Figure 2.6-6 Major Corridor Alternatives
(Los Angeles to San Francisco Bay Area)

Based on its comparison of the coastal, I-5, and SR-99 corridors, the Commission redirected the focus of study to the I-5 and SR-99 corridors. The Commission concluded that the coastal corridor would be more suitable for conventional rail service below 150 mph (240 kph) and "does not support travel times fast enough to capture a considerable share of the end-to-end market" (California Intercity High Speed Rail Commission 1996). The Commission noted that intermediate markets served by the coastal corridor are popular "tourist and recreation markets with sizable existing populations" that might be well served by a slower, relatively inexpensive conventional intercity rail service using incrementally improved existing rail infrastructure. These conclusions are consistent with input received from public agencies in the coastal corridor and with the policies of the Coast Rail Coordinating Council, whose member agencies include San Luis Obispo Council of Governments, Santa Barbara County Association of Governments, Ventura County Transportation Commission, and the Transportation Agency of Monterey County.

The coastal corridor is not a reasonable HST route because its challenging topography results in a longer and slower route with higher capital costs. This corridor also has a higher potential for environmental impacts than other options because of the sensitive natural and cultural resources and residential communities in the coastal hills and valleys. In addition, this corridor would not serve fast-growing Central Valley cities. The coastal corridor fails to meet the purpose and need and basic objectives of the project because it would not reduce travel times between major intercity travel markets in California. Therefore, it was dismissed from further consideration in this Program EIR/EIS.

C. INTERSTATE 5 CORRIDOR (SACRAMENTO TO BAKERSFIELD)

Review of the I-5 and SR-99 corridors showed that, although the SR-99 corridor options would be about 6% more costly than the I-5 corridor options, the SR-99 corridor would provide far better service to the growing Central Valley population, while offering fast, competitive service between the San Francisco Bay Area and Los Angeles metropolitan regions. The SR-99 corridor was found to have the highest overall ridership potential, with ridership projections estimated at 1.2 million more annual passengers than the highest I-5 corridor projections (Charles River Associates 1996).

The I-5 corridor has very little existing or projected population between the San Francisco Bay Area and Los Angeles. In contrast, according to the California Department of Finance, well over 3 million residents are projected to live between Fresno and Bakersfield along the SR-99 corridor by 2015, which directly serves all the major Central Valley cities (Charles River Associates 1996). Residents along the SR-99 corridor lack a competitive transportation alternative to the automobile, and the Commission's detailed ridership analysis showed that they would be ideal candidates to use an HST system. The I-5 corridor would not be compatible with current land use planning in the Central Valley that accommodates growth in the communities along the SR-99 corridor.

Express trains in the SR-99 corridor would connect San Francisco to Fresno in just 1 hr and 15 min, and Fresno to Los Angeles in 1 hr and 20 min. This corridor would link San Francisco to Bakersfield in about 1 hr and 50 min, and Bakersfield to Los Angeles in less than 50 min. The SR-99 corridor was estimated to have 3.3 million more intermediate-market ridership (passengers to or from the Central Valley) per year than the highest I-5 corridor projections. Therefore, while SR-99 corridor travel times would be 11 to 16 min longer than the I-5 alternatives between Los Angeles and San Francisco, overall ridership and revenue for the SR-99 corridor would be higher.

The Commission considered linking the I-5 corridor to Fresno and Bakersfield with spur lines but rejected this concept since it would add approximately $2 billion to the I-5 corridor capital costs, provide less ridership than the SR-99 corridor, and create severe operational constraints (California Intercity High Speed Rail Commission 1996).

Preliminary environmental analyses concluded that there would be a number of constraints and potential impacts for both the I-5 and SR-99 corridors. These environmental constraints analyses did not identify clear differentiating factors between the two alternatives. The I-5 corridor was found to have a higher potential for impacts on the natural environment and land use, while the SR-99 corridor had a higher potential for social/cultural impacts (Parsons Brinckerhoff 1995).

At Commission meetings and through public workshops and other public involvement activities, the Commission found that the majority of public comments indicated a preference for the SR-99 corridor over the I-5 corridor. In particular, there was overwhelming support for the SR-99 corridor in the Central Valley. The Commission received resolutions of support for the SR-99 corridor from nearly every Central Valley city, county, and regional government (California Intercity High Speed Rail Commission 1996a and 1996b). At its February 1996 meeting, the Commission directed staff to focus further technical investigations on SR-99 corridor alternatives.

In summary, while the I-5 corridor could provide better end-to-end travel times compared to the SR-99 corridor, the I-5 corridor would result in lower ridership and would not meet the current and future intercity travel demand of Central Valley communities as well as the SR-99 corridor. The I-5 corridor would not provide transit and airport connections in this area, and thus failed to meet the purpose and need and basic objectives of maximizing intermodal transportation opportunities and improving the intercity travel experience in the Central Valley area of California as well as the SR-99 corridor. For these reasons the I-5 corridor was dismissed from further consideration in this Program EIR/EIS.

D. CAPITOL RAIL CORRIDOR (SACRAMENTO TO OAKLAND)

The Commission considered the capitol corridor (which approximates the I-80 corridor) to link the statewide HST system to Sacramento via the San Francisco Bay Area. However, the Commission recommended that further study of the connection to Sacramento should focus on the extension of the SR-99 corridor through the Central Valley rather than the capitol corridor (see Figure 2.6-7).

The capitol corridor is an existing intercity rail alignment carrying freight traffic, long-distance Amtrak, and intrastate service to and from the state capitol (Sacramento). This corridor is severely constrained by adjacent land use, topography, and its circuitous routing along and across San Pablo Bay from Benicia to Richmond. Moreover, speeds are restricted primarily because of curves through the heavily urbanized Bay Area metropolitan region from Benicia through Santa Clara County. In contrast, maximum speeds can be achieved throughout the SR-99 corridor south of the Sacramento metropolitan area. A trip from Sacramento to Los Angeles via the capitol corridor would be approximately 1.5 hrs longer than a Sacramento to Los Angeles trip via the SR-99 corridor. As a result, the statewide ridership using SR-99 to Sacramento would be about 1 million more passengers annually than that using the capitol corridor (California Intercity High Speed Rail Commission 1996).

Travel times between Sacramento and Oakland would be shorter via the capitol corridor than via the SR-99 corridor. Because of the high average speeds maintained through the Central Valley, however, the travel times between Sacramento and San Jose would be shorter via the SR-99 corridor.

In 2002, the capitol corridor rail service was the fastest-growing Amtrak service in the nation. The service is expected to continue to improve and expand operations. The Commission recommended that the existing capitol corridor intercity rail service be improved to speeds of up to 110 mph (177 kph), and that it serve (at least initially) as a feeder system to the statewide HST system. A direct HST link from Sacramento to Oakland via the capitol corridor is not included as part of the proposed HST system for the Program EIR/EIS. It could be considered in the future as a potential extension of the proposed HST system, if it is implemented.

Figure 2.6-7
Capitol Corridor

In summary, HST service to Sacramento would be an integral part of the proposed action to construct an HST system considered in this Program EIR/EIS. However, the capitol corridor option for providing HST service to Sacramento was eliminated from further consideration in this Program EIR/EIS because it would not meet current and future intercity travel demand, would not sufficiently reduce intercity travel times between Sacramento and both the Bay Area and southern California, and thus would not meet the purpose and need and basic project objectives. In contrast, routes through the Central Valley satisfy the purpose of improving intercity travel between major metropolitan areas of California.

E. PANOCHE PASS (CENTRAL VALLEY TO BAY AREA)

The Commission investigated the Panoche Pass in its feasibility studies that were completed at the end of 1996). The proposed Panoche Pass crossing is forecasted to result in low ridership and revenue and would require higher capital and operating and maintenance costs between the San Francisco Bay Area and Los Angeles than other potential routes. More importantly, the Panoche Pass would not provide adequate service between the San Francisco Bay Area and Sacramento/Northern San Joaquin Valley.

