

## Chapter 2

### ***The Implementation Strategy: Blending, Phasing, Investing in Early Benefits***

The implementation strategy described in this chapter draws on successful international experience in building high-speed rail (HSR) systems and has been tailored to address the unique circumstances in California through collaboration with state, regional, local, and private transportation partners. It is a phased strategy with three key elements:

- **Blending** high speed with existing rail systems on shared infrastructure to accelerate and broaden benefits, improve efficiency, minimize community impacts, and reduce construction costs
- Making **early investments** in the “bookends,” or Bay Area and Los Angeles Basin regions, and north from the San Joaquin Valley, to upgrade existing services, increase regional connectivity, improve safety, build ridership, and lay the foundation for expansion of the high-speed rail system
- Delivering **early benefits** to Californians by using and leveraging investments as they are made

A system cornerstone will be its integration into the statewide transportation system. Proposition 1A recognized the importance of this connectivity, authorizing both \$9 billion in bond funds for HSR and \$950 million for complementary improvements in the state’s connecting rail systems. With connections at all new high-speed rail stations to existing regional and local transit systems, the HSR system will significantly enhance the passenger transportation network across the state, as shown in Exhibit 2-1. Existing intercity and regional/commuter systems will provide important feeder service to the HSR. Equally important, HSR also will bring new passengers to regional and local transit systems. Blended services linking statewide high-speed rail service with regional and local transit systems will benefit travelers in the near term and provide the platform for continued improvement in rail transportation. Connectivity and mobility will improve significantly across the state by expanding the network of interconnected public transportation systems and can be expedited through early investments in the regional systems.

#### **What does “blended” mean?**

The Revised 2012 Business Plan (Revised Plan) refers to *blended systems* and *blended operations*, which are the integration of high-speed trains with existing intercity and regional/commuter rail systems via coordinated infrastructure (the system) and scheduling, ticketing, and other means (operations).



*Proposition 1A authorized bond funds for HSR and improvements to existing rail systems.*

Exhibit 2-1. Early investments/statewide benefits



**Early Investments/Statewide Benefits**

- ◆ Begin construction of IOS HSR infrastructure
- ◆ Start Northern California unified service
- ◆ Invest in the “bookends”
- ◆ Advance early priority:
  - Close rail gap to LA Basin

The HSR will significantly enhance mobility across the state by expanding the network of inter-connected public transportation systems.

**Blended systems—infrastructure development**

California has rail systems that serve intercity, commuter, and regional trips throughout the state. A blended system would leverage these existing systems by tying them together with a HSR backbone through the Central Valley and connecting to the major metropolitan areas of Northern and Southern California. Integration of high-speed rail with these systems can serve two important functions. First, improvements to the intercity and regional/commuter rail systems will improve or facilitate connections and integration with the high-speed system. As such, they build rail ridership in corridors that will be served by high-speed rail. Second, in some cases, a blended approach means early construction of facilities that ultimately will be incorporated into the high-speed rail system, such as electrification of track that will be shared by high-speed and regional/commuter operations. Making improvements to these existing systems, such as eliminating at-grade crossings, electrification, advanced signal systems, and adding more passing tracks, will have independent utility that will benefit all of the state’s passengers prior to being connected to the high-speed system. Where possible, these improvements

should move ahead independently and as quickly as feasible to accelerate benefits to California travelers.



*Immediate benefits will be realized with improvements in the San Jose to San Francisco corridor system.*

### **Blended operations—services**

The blended system will allow rail operators to take advantage of new and improved infrastructure to enhance existing service, delivering benefits sooner. Blended operations will evolve over time, as new infrastructure is developed and will include the following components:

- Operating existing services over new high-speed rail infrastructure before high-speed revenue service is initiated
- Coordinating conventional rail services and connecting high-speed rail after high-speed rail service begins
- Emphasizing interoperability of high-speed and conventional rail on shared infrastructure



Visualization of Caltrain and high-speed trains sharing tracks on the existing four-track section at Brisbane

During each phase, the goal is to maximize and accelerate the benefits of investments in the most cost-effective manner and provide enhanced service to rail passengers across the state.

### **Creating a statewide system by leveraging state and local roles and resources**

Today, extensive rail systems with high ridership levels exist within California's metropolitan areas. Recognizing the role that enhanced regional mobility plays in growing local economies and improving quality of life, cities and counties are making unprecedented investments in their transit systems. In California's most populous counties, voters have approved a combined \$140 billion of investments in local transportation improvements. Los Angeles County, with its \$40 billion Measure R program, is in the midst of the largest transit expansion program in the country.

As these landmark *intra*-regional investments are being made, what is lacking is the *inter*-regional connection that will tie together the state's economic centers. The state's three intercity rail lines (Capitol Corridor, San Joaquin, and Surfliner) are among the five busiest in the country, indicating a strong underlying ridership base for high-speed rail. However, they do not provide direct connectivity between the north and south. Today, state-funded intercity service requires passengers to switch from train to bus service between Los Angeles and Bakersfield. Speed on this rail line is capped at 79 miles per hour (mph), and it averages just over 50 mph.<sup>1</sup> In spite of these limitations, the San Joaquin line is Amtrak's fifth busiest, with more than 1 million riders annually. This north-south gap is a major detriment to greater rail ridership and closing it will be an important element of a statewide rail system.

In approving Proposition 1A, voters gave the state tools to do two things:

- Provide the HSR connection between California's economic centers
- Enhance the regional/commuter rail systems that will tie into that HSR connection

This Revised Plan ties together these two goals and can help advance both simultaneously.

Of the \$950 million in Proposition 1A set aside to enhance regional rail systems, \$190 million is allocated to the state's three intercity rail lines (the Capitol Corridor, the San Joaquin, and the Pacific Surfliner lines) and \$760 million is allocated to local and regional/commuter rail systems. Proposition 1A gave approval authority over project selection to the California Transportation Commission (CTC).<sup>2</sup>

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**“2704.095.(a)(1) Net proceeds received from the sale of nine hundred fifty million dollars (\$950,000,000) principal amount of bonds authorized by this chapter shall be allocated to eligible recipients for capital improvements to intercity and commuter rail lines and urban rail systems that provide direct connectivity to the high-speed train system and its facilities, or that are part of the construction of the high-speed train system as that system is described in subdivision (b) of Section 2704.04, or that provide capacity enhancements and safety improvements.**

*AB 3034, Safe, Reliable High-Speed Passenger Train Bond Act for the 21st Century*

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The \$760 million for regional/commuter rail systems was allocated to 10 agencies based on existing state formula distributions. Because these 10 systems will connect directly with the high-speed system, it is imperative that the state and regional/local agencies work cooperatively to ensure those linkages are efficient and effective. The 10 agencies are as follows:

- Altamont Commuter Express (ACE)
- Los Angeles County Metropolitan Transportation Authority (LACMTA)
- North Coast Transit District, San Diego County (NCTD)
- Peninsula Corridor Joint Powers Board (Caltrain)
- Sacramento Regional Transit District (RT)
- San Diego Trolley, Inc.
- San Francisco Bay Area Rapid Transit District (BART)
- San Francisco Municipal Railway Transit System (MUNI)
- Santa Clara Valley Transportation Authority (VTA)
- Southern California Regional Rail Authority (Metrolink)

In February 2010, the CTC adopted guidelines for the program. Those guidelines state that, “the Commission will give priority to those projects that provide direct connectivity to the high-speed train system.”<sup>3</sup> A program of projects was identified and adopted by the CTC in May 2010. However, to date,

of the \$760 million, only \$45.5 million has been appropriated, specifically to advance important safety programs. Two governors have vetoed the appropriation of additional funding, each citing the lack of a coordinated plan for improvements as called for in Proposition 1A and the CTC guidelines. As part of the implementation strategy of early investment, the CTC has begun to work collaboratively with regional transportation agencies to reach agreement on a package of investments that will provide near-term local benefits and address previous concerns that resulted in vetoes. Success will allow regional agencies to put their shares of these funds to use for important projects—creating jobs, transportation improvements, and economic activity as the system progresses, as well as increasing the overall rail-system capacity to support high-speed rail.

A goal of this collaboration is to identify and move forward with a program of “early investments” in the regional/commuter rail systems. These investments will provide two levels of benefit: first, they will benefit the riders of those systems prior to being connected to the high-speed system. Second, as the high-speed system is developed and connects with these systems, they will provide the basis for enhanced blended operations. Some of the property or rail corridors involved in this network are owned by private parties or share operations by freight and passenger services, meaning that cooperative approaches will need to be further developed among public and private parties.

