

5.0 Executive Summary

Introduction

The LAX-PMD High-Speed Ground Access Study Milestone Report on Ridership Studies and Analysis is the fifth in series of eleven. It describes the investment quality ridership demand studies and analyses for the alignment and technology alternatives that were developed for a high-speed ground access system from Los Angeles International Airport (LAX) to Palmdale International Airport (PMD).

Milestone 5 consists of five tasks:

5.1 Ridership Forecasts Development Approach and Methodology

5.2 Market Research

5.3 Regional Model Preparation

5.4 Regional Air Demand Allocation Model (RADAM) Preparation

5.5 Ridership Forecasts and Benefits Assessment.

The results of each task are described in subsequent sections of the report.

The results of this Milestone feed into Milestone 6 (Environmental Assessment) and Milestone 8 (Financial Plan). This study will culminate in a Project Deployment Plan (Milestone 10), which will bring together the various elements from the other milestones to recommend a combined alignment, technology and implementation alternative for the LAX-PMD Ground Access System.

Baseline Assumption

The ridership forecast builds on two significant baseline assumptions that are important to note. 1) SCAG Regional Airport Scenario #8 is assumed for airport activity level. 2) The first phase of the SCAG intra-regional high-speed system (LAX-March Maglev line) is assumed to be in place. Special sensitivity assignments were also conducted, in addition to the baseline, to test perform of the LAX-PMD line as a standalone system (without LAX-March) and to understand the difference in ridership due to the variation in rail technology. The decision for the baseline assumptions and the results are discussed in later sections of the report.

Approach and Methodology

Ridership forecasts have been performed in a manner that is consistent with those performed for the California Maglev Deployment Program Phase I. Those forecasts used a methodology and approach that was in accordance with the guidelines and direction of the Federal Railroad Administration (FRA) and Major Investment Study (MIS) guidelines of the U.S. Department of Transportation. The horizon year for ridership work is year 2025. The ridership forecasting procedure is composed of four primary components as presented in the following discussions:

Market Research - The introduction of a new high-speed technology to the complex travel markets of Southern California creates a new frontier in transportation. With average operating speeds of approximately 100 miles per hour (mph) and top end

speeds approaching 250 mph, Maglev and High Speed Rail (HSR) will affect the travel choices of commuters, visitors and residents very differently than have other traditional modes of travel. Historically, travel surveys in Southern California have not addressed very high-speed technologies as choices for travelers. Therefore, a broad-based coordinated market research effort was performed on both the LAX-Palmdale and LAX-March corridors to help define potential markets. Market research surveys gauged the traveling public's propensities for using Maglev and HSR and provided modelers with needed statistical measures to update travel model programs.

Regional Travel Model - The ridership approach for the LAX-Palmdale High Speed Ground Access Study is identical to that used for LAX-March Maglev and draws from the market research. It uses a multi-faceted approach to forecasting; because of the wide variety of trip purposes, (both resident and visitor based) that high-speed technologies can attract, various forecasting tools have been used to produce ridership estimates for LAX-Palmdale Alternatives. These tools include the new state-of-the-art regional travel demand model that is capable of forecasting travel in the six-county SCAG Region. The model's zone system covers the entire LAX-Palmdale corridor and additional buffer areas. The model addresses all motorized and non-motorized modes of travel, including all automotive and transit modes. Based on the results of the market research, the regional model was modified to incorporate Maglev/HSR in the mode choice model and the transportation networks.

Regional Air Demand Allocation Model - The second tool used in High Speed Ground Transportation forecasting is the Regional Air Demand Allocation Model (RADAM) to project air passenger demand. RADAM is a proprietary model that has been used in recent years by SCAG to perform forecasts of travel to, from and between airports in the Region. This model has been used to estimate air passenger traffic on the Maglev/HSR system alternatives.

Forecasting Other Purposes - Trip spreadsheets are used to estimate a segment of riders that neither of the above models address fully: special event and visitor trips. The spreadsheet is based on corridor market research about special generators and events sites in the LAX-PMD Corridor. Finally, because of their vastly superior travel time advantage, reliability, and attractiveness, Maglev and High Speed Rail (HSR) technologies will create induced demand above those trips accounted for from the above categories.

