 SEIR	3 Aerial	1.7	5.3	35.2	3,700	\$1,070	\$1,280
	I-8	LRT/BRT	1994 SEIR	8 At-Grade	1.7	2.3	38.1	4,000	\$280	\$340
Modified LRT Trunk	T-1	LRT	Through LAX	1 Tunnel	0.5	2.0	24.9	6,100	\$940	\$1,130
	T-2	LRT/APM	Airport Bl	2 Aerial	1.0	4.0	31.1	4,700	\$1,020	\$1,220
	T-3	LRT/APM	Airport Bl	2 Tunnel	1.0	4.0	30.4	4,700	\$1,220	\$1,460
	T-4	LRT/APM	Airport Bl	3 Aerial	1.0	4.0	30.1	4,800	\$1,170	\$1,400
	T-5	LRT/BRT	Airport Bl	8 At-Grade	1.0	1.0	33.1	5,100	\$480	\$580







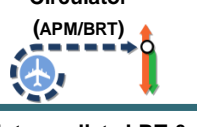
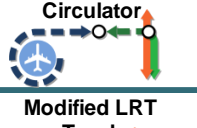

Table 4.11 alone, however, is not intended to inform which of the 27 alternatives should move forward to the Draft EIS/EIR phase. Therefore, another level of analysis is necessary to complete Stage II screening. This other analysis focuses on four main trade-off categories:

- Passenger convenience
- Direct LRT Branch vs. Modified LRT Trunk
- On-airport configuration
- Off-airport configuration

4.4.1. Passenger Convenience (by Alternative and Alternative Class)

The trade-off analysis for passenger convenience is provided below. This analysis provides a comparison of the four alternative classes (i.e., Direct LRT Branch, Circulator, Intermediate LRT and Circulator, and Modified LRT Trunk) in terms of the overall experience for passengers traveling to/from the airport. The performance measures used to evaluate passenger convenience are: the average number of transfers, the average number of vertical level changes, the average travel time, and ridership. Figure 4.8 shows the trade-off analysis graphically.

Figure 4.8. Passenger Convenience Trade-Off Analysis

Alternative Connection Types	 Number of Transfers	 Vertical Level Changes	 Average Travel Time Saved (min)	 Airport Transit Riders per Day	 Capital Cost (\$M) (\$200M is available)
Direct LRT Branch 	0-1	2-4	11	4,900-5,400	\$540 - \$1,160
Circulator (APM/BRT) 	1	1-4	9	4,600-5,100	\$624-\$1,250 (APM) \$120-140 (BRT)
Intermediate LRT & Circulator 	1-2	4-6	7	3,600-4,300	\$680-\$1,370 (APM)
Modified LRT Trunk 	0-1	2-4	16 <small>Average travel time saved/added dependent on station location</small>	4,700-6,100	\$940-\$1,460

Source: ConnectLAX, 2012

The five primary conclusions of this trade-off analysis are:





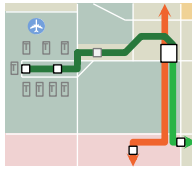



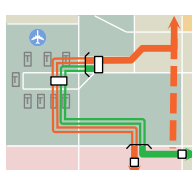




- Ridership for air passengers and employees increases as travel times and number of transfers decrease
- Direct LRT Branch and Modified LRT Trunk have fewest transfers, shortest travel times and highest ridership for airport passengers

- Circulator (APM/BRT) ridership is slightly lower, since all Metro Rail passengers transfer
- Intermediate LRT and Circulator Alternative has most transfers and level changes, and the lowest ridership
- All alternatives, except the BRT Circulator, would require funding in excess of the \$200 million available from Metro

4.4.2. Direct LRT Branch vs. Modified LRT Trunk Alternatives

With the highest travel time savings and ridership potential, the second trade-off scenario compares the Direct LRT Branch vs. Modified LRT Trunk alternative classes. The performance measures used to compare these two alternative classes against each other are: the average travel time, ridership, capital cost, and constructability issues where the project would interface with existing and planned Metro facilities. Figure 4.9 shows the trade-off analysis graphically.

Figure 4.9. Direct vs. Modified LRT Trunk Alternative Trade-Off Analysis

Alternative	 Average Travel Time* (minutes)	 Ridership (Transit Riders per Day)	 Capital Cost (\$M) (\$200M is available)	 Constructability Issues
Direct LRT Branch 	 29-30 *Average from Norwalk, Expo, and South Bay	 5,300-5,400	 \$540-\$1,160	
Through LAX 	 25 *Average from Norwalk, Expo, and South Bay	 6,100	 \$940-\$1,130	

Source: ConnectLAX, 2012

The five primary conclusions of this trade-off analysis are:

- Because the Modified LRT Trunk Alternative (Through LAX) has a shorter travel time, ridership is higher than the Direct LRT Branch Alternative for airport passengers
- The Modified LRT Trunk Alternative increases travel time by 2 minutes for non-airport bound passengers between Expo (Crenshaw/LAX Corridor) and South Bay (Redondo Beach)

- The single station for the Modified LRT Trunk Alternative in the terminal area requires a long walk (0.3 to 0.4 miles) or transfer to a circulator (e.g., bus, moving walkway, shuttle) to reach western terminals (T3, T4, TBIT)
- Constructability issues:
 - Parallels portion of Crenshaw/LAX Line that is scheduled for construction (in 2013)
 - Requires a complex connection to existing Metro Green Line in El Segundo that would have operations impacts during construction
- Both alternatives would require funding in excess of the \$200 million available from Metro





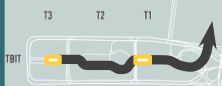

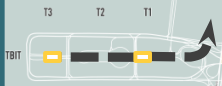
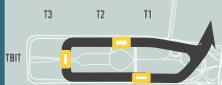

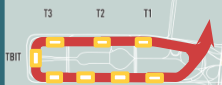
4.4.3. On-Airport Configuration

The trade-off analysis for the configuration within the CTA is provided below. This analysis compares four on-airport options that vary by number of stations, vertical alignment, and mode of access. The performance measures used to evaluate these on-airport options against one another are:

- Capital cost
- Average travel time to terminal
- Average walk distance to terminal
- Potential visual impacts to the Theme Building (a historic and cultural building in the center of the airport often cited as an icon of modern architecture and representative of LAX)

Figure 4.10 shows the trade-off analysis graphically.

