Memorandum

TO: Nick Brand

FROM: Michael Snavely, Rachel Copperman, Yushuang Zhou and George Mazur

DATE: August 17, 2010

RE: San Gabriel Valley Alignment and Station Location Alternatives

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Three year 2030 Full System scenarios were modeled to test alternative alignments and station locations between Los Angeles Union Station (LAUS) and Ontario through the San Gabriel Valley. Each scenario included the same overall level of high-speed rail (HSR) operations featured in the May 2009 operating plan, and the higher station parking rates included in the *Increased Parking Cost Scenario*. These alternatives test the effects of:

- **El Monte Transit Village Scenario**: This alignment follows I-10 east from LAUS and transitions north to the Metro/Metrolink line before turning south towards Ontario Airport. This scenario has an HSR station at El Monte Transit Village in lieu of City of Industry.

- **West Covina Station Scenario**: This alignment follows SR 60 east from LAUS and I-10/Holt east of I-605 towards Ontario Airport. This scenario has an HSR station at West Covina in lieu of City of Industry.

- **Pomona Station Scenario**: This alignment follows the Union Pacific railroad east from LAUS and I-10/Holt east of I-605 towards Ontario Airport. This scenario has an HSR station at Pomona in lieu of City of Industry.

Figure 1 displays the HSR alignments and station alternatives within the San Gabriel Valley.

Operating Plans

The operating plan for the *El Monte Transit Village Scenario* (see Table 1) is identical to the *Increased Parking Cost Scenario* with the exception that the City of Industry station is replaced by a new El Monte Transit Village stop located west of Santa Ana Avenue at the site of the existing Lower El Monte and El Monte bus stations. Travel time decreases by three minutes between LAUS and points east/south compared to the *Increased Parking Cost Scenario* due to a shorter alignment through the San Gabriel Valley.

Figure 1. San Gabriel Valley HSR Alignment and Station Alternatives

The operating plan for the *West Covina Station Scenario* (see Table 2) is identical to the *Increased Parking Cost Scenario* with the exception that the City of Industry station is replaced by a new West Covina station located near the West Covina Shopping Center along I-10. Travel time decreases by eight minutes between LAUS and points east/south compared to the *Increased Parking Cost Scenario* due to a shorter alignment and fewer curves through the San Gabriel Valley.

The *Pomona Station Scenario* operating plan (see Table 3) is identical to the *Increased Parking Cost Scenario* with the exception that the City of Industry station is replaced by a station at Pomona located just south of North Holt Avenue at North Garey Avenue. Travel time decreases by seven minutes between LAUS and points east/south compared to the *Increased Parking Cost Scenario* due to a shorter alignment through San Gabriel Valley.

Table 1. Full System Operating Plan for the El Monte Transit Village Scenario

Station	Run Time from Start Station (Minutes)													
Pattern #	**0**	**1**	**2**	**29**	**28**	**4**	**20**	**41**	**42**	**14**	**39**	**25**	**15**	**35**
San Francisco	0	0	0	0	0	0	0			0	0			
Millbrae	|	|	|	|	15	15	15			15	|			
Redwood City/Palo Alto	|	20	|	20	25	25	25			25	20			
San Jose	|	35	30	35	40	40	40			40	35			
Gilroy	|	51	|	51	56	56	|			56	|			
Merced										91	|			
Modesto										108	|			
Stockton										124	104			
Sacramento										146	126	0	0	0
Stockton												22	22	22
Modesto												|	38	|
Merced												|	55	|
Fresno	|	|	|	|	97	97	93					68	78	68
Bakersfield	|	|	|	|	|	138	134					|	119	|
Palmdale	|	|	|	151	164	172	|				135	153	|
Sylmar	|	|	|	173	|	194	183					157	175	|
Burbank	|	|	|	|	|	203	|				166	184	|
Los Angeles Union Station	160	175	163	188	198	213	198	0	0			176	194	154
El Monte Transit Village		|		200	210	|		12	|					166
Ontario		200		217	227	238		29	|					183
Riverside		213		230	240	251		42	33					196
Murrieta		|		247	257	|		59	|					213
Escondido		|		265	275	|		77	|					231
University City		255		280	290	293		92						246
San Diego		267		292	302	305		104	83					258
Norwalk	173		176				211					189	207	
Anaheim	184		187				222					200	218	
Frequency (trains per hour)	1	2	1	1	1	1	1	1	1	1	1	1	1	1

Notes: "|" indicates no station stop for indicated pattern.

Table 2. Full System Operating Plan for the West Covina Station Scenario

Station	Run Time from Start Station (Minutes)													
Pattern #	**0**	**1**	**2**	**29**	**28**	**4**	**20**	**41**	**42**	**14**	**39**	**25**	**15**	**35**
San Francisco	0	0	0	0	0	0	0			0	0			
Millbrae	|	|	|	|	15	15	15			15	|			
Redwood City/Palo Alto	|	20	|	20	25	25	25			25	20			
San Jose	|	35	30	35	40	40	40			40	35			
Gilroy	|	51	|	51	56	56	|			56	|			
Merced										91	|			
Modesto										108	|			
Stockton										124	104			
Sacramento										146	126	0	0	0
Stockton												22	22	22
Modesto												|	38	|
Merced												|	55	|
Fresno	|	|	|	|	97	97	93					68	78	68
Bakersfield	|	|	|	|	|	138	134					|	119	|
Palmdale	|	|	|	151	164	172	|				135	153	|
Sylmar	|	|	|	173	|	194	183					157	175	|
Burbank	|	|	|	|	|	203	|					166	184	|
Los Angeles Union Station	160	175	163	188	198	213	198	0	0			176	194	154
West Covina		|		201	211	|		13	|					167
Ontario		195		212	222	233		24	|					178
Riverside		208		225	235	246		37	28					191
Murrieta		|		242	252	|		54	|					208
Escondido		|		260	270	|		72	|					226
University City		250		275	285	288		87	|					241
San Diego		262		287	297	300		99	78					253
Norwalk	173		176				211					189	207	
Anaheim	184		187				222					200	218	
Frequency (trains per hour)	1	2	1	1	1	1	1	1	1	1	1	1	1	1

Notes: "|" indicates no station stop for indicated pattern.