Ridership Forecasts - General Findings

As was the case with the LAX-March Travel Corridor, the LAX-Palmdale Travel Corridor is a very strong market for long distance travel. The corridor is projected to have in excess of 2.4 million total daily trips in excess of 15 miles for the horizon year 2025. The total number of daily trips (short, medium, and long) forecast for the corridor is substantially higher, exceeding 10 million per day.

Table 5.0-1 shows that the Maglev/HSR alternatives are forecast to penetrate between 2 and 8 percent of the total long distance trips in the LAX-Palmdale Corridor for the various trip purposes. Ridership for the three selected LAX-Palmdale Corridor Alternatives range from 96,000 to 122,000 passengers for an average weekday in the year 2025. This constitutes a very conservative market share of only 3 to 4 percent of the corridor's long distance trips.

The three selected LAX-Palmdale Alternatives (Airport Connector, Maximum Coverage and Transit Hubs) were analyzed as a second Maglev Line in a Maglev System that also includes the 92-mile LAX-March Line. The performance of each Alternative was evaluated based on how much is added to the patronage and revenue forecasts of the east-west Maglev Line.

Table 5.0-1
Market Shares for High-Speed Modes (2025)
LAX-PMD Corridor

Trip Table	Range in LAX-PMD Ridership ¹	Range in Daily Long Distance Trips in Corridor ²	Percent Market Share
Long Distance Commute to Work	60,000 – 72,000	1,000,000 – 1,400,000	3% - 4%
Long Distance Resident Non-work	17,000 – 24,000	1,000,000 – 1,200,000	2% - 3%
Airport Passengers LAX, Van Nuys Flyaway, PMD	12,000 – 19,000	150,000 – 200,000	7% - 8%
Special Events/Special Generators/Visitors	3,000 – 4,000	150,000 – 200,000	2% - 3%
Induced Passenger Trips	4,000 – 5,000	N/A	N/A
Total	96,000 – 122,000	2,400,000 – 3,000,000	3% - 4%

¹ Assumes a 10-minute headway. Range in ridership is for the three selected LAX-PMD alternatives

² Long distance trips in excess of 15 miles in distance.

N/A = Not Applicable

The Baseline East-West Maglev line creates a reliable high-speed link for air passengers between LAX, Ontario, San Bernardino and March Airfields, as well as connections to major activity centers in downtown and West Los Angeles. The line is forecast to carry approximately 128,000 daily passengers in the horizon year 2025. Its strong ridership is due partly because of its capture of a substantial number of air passengers between these locations. The East-West line is forecast to carry approximately 42,000 daily air passenger trips for horizon year 2025; these are both air passenger trips traveling between airports and trips from groundside origins along the line.

Table 5.0-2 shows the estimated ridership for the LAX-Palmdale alternatives, including the Baseline Alternative. The highest Maglev/HSR system ridership is produced by the Maximum Coverage Alternative. Its system ridership is forecast to be 229,540 riders per day in year 2025. Of the Maximum Coverage system total, the line to Palmdale is forecast to carry approximately 122,000 riders per day including nearly 55,000 that transfer between the two lines. The alternative has two stations in the San Fernando Valley rather than just one and better penetrates that extensive travel market. This alternative is longer than the other two alignments. In a later milestone in this study, a cost-benefit analysis will be performed to compare the extra costs against gains in ridership and passenger revenues.

Table 5.0-2
Year 2025 Daily Passenger Volumes - Comparisons of LAX-Palmdale Alternatives as Part of a Maglev System

Trip Type	Baseline Alternative (LAX-March)	Airport Connector Alternative				Maximum Coverage Alternative.				Transit Hubs Alternative			
		LAX-PMD Riders	LAX-March Riders	Transfer (Note 1)	System Riders (Note 2)	LAX-PMD Riders	LAX-March Riders	Transfer (Note 1)	System Riders (Note 2)	LAX-PMD Riders	LAX-March Riders	Transfer (Note 1)	System Riders (Note 2)
Peak Commute	47,580	60,820	66,100	26,420	100,500	71,610	77,150	37,870	110,890	69,810	81,220	40,640	110,390
Off-peak	29,290	16,790	29,740	5,640	40,900	23,820	34,080	10,300	47,600	19,180	33,640	9,400	43,420
Air Passengers	42,130	11,980	37,450	1,410	48,020	18,570	38,540	2,820	54,290	12,500	37,880	2,590	47,780
Special Events/Visitors	4,030	3,100	6,570	1,750	7,920	3,100	6,550	1,740	7,920	3,090	6,550	1,740	7,910
Induced Passengers	4,920	3,710	5,600	1,410	7,890	4,680	6,250	2,110	8,830	4,180	6,370	2,170	8,380
Total	127,940	96,400	145,450	36,630	205,230	121,790	162,580	54,830	229,540	108,760	165,670	56,540	217,890