Figure 4.10. On-Airport Trade-Off Analysis

On-Airport Options				
	Capital Cost (\$M) (\$200M is available)	Average Travel Time to Terminal (minutes)	Average Walk Dist. to Terminal (feet)	Potential Visual Impacts to Theme Building
 Aerial (Rail)	\$620-\$740	32.2	820	
 Tunnel (Rail)	\$1,040-\$1,250	31.5	820	
 Aerial (Rail)	\$1,060-\$1,270	31.2	600	
 At-Grade (BRT)	\$110-\$130	34.3 <small>Add 5-10 minutes under severe traffic congestion</small>	200	

Source: ConnectLAX, 2012

NOTE: (Rail) refers to LRT or APM

The three primary conclusions of this trade-off analysis are:





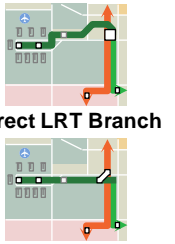


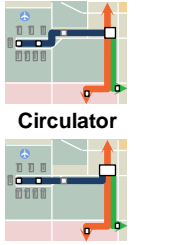


- For LRT and APM, the 2 station aerial option
 - Costs approximately \$450 million less than the 2 station subway and 3 station aerial options
 - Runs adjacent to the Theme Building, leading to potential visual impacts
- The 3 station aerial loop option provides the shortest walk distances to terminals among the rail alignments, but extra time to travel around the loop leads to comparable total travel times (walk + ride) to terminals
- BRT is the least costly (the only on-airport option that would not require funding in excess of the \$200 million available from Metro) and has shorter walking distances than the rail (LRT and APM) configurations, but...
 - Involves the longest total travel times (walk + ride) to airport terminals
 - Is subject to airport roadway congestion

4.4.4. Off-Airport Configuration

The trade-off analysis for the configuration outside of the CTA is provided below. This analysis compares four off-airport options that vary by mode of access (i.e., LRT or Circulator) and alignment (i.e., 98th Street, 98th Street North, or Century Boulevard). The performance measures used to evaluate these off-airport options against one another are: the average

number of vertical level changes, the average travel time, the capital cost, and potential visual impacts to landscaping, art treatments and businesses. Figure 4.11 shows the trade-off analysis graphically.

Figure 4.11. Off-Airport Trade-Off Analysis

Alternative				
98 th St Century Blvd	Average Number of Vertical Level Changes	Average Travel Time (minutes)	Capital Cost (millions) <i>PRELIMINARY</i>	Potential Impacts Visual Traffic/Access
 <p>Direct LRT Branch</p>	2	29-30	540-1,160	
	3.3	31-32	470-1,080	 
 <p>Circulator</p>	4	31-32	620-1,270	
	4	29-30 <small>Average from Norwalk, Expo, and South Bay</small>	600-1,240	 

Source: ConnectLAX, 2012

The three primary conclusions of this trade-off analysis are:

- Century Boulevard LRT
 - Requires a second station at Aviation/Century
 - Results in transfers, additional level changes, longer walks and longer travel times
- For both LRT and APM, the aerial structure along Century Boulevard may result in:
 - Visual impacts to landscaping (tree-lined medians) and art treatments (light pylons) by structures associated with light rail, APM or an elevated busway.
 - Potential impacts to traffic circulation and access to businesses
- All alternatives would require funding in excess of the \$200 million available from Metro

5. PUBLIC OUTREACH SUMMARY

The Public Outreach process for the Metro Green Line to LAX was comprehensive and involved residents, transit users, elected officials, local LAX-area businesses and airport-related industries and regional stakeholders.

Since introducing the Metro Green Line to LAX project to the public in August 2011, the team has held over 40 outreach meetings and briefings with an array of stakeholders including agency and legislative representatives, neighborhood councils, chambers of commerce, business improvement districts, and transportation organizations and committees.

Concurrently, the team has engaged in ongoing outreach using online and traditional methods, including advertising, social media, online survey, e-blasts, collateral distribution and press releases for purposes of gaining additional stakeholder input. Through digital platforms, stakeholders have been able to interact with each other and have conversations about the project on our social media pages. Online questionnaires were used to collect stakeholder feedback – which respondents were able to access both online and through their mobile devices.

During the first round of community workshops and briefings held in August 2011, which attracted hundreds of attendees, Metro introduced the project and provided an overview of the alternatives analysis process and various aspects of a transit connection to LAX. The series of meetings included: (1) a briefing to agency stakeholders on August 10, 2011; (2) a briefing to legislative stakeholders on August 17, 2011; and (3) three community workshops on August 23, 25, and 30, 2011.

Stakeholders were also able to participate by providing feedback through online questionnaires, social media platforms and online comment forms. This type of engagement provided an opportunity for the public to provide input early on in the process. Participants provided feedback on a range of topics and identified issues to be addressed in the purpose and need statement and in the development of alternatives. Input received helped to clarify criteria for screening and evaluating alternatives, positive characteristics of transit solutions, and the range of potential modes and alternatives.

In early 2012, Metro presented the results of the alternatives screening process, with the goal of further narrowing the number of alternatives to be studied in the Draft EIS/EIR from twenty-seven (27) down to two or three. These alternatives were presented to stakeholders during: (1) briefings to agency and legislative staff on February 28, 2012; (2) an open house held on February 29, 2012; and (3) two community workshops on March 1 and 7, 2012.