Table 3. Full System Operating Plan for the Pomona Station Scenario

Station	Run Time from Start Station (Minutes)													
Pattern #	**0**	**1**	**2**	**29**	**28**	**4**	**20**	**41**	**42**	**14**	**39**	**25**	**15**	**35**
San Francisco	0	0	0	0	0	0	0			0	0			
Millbrae	|	|	|	|	15	15	15			15	|			
Redwood City/Palo Alto	|	20	|	20	25	25	25			25	20			
San Jose	|	35	30	35	40	40	40			40	35			
Gilroy	|	51	|	51	56	56	|			56	|			
Merced										91	|			
Modesto										108	|			
Stockton										124	104			
Sacramento										146	126	0	0	0
Stockton												22	22	22
Modesto												|	38	|
Merced												|	55	|
Fresno	|	|	|	|	97	97	93					68	78	68
Bakersfield	|	|	|	|	|	138	134					|	119	|
Palmdale	|	|	|	151	164	172	|				135	153	|
Sylmar	|	|	|	173	|	194	183					157	175	|
Burbank	|	|	|	|	|	203	|					166	184	|
Los Angeles Union Station	160	175	163	188	198	213	198	0	0			176	194	154
Pomona		|		206	216	|		18	|					172
Ontario		196		213	223	234		25	|					179
Riverside		209		226	236	247		38	28					192
Murrieta		|		243	253	|		55	|					209
Escondido		|		261	271	|		73	|					227
University City		251		276	286	289		88	|					242
San Diego		263		288	298	301		100	78					254
Norwalk	173		176				211					189	207	
Anaheim	184		187				222					200	218	
Frequency (trains per hour)	1	2	1	1	1	1	1	1	1	1	1	1	1	1

Notes: "|" indicates no station stop for indicated pattern.

2030 Full System Ridership and Revenue Results

El Monte Transit Village Scenario

The 2030 full system forecast for this scenario resulted in a predicted annual high-speed rail ridership of 95.2 million (see Table 4). This value represents an increase of 1.5 million (1.6 percent) compared to the *Increased Parking Cost Scenario*. This result can be largely attributed to an increase of 1.1 million riders within the LA basin (8.3 percent). The greatest gains in interregional ridership occur in the Bay Area-San Diego (2.9 percent) and LA Basin-San Diego (1.0 percent) markets. Interregional trips increase by about 0.5 percent systemwide due to reduced travel times through the San Gabriel Valley.

Improvements in market-to-market ridership translate to a $28 million (0.7 percent) overall rise in system revenue. Much of this gain can be attributed to trips within the northern LA Basin, which generate an additional $13 million (21.3 percent). In interregional travel markets, increases occur between the LA Basin-San Diego ($6 million), Bay Area-San Diego ($5 million), and LA Basin-Bay Area ($4 million) travel markets.

Table 5 presents the average daily boardings at each high-speed rail station. In the *El Monte Transit Village Scenario*, average daily boardings increase by 4,900 (1.8 percent) compared to the *Increased Parking Cost Scenario*. The largest increases occur at El Monte Transit Village (25.2 percent more than City of Industry) and Ontario (22.7 percent). The availability of connecting local transit services at El Monte Transit Village enhances its attractiveness as an HSR access point. In addition, El Monte Transit Village offers improved access to more densely populated areas in the western San Gabriel Valley, which draws riders away from LAUS and causes many passengers who boarded at City of Industry (in the *Increased Parking Cost Scenario)* to instead board at Ontario. LAUS shows the sharpest decline in daily boardings (a loss of 7.0 percent).

The majority of new trips on the HSR system in the *El Monte Transit Village Scenario* travel between San Diego County and the LA Basin. As shown in Table 6, daily line loads in this area increase by one to four percent. Line loads in other segments increase by one percent or less.

West Covina Station Scenario

The 2030 full system *West Covina Station Scenario* resulted in predicted annual high-speed rail ridership of 96.2 million (see Table 4), an increase of 2.5 million (2.7 percent) compared to the *Increased Parking Cost Scenario*. This increase can be attributed in part to 1.1 million more riders within the SCAG region (8.3 percent). Interregional travel increases by about 1.9 percent overall due to reduced travel times through the San Gabriel Valley, with the most significant improvement in the LA Basin-San Diego market (0.9 million, 4.3 percent).