This Revised Plan builds on the foundation of Proposition 1A to lay out a framework for establishing the partnerships and coordination to create the statewide system that is needed. It recognizes that metropolitan areas have existing rights-of-way and rail service, as well as the transportation agencies that fund and provide those services. While those services and entities exist within the metropolitan areas, there is no comparable entity that connects them. The state is the appropriate entity to fill that void and provide the connection between Northern and Southern California. Under an overarching cooperative arrangement, the agencies within the metropolitan areas can take the lead in planning, initiating, providing, and improving the intra-regional services with improvements that have independent utility and will connect to the statewide high-speed service, and the state can take the lead in developing and implementing the inter-regional connection.

To ensure that such progress can be achieved, the Authority is working with state, regional, and local agencies and private parties to establish formal processes to achieve the following:

- Ensure that the initial high-speed rail capital investment in the Initial Operating Section (IOS) is immediately used by regional/commuter rail services to provide benefits to the public
- Identify and advance mutually beneficial investments that can proceed quickly using authorized Proposition 1A funding
- Identify additional sources of funding that can be agreed upon and put to use for early investments in improvements in the regional/local systems in anticipation of high-speed rail
- Develop operational procedures to ensure seamless integration of inter-regional and intra-regional transportation services, including coordinated schedules, ticketing, marketing, and other activities
- Identify potential opportunities for improving financial performance of the various services through improved coordination, potential leveraging of resources, joint purchases, and other steps

- Develop proposals for institutional arrangements that will facilitate cooperative actions among public and private rail operators, including freight
- Develop a cooperative and complementary agenda for jointly pursuing federal support
- Ensure that plans for improvements adequately assess and address the needs of both passenger and freight operations and take into account their respective needs, rights, and operating issues

## Regional early investment strategies

The Authority is working closely with Caltrans, regional/commuter rail agencies, and private rail operators to better define how high speed, conventional passenger, and freight rail can be integrated and leveraged effectively. Consistent with the long-term vision for high-speed rail, these cooperative efforts focus on the following:

- **Passengers**—Making improvements that benefit rail riders and make rail a better option for travelers now and in the future
- **Early benefits**—Optimizing new investments and other opportunities to accelerate improvements in passenger and freight operations
- **Improved coordination**—Working to reduce costs, avoid redundancies, and leverage resources

Early investment strategies for Southern California, the San Francisco Bay Area, and the Northern San Joaquin Valley are being led by regional agencies and have the common goal of accelerating investments in rail infrastructure and services in their regions, while also preparing for the eventual arrival of high-speed rail service in the future. The Authority is in the process of executing a series of Memoranda of Understanding (MOU) with each these three regions to formalize the process for the early investments. Below is a brief summary of the regional strategies currently under development.

### ***Southern California***

Early investments in Southern California in projects such as double tracking, crossing improvements, and grade separations, will accelerate benefits to the region in preparation for high-speed trains. Connections in Los Angeles County and the San Fernando Valley via Metrolink and Amtrak (Surfliner and other intercity rail routes) will allow passengers to continue their trip to destinations both east into the Inland Empire and south toward San Diego. Station enhancements to facilitate and improve these passenger connections also could be implemented, improving the overall passenger experience.

The LACMTA has been working on a strategic analysis of the Metrolink Antelope Valley commuter rail line that connects Los Angeles' Union Station with Palmdale. This work has progressed with the goal of providing additional capacity and faster travel times over this corridor and is the important first step in ensuring sufficient Metrolink commuter service to meet the needs of the HSR system as it reaches Palmdale as part of the IOS. LACMTA will be advancing analysis of this line for additional operations that would provide shorter run times as well as additional capacity for the line. In addition to this analysis, LACMTA is studying a possible Metrolink station located at Bob Hope (Burbank) Airport on this

line. Coupled with a high-speed train station at this location, this station will provide additional connectivity options for the HSR system and Metrolink.

The Southern California Transportation Authorities have approved a MOU that would address early investment procedures with a goal of having projects in place by 2020 and are identifying specific projects. The following agencies are parties to the MOU and will be working with the Authority to implement a program of improvements:

- Southern California Association of Governments (SCAG)
- Southern California Regional Rail Authority (Metrolink)
- Los Angeles County Metropolitan Transportation Authority (LACMTA)
- San Diego Association of Governments (SANDAG)
- Riverside County Transportation Commission (RCTC)
- San Bernardino Association of Governments (SANBAG)
- California High-Speed Rail Authority (CHSRA/Authority)

### ***The Bay Area***

As the transportation planning, coordinating, and financing agency for the nine-county San Francisco Bay Area, the Metropolitan Transportation Commission (MTC) is taking the lead in defining early investments for the region. MTC is collaborating with Caltrain and the City of San Francisco on developing a phased investment strategy that will allow for Caltrain service between San Jose and San Francisco to develop into a HSR-ready railroad capable of allowing HSR passengers to travel from Los Angeles to San Francisco with a one-seat ride (see the discussion on Phase 1 Blended Operations later in this chapter). As with Southern California, Caltrain's objective is that this early investment in the Caltrain corridor be completed before 2020, and the agency continues to move forward with a collaborative planning process to better define specific improvements in the corridor that would best meet the traveling public's needs while also being sensitive to community concerns about potential impacts.

Over the next several months, Caltrain, in consultation with the Authority, will work with communities on the San Francisco Peninsula to further define the blended system, focusing on the following three efforts:

- Defining a planning process for developing a vision/project for the corridor. While the early investments will focus on implementing an advanced signal system, electrification of the corridor and necessary infrastructure upgrades, Caltrain will continue to work with its cities and communities to define additional infrastructure improvements needed to support blended Caltrain/high-speed rail operations and to bring high-speed rail to Downtown San Jose and San Francisco
- Conducting additional service plan/operational analysis to supplement the blended operations capacity analysis
- Conducting a grade-crossing and traffic analysis to identify needed crossing upgrades to support blended operations

### **Northern San Joaquin Valley**

The California Department of Transportation (Caltrans) is working with the San Joaquin Regional Rail Commission (SJRRRC) and others to identify early investments for connecting regional rail service to the first segment of the IOS using the San Joaquin intercity service and Altamont Commuter Express (ACE) service. Service improvements are being planned in the Northern San Joaquin Valley and the East Bay Area to improve and enhance existing commuter and intercity services to create much needed mobility in the Central Valley and improve access to metropolitan areas. Together the SJRRRC, the Caltrans Division of Rail, the Capitol Corridor Joint Powers Authority, and Sacramento Regional Transit have developed a Northern California Unified Service Concept, as shown on Exhibit 2-1. Unified Service would use the first IOS segment in the interim period until the initiation of full high-speed service. This concept would include speeds on the first IOS segment of 125 mph (compared to a maximum of 79 mph and an average of 50 mph on the existing line) and improved sections of existing rail up to 90 mph to significantly speed up rail travel from Bakersfield to Sacramento, Oakland, and San Jose. Once high-speed rail becomes operational, the improved network becomes a critical feeder service to the high-speed rail system.

The Unified Services group is finalizing an MOU, to which the Authority will be a party, that includes a list of early investments such as grade-crossing improvements, grade separations, double-tracking, curve realignments, and positive train control that will improve existing rail operating speeds and safety and allow for substantial increases in frequency by the 2018 operations on the first IOS section. This partnership will immediately benefit the traveling public while preparing the region for eventual HSR service.

### **Phased implementation**

As discussed elsewhere in this Revised Plan, the HSR program will depend on a mix of public and private investment, the latter becoming available after the fundamental economics of the program are demonstrated. A phased approach to system development is the prudent course to build a foundation that allows for greater efficiency in the use of private investment once the initial segments of the system are in place. Chapter 4, Business Model, addresses the role of the private sector in delivering the high-speed program over time and outlines strategies for effectively engaging the private sector.

This approach also recognizes current budgetary and funding realities. Among other things, the phased approach will help ensure the system's success by introducing Californians to HSR service and building ridership over time. At the same time, improvements can be made to regional systems that connect with HSR, resulting in the conventional and high-speed systems complementing each other.