The more than 130 attendees at the community workshops and briefings had the opportunity to learn about the alternatives under consideration and to discuss the trade-offs between the alternatives vis-à-vis travel time, cost, convenience, walk distance, and ridership. In addition to physical attendance at these meetings, attendees were able to view the live stream on their computers, tablets, and mobile devices. Stakeholders could provide their input and thoughts about their preferred alternative through an online questionnaire, Facebook and Twitter.

All feedback from local and regional stakeholders is integral to the alternatives screening process. Between September 1, 2011 and January 4, 2012 Metro also held twenty-seven (27) stakeholder briefings with stakeholders in smaller group settings. In advance of Scoping meetings scheduled to occur in May 2012, Metro will hold an additional fifteen (15) stakeholder briefings in March/April 2012 with a focus on groups in Westchester, Inglewood, South Los Angeles, downtown Los Angeles and South Bay and Gateway Cities. This report provides summaries of key public outreach activities as follows:

- Summary of Meetings
- Technical Advisory Committee (TAC) and Legislative Briefings
- Collateral Materials
- Digital Engagement
- Notifications
- Community Workshops
- Summary of Comments
- Stakeholder Briefings Summary

5.1. PUBLIC OUTREACH – AUGUST 2011 – STUDY INITIATION

This round of outreach was designed to introduce the Project and gather initial input on potential ways to connect the growing Metro Rail system to LAX. The project team provided examples of major transit connections at other airports around the country and initiated discussion on the goals and objectives of the study.

5.1.1. Summary of Meetings

Meetings held in August 2011 include:

- Briefing to Technical Advisory Committee (agency stakeholders) on August 10, 2011 at Flight Path Learning Center, 6661 W. Imperial Highway, Los Angeles, CA 90045
- Briefing to legislative stakeholders on August 17, 2011 at Metro Headquarters, One Gateway Plaza, Los Angeles, CA 90012
- Three community workshops on August 23, 25, and 30, 2011 at the following locations:
 - Flight Path Learning Center, 6661 W. Imperial Highway, Los Angeles, CA 90045
 - Metro Headquarters, Plaza Level Lobby, One Gateway Plaza, Los Angeles, CA 90012
 - Veterans' Memorial Complex, 4117 Overland Ave., Culver City, CA 90230

5.1.2. Technical Advisory Committee and Legislative Briefings

At the beginning of the Project, Metro organized a Technical Advisory Committee (TAC) that includes representatives from federal, state and local agencies. The purpose of the TAC is to obtain technical feedback, throughout the planning process, on the alternatives under consideration. On August 10, 2011, Metro staff briefed members of the TAC, and on August

17, 2011 representatives from the offices of federal, state, and local elected officials were briefed. Presentations were followed by question and answer sessions and discussion. Copies of sign-in sheets are included in the appendix of this report.

The TAC briefing included 25 representatives from:

- Caltrans
- City of Los Angeles (Police, Bureau of Street Services)
- City of El Segundo
- City of Inglewood
- Federal Aviation Administration
- Los Angeles County (Regional Planning, Sheriff, Public Works)
- Los Angeles World Airports (LAWA)
- South Bay Cities Council of Governments

The legislative briefing included representatives from the offices of:

- City of Los Angeles Councilmember Bill Rosendahl
- City of Los Angeles Councilmember Eric Garcetti
- City of Los Angeles Councilmember Tom LaBonge
- Los Angeles County Supervisor Mark Ridley-Thomas
- State Assemblymember Betsy Butler
- State Senator Ted Lieu

At the TAC meeting and legislative briefing, Metro staff introduced the project, provided an overview of the initial connection types, including modes, under consideration, described the project development process, and asked for feedback on the draft purpose and need statement and alternatives screening criteria. TAC meeting participants noted that the purpose and need statement should take into consideration safety/security, passenger and employee needs, local traffic impacts, and impacts to LAX operations (such as baggage handling, passenger convenience). They asked questions about the connection types, funding sources, LAWA's parking plans, and lessons learned from other airport transit systems. In addition, they provided input on the alternatives screening criteria, noting that fare policy, construction impacts, right of way acquisitions, and grade separations should all be considered. Legislative briefing participants inquired about coordination with LAWA, funding options, operation plans, coordination with the Crenshaw/LAX Project, needs of hotel employees, and lessons learned from other airport transit systems. Members of the public and stakeholders offered feedback on the relative performance of alternatives, which alternative characteristics they prioritized, and their preferences among alternatives.

5.1.3. Public Outreach Materials

The following materials were created to inform and engage stakeholders. Materials were distributed at the various meetings and on the web. The information included background on

the project, the meeting format, and avenues for stakeholders to provide input and ideas for consideration in project planning. Copies of collateral materials are included in the appendix of this report.

- Fact Sheet (bilingual)
- Contact Card
- Comment Sheets (bilingual)
- Welcome Sheets (customized for each workshop)
- LAX User Questionnaire (customized for each workshop)
- LAX User Questionnaire (also distributed at outreach days and via social media as an online questionnaire)
- Presentation Boards

5.1.4. Digital Engagement

In August 2011, Metro launched the project website and Facebook, Twitter, LinkedIn, and YouTube pages to broaden the study's audience, provide a convenient forum for stakeholders to stay up-to-date on project information and promote peer-to-peer communications. Metro also produced the first webisode in a series with information on the project study options to educate and engage stakeholders and prompt them to provide input.

The webisode was posted to Metro's project website, emailed to stakeholders, and promoted via the project's social media sites, regional blogs, and related organizations' websites. The result has been over 5,000 views on YouTube, in addition to the views that the video received at Pre-Scoping meetings.

In addition, Metro created and distributed the LAX User Questionnaire to collect information useful in defining the alternatives and guiding plans. In order to collect a diversity of feedback, the questionnaire was administered to stakeholders at various strategic locations, including LAX, Metro Aviation/LAX Green Line Station, and Union Station, as well as during Pre-Scoping workshops, stakeholder group and legislative briefings and various community events. A link to an online and mobile version of the questionnaire was also posted on Metro's project web page and social media sites, and emailed to project stakeholders. From August to October, 2011 a total number of 530 valid responses were received.