For the San Francisco to Los Angeles route section, a Panoche Pass alignment was estimated to cost $500 million more than a Pacheco Pass alignment. Although there would be less tunneling and cut-and-fill compared to the Pacheco Pass, the Panoche Pass option would have to cross a much longer distance of mountainous terrain. The Pacheco Pass option would have higher intercity ridership for the San Francisco to Los Angeles section (300,000 passengers annually by 2015) than the Panoche Pass option because it would serve a greater portion of the Central Valley population and would provide slightly faster travel times between the major markets (California Intercity High Speed Rail Commission 1996).

The Pacheco Pass would provide a superior link to Sacramento and the northern San Joaquin Valley since it is 35 to 40 mi (56 to 64 km) north of the Panoche Pass. Ridership for the Pacheco Pass would be much higher than the Panoche Pass since trips from Sacramento/northern San Joaquin Valley to the Bay Area would take substantially longer via the Panoche Pass. For example, compared to the Pacheco Pass, the express trip time between Sacramento and San Jose was estimated to be 37 min longer using the Panoche Pass. Costs would also be substantially higher since the network (in total) would be more than 30 mi (48 km) longer using the Panoche Pass.

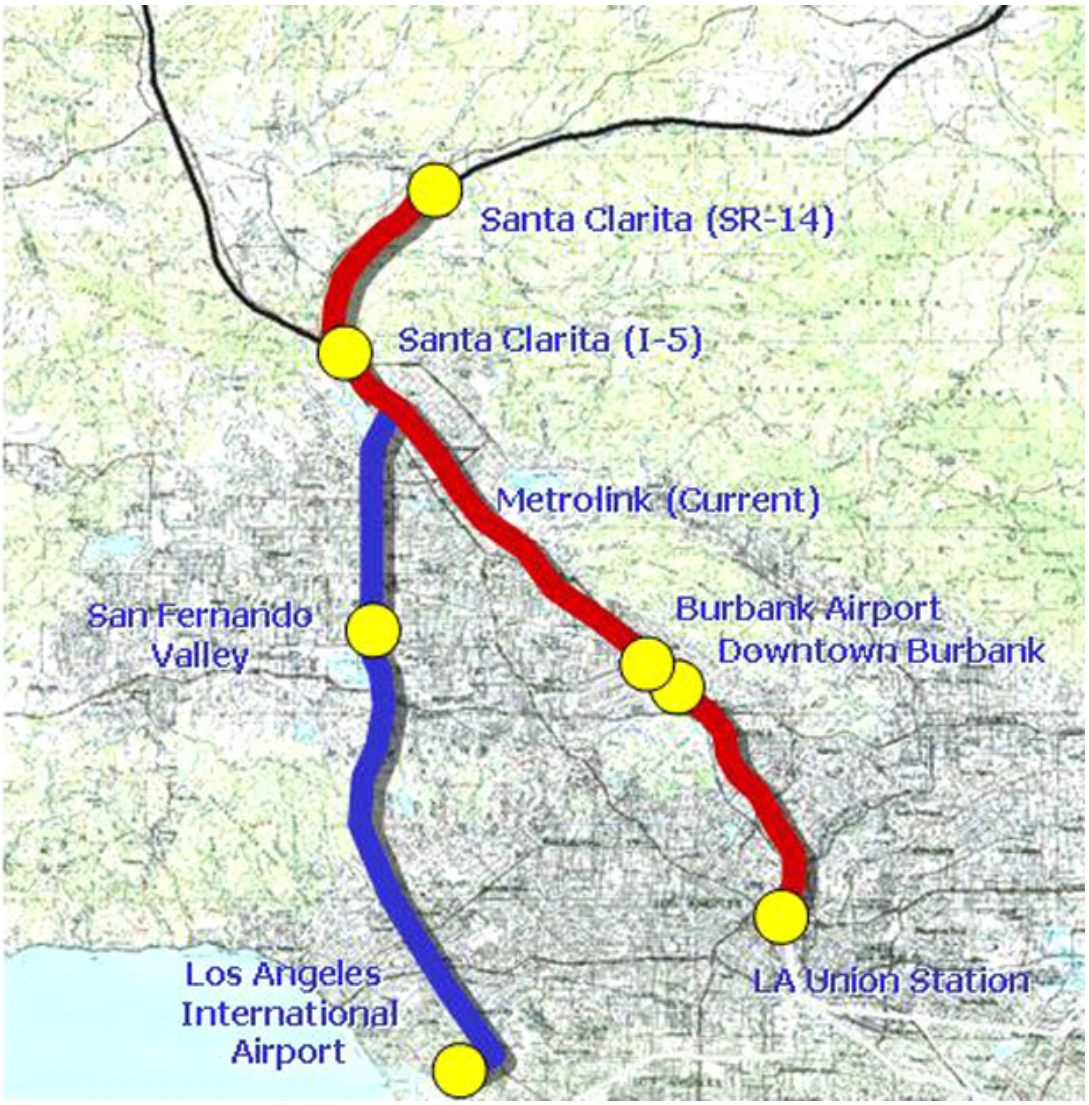
Like the capitol corridor, the Panoche Pass was eliminated from further consideration in this Program EIR/EIS because it would not meet current and future intercity travel demand and would not sufficiently reduce intercity travel times between Sacramento, as well as other northern San Joaquin Valley cities (Merced, Modesto, Stockton), and the Bay Area, and thus would not meet the purpose and need and basic program objectives. The Panoche Pass option also would be more costly and less efficient than other potential routes.

F. THIS SECTION LEFT BLANK INTENTIONALLY – due to revisions made in response to comments received, an Alternative Pass alignment will be considered in a subsequent study of the Northern Mountain Crossing.

G. LOS ANGELES INTERNATIONAL AIRPORT (LAX) AS LOS ANGELES TERMINUS STATION

The Phase 2 analyses of the Commission's feasibility studies indicated that a southern terminus at LAX failed to meet the purpose and need and basic project objectives (see Figure 2.6-11). A southern terminus at LAX is forecasted to result in low ridership and revenues and would not accommodate extensions to San Diego, Orange County, or Inland Empire (Riverside and San Bernardino Counties). It also would require high capital and operating and maintenance costs.

Figure 2.6-11
Union Station Terminus Versus LAX



Ridership for the LAUS option would be more than 1 million passengers a year greater than the LAX terminus option (Charles River Associates 1995). The capital costs to develop and access a terminal at LAX along I-405 would be 116% greater than the LAUS terminal option using the Metrolink rail alignment. Construction on the I-405 alignment would be particularly costly because of a lack of any available right-of-way. In addition, the longer LAX option was estimated to have 12% greater operational and maintenance costs (California Intercity High Speed Rail Commission 1996). The LAUS and LAX options were projected to have similar environmental impacts.

Located in downtown Los Angeles, LAUS is the transit hub of the Los Angeles Metropolitan Area, serving buses, urban rail services, and intercity rail. Although LAX is the most heavily used airport in California and the hub airport for southern California, it is located away from downtown and is not as well connected to the Los Angeles transit network. Extensions of the HST system to Orange County, Inland Empire, and San Diego would be easier from the more centrally located LAUS and could be accomplished using existing rail alignments. An extension south from LAX to Orange County would need to use the heavily constrained I-405 alignment.

The Commission concluded that LAX would be inefficient and too costly as a Los Angeles terminus location, and recommended instead that service to a potential LAX station should be considered as an extension from downtown Los Angeles, e.g., from LAUS. While locating the Los Angeles terminus station at LAX instead of LAUS would serve some air travelers well, it would fail to maximize intermodal connections to the multimodal transit system in this area. Because the LAX terminus did not meet the purpose of and need for the proposed improvements, the Authority dismissed the LAX terminus from further consideration in this Program EIR/EIS. The elimination of this option would not preclude consideration in the future of a potential HST extension serving LAX with a spur line from LAUS.