The goals of Proposition 1A were used to develop the phasing strategy for the statewide HSR system and were guided by the following key principles:

- Divide the statewide high-speed rail *program* into a series of smaller, discrete *projects* that can stand alone, will provide viable revenue service, can be matched to available funding, and can be delivered through appropriate business models

- Advance sections as soon as feasible to realize early benefits, especially employment, and to minimize inflation impact
- Leverage existing rail systems and infrastructure, including connecting rail and bus services
- Forge a long-term partnership with the federal government for program delivery
- Develop partnerships with other transportation operators to identify efficiencies through leveraging state, regional, local, and capital program investments and maximizing connectivity between systems
- Seek earliest feasible and best value private-sector participation and financing with appropriate risk transfer and cost containment
- Mitigate against the risk of funding delays by providing decision points for state policy-makers to determine how and when the next steps should proceed while leaving a fully operational system and generating economic benefits at each step

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**“Under our cooperation agreement which has been in place since 2003, we have been pleased to be able to provide the California High Speed Rail Authority with information regarding development of the Spanish HSR system, and to discuss with you and your team various issues related to the development of the system in California. There are numerous parallels between Spain and California with regard to HSR, including the distance between key cities and the potential for significant mode shift from air to train travel for those cities. We believe the phased approach to building the system makes sense; in fact, it is very consistent with how the system has been developed here in Spain.**

*Ministry of Public Works/Spanish Government*

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The Authority applied these principles, taking into account key factors discussed in subsequent chapters such as cost, funding scenarios, and ridership and revenue projections, to develop an implementation strategy with the following key steps:

- **Step 1—Early Investments, Statewide Benefits.** The first construction of dedicated high-speed infrastructure for the IOS begins in the Central Valley. As with all of the steps, this initial section is being developed to deliver early benefits by leveraging other systems—enabling them to operate on the new high-speed tracks, which can be done without impacts on design or the integrity of the new infrastructure. Improved passenger rail service would begin upon completion of the first IOS segment by connecting the San Joaquins, ACE, Sacramento Regional Transit, the Capitol Corridor (and potentially Caltrain). Through a new, strategic approach, there is also the opportunity for new or improved travel between Bakersfield and Sacramento, Oakland, San Jose, and San Francisco. This expanded Northern California Unified Service could begin operation as early as 2018, with the

potential to provide transportation and economic benefits well before fully operational high-speed rail service is initiated.

As part of this first step, complementary investments and improvements will be made to both accelerate benefits and distribute them more widely across the state. These investments will be made using the \$950 million in Proposition 1A connectivity funding, available Proposition 1A high-speed rail funds, future federal funds, and other sources, and will include the following:

- Investment in the bookends: In Northern California, the long-awaited electrification of the Caltrain corridor will begin under a collaborative program between Bay Area agencies and the Authority. In addition, consistent with the Southern California MOU, investments will be made in key rail corridors in the southern part of the state, such as upgrading the Metrolink corridor from Los Angeles to Palmdale.
  - The Northern California Unified Service described above will be initiated.
  - As the next step in the IOS, work to close the rail gap between Bakersfield and Palmdale through the Tehachapi Mountains will begin. Environmental clearance is possible in early 2014, and plans are being developed to move quickly to implement the improvements to close this critical gap and create the first statewide rail link between the Bay Area and the Los Angeles Basin.
- **Step 2—Initial High-Speed Rail Operations.** Introduction of the state’s (and the nation’s) first fully operational high-speed rail service will begin. This service can be operated by a private entity without subsidy, will have the potential to attract private investment to expand the system from Bay to Basin, and can be completed within a decade. The service will be blended with regional/local systems. The IOS is achieved through expansion of the first construction segment into an electrified operating high-speed rail line from Merced to Palmdale and the San Fernando Valley, accessing the populous Los Angeles Basin. Following on the work discussed above, the next priority in implementing the IOS will be closing the rail gap between Northern and Southern California by crossing the Tehachapi Mountains with new, dedicated high-speed rail infrastructure. Prior to completion of the IOS to the San Fernando Valley, this link will tie the north to the south at Palmdale, where Metrolink commuter rail service can then provide service and connections throughout Southern California.

Currently, the IOS is defined as extending from Merced to the San Fernando Valley, and high-speed revenue service would only start once the full IOS is built and operable. Should ridership and revenue forecasts and financial projections demonstrate that revenue service compliant with Proposition 1A could begin earlier, with a shorter IOS, appropriate reviews would occur to consider and implement earlier service, if appropriate.

- **Step 3—The Bay to Basin System.** The dedicated high-speed rail infrastructure of the IOS will be expanded north and west to San Jose, providing HSR service between the state’s major population centers in the north and south and providing the platform for the transition to statewide blended operations. At this stage, passengers will be able to take a one-seat ride between greater Los Angeles (San Fernando Station) and the San Francisco Transbay Transit Center using blended infrastructure in the north between San Francisco and San Jose (assuming electrification of the

Caltrain corridor by 2020 as proposed by Caltrain), using dedicated high-speed rail infrastructure between San Jose and the San Fernando Station, and, in the south, connecting via Metrolink between the San Fernando Valley Station and Los Angeles' Union Station and on to other points throughout Southern California.

- **Step 4—The Phase 1 System.** For the blended approach, the dedicated high-speed rail infrastructure of the Bay-to-Basin system will be extended from the San Fernando Valley to Los Angeles Union Station, linking to a significantly upgraded passenger rail corridor developed to maximize service between Los Angeles and Anaheim while also addressing community concerns about new infrastructure impacts in a congested urban corridor that includes a number of established communities that abut the existing right-of-way. Under a Full Build scenario, dedicated high-speed rail infrastructure would be extended from San Jose to San Francisco's Transbay Transit Center and from Los Angeles to Anaheim.
- **Step 5—The Phase 2 System.** Phase 2 will extend the high-speed rail system to Sacramento and San Diego, representing completion of the 800-mile statewide system. Travelers will be able to travel among all of the state's major population centers on high-speed rail. Phase 2 areas will see improvements in rail service well in advance of the expansion of the high-speed rail system through the combination of early investments and blended operations, as described in this Revised Plan.

### ***Step 1: Early investments, statewide benefits***

Assuming approval of a state appropriations request to use Proposition 1A bond proceeds to match federal funds, HSR construction can begin within a year. This first construction segment will cover up to 130 miles of new high-speed rail alignment from just north of Bakersfield to north of Fresno. Because this segment has a set budget tied to the award of federal funds to date, the actual length will depend on what alignment is selected through the pending environmental process and on prices received with the procurement of design-build contracts beginning in 2012. Funded in significant part by the American Recovery and Reinvestment Act of 2009 (ARRA) as part of the program to promote economic recovery, construction of the IOS will bring much needed employment to the Central Valley—approximately 100,000 job-years of employment will be created during the construction period.<sup>4</sup>

The ARRA funding comes with three important requirements:

- First, because the legislative intent was to stimulate the economy, the ARRA funding sunsets on September 30, 2017, and therefore must be fully expended by that date.
- Second, any project funded with ARRA funds must have “operational independence.”
- Third, funding is limited to “rail passenger transportation except commuter rail passenger transportation.”<sup>5</sup>

Federal funding requirements for the nation's high-speed rail program were established by two related pieces of legislation: the Passenger Rail Investment and Improvement Act of 2008, which created the High-Speed and Intercity Passenger Rail Program; and ARRA. The Consolidated Appropriations Act of 2010 provided additional funding for the IOS—First Construction section. These federal funds require state matching funds. These are to come from California Proposition 1A bond proceeds.



*Placing a priority on “Closing the Gap” through the Tehachapi Mountains brings high-speed rail service to the Los Angeles Basin within the decade.*

The Authority submitted funding applications for four sections:

- San Francisco–San Jose
- Los Angeles–Anaheim
- Merced–Fresno
- Fresno–Bakersfield

These sections were initially prequalified for funding. To ensure that all criteria were met, as well as conditions in Proposition 1A, the Authority, in unison with the Federal Railroad Administration, decided to use the ARRA funds to start construction in the Central Valley. Work on the first IOS segment using ARRA funds can be completed by 2017; operational independence can be achieved by allowing intercity rail service to use the line; and this section will be the first high-speed, intercity section in the state.

In addition to meeting the federal funding criteria, beginning construction in the Central Valley is an important first step for the HSR system. The “spine” of the statewide high-speed rail system will be created, which can then be extended north and south, creating the first true high-speed rail system in the nation. Starting construction in the Central Valley is a cost-effective way to use initial funding. As detailed in Chapter 3, Capital Costs, the per-mile cost of building this section is significantly lower than the cost per mile of construction in developed and densely populated metropolitan areas. Moving ahead in the Central Valley, which is the fastest-growing area of the state, will allow the acquisition of necessary right-of-way before more development occurs, thus avoiding further increases in land costs or re-routing to avoid impacts on newly established residential areas. The state will own this right of way—an asset of more than \$400 million that will increase in value over time.