The results of the questionnaire were as follows:

- More than half of respondents travel to LAX only a few times per year, mainly for personal or business travel. They either drive and park or get dropped off at LAX.
- Airport employees are more likely to take transit than passengers.
- Half of air passengers who take transit to LAX use the FlyAway Shuttle.
- Respondents who use transit at other airports appreciate ease of use, frequent service and few or no transfers.
- There was slight preference for direct rail connection among respondents who commented on a preferred mode.

- There was a limited response from individuals who work near the airport, suggesting a need for more data.

5.1.5. Notifications

The outreach team distributed notifications to a wide array of stakeholders to encourage their participation in the workshops. Copies of supporting materials are included in the appendix of this report.

- Mailings: distributed to the project database.
- Flyers: 22,174 “Take-One” flyers were distributed on-board transit vehicles, including Metro bus and rail lines and municipal operators.
- “Metro Briefs”: advertisement ran during the month of August, 2011 in the following publications:
 - Easy Reader
 - Gardena Valley News
 - Herald Publications Group
 - Daily Breeze
 - Beach Reporter
 - PV Peninsula News
 - Random Lengths
- Regular Display Advertisements: ran in The Argonaut newspaper on August 19, 2011.
- Eblasts: In the weeks prior to the August 2011 meetings, several rounds of email invitations for the open house and workshops were distributed to the following project stakeholder databases:
 - Metro Green Line to LAX
 - South Bay Metro Green Line Extension
 - Crenshaw/LAX Transit Corridor Project
 - Westside Extension
 - Regional Connector

In addition, Eblasts were sent to the Metro Service Council database and federal/state/local elected officials’ databases.

- Flyers and Contact Cards: were distributed at the following locations:
 - LAX baggage claim areas – Sunday, August 14, 2011
 - Aviation/LAX Green Line Station – Monday, August 15, 2011
 - Redondo Beach Farmers Market – Thursday, August 18, 2011
 - Howard Hughes Center – Friday, August 19, 2011
 - Patsaouras Plaza FlyAway area – Friday, August 19, 2011
 - Crenshaw Farmers Market – Saturday, August 20, 2011
 - South Bay Galleria – Sunday, August 21, 2011
- Media Release: issued on August 11, 2011

- Digital Media Channels: Open house and workshop information was also distributed through the following channels:
 - Facebook.com/GreenLinetoLAX
 - Twitter @GreenLinetoLAX
 - Metro.net/GreenLinetoLAX
 - The Source Blog
 - El Pasajero
 - ABC7
 - Beverly Hills Courier
 - CBS
 - Citywatch
 - Contra Costa Times
 - Curbed LA
 - Daily Breeze
 - Huffington Post
 - Inside Bay Area
 - Los Angeles City Councilman Bill Rosendahl's (11th District) website
 - LAist
 - LA Streetsblog
 - NBC
 - Our Weekly
 - Press Telegram
 - Progressive Railroading
 - Southern California Public Radio – AirTalk
 - Transit Coalition Newsletter

5.1.6. Community Workshops

Metro hosted three (3) Pre-Scoping community workshops as follows:

- Flight Path Museum – August 23, 2011
 - 78 stakeholders signed in
- Metro Headquarters – August 25, 2011
 - 57 stakeholders signed in
- Veteran's Memorial Complex – August 30, 2011
 - 54 stakeholders signed in
- **Total Number of in Sign-ins: 189**

Stakeholders were invited to learn about the project and provide feedback at these open-house style workshops held in strategic locations across the county. These workshops encouraged stakeholders' creative engagement with project information and promoted their

collaborative input. Each workshop included the seven information stations (outlined below) that stakeholders visited at their own pace and preference. Project staff were available at each station to answer questions and engage with stakeholders.

- **Sign-in** – Upon arrival, participants were provided a project fact sheet and welcome sheet that outlined information available at each station. They were asked to sign-in; later stakeholder contact information was added to the ongoing project database.
- **Project Setting** – At this station, a television played the webisode on continuous loop, and presentation boards displayed information on the project development process, draft purpose and need statement and alternatives screening criteria.
- **Regional Context** – This station featured presentation boards with a map of Metro's existing system and projects in development, a map of the Project Study Area, and information on alignments under consideration.
- **Potential Connections** – This station featured presentation boards depicting airport connections around the country and initial connection types, including modes, under consideration.
- **Interactive Workshop** – At this station - a table filled with blocks, pipe cleaners, construction paper and figurines - workshop participants built their own vision of an airport transportation connection and described their models.
- **Video Booth** – At this station, stakeholders spoke into a camera, answering questions about their preferences for airport travel. Six of the videos were uploaded to the project YouTube channel.
- **Comments and Questionnaire** – This station was designated for stakeholders to fill out and submit the comment sheets and questionnaires.

5.1.7. Summary of Comments – August 2011

To maximize the range of input during Pre-Scoping, comments were accepted verbally, in writing and digitally. The team collected comments from the following:

- Notes taken at each information station delineating stakeholder questions, comments and concerns
 - Total number of comments, questions and concerns: 219
- Comment forms
 - Total number of comment forms: 45
- Interactive models and drawings
 - Total number of models and drawings: 14
- Video booth (footage of interviews)
 - Total number of interviews conducted: 28
- Comments posted to social media sites or submitted online
 - Total number of comments: 73

In general, stakeholders at the August 2011 workshops expressed a preference for connection types and modes that provided the best passenger convenience. A summary of comments organized by topic is as follows:

- Light Rail Transit (LRT)
 - Many noted a preference for LRT that would serve the Central Terminal Area (CTA) and connects to the regional rail network.
 - Several expressed a preference for a direct service from all areas of the region into LAX, with minimal stops/transfers and periodic express trains.
 - Others said they would like to see connections to rental car facilities and airport-area parking.
- Automatic People Mover (APM)
 - Several said they favored an APM with frequent stops at the terminals as well as at other airport areas, such as rental car facilities, parking and nearby hotels.
 - Several said they preferred an APM because it seemed most realistic and easiest to build, and would be designed to accommodate luggage.
- Bus Rapid Transit (BRT)
 - The majority of comments on BRT were unfavorable - noting access issues for people with baggage and the handicapped/elderly, congestion in the terminal area and inferiority of the mode compared to the train options.
 - Some said that if BRT were chosen there must be a solution to reduce congestion in the terminals.
- Stations Locations and Proximity to Terminals
 - Several noted a preference for a central LAX station as close as possible to airport terminals.
 - Others stated preference for a hybrid system that could loop around the CTA providing service directly to the terminals.
 - Several noted support for a station at Aviation/Manchester.
- Passenger Experience, Transfers and Luggage
 - Many stated a preference for a system that is easy to use, with limited (few or no) transfers, citing systems in other countries that they found easy to use. Many said that transferring in integrated way is less burdensome and that transfers are more difficult when carrying luggage.
 - Several noted a need for transit vehicles that accommodate luggage.
- Traffic Impacts
 - Some noted concerns about possible traffic and congestion impacts at the Aviation and Century Station.
- Green Line Northern Extension
 - Others supported a future extension of the Green Line to the north, noting the need for this project to allow for possible northern connections.
- World Class Airport

- Several referenced the need for LAX to be on par with other airports by providing simple, well-maintained and well-connected transit.
- Bike Accommodations
 - A few suggested that the system include bike accommodations, including storage lockers and bike parking.
- Security
 - Several spoke of security concerns, including the need to provide for a secure luggage check and security checkpoints.
- Cost/Fares
 - Some noted concerns about the cost of an APM, the need to use public funds efficiently and the possibility of leveraging business improvement taxes to fund a station on Century Boulevard.
 - Others noted that people may be less inclined to use the system if they have to purchase multiple tickets.
 - One person suggested that LAWA fund and operate an APM that connects to Metro's LRT network.
- Schedule
 - Many stakeholders stressed the importance of building an extension to the airport as soon as possible using the fastest transit mode.

5.2. STAKEHOLDER BRIEFINGS SUMMARY

Between September 1, 2011 and January 4, 2012 Metro held twenty-seven (27) stakeholder briefings to introduce the project to stakeholders in smaller group settings. Copies of supporting materials are included in the appendix of this report.

5.3. PUBLIC OUTREACH – FEBRUARY/MARCH 2012 – ALTERNATIVES ANALYSIS RESULTS

This round of outreach was designed to provide information on the Alternatives Analysis process, the two-stage screening process and results, and gather feedback on the trade-offs between the alternatives being evaluated. The goal of this round of outreach was to gather community input prior to identifying the alternatives to be carried forward to the Draft EIS/EIR phase.

5.3.1. Summary of Meetings

Alternatives Analysis meetings took place in February and March 2012, as follows:

- Briefings to Technical Advisory Committee (agency stakeholders) and legislative stakeholders on February 28, 2012 at Flight Path Learning Center, 6661 W. Imperial Highway, Los Angeles, CA 90045
- Open House on February 29, 2012 at Union Station/Gateway Transit Center, One Gateway Plaza, Los Angeles, CA 90012
- Two community workshops on March 1 and 7, 2012 at the following locations:

- Flight Path Learning Center, 6661 W. Imperial Highway, Los Angeles, CA 90045
- Union Station Historic Ticketing Concourse, 800 North Alameda Street, Los Angeles, CA 90012
- Stakeholders had the opportunity to view a webcast of the community workshops – which were available to view via computer, tablet and on mobile devices.

5.3.2. Technical Advisory Committee and Legislative Briefings

On February 28, 2012, Metro staff briefed members of the TAC and representatives from the offices of federal, state, and local elected officials. Following the presentation, these stakeholders had the opportunity to ask questions and provide their feedback. Copies of sign-in sheets are included in the appendix of this report.

The TAC meeting included 11 representatives from:

- City of Los Angeles (including LADOT, Bureau of Engineering, Planning)
- City of Inglewood
- City of El Segundo
- Federal Aviation Administration
- Los Angeles World Airports
- South Bay Cities Council of Governments
- Transportation Security Administration

The legislative briefing included representatives from the offices of:

- State Senator Ted Lieu
- State Assemblymember Holly Mitchell
- State Assemblymember Betsy Butler
- Congresswoman Maxine Waters
- Senator Dianne Feinstein

At the TAC meeting and legislative briefing, Metro's presentation included the following elements:

- Project and Funding Overview
- Description of Connection Types, Modes, and Off-Airport/On-Airport Alignments Under Consideration
- Explanation of the Two-stage Screening Process and Trade-offs Between the Twenty-Seven Alternatives as they Relate to:
 - Passenger Convenience
 - Direct LRT Branch vs. Through LAX
 - On-Airport Alignments

- Century Blvd. vs. 98th Street.

TAC meeting participants asked questions about how the Through-LAX alignment would affect the Crenshaw/LAX project, how criteria will be weighted, how ridership estimates were determined, how the travel times, walk times/distances were measured, how Manchester Square will interface with this project, and how the project can be funded. Legislative briefing participants provided feedback and asked questions about passenger experience (“shorter walk times and distances are better”), cost/funding (“what would happen if funding is not realized”), impacts (“have security agencies been involved”), and the alternatives (“circulator is a state-of-the-art connection type”; “the Modified Trunk is most convenient”; “how would the rental car facility and Crenshaw/LAX line connect?”).

5.3.3. Public Outreach Materials

The following informational materials were created to inform and engage stakeholders. Copies of supporting materials are included in the appendix of this report.