H. LOS ANGELES-ORANGE COUNTY-SAN DIEGO (LOSSAN) CORRIDOR DEDICATED HIGH-SPEED SERVICE

The Commission investigated a dedicated HST system using the LOSSAN rail corridor. It concluded that a dedicated HST corridor with completely separate tracks for HST service would be impracticable in the severely constrained LOSSAN corridor because of severe constructability issues and high costs. The corridor would also have considerable environmental impacts.

In 2002, the existing LOSSAN rail corridor was the second-most-traveled rail passenger route in the U.S. In addition to Amtrak's intercity service, two thriving commuter rail services (Metrolink and Coaster) operate in this corridor, along with considerable rail freight traffic. Although the corridor provides the most direct rail route between Los Angeles and San Diego, it passes through some of the state's most populated regions and environmentally sensitive areas (wetlands, coastal lagoons, fragile coastal bluffs, and coastal communities).

The Commission's technical investigations and public input throughout the feasibility studies identified considerable environmental obstacles to implementing a dedicated HST service along the LOSSAN corridor. Written comments received during the Commission's public comment period raised the following issues.

- The coastal bluffs are narrow in some areas and susceptible to failure, in particular the Del Mar Bluffs. Noise and vibration from steel-wheel-on-steel-rail traffic could result in harm to the fragile bluffs above the beach.
- The existing right-of-way is narrow and currently divides Encinitas. Additional service in the corridor could restrict access and enjoyment of the beach area for visitors and residents.

- To prevent dangerous pedestrian crossings of the tracks, the railroad rights-of-way would need to be fenced. This would restrict or block beach access and concentrate the crossing of pedestrian and vehicle traffic at fewer locations.
- Noise and vibration from trains would be disruptive to ecologically sensitive coastal areas and lagoons (e.g., San Elijo Lagoon). The saltwater marshes and lagoons are a winter habitat to residential avian species protected under state and federal laws.
- A dedicated right-of-way would require two more tracks at grade (with fencing) or a double-deck configuration, to accommodate existing rail services and high-speed rail. In Encinitas, there may not be room in the existing right-of-way to add two more tracks at grade, so this could mean a double-deck configuration. The structures and overhead catenaries could block highly sensitive ocean and community views, creating a negative aesthetic impact on tourism-related businesses and potentially reducing property values adjacent to the corridor.

After reviewing the work of the Commission, recent technical reports, and comment received during scoping and in the screening process, the Authority and the FRA determined to study an upgraded LOSSAN corridor to provide higher operating speeds but rejected a dedicated high-speed system for this area. The high level of existing passenger rail, extensive existing rail infrastructure, and mixed rail traffic operations on this corridor, along with the limited existing right-of-way and sensitive coastal resources, make a dedicated electrified HST service infeasible for this corridor at this time. Incremental improvement phasing, however, would be feasible. For this option, improvements would be made to the existing LOSSAN rail corridor and rail service to improve this service as a link to the HST corridor in Los Angeles. These improvements could be applied with or without the implementation of an inland (I-15) corridor (California High Speed Rail Authority 1999).

I. EXTENSION TO DOWNTOWN SAN DIEGO FROM EAST MISSION VALLEY (QUALCOMM STADIUM)

Several alignment options were considered in the Commission's studies to access downtown San Diego from the I-15 corridor. One of these options would have traversed Mission Valley between I-15 and I-5 prior to joining the existing LOSSAN rail corridor and proceeding south to downtown San Diego (Figure 2.6-12). The Commission's technical studies showed that, because of extensive urban development of land uses and existing transportation systems, there would be insufficient space for a new HST corridor without extensive displacement and disruption to the existing communities. The high concentration of existing transportation facilities in Mission Valley (I-8, I-805, SR-163, and numerous arterial streets) presented constraints both horizontally and vertically due to multilevel crossings and interchanges. Existing urban development (mostly commercial and high-density residential) left no space for an HST alignment. Consultation with local and regional agencies confirmed the constraints on the proposed alignment option and its incompatibility with existing land uses.

The use of the Mission Valley to cross over from the I-15 corridor to the I-5 corridor was dismissed by the Authority from further consideration in this Program EIR/EIS because this option was impracticable as a result of high costs and constructability issues and would require displacement of residences that could be avoided with the use of other routes to reach downtown San Diego. A modification of this corridor option, which included a deep bore tunnel, was considered and was also rejected as impracticable in a subsequent screening evaluation.

J. PEÑASQUITOS CANYON (I-15 TO I-5)

Another alignment option considered to access downtown San Diego from the I-15 corridor traversed Peñasquitos Canyon between I-15 and I-5 prior to joining the existing LOSSAN rail corridor and proceeding south to downtown San Diego (Figure 2.6-12). The Peñasquitos Canyon crossing was eliminated from further consideration in this Program EIR/EIS because of its inability to avoid or to substantially reduce potential environmental impacts. Over half of the alignment option would have

Figure 2.6-12
East Mission Valley and Penasquitos Canyon

traversed the Peñasquitos Canyon Preserve, an area of open space preserved by the County of San Diego. In addition to the obvious parkland impacts, the alignment option also presented extensive potential impacts on wetland areas, water resources, and sensitive biological habitats, as well as on the viewsheds in the area of the preserve.

2.6.9 Alternative Alignment and Station Options Considered in Screening Evaluation

The Authority and the FRA developed a range of potential HST Alternative alignment and station options through review of previous studies discussed in Section 2.1.1, review of scoping comments, and engineering evaluation of alignment and station options within the most promising potential corridors. Through the screening process, alignment and station options were identified that best met the purpose and need of the proposed action. At the conclusion of the screening process, certain alignment and station options were determined to be reasonable and feasible and are analyzed in this Program EIR/EIS.

To facilitate analysis, the proposed statewide HST system was divided into five regions, and technical evaluations of the available options in each region were prepared. The alignment and station options within HST Alternative corridors carried forward are illustrated in Figures 2.6-13 and 2.6-14 for the northern and southern portions of the study area, respectively. These options are defined and described in detail in the screening report and the regional alignment/station screening evaluation reports (California High Speed Rail Authority 2001). The screening evaluation included the following activities.

- Review of past alignment and station options identified in previous studies within viable corridors.
- Identification of alignment and station options not previously evaluated.
- Evaluation of alignment and station options using standardized engineering, environmental, and financial criteria and evaluation methodologies.
- Evaluation of alignment and station options against defined objectives.

The alignment and station-screening evaluation reports were combined with public and agency input, and provided the Authority and the FRA with the necessary information to identify a reasonable range of alignment, station location, and HST corridor options. The evaluation of potential HST alignments and stations within viable corridors used the following standardized criteria.

- Construction: Substantial engineering and construction complexity as well as excessive initial and/or recurring costs were considered criteria for project impracticability because they present logistical constraints.
- Environment: A high potential for considerable impacts to natural resources including waters, streams, floodplains, wetlands, and habitat of threatened or endangered species was considered a criterion for failing to meet project objectives.
- Land Use Compatibility: Substantial incompatibility with current or planned local land use as defined in local plans was considered a criterion for failing to meet project objectives.
- Right-of-Way: A lack of available right-of-way or extensive right-of-way needs that would result in excessively high acquisition costs for a corridor, technology, alignment, or station were considered criteria for project impracticability.
- Connectivity/Accessibility: Limited connectivity with other transportation modes (aviation, highway and/or transit systems) that would impair the service quality and could reduce ridership of the HST system was considered a criterion for failing to satisfy the project purpose.
- Ridership/Revenue: Longer trip times and/or suboptimal operating characteristics that would result in low ridership and revenue were considered criteria for failing to satisfy the project purpose.