The first IOS segment will be built using a design-build approach under which the private sector will assume responsibility for completion of design and construction. This will allow the state to transfer significant design, construction, schedule, and cost risks to the private sector and obtain the benefits of the current highly competitive bidding market. Furthermore, construction in the Central Valley is relatively straightforward from a construction standpoint compared to construction in dense urban areas. This allows local contractors to become familiar with the new requirements related to construction of high-speed infrastructure, which should translate into efficiencies in later stages. It also will enable small and disadvantaged businesses to begin developing valuable experience that will help position them to be involved in future extensions to the system.

The segment will become operational by allowing Caltrans to operate expanded San Joaquin service between Bakersfield and Merced on the first IOS section. To achieve this, track connections would be built to connect to the BNSF Railway line at the northern and southern ends of the first constructed segment. Relatively minor investments would be made in rail systems (signaling, positive train control) and other investments to augment the base infrastructure so that the San Joaquin service can operate on it. Combined with improvements described earlier, this would allow trains to travel at speeds up to 125 mph or more in the Central Valley, which would reduce travel times on the San Joaquin service between Northern and Southern California—already one of Amtrak’s five busiest corridors in the country—by at least 45 minutes and likely well over one hour.

Planning for early interim service on the IOS segment is already underway, with the goal of commencing Amtrak operations as soon as possible after construction is complete in 2017. The Authority is already collaborating with its transportation partners to identify and address the technical and policy issues that would be associated with developing early service. Through this process, agreements will be worked out on a range of issues, including how and where the service would operate, how it would be integrated with other systems, and how to transition to revenue HSR service as the IOS is completed.

## **Step 2: Initial high-speed rail operations**

This stage marks the introduction of world-class high-speed rail to the United States. The rail line will be electrified, necessary safety and signaling systems will be put into place, rail cars will be procured, and revenue service through a private operator will begin. As discussed in detail in Chapter 7, Financial Analysis and Funding, under the three different revenue and operating and maintenance cost scenarios analyzed, there is positive net cash flow from the first year of operation of the IOS.

Completion of the IOS is a pivotal step in the development of the statewide system, providing a high-speed rail link between the Los Angeles Basin and the fastest-growing part of California, the Central Valley. With a population approaching 7 million, the Central Valley is larger than 38 states and comprises close to 20 percent of California's population. Over the last 10 years, the Central Valley has been the fastest growing region in the state, with its population increasing by 17 percent, compared to 10 percent statewide. The counties in the region have been some of the fastest growing counties in the state over the last decade.

This growth is predicted to continue. Moody's Analytics, which develops population and other forecasts, predicts that by 2040, the Central Valley will approach 10 million residents while most of its counties will continue to grow faster than the rest of the state. The cities of Fresno and Bakersfield today have populations of 500,000 and 350,000, or roughly 60 percent and 45 percent of the population of San Francisco respectively. In fact, only Los Angeles, San Diego, San Jose, and San Francisco are larger than Fresno.

As detailed in Chapter 5, Ridership and Revenue, the IOS is able to support operations without a subsidy and, with the revenues from ridership, has the potential to begin attracting private investment to expand the system further. On its own, the IOS is a viable, profitable high-speed rail system. Of equal importance, an IOS becomes the basis for expansion of the system statewide. This creates the foundation for an unprecedented integrated statewide system that will provide inter-regional and intra-regional benefits, as envisioned in Proposition 1A, which authorized both \$9 billion for the high-speed rail system and \$950 million for connecting rail programs.

A decision about which direction to expand following the first construction segment—either north to San Jose or south to the Los Angeles Basin, is based on a number of factors, including the following:

- Ridership and revenue generation
- Capital and operating costs

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**“Operating the San Joaquin trains over this new route at higher speeds on an interim basis while other segments of your proposed system are developed to allow for full high-speed train service would benefit the public and our riders by greatly improving travel times, reliability, and passenger comfort... we will work closely with your agency and the Caltrans Division of Rail to address any details that will need to be discussed.**

*Letter from Amtrak to High Speed Rail Authority, October 2010*

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- Funding availability
- Public and stakeholder input
- Environmental approvals
- Level and type of potential private-sector investment
- Connectivity with regional rail systems
- Complementary investments/statewide system benefits
- Policy considerations

Based on these factors, this Revised Plan assumes that the next step in constructing dedicated high-speed rail infrastructure will be to complete the southern link to the Los Angeles Basin after the first IOS section is construction to close the rail gap between Northern and Southern California. Should this extension be prevented for a significant time as a result of environmental or other delays, the Authority could proceed with extending the system north to San Jose. This route, the “IOS-North,” was described in detail in the Draft 2012 Business Plan (Draft Plan), which was completed in November 2011 and is available at [www.cahighspeedrail.ca.gov/Business\\_Plan\\_reports.aspx](http://www.cahighspeedrail.ca.gov/Business_Plan_reports.aspx).

The 300-mile IOS, shown on Exhibit 2-2, will extend from Merced south through Bakersfield and Palmdale to the San Fernando Valley. Importantly, it will close the existing gap in passenger rail service between Northern and Southern California with new dedicated high-speed rail infrastructure. Through a connection to the San Joaquin service at Merced, it will allow passengers from the Sacramento region to travel on high-speed rail to greater Los Angeles with a single transfer, cutting travel time from what is now almost eight hours to just over five hours. Currently, that trip on Amtrak is made with a bus connection between Bakersfield and Los Angeles.



*Seamless travel will be possible with HSR connecting to Metrolink and additional destinations.*

Within the IOS, the first priority is to close the rail gap between Bakersfield and Palmdale. Approximately \$4 billion in Proposition 1A funds are identified for this priority, and obtaining the necessary matching funding will be the top financial priority for the Authority. Elimination of this gap will create an unprecedented connection between the state’s intercity rail service and the Metrolink commuter system.

Implementation of the IOS makes blended operations in the Los Angeles Basin possible, improving travel between the Basin, the Central Valley, and other parts of the state. Arrivals and departures of high-speed trains can be timed to provide efficient transfers to regional and local services as seamlessly as possible without requiring the purchase of a new fare. Passengers arriving from the north could exit the HSR train, walk a few steps across a platform, and transfer to Metrolink trains or other connecting transit services to take them to their local or regional destinations. Early investments in grade crossings and other improvements will accelerate benefits, and implementation of positive train control safety systems will safely allow higher speeds.

### **High-speed rail and freight operations**

While the United States lags behind other nations in the development of high-speed passenger rail, America's freight rail system is the envy of the world. The freight rail infrastructure is an interconnected network of privately owned track and signaling systems, which provides for the safe and efficient movement of goods. Aspirations for improved inter-city passenger rail have depended, in all but a few cases, on access to privately owned railways and the integration of such service with private freight operations. To ensure the safety of these combined operations, federal regulations limit the speeds of passenger trains on mixed routes.

Freight railroads have accommodated passenger rail service to a high degree, but the construction of a dedicated high-speed rail system in California will provide an important additional benefit in ultimately transferring key passenger operations off existing rail lines, thus increasing the capacity and efficiency of freight operations and enhancing safety.

Over the long term, the vitality of freight operations is itself critical to California's economy, particularly in providing efficient connections to and from California's ports. The ports, an indispensable element of California's economy, face growing competition from port operations in other states. High-speed rail can contribute to improved goods movement by freeing not only highways but also freight rail lines of some passenger traffic.

It is important to note that high-speed, electrified train service is the only effective means to close this Bakersfield-to-Palmdale passenger rail gap. Today, there is a single freight line, owned and operated by the Union Pacific Railroad that provides a vital freight connection between the Los Angeles Basin (and the Ports of Los Angeles/Long Beach) with the Central Valley. Since diesel-powered locomotives are limited to no more than approximately 2-percent grades to ascend the mountains, the routing is circuitous and speeds are modest. These limitations have no great effect overall on freight movement through that corridor but would be unacceptable for passenger service. Electrified trains can efficiently ascend greater gradients and maintain higher speeds climbing and descending the Tehachapi Mountains. Thus, the only effective means to bring intercity passenger rail service across the mountains that separate Los Angeles from the Central Valley is with an electrified high-speed rail line, which will be the IOS.

