

Memorandum

TO: Nick Brand

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

RE: Anaheim 3 Trains Per Hour Scenario - FINAL

Alternative operating scenarios were modeled for Year 2030 Phase I and Full System to test the ridership and revenue impacts of decreased service between LA Union Station and Anaheim station (*Anaheim 3 Trains Per Hour Scenario*). Both the Phase I and Full System alternatives follow the same alignment and include the same overall level of high-speed rail (HSR) operations used in the Increased Parking Cost and featured in the *Increased Parking Cost Scenario*.¹

Operating Plans

The operating plan for the Phase I *Anaheim 3 Trains Per Hour Scenario* (see Table 1) is identical to the Phase I *Increased Parking Cost Scenario* with the exception that train Pattern #1 terminates at LA Union Station rather than continuing on to Anaheim. Compared to the *Increased Parking Cost Scenario*, this constitutes a cumulative reduction of one train every 120 minutes from LA Union Station to Anaheim during peak hours. Under this operating plan, a total of seven trains arrive at Anaheim station every two-hours during peak periods.

The operating plan for the Full System *Anaheim 3 Trains Per Hour Scenario* (see Table 2) is identical to the *Increased Parking Cost Scenario* with the exception that train Patterns 0 and 15 terminate at LA Union Station rather than continuing on to Anaheim. Compared to the *Increased Parking Cost Scenario*, this constitutes a cumulative reduction of two trains per hour (a total of three trains) arriving at Anaheim station during the peak period.

¹ These scenarios also featured the higher station parking rates assumed under the Increased Parking Cost Scenario.

Table 1. 2030 Phase I Operating Plan for the Anaheim 3 Trains Per Hour Scenario

Station	Run Time from Start Station (Minutes)								
	60	120	60	120	30	60	120	40	40
Pattern #	0	1	2	3	4	5	6	7	8
San Francisco	0	0	0	0	0	0	0	0	
Millbrae				15	15			15	
Redwood City/Palo Alto		20		25		20	20	25	
San Jose		35	30	40	35	35	35	40	
Gilroy		51		56		51		56	
Merced								91	0
Fresno				97	87				22
Bakersfield				136	126				61
Palmdale						151	145		95
Sylmar					175		167		117
Burbank						179	176		126
Los Angeles Union Station	160	175	163	194	189	188	185		135
Norwalk				207			198		148
Anaheim			187	219			210		160

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

2030 Phase I Ridership and Revenue Results

The 2030 Phase I forecast for this scenario resulted in a predicted annual high-speed rail ridership of 52.9 million (see Table 3), a decrease of 1.5 million (2.8 percent) compared to the *Increased Parking Cost Scenario*. This drop can be attributed to a decline in ridership of 0.4 million within the LA Basin (5.0 percent), as well as a 1.1 million decline in interregional ridership (2.8 percent). The greatest percent drop in interregional ridership occurs in the San Diego-Bay Area market (0.2 million riders, 6.9 percent), since the Anaheim station serves as the primary access point for San Diego County travelers in the Phase I system. Other markets showing significant declines include LA Basin-Sacramento (0.1 million riders, 4.1 percent) and LA Basin-Bay Area (0.4 million riders, 3.3 percent). Interregional travel to locations in the Inland Empire also are negatively affected by the service reduction to Anaheim, since it is the primary HSR access point for San Bernardino and Riverside Counties in the Phase I system.

Ridership declines correspond to slightly higher overall drop in system revenues (\$75.4 million, 3.3 percent), the vast majority of which is attributable to interregional ridership. Interregional travel markets with the largest drop in revenue include San Diego-Bay Area (\$14.9 million, 6.8 percent) and LA Basin-Bay Area (\$25.9 million, 3.3 percent). For trips within the LA Basin, revenues decline by \$3.7 million (4.2 percent).

Table 2. Full System Operating Plan for the Anaheim 3 Trains per Hour 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							
Burbank						203						157	175	
Los Angeles Union Station	160	175	163	188	198	213	198	0	0			172	190	154
City of Industry				208	218			19						174
Ontario		203		220	230	237		31						186
Riverside		216		233	243	250		44	35					199
Murrieta				250	260			61						216
Escondido				268	278			79						234
University City		258		283	293	292		94						249
San Diego		270		295	305	304		106	85					261
Norwalk			176				211					189		
Anaheim			187				222					200		
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 3. 2030 Phase I Annual Region-to-Region Ridership and Revenue, Anaheim 3 Trains Per Hour Scenario