Table 4. 2030 Full System Annual Region-to-Region Ridership and Revenue, San Gabriel Valley Station Alternatives

	Increased Parking Cost Scenario				El Monte Transit Village Scenario				West Covina Station Scenario				Pomona Station Scenario			
Market	HSR Ridership (Millions)	HSR Mode Share	HSR Avg. Fare (2008 Dollars)	Revenue (2008 Dollars in Millions)	HSR Ridership (Millions)	HSR Mode Share	HSR Avg. Fare (2008 Dollars)	Revenue (2008 Dollars in Millions)	HSR Ridership (Millions)	HSR Mode Share	HSR Avg. Fare (2008 Dollars)	Revenue (2008 Dollars in Millions)	HSR Ridership (Millions)	HSR Mode Share	HSR Avg. Fare (2008 Dollars)	Revenue (2008 Dollars in Millions)
LA Basin – Sacramento	3.8	50%	$66	$249	3.8	50%	$66	$251	3.8	51%	$66	$252	3.8	51%	$66	$252
LA Basin – San Diego	20.8	15%	$31	$637	21.0	15%	$31	$643	21.7	15%	$31	$665	21.5	15%	$31	$659
LA Basin – Bay Area	12.2	59%	$68	$827	12.3	59%	$68	$831	12.3	59%	$68	$837	12.3	59%	$68	$835
Sacramento – Bay Area	2.8	4%	$45	$127	2.9	4%	$45	$128	2.8	4%	$45	$127	2.8	4%	$45	$127
San Diego – Sacramento	0.1	4%	$77	$7	0.1	4%	$78	$7	0.1	5%	$78	$7	0.1	4%	$78	$7
San Diego – Bay Area	3.4	38%	$81	$274	3.5	39%	$81	$279	3.6	40%	$81	$287	3.5	40%	$81	$285
Bay Area – San Joaquin Valley	7.8	11%	$45	$354	7.8	11%	$45	$353	7.8	11%	$45	$353	7.8	11%	$45	$353
San Joaquin Valley – LA Basin	8.2	11%	$44	$360	8.1	11%	$44	$361	8.2	12%	$44	$364	8.2	12%	$44	$364
Sacramento – San Joaquin Valley	2	9%	$43	$86	2	9%	$43	$86	2.0	9%	$42	$86	2.0	9%	$43	$86
San Diego – San Joaquin Valley	0.1	27%	$56	$5	0.1	26%	$56	$5	0.1	28%	$57	$5	0.1	28%	$56	$5
Within Bay Area Peninsula	6.5	0.10%	$11	$71	6.5	0.08%	$11	$71	6.5	0.08%	$11	$71	6.5	0.08%	$11	$71
Within North LA Basin	5	0.10%	$12	$61	5.9	0.07%	$12	$74	5.9	0.07%	$12	$72	5.8	0.07%	$12	$71
Within South LA Basin	2.9	0.00%	$10	$30	2.8	0.03%	$10	$29	2.9	0.03%	$10	$30	2.7	0.03%	$10	$28
North LA – South LA	5.5	0.20%	$11	$61	5.6	0.19%	$11	$63	5.6	0.19%	$11	$64	5.5	0.19%	$11	$62
Within San Diego Region	0.3	0.00%	$11	$3	0.3	0.00%	$11	$3	0.3	0.00%	$11	$3	0.3	0.00%	$11	$3
Within San Joaquin Valley*	2.1	0.00%	$29	$62	2.1	0.03%	$29	$62	2.1	0.03%	$29	$62	2.1	0.03%	$29	$62
Other *	10.3	0.10%	$53	$547	10.4	0.14%	$53	$550	10.4	0.14%	$53	$551	10.4	0.14%	$53	$551
Total	**93.7**	**0.20%**	**$40**	**$3,763**	**95.2**	**0.18%**	**$0**	**$3,795**	**96.2**	**0.18%**	**$0**	**$3,836**	**95.6**	**0.18%**	**$0**	**$3,820**
Within San Diego Region	0.3	0.00%	$11	$3	0.3	0.00%	$11	$3	0.3	0.00%	$11	$3	0.3	0.00%	$11	$3
Within Entire LA Basin	13.3	0.00%	$11	$153	14.4	0.06%	$12	$166	14.4	0.06%	$12	$166	14.1	0.06%	$11	$161
Within Entire Bay Area	6.5	0.00%	$11	$71	6.5	0.08%	$11	$71	6.5	0.08%	$11	$71	6.5	0.08%	$11	$71
Total Between Regions	**73.6**	**8.1%**	**$48**	**$3,536**	**74.0**	**8.1%**	**$48**	**$3,555**	**75.0**	**8.2%**	**$48**	**$3,597**	**74.7**	**8.2%**	**$48**	**$3,585**

* "Within San Joaquin Valley" and "Other" markets include interregional and intraregional travel.

Table 5. Station Boardings, San Gabriel Valley Variations

Origin Station	Increased Parking Cost Scenario	El Monte Transit Village Scenario	West Covina Station Scenario	Pomona Station Scenario
San Francisco (Transbay)	34,500	34,600	34,800	34,700
Millbrae	5,700	5,700	5,700	5,700
Redwood City	7,500	7,500	7,500	7,500
San Jose	12,100	12,100	12,100	12,100
Gilroy	6,500	6,500	6,500	6,500
Sacramento	18,100	18,200	18,200	18,200
Stockton	6,300	6,300	6,400	6,400
Modesto/SP Downtown	4,400	4,300	4,400	4,400
Merced	2,500	2,500	2,400	2,500
Fresno	8,000	7,900	8,000	8,000
Bakersfield	8,100	8,100	8,100	8,100
Palmdale	16,400	16,500	16,700	16,500
Sylmar	12,900	12,900	13,000	13,000
Burbank	4,100	4,200	4,200	4,200
Los Angeles (Union)	28,100	26,100	28,800	31,000
Norwalk	6,800	6,900	6,800	7,100
Anaheim	21,700	22,800	22,800	23,200
City of Industry	6,400			
El Monte Transit Village		8,000		
West Covina			7,100	
Pomona				6,000
Ontario	10,600	13,000	12,100	10,000
Riverside	13,700	14,400	14,700	13,600
Temecula/Murrieta	7,100	7,200	7,300	7,200
Escondido	7,800	7,900	8,100	8,100
University City	5,900	5,900	6,100	6,100
San Diego (Downtown)	19,200	19,300	19,900	19,800
Daily	**274,100**	**279,000**	**281,700**	**279,700**