Figure 2.6-13
Initial Alignment and Station Options - Northern Portion

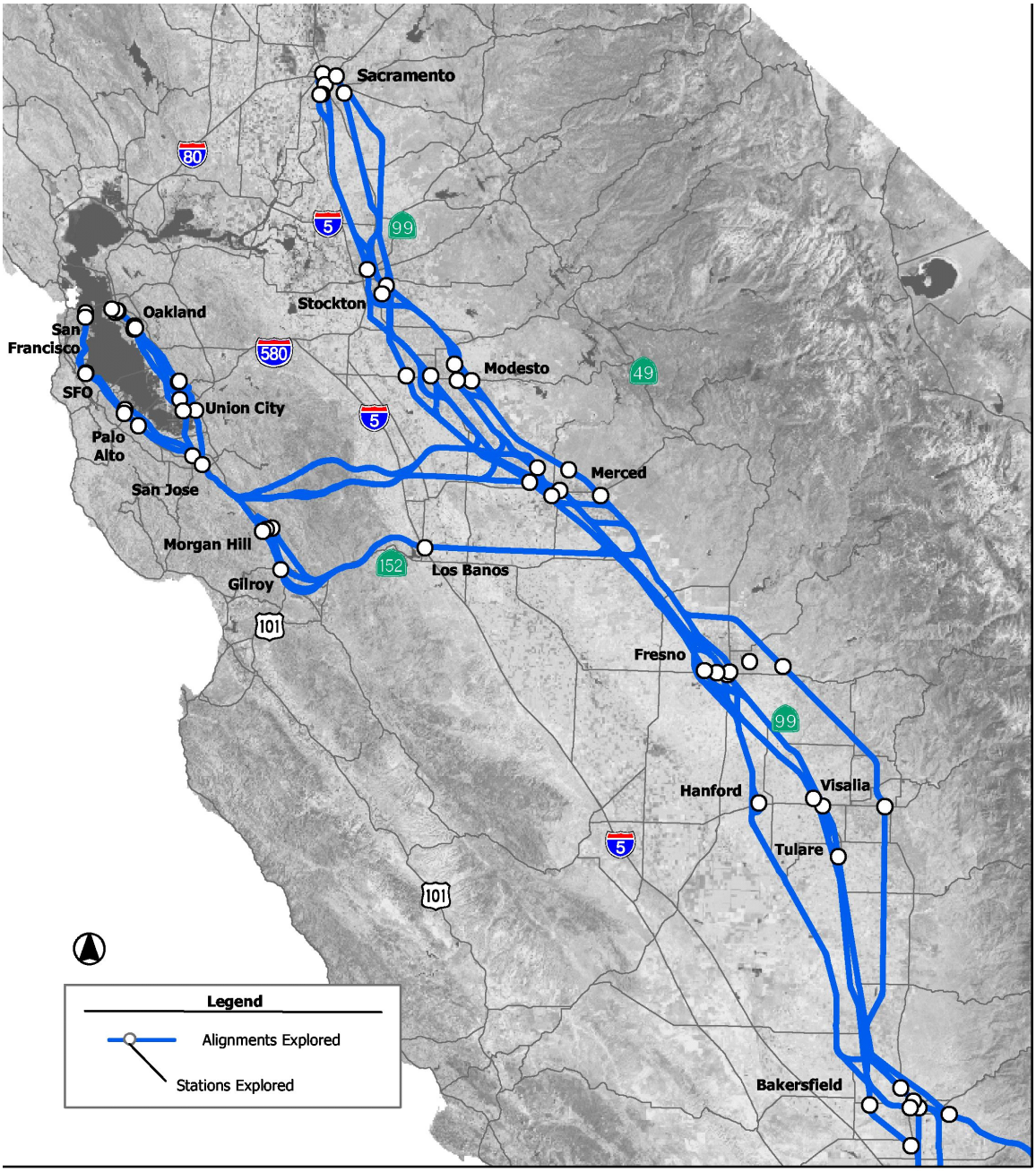


Figure 2.6-14
Initial Alignment and Station Options - Southern Portion

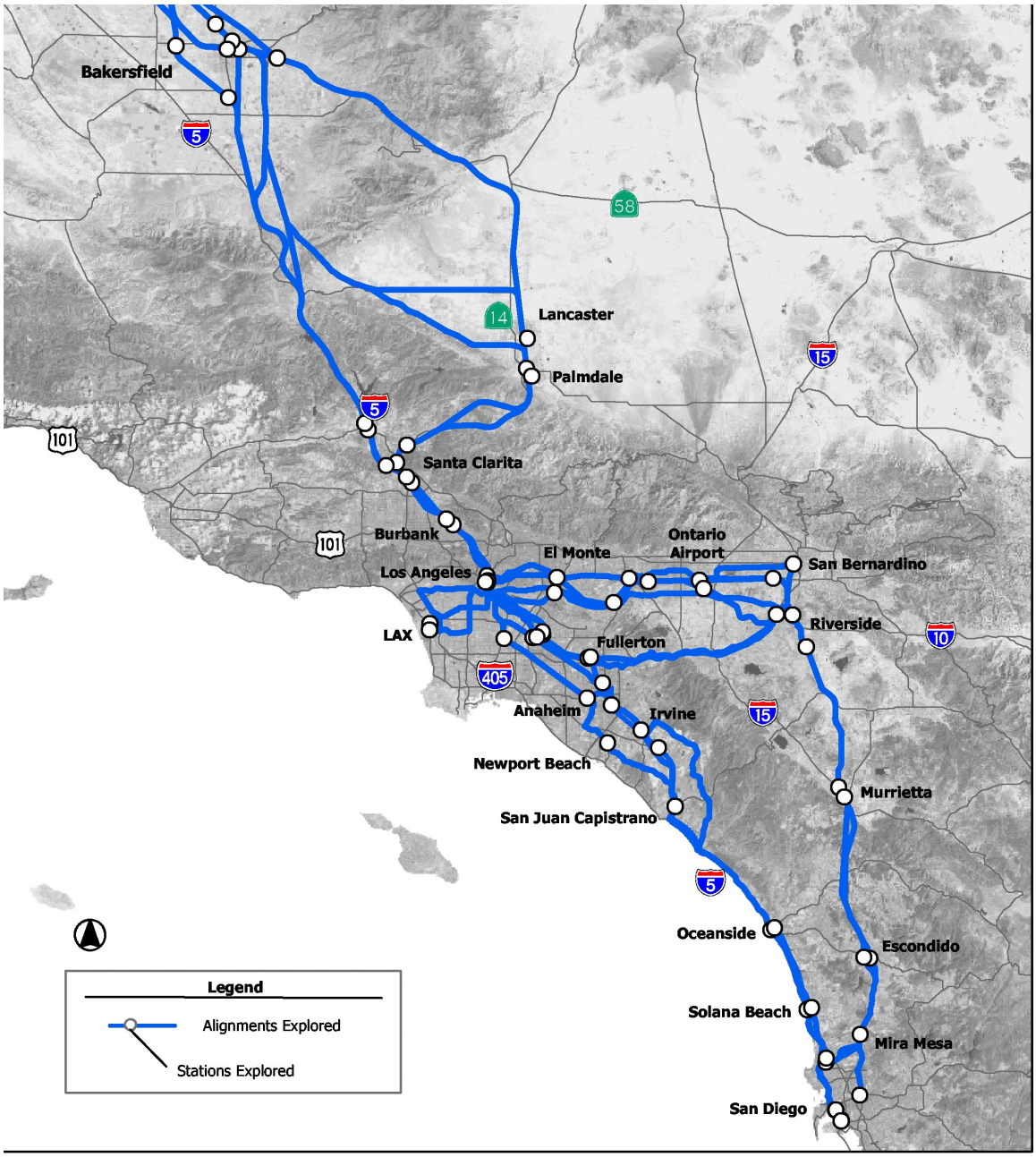


Table 2.6-5 presents the relationship of objectives and criteria applied in the screening evaluation. The objectives and criteria used in this evaluation represent further refinement of those used in previous studies and incorporated the HST system performance goals and criteria described in Section 2.1. Alignment and station options were considered and compared based on the established objectives and criteria.

