California High-Speed Train Project

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TECHNICAL MEMORANDUM

Phase 1 Service PLan
TM 4.2

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Prepared by **PB** 100 YEARS

for the California High-Speed Rail Authority

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1. INTRODUCTION

A concept level service plan and hypothetical timetable for the Phase 1 California High Speed Train (HST) project has been developed, which provides a description of the proposed type and quantity of service that is more detailed than had been available previously. The Phase 1 service plan is intended to serve several purposes:

- Confirm the level of service assumptions (travel times and service frequencies between station pairs) used to develop the estimates of system ridership and revenue

- Validate the operational feasibility of the desired level of service at a conceptual level

- Identify operable patterns of train service, particularly the general requirements for non-stop or limited-stop trains to pass slower trains that need to make a greater number of stops along the route (i.e., the locations and frequencies of occurrence of these "overtakes" at various times of day)

- Provide a basis for estimating the number of required train sets and overall rolling stock fleet requirements

- Provide a basis for estimating platform track and storage track capacity needed to support operations at the end terminal stations

2. ANALYTIC METHODOLOGY

A PB-developed spreadsheet-based "static" model for formulating and analyzing concept level operating plans for railroad systems was adapted for the HST network. This model utilizes train performance calculations taken from prior detailed "dynamic" simulation modeling results to identify the running time characteristics of the various types of service and train stopping patterns that are expected to operate on the HST system. The model generates stringline (time-distance) diagrams and tabular outputs describing the timing and scheduled operating performance of every train. It provides a level of detail sufficient to confidently perform "pattern analysis" of the various express, limited stop and all-stop local services that are envisioned, with the objective of identifying a reasonable service pattern that achieves the desired level of service at each station while minimizing both conflicts between trains and the required number of overtakes.

The spreadsheet model provides the ability for trains to be "linked" with subsequent trains and assigned to specific train sets. The resulting train set equipment cycles form the basis for estimating the size of the required rolling stock fleet.

The model also includes a module that compares the forecast level of system ridership with the quantity of service delivered, allocating riders to specific trains and calculating estimated load factors (projected number of riders per train divided by train seating capacity), using station specific boarding and alighting passenger (detail) estimates and peaking factors derived from the ridership forecasts.

This plan, while contributing to confident approximations at the conceptual level, does not yet represent a detailed operating plan for the system, even though the train timetables and stringline (time-distance) diagrams give the impression of a high level of precision. This conceptual plan

analysis is based on optimal ideal operations with trains running exactly on schedule. It does not analyze any randomization, delays or perturbations to the normal schedule and does not address the time required to recover from track blockages or the impacts of delay conditions on the network. A full detailed operating plan supported by dynamic computer simulation modeling of train movements throughout the system will be developed in a subsequent task later in the project, at which time an actual proposed timetable can be confidently prepared and approved.

3. ASSUMPTIONS AND GENERAL PRINCIPLES

The following assumptions and general principals guided the development of the Phase 1 service plan:

1. The HST system assumed to operate independently of any other passenger or freight rail services

2. Train sets are assumed to comprise units of 200 meters (m) in length, either singly (200 m train with 500 passengers) or operating as pairs (400 m train with 1,000 passengers)

3. Train running times were obtained from simulated train performance calculations, with an additional time factor added to these times. This added time, sometimes referred to as "schedule pad" or "recovery time" accounts for operator performance, external conditions and minor delays, which result in minimal day-to-day fluctuations in train performance – the additional time factor assumed in this analysis is common in passenger train scheduling, permits trains to recover from time lost due to minor causes, and provides an allowance for the system to maintain a high degree of overall on-time performance when operations are normal. Two different scenarios were analyzed concerning recovery time. The initial base case analysis assmed a recovery time factor of seven percent on top of the minimum train run time. This is consistent with current industry practice in the U.S. and is considered a conservative estimate, since the HST system is expected to operate at a higher level of precision than is "typical." A second service plan variation was developed assuming a recovery time factor of three and one-half percent for most trains. In this second case, certain "premium" services, such as express trains during peak periods were assumed to operate with a recovery time allowance of as little as one percent.

4. The schedule features "clockface" service patterns and regular intervals between trains (headways), which can be easily remembered and is markedly customer friendly

5. The schedule features service patterns that repeat every hour, as opposed to patterns that differ somewhat from hour-to-hour providing for more simplified operations – this makes the service more regular and predictable and reduces the number of different types of overtakes required

6. The minimum spacing between trains following each other past a given point is set at three minutes, based on the assumed practical capacity design attributes of the signal and train control system

7. Express trains are given the highest priority in terms of their schedule paths; limited stop trains and those that travel a longer distance along the network have the next highest priority, and all-stop local trains generally have the lowest priority and, therefore, the highest incidence of overtakes

8. Train overtakes were arranged to utilize station (siding) tracks for express trains to pass local trains making a service stop, while maintaining consistency and reliability in the service stopping patterns.

9. The level of service between Los Angeles and Anaheim is maintained at four trains per hour per direction in the business travel peaks, and three trains per hour per direction at other times of day

10. The service levels and patterns developed as the basis for the ridership and revenue forecasts were taken as a guideline in the development of the Phase 1 service plan; adjustments were made where necessary to improve the operational efficiency and performance of the system; in all cases the level of service provided at each station remains at or better than the level assumed in the ridership forecasts.

The analysis assumed the following station dwell times and minimum terminal layover (turnaround) times. The latter is defined to be the minimum time allowed between the scheduled arrival of a train set at a terminal and the scheduled departure of the same train set in the opposite direction of service.

TABLE 1 – INTERMEDIATE STATION DWELL TIMES

Code	Station	Scheduled Dwell Time (mins)
SFO	Millbrae	1.5
RWC	Redwood City	1.5
SJC	San Jose	2.0
GLY	Gilroy	1.5
FNO	Fresno	1.5
BFD	Bakersfield	1.5
PMD	Palmdale	1.5
SYL	Sylmar	1.5
BUR	Burbank	1.5
LAU	L.A. Union Sta.	2.0
NSF	Norwalk	1.5

TABLE 2 – TERMINAL STATION MINIMUM LAYOVER TIMES

Code	Station	Minimum Scheduled Layover Time (mins)
SFT	S.F.-Transbay	30
LAU	L.A. Union Sta.	40
ANA	Anaheim	40
MCD	Merced	40

4. PHASE 1 SERVICE PLAN

STOPPING PATTERNS AND SERVICE FREQUENCIES

Table 3 depicts the various train types and stopping patterns that were used to formulate the Phase 1 service plan, along with the average total estimated travel time from the origin station to the final destination station. The "Express" train type makes only one intermediate stop between San Francisco and Los Angeles – at San Jose – and therefore provides the fastest run time between these points and with an assumption of one percent recovery time during the peak period, is estimated to run between San Francisco and Los Angeles in two hours-forty minutes. At the other end of the spectrum are "All Stop" trains that serve every station along the line and therefore take significantly longer to make a run between San Francisco and the Los Angeles basin.

TABLE 3 – TRAIN STOPPING PATTERNS

STOPPING PATTERNS

Southbound

Train Type/Pattern	SFT	SFO	RWC	SJC	GLY	MCD	FNO	BFD	PMD	SYL	BUR	LAU	NSF	ANA	End-to-End Run Time (mins)
1 Bay Area Limited	X		X	X	X							X	X	X	205
2 Express	X			X								X	X	X	194
4 All-Stop	X	X	X	X	X		X	X	X	X	X	X	X	X	241
7 Central Valley Limited	X	X	X	X	X		X	X				X	X	X	225
9 San Fernando Valley Limited	X	X		X			X	X		X		X			198
10 Central Valley Limited	X	X	X	X	X		X		X		X	X	X	X	228
13 San Fernando Valley Limited	X		X	X					X	X	X	X	X	X	216
14 SF-Merced	X	X	X	X	X	X									94
15 LA-Merced						X	X	X	X	X	X	X	X	X	161
16 Central Valley Limited	X	X	X	X	X		X	X				X			200
17 San Fernando Valley Limited	X		X	X	X				X	X	X	X			196
18 Central Valley Limited	X	X	X	X	X		X		X		X	X			203
19 San Fernando Valley Limited	X		X	X	X				X	X		X			191
20 Central Valley Limited	X	X	X	X			X	X		X		X			200
21 San Fernando Valley Limited	X			X	X			X	X	X	X	X			199

Northbound

Train Type/Pattern	ANA	NSF	LAU	BUR	SYL	PMD	BFD	FNO	MCD	GLY	SJC	RWC	SFO	SFT	End-to-End Run Time (mins)
1 Bay Area Limited	X	X	X							X	X	X		X	205
2 Express	X	X	X								X			X	194
4 All-Stop	X	X	X	X	X	X	X	X		X	X	X	X	X	240
7 Central Valley Limited	X	X	X				X	X		X	X	X	X	X	223
9 San Fernando Valley Limited			X		X		X	X			X		X	X	197
10 Central Valley Limited	X	X	X	X		X		X		X	X		X	X	221
13 San Fernando Valley Limited	X	X	X	X	X	X					X	X		X	216
14 SF-Merced									X	X	X	X	X	X	94
15 LA-Merced	X	X	X	X	X	X	X	X	X						163
16 Central Valley Limited			X				X	X		X	X	X	X	X	197
17 San Fernando Valley Limited			X	X	X	X				X	X	X		X	196
18 Central Valley Limited			X	X		X		X		X	X	X	X	X	196
19 San Fernando Valley Limited			X		X	X				X	X	X		X	191
20 Central Valley Limited			X		X		X	X			X	X	X	X	198
21 San Fernando Valley Limited			X	X	X	X	X			X	X	X		X	203

In between these two service types are various categories of "Limited Stop" trains that make selected intermediate station stops but skip other stations. Several different limited stop patterns have been defined. They are grouped and named according to the part of the network within which they provide the greatest degree of service to individual intermediate stations. For instance, the "Bay Area Limiteds" make several stops within the Bay Area between San Francisco and Gilroy and then operate non-stop to Los Angeles. The "Central Valley Limiteds" stop at Fresno and/or Bakersfield but skip selected other intermediate stations, and the "San Fernando Valley Limiteds" make most or all of the stops between Los Angeles and Palmdale but skip many of the stations in the Bay Area and Central Valley. These "Limiteds" make up the majority of trains operating on the network and offer a compromise of a relatively fast run time along with connectivity among various groups of intermediate stations along the line.

The on-board travel time between stations varies, depending on the number of intermediate station stops (which is different for each train type) and the time of day (some trains have additional time built into their peak schedules to allow them to be "overtaken" by express or limited-stop trains while en route). The minimum or "fastest" trip times between selected city pair stations is presented in Table 4, based on the mix of train types and stopping patterns included in the Phase 1 service plan.

TABLE 4 – MINIMUM TRIP TIMES BETWEEN SELECTED STATIONS

(Based on Phase 1 Service Plan Train Stopping Patterns)

With Schedule Pad Allowance of 1.0%   Times in Hours:Minutes

		SFT	SJC	FNO	LAU	ANA
SFT	San Francisco-Transbay	--	0:27	1:29	2:40	3:04
SJC	San Jose	0:27	--	0:50	2:11	2:35
FNO	Fresno	1:29	0:50	--	1:31	1:55
LAU	Los Angeles Union Station	2:40	2:11	1:31	--	0:22
ANA	Anaheim	3:04	2:35	1:55	0:22	--

With Schedule Pad Allowance of 3.5%   Times in Hours:Minutes

		SFT	SJC	FNO	LAU	ANA
SFT	San Francisco-Transbay	--	0:28	1:31	2:44	3:08
SJC	San Jose	0:28	--	0:51	2:14	2:38
FNO	Fresno	1:31	0:51	--	1:33	1:57
LAU	Los Angeles Union Station	2:44	2:14	1:33	--	0:22
ANA	Anaheim	3:08	2:38	1:57	0:22	--

Note: The HST system is expected to operate at a high level of precision, with schedule pad allowances lower than for other intercity passenger rail corridors in the U.S. The development of system timetables will be based on tradeoffs that will need to be made among trip time, service reliability, alignment engineering, capital cost and operations and maintenance cost considerations.

Explanation: Table 4 (above) displays estimated timetable travel times between the city pairs presented in the matrix. For example, when reading the first row of the first table (with schedule pad allowance of 1%), the numbers shown represent the trip time between: San Francisco and San Jose (27 minutes minutes); San Francisco and Fresno (1 hour, 29 minutes); San Francisco and Los Angeles (2 hours, 40 minutes); and San Franciso and Anaheim (3 hours and 4 mintues).

Table 5 compares the service levels and stopping patterns originally assumed as the basis for high speed rail ridership and revenue estimates, and the proposed Phase 1 service plan. The original set of stopping patterns proved to be operationally infeasible, resulting in excessive numbers of overtakes and delays to trains being overtaken. Alternative patterns were examined that deliver

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approximately the same level of service at each station, in terms of service frequency and the mix of express, limited stop and all-stop local service. Though the mix of stopping patterns has been modified, the number of trains per hour at each terminal and intermediate station is the same as or higher than what was assumed for the ridership demand forecasting purposes. The proposed mix of services offers regular clockface patterns, with each service type leaving at the same time each hour, with relatively limited exceptions. Slightly more service is assumed during the three hour peak periods in the morning and late afternoon.

TABLE 5 — PEAK AND OFF-PEAK SERVICE FREQUENCIES

ORIGINAL SERVICE PLAN ASSUMPTIONS FOR RIDERSHIP FORECASTING

PEAK HOUR STATION STOPS-SOUTHBOUND

Pattern No. →	2 Super	1 Exp	9 Ltd A	10 Ltd B	7 NLAX	13 VX	14 SF-M	15 LA-M	TOTAL
Trains per hour →	1	0.5	2	2	0.5	0.5	1.5	1.5	**9.5**
SFT S.F.-Transbay	1		2	2	0.5	0.5	1.5		**8**
SFO Millbrae			2		0.5		1.5		**4**
RWC Redwood City		0.5	2		0.5	0.5	1.5		**5**
SJC San Jose	1	0.5	2	2	0.5	0.5	1.5		**8**
GLY Gilroy		0.5	2		0.5		1.5		**4.5**
MCD Merced							1.5	1.5	**3**
FNO Fresno			2		0.5			1.5	**4**
BFD Bakersfield			2		0.5			1.5	**4**
PMD Palmdale				2		0.5		1.5	**4**
SYL Sylmar			2			0.5		1.5	**4**
BUR Burbank				2		0.5		1.5	**4**
LAU L.A. Union Sta.	1	0.5	2	2	0.5	0.5		1.5	**8**
NSF Norwalk		0.5			0.5	0.5		1.5	**3**
ANA Anaheim		0.5			0.5	0.5		1.5	**3**

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PEAK HOUR STATION STOPS-SOUTHBOUND

Pattern No. →	2 Super	1 Exp	14 SF-M	15 LA-M	18 CV2	19 SFV2	20 CV3	21 SFV3	4 Local	TOTAL
Trains per hour →	1	1	1	1	1	1	1	1	1	**9**
SFT S.F.-Transbay	1	1	1		1	1	1	1	1	**8**
SFO Millbrae			1		1		1		1	**4**
RWC Redwood City		1	1		1	1	1		1	**6**
SJC San Jose	1	1	1		1	1	1	1	1	**8**
GLY Gilroy		1	1		1		1	1	1	**6**
MCD Merced			1	1						**2**
FNO Fresno				1	1		1		1	**4**
BFD Bakersfield				1		1	1		1	**4**
PMD Palmdale				1	1	1		1	1	**5**
SYL Sylmar				1		1	1	1	1	**5**
BUR Burbank				1	1			1	1	**4**
LAU L.A. Union Sta.	1	1		1	1	1	1	1	1	**8**
NSF Norwalk	1	1	1						1	**4**
ANA Anaheim	1	1	1						1	**4**

PEAK HOUR STATION STOPS-NORTHBOUND

Pattern No. →	2 Super	1 Exp	9 Ltd A	10 Ltd B	7 NLAX	13 VX	14 SF-M	15 LA-M	TOTAL
Trains per hour →	1	0.5	2	2	0.5	0.5	1.5	1.5	**9.5**
ANA Anaheim		0.5			0.5	0.5		1.5	**3**
NSF Norwalk		0.5			0.5	0.5		1.5	**3**
LAU L.A. Union Sta.	1	0.5	2	2	0.5	0.5		1.5	**8**
BUR Burbank				2		0.5		1.5	**4**
SYL Sylmar			2			0.5		1.5	**4**
PMD Palmdale				2		0.5		1.5	**4**
BFD Bakersfield			2		0.5			1.5	**4**
FNO Fresno			2		0.5			1.5	**4**
MCD Merced							1.5	1.5	**3**
GLY Gilroy		0.5	2		0.5		1.5		**4.5**
SJC San Jose	1	0.5	2	2	0.5	0.5	1.5		**8**
RWC Redwood City		0.5	2		0.5	0.5	1.5		**5**
SFO Millbrae			2		0.5		1.5		**4**
SFT S.F.-Transbay	1	0.5	2	2	0.5	0.5	1.5		**8**

PEAK HOUR STATION STOPS-NORTHBOUND

Pattern No. →	2 Super	1 Exp	14 SF-M	15 LA-M	18 CV2	19 SFV2	20 CV3	21 SFV3	4 Local	TOTAL
Trains per hour →	1	1	1	1	1	1	1	1	1	**9**
ANA Anaheim	1	1	1						1	**4**
NSF Norwalk	1	1	1						1	**4**
LAU L.A. Union Sta.	1	1		1	1	1	1	1	1	**8**
BUR Burbank			1	1				1	1	**4**
SYL Sylmar			1		1	1	1	1	1	**5**
PMD Palmdale			1	1	1			1	1	**5**
BFD Bakersfield			1			1	1		1	**4**
FNO Fresno			1	1		1			1	**4**
MCD Merced			1	1						**2**
GLY Gilroy		1	1		1		1	1	1	**6**
SJC San Jose	1	1	1		1	1	1	1	1	**8**
RWC Redwood City		1	1			1	1	1	1	**6**
SFO Millbrae			1		1		1		1	**4**
SFT S.F.-Transbay	1	1	1		1	1	1	1	1	**8**

OFF-PEAK HOUR STATION STOPS

Pattern No. →	2 Super	1 Exp	9 Ltd A	10 Ltd B	7 NLAX	13 VX	14 SF-M	15 LA-M	4 Local	TOTAL
Trains per hour →	0	0.5	2	2	0.5	0	0.8	0.8	0.5	**7.1**
SFT S.F.-Transbay	0	0.5	2	2	0.5	0	0.8		0.5	**6.3**
SFO Millbrae			2		0.5		0.8		0.5	**3.8**
RWC Redwood City		0.5	2		0.5	0	0.8		0.5	**4.3**
SJC San Jose	0	0.5	2	2	0.5	0	0.8		0.5	**6.3**
GLY Gilroy		0.5	2		0.5		0.8		0.5	**4.3**
MCD Merced							0.8	0.8		**1.6**
FNO Fresno			2		0.5			0.8	0.5	**3.8**
BFD Bakersfield			2		0.5			0.8	0.5	**3.8**
PMD Palmdale				2		0		0.8	0.5	**3.3**
SYL Sylmar			2			0		0.8	0.5	**3.3**
BUR Burbank				2		0		0.8	0.5	**3.3**
LAU L.A. Union Sta.	0	0.5	2	2	0.5	0		0.8	0.5	**6.3**
NSF Norwalk		0.5			0.5	0		0.8	0.5	**2.3**
ANA Anaheim		0.5			0.5	0		0.8	0.5	**2.3**

OFF-PEAK HOUR STATION STOPS

Pattern No. →	2 Super	1 Exp	14 SF-M	15 LA-M	16 CV2	17 SFV2	4 Local	TOTAL
Trains per hour →	0	1.1	1	1	1.7	1.7	1.1	**7.6**
SFT Anaheim		1.1		1			1.1	**3.2**
SFO Norwalk		1.1		1			1.1	**3.2**
RWC L.A. Union Sta.	0	1.1		1	1.7	1.7	1.1	**6.6**
SJC Burbank				1		1.7	1.1	**3.8**
GLY Sylmar				1		1.7	1.1	**3.8**
FNO Palmdale				1		1.7	1.1	**3.8**
BFD Bakersfield				1	1.7		1.1	**3.8**
PMD Fresno				1	1.7		1.1	**3.8**
MCD Merced			1	1				**2**
SYL Gilroy		1.1	1		1.7	2	1.1	**6.9**
BUR San Jose	0	1.1	1		1.7	1.7	1.1	**6.6**
LAU Redwood City		1.1	1		1.7	1.7	1.1	**6.6**
NSF Millbrae			1			1.7	1.1	**3.8**
ANA S.F.-Transbay	0	1.1	1		1.7	1.7	1.1	**6.6**

The Phase 1 service plan as outlined in this document and its attachments provides a level of service at each station that is generally equivalent to the level of service assumed in the development of the estimates of system ridership and revenue (for Phase 1). A similar methodology is being applied to the service and operations analysis of the HST project to include the extensions of the system to Sacramento and San Diego; the results of the analysis of the system extensions to Sacramento and San Diego will be reported in a separate Technical Memorandum at a later date.

Table 5 indicates a slight increase in the number of peak station stops at Redwood City, Gilroy, Palmdale and Sylmar on the San Fernando Valley and Central Valley Limited services (Patterns 18-21), with a slightly longer running time for these services than indicated in the original service plan for the limited stop services (Patterns 9 and 10). As the HST project studies continue to progress it would be prudent to consider a more detailed ridership estimation to assess the relative merits of these run time and service frequency tradeoffs.

TRAIN SCHEDULE DEVELOPMENT

The process of developing a feasible train schedule for the various combinations of stopping patterns, train origins and destinations and service frequencies entailed overlaying the various patterns in a graphical template known as a "stringline" – which is a diagram with clock time on the horizontal axis and location along the rail system on the vertical axis. Each train movement is represented by a line that traces its path along the network in both time and distance. The stringline for a non-stop train has a steeper slope than that of a multiple-stop train. Stringlines in the same direction of flow are not permitted to intersect one another except at locations where there are additional tracks (at passenger stations) available for faster trains to bypass slower or stopped trains. These locations are assumed to be limited to the areas surrounding the stations on the main portion of the HST line between Gilroy and Palmdale – where non-stop trains are permitted to bypass or "overtake" trains operating in the same direction and stopping at the station. It is also worthy to note that with these service levels and consistent stopping patterns, the conceptual analysis revealed that trains are able to run in sequence (without overtakes) north of Gilroy and south of Palmdale. This attribute is subject to further study and validation, and will be examined in detail when the full dispatch computer simulation is performed

Stringline diagrams were constructed in the spreadsheet model by starting with the highest priority trains (express trains running on clockface schedules), and then adding the other stopping patterns and frequencies in a priority order, adjusting the starting times of each subsequent group of trains to minimize the number of required overtakes and to make sure that all overtakes, when required, occur at the appropriate intermediate station locations. Additional station dwell time was added to the schedules of trains being overtaken, as necessary, to ensure that the minimum three minute separation between trains is maintained.

Hypothetical timetables are presented in the appendices. A timetable for the base service plan is presented in Appendix A1. This same schedule is represented in stringline format in Appendix A2, which shows the patterns of train movements during the morning peak, mid-day period, afternoon peak and late evening period. Appendix B presents the same information for the service plan variation based on three and one half percent and one percent recovery time allowances. A hypothetical timetable for this service plan variation is presented in Appendix B1, with this schedule respresented in stringline format in Appendix B2.

