

# Memorandum

TO: Nick Brand

FROM: James Johnson, Michael Snavely, Rachel Copperman,  
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DATE: August 17, 2010

RE: Ridership and Revenue Results for Inland Empire Alignment and Station  
Alternatives - FINAL

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The CS project team modeled three scenarios with alternative station configurations in the Inland Empire for the Full System in 2030. Each alternative included the same overall level of high-speed rail operations used in the May 2009 operating plan and included in the *Increased Parking Cost Scenario*. These scenarios test the effects of:

- Adding a stop at San Bernardino (*San Bernardino Station Scenario*);
- Replacing the Riverside station with a stop at March Air Reserve Base (*March ARB Station Scenario*); and
- Replacing the Riverside station with a stop at Corona (*Corona Station Scenario*).

Both the *San Bernardino Station Scenario* and *Corona Station Scenario* include an alignment variation, as shown in Figure 1.

## *Operating Plans*

The operating plan for the *San Bernardino Station Scenario* (see Table 1) is identical to the *Increased Parking Cost Scenario* with the exception of an additional station in San Bernardino between Ontario and Riverside, located east of I-215 along West Rialto Avenue. This addition requires an alignment change, which follows the Metrolink line from Ontario to San Bernardino before turning south along I-215 towards Riverside. Due to the slightly longer alignment and additional station, travel time through the Inland Empire increases by two minutes for express trains and seven minutes for trains stopping at San Bernardino.



**Table 1. Full System Operating Plan for the San Bernardino Station Scenario**

Station	Run Time from Start Station (Minutes)													
	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
City of Industry				208	218			19						174
Ontario		203		220	230	241		31						186
San Bernardino		213		230	240			41						196
Riverside				240	250	257		51	39					206
Murrieta				257	267			68						223
Escondido				275	285			86						241
University City		260		290	300	299		101						256
San Diego		272		302	312	311		113	89					268
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

Note: “|” indicates no station stop for indicated pattern.

**Table 2. Full System Operating Plan for the March ARB Station Scenario**

Station	Run Time from Start Station (Minutes)													
	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
City of Industry				208	218			19						174
Ontario		203		220	230	241		31						186
March ARB		218		235	245	256		46	37					201
Murrieta				250	260			61						216
Escondido				268	278			79						234
University City		258		283	293	296		94						249
San Diego		270		295	305	308		106	85					261
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 Corona Station Scenario**

Station	Run Time from Start Station (minutes)													
	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
City of Industry				208	218			19						174
Ontario		203		220	230	241		31						186
Corona		213		230	240	251		41	32					196
Murrieta				244	254			55						210
Escondido				262	272			73						228
University City		262		277	287	290		88						243
San Diego		264		289	299	302		100	79					255
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

### San Bernardino Station Scenario

The 2030 full system forecast for this scenario resulted in a predicted annual high-speed rail ridership of 94.2 million (see Table 4). This value represents an overall increase of 0.5 million riders (1 percent) compared to the *Increased Parking Cost Scenario*. The San Bernardino Station Scenario experiences a decrease in interregional HSR trips along with an increase in intraregional HSR trips. The interregional decrease can be largely attributed to a decline of 350,000 riders in the LA Basin-San Diego market (2 percent). However, the introduction of a new station improves local connectivity, raising intraregional ridership within the LA Basin by 1.12 million trips (8 percent).

Systemwide revenue is projected to decrease by \$27 million (0.7 percent) compared to the *Increased Parking Cost Scenario*. Interregional total revenue decreases by approximately \$36 million (0.03 percent). Much of this drop can be attributed to decreases occurring between the LA Basin-San Diego (\$14 million), Bay Area-San Diego (\$8 million), and LA Basin-Bay Area (\$10 million) travel markets.