**Exhibit 2-2. Initial Operating Section**



- IOS—High Speed Rail**
- ◆ Extend HSR to Merced and San Fernando Valley
  - ◆ Start HSR service
  - ◆ Start blended service
    - Northern California unified service
    - Metrolink corridor
  - ◆ Continue investment in “bookends”

The IOS will connect with transit options allowing passengers to reach a wide range of regional destinations.

The train will serve the following locations and make the following transit connections:

- Merced (The Bus)
- Fresno (FAX)
- Kings/Tulare (KART/TCAT)
- Bakersfield (GET Bus, Kern Regional Transit)
- Palmdale (Antelope Valley Transit Authority-AVTA, City of Santa Clarita Transit)
- San Fernando Valley (LACMTA, Santa Clarita Transit)

In addition to local transit, a range of connecting regional rail and bus services to the new high-speed rail service will include connections in Palmdale and the San Fernando Valley to Metrolink and potential “thruway” bus services that will allow passengers to continue their trip to destinations throughout the region.



*Completion of the IOS will cut travel time from the Sacramento region to Los Angeles' Union Station by three hours.*

### ***Step 3: The Bay to Basin system***

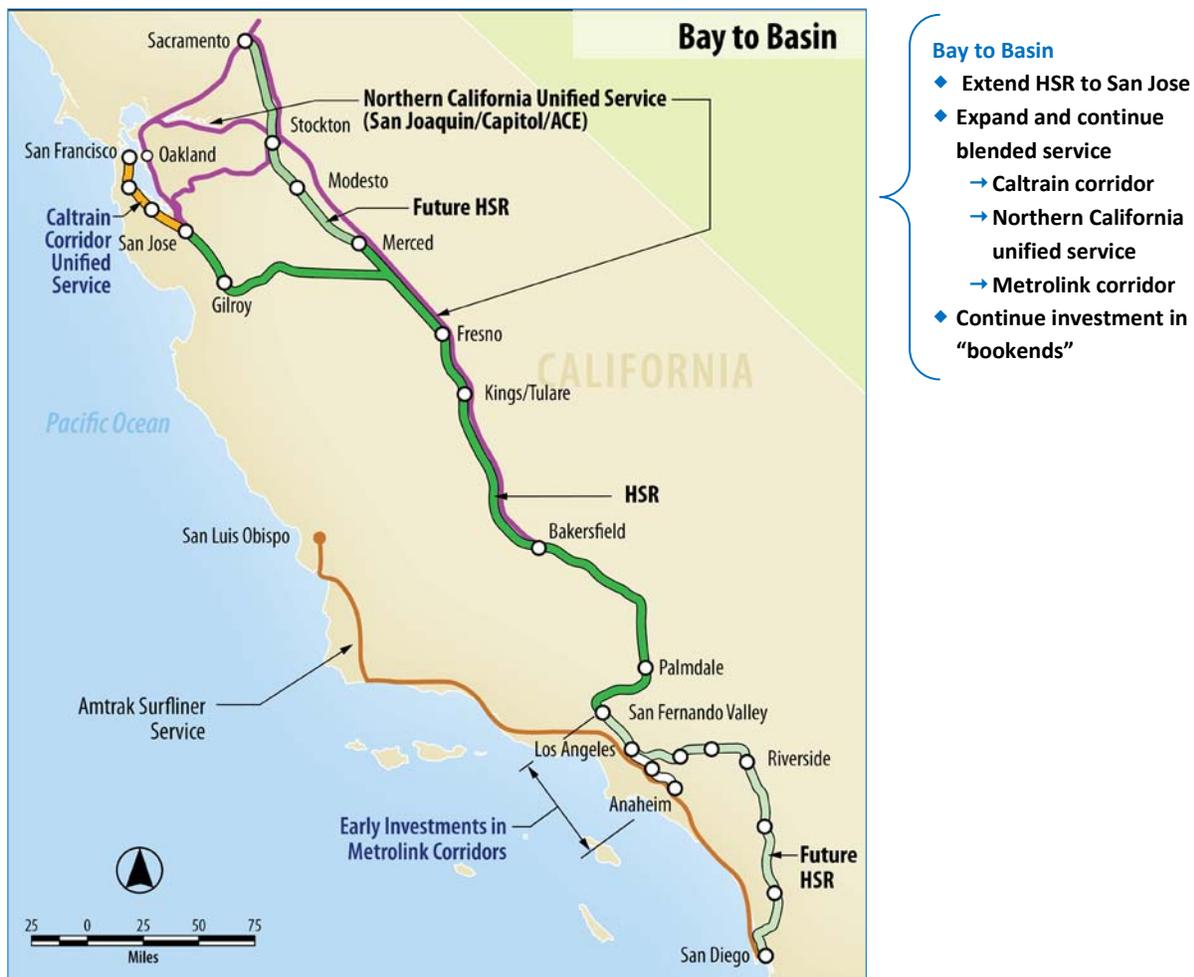
Step 3 connects California's two megaregions. The 410-mile Bay-to-Basin system will integrate directly with commuter rail services serving San Jose and the San Fernando Valley, providing the basis for blended systems and eventually blended operations in both metropolitan regions (Exhibit 2-3). Bay to Basin will achieve the following:

- **Connect for the first time the state's two megaregions with world-class high-speed rail service.** The success of Bay to Basin will be underpinned by connecting urban rail and bus services, and the ability to transfer to and from automobiles at key terminal and intermediate stations. The station at San Jose will be a key interchange with existing transit services on the San Francisco Peninsula. Caltrain, operated by the Peninsula Corridor Joint Powers Board, provides direct connections to key peninsula stations and Downtown San Francisco. A BART extension to San Jose will enhance access to Oakland and the East Bay area. At Merced, the HSR will provide an interchange with the Northern California Unified Service to all of the major metropolitan areas. Throughout the Central Valley, connecting bus services will continue to serve a wide range of destinations, creating greater access and mobility for residents and business owners currently severely underserved by other transportation modes. The southern station for this step in the San Fernando Valley will provide a direct connection to an existing and extensive Metrolink rail system, which provides service to the entire Southern California Basin, including to Union Station in Los Angeles and to the Anaheim Regional Transportation Intermodal Center in Anaheim.
- **Link with commuter and intercity rail systems on both ends,** making blended operations with local and regional rail systems possible. This will expand the reach of the high-speed rail system, making it more attractive to potential riders throughout the Bay Area and Southern California. In addition to their own capital programs, these systems will see ongoing improvements through federal investments in those corridors. Cooperative planning and implementation between state and

regional agencies will result in improved connections, more reliable service, and reduced travel times for travelers going beyond the Bay-to-Basin system.

- **Provide cost-effective service** that can be operated by a private party with no subsidy from the state.
- **Accelerate travelers’ benefits in some Phase 2 areas** by linking those areas with high-speed service through intercity or commuter rail services. For example, travelers from Sacramento or Oakland would be able to connect to high-speed service by using the San Joaquins and ACE to Merced and San Jose. Travelers in San Diego would have easy access to points north of Los Angeles by taking rail along the Los Angeles–San Diego corridor to northern Los Angeles County.

Exhibit 2-3. Bay to Basin/Blended



The Bay-to-Basin system will connect the San Francisco Bay and Los Angeles metropolitan areas, along with the state’s fastest growing region—the Central Valley—with world-class high-speed rail service.

**Step 4: The Phase 1 system**

Completion of the Bay-to-Basin system moves closer to a Phase 1 connection between San Francisco and Los Angeles/Anaheim. This 520-mile route would be completed through a coordinated “blended operation” that uses the infrastructure investments made to create upgraded “high-speed rail ready” commuter rail corridors and systems. These investments will allow high-speed trains to make a complete journey from San Francisco to Los Angeles and Anaheim by operating on the upgraded corridors between San Jose and San Francisco in the north and between Los Angeles and Anaheim in the south.



*Artist's rendering of the Transbay Transit Center, the northern terminus for California High-Speed Rail*

**The coordinated blended operation**

Similar to systems in Europe, it is anticipated that connecting service to the IOS, and to the subsequent Bay-to-Basin high-speed rail service, will be provided by partially sharing existing commuter rail infrastructure and facilities. This will result in a full rail connection from San Francisco to Los Angeles, offering passengers a “one-seat-ride” from end to end. In the Bay Area, the high-speed rail trains will use upgraded existing Caltrain infrastructure between San Jose and San Francisco. In the Los Angeles Basin, Metrolink infrastructure will provide the connection for high-speed trains between Anaheim/Los Angeles and the Central Valley. This infrastructure will require some upgrades to accommodate high-speed operations and added capacity with speeds through urban areas of up to 125 mph. However, such improvements likely can be accomplished while staying substantially within the existing rights-of-way, resulting in substantially reduced impacts to communities along the corridor. On the San Francisco to San Jose section, Caltrain is taking a leadership role to define the rail corridor based on the needs and desires of the project’s stakeholders.