Notes:

1. Transfers are riders using both the LAX-Palmdale and LAX-March alignments. These riders are counted under the columns for each alignment.
2. System riders are the total number of riders on the two-line system, with transfers counted only once.

Exhibits 5.0-1 to 5.0-3 show the daily passenger volumes at each of the stations along the LAX-PMD line. Daily passenger volumes represent boardings at the station.

It is interesting to note that the Antelope Valley is generating substantial passenger volumes, in excess of 31,000 boardings per day in peak periods for the year 2025. The substantial boardings are primarily due to severe congestion on the SR –14. The Palmdale station’s sizable demand (with substantial circulation and parking needs) may warrant the consideration of more than one station to serve the Antelope Valley.

The general conclusion that can be drawn from the ridership forecasts for the three LAX-Palmdale alternatives is that they each perform well in terms of attracting riders from all trip categories. They each have their separate strengths in terms of markets they serve and how they interconnect with the East-West Maglev Line. The substantial number of transfers for each of the three alternatives demonstrates strong system connectivity between lines.

Impact on Other Rail Systems

A genuine concern is the potential for competition for this system and other rail lines in the region. Table 5.0-3 shows daily passenger boardings for Metrolink Commuter Rail lines and Los Angeles County Metropolitan Transportation Authority (LACMTA) Urban Rail lines (Metro Blue, Red and Green Lines). Results of the analysis confirm earlier findings from other studies that indicate the degree of competition is limited and on a system-wide basis, negligible. The demand for fast, reliable transportation in the future will be much greater than capacity.

Table 5.0-3
Impacts of LAX-Palmdale Alternatives on other Rail Systems

METROLINK COMMUTER RAIL - DAILY BOARDINGS							
Alternatives	Baseline	Airport Connector		Maximum Coverage		Transit Hubs	
Line	Total	Total	% Diff.	Total	% Diff.	Total	% Diff.
Antelope Valley	26,690	21,350	-25.0	20,960	-27.4	18,650	-43.1
Ventura Line	7,060	8,690	18.8	9,590	26.4	16,350	56.8
Other Metrolink	30,490	31,970	4.6	32,460	6.1	34,160	10.8
TOTAL	64,240	62,000	-3.6	63,010	-2.0	69,170	7.1

URBAN RAIL SYSTEMS - DAILY BOARDINGS							
Alternatives	Baseline	Airport Connector		Maximum Coverage		Transit Hubs	
Line	Total	Total	% Diff.	Total	% Diff.	Total	% Diff.
Red Line West	75,530	74,460	-1.4	76,660	1.50	75,210	-0.4
Other Urban Rail	180,650	190,710	5.3	202,220	10.67	191,170	5.5
TOTAL	256,180	265,170	3.4	278,880	8.14	266,380	3.8