Table 5 presents the average daily boardings at each high-speed rail station. In the *San Bernardino Station Scenario*, systemwide average daily boardings increase by 2,300 (0.8 percent) compared to the *Increased Parking Cost Scenario*. Riverside boardings decrease by about 3,900 per day and Ontario boardings decrease by about 1,700, but these are offset by 8,600 boardings at the San Bernardino station. Intraregional travel from the three Inland Empire stations increases by 29 percent, accounting for 85 percent of the net increase in boardings. Total interregional boardings from Inland Empire stations increase by about 400 (3 percent). This increase in local boardings is offset by a significant decrease of about 2,200 interregional boardings for other stations throughout the system.

While station boardings increased, daily line loads are projected to decrease between 0.4 and 2 percent (see Table 6). This situation is related to the decrease in interregional trips to and from San Diego offset by an increase in intraregional trips at the San Bernardino station.

### March ARB Station Scenario

The 2030 full system *March ARB Station Scenario* resulted in predicted annual high-speed rail ridership of 93.2 million (see Table 4), a decrease of 0.5 million (0.1 percent) compared to the *Increased Parking Cost Scenario*. This decrease can be largely attributed to a 3.18 percent decrease in travel within the SCAG region. There is no measurable change in interregional HSR ridership.

Systemwide revenue is projected to decrease slightly by \$4 million (0.01 percent) compared to the *Increased Parking Cost Scenario*. Interregional revenue increases by approximately \$2 million (less than 0.01 percent). No individual market showed a measurable change in revenue.

**Table 4. 2030 Full System Annual Region-to-Region Ridership and Revenue, Inland Empire Station Scenarios**

Market	Increased Parking Cost Scenario				San Bernardino Station Scenario				March ARB Station Scenario				Corona Station Scenario			
	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	\$249	3.8	50%	\$66	\$249	3.7	49%	\$66	\$247
LA Basin - San Diego	20.8	15%	\$31	\$637	20.4	14%	\$31	\$623	20.7	15%	\$31	\$637	20.7	15%	\$31	\$639
LA Basin - Bay Area	12.2	59%	\$68	\$827	12.1	58%	\$68	\$817	12.2	59%	\$68	\$828	11.9	57%	\$68	\$806
Sacramento - Bay Area	2.8	4%	\$45	\$127	2.8	4%	\$45	\$126	2.9	4%	\$45	\$127	2.8	4%	\$45	\$127
San Diego - Sacramento	0.1	4%	\$77	\$7	0.1	4%	\$77	\$6	0.1	4%	\$78	\$7	0.1	4%	\$78	\$7
San Diego - Bay Area	3.4	38%	\$81	\$274	3.3	37%	\$81	\$266	3.4	38%	\$81	\$274	3.5	39%	\$81	\$284
Bay Area - San Joaquin Valley	7.8	11%	\$45	\$354	7.8	11%	\$45	\$353	7.8	11%	\$45	\$354	7.8	11%	\$45	\$353
San Joaquin Valley - LA Basin	8.2	11%	\$44	\$360	8.1	11%	\$44	\$359	8.2	11%	\$44	\$361	8.1	11%	\$44	\$358
Sacramento - San Joaquin Valley	2	9%	\$43	\$86	2	9%	\$42	\$86	2	9%	\$43	\$86	2	9%	\$42	\$86
San Diego - San Joaquin Valley	0.1	27%	\$56	\$5	0.1	27%	\$57	\$5	0.1	27%	\$56	\$5	0.1	29%	\$57	\$5
Within Bay Area Peninsula	6.5	0.1%	\$11	\$71	6.5	0.0%	\$11	\$71	6.5	0.0%	\$11	\$71	6.5	0.0%	\$11	\$71
Within North LA Basin	5	0.1%	\$12	\$61	5.7	0.0%	\$12	\$67	4.9	0.0%	\$12	\$61	4.9	0.0%	\$12	\$61
Within South LA Basin	2.9	0.0%	\$10	\$30	2.9	0.0%	\$10	\$30	2.8	0.0%	\$10	\$29	2.3	0.0%	\$10	\$23
North LA - South LA	5.5	0.2%	\$11	\$61	5.9	0.0%	\$11	\$65	5.2	0.1%	\$11	\$58	4.9	0.1%	\$11	\$55
Within San Diego region	0.3	0.0%	\$11	\$3	0.3	0.0%	\$11	\$3	0.3	0.0%	\$11	\$3	0.3	0.0%	\$11	\$3
Within San Joaquin Valley*	2.1	0.0%	\$29	\$62	2.1	0.0%	\$29	\$62	2.1	0.0%	\$29	\$62	2.2	0.0%	\$29	\$62
Other*	10.3	0.1%	\$53	\$547	10.4	0.1%	\$53	\$547	10.4	0.1%	\$53	\$548	10.4	0.1%	\$53	\$548
<b>Total</b>	<b>93.7</b>	<b>0.2%</b>	<b>\$40</b>	<b>\$3,763</b>	<b>94.2</b>	<b>0.1%</b>	<b>\$40</b>	<b>\$3,736</b>	<b>93.2</b>	<b>0.1%</b>	<b>\$40</b>	<b>\$3,759</b>	<b>92.1</b>	<b>0.1%</b>	<b>\$41</b>	<b>\$3,735</b>
Within San Diego Region	0.3	0.0%	\$11	\$3	0.3	0.0%	\$11	\$3	0.3	0.0%	\$11	\$3	0.3	0.0%	\$11	\$3
Within Entire LA Basin	13.3	0.0%	\$11	\$153	14.4	0.0%	\$11	\$162	12.9	0.0%	\$11	\$148	12.1	0.0%	\$12	\$139
Within Entire Bay Area	6.5	0.0%	\$11	\$71	6.5	0.0%	\$11	\$71	6.5	0.0%	\$11	\$71	6.5	0.0%	\$11	\$71
<b>Total Between Regions</b>	<b>73.6</b>	<b>8.1%</b>	<b>\$48</b>	<b>\$3,536</b>	<b>73.0</b>	<b>8.0%</b>	<b>\$48</b>	<b>\$3,500</b>	<b>73.6</b>	<b>8.1%</b>	<b>\$48</b>	<b>\$3,538</b>	<b>73.2</b>	<b>8.0%</b>	<b>\$48</b>	<b>\$3,522</b>