Market	Increased Parking Cost Scenario				Anaheim 3 Trains Per Hour 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)
LA Basin - Sacramento	1.8	24%	\$68	\$123	1.7	23%	\$68	\$118
LA Basin - San Diego	0.2	0%	\$14	\$2	0.2	0%	\$14	\$2
LA Basin - Bay Area	11.7	56%	\$67	\$777	11.3	54%	\$66	\$751
Sacramento - Bay Area	0.0	0%	\$12	\$0	0.0	0%	\$12	\$0
San Diego - Sacramento	0.0	2%	\$69	\$2	0.0	1%	\$69	\$2
San Diego - Bay Area	3.2	35%	\$69	\$219	3.0	33%	\$69	\$204
Bay Area - San Joaquin Valley	7.4	10%	\$46	\$340	7.5	10%	\$46	\$342
San Joaquin Valley - LA Basin	8.3	12%	\$42	\$344	8.1	11%	\$42	\$338
Sacramento - San Joaquin Valley	0.6	3%	\$52	\$29	0.6	3%	\$52	\$29
San Diego - San Joaquin Valley	0.1	26%	\$46	\$3	0.1	25%	\$46	\$3
Within Bay Area Peninsula	6.4	0.1%	\$11	\$70	6.4	0.1%	\$11	\$70
Within North LA Basin	3.6	0.1%	\$12	\$43	3.6	0.1%	\$12	\$43
Within South LA Basin	1.2	0.0%	\$10	\$12	0.9	0.0%	\$10	\$9
North LA - South LA	3.0	0.2%	\$11	\$33	2.9	0.2%	\$11	\$32
Within San Diego region	0.0	0.0%	\$0	\$0	0.0	0.0%	\$0	\$0
Within San Joaquin Valley*	0.9	0.0%	\$31	\$29	0.9	0.0%	\$31	\$29
Other *	6.1	0.1%	\$47	\$288	5.8	0.1%	\$46	\$267
Total	54.4	0.2%	\$43	\$2,316	52.9	0.2%	\$42	\$2,241
Within San Diego Region	0.0	0.0%	\$0	\$0	0.0	0.0%	\$0	\$0
Within Entire LA Basin	7.7	0.1%	\$11	\$88	7.3	0.1%	\$12	\$84
Within Entire Bay Area	6.4	0.1%	\$11	\$70	6.4	0.1%	\$11	\$70
Total Between Regions	40.3	4.4%	\$54	\$2,158	39.2	4.3%	\$53	\$2,086

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

Average daily boardings decrease by 4,500 (2.8 percent) versus the *Increased Parking Cost Scenario*. Table 4 presents the average daily boardings at each high-speed rail station. Stations with the highest decline in boardings include Norwalk, which yields 1,000 fewer daily boardings (17.4 percent) due to reduced service levels between LA Union Station and Anaheim; and Gilroy, where daily boardings drop by 700 (10.8 percent) due to a specific operating plan issue pertaining to Anaheim-bound Gilroy travelers, which is discussed further in the following paragraph.

Average daily station-to-station line loads decline from 2 and 7 percent between the central valley and Anaheim station, and from 1 to 2 percent between San Francisco and Gilroy (see Table 5). A much greater single decline occurs between Gilroy and Fresno, a reduction of 18.3 percent. This large drop makes sense because train Pattern #1, which provided the fastest service between Gilroy and Anaheim, terminates at LA Union Station under the *Anaheim 3 Trains Per Hour Scenario*. The result is a two-hour headway between peak hour trains traveling direct to Anaheim from Gilroy. Thus, for Anaheim-bound Gilroy travelers, headways double and average travel times increase by about 10 minutes. Given this significant reduction in service levels from Gilroy, such travelers are likely to choose alternative modes of travel to final destinations in the Anaheim area.

Table 4. Phase I Station Boardings, Anaheim 3 Trains Per Hour Scenario

Origin Station	Increased Parking Cost Scenario	Anaheim 3 Trains Per Hour Scenario
San Francisco (Transbay)	38,500	38,000
Millbrae	5,300	5,300
Redwood City	6,200	6,000
San Jose	10,200	10,100
Gilroy	6,000	5,300
Merced	7,300	7,400
Fresno	6,400	6,300
Bakersfield	7,300	7,300
Palmdale	14,500	14,600
Sylmar	6,800	6,700
Burbank	3,300	3,300
Los Angeles (Union)	14,200	14,400
Norwalk	5,400	4,400
Anaheim	29,300	27,300
Daily	161,000	156,500