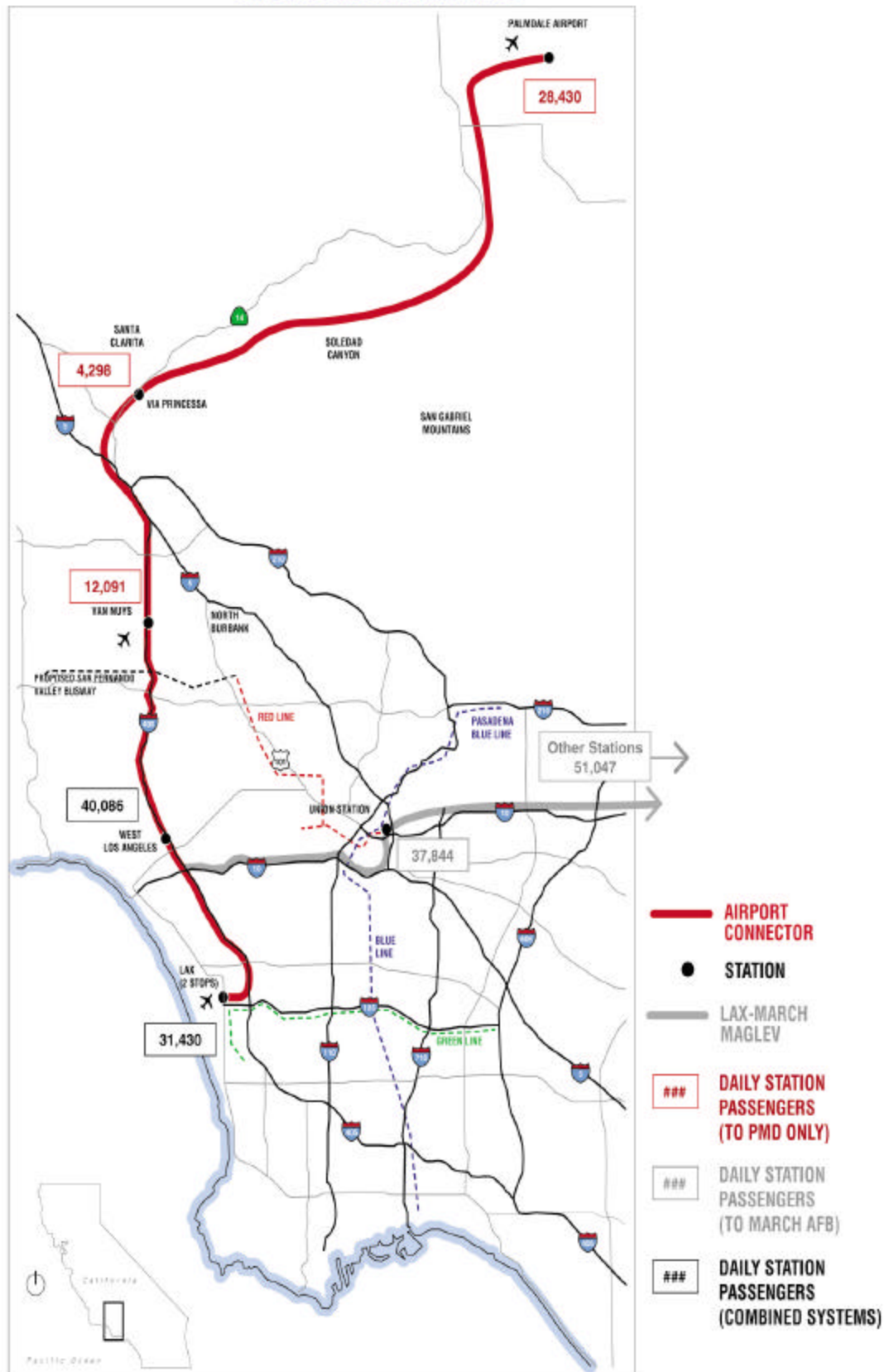
Exhibit 5.0-1
AIRPORT CONNECTOR ALTERNATIVE