Table 6 shows the number of scheduled trains, for each stopping pattern/service type, within the morning peak, mid-day, afternoon peak and late evening periods. The daily schedule provides a total of 260 revenue trains.

TABLE 6 — REVENUE TRAINS BY TIME PERIOD AND TRAIN TYPE

Pattern	Train Type	End Points	Daily Trains (both directions)				
			Morning Peak 3 Hrs	Mid-Day 7 Hrs	Afternoon Peak 3 Hrs	Late Evening 3+ Hrs	**Total Daily**
1	Bay Area Limited	SFT-ANA	6	14	6	8	**34**
2	Express	SFT-ANA	6	—	6	—	**12**
4	All-Stop Local	SFT-ANA	6	14	6	8	**34**
10	Central Valley Limited	SFT-ANA	2	—	2	—	**4**
14	San Francisco-Merced All-Stop	SFT-MCD	6	14*	6	6	**32**
15	Anaheim-Merced All-Stop	MCD-ANA	6	14*	6	6	**32**
16	Central Valley Limited	SFT-LAU	—	28	—	6	**34**
17	San Fernando Valley Limited	SFT-LAU	—	28	—	6	**34**
18	Central Valley Limited	SFT-LAU	4	—	4	—	**8**
19	San Fernando Valley Limited	SFT-LAU	6	—	6	—	**12**
20	Central Valley Limited	SFT-LAU	6	—	6	—	**12**
21	San Fernando Valley Limited	SFT-LAU	6	—	6	—	**12**
Total			**54**	**112**	**54**	**40**	**260**

*Assumes one mid-day interval of 2 hours instead of normal 1 hour headway, during period of lowest ridership demand.

Annual operating costs for HST service, in large measure, are estimated based on the number of train-miles of assumed service operated. Table 7 presents the annual train-miles associated with the Phase 1 service plan. This estimate is based on full daily service for 250 weekdays per year, plus 115 weekend days and holidays with a reduced level of service.

TABLE 7 — DAILY AND ANNUAL TRAIN-MILES

	Daily Train-Miles	Daily Train-Miles (200m equivalent)	Days/ Year	Annual Train-Miles (200m equivalent)
Weekday	106,211	140,405	250	35,101,000
Weekend & Holiday	83,760	83,760	115	9,632,000
Total	- -	--	365	*44,734,000

* Average annual train miles per 200 meter trainset is estimated at approximately 426,000, assuming a Phase 1 fleet requirement of 105 trainsets including spares (assumed spare ratio of 10%).

CALIFORNIA HIGH SPEED RAIL AUTHORITY

ESTIMATED PASSENGER LOADS AND LOAD FACTORS

In order to estimate train consists and fleet requirements, and verify that the capacity of the Phase 1 service plan approximately matches demand, the estimated daily Phase 1 ridership in 2030 of 159,000 trips was factored to develop an approximation of demand by hour for the peak, peak shoulder and off-peak periods. Ridership projections for daily boardings at each station, and annual region-to-region trips factored down to average daily travel, were used to derive a station-to-station daily trip table, which is presented in Table 8 below. The assumed peaking factors are presented in Table 9.

TABLE 8 – ESTIMATED DAILY STATION-TO-STATION RIDERSHIP IN 2030 (PHASE 1)

Alighting Station…	San Francisco (Transbay)	Millbrae	Redwood City	San Jose	Gilroy	Merced	Fresno	Bakersfield	Palmdale	Sylmar	Burbank	Los Angeles Union Station	Norwalk	Anaheim	Total
SFT San Francisco (Transbay)	0	262	1,247	3,154	856	1,707	1,654	1,653	3,421	2,586	614	2,256	1,836	11,643	32,890
SFO Millbrae	262	0	352	891	242	68	66	66	137	104	25	91	74	467	2,845
RWC Redwood City	1,247	352	0	40	11	184	178	178	369	279	66	243	198	1,254	4,599
SJC San Jose	3,154	891	40	0	50	396	384	383	794	600	142	523	426	2,702	10,485
GLY Gilroy	856	242	11	50	0	306	297	296	615	465	110	405	330	2,092	6,074
MCD Merced	1,707	68	184	396	306	0	405	671	556	420	100	367	298	1,892	7,370
FNO Fresno	1,654	66	178	384	297	405	0	955	365	276	65	241	196	1,242	6,324
BFD Bakersfield	1,653	66	178	383	296	671	955	0	514	389	92	339	276	1,750	7,562
PMD Palmdale	3,421	137	369	794	615	556	365	514	0	135	360	6,473	826	2,499	17,063
SYL Sylmar	2,586	104	279	600	465	420	276	389	135	0	91	1,632	208	630	7,814
BUR Burbank	614	25	66	142	110	100	65	92	360	91	0	1,686	215	651	4,217
LAU Los Angeles Union Station	2,256	91	243	523	405	367	241	339	6,473	1,632	1,686	0	730	2,211	17,197
NSF Norwalk	1,836	74	198	426	330	298	196	276	826	208	215	730	0	0	5,613
ANA Anaheim	11,643	467	1,254	2,702	2,092	1,892	1,242	1,750	2,499	630	651	2,211	0	0	29,034
Total	32,890	2,845	4,599	10,485	6,074	7,370	6,324	7,562	17,063	7,814	4,217	17,197	5,613	29,034	159,087

TABLE 9 – RIDERSHIP PEAKING FACTORS

Origin-Destination Market	Peak Hour	Peak Shoulder Hour	6 peak hours	10 off-peak hours	Directional Peaking Factors	
					PM Peak South-bound	PM Peak North-bound
Inter-regional	12%	10%	54%	46%	1.0	1.0
Within MTC territory	17%	11%	67%	33%	1.2	0.8
Within SCAG territory	15%	10%	61%	39%	0.9	1.1

For the peak hour, average peak shoulder hour and average off-peak hour, station-to-station ridership was allocated among the available trains operating during those hours. Where choices among both express and local trains exist, a higher percentage of trips is allocated to the faster express services. Within each hour, overall demand is constrained by trainset seating capacity. Where the initial allocation of trips resulted in some trains being over capacity, a portion of the affected station-to-station loads were re-assigned to trains with available seating capacity operating within the same hour.

The graphs on the following pages show the estimated passenger loadings on the various train types for each station-to-station segment. In all cases, passenger loads can be kept within the 1,000 seat capacity of a 400 m trainset. The express services require 400 m trainsets all day long. The all-stop local trains, selected limited stop trains, and the Anaheim-Merced local trains all have passenger loads between 500 and 1,000 passengers, necessitating 400 m trainsets. All off-peak trains other than the hourly expresses have passenger loads under 500 and can be accommodated on 200 m trainsets.

FIGURE 1 – ESTIMATED PASSENGER LOADS IN 2030 – EVENING PEAK HOUR SOUTHBOUND

Passenger Loadings - Peak Hour (Individual Trains)
PM Peak Southbound
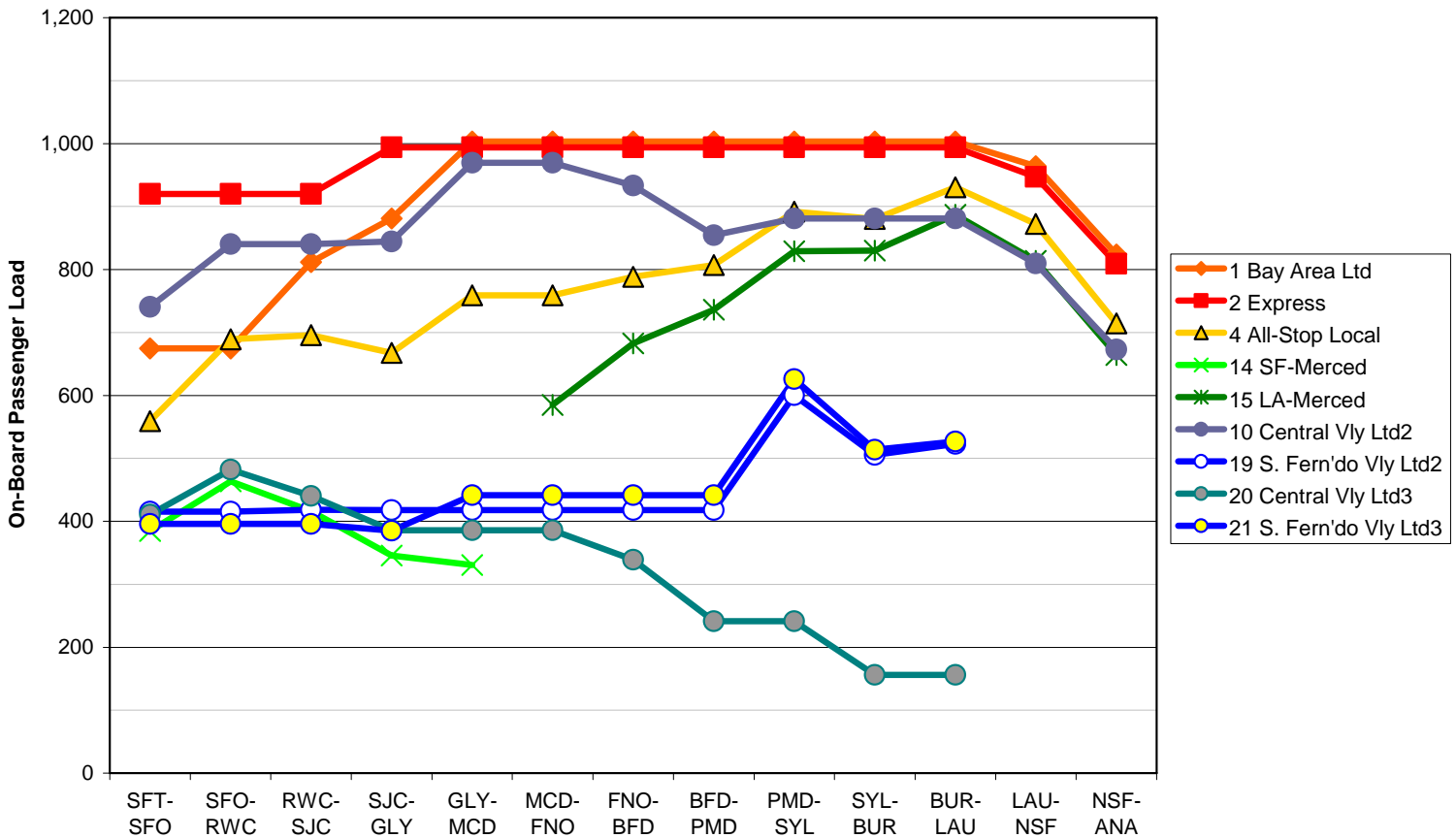
FIGURE 2 –
ESTIMATED PASSENGER LOADS IN 2030 – EVENING PEAK SHOULDER HOUR
SOUTHBOUND

Passenger Loadings - Avg Train in Peak Shoulder Hour
PM Peak Southbound
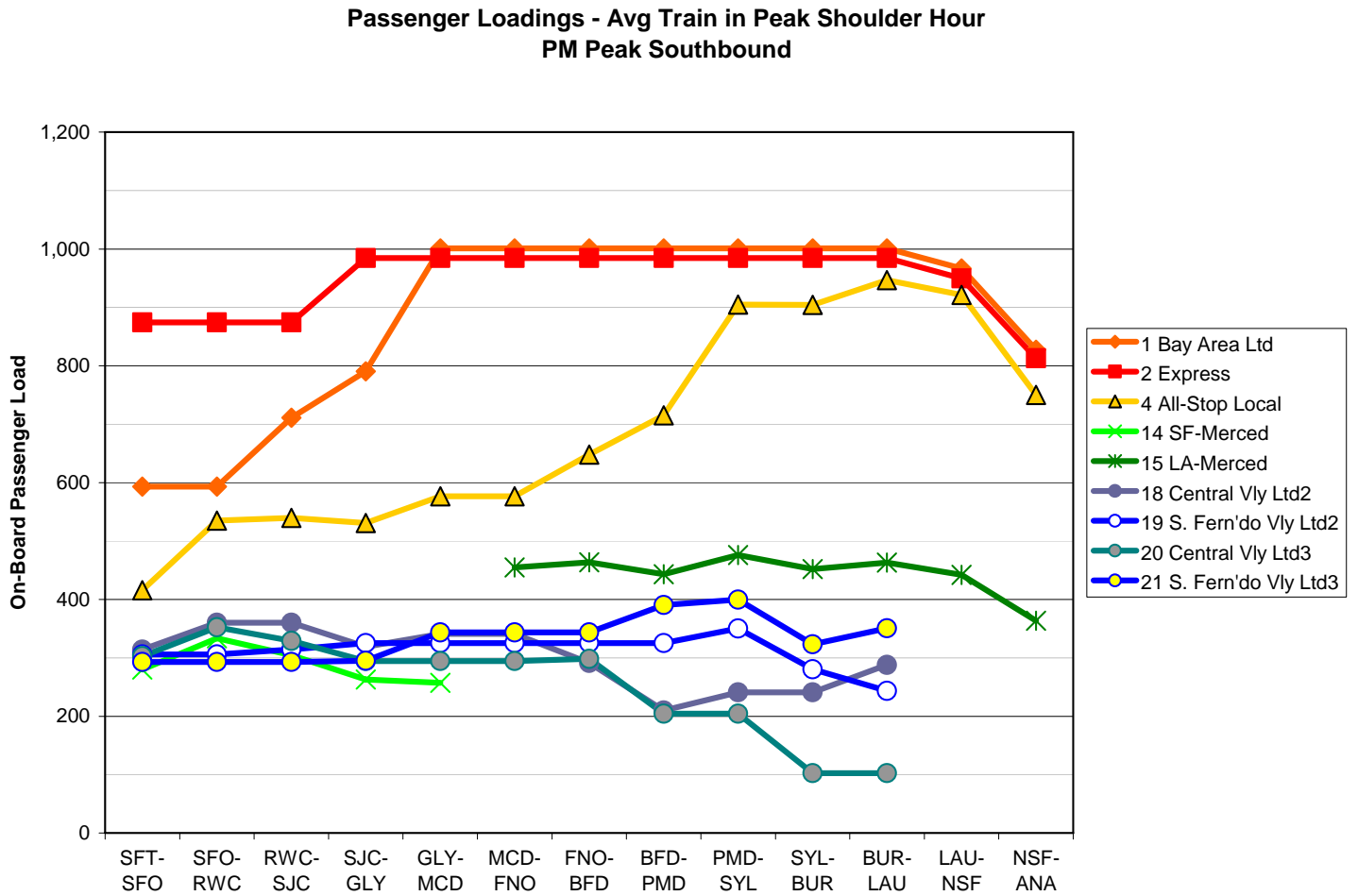
FIGURE 3 –
ESTIMATED PASSENGER LOADS IN 2030 – EVENING PEAK HOUR NORTHBOUND

Passenger Loadings - Peak Hour (Individual Train)
PM Peak Northbound
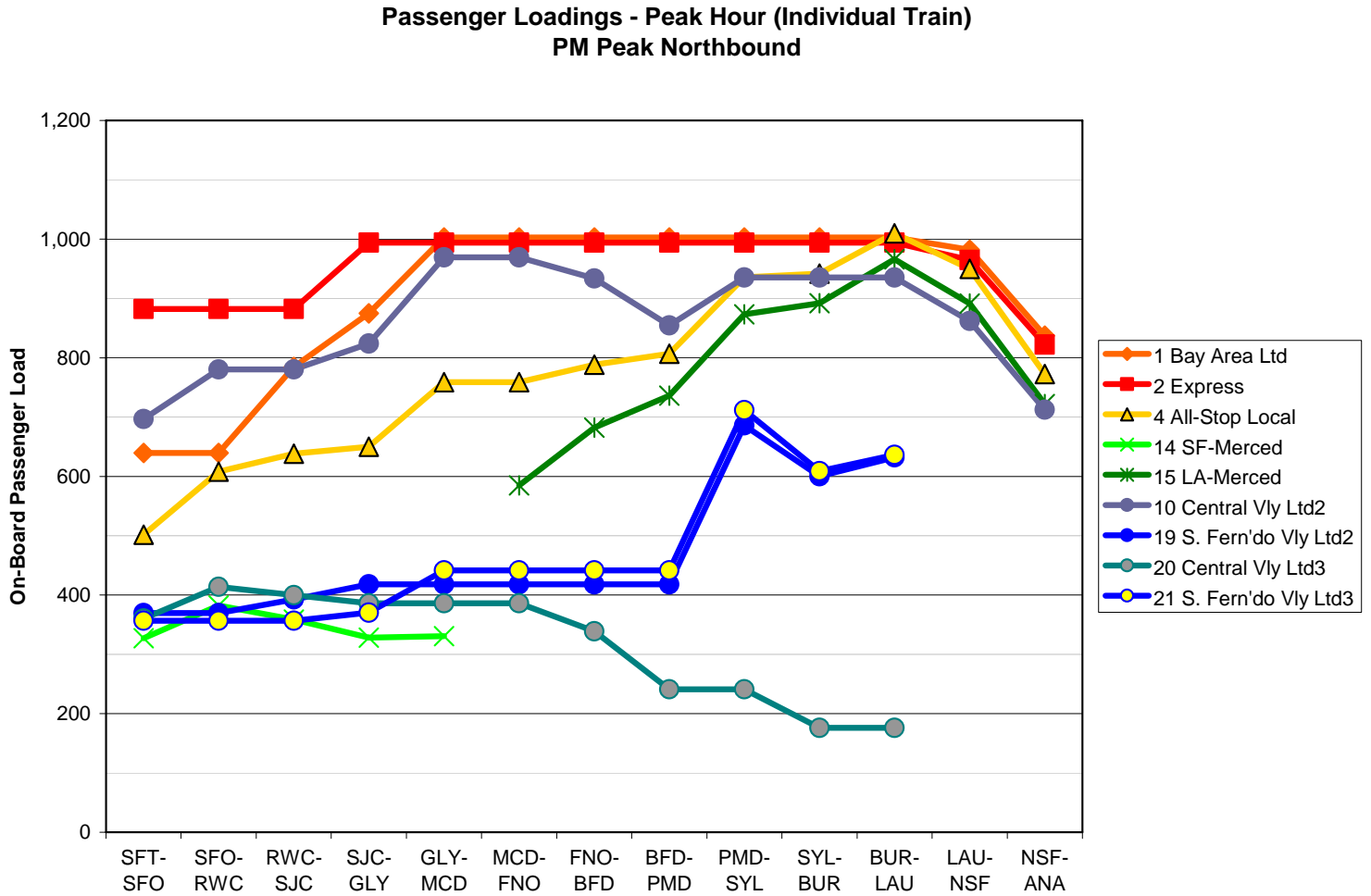
FIGURE 4 –
ESTIMATED PASSENGER LOADS IN 2030 – EVENING PEAK SHOULDER HOUR
NORTHBOUND

Passenger Loadings - Avg Train in Peak Shoulder Hour
PM Peak Northbound
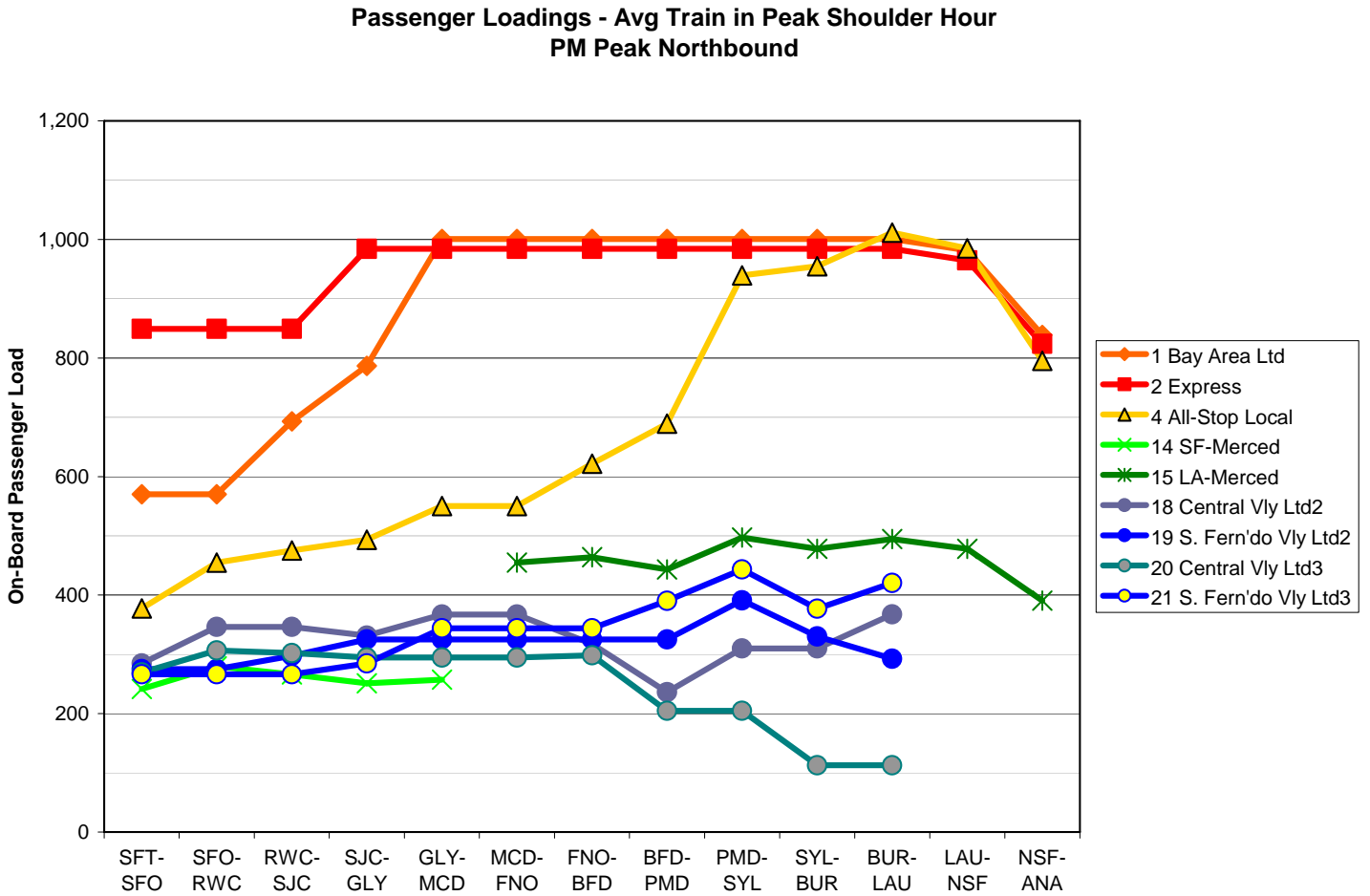
FIGURE 5 –
ESTIMATED PASSENGER LOADS IN 2030 – AVERAGE OFF-PEAK