Table 6. Daily Line Loads, San Gabriel Valley Variations

Origin Station	Destination Station	Increased Parking Cost Scenario	El Monte Transit Village Scenario	West Covina Station Scenario	Pomona Station Scenario
San Francisco (Transbay)	Millbrae	34,500	34,600	34,800	34,700
Millbrae	Redwood City	32,400	32,500	32,700	32,600
Redwood City	San Jose	34,400	34,500	34,700	34,600
San Jose	Gilroy	39,200	39,400	39,600	39,500
Gilroy	Merced	6,100	6,100	6,000	6,100
Gilroy	Fresno	33,700	33,900	34,200	34,100
Sacramento	Stockton	18,100	18,200	18,200	18,200
Stockton	Modesto/SP Downtown	23,700	23,800	23,800	23,800
Modesto/SP Downtown	Merced	26,700	26,700	26,700	26,700
Merced	Fresno	22,200	22,300	22,300	22,300
Fresno	Bakersfield	53,000	53,300	53,600	53,500
Bakersfield	Palmdale	49,100	49,400	49,800	49,600
Palmdale	Sylmar	55,900	56,200	56,800	56,600
Sylmar	Burbank	53,300	53,700	54,400	54,100
Burbank	Los Angeles Union	51,900	52,300	53,200	52,800
Los Angeles Union	Norwalk	25,100	26,400	26,200	27,000
Norwalk	Anaheim	21,700	22,800	22,700	23,100
Los Angeles Union	City of Industry	37,500			
Los Angeles Union	El Monte Transit Village		37,900		
Los Angeles Union	West Covina			41,000	
Los Angeles Union	Pomona				41,900
City of Industry	Ontario	39,800			
El Monte Transit Village	Ontario		42,400		
West Covina	Ontario			43,200	
Pomona	Ontario				41,100
Ontario	Riverside	39,700	40,900	42,300	40,800
Riverside	Temecula/Murrieta	36,200	36,600	37,800	37,400
Temecula/Murrieta	Escondido	32,000	32,300	33,300	33,000
Escondido	University City	24,700	25,000	25,700	25,500
University City	San Diego	19,200	19,400	19,900	19,800

Ridership increases lead to a $74 million (2.0 percent) rise in system revenue over the *Increased Parking Cost Scenario*. Interregional total revenue increases by approximately $61 million (1.7 percent). The individual markets with the largest increase in revenues are LA Basin-San Diego ($27 million, 4.3 percent) and San Diego-Bay Area ($13 million, 4.7 percent). Revenue for trips within the LA Basin increases by about $13 million (8.5 percent).

Overall, average daily boardings increase by 7,600, or 2.8 percent (see Table 5). San Gabriel Valley stations gain about 2,200 daily interregional boardings over the *Increased Parking Cost Scenario*. Many travelers from the southern San Gabriel Valley and southwestern San

Bernardino County who formerly boarded at City of Industry (in the *Increased Parking Cost Scenario*) are projected to instead use the Anaheim and Ontario stations, which experience the largest increase in daily boardings (1,100 and 1,500, respectively). The West Covina station attracts roughly 700 more boardings than City of Industry, due largely to increases in intraregional travelers. Daily line loads between the San Diego area and the LA Basin increase by 3 to 9 percent (see Table 6). Line loads in other segments are projected to increase by two percent or less.

Pomona Station Scenario

The 2030 forecast for this scenario resulted in a predicted annual high-speed rail ridership of 95.6 million, an increase of 1.9 million (2.0 percent) compared to the *Increased Parking Cost Scenario* (see Table 4). This overall increase includes a 0.8 million (6.0 percent) ridership increase within the LA Basin. The greatest change in interregional HSR ridership occurs in the LA Basin-San Diego (3.4 percent) and San Diego-Bay Area (2.9 percent) markets.

Ridership increases lead to a $57 million (1.5 percent) increase in system revenue compared to the *Increased Parking Cost Scenario*. Interregional revenue increases by approximately $49 million (1.4 percent). The individual markets with the largest improvement in revenues are LA Basin-San Diego ($21 million, 3.4 percent) and San Diego-Bay Area ($11 million, 4.0 percent). Intraregional revenue within the LA Basin rises by about $13 million (5.7 percent).