Based on the Caltrain planning process and the Southern California Passenger Rail Planning Coalition’s efforts in the Los Angeles region, initial environmental reviews can focus primarily on the impacts of limited upgrades to the existing facilities, thus avoiding the mitigation requirements associated with an

expanded dedicated high-speed rail system. Sharing existing commuter rail facilities in urban areas will not only materially reduce the environmental impacts of the planned full system, but will result in substantial cost savings as well.

#### **Blended operations from San Jose to San Francisco**

The proposed blended system for the San Francisco Peninsula is primarily a two-track system that will be shared by Caltrain, high-speed rail service, and current rail tenants. Initial investigations show that blended operations as currently envisioned for the corridor are cost-effective solutions on both a capital and operating basis.

The key improvements needed to support the blended system are Caltrain's advanced signal system, electrification, and infrastructure upgrades, and are intended to be made as part of the early investment strategy. Planning and implementation of this electrification will be coordinated between the Authority and Caltrain to ensure full integration with the statewide system. Additional improvements necessary for blended operations are currently being identified by Caltrain through a planning process with local stakeholders.

Sharing the existing commuter rail facilities will significantly reduce community impacts and result in substantial cost savings as compared to the dedicated, four-track system analyzed in the first-tier, Bay Area to Central Valley Program Environmental Impact Report (EIR). A blended system will require further environmental analysis in the form of a project-level EIR prior to implementation. Any expansion in the corridor to add additional capacity, accommodate dedicated tracks, significant structure or tunnel work, and additional right-of-way beyond what is defined in the blended system would have to be revisited through one or more additional, future second-tier environmental reviews.

The revised *Bay Area to Central Valley Program EIR* was certified on September 2, 2010, well before the San Jose to San Francisco blended approach was proposed. In response to the proposal for a blended system, the Authority's Board of Directors suspended further substantive work on the San Francisco–San Jose project-level EIR in order to understand and consider the blended approach and determine what should be studied in the project-level EIR. Litigation challenging the Revised Program EIR also has proceeded, resulting in a court ruling requiring the Authority to rescind its September 2, 2010, routing decision and conduct additional analysis per the California Environmental Quality Act prior to making a new first-tier decision regarding the route into the Bay Area. The Authority has proceeded with corrections to the Program EIR and will consider making a new program-level route decision in the near future. While a new Program EIR decision has not yet been made, several alternatives into the Bay Area would use the Caltrain corridor and could benefit from the blended approach. With adoption of this Revised Plan, including the blended approach on the San Francisco Peninsula, and as allowed by law, the "project" to be studied in the Project EIR for a San Francisco to San Jose second-tier project will be the blended system.

High-speed trains on the Caltrain corridor will serve the following stations:

- The Transbay Transit Center: (BART, (MUNI, Caltrain, Alameda-Contra Costa Transit District (AC Transit), and Golden Gate Transit) and to Caltrain's 4th and King Station if necessary

- Millbrae (Caltrain, San Mateo County Transit District–SamTrans, and BART, providing a connection to San Francisco International Airport)
- A potential mid-peninsula station (at Redwood City) (Caltrain and SamTrans)

### **Blended operations to Los Angeles and Anaheim**

The ultimate HSR operation into the Southern California region, envisioned by Phase 1 Blended and shown in Exhibit 2-4, requires establishing new high-speed rail right-of-way. Unlike Caltrain on the San Francisco Peninsula, there are currently no plans to electrify the Metrolink system. Therefore, while incremental improvements can be made within the existing rail corridors that will be shared with the HSR system, provision of a one-seat ride to Anaheim would require implementation of the Phase 1 Full Build improvements there. However, as outlined in the description of the IOS earlier in this chapter, the connection made through the IOS makes blended operations possible. Connections in Los Angeles to Metrolink and Amtrak (Surfliner and other intercity routes), will allow passengers to continue their trip to destinations both east into the Inland Empire and south toward San Diego. Anaheim also will have connections to Amtrak’s Surfliner and the Metrolink commuter rail service. Station enhancements to facilitate and improve these passenger connections also could be implemented, improving the passenger experience with faster, easier ticketing and baggage-handling processes. The Authority supports the goal of implementing a cost-effective means of providing passengers a one-seat ride to and from San Francisco TTC to Los Angeles and Anaheim. The Southern California Passenger Rail Planning Coalition, described below, will develop and consider options for a low-cost and less-intrusive connection that would allow a one-seat ride to Anaheim; and, subject to the agreement of the parties who will be responsible for implementing such a connection, the Authority will work collaboratively with regional and private parties to advance the selected option.

The Southern California Passenger Rail Planning Coalition is a staff level working group that has been formed with the goals of increasing cooperation, enhancing rail service in the south, developing cost-effective solutions to infrastructure problems, and preparing for the HSR system’s entrance into Southern California. The coalition is examining possibilities for joint planning, operations collaboration, and for early investment in the HSR corridors. This coalition will help ensure that the HSR planning is well coordinated in Southern California. Participating staff of the major rail transportation providers in Southern California, along with the rail corridor owners and major transportation planning agencies, include the following:

- Amtrak
- BNSF Railway
- Caltrans Division of Rail
- LACMTA
- North County Transit District (San Diego County)
- Orange County Transportation Authority (OCTA)
- Riverside County Transportation Commission (RCTC)

- San Diego Association of Governments (SANDAG)
- Southern California Regional Rail Authority (Metrolink)
- Union Pacific (UP) Railroad
- California High-Speed Rail Authority (CHSRA/Authority)

Exhibit 2-4. Phase 1 Blended Operation—San Francisco to Los Angeles/Anaheim



- Phase 1 Blended**
- ◆ Extend HSR to Los Angeles
  - ◆ Deliver one-seat HSR service, San Francisco Transbay Terminal to Los Angeles Union Station
  - ◆ Continue blended service
    - Northern California unified service
    - Metrolink corridor, Los Angeles to Anaheim

This “one-seat ride” allows a passenger to ride high-speed rail all the way from San Francisco to Los Angeles.

**Step 5: The Phase 2 system**

This step will add a northern and southern extension, resulting in an 800-mile system. The northern extension will extend from Merced to Sacramento, allowing direct high-speed rail service from San Francisco and Los Angeles to Sacramento. As shown in Exhibit 2-5, the train also will serve Stockton and Modesto.

Proposition 1A focuses investments on the Phase 1 system. The Revised Plan, with its emphasis on blending and early investments, provides a basis for improvements that will accelerate benefits to Phase 2 areas, provide the foundation for Phase 2 HSR service, and could help attract additional investment. A full range of rail and bus services connecting to these new high-speed rail extensions will include the following:

- In Sacramento, connections to Amtrak (Capitol Corridor), Amtrak Thruway buses, Sacramento Regional Transit, and a short bus trip to Sacramento International Airport
- In Stockton, connections to the Altamont Commuter Express (ACE) commuter rail, San Joaquin intercity rail service, and the local transit provider San Joaquin RTD
- In Modesto, connections to the San Joaquin Corridor and Modesto Area Express (MAX) transit service

**Exhibit 2-5. Phase 2—Extensions to Sacramento and San Diego**



**Phase 2 San Francisco/  
Sacramento to San Diego**  
◆ Expand HSR to Sacramento,  
Anaheim, and San Diego

*Phase 2 will allow full HSR service from Sacramento to San Diego.*

Extensive cooperative planning efforts have been underway in this area. The Central Valley Rail Policy Working Group is a collaboration consisting of the Authority, the U.S. Department of Transportation/ Federal Railroad Administration, Amtrak California, the ACE, the San Joaquin Regional Rail Commission, and regional and local public agencies in the Sacramento-to-Merced section. Its purpose is to serve as a partner with the Authority throughout the project-development process; provide guidance on local issues, development plans, and policies; assist in developing and evaluating alternative alignments; and develop consensus regarding project goals, objectives, and major elements. The Central Valley Regional Rail Working Group has been working since 2006 to promote cooperative planning and development of integrated rail services.

The Altamont Corridor Partnership Work Group is a collaboration of public agencies providing strategic guidance and planning for the Altamont Corridor Rail Project with the goals of integrating transit systems, maximizing efficiencies, and enhancing the regional transportation network between Stockton and San Jose.