Passenger Loadings - Avg Off-Peak Train
Southbound / Northbound
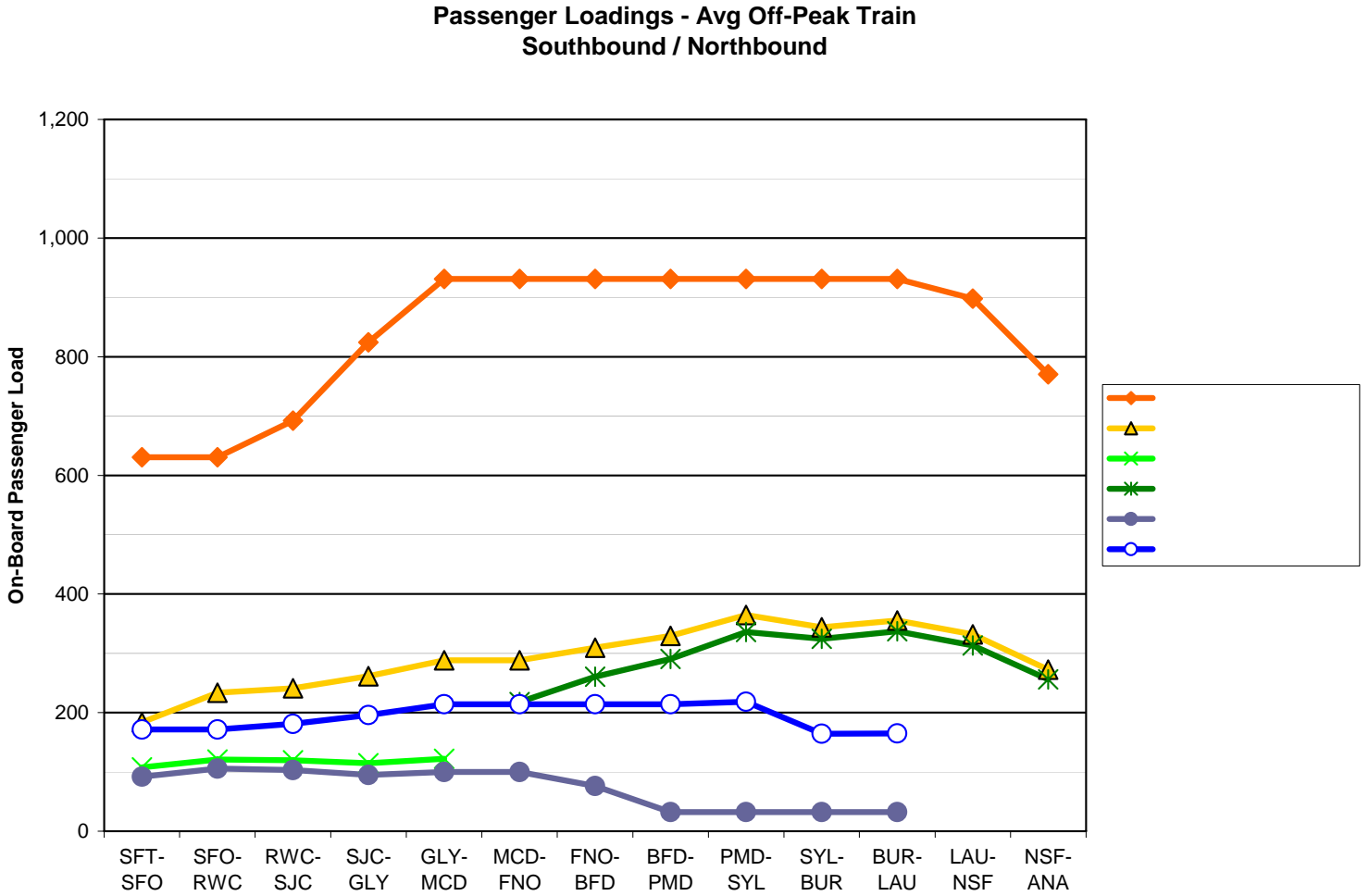
5. FLEET REQUIREMENTS

EQUIPMENT CYCLES

The concept level train schedule presented in Appendix A, which shows 260 daily revenue trains, was analyzed to estimate the number of trainsets based upon the number of 200 m and 400 m trainsets required to meet forecasted 2030 demand. Trains arriving at a terminal station are assumed to lay over at the platform for a certain period of time, for passenger alighting train servicing/inspection and passenger boarding, then depart in the opposite direction as the next available departing revenue train. This analysis generally adhered to the minimum terminal layover times presented in Table 2. In certain cases, shorter layover times were assumed in order to keep the number of trainsets to a reasonable minimum and to avoid inordinately long layovers, which would occupy terminal station or yard tracks for extended periods of time. Except during the late evening time period, train sets are generally available at the SFT and ANA terminals to provide "protection" for short connections from potentially delayed trains. These additional equipment sets would be culled from the 400 m local and limited trains operating during the morning peak period that continue during the mid-day period as 200 m trains. The train turns at the endpoint terminals are balanced during the mid-day and late evening off-peak hours. During the peaks, additional directional service is offered, so a relatively small number of trains are designated for mid-day yard storage in lieu of making a revenue turn.

Most trainsets are able to make 3-4 trips between the Bay area and Los Angeles basin over the course of a service day. Selected trains (one per hour each way) operate to and from Merced. At Merced, these trains then turn for the next available train operating towards the alternate terminal (i.e., a San Francisco-Merced train will lay over at Merced and turn for a Merced-Anaheim train).

REVENUE TRAINSETS

A "baseline" total of sixty five (65), 200 m trainsets were estimated to operate the 260 daily train schedule in revenue service. An additional twenty-nine (29), 200m sets are required to "fill out" the 400m trainsets that serve the peak periods (and all-day express services), as shown in Table 10.

TABLE 10 – 200M TRAIN SECTIONS NEEDED TO "FILL OUT" 400M TRAINS

Bay Area Limited	9
Express	6
All-Stop Local	6
Anaheim-LA-Merced	2
Central Valley Limited	2
San Fernando Valley Limited	4
Total	29

FLY CALIFORNIA
CALIFORNIA HIGH SPEED RAIL AUTHORITY

6. TRAIN STORAGE REQUIREMENTS

The number of trainsets estimated to be stored at each terminal location during both the overnight period and the mid-day off-peak period was calculated for the Phase 1 service plan based on the Phase 1 equipment cycles. The sixty five (65) revenue trainset consists required for Phase 1, includes thirty-six (36) 200m trainsets and twenty-nine (29) 400m trainsets, were distributed among the four terminals for overnight storage as follows:

TABLE 11 – OVERNIGHT TRAIN STORAGE REQUIREMENTS

(Revenue Trainsets)

Location	200 m Sets	400 m Sets	Total Trainsets	200 m Equivalents	400 m Yard Tracks*
San Francisco	14	[13] 4 BayArea Ltd 3 Express 2 SF Vly Ltd 1 CenVly Ltd 3 All-Stop	27	40	20
Los Angeles	13	[2] 2 SF Vly Ltd	15	17	9
Anaheim	4	[13] 5 BayArea Ltd 3 Express 1 CenVly Ltd 3 All-Stop 1 LA-Merced	17	30	15
Merced	5	[1] 1 LA-Merced	6	7	4
Total	36	29	65	94	48

* Additional tracks will be required at most locations for train maneuvering and to support required maintenance functions. Allowances for extensions to Sacramento and San Diego to satisfy full system needs are not included and will be added later at the conclusion of the Sacramento and San Diego extensions Study which will follow this analysis and report.

The overnight train storage requirements influence the sizes of the required storage yards capacities significantly. Train storage yards can be configured in several different ways, depending upon the size and shape of the available property for yard storage. Yards could be configured as a series of double-ended 400m tracks capable of storing either one 400m train or two 200m trains. Or, yards could comprise a combination of 400m and 200m long tracks. The storage yards are assumed to be located in reasonable proximity to the terminal stations, to minimize the extent of non-revenue or "deadhead" train movements, although the yards do not need to be immediately adjacent to the stations. Detailed operations analysis of the terminal stations, storage yards and connecting trackage have not yet been performed but are planned to be undertaken at a future stage of project development. Utilization of tracks in terminal stations to supplement overnight storage capacity will be examined during this analysis.

All sixty five trainset consists are forecasted to be in active revenue during both the morning and afternoon peak periods. The mid-day off-peak train schedule (between approximately 11:00 AM and 3:00 PM) can be operated with fifty-eight revenue trainsets. The remaining seven trainsets (all 400m long) will be stored in the terminal and yards, along with an additional thirteen (13) 200m sets culled from trains that need to be 400m long to meet peak demand but which can be reduced to 200m long during the mid-day period to reduce the quantity of off-peak empty seat-mileage. The number of required mid-day storage tracks, by location, is presented in the following table.

TABLE 12 – MID-DAY TRAIN STORAGE REQUIREMENTS

(Revenue Trainsets)

Location	200 m Extra Sets	400 m Sets	Total Trainsets	200 m Equivalents	400 m Yard Tracks
San Francisco	[6] 2 SF Vly Ltd 1 CenVly Ltd 3 All-Stop	[3] 3 Express	9	12	6
Los Angeles	2 SF Vly Ltd		2	2	1
Anaheim	[4] 3 All-Stop 1 LA-Merced	[4] 3 Express 1 CenVly Ltd	8	12	6
Merced	1 LA-Merced	--	1	1	1
Total	13	7	20	27	14

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APPENDICES – PHASE 1 SERVICE PLAN CHARACTERISTICS

[A] BASE, WITH 7.0% RECOVERY TIME ALLOWANCE

To develop the base Phase 1 conceptual service plan and hypothetical train schedules, trains were applied to the schedule in the following sequence:

1. San Francisco-Los Angeles-Anaheim Bay Area Limited service (Pattern #1) - (SFT-RWC-SJC-GLY-LAU-NSF-ANA)

    *   Clockface departures on the hour southbound from SFT, with first departure at 5:00 AM and last departure at 9:00 PM

    *   Clockface hourly departures northbound, from ANA at :35 and departing LAU at :00, with first departure at 4:35 AM and last departure at 8:35 PM

2. San Francisco-Los Angeles Express service (Pattern #2) - (SFT-SJC-LAU)

    *   Service provided only during the 3-hour morning and afternoon business travel peaks, one train per hour in each direction in each peak period

    *   Clockface departures on the half hour southbound from SFT and northbound from LAU, with morning departures at approximately 5:30 AM, 6:30 AM and 7:30 AM and afternoon departures from Los Angeles at approximately 3:30 PM, 4:30 PM and 5:30 PM, and from Anaheim at :05 past the hour.

    *   These trains are assumed to operate to Anaheim in Phase 1, in order to spread the peak period demand between the Bay Area and Anaheim among a greater number of trains.

3. San Fernando Valley Ltd. (Patterns #19 and #21 peak, #17 off-peak) – Limited stop service between San Francisco and L.A., stopping at San Fernando Valley stations and generally bypassing Central Valley stops

    *   30-minute headways in both directions of travel all day long

    *   Off-peak, southbound departures from SFT at :03 and :33; northbound departures from LAU at :10 and :40

    *   Service operates without being overtaken

    *   Service tapers after 7:00 pm

4. Central Valley Ltd. (Patterns #18 and #20 peak, #16 off-peak) – Limited stop service between San Francisco and L.A. stopping at Fresno and Bakersfield and making limited stops within the San Fernando Valley

    *   30-minute headways in both directions of travel all day long

    *   Off-peak, southbound departures from SFT at :08 and :38; northbound departures from LAU at :03 and :33

    *   During off-peak hours, service operates without being overtaken

    *   During peak hours, one of the two trains in each hour is overtaken in each direction (southbound at Fresno, northbound at Gilroy)

    *   Peak train in each peak period operates to/from Anaheim (ANA) to provide additional required seating capacity at the height of the peak at Anaheim.

- Service tapers after 7:00 pm

5. All-stop service, to ensure direct train service connectivity among all possible station pairs (Pattern #4)

   - Hourly service with clockface departure times, San Francisco to Anaheim all day long (Pattern #4, SFT-SFO-RWC-SJC-GLY-FNO-BFD-PMD-SYL-BUR-LAU-NSF-ANA)

   - Southbound trains depart SFT at :14

   - Northbound trains depart Anaheim (ANA) at :52, except during AM and PM business travel peaks, when these trains depart ANA at :46

   - During off-peak hours, the All-Stop trains are overtaken once per trip by limited stop trains, southbound at Bakersfield and northbound at Palmdale

   - During business travel peaks, southbound trains are overtaken twice, by the Super Express service, at Gilroy and by a limited stop train at Fresno; northbound All-Stop trains are overtaken once, at Bakersfield.

6. Anaheim-Los Angeles-Merced local service (Pattern #15)

   - Hourly service with clockface departure times, San Francisco to Merced making all intermediate stops (MCD-FNO-BFD-PMD-SYL-BUR-LAU-NSF-ANA)

   - Off-peak trains depart Merced southbound at :02 and depart Anaheim northbound at :20.

   - Peak period trains have slightly different departure times on account of different overtake patterns: southbound from Merced at :19 and northbound from Anaheim at :19.

   - Provides for equipment rotations to/from storage and maintenance facility at Merced

   - These trains could be extended in the system expansions to Sacramento and San Diego

   - During off-peak times, these trains are overtaken by two closely-spaced express trains – northbound at Palmdale and southbound at Bakersfield (extra 6 minutes of dwell time)

   - During business travel peaks, southbound trains have the same double overtake at Bakersfield, and northbound trains are overtaken twice – at Palmdale and Fresno.

7. San Francisco-Merced local service (Pattern #14)

   - Hourly service with clockface departure times, San Francisco to Merced making all intermediate stops (SFT-SFO-RWC-SJC-GLY-MCD)

   - Southbound trains depart SFT at :47; northbound trains depart Merced at :37

   - Provides for equipment rotations to/from storage and maintenance facility at Merced

   - These trains could be extended in the system expansions to Sacramento and San Diego

   - The relatively short distance of operation for this train on the San Francisco-Los Angeles network makes it easier to "slot in" around other trains without triggering an overtake – hence its position at the end of the priority sequence.

A hypothetical daily timetable for this service plan is presented in Appendix A1. This same schedule is presented in stringline (time-distance) diagram format in Appendix A2. Equipment cycles and the patterns of movement of each trainset throughout the day are documented in Appendix A3.

A1. Hypothetical Timetable

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CALIFORNIA HIGH-SPEED RAIL
PHASE 1 TIMETABLE
BASE SERVICE PLAN

APPENDIX A1

Southbound

Mile / Station	M1 S140519 Night 14 L.A.-Merced Local	M2 S140619 Peak O/T 14 L.A.-Merced Local	4 S040514 Peak O/T 4 All-Stop Local	8 S150547 Reg 15 S.F.-Merced Local	M5 S140719 Peak O/T 14 L.A.-Merced Local	12 S040614 Peak O/T 4 All-Stop Local	16 S150647 Reg 15 S.F.-Merced Local	8 S140819 Peak O/T 14 L.A.-Merced Local	20 S040714 Peak O/T 4 All-Stop Local	24 S150747 Reg 15 S.F.-Merced Local	16 S140902 Reg 14 L.A.-Merced Local
0.0 SFT S.F.-Transbay Dep			5:14	5:47		6:14	6:47		7:14	7:47	
14.7 SFO Millbrae Dep			5:30	6:03		6:30	7:03		7:30	8:03	
26.4 RWC Redwood City Dep			5:40	6:13		6:40	7:13		7:40	8:13	
48.0 SJC San Jose Dep			5:56	6:29		6:56	7:29		7:56	8:29	
77.7 GLY Gilroy Arr			6:11			7:11			8:11		
77.7 GLY Gilroy Dep			6:16	6:46		7:16	7:46		8:16	8:46	
187.5 MCD Merced Arr				7:21			8:21			9:21	
-- MCD Merced Dep	5:19	6:19	↓	↓	7:19	↓	↓	8:19	↓	↓	9:02
191.5 FNO Fresno Arr											
191.5 FNO Fresno Dep	5:42	6:42	7:03		7:42	8:03		8:42	9:03		9:25
302.8 BFD Bakersfield Arr		7:21			8:21			9:21			10:04
302.8 BFD Bakersfield Dep	6:22	7:29	--		8:29	--		9:29	--		10:10
387.4 PMD Palmdale Arr											
387.4 PMD Palmdale Dep	6:57	8:02	8:15		9:02	9:15		10:02	10:15		10:44
425.7 SYL Sylmar Dep	7:19	8:24	8:36		9:24	9:36		10:24	10:36		11:06
436.3 BUR Burbank Arr											
436.3 BUR Burbank Dep	7:28	8:33	8:45		9:33	9:45		10:33	10:45		11:15
446.6 LAU L.A. Union Sta. Arr	7:36	8:42	8:54		9:42	9:54		10:42	10:54		11:23
446.6 LAU L.A. Union Sta. Dep	7:38	8:44	8:56		9:44	9:56		10:44	10:56		11:25
461.8 NSF Norwalk Arr	7:50	8:55	9:08		9:55	10:08		10:55	11:08		11:37
476.9 ANA Anaheim Arr	8:01	9:07	9:19		10:07	10:19		11:07	11:19		11:48

Available →: 8:41, 9:05, 8:55, 9:47, 9:14, 9:59, 9:23, 9:31, 9:37, 8:01, 10:05, 9:55, 10:47, 10:39, 10:59, 10:23, 10:31, 10:37, 9:01, 11:05, 10:55, 11:47, 11:14, 11:59, 11:23, 11:31, 11:37, 10:01, 12:28, 12:05, 11:59, 12:07

Northbound

Mile / Station	M3 N150537 Reg 15 S.F.-Merced Local	M4 N150637 Reg 15 S.F.-Merced Local	42 N040446 Peak O/T 4 All-Stop Local	44 N140519 Peak O/T 14 L.A.-Merced Local	M6 N150737 Reg 15 S.F.-Merced Local	46 N040546 Peak O/T 4 All-Stop Local	48 N140619 Peak O/T 14 L.A.-Merced Local	44 N150837 Reg 15 S.F.-Merced Local	51 N040646 Peak O/T 4 All-Stop Local	53 N140720 Reg 14 L.A.-Merced Local	48 N150937 Reg 15 S.F.-Merced Local
0.0 ANA Anaheim Dep			4:46	5:19		5:46	6:19		6:46	7:20	
15.0 NSF Norwalk Dep			4:57	5:30		5:57	6:30		6:57	7:31	
30.3 LAU L.A. Union Sta. Arr			5:09	5:42		6:09	6:42		7:09	7:43	
30.3 LAU L.A. Union Sta. Dep			5:11	5:44		6:11	6:44		7:11	7:45	
40.6 BUR Burbank Dep			--	5:54		--	6:54		--	7:55	
51.1 SYL Sylmar Dep			5:30	6:03		6:30	7:03		7:30	8:04	
89.4 PMD Palmdale Arr				6:23			7:23			8:24	
89.4 PMD Palmdale Dep			5:51	6:27		6:51	7:27		7:51	8:30	
174.1 BFD Bakersfield Arr			6:22			7:22			8:22		
174.1 BFD Bakersfield Dep			6:27	7:02		7:27	8:02		8:27	9:05	
285.4 FNO Fresno Arr				7:41			8:41				
285.4 FNO Fresno Dep			7:08	7:45		8:08	8:45		9:08	9:46	
354.4 MCD Merced Arr				8:07			9:07			10:07	
-- MCD Merced Dep	5:37	6:37	↓		7:37	↓		8:37	↓		9:37
399.2 GLY Gilroy Arr											
399.2 GLY Gilroy Dep	6:13	7:13	7:51		8:13	8:51		9:13	9:51		10:13
428.8 SJC San Jose Dep	6:30	7:30	8:08		8:30	9:08		9:30	10:08		10:30
450.5 RWC Redwood City Arr	6:44	7:44	8:22		8:44	9:22		9:44	10:22		10:44
462.2 SFO Millbrae Arr	6:55	7:55	8:32		8:55	9:32		9:55	10:32		10:55
476.9 SFT S.F.-Transbay Arr	7:11	8:11	8:48		9:11	9:48		10:11	10:48		11:11

Available →: 7:41, 8:30, 8:41, 8:45, 8:57, 9:18, 8:49, 9:21, 9:27, 8:47, 9:30, 9:41, 9:45, 9:57, 9:47, 10:18, 9:49, 10:21, 10:27, 10:30, 10:41, 10:45, 10:57, 11:18, 10:49, 11:21, 11:27, 10:47, 11:30, 11:41, 11:51, 11:56

CALIFORNIA HIGH-SPEED RAIL
PHASE 1 TIMETABLE
BASE SERVICE PLAN   Turns from →

APPENDIX A1

Southbound

Mile	Station		27	61	24	42	45	61	46	49	45	51	54	49	55
	Train No. →		S040814	S150847	S141002	S040914	S150947	S141102	S041014	S151047	S141202	S041114	S151147	S141302	S041214
	Pattern →		4	15	14	4	15	14	4	15	14	4	15	14	4
	Service Type →		All-Stop Local	S.F.-Merced Local	L.A.-Merced Local	All-Stop Local	S.F.-Merced Local	L.A.-Merced Local	All-Stop Local	S.F.-Merced Local	L.A.-Merced Local	All-Stop Local	S.F.-Merced Local	L.A.-Merced Local	All-Stop Local
0.0	SFT S.F.-Transbay	Dep	8:14	8:47		9:14	9:47		10:14	10:47		11:14	11:47		12:14
14.7	SFO Millbrae	Dep	8:30	9:03		9:30	10:03		10:30	11:03		11:30	12:03		12:30
26.4	RWC Redwood City	Dep	8:40	9:13		9:40	10:13		10:40	11:13		11:40	12:13		12:40
48.0	SJC San Jose	Dep	8:56	9:29		9:56	10:29		10:56	11:29		11:56	12:29		12:56
77.7	GLY Gilroy	Dep	9:13	9:46		10:13	10:46		11:13	11:46		12:13	12:46		13:13
187.5	MCD Merced	Arr	↓	10:21		↓	11:21		↓	12:21		↓	13:21		↓
--		Dep			10:02			11:02			12:02			13:02	
191.5	FNO Fresno	Dep	9:56		10:25	10:56		11:25	11:56		12:25	12:56		13:25	13:56
302.8	BFD Bakersfield	Arr	10:35		11:04	11:35		12:04	12:35		13:04	13:35		14:04	14:35
		Dep	10:39		11:10	11:39		12:10	12:39		13:10	13:39		14:10	14:39
387.4	PMD Palmdale	Dep	11:13		11:44	12:13		12:44	13:13		13:44	14:13		14:44	15:13
425.7	SYL Sylmar	Dep	11:35		12:06	12:35		13:06	13:35		14:06	14:35		15:06	15:13
436.3	BUR Burbank	Dep	11:44		12:15	12:44		13:15	13:44		14:15	14:44		15:15	15:44
446.6	LAU L.A. Union Sta.	Arr	11:52		12:23	12:52		13:23	13:52		14:23	14:52		15:23	15:52
		Dep	11:54		12:25	12:54		13:25	13:54		14:25	14:54		15:25	15:54
461.8	NSF Norwalk	Arr	12:06		12:37	13:06		13:37	14:06		14:37	15:06		15:37	16:06
476.9	ANA Anaheim	Arr	12:17		12:48	13:17		13:48	14:17		14:48	15:17		15:48	16:17