- Fact Sheet (bilingual)
- Contact card
- Comment Form (also distributed as an online survey)
- Presentation Boards
- Presentation

5.3.4. Digital Engagement

During the Alternatives Analysis phase, Metro continued to engage with stakeholders using the project web, Facebook, Twitter, Linked In and Youtube pages. The project website was regularly updated with presentations, fact sheets and news articles, the social media pages were continually populated with consistent and up-to-date content, and an “Airport Feature of the Week” – highlighting other U.S. city airport transit connections – was added to the Facebook page to stimulate discussion. As of February 29, 2012, the Facebook page had 239 fans, Twitter had 177 followers, LinkedIn had 31 connections, and YouTube had 5,009 views of the webisode and 786 views of six video testimonials from the August 2011 community workshops.

In addition, for those who were not able to attend the March 2012 community workshops in person, Metro provided an opportunity for online participation by broadcasting the meetings live via a UStream webcast. Approximately 90 people viewed the webcast on March 1, 2012, and 40 viewed the webcast on March 7, 2012.

Metro also created an online and mobile survey version of the comment form so that stakeholders could submit their preferences online. A link to the survey was posted on the project website, distributed to stakeholders electronically and announced at stakeholder briefings. Approximately 40 online survey responses were received. A summary of the survey results is included in the Section 5.3.7.

5.3.5. Notifications

The outreach team distributed notifications to a wide array of stakeholders to encourage their participation in the open house and workshops. Copies of supporting materials are included in the appendix of this report.

- 17,574 “Take-One” fliers were distributed on-board transit vehicles, including Metro bus and rail lines and municipal carriers, during the week of February 27, 2012
- A “Metro Briefs” ad ran during the week of February 20, 2012 in the following publications which reach constituents in the immediate LAX area, the City of Los Angeles, and the South Bay Cities:
 - Easy Reader
 - Gardena Valley News
 - Herald Publications Group
 - Daily Breeze
 - Beach Reporter
 - PV Peninsula News
 - Random Lengths
- In the weeks prior to the February and March 2012 meetings, several rounds of Eblast invitations to the open house and workshops were distributed to stakeholder databases of the following Metro projects:
 - Metro Green Line to LAX
 - South Bay Metro Green Line Extension
 - Crenshaw/LAX Transit Corridor Project
 - Westside ExtensionIn addition, Eblasts were sent to the Metro Service Council database and federal/state/local elected officials’ databases.
- Flyers, fact sheets and contact cards were distributed at the Open House at Union Station on February 29, 2012
- Four boards with open house and workshop information in English and Spanish were displayed in the West and East Portals of Union Station during the weeks of February 27 and March 5, 2012
- Metro issued Media Releases on February 14 and March 5, 2012.
- Open house and workshop information was also distributed through online media channels, including:
 - Facebook.com/GreenLinetoLAX
 - Twitter @GreenLinetoLAX
 - Metro.net/GreenLinetoLAX
 - LinkedIn
 - The Source Blog
 - El Pasajero

- LA Streetsblog
- Transit Coalition Forum and Newsletter
- Progressive Railroading
- LADOT Bike Blog
- Facebook pages for other organizations, such as FAST (Fixing Angelenos Stuck in Traffic)

5.3.6. Open House and Community Workshops

Metro hosted one open house and two community workshops. At the open house at Union Station on February 29, 2012, approximately 50 attendees viewed the boards, spoke with Metro staff and outreach team members and obtained collateral materials about the project.

At the first community workshop, held at Flight Path on March 1, 2012, approximately 44 stakeholders attended and participated in the breakout sessions and another 90 people viewed the UStream webcast.

The second community workshop was held at Union Station on March 7, 2012 and drew approximately 42 stakeholders and an additional 40 viewed the UStream webcast. Sign-in sheets were provided at the open house and workshops, and that stakeholder contact information has been added to the ongoing project database to provide future project updates:

- Union Station Open House – February 29, 2012
 - 28 stakeholders signed in; approximately 22 stakeholders attended but did not sign in
- Flight Path Community Meeting – March 1, 2012
 - 44 stakeholders signed in
- Union Station Community Meeting – March 7, 2012
 - 42 stakeholders signed in
- Total Number of Sign-Ins: 114

The workshops featured an open house session with technical team members on-hand at each of the presentation boards to provide one-on-one interface with stakeholders. Following the open house, Metro staff presented a PowerPoint update on the alternatives under consideration, including a question and answer session. Following the presentation, attendees were directed to one of the rotating breakout sessions that focused on the following four trade-off areas:

- Trade-Offs: Passenger Convenience
- Trade-Offs: Direct LRT Branch vs. Through LAX
- Trade-Offs: Alignments in the Airport Terminal Area
- Trade-Offs: Century Boulevard vs. 98th Street

5.3.7. Summary of Comments – February/March 2012

To maximize the range of input during the Alternatives Analysis phase, the team collected comments in a variety of formats, from written, to spoken and visual, including:

- Comment forms
 - Total number of comment forms: 60 (20 submitted in person or via email or mail; 40 submitted via the online survey)
- Notes on stakeholder comments, questions, and concerns expressed at breakout sessions
 - Total number of comments, questions, and concerns: 275
- Comments submitted online
 - Total number of comments submitted online: 23

At the breakout sessions at the community workshops, stakeholders had the opportunity to provide feedback on the four tradeoff areas. Stakeholders expressed a range of views and suggestions, with key points included below.

- Passenger Convenience
 - Concerns about walk distance
 - Suggestions in favor of moving walkways
 - Concerns about buses (traffic delays, competition with existing service, insufficient space for luggage, etc.)
 - Questions about security check in, luggage
- Direct LRT Branch vs. Through LAX
 - Interest in the Through LAX option and concerns about the additional cost and walk distances for one station and travel time for Through LAX passengers
 - Direct LRT reduces congestion, serves more businesses, serves more people
 - Questions about level changes, moving walkways
 - Some concerns about buses (congestion in the terminal area, duplicative of existing services)
 - Some expressed preference for rail, pointing to other airports (San Francisco, Chicago, Atlanta)
- Alignments in the Airport Terminal Area
 - Questions about proximity to terminals and walk distance
 - Moving walkways and better pedestrian bridges would be helpful
 - Some felt that BRT was a good option for distribution to the terminals (shorter walk time, lower cost)
 - Others felt BRT would be too slow and expressed concern about reliability, convenience for passengers (in terms of narrow aisles, etc.)
 - Rail was seen as more efficient and reliable, especially for connecting passengers
 - 3-station aerial offers balance of convenience and travel time
 - 4-station alternative was suggested by several stakeholders

- Minimal concern about visual impacts to the Theme Building
- Century Boulevard vs. 98th Street
 - Concerns about vertical level changes, walk distances
 - Preference for 98th Street in terms of fewer impacts (Century was just upgraded, etc.)