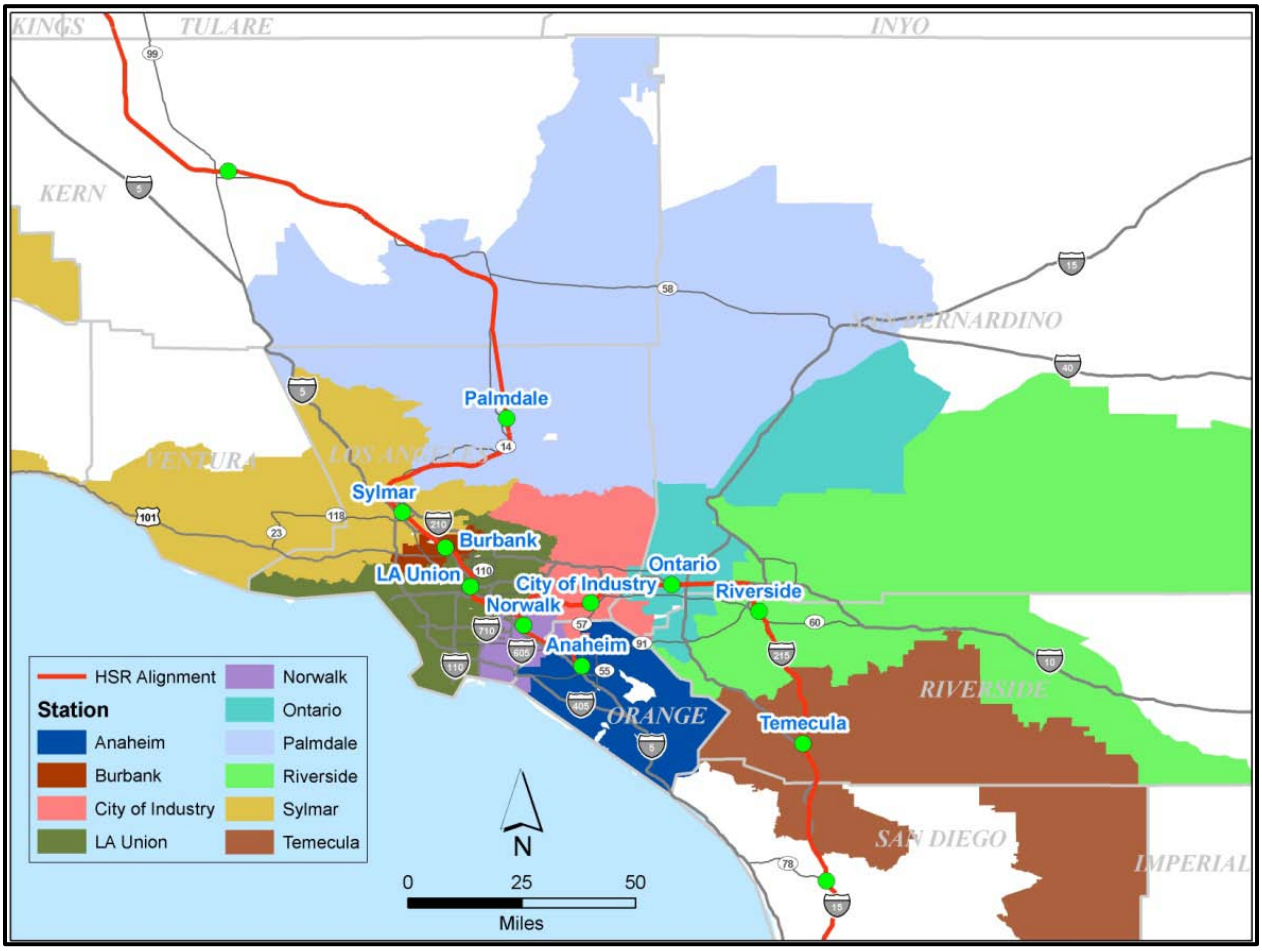
Systemwide daily boardings increase by 5,600, or 2.1 percent (see Table 5). The Pomona station is projected to have about 400 fewer boardings (6.7 percent) compared to City of Industry. In addition, Ontario is projected to have about 10,000 fewer daily boardings in this scenario due to residents in southwest San Bernardino County shifting to the Pomona station. However, the more eastern location of the Pomona station (relative to City of Industry) contributes to large increases in boardings at LAUS (10.6 percent) and Anaheim (6.9 percent).

Daily line loads between the San Diego region and the LA Basin increase by about 3 percent, with the exception of LAUS-Pomona, which rises by 11.7 percent (see Table 6). The majority of these new trips between LAUS and the San Gabriel Valley stop are intraregional travelers within the LA Basin. Other line loads on the corridor are projected to increase by one percent or less.

Station Catchment Areas

Replacing the City of Industry stop with a new station and alignment along the I-10 corridor alters the HSR station access decisions made by travelers in eastern Los Angeles County and northern Orange County, as illustrated in Figures 2 through 5.