Available → 12:57, 12:29, 12:37, 11:01, 13:28, 13:05, 12:59, 13:07, 13:57, 13:29, 13:37, 12:01, 14:28, 14:05, 13:59, 14:07, 14:57, 14:29, 14:37, 13:01, 15:28, 15:05, 14:59, 15:07, 15:57, 15:29, 15:37, 14:01, 16:28, 16:05, 15:59, 16:07, 16:57

Northbound

Mile	Station		55	56	53	M1	1	56	M2	9	1	M5	17	9	8
	Train No. →		N040752	N140820	N151037	N040852	N140920	N151137	N040952	N141020	N151237	N041052	N141120	N151337	N041152
	Pattern →		4	14	15	4	14	15	4	14	15	4	14	15	4
	Service Type →		All-Stop Local	L.A.-Merced Local	S.F.-Merced Local	All-Stop Local	L.A.-Merced Local	S.F.-Merced Local	All-Stop Local	L.A.-Merced Local	S.F.-Merced Local	All-Stop Local	L.A.-Merced Local	S.F.-Merced Local	All-Stop Local
0.0	ANA Anaheim	Dep	7:52	8:20		8:52	9:20		9:52	10:20		10:52	11:20		11:52
15.0	NSF Norwalk	Dep	8:03	8:31		9:03	9:31		10:03	10:31		11:03	11:31		12:03
30.3	LAU L.A. Union Sta.	Arr	8:15	8:43		9:15	9:43		10:15	10:43		11:15	11:43		12:15
		Dep	8:17	8:45		9:17	9:45		10:17	10:45		11:17	11:45		12:17
40.6	BUR Burbank	Dep	8:27	8:55		9:27	9:55		10:27	10:55		11:27	11:55		12:27
51.1	SYL Sylmar	Dep	8:36	9:04		9:36	10:04		10:36	11:04		11:36	12:04		12:36
89.4	PMD Palmdale	Arr	8:56	9:24		9:56	10:24		10:56	11:24		11:56	12:24		12:56
		Dep	9:01	9:28		10:01	10:28		11:01	11:30		12:01	12:30		13:01
174.1	BFD Bakersfield	Dep	9:33	10:03		10:33	11:03		11:33	12:05		12:33	13:05		13:33
285.4	FNO Fresno	Arr		10:42			11:42								
		Dep	10:14	10:46		11:14	11:46		12:14	12:46		13:14	13:46		14:14
354.4	MCD Merced	Arr	↓	11:08		↓	12:08		↓	13:07		↓	14:07		↓
--		Dep			10:37			11:37			12:37			13:37	
399.2	GLY Gilroy	Dep	10:57		11:13	11:57		12:13	12:57		13:13	13:57		14:13	14:57
428.8	SJC San Jose	Dep	11:14		11:30	12:14		12:30	13:14		13:30	14:14		14:30	15:14
450.5	RWC Redwood City	Arr	11:28		11:44	12:28		12:44	13:28		13:44	14:28		14:44	15:28
462.2	SFO Millbrae	Arr	11:38		11:55	12:38		12:55	13:38		13:55	14:38		14:55	15:38
476.9	SFT S.F.-Transbay	Arr	11:54		12:11	12:54		13:11	13:54		14:11	14:54		15:11	15:54

Available → 12:24, 12:21, 12:26, 11:48, 12:30, 12:41, 12:51, 12:56, 13:24, 13:21, 13:26, 12:48, 13:30, 13:41, 13:51, 13:56, 14:24, 14:21, 14:26, 13:47, 14:30, 14:41, 14:51, 14:56, 15:24, 15:21, 15:26, 14:47, 15:30, 15:41, 15:51, 15:56, 16:24

CALIFORNIA HIGH-SPEED RAIL
PHASE 1 TIMETABLE
BASE SERVICE PLAN   Turns from →

APPENDIX A1

Southbound

Mile	Station		57	54	M1	5	57	M2	13	5	M5	21	13	8
		Reg/Peak	Reg	Reg	Reg	Reg	Peak O/T	Reg	Reg	Peak O/T	Peak O/T	Reg	Peak O/T	Peak O/T
		Direction	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
		Train No.	S151247	S141402	S041314	S151347	S141519	S041414	S151447	S141619	S041514	S151547	S141719	S041614
		Pattern	15	14	4	15	14	4	15	14	4	15	14	4
		Service Type	S.F.-Merced Local	L.A.-Merced Local	All-Stop Local	S.F.-Merced Local	L.A.-Merced Local	All-Stop Local	S.F.-Merced Local	L.A.-Merced Local	All-Stop Local	S.F.-Merced Local	L.A.-Merced Local	All-Stop Local
0.0	SFT S.F.-Transbay	Dep	12:47		13:14	13:47		14:14	14:47		15:14	15:47		16:14
14.7	SFO Millbrae	Dep	13:03		13:30	14:03		14:30	15:03		15:30	16:03		16:30
26.4	RWC Redwood City	Dep	13:13		13:40	14:13		14:40	15:13		15:40	16:13		16:40
48.0	SJC San Jose	Dep	13:29		13:56	14:29		14:56	15:29		15:56	16:29		16:56
77.7	GLY Gilroy	Arr									16:11			17:11
		Dep	13:46		14:13	14:46		15:13	15:46		16:16	16:46		17:16
187.5	MCD Merced	Arr	14:21			15:21			16:21			17:21		
--		Dep		14:02	↓		15:19	↓		16:19	↓		17:19	↓
191.5	FNO Fresno	Arr												
		Dep		14:25	14:56		15:42	15:56		16:42	17:03		17:42	18:03
302.8	BFD Bakersfield	Arr		15:04	15:35		16:21	16:35		17:21			18:21	
		Dep		15:10	15:39		16:29	16:39		17:29	--		18:29	--
387.4	PMD Palmdale	Arr												
		Dep		15:44	16:13		17:02	17:13		18:02	18:15		19:02	19:15
425.7	SYL Sylmar	Dep		16:06	16:35		17:24	17:35		18:24	18:36		19:24	19:36
436.3	BUR Burbank	Arr												
		Dep		16:15	16:44		17:33	17:44		18:33	18:45		19:33	19:45
446.6	LAU L.A. Union Sta.	Arr		16:23	16:52		17:42	17:52		18:42	18:54		19:42	19:54
		Dep		16:25	16:54		17:44	17:54		18:44	18:56		19:44	19:56
461.8	NSF Norwalk	Arr		16:37	17:06		17:55	18:06		18:55	19:08		19:55	20:08
476.9	ANA Anaheim	Arr		16:48	17:17		18:07	18:17		19:07	19:19		20:07	20:19

Available → 16:29, 16:37, 15:01, 17:28, 17:05, 16:59, 17:07, 17:57, 17:29, 17:37, 16:01, 18:05, 17:59, 18:47, 18:07, 18:57, 18:29, 18:37, 17:01, 19:05, 18:55, 19:47, 19:39, 19:59, 19:23, 19:31, 19:37, 18:01, 20:05, 19:55, 20:47, 20:14, 20:59

Turns for →

Turns from →

Northbound

Mile	Station		25	17	27	62	25	42	65	62	46	69	65	51
		Reg/Peak	Reg	Reg	Reg	Reg	Reg	Reg	Peak O/T	Reg	Peak O/T	Reg	Reg	Peak O/T
		Direction	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
		Train No.	N141220	N151437	N041252	N141320	N151537	N041352	N141419	N151637	N041446	N141519	N151737	N041546
		Pattern	14	15	4	14	15	4	14	15	4	14	15	4
		Service Type	L.A.-Merced Local	S.F.-Merced Local	All-Stop Local	L.A.-Merced Local	S.F.-Merced Local	All-Stop Local	L.A.-Merced Local	S.F.-Merced Local	All-Stop Local	L.A.-Merced Local	S.F.-Merced Local	All-Stop Local
0.0	ANA Anaheim	Dep	12:20		12:52	13:20		13:52	14:19		14:46	15:19		15:46
15.0	NSF Norwalk	Dep	12:31		13:03	13:31		14:03	14:30		14:57	15:30		15:57
30.3	LAU L.A. Union Sta.	Arr	12:43		13:15	13:43		14:15	14:42		15:09	15:42		16:09
		Dep	12:45		13:17	13:45		14:17	14:44		15:11	15:44		16:11
40.6	BUR Burbank	Dep	12:55		13:27	13:55		14:27	14:54		--	15:54		--
51.1	SYL Sylmar	Dep	13:04		13:36	14:04		14:36	15:03		15:30	16:03		16:30
89.4	PMD Palmdale	Arr	13:24		13:56	14:24		14:56	15:23		15:51	16:23		16:51
		Dep	13:30		14:01	14:30		15:01	15:27		15:51	16:29		16:51
174.1	BFD Bakersfield	Arr									16:22			17:22
		Dep	14:05		14:33	15:05		15:33	16:02		16:27	17:04		17:27
285.4	FNO Fresno	Arr									16:41			
		Dep	14:46		15:14	15:46		16:14	16:45		17:08	17:45		18:08
354.4	MCD Merced	Arr	15:07		↓	16:07		↓	17:07		↓	18:06		↓
--		Dep		14:37	↓		15:37	↓		16:37	↓		17:37	↓
399.2	GLY Gilroy	Arr												
		Dep		15:13	15:57		16:13	16:57		17:13	17:51		18:13	18:51
428.8	SJC San Jose	Dep		15:30	16:14		16:30	17:14		17:30	18:08		18:30	19:08
450.5	RWC Redwood City	Arr		15:44	16:28		16:44	17:28		17:44	18:22		18:44	19:22
462.2	SFO Millbrae	Arr		15:55	16:38		16:55	17:38		17:55	18:32		18:55	19:32
476.9	SFT S.F.-Transbay	Arr		16:11	16:54		17:11	17:54		18:11	18:48		19:11	19:48

Available → 16:21, 16:26, 15:47, 16:30, 16:41, 16:51, 16:56, 17:24, 17:21, 17:26, 16:47, 17:30, 17:41, 17:51, 17:56, 18:24, 18:21, 18:26, 17:47, 18:45, 18:57, 19:18, 18:49, 19:21, 19:27, 18:46, 19:30, 19:41, 19:45, 19:57, 20:18

Turns for →

CALIFORNIA HIGH-SPEED RAIL
PHASE 1 TIMETABLE
BASE SERVICE PLAN   Turns from →

APPENDIX A1

Southbound

Mile / Station		16 S151647 Pat.15 S.F.-Merced Local (Reg)	21 S141802 Pat.14 L.A.-Merced Local (Reg)	27 S041714 Pat.4 All-Stop Local (Peak O/T)	66 S151747 Pat.15 S.F.-Merced Local (Reg)	16 S141902 Pat.14 L.A.-Merced Local (Reg)	44 S041814 Pat.4 All-Stop Local (Reg)	50 S151847 Pat.15 S.F.-Merced Local (Reg)	66 S142002 Pat.14 L.A.-Merced Local (Reg)	46 S041914 Pat.4 All-Stop Local (Night)	73 S151947 Pat.15 S.F.-Merced Local (Reg)	51 S042014 Pat.4 All-Stop Local (Night)	3 S152047 Pat.15 S.F.-Merced Local (Reg)	55 S042114 Pat.4 All-Stop Local (Night)
0.0 SFT S.F.-Transbay	Dep	16:47		17:14	17:47		18:14	18:47		19:14	19:47	20:14	20:47	21:14
14.7 SFO Millbrae	Dep	17:03		17:30	18:03		18:30	19:03		19:30	20:03	20:30	21:03	21:30
26.4 RWC Redwood City	Dep	17:13		17:40	18:13		18:40	19:13		19:40	20:13	20:40	21:13	21:40
48.0 SJC San Jose	Dep	17:29		17:56	18:29		18:56	19:29		19:56	20:29	20:56	21:29	21:56
77.7 GLY Gilroy	Arr			18:11										
	Dep	17:46		18:16	18:46		19:13	19:46		20:13	20:46	21:13	21:46	22:13
187.5 MCD Merced	Arr	18:21		↓	19:21		↓	20:21		↓	21:21	↓	22:21	↓
--	Dep		18:02			19:02			20:02					
191.5 FNO Fresno	Dep		18:25	19:03		19:25	19:56		20:25	20:56		21:56		22:56
302.8 BFD Bakersfield	Arr		19:04			20:04	20:35		21:04					
	Dep		19:10	--		20:10	20:39		21:10	21:36		22:36		23:36
387.4 PMD Palmdale	Dep		19:44	20:15		20:44	21:13		21:44	22:09		23:09		0:09
425.7 SYL Sylmar	Dep		20:06	20:36		21:06	21:35		22:06	22:31		23:31		0:31
436.3 BUR Burbank	Dep		20:15	20:45		21:15	21:44		22:15	22:40		23:40		0:40
446.6 LAU L.A. Union Sta.	Arr		20:23	20:54		21:23	21:52		22:23	22:48		23:48		0:48
	Dep		20:25	20:56		21:25	21:54		22:25	22:50		23:50		0:50
461.8 NSF Norwalk	Arr		20:37	21:08		21:37	22:06		22:37	23:02		0:02		1:02
476.9 ANA Anaheim	Arr		20:48	21:19		21:48	22:17		22:48	23:13		0:13		1:13

Available → 20:23 20:31 20:37 19:01 21:28 21:05 20:55 21:14 21:59 21:23 21:31 21:37 20:01 22:28 22:05 21:59 22:07 22:57 22:29 22:37 21:01 23:28 23:05 23:06 23:53 23:34 22:01 0:05 0:53 23:01 1:05 1:53
Turns for →

Turns from →

Northbound

Mile / Station		72 N141619 Pat.14 L.A.-Merced Local (Reg)	69 N151837 Pat.15 S.F.-Merced Local (Reg)	55 N041646 Pat.4 All-Stop Local (Reg)	2 N141720 Pat.14 L.A.-Merced Local (Peak O/T)	72 N151937 Pat.15 S.F.-Merced Local (Reg)	M1 N041752 Pat.4 All-Stop Local (Reg)	10 N141820 Pat.14 L.A.-Merced Local (Reg)	2 N152037 Pat.15 S.F.-Merced Local (Reg)	M2 N041852 Pat.4 All-Stop Local (Reg)	18 N141920 Pat.14 L.A.-Merced Local (Night)	5 N041952 Pat.4 All-Stop Local (Reg)	M3 N142020 Pat.14 L.A.-Merced Local (Night)	13 N042052 Pat.4 All-Stop Local (Night)
0.0 ANA Anaheim	Dep	16:19		16:46	17:20		17:52	18:20		18:52	19:20	19:52	20:20	20:52
15.0 NSF Norwalk	Dep	16:30		16:57	17:31		18:03	18:31		19:03	19:31	20:03	20:31	21:03
30.3 LAU L.A. Union Sta.	Arr	16:42		17:09	17:43		18:15	18:43		19:15	19:43	20:15	20:43	21:15
	Dep	16:44		17:11	17:45		18:17	18:45		19:17	19:45	20:17	20:45	21:17
40.6 BUR Burbank	Dep	16:54		--	17:55		18:27	18:55		19:27	19:55	20:27	20:55	21:27
51.1 SYL Sylmar	Dep	17:03		17:30	18:04		18:36	19:04		19:36	20:04	20:36	21:04	21:36
89.4 PMD Palmdale	Arr	17:23		17:51	18:24		18:56	19:24		19:56	20:24	20:56	21:24	21:56
	Dep	17:29		17:51	18:30		19:01	19:30		20:01	20:30	21:01	21:30	22:01
174.1 BFD Bakersfield	Arr			18:22										
	Dep	18:04		18:27	19:05		19:33	20:05		20:30	21:05	21:30	22:05	22:30
285.4 FNO Fresno	Dep	18:45		19:08	19:46		20:14	20:46		21:11	21:46	22:11	22:46	23:11
354.4 MCD Merced	Arr	19:06		↓	20:07		↓	21:07		↓	22:07	↓	23:07	↓
--	Dep		18:37			19:37			20:37					
399.2 GLY Gilroy	Dep		19:13	19:51		20:13	20:57		21:13	21:54		22:54		23:54
428.8 SJC San Jose	Dep		19:30	20:08		20:30	21:14		21:30	22:11		23:11		0:11
450.5 RWC Redwood City	Arr		19:44	20:22		20:44	21:28		21:44	22:25		23:25		0:25
462.2 SFO Millbrae	Arr		19:55	20:32		20:55	21:38		21:55	22:35		23:35		0:35
476.9 SFT S.F.-Transbay	Arr		20:11	20:48		21:11	21:54		22:11	22:51		23:51		0:51

Available → 19:49 20:21 20:27 19:46 20:30 20:41 20:45 20:57 21:18 20:49 21:21 21:27 20:47 21:30 21:41 21:51 21:56 22:24 22:21 22:26 21:47 22:30 22:41 23:01 23:21 23:26 22:47 23:30 0:21 23:47 0:30 1:21
Turns for →

A2. Stringline Diagrams

- Morning Peak Period

- Mid-Day Period

- Afternoon Peak Period

- Evening and Late Night Period

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Appendix A2 - HST PHASE 1 SERVICE PLAN - BASE (Version 10) - MORNING PEAK
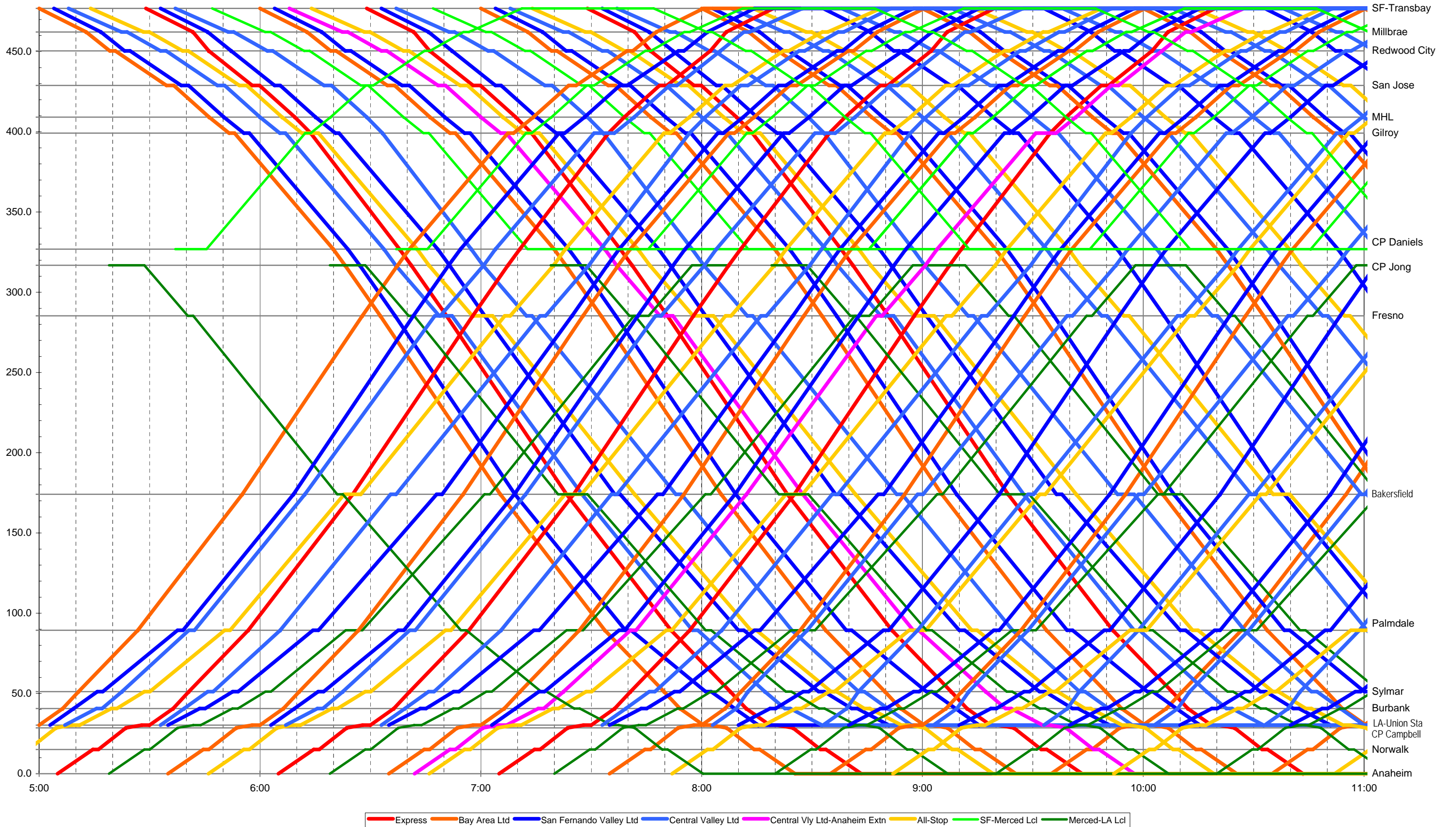
Legend: Express — Bay Area Ltd — San Fernando Valley Ltd — Central Valley Ltd — Central Vly Ltd-Anaheim Extn — All-Stop — SF-Merced Lcl — Merced-LA Lcl

Appendix A2 - HST PHASE 1 SERVICE PLAN - BASE (Version 10) - MID-DAY

Legend: Express | Bay Area Ltd | San Fernando Valley Ltd | Central Valley Ltd | Central Vly Ltd-Anaheim Extn | All-Stop | SF-Merced Lcl | Merced-LA Lcl