To facilitate coordinated planning for the Merced-to-Sacramento extension, the Authority has entered into a partnership with the San Joaquin Regional Rail Commission to plan for improved “Super ACE” higher-speed regional rail service connecting Stockton and Modesto in the Central Valley with Fremont and San Jose in the Bay Area. The proposed Super ACE corridor would be new dedicated infrastructure, would connect with the high-speed rail system in San Jose and Stockton, and could serve as an east-west regional connector to both the Bay-to-Basin main line and the Merced-to-Sacramento extension. To enhance mobility, the ACE corridor could be designed to accommodate both ACE and high-speed trains.

The Merced-to-Sacramento corridor is being designed to host regional rail service. In partnership with the San Joaquin Regional Rail Commission, the Authority is looking to share high-speed rail infrastructure and tracks with the future Super ACE service to allow regional service to areas around such cities as Elk Grove, Galt, Lodi, Manteca, and Turlock. This blended service would improve regional mobility throughout Northern California.

Starting from the regional transportation hub at Los Angeles’ Union Station, the extension to San Diego will extend east through Los Angeles County to San Bernardino County, south through Riverside County, and end in Downtown San Diego. The Authority has executed various memoranda of understanding with local, regional, state, and federal organizations along the corridor to facilitate coordination efforts. In 2008, the Southern California Inland Corridor Group (Socal ICG) was formed with the following agencies:

- San Diego Association of Governments (SANDAG)
- Riverside County Transportation Commission (RCTC)
- San Bernardino Associated Governments (SANBAG)
- Southern California Association of Governments (SCAG)
- Los Angeles County Metropolitan Transportation Authority (LACMTA)
- San Diego County Regional Airport Authority (SDCRAA)
- Caltrans Districts 7, 8, and 11

The Los Angeles-to-San Diego extension will extend east through the Inland Empire to the Riverside/San Bernardino areas and then south to San Diego serving the following stations (some of which are optional stations) and their associated transit services:

- El Monte (Foothill Transit, Metrolink, LACMTA)
- West Covina (Foothill Transit, LACMTA)
- Pomona (Foothill Transit, Metrolink)
- Ontario Airport (Foothill Transit, Metrolink, Omnitrans)
- San Bernardino (Metrolink, Omnitrans)
- Corona/March ARB (RTA)
- Murrieta (RTA)
- Escondido (NCTD)
- San Diego International Airport (MTS, NCTD)



*Artist's rendering of Sacramento Station*

## Environmental schedule

The key environmental milestone dates are summarized in Exhibit 2-6. The schedule for environmental clearance is predicated on the desire to achieve environmental clearance of all sections within five years to permit early right-of-way acquisition and provide opportunities for early implementation of projects along the HSR corridor. The schedule may be revised to reflect funding availability and refined implementation strategies. The Merced–Fresno and Fresno–Bakersfield environmental documents are the most advanced. Draft Environmental Impact Statements/Environmental Impact Reports (EIR/EISs) were published for both the Merced–Fresno and Fresno–Bakersfield sections in August 2011, and the public

comment period closed on these documents on October 13, 2011. Preparation of the Merced–Fresno Final EIR/EIS is underway and is scheduled for release in April 2012, with certification by the Authority anticipated in May 2012 and issuance of a Record of Decision by the Federal Railroad Administration in June 2012. The Fresno-to-Bakersfield section is being updated for recirculation as a Revised Draft EIR/EIS in June 2012 based on a request from the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers to analyze a new alignment west of Hanford. The Final EIR/EIS is scheduled for certification in December 2012 with the issuance of the Record of Decision anticipated in January 2013. The start of construction is expected to in early 2013 with the issuance of a Notice to Proceed for the first construction segment. Completion of construction on these two segments is expected in mid-2017.

**Exhibit 2-6. Projected milestones for completing the environmental review process/potential construction completion**

High-speed Rail Section	Release Draft EIR/EIS	Adopt Final EIR/EIS	Receive Record of Decision	Complete Construction
Merced–Fresno (ARRA)	August 2011	June 2012	June 2012	2021
Fresno–Bakersfield (ARRA)	May 2012	November 2012	December 2012	2017
San Francisco–San Jose	February 2014	October 2014	December 2014	2028
San Jose–Merced	February 2013	October 2013	December 2013	2026
Bakersfield–Palmdale	May 2013	December 2013	February 2014	2021
Palmdale–Los Angeles	February 2013	September 2013	October 2013	2028
Los Angeles–Anaheim	February 2014	September 2014	December 2014	TBD
Merced–Sacramento (Phase 2)	TBD	TBD	TBD	TBD
Los Angeles–San Diego (Phase 2)	TBD	TBD	TBD	TBD

Note: Construction completion schedule is based on the business planning schedule described below.

### Environmental review process

Information on the schedule and status of the environmental review process can be found on the Authority's website at [www.cahighspeedrail.ca.gov/environmental\\_review.aspx](http://www.cahighspeedrail.ca.gov/environmental_review.aspx)

## Business planning schedule

### ***Introduction***

California's HSR system will be implemented in phases to manage the development process, costs, and funding. The system will be developed over a long period of time, and many future decisions will need to be made regarding alignment and profile (i.e., surface, elevated, and tunnel), environmental mitigations, and sequencing, among others.

This Revised Plan does not attempt to evaluate all possible options presented in the system's environmental documents. Rather, the Authority identified a set of system development scenarios to illustrate a range of potential project phasing and other outcomes so that current policy leaders can assess the program and make appropriate near-term decisions. This section identifies the assumed project development schedule, which serves as the basis for the financial analysis conducted for this Revised Plan.

It is important to note that this project development schedule is illustrative and will depend on future decisions, the availability of funds, and other factors. The schedule does not represent or suggest decisions of the Authority's Board of Directors or other decision-makers, nor does it represent recommendations of Authority staff.

### ***Project schedule***

If substantially all of the project budget were available to allow multiple major contracts to begin simultaneously, and if there were no significant environmental document delays, the Phase 1 system from San Francisco to Los Angeles/Anaheim could be completed in approximately 12 years (by 2024). This represents a *financially unconstrained* schedule. However, this unconstrained schedule presents an unrealistic view of the likely project development schedule.

A more realistic phased implementation schedule shows how the system could be implemented over time and results in a fully operational segment (the IOS) by 2021; the Bay to Basin in 2026; and Phase 1 Blended by 2028. Early investments would begin along with the first IOS segment and be made over the course of the Phase 1 Blended time frame.

This project-development schedule was used as a basis to inflate capital costs, revenues, and operating and maintenance costs to a year of expenditure. After 2015, a standard inflation rate of 3 percent is used throughout this Revised Plan. In the near term, inflation is based on projected rates, as detailed in Chapter 7, Financial Analysis and Funding.

The schedule for completing the various development sections is shown in Exhibit 2-7. The schedule identifies a construction timeline for each section, as well as the year in which operations could commence by section. This schedule is also illustrated in other chapters.

Exhibit 2-7. Schedule by section



The financial plan assumes that self-sufficient operating sections that do not require operating subsidies would be opened for passenger service beginning in 2022 after construction of the IOS is complete. This will be followed by construction of the remainder of the alignment needed to provide full service from San Jose to the San Fernando Valley (Bay to Basin), which is estimated to be opened for service in 2027. The Phase 1 Blended system is estimated to be opened in 2029. As previously discussed, incremental blended system improvements between San Francisco and San Jose and between San Fernando and Anaheim will be made during every phase of HSR construction.

This schedule is used throughout this Revised Plan and is the basis for revenue, cost, and funding analyses.

### California’s experience with major infrastructure programs

#### *The California highway and freeway system*

Significant similarities exist between development of California’s world-famous freeway system and the statewide HSR system. California’s current 50,000 miles of highways and freeways began with an initial bond issuance of \$18 million in 1909, with another in 1919, after funding had been exhausted. Demonstrating leadership, California approved initial funding for the current freeway system in 1947, a decade before the federal government established the National Defense and Interstate Highway System. Since then, California has spent well over half a century building the system, bringing new sections, often not contiguous, based on factors such as funding and environmental clearance. Interstate 5 is a particularly interesting comparison to the HSR system as it covers 796 miles and forms one of the most critical backbones of the state’s highway system. From its designation as a key highway in 1947, phased implementation of Interstate 5 was not completed until October 12, 1979. Exhibit 2-8 illustrates the phased implementation and progress in building Interstate 5 through the Central Valley.