Figure 2. Station Catchment Areas for Increased Parking Cost Scenario

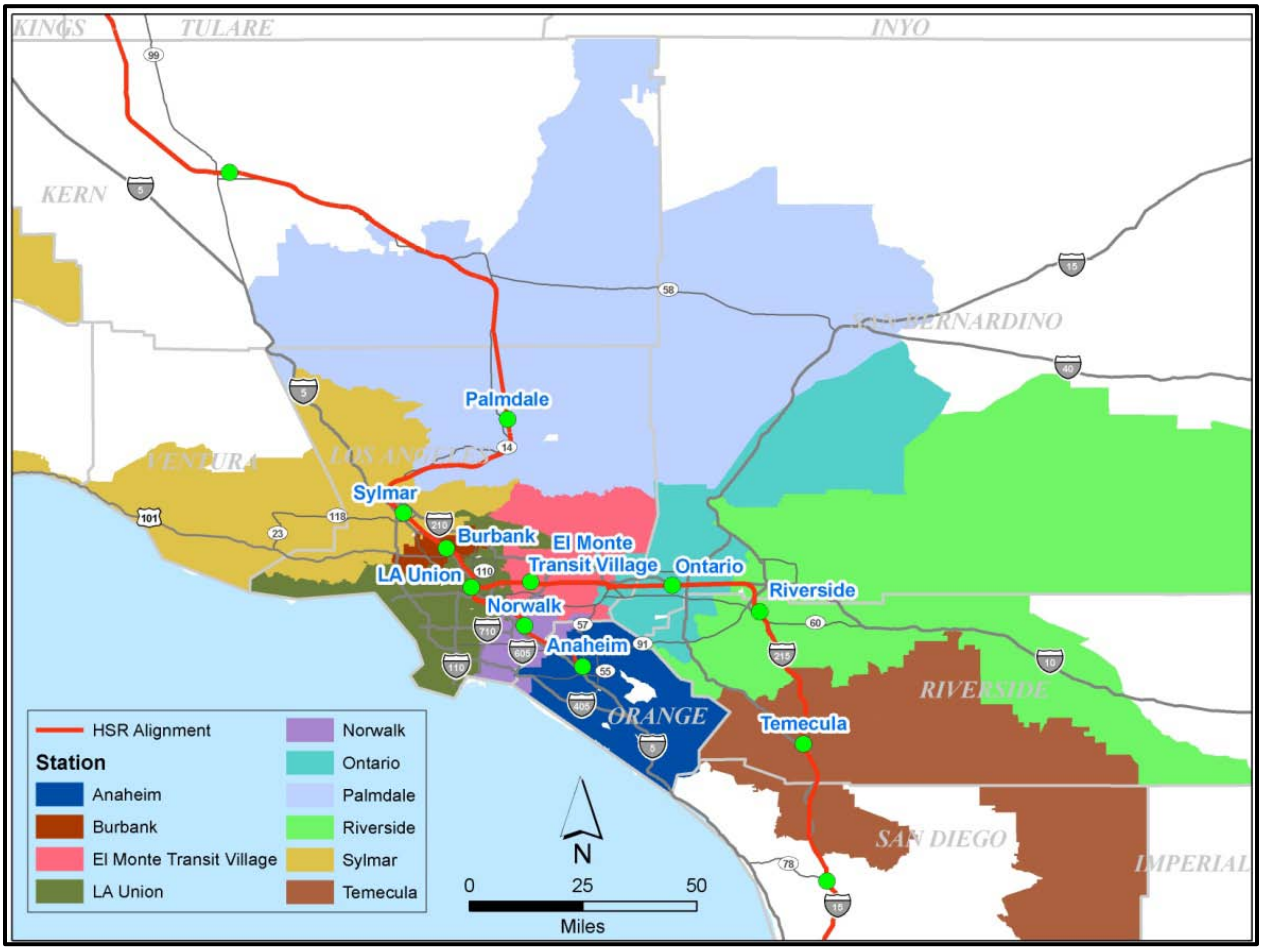


An El Monte Transit Village station offers more convenient access to areas in eastern Los Angeles County, drawing riders away from LAUS and leading those in the southern San Gabriel Valley and southwestern San Bernardino County to choose Ontario in the absence of a City of Industry station (Figure 3).

While West Covina's catchment area (Figure 4) is of a similar extent as the City of Industry, its central location offers access to a higher-density area, while residents in the southern San Gabriel Valley and Chino areas find suitable alternative access at Ontario.

Pomona's location in the far eastern portion of San Gabriel Valley (Figure 5) leads to a station catchment area that extends into San Bernardino County, while LAUS and Anaheim stations replace City of Industry as the most attractive station for southern and western portions of the San Gabriel Valley.

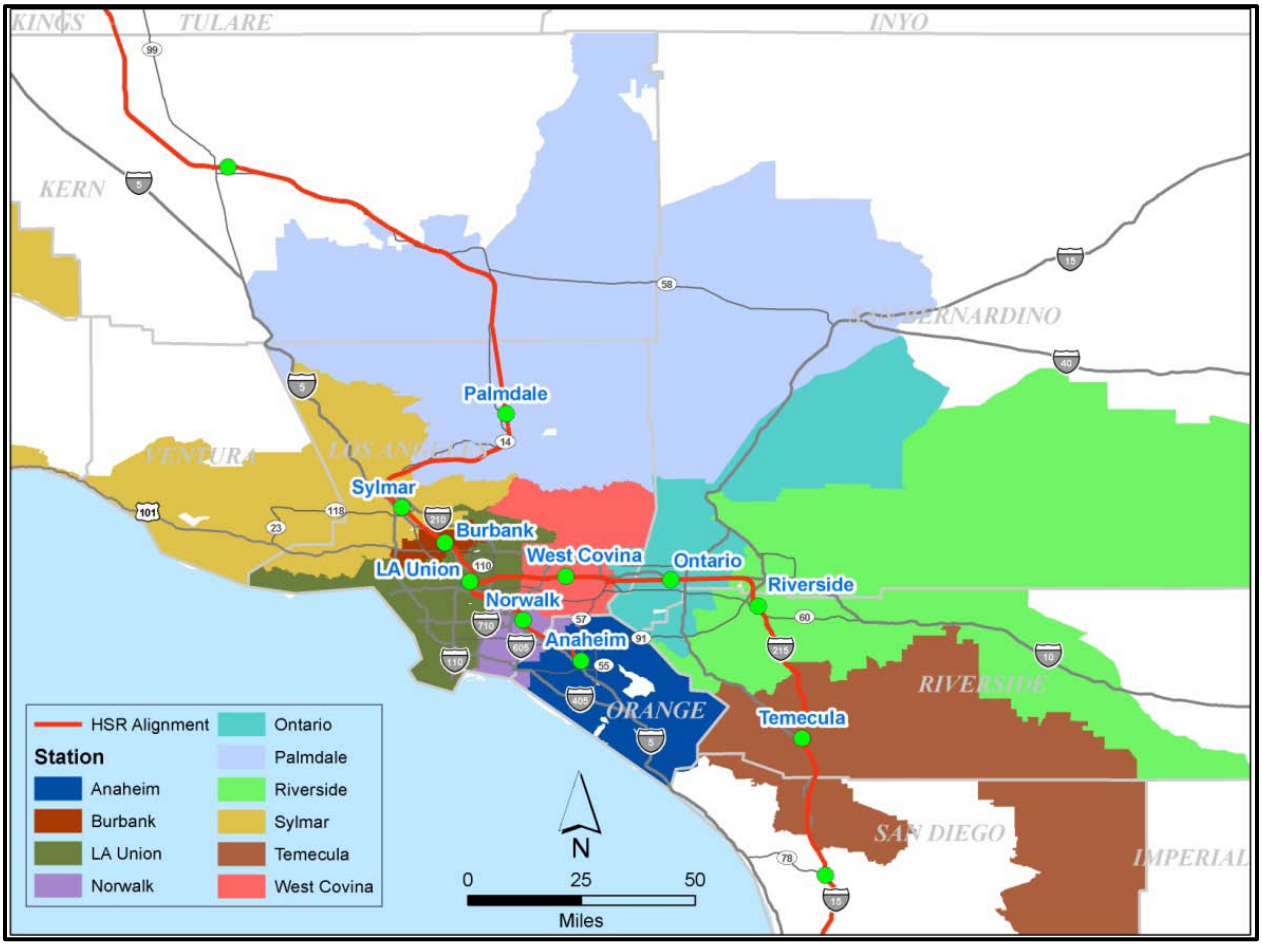
Figure 3. Station Catchment Areas for El Monte Transit Village Scenario