Stations (top to bottom): SF-Transbay, Millbrae, Redwood City, San Jose, MHL, Gilroy, CP Daniels, CP Jong, Fresno, Bakersfield, Palmdale, Sylmar, Burbank, LA-Union Sta, CP Campbell, Norwalk, Anaheim
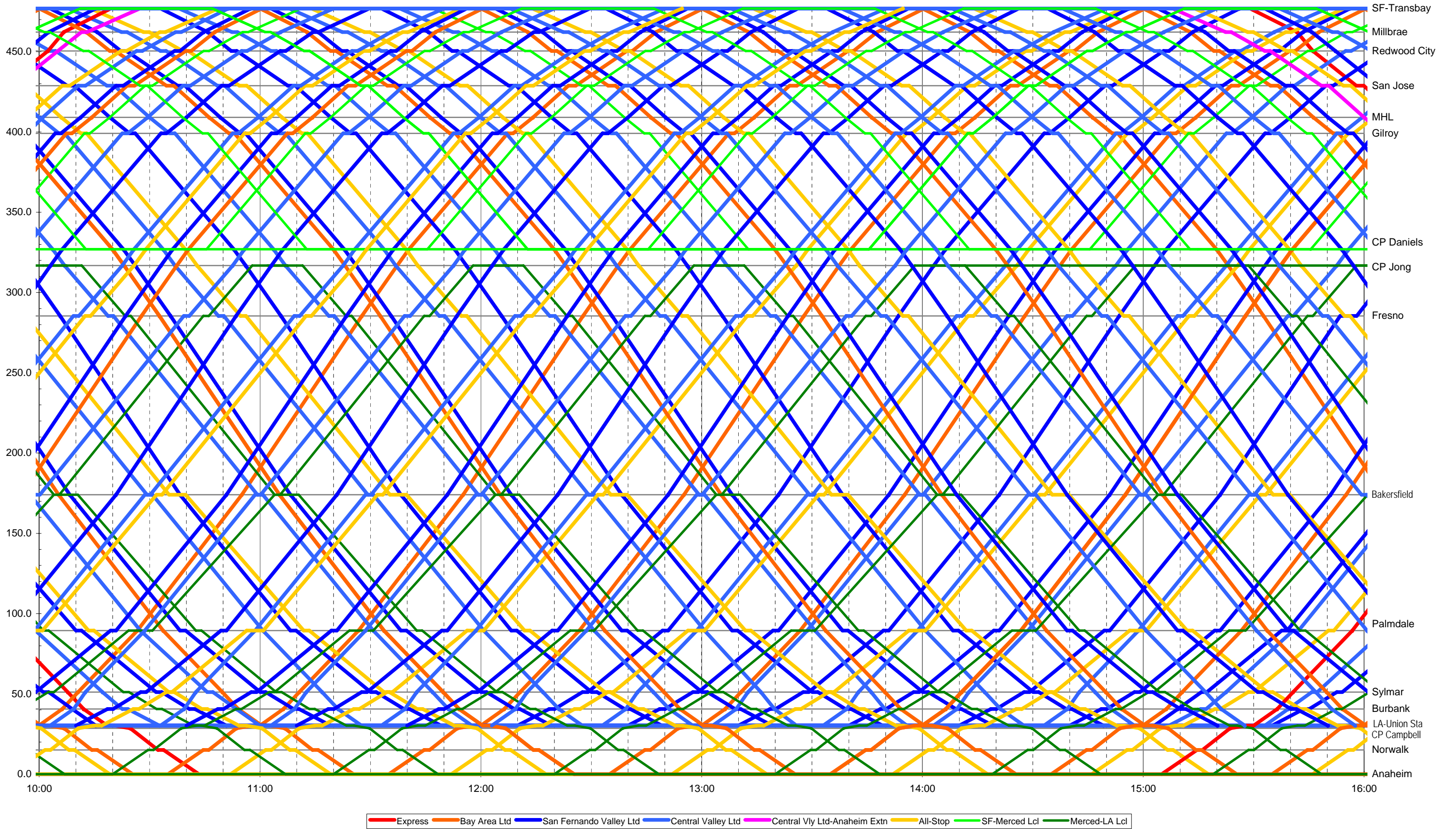
Appendix A2 - HST PHASE 1 SERVICE PLAN - BASE (Version 10) - AFTERNOON PEAK

Legend: Express — Bay Area Ltd — San Fernando Valley Ltd — Central Valley Ltd — Central Vly Ltd-Anaheim Extn — All-Stop — SF-Merced Lcl — Merced-LA Lcl

Stations (top to bottom): SF-Transbay, Millbrae, Redwood City, San Jose, MHL, Gilroy, CP Daniels, CP Jong, Fresno, Bakersfield, Palmdale, Sylmar, Burbank, LA-Union Sta, CP Campbell, Norwalk, Anaheim

Time axis: 14:00 – 20:00
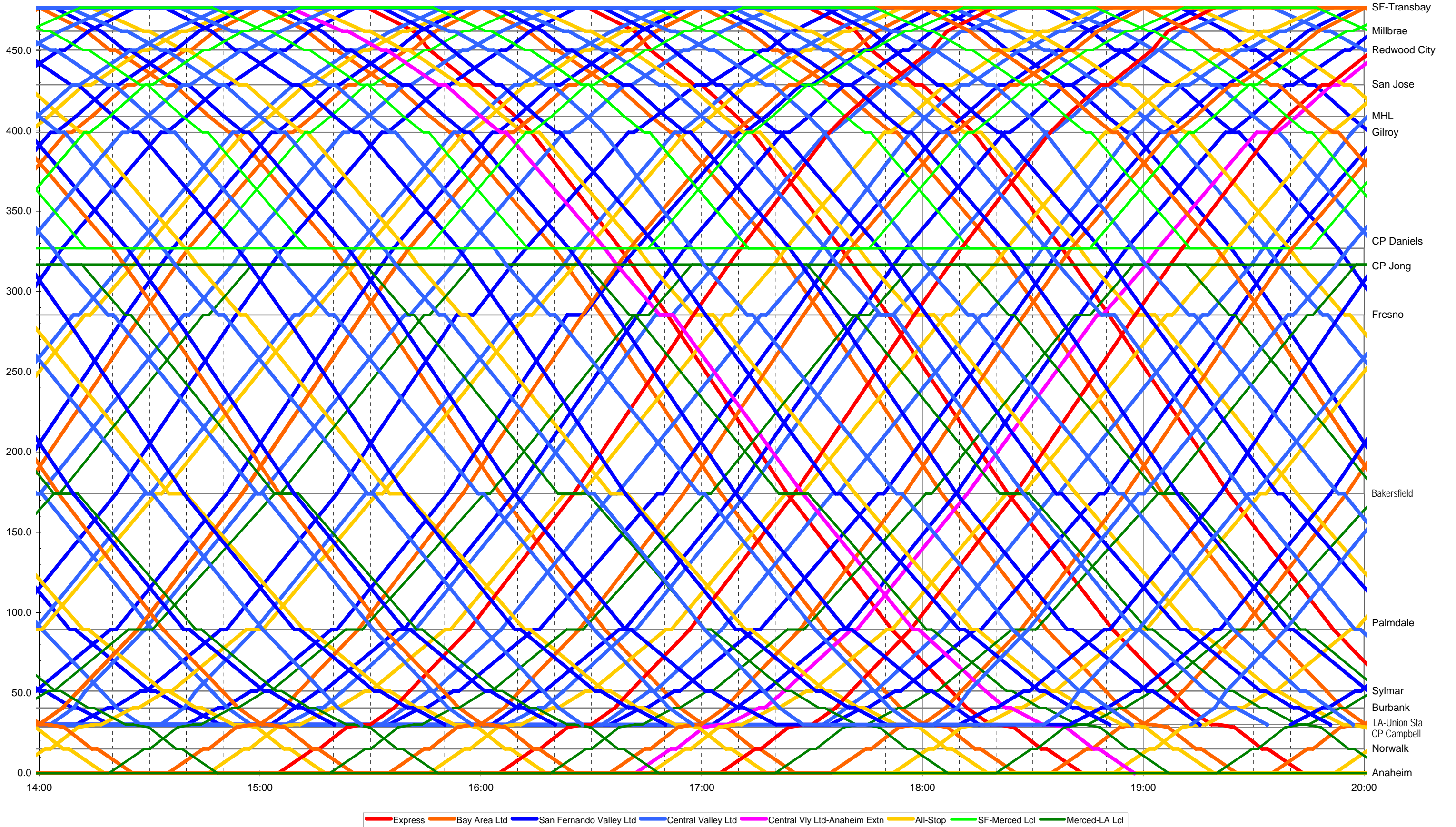
Appendix A2 - HST PHASE 1 SERVICE PLAN - BASE (Version 10) - LATE EVENING

Legend: Express, Bay Area Ltd, San Fernando Valley Ltd, Central Valley Ltd, Central Vly Ltd-Anaheim Extn, All-Stop, SF-Merced Lcl, Merced-LA Lcl

Stations (top to bottom): SF-Transbay, Millbrae, Redwood City, San Jose, MHL, Gilroy, CP Daniels, CP Jong, Fresno, Bakersfield, Palmdale, Sylmar, Burbank, LA-Union Sta, CP Campbell, Norwalk, Anaheim
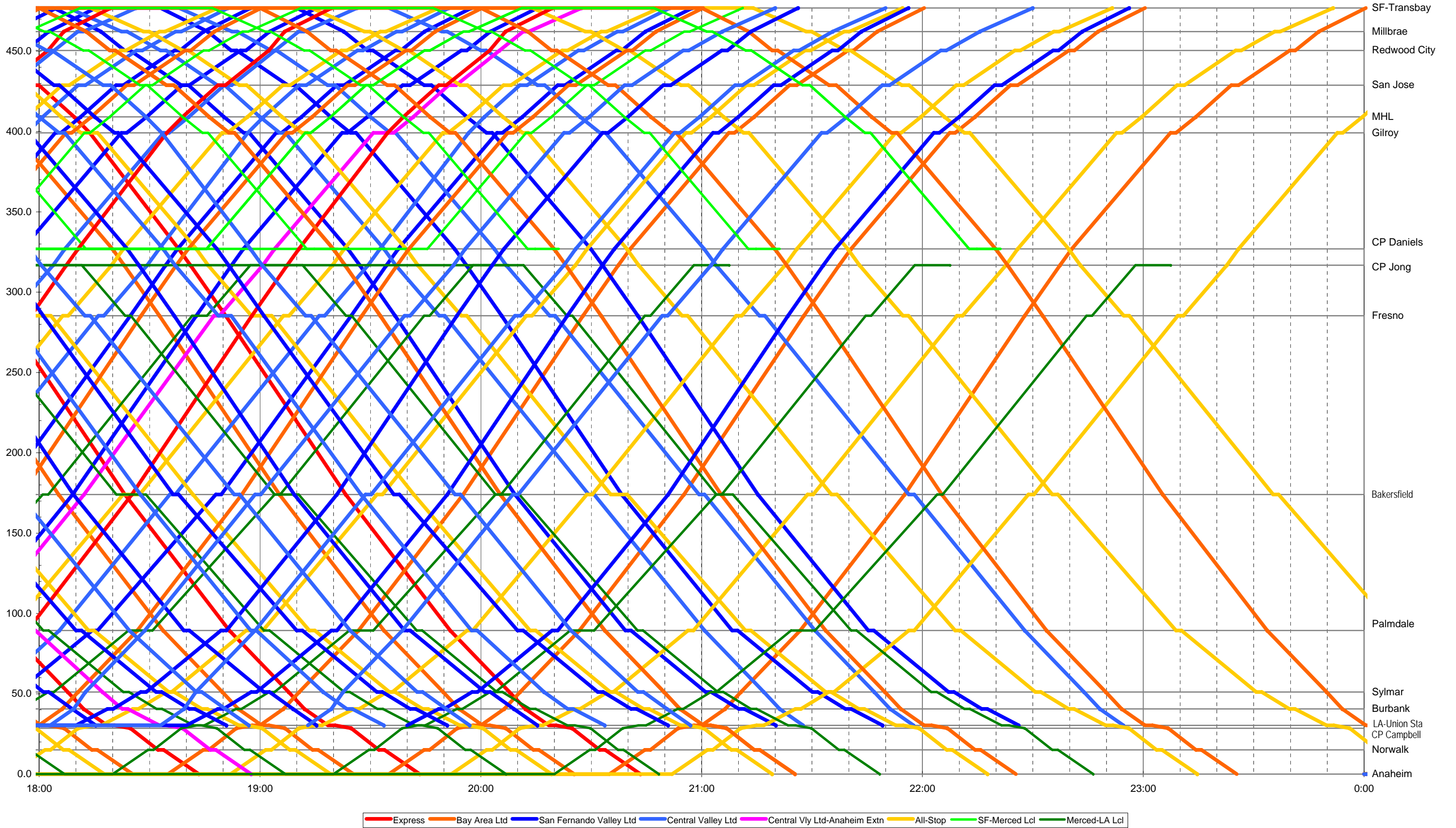
A3. Equipment Cycles

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CALIFORNIA HIGH SPEED RAIL
APPENDIX A3 -- EQUIPMENT CYCLES -- PHASE 1 BASE SERVICE PLAN (Version 10)

ID	OvertkScheme	Dir	Set	Set2	Consist	Train No.	Pattern	Train Type	Orig	OrigTime	Dest	DestTime	RunTime	MinLay	Avail	Layover	Excess	DestArr	DestDep	T	TrnMi	200m SetMi	Wkend	Yd
2	Reg	SB	1	X11	400	S010500	1	Bay Area Ltd	SFT	5:00	ANA	8:25	3:25	40	9:05	0:55	15	8:25	9:20		476.9	953.8	476.9	
174	Peak O/T	NB	1			N140920	14	LA-Merced	ANA	9:20	MCD	12:08	2:48	30	12:38	0:29	(1)	12:08	12:37		354.3	354.3	354.3	
184	Reg	NB	1			N151237	15	SF-Merced	MCD	12:37	SFT	14:11	1:34	40	14:51	0:27	(13)	14:11	14:38	*	161.2	161.2	161.2	
83	Reg	SB	1			S161438	16	Central Vly. Ltd	SFT	14:38	LAU	17:57	3:19	40	18:37	0:43	3	17:57	18:40		446.6	446.6	0	
248	Reg	NB	1			N171840	17	S.Fernando Vly. Ltd	LAU	18:40	SFT	21:56	3:16	30	22:26	--	--	21:56	--		446.6	446.6	446.6	
3	Peak O/T	SB	2			S190504	19	S.Fernando Vly. Ltd	SFT	5:04	LAU	8:15	3:11	40	8:55	0:48	8	8:15	9:03		446.6	446.6	446.6	
169	Reg	NB	2			N160903	16	Central Vly. Ltd	LAU	9:03	SFT	12:21	3:18	30	12:51	0:39	9	12:21	13:00		446.6	446.6	0	
70	Reg	SB	2	X5	400	S011300	1	Bay Area Ltd	SFT	13:00	ANA	16:25	3:25	40	17:05	0:55	15	16:25	17:20		476.9	953.8	476.9	
241	Reg	NB	2		400	N141720	14	LA-Merced	ANA	17:20	MCD	20:07	2:47	30	20:37	0:30	0	20:07	20:37		354.3	708.6	354.3	
251	Reg	NB	2			N152037	15	SF-Merced	MCD	20:37	SFT	22:11	1:34	40	22:51	--	--	22:11	--		161.2	161.2	161.2	
5	Peak O/T	SB	3			S180508	18	Central Vly. Ltd	SFT	5:08	LAU	8:34	3:26	40	9:14	0:36	(4)	8:34	9:10		446.6	446.6	446.6	
170	Reg	NB	3			N170910	17	S.Fernando Vly. Ltd	LAU	9:10	SFT	12:26	3:16	30	12:56	0:37	7	12:26	13:03		446.6	446.6	446.6	
71	Peak O/T	SB	3			S171303	17	S.Fernando Vly. Ltd	SFT	13:03	LAU	16:19	3:16	40	16:59	0:44	4	16:19	17:03		446.6	446.6	446.6	
235	Peak O/T	NB	3		400	N191703	19	S.Fernando Vly. Ltd	LAU	17:03	SFT	20:15	3:12	30	20:45	0:32	2	20:15	20:47		446.6	893.2	446.6	
128	Reg	SB	3			S152047	15	SF-Merced	SFT	20:47	MCD	22:21	1:34	40	23:01	--	--	22:21	--		161.2	161.2	161.2	
6	Peak O/T	SB	4			S040514	4	All-Stop	SFT	5:14	ANA	9:19	4:05	40	9:59	0:51	11	9:19	10:10		476.9	476.9	476.9	
178	Reg	NB	4			N171010	17	S.Fernando Vly. Ltd	LAU	10:10	SFT	13:26	3:16	30	13:56	0:37	7	13:26	14:03		446.6	446.6	446.6	
78	Peak O/T	SB	4			S171403	17	S.Fernando Vly. Ltd	SFT	14:03	LAU	17:19	3:16	40	17:59	0:44	4	17:19	18:03		446.6	446.6	446.6	
244	Reg	NB	4			N161803	16	Central Vly. Ltd	LAU	18:03	SFT	21:21	3:18	30	21:51	--	--	21:21	--		446.6	446.6	0	
7	Reg	SB	5	SX1	400	S020529	2	Express	SFT	5:29	ANA	8:43	3:14	40	9:23	0:52	12	8:43	9:35		446.6	893.2	0	
175	Reg	NB	5	X11	400	N010935	1	Bay Area Ltd	ANA	9:35	SFT	13:00	3:25	30	13:30	0:47	17	13:00	13:47		476.9	953.8	476.9	
76	Reg	SB	5			S151347	15	SF-Merced	SFT	13:47	MCD	15:21	1:34	40	16:01	0:58	18	15:21	16:19		161.2	161.2	161.2	
87	Peak O/T	SB	5			S141619	14	LA-Merced	MCD	16:19	ANA	19:07	2:48	40	19:47	0:45	5	19:07	19:52		354.3	354.3	354.3	
257	Night	NB	5			N041952	4	All-Stop	ANA	19:52	SFT	23:51	3:59	30	0:21	--	--	23:51	--		476.9	476.9	476.9	
8	Peak O/T	SB	6			S210533	21	S.Fernando Vly. Ltd	SFT	5:33	LAU	8:51	3:18	40	9:31	0:42	2	8:51	9:33		446.6	446.6	446.6	
172	Reg	NB	6			N160933	16	Central Vly. Ltd	LAU	9:33	SFT	12:51	3:18	30	13:21	0:17	(13)	12:51	13:08	*	446.6	446.6	0	
72	Reg	SB	6			S161308	16	Central Vly. Ltd	SFT	13:08	LAU	16:27	3:19	40	17:07	0:38	(2)	16:27	17:05		446.6	446.6	446.6	
238	Reg	NB	6	SX6	400	N021705	2	Express	ANA	17:05	SFT	20:19	3:14	30	20:49	--	--	20:19	--		446.6	893.2	0	
9	Peak O/T	SB	7			S200537	20	Central Vly. Ltd	SFT	5:37	LAU	8:57	3:20	40	9:37	0:43	3	8:57	9:40		446.6	446.6	446.6	
173	Reg	NB	7			N170940	17	S.Fernando Vly. Ltd	LAU	9:40	SFT	12:56	3:16	30	13:26	0:37	7	12:56	13:33		446.6	446.6	446.6	
74	Reg	SB	7			S171333	17	S.Fernando Vly. Ltd	SFT	13:33	LAU	16:49	3:16	40	17:29	0:44	4	16:49	17:33		446.6	446.6	446.6	
239	Peak O/T	NB	7			N201733	20	Central Vly. Ltd	LAU	17:33	SFT	20:51	3:18	30	21:21	--	--	20:51	--		446.6	446.6	446.6	
10	Reg	SB	8			S150547	15	SF-Merced	SFT	5:47	MCD	7:21	1:34	40	8:01	0:58	18	7:21	8:19		161.2	161.2	161.2	
22	Peak O/T	SB	8			S140819	14	LA-Merced	MCD	8:19	ANA	11:07	2:48	40	11:47	0:45	5	11:07	11:52		354.3	354.3	354.3	
195	Reg	NB	8			N041152	4	All-Stop	ANA	11:52	SFT	15:54	4:02	30	16:24	0:20	(10)	15:54	16:14	*	476.9	476.9	476.9	
98	Peak O/T	SB	8		400	S041614	4	All-Stop	SFT	16:14	ANA	20:19	4:05	40	20:59	--	--	20:19	--		476.9	953.8	476.9	
11	Reg	SB	9	X12	400	S010600	1	Bay Area Ltd	SFT	6:00	ANA	9:25	3:25	40	10:05	0:55	15	9:25	10:20		476.9	953.8	476.9	
182	Reg	NB	9			N141020	14	LA-Merced	ANA	10:20	MCD	13:07	2:47	30	13:37	0:30	0	13:07	13:37		354.3	354.3	354.3	
192	Reg	NB	9			N151337	15	SF-Merced	MCD	13:37	SFT	15:11	1:34	40	15:51	0:26	(14)	15:11	15:37	*	161.2	161.2	161.2	
92	Peak O/T	SB	9			S201537	20	Central Vly. Ltd	SFT	15:37	LAU	18:57	3:20	40	19:37	--	--	18:57	--		446.6	446.6	446.6	
12	Peak O/T	SB	10			S190604	19	S.Fernando Vly. Ltd	SFT	6:04	LAU	9:15	3:11	40	9:55	0:48	8	9:15	10:03		446.6	446.6	446.6	
177	Reg	NB	10			N161003	16	Central Vly. Ltd	LAU	10:03	SFT	13:21	3:18	30	13:51	0:39	9	13:21	14:00		446.6	446.6	0	
77	Reg	SB	10	X11	400	S011400	1	Bay Area Ltd	SFT	14:00	ANA	17:25	3:25	40	18:05	0:55	15	17:25	18:20		476.9	953.8	476.9	
249	Reg	NB	10			N141820	14	LA-Merced	ANA	18:20	MCD	21:07	2:47	30	21:37	--	--	21:07	--		354.3	354.3	354.3	
14	Peak O/T	SB	11		400	S100608	10	Central Vly. Ltd Ext.	SFT	6:08	ANA	9:59	3:51	40	10:39	5:06	266	9:59	15:05		476.9	953.8	0	YAN
220	Reg	NB	11	SX4	400	N021505	2	Express	ANA	15:05	SFT	18:19	3:14	30	18:49	0:41	11	18:19	19:00		446.6	893.2	0	
121	Reg	SB	11	X2	400	S011900	1	Bay Area Ltd	SFT	19:00	ANA	22:25	3:25	40	23:05	--	--	22:25	--		476.9	953.8	476.9	
15	Peak O/T	SB	12		400	S040614	4	All-Stop	SFT	6:14	ANA	10:19	4:05	40	10:59	5:46	306	10:19	16:05		476.9	953.8	476.9	YAN
229	Reg	NB	12	SX5	400	N021605	2	Express	ANA	16:05	SFT	19:19	3:14	30	19:49	--	--	19:19	--		446.6	893.2	0	
16	Reg	SB	13	SX2	400	S020629	2	Express	SFT	6:29	ANA	9:43	3:14	40	10:23	0:52	12	9:43	10:35		446.6	893.2	0	
183	Reg	NB	13	X12	400	N011035	1	Bay Area Ltd	ANA	10:35	SFT	14:00	3:25	30	14:30	0:47	17	14:00	14:47		476.9	953.8	476.9	