\* "W/in San Joaquin Valley" and "Other" markets include interregional and intraregional travel.

**Table 5. Station Boardings, Inland Empire Station Scenarios**

<b>Origin Station</b>	<b>Increased Parking Cost Scenario</b>	<b>San Bernardino Station Scenario</b>	<b>March ARB Station Scenario</b>	<b>Corona Station Scenario</b>
San Francisco (Transbay)	34,500	34,300	34,500	34,400
Millbrae	5,700	5,700	5,700	5,700
Redwood City	7,500	7,400	7,500	7,400
San Jose	12,100	12,000	12,100	12,000
Gilroy	6,500	6,500	6,300	6,500
Sacramento	18,100	18,000	18,100	18,000
Stockton	6,300	6,400	6,300	6,300
Modesto/SP Downtown	4,400	4,300	4,400	4,400
Merced	2,500	2,500	2,500	2,500
Fresno	8,000	7,900	8,000	7,900
Bakersfield	8,100	8,100	8,100	8,100
Palmdale	16,400	15,900	16,400	16,400
Sylmar	12,900	12,800	12,900	13,000
Burbank	4,100	4,100	4,100	4,200
Los Angeles (Union)	28,100	28,600	27,700	28,000
Norwalk	6,800	6,900	6,800	6,800
Anaheim	21,700	21,600	21,700	21,400
City of Industry	6,400	6,500	6,200	6,300
Ontario	10,600	8,900	11,600	12,800
San Bernardino		8,600		
March ARB			12,500	
Corona				4,100
Riverside	13,700	9,800		
Temecula/Murrieta	7,100	7,500	7,100	9,200
Escondido	7,800	7,600	7,800	8,000
University City	5,900	5,700	5,900	6,000
San Diego (Downtown)	19,200	18,800	19,200	18,900
<b>Daily</b>	<b>274,100</b>	<b>276,400</b>	<b>272,300</b>	<b>268,400</b>