Population and Employment Density

Stations at El Monte Transit Village, West Covina, and Pomona each serve areas of greater population density compared to City of Industry (see Figure 6). While average population density at the City of Industry station is roughly 5,000 people per square mile, the other station locations feature average per mile population densities between 5,000 and 20,000 people per square mile. Employment density at these stations is roughly comparable to the City of Industry vicinity (see Figure 7). Different population densities near stations along the I-10 corridor is a major contributor to the projected ridership and station boarding differences between scenarios.

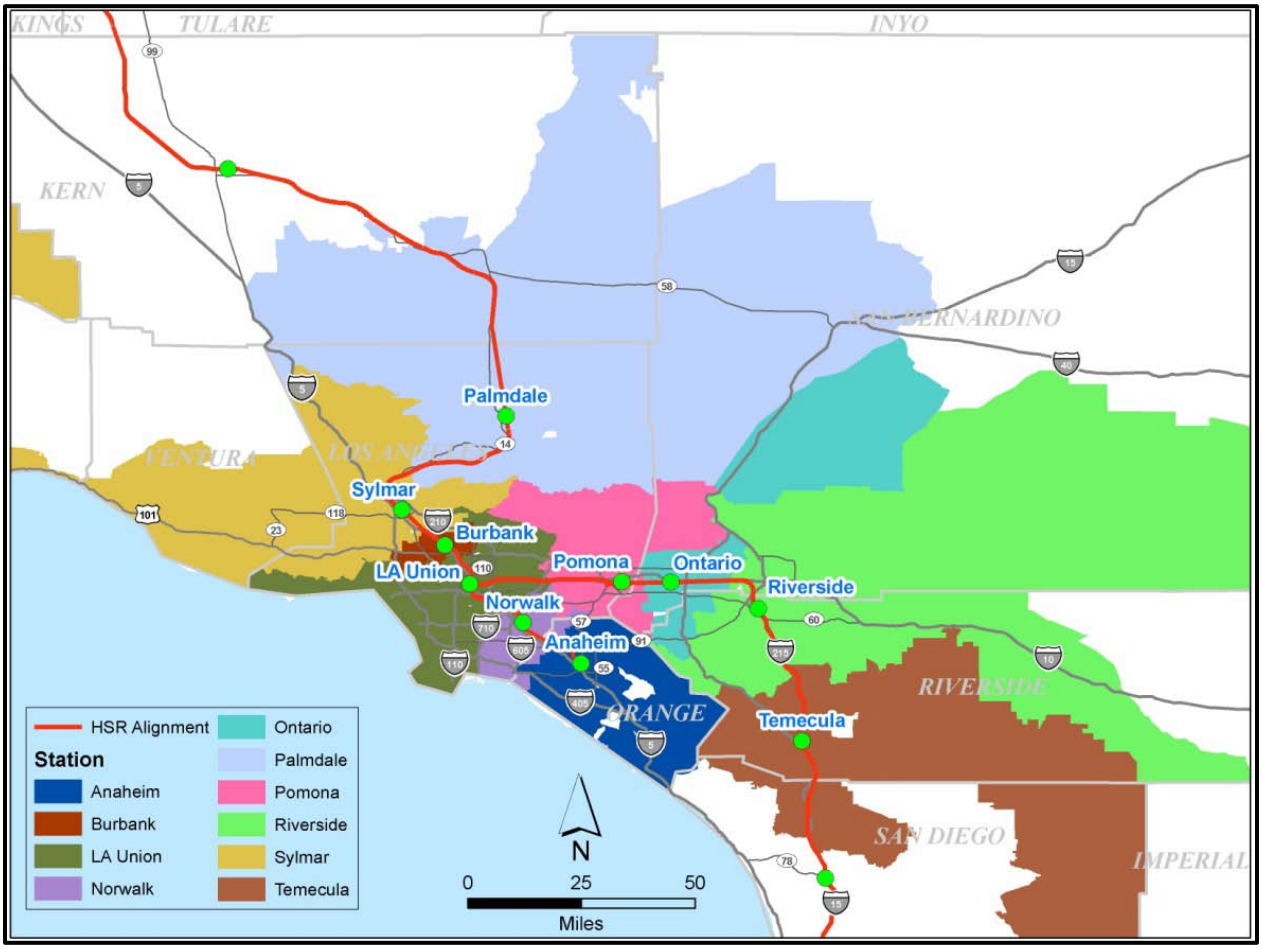
Figure 4. Station Catchment Areas for West Covina Station Scenario