Table 5. Phase I Daily Line Loads, Anaheim 3 Trains Per Hour Scenario

Origin Station	Destination Station	Increased Parking Cost Scenario	Anaheim 3 Trains Per Hour Scenario
San Francisco (Transbay)	Millbrae	38,500	38,000
Millbrae	Redwood City	36,000	35,400
Redwood City	San Jose	36,800	36,100
San Jose	Gilroy	39,900	39,100
Gilroy	Merced	2,400	2,400
Gilroy	Fresno	42,700	34,900
Merced	Fresno	5,000	4,900
Fresno	Bakersfield	43,600	42,200
Bakersfield	Palmdale	40,600	39,000
Palmdale	Sylmar	46,200	44,600
Sylmar	Burbank	41,000	39,400
Burbank	Los Angeles (Union)	37,700	36,100
Los Angeles (Union)	Norwalk	33,200	31,300
Norwalk	Anaheim	29,300	27,300

2030 Full System Ridership and Revenue Results

The 2030 Full System forecast for the *Anaheim 3 Trains Per Hour Scenario* resulted in a predicted annual high-speed rail ridership of 91.7 million (see Table 6), a decrease of 2.0 million (2.1 percent) compared to the *Increased Parking Cost Scenario*. This drop is attributed to the loss of 1.0 million riders within the LA Basin (7.3 percent), and the loss of 1.0 million interregional riders (1.4 percent). The greatest percent drop in interregional ridership occurs in the San Joaquin Valley-LA Basin market (0.4 million riders, 5.1 percent) due largely to service reductions on Pattern #15, which previously provided direct service to Anaheim from all stops in the San Joaquin Valley. After this change, all direct Anaheim-bound service from Merced and Modesto is eliminated, and direct service from Stockton and Bakersfield is cut by 50 percent. Pattern #15 also offered direct service to Anaheim from northern LA Basin stops at Palmdale, Sylmar, and Burbank, accounting for much of the 7.3 percent decline in intraregional travel. Other markets showing significant declines include LA Basin-Sacramento (0.1 million riders, 3.1 percent) and LA Basin-San Diego (0.3 million riders, 1.3 percent).

Ridership declines at a slightly lower rate drop in system revenues (\$57.0 million, 1.5 percent), due primarily to a \$48.2 million (1.4 percent) decrease in revenues from higher-value interregional travel. For reasons indicated above, the San Joaquin Valley-LA Basin market shows the largest drop in revenues (\$17.7 million, 4.9 percent), followed by LA Basin-Sacramento (\$7.9 million, 3.2 percent). For trips within the LA Basin, revenues decline by \$8.8 million, 5.8 percent).

Table 6. 2030 Full System Annual Region-to-Region Ridership and Revenue, Anaheim 3 Trains Per Hour Scenario

Market	Increased Parking Cost Scenario				Anaheim 3 Trains Per Hour 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)
LA Basin - Sacramento	3.8	50%	\$66	\$249	3.6	49%	\$66	\$241
LA Basin - San Diego	20.8	15%	\$31	\$637	20.5	14%	\$31	\$630
LA Basin - Bay Area	12.2	59%	\$68	\$827	12.1	58%	\$68	\$819
Sacramento - Bay Area	2.8	4%	\$45	\$127	2.8	4%	\$45	\$127
San Diego - Sacramento	0.1	4%	\$77	\$7	0.1	4%	\$78	\$7
San Diego - Bay Area	3.4	38%	\$81	\$274	3.4	38%	\$81	\$273
Bay Area - San Joaquin Valley	7.8	11%	\$45	\$354	7.8	11%	\$45	\$353
San Joaquin Valley - LA Basin	8.2	11%	\$44	\$360	7.7	11%	\$44	\$343
Sacramento - San Joaquin Valley	2.0	9%	\$43	\$86	2.0	9%	\$43	\$86
San Diego - San Joaquin Valley	0.1	27%	\$56	\$5	0.1	29%	\$56	\$5
Within Bay Area Peninsula	6.5	0.1%	\$11	\$71	6.5	0.1%	\$11	\$71
Within North LA Basin	5.0	0.1%	\$12	\$61	5.0	0.1%	\$12	\$62
Within South LA Basin	2.9	0.0%	\$10	\$30	2.2	0.0%	\$11	\$23
North LA - South LA	5.5	0.2%	\$11	\$61	5.2	0.2%	\$11	\$59
Within San Diego region	0.3	0.0%	\$11	\$3	0.3	0.0%	\$11	\$3
Within San Joaquin Valley*	2.1	0.0%	\$29	\$62	2.2	0.0%	\$29	\$62
Other *	10.3	0.1%	\$53	\$547	10.2	0.1%	\$53	\$541
Total	93.7	0.2%	\$40	\$3,763	91.7	0.2%	\$40	\$3,706
Within San Diego Region	0.3	0.0%	\$11	\$3	0.3	0.0%	\$11	\$3
Within Entire LA Basin	13.3	0.1%	\$11	\$153	12.3	0.1%	\$12	\$144
Within Entire Bay Area	6.5	0.1%	\$11	\$71	6.5	0.1%	\$11	\$71
Total Between Regions	73.6	8.1%	\$48	\$3,536	72.6	8.0%	\$48	\$3,488