Table 2.6-5
High-Speed Rail Alignment and Station Evaluation Objectives and Criteria

Objective	Criteria
Maximize ridership/revenue potential	Travel time Length Population/employment catchment area
Maximize connectivity and accessibility	Intermodal connections
Minimize operating and capital costs	Length Operational issues Construction issues Capital cost Right-of-way issues/cost
Maximize compatibility with existing and planned development	Land use compatibility and conflicts Visual quality impacts
Minimize impacts on natural resources	Water resources impacts Floodplain impacts Wetland impacts Threatened and endangered species impacts
Minimize impacts on social and economic resources	Environmental justice impacts (demographics) Farmland impacts
Minimize impacts on cultural and parks/wildlife refuge resources	Cultural resources impacts Parks and recreation impacts Wildlife refuge impacts
Maximize avoidance of areas with geologic and soils constraints	Soils/slope constraints Seismic constraints
Maximize avoidance of areas with potential hazardous materials	Hazardous materials/waste constraints

The screening evaluation criteria focus on cost and travel time as primary indicators of engineering viability and ridership potential. Capital costs were estimated and travel times were quantified for each alignment and station option considered. Other engineering criteria such as operational, construction, and right-of-way issues were evaluated qualitatively. The screening evaluation criteria are consistent with the criteria applied in the previous studies. The criteria related to HST operations are based on accepted engineering practices, the criteria and experiences of other railway and HST systems, and the comments of HST manufacturers.

The broad objectives and criteria related to the environment used for evaluation reflect the objectives of NEPA and CEQA, and are consistent with the objective of the Clean Water Act Section 404(b)(1) to provide consideration of alternatives to minimize impacts on waters of the U.S. The environmental

constraints and impacts criteria focus on environmental issues that can affect the location or selection of alignments and stations.

To identify potential impacts, a number of commonly available GIS digital data sources were used along with published information from federal, state, regional, and local planning documents and reports. Alignment and station rights-of-way widths dictated by engineering requirements were used to identify, in general terms, the sensitive environmental resources within each corridor segment. For screening potential environmental impacts were reviewed by considering areas of potential impact appropriate to the resources, and these areas varied from 100 ft (30 meters [m]) to 0.5 mi (0.8 km), extending beyond the conceptual right-of-way for the segments. In some cases, field reconnaissance was required to view on-the-ground conditions and to provide relative values.

The results of the detailed screening evaluation are described in the *California High-Speed Train Screening Report* (California High Speed Rail Authority 2001), which was presented at public meetings of the Authority governing board in August 2001 through January 2002. Some alignment and station options were considered and removed from further study. For most of the alignment and station options not carried forward, failure to meet the general project purpose and objectives and practicability constraints were the primary reasons for elimination. Environmental criteria were considered a reason for elimination when an option had considerably more probable environmental impacts than other practicable options for the same segment. General project purpose and objectives were considered in terms of ridership potential, connectivity and accessibility, incompatibility with existing or planned development, and severe operational constraints. Practicability constraints were considered in terms of cost, constructability, right-of-way constraints, and other technical issues. To assess the constructability of tunnels, some specific thresholds were established to help guide the ranking. Continuous tunnel lengths of more than 12 mi were considered impracticable, and the crossing of major fault zones at grade was also identified as a necessary criterion. For other practicability considerations (e.g., right-of-way constraints, construction issues, costs) thresholds could not be established for this program-level evaluation and impracticability was determined based on professional judgment. Environmental constraints are identified for alternatives only if they constituted primary reasons for eliminating an alternative. The remaining alignment and station options within each region were determined to generally meet the objectives described in the purpose and need and are analyzed in this Program EIR/EIS.

Tables summarizing the comparison of alignment and station options prepared during the screening evaluation are included in Appendix 2-H. As discussed in the previous section, these tables present screening criteria used to evaluate all alignment and station options considered and distinguish between the options carried forward and those eliminated from further consideration. The primary considerations for elimination are highlighted. The tables in Appendix 2-H include information from the tunneling conference and the alignments that were developed as part of the Quantm optimization study, which was used for the screening of alignments and station locations for the Bay Area to Merced and Bakersfield to Los Angeles regions. The specific methodologies applied in the screening evaluation and a summary of the criteria and measurements used are presented by region in Appendix 2-I.

Proposed HST alignment options are generally configured along or adjacent to existing rail transportation facilities instead of creating new transportation corridors. While a wide range of options have been considered, the Authority's initial conceptual approach, previous corridor evaluations, and the screening evaluation conducted as part of this Program EIR/EIS have consistently shown a potential for fewer substantial environmental impacts along existing highway and rail facilities than on new alignments through both developed and undeveloped areas. Although increasing the overall width of existing facilities could have similar potential impact on the amount of land disturbed as creating new facilities, creating new facilities would also introduce potential incompatibility and severance issues in both urban communities and rural settings (farmlands, open spaces).

The station locations described in this section were identified generally and represent the most likely sites based on current knowledge, consistent with the objective to serve the state's major population centers. There is a critical tradeoff between accessibility of the system to potential passengers and the resulting HST travel times (i.e., more closely spaced stations will lengthen the travel times for local service as well as express services). The station locations shown here are spaced approximately 50 mi (80 km) apart in rural areas and 15 mi (24 km) apart in the metropolitan areas. Additional or more closely spaced stations would negatively impact travel times and the ability to operate both express and local services.

Several key factors were considered in identifying potential station stops, including speed, cost, local access times, potential connections with other modes of transportation, ridership potential, and the distribution of population and major destinations along the route. Again, the ultimate locations and configurations of stations cannot be determined until the project-level environmental process. The alignment and station options are described by region below.

A. BAY AREA TO MERCED

This region includes central California from the San Francisco Bay Area (San Francisco and Oakland) south to the Santa Clara Valley and east across the Diablo Range to the Central Valley. To facilitate this analysis, this region was divided into three sections.

- San Francisco to San Jose.
- Oakland to San Jose.
- San Jose to Merced.

These sections are fundamentally different and distinct in terms of land use, terrain, and construction configuration (mix of at-grade, aerial structure, and tunnel sections). The alignment and station options considered in each section of the Bay Area to Merced region are discussed below and compared in detail in Appendix 2-H.

Bay Area to Merced Options Eliminated

Figure 2.6-15 shows the alignments and stations that were considered and eliminated for the Bay Area to Merced region. The reasons for elimination of the options are categorically summarized in Table 2.6-6 and further described in the following subsections.