Analysis

These results suggest that, at the system level, the analyzed scenarios for the San Gabriel Valley, have similar ridership and revenue potential, particularly for interregional travelers. Due to faster service and more favorable station locations, the three San Gabriel Valley scenarios result in measurable increases in intraregional travel within the LA Basin (9 to 15 percent) compared to the *Increased Parking Cost Scenario*. Of the three scenarios, the *West Covina Station Scenario* would provide the greatest increase in overall ridership (2.7 percent) and revenue (2.0 percent) due in part to its shorter, more direct alignment and location within a densely populated area roughly halfway between LAUS and Ontario.

Figure 5. Station Catchment Areas for Pomona Station Scenario



Additional Note

The information and results presented in this memorandum are estimates and projections that involve subjective judgments, and may differ materially from the actual future ridership and revenue. This memorandum is not intended nor shall it be construed to constitute a guarantee, promise, or representation of any particular outcome(s) or result(s). Further, the material presented in this memorandum is provided for purposes of supporting high-speed rail planning-level analyses, and is intended to assist in identifying relative differences between potential alignment and station alternatives.

Figure 6. Year 2030 Projected Population Density (people per square mile)

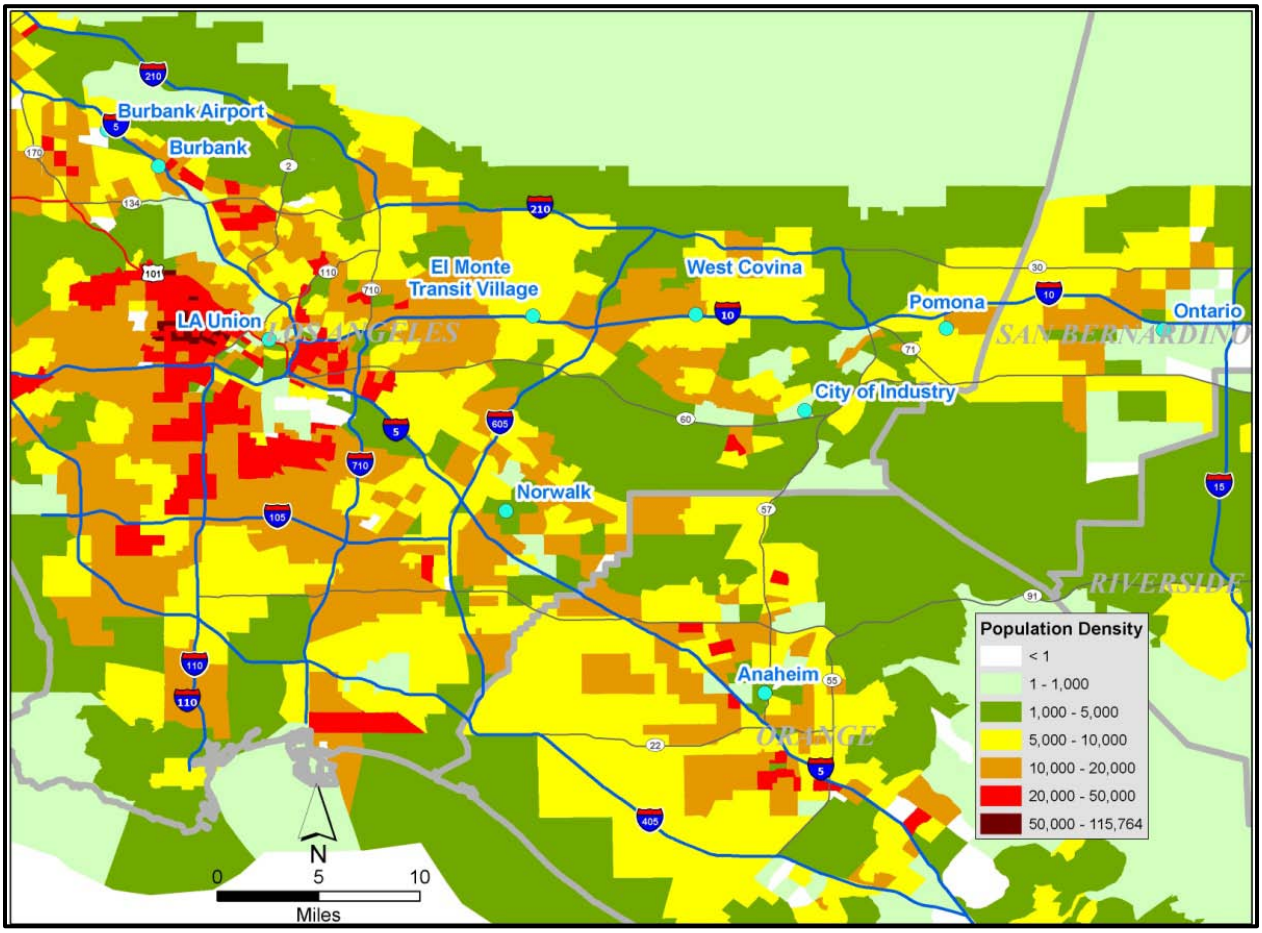


Figure 7. Year 2030 Projected Employment Density (jobs per square mile)