At a number of the stations, participants asked about LAWA participation in the process and Metro's coordination with LAWA and its LAX plans.

Stakeholder preferences revealed during meetings and in written commentary include the following connection types and alignments:

- Connection types: Modified LRT Trunk and Direct LRT Branch
- Alignment in the terminal area: Two station (aerial or tunnel) and three-station loop
- Alignment outside the airport: 98th Street

In general, stakeholders preferred alternatives or design options that provided fewer transfers and more reliable travel times. Inside the LAX terminal area, many stakeholders suggested that the design options with fewer than three stations include pedestrian enhancements, such as moving walkways, to make the longer average walk distance to/from terminals more manageable for passengers with luggage.

Over the course of the Alternatives Analysis phase a total of 60 written comment forms/surveys were submitted either at meetings, via mail, email or online.

With regard to which alternative is preferred by those who filled out the comment forms and online survey, 42 percent of respondents chose Modified LRT Trunk – Through LAX as their first choice, followed by 26 percent who chose Circulator (APM) and 21 percent who selected Direct LRT Branch. The Intermediate LRT & Circulator connection type and the Circulator (BRT) alternative garnered just 6 percent and 7 percent of total votes respectively.

In terms of on-airport alignment options, 37 percent of respondents chose the three-station aerial loop option, followed by 29 percent who preferred the two-station tunnel and 19 percent who selected the two-station aerial option.

5.4. STAKEHOLDER BRIEFINGS SUMMARY

In advance of Scoping meetings scheduled to occur in May 2012, Metro will hold an additional fifteen (15) stakeholder group briefings in March/April 2012 with a focus on groups in Westchester, Inglewood, South Los Angeles, downtown Los Angeles and South Bay and Gateway Cities. Copies of supporting materials are included in the appendix of this report.

6. RECOMMENDED PROJECT ALTERNATIVES

Based on the two-stage screening process and public input discussed above, the following alternatives will be carried forward to be studied in detail in the Draft EIS/EIR (see Table 4.11 for the Stage II Performance Summary):

- **No Build** – Existing transit and highway plans and programmed improvements through the year 2035.
- **Transportation Systems Management (TSM)** – Lower cost capital and operational improvements to roadways designed to improve bus speeds along existing roadways from the Aviation/Century Station to LAX.

Figure 6.1. Direct LRT Branch Alternative



Source: ConnectLAX, 2012

- Direct LRT Branch Alternative** – As shown in Figure 6.1, this alternative would directly connect Metro Green Line and possibly Crenshaw/LAX passengers to the CTA from the planned Metro Rail station located at Aviation and Century Boulevards. There are two areas where optional station configurations will require additional study: Lot C and the CTA. This alternative was selected to move forward for further consideration in the Draft EIS/EIR because it offers a balance between cost and passenger convenience. Stakeholders cited fewer transfers, competitive travel times for most passengers and higher reliability of the rail mode as key advantages for this alternative. In addition, the transfer at Aviation/Century could occur with a cross-platform transfer with no level changes. This would facilitate the transfer for passengers with luggage. Of the comment forms submitted, 21 percent of respondents preferred the Direct LRT Branch alternative.

- Circulator Alternative (APM)** – As shown in Figure 6.2, this alternative is an airport APM system that connects airport facilities with the Metro Rail station planned at Aviation and Century Boulevards. There are two station configuration options inside the CTA that will require additional study. This alternative was selected to move forward for further consideration in the Draft EIS/EIR because it offers a fast and reliable connection between the transit system and CTA. A central connection point to the Metro Rail system and perceptions that this service could operate more frequently to match the internal airport demand were cited as attractive features of this alternative. The common connection point offered a certain level of clarity and user friendliness for passengers. As a rail mode, this alternative could provide a high level of reliability. The APM Circulator alternative also offers the ability to have the level and frequency of service and the length and size of the trains to be adjusted to match airport-specific demand levels. Of the comment forms submitted, 26 percent of respondents preferred the Circulator (APM) alternative.