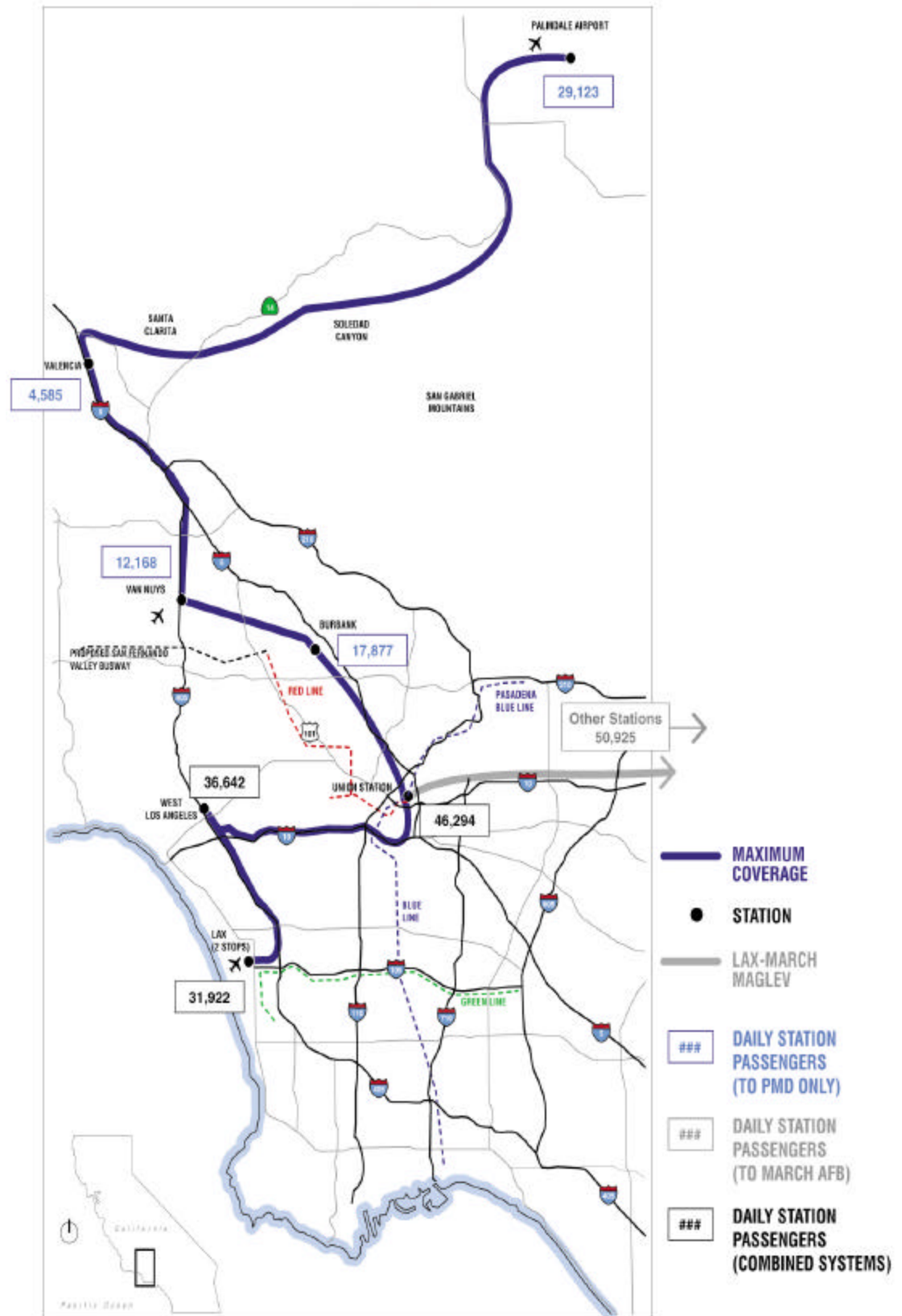
Exhibit 5.0-2
MAXIMUM COVERAGE ALTERNATIVE

Exhibit 5.0-3
TRANSIT HUB ALTERNATIVE

LAX-PMD Stand Alone System

A sensitivity analysis was conducted for the LAX-PMD system as a standalone system, without the east-west Maglev line. This scenario would test the performance of the line on its own merits and provides an understanding of how the system would perform as a first phase of the SCAG intra-regional high-speed system. The results indicate a healthy performance in ridership with an expected increase of slightly more than 6% of the combined system results. Table 5.0-4 summarizes the results by market segments. The increase is due to the elimination of competition with the LAX-March line in the same alignment and station segments. Similar increases in the Maximum Coverage and Transit Hubs alternatives are expected for a stand-alone system configuration.

Table 5.0-4
Comparison of Stand Alone System to Combined System (Year 2025 Daily Passenger Volumes)

Trip Type	Airport Connector Alternative	
	COMBINED SYSTEMS LAX-PMD Riders	STAND ALONE (Maglev) LAX-PMD Riders
Peak Commute	60,820	66,430
Off-peak	16,790	18,280
Air Passengers	11,980	12,620
Special Events/Visitors	3,100	1,100
Induced Passengers	3,710	3,940
Total	96,400	102,360

Comparison of Maglev versus High Speed Rail

Model runs were carried out for the Airport Connector Alternative without the east-west Maglev, to determine the impact of technology (which affects travel time) on ridership. Although three technology finalists were identified in previous Milestones, modeling of the two “bookend” technologies, High Speed Rail (HSR) and Very High-Speed Maglev (VHSM) is sufficient to establish the boundaries of ridership sensitivities due to technology. The results indicated that the Maglev Technology would generate only approximately 5 percent more ridership than HSR in the more restrictive urban setting where speeds between the two technologies are not substantially different. The Airport Connector Alternative operating as a “stand-alone” Maglev line (without the East-West Line) attracts approximately 102,000 daily passenger boardings. By comparison, the Airport Connector at HSR performance attains about 97,000 daily riders in year 2025.