pb

ID	OvertkScheme	Dir	Set	Set2	Consist	Train No.	Pattern	Train Type	Orig	OrigTime	Dest	DestTime	RunTime	MinLay	Avail	Layover	Excess	DestArr	DestDep	T	TrnMi	200m SetMi	Wkend	Yd
84	Reg	SB	13			S151447	15	SF-Merced	SFT	14:47	MCD	16:21	1:34	40	17:01	0:58	18	16:21	17:19		161.2	161.2	161.2	
96	Peak O/T	SB	13		400	S141719	14	LA-Merced	MCD	17:19	ANA	20:07	2:48	40	20:47	0:45	5	20:07	20:52		354.3	708.6	354.3	
260	Night	NB	13			N042052	4	All-Stop	ANA	20:52	SFT	0:51	3:59	30	1:21	--	--	0:51	--		476.9	476.9	476.9	
17	Peak O/T	SB	14		400	S210633	21	S.Fernando Vly. Ltd	SFT	6:33	LAU	9:51	3:18	40	10:31	0:42	2	9:51	10:33		446.6	893.2	446.6	
180	Reg	NB	14			N161033	16	Central Vly. Ltd	LAU	10:33	SFT	13:51	3:18	30	14:21	0:17	(13)	13:51	14:08	*	446.6	446.6	0	
80	Reg	SB	14			S161408	16	Central Vly. Ltd	SFT	14:08	LAU	17:27	3:19	40	18:07	0:43	3	17:27	18:10		446.6	446.6	0	
245	Reg	NB	14			N171810	17	S.Fernando Vly. Ltd	LAU	18:10	SFT	21:26	3:16	30	21:56	--	--	21:26	--		446.6	446.6	446.6	
18	Peak O/T	SB	15			S200637	20	Central Vly. Ltd	SFT	6:37	LAU	9:57	3:20	40	10:37	0:43	3	9:57	10:40		446.6	446.6	446.6	
181	Reg	NB	15			N171040	17	S.Fernando Vly. Ltd	LAU	10:40	SFT	13:56	3:16	30	14:26	0:37	7	13:56	14:33		446.6	446.6	446.6	
82	Reg	SB	15			S171433	17	S.Fernando Vly. Ltd	SFT	14:33	LAU	17:49	3:16	40	18:29	0:44	4	17:49	18:33		446.6	446.6	446.6	
247	Reg	NB	15			N161833	16	Central Vly. Ltd	LAU	18:33	SFT	21:51	3:18	30	22:21	--	--	21:51	--		446.6	446.6	0	
19	Reg	SB	16			S150647	15	SF-Merced	SFT	6:47	MCD	8:21	1:34	40	9:01	0:41	1	8:21	9:02		161.2	161.2	161.2	
29	Reg	SB	16			S140902	14	LA-Merced	MCD	9:02	ANA	11:48	2:46	40	12:28	0:47	7	11:48	12:35		354.3	354.3	354.3	
199	Reg	NB	16	X14	400	N011235	1	Bay Area Ltd	ANA	12:35	SFT	16:00	3:25	30	16:30	0:47	17	16:00	16:47		476.9	953.8	476.9	
102	Reg	SB	16			S151647	15	SF-Merced	SFT	16:47	MCD	18:21	1:34	40	19:01	0:41	1	18:21	19:02		161.2	161.2	161.2	
112	Reg	SB	16			S141902	14	LA-Merced	MCD	19:02	ANA	21:48	2:46	40	22:28	--	--	21:48	--		354.3	354.3	354.3	
20	Reg	SB	17	X13	400	S010700	1	Bay Area Ltd	SFT	7:00	ANA	10:25	3:25	40	11:05	0:55	15	10:25	11:20		476.9	953.8	476.9	
190	Reg	NB	17			N141120	14	LA-Merced	ANA	11:20	MCD	14:07	2:47	30	14:37	0:30	0	14:07	14:37		354.3	354.3	354.3	
200	Reg	NB	17			N151437	15	SF-Merced	MCD	14:37	SFT	16:11	1:34	40	16:51	0:26	(14)	16:11	16:37	*	161.2	161.2	161.2	
101	Peak O/T	SB	17			S201637	20	Central Vly. Ltd	SFT	16:37	LAU	19:57	3:20	40	20:37	--	--	19:57	--		446.6	446.6	446.6	
21	Peak O/T	SB	18		400	S190704	19	S.Fernando Vly. Ltd	SFT	7:04	LAU	10:15	3:11	40	10:55	0:48	8	10:15	11:03		446.6	893.2	446.6	
185	Reg	NB	18			N161103	16	Central Vly. Ltd	LAU	11:03	SFT	14:21	3:18	30	14:51	0:39	9	14:21	15:00		446.6	446.6	0	
85	Reg	SB	18	X12	400	S011500	1	Bay Area Ltd	SFT	15:00	ANA	18:25	3:25	40	19:05	0:55	15	18:25	19:20		476.9	953.8	476.9	
255	Reg	NB	18			N141920	14	LA-Merced	ANA	19:20	MCD	22:07	2:47	30	22:37	--	--	22:07	--		354.3	354.3	354.3	
23	Peak O/T	SB	19			S180708	18	Central Vly. Ltd	SFT	7:08	LAU	10:34	3:26	40	11:14	0:36	(4)	10:34	11:10		446.6	446.6	446.6	
186	Reg	NB	19			N171110	17	S.Fernando Vly. Ltd	LAU	11:10	SFT	14:26	3:16	30	14:56	0:38	8	14:26	15:04		446.6	446.6	446.6	
86	Peak O/T	SB	19			S191504	19	S.Fernando Vly. Ltd	SFT	15:04	LAU	18:15	3:11	40	18:55	0:58	18	18:15	19:13		446.6	446.6	446.6	
252	Reg	NB	19			N161913	16	Central Vly. Ltd	LAU	19:13	SFT	22:31	3:18	30	23:01	--	--	22:31	--		446.6	446.6	446.6	
24	Peak O/T	SB	20		400	S040714	4	All-Stop	SFT	7:14	ANA	11:19	4:05	40	11:59	5:23	283	11:19	16:42		476.9	953.8	476.9	YAN
236	Peak O/T	NB	20		400	N101642	10	Central Vly. Ltd Ext.	ANA	16:42	SFT	20:27	3:45	30	20:57	0:33	3	20:27	21:00		476.9	953.8	0	
129	Reg	SB	20	X4	400	S012100	1	Bay Area Ltd	SFT	21:00	ANA	0:25	3:25	40	1:05	--	--	0:25	--		476.9	953.8	476.9	
25	Reg	SB	21	SX3	400	S020729	2	Express	SFT	7:29	ANA	10:43	3:14	40	11:23	0:52	12	10:43	11:35		446.6	893.2	0	
191	Reg	NB	21	X13	400	N011135	1	Bay Area Ltd	ANA	11:35	SFT	15:00	3:25	30	15:30	0:47	17	15:00	15:47		476.9	953.8	476.9	
93	Reg	SB	21			S151547	15	SF-Merced	SFT	15:47	MCD	17:21	1:34	40	18:01	0:41	1	17:21	18:02		161.2	161.2	161.2	
103	Reg	SB	21			S141802	14	LA-Merced	MCD	18:02	ANA	20:48	2:46	40	21:28	--	--	20:48	--		354.3	354.3	354.3	
26	Peak O/T	SB	22			S210733	21	S.Fernando Vly. Ltd	SFT	7:33	LAU	10:51	3:18	40	11:31	0:42	2	10:51	11:33		446.6	446.6	446.6	
188	Reg	NB	22			N161133	16	Central Vly. Ltd	LAU	11:33	SFT	14:51	3:18	30	15:21	0:17	(13)	14:51	15:08	*	446.6	446.6	0	
88	Peak O/T	SB	22		400	S101508	10	Central Vly. Ltd Ext.	SFT	15:08	ANA	18:59	3:51	40	19:39	--	--	18:59	--		476.9	953.8	0	
27	Peak O/T	SB	23			S200737	20	Central Vly. Ltd	SFT	7:37	LAU	10:57	3:20	40	11:37	0:43	3	10:57	11:40		446.6	446.6	446.6	
189	Reg	NB	23			N171140	17	S.Fernando Vly. Ltd	LAU	11:40	SFT	14:56	3:16	30	15:26	0:37	7	14:56	15:33		446.6	446.6	446.6	
91	Peak O/T	SB	23			S211533	21	S.Fernando Vly. Ltd	SFT	15:33	LAU	18:51	3:18	40	19:31	0:49	9	18:51	19:40		446.6	446.6	446.6	
254	Reg	NB	23			N171940	17	S.Fernando Vly. Ltd	LAU	19:40	SFT	22:56	3:16	30	23:26	--	--	22:56	--		446.6	446.6	446.6	
28	Reg	SB	24			S150747	15	SF-Merced	SFT	7:47	MCD	9:21	1:34	40	10:01	0:41	1	9:21	10:02		161.2	161.2	161.2	
37	Reg	SB	24			S141002	14	LA-Merced	MCD	10:02	ANA	12:48	2:46	40	13:28	0:47	7	12:48	13:35		354.3	354.3	354.3	
207	Reg	NB	24	X1	400	N011335	1	Bay Area Ltd	ANA	13:35	SFT	17:00	3:25	30	17:30	0:29	(1)	17:00	17:29		476.9	953.8	476.9	
108	Reg	SB	24	SX6	400	S021729	2	Express	SFT	17:29	ANA	20:43	3:14	40	21:23	--	--	20:43	--		446.6	893.2	0	
30	Reg	SB	25	X14	400	S010800	1	Bay Area Ltd	SFT	8:00	ANA	11:25	3:25	40	12:05	0:55	15	11:25	12:20		476.9	953.8	476.9	
198	Reg	NB	25			N141220	14	LA-Merced	ANA	12:20	MCD	15:07	2:47	30	15:37	0:30	0	15:07	15:37		354.3	354.3	354.3	
208	Reg	NB	25			N151537	15	SF-Merced	MCD	15:37	SFT	17:11	1:34	40	17:51	0:26	(14)	17:11	17:37	*	161.2	161.2	161.2	
110	Peak O/T	SB	25			S201737	20	Central Vly. Ltd	SFT	17:37	LAU	20:57	3:20	40	21:37	--	--	20:57	--		446.6	446.6	446.6	
32	Reg	SB	26			S160808	16	Central Vly. Ltd	SFT	8:08	LAU	11:27	3:19	40	12:07	0:43	3	11:27	12:10		446.6	446.6	0	

pb

CALIFORNIA HIGH SPEED RAIL
APPENDIX A3 -- EQUIPMENT CYCLES -- PHASE 1 BASE SERVICE PLAN (Version 10)

ID	OvertkScheme	Dir	Set	Set2	Consist	Train No.	Pattern	Train Type	Orig	OrigTime	Dest	DestTime	RunTime	MinLay	Avail	Layover	Excess	DestArr	DestDep	T	TrnMi	200m SetMi	Wkend	Yd
194	Reg	NB	26			N171210	17	S.Fernando Vly. Ltd	LAU	12:10	SFT	15:26	3:16	30	15:56	0:38	8	15:26	16:04		446.6	446.6	446.6	
95	Peak O/T	SB	26			S191604	19	S.Fernando Vly. Ltd	SFT	16:04	LAU	19:15	3:11	40	19:55	--	--	19:15	--		446.6	446.6	446.6	
33	Reg	SB	27		400	S040814	4	All-Stop	SFT	8:14	ANA	12:17	4:03	40	12:57	0:35	(5)	12:17	12:52		476.9	953.8	476.9	
203	Reg	NB	27			N041252	4	All-Stop	ANA	12:52	SFT	16:54	4:02	30	17:24	0:20	(10)	16:54	17:14	*	476.9	476.9	476.9	
107	Peak O/T	SB	27		400	S041714	4	All-Stop	SFT	17:14	ANA	21:19	4:05	40	21:59	--	--	21:19	--		476.9	953.8	476.9	
132	Reg	NB	41	X1	400	N010435	1	Bay Area Ltd	ANA	4:35	SFT	8:00	3:25	30	8:30	0:33	3	8:00	8:33		476.9	953.8	476.9	
34	Reg	SB	41			S170833	17	S.Fernando Vly. Ltd	SFT	8:33	LAU	11:49	3:16	40	12:29	0:44	4	11:49	12:33		446.6	446.6	446.6	
196	Reg	NB	41			N161233	16	Central Vly. Ltd	LAU	12:33	SFT	15:51	3:18	30	16:21	0:17	(13)	15:51	16:08	*	446.6	446.6	0	
97	Peak O/T	SB	41			S181608	18	Central Vly. Ltd	SFT	16:08	LAU	19:34	3:26	40	20:14	--	--	19:34	--		446.6	446.6	446.6	
136	Peak O/T	NB	42			N040446	4	All-Stop	ANA	4:46	SFT	8:48	4:02	30	9:18	0:26	(4)	8:48	9:14		476.9	476.9	476.9	
41	Reg	SB	42			S040914	4	All-Stop	SFT	9:14	ANA	13:17	4:03	40	13:57	0:35	(5)	13:17	13:52		476.9	476.9	476.9	
211	Reg	NB	42			N041352	4	All-Stop	ANA	13:52	SFT	17:54	4:02	30	18:24	0:09	(21)	17:54	18:03	*	476.9	476.9	476.9	
114	Reg	SB	42			S171803	17	S.Fernando Vly. Ltd	SFT	18:03	LAU	21:19	3:16	40	21:59	--	--	21:19	--		446.6	446.6	446.6	
137	Reg	NB	43	SX1	400	N020505	2	Express	ANA	5:05	SFT	8:19	3:14	30	8:49	0:44	14	8:19	9:03		446.6	893.2	0	
39	Reg	SB	43			S170903	17	S.Fernando Vly. Ltd	SFT	9:03	LAU	12:19	3:16	40	12:59	0:44	4	12:19	13:03		446.6	446.6	446.6	
201	Reg	NB	43			N161303	16	Central Vly. Ltd	LAU	13:03	SFT	16:21	3:18	30	16:51	0:39	9	16:21	17:00		446.6	446.6	0	
104	Reg	SB	43	X14	400	S011700	1	Bay Area Ltd	SFT	17:00	ANA	20:25	3:25	40	21:05	--	--	20:25	--		476.9	953.8	476.9	
140	Peak O/T	NB	44			N140519	14	LA-Merced	ANA	5:19	MCD	8:07	2:48	30	8:37	0:30	0	8:07	8:37		354.3	354.3	354.3	
151	Reg	NB	44			N150837	15	SF-Merced	MCD	8:37	SFT	10:11	1:34	40	10:51	0:27	(13)	10:11	10:38	*	161.2	161.2	161.2	
51	Reg	SB	44			S161038	16	Central Vly. Ltd	SFT	10:38	LAU	13:57	3:19	40	14:37	0:43	3	13:57	14:40		446.6	446.6	0	
213	Reg	NB	44			N171440	17	S.Fernando Vly. Ltd	LAU	14:40	SFT	17:56	3:16	30	18:26	0:18	(12)	17:56	18:14		446.6	446.6	446.6	
116	Reg	SB	44			S041814	4	All-Stop	SFT	18:14	ANA	22:17	4:03	40	22:57	--	--	22:17	--		476.9	476.9	476.9	
141	Reg	NB	45	X2	400	N010535	1	Bay Area Ltd	ANA	5:35	SFT	9:00	3:25	30	9:30	0:47	17	9:00	9:47		476.9	953.8	476.9	
44	Reg	SB	45			S150947	15	SF-Merced	SFT	9:47	MCD	11:21	1:34	40	12:01	0:41	1	11:21	12:02		161.2	161.2	161.2	
53	Reg	SB	45			S141202	14	LA-Merced	MCD	12:02	ANA	14:48	2:46	40	15:28	0:47	7	14:48	15:35		354.3	354.3	354.3	
224	Reg	NB	45	X3	400	N011535	1	Bay Area Ltd	ANA	15:35	SFT	19:00	3:25	30	19:30	--	--	19:00	--		476.9	953.8	476.9	
145	Peak O/T	NB	46		400	N040546	4	All-Stop	ANA	5:46	SFT	9:48	4:02	30	10:18	0:26	(4)	9:48	10:14		476.9	953.8	476.9	
49	Reg	SB	46			S041014	4	All-Stop	SFT	10:14	ANA	14:17	4:03	40	14:57	0:29	(11)	14:17	14:46	*	476.9	476.9	476.9	
219	Peak O/T	NB	46		400	N041446	4	All-Stop	ANA	14:46	SFT	18:48	4:02	30	19:18	0:26	(4)	18:48	19:14		476.9	953.8	476.9	
123	Night	SB	46			S041914	4	All-Stop	SFT	19:14	ANA	23:13	3:59	40	23:53	--	--	23:13	--		476.9	476.9	476.9	
146	Reg	NB	47	SX2	400	N020605	2	Express	ANA	6:05	SFT	9:19	3:14	30	9:49	0:49	19	9:19	10:08		446.6	893.2	0	
48	Reg	SB	47			S161008	16	Central Vly. Ltd	SFT	10:08	LAU	13:27	3:19	40	14:07	0:43	3	13:27	14:10		446.6	446.6	0	
210	Reg	NB	47			N171410	17	S.Fernando Vly. Ltd	LAU	14:10	SFT	17:26	3:16	30	17:56	0:34	4	17:26	18:00		446.6	446.6	446.6	
113	Reg	SB	47	X1	400	S011800	1	Bay Area Ltd	SFT	18:00	ANA	21:25	3:25	40	22:05	--	--	21:25	--		476.9	953.8	476.9	
149	Peak O/T	NB	48		400	N140619	14	LA-Merced	ANA	6:19	MCD	9:07	2:48	30	9:37	0:30	0	9:07	9:37		354.3	708.6	354.3	
160	Reg	NB	48			N150937	15	SF-Merced	MCD	9:37	SFT	11:11	1:34	40	11:51	0:27	(13)	11:11	11:38	*	161.2	161.2	161.2	
59	Reg	SB	48			S161138	16	Central Vly. Ltd	SFT	11:38	LAU	14:57	3:19	40	15:37	0:38	(2)	14:57	15:35		446.6	446.6	0	
222	Peak O/T	NB	48			N211535	21	S.Fernando Vly. Ltd	LAU	15:35	SFT	18:57	3:22	30	19:27	--	--	18:57	--		446.6	446.6	446.6	
150	Reg	NB	49	X3	400	N010635	1	Bay Area Ltd	ANA	6:35	SFT	10:00	3:25	30	10:30	0:47	17	10:00	10:47		476.9	953.8	476.9	
52	Reg	SB	49			S151047	15	SF-Merced	SFT	10:47	MCD	12:21	1:34	40	13:01	0:41	1	12:21	13:02		161.2	161.2	161.2	
61	Reg	SB	49			S141302	14	LA-Merced	MCD	13:02	ANA	15:48	2:46	40	16:28	0:47	7	15:48	16:35		354.3	354.3	354.3	
233	Reg	NB	49	X4	400	N011635	1	Bay Area Ltd	ANA	16:35	SFT	20:00	3:25	30	20:30	--	--	20:00	--		476.9	953.8	476.9	
153	Peak O/T	NB	50		400	N100642	10	Central Vly. Ltd Ext.	ANA	6:42	SFT	10:27	3:45	30	10:57	0:36	6	10:27	11:03		476.9	953.8	0	
55	Reg	SB	50			S171103	17	S.Fernando Vly. Ltd	SFT	11:03	LAU	14:19	3:16	40	14:59	0:44	4	14:19	15:03		446.6	446.6	446.6	
217	Peak O/T	NB	50			N191503	19	S.Fernando Vly. Ltd	LAU	15:03	SFT	18:15	3:12	30	18:45	0:32	2	18:15	18:47		446.6	446.6	446.6	
119	Reg	SB	50			S151847	15	SF-Merced	SFT	18:47	MCD	20:21	1:34	40	21:01	--	--	20:21	--		161.2	161.2	161.2	
154	Peak O/T	NB	51		400	N040646	4	All-Stop	ANA	6:46	SFT	10:48	4:02	30	11:18	0:26	(4)	10:48	11:14		476.9	953.8	476.9	
57	Reg	SB	51			S041114	4	All-Stop	SFT	11:14	ANA	15:17	4:03	40	15:57	0:29	(11)	15:17	15:46	*	476.9	476.9	476.9	
228	Peak O/T	NB	51		400	N041546	4	All-Stop	ANA	15:46	SFT	19:48	4:02	30	20:18	0:26	(4)	19:48	20:14		476.9	953.8	476.9	
127	Night	SB	51			S042014	4	All-Stop	SFT	20:14	ANA	0:13	3:59	40	0:53	--	--	0:13	--		476.9	476.9	476.9	
155	Reg	NB	52	SX3	400	N020705	2	Express	ANA	7:05	SFT	10:19	3:14	30	10:49	0:49	19	10:19	11:08		446.6	893.2	0	
56	Reg	SB	52			S161108	16	Central Vly. Ltd	SFT	11:08	LAU	14:27	3:19	40	15:07	0:40	0	14:27	15:07		446.6	446.6	0	