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

Average daily boardings decrease by 6,400 (2.3 percent) compared to the *Increased Parking Cost Scenario*. Table 7 presents the average daily boardings at each high-speed rail station. Due to reduced service levels between LA Union Station and Anaheim, the highest decline in individual station boardings occurs at Norwalk (decrease of 1,600 boardings, 23.7 percent), followed by Anaheim (2,900 boardings, 13.4 percent). Stockton (3.2 percent) and Modesto (2.3 percent) show lower boardings due to the reduction of service discussed above. LA Union Station (2.5 percent) also features a decline in boardings.

Average daily station-to-station line loads decline from 1 and 3 percent between the central valley and Anaheim station, and from 0 to 1 percent between San Francisco and Fresno (see Table 8). As would be expected, the greatest segment trip declines occur between LA Union Station and Anaheim (11 to 14 percent).

Phase I and Full System Catchment Areas

Figures 1 and 2, below, display *Anaheim 3 Trains Per Hour Scenario* high-speed rail station catchment areas for Phase I and the Full System, respectively. Both catchment area distributions are more or less identical to their *Increased Parking Cost Scenario* counterparts since station access has not changed. The large Anaheim catchment area in Figure 1 demonstrates how interregional travel to the Inland Empire and San Diego County are significantly impacted by service frequency reductions between LA Union Station and Anaheim. The addition of new access points in the Inland Empire and San Diego County under the Full System (Figure 2) slightly alleviates the negative impact of decreased service to Anaheim.

As one would expect, the Phase I system sustains slightly greater systemwide ridership and revenue losses than under the Full System, which offers riders in the Inland Empire and San Diego County a number of new HSR system access points. Passengers traveling to and from the Anaheim area and points south and east in the Full System might find suitable access at these new station locations.

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.

Table 7. Full System Station Boardings, Anaheim 3 Trains Per Hour Scenario

Origin Station	Increased Parking Cost Scenario	Anaheim 3 Trains Per Hour Scenario
San Francisco (Transbay)	34,500	34,400
Millbrae	5,700	5,700
Redwood City	7,500	7,500
San Jose	12,100	12,100
Gilroy	6,500	6,400
Sacramento	18,100	17,900
Stockton	6,300	6,100
Modesto/SP Downtown	4,400	4,300
Merced	2,500	2,400
Fresno	8,000	8,000
Bakersfield	8,100	8,000
Palmdale	16,400	16,300
Sylmar	12,900	12,800
Burbank	4,100	4,100
Los Angeles (Union)	28,100	27,300
Norwalk	6,800	5,100
Anaheim	21,700	18,700
City of Industry	6,400	6,700
Ontario	10,600	10,600
Riverside	13,700	13,800
Temecula/Murrieta	7,100	7,100
Escondido	7,800	7,800
University City	5,900	5,800
San Diego (Downtown)	19,200	18,900
Daily	274,100	267,700

Table 8. Full System Daily Line Loads, Anaheim 3 Trains Per Hour Scenario

Origin Station	Destination Station	Increased Parking Cost Scenario	Anaheim 3 Trains Per Hour Scenario
San Francisco (Transbay)	Millbrae	34,500	34,300
Millbrae	Redwood City	32,400	32,300
Redwood City	San Jose	34,400	34,200
San Jose	Gilroy	39,200	39,100
Gilroy	Merced	6,100	6,100
Gilroy	Fresno	33,700	33,500
Sacramento	Stockton	18,100	17,900
Stockton	Modesto/SP Downtown	23,700	23,300
Modesto/SP Downtown	Merced	26,700	26,100
Merced	Fresno	22,200	21,600
Fresno	Bakersfield	53,000	52,200
Bakersfield	Palmdale	49,100	48,300
Palmdale	Sylmar	55,900	55,000
Sylmar	Burbank	53,300	52,200
Burbank	Los Angeles Union	51,900	50,800
Los Angeles Union	Norwalk	25,100	22,300
Norwalk	Anaheim	21,700	18,700
Los Angeles Union	City of Industry	37,500	37,300
City of Industry	Ontario	39,800	39,400
Ontario	Riverside	39,700	39,400
Riverside	Temecula/Murrieta	36,200	35,900
Temecula/Murrieta	Escondido	32,000	31,600
Escondido	University City	24,700	24,400
University City	San Diego	19,200	18,900

Figure 1. Phase I Catchment Areas, Anaheim 3 Trains Per Hour Scenario



Figure 2. Full System Catchment Areas, Anaheim 3 Trains Per Hour Scenario