**Table 6. Daily Line Loads, Inland Empire Station Scenarios**

Origin Station	Destination Station	Increased Parking Cost Scenario	San Bernardino Station Scenario	March ARB Station Scenario	Corona Station Scenario
San Francisco (Transbay)	Millbrae	34,500	34,300	34,500	34,400
Millbrae	Redwood City	32,400	32,200	32,400	32,300
Redwood City	San Jose	34,400	34,100	34,400	34,200
San Jose	Gilroy	39,200	38,900	39,300	39,000
Gilroy	Merced	6,100	6,000	6,100	6,100
Gilroy	Fresno	33,700	33,400	33,700	33,500
Sacramento	Stockton	18,100	18,000	18,100	18,000
Stockton	Modesto/SP Downtown	23,700	23,700	23,700	23,600
Modesto/SP Downtown	Merced	26,700	26,500	26,600	26,500
Merced	Fresno	22,200	22,100	22,200	22,100
Fresno	Bakersfield	53,000	52,600	53,000	52,600
Bakersfield	Palmdale	49,100	48,700	49,100	48,700
Palmdale	Sylmar	55,900	55,300	55,900	55,500
Sylmar	Burbank	53,300	52,600	53,300	53,000
Burbank	Los Angeles Union	51,900	51,200	52,000	51,700
Los Angeles Union	Norwalk	25,100	25,200	25,100	24,900
Norwalk	Anaheim	21,700	21,600	21,700	21,400
Los Angeles Union	City of Industry	37,500	36,900	37,100	37,000
City of Industry	Ontario	39,800	39,200	39,200	39,200
Ontario	Riverside	39,700			
Ontario	San Bernardino		39,100		
Ontario	March ARB			39,000	
Ontario	Corona				38,900
San Bernardino	Riverside		39,300		
Riverside	Temecula/Murrieta	36,200	36,000		
March ARB	Temecula/ Murrieta			35,800	
Corona	Temecula/Murrieta				38,000
Temecula/Murrieta	Escondido	32,000	31,300	31,800	31,900
Escondido	University City	24,700	24,200	24,600	24,500
University City	San Diego	19,200	18,800	19,100	18,900

Overall, average daily boardings decrease by 1,800, or 0.1 percent (see Table 5). For interregional travel, the greatest boarding differences are found for Ontario, March ARB/Riverside, and Temecula. Interregional ridership increases at Ontario by 1,200, but decreases at March ARB and Temecula. This result occurs since March ARB is closer to Temecula while Riverside is closer to Ontario. Intraregional boardings decrease at all stations between LA Union Station and Temecula, with the greatest decrease at March ARB. A decline in trips to/from March ARB accounts for much of the decrease in systemwide station

boardings. Daily line loads between Los Angeles and Temecula drop by about 1.8 percent compared to the Ontario-Riverside segment (see Table 6). Other station-to-station loads on the corridor show no significant change.

### **Corona Station Scenario**

The 2030 forecast of annual high-speed rail ridership for this scenario is 92.1 million, a decrease of 1.6 million (0.1 percent) compared to the *Increased Parking Cost Scenario* (see Table 4). This decrease can be largely attributed to a decrease in LA Basin intraregional travel of 1.3 million trips (10 percent).

Systemwide revenue decreases by \$28 million (0.1 percent) compared to the *Increased Parking Cost Scenario*. Interregional revenue decreases by approximately \$14 million (0.04 percent). The individual markets with the largest change in revenue are LA Basin-Bay Area, which drops by \$21 million (2.5 percent), and San Diego-Bay Area which rises by \$10 million (3.6 percent). Intraregional revenue within the LA Basin decreases by about \$14 million (9 percent).