**Exhibit 2-9. International high-speed rail phased implementation**

Country	Initial Segment	Network Extensions	Under Construction
France–TGV (high-speed lines)	Paris–Lyon (1981)	Lyon–Valence/Marseille (1992/2001) Paris–Tours and Le Mans (1990) Paris–Lille and Calais (1993) Paris–Rheims/Strasbourg (2007) Paris Interconnection (1994) Perpignan–Figueres (2010)	Dijon–Mulhouse (2011) Tours–Bordeaux (2017) Le Mans–Rennes (2019)
Spain–AVE	Madrid–Seville (1992)	Madrid–Zaragoza/Barcelona (2003/2008) Madrid–Malaga (2007) Madrid–Valencia (2010)	Alicante (2012) Barcelona–Figueres (2012)
South Korea–KTX	Seoul–Daegu (2004)	Daegu–Busan (2010)	Daegu–Mokpo (2014)
Japan–Shinkansen	Tokyo–Shin-Osaka (1964)	Shin-Osaka–Hakata (1972-1975) Tokyo–Shin-Aomori (1982 -2010) Omiya–Niigata (1982) Takasaki–Nagano (1997) Hakata–Kagoshima–Chuo (2004–2011)	Shin-Aomori–Shin–Hakodate (2015) Nagano–Kanazawa (2014)
Taiwan–THSTC	Taipei–Kaohsiung (2007)	None planned	

The California High-Speed Rail Authority has concluded cooperation agreements with nine nations' governments that have deployed and operate HSR systems. Descriptions of the information exchanged and knowledge gained through a number of those agreements is provided in *International Case Studies*.

[www.cahighspeedrail.ca.gov/business\\_plan\\_reports.aspx](http://www.cahighspeedrail.ca.gov/business_plan_reports.aspx)

Virtually all the world's large-scale intercity HSR systems have been developed through a phased implementation strategy. Using this approach, a portion of the system is constructed and opened for revenue service while the balance of the system has yet to be constructed. Few exceptions to this model exist, except in Taiwan where almost the entire system was opened at once. Exhibit 2-9 provides examples of this successful phasing.

In Europe, an incremental phased construction segment and revenue service start-up strategy was chosen for the high-speed rail systems in France (TGV), Germany (ICE), Spain (AVE), and Italy (TAV).

France initiated the first TGV service between Paris and Lyon in 1981 (Exhibit 2-10). This corridor was selected because of capacity constraints on the conventional rail lines. Service began after construction of the initial two-thirds of the system; the remaining portion was completed some years later, with high-speed rail trains running on conventional rail lines in the interim. The challenges of constructing new high-speed track within Paris and Lyon required that the TGV trains continue to run on conventional rail lines at slower speeds before reaching high speed (+180 mph) on the dedicated high-speed alignment outside of the cities. Following the success of the inaugural Paris-to-Lyon service, France has constructed additional TGV lines based on funding availability.

**Exhibit 2-10. France's high-speed rail system and four decades of expansion**

*France continues to expand its dedicated high-speed rail network building on the system's success. To date, seven segments have been constructed.*

Spain and Germany planned, constructed, and placed into revenue service their HSR systems using implementation strategies similar to the French network expansion model. Each country constructed an initial segment, typically linking a large city and a moderately sized city, and using conventional rail lines in urban areas. High-speed rail trains typically also run on conventional rail to serve other markets and increase service viability. The owners extended the initial construction segment incrementally as funding became available. For example, Germany started its high-speed rail network using upgraded existing inter-city rail infrastructure. As ridership grew and funding became available, dedicated high-speed rail corridors were developed.

Similarly, the high-speed rail networks of Japan and South Korea have been developed incrementally. Japan pioneered development of high-speed rail technology and implementation planning. Japan has expanded the Shinkansen HSR system according to each corridor's capacity constraints and funding availability (Exhibit 2-11). Even today, the Shinkansen operates on certain lines in mixed operations with other rail traffic, while new sections dedicated to HSR are completed as funds become available. South Korea constructed a new HSR alignment between cities, but as in Europe, slower speeds are used on approaches to the capital, Seoul.

Exhibit 2-11. Japan’s high-speed rail system and six decades of expansion



***Phased approach and private capital***

As discussed elsewhere in this Revised Plan, a phased approach also provides the most efficient means to attract private investment capital into the program. At the outset, before ridership levels and operational issues are proven, private risk capital would either be unavailable or would require guarantees contrary to plans. This Revised Plan assumes—based on similar experience throughout the world and information from private infrastructure development interests—that upon completion of the IOS, private-sector financing for future segments would become available and attractive. The phased approach set forth above represents the most efficient mix of public dollars and private funding.

**Town of Atherton CEQA litigation and the high-speed train connection to the Bay Area**

The California High-Speed Rail Authority has studied the connection for the high-speed train (HST) between the San Francisco Bay Area and the Central Valley for many years. Its environmental compliance process and its decisions have also been the subject of litigation challenges under the California Environmental Quality Act (CEQA) for many years. The Authority originally certified the Bay Area to Central Valley HST Final Program Environmental Impact Report (EIR) in 2008 for its compliance with CEQA and selected the Pacheco Pass Network Alternative for further analysis in second-tier environmental documents. These decisions were challenged in litigation (Atherton 1, Sacramento Superior Court Case No. 34-2008-8000022), which resulted in a final judgment requiring the Authority to correct certain aspects of the Program EIR and one CEQA finding.

The Authority circulated a Revised Draft Program EIR to comply with the Atherton 1 court ruling, received public comment, and issued a Final Program EIR in August 2010. The Program EIR was then certified in September 2010, and the Authority again selected the Pacheco Pass Network Alternative for further analysis in second-tier environmental documents. Further lawsuits ensued, including a renewed challenge to the Authority's CEQA compliance in the Atherton 1 case, as well as a new case (Atherton 2, Sacramento Superior Court No. 34-2010-8000679). On November 10, 2011, after release of the Draft 2012 Business Plan, rulings in the two cases were issued that upheld the Program EIR in many respects, but also required further analysis on certain noise, vibration, and traffic issues related to the Monterey Highway and the San Francisco Peninsula, as well as construction impacts.

The Authority released a Partially Revised Draft Program EIR on January 6, 2012, to address the Atherton rulings. The 45-day public comment closed on February 21, 2012. The Authority was served with final court papers on February 13, 2012. The Authority Board is expected to consider an agenda item to rescind its prior 2010 decisions, including its selection of the Pacheco Pass Network Alternative at a publicly noticed board meeting in spring 2012. After issuance of a Partially Revised Final Program EIR, the Authority will consider the entire record before it, including all historic work on the Program EIR and all public input received, in deciding whether to certify the Partially Revised Program EIR for compliance with CEQA. The Authority will also make a new decision on the network alternative for connecting the Bay Area with the Central Valley.

This Business Plan depicts a statewide high-speed train system utilizing the Pacheco Pass to reach the San Francisco Bay Area, consistent with the staff recommendation in the Partially Revised Draft Program EIR. Adoption of the Business Plan by the Authority Board does not, however, constitute an approval of the Pacheco Pass Network Alternative as described in the Partially Revised Draft Program. Nor does approval of the Business Plan commit the Authority to the Pacheco Pass or limits its discretion at the conclusion of the Program EIR process.

## End notes

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<sup>1</sup> Source: California Department of Transportation. March 2108. *San Joaquin Corridor Strategic Plan*. <http://149.136.20.80/rail/dor/assets/File/SJCSPExecutiveSummary-032508.pdf>.

<sup>2</sup> Source: California Transportation Commission. *Formula Shares for Commuter and Urban Rail Agencies. High-Speed Rail Passenger Train Bond Act*. [http://www.catc.ca.gov/programs/HSR/HSR\\_Formulashare\\_Attachment I 121709.pdf](http://www.catc.ca.gov/programs/HSR/HSR_Formulashare_Attachment_I_121709.pdf)

<sup>3</sup> Source: California Transportation Commission. February 24, 2010. *High-Speed Passenger Train Bond Program Guidelines*.

<sup>4</sup> The estimates of jobs in this Revised 2012 Business Plan are presented in job-years. One job-year is the equivalent of one person working a full-time job for one year. For example, a full-time job that lasts 20 years generates 20 job-years.

<sup>5</sup> Source: *Federal Register*. April 16010. "High Speed Intercity Passenger Rail (HSIPR) Program" (notice by the [Federal Railroad Administration](#))