Figure 2.6-15
Eliminated Alignments and Stations Bay Area to Merced

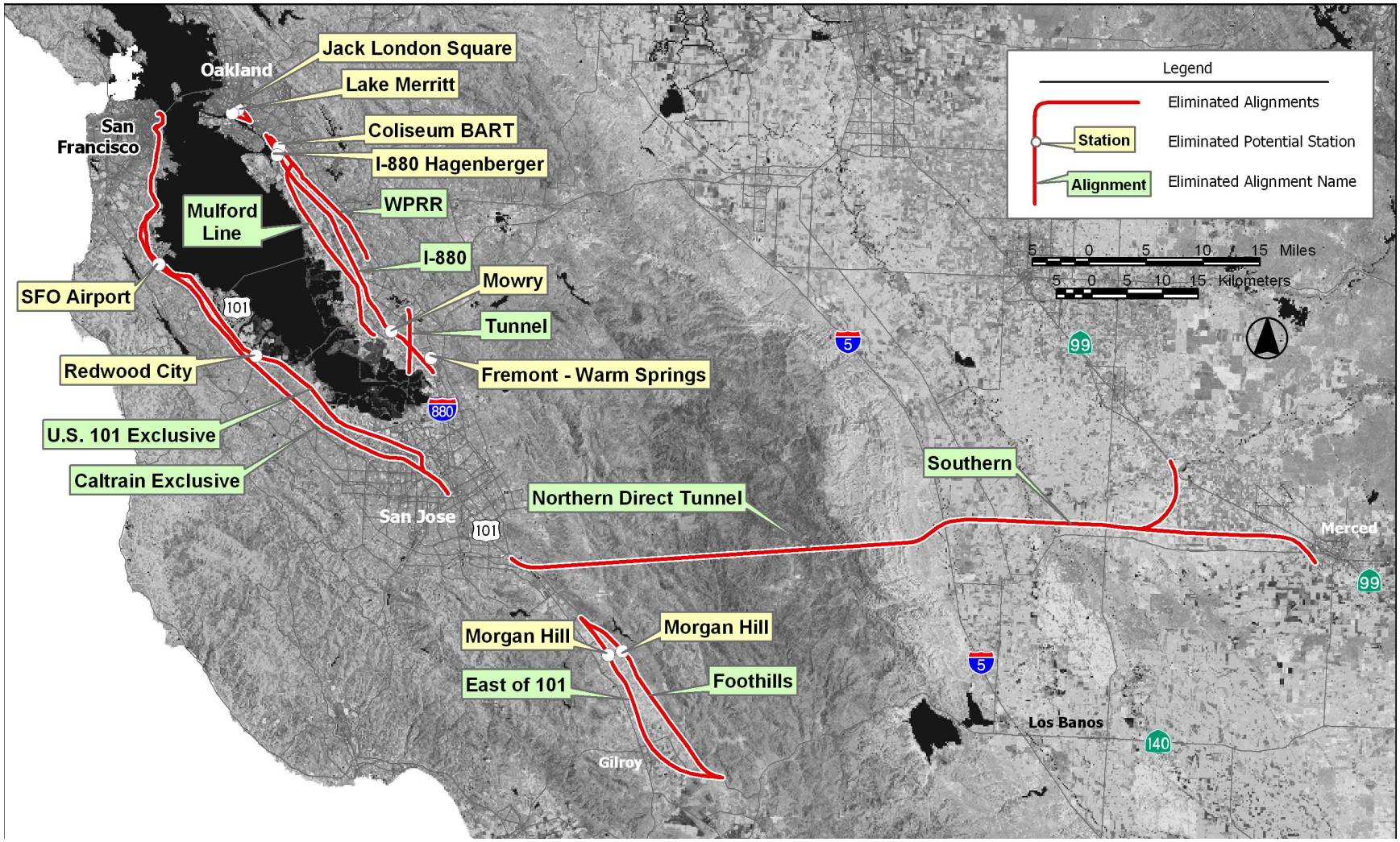


Table 2.6-6
Bay Area to Merced: High-Speed Train Alternative Alignment and Station Options Considered and Eliminated

Alignment or Station	Reason for Elimination							
	Construction	Incompatibility	Right-of-Way	Connectivity/ Accessibility	Revenue/ Ridership	Alignment Eliminated*	Environment	Environmental Concerns
San Francisco to San Jose								
US-101 Alignment (exclusive guideway)	P	S	P				P	Visual, land use (right-of-way acquisition)
Caltrain Corridor (exclusive guideway)	P	P	P				P	Visual, land use (right-of-way acquisition), cultural resources
Station Locations								
Millbrae–San Francisco Airport (US-101)						P		
Redwood City (US-101)						P		
Oakland to San Jose								
Mulford Line (Note: only Oakland to Newark portion to be eliminated)	P	P	P				S	Visual, land use
I-880 (Note: only Oakland to Fremont portion to be eliminated)	P		P					
Former Western Pacific Railroad (WPRR) Rail Line to Hayward Line to I-880 (WPRR alignment/Hayward/I-880)	P							
Former WPRR Rail Line through Niles Junction to Mulford Line (WPRR/Niles/Mulford alignment)	P							
Hayward Line via tunnel to Mulford Line (Hayward/Tunnel/Mulford alignment)	P	S	P				S	Land use, seismic constraints
Former WPRR Rail Line via tunnel to Mulford Line (WPRR/Tunnel/Mulford alignment)	P	S	P				S	Land use, seismic constraints
Station Locations								
Lake Merritt		P		P				
Jack London Square	P			P				
I-880 Hegenberger						P		
Coliseum BART (WPRR)						P		
Fremont–Warm Springs	P							
Mowry Avenue	P					P		
San Jose to Merced								
Merced Southern alignment (Central Valley Portion of San Jose-Merced section for Diablo Range Direct options)							P	San Luis National Wildlife Refuge impacts
Direct Tunnel Alignment (Northern or Southern Connection to Merced	P						S	Seismic constraints

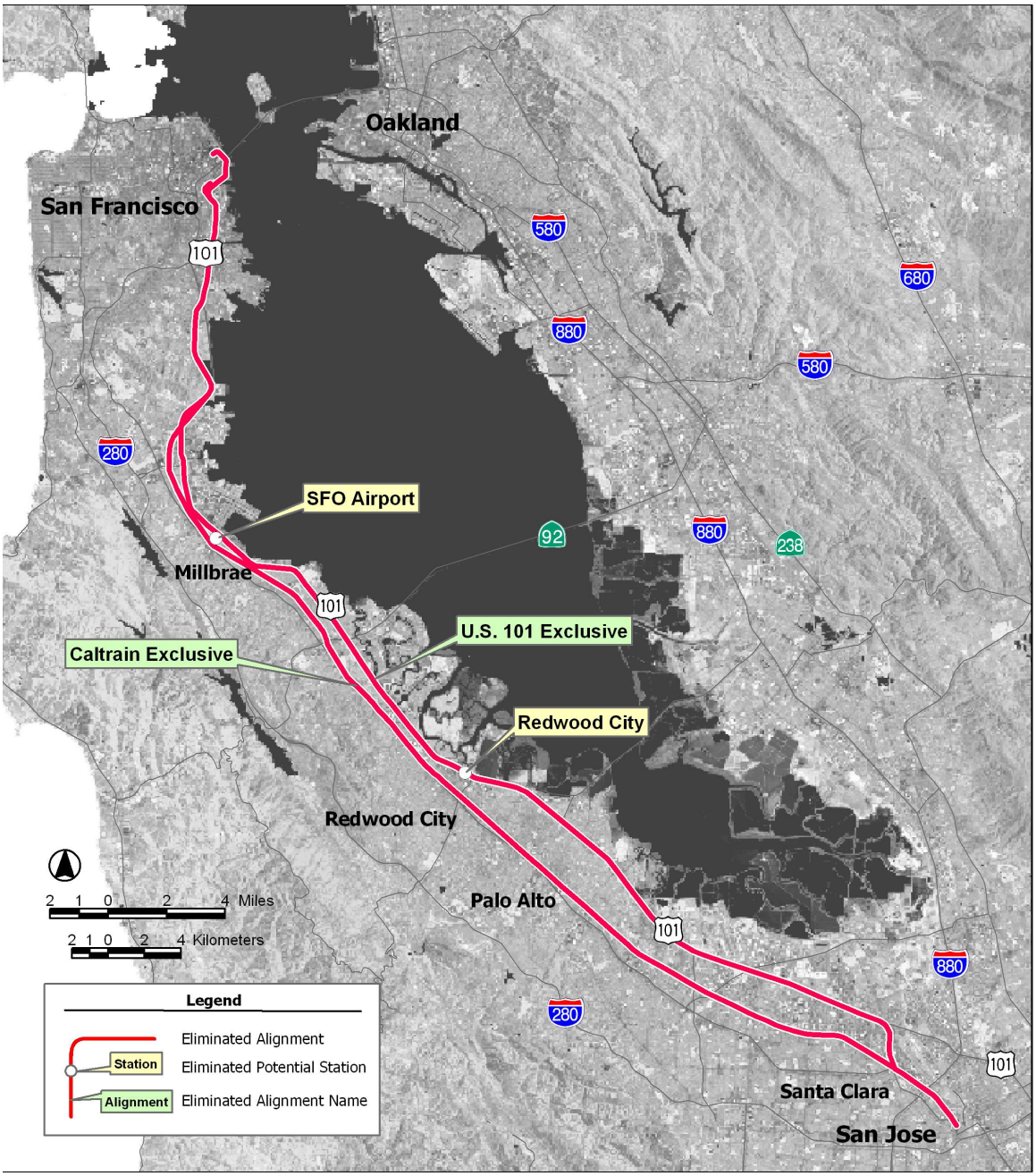
Alignment or Station	Reason for Elimination: Construction	Incompatibility	Right-of-Way	Connectivity / Accessibility	Revenue / Ridership	Alignment Eliminated*	Environment	Environmental Concerns
Caltrain/Morgan Hill/Foothill/Pacheco Pass Alignment	P	P		P			P	Visual, land use
Caltrain/Morgan Hill/East US-101/Pacheco Pass Alignment		P		P				
Station Locations								
Morgan Hill (Foothills)				P		P		
Morgan Hill (East of US-101)				P		P		
BART = San Francisco Bay Area Rapid Transit District.								
Definitions:								
Reason: Primary (P) and secondary (S) reasons for elimination.								
Construction: Engineering and construction complexity, initial and/or recurring costs that would render the project impracticable and logistical constraints.								
Environment: High potential for considerable impacts to natural resources, including waters, streams, floodplains, wetlands, and habitat of threatened or endangered species that would fail to meet project objectives.								
Incompatibility: Incompatibility with current or planned local land use as defined in local plans that would fail to meet project objectives.								
Right-of-Way: Lack of available rights-of-way or extensive right-of-way needs would result in high acquisition costs and/or delays that would render the project impracticable.								
Connectivity/Accessibility: Limited connectivity with other transportation modes (aviation, highway and/or transit systems) would impair the service quality, could reduce ridership of the HST system, and would fail to meet the project purpose.								
Ridership/Revenue: The alignment/station would result in longer trip times and/or have suboptimal operating characteristics and would have low ridership and revenue and would fail to meet the project purpose.								
Alignment Eliminated: Station or connection eliminated because the connecting alignment option was eliminated.								
* Alignment Eliminated column only applies to station locations. If an alignment is eliminated, a specific station location may no longer be necessary.								