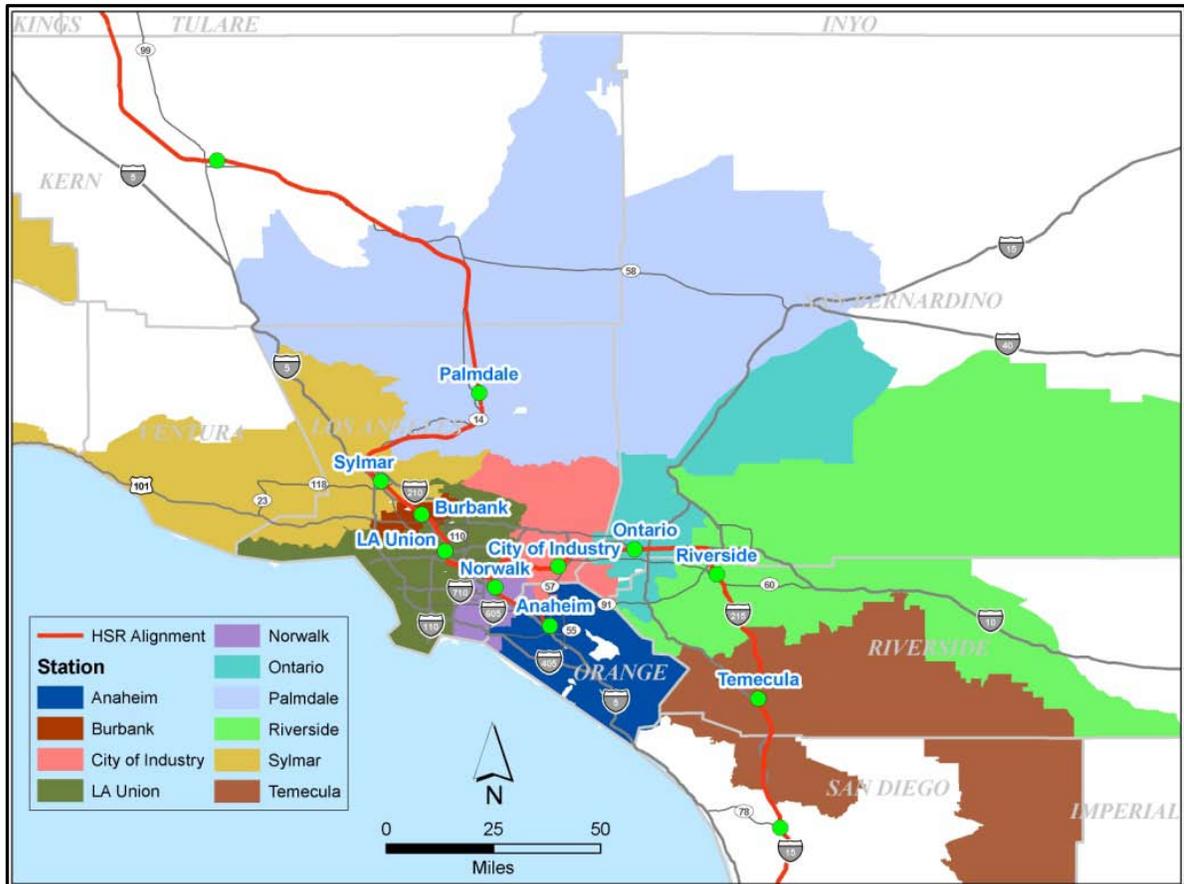
Systemwide daily boardings decrease by 5,700, or 2 percent (see Table 5). The Corona station has about 9,600 fewer daily boardings (70 percent) than Riverside. This decrease results from 7,300 fewer interregional boardings and 2,300 fewer intraregional boardings. For interregional travel, boardings at the adjacent stations (Ontario and Temecula) increase by 6,100, largely offsetting the loss of boardings at the Corona station. Thus, for longer distance trips, it appears that many travelers who use the Riverside station in the *Increased Parking Cost Scenario* use Ontario or Temecula rather than Corona.