Air Passenger Forecasts and Palmdale Airport Usage

As shown in Table 5.0-2, the three selected LAX-Palmdale Alternatives add additional air passengers to the Baseline Alternative, which on its own carries 42,000 air passengers per day. The Maximum Geographic Coverage Alternative carries the

highest number of air passenger trips, approximately 54,000 per day in the year 2025. The LAX-Palmdale lines in the Transit Hubs Connector and Airport Connector alternatives each carry approximately 48,000 air passengers per day. A similar pattern of air passenger station-to-station activity occurs for all three alternatives. In general, the interchanges between the Van Nuys Flyaway, LAX Airport, West Los Angeles and Los Angeles Union Station are the heaviest.

The Airport Connector and Maximum Coverage alternatives generate over 3,000 daily air passenger boardings at Van Nuys, with more than two-thirds of those boardings destined to the LAX Airport. All three LAX-Palmdale alternatives carry about the same number of daily air passenger trips to Palmdale Airport, approximately 2,000. About 500 of these trips are passengers connecting from LAX.

Annual passenger ridership to Palmdale (PMD) totals 749,413 for horizon year 2025. This equates to approximately 2050 daily passenger boardings on Maglev (or HSR) at Palmdale Airport per day. This is a relatively high percentage of the airport's travel market considering that PMD is a small 1.728 Million Annual Passenger (MAP) airport in the scenario examined, and the region is served by two major airports that exceeds 29 MAP each, with a full spectrum of domestic and international flights.

As a result of this, PMD primarily serves its own geographic demand from Santa Clarita north to the Antelope Valley, which is primarily a commuter and short haul market. It competes for passengers with three major airports, two of which are unconstrained, with usage totaling 186 MAP under the SCAG Regional Aviation Scenario 8. In addition, it competes with Burbank Airport (BUR), which is terminal/gate constrained but can accommodate up to 9.4 MAP with a full portfolio of high frequency domestic flights.

Even though air passenger forecasts for the year 2025 on Maglev (or HSR) are low, sensitivity tests show other positive influences for PMD with regard to a high-speed link. The air passenger simulations do indicate that a Maglev (or HSR) link will allow PMD to more rapidly expand its portfolio to longer haul flights as compared to an airport without Maglev. This is due to the fact that passengers will not mind using Maglev to reliably access a medium haul flight, compared to going by car and perhaps missing a medium or long haul flight.

It should be noted that the passenger profiles used for Regional Aviation Scenario 8 Maglev model simulations were the same as conservative profiles used in previous LAX-March modeling. This profile was characterized by a higher threshold propensity to consistently use Maglev for airport access. This is consistent with methodologies for Environmental Documents where a more conservative, rather than optimistic approach is mandated. Using more liberal passenger profiling for Maglev for the LAX-PMD would result in a 20-24% increase in boardings on the LAX-March line and an increase of 22-26% increase in ridership on the LAX-Palmdale line. However, modeling of passenger demand in terms of destinations, haul types and time of travel preferences indicates that LAX and PMD cannot be functionally consolidated, as is often suggested unless the basic functions of the airports are changed from those contemplated in the scenario examined.

Total Revenues

Passenger revenues are expected to provide the majority of the revenue streams for the LAX-PMD Corridor, just as they did for the Maglev Project. However, other streams of revenues are expected from a variety of other sources once the line begins operations. Table 5.0-5 summarizes the range of expected revenues from the LAX-Palmdale alternatives.