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ID	OvertkScheme	Dir	Set	Set2	Consist	Train No.	Pattern	Train Type	Orig	OrigTime	Dest	DestTime	RunTime	MinLay	Avail	Layover	Excess	DestArr	DestDep	T	TrnMi	200m SetMi	Wkend	Yd
218	Peak O/T	NB	52			N181507	18	Central Vly. Ltd	LAU	15:07	SFT	18:27	3:20	30	18:57	0:43	13	18:27	19:10		446.6	446.6	446.6	
122	Reg	SB	52			S171910	17	S.Fernando Vly. Ltd	SFT	19:10	LAU	22:26	3:16	40	23:06	--	--	22:26	--		446.6	446.6	446.6	
158	Reg	NB	53			N140720	14	LA-Merced	ANA	7:20	MCD	10:07	2:47	30	10:37	0:30	0	10:07	10:37		354.3	354.3	354.3	
168	Reg	NB	53			N151037	15	SF-Merced	MCD	10:37	SFT	12:11	1:34	40	12:51	0:27	(13)	12:11	12:38	*	161.2	161.2	161.2	
67	Reg	SB	53			S161238	16	Central Vly. Ltd	SFT	12:38	LAU	15:57	3:19	40	16:37	0:38	(2)	15:57	16:35		446.6	446.6	0	
231	Peak O/T	NB	53		400	N211635	21	S.Fernando Vly. Ltd	LAU	16:35	SFT	19:57	3:22	30	20:27	--	--	19:57	--		446.6	893.2	446.6	
159	Reg	NB	54	X4	400	N010735	1	Bay Area Ltd	ANA	7:35	SFT	11:00	3:25	30	11:30	0:47	17	11:00	11:47		476.9	953.8	476.9	
60	Reg	SB	54			S151147	15	SF-Merced	SFT	11:47	MCD	13:21	1:34	40	14:01	0:41	1	13:21	14:02		161.2	161.2	161.2	
69	Reg	SB	54			S141402	14	LA-Merced	MCD	14:02	ANA	16:48	2:46	40	17:28	0:47	7	16:48	17:35		354.3	354.3	354.3	
242	Reg	NB	54	X5	400	N011735	1	Bay Area Ltd	ANA	17:35	SFT	21:00	3:25	30	21:30	--	--	21:00	--		476.9	953.8	476.9	
163	Reg	NB	55		400	N040752	4	All-Stop	ANA	7:52	SFT	11:54	4:02	30	12:24	0:20	(10)	11:54	12:14	*	476.9	953.8	476.9	
65	Reg	SB	55			S041214	4	All-Stop	SFT	12:14	ANA	16:17	4:03	40	16:57	0:29	(11)	16:17	16:46	*	476.9	476.9	476.9	
237	Peak O/T	NB	55		400	N041646	4	All-Stop	ANA	16:46	SFT	20:48	4:02	30	21:18	0:26	(4)	20:48	21:14		476.9	953.8	476.9	
130	Night	SB	55			S042114	4	All-Stop	SFT	21:14	ANA	1:13	3:59	40	1:53	--	--	1:13	--		476.9	476.9	476.9	
166	Peak O/T	NB	56			N140820	14	LA-Merced	ANA	8:20	MCD	11:08	2:48	30	11:38	0:29	(1)	11:08	11:37		354.3	354.3	354.3	
176	Reg	NB	56			N151137	15	SF-Merced	MCD	11:37	SFT	13:11	1:34	40	13:51	0:27	(13)	13:11	13:38	*	161.2	161.2	161.2	
75	Reg	SB	56			S161338	16	Central Vly. Ltd	SFT	13:38	LAU	16:57	3:19	40	17:37	0:38	(2)	16:57	17:35		446.6	446.6	0	
240	Peak O/T	NB	56			N211735	21	S.Fernando Vly. Ltd	LAU	17:35	SFT	20:57	3:22	30	21:27	--	--	20:57	--		446.6	446.6	446.6	
167	Reg	NB	57	X5	400	N010835	1	Bay Area Ltd	ANA	8:35	SFT	12:00	3:25	30	12:30	0:47	17	12:00	12:47		476.9	953.8	476.9	
68	Reg	SB	57			S151247	15	SF-Merced	SFT	12:47	MCD	14:21	1:34	40	15:01	0:58	18	14:21	15:19		161.2	161.2	161.2	
79	Peak O/T	SB	57			S141519	14	LA-Merced	MCD	15:19	ANA	18:07	2:48	40	18:47	0:28	(12)	18:07	18:35		354.3	354.3	354.3	
250	Reg	NB	57	X11	400	N011835	1	Bay Area Ltd	ANA	18:35	SFT	22:00	3:25	30	22:30	--	--	22:00	--		476.9	953.8	476.9	
134	Peak O/T	NB	61			N190503	19	S.Fernando Vly. Ltd	LAU	5:03	SFT	8:15	3:12	30	8:45	0:32	2	8:15	8:47		446.6	446.6	446.6	
36	Reg	SB	61			S150847	15	SF-Merced	SFT	8:47	MCD	10:21	1:34	40	11:01	0:41	1	10:21	11:02		161.2	161.2	161.2	
45	Reg	SB	61			S141102	14	LA-Merced	MCD	11:02	ANA	13:48	2:46	40	14:28	0:47	7	13:48	14:35		354.3	354.3	354.3	
215	Reg	NB	61	X2	400	N011435	1	Bay Area Ltd	ANA	14:35	SFT	18:00	3:25	30	18:30	0:33	3	18:00	18:33		476.9	953.8	476.9	
117	Reg	SB	61			S171833	17	S.Fernando Vly. Ltd	SFT	18:33	LAU	21:49	3:16	40	22:29	--	--	21:49	--		446.6	446.6	446.6	
135	Peak O/T	NB	62			N180507	18	Central Vly. Ltd	LAU	5:07	SFT	8:27	3:20	30	8:57	0:33	3	8:27	9:00		446.6	446.6	446.6	
38	Reg	SB	62	X1	400	S010900	1	Bay Area Ltd	SFT	9:00	ANA	12:25	3:25	40	13:05	0:55	15	12:25	13:20		476.9	953.8	476.9	
206	Reg	NB	62			N141320	14	LA-Merced	ANA	13:20	MCD	16:07	2:47	30	16:37	0:30	0	16:07	16:37		354.3	354.3	354.3	
216	Reg	NB	62			N151637	15	SF-Merced	MCD	16:37	SFT	18:11	1:34	40	18:51	0:27	(13)	18:11	18:38		161.2	161.2	161.2	
118	Reg	SB	62			S161838	16	Central Vly. Ltd	SFT	18:38	LAU	21:57	3:19	40	22:37	--	--	21:57	--		446.6	446.6	0	
138	Peak O/T	NB	63			N200533	20	Central Vly. Ltd	LAU	5:33	SFT	8:51	3:18	30	9:21	0:17	(13)	8:51	9:08	*	446.6	446.6	446.6	
40	Reg	SB	63			S160908	16	Central Vly. Ltd	SFT	9:08	LAU	12:27	3:19	40	13:07	0:43	3	12:27	13:10		446.6	446.6	446.6	
202	Reg	NB	63			N171310	17	S.Fernando Vly. Ltd	LAU	13:10	SFT	16:26	3:16	30	16:56	0:38	8	16:26	17:04		446.6	446.6	446.6	
105	Peak O/T	SB	63		400	S191704	19	S.Fernando Vly. Ltd	SFT	17:04	LAU	20:15	3:11	40	20:55	--	--	20:15	--		446.6	893.2	446.6	
139	Peak O/T	NB	64			N210535	21	S.Fernando Vly. Ltd	LAU	5:35	SFT	8:57	3:22	30	9:27	0:36	6	8:57	9:33		446.6	446.6	446.6	
42	Reg	SB	64			S170933	17	S.Fernando Vly. Ltd	SFT	9:33	LAU	12:49	3:16	40	13:29	0:44	4	12:49	13:33		446.6	446.6	446.6	
204	Reg	NB	64			N161333	16	Central Vly. Ltd	LAU	13:33	SFT	16:51	3:18	30	17:21	0:17	(13)	16:51	17:08	*	446.6	446.6	0	
106	Peak O/T	SB	64			S181708	18	Central Vly. Ltd	SFT	17:08	LAU	20:34	3:26	40	21:14	--	--	20:34	--		446.6	446.6	446.6	
143	Peak O/T	NB	65			N190603	19	S.Fernando Vly. Ltd	LAU	6:03	SFT	9:15	3:12	30	9:45	0:45	15	9:15	10:00		446.6	446.6	446.6	
46	Reg	SB	65	X2	400	S011000	1	Bay Area Ltd	SFT	10:00	ANA	13:25	3:25	40	14:05	0:54	14	13:25	14:19		476.9	953.8	476.9	
214	Peak O/T	NB	65			N141419	14	LA-Merced	ANA	14:19	MCD	17:07	2:48	30	17:37	0:30	0	17:07	17:37		354.3	354.3	354.3	
225	Reg	NB	65			N151737	15	SF-Merced	MCD	17:37	SFT	19:11	1:34	40	19:51	--	--	19:11	--		161.2	161.2	161.2	
144	Peak O/T	NB	66			N180607	18	Central Vly. Ltd	LAU	6:07	SFT	9:27	3:20	30	9:57	0:36	6	9:27	10:03		446.6	446.6	446.6	
47	Reg	SB	66			S171003	17	S.Fernando Vly. Ltd	SFT	10:03	LAU	13:19	3:16	40	13:59	0:44	4	13:19	14:03		446.6	446.6	446.6	
209	Reg	NB	66			N161403	16	Central Vly. Ltd	LAU	14:03	SFT	17:21	3:18	30	17:51	0:26	(4)	17:21	17:47		446.6	446.6	446.6	
111	Reg	SB	66			S151747	15	SF-Merced	SFT	17:47	MCD	19:21	1:34	40	20:01	0:41	1	19:21	20:02		161.2	161.2	161.2	
120	Reg	SB	66			S142002	14	LA-Merced	MCD	20:02	ANA	22:48	2:46	40	23:28	--	--	22:48	--		354.3	354.3	354.3	YSF
147	Peak O/T	NB	67			N200633	20	Central Vly. Ltd	LAU	6:33	SFT	9:51	3:18	30	10:21	5:38	308	9:51	15:29		446.6	446.6	446.6	
90	Reg	SB	67	SX4	400	S021529	2	Express	SFT	15:29	ANA	18:43	3:14	40	19:23	0:52	12	18:43	19:35		446.6	893.2	0	
256	Reg	NB	67	X12	400	N011935	1	Bay Area Ltd	ANA	19:35	SFT	23:00	3:25	30	23:30	--	--	23:00	--		476.9	953.8	476.9	

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CALIFORNIA HIGH SPEED RAIL
APPENDIX A3 -- EQUIPMENT CYCLES -- PHASE 1 BASE SERVICE PLAN (Version 10)

ID	OvertkScheme	Dir	Set	Set2	Consist	Train No.	Pattern	Train Type	Orig	OrigTime	Dest	DestTime	RunTime	MinLay	Avail	Layover	Excess	DestArr	DestDep	T	TrnMi	200m SetMi	Wkend	Yd
148	Peak O/T	NB	68		400	N210635	21	S.Fernando Vly. Ltd	LAU	6:35	SFT	9:57	3:22	30	10:27	0:36	6	9:57	10:33		446.6	893.2	446.6	
50	Reg	SB	68			S171033	17	S.Fernando Vly. Ltd	SFT	10:33	LAU	13:49	3:16	40	14:29	0:44	4	13:49	14:33		446.6	446.6	446.6	
212	Reg	NB	68			N161433	16	Central Vly. Ltd	LAU	14:33	SFT	17:51	3:18	30	18:21	0:17	(13)	17:51	18:08		446.6	446.6	0	
115	Reg	SB	68			S161808	16	Central Vly. Ltd	SFT	18:08	LAU	21:27	3:19	40	22:07	--	--	21:27	--		446.6	446.6	0	
152	Peak O/T	NB	69		400	N190703	19	S.Fernando Vly. Ltd	LAU	7:03	SFT	10:15	3:12	30	10:45	0:45	15	10:15	11:00		446.6	893.2	446.6	
54	Reg	SB	69	X3	400	S011100	1	Bay Area Ltd	SFT	11:00	ANA	14:25	3:25	40	15:05	0:54	14	14:25	15:19		476.9	953.8	476.9	
223	Reg	NB	69			N141519	14	LA-Merced	ANA	15:19	MCD	18:06	2:47	30	18:36	0:31	1	18:06	18:37		354.3	354.3	354.3	
234	Reg	NB	69			N151837	15	SF-Merced	MCD	18:37	SFT	20:11	1:34	40	20:51	--	--	20:11	--		161.2	161.2	161.2	YSF
156	Peak O/T	NB	70			N200733	20	Central Vly. Ltd	LAU	7:33	SFT	10:51	3:18	30	11:21	5:38	308	10:51	16:29		446.6	446.6	446.6	
99	Reg	SB	70	SX5	400	S021629	2	Express	SFT	16:29	ANA	19:43	3:14	40	20:23	0:52	12	19:43	20:35		446.6	893.2	0	
259	Reg	NB	70	X13	400	N012035	1	Bay Area Ltd	ANA	20:35	SFT	0:00	3:25	30	0:30	--	--	0:00	--		476.9	953.8	476.9	
157	Peak O/T	NB	71			N210735	21	S.Fernando Vly. Ltd	LAU	7:35	SFT	10:57	3:22	30	11:27	0:36	6	10:57	11:33		446.6	446.6	446.6	
58	Reg	SB	71			S171133	17	S.Fernando Vly. Ltd	SFT	11:33	LAU	14:49	3:16	40	15:29	0:44	4	14:49	15:33		446.6	446.6	446.6	
221	Peak O/T	NB	71			N201533	20	Central Vly. Ltd	LAU	15:33	SFT	18:51	3:18	30	19:21	0:44	14	18:51	19:35		446.6	446.6	446.6	
124	Reg	SB	71			S161935	16	Central Vly. Ltd	SFT	19:35	LAU	22:54	3:19	40	23:34	--	--	22:54	--		446.6	446.6	0	
161	Reg	NB	72			N160803	16	Central Vly. Ltd	LAU	8:03	SFT	11:21	3:18	30	11:51	0:39	9	11:21	12:00		446.6	446.6	0	
62	Reg	SB	72	X4	400	S011200	1	Bay Area Ltd	SFT	12:00	ANA	15:25	3:25	40	16:05	0:54	14	15:25	16:19		476.9	953.8	476.9	
232	Reg	NB	72			N141619	14	LA-Merced	ANA	16:19	MCD	19:06	2:47	30	19:36	0:31	1	19:06	19:37		354.3	354.3	354.3	
243	Reg	NB	72			N151937	15	SF-Merced	MCD	19:37	SFT	21:11	1:34	40	21:51	--	--	21:11	--		161.2	161.2	161.2	
162	Reg	NB	73			N170810	17	S.Fernando Vly. Ltd	LAU	8:10	SFT	11:26	3:16	30	11:56	0:37	7	11:26	12:03		446.6	446.6	446.6	
63	Peak O/T	SB	73			S171203	17	S.Fernando Vly. Ltd	SFT	12:03	LAU	15:19	3:16	40	15:59	0:44	4	15:19	16:03		446.6	446.6	446.6	
226	Peak O/T	NB	73			N191603	19	S.Fernando Vly. Ltd	LAU	16:03	SFT	19:15	3:12	30	19:45	0:32	2	19:15	19:47		446.6	446.6	446.6	
125	Reg	SB	73			S151947	15	SF-Merced	SFT	19:47	MCD	21:21	1:34	40	22:01	--	--	21:21	--		161.2	161.2	161.2	
164	Reg	NB	74			N160833	16	Central Vly. Ltd	LAU	8:33	SFT	11:51	3:18	30	12:21	0:17	(13)	11:51	12:08	*	446.6	446.6	0	
64	Reg	SB	74			S161208	16	Central Vly. Ltd	SFT	12:08	LAU	15:27	3:19	40	16:07	0:40	0	15:27	16:07		446.6	446.6	0	
227	Peak O/T	NB	74			N181607	18	S.Fernando Vly. Ltd	LAU	16:07	SFT	19:27	3:20	30	19:57	0:33	3	19:27	20:00		446.6	446.6	446.6	
126	Reg	SB	74	X3	400	S012000	1	Bay Area Ltd	SFT	20:00	ANA	23:25	3:25	40	0:05	--	--	23:25	--		476.9	953.8	476.9	
165	Reg	NB	75			N170840	17	S.Fernando Vly. Ltd	LAU	8:40	SFT	11:56	3:16	30	12:26	0:37	7	11:56	12:33		446.6	446.6	446.6	
66	Reg	SB	75			S171233	17	S.Fernando Vly. Ltd	SFT	12:33	LAU	15:49	3:16	40	16:29	0:44	4	15:49	16:33		446.6	446.6	446.6	
230	Peak O/T	NB	75			N201633	20	Central Vly. Ltd	LAU	16:33	SFT	19:51	3:18	30	20:21	--	--	19:51	--		446.6	446.6	446.6	
1	Night	SB	M1			S140519	14	LA-Merced	MCD	5:19	ANA	8:01	2:42	40	8:41	0:51	11	8:01	8:52		354.3	354.3	354.3	
171	Reg	NB	M1			N040852	4	All-Stop	ANA	8:52	SFT	12:54	4:02	30	13:24	0:20	(10)	12:54	13:14	*	476.9	476.9	476.9	
73	Reg	SB	M1			S041314	4	All-Stop	SFT	13:14	ANA	17:17	4:03	40	17:57	0:35	(5)	17:17	17:52		476.9	476.9	476.9	
01190	Reg	NB	M1			N041752	4	All-Stop	ANA	17:52	SFT	21:54	4:02	30	22:24	--	--	21:54	--		476.9	476.9	476.9	
4	Peak O/T	SB	M2		400	S140619	14	LA-Merced	MCD	6:19	ANA	9:07	2:48	40	9:47	0:45	5	9:07	9:52		354.3	708.6	354.3	
179	Reg	NB	M2			N040952	4	All-Stop	ANA	9:52	SFT	13:54	4:02	30	14:24	0:20	(10)	13:54	14:14	*	476.9	476.9	476.9	
81	Reg	SB	M2			S041414	4	All-Stop	SFT	14:14	ANA	18:17	4:03	40	18:57	0:35	(5)	18:17	18:52		476.9	476.9	476.9	
253	Night	NB	M2			N041852	4	All-Stop	ANA	18:52	SFT	22:51	3:59	30	23:21	--	--	22:51	--		476.9	476.9	476.9	
131	Reg	NB	M3			N150537	15	SF-Merced	MCD	5:37	SFT	7:11	1:34	40	7:51	0:52	12	7:11	8:03		161.2	161.2	161.2	
31	Reg	SB	M3			S170803	17	S.Fernando Vly. Ltd	SFT	8:03	LAU	11:19	3:16	40	11:59	0:44	4	11:19	12:03		446.6	446.6	446.6	
193	Reg	NB	M3			N161203	16	Central Vly. Ltd	LAU	12:03	SFT	15:21	3:18	30	15:51	0:39	9	15:21	16:00		446.6	446.6	0	
94	Reg	SB	M3	X13	400	S011600	1	Bay Area Ltd	SFT	16:00	ANA	19:25	3:25	40	20:05	0:55	15	19:25	20:20		476.9	953.8	476.9	
258	Reg	NB	M3			N142020	14	LA-Merced	ANA	20:20	MCD	23:07	2:47	30	23:37	--	--	23:07	--		354.3	354.3	354.3	
133	Reg	NB	M4			N150637	15	SF-Merced	MCD	6:37	SFT	8:11	1:34	40	8:51	0:27	(13)	8:11	8:38	*	161.2	161.2	161.2	
35	Reg	SB	M4			S160838	16	Central Vly. Ltd	SFT	8:38	LAU	11:57	3:19	40	12:37	0:43	3	11:57	12:40		446.6	446.6	0	
197	Reg	NB	M4			N171240	17	S.Fernando Vly. Ltd	LAU	12:40	SFT	15:56	3:16	30	16:26	0:37	7	15:56	16:33		446.6	446.6	446.6	
100	Peak O/T	SB	M4		400	S211633	21	S.Fernando Vly. Ltd	SFT	16:33	LAU	19:51	3:18	40	20:31	--	--	19:51	--		446.6	893.2	446.6	
13	Peak O/T	SB	M5			S140719	14	LA-Merced	MCD	7:19	ANA	10:07	2:48	40	10:47	0:45	5	10:07	10:52		354.3	354.3	354.3	
187	Reg	NB	M5			N041052	4	All-Stop	ANA	10:52	SFT	14:54	4:02	30	15:24	0:20	(10)	14:54	15:14	*	476.9	476.9	476.9	
89	Peak O/T	SB	M5		400	S041514	4	All-Stop	SFT	15:14	ANA	19:19	4:05	40	19:59	--	--	19:19	--		476.9	953.8	476.9	
142	Reg	NB	M6			N150737	15	SF-Merced	MCD	7:37	SFT	9:11	1:34	40	9:51	0:27	(13)	9:11	9:38	*	161.2	161.2	161.2	
43	Reg	SB	M6			S160938	16	Central Vly. Ltd	SFT	9:38	LAU	12:57	3:19	40	13:37	0:43	3	12:57	13:40		446.6	446.6	0	

pb

CALIFORNIA HIGH SPEED RAIL
APPENDIX A3 -- EQUIPMENT CYCLES -- PHASE 1 BASE SERVICE PLAN (Version 10)

ID	OvertkScheme	Dir	Set	Set2	Consist	Train No.	Pattern	Train Type	Orig	OrigTime	Dest	DestTime	RunTime	MinLay	Avail	Layover	Excess	DestArr	DestDep	T	TrnMi	200m SetMi	Wkend	Yd
205	Reg	NB	M6			N171340	17	S.Fernando Vly. Ltd	LAU	13:40	SFT	16:56	3:16	30	17:26	0:37	7	16:56	17:33		446.6	446.6	446.6	
109	Peak O/T	SB	M6			S211733	21	S.Fernando Vly. Ltd	SFT	17:33	LAU	20:51	3:18	40	21:31	--	--	20:51	--		446.6	446.6	446.6	

*Additional 200m trainsets available for these equipment turns◄

														Avail						TrnMi	SetMi	Wkend	
Totals														2,037						106211	140405	83760	

	Weekday	Weekend
Days/yr	250	115
Ann miles	35101	9632
Ann miles	**44,734**	

pb

[B] – VARIATION, WITH 1.0-3.5% RECOVERY TIME ALLOWANCE

Appendix B presents the characteristics of a variation of the California High-Speed Train (HST) Phase 1 Service Plan, which assumes a lower and more aggressive allowance for schedule pad or recovery time, consistent with the intent of the HST system to operate at a very high level of precision. In this variation of the service plan, the express services operating between San Francisco and Los Angeles with one intermediate stop at San Jose would have a scheduled run time of 2 hours and 40 minutes, with a recovery time allowance of one percent. All other trains in this variation of the plan would have a recovery time allowance of three and one half percent.

In this versiosn of the service plan, the train stopping patterns, hours of service, and service frequencies were kept essentially the same as that of the base service plan described in Appendix A. Certain changes were made to the assumptions and general principles to allow for the marginally faster travel times estimated for the "express" trains:

- Recovery time incorporated in the end-to-end train running times was reduced from 7 percent to 1 percent for "express" trains and to 3.5 percent for all other train types

- The minimum headway between trains following each other past a given point was kept at 3 minutes except for sections north of San Jose and near each terminal location, which includes San Francisco-Transbay, Los Angeles Union Station, Anaheim, and Merced stations, because it was assumed that the rate in which trains would arrive and depart these locations could support a minimum headway of no less than 2 minutes.

- In addition to the standard 1 to 3.5 percent recovery time applied to all trains, additional recovery was added to certain trains to adjust the running time so as to avoid the overtakes and to maintain the minimum spacing between trains. This is described in more detail in the *New Service Sequence* section of this memorandum.

- To further reduce the estimated travel time, station dwell times at intermediate stops were reduced from two minutes to 90 seconds at San Jose and Los Angeles Union Station, and from 90 seconds to 75 seconds at all other intermediate stops.

- While the original baseline timetable presented clock face scheduling, the reduction of the amount of recovery time in this iteration resulted in departure times that do not allow for maintaining the clock face structure as long as the stopping patterns of each service type are kept the same as in the baseline timetable.

This variation of the Phase 1 service plan for the initial operating segment between Anaheim, Los Angeles and San Francisco was composed of the following train types and service patterns:

1. San Francisco-Los Angeles-Anaheim "Express" service (Pattern #1)

    - Clockface departure on the hour southbound from San Francisco between 5:00 AM and 9:00 PM

    - Clockface hourly departures northbound from Anaheim at 35 minutes past the hour, and departures from Los Angeles at the "top of the hour".

    - During the peak period, northbound departures at Los Angeles were changed to 59 minutes past the hour to create time slots for local and limited-stop trains in order to minimize the overtakes.

2. San Francisco-Los Angeles-Anaheim "Express" service (Pattern #2)

    ▪   Southbound trains depart San Francisco at 5:30 AM, 6:30 AM, 7:30 AM, 3:30 PM, 4:30 PM, and 5:30 PM.

    ▪   Northbound trains depart Anaheim at 5:05 AM, 6:05 AM, 7:05 AM, 3:05 PM, 4:05 PM, and 6:05 PM so that the trains can depart Los Angeles at the "bottom" (:30) of the hour.

3. San Fernando Valley Off-peak Limited – Limited stop service between San Francisco and Los Angeles stopping at stations in the San Fernando Valley and the Santa Clara/Silicon Valley area, while generally bypassing Central Valley stations (Pattern #17)

    ▪   30-minute headways in both direction for travel between 8:00 AM and 3:00 PM, and again between 6:00 PM and 9:00 PM.

    ▪   Southbound departure from San Francisco at :03 and :33 of the hour; northbound departure from Los Angeles at :10 and :40 of the hour.

    ▪   No overtakes occur en route

    ▪   Two northbound trips, departing Los Angeles at 8:10 AM and 9:10 AM, provide service to the Milbrae station.

    ▪   Northbound trains departing Los Angeles at :40 of the hour reduce speed between Palmdale and Bakersfield to increase travel time by 2 minutes in order to minimize the dwell time of local trains overtaken at Bakersfield.

    ▪   Reduced service to 60-minute headways after 7:00 PM

4. San Fernando Valley Peak Limited – Peak-only Limited stop service between San Francisco and Los Angeles stopping at stations in the San Fernando Valley and the Santa Clara/Silicon Valley area, while generally bypassing Central Valley stations (Patterns #19 and 21).

    ▪   Two trains per hour per direction with combined 28 to 32 minute headways during the peak period.

    ▪   Southbound departures from San Francisco at :03 of the hour (Pattern #19) and :33 of the hour (Pattern #21); Northbound departures from Los Angeles at :03 of the hour (Pattern #19) and :35 of the hour (Pattern #21)

    ▪   No overtakes occur en route

5. Central Valley Off-peak Limited – Limited stop service between San Francisco and Los Angeles stopping at all stations north of Bakersfield while skipping all San Fernando Valley stations (Pattern #16).

    ▪   30-minute headways in both directions for travel between 8:00 AM and 3:00 PM, and again between 6:00 PM and 9:00 PM.