Daily line loads (see Table 6) show a small but consistent decrease for most segments, with the exception of the segment between Corona and Temecula.

### **Station Catchment Areas**

Figures 2 through 5 show station catchment areas for the *Increased Parking Cost Scenario* and the three Inland Empire scenarios. Taken as a group, these four figures help explain the ridership and revenue differences between the scenarios. The addition of the San Bernardino station (Figure 3) offers more convenient access to much of San Bernardino County, drawing from areas served by the Palmdale, Ontario, and Riverside stations in the *Increased Parking Cost Scenario*. A station at March ARB (Figure 4) attracts riders from a similar geographic area to that of Riverside in the *Increased Parking Cost Scenario*. The *Corona Station Scenario* (Figure 5) illustrates a very different station usage pattern than exhibited in the other Inland Empire alternatives; the catchment areas for Ontario and Temecula increase to capture much of the area formerly served by a Riverside station, and the Corona station serving a geographically small area between the Cities of Corona and Riverside.

**Figure 2. Increased Parking Cost Scenario Catchment Areas**



***Population and Employment Density***

The population and employment densities maps in Figures 6 and 7, respectively, assist in further explaining the ridership patterns among the Inland Empire scenarios. Compared to Riverside, the areas around March ARB and Corona stations are forecast to have substantially lower population and employment density in 2030 (see Figure 6). While densities near the Riverside station ranges up to 50,000 people and 10,000 jobs per square mile, the Corona and March ARB stations are surrounded by areas with projected population and employment densities of less than 1,000 per square mile. *San Bernardino* features similar population density to Riverside, but somewhat higher-employment density. Other things being equal, station areas with higher population and employment density would be expected to generate higher levels of HSR ridership.