Table 5.0-5
Total Annual Revenues Forecast
LAX-PMD Alternatives (2025)

Category of Revenue	Range of Estimates (in Millions of Dollars)				
	Baseline E-W Maglev Line	Airport Connector w/ Baseline	Maximum Coverage w/ Baseline	Transit Hubs w/ Baseline	Airport Connector (stand-alone)
Passenger	\$440 - \$450	\$720 - \$730	\$790 - \$810	\$760 - \$780	\$330 - \$340
Freight and Cargo	\$40 - \$60	\$80 - \$120	\$80 - \$120	\$80 - \$120	\$40 - \$60
Station Parking	\$40 - \$50	\$80 - \$100	\$90 - \$110	\$90 - \$100	\$40 - \$50
Station Concessions and Advertising	\$10 - \$15	\$10 - \$15	\$10 - \$15	\$10 - \$15	\$10 - \$15
Joint Development	N/A	N/A	N/A	N/A	N/A
Total Revenues	\$530 - \$575	\$890 - \$965	\$970 - \$1,050	\$940 - \$1,015	\$420 - \$465

In addition to passenger fares, the types of revenue include:

Freight and Cargo Revenues – The variety of freight and cargo movement along the LAX-PMD corridor is substantial and varied. Because of their very high speed and reliability, Maglev or HSR operating in the LAX to Palmdale Corridor have significant potential to serve market niches in the following categories:

- Overnight delivery commodities (Fed Ex, DHL, UPS, etc.), especially if one or more of these companies were to decide to locate a major distribution facility at or near a Maglev station;
- Courier services across the north-south corridor;
- Specialized/time sensitive commodities;
- Because Maglev would serve and connect two airports plus an airport flyaway, a wide variety of markets for airfreight and cargo could be penetrated by a LAX-Palmdale High Speed Link. Based upon a review of the cargo markets in the corridor and input from air cargo economists, a range of approximately \$40,000,000 to \$60,000,000 per operating line has been suggested. As discussed in the previous section, various categories of air cargo might be attracted to the line.

Station Parking Revenues – The Maximum Coverage alternative will have 6 stations that, collectively, are projected to generate parking demand in excess of 44,000 additional spaces in year 2025. Based on these forecasts, an average of parking charge of \$5.00 per day per space, the Maximum Coverage Alternative could generate approximately \$66,000,000 annually beyond the Baseline Alternative.

Station Concessions and Advertising – Another stream of revenues for many transit operators comes through station concessions and advertising. It is assumed that the eleven or twelve station in the systems alternatives could generate \$10 – 15 million annually from these sources.

Joint Development - The opportunities for joint development are the greatest for stations on the northern end of the corridor where more under developed parcels exist in proximity of stations. To date, no estimates of joint development potential have been developed.

Benefits

The benefits of new and efficient travel modes such as Maglev and High Speed Rail (HSR) extend beyond the immediate, and perhaps most readily identifiable, advantages to users, who will (1) be able to make selected trips in the region on a very fast and reliable service and (2) pay fare revenues that are projected to cover a substantial portion or all operating costs and a significant portion of system development costs. In addition, Maglev and HSR in the LAX-Palmdale Corridor will generate a number of other direct and indirect transportation related benefits that have great importance for the corridor and the region. Among these other benefits are:

- New opportunities to change the shape of urban development in a metropolitan area projected to grow by at least 30% in the next 20 years and possibly 80% over the next 45 (station proximity and corridor level benefits). The land use shaping effect around the Maglev/HSR stations will lessen urban sprawl and have positive consequences for air quality and energy conservation.
- Less severe highway and airport congestion (corridor level and region wide benefits). The high speed line will remove automobile trips from SR-14, I-405, I-5 and other roadway segments and will shift some air operations away from LAX.
- New travel mode opportunities and shifts in modal use (corridor and system level benefits). The three LAX-Palmdale Alternatives create a range in modal shift of approximately 80,000 to 110,000 person trips for an average weekday from automobile model to transit mode.
- Improvements in the capacity and reliability of person and goods movements (corridor level benefits). The high-speed link to Palmdale adds substantial additional person carrying capacity to the transportation system of over 7,000 person per hour per direction.
- Savings in energy consumption, improvements in air quality and various other environmental benefits (corridor and system level benefits). The three LAX-Palmdale Alternatives tested reduced vehicle miles traveled (VMT) by over 600,000,000 annually from the combined East-West and LAX-March lines.