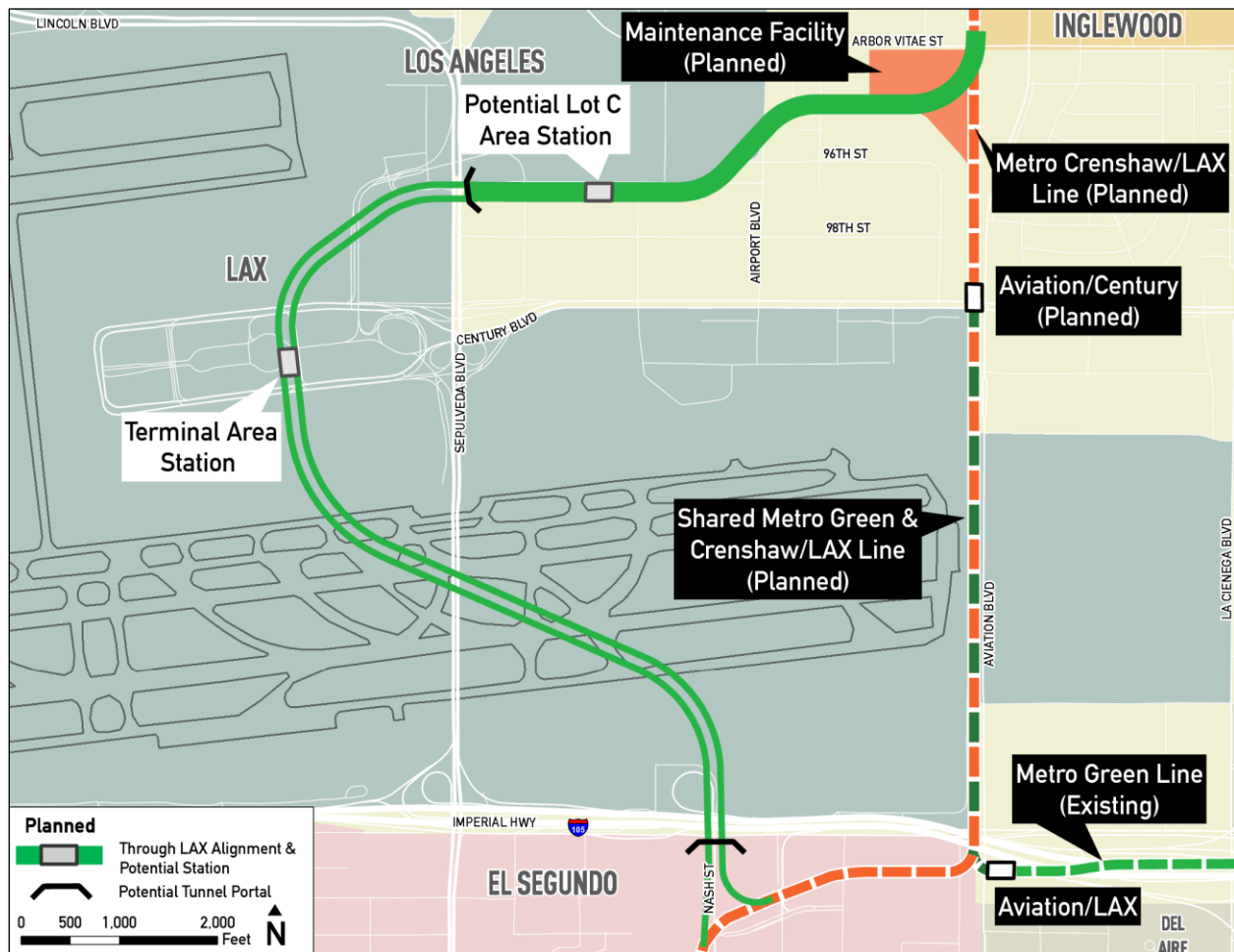
Figure 6.2. Circulator Alternative



Source: ConnectLAX, 2012

- Modified LRT Trunk Alternative (Through LAX)** – As shown in Figure 6.3, this alternative routes Metro Rail under the airport with one centrally located station, which will connect both the Metro Green and Crenshaw/LAX Lines directly to the airport. This alternative was selected to move forward for further consideration in the Draft EIS/EIR because it results in the most direct and fastest trips and the highest-ridership potential of all the alternatives. The ability to offer direct, one-seat ride connections with the lowest travel time and fewest transfers was cited by stakeholders as features they found attractive in this alternative. This alternative and its single central station provided a certain level of user-friendliness and clarity for passengers. As a rail mode, this was perceived as a highly reliable alternative as well. Of the comment forms submitted, 42 percent of respondents preferred the Modified LRT Trunk (Through LAX) alternative.

Figure 6.3. Modified LRT Trunk (Through LAX) Alternative



Source: ConnectLAX, 2012

The three Build Alternatives (Direct LRT Branch, Circulator and Modified LRT Trunk (Through LAX) Alternatives), along with the No Build and TSM Alternatives, will be carried forward into the Draft EIS/EIR phase. The focus of the Draft EIS/EIR phase is to identify potential environmental impacts resulting from the implementation of the project alternatives. Several other activities will proceed in parallel, including advanced conceptual engineering, refinement of capital and operating cost estimates, and identification of potential funding sources. The Draft EIS/EIR is scheduled to be completed and available for public review in Spring 2013.

7. ALTERNATIVES ELIMINATED FROM FURTHER ANALYSIS

Based on the two-stage screening process and public input discussed above, the following alternatives will not be carried forward to be studied in detail in the Draft EIS/EIR:

- **Intermediate LRT and Circulator** – In terms of passenger convenience, this connection type involves the most number of transfers, least travel time savings and the lowest ridership. All alternatives within this connection type were eliminated. Of the comment forms submitted, six percent of respondents preferred the Intermediate LRT and Circulator alternative.
- **BRT Mode** – This mode would operate on an aerial busway between Aviation and Sepulveda Boulevards and then transition to mixed flow operation using the existing airport roadway inside the terminal area. With this configuration, the BRT mode is subject to roadway congestion within the airport terminal area which reduces reliability and results in the longest travel times. All alternatives that utilize BRT as a mode have been eliminated from further consideration. Of the comment forms submitted, seven percent of respondents preferred the Circulator (BRT) alternative.
- **Century Boulevard Alignment (for both LRT and APM modes)** – Public input suggested that there is a general preference for the 98th Street alignments for both the Direct LRT Branch and Circulator (APM) alternatives. This option has the potential for visual impacts to the existing Century Boulevard corridor landscape as well as negatively affecting traffic circulation and vehicular access to local businesses. Furthermore, for the Direct LRT Branch alternative, an additional transfer with a long walk would be involved between the Metro Green and the Crenshaw/LAX Lines reducing the attractiveness of this alignment option. This situation is caused by the need for a second station associated with the Metro Green Line turning west onto Century Boulevard before reaching the new Crenshaw/LAX station planned at the northwest corner of Aviation and Century Boulevards. Therefore, all options that utilized an alignment along Century Boulevard have been eliminated from further consideration.

APPENDICES

- A. Public Outreach – August 2011**
- B. Public Outreach – February/March 2012**