Figure 5. Corona Station Scenario Catchment Areas

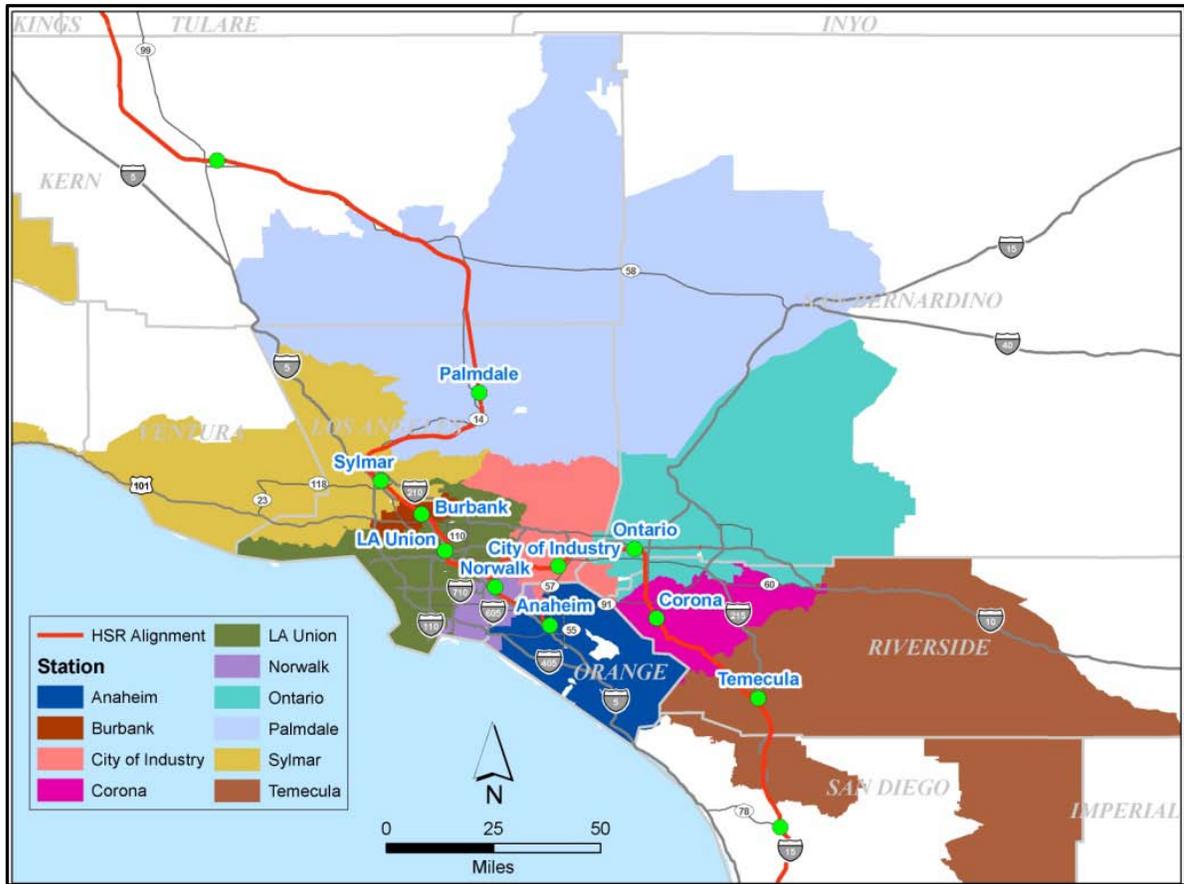


Figure 6. Year 2030 Projected Population Density (people per square mile)

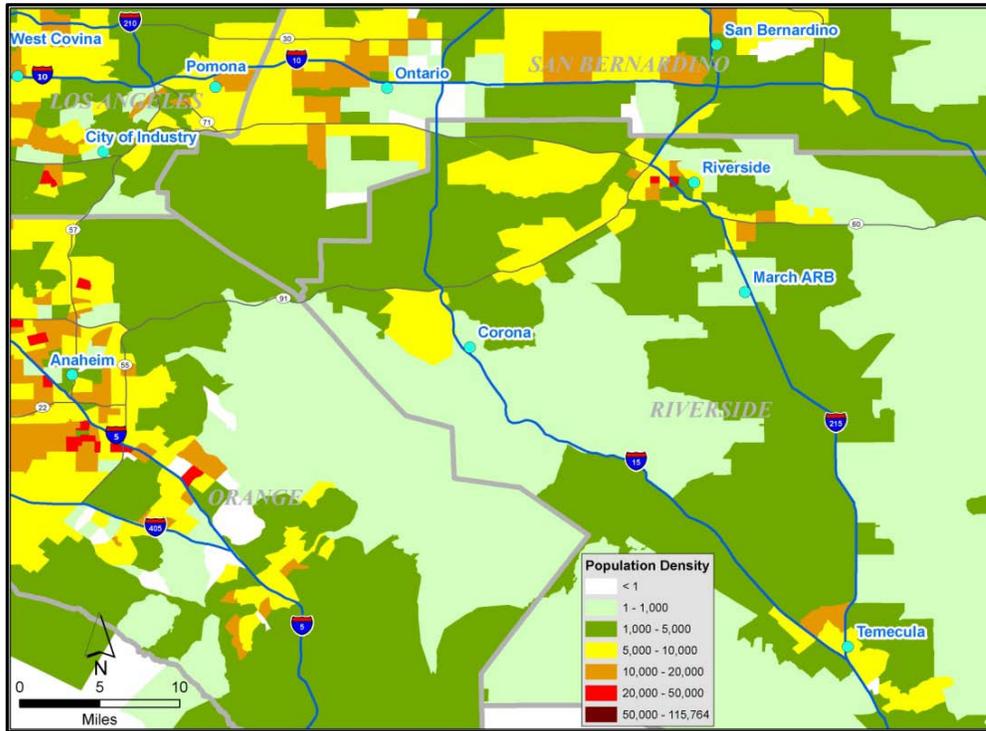


Figure 7. Year 2030 Projected Employment Density (jobs per square mile)