    ▪   Southbound departure from San Francisco at :08 and :38 of the hour; northbound departure from Los Angeles at :03 and :33 of the hours

    ▪   No overtakes occur en route

- Southbound trains departing San Francisco at :08 of the hour reduce speed between Bakersfield and Los Angeles to increase travel time by 5 to 10 minutes in order to avoid an overtake.

- Reduced service to 60-minute headways after 7:00 PM

6. Central Valley Peak Limited – Limited stop service between San Francisco and Los Angeles stopping at all stations in the Central Valley and the north while making limited stops in the San Fernando Valley (Patterns #10, 18, and 20)

- Two trains per hour per direction with 28 to 32 minute headways during peak period

- Southbound departure from San Francisco at :08 of the hour (Pattern #10/18) and :39 of the hour (Pattern #20); Northbound departure from Los Angeles at :06 of the hour (Pattern #10) or :07 of the hour (Pattern #19) and :33 of the hour (Pattern #21)

- Two roundtrips in each direction are extended to Anaheim

- Southbound trains departing San Francisco at :08 of the hour are overtaken by Express trains (Pattern #2) at Fresno

- Northbound trains departing Los Angeles at :06 or :07 of the hour are overtaken by Express trains (Pattern #2) at Fresno

- Some southbound trains reduce speed between Bakersfield and Los Angeles in order to avoid an overtake.

7. Local service, making all stops between San Francisco and Anaheim (Pattern #4)

- All day, hourly service with semi-clockface schedule.

- Southbound departure from San Francisco at :14 of the hour during peak period, :15 of the hour during off-peak period; northbound departure from Anaheim at :46 of the hour during peak period, :40 of the hour during off-peak period (departure at Los Angeles at :10 and :06 of the hour, respectively)

- During the peak period, southbound trains are overtaken twice by Express trains (Pattern #2) at Gilroy and by San Fernando Valley Limited trains at Fresno; while northbound trains are overtaken once by Express trains (Pattern #2) at Bakersfield

- During off-peak period, both southbound and northbound trains are overtaken once by San Fernando Valley Limited trains at Bakersfield

- All trains during mid-day period are overtaken once by San Fernando Valley Limited trains at Bakersfield

8. Merced-Los Angeles Local (Pattern #14)

- All day, hourly service with semi-clockface schedule

- Southbound departure from Merced at :05 of the hour throughout the day; northbound departure from Anaheim at :17 of the hour during peak period, :12 of the hour during off-peak period (departure at Los Angeles at :41 and :36 of the hour, respectively)

- During peak period, southbound trains have overtakes by Express (Pattern #1) and San Fernando Valley Limited trains at Fresno and Express trains (Pattern #2) at Bakersfield while northbound trains are overtaken once by Express trains (Pattern #1) at Bakersfield

- During off-peak periods, all trains have overtakes: (by San Fernando Valley Limited and Express trains (Pattern #1); northbound at Bakersfield and southbound at Fresno)

- Southbound trains arrive at Los Angeles Union Station before the following Central Valley Limited trains

9. San Francisco-Merced local service (Pattern #15)

   - All-day, hourly service with semi-clockface schedule

   - Southbound departure from San Francisco at :47 of the hour throughout the day; northbound departure from Merced at :34 of the hour during peak period and :37 of the hour during off-peak period

   - No overtakes occur en route

Stations served by each stopping pattern are illustrated in the chart provided below:

Stopping Pattern in Revised (with reduced recovery time) Phase 1 Service Plan
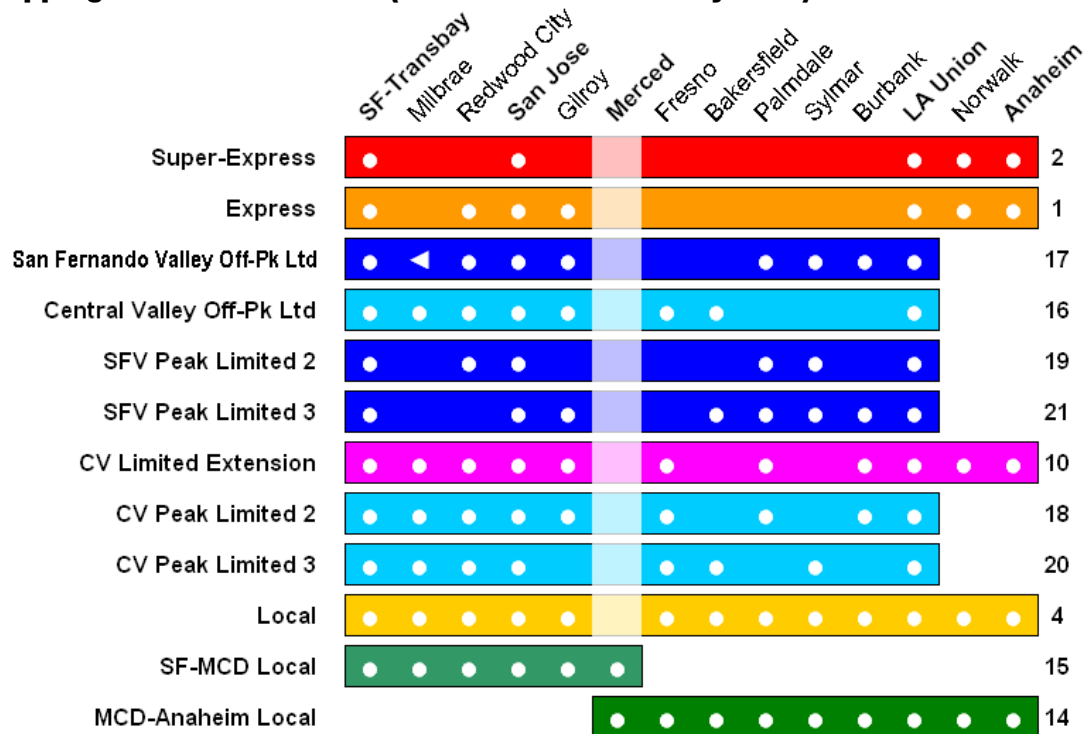
Note: Trains make a stop at station with white circle; ◄: Special stop (northbound only).

This schedule variation provides a total of 260 revenue trips, the same number of trips assumed in the base plan. Since both service plans follow the same planning principles, the breakdown of the levels of service in each time period of the day is identical between them. This is illustrated in the revised timetable and time-distance chart presented in the Appendices B1 and B2.

As a result of reducing the recovery and station dwell times, it is estimated that Express trains (Pattern #2) can complete the travel between San Francisco and Los Angeles within 2 hours and 40 minutes. This reduction in the recovery and dwell times also improves the travel time of most of the projected 260 revenue trips in this service plan.

A hypothetical daily timetable for this service plan is presented in Appendix B1. This same schedule is presented in stringline (time-distance) diagram format in Appendix B2. Equipment cycles and the number of required trainsets will be the same in this scenario as in the base plan documented in Appendix A3, so a separate analysis of equipment cycles is not shown for the service plan variation.

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B1. Hypothetical Timetable

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CALIFORNIA HIGH-SPEED RAIL
PHASE 1 TIMETABLE
VARIATION SERVICE PLAN

APPENDIX B1

Northbound

Mile	Station																															
0.0	ANA Anaheim	Dep																														
15.0	NSF Norwalk	Dep																														
30.3	LAU L.A. Union Sta.	Arr																														
40.6	BUR Burbank	Dep																														
51.1	SYL Sylmar	Dep																														
89.4	PMD Palmdale	Dep																														
174.1	BFD Bakersfield	Dep																														
285.4	FNO Fresno	Dep																														
354.4	MCD Merced	Dep																														
399.2	GLY Gilroy	Dep																														
428.8	SJC San Jose	Dep																														
450.6	RWC Redwood City	Arr																														
462.2	SFO Millbrae	Arr																														
476.9	SFT S.F.-Transbay	Arr																														

Southbound

Mile	Station																															
0.0	SFT S.F.-Transbay	Dep																														
	SFO Millbrae	Dep																														
26.4	RWC Redwood City	Dep																														
48.0	SJC San Jose	Dep																														
77.7	GLY Gilroy	Arr																														
187.5	MCD Merced	Arr																														
191.5	FNO Fresno	Dep																														
302.8	BFD Bakersfield	Arr																														
387.4	PMD Palmdale	Arr																														
425.7	SYL Sylmar	Dep																														
436.2	BUR Burbank	Arr																														
446.6	LAU L.A. Union Sta.	Arr																														
461.8	NSF Norwalk	Dep																														
476.9	ANA Anaheim	Arr																														

CALIFORNIA HIGH-SPEED RAIL
PHASE 1 TIMETABLE
VARIATION SERVICE PLAN

APPENDIX B1

Southbound

Mile	Station																														
0.0	SFT S.F.-Transbay	Dep
7.7	SFO Millbrae	Dep
26.4	RWC Redwood City	Dep
48.1	SJC San Jose	Dep
77.7	GLY Gilroy	Arr/Dep
122.5	MCD Merced	Arr/Dep
191.5	FNO Fresno	Arr/Dep
260.8	BFD Bakersfield	Arr/Dep
387.4	PMD Palmdale	Arr/Dep
425.7	SYL Sylmar	Dep
436.3	BUR Burbank	Dep
446.6	LAU L.A. Union Sta.	Arr/Dep
461.8	NSF Norwalk	Arr
476.9	ANA Anaheim	Arr

Service Type / Pattern / Train No. / Transet / Direction (SB) / Reg–Peak–Peak Ext–Peak O/T–Mid 1–Mid 2

Northbound

Mile	Station																														
0.0	ANA Anaheim	Dep
15.0	NSF Norwalk	Dep
30.3	LAU L.A. Union Sta.	Arr/Dep
40.6	BUR Burbank	Dep
51.1	SYL Sylmar	Dep
89.4	PMD Palmdale	Arr/Dep
174.1	BFD Bakersfield	Arr/Dep
285.4	FNO Fresno	Arr/Dep
354.4	MCD Merced	Arr/Dep
399.2	GLY Gilroy	Arr/Dep
428.8	SJC San Jose	Dep
450.6	RWC Redwood City	Arr
462.2	SFO Millbrae	Arr
476.9	SFT S.F.-Transbay	Arr

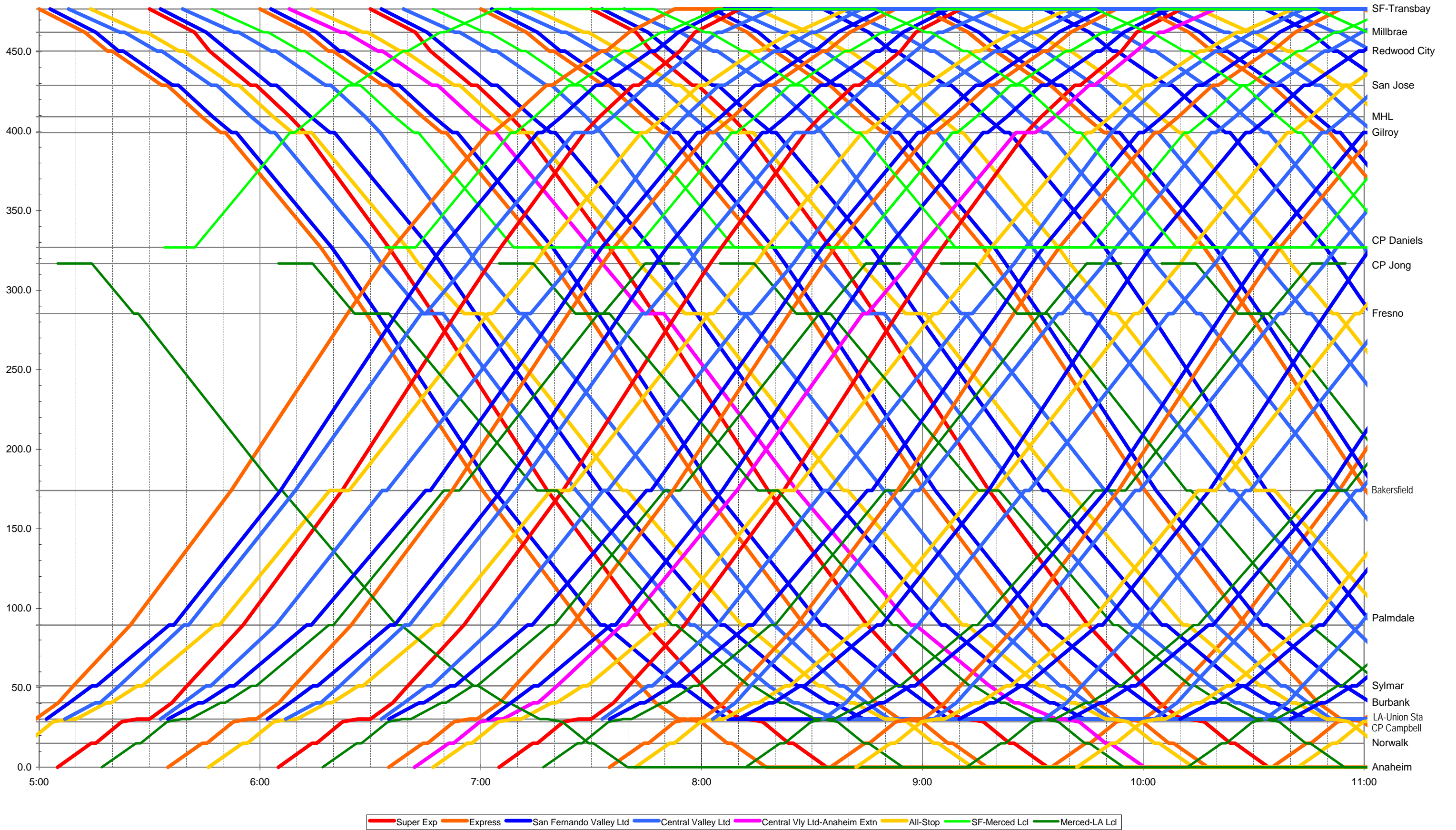Service Type / Pattern / Train No. / Transet / Direction (NB) / Reg–Peak–Peak Ext–Peak O/T

B2. Stringline Diagrams

- Morning Peak Period
- Mid-Day Period
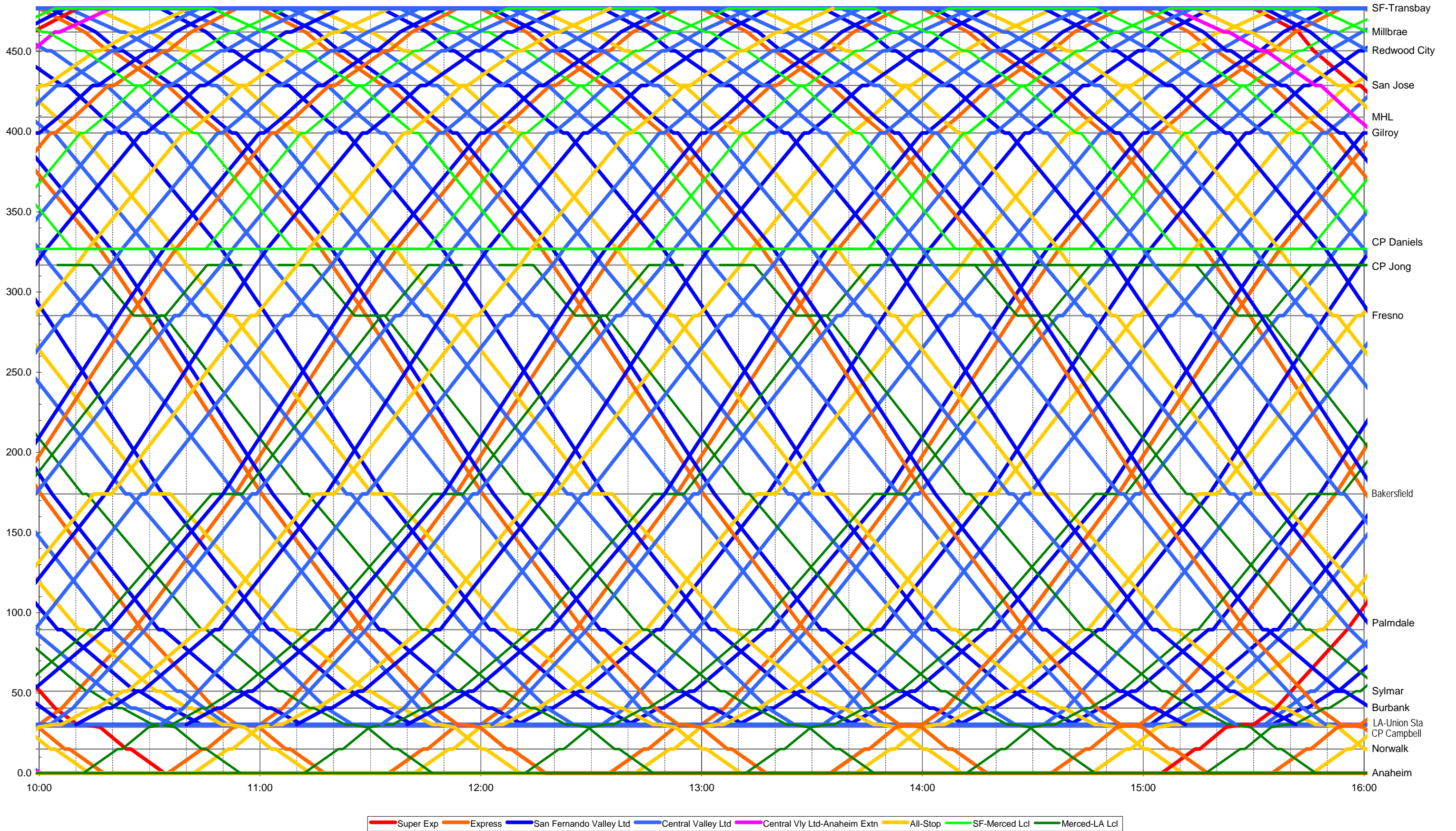- Afternoon Peak Period
- Evening and Late Night Period

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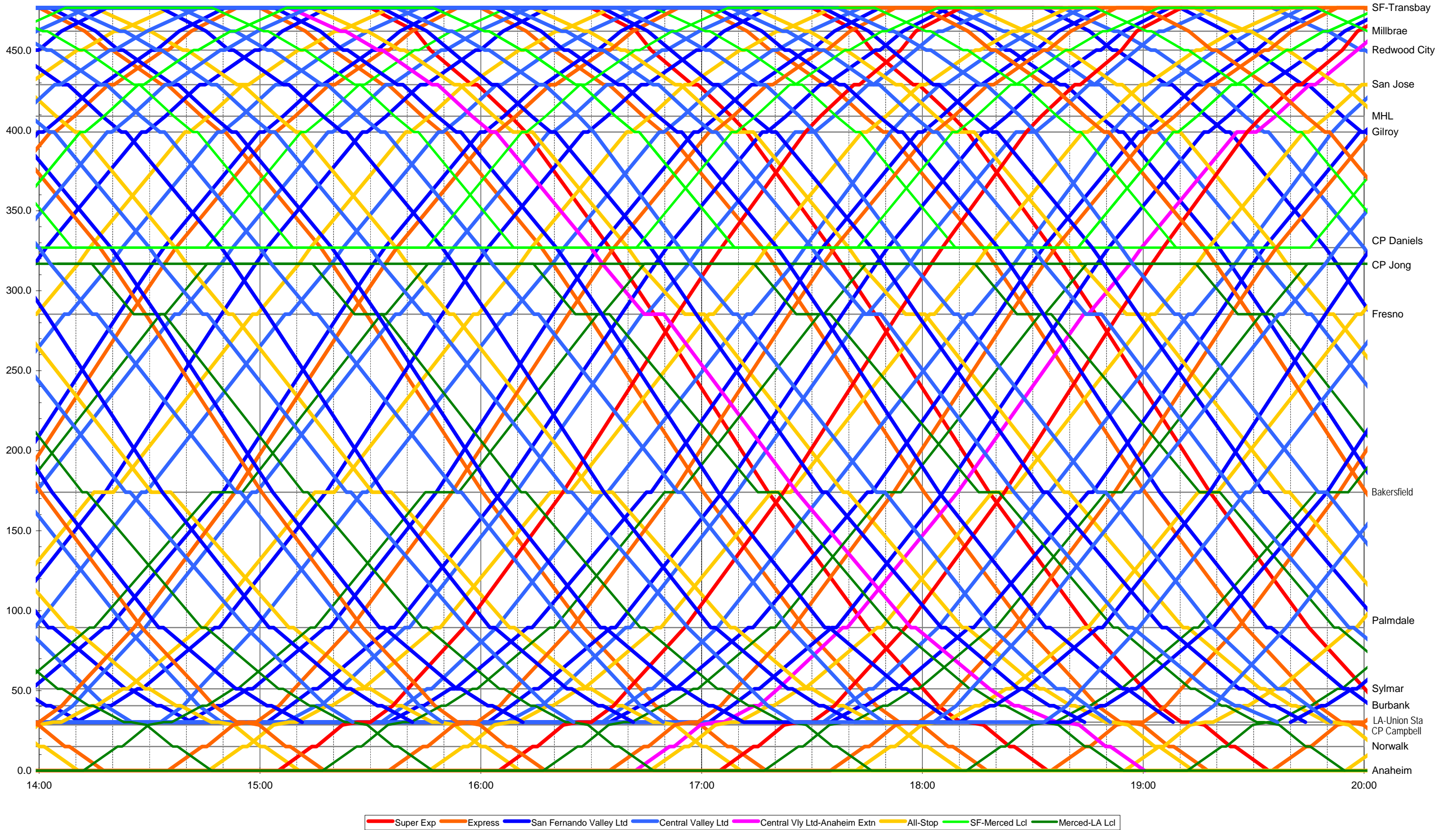
Appendix B2 - HSR PHASE 1 SERVICE PLAN - VARIATION (Version 10B) - MORNING PEAK

Legend: Super Exp — Express — San Fernando Valley Ltd — Central Valley Ltd — Central Vly Ltd-Anaheim Extn — All-Stop — SF-Merced Lcl — Merced-LA Lcl

Appendix B2 - HSR PHASE 1 SERVICE PLAN - VARIATION (Version 10B) - MID-DAY

Legend: Super Exp — Express — San Fernando Valley Ltd — Central Valley Ltd — Central Vly Ltd-Anaheim Extn — All-Stop — SF-Merced Lcl — Merced-LA Lcl

Stations (top to bottom): SF-Transbay, Millbrae, Redwood City, San Jose, MHL, Gilroy, CP Daniels, CP Jong, Fresno, Bakersfield, Palmdale, Sylmar, Burbank, LA-Union Sta, CP Campbell, Norwalk, Anaheim

Appendix B2 - HSR PHASE 1 SERVICE PLAN - VARIATION (Version 10B) - AFTERNOON PEAK

Legend: Super Exp — Express — San Fernando Valley Ltd — Central Valley Ltd — Central Vly Ltd-Anaheim Extn — All-Stop — SF-Merced Lcl — Merced-LA Lcl

Appendix B2 - HSR PHASE 1 SERVICE PLAN - VARIATION (Version 10B) - LATE EVENING

Legend: Super Exp — Express — San Fernando Valley Ltd — Central Valley Ltd — Central Vly Ltd-Anaheim Extn — All-Stop — SF-Merced Lcl — Merced-LA Lcl