San Francisco to San Jose: The alignment and station options eliminated from further consideration in this segment are illustrated in Figure 2.6-16 and described below.

- US-101 Alignment (Exclusive Guideway): From San Francisco (Transbay Terminal or 4th and King Terminal Station), this alignment would follow south along the US-101 freeway alignment to San Jose and be on an exclusive guideway in the US-101 corridor.

  This exclusive guideway alignment would have major construction issues involving the construction of an aerial guideway adjacent to and above an active existing freeway facility while maintaining freeway traffic. Limited right-of-way in this corridor would require the extensive purchase of additional right-of-way and nearly exclusive use of an aerial structure between San Francisco and San Jose. In San Francisco, major new tunnel construction would be required.

Figure 2.6-16
Eliminated Alignments San Francisco to San Jose



The US-101 alignment would require many sections of high-level structures to pass over existing overpasses and connector ramps, resulting in high construction costs and constructability issues that would make this option impracticable. This alignment would also require relocating and maintaining freeway access and capacity during construction. The aerial portions would introduce a major new visual element along the US-101 corridor that would have visual impacts (intrusion/shade/shadow) on the residential portions for this alignment. In addition, the freeway has substandard features (e.g., medians and shoulders) in many places, and it is assumed that any room that might be available for HST facilities likely would be used by Caltrans to upgrade the freeway in these areas. Construction of the tunnel in San Francisco from the Transbay Terminal site to 17th Street would be difficult because most of the tunnel would need to be constructed using compressed air techniques in very soft Bay-fill ground.

- Caltrain Corridor (Exclusive Guideway): From San Francisco (Transbay Terminal or 4th and King Terminal Station), this alignment would follow south along the Caltrain rail alignment to San Jose. This alignment would be on an exclusive guideway within the Caltrain corridor.

  An exclusive guideway alignment would be impracticable in this area because it would have major construction issues and high capital costs involving the construction of an aerial guideway adjacent to and above an active existing transportation facility, while maintaining rail traffic. It would require the extensive purchase of additional right-of-way and nearly exclusive use of an aerial structure between San Francisco and San Jose.

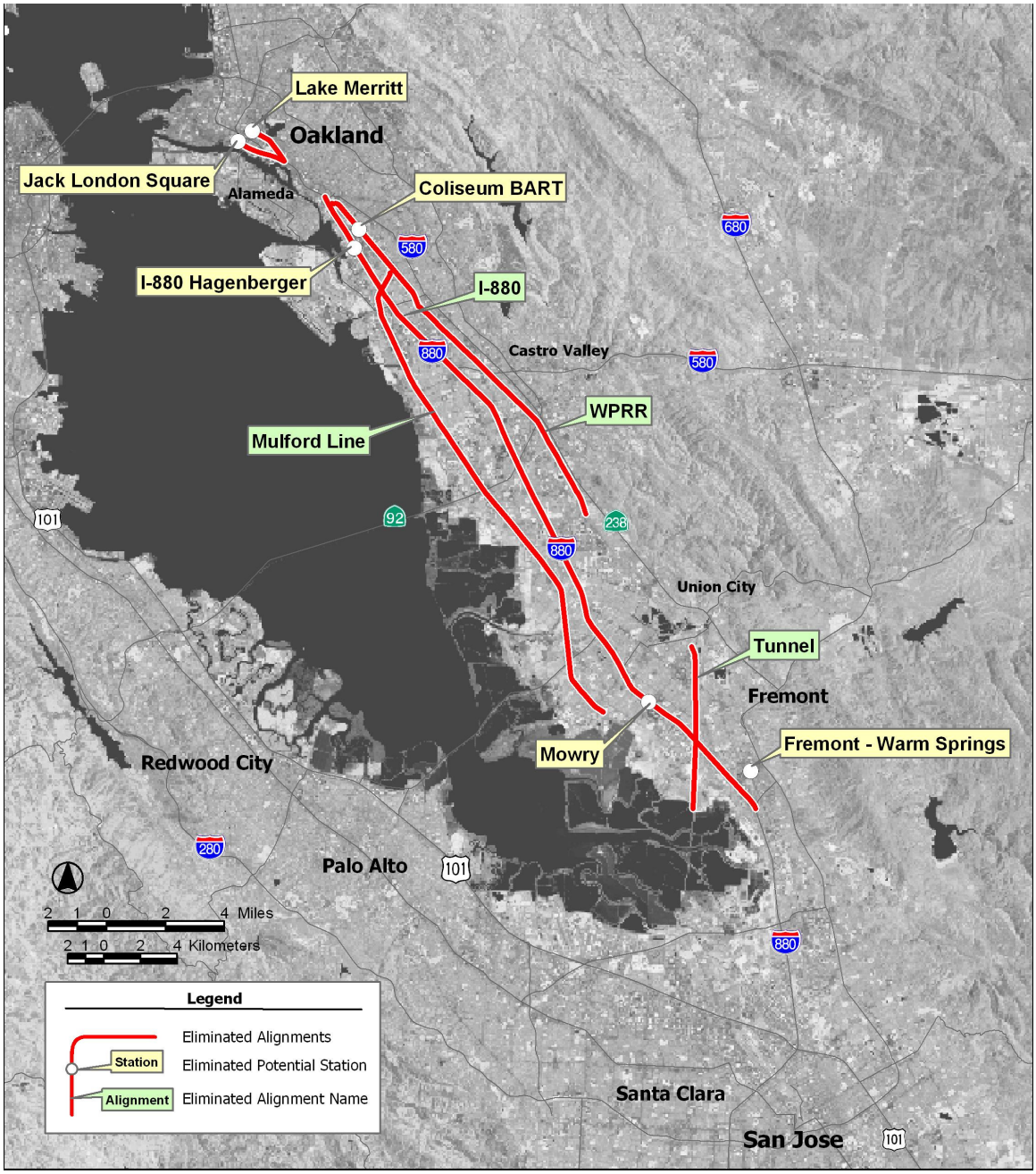
  The aerial portions of this alignment would introduce a new visual element along the Caltrain corridor that would have visual impacts (intrusion/shade/shadow) on the residential portions of this alignment. For the Caltrain exclusive guideway option, introduction of the elevated structure (for the high-speed tracks and stations) would also have adverse impacts on the suburban town centers along the Caltrain corridor (San Mateo, San Carlos, Redwood City, Menlo Park, Palo Alto, and Mountain View). Although the structure would generally be in a commercial area in these centers, it would represent a physical barrier for land use and urban design. Construction of the tunnel in San Francisco from the Transbay Terminal site to 17th Street would be particularly difficult because most of the tunnel would need to be constructed using compressed air techniques in very soft Bay-fill ground. Although the Caltrain exclusive guideway alignment would provide faster potential travel times than any of the other alignment options in this section, this alternative would have the most impacts on cultural resources and would be the least compatible with the existing and planned development on the Peninsula. Samtrans has formally commented that this alternative would not be compatible with its existing and planned Caltrain services and would not be feasible in its existing right-of-way.

Station Locations: The following station locations were considered and eliminated because they were located on alignments that were eliminated.

- Millbrae–San Francisco International Airport (US-101).
- Redwood City (US-101).

Oakland to San Jose: The alignment and station options eliminated from further consideration in this segment are illustrated in Figure 2.6-17 and described below.

Figure 2.6-17
Eliminated Alignments Oakland to San Jose



- Mulford Line: From Oakland, this alignment would follow south along Union Pacific Railroad's (UPRR's) entire Mulford Line.[13]

  Using the most northern portion of the Mulford Line would be impracticable, having high capital costs and construction issues, because it is an existing narrow rail line whose use would need to be expanded to accommodate a proposed HST system. It would create substantial environmental impacts and have considerable potential for effects on social and economic resources and minority populations while being the least compatible with existing and planned development. This alignment would require a portion of the UPRR corridor (that is generally 60 ft or 18.3 km wide) for aerial structure foundations and for an aerial easement over the tracks that would result in high visual impacts. In addition, a 50-ft (15.3-km) right-of-way strip would be needed from the residential, commercial, and light industrial areas to the east of the alignment.

- I-880: From Oakland, this alignment would follow I-880 south to San Jose.[14]

  The I-880 alignment would require acquisition of considerable right-of-way in the more northern area to be able to expand the highway sufficiently to allow for high-speed tracks in the median. The I-880 alignment would be mostly an aerial configuration requiring construction of footings within the highway right-of-way and lane closures during construction. This likely would require off-peak construction, which is time consuming and costly. Where the highway is narrow (Oakland to Fremont), adding high-speed rail would require full median widening and would present right-of-way issues similar to major highway reconstruction (demolition of existing adjacent property, new noise walls, demolition of existing noise walls, construction of new highway lanes, and maintenance of traffic). This alternative would have high capital costs and substantial right-of-way constraints, making it impracticable.

- Former Western Pacific Railroad (WPRR) Rail Line to Hayward Line to I-880 (WPRR alignment/Hayward/I-880): From Oakland, this alignment would follow the UPRR (former WPRR) rail line transition to UPRR's Hayward Line and then transition to I-880.

  This alignment option would be nearly entirely on an aerial structure that would create substantial visual impacts. The WPRR alignment would have considerable construction issues making it impracticable, including rearrangement of San Francisco Bay Area Rapid Transit District (BART) foundations to allow for the high-speed alignment to pass from one side of BART to the other. In contrast, a proposed alignment along the UPRR Hayward Line would be at grade and would follow the existing freight and commuter railroad.

- Former WPRR Rail Line through Niles Junction to Mulford Line (WPRR/Niles/Mulford alignment): From Oakland, this alignment would follow the former WPRR Rail Line onto the UPRR's Hayward Line, to UPRR's Niles Line, and then UPRR's Mulford Line.

  This alternative would be nearly entirely on an aerial structure that would create substantial visual impact. The WPRR alignment would have major construction issues making it impracticable, including rearrangement of BART foundations to allow for the high-speed alignment to pass from one side of BART to the other. In contrast, the proposed alignment along the UPRR Hayward Line would be at grade and would follow the existing freight and commuter railroad.

[13] Only the Oakland to Newark segment on the Mulford Line would be eliminated since the Newark to San Jose portion is part of the Hayward/Niles/Mulford option for further evaluation.

[14] Only the Oakland to Fremont segment of the I-880 option would be eliminated since the Fremont to San Jose portion is part of the Hayward/I-880 option carried forward for further evaluation.

- Hayward Line via tunnel to Mulford Line (Hayward/Tunnel/Mulford alignment): From Oakland, this alignment would follow south along UPRR's Hayward Line to a tunnel leading to UPRR's Mulford Line.

  The tunnel alternatives in Fremont have high projected costs, and the tunnel section would result in considerable right-of-way constraints, making this option impracticable. The purpose of a tunnel would be to improve travel times and eliminate tight curves. However, eliminating tight curves would result in tunnel alignments through the City of Fremont that do not follow under existing transportation rights-of-way. This alternative would not be compatible with the existing development and would have considerable seismic constraints.

- Former WPRR Rail Line via tunnel to Mulford Line (WPRR/Tunnel/Mulford alignment): From Oakland, this alignment would follow the former WPRR rail line, transitioning to UPRR's Hayward Line, then to a tunnel leading to UPRR's Mulford Line.

  The tunnel alternatives in Fremont have high projected costs, and the tunnel section would result in considerable right-of-way constraints making this option impracticable. The purpose of a tunnel would be to improve travel times and eliminate tight curves. However, eliminating tight curves would result in tunnel alignments through the City of Fremont that would not follow under existing transportation right-of-way. This alternative would not be compatible with the existing development and also has considerable seismic constraints.

Station Locations: The following station locations were considered and eliminated in the Oakland to San Jose section.

- Oakland Terminus Stations
  - Lake Merritt: The Lake Merritt Station would result in a high level of potential adverse effects in residential areas. Residential uses would be proximate to this potential station site, whereas land uses adjacent to the potential Jack London Square and the City Center station sites are more commercial in nature. The Lake Merritt Station and alignment would require construction of a tunnel or subway through the campus of Laney College adjacent to the BART alignment. The Lake Merritt alternative does not meet the program objectives since it would not be compatible with existing development, and would not provide sufficient connectivity and accessibility to serve the East Bay.
  - Jack London Square: The Jack London Square Station and alignment leading to and from it would be in bored tunnels in the bay mud underneath the Embarcadero and the active UPRR tracks. Relocating the railroad even temporarily is probably not an option. A cut-and-cover access would need to be constructed within the Amtrak parking lot and a concourse would need to be excavated over the bored tunnels. This station option would have the most considerable geologic challenges and soils constraints of the Oakland terminus alternatives. A terminus HST station at Jack London Square would be difficult to construct and would be the most costly alternative to serve Oakland. Although the Jack London Square location would serve a thriving commercial center and could provide a direct link to Amtrak, this terminus would not provide a connection with BART. This option is impracticable because of logistical constraints and would not meet program objectives because it would not connect with BART to provide accessibility and connectivity for the East Bay.
- Oakland Airport/Coliseum Stations
  - I-880 Hegenberger: This potential station site would only serve the I-880 (entire segment) alignment that has been eliminated from further investigation.